## AGENDA
### Standards Council Meeting
Via Teams Video Conferencing

December 7-8, 2021

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Attached Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-12-1</td>
<td>Report of the Committee Membership Task Group (J. Quiter, Chair).</td>
<td>No Attachment</td>
</tr>
<tr>
<td>21-12-1-a</td>
<td>Act on pending applications for Committee Members. No Attachment</td>
<td></td>
</tr>
<tr>
<td>21-12-2</td>
<td>Report of the Policy and Procedures Task Group (J. Foisel, Chair). No Attachment</td>
<td>No Attachment</td>
</tr>
<tr>
<td>21-12-3</td>
<td>Report of the August 2021 Minutes. No Attachment</td>
<td></td>
</tr>
</tbody>
</table>

### TENTATIVE INTERIM AMENDMENTS (TIA)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Attached Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-12-4</td>
<td>Act on the issuance of proposed Tentative Interim Amendment No. 1609 to revise Section 13.3.2.6.1 of the 2021 edition of NFPA 1 Fire Code.</td>
<td>Attach 21-12-4-a</td>
</tr>
<tr>
<td>21-12-4-a</td>
<td>Text of proposed TIA No. 1609. See Attachment 21-12-4-a</td>
<td></td>
</tr>
<tr>
<td>21-12-4-b</td>
<td>Ballot results of TIA No. 1609. PASSED TC ballot on both technical merit and emergency nature – 34 voting members/24 agree on technical merit/0 disagree/0 abstained/10 ballots not returned/24 agree on emergency nature/0 disagree/0 abstained/10 ballots not returned. PASSED CC ballot on both correlation and emergency nature – 19 voting members/17 agree on correlation/0 disagree/0 abstained/2 ballots not returned/17 agree on emergency nature/0 disagree/0 abstained/2 ballots not returned. See Attachment 21-12-4-b</td>
<td></td>
</tr>
<tr>
<td>21-12-4-c</td>
<td>No comments were received. No Attachment</td>
<td></td>
</tr>
<tr>
<td>21-12-5</td>
<td>Act on the issuance of proposed Tentative Interim Amendment No. 1604 to revise Section 11.4.1.3.1 of the 2022 edition of NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection.</td>
<td>Attach 21-12-5-a</td>
</tr>
<tr>
<td>21-12-5-a</td>
<td>Text of proposed TIA No.1604. See Attachment 21-12-5-a</td>
<td></td>
</tr>
<tr>
<td>21-12-5-b</td>
<td>Ballot results of TIA No. 1604. PASSED TC ballot on both technical merit and emergency nature – 33 voting members/27 agree on technical merit/2 disagree/0 abstained/4 ballots not returned/27 agree on emergency nature/2 disagree/0 abstained/4 ballots not returned. See Attachment 21-12-5-b</td>
<td></td>
</tr>
<tr>
<td>21-12-5-c</td>
<td>No comments were received. No Attachment</td>
<td></td>
</tr>
<tr>
<td>21-12-6</td>
<td>Act on the issuance of proposed Tentative Interim Amendment No. 1611 to revise Section 11.4.1.3.1.1 of the 2022 edition of NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection.</td>
<td>Attach 21-12-6-a</td>
</tr>
<tr>
<td>21-12-6-a</td>
<td>Text of proposed TIA No. 1611. See Attachment 21-12-6-a</td>
<td></td>
</tr>
<tr>
<td>21-12-6-b</td>
<td>Ballot results of TIA No. 1611 PASSED TC ballot on both technical merit and emergency nature – 33 voting members/27 agree on technical merit/0 disagree/0 abstained/6 ballots not returned/26 agree on emergency nature/1 disagree/0 abstained/6 ballots not returned. See Attachment 21-12-6-b</td>
<td></td>
</tr>
<tr>
<td>21-12-6-c</td>
<td>No comments were received. No Attachment</td>
<td></td>
</tr>
<tr>
<td>21-12-7</td>
<td>Act on the issuance of proposed Tentative Interim Amendment No. 1603 to revise Section 8.3.7.1.3 of the 2020 edition of NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.</td>
<td>Attach 21-12-7-a</td>
</tr>
<tr>
<td>21-12-7-a</td>
<td>Text of proposed TIA No. 1603. See Attachment 21-12-7-a</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Title</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>21-12-7-b</td>
<td>Ballot results of TIA No. 1603. <strong>PASSED</strong> TC ballot on both technical merit and emergency nature – 41 voting members/35 agree on technical merit/0 disagree/0 abstained/6 ballots not returned/34 agree on emergency nature/1 disagree/0 abstained/6 ballots not returned. See Attachment 21-12-7-b</td>
<td></td>
</tr>
<tr>
<td>21-12-7-c</td>
<td>No comments were received. No Attachment</td>
<td></td>
</tr>
<tr>
<td><strong>21-12-8</strong></td>
<td><strong>NFPA 33</strong></td>
<td>Act on the issuance of proposed Tentative Interim Amendment No. 1603 to revise Section 1.1.6 of the 2021 edition of NFPA 33, <em>Standard for Spray Application Using Flammable or Combustible Materials</em>.</td>
</tr>
<tr>
<td><strong>21-12-8-a</strong></td>
<td></td>
<td>Text of proposed TIA No. 1602. See Attachment 21-12-8-a</td>
</tr>
<tr>
<td><strong>21-12-8-b</strong></td>
<td></td>
<td>Ballot results of TIA No. 1603. <strong>FAILED</strong> TC ballot on both technical merit and emergency nature – 31 voting members/18 agree on technical merit/8 disagree/1 abstained/4 ballots not returned/15 agree on emergency nature/11 disagree/1 abstained/4 ballots not returned. See Attachment 21-12-8-b</td>
</tr>
<tr>
<td><strong>21-12-8-c</strong></td>
<td></td>
<td>Eight comments were received. See Attachment 21-12-8-c</td>
</tr>
<tr>
<td><strong>21-12-9</strong></td>
<td><strong>NFPA 55</strong></td>
<td>Act on the issuance of proposed Tentative Interim Amendment No. 1601 to add Section 17.2.9(new) and A.17.2.9(new) to the 2020 edition of NFPA 55, <em>Compressed Gases and Cryogenic Fluid Code</em>.</td>
</tr>
<tr>
<td><strong>21-12-9-a</strong></td>
<td></td>
<td>Text of proposed TIA No. 1601. See Attachment 21-12-9-a</td>
</tr>
<tr>
<td><strong>21-12-9-b</strong></td>
<td></td>
<td>Ballot results of TIA No. 1601. <strong>PASSED</strong> TC ballot on both technical merit and emergency nature – 26 voting members/17 agree on technical merit/2 disagree/0 abstained/7 ballots not returned/19 agree on emergency nature/0 disagree/0 abstained/7 ballots not returned. See Attachment 21-12-9-b</td>
</tr>
<tr>
<td><strong>21-12-9-c</strong></td>
<td></td>
<td>Two comments were received. See Attachment 21-12-9-c</td>
</tr>
<tr>
<td><strong>21-12-10</strong></td>
<td><strong>NFPA 70</strong></td>
<td>Act on the issuance of proposed Tentative Interim Amendment No. 1520 to revise Article 100, Part III, and various sections in Articles 500, 503, and 506 of the 2020 edition of NFPA 70, <em>National Electrical Code®</em>.</td>
</tr>
<tr>
<td><strong>21-12-10-a</strong></td>
<td></td>
<td>Text of proposed TIA No. 1520. See Attachment 21-12-10-a</td>
</tr>
<tr>
<td><strong>21-12-10-b</strong></td>
<td></td>
<td>Ballot results of TIA No. 1520. <strong>PASSED</strong> Panel ballot on both technical merit and emergency nature – 19 voting members/16 agree on technical merit/0 disagree/0 abstained/3 ballots not returned/16 agree on emergency nature/0 disagree/0 abstained/3 ballots not returned. <strong>PASSED</strong> CC ballot on both correlation and emergency nature – 12 voting members/10 agree on correlation/2 disagree/0 abstained/0 ballots not returned/12 agree on emergency nature/0 disagree/0 abstained/0 ballots not returned. <strong>PASSED</strong></td>
</tr>
<tr>
<td><strong>21-12-10-c</strong></td>
<td></td>
<td>Five comments were received. See Attachment 21-12-10-c</td>
</tr>
</tbody>
</table>

**SUPPLEMENTAL BALLOT RESULTS**

During balloting, a discrepancy was discovered in the wording for Item 11. A Supplemental Ballot was processed to determine whether the text in 506.6(A), (B), and (C) of TIA No. 1520 is to reflect the text from the NFPA 499-2021 extract references. Code Making Panel 14 and the NEC Correlating Committee were balloted on *Question No. 1* as follows: *I AGREE it is my intention that the text of 506.6(A), (B), and (C) in item 11 of TIA No. 1520 is to directly reflect the text from the NFPA 499-2021 extract references.*

The Supplement Ballot **FAILED** Panel ballot on Question No. 1 – 19 voting members/9 agree/7 disagree/0 abstained/3 ballots not returned. **FAILED** CC ballot on Question No. 1 – 12 voting members/7 agree/3 disagree/1 abstained/1 ballots not returned. See Attachment 21-12-10-b
<table>
<thead>
<tr>
<th>Date</th>
<th>NFPA</th>
<th>Action</th>
<th>Notes</th>
</tr>
</thead>
</table>
| 21-12-11 | 70    | Act on the issuance of proposed Tentative Interim Amendment No. 1597 to revise Section 706.50 of the 2020 edition of NFPA 70, *National Electrical Code*®. | 21-12-11-a Text of proposed TIA No. 1597. See Attachment 21-12-11-a  
21-12-11-b Ballot results of TIA No. 1597. PASSED Panel ballot on both technical merit and emergency nature – 21 voting members/14 agree on technical merit/0 disagree/0 abstained/7 ballots not returned/13 agree on emergency nature/1 disagree/0 abstained/7 ballots not returned. PASSED CC ballot on both correlation and emergency nature – 12 voting members/10 agree on correlation/0 disagree/0 abstained/2 ballots not returned/10 agree on emergency nature/0 disagree/0 abstained/2 ballots not returned. See Attachment 21-12-11-b  
21-12-11-c One comment was received. See Attachment 21-12-11-c  
21-12-12 | 70    | Act on the issuance of proposed Tentative Interim Amendment No. 1598 to add a new Exception No. 2 to Section 406.9(C) of the 2020 edition of NFPA 70, *National Electrical Code*®. | 21-12-12-a Text of proposed TIA No. 1598. See Attachment 21-12-12-a  
21-12-12-b Ballot results of TIA No. 1598. PASSED Panel ballot on both technical merit and emergency nature – 13 voting members/10 agree on technical merit/3 disagree/0 abstained/0 ballots not returned/11 agree on emergency nature/2 disagree/0 abstained/0 ballots not returned. PASSED CC ballot on both correlation and emergency nature – 12 voting members/9 agree on correlation/0 disagree/0 abstained/3 ballots not returned/8 agree on emergency nature/1 disagree/0 abstained/3 ballots not returned. See Attachment 21-12-12-b  
21-12-12-c Thirteen comments were received. See Attachment 21-12-12-c  
21-12-13 | 70    | Act on the issuance of proposed Tentative Interim Amendment No. 1608 to revise Section 250.114(3)e and 250.114(4)e of the 2020 and proposed 2023 editions of NFPA 70, *National Electrical Code*®. | 21-12-13-a Text of proposed TIA No. 1608. See Attachment 21-12-13-a  
21-12-13-b Ballot results of TIA No. 1608. PASSED Panel ballot on both technical merit and emergency nature – 18 voting members/15 agree on technical merit/1 disagree/0 abstained/ 2 ballots not returned/14 agree on emergency nature/2 disagree/0 abstained/2 ballots not returned. PASSED CC ballot on both correlation and emergency nature – 12 voting members/12 agree on correlation/0 disagree/0 abstained/0 ballots not returned/12 agree on emergency nature/0 disagree/0 abstained/0 ballots not returned. See Attachment 21-12-13-b  
21-12-13-c No comments were received. No Attachment  
21-12-14 | 407   | Act on the issuance of proposed Tentative Interim Amendment No. 1610 to revise Section 5.1.12.4 and delete Annex A.5.1.12.4 of the 2022 edition of NFPA 407, *Standard on Aircraft Fuel Servicing*. | 21-12-14-a Text of proposed TIA No. 1610. See Attachment 21-12-14-a  
21-12-14-b Ballot results of TIA No. 1610. PASSED TC ballot on both technical merit and emergency nature – 27 voting members/23 agree on technical merit/4 disagree/0 abstained/0 ballots not returned/24 agree on emergency nature/3 disagree/0 abstained/0 ballots not returned. See Attachment 21-12-14-b  
21-12-14-c Twelve comments were received. See Attachment 21-12-14-c  
21-12-15 | 652   | Act on the issuance of proposed Tentative Interim Amendment No. 1525 to add 1.3.3(new), 2.4, 3.3.6, Various new definitions in 3.3, 8.4.2.2, 8.4.2.6.2 item (4), 9.4.6, A.3.3.8, A.9.4.7.4.6 and D.1.2.8 to the 2019 and edition of NFPA 652, *Standard on the Fundamentals of Combustible Dust*. |
<table>
<thead>
<tr>
<th>Date</th>
<th>Text/Action/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-12-15-a</td>
<td>Text of proposed TIA No. 1525. See Attachment 21-12-15-a</td>
</tr>
<tr>
<td>21-12-15-b</td>
<td>Ballot results of TIA No. 1525. <strong>PASSED</strong> TC ballot on both technical merit and emergency nature – 37 voting members/27 agree on technical merit/5 disagree/1 abstained/4 ballots not returned/24 agree on emergency nature/6 disagree/3 abstained/4 ballots not returned. <strong>PASSED</strong> CC ballot on correlation but <strong>FAILED</strong> emergency nature – 16 voting members/11 agree on correlation/3 disagree/0 abstained/2 ballots not returned. See Attachment 21-12-15-b</td>
</tr>
<tr>
<td>21-12-15-c</td>
<td>Four comments were received. See Attachment 21-12-15-c</td>
</tr>
<tr>
<td>21-12-15-d</td>
<td><strong>APPEAL</strong> Consider an Appeal from Samuel Rodgers, Honeywell International and Walter Frank, Frank Risk Solutions, Inc., requesting that the NFPA Standards Council issue NFPA 652 Proposed TIA No. 1525. Alternatively, the appeal requests Council to remand the TIA to the Correlating Committee on Combustible Dusts for reconsideration of emergency nature. See Attachment 21-12-15-d</td>
</tr>
<tr>
<td>21-12-16</td>
<td>Act on the issuance of proposed Tentative Interim Amendment No. 1526 to revise various paragraphs of the 2020 edition of NFPA 654, <em>Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids</em>.</td>
</tr>
<tr>
<td>21-12-16-a</td>
<td>Text of proposed TIA No. 1526. See Attachment 21-12-16-a</td>
</tr>
<tr>
<td>21-12-16-b</td>
<td>Ballot results of TIA No. 1526. <strong>PASSED</strong> TC ballot on both technical merit and emergency nature – 31 voting members/17 agree on technical merit/0 disagree/0 abstained/9 ballots not returned/19 agree on emergency nature/5 disagree/1 abstained/9 ballots not returned. <strong>PASSED</strong> CC ballot on correlation but <strong>FAILED</strong> emergency nature – 16 voting members/11 agree on correlation/3 disagree/0 abstained/2 ballots not returned/10 agree on emergency nature/4 disagree/0 abstained/2 ballots not returned. See Attachment 21-12-16-b</td>
</tr>
<tr>
<td>21-12-16-c</td>
<td>Four comments were received. See Attachment 21-12-16-c</td>
</tr>
<tr>
<td>21-12-16-d</td>
<td><strong>APPEAL</strong> Consider an Appeal from Samuel Rodgers, Honeywell International and Walter Frank, Frank Risk Solutions, Inc., requesting that the NFPA Standards Council issue NFPA 654 Proposed TIA No. 1526. Alternatively, the appeal requests Council to remand the TIA to the Correlating Committee on Combustible Dusts for reconsideration of emergency nature. See Attachment 21-12-16-d</td>
</tr>
<tr>
<td>21-12-17</td>
<td>Act on the issuance of proposed Tentative Interim Amendment No. 1613 to revise section 5.1.2 of the 2019 edition of NFPA 750, <em>Standard for Water Mist Fire Protection Systems</em>.</td>
</tr>
<tr>
<td>21-12-17-a</td>
<td>Text of proposed TIA No. 1613. See Attachment 21-12-17-a</td>
</tr>
<tr>
<td>21-12-17-b</td>
<td>Ballot results of TIA No. 1613. <strong>PASSED</strong> TC ballot on both technical merit and emergency nature – 26 voting members/17 agree on technical merit/0 disagree/0 abstained/9 ballots not returned/17 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. See Attachment 21-12-17-b</td>
</tr>
<tr>
<td>21-12-17-c</td>
<td>No comments were received. No Attachment</td>
</tr>
<tr>
<td>21-12-18</td>
<td>Act on the issuance of proposed Tentative Interim Amendment No. 1607 to revise Table 4.3.9, 6.11, 6.20.1.1, 6.20.1.2, 6.20.3.2, of the 2021 edition of NFPA1802, <em>Standard on Two-Way, Portable RF Voice Communications Devices for Use by Emergency Services Personnel in the Hazard Zone</em>.</td>
</tr>
<tr>
<td>21-12-18-a</td>
<td>Text of proposed TIA No. 1607. See Attachment 21-12-18-a</td>
</tr>
<tr>
<td>21-12-18-b</td>
<td>Ballot results of TIA No. 1607. <strong>PASSED</strong> TC ballot on both technical merit and emergency nature – 40 voting members/37 agree on technical merit/0 disagree/0 abstained/3 ballots not</td>
</tr>
</tbody>
</table>
returned/37 agree on emergency nature/0 disagree/0 abstained/3 ballots not returned. **PASSED**

CC ballot on both correlation and emergency nature – 27 voting members/19 agree on correlation/0 disagree/1 abstained/7 ballots not returned/19 agree on emergency nature/0 disagree/1 abstained/7 ballots not returned.

See Attachment 21-12-18-b

21-12-18-c No comments were received. No Attachment

### REVISION CYCLES

**21-12-19** Consider a request to change the respective revision schedule as follows:

<table>
<thead>
<tr>
<th>Doc No</th>
<th>Current Edition</th>
<th>Next Applicable Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>2022</td>
<td>PI Closing: January 5, 2023</td>
</tr>
<tr>
<td>12A</td>
<td>2022</td>
<td>PI Closing: January 5, 2023</td>
</tr>
<tr>
<td>2001</td>
<td>2022</td>
<td>PI Closing: January 5, 2023</td>
</tr>
<tr>
<td>1122</td>
<td>2018</td>
<td>Request Permanent 4-year cycle</td>
</tr>
<tr>
<td>1125</td>
<td>2022</td>
<td>PI Closing: June 1, 2023 Request Permanent 4-year cycle</td>
</tr>
<tr>
<td>1127</td>
<td>2018</td>
<td>Request Permanent 4-year cycle</td>
</tr>
</tbody>
</table>

See Attachment 21-12-19

### NEW PROJECTS

**21-12-20** Consider the request of the Technical Committee on Fire Service Analysts and Informational Technical Specialists Professional Qualifications to approve the proposed draft standard NFPA 1022, *Standard for Fire and Emergency Services Analyst Professional Qualifications*. The Technical Committee also requests the standard be entered into its initial revision cycle, with a Public Input closing date of June 1, 2022.

See Attachment 21-12-20

**21-12-21** Consider the request of the Technical Committee on Exposure and Contamination Control to approve the proposed draft standard NFPA 1585, *Standard for Exposure and Contamination Control*. The Technical Committee also requests the Standard be entered into its initial revision cycle, with a Public Input closing date of June 1, 2022.

See Attachment 21-12-21

### REPORTS BACK TO COUNCIL

**21-12-22** Consider the request of the Emergency Response and Responder Safety (ERRS) Division to approve the custom revision cycle for ERRS Group 3.

See Attachment 21-12-22

### GENERAL ITEMS

**21-12-23** Presentation of Annual 2024 and Fall 2024 revision cycle schedules.

See Attachment 21-12-23

**21-12-24** The Council to review and approve the dates of upcoming Council meetings:

April 12-14, 2022
   Tempe, Arizona

August 10-12, 2022
   Quincy, Massachusetts

December 2022
   Date and Location to be determined
Update from the Council Secretary.
No Attachment
NFPA 1-2021 Edition
Fire Code
TIA Log No.: 1609
Reference: 13.3.2.6.1
Comment Closing Date: October 22, 2021
Submitter: Terin Hopkins, National Fire Sprinkler Association (NFSA)
www.nfpa.org/1

1. Revise 13.3.2.6.1 to read as follows:

   13.3.2.6.1 The following assembly occupancies shall be protected throughout by an approved, supervised automatic sprinkler system in accordance with 13.3.1.2:
   (1) Dance halls
   (2) Discotheques
   (3) Nightclubs
   (4) Bars
   (5) Restaurants
   (6) Assembly occupancies with festival seating

Substantiation: NFPA 1 (2021) Chapter 13, Section 13.3.2.6.1 (Extract from NFPA 101 (2021), Section 12.3.5.1)
NFPA 1 extracted this section from NFPA 101 for many cycles. During the 2018-2021 code cycle for NFPA 101 - 2021 edition, the technical committee unanimously amend section 12.3.5.1 at first draft. This added Bars and Restaurants to the list of existing assembly occupancies requiring supervised automatic sprinkler systems. NFPA 101 Section 12.3.5.1 was once again extracted by the NFPA 1 technical committee into the 2021 edition of NFPA 1, Section 13.3.2.6.1. Unfortunately, the extract was not updated correctly during the extract review process which inappropriately omitted the change. This requirement needs to be corrected to clarify the error and document the appropriate change in NFPA 1 (2021).
Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process. The NFPA Standard contains a conflict within the NFPA Standards or within another NFPA Standard. The proposed TIA intends to correct a previously unknown existing hazard. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.
The 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 of the action.

The omission of fire sprinkler protection in bars and restaurants, required by NFPA 101 - Life Safety Code, creates a significant public life safety concern. This was overlooked in the extract process and this TIA seeks to correct that error in a time sensitive manor correlating it with the requirements of NFPA 101.
MEMORANDUM

TO: Technical Committee on Building Systems and Special Occupancies

FROM: Kelly Carey, Committee Administrator

DATE: October 26, 2021

SUBJECT: NFPA 1 Proposed TIA No. 1609 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA **HAS** achieved the ¾ majority vote needed on both Ballot Item No. 1 (**Technical Merit**) and Ballot Item No. 2 (**Emergency Nature**).

<table>
<thead>
<tr>
<th>34</th>
<th>Eligible to Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Not Returned <em>(Bennett-Hourigan, Biller, Costello, Fukuda, Kwon, Nair, Saeefan, Sheehan, Spataru, Weaver)</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Technical Merit:</strong></th>
<th><strong>Emergency Nature:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>24 Agree <em>(w/ comment, Hall, Hart, Hopkins, Tyree, Jr.)</em></td>
<td>24 Agree <em>(w/ comment, Schneider, Tyree, Jr.)</em></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Disagree

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

   \[34 \text{ eligible} \div 2 = 17 + 1 = (18)\]

2. The number of affirmative votes needed to satisfy the ¾ requirement is as follows:

   \[(34 \text{ eligible to vote} - 10 \text{ not returned} - 0 \text{ abstentions} = 24 \times 0.75 = 18)\]

Ballot comments are attached for your review.

The **Regs** at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **October 31, 2021**.
### POLL RESULTS

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Michael L. Savage, Sr.</td>
<td></td>
<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1609</td>
</tr>
<tr>
<td>Catherine L. Stashak</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>James S. Peterkin</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Kenneth E. Bush</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Chris L. Butts</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Richard Jay Roberts</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Daniel P. Finnegan</td>
<td>Agree with this mission</td>
<td>The standard contains an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Raymond C. O?Brocki</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ralph E. Bless, Jr.</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Daniel Buuck</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Michael J. Thomas</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Kenneth R. Schneider</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Bruce L. Rottner</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Roy C. Kimball</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Sarina L. Hart</td>
<td>I agree, but to clarify, this is for NEW bars and restaurants as required by Chapter 12 of the LSC. The substantiation mentions Chapter 13 and existing assembly occupancies. The NFPA 1 extract that is in error is from LSC Section 12.3.5.1 for new assembly occupancies.</td>
<td></td>
</tr>
<tr>
<td>Kevin Ryan Hall</td>
<td></td>
<td>The technical committee on SAF updated this extracted section in NFPA 101, but the section was not updated in NFPA 1</td>
</tr>
<tr>
<td>Bruce E. Johnson</td>
<td>Agree with Technical Merit</td>
<td></td>
</tr>
<tr>
<td>Steven F. Sawyer</td>
<td>Agree</td>
<td></td>
</tr>
</tbody>
</table>
Terin Hopkins

Agree

NFPA 1 extracted this section from NFPA 101 for many cycles. During the 2018-2021 code cycle for NFPA 101 - 2021 edition, the technical committee unanimously amend section 12.3.5.1 at first draft. This added Bars and Restaurants to the list of existing assembly occupancies requiring supervised automatic sprinkler systems. NFPA 101 Section 12.3.5.1 was once again extracted by the NFPA 1 technical committee into the 2021 edition of NFPA 1, Section 13.3.2.6.1. Unfortunately, the extract was not updated correctly during the extract review process which inappropriately omitted the change. This requirement needs to be corrected to clarify the error and document the appropriate change in NFPA 1 (2021).

Michael Connolly
Musfiqul Azad

Agree

I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No.1609 to NFPA 1 to revise 13.3.2.6.1.

Edward M. Hawthorne
Kenneth Earl Tyree, Jr. 
Sam Newman

I agree

In principle based on intent of NFPA 101 language.
I agree with the technical merits

Disagree

0

Abstain

0

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 34
Not Returned : 10
Justin B. Biller, Timothy R. Costello, Carl F. Weaver, Andrew Fukuda, Alex Spataru, Laura Bennett-Hourigan, Mohammed A. Saefan, Jaewook Kwon, Balakrishnan V. Nair, Michael Sheehan

Vote Selection

<table>
<thead>
<tr>
<th>Agree</th>
<th>24</th>
</tr>
</thead>
</table>
| Michael L. Savage, Sr. | I AGREE that the subject is of an EMERGENCY NATURE
| Catherine L. Stashak | A
| James S. Peterkin | Reason "A"
| Kenneth E. Bush | A.
| Chris L. Butts | A. The standard contains an error or an omission that was overlooked during the regular revision process
| Richard Jay Roberts | The standard contains an error or an omission that was overlooked during the regular revision process.
| Daniel P. Finnegan | |

Votes Comments
Raymond C. O'Brocki  
The proposed TIA intends to correct a previously unknown existing hazard.

Ralph E. Bless, Jr.  
Agree

Daniel Buuck  
A and B

Michael J. Thomas  
The proposed TIA intends to correct a previously unknown existing hazard.

Kenneth R. Schneider  
I generally do not agree that TIAs are of an EMERGENCY NATURE, for me this is the exception and I agree.

Bruce L. Rottner  
I agree based on a conflict with other NFPA standard(s).

Roy C. Kimball  
A

Sarina L. Hart  
Reason A

Kevin Ryan Hall  
A. The standard contains an error or an omission that was overlooked during the regular revision process.

Bruce E. Johnson  
B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard (NFPA 101 Extract).

Steven F. Sawyer  
A

Terin Hopkins  
Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process. The NFPA Standard contains a conflict within the NFPA Standards or within another NFPA Standard. The proposed TIA intends to correct a previously unknown existing hazard. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.

Michael Connolly  
B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.

Musfiqul Azad  
I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box

Edward M. Hawthorne  
agree

Kenneth Earl Tyree, Jr.  
Based on need not to eliminate conflicting language of utilized consensus standards.

Sam Newman  
It needs to be addressed

Disagree  
0

Abstain  
0
MEMORANDUM

TO: Correlating Committee on Fire Code

FROM: Kelly Carey, Committee Administrator

DATE: October 26, 2021

SUBJECT: NFPA 1 Proposed TIA No. 1609 FINAL CC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

19 Eligible to Vote
2 Not Returned (Ramo, Tyree, Jr.)

<table>
<thead>
<tr>
<th>Correlation Issues:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>17 Agree (w/ comment, O’Brian)</td>
<td>17 Agree</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[19 \text{ eligible} \div 2 = 9.5 = (10)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 13.

(19 eligible to vote - 2 not returned - 0 abstentions = 17 \times 0.75 = 12.75)

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is October 31, 2021.
NFPA 1 CORRELATING COMMITTEE ON FIRE CODE
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1609 - FINAL BALLOT RESULTS

QUESTION NO. 1: I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA
Regs.

Eligible to Vote: 19
Not Returned : 2
Leonard J. Ramo, Kenneth Earl Tyree, Jr.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td></td>
<td>I am in agreement that there is no correlation issues.</td>
</tr>
<tr>
<td>William E. Koffel</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Catherine L. Stashak</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Raymond C. O'Brocki</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Kenneth E. Bush</td>
<td></td>
<td>I agree that there are no correlation issues</td>
</tr>
<tr>
<td>Robert J. Davidson</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Carl F. Baldassarra</td>
<td></td>
<td>I agree with the supporting comments included in the ballot.</td>
</tr>
<tr>
<td>Kevin Ryan Hall</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Ernest J. Gallo</td>
<td></td>
<td>I AGREE there are no CORRELATION ISSUES</td>
</tr>
<tr>
<td>Wade Palazini</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Kelly T. Nicolello</td>
<td></td>
<td>Note A</td>
</tr>
<tr>
<td>Jeffrey M. Hugo</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Edward M. Hawthorne</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Chris L. Butts</td>
<td></td>
<td>Agree.</td>
</tr>
<tr>
<td>David W. Hollinger</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Michael O'Brian</td>
<td></td>
<td>The documentation demonstrates the change was made in 101 for new assembly occupancies and was not carried over into NFPA 1</td>
</tr>
</tbody>
</table>

Disagree 0
Abstain 0

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 19
Not Returned : 2
Leonard J. Ramo, Kenneth Earl Tyree, Jr.
<table>
<thead>
<tr>
<th><strong>Vote Selection</strong></th>
<th><strong>Votes</strong></th>
<th><strong>Comments</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agree</strong></td>
<td>17</td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process. A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>William E. Koffel</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Catherine L. Stashak</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Raymond C. O'Brocki</td>
<td></td>
<td>A. Reason A and B.</td>
</tr>
<tr>
<td>Kenneth E. Bush</td>
<td></td>
<td>I agree that this is of emergency nature. A. The standard contains an error or an omission that was overlooked during the regular revision process. B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.</td>
</tr>
<tr>
<td>Robert J. Davidson</td>
<td></td>
<td>I AGREE that the subject is of an EMERGENCY NATURE</td>
</tr>
<tr>
<td>Carl F. Baldassarra</td>
<td></td>
<td>A and B</td>
</tr>
<tr>
<td>Kevin Ryan Hall</td>
<td></td>
<td>Note A</td>
</tr>
<tr>
<td>Ernest J. Gallo</td>
<td></td>
<td>A. agree</td>
</tr>
<tr>
<td>Wade Palazini</td>
<td></td>
<td>Agree. B.</td>
</tr>
<tr>
<td>Kelly T. Nicolello</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jeffrey M. Hugo</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Edward M. Hawthorne</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Chris L. Butts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>David W. Hollinger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael O'Brian</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Marvin Dwayne Garriss</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td><strong>Disagree</strong></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Abstain</strong></td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
NFPA 20-2022 Edition

*Standard for the Installation of Stationary Pumps for Fire Protection*

TIA Log No.: 1604

Reference: 11.4.1.3.1

Comment Closing Date: September 30, 2021

Submitter: John Denhardt, American Fire Sprinkler Association

www.nfpa.org/20

1. Revise 11.4.1.3.1 to read as follows:

11.4.1.3.1* Fuel supply tank(s) shall be sized for a minimum of 12 hours of engine run time based on the fuel supply consumption rate requirements of the engine as indicated on the manufacturer’s published data, plus 5 percent volume for expansion and 5 percent volume for sump.

Substantiation: There are three different rates that are specified for diesel engines: Fuel Supply, Fuel Return, and Fuel consumption. The "fuel supply rate" is not the appropriate rate and should be changed to the "fuel consumption rate." As the section is currently written, this requirement would grossly over size the diesel fuel tank. This language needs to be changed for it to have the effect the committee wanted to achieve. This terminology was overlooked during the second draft meeting as the submitter used fuel consumption rate in his substantiation, but inadvertently used fuel supply rate in the submitted text.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process.

The requirements above were revised by SR-29. The submitter of the public comment that prompted this change referenced “fuel consumption rate” in his substantiation, however “fuel supply rate” was erroneously used in the revised text. As the section is currently written, this grossly oversize the diesel fuel tank. This language needs to be changed to meet the committee’s and submitter’s original intent.
MEMORANDUM

TO: Technical Committee on Fire Pumps

FROM: Elena Carroll, Sr. Committee Administrator

DATE: October 1, 2021

SUBJECT: NFPA 20 Proposed TIA No. 1604 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPARegs, the final results show this TIA **HAS** achieved the ¾ majority vote needed on both Ballot Item No. 1 **(Technical Merit)** and Ballot Item No. 2 **(Emergency Nature)**.

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>27 Agree (w/ comment, Kovacik, Reser, Rodriguez, Victor)</td>
<td>27 Agree (w/ comment, Campbell, Denhardt, Fuller, Reser, Rodriguez)</td>
</tr>
<tr>
<td>2 Disagree (Luinstra, Roberts)</td>
<td>2 Disagree (Luinstra, Roberts)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative ¾ vote]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[33 \text{ eligible} \div 2 = 16.5 = (17)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is **22**

\[(33 \text{ eligible to vote} - 4 \text{ not returned} - 0 \text{ abstentions} = 29 \times 0.75 = 21.75)\]

Ballot comments are attached for your review.

The **Regs** at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **October 6, 2021**.
**QUESTION NO. 1:** I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1604 to  
Revise 11.4.1.3.1.

**Eligible to Vote:** 33  
**Not Returned:** 4  
Mohamed Ezzat Kheir, Marinus  
Both, Mohammad Dadgardoust, Timothy Ballengee

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>John D. Campbell</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td></td>
<td>I’m on-board with the intent of this revision; however, the new 11.4.1.3.1.1 should have also been revised to reference “fuel consumption rate” rather than “fuel supply rate”. The terminology in the two paragraphs is now inconsistent.</td>
</tr>
<tr>
<td>Bradford T. Cronin</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Terry L. Victor</td>
<td></td>
<td>This change also needs to be made in section 11.4.1.3.1.1.</td>
</tr>
<tr>
<td>David B. Fuller</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Milosh T. Puchovsky</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Donald G. Goosman</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Michael A. Rothmier</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>William F. Stelter</td>
<td></td>
<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1604 to Revise 11.4.1.3.1.</td>
</tr>
<tr>
<td>Damon T. Pietraz</td>
<td></td>
<td>AGREE</td>
</tr>
<tr>
<td>R. T. Leicht</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>John August Denhardt</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Byron E. Ellis</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jennifer A. McGrath</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Thomas Reser</td>
<td></td>
<td>The error is real and the fuel consumption &quot;rate&quot; is the correct term to use - otherwise the standard is not effective</td>
</tr>
<tr>
<td>Peter Placidus Petrus</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Mike Dembkowski</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Joseph R. Sanford</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>James A. Beals</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Vincent Rodriguez</td>
<td></td>
<td>This error is an obvious one and should be corrected immediately to prevent inadvertent misapplications of diesel fuel tank sizes between now and the time it is corrected.</td>
</tr>
<tr>
<td>Brian Buscher</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Darrell A. Snyder</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Marvin F. Yoder, Jr.</td>
<td></td>
<td>agree</td>
</tr>
</tbody>
</table>
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 33
Not Returned : 4
Mohamed Ezzat Kheir,Marinus
Both,Mohammad
Dadgardoust,Timothy Ballengee

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>John D. Campbell</td>
<td></td>
<td>Whilst I do not believe this is of a true emergency nature, I do agree with the submitter's contention that fuel tanks will be oversized which can result in degradation of the fuel in the tank due to having too much.</td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Bradford T. Cronin</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Terry L. Victor</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>David B. Fuller</td>
<td>A</td>
<td>The current wording referring to &quot;supply&quot; does make sense and will result in ambiguous fuel tank sizing requirements.</td>
</tr>
<tr>
<td>Milosh T. Puchovsky</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Donald G. Goosman</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Michael A. Rothmier</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Comment</td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>William F. Stelter</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Damon T. Pietraz</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>R. T. Leicht</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>John August Denhardt</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process. It should be noted section 11.4.1.3.1.1 needs to be updated. I will submit this after this TIA is processed.</td>
<td></td>
</tr>
<tr>
<td>Byron E. Ellis</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Jennifer A. McGrath</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Thomas Reser</td>
<td>This is of emergency nature since it would provide gross misdirection to the standard users</td>
<td></td>
</tr>
<tr>
<td>Peter Placidus Petrus</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Mike Dembkowski</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Joseph R. Sanford</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>James A. Beals</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Vincent Rodriguez</td>
<td>This is considered an emergency as diesel fuel tank sizing will potentially become oversized based on this error.</td>
<td></td>
</tr>
<tr>
<td>Brian Buscher</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Darrell A. Snyder</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Marvin F. Yoder, Jr.</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Steven Baird</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Stephen M. Jaskolka</td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Alexander Popov</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Mike Dawson</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td><strong>DISAGREE</strong></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Floyd Luinstra</td>
<td>There was committee discussion on this topic. There was a vote on this. I do not see this as relating to any of the A, B, C, D, E, F reasons.</td>
<td></td>
</tr>
<tr>
<td>Jeffrey R. Roberts</td>
<td>This is not an emergency.</td>
<td></td>
</tr>
<tr>
<td><strong>ABSTAIN</strong></td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
NFPA 20-2022 Edition
*Standard for the Installation of Stationary Pumps for Fire Protection*
TIA Log No.: 1611
Reference: 11.4.1.3.1.1
Comment Closing Date: October 29, 2021
Submitter: John Denhardt, American Fire Sprinkler Association

www.nfpa.org/20

1. Revise 11.4.1.3.1.1 to read as follows:

11.4.1.3.1.1* When the fuel supply consumption rate requirements of the engine are not known, fuel supply tank(s) shall have a capacity at least equal to 1 gal per hp (5.07 L per kW), plus 5 percent volume for expansion and 5 percent volume for sump.

**Substantiation:** This subsection was missed by TIA No. 1604. There are three different rates that are specified for diesel engines: Fuel Supply, Fuel Return, and Fuel consumption. The "fuel supply rate" is not the appropriate rate and should be changed to the "fuel consumption rate." As the section is currently written, this requirement would grossly over size the diesel fuel tank. This language needs to be changed for it to have the effect the committee wanted to achieve. This terminology was overlooked during the second draft meeting as the submitter used fuel consumption rate in his substantiation, but inadvertently used fuel supply rate in the submitted text.

**Emergency Nature:** The standard contains an error or an omission that was overlooked during the regular revision process.

The requirements above were revised by SR-29. The submitter of the public comment that prompted this change referenced “fuel consumption rate” in his substantiation, however “fuel supply rate” was erroneously used in the revised text. As the section is currently written, this grossly oversize the diesel fuel tank. This language needs to be changed to meet the committee’s and submitter’s original intent.
MEMORANDUM

TO: Technical Committee on Fire Pumps

FROM: Elena Carroll, Sr. Committee Administrator

DATE: November 1, 2021

SUBJECT: NFPA 20 Proposed TIA No. 1611 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

33 Eligible to Vote
6 Not Returned (Ballengee, Campbell, Dorini, Kheir, Luinstra, Petrus)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  Abstentions</td>
<td>0  Abstentions</td>
</tr>
<tr>
<td>27  Agree (w/comment, Fuller, Pietraz, Rodriguez)</td>
<td>26  Agree (w/comment, Fuller, Pietraz, Rodriguez)</td>
</tr>
<tr>
<td>0  Disagree</td>
<td>1  Disagree (Roberts)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative ¾ vote]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[33 \text{ eligible} \div 2 = 16.5 = (17)\]

2) The number of affirmative votes needed to satisfy the ¾ requirement is 21

\[33 \text{ eligible to vote} - 6 \text{ not returned} - 0 \text{ abstentions} = 27 \times 0.75 = 20.25\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **November 6, 2021**.
### QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1611 to Revise 11.4.1.3.1.1.

**Eligible to Vote: 33**  
**Not Returned:** 6  
- John D. Campbell, Floyd  
- Luinstra, Alan A. Dorini, Mohamed  
- Ezzat Kheir, Peter Placidus  
- Petrus, Timothy Ballengee

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AGREE</strong></td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Terry L. Victor</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Bradford T. Cronin</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Donald G. Goosman</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>David B. Fuller</td>
<td>Fuel consumption rate is correct.</td>
<td></td>
</tr>
<tr>
<td>Milosh T. Puchovsky</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>R. T. Leicht</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Steven Baird</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>John August Denhardt</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>John Whitney</td>
<td>Agree, note A</td>
<td></td>
</tr>
<tr>
<td>Michael A. Rothmier</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Jennifer A. McGrath</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>William F. Stelter</td>
<td>I agree with the technical merits as proposed.</td>
<td></td>
</tr>
<tr>
<td>Joseph R. Sanford</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Byron E. Ellis</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Damon T. Pietraz</td>
<td>The revisions here are required to correspond to the action taken on #1604 for 11.4.1.3.1.1</td>
<td></td>
</tr>
<tr>
<td>Alexander Popov</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Mike Dawson</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Vincent Rodriguez</td>
<td>I agree that this was missed and feel that this amendment should be made due to the full nature of the intent.</td>
<td></td>
</tr>
</tbody>
</table>

| Stephen M. Jaskolka| Agree |          |
| Darrell A. Snyder| Agree |          |
| Thomas Reser| agree |          |
| James A. Beals| Agree |          |
| Jeffrey R. Roberts| I agree with this |          |
| Marinus Both| Agree |          |
| Brian Buscher| Agree |          |
| Mohammad Dadgardoust| I agree with the proposed Technical merits | |
### QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

**Eligible to Vote: 33**  
**Not Returned: 6**  
John D. Campbell, Floyd  
Luinstra, Alan A. Dorini, Mohamed  
Ezzat Khier, Peter Placidus  
Petrus, Timothy Ballenger

<table>
<thead>
<tr>
<th><strong>Vote Selection</strong></th>
<th><strong>Votes</strong></th>
<th><strong>Comments</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AGREE</strong></td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Terry L. Victor</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Bradford T. Cronin</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Donald G. Goosman</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>David B. Fuller</td>
<td>Agree that the language could cause confusion sizing fuel tanks.</td>
<td></td>
</tr>
<tr>
<td>Milosh T. Puchovsky</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>R. T. Leicht</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Steven Baird</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>John August Denhardt</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>John Whitney</td>
<td>Agree, note A</td>
<td></td>
</tr>
<tr>
<td>Michael A. Rothmier</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Jennifer A. McGrath</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>William F. Stelter</td>
<td>Reason A</td>
<td></td>
</tr>
<tr>
<td>Joseph R. Sanford</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Byron E. Ellis</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Damon T. Pietraz</td>
<td>The revisions here are required to correspond to the action taken on #1604 for 11.4.1.3.1.1</td>
<td></td>
</tr>
<tr>
<td>Alexander Popov</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Mike Dawson</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Vincent Rodriguez</td>
<td>For all intents and purposes, this should be addressed immediately in order to maintain the proper sizing of fuel tanks when applicable.</td>
<td></td>
</tr>
<tr>
<td>Stephen M. Jaskolka</td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Darrell A. Snyder</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Thomas Reser</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Vote</td>
<td>Comment</td>
</tr>
<tr>
<td>---------------------</td>
<td>------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>James A. Beals</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Marinus Both</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Brian Buscher</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Mohammad Dadgardoust</td>
<td>I agree with the subject</td>
<td></td>
</tr>
<tr>
<td>DISAGREE</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Jeffrey R. Roberts</td>
<td>I don’t think that this is an emergency.</td>
<td></td>
</tr>
<tr>
<td>ABSTAIN</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
1. Revise 8.3.7.1.3 to read as follows:

8.3.7.1.3 Where applicable, speed and velocity pressure adjustments shall be applied to the net pressure and flow data obtained to determine compliance with 8.3.7.2.3(23)

Substantiation: When Section 8.3.7.2.3 was modified in the 2020 edition the subsection reference in Section 8.3.7.1.3 was not adjusted to reflect these changes. As the standard is currently written, speed and velocity pressures cannot be adjusted to determine compliance with Section 8.3.7.2.3(3) which states the net pressure at each flow point is at least 95 percent of the data plate or original pump curve.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process.

Without the ability to adjust for velocity and flow many fire pump assemblies could fail unnecessarily. This can also cause unnecessary deficiencies for building owners as well as large financial impacts such as fire pump replacements.
MEMORANDUM

TO: Technical Committee on Inspection, Testing and Maintenance of Water-Based Systems

FROM: Elena Carroll, Sr. Committee Administrator

DATE: September 23, 2021

SUBJECT: NFPA 25 Proposed TIA No. 1603 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

<table>
<thead>
<tr>
<th>Technical Merit</th>
<th>Emergency Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>35 Agree (w/comment, Bosma, Myers, Pietraz, Saidi)</td>
<td>34 Agree (w/comment, Bosma, Myers, Saidi)</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>1 Disagree (Munno)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[ \frac{41 \text{ eligible}}{2} = 20.5 = (21) \]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 27.

\[ (41 \text{ eligible to vote} - 6 \text{ not returned} - 0 \text{ abstentions} = 35 \times 0.75 = 26.25) \]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **September 28, 2021**.
## QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1603 to Revise 8.3.7.1.3.

<table>
<thead>
<tr>
<th>Eligible to Vote: 41</th>
<th>Not Returned : 6</th>
</tr>
</thead>
</table>

### Vote Selection

<table>
<thead>
<tr>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>35</td>
</tr>
</tbody>
</table>

- Tracey D. Bellamy
- Kerry M. Bell
- Bradford T. Cronin
- Erik G. Olsen
- Terry L. Victor
- William E. Koffel
- David W. Frable
- Damon T. Pietraz

Depending on the pump suction and discharge flange sizes, the velocity head correction alone can be enough to pass fail a pump. this TIA has technical merrit.

- George W. Stanley: agree
- Peter A. Larrimer: Agree
- Charles W. Ketner: agree
- Larry Keeping: AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1603 to Revise 8.3.7.1.3.
- Donald Hopkins, Jr.: Agree
- Brandon W. Frakes: Agree
- Michael J. Bosma: I agree with the technical merits
- David R. Baron: Agree
- Scott Futrell: Agree
- Chase A. Browning: Agree
- Leslie D. Scott: Agree
- Kevin J. Kelly: Agree
- Top Myers: This is a mistake in the code which I prefer being handled by Staff. If this is the best way to notify more people of correction than that must be our course.

- Robbie Gordon: Agree
- John T. Johnson: Agree
- John DiGirolomo: Agree
Charles David Raborn  Agree
Clayton Norred, Jr.  Agree
John F. Saidi  Potential conflict in current language should be reconciled.
Stephen M. Jaskolka  Agree
Greg Garber  Agree
Timothy Dwain Schmidle  Agree
John D. Munno  There are technical merits to the amendment.
Corey Certain  Agree
Stephanie C. Thomas  Agree
Ryan Fick  Agree
Dennis Sullivan  Agree

DISAGREE  0
ABSTAIN  0

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 41
Not Returned: 6

Vote Selection  Votes  Comments
AGREE  34
Tracey D. Bellamy  Agree A.
Kerry M. Bell  A
Bradford T. Cronin  A
Erik G. Olsen  A
Terry L. Victor  A
William E. Koffel  A. The standard contains an error or an omission that was overlooked during the regular revision process.

David W. Frable  I agree - A.
Damon T. Pietraz  it is an emergency in nature.
George W. Stanley  agree
Peter A. Larrimer  Agree
Charles W. Ketner  agree
Larry Keeping  a
Donald Hopkins, Jr.  A
Brandon W. Frakes  Agree
Michael J. Bosma                                  I agree that it is a subject of an Emergency Nature

David R. Baron
Scott Futrell
Chase A. Browning
Leslie D. Scott
Kevin J. Kelly

A, F

A. The standard contains an error or an omission that was overlooked during the regular revision process.

Top Myers
Without this correction, there can be wrong analysis of fire pump condition.

Robbie Gordon
John T. Johnson

A
A. The standard contains an error or an omission that was overlooked during the regular revision process.

John DiGirolomo
Charles David Raborn
Clayton Norred, Jr.

C
Agree
A. The standard contains an error or an omission that was overlooked during the regular revision process.

John F. Saidi
Potential risk of adverse impact such as pump failures.

Stephen M. Jaskolka
The standard contains an error or an omission that was overlooked during the regular revision process.

Greg Garber
Timothy Dwain Schmidle
Corey Certain

A
Agree
A. The standard contains an error or an omission that was overlooked during the regular revision process

Stephanie C. Thomas
Ryan Fick
Dennis Sullivan

Agree per A.
A
A

DISAGREE 1
John D. Munno
The information presented did not clarify the necessity for immediate change versus the errata process.

ABSTAIN 0
1. Revise 1.1.6 to read as follows:

1.1.6 This standard shall not apply to spray application processes or operations that are conducted outdoors within inflatable enclosures.

2. Add a new definition “Inflatable Finishing Workstation” to section 3.3 and associated Annex material to read as follows:

3.3.x* Inflatable Finishing Workstation. A power-ventilated apparatus whose shape is maintained by air pressure in cells or tubes forming all or part of the enclosure of the usable area and in which the occupants are not within the pressurized area used to support the structure and confine the vapors, mists, residues, dusts, or deposits generated by a spray application process.

A.3.3.X Inflatable Finishing Workstation. An inflatable finishing workstation is not a spray booth, spray room, or limited finishing workstation as defined in this standard.

3. Add a new Section 14.4 to read as follows:

14.4 Inflatable Finishing Workstations.

14.4.1 General.

14.4.1.1 An inflatable finishing workstation shall be designed and operated in accordance with the requirements of 14.4.2 through 14.4.8 and NFPA 5000.

14.4.1.2 In addition to the requirements of this section, an inflatable finishing workstation shall meet all applicable requirements of Chapter 10 and Chapter 19.

14.4.1.3 An inflatable finishing workstation shall not be used for processes in which combustible dry powders are applied.

14.4.2 Location.

14.4.2.1 An inflatable finishing workstation shall only be used outdoors.

14.4.2.2 The location of an inflatable finishing workstation shall meet the following conditions:

(1) Separated by a minimum distance of 6.1 m (20 ft) from any permanent or temporary structures

(2) Separated by a minimum distance of 6.1 m (20 ft) from a public way

14.4.2.3 An inflatable finishing workstation shall not block emergency vehicle access to adjacent structures.

14.4.3 Construction and Design.

14.4.3.1 An inflatable finishing workstation, including the floor, shall be constructed of materials that are noncombustible or limited-combustible as defined in Section 4.5 and Section 4.6 or that can successfully pass Test Method 2 in NFPA 701.

14.4.3.2* Materials that enclose the spray area shall be static dissipative.
A.14.4.3.2 Typically, a dissipative material is one having a surface resistivity equal to or greater than $10^5$ but less than $10^9$ ohms per square or a volume resistivity equal to or greater than $10^5$ but less than $10^9$ ohm-meters. Some applications might require different resistivities, though the intent is to dissipate charge. See ASTM D257, *Standard Test Methods for DC Resistance or Conductance of Insulating Materials*, for a procedure to determine resistivity.

14.4.3.3* A means for grounding shall be provided.

A.14.4.3.3 See NFPA 70 and NFPA 77 for additional information.

14.4.3.4 The interior surfaces of the spray area shall be smooth, designed and installed to prevent pockets that can trap residues, and designed to facilitate ventilation and cleaning.

14.4.3.5 Air intake filters that are part of a wall or ceiling assembly shall be listed in accordance with UL 900, *Air Filter Units*.

14.4.3.6 An inflatable finishing workstation shall include a means for anchoring.

14.4.3.6.1* The method of anchoring shall be acceptable to the AHJ.

A.14.4.3.6.1 The manufacturer should provide the recommended anchoring method.

14.4 Means of Egress. The number and location of exits shall comply with Chapter 40 of NFPA 101.

14.4.4.1 The inflatable finishing workstation shall be considered to contain high-hazard contents when determining the means of egress.

14.4.4.2 A minimum of two means of egress shall be provided.

14.4.5 Ventilation.

14.4.5.1 Performance Requirements.

14.4.5.1.1 The inflatable finishing workstation shall be provided with mechanical ventilation capable of confining and removing vapors and mists to a safe location and capable of confining and controlling combustible residues, dusts, and deposits.

14.4.5.1.2 The concentration of the vapors and mists in the exhaust stream of the ventilation system shall not exceed 10 percent of the lower flammable limit.

14.4.5.2* Safety Design Data Form. A safety design data form or a nameplate that states the operating conditions for which the enclosure was designed, built, altered, or extended shall be accessible to the operator.

A.14.4.5.2 The safety design data form or nameplate, at a minimum, should include the following:

1. Maximum solvent release rate for which the ventilation system is designed to meet the requirements of 14.4.7.1

2. The solvent used in the calculation of the ventilation rate

14.4.5.3 Routing of Exhaust. Air exhausted from an inflatable finishing workstation shall meet the following conditions:

1. Exhaust discharge shall be directed away from any air intakes.

2. The exhaust discharge point shall be at least 6096 mm (20 ft) from openings into the building or other inflatable finishing workstations.

3. The exhaust shall not discharge in the direction of any combustible construction that is within 7625 mm (25 ft) of the exhaust duct discharge point.

4. The exhaust shall not discharge in the direction of any unprotected opening in any noncombustible or limited-combustible construction that is within 7625 mm (25 ft) of the exhaust duct discharge point.

5. The exhaust shall not discharge in the direction of any exit discharge or public way that is within 7625 mm (25 ft) of the exhaust duct discharge point.
A.14.4.5.3(2) Locating the exhaust discharge point away from intakes into other inflatable finishing workstations will prevent introducing contaminated air into adjacent inflatable finishing workstations.

14.4.5.4 Supply Air. Intakes for supply blowers used for introducing fresh air or for inflating the structure shall be located such that the process exhaust is not recirculated.

14.4.5.5 Air Recirculation. Recirculation of process exhaust air shall not be permitted.

14.4.6 Electrical and Other Sources of Ignition.

14.4.6.1 The area within the inflatable finishing workstation shall be Class I, Division 1 or Zone 1.

14.4.6.2 Areas within 1524 mm (5 ft) of the exhaust shall be Class I, Division 1 or Zone 1.

14.4.6.3 Areas between 1524 mm (5 ft) and 3048 mm (10 ft) of the exhaust shall be Class I, Division 2 or Zone 2.

14.4.6.4 The area within 915 mm (3 ft) of any opening shall be classified as Class I, Division 2; Zone 2; Class II, Division 2; or Zone 22, whichever is applicable (see Figure 14.4.6.4).

Figure 14.4.6.4 Electrical Classifications for Outdoor Inflatable Workstations.

14.4.6.5 Electrical wiring and electrical utilization equipment shall not be used within the enclosure.

14.4.6.6 Electrical wiring and electrical utilization equipment that is used adjacent to the inflatable finishing workstation shall comply with Chapter 6.
14.4.6.7* All electrically conductive objects in the spray area shall be electrically connected to ground in accordance with Section 6.7.
A.14.4.6.7 Electrically conductive objects include, but are not limited to, containers of coating material, wash cans, guards, hose connectors, brackets, and any personnel who enter the spray area.

14.4.7 Storage, Handling, and Distribution of Ignitable Liquids.
14.4.7.1 Ignitable (flammable and combustible) liquids within the inflatable finishing workstation shall not exceed a total of 3.8 L (1 gal) at any time.
14.4.7.2 Pressurized containers for paint delivery shall not be located within the inflatable finishing workstation.

14.4.8 Protection.
14.4.8.1 Portable Fire Extinguishers.
14.4.8.1.1 Portable fire extinguishers shall be installed, inspected, and maintained in accordance with NFPA 10.
14.4.8.1.2 Portable fire extinguishers shall be selected for extra-hazard locations.
14.4.8.1.3 At least one portable fire extinguisher shall be located within the inflatable finishing workstation at the air inlet side.
14.4.8.1.4 At least one portable fire extinguisher shall be located external to the inflatable finishing workstation near the exhaust side.

4. Add a new section E.1.2.2 and renumber subsequent sections to read as follows:

E.1.2.2 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.
E.1.2.23 CENELEC Publications. …
E.1.2.34 FEMA Publications. …
E.1.2.45 FM Publications. …
E.1.2.56 ISA Publications. …
E.1.2.67 SAE International. …
E.1.2.78 SMACNA Publications. …
E.1.2.89 UL Publications. …
E.1.2.910 US Government Publications. …

Substantiation: The proposed TIA seeks to address a gap in the fire and life safety protection features associated with operations involving spray finishing within a variety of applications necessitating the ability to deliver spray finishing touch-up service in non-traditional locations. Using a portable enclosure that ensures against release of hazardous emissions, this approach has been used extensively for automobile used vehicle reconditioning. While that industry segment represents the largest current example of the operation involving the inflatable work stations, auto reconditioning is only one example, as the inflatable work stations have also been used within other transportation sectors, including rail and aircraft maintenance and repair.

While NFPA 33 currently provides requirements for powder coating and spray finishing in permanent spray booth arrangements, it is estimated that within the industry usually engaged in
vehicle reconditioning that over 65% are relying on alternative approaches and installations that are not presently addressed by the standard. The most common installation is an inflatable membrane structure, and the repair technicians within the “Small to Medium Area Repair Technique (SMART)” industry can perform touch-ups for bumper scratches, repair to alloy wheels, and repair of scratches in body panels. Every dealership or auto auction has a team of technicians that handles the reconditioning of their inventory.

Prior to 2011 the common method practiced by SMART technicians was to open air spray, spray under a car port, spray under a popup style tent or an inflatable shelter with no air circulation or control for the paint overspray and emissions. However, in January 2011, the EPA promulgated a new rule aimed at controlling the paint spray emissions of the volatile components common in the types of paints used in this industry. The “6HRule” as it is known within the industry, requires motor vehicle and mobile equipment surface coating operations to install and operate filter technology on all booths, stations and enclosures to ensure at least 98% capture efficiency. In addition, those booths or stations used to refinish complete motor vehicles or mobile equipment must be fully enclosed and ventilated to a defined negative pressure level.

Without specific fire and life safety requirements in the fire codes and standards, operators have not always conducted the reconditioning activities in compliance with the EPA standard or best practices for fire and life safety. NFPA 33 added requirements permitting the use of membrane enclosures to the 2015 standard; those requirements address specific features that could be applicable to the inflatable spray workstations that are used within the SMART operations. Specifically, membrane enclosures are required to be located outside, but are permitted indoors with additional safeguards. Separation distances are also included in the membrane enclosure provisions to ensure safe distances between the membrane structure and other exposure structures and to ensure safety distances are maintained for arrival of emergency apparatus. The NFPA requirements in Chapter 18 require that the membrane be constructed of material that meets the performance requirements for Test Method 2 of NFPA 701; establishes requirements for ventilation and filtration with limits on the concentration of the paint volatiles to reduce the potential for development of a flammable atmosphere; addresses ignition sources such as hot work, static, and electrical equipment, including defining electrical area classification for the inflatable workstation; and requires fire protection including portable fire extinguishers.

The new requirements for membrane structures were developed by the Committee with extensive study and input from the affected stakeholders. The Committee is once again addressing this new application by working with those stakeholders engaged in SMART and similar operations. New requirements for NFPA 33 that would be applicable to inflatable spray workstations were discussed during the prior revision cycle (F2020) as part of both first draft and second draft. However, a number of technical questions were raised by the Committee, so no changes were included for this technology as part of the 2021 edition of NFPA 33. The Committee formed a Task Group at the direction of the Chair, and that task group was charged with continuing to discuss and refine proposed requirements for future inclusion in the standard. The Task Group was given instruction to develop possible TIA language as the next revision cycle (F2023) was over three years away and this type of installation is in regular operation throughout the country with no established provisions to safeguard the facilities or the community. For those communities with AHJ awareness of the operations, the AHJ currently has no set of
requirements to point to, leaving them to prohibit or to create an equivalency application based on NFPA 33 or similar protective measures.

The Task Group, comprised of a broad cross-section of the committee members (insurance, research/testing, users, manufacturers, enforcers, installer/maintainers), began its work in late 2020 and has developed the proposed technical language in this TIA, mindful of the feedback from the full committee during the previous discussions in March 2020. The TIA contains provisions that follow a similar model to the requirements applicable to the membrane enclosures. Specifically, the proposed TIA requires inflatable workstations to be only used outdoors with separation distances of 20 ft from any permanent or temporary structure and from any public way. The workstation shall be constructed of materials that are noncombustible, limited combustible, or that meet the performance of Method 2 of NFPA 701 as defined for other materials by NFPA 33 (and consistent with the definition used throughout NFPA codes and standards). The proposed TIA also establishes means of egress requirements based on NFPA 101, using High Hazard Contents as the basis. The proposed language focuses on controlling the fuel (paint spray vapors) and ignition sources (hot work, electrical equipment, static), so fire protection is addressed with the requirement for portable extinguishers, based on the requirements in NFPA 10 for Extra-Hazard locations. The ventilation requirements for these workstations must limit the concentration of the paint volatiles to no greater than 10% LFL. As part of the ventilation system design, exhaust from the enclosure must be directed away from buildings or other structures, away from openings or vents, and away from public ways.

The TIA addresses a practice that is ongoing, but which has no established source of protection for fire and life safety. The operation uses the same liquids in an identical application form as that which is currently covered by NFPA 33 for permanent spray booths and spray rooms and for membrane enclosures, but that operation is not currently covered by the standard. The operation has been created to meet an industry need without thought for the hazards to fire and life safety. The TIA seeks to act before an incident results from this unregulated operation and to provide the AHJ with the basis for properly evaluating operations in their jurisdictions. Through this TIA, safeguards can be put in place sooner than waiting for the completion of the next revision cycle, which would be the end of 2023.

**Emergency Nature:** The proposed TIA intends to correct a previously unknown existing hazard. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

Throughout the United States, refinishing and touch-up of automobiles occurs daily, and only a small fraction of that refinishing takes place in permanent spray booth installations. The proposed TIA seeks to address a gap in the fire and life safety protection features associated with operations involving spray finishing within automobile used vehicle reconditioning. While NFPA 33 currently provides requirements for powder coating and spray finishing in permanent spray booth arrangements, it is estimated that within the industry usually engaged in vehicle reconditioning that over 65% are relying on alternative approaches and installations that are not presently addressed by the standard. The TIA addresses a practice that is ongoing, but which has no source of protection for fire and life safety. The operation uses the same materials in an identical application form as that which is currently covered by NFPA 33 for permanent spray
booths and spray rooms and for membrane enclosures, but is not currently covered by the standard. The operation has been created to meet an industry need without thought for the hazards to fire and life safety. The TIA seeks to act before an incident results from this unregulated operation and to provide AHJ with the basis for properly evaluating operations in their jurisdictions. Through this TIA, safeguards can be put in place sooner than waiting for the completion of the next revision cycle, which would be the end of 2023.
MEMORANDUM

TO: Technical Committee on Finishing Processes

FROM: Yiu Lee, Committee Administrator

DATE: October 1, 2021

SUBJECT: NFPA 33 Proposed TIA No. 1602 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to Section 5.6(a) in the NFPA Regs, the final results show this TIA HAS NOT achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

31 Eligible to Vote
4 Not Returned (Carbery, Donnell, Euson, Moseley)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Abstentions (Roebert)</td>
<td>1 Abstentions (Roebert)</td>
</tr>
<tr>
<td>18 Agree (w/comment: Dubbin, LeBlanc, Raifsnider, Thies, Thomas)</td>
<td>15 Agree (w/comment: Ankele, Bennett, Dubbin)</td>
</tr>
<tr>
<td>8 Disagree (Adams, Ankele, Bowman, Feldkamp, George, Gustin, Jeffrey, Korecky)</td>
<td>11 Disagree (Adams, Bowman, Feldkamp, George, Gustin, Jeffrey, Korecky, LeBlanc, Raifsnider, Thies, Thomas)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.
   \[ \frac{31 \text{ eligible}}{2} = 15.5 = 16 \text{ (rounded up)} \]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 20.
   \[ (31 \text{ eligible to vote} - 4 \text{ not returned} - 1 \text{ abstentions}) = 26 \times 0.75 = 19.5 \]

Ballot comments are attached for your review.
The Regs at Section 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with Section 4.2.6.

**Appeal Closing Date** for this TIA is **October 6, 2021**
QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1602 to Revise 1.1.6, Add a new definition "Inflatable Finishing Workstation" to section 3.3, Add a new Section 14.4 and E.1.2.2.

Eligible to Vote: 31
Not Returned : 4
Matthew M. Euson, Skip Donnell, Jarod M. Moseley, David Alan Carbery

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>John A. LeBlanc</td>
<td></td>
<td>This guidance appears to cover the intended operations but would benefit from going into the normal standard/code revision process.</td>
</tr>
<tr>
<td>Barry Thomas</td>
<td></td>
<td>I believe there is merit to its use outside only!</td>
</tr>
<tr>
<td>Paul B. Gentry</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Steven D. Jensen</td>
<td>D.</td>
<td></td>
</tr>
<tr>
<td>Brent W. Thor</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Geoffrey A. Raifsnider</td>
<td></td>
<td>I would like to recognize the contribution of the task group members. The discussions resulted in language that makes for a solid public input. I believe there may still be some areas that we have not addressed and that these areas would be addressed through the normal standard development process. I do have some recommended edits: - Proposed language for 1.1.6 should be new language as a subsection of 1.1.6. We should keep a statement in the standard that states that the standard shall not apply to spray application processes or operations that are conducted outdoors. The exception being inflatable finishing workstations. - I do not believe the intent was for these enclosures to be permanent structures. We may need some edits to address this and make it clear to the user. - Allowing the use of material that has passed Test Method 2 of NFPA 701 may not be appropriate for all surfaces of a complete enclosure. The use of this type of material is currently allowed in the standard for curtains only on a limited finishing workstation and this type of material is allowed for a single use on membrane enclosures. - We may need to revisit the area classification in section 14.4.6.4. The 3 foot distance, which as referenced from Chapter 6, was for booths that operate at a negative or neutral pressure to the area surrounding the booth. Due to the inflatable nature of these products, the workspace is pressurized relative to the area surrounding the booth. If a door is open during spraying, a flammable concentration may extend beyond 3 feet. The proposal uses 5 feet for area around the exhaust discharge. An open door would behave the same as the exhaust opening at far as the discharge of contaminated air. 5 feet may be a more suitable distance for the requirements of 14.4.6.4.</td>
</tr>
<tr>
<td>William C. Anderson</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>John August Denhardt</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>John Schweitzer</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Jeffrey R. Bennett</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Agreement</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>Nan Wei</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Laura Jacobsen</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Mark Dubbin</td>
<td>I agree with the technical merits of the proposal</td>
<td></td>
</tr>
<tr>
<td>Derek P. Wester</td>
<td>C. The proposed TIA intends to correct a previously unknown existing hazard.</td>
<td></td>
</tr>
<tr>
<td>Mike Thies</td>
<td>Agree however more discussion and edits should be conducted in the normal committee review cycle.</td>
<td></td>
</tr>
<tr>
<td>Benjamin Bushaw</td>
<td>I agree</td>
<td></td>
</tr>
<tr>
<td>James M. Sute</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Seung-Ho Choi</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td><strong>Disagree</strong></td>
<td><strong>8</strong></td>
<td></td>
</tr>
<tr>
<td>Thomas B. George</td>
<td>The proposed language does not adequately address the dangers associated with the use of inflatable enclosures for flammable spray coating operations; adopting this language could lead to new unsafe practices. Additional committee review is required.</td>
<td></td>
</tr>
<tr>
<td>Mark A. Bowman</td>
<td>During the last cycle we agreed to hold off discussions on inflatable finishing workstations until the next cycle. I don't believe this needs to be added outside of the normal process.</td>
<td></td>
</tr>
<tr>
<td>Robert J. Feldkamp</td>
<td>I do not believe it was the intent to allow processes which could be done in a standard spray booth to be done in an inflatable work station. I think this needs to be addressed with the committee.</td>
<td></td>
</tr>
</tbody>
</table>
I disagree as there are gaps in the requirements. 1.Revise 1.1.6 to refer to these workstations as inflatable membrane structures to help the AHJ, align the term used in NFPA 5000 and the International Fire Code. 2.Revise 3.3.x Inflatable Finishing Workstation definition such that the workstation is identified as an inflatable membrane structure, not an apparatus. Do not state these work stations confine flammable vapors. 3. Section 14.4.2, Location, is incomplete. The requirement lacks details of other restrictions needed to address protection within the 5 foot Division 2 boundary of the outer surfaces of the structure. See comment on 14.4.6.4. Inflatable membrane structures cannot be located near combustible materials and shrubbery (NFPA 5000) nor be located near potential sources of ignition, nor can potential ignition sources be permitted to cross the 5 foot Div. 2/ Zone 2 boundary, including vehicles, cell phones, etc. Mobile hail repair might set up in parking lots. Overhead lighting must be greater than 5 feet above the workstation and comply with 6.2.6. It cannot be located under the feeder to a building where the conductors might hang down within 5 feet of the workstation as the wiring is likely not permitted by NEC® 501.10(B). 4. 14.4.3.1 is inadequate to represent how the plastic film will react to flame. The test methods in NFPA 701 are tested in a static condition, whereas, an inflatable membrane structure, the blower air flow will dramatically change the reaction to the flame. Revised requirements are needed, and the film certified for such use. 5. The proposed 14.4.3.3 is vague and cannot be uniformly enforced. A.14.4.3.3 says all of NFPA 70 and NFPA 77 apply. Regarding NFPA 70, the proposed 13.4.6.5 states that electrical wiring and electrical utilization equipment shall not be used within the membrane structure. This requirement seems to eliminate the need for any reference to NFPA 70 for electrical grounding in accordance with Article 250 of the NEC®. Because NFPA 77 contains no requirements for electrostatic bonding and grounding of membrane structures, there needs to be a either a direct reference to the applicable parts of NFPA 77 or the applicable concepts from NFPA 77 need to be incorporated here. 6. The proposed 14.4.3.6 needs to be revised such that the manufacturer shall provide the anchoring means. The proposed A.14.4.3.6 can then be eliminated. 7.14.4.5.1.2 requires that the concentration of vapors and mists in the exhaust stream of the ventilation system not exceed 10 percent of the LFL. What portion of a membrane structure can be identified as the ventilation system, and what part of that is considered to be the exhaust stream? When is the measurement required to be taken, by whom, using what instruments? This requirement is likely to frustrate both a user and an AHJ. 8. The proposed 14.4.5.4 needs to be revised to include that the supply blowers need to remain greater than 5 feet from the inflatable membrane structure. Refer to the related comment on 14.4.6.4. 9. Inflatable membrane structures include sections secured by Velcro, zippers, and the like, which are not air-tight. The proposed 14.4.6.4 needs to be revised to include a 5 foot Class I, Division 2 or Zone 2 at all sides and top of the structure, excluding the area for the exhaust. This is similar to the requirements in 18.6.1.3 for membrane enclosures which are typically under negative pressure, not positive pressure, as are inflatable finishing workstations. 10. Revise Figure 14.4.6.4 to show a 5 foot Class I, Division 2 or Zone 2 at all sides and top of the structure, excluding the area for the exhaust.

James S. Gustin

There is too much technical detail proposed in this TIA that needs additional discussion and review through our normal code development process.
There has been long standing fire protection features associated with spray finishing operations involving a variety of applications in non-traditional locations. The proposed TIA seeks to allow a lower level of fire protection and safety features from the current Standard. The occurrence of small to medium area repair within an inflatable membrane structures is not an approved method for providing safety and fire protection measures. The proposed TIA does not provide for the same level of fire protection that the current standard requires for spray areas. There is not a gap in fire and life safety features associated with spray finishing. Although it may be estimated that 65% of the industry is relying on alternative approaches and installations, these approaches and installations are non-compliant with the current Standard. The Standard provides for spray rooms and booths, and more specifically limited finishing workstations. The proposal limits the quantities of ignitable liquids to less than one gallon. If users can limit the quantities of ignitable liquids to less than one liter, their operation is outside the scope of the Standard. Small to medium touch-up operations can be performed safely and in compliance with the Standard as it is currently written. Authorities Having Jurisdiction have the requirements of the Standard to provide direction, not prohibiting operations or creating an unjustifiable and non-uniform application of safety protocols. Other considerations include the absence of automatic fire protection systems in accordance with Chapter 9, Protection. There is no consideration to have separation of the ignitable liquid supply from the enclosure. Manufacturers are advertising these inflatable enclosures as having “air hose access slots” which allows for pressurized delivery lines inside the enclosure and an unlimited supply outside. The means of egress has not been demonstrated to comply with recognized codes and standards. There is not data available for live fire performance testing of inflatable finishing workstations.

The information in the TIA does not define the number of times an Inflatable Finishing Workstation can be used or for how long it can be erected. TIA does not limit to just the spray of flammable liquid coatings. If sanding is permitted, there is no guidance for the presence of combustible dust. 14.4.3.4 - does not define the limitations of overspray (maximum permissible limits). 14.4.5.4 Supply Air - does not define minimum distance the blowers can be from carbon monoxide generating devices. 14.4.5.1.1 - does not address interlocks in the event the LEL exceeds 10% of the lower flammable limit.

This content of this proposed TIA has not been fully vetted as it still has gaps with regards to the design/structural requirements of the enclosure and meeting/maintaining LFL thresholds through the use of positive pressure as a means to exhaust flammable vapors.

**QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the instructions box.**

<table>
<thead>
<tr>
<th>Eligible to Vote: 31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Returned : 4</td>
</tr>
</tbody>
</table>

Matthew M. Euson,
Skip Donnell,
Jarod M. Moseley,
David Alan Carbery

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>15</td>
<td>A.</td>
</tr>
</tbody>
</table>

Abstain 1
Mark W. Roeber Abstain
Steven D. Jensen  D.
Brent W. Thor d,e
Donald W. Ankele Rationale D.
William C. Anderson C and D
John August Denhardt The proposed TIA intends to correct a previously unknown existing hazard.
John Schweitzer Agree.
Jeffrey R. Bennett D. : Public Benefit
Nan Wei C, D, E,
Laura Jacobsen C and D
Mark Dubbin This is already a common issue requiring guidance from NFPA. Its immediate nature merits an emergency action.
Derek P. Wester C. The proposed TIA intends to correct a previously unknown existing hazard.
Benjamin Bushaw A
James M. Sute 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.
Seung-Ho Choi A and E

Disagree

John A. LeBlanc While these operations do exist now, the newly developed content seems to go beyond what is reasonable for a TIA.
Barry Thomas I believe the committee needs to review this prior to its release!
Thomas B. George The standard as written does not permit the use of inflatable enclosures for flammable spray coating operations and thus there is no emergency to proceed with adopting the proposed language outside of the normal standard cycle.
Mark A. Bowman I don't see this as an emergency situation.
Robert J. Feldkamp Do not agree this is emergency in nature.
James S. Gustin I do not agree with the emergency nature of this subject and the TIA process is the wrong venue for such a significant change in the code.
After reviewing 5.4 from the Regulations Governing the Development of NFPA Standards, I have provided below my opinions on if this proposed TIA meets the listed criteria. “5.4 Evaluation of Emergency Nature. Determination of an emergency nature shall include but not be limited to one or more of the following factors: (a) The NFPA Standard contains an error or an omission that was overlooked during a regular revision process.” - No. This proposed TIA is not addressing a known error. While this material may be considered an omission, it was not overlooked during the regular process. It was discussed and the committee chose not to include this material until the task group could further develop and present a public input for the committee to consider. “(b) The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.” - No. This proposed TIA does not address a known conflict within NFPA 33 or another NFPA Standard. “(c) The proposed TIA intends to correct a previously unknown existing hazard.” - No. The hazard (spray application of flammable or combustible materials) is known, and the existing standard provides guidance to address the hazard. “(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.” - No. The recognized hazard is addressed by guidance already provided in NFPA 33. There was no loss data provided to demonstrate that an emergency response is needed to address known hazards associated with this type of product. I still have some reservations that the language developed by the task group has fully addressed the hazards associated with the use of this type of enclosure. While the task group made great strides in developing new requirements, I strongly believe that the proposed new requirements should go through the proper development process in the next revision cycle. “(e) The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.” - No. Multiple methods for safeguarding property or life currently exist in NFPA 33. “(f) 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.” - No. The TIA does not address a revision in the standard that was inadvertently overlooked. The initial proposal was found to be not ready for inclusion in the standard by the committee. The committee formed a task group to develop new language and to submit a public input. I am not convinced that a TIA is the appropriate way to go about making a change of this scope to the standard. I recommend that the task group present the material that is contained in this TIA as a public input in the next revision cycle and let this run through the normal development process.

This TIA does not address: 1. An error or omission that was overlooked during the regular revision process 2. A conflict in a Standard or with another Standard. 3. Corrections to a previously unknown existing hazard. 4. An offer to the public benefit that would lessen a known hazard or ameliorate a continuing dangerous condition or situation. 5. A recognition of an advance in the art of safeguarding property or life where and alternative method is not in current use or is unavailable to the public. 6. A circumstance in which the revised Standard resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical justification for the action.

I do not agree the substantiation as proposed is enough to warrant an Emergency Nature. Other than the recent addition of Chapter 18 - Spray Application Operations in Membrane Enclosures, we have required all Spray Applications be done in permanent spray booths or rooms. The process of adding Chapter 18 went through full Committee review as well as public inputs before we agreed by vote to include it in the standard. The fact that 65% of the spray finishing touch-up service doing vehicle reconditioning doesn't make this an emergency. The substantiation that it is inconvenient to use a permanent booth or spray room does not constitute and emergency. There is no indication of lose of life or equipment to warrant an Emergency TIA. I believe we need to have the full committee discuss this and go through the same scrutiny we did with Chapter 18.
<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bryant C. Jeffrey</td>
<td></td>
<td>I do not believe this proposal is urgent enough for a TIA. The full NFPA 33/34 committee should have the opportunity to review, discuss and/or revise the task force proposal as part of the normal committee process.</td>
</tr>
<tr>
<td>Mike Thies</td>
<td></td>
<td>Do not agree that this is change is considered emergency in nature and the extent of this change should be considered through normal committee review.</td>
</tr>
<tr>
<td><strong>Abstain</strong></td>
<td><strong>1</strong></td>
<td>Abstain</td>
</tr>
</tbody>
</table>
booths and spray rooms and for membrane enclosures, but is not currently covered by the standard. The operation has been created to meet an industry need without thought for the hazards to fire and life safety. The TIA seeks to act before an incident results from this unregulated operation and to provide AHJ with the basis for properly evaluating operations in their jurisdictions. Through this TIA, safeguards can be put in place sooner than waiting for the completion of the next revision cycle, which would be the end of 2023.
The UL Principal and Alternated ballot is Disagree with the TIA, while providing the technical comments below. We agree with the emergency nature, and note item 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.

1. The proposed revision to 1.1.6 needs to be revised to refer to these workstations as inflatable membrane structures. This aligns to the terms used in other applicable standards such as NFPA 5000 - 2021 and the International Fire Code - 2021. This will assist all involved, including the AHJ by having one common term.

2. The proposed new 3.3.x Inflatable Finishing Workstation definition needs to be revised such that the workstation is identified as an inflatable membrane structure, not as an apparatus. Additionally, such workstations are not capable of confining flammable vapors. This wording needs to be deleted.

3. The proposed new Section 14.4.2 for Location, is incomplete. While it restricts the location to outdoors and 20 feet from temporary structures and the public way, the requirement is lacking detail of what other restrictions are needed to address protection within the 5 foot Division 2 boundary of the outer surfaces of the structure. Refer to the related comment on 14.4.6.4. Inflatable membrane structures cannot be located near combustible materials and shrubbery (NFPA 5000) and inflatable finishing workstations cannot be located near potential sources of ignition, nor can potential ignition sources be permitted to cross the 5 foot Div. 2/ Zone 2 boundary, including vehicles, cell phones, and the like. Mobile hail repair professionals might set up in parking lots. Overhead parking lot lighting must be greater than 5 feet above the structure and totally enclosed in accordance with 6.2.6. When located outside of a building it cannot be located under the feeder to the building where the conductors might hang down within 5 feet of the workstation as the wiring is likely not permitted in Class I, Division 2 in accordance with Section 501.10(B) of the NEC®.

4. The proposed requirements for 14.4.3.1 are inadequate to represent how the plastic film that makes up the inflatable membrane structure will react to flame. The test methods in the standards referenced in 4.5, 4.6 and in NFPA 701 are tested in a static condition, whereas, if an active flame were to occur against an inflatable membrane structure, the air flow from the blowers will dramatically change the reaction of the plastic film to the flame. Revised requirements need to be developed, and the film certified for such use needs to be a requirement, and documentation made available to the user and the AHJ.

5. The proposed 14.4.3.3 is vague and cannot be uniformly enforced. A.14.4.3.3 says all of NFPA 70 and NFPA 77 apply. Regarding NFPA 70, the proposed 13.4.6.5 states that electrical wiring and electrical utilization equipment shall not be used within the membrane structure. This requirement seems to eliminate the need for any reference to NFPA 70 for electrical grounding in accordance with Article 250 of the NEC®. Because NFPA 77 contains no requirements for electrostatic bonding and grounding of membrane structures, there needs to be a either a direct reference to the applicable parts of NFPA 77 or the applicable concepts from NFPA 77 need to be incorporated here.

6. The proposed 14.4.3.6 needs to be revised such that the manufacturer shall provide the anchoring means. The proposed A.14.4.3.6 can then be eliminated.

7. 14.4.5.1.2 requires that the concentration of vapors and mists in the exhaust stream of the ventilation system not exceed 10 percent of the LFL. What portion of a membrane structure can be identified as the ventilation system, and what part of that is considered to be the exhaust stream? When is the measurement...
required to be taken, by whom, using what instruments? This requirement is likely to frustrate both a user and an AHJ.

8. The proposed 14.4.5.4 needs to be revised to include that the supply blowers need to remain greater than 5 feet from the inflatable membrane structure. Refer to the related comment on 14.4.6.4.

9. Inflatable membrane structures include sections secured by Velcro, zippers, and the like, which are not air-tight. The proposed 14.4.6.4 needs to be revised to include a 5 foot Class I, Division 2 or Zone 2 at all sides and top of the structure, excluding the area for the exhaust. This is similar to the requirements in 18.6.1.3 for membrane enclosures which are typically under negative pressure, not positive pressure, as are inflatable finishing workstations.

10. Revise Figure 14.4.6.4 to show a 5 foot Class I, Division 2 or Zone 2 at all sides and top of the structure, excluding the area for the exhaust.

Best,

Donald W. Ankele  
Principal Engineer-Hazardous Locations  
Energy & Industrial Automation  
*Distinguished Member of the Technical Staff - William Henry Merrill Society*

UL LLC  
333 Pfingsten Road  
Northbrook, IL 60062-2096 USA

W: ul.com/hazloc

*Download the complimentary UL HazLoc app* to have UL expertise at your fingertips and opt in for push notifications to receive exclusive HazLoc technical insights

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.
I have reviewed the proposed TIA Log Number 1602 to NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*, and appreciate the opportunity to submit the following comments in support of issuing this revision to the standard.

These activities are not currently covered by the standard, I often don’t get asked about them because operators ignore any possible permitting or inspection requirements that might be needed to ensure safety. But the hazards posed by these operations are similar to those in permanent installations and require similar protections.

Based on my experience with the safeguards applied to permanent spray finishing-type activities, the specific elements included in this proposed revision address important aspects necessary for fire safety, such as the construction and location, control of the hazardous material, and control of potential ignition sources. This TIA would aid me in my ability to do my job by enabling me to conduct a more thorough and consistent review with greater confidence that a safe practice has been put in place.

Through this TIA, safeguards can be put in place sooner than waiting for the completion of the next revision cycle for NFPA 33, which I understand would be the end of 2023. I support the issuance of this proposed TIA to NFPA 33.

As a paid professional fire fighter of 23 years, 16 of those years as an Officer with the fourth largest fire department of the United States.
I have reviewed the proposed TIA Log Number 1602 to NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*, and appreciate the opportunity to submit the following comments in support of issuing this revision to the standard.

As a Fire Chief for the last 8 years and previously the Fire Marshal for the same City, I have been the enforcing official for the City of West University Place, Texas for 11 years. I share the concern for the use of temporary installations where spray paints or coatings can be applied outside the normal spray booth or spray room covered by NFPA 33. As the popularity of this type of installation is rapidly increasing, the need for regulating their installation and use is now. Possible permitting or inspection requirements that might be needed to ensure safety is not enforceable by the AHJ as these activities are not currently covered by the standard but the hazards posed by these operations are similar to those in permanent installations and require similar protections.

As an AHJ, we lean heavily on the NFPA to establish codes that support enforcement of fire and life safety. This TIA would aid me in my ability to do my job by enabling me to conduct a more thorough and consistent review with greater confidence that a safe practice has been put in place.

Through this TIA, safeguards can be put in place sooner than waiting for the completion of the next revision cycle for NFPA 33, which I understand would be the end of 2023. I support the issuance of this proposed TIA to NFPA 33.

Regards,

Aaron Taylor
I am in support of both the TIA language and the emergency need. As a Fire Chief and as a consultant working on these types of projects I have seen more and more where end users are purchasing booths that are unsafe because they are cheap and because they have no guidance as to what safe construction and placement are. These individuals are putting them up after hours or inside buildings so they don’t get caught because the local AHJ’s have told them they have no guidance so therefore they are not permitted to be used. This TIA was put together with some of the best minds in the industry as far as engineering and safety requirements to put out a temporary document that gives the local AHJ guidance on what would be considered a safe enclosure should the local authority choose to permit it.

There are manufacturers in this space that provide a quality product with safety being in the forefront of design and construction and some that you can buy off of Amazon or eBay that are plastic bags with no safety designs even considered. An AHJ who just permits a booth based on the fact that there is not guidance could be allowing something that could be a huge hazard to the occupants as well as the community. I urge the committee to vote in favor of this TIA while the committee as a whole works on deeper language during the next revision cycle. We on the Task Group know that there is much more to be discussed on this topic but the truth of the matter is that these booths are out there, they are being used every day and with the 2 manufacturers that were on the task group there has not been one incident involving a fire with either of their booths.

Thank you,

Brent W Thor
President/ CEO
Thor and Associates, Inc

Notice of Confidentiality: This transmission contains information that may be confidential and that may also be privileged. Unless you are the intended recipient of the message (or authorized to receive it for the intended recipient, you may not copy, forward, or otherwise use it, or disclose its contents to anyone else. If you have received this transmission in error, please notify us immediately and delete it from your system.
As a submitter of the TIA 1602 NFPA 33 Inflatable Workstations I would like to thank the entire Task Group that was put in place at the San Diego NFPA 33 meeting in 2020. Everyone worked extremely hard on this proposed TIA language. It was a very rounded and well-versed group that dedicated a lot of time and energy to go over every concern and potential hazard with the use of inflatable workstations.

I would like to address some concerns I have heard from other committee members from the vote or from speaking via phone.

These workstations are not designed nor am I aware of any current customers utilizing high volume high pressure style spraying equipment. These would not be used for any sort of high-volume spray equipment. I had a member question whether this proposed application for inflatable workstations would permit a spray gun that could spray 1 gallon in 25 seconds. These workstations are not designed for that. I propose an line item limiting the spray gun to be a high volume, low pressure (HVLP) gun or smaller as a revision to the TIA that would address that concern.

The pressurized air hose slots designed in these workstations are intended for the spray gun air supply line, not for a continuous amount of flammable liquid.

Although it is not referenced in the proposed TIA it is not common practice to sand inside these workstations. The end users are looking for a clean environment to apply spray finishing, so there would not be any combustible dust hazard expected from this application.

It was never our intention to exclude the committee from the process. Due to the Covid Pandemic following the meeting in San Diego in 2020 the Task Group did not get an opportunity to make the previous timelines for submittal. Once the Task Group was able to properly organize and individually pick out each concern and potential hazard a game plan was put in place for a TIA submittal. The TIA was discussed in dept, however the task group understands that the TIA was developed to address the most immediate hazards from these operations that exist today with the expectation that the full committee would be able to improve upon those requirements during the upcoming revision cycle. What I personally feel that makes this much different than the previous membrane code standards are how readily available these are to the public.

Currently you can purchase inflatable workstations from Amazon, Wayfair, eBay, Alibaba, Walmart, and other outlets. These workstations are being sold with no warning labels, no guidance whatsoever for the end user. Not only does the local AHJ not have a clear path on what to look for, the end user is having absolutely no guidance on how to properly utilize these structures.

As an example of how these as yet unregulated booths are being misused, I highly recommend you take a few minutes to pull up Youtube.com and enter “inflatable paint booths” in the search bar. You will see pages of reviews ranging from videos getting over 3.5million views. One review video even has the presenter smoking a cigarette in the booth while the paint is curing on a truck he just painted.
Just like the social sites did to Game Stop stock and others on the Stock Market. That is exactly what is happening with these inflatable workstations. When you have an entry price of less than $1000.00 people will take the risk.

I spent years working with engineers on R&D for the correct design of an inflatable workstation to be able to provide a safe working environment that addresses the flammable atmosphere potential by maintaining a low LFL as well as potential ignition sources. There is no way possible these cheaper knock off versions can maintain a low LFL utilizing the blower size they use. The material they are constructed out of could not pass Test Method 1 or 2 in NFPA 701.

It is my opinion that this TIA does a good job at getting some very important safeguards put in place now.

It still has room for important just like other codes and standards. Waiting until 2024 (the next full revision cycle for NFPA 33 is F23) to have some sort of base standard is not being proactive to prevent a potential life or property hazard.

Thank you,

---

**Tom Williams**
**Mobile Environmental Solutions, LLC**
**13040 Pearson RD SU 4C**
**Montgomery TX 77356**

[www.mobileenvironmentalsolutions.com](http://www.mobileenvironmentalsolutions.com)
<table>
<thead>
<tr>
<th>From:</th>
<th>Brian Edwards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sent:</td>
<td>Tuesday, September 21, 2021 4:40 PM</td>
</tr>
<tr>
<td>To:</td>
<td>Shared TIAs</td>
</tr>
<tr>
<td>Subject:</td>
<td>MCESD#2 comment on NFPA 33</td>
</tr>
<tr>
<td>Attachments:</td>
<td>NFPA 33- 2021.pdf</td>
</tr>
</tbody>
</table>

**CAUTION:** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

**CAUTION:** Always use caution when opening attachments. Make sure you know the sender and are you expecting one.
September 21, 2021

NFPA 33-2021 Edition

I have reviewed the proposed TIA Log Number 1602 to NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*, and appreciate the opportunity to submit the following comments in support of issuing this revision to the standard.

As an enforcing official for MCESD#2/ Montgomery FD, I have experienced frequent instances where operations involving the use of spray application of flammable paints or coatings have been performed in “pop-up” or temporary installations. I have observed various designs and configurations for these installations and have questioned whether they incorporate the essential elements to ensure fire and life safety during their operation. Generally, I look to the fire and life safety codes for guidance when evaluating such operations, but in this case, these inflatable workstations are not currently addressed within any such documents.

Based on my experience inspecting spray finishing-type activities, the specific elements included in this proposed revision address important aspects necessary for fire safety, such as the construction and location, control of the hazardous material, and control of potential ignition sources. This TIA would aid me in my ability to do my job as I would be able to point to specifically developed requirements for this operation and the hazards, which in turn makes the review process more consistent and yields a higher confidence in the overall safety.

Through this TIA, safeguards can be put in place sooner than waiting for the completion of the next revision cycle for NFPA 33, which I understand would be the end of 2023. I support the issuance of this proposed TIA to NFPA 33.

Sincerely,

Brian Edwards
MCESD#2 Fire Chief
Greetings. I have reviewed the proposed TIA Log Number 1602 to NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*, and appreciate the opportunity to submit the following comments in support of issuing this revision to the standard.

As a current NFPA member as well as a Texas certified master inspector for over 20 years, I have experienced frequent instances where operations involving the use of spray application of flammable paints or coatings have been performed in “pop-up” or temporary installations. I have observed various designs and configurations for these installations and have questioned whether they incorporate the essential elements to ensure fire and life safety during their operation. Generally, I look to the fire and life safety codes adopted by the AHJ for guidance when evaluating such operations, but in this case, these inflatable workstations are not currently addressed within any such documents. Applying the spray booth or spray room provisions in NFPA 33 requires me or any fire inspector to adapt and interpret those provisions to this alternative design and application or to prohibit such operations altogether. The code enforcement agency of the AHJ, is normally permitted to accept alternative approaches through the equivalency provisions in NFPA 33, however, that approach requires the evaluation of all the required features and select which to apply in order to guard against the specific hazards.

In reviewing the proposed TIA, I believe that the hazard conditions anticipated from a spray painting or coating activity have been addressed in the proposed requirements – limiting use to outdoors only, use of noncombustible materials, separation distances to other structures, limiting quantity of flammable material within the enclosure, electrical safeguards (bonding/grounding, electrostatic controls, and electrical area classification), ventilation, and fire protection. As this application differs from the permanent arrangements currently addressed by the standard, the adjustments based on the scale of the workstations and the activity, provide a safe condition.

The TIA, if issued, would serve to address a practice that is ongoing, but which currently has no specific source of protection for fire and life safety. The operation uses the same materials in an identical application form as that which is currently covered by NFPA 33 for permanent spray booths and spray rooms and for membrane enclosures but is not currently covered by the standard as a specific operation. Many of these installations have been created to meet an industry need without thought for the hazards to fire and life safety that would be found in a permanent spray booth or spray room. The TIA seeks to act before an incident results from this unregulated operation and to provide the AHJ, with the basis for properly evaluating operations in the jurisdiction. This TIA would aid the AHJ in its ability, as codified by local ordinance, the ability to do its job as the AHJ would be able to point to specifically developed requirements for this operation and the hazards, which in turn makes the review process more consistent and yields a higher confidence in the overall safety.

Respectfully Submitted,

Derek Elkins
Master Fire Inspector (TCFP ID#70815095)
NFPA Engage Member #2362952
Owner/Chief Training Officer
Safety and Fire Education Training LLC
This code would greatly help and benefit our current and future processes. As a mobile hail and SMART repair business, it is imperative for our operations to conduct our repairs in as safe and efficient manner possible. The use and ability to use these workstations not only protect our staff but the environment, as well. We have tried to utilize other “pop-up” style tents while doing mobile SMART repairs, however none are even close to comparable to the benefits of ventilation and reductions of contaminates and vapors. These enclosed workstations allow us to perform the safest, cleanest and most efficient repairs protecting those using it, as well as the environment and area surroundings.

Michael Nosker
Metro Dent
1620 E State Hwy 121
Ste C100
Lewisville, TX 75056
www.HailFreeCar.com
NFPA 55-2020 Edition
Compressed Gases and Cryogenic Fluids Code
TIA Log No.: 1601
Reference: 17.2.9(new) and A.17.2.9(new)
Comment Closing Date: August 30, 2021
Submitter: Keith Ferrari, Linde/Praxair, Inc.

1. Add a new section 17.2.9 to read as follows:
   17.2.9* Outdoor bulk cryogenic liquid systems shall have at least two means of egress provided from any enclosure.
   17.2.9.1 Outdoor bulk cryogenic liquid systems shall be in accordance with ANSI/CGA M-1, Standard for Medical Gas Supply Systems at Health Care Facilities.

2. Add a new Annex A.17.2.9 to read as follows:
   A.17.2.9 Enclosures include those that are fenced or walled.

Substantiation: The NFPA 55, 2020 Edition went through a consolidation of information transferred from NFPA 99, 2018 to be included into the NFPA 55, 2020 edition. The section below seems to have been missed. I went through the comments and drafts associated with NFPA 55, 2020 edition and did not see any comments or justification to remove (omit) this safety item that has been in the NFPA 99 since the 2012 edition.

I also reviewed CGA M-1, 2018 that is referenced in NFPA 55, 2020, I did not find anywhere in CGA M-1 a requirement to install a minimum of two means of egress.

REFERENCE: NFPA 99, 2018
5.1.3.3.2* Design and Construction. Locations for central supply systems and the storage of positive-pressure gases shall meet the following requirements:
(5) If outdoors, bulk cryogenic liquid systems shall be provided with a minimum of two entry/exits.

ROP 2011 of the NFPA 99 for the 2012 edition:
99-141 Log #278 HEA-PIP Final Action: Accept (5.1.3.3.2(3))

Submitter: Keith Ferrari, Praxair
Recommendation: Revise text to read as follows: 5.1.3.3.2* Design and Construction. Locations for central supply systems and the storage of positive pressure gases shall meet the following requirements: (For Bulk Cryogenic Systems) - (3) If outdoors, be provided with an enclosure (wall or fencing) constructed of noncombustible materials with a min. of two entry/exits.
Substantiation: This is an employee safety issue. In the case of a bulk cryogenic supply source, you could have a valve rupture or fill line leak or any other number of failure scenarios occur. If the outdoor storage location only has one entry/exit and an employee is inside the fence or enclosure performing maintenance or testing and a failure occurs blocking the only exit (for
example liquid oxygen streaming through the gate opening blocking the exit), the employee will need another way out of the enclosure.

Committee Meeting Action: Accept

Number Eligible to Vote: 22 Ballot Results:
Affirmative: 20 Ballot Not Returned: 2 Shoemaker, E., Thomason, R.

Also, note that Hydrogen Bulk Systems in chapters 10 and 11 of NFPA 55, 2020 does include two means of egress:
11.4.1.3.2 At least two means of egress shall be provided from any fenced area.
10.4.6.3 At least two means of egress shall be provided from any fenced area.

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 of the action.

This is an employee safety issue. In the case of a bulk cryogenic supply source, you could have a valve rupture or fill line leak or any other number of failure scenarios occur. If the outdoor storage location only has one entry/exit and an employee is inside the fence or enclosure performing maintenance or testing and a failure occurs blocking the only exit (for example liquid oxygen streaming through the gate opening blocking the exit), the employee will need another way out of the enclosure. Note: Cases exist of employees’ injuries/fatalities under these conditions.
MEMORANDUM

TO: Technical Committee on Industrial and Medical Gases

FROM: Yiu Lee, Committee Administrator

DATE: September 9, 2021

SUBJECT: NFPA 55 Proposed TIA No. 1601 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to Section 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

26 Eligible to Vote
7 Not Returned (Barnes, Bogart, Frick, Gonzalez, Lachawiec, Jr., Pringle, Richardson)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>17 Agree (w/comment: Fasel, Gresho, Ngai, Sutter)</td>
<td>19 Agree (w/comment: Beach, Ehrhart, Fasel, Gordon, Gresho, Ngai, Sutter)</td>
</tr>
<tr>
<td>2 Disagree (Beach, Ehrhart)</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[
[26 \text{ eligible } \div 2 = 13 + 1 = 14] \]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 15.

\[
[26 \text{ eligible to vote } - 7 \text{ not returned } - 0 \text{ abstentions} = 19 \times 0.75 = 14.25 = 15 \text{ (rounded up)}] \]

Ballot comments are attached for your review.

The Regs at Section 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with Section 4.2.6.

Appeal Closing Date for this TIA is September 14, 2021
**QUESTION NO.1:** I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1601 to add new section 17.2.9 and add a new Annex A.17.2.9.

<table>
<thead>
<tr>
<th>Eligible to Vote: 26</th>
<th>Not Returned: 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alejandro Gonzalez,</td>
<td>Anthony J. Lachawiec, Jr.,</td>
</tr>
<tr>
<td>Rodney L. Barnes,</td>
<td>April Dawn Richardson,</td>
</tr>
<tr>
<td>Robert Bogart,</td>
<td>Jef Frick,</td>
</tr>
<tr>
<td>Josh Pringle</td>
<td></td>
</tr>
</tbody>
</table>

**Vote Selection** | **Votes** | **Comments**
--- | --- | ---
Agree | 17 | The proposed language was missed in the consolidation of the requirements into chapter 17.

Eugene Y. Ngai
Jonathan C. Willard
Martin T. Gresho

Robert M. Sutter

This was missed in the revision process

Agree

This TIA should be approved but needs to be improved as well. The text that was not included from NFPA 99 was incomplete as is existing text from NFPA 55 Ch 10 and 11 highlighted in the TIA substantiation. Once outdoors, egress is not crystal clear in terms of enforceability and applicability of relevant codes. To simply state that one or two means of egress is required is incomplete. What type of egress is required? Dimensions? swing? Remoteness? Hardware? Exit path? Travel distance? All these are left open for interpretation. A common problem for outdoor fenced areas is gates with fence/gate type door hardware and padlocks. Administrative controls to remove padlocks when occupied are often cited as justification but are weak and specifically prohibited indoors. Should gate hardware be allowed here? The TIA is well intentioned but needs to have specific additional detail clearly stating the specific requirements intended by the term “means of egress” as used here. For example, the likely critical elements are: 1. Remoteness. The exits should be sufficiently remote as to be useful. They cannot be next to each other. However, the typical remoteness rules in NFPA 101 or IBC won’t work as written either so a simple specific requirement specific to this application in NFPA 55 and enforced by Fire Code Officials (not building officials as is often the case with egress) needs to be developed. 2. Door hardware. Be specific. Door hardware needs to meet single action and no special knowledge criteria in NFPA 101 or the IBC. Padlocks need to be prohibited. 3. Direction of swing – specify if this is important. 4. Type of door. Is a swinging door or gate with door hardware OK? Likely yes but a rolling gate of a vehicle access (larger) swinging gate likely is not. Not consistently enforceable as written. Suggest this TIA be approved and this comment be provided with a requirement for further action, from the Standards Council to the affected TCs (at least NFPA 55, 2 and perhaps 101) regarding serious issues with egress as applied to outdoor “enclosures”.

Scott E. Swanson
Richard P. Palluzi
Erik W. Christiansen

agree
I agree
I agree with the Technical Merits
The proposal is based on NFPA 99, which apparently recognized walled areas as acceptable enclosures. This conflicts with the intent of NFPA 55 to allow natural ventilation to aid in dispersion of unintentional releases. See NFPA 55:6.7.3 and 55:8.6.2.1.4. In general, I think this subject should be expanded to discuss physical protection of these critical healthcare systems to prevent tampering and unauthorized access. See NFPA 58:6.21.4. If the reference to walled areas is removed or additional information related to limiting obstructions to dispersion is added, then I would be in favor of the TIA as an interim step to a more comprehensive approach.

I agree that adding a requirement for at least 2 means of egress could make sense, and that there does not seem to be this explicit requirement elsewhere. However, according to my understanding of the TIA, there is also a sub-section added (17.2.9.1) which would also require "Outdoor bulk cryogenic liquid systems shall be in accordance with ANSI/CGA M-1, Standard for Medical Gas Supply Systems at Health Care Facilities." This additional requirement seems overly broad and is not addressed in the substantiation at all; the only aspect discussed in the substantiation is the 2 means of egress.

This is a safety concerns for the individual delivering or servicing the oxygen cryogenic fluid system.

This was missed in the revision process

Outdoor location does mitigate urgency somewhat but still urgent enough for a TIA. See technical concerns with technical merits.
<table>
<thead>
<tr>
<th>Name</th>
<th>Vote</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scott E. Swanson</td>
<td>agree</td>
<td>I agree</td>
</tr>
<tr>
<td>Richard P. Palluzi</td>
<td>I agree</td>
<td>Agree due to reason A: The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Erik W. Christiansen</td>
<td></td>
<td>Agree due to reason A: The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Denise Beach</td>
<td></td>
<td>This appears to be a clear oversight in the inclusion of the NFPA 99 requirements.</td>
</tr>
<tr>
<td>Kenneth Fegley</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Gerald T. Hayes</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Rob Early</td>
<td>reason A</td>
<td></td>
</tr>
<tr>
<td>Edgar Wolff-Klammer</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>David A. Rohrig</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Bryan R. Gordon</td>
<td></td>
<td>I agree that this is emergency in nature to ensure all of the references from NFPA-99 are incorporated and the code is updated to provide basic considerations for service/operator safety in accordance with OSHA and NFPA</td>
</tr>
<tr>
<td>Brian D. Musch</td>
<td>A</td>
<td>I agree with the proponents substantiation.</td>
</tr>
<tr>
<td>Mark Fasel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brian Ehrhart</td>
<td></td>
<td>I agree that the TIA is of emergency nature per reason F: 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.</td>
</tr>
<tr>
<td>Michael Ciotti</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bridget Hamilton</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Disagree**: 0
**Abstain**: 0
This TIA should be approved but needs to be improved as well. The text that was not included from NFPA 99 was incomplete as is existing text from NFPA 55 Ch 10 and 11 highlighted in the TIA substantiation. Once outdoors, egress is not crystal clear in terms of enforceability and applicability of relevant codes. To simply state that one or two means of egress is required is incomplete. What type of egress is required? Dimensions? swing? Remoteness? Hardware? Exit path? Travel distance? All these are left open for interpretation. A common problem for outdoor fenced areas is gates with fence/gate type door hardware and padlocks. Administrative controls to remove padlocks when occupied are often cited as justification but are weak and specifically prohibited indoors. Should gate hardware be allowed here? The TIA is well intentioned but needs to have specific additional detail clearly stating the specific requirements intended by the term “means of egress” as used here. For example, the likely critical elements are: 1. Remoteness. The exits should be sufficiently remote as to be useful. They cannot be next to each other. However, the typical remoteness rules in NFPA 101 or IBC won’t work as written either so a simple specific requirement specific to this application in NFPA 55 and enforced by Fire Code Officials (not building officials as is often the case with egress) needs to be developed. 2. Door hardware. Be specific. Door hardware needs to meet single action and no special knowledge criteria in NFPA 101 or the IBC. Padlocks need to be prohibited. 3. Direction of swing – specify if this is important. 4. Type of door. Is a swinging door or gate with door hardware OK? Likely yes but a rolling gate of a vehicle access (larger) swinging gate likely is not. Not consistently enforceable as written. Suggest this TIA be approved and this comment be provided with a requirement for further action, from the Standards Council to the affected TCs (at least NFPA 55, 2 and perhaps 101) regarding serious issues with egress as applied to outdoor “enclosures”.

Martin Gresho, PE
FP2FIRE
1140 Indian Peak Road
Golden, CO 80403

WEB: www.fp2fire.com
I support this proposed TIA as written. This section is copied into NFPA 99, 5.1.3.10; 2021 edition. I discovered it too late to send a proposal for either 55 or 99.

This is a safety issue for personnel that needs to be added back into the requirements.

Corky Bishop
Apex Medical Gas Systems
MGPHO CMGV

Sent from Mail for Windows 10
1. Revise Article 100, Part III to include Combustible Fibers/Flyings and Ignitible Fibers/Flyings to read as follows:

**Part III. Hazardous (Classified) Locations (CMP-14).**

**Combustible Fibers/Flyings.** Fibers/flyings, where any dimension is greater than 500 \( \mu m \) in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. \[499:3.3.4.1\]

Informational Note No.1: This definition and Informational Notes No. 2 and 3 have been extracted from NFPA 499-2021, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*. The NFPA 499 reference is in brackets. Only editorial changes were made to the extracted text to make it consistent with this Code.

Informational Note No. 2: Section 500.5(D) of this Code prescribes a Class III location. Combustible fibers/flyings can be similar in physical form to ignitible fibers/flyings and protected using the same electrical equipment installation methods. Examples of fibers/flyings include flat platelet-shaped particulate, such as metal flake, and fibrous particulate, such as particle board core material. If the smallest dimension of a combustible material is greater than 500 \( \mu m \), it is unlikely that the material would be combustible fibers/flyings, as determined by test. Finely divided solids with lengths that are large compared to their diameter or thickness usually do not pass through a 500 \( \mu m \) sieve, yet when tested could potentially be determined to be explosible. \[499:A.3.3.4.1\]

Informational Note No. 3: The typical test methods for evaluating an explosive mixture are ASTM E1226-2012a, *Standard Test Method for Explosibility of Dust Clouds*, ISO 6184-1-1985 (2005), *Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air*, or ISO/IEC/UL 80079-20-2-2016, *Explosive atmospheres — Part 20-2: Material characteristics — Combustible dusts test methods*, for procedures for determining the explosibility of dusts. A material that is found to not present an explosive mixture hazard could still be an ignitible fiber/flying, as defined in this article. Historically, the explosibility condition has been described as presenting a flash fire or explosion hazard. It could be understood that the potential hazard due to the formation of an explosive mixture when suspended in air at standard atmospheric pressure and temperature would include ignition. \[499:A.3.3.4.1\]

**Ignitible Fibers/Flyings.** Fibers/flyings where any dimension is greater than 500 \( \mu m \) in nominal size, which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitible layer fire hazard. \[499:3.3.4.2\]

Informational Note No.1: This definition and Informational Note No. 2 have been extracted from NFPA 499-2021, *Recommended Practice for the Classification of*
Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas. The NFPA 499 reference is in brackets. Only editorial changes were made to the extracted text to make it consistent with this Code.

Informational Note No. 2: Section 500.5 of this Code prescribes a Class III location as one where ignitible fibers/flyings are present, but not likely to be in suspension in the air in quantities sufficient to produce ignitible mixtures. This description addresses fibers/flyings that do not present a flash-fire hazard or explosion hazard by test. This could be because those fibers/flyings are too large or too agglomerated to be suspended in air in sufficient concentration, or at all, under typical test conditions. Alternatively, this could be because they burn so slowly that, when suspended in air, they do not propagate combustion at any concentration. The zone classification system does not address ignitible fibers/flyings.

Where these are present, the user should consider installation in accordance with Article 503 of this Code. [499:A.3.3.4.2]

2. Revise Section 500.5(D) to read as follows:

500.5(D) Class III Locations. Class III locations are those that are hazardous because of the presence of easily ignitible fibers or where materials producing combustible flyings are handled, manufactured, or used, but in which such fibers/flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitible mixtures. Class III locations shall include those specified in 500.5(D)(1) and (D)(2). Class III locations shall be locations meeting the requirements of 500.5(D)(1) and (D)(2).

1. Class III, Division 1.

A Class III, Division 1 location is a location in which easily ignitible fibers/flyings are handled, manufactured, or used. Class III, Division 1 locations shall include those locations specified in 500.5(D)(1)(a) and (D)(1)(b).

(a) Combustible Fibers/Flyings. Locations where nonmetal combustible fibers/flyings are in the air under normal operating conditions in quantities sufficient to produce explosible mixtures or where mechanical failure or abnormal operation of machinery or equipment might cause combustible fibers/flyings to be produced and might also provide a source of ignition through simultaneous failure of electrical equipment, through operation of protection devices, or from other causes shall be classified as Class III, Division 1. Locations where metal combustible fibers/flyings are present shall be classified as Class II, Division 1, Group E.

Informational Note No. 1: Such locations usually include some parts of rayon, cotton, and other textile mills; combustible fibers/flyings associated manufacturing and processing plants; cotton gins and cotton-seed mills; flax-processing plants; clothing manufacturing plants; woodworking plants; and establishments and industries involving similar hazardous processes or conditions.

Informational Note No. 2: Combustible fibers/flyings include flat platelet-shaped particulate such as metal flake and fibrous board such as particle board.

(b) Ignitible Fibers/Flyings. Locations where ignitible fibers/flyings are handled, manufactured, or used shall be classified as Class III, Division 1.

Informational Note No. 1: Such locations usually include some parts of rayon, cotton, and other textile mills; combustible fibers/flyings associated manufacturing and processing plants; cotton gins and cotton-seed mills; flax-processing plants; clothing manufacturing...
plants; woodworking plants; and establishments and industries involving similar hazardous processes or conditions.

Informational Note No. 2: Easily ignitable fibers/flyings can include rayon, cotton (including cotton linters and cotton waste), sisal or henequen, istle, jute, hemp, tow, cocoa fiber, oakum, baled waste kapok, Spanish moss, excelsior, and other materials of similar nature.

(2) Class III, Division 2.
A Class III, Division 2 location is a location in which easily ignitable fibers/flyings are stored or handled other than in the process of manufacture. Class III, Division 2 locations shall include those locations specified in 500.5(D)(2)(a) and (D)(2)(b).

(a) Combustible Fibers/Flyings. Locations where nonmetal combustible fibers/flyings might be present in the air in quantities sufficient to produce explosible mixtures due to abnormal operations or where accumulations of nonmetal combustible fibers/flyings accumulations are present but are insufficient to interfere with the normal operation of electrical equipment or other apparatus but could, as a result of infrequent malfunctioning of handling or processing equipment, become suspended in the air shall be classified as Class III, Division 2.

(b) Ignitible Fibers/Flyings. Locations where ignitible fibers/flyings are stored or handled, other than in the process of manufacture, shall be classified as Class III, Division 2.

3. Revise Section 500.6 to read as follows:

500.6 Materials Groups:
For purposes of testing, approval, and area classification, various air mixtures (not oxygen-enriched) shall be grouped in accordance with 500.6(A) and (B).

Exception: Equipment identified for a specific gas, vapor, dust, or fiber/flying.

Informational Note: This grouping is based on the characteristics of the materials.

Facilities are available for testing and identifying equipment for use in the various atmospheric groups.

(A) Class I Group Classifications. …

(B) Class II Combustible Dust Group Classifications.
Class II groups shall be in accordance with 500.6(B)(1) through (B)(3).
Combustible dust shall be grouped in accordance with 500.6(B)(1) through (B)(3).

…

(C) Class III Combustible Fibers/Flyings. Combustible fibers/flyings shall not be further grouped.

(D) Class III Ignitible Fibers/Flyings. Ignitible fibers/flyings shall not be further grouped.

4. Revise Section 500.8(D)(2) and (D)(3) to read as follows:

500.8(D) Temperature.
(1) Class I Temperature. …
(2) Class II Temperature. The temperature marking specified in 500.8(C) shall be less than the ignition temperature of the specific dust or metal fiber/flying to be encountered. For organic dusts that may dehydrate or carbonize, the temperature marking shall not exceed the lower of either the ignition temperature or 165°C (329°F).

Informational Note: See NFPA 499-2017, Recommended Practice for the
(3) **Class III Temperature.** The temperature marking specified in 500.8(C) shall be less than the ignition temperature of the specific fiber/flying to be encountered, except as specified in 500.8(D)(3)(a) or (D)(3)(b).

(a) For nonmetal combustible fibers/flyings that may dehydrate or carbonize, the temperature marking shall not exceed the lower of either the ignition temperature or 165°C (329°F).

(b) When ignitible fibers/flyings are present, the maximum surface temperatures under operating conditions shall not exceed 165°C (329°F) for equipment that is not subject to overloading and 120°C (248°F) for equipment (such as motors or power transformers) that could be overloaded.

5. Revise Section 503.1 to read as follows:

**503.1 Scope.** Article 503 covers the requirements for electrical and electronic equipment and wiring for all voltages in Class III, Division 1 and 2 locations where fire or explosion hazards may exist due to nonmetal combustible fibers/flyings or ignitible fibers/flyings.

6. Revise Section 503.5 and 503.6 to read as follows:

**503.5 General.** Equipment installed in Class III locations shall be able to function at full rating without developing surface temperatures high enough to cause excessive dehydration or gradual carbonization of accumulated fibers/flyings. Organic material that is carbonized or excessively dry is highly susceptible to spontaneous ignition. The maximum surface temperatures under operating conditions shall not exceed 165°C (329°F) for equipment that is not subject to overloading, and 120°C (248°F) for equipment (such as motors or power transformers) that may be overloaded.

Informational Note No. 1: For electric trucks, see NFPA 505-2018, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations.*

Informational Note No. 2: Organic material that is carbonized or excessively dry is highly susceptible to spontaneous ignition.

**503.6 Zone Equipment.** Equipment listed and marked in accordance with 506.9(C)(2) for Zone 20 locations and with a temperature marking class of in accordance with 500.8(D)(3) not greater than T120°C (for equipment that may be overloaded) or not greater than T165°C (for equipment not subject to overloading) shall be permitted in Class III, Division 1 locations.

Equipment listed and marked in accordance with 506.9(C)(2) for Zone 20, 21, or 22 locations and with a temperature marking in accordance with 500.8(D)(3) class of not greater than T120°C (for equipment that may be overloaded) or not greater than T165°C (for equipment not subject to overloading) shall be permitted in Class III, Division 2 locations.
7. Revise Section 503.125 Exception to read as follows:

503.125 Motors and Generators — Class III, Divisions 1 and 2.

In Class III, Divisions 1 and 2 locations, motors, generators, and other rotating machinery shall be totally enclosed nonventilated, totally enclosed pipe ventilated, or totally enclosed fan cooled.

Exception: In locations where, in the judgment of the authority having jurisdiction, only moderate accumulations of lint or ignitible fibers/flyings are likely to collect on, in, or in the vicinity of a rotating electrical machine and where such machine is readily accessible for routine cleaning and maintenance, one of the following shall be permitted:

1. Self-cleaning textile motors of the squirrel-cage type
2. Standard open-type machines without sliding contacts, centrifugal or other types of switching mechanisms, including motor overload devices
3. Standard open-type machines having such contacts, switching mechanisms, or resistance devices enclosed within tight housings without ventilating or other openings

8. Revise Section 503.145 Exception to read as follows:

503.145 Receptacles and Attachment Plugs — Class III, Divisions 1 and 2.

Receptacles and attachment plugs shall be of the grounding type, shall be designed so as to minimize the accumulation or the entry of fibers/flyings, and shall prevent the escape of sparks or molten particles.

Exception: In locations where, in the judgment of the authority having jurisdiction, only moderate accumulations of lint or ignitible fibers/flyings are likely to collect in the vicinity of a receptacle, and where such receptacle is readily accessible for routine cleaning, and mounted to minimize the entry of fibers/flyings, general-purpose grounding-type receptacles mounted so as to minimize the entry of fibers/flyings shall be permitted.

9. Revise Section 506.1 to read as follows:

506.1 Scope.

This article covers the requirements for the zone classification system as an alternative to the division classification system covered in Article 500, Article 502, and Article 503 for electrical and electronic equipment and wiring for all voltages in Zone 20, Zone 21, and Zone 22 hazardous (classified) locations where fire and explosion hazards may exist due to combustible dusts, or combustible fibers/flyings, or ignitible fibers/flyings.

This article does not cover area classification and general requirements for dusts for the division system as described in 500.1. This Code does not address the unique risk and explosion hazards associated with explosives, pyrotechnics, and blasting agents.

Informational Note No. 1: For the requirements for electrical and electronic equipment and wiring for all voltages in Class I, Division 1 or Division 2; Class II, Division 1 or Division 2; Class III, Division 1 or Division 2; Zone 0; Zone 1; or Zone 2 hazardous (classified) locations where fire or explosion hazards may exist due to flammable gases or vapors, flammable liquids, or combustible dusts or ignitible fibers/flyings, refer to Articles 500 through 505. See 505.20 or 505.22 for Zone 0, Zone 1, or Zone 2 hazardous (classified) locations where fire or explosion hazards may exist due to flammable gases or vapors or flammable liquids.

Informational Note No. 2: Zone 20, Zone 21, and Zone 22 area classifications are based
on the modified IEC area classification system as defined in ANSI/ISA 60079-10-2 (12.10.05)-2013, Explosive Atmospheres — Part 10-2: Classification of Areas — Combustible Dust Atmospheres.

Informational Note No. 3: The unique hazards associated with explosives, pyrotechnics, and blasting agents are not addressed in this article.

Informational Note No. 34: NFPA 499-2017, Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas, provides additional information for classification of hazardous (classified) locations using zone methodology.

10. Revise Section 506.5 to read as follows:

506.5 Classification of Locations.
(A) Classifications of Locations. Locations shall be classified on the basis of the properties of the combustible dust, or ignitable combustible fibers/flyings, or ignitable fibers/flyings that may be present, and the likelihood that a combustible or ignitable combustible concentration or quantity is present. Each room, section, or area shall be considered individually in determining its classification. Where pyrophoric materials are the only materials used or handled, these locations are outside of the scope of this article.

(B) Zone 20, Zone 21, and Zone 22 Locations. Zone 20, Zone 21, and Zone 22 locations are those in which combustible dust, or ignitable combustible fibers/flyings, or ignitable fibers/flyings are or may be present in the air or in layers, in quantities sufficient to produce explosive or ignitable mixtures. Zone 20, Zone 21, and Zone 22 locations shall include those specified in 506.5(B)(1), (B)(2), and (B)(3).

Informational Note: Through the exercise of ingenuity in the layout of electrical installations for hazardous (classified) locations, it is frequently possible to locate much of the equipment in a reduced level of classification and, thus, to reduce the amount of special equipment required.

(1) Zone 20. A Zone 20 location is a location in which any of the following occur:

(1) Ignitible concentrations of combustible dust, or ignitable combustible fibers/flyings, or ignitable fibers/flyings are present continuously or for long periods of time.

(2) Ignitible concentrations of combustible dust or ignitable fibers/flyings are present for long periods of time.

Informational Note No. 1: As a guide to classification of Zone 20 locations, refer to ANSI/ISA 60079-10-2 (12.10.05)-2013, Explosive Atmospheres — Part 10-2: Classification of areas — Combustible dust atmospheres.

Informational Note No. 2: Zone 20 classification includes locations inside dust containment systems; hoppers, silos, etc., cyclones and filters, dust transport systems, except some parts of belt and chain conveyors, etc.; blenders, mills, dryers, bagging equipment, etc.

(23) Group IIIC combustible dusts are present in quantities sufficient to be hazardous continuously or for long periods of time.

(2) Zone 21. A Zone 21 location is a location where one of the following apply:

(1) Ignitible concentrations of combustible dust, or ignitable combustible fibers/flyings, or ignitable fibers/flyings are likely to exist occasionally under normal operating conditions; or

(2) Ignitible concentrations of combustible dust, or ignitable combustible fibers/flyings, or ignitable fibers/flyings may exist frequently because of repair or maintenance operations or because of leakage; or
(3) Equipment is operated or processes are carried on, of such a nature that equipment breakdown or faulty operations could result in the release of ignitible concentrations of combustible dust, or ignitible combustible fibers/flyings, or ignitible fibers/flyings and also cause simultaneous failure of electrical equipment in a mode to cause the electrical equipment to become a source of ignition; or

(4) The location is adjacent to a Zone 20 location from which ignitible concentrations of combustible dust, or ignitible combustible fibers/flyings, or ignitible fibers/flyings could be communicated.

Exception: When communication from an adjacent Zone 20 location is minimized by adequate positive pressure ventilation from a source of clean air, and effective safeguards against ventilation failure are provided.

(5) Group IIIC combustible dusts are present in quantities sufficient to be hazardous occasionally; under normal or abnormal operating conditions; or frequently because of repair or maintenance operations or because of leakage.

Informational Note No. 1: As a guide to classification of Zone 21 locations, refer to ANSI/ISA 60079-10-2 (12.10.05)-2013, Explosive Atmospheres — Part 10-2: Classification of areas — Combustible dust atmospheres.

Informational Note No. 2: This classification usually includes locations outside dust containment and in the immediate vicinity of access doors subject to frequent removal or opening for operation purposes when internal combustible mixtures are present; locations outside dust containment in the proximity of filling and emptying points, feed belts, sampling points, truck dump stations, belt dump over points, etc., where no measures are employed to prevent the formation of combustible mixtures; locations outside dust containment where dust accumulates and where due to process operations the dust layer is likely to be disturbed and form combustible mixtures; locations inside dust containment where explosive dust clouds are likely to occur (but neither continuously, nor for long periods, nor frequently) as, for example, silos (if filled and/or emptied only occasionally) and the dirty side of filters if large self-cleaning intervals are occurring.

(3) Zone 22. A Zone 22 location is a location where one of the following apply:

(1) Ignitible concentrations of combustible dust, or ignitible combustible fibers/flyings, or ignitible fibers/flyings are not likely to occur in normal operation and, if they do occur, will only persist for a short period; or

(2) Combustible dust, or ignitible combustible fibers/flyings, or ignitible fibers/flyings are handled, processed, or used but in which the dust or fibers/flyings are normally confined within closed containers of closed systems from which they can escape only as a result of the abnormal operation of the equipment with which the dust or fibers/flyings are handled, processed, or used; or

(3) The location is adjacent to a Zone 21 location, from which ignitible concentrations of combustible dust, or ignitible combustible fibers/flyings, or ignitible fibers/flyings could be communicated.

Exception No. 1: When communication from an adjacent Zone 21 location is minimized by adequate positive pressure ventilation from a source of clean air, and effective safeguards against ventilation failure are provided.

Exception No. 2: For Group IIC combustible dusts or metal combustible fibers/flyings, there shall be only Zone 20 or 21 locations.

Informational Note No. 1: As a guide to classification of Zone 22 locations, refer to
ANSI/ISA 60079-10-2 (12.10.05)-2013, Explosive Atmospheres — Part 10-2: Classification of areas — Combustible dust atmospheres.

Informational Note No. 2: Zone 22 locations usually include outlets from bag filter vents, because in the event of a malfunction there can be emission of combustible mixtures; locations near equipment that has to be opened at infrequent intervals or equipment that from experience can easily form leaks where, due to pressure above atmospheric, dust will blow out; pneumatic equipment, flexible connections that can become damaged, etc.; storage locations for bags containing dusty product, since failure of bags can occur during handling, causing dust leakage; and locations where controllable dust layers are formed that are likely to be raised into explosive dust–air mixtures. Only if the layer is removed by cleaning before hazardous dust–air mixtures can be formed is the area designated unclassified.

Informational Note No. 3: Locations that normally are classified as Zone 21 can fall into Zone 22 when measures are employed to prevent the formation of explosive dust–air mixtures. Such measures include exhaust ventilation. The measures should be used in the vicinity of (bag) filling and emptying points, feed belts, sampling points, truck dump stations, belt dump over points, etc.

11. Revise Section 506.6 to read as follows:

506.6 Material Groups. For the purposes of testing, approval, and area classification, various air mixtures (not oxygen enriched) shall be grouped as required in 506.6(A), (B), and (C).

(A) Group IIIC.
Combustible metal dust, including metal combustible fibers/flyings. Group IIIC shall be considered to be equivalent to Class II, Group E. [499:3.3.8.2.1]

(B) Group IIIB.
Combustible dust other than combustible metal dust. Group IIIB shall be considered to be equivalent to Class II, Groups F and G. [499:3.3.8.2.2]

Informational Note: Group IIIA materials are larger particle-size than Group IIIB materials and do not include metal combustible dust or metal combustible fibers/flyings. [499:A.3.3.8.2.3]

(C) Group IIIA.
Solid particles, including fibers, greater than 500 µm in nominal size, which could be suspended in air and could settle out of the atmosphere under their own weight. Group IIIA shall be considered to be equivalent to Class III. Combustible fibers/flyings or ignitible fibers/flyings other than metal. [499:3.3.8.2.3]

Informational Note No. 1: Group IIIA materials are larger particle-size than Group IIIB materials and do not include metal dust or metal fibers/flyings. [499:A.3.3.8.2.3]

Informational Note No. 2: Examples of ignitible fibers/flyings include rayon, cotton (including cotton linters and cotton waste), sisal, jute, hemp, cocoa fiber, oakum, and baled waste kapok.

Informational Note No. 3: Combustible fibers/flyings include flat platelet-shaped particulate such as metal flake and fibrous board such as particle board.

12. Revise Sections 506.7(C) and (D) to read as follows:

506.7 Special Precaution.
(C) **Reclassification Permitted.** A Class II or Class III, Division 1 or Division 2 location shall be permitted to be reclassified as a Zone 20, Zone 21, or Zone 22 location, provided that all of the space that is classified because of a single combustible dust, or ignitable combustible fiber/flying, or ignitable fiber/flying source is reclassified under the requirements of this article.

(D) **Simultaneous Presence of Flammable Gases and Combustible Dusts or Fibers/Flyings.** Where flammable gases, combustible dusts, or ignitable combustible fibers/flyings, or ignitable fibers/flyings are or may be present at the same time, the simultaneous presence shall be considered during the selection and installation of the electrical equipment and the wiring methods, including the determination of the safe operating temperature of the electrical equipment.

13. Revise Sections 506.9(B) and (C)(1) to read as follows:

**506.9 Equipment Requirements.**

... 

(B) **Listing.** Equipment that is listed for Zone 20 shall be permitted in a Zone 21 or Zone 22 location of the same combustible dust, or ignitable combustible fiber/flying, or ignitable fiber/flying. Equipment that is listed for Zone 21 may be used in a Zone 22 location of the same combustible dust, or ignitable combustible fiber/flying, or ignitable fiber/flying.

(C) **Marking.**

(1) **Division Equipment.** Equipment identified for Class II, Division 1, or Class II, Division 2, or Class III, Division 1, or Class III, Division 2 shall, in addition to being marked in accordance with 500.8(C), be permitted to be marked with all of the following:

(1) Zone 20, 21, or 22 (as applicable)
(2) Material group in accordance with 506.6
(3) Maximum surface temperature in accordance with 506.9(D), marked as a temperature value in degrees C, preceded by “T” and followed by the symbol “°C”

14. Revise Section 506.16 to read as follows:

**506.16 Sealing.** Where necessary to protect the ingress of combustible dust, or ignitable combustible fiber/flying, or ignitable fiber/flying, or to maintain the type of protection, seals shall be provided. The seal shall be identified as capable of preventing the ingress of combustible, or ignitable combustible fiber/flying, or ignitable fiber/flying and maintaining the type of protection but need not be explosionproof or flameproof.

15. Revise Section 506.20 to read as follows:

**506.20 Equipment Installation.**

(A) **Zone 20.** In Zone 20 locations, only equipment listed and marked as suitable for the location shall be permitted.

**Exception No. 1:** Equipment listed for use in Class II, Division 1 locations with a suitable temperature class shall be permitted.

**Exception No. 2:** For Group IIIA materials, equipment listed for use in Class III, Division 1 locations with a suitable temperature in accordance with 500.8(D)(3) shall be permitted.
(B) Zone 21. In Zone 21 locations, only equipment listed and marked as suitable for the location shall be permitted.

Exception No. 1: Apparatus listed for use in Class II, Division 1 locations with a suitable temperature class shall be permitted.

Exception No. 2: Pressurized equipment identified for Class II, Division 1 shall be permitted.

Exception No 3: For Group IIIA materials, equipment listed for use in Class III, Division 1 locations with a suitable temperature in accordance with 500.8(D)(3) shall be permitted.

(C) Zone 22. In Zone 22 locations, only equipment listed and marked as suitable for the location shall be permitted.

Exception No. 1: Apparatus listed for use in Class II, Division 1 or Class II, Division 2 locations with a suitable temperature class shall be permitted.

Exception No. 2: Pressurized equipment identified for Class II, Division 1 or Division 2 shall be permitted.

Exception No 3: For Group IIIA materials, equipment listed for use in Class III, Division 1 or Class III, Division 2 locations with a suitable temperature in accordance with 500.8(D)(3) shall be permitted.

(F) Temperature. The temperature marking specified in 506.9(C)(2)(5) shall comply with one of the following:

(1) For combustible dusts or combustible fibers/flyings shall be less than the lower of either the layer or cloud ignition temperature of the specific combustible dust or combustible fiber/flying. For nonmetal organic dusts or nonmetal combustible fibers/flyings that may dehydrate or carbonize, the temperature marking shall not exceed the lower of either the ignition temperature or 165°C (329°F).

(2) For ignitible fibers/flyings, less than 165°C (329°F) for equipment that is not subject to overloading, or 120°C (248°F) for equipment (such as motors or power transformers) that may be overloaded.

Substantiation: This TIA is necessary to define the terms “combustible fibers/flyings” and “ignitible fibers/flyings” and include them in the hazardous (classified) location descriptions to draw the connection to the combustible dust standards and hazardous location classification documents. This alignment will allow the combustible dust documents to remove any prescriptive limitation or prohibition for use of the Zone system for classification.

We have not yet and do not expect to completely agree on a definition for combustible dust because of the need to include process-specific atmospheres in NFPA 652 and the commodity standards. This proposal makes the functional usage of the term “combustible dust” equivalent between NFPA 70 and the various dust standards.

Emergency Nature: The NFPA Standard contains a conflict within the NFPA Standards or within another NFPA Standard.
MEMORANDUM

TO: Code-Making Panel 14
FROM: Sarah Caldwell, Committee Administrator
DATE: October 12, 2021
SUBJECT: NEC® Proposed TIA No. 1520 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to Section 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

19 Eligible to Vote
3 Not Returned (Cahill, Fam, McBride)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>16 Agree (w/comment: Goodman, Simmons, Wechsler)</td>
<td>16 Agree (w/comment: Fiske, Neagle, Wechsler)</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[ \frac{19 \text{ eligible} - 2}{2} = 9.5 = (10) \]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 12.

\[ (19 \text{ eligible to vote} - 3 \text{ not returned} - 0 \text{ abstentions} = 16 \times 0.75 = 12) \]

Ballot comments are attached for your review.

The Regs at Section 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with Section 4.2.6.

Appeal Closing Date for this TIA is October 18, 2021.
QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1520 to revise Article 100, Part III to include Combustible Fibers/Flyings and Ignitable Fibers/Flyings, to revise Section 500.5(D), to revise Section 500.6, to revise Section 500.8(D)(2) and (D)(3), to revise Section 503.1, to revise Sections 503.5 and 503.6, to revise Section 503.125 Exception, to revise Section 503.145 Exception, to revise Section 506.1, to revise Section 506.5, to revise Section 506.6, to revise Sections 506.7(C) and (D), to revise Sections 506.9(B) and (C)(1), to revise Section 506.16, and to revise Section 506.20.

Eligible to Vote: 19
Not Returned : 3
William E. McBride, Corey Cahill, Patrick Fam

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

David B. Wechsler  
Within this listing we seem to have omitted changes in the term 'explosive' and 'explosible'. Those areas in the above referenced texts should be reviewed to reflect this condition. Note: There is a great deal of confusion on this ballot process. Many agree that the desired resolution is for the NFPA 499 and the specific parts of the NEC AGREE! We do not appear to be at that junction completely at this point. A vote to disagree would not result in achieving the long term objective. Failure is NOT an option!!!

William T. Fiske  
Agree

William G. Lawrence, Jr.  
Agree

John L. Simmons  
The changes in this TIA are needed to define combustible fibers/flyings and ignitable fiber/flyings to align with the 2021 edition of NFPA 499. Placing the text of this TIA will add clarity to the use of wiring methods and equipment in hazardous areas where each of the two classes of fibers/flyings is installed.

Michael W. Smith  
I Agree

Donald W. Ankele  
Agree

Jeremy Neagle  
Agree
Rexford Belleville  
Agree

Lowell Reith  
Agree

Paul E. Guidry  
I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1520 to revise Article 100, Part III to include Combustible Fibers/Flyings and Ignitable Fibers/Flyings, to revise Section 500.5(D), to revise Section 500.6, to revise Section 500.8(D)(2) and (D)(3), to revise Section 503.1, to revise Sections 503.5 and 503.6, to revise Section 503.125 Exception, to revise Section 503.145 Exception, to revise Section 506.1, to revise Section 506.5, to revise Section 506.6, to revise Sections 506.7(C) and (D), to revise Sections 506.9(B) and (C)(1), to revise Section 506.16, and to revise Section

Haywood Kines  
I agree

Ted H. Schnaare  
Agree

Steven J. Blais  
Agree

Mark C. Wirfs  
AGREE

Mark Goodman  
This TIA is part of a number of TIAs to multiple NFPA standards to provide consistency. TIA 1525 should be corrected to match TIA-21-1 for NFPA 499.

Karl von Knobelsdorff  
Agree

Disagree  
0

Abstain  
0
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 19
Not Returned: 3
William E. McBride, Corey Cahill, Patrick Fam

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>David B. Wechsler</td>
<td></td>
<td>Thanks all See comment above.</td>
</tr>
<tr>
<td>William T. Fiske</td>
<td></td>
<td>B. TIA helps resolve conflicts among NEC, NFPA 499, NFPA 652 and NFPA 654, all of which have TIAs passed or in process</td>
</tr>
<tr>
<td>William G. Lawrence, Jr.</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>John L. Simmons</td>
<td></td>
<td>The NFPA Standard contains a conflict within the NFPA Standard or within another NFPA Standard.</td>
</tr>
<tr>
<td>Michael W. Smith</td>
<td></td>
<td>The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.</td>
</tr>
<tr>
<td>Donald W. Ankele</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Jeremy Neagle</td>
<td></td>
<td>B - Necessary to correct conflicts between NFPA dust documents.</td>
</tr>
<tr>
<td>Rexford Belleville</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Lowell Reith</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Paul E. Guidry</td>
<td></td>
<td>B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.</td>
</tr>
<tr>
<td>Haywood Kines</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Ted H. Schnaare</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Steven J. Blais</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Mark C. Wirfs</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Mark Goodman</td>
<td></td>
<td>B.</td>
</tr>
<tr>
<td>Karl von Knobelsdorff</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
MEMORANDUM

TO: NEC® Correlating Committee

FROM: Sarah Caldwell, Committee Administrator

DATE: October 12, 2021

SUBJECT: NEC® Proposed TIA No. 1520 FINAL CC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA **HAS** achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

<table>
<thead>
<tr>
<th>Eligible to Vote</th>
<th>Not Returned</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>0</td>
</tr>
</tbody>
</table>

**Correlation Issues:**

- 0 Abstentions
- 10 Agree
- 2 Disagree (Holub, Porter)

**Emergency Nature:**

- 0 Abstentions
- 12 Agree
- 0 Disagree

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

   \[ \text{12 eligible} \div 2 = 6 + 1 = (7) \]

2. The number of affirmative votes needed to satisfy the ¾ requirement is 9.

   \[ (12 \text{ eligible to vote} - 0 \text{ not returned} - 0 \text{ abstentions} = 12 \times 0.75 = 9) \]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **October 18, 2021.**
NEC CC TIA 1520 Ballot Final
Election:70_A2022_NEC_AAC_Log1520_tibiaballot
Results by Revision

**QUESTION NO. 1: I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.**

<table>
<thead>
<tr>
<th>Eligible to Vote: 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Returned: 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Palmer L. Hickman</td>
<td>Agree.</td>
<td></td>
</tr>
<tr>
<td>David L. Hittinger</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Ernest J. Gallo</td>
<td>I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.</td>
<td></td>
</tr>
<tr>
<td>Alan Manche</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Michael J. Johnston</td>
<td>No Correlation Issues</td>
<td></td>
</tr>
<tr>
<td>Roger D. McDaniel</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>David H. Kendall</td>
<td>AGREE. Agree there is not a Correlating Issue.</td>
<td></td>
</tr>
<tr>
<td>David A. Williams</td>
<td>I agree</td>
<td></td>
</tr>
<tr>
<td>Dean C. Hunter</td>
<td>I agree there there are no correlation issues in accordance with 3.4.2 and 3.4.3 of the NFPA Regulations.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disagree</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richard A. Holub</td>
<td>506.6(C) inadvertently included &quot;Ignitible fibers/flyings other than metal&quot; in the Group IIIA assignment where NFPA 499's TIA did not and only includes &quot;Combustible Fibers/flyings other than metal&quot;. This needs to be corrected.</td>
</tr>
<tr>
<td>Christine T. Porter</td>
<td>499 TIA says: 3.3.8.2.3 Group IIIA. Combustible fibers/flyings other than metal. [499]: 3.3.8.2.3]. A.3.3.4.2 “The zone classification system does not address ignitible fibers/flyings. Where these are present, the user should consider installation in accordance with Article 503 of NFPA 70.” NFPA 70 proposed TIA 1520 says: 506.6(C) Group IIIA. Combustible fibers/flyings or ignitible fibers/flyings other than metal. Adding in the ignitible fibers/flyings other than metal creates a conflict between 499 and the NEC</td>
</tr>
</tbody>
</table>

| Abstain | 0 |
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 12  
Not Returned : 0

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Palmer L. Hickman</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>David L. Hittinger</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Ernest J. Gallo</td>
<td></td>
<td>I AGREE that the subject is of an EMERGENCY NATURE</td>
</tr>
<tr>
<td>Alan Manche</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Michael J. Johnston</td>
<td>B</td>
<td>The TIA corrects a conflict within the NFPA Standard or with another NFPA Standard.</td>
</tr>
<tr>
<td>Roger D. McDaniel</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>David H. Kendall</td>
<td>B</td>
<td>“The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard”.</td>
</tr>
<tr>
<td>David A. Williams</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Dean C. Hunter</td>
<td>B</td>
<td>The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.</td>
</tr>
<tr>
<td>Richard A. Holub</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Christine T. Porter</td>
<td>B</td>
<td>The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
SUPPLEMENTAL BALLOT RESULTS

MEMORANDUM

TO: Code-Making Panel 14 and NEC® Correlating Committee

FROM: Sarah Caldwell, Committee Administrator

DATE: September 22, 2021

SUBJECT: NEC® Proposed Tentative Interim Amendment (TIA) No. 1520 – Supplemental Ballot

The attached proposed Tentative Interim Amendment (TIA) Log No. 1520 is being submitted to you for ballot. During balloting it was discovered that there was a discrepancy in the wording for Item 11. You are now receiving this Supplemental Ballot to determine that the intention of the text in 506.6(A), (B), and (C) in Item 11 of TIA No. 1520 is to directly reflect the text from the NFPA 499-2021 extract references. The Correlating Committee is being balloted on any correlation issues resulting from the proposed TIA.

This proposed TIA was submitted by Michael W. Smith of K & F Electric Inc. (ZAK Companies, Inc.) and we have received written agreement to the processing of the submitted TIA from Donald Ankele of UL LLC, and Richard Holub of The DuPont Company, Inc.

This proposed TIA was published for public comment in the August 2021 issue of NFPA News with a Public Comment Closing Date of September 30, 2021. Any public comments received will be circulated to the committee. Finally, the Standards Council will review and consider the issuance of this TIA.

The ballots can now be accessed through the NFPA online ballot system at the following link: NFPA Ballot Link. The link will bring you to your profile page and once you sign in, select the My Committees tab and click on the blue Vote button which will direct you to the ballot site.

Please complete the ballot on or before September 28, 2021 by 11:59PM (ET).

While completing your ballot, please remember the following:

- A comment is required for Question No. 1 for the online TIA ballot. Comments must accompany all Negative, Abstaining and Agree votes.

- If you vote “Agree” on Question 1, simply add “Agree” to the comment field.

You must hit SUBMIT to SAVE your work. Note: the system session will time you out after 60 minutes; any work not submitted at that time will not be saved! You may return to finish or change your ballot at any time up to the closing date. Ballot comments exceeding 4,000 characters must be submitted in a Word document via email, to Sarah Caldwell at scaldwell@nfpa.org.

Note: Please remember that the return of ballots and attendance at committee meetings are required in accordance with the Regulations Governing the Development of NFPA Standards.
MEMORANDUM

TO: Code-Making Panel 14

FROM: Sarah Caldwell, Committee Administrator

DATE: October 8, 2021

SUBJECT: NEC® Proposed TIA No. 1520 FINAL TC SUPPLEMENTAL BALLOT RESULTS

The final supplemental ballot results show this TIA HAS NOT achieved the ¾ majority vote needed on Ballot Question No. 1. The results of the ballot are as follows:

19 Eligible to Vote
3 Not Returned (Cahill, McBride, Schnaare)
0 Abstentions
9 Agree
7 Disagree (Ankele, Fiske, Goodman, Lawrence, Jr., Simmons, Smith, Wechsler)

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[
\text{[19 eligible ÷ 2 = 9.5 = (10)]}
\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 12.

(19 eligible to vote - 3 not returned - 0 abstentions = 16 \times 0.75 = 12)

The supplemental ballot comments have been attached for your review.
QUESTION NO. 1: I AGREE it is my intention that the text of 506.6(A), (B), and (C) in Item 11 of TIA No. 1520 is to directly reflect the text from the NFPA 499-2021 extract references.

Eligible to Vote: 19
Not Returned: 3
Ted H. Schnaare, Corey Cahill, William E. McBride

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Haywood Kines</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Jeremy Neagle</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Steven J. Blais</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Paul E. Guidry</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Mark C. Wirfs</td>
<td>AGREE</td>
<td></td>
</tr>
<tr>
<td>Rexford Belleville</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Lowell Reith</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Patrick Fam</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Karl von Knobelsdorff</td>
<td>agree</td>
<td></td>
</tr>
</tbody>
</table>

Disagree
William T. Fiske
In Section 506.6, the TIA should describe Class IIIA materials as "combustible fibers/flyings or ignitable fibers/flyings other than metal." This does not agree with NFPA 499 TIA 21-1, so the indication that it is extracted text should be removed. In addition, references to "explosive mixture" should be to "explosible mixture."
David B. Wechsler  
The recent action of the EECA Committee was to change Class IIIA in NFPA 499. This change will revert back to the original NEC 1520 Group IIIA which should read: "Combustible fibers/flyings or ignitible fibers/flyings other than metal. [499:3.3.8.2.3]" However there will be a new NFPA 499 TIA to address the needed changes which impact more than this one Group term. My vote is to include all this 499 material. It is also very important the errors with the improper use of the term 'explosive' when it often should be 'explosible' need to be corrected.

William G. Lawrence, Jr.  
The proposed Group IIIA revision is incorrect, and should read as follows “Group IIIA Combustible fibers/flyings or ignitible fibers/flyings other than metal. The "or ignitible fibers/flyings" is necessary to align with the historical Class III. The "extract" from NFPA 499 needs to be removed until the NFPA 499 text is revised to align with this. (NFPA 499:2021 TIA coming) Also note that "explosive mixture" should be "explosible mixture" in 3 places for consistency.

Donald W. Ankele  
The proposed Group IIIA revision is incorrect, and should read as follows “Group IIIA Combustible fibers/flyings or ignitible fibers/flyings other than metal. The "or ignitible fibers/flyings" is necessary to align with the historical Class III, and to permit area classification in accordance with 506.5. The "extract" from NFPA 499 needs to be removed until the NFPA 499 text is revised to align with this. (NFPA 499:2021 TIA coming) Also note that "explosive mixture" should be "explosible mixture" in 3 places for consistency.

Michael Smith  
? Disagree Comments: The proposed Group IIIA revision is incorrect, and should read as follows “Group IIIA Combustible fibers/flyings or ignitible fibers/flyings other than metal. The "or ignitible fibers/flyings" is necessary to align with the historical Class III, and to permit area classification in accordance with 506.5. The "extract" from NFPA 499 needs to be removed until the NFPA 499 text is revised to align with this. (NFPA 499:2021 TIA coming) Also note that "explosive mixture" should be "explosible mixture" in 3 places for consistency.
John L. Simmons

Comments: The proposed Group IIIA revision is incorrect and should read as follows “Group IIIA Combustible fibers/flyings or Ignitible fibers/flyings” other than metal. The “or Ignitible fibers/flyings” is necessary to align with the historical Class III, and to permit area classification in accordance with 506.5. The “extract” from NFPA 499 needs to be removed until the NFPA 499 text is revised to align with this. (NFPA 499:2021 TIA is coming.) Also note that “explosive mixture” should be “explosible mixture” in three places for consistency.

Mark Goodman

The proposed Group IIIA revision is incorrect, and should read as follows “Group IIIA Combustible fibers/flyings or ignitible fibers/flyings other than metal. The "or ignitible fibers/flyings" is necessary to align with the historical Class III, and to permit area classification in accordance with 506.5. The "extract" from NFPA 499 needs to be removed until the NFPA 499 text is revised to align with this. (NFPA 499:2021 TIA coming) Also note that "explosive mixture" should be "explosible mixture" in 3 places for consistency.

Abstain 0
Dear Sarah,

Please accept this comment in support of the UL ballot to disagree.

- **Disagree**

**Comments:** The proposed Group IIIA revision is incorrect, and should read as follows "Group IIIA Combustible fibers/flyings or ignitible fibers/flyings other than metal. The "or ignitible fibers/flyings" is necessary to align with the historical Class III, and to permit area classification in accordance with 506.5. The "extract" from NFPA 499 needs to be removed until the NFPA 499 text is revised to align with this. (NFPA 499:2021 TIA coming) Also note that "explosive mixture" should be "explosible mixture" in 3 places for consistency.

The proposed Group IIIA revision is incorrect, and should read as follows "Group IIIA Combustible fibers/flyings or ignitible fibers/flyings other than metal. [\textit{499:3.3.8.2.3}]"

This permits the 2020 and 2023 NEC and NFPA 499 to eventually align.

Additionally, it has been identified that in several instances (4 actually) an incorrect word explosive was used where explosible is appropriate as follows:

**Combustible Fibers/Flyings.** Fibers/flyings, where any dimension is greater than 500 μm in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. [\textit{499:3.3.4.1}]

Informational Note No.1: This definition and Informational Notes No. 2 and 3 have been extracted from NFPA 499-2021, \textit{Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas}. The NFPA 499 reference is in brackets. Only editorial changes were made to the extracted text to make it consistent with this \textit{Code}.

Informational Note No. 2: Section 500.5(D) of this \textit{Code} prescribes a Class III location. Combustible fibers/flyings can be similar in physical form to ignitible fibers/flyings and protected using the same electrical equipment installation methods. Examples of fibers/flyings include flat platelet-shaped particulate, such as metal flake, and fibrous particulate, such as particle board core material. If the smallest dimension of a combustible material is greater than 500 μm, it is unlikely that the material would be combustible fibers/flyings, as determined by test. Finely divided solids with lengths that are large compared to their diameter or thickness usually do not pass through a 500 μm sieve, yet when tested could potentially be determined to be explosible. [\textit{499:3.3.3.4.1}]

Informational Note No. 3: The typical test methods for evaluating an explosive explosible mixture are...
ASTM E1226-2012, Standard Test Method for Explosibility of Dust Clouds, ISO 6184-1985 (2005), Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air, or ISO/IEC/UL 80079-20-2-2016, Explosive atmospheres — Part 20-2: Material characteristics — Combustible dusts test methods, for procedures for determining the explosibility of dusts. A material that is found to not present an explosive explosible mixture hazard could still be an ignitible fiber/flying, as defined in this article. Historically, the explosibility condition has been described as presenting a flash fire or explosion hazard. It could be understood that the potential hazard due to the formation of an explosive explosible mixture when suspended in air at standard atmospheric pressure and temperature would include ignition. [499:A.3.3.4.1]

... Ignitible Fibers/Flyings. Fibers/flyings where any dimension is greater than 500 μm in nominal size, which are not likely to be in suspension in quantities to produce an explosive explosible mixture, but could produce an ignitible layer fire hazard. [499:3.3.4.2]

Informational Note No.1: This definition and Informational Note No. 2 have been extracted from NFPA 499-2021, Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas. The NFPA 499 reference is in brackets. Only editorial changes were made to the extracted text to make it consistent with this Code.

Informational Note No. 2: Section 500.5 of this Code prescribes a Class III location as one where ignitible fibers/flyings are present, but not likely to be in suspension in the air in quantities sufficient to produce ignitible mixtures. This description addresses fibers/flyings that do not present a flash-fire hazard or explosion hazard by test. This could be because those fibers/flyings are too large or too agglomerated to be suspended in air in sufficient concentration, or at all, under typical test conditions. Alternatively, this could be because they burn so slowly that, when suspended in air, they do not propagate combustion at any concentration. The zone classification system does not address ignitible fibers/flyings.

Where these are present, the user should consider installation in accordance with Article 503 of this Code. [499:A.3.3.4.2]

Don and Paul

Donald W. Ankele
Principal Engineer-Hazardous Locations
Energy & Industrial Automation
Distinguished Member of the Technical Staff - William Henry Merrill Society

UL LLC
333 Pfingsten Road
Northbrook, IL 60062-2096 USA
T: 847.664.2965
F: 847.313.2965
E: Donald.W.Ankele@ul.com
W: ul.com/hazloc

Download the complimentary UL HazLoc app to have UL expertise at your fingertips and opt in for push notifications to receive exclusive HazLoc technical insights
Good Afternoon Code-Making Panel 14 and Correlating Committee Members,

The attached Proposed Tentative Interim Amendment No. 1520 Supplemental Ballot is now available through the NFPA online balloting system. There will be two separate TIA ballots, one for Code-Making Panel 14 and one for the Correlating Committee. Please review the attached instructions before completing your ballots.

While completing your ballots, please remember the following:

- **A comment is required for Question No. 1 for the online TIA ballot.** Comments **must** accompany all Negative, Abstaining and Agree votes.

- **If you vote “Agree” on Question 1, simply add “Agree” to the comment field.**

- Ballot comments exceeding 4,000 characters must be submitted in a Word document, via email to scaldwell@nfpa.org.

- In order to prevent any work from being lost, please remember to hit SUBMIT to SAVE your work! The system session will time out after 60 minutes and any work not submitted will be lost. You may also return to finish or change your ballot at any time up to the closing date.

**Ballots are due by September 28, 2021 by 11:59PM (ET)**

To access your ballots, click on the following link which directs you to your profile page. Once you sign in, select the My Committees tab and click on the blue Vote button which will direct you to the ballot site.

[NFPA Ballot link](#)

This information has also been posted to the NFPA Document Information Page, [www.nfpa.org/70next](http://www.nfpa.org/70next).

Please feel free to contact me if you need any additional information.

Thank you,

**Sarah Caldwell**  
*Committee Administrator | NFPA*  
1 Batterymarch Park  
Quincy, MA 02169-7471  
+1 617 984-7950  
[www.nfpa.org](http://www.nfpa.org)
MEMORANDUM

TO: NEC® Correlating Committee
FROM: Sarah Caldwell, Committee Administrator
DATE: October 8, 2021
SUBJECT: NEC® Proposed TIA No. 1520 FINAL CC SUPPLEMENTAL BALLOT RESULTS

The final supplemental ballot results show this TIA HAS NOT achieved the ¾ majority vote needed on Ballot Question No. 1. The results of the ballot are as follows:

<table>
<thead>
<tr>
<th>Eligible to Vote</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Returned</td>
<td>1</td>
</tr>
</tbody>
</table>

1 Abstentions (Hickman)
7 Agree
3 Disagree (Fiske, Holub, Johnston)

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both must pass ballot in order to recommend that the Standards Council issue this TIA.

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

   \[ \frac{12 \text{ eligible}}{2} = 6 + 1 = 7 \]

2. The number of affirmative votes needed to satisfy the ¾ requirement is 8.

   \( 12 \text{ eligible to vote} - 1 \text{ not returned} - 1 \text{ abstentions} = 10 \times 0.75 = 7.5 \)

The supplemental ballot comments have been attached for your review.
Eligible to Vote: 12
Not Returned: 1

Lawrence S. Ayer

**Vote Selection** | **Votes** | **Comments**
--- | --- | ---
Agree | 7 | I agree there are no correlation issues in accordance with 3.4.2 and 3.4.3 of the NFPA Regulations.
John R. Kovacik | Agree |
Alan Manche | Agree |
Roger D. McDaniel | Agree |
David H. Kendall | Agree |
Dean C. Hunter | I agree there are no correlation issues in accordance with 3.4.2 and 3.4.3 of the NFPA Regulations. |
Ernest J. Gallo | I AGREE there are no CORRELATION ISSUES |
David A. Williams | Agree |

Disagree | 3 |
William T. Fiske | As presented, the TIA does not agree with NFPA 499 TIA 21-1. TIA 1520 does not have the same language describing Group IIIA materials as NFPA 499; therefore, it cannot be identified as extracted material. |
Michael J. Johnston | There appears to be continuing correlation issues with other NFPA Standards. |
The proposed Group IIIA revision is incorrect, and should read as follows "Group IIIA Combustible fibers/flyings or ignitible fibers/flyings other than metal." The "or ignitible fibers/flyings" is necessary to align with the historical Class III, and to permit area classification in accordance with 506.5. There is a forthcoming TIA to NFPA 499 to be submitted the week of 9/27/21 to align with the proposed language for the NEC® TIA and the two should be processed concurrently. Also note that "explosive mixture" should be "explosible mixture" in 3 places for consistency.

Abstain

Palmer L. Hickman

I want to see the results of the Panel 14 ballot before forming an informed opinion.
Foran, Rosanne

From: Rodgers, Sam (Process Safety)
Sent: Friday, September 10, 2021 10:50 AM
To: Bill Fiske Intertek; Marando, Michael; Shared TIAs
Cc: Frank Risk
Subject: RE: [External] RE: Public Comment for NEC TIA 1520

Follow Up Flag: Follow up
Flag Status: Flagged

I agree with Bill’s limitation on my comment to be only 506.6(C).

From: Bill Fiske Intertek
Sent: Friday, September 10, 2021 10:48 AM
To: Marando, Michael ; Shared TIAs <STIAs@nfpa.org>
Cc: Rodgers, Sam (Process Safety) ; Frank Risk
Subject: [External] RE: Public Comment for NEC TIA 1520

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

The chair of the 499 committee agrees with Mr. Sam Rodgers. EEC-AAA has purview over those definitions, not NEC-P14. Please identify this as a comment in opposition to 506.6(C), and ONLY 506.6(C) of NFPA 70 proposed TIA 1520. We support the remainder of the TIA.

Kind regards,

Bill Fiske

William T. Fiske, P.E.
Chair – EEC-AAA
Intertek Electrical & Network Assurance

Intertek
3933 Route 11
Cortland, NY  13045
www.intertek.com

From: Marando, Michael
Sent: Friday, September 10, 2021 10:29 AM
To: Shared TIAs <STIAs@nfpa.org>
Good morning Rosanne,

Please see Sam’s Public Comment below.

Mike

From: Rodgers, Sam (Process Safety)
Sent: Friday, September 10, 2021 10:24 AM
To: Marando, Michael
Cc: Walter Frank
Subject: Public Comment for NEC TIA 1520

Proposed TIA 1520 indicates an extraction of the definition of Group IIIA from NFPA 499, yet the text inexplicably includes ignitible fibers/flyings under Group IIIA. While the NEC can add a requirement to install certain equipment when ignitible fibers/flyings are present, it cannot change the definition of Group IIIA as established by NFPA 499.

Below is the definition as approved in the latest NFPA 499 TIA, 1546.

3.3.4.4* 3.3.8.2.3* Group IIIA. Combustible fibers/flyings other than metal. Solid particles; other than combustible metal, including fibers, greater than 500 μm in nominal size that might be suspended in air and could settle out of the atmosphere under their own weight. Group IIIA is equivalent to Class III.

3.3.4.4 A.3.3.8.2.3 Group IIIA. Group IIIA materials are larger particle-size Group IIIB materials and do not include metal dust or metal fibers/flyings.

As you can see, the NEC Proposed TIA 1520 indicates an extract from 499, but adds ignitible fibers/flyings to the Group IIIA definition.
The chair of the 499 committee agrees with Mr. Sam Rodgers. EEC-AAA has purview over those definitions, not NEC-P14. Please identify this as a comment in opposition to 506.6(C), and ONLY 506.6(C) of NFPA 70 proposed TIA 1520. We support the remainder of the TIA.

Kind regards,

Bill Fiske

William T. Fiske, P.E.
Chair – EEC-AAA
Intertek Electrical & Network Assurance

---

From: Marando, Michael  Sent: Friday, September 10, 2021 10:29 AM
To: Shared TIAs <STIAs@nfpa.org>
Cc: Bill Fiske Intertek

Subject: [External] FW: Public Comment for NEC TIA 1520

Good morning Rosanne,

Please see Sam’s Public Comment below.

Mike

From: Rodgers, Sam (Process Safety)  Sent: Friday, September 10, 2021 10:24 AM
To: Marando, Michael
Cc: Walter Frank
Subject: Public Comment for NEC TIA 1520

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Please enter this as a public comment for the referenced TIA.

Proposed TIA 1520 indicates an extraction of the definition of Group IIIA from NFPA 499, yet the text inexplicably includes ignitible fibers/flyings under Group IIIA. While the NEC can add a requirement to install certain equipment when ignitible fibers/flyings are present, it cannot change the definition of Group IIIA as established by NFPA 499.

Below is the definition as approved in the latest NFPA 499 TIA, 1546.

3.3.4.4* 3.3.8.2.3* Group IIIA. Combustible fibers/flyings other than metal. Solid particles; other than combustible metal, including fibers, greater than 500 \( \mu m \) in nominal size that might be suspended in air and could settle out of the atmosphere under their own weight. Group IIIA is equivalent to Class III.

3.3.4.4 A.3.3.8.2.3 Group IIIA. Group IIIA materials are larger particle-size Group IIIB materials and do not include metal dust or metal fibers/flyings.

As you can see, the NEC Proposed TIA 1520 indicates an extract from 499, but adds ignitible fibers/flyings to the Group IIIA definition.
Foran, Rosanne

From: david shapiro
Sent: Friday, August 13, 2021 9:12 PM
To: Shared TIA
Subject: Comment on Proposed TIA 1520 on NFPA 70

I certainly don't oppose the proposed updating, which makes very good sense. However, I would urge deletion of the Exceptions to .125 and .145 due to an unfortunate fact. An AHJ often is presented with a tidy, new setup, possibly with assurances of a maintenance schedule. Then things change, and very few jurisdictional authorities indeed have the leisure to check back to make sure maintenance is still being performed as they were assured. in consequence, you find setups such as the one shown below. This was not a faked photo, but something I noticed on a shopping trip. While the sawdust in the picture might not explode, it certainly could ignite, and therefore poses a real danger--particularly as this big-box store meets some of the criteria for a place of assembly. That danger of combustion is one point of this TIA.

David E. Shapiro
While this some of the text within this TIA could be improved for better readability and clarity such as the very long sentence addressing combustible fibers/flyings, I support this TIA and comment the work of this committee to resolve these issues with an agreement with NFPA 499.

David Wechsler
I have two concerns about TIA 1520:

First, why do we need to copy the definition verbatim from NFPA 499? It seems to me that there are two acceptable alternatives for both of these definitions that would require much less effort to maintain NFPA 70: (1) “Locations where nonmetal combustible fibers/flyings, as defined in NFPA 499, are in the air ...,” or (2) “Informational Note No. 2: The definition and characteristics of combustible fibers/flyings may be found in NFPA 499.” Taking either approach would limit the scope of the contents of NFPA 70 to just the electrical requirements applicable to these material environments, not to defining the environments.

Second -- and this concern is more of a comment against NFPA 499 but also applies to TIA 1520 -- why is the phrase “explosive mixture” used to define “combustible fibers/flyings” and the phrase “explosive mixture” used to define “ignitable fibers/flyings” (spelling sic)? Not all materials that are capable of exploding are capable of being lit or bursting into flames; and not all materials that are capable of being lit or bursting into flames are capable of exploding. These definitions copied from NFPA 499 appear to make these three disparate terms effectively synonymous. The hazards of “ignitable” mixtures (i.e., capable of being lit and sustaining a fire in the presence of air or other oxidizer), “combustible” mixtures (i.e., capable of bursting into large flames, esp. without the need for exposure to an oxidizer), and “explosible” mixtures (i.e., capable of rapidly breaking apart and expanding with energy) -- and their mitigation requirements -- should be different.
1. Revise Section 706.50 to read as follows:

706.50 General. All electrical connections to and from the system and system components shall be in accordance with the applicable provisions of this Code. Unless otherwise directed by this article, other energy storage technologies shall comply with the applicable provisions of Part III of Article 705. Parts I, II, and III of this article.

Substantiation: The reference to Part III of Article 705 is incorrect as there is no Part III in that Article. However, the previous parts of Article 706 apply to these other types of Energy Storage Systems (ESS).

Emergency Nature: The NFPA Standard contains an error or an omission that was overlooked during the regular revision process.

This revision is necessary as the current reference in Section 706.50 is pointing to a non-existent part of Article 705, which could lead to confusion for users of the NEC. Instead, this Section should be pointing to the previous parts of Article 706, which do apply to other types of ESS.
MEMORANDUM

TO:         Code-Making Panel 13

FROM:       Sarah Caldwell, Committee Administrator

DATE:       September 14, 2021

SUBJECT:    NEC® Proposed TIA No. 1597 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to Section 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

21 Eligible to Vote
7 Not Returned (Baldwin, Cantor, Grover, Jordan, Spina, Tice, Wilson)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>14 Agree (w/comment: Conrad)</td>
<td>13 Agree (w/comment: Marchand)</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>1 Disagree (Conrad)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

   \[21 \text{ eligible} \div 2 = 10.5 = (11)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 11.

   \((21 \text{ eligible to vote} - 7 \text{ not returned} - 0 \text{ abstentions} = 14 \times 0.75 = 10.5)\)

Ballot comments are attached for your review.

The Regs at Section 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with Section 4.2.6.

**Appeal Closing Date** for this TIA is **September 20, 2021**.
Eligible to Vote: 21
Not Returned: 7

William P. Cantor, Robert E. Jordan, Mario C. Spina, Michael Wilson, Steve Baldwin, Richard Tice, Matthew B Grover

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Herbert H. Daugherty</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>James S. Conrad</td>
<td></td>
<td>I agree with the technical merit of the Proposed TIA Log No. 1597 to Revise Section 706.50.</td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Daniel J. Caron</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Daniel R. Neeser</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Neil A. Czarnecki</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Linda J. Little</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Timothy P. Windey</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Richard D. Currin, Jr.</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Krista McDonald Biason</td>
<td></td>
<td>I agree</td>
</tr>
<tr>
<td>Greg Marchand</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Steven F. Froemming</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Greg J. Ball</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Arnoldo L. Rodriguez</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
**QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.**

Eligible to Vote: 21  
Not Returned : 7  
William P. Cantor, Robert E. Jordan, Mario C. Spina, Michael Wilson, Steve Baldwin, Richard Tice, Matthew B Grover

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Herbert H. Daugherty</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Daniel J. Caron</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Daniel R. Neeser</td>
<td>The standard contains an error that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Neil A. Czarnecki</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Linda J. Little</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Timothy P. Windey</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Richard D. Currin, Jr.</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Krista McDonald Biason</td>
<td>I agree</td>
<td></td>
</tr>
<tr>
<td>Greg Marchand</td>
<td>There is an error and I agree this is meets an emergency nature.</td>
<td></td>
</tr>
<tr>
<td>Steven F. Froemming</td>
<td>&quot;A&quot;</td>
<td></td>
</tr>
<tr>
<td>Greg J. Ball</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Arnoldo L. Rodriguez</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>James S. Conrad</td>
<td>I don't see the emergency nature of this TIA. This is something that could be corrected in the current cycle.</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
MEMORANDUM

TO: NEC® Correlating Committee

FROM: Sarah Caldwell, Committee Administrator

DATE: September 14, 2021

SUBJECT: NEC® Proposed TIA No. 1597 FINAL CC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

12 Eligible to Vote
2 Not Returned (Kendall, Williams)

<table>
<thead>
<tr>
<th>Correlation Issues:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>10 Agree</td>
<td>10 Agree (w/comment: Johnston)</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[12 \text{ eligible} \div 2 = 6 + 1 = (7)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 8.

\[(12 \text{ eligible to vote} - 2 \text{ not returned} - 0 \text{ abstentions} = 10 \times 0.75 = 7.5)\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is September 20, 2021.
QUESTION NO. 1: I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.

Eligible to Vote: 12  
Not Returned : 2  
David A. Williams, David H. Kendall

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Palmer L. Hickman</td>
<td></td>
<td>Agree.</td>
</tr>
<tr>
<td>David L. Hittinger</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Christine T. Porter</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Ernest J. Gallo</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Michael J. Johnston</td>
<td></td>
<td>No correlation issues</td>
</tr>
<tr>
<td>Alan Manche</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Dean C. Hunter</td>
<td></td>
<td>There are no correlation issues in accordance with 3.4.2 and 3.4.3 of the NFPA Regulations.</td>
</tr>
<tr>
<td>Richard A. Holub</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Roland E. Deike, Jr.</td>
<td></td>
<td>No Correlation issues.</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instruction box.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Palmer L. Hickman</td>
<td>F.</td>
<td></td>
</tr>
<tr>
<td>David L. Hittinger</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Christine T. Porter</td>
<td>F.</td>
<td>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.</td>
</tr>
<tr>
<td>Ernest J. Gallo</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Michael J. Johnston</td>
<td>Agree with the Code Panel position on emergency nature.</td>
<td></td>
</tr>
<tr>
<td>Alan Manche</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Dean C. Hunter</td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Eligible to Vote: 12
Not Returned : 2
David A. Williams, David H. Kendall
We agree with your findings under 706.50 and the proposed changes/corrections are indeed needed for clarification.

Thank you.

Andrew James
Master Electrician I Senior Electrical Project Manager
andrewjames@industriallightandpower.com
OSHA Safety Trained I MSHA Safety Trained
Member NFPA I Member IES
NSCB License 0076683
Bid Limit: $3,000,000.00

This e-mail communication is a confidential communication intended only for the person named above. If you are not the person named above, or the employee or agent responsible for delivery of the following information, you are hereby notified that any dissemination, distribution, or copying of this communication by anyone including the recipient is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone at (702) 530-7281. Also, please e-mail the sender that you have received the communication in error. Thank you.
1. Add a new Exception No. 2 to Section 406.9(C) to read as follows:

406.9 Receptacles in Damp or Wet Locations. …
(C) Bathtub and Shower Space. Receptacles shall not be installed within a zone measured 900 mm (3 ft) horizontally and 2.5 m (8 ft) vertically from the top of the bathtub rim or shower stall threshold. The identified zone is all-encompassing and shall include the space directly over the tub or shower stall.

Exception No. 1: In bathrooms with less than the required zone the receptacle(s) shall be permitted to be installed opposite the bathtub rim or shower stall threshold on the farthest wall within the room.

Exception No. 2: In a dwelling unit, a single receptacle shall be permitted for an electronic toilet or personal hygiene device such as an electronic bidet seat. The receptacle shall be readily accessible and located on one of the following:
(1) The wall behind the toilet but not behind the tank
(2) The opposite side of the toilet from the bathtub or shower

Substantiation: It is quite common for a toilet to be located next to a bathtub or shower in a residential bathroom. The existing text in NFPA 70 could prevent the installation of a receptacle that is necessary for the operation of an electronic toilet (also known as a “smart toilet”) or personal hygiene device (e.g., electronic bidet seat) where a toilet is located within 3 feet horizontally of a bathtub or shower. Application of the receptacle placement requirements has the potential to place an undue burden on the consumer whereby additional cost may be incurred to position the receptacle in an acceptable location without considering potential structural barriers behind the wall that may further restrict installation. Therefore, the proposed exception is necessary to ensure that such plumbing products are permitted to be installed while not jeopardizing the level of electrical safety that the standard seeks [see below photo(s)/diagram(s) that provide clarity for the proposed exception]. As such, due to the proximity of the individual receptacle to the bathtub or shower, it would be required by NEC Section 210.8(A)(9) to be protected by a Class A GFCI device minimizing any potential shock hazard. Moreover, it is our understanding that products like electronic toilets and personal hygiene devices were not taken into consideration during the discussion of the proposal prior to adoption into the current standard.

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 of the action.
Making an allowance for these listed products (which are permitted in all major plumbing codes), which have been in the market for decades, is necessary for safeguarding public health and safety. People all over the United States use such products in their bathrooms, and they are necessary for people with special needs or abilities to maintain their dignity, privacy and self-reliance. Ease of cleaning for seniors is of immediate benefit and critical to their hygiene. Additional hygiene-oriented benefits are obtained by people experiencing colorectal issues such as hemorrhoids, irritable bowel syndrome (IBS) and inflammatory bowel disease (IBD),\(^1\) as well as women experiencing severe constipation during pregnancy\(^2\) or recovering from postpartum activity. These products also help to maintain hand hygiene\(^3\) which is critical for preventing the spread of disease. Many smart toilets include health monitoring features that analyze one’s stool or urine to detect health issues such as sugar levels for a diabetic. Also, smart toilets have proven to be quite beneficial for those who are rehabilitating from a stroke.\(^4\) Personal hygiene devices are necessary for some in maintaining their cleanliness as they may not be able to use toilet paper due to medical reasons. Also, personal hygiene devices have been proven to lead to fewer instances of rashes, hemorrhoids, and urinary tract infections. The bottom line is these products are necessary for many individuals around the United States for maintaining their health, and the existing text in NFPA 70 would prevent the installation of such products in many residential bathrooms.

MEMORANDUM

TO: Code-Making Panel 18

FROM: Sarah Caldwell, Committee Administrator

DATE: September 2, 2021

SUBJECT: NEC® Proposed TIA No. 1598 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to Section 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

13 Eligible to Vote
0 Not Returned

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>10 Agree (w/comment: Potter)</td>
<td>11 Agree (w/comment: Fahey)</td>
</tr>
<tr>
<td>3 Disagree (Alley, Clemente, Hasan)</td>
<td>2 Disagree (Clemente, Hasan)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[
\frac{13 \text{ eligible} + 2}{2} = 6.5 = (7) 
\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 10.

(13 eligible to vote - 0 not returned - 0 abstentions = 13 \times 0.75 = 9.75)

Ballot comments are attached for your review.

The Regs at Section 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with Section 4.2.6.

**Appeal Closing Date** for this TIA is September 8, 2021.
QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1598 to add a new Exception No. 2 to Section 406.9(C).

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Paul Yesbeck</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Donald Berlin</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Frederick L. Carpenter</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Randall K. Wright</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Robert G. Fahey</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Charles S. Kurten</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>William Ross McCorcle</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Paul Costello</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jason D Potterf</td>
<td></td>
<td>Agree. Due to the emergency nature of this amendment I think the text can be accepted as is, but at the next opportunity I think additional clarity could be achieved. Specifically, the phrasing for the second exception option essentially reads &quot;The receptacle shall be readily accessible and located on... the opposite side of the toilet from the bathtub or shower.&quot; A literal reading of this would result in the outlet being allowed only on the actual toilet, when a reasonable person would realize this means the wall or cabinet on the opposite side of the toilet. It would also be prudent to indicate that outlets behind the tank should be placed on the side of the toilet furthest from the bathtub or shower.</td>
</tr>
<tr>
<td>Kenneth Peskin</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Disagree</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Hakim Hasan</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>there is no technical merit to remove the restricted zone completely. The existing restricted zone is only 900 mm (3 ft) horizontally from the tub or shower stall. An installer should have no trouble installing a dedicated receptacle outside that boundary and suggest that the use of the term &quot;Device&quot; should be changed to &quot;Appliance&quot;, since these products are considered personal hygiene appliances, not devices.</td>
</tr>
</tbody>
</table>
Kurt J. Clemente  
The panel's intent was to exclude receptacles from the zone comprising the bathtub and shower space. Any device's need for a receptacle within this zone does not supersede the panel's concern. The existing exception addresses situations where the room is smaller than this zone, providing explicit direction for the placement of a receptacle in this event.

Ron D. Alley  
An electronic toilet or bidet seat should be considered a fixed appliance. Requiring a "hardwire" type installation, rather than a cord-and-plug connection, will provide a needed extra layer of protection for the consumer. It is far too easy for the consumer to simply unplug the electronic toilet/bidet and plug a phone charger (for instance) into the outlet when it is in close proximity to the bath tub and the tub is occupied. The electronic toilet/bidet should also be GFCI protected. A recent fatality occurred when a teenage girl was using her phone on a charger while she was in the tub.

Abstain

0
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 13
Not Returned : 0

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>11</td>
<td>A</td>
</tr>
<tr>
<td>Paul Yesbeck</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Donald Berlin</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Frederick L. Carpenter</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Randall K. Wright</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Robert G. Fahey</td>
<td></td>
<td>F. 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. The Tentative Interim Amendment should be accepted based on the fact the additional exception will allow devices to be installed which enhance the safety and wellness of certain demographic of users. This acceptance does in no way endorse any certain product, the acceptance only recognizes that there is a hardship for a certain number of individuals, and this TIA will enhance the safety and wellness of those individuals. IAEI Proposed TIA text: 406.9 Receptacles in Damp or Wet Locations. ... (C) Bathtub and Shower Space. Receptacles shall not be installed within a zone measured 900 mm (3 ft) horizontally and 2.5 m (8 ft) vertically from the top of the bathtub rim or shower stall threshold. The identified zone is all-encompassing and shall include the space directly over the tub or shower stall. Exception No. 1: In bathrooms with less than the required zone the receptacle(s) shall be permitted to be installed opposite the bathtub rim or shower stall threshold on the farthest wall within the room. Exception No. 2: In a dwelling unit, a single receptacle shall be permitted for an electronic toilet or personal hygiene device such as an electronic bidet seat. The receptacle shall be readily accessible and located on the opposite side of the toilet from the bathtub or shower.</td>
</tr>
<tr>
<td>Charles S. Kurten</td>
<td></td>
<td>F. 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.</td>
</tr>
</tbody>
</table>
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.

Hakim Hasan

this is not emergency nature and I’m not in support of the proposal.

Kurt J. Clemente

The subject is not of an emergency nature because the author's proposed exception to 406.9(C) should not be accepted.

Abstain

0
MEMORANDUM

TO: NEC® Correlating Committee

FROM: Sarah Caldwell, Committee Administrator

DATE: September 2, 2021

SUBJECT: NEC® Proposed TIA No. 1598 FINAL CC BALLOT RESULTS

The public comment circulation has passed, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

12 Eligible to Vote
3 Not Returned (Hickman, Johnston, Williams)

<table>
<thead>
<tr>
<th>Correlation Issues:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>9 Agree</td>
<td>8 Agree</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>1 Disagree (Holub)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[12 \text{ eligible} \div 2 = 6 + 1 = (7)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 8.

\[(12 \text{ eligible to vote} - 3 \text{ not returned} - 0 \text{ abstentions} = 9 \times 0.75 = 6.75)\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is September 8, 2021.
Election:70_A2022_NEC_AAC_Log1598_Ballot
Results by Revision

QUESTION NO. 1: I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Ernest J. Gallo</td>
<td></td>
<td>I agree with the Proposed TIA No. 1598</td>
</tr>
<tr>
<td>Alan Manche</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>David L. Hittinger</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Roland E. Deike, Jr.</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Christine T. Porter</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Richard A. Holub</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Dean C. Hunter</td>
<td></td>
<td>I agree there are no correlation issues in accordance with 3.4.2 and 3.4.3 of the NFPA Regulations</td>
</tr>
<tr>
<td>David H. Kendall</td>
<td></td>
<td>There is not a correlation issue.</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 12
Not Returned: 3
Michael J. Johnston, Palmer L. Hickman, David A. Williams

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ernest J. Gallo</td>
<td></td>
<td>I agree that the subject is of an EMERGENCY NATURE and should be addressed with a Tentative Interim Amendment (TIA)</td>
</tr>
<tr>
<td>Alan Manche</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>David L. Hittinger</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Roland E. Deike, Jr.</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Christine T. Porter</td>
<td>F</td>
<td>F. 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.</td>
</tr>
<tr>
<td>Dean C. Hunter</td>
<td>F</td>
<td>F. 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 revision process.</td>
</tr>
<tr>
<td>David H. Kendall</td>
<td>[F]</td>
<td>[F]. 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.</td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Richard A. Holub</td>
<td></td>
<td>This should be debated during the normal cycle, among the panel. I see in the public comments clear arguments that this resulting language may in fact introduce a hazard that this language is intended to address. Changing this language by TIA to promote the company's product is not the proper use of the TIA process.</td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Opposing. It needs to be rewritten.

The intent of the distance is to keep appliances such as radios, televisions, blow dryers, etc. away from the bathtubs and showers. To truly protect the safety of the public, the receptacles should be a minimum distance of 6 feet away from a tub or shower so a standard NEMA cord length device cannot reach the tub or shower. For special water closet equipment requirements, perhaps use a twist lock receptacle or require it to be hard wired so standard cord plugs cannot be used and locate device box or j-box on the opposite side of the water closet away from the tub or shower.

Re-consideration of receptacles this close to a water closet should also be made as spraying water is always a possibility during maintenance or when the water closet fill valve fails such as the refill tubing separating from the fill valve creating a possible electrocution hazard. It also raises another question about the safety of the equipment being used needing GFCI protection at source as the equipment undoubtedly has bare wet skin contact and water contact during cleaning.

The solution might be a weatherproof twist lock receptacle with GFCI protection through another receptacle in the room or at the panelboard with a GFCI circuit breaker.

Andrew P. Macdonald, P.E.
Senior Associate Electrical Engineer
16414 San Pedro Ave. STE 425
San Antonio, Texas 78232
I oppose it.

AC

---

From: Aldo Carminio  
Sent: Friday, August 13, 2021 12:27 PM  
To: Shared TIAs <STIAs@nfpa.org>  
Subject: Comment on Proposed TIA 1598 on NFPA 70

Dear Committee:

I see the concern, but this is no different than placing an outlet in any bathroom; normally near a lavatory. The GFCI requirements should be sufficient. If additional concerns remain, an independently ground circuit could be called for; similar or equal to “hospital grade” devices in healthcare environments.

Aldo Carminio, R.A.  
CARMINIO Architecture  
655 Jerusalem Road  
Scotch Plains, NJ 07076
I do not agree this is a valid TIA. There’s no evidence of an emergency presented with the substantiation.

CMP 14 Princ.

Regards,

Eddie Guidry | FLUOR | Sr. Fellow – Codes and Standards - Electrical Engineering | One Fluor Daniel Dr., Sugar Land, TX 77478 | www.fluor.com

The information transmitted is intended only for the person or entity to which it is addressed and may contain proprietary, business-confidential and/or privileged material. If you are not the intended recipient of this message you are hereby notified that any use, review, retransmission, dissemination, distribution, reproduction or any action taken in reliance upon this message is prohibited. If you received this in error, please contact the sender and delete the material from any and all computers and other devices.

Any views expressed in this message are those of the individual sender and may not necessarily reflect the views of the company.
CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

I agree with the worth of this concept. At the same time, I propose removing the word "readily." I do not see any substantiation for this.
If the receptacle is a GFCI device, it already will need to be readily accessible. If it is a plain receptacle, GFCI-protected upstream, this requirement is unnecessary.

David E. Shapiro

Safety First
Foran, Rosanne

Subject: FW: Comment on Proposed TIA 1598 on NFPA 70

From: Robert Posma
Sent: Tuesday, July 13, 2021 12:38 PM
To: Shared TIAs <STIAs@nfpa.org>
Subject: Comment on Proposed TIA 1598 on NFPA 70

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

The sample photo shows a GFCI protected duplex receptacle installation. A single receptacle device protected by a remote Class A GFCI protective device would provide accessible of the switch/testing function and limit the possibility of plugging other devices into the receptacle. Alternative for these installations would be to hardwire the connection through a remote GFCI protective device.

Robert D Posma PE
Principal Electrical/Fire Protection Engineering

PDC, a Division of RESPEC Company LLC
A RESPEC COMPANY
2700 Gambell St. Suite 500, Anchorage, Alaska 99503 |
Facebook | LinkedIn | Twitter | www.pdceng.com

Transforming Challenges into Solutions
Anchorage | Fairbanks | Juneau | Palmer | Soldotna

Confidentiality Notice: This E-mail and any attachments is covered by the Electronic Communications Privacy Act, 18 U.S.C. & 2510-2524, is confidential and may be legally privileged. If you are not the intended recipient, you are hereby notified that any retention, dissemination, or copying of this communication is strictly prohibited. Please reply to the sender that you have received the message in error, and permanently delete the original and destroy any copy, including printed copies of this email and any attachments thereto.
To Whom it May Concern:

Regarding Proposed TIA 1598, ICC supports the TIA as the use of personal hygiene devices and smart toilets are necessary for not only protecting the health of individuals that suffer from various medical conditions, but maintaining the dignity and self-reliance of individuals with special needs as well. We believe this TIA provides appropriate measures to protect against electrical shock, while providing provisions for the installation of an electrical receptacle that is necessary for such devices to function.

If ICC can be of further assistance on this matter, please contact Matt Sigler (PMG Executive Director) at 407-858-8454.

Regards

Dominic Sims, CBO, CEO
International Code Council
500 New Jersey Ave
Washington, DC 20001

We welcome you to join us in Pittsburgh for the 2021 ICC Annual Conference & Public Comment Hearings. Our signature event is packed full of networking and learning opportunities. Registration is open!
I am supporting if the change the wording from not behind to not behind the tank nor under. I understand the need but we must still be cognitive of the hazard an outlet box is under a water tank by at fill line.

Thanks

Bob

Robert L. Ballantyne Jr
Senior Vice President
Principal Engineer, Atomic & Molecular Spectroscopist
2245 Colex Dr
Grand Junction, CO. 81505

http://www.resourcewest.com

Comment:

The written description and the associated picture of the receptacle location has errors.

The location of the receptacle in the picture shows the receptacle in a location where a servicing plumber could inadvertently have water drainage into the receptacle when servicing the seal between the tank and the stool. Furthering the location problem is the fact many home owners change out their own filler line and tank gaskets. In this situation the home owner with minimal electrical knowledge may believe the GFCI is offer protection for any water in the area. However it the GFCI is a GFCI outlet instead of a GFCI circuit breaker (both would be legal under NEC 70 presently) a electrocution hazard could exist where water runs into the outlet box and finds the hot line power. This could result in electrocution of a home owner unaware that line voltage is still present in the outlet box even though the GFCI is tripped.

I would propose the wording be amended to state “Located Neither behind nor under the tank” to remove this hazard.

Thanks

Bob Ballantyne
Senior Vice President
Principal Engineer, EE, Spectroscopist
Resource West, Inc.
2245 Colex Dr.
Grand Junction, CO 81505 USA

CHECK OUT OUR WEBSITE by clicking the RWI Logo:
The current proposed language of Exception No. 2 is as follows:

Exception No. 2: In a dwelling unit, a single receptacle shall be permitted for an electronic toilet or personal hygiene device such as an electronic bidet seat. The receptacle shall be readily accessible and located on one of the following:
(1) The wall behind the toilet but not behind the tank
(2) The opposite side of the toilet from the bathtub or shower.

While the desire to have a receptacle outlet in close proximity to a toilet for the purpose of powering the bidet and smart-device accessories now available for toilets is understandable, this does not mitigate the reasoning for why receptacles are not permitted in these locations. These locations are known for getting splashed, sprayed, and exposed to overflows of water from tubs or countertops. Why a receptacle is there does not make any difference from a safety perspective.

I believe there may be a solution, though. We already permit receptacles to be located in outdoor spaces that are rained on and splashed all of the time, and the pertinent requirements for those can be extracted from Article 406.9(B)(1), namely the use of a weatherproof hood. Modifying the text of Exception No. 2 to require a “weatherproof” hood (basically one that is splash-proof) that seals against the wall should address the problem such outlets would present. If the bidet and smart-product manufacturers would commit to using the low-profile right-angle plugs similar to that shown in the TIA 1598 supporting materials, then a lower-profile hood or hooded cover plate with wall gasket could possibly be used for better aesthetics.

Based on that reasoning, I recommend the language of Exception No. 2 be changed to read:

Exception No. 2: In a dwelling unit, a single receptacle shall be permitted for an electronic toilet or personal hygiene device such as an electronic bidet seat. The receptacle shall have a splash-proof hood that completely covers the receptacle faceplate area and seals against the wall. The receptacle shall be readily accessible and located on one of the following:
(1) The wall behind the toilet but not behind the tank
(2) The opposite side of the toilet from the bathtub or shower.

Karl Reighard
Sr. Engineering Tech Specialist
Delmarva Power
600 Marvel Road
Salisbury, MD 21801
To Whom it May Concern:

Regarding proposed TIA 1598, Toto USA, Inc, a manufacturer of electronic toilets and personal hygiene toilet seats covered under the scope of standard UL 1431, fully supports the TIA 1598.

Toto USA Inc, firmly believes the TIA addresses the necessary and appropriate language to permit the complete installation of these products to a nearby receptacle. The amended language in the 2020 edition of the affected clause inadvertently omitted consideration of the referenced products.

The TIA proposal allows for a connection of smart toilets and hygiene seats to an accessible receptacle with greater access while protecting the safety of individuals. The stated rationale has much merit and provides for an exigent need amongst people suffering from a multitude of colorectal health issues while providing relief for postpartum circumstances and facilitates washing for the elderly as well as mobility challenged community.

Regards,

Fernando Fernandez,

フェルナンド・フェルナンデス

Sr. Director Codes and Standards
TOTO USA, Inc.
5351 E. Jurupa St.
Ontario, CA 91761

web: www.totousa.com
For 20 years or more I have been working to promote the use of bidet toilet seats for use as an aid to allow elderly people to continue to live in their homes instead of moving to an elderly care facility which few people want. The bidet toilet seat in many cases eliminates the need for a nurse or loved one to assist with toileting. The latter is probably the most common reason elderly people give up independence and move to nursing homes. This move is usually demoralizing and traumatic. Most people want to stay in their homes as long as they can.

Numerous studies have shown health benefits to those with certain maladies such as urinary tract infections, stroke, missing limbs, and physical weakness that makes wiping the perineal area with paper impossible. The benefits of washing are considerable regardless.

I strongly support TIA 1598 as it makes installation of a needed GFCI outlet possible in many bathrooms.

Gunnar Baldwin
Dear Esteemed NEC Committee,

Please see attachment for our letter of support for the subject TIA proposal as part of the public commenting period. Thanks.

If you have any questions, please do not hesitate to contact me.

Regards,

Tony Zhou
VP, Engineering
IAPMO EGS
5001 E. Philadelphia St.
Ontario, CA 91761 USA

CONFIDENTIALITY: This email (including any attachments) may contain confidential, proprietary and privileged information, and unauthorized disclosure or use is prohibited. If you received this email in error, please notify the sender and delete this email from your system. Thank you
August 23, 2021

NFPA
1 Batterymarch Park
Quincy, Massachusetts
USA 02169-7471
1 800 344-3555 (U.S. & Canada)

To: TIAErrata_Errata@nfpa.org, STIAs@nfpa.org

Subject: Proposed TIA 1598, NFPA 70

Dear Esteemed NEC Committee,

This letter is to indicate our support for the proposed TIA as a Nationally Recognized Testing Laboratory (NRTL) by OSHA and member of the UL 1431 Standard Technical Panel which these electronic toilet or personal hygiene devices are electrically Listed to. We agree with the argument noted in proposed TIA for justification in proposed Exception No. 2.

Also, we would like to note that even though these products have been installed for many years prior to the recent 2020 NEC change, we are not aware of any safety field incident associated with them based on the pre-2020 NEC installation requirement.

The recent change creates an unnecessary burden for the industry and support the proposed TIA 1598 to alleviate the situation.

If you have any questions, please do not hesitate to contact me.

Regards,

Tony Zhou
VP, Engineering
IAPMO EGS
5001 E. Philadelphia St.
Ontario, CA 91761 USA
To Whom It May Concern:

I am writing with regard to the proposed TIA1598, clause 406.9(C). As a member of the public, I am in full support of this amendment. As an American who owns, uses, and benefits from electric bidet seats in the bathroom, whether I am at home or staying at hotels, I strongly support the addition of these two exceptions to the existing electrical code. I also have elderly parents who refuse to travel without the ability to wash themselves privately, and electric bidet seats aid in their ability to maintain their hygiene, integrity, and freedom.

Thank you,

--

Nobu Terasaki
20675 Rawhide Road
Elkhorn NE 68022
To Whom It May Concern:

I am writing with regard to the proposed TIA1598, clause 406.9(C). As an employee of TOTO USA, a company that manufactures electric bidet seats, and as a member of the public who benefits from these products, I fully support this amendment. This proposal allows for the safe installation of smart toilets and bidet seats, which also provides many health and comfort benefits for a diverse group of individuals, not limited to those with limited mobility issues and colorectal health issues. I, for one, while privileged in terms of health and mobility, still benefit greatly from being able to install and use electric bidet seats. I also know that my family members, especially aging grandparents, refuse to travel without access to bidet seats. These products provide increased freedom, hygiene, and integrity, and I am very encouraged that this amendment is on the table.

Thank you,

Mariko Terasaki

Mariko Terasaki, MPP | LEED Green Associate
Assistant Manager
Marketing and Communications
TOTO USA
w. totousa.com
Wording for both the 2020 and Proposed 2023 editions:

1. Revise 250.114(3)e and (4)e to read as follows:

   250.114 Equipment Connected by Cord and Plug. Exposed, normally non-current-carrying metal parts of cord-and-plug-connected equipment shall be connected to the equipment grounding conductor under any of the following conditions:

   …

   (3) In residential occupancies:

   …

   e. Portable handlamps and portable luminaires

   (4) In other than residential occupancies:

   …

   e. Portable handlamps and portable luminaires

   …

Substantiation: The phrase “and portable luminaires” was added during the 2020 cycle (FR 8040, based on PI 1200) to both 250.114(3)(e) and (4)(e). The FR substantiation (carried forward from the PI) states:

“Portable handlamps were originally covered by UL 298, titled "Portable Electric Hand Lamps". UL 298 was withdrawn in 2004, and has been superceded by UL 153, titled "Portable Electric Luminaires". Devices that were once called "Portable Handlamp" on their label are now being labeled as "Portable Luminaire", but are the same product. Therefore, 3(e) and 4(e) should include "portable luminaires" to continue to cover the grounding need for these products.”

The substantiation conflated the certification organization label designation (“Portable Luminaire”) with the requirements in the standard that apply to the specific product type (a portable hand light). UL 153 (clause 138.6.1) explicitly requires portable hand lights, which are typically used in garages and similar environments, to use a grounding type attachment plug when they have accessible metal that may become energized. UL 153 applies a similar grounding plug requirement on other types of portable luminaires, such as those for wet locations. But there are many indoor use (residential and commercial) portable luminaire types that have always been permitted, by UL 153 and NEC 410.82, to use a polarized, 2-wire supply plug. Polarized portable luminaires compliant with UL 153 have a well-established acceptable field record of adequately managing the associated risks. The substantiation for FR 8040 did not claim otherwise but appears to have inadvertently removed this longstanding design option.
During the 2020 cycle, NEC 410.42 was revised (PI 2473, FR 8426) to reinforce the longstanding permission (in 410.82) for portable luminaires to use a polarized plug.

The result is that NEC 250.114(3) and (4), which now require all portable luminaires with accessible metal (and without double insulation) to be grounded, is in conflict with 410.82 which permits a polarized plug and 410.42 which says those with a polarized plug do not require grounding. This TIA therefore proposes that 250.114(3)(e) and (4)(e) be returned to their 2017 edition status to eliminate this conflict. The objective of PI 1200 / FR 8040, to maintain the grounding requirement for portable hand lights (despite their requirements shifting from UL 298 to UL 153) was never in jeopardy so the PI / FR was never needed.

**Emergency Nature:** The NFPA Standard contains a conflict within the NFPA Standard or within another NFPA Standard.

Portable luminaires listed in accordance with UL 153 and with a polarized plug should not be rejected due to non-compliance with 250.114. The conflict between this section and 410.42 was found too late in the 2023 cycle for a public input, and it should not be left to linger until the 2026 revision cycle opens.
MEMORANDUM

TO: Code-Making Panel 5
FROM: Sarah Caldwell, Committee Administrator
DATE: October 21, 2021
SUBJECT: NEC® Proposed TIA No. 1608 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

18 Eligible to Vote
2 Not Returned (Beltran Feliciano, Sumbera)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>15 Agree (w/comment: Mohla)</td>
<td>14 Agree</td>
</tr>
<tr>
<td>1 Disagree (Crawford)</td>
<td>2 Disagree (Crawford, Stromberg)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[18 \text{ eligible} \div 2 = 9 + 1 = 10\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 12.

\[(18 \text{ eligible to vote} - 2 \text{ not returned} - 0 \text{ abstentions} = 16 \times 0.75 = 12)\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is October 26, 2021.
QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1608 to revise 250.114(3)e and (4)e of the 2020 and proposed 2023 editions of the NEC.

Eligible to Vote: 18
Not Returned: 2
Darrell M. Sumbera, David Enrique Beltran Feliciano

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>15</td>
<td>Agree</td>
</tr>
<tr>
<td>Bobby J. Gray</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>William A. Pancake, III</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Daleep C. Mohla</td>
<td></td>
<td>According to the substantiation submitted with this TIA, UL standard 153 permits use of a polarized, 2-wire supply plug only for indoor use portable luminaires. The UL standard 153 requires an equipment grounding conductor for all other installations such as those for wet locations. 410.42 in NEC 2021 only precludes connection to an equipment grounding conductor for portable luminaires with a polarized plug attachment. Deleting “portable luminaires” in 250.114(3)e and 250.114(4)e will remove the requirement for connection to equipment grounding conductor for all portable luminaires used in all locations (both indoor and outdoor wet locations), and with any plug attachments (both with, or without, a polarized plug). Only an exception is needed to harmonize requirements of UL 153, 250.114, 410.42 and 410.82. This exception can permit the grounded conductor to be used for grounding purposes for listed indoor use portable luminaires provided with a polarized 2-wire supply plug attachment. It will be more appropriate if this TIA is withdrawn and a new TIA is submitted with an exception to 250.114(3)e and 250.114(4)e as stated above to address the conflicting requirements.</td>
</tr>
</tbody>
</table>

Paul W. Abernathy          | AGREE |
Joseph F. Andre            | Agree |
Christine T. Porter        | agree |
Paul Dobrowsky              | I agree |
Joseph James Harding       | Agree. |
Gregory J. Steinman        | agree |

Agree.
G. Scott Harding  
I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1608 to revise 250.114(3)e and (4)e of the 2020 and proposed 2023 editions of the NEC.

Bryan Keith Wilson  
Disagree

Carlie Rose Crawford  
CMP-5 has not been furnished substantiation to support consideration of this TIA. If this were from the public in the form of a Public Input or Public Comment, it would be rejected with a statement that there is inadequate substantiation. The NEC Correlating Committee informed CMP-5 that PIs or Comments related to grounding and bonding would be routed to CMP-5 for consideration. That did not happen.

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 18  
Not Returned: 2

Bobby J. Gray
William A. Pancake, III
Daleep C. Mohla
Paul W. Abernathy
Joseph F. Andre
Christine T. Porter
Paul Dobrowsky

Vote Selection  |  Votes  | Comments
---|---|---
Agree  | 14  | B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.
                  |  | A and E
                  |  | The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.
                  |  | AGREE
                  |  | Agree A. The standard contains an error or an omission that was overlooked during the regular revision process. and B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.
                  |  | The standard contains an error or an omission that was overlooked during the regular revision process.
                  |  | I agree
The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.

**Reason A**

The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.

**Disagree**

- **2**

- **Eric Roland Stromberg**
  - There is a public comment concerning this. We will discuss this during the second draft meetings (for 2023). I don't believe this warrants an emergency TIA (for 2020).

- **Carlie Rose Crawford**
  - CMP-5 has not been furnished substantiation to support consideration of this TIA. If this were from the public in the form of a Public Input or Public Comment, it would be rejected with a statement that there is inadequate substantiation. The NEC Correlating Committee informed CMP-5 that PIs or Comments related to grounding and bonding would be routed to CMP-5 for consideration. That did not happen.

**Abstain**

- **0**
MEMORANDUM

TO: NEC® Correlating Committee

FROM: Sarah Caldwell, Committee Administrator

DATE: October 21, 2021

SUBJECT: NEC® Proposed TIA No. 1608 FINAL CC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

<table>
<thead>
<tr>
<th>Correlation Issues:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>12 Agree</td>
<td>12 Agree</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

   \[
   12 \text{ eligible} \div 2 = 6 + 1 = (7)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 9.

   \[
   (12 \text{ eligible to vote} - 0 \text{ not returned} - 0 \text{ abstentions} = 12 \times 0.75 = 9)\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is October 26, 2021.
NEC CC TIA 1608 Ballot Final Results
Election:70_A2022_NEC_AAC_Log1608_Ballot
Results by Revision

QUESTION NO. 1: I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.

Eligible to Vote: 12
Not Returned: 0

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Palmer L. Hickman</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Michael J. Johnston</td>
<td>No apparent correlation issues within NFPA Standards.</td>
<td></td>
</tr>
<tr>
<td>Dean C. Hunter</td>
<td>I agree there are no correlation issues in accordance with 3.4.2 and 3.4.3 of the NFPA Regulations.</td>
<td></td>
</tr>
<tr>
<td>Roger D. McDaniel</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>David L. Hittinger</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Alan Manche</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Ernest J. Gallo</td>
<td>I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.</td>
<td></td>
</tr>
<tr>
<td>David H. Kendall</td>
<td>Agree- There are no correlating issues.</td>
<td></td>
</tr>
<tr>
<td>David A. Williams</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Richard A. Holub</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Christine T. Porter</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 12
Not Returned: 0

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Palmer L. Hickman</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>John R. Kovacik</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Michael J. Johnston</td>
<td></td>
<td>Appears in conflict with directly related product standard.</td>
</tr>
<tr>
<td>Dean C. Hunter</td>
<td>B</td>
<td>The NFPA Standard contains a conflict within the NFPA Standard.</td>
</tr>
<tr>
<td>Roger D. McDaniel</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>David L. Hittinger</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Alan Manche</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Ernest J. Gallo</td>
<td></td>
<td>I AGREE that the subject is of an EMERGENCY NATURE</td>
</tr>
<tr>
<td>David H. Kendall</td>
<td>B</td>
<td>The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard</td>
</tr>
<tr>
<td>David A. Williams</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Richard A. Holub</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Christine T. Porter</td>
<td></td>
<td>The phrase “portable luminaire” is a very broad term that covers a wide variety of luminaires. All of which are now listed to UL 153. By adding that phrase to 250.114(3)(e) and (4)(e) the NEC is now requiring all portable luminaires to be the 3-wire type with an equipment grounding conductor. This includes ALL table lamps, bedside lamps, living room pole style lamps, etc. which have been a polarized 2-wire type for years without issue. The Portable Hand Lamp is not the same thing as Portable Luminaires, it is merely just one specific type of portable luminaires. Clauses 1-37 of UL 153 cover the general requirements for all portable luminaires. The supplemental construction requirements for the specific types of portable luminaires are covered next. The various types are: Incandescent, Tungsten Halogen, Fluorescent, High Intensity Discharge, Surface Mounted, Cord and Chain suspended, Clamp on, Portable Cabinet, Units for use with office furnishings, Convertible units, Interchangeable units, Track style, Portable luminaire Kit, Portable luminaire subassemblies, work lights, damp location use, wet location use, and Portable Hand Lights.</td>
</tr>
</tbody>
</table>
1. Revise paragraph 5.1.12.4 to read as follows:

5.1.12.4* New and existing loading systems shall comply with 5.1.12.1 through 5.1.12.3 by June 2, 2023.

2. Delete Annex A.5.1.12.4 in its entirety as follows:

A.5.1.12.4 This date is consistent with the 5-year phase-in for overfill prevention systems as required in the 2017 edition of NFPA 407.

Substantiation: The global coronavirus pandemic has restricted the ability to comply with the implementation date. Manpower constraints, social distancing requirements, delays in global shipping, availability of parts, and travel restrictions have inhibited the procurement and installation of the electronic overfill protection system. Although the original implementation date has already passed, the Committee should consider that many of the above-mentioned impacts will continue for the foreseeable future and that more time will be needed to conduct a safe and effective upgrade.

Given the above, this TIA is to request a 24-month extension to the implementation date outlined in section 5.1.12, Aircraft Fuel Servicing Vehicle Loading and Unloading Racks.

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.

The global coronavirus pandemic has restricted the ability to comply with this implementation date. Manpower constraints, social distancing requirements, delays in global shipping, availability of parts and travel restrictions have inhibited the procurement and installation of the electronic overfill protection system.
MEMORANDUM

TO: Technical Committee on Aircraft Fuel Servicing

FROM: Yiu Lee, Committee Administrator

DATE: November 9, 2021

SUBJECT: NFPA 407 Proposed TIA No. 1610 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to Section 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

27 Eligible to Vote
0 Not Returned

<table>
<thead>
<tr>
<th>Technical Merit</th>
<th>Emergency Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>23 Agree (w/ comment, Leahey, Lindner, Moody, Souza, Tonnacliff)</td>
<td>24 Agree (w/ comment, Bautista Demyan, Leahey, Lindner, Motschman, Souza, Sundby, Tonnacliff)</td>
</tr>
<tr>
<td>4 Disagree (Gambino, Hawthorne, Murray, Sundby)</td>
<td>3 Disagree (Gambino, Hawthorne, King)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[
27 \text{ eligible} \div 2 = 13.5 = 14 \text{ (rounded up)}
\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 21.

\[
(27 \text{ eligible to vote} - 0 \text{ not returned} - 0 \text{ abstentions} = 27 \times 0.75 = 20.25)
\]

Ballot comments are attached for your review.

The Regs at Section 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with Section 4.2.6.

Appeal Closing Date for this TIA is November 14, 2021
**NFPA TECHNICAL COMMITTEE ON AIRCRAFT FUEL SERVICING**

**PROPOSED TENTATIVE AMENDMENT LOG NO. 1610 - FINAL BALLOT RESULTS**

**QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1610 to Revise paragraph 5.1.12.4.**

Delete Annex A.5.1.12.4.

Eligible to Vote: 27

Not Returned: 0

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Michael Kluttz</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jeremy Souza</td>
<td></td>
<td>Agree. The industry has had over 5 years to meet this requirement, four of those years before the pandemic struck. Indeed, many airports were able to meet the requirement. That said, to facilitate industry-wide compliance, a 2-year extension is sound.</td>
</tr>
<tr>
<td>Thomas Boriack</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>John J. Demyan</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Marc S. Tonnacliff</td>
<td></td>
<td>The proposed TIA intends to correct a circumstance where the revised NFPA standard has resulted in an adverse impact on a product or methods that were inadvertently overlooked during the revision process or was without adequate technical (safety) justification for the action. Therefore, the additional requirement for an automatic secondary shutdown system is not considered “Emergency in Nature” and the impact of the TIA is minimal on fire safety for airports that have not yet installed an automatic secondary shutdown system, as long as the current safety procedures are followed. We understand the basis of this extension is due to the global coronavirus pandemic which has restricted the ability to comply with the implementation date because of labor constraints, social distancing requirements, delays in global shipping, availability of parts, and travel restrictions. This has inhibited the procurement process and installation of the electronic overfill protection system.</td>
</tr>
<tr>
<td>Michael Motschman</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Andrew Lipari</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>John Leahey</td>
<td></td>
<td>While I understand and agree with issues stated due to the coronavirus pandemic which occurred during the final year of the five year implementation period, I would be remiss if I didn't mention that those who were affected by this requirement and took the initiative to begin working to meet the requirement should be recognized. Many airports utilized the given five year time frame and because of this were still able to meet the implementation deadline even during a global pandemic.</td>
</tr>
<tr>
<td>Jean-Luc Kassabian</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>William E. Moody</td>
<td></td>
<td>The TIA is for a revision of a standard that I cannot agree with. I agree to the extension, however I do not agree with the requirements set our in 5.1.12. Will make comment for next revision to review this requirement and discuss other alternatives. Am open to review any data that is driving his requirement.</td>
</tr>
<tr>
<td>Kenneth M. Bilson</td>
<td></td>
<td>Agree</td>
</tr>
</tbody>
</table>
Cristino Colon, Jr.  Agree
Terry L. Bosserman  Agree
David Wesley King  Agree
Jason Travis Pritchett  Agree
Brian Lacher  Agree
Steve C. Berry  Agree.
John Behrens Lindner  AGREE - Due to unavoidable issues of supply the date needs to be extended
Donald Nodes  Agree
Reed C. Fuller  Agree
Miguel Bautista  Agree
Brian G. Coyle  Agree
Ronald Waggett  Agree
Disagree  4
Thomas D. Gambino  No assurances from the submitter has been provided that a 2-year extension would promote compliance with the requirements of Paragraph 5.1.12.
Edward M. Hawthorne  Already provided 5 years to implement.
Dan Murray  Given the current supply chain environment and labor shortage, I do not believe a two year extension from June 2nd, 2021 will be sufficient. Industry expectation will be two years before we might be able to get our supply chain back in order if we do not have any further pandemic set back. Maybe another year or two will be needed. It certainly is not in a productive state today.
Paul E. Sundby  I don't think enough discussion has taken place about the latest TIA date. Need to confirm the FAA and NFPA dates will align and is June 2023 the correct date? I still believe in the overfill requirement, just want the dates to align and confirmed it as doable. I Don't want another extension.
Abstain  0

**QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.**

Eligible to Vote: 27
Not Returned : 0

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Michael Kluttz</td>
<td></td>
<td>F</td>
</tr>
<tr>
<td>Jeremy Souza</td>
<td></td>
<td>While the industry has had now more than 5 years to achieve compliance with this requirement, I agree that an additional two years is warranted based on current supply problems.</td>
</tr>
<tr>
<td>Thomas Boriack</td>
<td>Agree, F</td>
<td></td>
</tr>
<tr>
<td>John J. Demyan</td>
<td></td>
<td>I will agree with this extension, but I don't believe it will fix the problem. They had 5 years to comply, and many airports did go and get the new system installed at their fuel farms. Their local FAA Part 139 inspector probably sent out a letter asking if they comply with the new standard and provided guidance on how to proceed if you did not meet the requirement by the deadline.</td>
</tr>
</tbody>
</table>

Posted: December 3, 2021  Standards Council Agenda: December 7-8, 2021  148 of 397
Marc S. Tonnacliff  
The proposed TIA intends to correct a circumstance where the revised NFPA standard has resulted in an adverse impact on a product or methods that were inadvertently overlooked during the revision process or was without adequate technical (safety) justification for the action. Therefore, the additional requirement for an automatic secondary shutdown system is not considered “Emergency in Nature” and the impact of the TIA is minimal on fire safety for airports that have not yet installed an automatic secondary shutdown system, as long as the current safety procedures are followed. We understand the basis of this extension is due to the global coronavirus pandemic which has restricted the ability to comply with the implementation date because of labor constraints, social distancing requirements, delays in global shipping, availability of parts, and travel restrictions. This has inhibited the procurement process and installation of the electronic overfill protection system.

Michael Motschman  
Due to the pandemic

Andrew Lipari  
F

John Leahey  
The global pandemic has created a unique situation that could not have been foreseen at the time the standard was revised.

Jean-Luc Kassabian  
A

William E. Moody  
F

Kenneth M. Bilson  
F

Cristino Colon, Jr.  
“A”

Terry L. Bosserman  
agree

Jason Travis Pritchett  
F. 

Dan Murray  
Agree

Brian Lacher  
F.

Paul E. Sundby  
This needs to be dealt with.

Steve C. Berry  
F.

John Behrens Lindner  
AGREE - There are presently inspectors attempting to enforce this section.

Donald Nodes  
Agree

Reed C. Fuller  
F

Miguel Bautista  
F. 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.

Brian G. Coyle  
F

Ronald Waggett  
Agree

Disagree  
3

Thomas D. Gambino  
This request does not rise to an Emergency Nature, because as part of the 2017 revision the public was provided with a 5-year phase in period.

Edward M. Hawthorne  
Had 5 years to implement

David Wesley King  
I disagree that this is not of an emergency nature but a standard compliance road block that will need to be addressed due to materials shortage and the corona virus epidemic.

Abstain  
0
They already had 5 years. They should have done it already. I think they need to be fined if there is any extension allowed. This is why people don’t do things because you always do this. We had ours done with no issues.

Randy Galyean
Line Manager

Ranger Aviation Enterprises, Inc.
PO Box 61010
San Angelo, TX 76906-1010
www.rangeraviation.com

Happy Flying!
Dear Secretary-Standards Council,

We are in full support of the Proposed TIA 1610 on NFPA 407 requesting a 24-month extension for implementation to June 2, 2023. We are currently in the process of upgrading our systems to comply with the new requirements, but the coronavirus pandemic had delayed our ability to implement this fully.

Thank you for your consideration.

Jason Maga  
General Manager, HFFC Fuel Consortium

Signature Flight Support  
Honolulu International Airport  
3201 Aolele Street  
Honolulu, HI 96819

SignatureFlight.com

This message may contain confidential and/or privileged information. If you are not the intended recipient or believe you have received this message in error, please notify us immediately by responding to the sender and then delete this message from your system.
Good morning,

Please let this email serve as my support to extend the deadline.

Jeff Gillquist | General Manager | PIE
14525 Airport Parkway
Clearwater, FL 33762

www.signatureflight.com

This message may contain confidential and/or privileged information. If you are not the intended recipient or believe you have received this message in error, please notify us immediately by responding to the sender and then delete this message from your system.
This email address is not monitored outside of the employee’s scheduled working hours. Should you need immediate assistance, please contact the Signature location directly at pie@signatureflight.com
To whom it may concern,

I am in agreement with TIA Log No.: 1610 both in the technical aspect and the emergency nature.

Roy Creley
Fuel Systems Specialist
Lakes Region Environmental, Inc.
LR Fuel Systems
I would comment that in the present market, “allowing” a delay to 2023 on this provides time to reword the standard.

A rack mounted high level control is not superior to what we have always required, it gives the false sense of added safety while reducing safety. This is because both operators and even Fire/Safety inspectors think it is better than the old-fashioned on-board high level controls. IT IS NOT! When the rack mounted system is employed, operators tend to stop doing their precheck, due to this false sense of it being better.

Even many Fire/Safety inspectors believe this false concept and stop requiring pre-checks.

The problem is that the rack mounted system does not check that the internal valve closes. These valves stick over time and WHEN they do (not “if”), an accident on the ramp can result in the entire contents of the cargo tank going into the nearest storm drain. ONLY THE PRE-CHECK OF THE ONBOARD HIGH LEVEL CONTROL TESTS THE INTERNAL VALVE.

I stress that the problem is a false belief (EVEN BY MEMBERS OF THIS COMMITTEE) that the rack mounted system adds safety - while IN EFFECT IT can reduce safety.

We may be better off overall by simply mentioning/requiring that the wholly on-board high level controls (we do require now) MUST be tested at least daily.

This is in accordance with the Airline Standard ATA-103.

Section 2.8.18 requires this capability and 2.9.3.15 requires it to be “prechecked” during filling at least once a day.

Unfortunately, the on board high level control has gotten a reputation for not working, when the rack mounted system fails. This only happens if the operators are not doing the precheck and it only proves the system was not properly being checked for full safety. The internal valve was already stuck open and the truck was dangerous to operate – but in following the false belief that a pre-check is no longer needed, no one knew the risk of a major environmental disaster existed!

How does this happen?

IT HAPPENS WHEN THE LOCAL SUPERVISOR AND FIRE INSPECTOR DO NOT MAKE SURE THE (airline-required) PRECHECK TEST IS BEING PERFORMED!

Rack mounted systems are good for ONLY preventing an overfill at the loading rack and should be (at most) considered secondary high level controls, as they are in NFPA-30. But in 30, the meter preset is the primary high level control, as tractor
trailer are always empty when loaded. Refuelers are almost never empty when the cargo tank is “topped off”.

Also NFPA-30 does not require on-board high level control, so they have very different internal valves, which are apparently not prone to sticking.

==========================================

An alternative is to build/modify refuelers to have an automatic precheck. We can do this, there are ways. Being a manufacturer, I will not define it, but allow every engineer a clean piece of paper to design his/her own concept.

Jim Gammon
From: Paul Sundby
Sent: Wednesday, September 29, 2021 4:35 PM
To: Shared TIs
Subject: Comment on Proposed TIA 1610 on NFPA 407
Attachments: Compliance with National Fire Protection Association (NFPA) 407 Revision - FINAL.pdf

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

CAUTION: Always use caution when opening attachments. Make sure you know the sender and are you expecting one.

If we are going to extend, I think we should align the completion date with the FAA requirements – December 2, 2022. See attached.

Best Regards,

Paul Sundby
Vice President Sales and Marketing
American Environmental Aviation
Member of the NFPA 407 Technical Committee

www.americanenvironmentalaviation.com

One Call. One Company...Done!
Airport Certification Program – 14 CFR 139
Policy Guidance #114

Subject: Enforcement Policy with Regard to Compliance with National Fire Protection
Association (NFPA) 407 Standard for Aircraft Fuel Servicing automatic shutdown systems.

Contacts
Birke Rhodes, Manager, Airport Safety and Operations Division
Marc Tonnacliff, ARFF Specialist, Airport Safety and Operations Office

Purpose
Provide all Airport Certification Safety Inspectors (ACSI) guidance¹ for certificated airports
utilizing NFPA 407 Standard for Aircraft Fuel Servicing 2017 Ed. in regards to complying with the
requirement for an automatic fuel shutdown system and the timeframe for airport certificate
holders to install an automatic fuel shut down.

Background
a. 14 CFR Part 139.321(b) states: “Each certificate holder must establish and maintain
standards authorized by the Administrator for protecting against fire and explosions in
storing, dispensing, and otherwise handling fuel on the airport. These standards must
cover facilities, procedures, and personnel training and must address at least the following:
(1) Bonding; (2) Public protection; (3) Control of access to storage areas; (4) Fire safety in
fuel farm and storage areas; (5) Fire safety in mobile fuelers, fueling pits and fueling
cabinets; (6) Training of fueling personnel in fire safety; (7) The fire code of the public body
having jurisdiction over the airport”.

b. AC 150/5230-4 Aircraft Fuel Storage, Handling, Training, and Dispensing on Airports
states: “NFPA 407 is the generally accepted industry best practice at many airports;
however, local fire code and regulations at specific airports may differ. All Part 139 airport
operators will identify the standard adopted in their Airport Certification Manual”. FAA
believes the majority of Part 139 airports use and adopt the latest edition of NFPA 407;
which would be NFPA 407 Standard for Aircraft Fuel Servicing 2017 Ed.

c. On June 2, 2016, the National Fire Protection Association (NFPA) 407 Standard for
Aircraft Fuel Servicing 2017 Ed. was published. That standard provided a June 2, 2021

¹ This PG is not considered guidance because it constitutes purely internal agency policies or guidance directed
solely to DOT employees or contractors or to other Federal agencies.
requirement for the installation of automatic shutdown systems that stop the tank loading operation when the fuel servicing vehicle tank is full.

**Action**
Within 45-days of the issuance of this policy guidance, the ACSIs shall confirm the fueling standard adopted by each Part 139 airport. For Part 139 Airports that have adopted fire codes that specify the automatic shutdown will be installed with a compliance date of June 2 and have not met this requirement, the ACSI shall contact the airport and document this in a compliance letter as a discrepancy. The planned correction date selected should be as soon as possible; however, it must be no later than 18 months from the deadline or December 2, 2022. CCMIS has been modified to accommodate the tracking and documentation for this requirement. The status of each airport will be entered and tracked in CCMIS. ACSI's shall issue a Letter of Investigation for any airports that have not come into compliance by December 2, 2022.

**Mitigations**
The ACSI shall request the certificated airport provide information within 60 days of the discrepancy that documents how the certificate holder will come into compliance by the date specified. The ASCI will document the information within CCMIS as part of the correction actions.

Birke Rhodes, Manager

DATE 5/26/2021

Airport Safety and Operations Division
From: John Thurston
Sent: Tuesday, October 5, 2021 8:13 AM
To: Shared TIAs
Cc: John Thurston
Subject: Comment on Proposed TIA 1610 on NFPA 407

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

NFPA 407,

Fully support TIA for reasons sated in TIA

Regards,

John C Thurston
Director, Quality Assurance and Technical Authority
Global Physical Operations (Aviation)

"One Team, One Mission"

World Fuel Services Corp.
9800 N.W. 41st Street, Suite 400
Miami, FL 33178

*** This communication has been sent from World Fuel Services Corporation or its subsidiaries or its affiliates for the intended recipient only and may contain proprietary, confidential or privileged information. If you are not the intended recipient, any review, disclosure, copying, use, or distribution of the information included in this communication and any attachments is strictly prohibited. If you have received this communication in error, please notify us immediately by replying to this communication and delete the communication, including any attachments, from your computer. Electronic communications sent to or from World Fuel Services Corporation or its subsidiaries or its affiliates may be monitored for quality assurance and compliance purposes.***
Standards Council Agenda: December 7-8, 2021

Comment No. 7

Foran, Rosanne

From: wpc aviationta.aero
Sent: Wednesday, October 6, 2021 8:21 AM
To: Shared TIAs
Subject: Comment on Proposed TIA 1610 on NFPA 407

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

We agree with the request for a 24-month extension to the implementation date outlined in section 5.1.12, Aircraft Fuel Servicing Vehicle Loading and Unloading Racks.

However, we never agreed with the implementation of the requirement in the first place as it was without adequate technical (safety) justification for the action.

Walter P. Chartrand
Aviation Training Academy

The NEW Standard in Flightline Training

Find ATA on LinkedIn

This e-mail is intended solely for the addressee(s) and contains confidential information. Unauthorized distribution, modification or disclosure of its contents is unlawful. If you have received this e-mail in error, please notify the sender immediately by return e-mail and delete this message from your system. The sender is not liable for any errors or omissions in the contents of this message which arise as a result of email transmission.

Please consider the environment before printing this email
NFPA 407 Committee,

I would like to voice my strong support for the TIAA Log # 1610 regarding the date of compliance with the requirements of section 5.1.12.1 through 5.1.12.3. The justification put forth by Keith Taylor of Delta Airlines has a solid argument and should be strongly considered.

I personally am strongly opposed to the retroactive element of this requirement for existing fuel storage facilities which are loading Aviation Refuelers. The existing technology of a Jet Level Sensor installed in a refueler tank compartment in conjunction with the test feature of the system has been very successful in preventing tanker truck overfills for many years.

Please consider the currently proposed TIA 1610 or do away with the retroactive component altogether.

Regards,

Derek Burge
Aviation Technical & Sales Manager | CityServiceValcon, LLC
From: Todd Fitzsimmons
Sent: Wednesday, October 13, 2021 9:21 PM
To: Shared TIAs
Subject: Comment on Proposed TIA 1610 on NFPA 407

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

We have been available to install and/or retrofit overfill prevention systems. We have experienced no problems or delays getting equipment. Covid has not hindered our ability to do this work. We have advised many of our clients of this new code requirement and advised our availability to do the required upgrades. Most haven’t taken any action to comply. Most seem to be ignoring the code as there is no enforcement. We have not seen any enforcement actions from the authorities having jurisdiction.

Regards,

Lowell “Todd” Fitzsimmons
Smarttank Inc.
133 Walton Street #117
Syracuse, NY 13202

www.fuel-tanks.com
This delay will cause no risk if the operators follow the procedures set down by ATA-103 by Airlines For America.

This is the US standard for handling fuel and all operators should be following it. The 407 requires on board, testable high level control, and every refueler has it – or they do not meet the 407.

The only time this fails is when the local inspectors do not do their job of making sure industry standard is followed.

Jim Gammon
President, Gammon Technical Products
Secretary ASTM D02, J05
Voting member CRC, SAE, ASTM, EI
Dear Secretary, Standards Council,

I agree with the substantiation for TIA 1610. I would also like to add because of the economic downturn and basic shut down of the economy due to the restrictions to control the spread of the pandemic many of the FBO’s and airports had their revenue streams dry up. Many of them were running on a skeleton staff and preservation of capital was paramount. Many were struggling to survive. Getting the pandemic under control with the resurgence and Delta Variant has taken much longer than anyone could have predicted. We are in unknown territory and even the best educated guesses are just that, guesses. Now we are seeing the impact of supply shortages across the country. Long lead times are the norm now, unfortunately. Technicians with the skills necessary for installation of systems such as these are now in short supply and in high demand. I feel it would be wise to allow more time for compliance for the systems to be installed correctly by skilled technicians. The alternative of having the systems installed by someone who doesn’t have the necessary training, licensing, or experience could result in a more detrimental impact due to improper installation.

Mike Welter, Sr. Sales Engineer  
RPD Services LLC  
1790 16th Street SE  
PO Box 12644  
Salem, OR 97309

www.RPDServices.com
1. Add a new 1.3.3 and associated Annex material to read as follows; and renumber existing paragraphs accordingly:

**1.3.3** This standard shall apply to the storage or use of ignitible fibers/flyings, specifically with regard to fire hazards.

**A.1.3.3** Ignitible fibers/flyings, as defined in *NFPA 70* and *NFPA 499*, do not present a flash-fire hazard or explosion hazard and are not included in the definition of combustible dust in this standard. Ignitible fibers/flyings present a fire hazard, so locations are classified differently and the electrical installation includes additional restrictions compared to combustible fibers/flyings.

**1.3.34** This standard shall not apply to the following: …

**1.3.45** Where an industry …

2. Add a new reference to Section 2.4 as follows:


3. Revise 3.3.6 Combustible Dust, and associated Annex material to read as follows:

**3.3.6** Combustible Dust. A finely divided combustible particulate solid, including combustible fibers/flyings, that presents a flash-fire hazard or explosion hazard when suspended in air or the process-specific oxidizing medium over a range of concentrations.

**A.3.3.6** Combustible Dust. The term *combustible dust* when used in this standard includes powders, fines, fibers, flyings, etc. Combustible fibers/flyings are specifically mentioned because, while the hazard is the same, *NFPA 70* and *NFPA 499* treat combustible dust and combustible fibers/flyings separately in regards to establishing hazardous (classified) locations and specifying the electrical installation. Ignitible fibers/flyings, as defined in *NFPA 70* and *NFPA 499*, do not present a flash-fire or explosion hazard and are not included in the definition of combustible dust in this standard. Ignitible fibers/flyings present a fire hazard, so locations are classified differently and the electrical installation includes additional restrictions compared to combustible fibers/flyings.

This definition also includes consideration of a process-specific oxidizing medium other than air. A larger particle size material might not present a hazard in air, yet could present a hazard in an atmosphere with increased oxygen concentration. Similarly, a combustible metal might still present a hazard in an atmosphere typically considered inert, such as CO₂ or nitrogen.
Dusts traditionally were defined as material 420 μm or smaller (i.e., capable of passing through a U.S. No. 40 standard sieve). For consistency with other standards, 500 μm (i.e., capable of passing through a U.S. No. 35 standard sieve) is now considered an appropriate size criterion. Particle surface area-to-volume ratio is a key factor in determining the rate of combustion. Combustible particulate solids with the smallest minimum dimension more than 500 μm generally have a surface-to-volume ratio that is too small to pose a deflagration hazard. Flat platelet-shaped particles, flakes, or fibers Fibers/flyings with lengths that are large compared to their diameter or thickness usually do not pass through a 500 μm sieve, yet could still pose a deflagration hazard. Many particulates accumulate electrostatic charge in handling, causing them to attract each other, forming agglomerates. Often, agglomerates behave as if they were larger particles, yet when they are dispersed they present a significant hazard. Therefore, it can be inferred that any particulate that has the smallest minimum dimension less than or equal to 500 μm could behave as a combustible dust if suspended in air or the process-specific oxidizer. If the smallest minimum dimension of the particulate is greater than 500 μm, it is unlikely that the material would be a combustible dust, as determined by test. The determination of whether a sample of combustible material presents a flash-fire or explosion hazard could be based on a screening test methodology such as provided in the ASTM E1226, *Standard Test Method for Explosibility of Dust Clouds*. Alternatively, and a standardized test method such as ASTM E1515, *Standard Test Method for Minimum Explosible Concentration of Combustible Dusts*, could be used to determine dust explosibility. Chapter 5 has additional information on testing requirements.

4. In 3.3 add new definition for Combustible Fibers/Flyings, and associated Annex material to read as follows:

**3.3.x Combustible Fibers/Flyings.** Fibers/flyings, where any dimension is greater than 500 μm in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. [499, 2021]

**A.3.3.x Combustible Fibers/Flyings.** Section 500.5 of NFPA 70 defines a Class III location. Combustible fibers/flyings can be similar in physical form to ignitible fibers/flyings and protected using the same electrical equipment installation methods. Examples of fibers/flyings include flat platelet-shaped particulate, such as metal flake, and fibrous particulate, such as particle board core material. If the smallest dimension of a combustible material is greater than 500 μm, it is unlikely that the material would be combustible fibers/flyings, as determined by test. Finely divided solids with lengths that are large compared to their diameter or thickness usually do not pass through a 500 μm sieve, yet when tested could potentially be determined to be exploisible. [499, 2021]

The typical test methods for evaluating an explosible mixture are ASTM E1226, *Standard Test Method for Explosibility of Dust Clouds*, ISO 6184-1, *Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air*, or ISO/IEC UL 80079-20-2, *Explosive atmospheres — Part 20-2: Material characteristics — Combustible dusts test methods*, for procedures for determining the explosibility of dusts. A material that is found to not present an explosible mixture could still be an ignitible fiber/flying, as defined in 3.3.4.2. Historically, the explosibility condition has been described as presenting a flash fire or explosion hazard. It could be understood that the potential hazard due to the formation of an explosible mixture when suspended in air at standard atmospheric pressure and temperature would include ignition. [499, 2021]
While this standard includes larger yet still hazardous materials as a subset of combustible dust, NFPA 70 addresses them separately for purposes of defining the appropriate electrical classification. Although the hazard is the same when dispersed in a cloud, the electrical installation to prevent ingress of combustible fibers/flyings is different.

5. In 3.3 add new definition for Ignitible Fibers/Flyings, and associated Annex material to read as follows:

3.3.y* Ignitible Fibers/Flyings. Fibers/flyings where any dimension is greater than 500 μm in nominal size, which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitible layer fire hazard. [499, 2021]

A.3.3.y Ignitible Fibers/Flyings. Section 500.5 of NFPA 70 defines a Class III location as one where ignitible fibers/flyings are present, but not likely to be in suspension in the air in quantities sufficient to produce ignitible mixtures. This description addresses fibers/flyings that do not present a flash-fire hazard or explosion hazard by test. This could be because those fibers/flyings are too large or too agglomerated to be suspended in air in sufficient concentration, or at all, under typical test conditions. Alternatively, this could be because they burn so slowly that, when suspended in air, they do not propagate combustion at any concentration. [499, 2021]

The zone classification system does not address ignitible fibers/flyings. Where these are present, the user should consider installation in accordance with Article 503 of NFPA 70. [499, 2021]

6. Revise 8.4.2.2, and associated Annex material to read as follows:

8.4.2.2 Vacuum Cleaning Method.

... 8.4.2.2.1.7* Portable vacuum cleaners that meet the following minimum requirements shall be permitted to be used to collect combustible particulate solids in unclassified (nonhazardous) areas/locations:

(1) Materials of construction shall comply with 9.4.7.1.
(2) Hoses shall be conductive or static dissipative.
(3) All conductive components, including wands and attachments, shall be bonded and grounded.
(4) The fan or blower shall be on the clean side of the primary filtration media or wet separation chamber.
(5) Electrical motors shall not be located on the dirty side of the primary filtration media or wet separation chamber unless listed for Class II or Class III, Division 1, as appropriate, or Zone 20 or Zone 21 locations.
(6)*Where liquids or wet materials are picked up by the vacuum cleaner, paper filter elements shall not be used.
(7) Vacuum cleaners used for metal dusts shall meet the requirements of NFPA 484.

A.8.4.2.2.1.7 If a large quantity of material is spilled in an unclassified area, the bulk material should be collected by sweeping or shoveling or with a portable vacuum cleaner listed as suitable for combustible dust hazardous (classified) Class II locations. Vacuum cleaners meeting the requirements in 8.4.2.2.1 can be used to clean up residual material after the bulk of the spill has been collected.
8.4.2.2.2* In combustible dust hazardous (classified) Class II electrically classified (hazardous) locations, electrically powered vacuum cleaners shall be listed for the purpose and location or shall be a fixed-pipe suction system with a remotely located exhauster and an AMS installed in conformance with Section 9.3, and they shall be suitable for the dust being collected.

A.8.4.2.2 The Committee is not aware of vendors providing equipment listed for Class III hazardous (classified) electrically classified (hazardous) locations. A common practice is to use equipment listed for combustible dust hazardous (classified) locations Class II in areas classified as Class III.

8.4.2.2.3 Where flammable vapors or gases are present in combustible dust hazardous (classified) locations Class II areas, vacuum cleaners shall be listed for both flammable vapors or gases and combustible dust Class I and Class II hazardous locations.

7. Revise 8.4.2.6.2 item (4) to read as follows:

8.4.2.6.2* Where blowdown using compressed air is used, the following precautions shall be followed:
(1) Prior to using compressed …
(4) All electrical equipment, including lighting, potentially exposed to airborne dust in the area during cleaning is suitable for use in a Class II, Division 2, or Zone 22, hazardous (classified) location in accordance with NFPA 70.

…

8. Revise 9.4.6, and associated Annex material to read as follows:

9.4.6 Hazardous (Classified) Locations for Electrical Installations.

9.4.6.1* The identification of the possible presence and extent of hazardous (classified) locations Class II and Class III locations shall be made based on the criteria in 500.5(C) and (D) Articles 500 and 506 of NFPA 70.

A.9.4.6.1 The best method to eliminate the need for hazardous (classified) locations electrically classified areas is to prevent the release of dust from equipment. The next best method to eliminate the need for hazardous (classified) locations electrically classified areas is to remove the dust by developing proper housekeeping procedures. If the release of dust from equipment cannot be prevented or the dust cannot be cleaned up, then that area might be a hazardous (classified) location in an electrically classified area. NFPA 499 can be used for guidance to supplement the criteria in Article 500.5 of NFPA 70. This guidance depends on a determination of the combustibility of dust in a particular area, the ignitability properties of the dust, and the nature of possible dust cloud formation and dust layer accumulations within and outside the electrical equipment near the dusts. NFPA 499 is a good source for guidance on identifying hazardous (classified) locations Class III areas.

The user of this document should be aware that the dust layer accumulation criteria in Articles 500 and 506 of NFPA 70 and NFPA 499 are intended to address electrical ignition hazards due to overheating or shorting of electrical equipment. However, the threshold housekeeping dust accumulation criteria in this standard are based on a dust flash-fire or dust deflagration hazard. These differing criteria can lead to different layer depth
requirements. It is possible that even where electrically classified equipment is installed the area can still be considered a flash-fire or deflagration hazard.

**9.4.6.1** The locations and extent of Class II and Class III hazardous (classified) locations shall be documented, and such documentation shall be preserved for access at the facility.

A.9.4.6.1 Local signage or floor indications should be considered. Having local floor signage provides the everyday operators and anyone else who would be in the facility with the awareness of the electrically classified areas hazardous (classified) locations. Knowledge of electrically classified areas hazardous (classified) locations gives anyone over the lifetime of the facility the awareness of immediate hazards within the facility.

**9.4.6.2** Electrical equipment and wiring within Class II hazardous (classified) locations shall comply with Article 502 of *NFPA 70*.

**9.4.6.3** Electrical equipment and wiring within Class III locations shall comply with Article 503 of *NFPA 70*.

**9.4.6.34** Preventive maintenance programs for electrical equipment and wiring in Class II and Class III hazardous (classified) locations shall include provisions to verify that dusttight electrical enclosures are not experiencing visible dust accumulation.

A.9.4.6.34 *NFPA 70B* contains recommendations on the development of an effective electrical equipment maintenance program. Article Section 502.15 of *NFPA 70* contains descriptions of seals for electrical enclosures and fittings. The description includes a requirement that sealing fittings be accessible. This requirement is intended to include cabinets and other enclosures such as MCCs, control panels, and main switch gear, but not conduit, raceways, junction boxes, or other similar equipment. Section 506.16 of *NFPA 70* also addresses seals.

**9.4.6.5** Zone classification for dusts in accordance with Article 506 of *NFPA 70* shall not be permitted.

A.9.4.6.5 Article 502 of *NFPA 70* permits the use of Zone 20 equipment installation in a Class II, Division 1, location for the same dust. If the dust is a metal dust and not a combustible metal dust according to the test methods for Group IIIC, based on a conductivity criterion, this would potentially have equipment identified for Group IIIB (suitable for nonconductive dusts) installed in a Class II, Division 1, Group E, location. This would definitely not be appropriate. Contrary to the general statement in 506.6(A) of *NFPA 70*, a metal dust could be in Division Group E but not be conductive enough to be in Zone Group IIIC.

—Another discrepancy in the requirements for zone classification versus division classification is that Article 506 of *NFPA 70* provides no limitation on the designation of Zone 22 locations for combustible metal dusts. Under the division system in Article 500.5(C)(1)(3), where there is Group E metal dust in hazardous quantities, the location would be classified as Division 1 and would not be permitted to be classified as Division 2. Under the zone system, the less protective Zone 22 could be chosen.

—Both of these discrepancies are nonconservative in comparison to the division classification system. While the *NEC* has established a framework for the use of zone classification for dusts, these noneconservative discrepancies in the boundaries between dust groups and area...
classification zones/divisions must be resolved before applying these concepts to industrial situations. The NFPA EECA committee had previously coordinated the boundaries between zone and division for gases but has not yet addressed this significant issue for dusts. Until these discrepancies can be addressed, NFPA 652 should not permit the application of zone classification for combustible dusts in industrial occupancies.

9.4.6.4* Electrical equipment exposed to a process-specific oxidizing medium, other than air, shall only use dust exclusion protection methods unless supported by a documented risk assessment.

A.9.4.6.4 Intrinsic safety and nonincendive circuits are defined for use in atmospheric oxygen at concentrations not greater than 21 percent as stated in the ANSI standards used to certify the equipment. Greater than 21 percent oxygen concentration or a more sensitive oxidizing medium would greatly lower the safety factor on these circuits. Dust exclusion types of protection, such as dust ignitionproof, dusttight, purged and pressurized, encapsulation, and hermetically sealed, remain effective, regardless of the process-specific oxidizing medium.

9. Add new text to the end of Annex A.3.3.8 to read as follows:

A.3.3.8 Combustible Particulate Solid…

For purposes of determining appropriate electrical installation requirements for combustible particulate solids, NFPA 499 has defined three material subgroups that can warrant establishing hazardous (classified) locations. Combustible dusts, per NFPA 499, are materials with a particle size less than 500 μm that can propagate a deflagration when suspended in a cloud, as determined by test. Combustible fibers/flyings are larger than 500 μm in at least one dimension, yet can still propagate a deflagration in a cloud. Both of these first two subgroups present flash-fire or explosion hazards when suspended in a cloud, as well as fire hazards when in a layer. Ignitible fibers/flyings are larger than 500 μm in at least one dimension, but either are too large or too agglomerated to suspend in the typical test or do not propagate a deflagration in a cloud. Ignitible fibers/flyings do not present a flash-fire or explosion hazard, yet still present a fire hazard when in a layer. All three of these subgroups defined in NFPA 499 are included in the term combustible particulate solid as defined and used in NFPA 652. Combustible fibers/flyings as defined in NFPA 499 are included in the term combustible dust as used and defined in NFPA 652.

NFPA 70 provides different installation requirements for each of these three material subgroups. Materials smaller than 500 μm require more stringent dust exclusion designs (i.e., Class II or Zone Group IIIB) than materials larger than 500 μm (i.e., Class III or Zone Group IIIA). The exception to this is combustible metals, where both combustible metal dust and combustible metal fibers/flyings require Class II or Zone Group IIIC installations. Ignitible fibers/flyings additionally require lower maximum surface temperatures than combustible fibers/flyings for certain electrical equipment subject to overload conditions. When a hazardous (classified) location is established to address the presence of more than one of the three subgroups, the more stringent electrical installation requirements should be applied.

10. Revise Annex A.9.4.7.4.6 to read as follows:

A.9.4.7.4.6 Table A.9.4.7.4.6 and Figure A.9.4.7.4.6 provide guides for the selection and use of FIBCs based on the MIE of product contained in the FIBC and the nature of the atmosphere
surrounding it. While Table A.9.4.7.4.6 indicates Division locations, equivalent Zone locations are also included. Class I, Division Group C/D is equivalent to Zone Group IIA/IIB. Class II, Division 1 and 2 is equivalent to Zone 20/21/22. Inner liners for FIBCs are separated into three types. Note that the selection of the type of liner is critical to maintaining classification of the FIBC. Appropriate inner liner selection, where applicable, is addressed in IEC 61340-4-4.

11. Add a new citation to D.1.2.8 as follows:

D.1.2.8


Substantiation: There are two main reasons for this TIA, first to clearly include combustible fibers/flyings and ignitable fibers/flyings, in order to draw the connection to the NFPA 70 application and second to remove any prescriptive limitation or prohibition for use of the Zone system for classification. A number of paragraphs in the main body and annex specifically call out Division system criteria, and these are updated to either remove the specific Division reference or add the equivalent Zone reference. Lastly the term “electrically classified area(s)” has been replaced with “hazardous(classified) location(s)” to more clearly align with NFPA 70 terminology.

We have not yet and do not expect to completely agree on a definition for combustible dust because of the need to include process-specific atmospheres in NFPA 652 and the commodity standards. This proposal makes the functional usage of the term combustible dust equivalent between NFPA 70 and the various dust standards.

These changes are due to Standards Council input to expeditiously correlate the dust standards to NFPA 70.

TIAs will be submitted to each dust committee from the Dust Correlating committee with the issuance to follow the Standards Council approval of the changes and the 2nd revision meeting of NEC. In progress Dust documents will create committee inputs to address these changes and will also issue TIAs to the current editions in order to expeditiously correlate all of the documents, unless the document will issue prior to NEC.

Emergency Nature: The NFPA Standard contains a conflict within the NFPA Standard or within another NFPA Standard.

To resolve the conflict between these standards as it pertains to the use of Zone electrical classifications for combustible dusts.
MEMORANDUM

TO: Technical Committee on Fundamentals of Combustible Dusts

FROM: Yiu Lee, Committee Administrator

DATE: September 9, 2021

SUBJECT: NFPA 652 Proposed TIA No. 1525 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to Section 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

37 Eligible to Vote
4 Not Returned (Burridge, Maxwell, Rangwala, Sprouse)

Technical Merit:
1 Abstentions (Sallman)
27 Agree (w/comment: Buc, Krbec, Masta, Osborn, Scherpa, Taylor, Thielen)
5 Disagree (Cholin, Koch, Scherpa, Ural, Zalosh)

Emergency Nature:
3 Abstentions (Clouthier, Sallman, Zalosh)
24 Agree (w/comment: Buc, Krbec, Osborn, Taylor)
6 Disagree (Cholin, Nosbisch, Parsons, Scherpa, Thielen, Ural)

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[
[37 \text{ eligible} \div 2 = 18.5 = 19 \text{ (rounded up)}]
\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is as follows:

Technical Merit: \( (37 \text{ eligible to vote} - 4 \text{ not returned} - 1 \text{ abstentions} = 32 \times 0.75) = 24 \)
Emergency Nature: \( (37 \text{ eligible to vote} - 4 \text{ not returned} - 3 \text{ abstentions} = 30 \times 0.75 = 22.5) = 23 \)

Ballot comments are attached for your review.
The *Regs* at Section 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with Section 4.2.6.

**Appeal Closing Date** for this TIA is **September 14, 2021**
Eligible to Vote: 37  
Not Returned: 4  
Brad D. Burridge,  
Jeffrey D. Sprouse,  
Michael A. Maxwell,  
Ali S. Rangwala

**Vote Selection** | **Votes** | **Comments**
---|---|---
Agree | 27 | Change in terminology requires definitions.  
Elizabeth C. Buc | |  
Samuel A. Rodgers | |  
Timothy J. Myers | Agree |  
Jack E. Osborn | |  
Denise N. Statham | Agree |  
Niels H. Pedersen | |  
Jeffery W. Sutton | Agree |  
Bruce McLelland | agree |  
Walter L. Frank | Agree |  
Robert D. Taylor | |  
P. D. (Nick) Thielen | |  
Jeffrey R. Roberts | I agree with the TIA |  
Randal R. Davis | Agree |  
Todd E. Baker | Agree |  
Jeremy Searfoss | Agree, no objections. |  
Andrew Ryerson | Agree |  
Edward L. Jones | Agree |  
Richard F. Masta | |  
Jason Krbec | |  
Philip J. Parsons | |  
Caroline Nosbisch | Agree |  
David M. House | Agree |  
Dale C. Hansen | Agree |  
Martin P. Clouthier | No comment. |  
Shawn M. Hanson | Agree |  

**QUESTION NO. 1:** I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1525 to Add a new 1.3.3 and renumber existing paragraphs accordingly, add new 2.4, In 3.3 add new definition for Combustible and Ignitable Fibers/Flyings, add new text to A.3.3.8, add new citation to D.1.2.8; Revise section 3.3.6, 8.4.2.2, 8.4.2.6.2, 9.4.6, A.9.4.7.4.6.‘.

P. D. (Nick) Thielen | |  
I agree this is useful but not an emergency to add based on c  
Jeffrey R. Roberts | |  
Randal R. Davis | Agree |  
Todd E. Baker | Agree |  
Jeremy Searfoss | Agree, no objections. |  
Andrew Ryerson | Agree |  
Edward L. Jones | Agree |  
Richard F. Masta | |  
Jason Krbec | |  
Philip J. Parsons | |  
Caroline Nosbisch | Agree |  
David M. House | Agree |  
Dale C. Hansen | Agree |  
Martin P. Clouthier | No comment. |  
Shawn M. Hanson | Agree |
The term flyings is obsolete (not even in most dictionaries) and should not be resurrected in NFPA 652 just because it is still in NFPA 70 and NFPA 492. The proposed paragraph A.1.3.3 states that fibers/flyings do not pose a flash fire or explosion hazard, but the proposed addition to paragraph 3.3.6 says just the opposite.

I do not believe this TIA is ready for prime time yet. For example, proposed A.1.3.3 says “Ignitible fibers/flyings, as defined in NFPA 70 and NFPA 499, do not present a flashfire hazard or explosion hazard and are not included in the definition of combustible dust in this standard.” This is simply false. There is ample evidence that particles greater than 500 microns can present a flashfire hazard or explosion hazard. Furthermore, the new definitions do not consider particle size distribution, morphology, and mixture composition. Another example is that the proposed definitions 3.3.x and 3.3.y are not enforceable. They rely on an ambiguous term called “nominal size,” which is not defined. They ignore important factors such as particle size distribution, morphology, and mixture composition. A user will have no clue on how to pick the nominal size of a sample. It is also not clear who will decide if the material can form an exploitable cloud and how. While 3.3.x talks about the ASTM or ISO test, 3.3.y refers to a fictional test by saying: “This description addresses fibers/flyings that do not present a flash-fire hazard or explosion hazard by test.” The Committee, and particularly the Standards Council need to be cognizant of the fact that NFPA 499 is a recommended practice, whereas NFPA 652 is a standard. Just because flawed definitions appear in 499 do not justify their adoption in NFPA dust standards. Similarly, NFPA 70 committee sorely lacks the combustible dust expertise. Adopting their flawed definitions into combustible dust standards will be unconscionable.

I agree that there is a gap in agreement between the combustible dust and electrical standards, but this is an extremely complicated TIA with many nuances. I believe that this should be discussed in a committee meeting to allow people to ask questions in areas of concern, such as applicability changes, losing references to flakes, and area/location wording changes.

The current language in 652 is the result of 20 years of loss history that supported the idea that the determination of hazard of a combustible particulate could NOT be based on a simple single dimensional criterion. Hence the reliance on ASTM E 1226. The proposed TIA returns a dimensional criterion to 654 in spite of the numerous caveats regarding particle attrition elsewhere in the standard. The Standards Council erred when it placed the responsibility for these definitions outside the combustible dust technical committees. This TIA only serves to compound that mistake. If such a distinction is necessary then the technical basis for that need should be clearly stated.
After reviewing proposed TIA 1520 (for NFPA 70) and approved TIA 21-1 (for NFPA 499), I noticed that the use of the term “ignitable fibers/flyings” within the context of Group IIIA materials is not consistent between NFPA 499 and NFPA 70. TIA 1520 proposes language for 506.6(C) that matches neither the approved TIA 21-1 language for Group IIIA materials nor the existing NFPA 499 language, despite using the extract tag [499:3.3.8.2.3]. Given that inconsistencies in usage between NFPA 499 and NFPA 70 still persist, I see neither the benefit nor the emergency nature in adding flawed definitions that include ambiguous terms such as “nominal size” and “not likely to be in suspension” into the combustible dust standards at this time.

Abstain 1
Steve Sallman Flyings is a term that needs revisited. I believe the 652 committee needs further discussion and clarity on this item.

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the instructions box.

Eligible to Vote: 37
Not Returned : 4
Brad D. Burridge,
Jeffrey D. Sprouse,
Michael A. Maxwell,
Ali S. Rangwala

Vote Selection  Votes  Comments
Agree 24 Since the last TIA to update the language passed then the definitions should follow as well.
Elizabeth C. Buc
Samuel A. Rodgers B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.
Timothy J. Myers
Jack E. Osborn this information should go out immediately and not wait until the next cycle (which will likely be many months away).
Denise N. Statham
Niels H. Pedersen I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the instructions box
Jeffery W. Sutton
Bruce McLelland A,D
James F. Koch Agree
Walter L. Frank I agree. Reason B applies.
Robert D. Taylor Improves fire and life safety in harmony with the scope of the standard.
Jeffrey R. Roberts I agree with the TIA
Randal R. Davis
Todd E. Baker Agree
Jeremy Searfoss Agree, no objections.
Andrew Ryerson A and B.
Edward L. Jones A
Richard F. Masta B.
Jason Krbec This is an important emergency change.
<table>
<thead>
<tr>
<th>Name</th>
<th>Vote</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>David M. House</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Dale C. Hansen</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Shawn M. Hanson</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Eric P. Maynard</td>
<td>Agree, principally per B. and D. in the instructions box.</td>
<td></td>
</tr>
<tr>
<td>Denise Albrecht</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td><strong>Disagree</strong></td>
<td>6</td>
<td>Hastily correlating NFPA dust standards into NFPA 70 is not an emergency, but is a big mistake. The real emergency is the need to correct the flawed definitions in NFPA 70 and NFPA 499, rather than adopting them into the combustible dust standards. The Committee, and particularly the Standards Council need to be cognizant of the fact that NFPA 499 is a recommended practice, whereas NFPA 652 is a standard. Just because flawed definitions appear in 499 do not justify their adoption in NFPA dust standards. Similarly, NFPA 70 committee sorely lacks the combustible dust expertise. Adopting their flawed definitions into combustible dust standards, particularly in haste, will be unconscionable.</td>
</tr>
<tr>
<td>Erdem A. Ural</td>
<td></td>
<td></td>
</tr>
<tr>
<td>John M. Cholin</td>
<td></td>
<td>The submitter has not provided a basis for the claim that there is an emergency need that cannot be handled in the normal course of public proposal, comment and vote</td>
</tr>
<tr>
<td>Thomas C. Scherpa</td>
<td></td>
<td>These changes do not resolve a conflict as written, and would be better addressed through the normal revision process providing opportunity for discussion and modification of each section as appropriate.</td>
</tr>
<tr>
<td>P. D. (Nick) Thielen</td>
<td></td>
<td>This is not an emergency because the addition would help better define the material in question, the current definitions do a adequate although imperfect job in the near term</td>
</tr>
<tr>
<td>Philip J. Parsons</td>
<td></td>
<td>this conflict has been present for many years. currently, a task force under the new NFPA 660 committee has been tasked to align consistency of terms such as &quot;combustible&quot;, &quot;deflagrable&quot;, &quot;flash fire&quot; &quot;explosion&quot; etc. the terminology used in the TIA is inconsistent within itself and inconsistent when compared to the proposed new language for NFPA 660. suggest incorporating this TIA in a review of the new standard development to ensure consistency going forward.</td>
</tr>
<tr>
<td>Caroline Nosbisch</td>
<td></td>
<td>This revision is a clarification of existing verbiage. It does not of an emergency nature as defined by the instructions.</td>
</tr>
<tr>
<td><strong>Abstain</strong></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Robert G. Zalosh</td>
<td></td>
<td>I am not aware of any specific applications where this proposed TIA is needed.</td>
</tr>
<tr>
<td>Steve Sallman</td>
<td></td>
<td>I believe the 652 committee needs further discussion and clarity on this item.</td>
</tr>
<tr>
<td>Martin P. Clouthier</td>
<td></td>
<td>I am uncertain that this is of an emergency nature, therefore I abstain.</td>
</tr>
</tbody>
</table>
MEMORANDUM

TO: Correlating Committee on Combustible Dusts

FROM: Yiu Lee, Committee Administrator

DATE: September 9, 2021

SUBJECT: NFPA 652 Proposed TIA No. 1525 FINAL CC BALLOT RESULTS

The public comment circulation has passed, therefore, according to Section 5.6(a) in the NFPA Regs, the final results show this TIA HAS NOT achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

16 Eligible to Vote
2 Not Returned (Creswell, Snoeys)

<table>
<thead>
<tr>
<th>Correlation Issues:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>11 Agree (w/comment: Leblanc)</td>
<td>10 Agree (w/comment: Frank)</td>
</tr>
<tr>
<td>3 Disagree (Aiken, Cholin, Sapper)</td>
<td>4 Disagree (Aiken, Cholin, Sapper, Yount)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[16 \text{ eligible} \div 2 = 8 + 1 = 9\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 11 (rounded up).

\[(16 \text{ eligible to vote} - 2 \text{ not returned} - 0 \text{ abstentions} = 14 \times 0.75 = 10.5)\]

Ballot comments are attached for your review.

The Regs at Section 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with Section 4.2.6.

Appeal Closing Date for this TIA is September 14, 2021
Eligible to Vote: 16
Not Returned: 2
Gregory F. Creswell, Jef Snoeys

**Vote Selection** | **Votes** | **Comments**
--- | --- | ---
Agree | 11 | This change does resolve a conflict however, the issues raised by several committee members identifies important issues that need to be addressed in the final document.

Jeffery W. Sutton | Agree |
Scott G. Davis | Agree |
Jeffrey R. Roberts | Agree |
Walter L. Frank | Agree |
Kevin Kreitman | Agree |
Jack E. Osborn | agree |
J. Anthony Yount | agree |
Matthew J. Bujewski | Agree |
Martin P. Clouthier | Agree |
Jason Krbec | Agree |

**Disagree** | 3 |
John M. Cholin | The proposed TIA creates inconsistencies between the text and the applicable annex material as it fails to address the caveat that all particulates tend to undergo attrition over time changing the mass‐median particle dimensions.

Arthur G. Sapper | Enough technical objections have been raised that it appears that the proposal should go through the regular committee process.

Chris Aiken | It appears TIAs were submitted for several standards (484, 652 and 654). I did not see a correlation issue when reviewing the TIA for 484 which did not pass. However, now that I am aware that changes to definitions in multiple standards are requested via multiple TIAs, I am voting disagree until a full review of impact across all the standards can be evaluated.

Abstain | 0 |

**QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the instructions box.**

Eligible to Vote: 16
Not Returned: 2
Gregory F. Creswell, Jef Snoeys

**Vote Selection** | **Votes** | **Comments**
--- | --- | ---
Agree | 10 | B
John A. LeBlanc | B |
Jeffery W. Sutton | B |
<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scott G. Davis</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jeffrey R. Roberts</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Walter L. Frank</td>
<td></td>
<td>Reason B. This TIA addresses a serious inconsistency between the dust standards and NFPA 499/70. While it has taken years to come to this point of agreement between the two standards groups, the issue is no less of an emergency than it was when the need to address the inconsistencies was first identified.</td>
</tr>
<tr>
<td>Kevin Kreitman</td>
<td></td>
<td>A&amp;B</td>
</tr>
<tr>
<td>Jack E. Osborn</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Matthew J. Bujewski</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Martin P. Clouthier</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Jason Krbec</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td><strong>Disagree</strong></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>John M. Cholin</td>
<td></td>
<td>While this is a pressing issue it should be addressed via the regular standards revision process</td>
</tr>
<tr>
<td>Arthur G. Sapper</td>
<td></td>
<td>The TIA process has been greatly abused and this is just another example. This problem has been known for years. It is not an emergency and the short circuiting of the regular process is unjustified.</td>
</tr>
<tr>
<td>Chris Aiken</td>
<td></td>
<td>I do not see the emergency nature of the TIA</td>
</tr>
<tr>
<td>J. Anthony Yount</td>
<td></td>
<td>not an emergency nature</td>
</tr>
<tr>
<td><strong>Abstain</strong></td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Ladies and gentlemen,

We have submitted comments on the subject TIA previously, in support of the TIA, with suggested changes for improvement. We have an additional comment, regarding parts that we missed during first reading of the draft. Kindly note that this is in opposition to the parts identified below, and only those parts.

3.3.6, definition of **Combustible Dust**: Do not add, “including combustible fibers/flyings” to the definition of Combustible Dust. NFPA Standards Council has stated that the Committee on Electrical Equipment in Chemical Atmospheres (EEC-AAA), responsible for NFPA 499, has purview over the definition of Combustible Dust. This proposed definition conflicts with NFPA 499 TIA 21-1, issued April 15, 2021. The definition on the NFPA 499 TIA is as follows (legislative text omitted for clarity).

3.3.3 **Combustible Dust.** Solid particles that are 500 um or smaller (i.e., material passing a U.S. No. 35 Standard Sieve as defined in ASTM E11-17, *Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves*) that can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature.

The proposed definition of Combustible Dust in TIA 1525 is also in conflict with proposed new 3.3.x of NFPA 652, that separately defines Combustible Fibers/Flyings. A fiber or a flying can’t be both a Fiber/Flying and a dust.

As noted in our previous comments on this proposed TIA, this is part of a concerted effort to resolve inconsistencies among NFPA 70, 484, 499, 652 and 654. If the recommended definition of Combustible Dust is accepted, NFPA 652 would be in conflict with NFPA 70 and 499.

Please feel free to contact me if there are any questions about this message.

Kind regards,

*Bill Fiske*

*William T. Fiske, P.E.*
Senior Director – Technical Affairs
Electrical & Network Assurance
Chair – EEC-AAA

Intertek
3933 Route 11
Cortland, NY 13045
[www.intertek.com](http://www.intertek.com)
TIA No. 1525 is incorrect and must not be published as proposed.

It was agreed by the Standards Council Combustible Dust Task Group that the EEC-AAA Committee has purview over the definitions for Combustible Dust.

The intent of the Standards Council to align NFPA 652 with NFPA 499 and NFPA 70 is not achieved with this proposal. The definition for Combustible Dust does not align with the NFPA 499 TIA nor the NFPA 70 TIA. This TIA must be revised to align with TIA 21-1 for NFPA 499 or years of effort to align these documents will not be realized.

The definition of Combustible Dust in TIA No. 21-1 for NFPA 499 does not contain combustible fibers/flyings. Combustible fibers/flyings has its own definition. Class III was revised to include combustible fibers/flyings. Where metal combustible fibers/flings exist, the area is classified as if the material is Class I, Group E metal dust.

Additionally, the definition of Combustible Dust in TIA No. 1520 for NFPA 70 does not contain combustible fibers/flyings. Combustible fibers/flyings has its own definition. Class III was revised to include combustible fibers/flyings. Where metal combustible fibers/flings exist, the area is classified as if the material is Class I, Group E metal dust.

Please refer to TIA No. 21-1 for NFPA 499 for the correct information.

Best,

Don Ankele
UL Principal Member EEC-AAA
UL Principal Member NEC CMP-14

Donald W. Ankele
Principal Engineer-Hazardous Locations
Energy & Industrial Automation

Distinguished Member of the Technical Staff - William Henry Merrill Society

UL LLC
333 Pfingsten Road
Northbrook, IL 60062-2096 USA

W: ul.com/hazloc

Download the complimentary UL HazLoc app to have UL expertise at your fingertips and opt in for push notifications to receive exclusive HazLoc technical insights
Foran, Rosanne

From: David Wechsler
Sent: Monday, August 30, 2021 10:36 AM
To: Shared TIAs
Subject: Response to NFPA 652 TIA 1525

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

The revised 1.3.3 language is vague as it implies that the 652 document applies to ignitable fibers/flyings "specifically with regard to fire hazards' but could apply to other, presently not defined hazards.
A1.3.3 for no apparent reason conflicts with NFPA 499 and TIA 1520 in which ignitable fibers/flyings with different criteria. TIA 1520 correctly addresses ignitable fibers/flyings which are not likely to be in suspension to produce an explosive mixture but could produce a fire hazard. This fire hazard may in fact become a flash fire hazard.

3.3.6 This term is different from that defined by NFPA 499 and TIA 1520. There should be no reason for having a different defined term. NFPA 652 should consider replacing the term 'combustible dust' with 'combustible particulate solid'.

A3.3.6 TIA correctly points out that a combustible fiber/flying is not a combustible dust as each have different definitions. However here 652 states a contradiction with very confusing texts and yet 652 still supports a different defined term for combustible fibers/flyings.

I strongly recommend against moving forward with this TIA and I do not support TIA 1525 for the reasons stated above.

Thank you.
David Wechsler
Ladies and gentlemen,

We respectfully offer the Public Comments on 652 TIA 1525 that are contained in the attached document. Please feel free to contact me if you have any questions.

Kind regards,

Bill Fiske

William T. Fiske, P.E.
Senior Director – Technical Affairs
Electrical & Network Assurance

Intertek
3933 Route 11
Cortland, NY 13045
www.intertek.com

CONFIDENTIALITY NOTICE

This email may contain confidential or privileged information, if you are not the intended recipient, or the person responsible for delivering the message to the intended recipient then please notify us by return email immediately. Should you have received this email in error then you should not copy this for any purpose nor disclose its contents to any other person.

EXPORT NOTIFICATION

This email may contain or attach controlled technology/technical data which may be subject to US Export Control regulations including, but not limited to, the US International Traffic in Arms Regulations (ITAR) 22 CFR Part 120-13, the Export Administration Act, 50 U.S.C. app. 2401-2420, and the Export Administration Regulations (EAR), 15 CFR 730-774. Any export, re-export, re-transfer, or disclosure to unauthorized parties, including non-US Persons inside or outside of the United States without first obtaining an export license is prohibited.
<table>
<thead>
<tr>
<th>National Committee</th>
<th>Line number</th>
<th>Clause/ Subclause</th>
<th>Type of comment (General/ Technical/Editorial)</th>
<th>COMMENTS</th>
<th>Proposed change</th>
<th>OBSERVATIONS OF THE SECRETARIAT on each comment submitted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A.1.3.3</td>
<td>General</td>
<td>It is not necessarily true that NFPA 70 &quot;includes additional restrictions&quot; compared to combustible fibers/flyings. More or less restrictive is in the eye of the beholder, so to speak.</td>
<td>Ignitable fibers/flyings present a fire hazard, so locations are classified differently and the electrical installation includes additional restrictions has different requirements, compared to combustible fibers/flyings.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A.3.3.6</td>
<td>General</td>
<td>It is not necessarily true that NFPA 70 &quot;includes additional restrictions&quot; compared to combustible fibers/flyings. More or less restrictive is in the eye of the beholder, so to speak.</td>
<td>Ignitable fibers/flyings present a fire hazard, so locations are classified differently and the electrical installation includes additional restrictions has different requirements, compared to combustible fibers/flyings.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A.9.7.4.6</td>
<td>General</td>
<td>The scope of NFPA 652 does not include combustible gases or vapors. Thus any mention of Class I or Groups IIA and IIB is irrelevant and should not be added to the document.</td>
<td>Class I, Division Group C/D is equivalent to Zone Group IIA/IIB.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A.9.7.4.6</td>
<td>General</td>
<td>As written the added text is misleading, as it doesn't clearly show the distinction between Division 1 and Division 2 and their Zone equivalents.</td>
<td>Class II, Division 1 and 2 is equivalent to Zones 20 and 21, and Class II, Division 2 is equivalent to Zone 22 Zone 20/21/22.</td>
<td></td>
</tr>
</tbody>
</table>

To be clear, I support the TIA. The reason that I offered comments is that the TIA is intended to resolve some differences among NFPA 70, 484, 499, 652 and 654. As you doubtless know, the NFPA Standards Council directed the respective technical committees to coordinate and issue TIAs to accomplish this. There are some very minor differences in this TIA - as well as 1526 for NFPA 654 - compared to the 499 TIA 21-1 and the 70 TIA to be submitted shortly by NEC-P14 Chair Michael W. Smith, and I commented on those small differences.
APPEAL TO THE STANDARDS COUNCIL RE: NFPA 652/654 PROPOSED TIAs No. 1525/1526

Name, affiliation, and address of the appellants

Samuel Rodgers, PE
Honeywell International
15801 Woods Edge Rd, Colonial Heights, VA 23834
Member of:
- Technical Committee on Fundamentals of Combustible Dust
- Technical Committee on Handling and Conveying of Dusts, Vapors, and Gases
- Technical Committee on Combustible Metals and Metal Dusts
- Technical Committee on Electrical Equipment in Chemical Atmospheres

Walter Frank, PE, CCPSC
Frank Risk Solutions, Inc.
116 Ridgewood Drive, Landenberg, PA 19350
Member of:
- Correlating Committee on Combustible Dusts
- Technical Committee on Fundamentals of Combustible Dusts
- Technical Committee on Handling and Conveying of Dusts, Vapors, and Gases

Statement identifying the particular action to which the appeal relates

This appeal relates to the decisions by the Correlating Committee on Combustible Dusts (CC) to not approve NFPA 652 Proposed TIA No. 1525 or NFPA 654 Proposed TIA No. 1526 based upon the conclusion that neither TIA was of an emergency nature.

Argument setting forth the grounds for the appeal

Proposed TIA No. 1525 addresses NFPA 652 and proposed TIA No. 1526 addresses NFPA 654. Together with proposed TIA No. 1527 addressing NFPA 484, these three TIAs seek to resolve inconsistencies between the combustible dust standards and NFPA 70. The TIAs were made necessary by the revision of the definition of combustible dust in NFPA 70, said revision being inconsistent with the definition of the term as used in the combustible dust standards. As a consequence, several of the combustible dust standard technical committees determined that it was necessary to remove from their standards the authorization to use the Zone system for electrical hazardous (classified) locations as related to dusts. The proposed TIAs seek to 1) add content to the combustible dusts standards to reconcile the disparate definitions and 2) restore recognition of and allow the use of the Zone system that is currently denied to users of the affected combustible dust standards.

In 2018, the Standards Council tasked the NEC Correlating Committee, Technical Committee on Electrical Equipment in Chemical Atmospheres, Technical Correlating Committee on Combustible Dusts, Technical Committee on Fundamentals of Combustible Dusts, and Technical Committee on Combustible Metals and Metal Dusts to resolve the conflict between these standards.
as it pertains to the use of Zone electrical classifications for combustible dusts (Standards Council Action 18-4-26). The proposed TIAs represent the culmination of that effort.

When balloting a proposed TIA, a correlating committee must consider only two issues:

1. The merits of the amendment (as it relates to the correlating committee authority and responsibilities) and
2. Whether the amendment involves an issue of an emergency nature.

On its final ballot of NFPA 652 Proposed TIA No. 1525, the CC voted in the affirmative on the merits of the TIA (11 affirmative votes vs 11 required). Thus, the merits of the TIA are not at issue. However, the CC denied the emergency nature of the TIA. Similarly for NFPA 654 Proposed TIA No. 1526, the CC voted in the affirmative on the merits (11 affirmative votes vs 11 required). Yet again, the CC denied the emergency nature of the TIA.

We believe that there are at least two compelling reasons that the proposed TIAs should be considered to be of an emergency nature, as defined in the NFPA Regulations Governing the Development of NFPA Standards:

- “The NFPA standard contains a conflict within the NFPA standard or with another NFPA standard.” There are clear and substantive conflicts between the content of NFPA 484 and NFPA 70. The nature of these conflicts was significant enough for the Standards Council to instruct the various technical and correlating committees to resolve the conflicts.

- “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.” The proposed TIA would restore to users the ability to apply the Zone system for electrical hazardous (classified) locations, an option that is currently denied to them by NFPA 652 and 654.

Both of these matters warrant expeditious resolution. To wait for release of a subsequent standard would be an unnecessary delay. It should be noted that the combustible dust standards are being consolidated into the new NFPA 660. It is uncertain when NFPA 660 will be released and the above matters would remain unresolved until this occurs.

**Statement of the precise relief requested**

We respectfully request that the Standards Council either approve NFPA 652 Proposed TIA No. 1525 and NFPA 654 Proposed TIA No. 1526 or remand them to the Correlating Committee on Combustible Dusts for reconsideration of the emergency nature.

**Whether a hearing on the appeal is being requested**

We do not anticipate, nor request, a hearing on this appeal.
Samuel Rodgers, PE
samuel.rodgers@honeywell.com
804-520-3152

Walter Frank, PE, CCPSC
wlf@frankrisk.com
302-521-7588
1. Add a new 1.4.2 and associated Annex material to read as follows; and renumber existing paragraphs accordingly:

1.4.2* This standard shall apply to the storage or use of ignitible fibers/flyings, specifically with regard to fire hazards.

A.1.4.2 Ignitible fibers/flyings, as defined in NFPA 70 and NFPA 499, do not present a flash-fire-hazard or explosion hazard and are not included in the definition of combustible dust in this standard. Ignitible fibers/flyings present a fire hazard, so locations are classified differently and the electrical installation includes additional restrictions compared to combustible fibers/flyings.

2. Revise section 2.4 to read as follows:

2.4 References for Extracts in Mandatory Sections. …


…

3. Revise 3.3.7, and associated Annex A.3.3.7 to read as follows:

3.3.7* Combustible Dust. A finely divided combustible particulate solid, including combustible fibers/flyings, that presents a flash-fire hazard or explosion hazard when suspended in air or the process-specific oxidizing medium over a range of concentrations. [652, 2019]

A.3.3.7 Combustible Dust. The term combustible dust when used in this standard includes powders, fines, fibers, flyings, etc. Combustible fibers/flyings are specifically mentioned because, while the hazard is the same, NFPA 70 and NFPA 499 treat combustible dust and combustible fibers/flyings separately in regards to establishing hazardous (classified) locations and specifying the electrical installation. Ignitible fibers/flyings, as defined in NFPA 70 and NFPA 499, do not present a flash-fire or explosion hazard and are not included in the definition of combustible dust in this standard. Ignitible fibers/flyings present a fire hazard, so locations are classified differently and the electrical installation includes additional restrictions compared to combustible fibers/flyings. [652, 2019]

This definition also includes consideration of a process-specific oxidizing medium other than air. A larger particle size material might not present a hazard in air, yet could present a hazard in an atmosphere with increased oxygen concentration. Similarly, a combustible metal might still present a hazard in an atmosphere typically considered inert, such as CO2 or nitrogen. [652, 2019]
Dusts traditionally were defined as material 420 μm or smaller (i.e., capable of passing through a U.S. No. 40 standard sieve). For consistency with other standards, 500 μm (i.e., capable of passing through a U.S. No. 35 standard sieve) is now considered an appropriate size criterion. Particle surface area-to-volume ratio is a key factor in determining the rate of combustion. Combustible particulate solids with the smallest minimum dimension more than 500 μm generally have a surface-to-volume ratio that is too small to pose a deflagration hazard. Flat platelet-shaped particles, flakes, or fibers Fibers/flyings with lengths that are large compared to their diameter or thickness usually do not pass through a 500 μm sieve, yet could still pose a deflagration hazard. Many particulates accumulate electrostatic charge in handling, causing them to attract each other, forming agglomerates. Often, agglomerates behave as if they were larger particles, yet when they are dispersed they present a significant hazard. Therefore, it can be inferred that any particulate that has the smallest minimum dimension less than or equal to 500 μm could behave as a combustible dust if suspended in air or the process-specific oxidizer. If the smallest minimum dimension of the particulate is greater than 500 μm, it is unlikely that the material would be a combustible dust, as determined by test. The determination of whether a sample of combustible material presents a flash-fire or explosion hazard could be based on a screening test methodology such as provided in the ASTM E1226, Standard Test Method for Explosibility of Dust Clouds. Alternatively, and a standardized test method such as ASTM E1515, Standard Test Method for Minimum Explosible Concentration of Combustible Dusts, could be used to determine dust explosibility. Chapter 5 of NFPA 652 has additional information on testing requirements. [652, 2019]

4. In 3.3 add new definitions for Combustible Fibers/Flyings, Ignitible Fibers/Flyings, and their associated Annex material to read as follows:

3.3.x* Combustible Fibers/Flyings. Fibers/flyings, where any dimension is greater than 500 μm in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. [499, 2021]

A.3.3.x Combustible Fibers/Flyings. Section 500.5 of NFPA 70 defines a Class III location. Combustible fibers/flyings can be similar in physical form to ignitible fibers/flyings and protected using the same electrical equipment installation methods. Examples of fibers/flyings include flat platelet-shaped particulate, such as metal flake, and fibrous particulate, such as particle board core material. If the smallest dimension of a combustible material is greater than 500 μm, it is unlikely that the material would be combustible fibers/flyings, as determined by test. Finely divided solids with lengths that are large compared to their diameter or thickness usually do not pass through a 500 μm sieve, yet when tested could potentially be determined to be explosible. [499, 2021]

The typical test methods for evaluating an explosible mixture are ASTM E1226, Standard Test Method for Explosibility of Dust Clouds, ISO 6184-1, Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air, or ISO/IEC/UL 80079-20-2, Explosive atmospheres — Part 20-2: Material characteristics — Combustible dusts test methods, for procedures for determining the explosibility of dusts. A material that is found to not present an explosible mixture could still be an ignitible fiber/flying, as defined in 3.3.4.2. Historically, the explosibility condition has been described as presenting a flash fire or explosion hazard. It could be understood that the potential hazard due to the formation of an explosible mixture when suspended in air at standard atmospheric pressure and temperature would include ignition. [499, 2021]
While this standard includes larger yet still hazardous materials as a subset of combustible dust, NFPA 70 addresses them separately for purposes of defining the appropriate electrical classification. Although the hazard is the same when dispersed in a cloud, the electrical installation to prevent ingress of combustible fibers/flyings is different.

5. In 3.3 add new definition for Ignitible Fibers/Flyings, and associated Annex material to read as follows:

3.3.y* Ignitible Fibers/Flyings. Fibers/flyings where any dimension is greater than 500 μm in nominal size, which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitible layer fire hazard. [499, 2021]

A.3.3.y Ignitible Fibers/Flyings. Section 500.5 of NFPA 70 defines a Class III location as one where ignitible fibers/flyings are present, but not likely to be in suspension in the air in quantities sufficient to produce ignitible mixtures. This description addresses fibers/flyings that do not present a flash-fire hazard or explosion hazard by test. This could be because those fibers/flyings are too large or too agglomerated to be suspended in air in sufficient concentration, or at all, under typical test conditions. Alternatively, this could be because they burn so slowly that, when suspended in air, they do not propagate combustion at any concentration. [499, 2021]

The zone classification system does not address ignitible fibers/flyings. Where these are present, the user should consider installation in accordance with Article 503 of NFPA 70. [499, 2021]

6. Revise 8.4.3.7, 8.4.3.8, 8.4.3.9, and associated Annex A.8.4.3.7 and A.8.4.3.8 to read as follows:

8.4.3.7* Portable vacuum cleaners that meet the following minimum requirements shall be permitted to be used to collect combustible particulate solids in unclassified (general purpose) areas:

1) Materials of construction shall comply with 9.3.13.2 and 9.4.3.2.
2) Hoses shall be conductive or static dissipative.
3) All conductive components, including wands and attachments, shall be bonded and grounded.
4) Dust-laden air shall not pass through the fan or blower.
5) Electrical motors shall not be in the dust-laden air stream unless listed for Class II or Class III, Division 1, as appropriate, or Zone 20 or Zone 21 locations.
6)* When liquids or wet material are picked up by the vacuum cleaner, paper filter elements shall not be used.
7) Vacuum cleaners used for metal dusts shall meet the requirements of NFPA 484.

8.4.3.8* In combustible dust hazardous (classified) Class II electrically classified (hazardous) locations, vacuum cleaners shall be listed for the purpose and location or shall be a fixed-pipe suction system with remotely located exhauster and AMS installed in conformance with 9.3.13 and shall be suitable for the dust being collected.

8.4.3.9 Where flammable vapors or gases are present, vacuum cleaners shall be listed for both flammable vapors or gases and combustible dust Class I and Class II hazardous (classified) locations.
The intention of this requirement is to provide specifications for vacuum cleaners that could be used to remove incidental amounts of combustible dusts from unclassified areas in order to maintain the unclassified area designation.

If a large quantity of material is spilled in an unclassified area, the bulk material should be collected by sweeping, by shoveling, or with a portable vacuum cleaner listed as suitable for combustible dust hazardous (classified) Class II locations. Vacuum cleaners meeting the requirements in 8.4.3.2 can be used to clean up residual material after the bulk of the spill has been collected.

These requirements for portable vacuum cleaners also should be applied to the use of vacuum trucks for combustible dust. However, there can be other safety issues concerning vacuum truck applications that are not covered within this section. Given that this application might represent a change from normal procedures, operators should also consider the guidance found in conducting a management of change evaluation.

The Committee is not aware of vendors providing equipment listed for Class III hazardous (classified) electrically classified (hazardous) locations. A common practice is to use equipment listed for combustible dust hazardous (classified) locations Class II in areas classified as Class III.

7. Revise 9.3.13.1.1.2(4)(e) and associated Annex A.9.3.13.1.1.2(4)(e) to read as follows:

   9.3.13.1.1.2* The requirement of 9.3.13.1.1.1 shall not apply to…
   (4)* Enclosureless AMSs meeting all the following criteria shall be permitted to be used:
   …
   (e)* The fan motor is suitable for Class II or Class III, Division 2, as appropriate, or Zone 22, or Class III, as appropriate.
   …

A.9.3.13.1.1.2(4)(e) NFPA 70, in 502.125(B), states: In Class II, Division 2, locations, motors, generators, and other rotating electrical equipment shall be totally enclosed non ventilated, totally enclosed pipe-ventilated, totally enclosed water-air-cooled, totally enclosed fan-cooled or dust-ignition proof for which maximum full-load external temperature shall be in accordance with 500.8(D)(2) of NFPA 70 for normal operation when operating in free air (not dust blanketed) and shall have no external openings. NFPA 70 does not include an equivalent description of suitable Zone-rated equipment.

8. Revise Section 9.4.2 and associated Annex A.9.4.2.2 and Table A.9.4.2.2 to read as follows:

   9.4.2 Electrical Equipment.
   9.4.2.1 All electrical equipment and installations shall comply with the requirements of NFPA 70.
   9.4.2.2* In local areas of a plant where a hazardous quantity of dust accumulates or is suspended in air, the area shall be classified and all electrical equipment and installations in those local areas shall comply with Article 502 or Article 503 of NFPA 70, as applicable. The identification of the possible presence and extent of hazardous (classified) locations shall be made based on the criteria in Article 500 or Article 506 of NFPA 70.
   9.4.2.3 Hazardous (classified) areas locations that are identified in accordance with 9.4.2.2 shall be documented, and such documentation shall be permanently maintained on file for the life of the facility.
A.9.4.2.2 Refer to NFPA 499. See also Table A.9.4.2.2 (Note: Table A.9.4.2.2 does not apply to Class III materials).

Threshold dust accumulation that would require electrically classified equipment is tied to the likelihood of the accumulations and the housekeeping policy as shown in Table A.9.4.2.2 provided as guidance. Dust accumulations present hazards due to potential overheating and failure of the covered equipment or overheating of the dust layer resulting in a fire, as well as potential to be put into suspension as a cloud resulting in a flash fire or explosion. However, neither the NFPA 70 nor NFPA 654 provides a mandatory prescription for the user to decide how much dust accumulation should trigger the use of classified equipment.

When evaluating how much dust is too much for electrical equipment, several factors need to be considered. NFPA 70 provides Class II, Division 1 and Division 2 criteria in article 500. It states that a Division 2 location is one of the following:
(1) A location in which combustible dust due to abnormal operations might be present in the air in quantities sufficient to produce explosive or ignitable mixtures
(2) A location in which combustible dust accumulations are present but are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus but could, as a result of infrequent malfunctioning of handling or processing equipment, become suspended in the air
(3) A location in which combustible dust accumulations on, in, or in the vicinity of the electrical equipment could be sufficient to interfere with the safe dissipation of heat from electrical equipment or could be ignitible by abnormal operation or failure of electrical equipment

The first two criteria deal with the potential for presence of a dust cloud in the location under abnormal conditions. The third criterion deals with the potential for ignition of a dust accumulation by unprotected hot surfaces, either internal or external to the electrical equipment under normal as well as abnormal conditions.

The first and second criteria are process related, and the third criterion is directly related to the layer thickness on the electrical equipment.

The likelihood of a dust to be heated to ignition temperature when accumulated on the outside of an electrical enclosure or a piece of electrical equipment is a function of the thickness, thermal conductivity, density, and combustion chemistry of the dust layer as well as the fractional coverage of the equipment’s heat dissipation area and the time it remains on the heated equipment.

Both NFPA 654 and NFPA 499 recognize early ignition possibilities due to dehydration and carbonization phenomena but do not offer any methods to evaluate this potential. The appropriate electrical equipment for a given dust is that equipment designed with a maximum surface temperature, designated by the T-code, less than the lower of the layer or cloud ignition temperature of the specific dust. The layer ignition temperature can be determined according to ASTM E2021, Standard Test Method for Hot-Surface Ignition of Dust Layers, using at least a 1/2 in. (13 mm) layer thickness. This is greater than the 1/8 in. (3.2 mm) nominal dust layer establishing a Division 1 or Zone 20 or 21 hazardous (classified) area location per NFPA 499, thus providing a safety factor. NFPA 499 also establishes that a Division 2 or Zone 22 hazardous (classified) area location would exist when the dust layer prevents clearly discerning the underlying floor color. Given that dust layers tend to be thicker
on the upward-facing surfaces of equipment while heat dissipation area is more evenly distributed, it can be seen that this is a significantly conservative approach.

Table A.9.4.2.2 Guidance for Area Electrical Classification

<table>
<thead>
<tr>
<th>Depth of Dust Accumulation (in.)</th>
<th>Frequency</th>
<th>Housekeeping Requirement</th>
<th>Area Electrical Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible</td>
<td>N/A</td>
<td>N/A</td>
<td>Unclassified (general purpose)</td>
</tr>
<tr>
<td>Negligible to &lt;1/32 b</td>
<td>Infrequent c</td>
<td>Clean up during same shift;</td>
<td>Unclassified (general purpose)</td>
</tr>
<tr>
<td>Negligible to &lt;1/32 b</td>
<td>Continuous/frequent d</td>
<td>Clean as necessary to maintain an average accumulation below 1/64 in.</td>
<td>Class II or Class III, Division 2 or Zone 22</td>
</tr>
<tr>
<td>1/32 to 1/8</td>
<td>Infrequent c</td>
<td>Clean up during same shift;</td>
<td>Class II or Class III, Division 2 or Zone 22</td>
</tr>
<tr>
<td>1/32 to 1/8</td>
<td>Continuous/frequent d</td>
<td>Clean as necessary to maintain an average accumulation below 1/16 in.</td>
<td>Class II or Class III, Division 2 or Zone 22</td>
</tr>
<tr>
<td>&gt;1/8</td>
<td>Infrequent c</td>
<td>Immediately shut down and clean;</td>
<td>Class II or Class III, Division 2 or Zone 22</td>
</tr>
<tr>
<td>&gt;1/8</td>
<td>Continuous/frequent d</td>
<td>Clean at frequency appropriate to minimize accumulation;</td>
<td>Class II or Class III, Division 1 or Zone 20 or 21</td>
</tr>
</tbody>
</table>

Notes:
(1) Note: For SI units, 1 in. = 25.4 mm.
(2) This table does not apply to Class III materials. Note: Where the combustible material is anticipated to be solely combustible fibers/flyings, installation in accordance with Class III or Zone Group IIIA is suitable. Where the combustible material is anticipated to be either combustible dust with particle size less than 500 μm or a mixture with combustible fibers/flyings, installation in accordance with Class II or Zone Group IIIB is appropriate.

aSurface color just discernible under the dust layer.
b 1/32 in. is approximately the thickness of a typical paper clip.
cEpisodic release of dust occurring not more than about two or three times per year.
dEpisodic release of dust occurring more than about three times per year or continuous release resulting in stated accumulation occurring in approximately a 24-hour period.
eIt has been observed that a thickness of about 1/64 in. of a low-density dust is sufficient to yield a small puffy cloud with each footstep.
For example, National Electrical Manufacturers Association (NEMA) 12 or better. Note:

Ordinary equipment that is not heat producing, such as junction boxes, can be significantly sealed against dust penetration by the use of silicone-type caulking. This can be considered in areas where fugitive dust is released at a slow rate and tends to accumulate over a long period of time.

Guidance to be applied for existing facilities. For new facilities, it is recommended that the electrical classification be at least Class II or Class III, depending on the material form, Division 2 or Zone 22.

9. Add new text to the end of Annex A.3.3.8 to read as follows:

A.3.3.8 Combustible Particulate Solid…

For purposes of determining appropriate electrical installation requirements for combustible particulate solids, NFPA 499 has defined three material subgroups that can warrant establishing hazardous (classified) locations. Combustible dusts, per NFPA 499, are materials with a particle size less than 500 μm that can propagate a deflagration when suspended in a cloud, as determined by test. Combustible fibers/flyings are larger than 500 μm in at least one dimension, yet can still propagate a deflagration in a cloud. Both of these first two subgroups present flash-fire or explosion hazards when suspended in a cloud, as well as fire hazards when in a layer. Ignitible fibers/flyings are larger than 500 μm in at least one dimension, but either are too large or too agglomerated to suspend in the typical test or do not propagate a deflagration in a cloud. Ignitible fibers/flyings do not present a flash-fire or explosion hazard, yet still present a fire hazard when in a layer. All three of these subgroups defined in NFPA 499 are included in the term combustible particulate solid as defined and used in NFPA 652. Combustible fibers/flyings as defined in NFPA 499 are included in the term combustible dust as used and defined in NFPA 652. [652, 2019]

NFPA 70 provides different installation requirements for each of these three material subgroups. Materials smaller than 500 μm require more stringent dust exclusion designs (i.e., Class II or Zone Group IIIB) than materials larger than 500 μm (i.e., Class III or Zone Group IIIA). The exception to this is combustible metals, where both combustible metal dust and combustible metal fibers/flyings require Class II or Zone Group IIIC installations. Ignitible fibers/flyings additionally require lower maximum surface temperatures than combustible fibers/flyings for certain electrical equipment subject to overload conditions. When a hazardous (classified) location is established to address the presence of more than one of the three subgroups, the more stringent electrical installation requirements should be applied. [652, 2019]

10. Revise Annex A.9.3.12.2.1 to read as follows:

A.9.3.12.2.1 The Committee is aware of installations of AMDs (electrical motor and impeller) inside the clean-air plenum of AMSs. Standard duty AMDs are not suitable for such service. Because of the potential for failure of the filter medium or other malfunction, the clean-air side of air-material separators should be considered as at least a Class II, Division 2 or Zone 22, location with regard to proper installation of electrical equipment. NFPA 91 also addresses AMD materials of construction and clearances, including specific requirements where combustible materials could be present.

11. Revise Annex A.9.4.3.6.6 to read as follows:
A.9.4.3.6.6 Table A.9.4.3.6.6 and Figure A.9.4.3.6.6 provide guides for the selection and use of FIBCs based on the MIE of product contained in the FIBC and the nature of the atmosphere surrounding it. While Table A.9.4.3.6.6 indicates Division locations, equivalent Zone locations are also included. Class I, Division Group C/D is equivalent to Zone Group IIA/IIB. Class II, Division 1 and 2 is equivalent to Zone 20/21/22.

12. Revise Annex A.9.4.8.2 to read as follows:
A.9.4.8.2 Diesel-powered front-end loaders suitable for use in hazardous (classified) locations have not been commercially available. The following provisions can be used to reduce the fire hazard from diesel-powered front-end loaders used in Class II combustible dust hazardous areas, as defined in Articles 500 and 506 of NFPA 70:
(1) Only essential electrical equipment should be used, …

13. Revise section G.1.2.6 to read as follows:
G.1.2.6 IEC Publications. …

14. Revise section G.3 to read as follows:
G.3 References for Extract in Informational Sections.
…
…

Substantiation: There are two main reasons for this TIA, first to clearly include combustible fibers/flyings and ignitable fibers/flyings, in order to draw the connection to the NFPA 70 application and second to remove any prescriptive limitation or prohibition for use of the Zone system for classification. A number of paragraphs in the main body and annex specifically call out Division system criteria, and these are updated to either remove the specific Division reference or add the equivalent Zone reference. Lastly the term “electrically classified area(s)” has been replaced with “hazardous(classified) location(s)” to more clearly align with NFPA 70 terminology.

We have not yet and do not expect to completely agree on a definition for combustible dust because of the need to include process-specific atmospheres in NFPA 652 and the commodity standards. This proposal makes the functional usage of the term combustible dust equivalent between NFPA 70 and the various dust standards.

These changes are due to Standards Council input to expeditiously correlate the dust standards to NFPA 70.

TIAs will be submitted to each dust committee from the Dust Correlating committee with the issuance to follow the Standards Council approval of the changes and the 2nd revision meeting of NEC. In progress Dust documents will create committee inputs to address these changes and
will also issue TIAs to the current editions in order to expeditiously correlate all of the
documents, unless the document will issue prior to NEC.

**Emergency Nature:** The NFPA Standard contains a conflict within the NFPA Standard or within
another NFPA Standard.

To resolve the conflict between these standards as it pertains to the use of Zone electrical
classifications for combustible dusts.
MEMORANDUM

TO: Technical Committee on Handling and Conveying of Dusts, Vapors, and Gases

FROM: Yiu Lee, Committee Administrator

DATE: September 9, 2021

SUBJECT: NFPA 654 Proposed TIA No. 1526 FINAL TC BALLOT RESULTS

The public comment circulation has passed, therefore, according to Section 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>1 Abstentions</td>
</tr>
<tr>
<td>21 Agree (w/comment: Krbec, Maynard, Osborn, Reza, Ryerson, Taylor)</td>
<td>19 Agree (w/comment: Krbec, Maynard, Osborn, Taylor)</td>
</tr>
<tr>
<td>4 Disagree (Cholin, Koch, Scherpa, Ural)</td>
<td>5 Disagree (Cholin, Deaver, Runyon, Scherpa, Ural)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.
   
   \[31 \text{ eligible} \div 2 = 15.5 = 16 \text{ (rounded up)}\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is as follows:

   - Technical Merit: (31 eligible to vote - 6 not returned - 0 abstentions = 25 \times 0.75 = 18.75) \textbf{19}
   - Emergency Nature: (31 eligible to vote - 6 not returned - 1 abstentions = 24 \times 0.75) \textbf{18}

Ballot comments are attached for your review.
The Regs at Section 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with Section 4.2.6.

Appeal Closing Date for this TIA is September 14, 2021
**QUESTION NO. 1:** I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1526 to add a new 1.4.2 and renumber existing paragraphs accordingly, In 3.3 add new definitions for Combustible and Ignitable Fibers/Flyings, add new text to A.3.3.8; revise sections 2.4, 3.3.7 and A.3.3.7, 8.4.3.7, 8.4.3.8, 8.4.3.9 and A.8.4.3.7, A.8.4.3.8, 9.3.13.1.1.2(4)(e) and A.9.3.13.1.1.2(4)(e), 9.4.2, A.9.4.2.2 and Table A.9.4.2.2, revise A.9.3.12.2.1, A.9.4.3.6.6, A.9.4.8.2, G.1.2.6 and G.3.

**Eligible to Vote:** 31  
**Not Returned:** 6

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Samuel A. Rodgers</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Ashok Ghose Dastidar</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Jack E. Osborn</td>
<td>this will provide a needed updating for the sections listed and provide a definition.</td>
<td></td>
</tr>
<tr>
<td>Jeffery W. Sutton</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Walter L. Frank</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Jeffrey R. Roberts</td>
<td>I agree with the TIA</td>
<td></td>
</tr>
<tr>
<td>Ali Reza</td>
<td>Agree. I have reviewed the sections and some of the language could be clearer. See for example below it doesn't make sense with the strikeout of Class II in the second sentence A.8.4.3.8 The Committee is not aware of vendors providing equipment listed for Class III hazardous (classified) electrically classified (hazardous) locations. A common practice is to use equipment listed for combustible dust hazardous (classified) locations in areas classified as Class III Having said that, the change is overall good</td>
<td></td>
</tr>
<tr>
<td>Burke Desautels</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Richard Pehrson</td>
<td>Agree.</td>
<td></td>
</tr>
<tr>
<td>Tony DiLucido</td>
<td>Agree.</td>
<td></td>
</tr>
<tr>
<td>Mark L. Runyon</td>
<td>Agree with technical merit</td>
<td></td>
</tr>
<tr>
<td>Bruce McLelland</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Niels H. Pedersen</td>
<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1526 to add a new 1.4.2 and renumber existing paragraphs accordingly, In 3.3 add new definitions for Combustible and Ignitable Fibers/Flyings, add new text to A.3.3.8; revise sections 2.4, 3.3.7 and A.3.3.7, 8.4.3.7, 8.4.3.8, 8.4.3.9 and A.8.4.3.7, A.8.4.3.8, 9.3.13.1.1.2(4)(e) and A.9.3.13.1.1.2(4)(e), 9.4.2, A.9.4.2.2 and Table A.9.4.2.2, revise A.9.3.12.2.1, A.9.4.3.6.6, A.9.4.8.2, G.1.2.6 and G.3.'</td>
<td></td>
</tr>
<tr>
<td>Soph R. Davenberry</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Andrew Ryerson</td>
<td>While I agree with the Technical Merits of this TIA, I feel it needs to be discussed as part of the next revision, with the full NFPA 654 committee.</td>
<td></td>
</tr>
</tbody>
</table>
I do not believe this TIA is ready for prime time yet. For example, proposed A.1.4.2 says “Ignitible fibers/flyings, as defined in NFPA 70 and NFPA 499, do not present a flashfire hazard or explosion hazard and are not included in the definition of combustible dust in this standard.” This is simply false. There is ample evidence that particles greater than 500 microns can present a flashfire hazard or explosion hazard. Furthermore, the new definitions do not consider particle size distribution, morphology, and mixture composition. Another example is that the proposed definitions 3.3.x and 3.3.y are not enforceable. They rely on a ambiguous term called “nominal size,” which is not defined. They ignore important factors such as particle size distribution, morphology, and mixture composition. A user will have no clue on how to pick the nominal size of a sample. It is also not clear who will decide if the material can form an explosive cloud and how. While 3.3.x talks about the ASTM or ISO test, 3.3.y refers to a fictional test by saying: “This description addresses fibers/flyings that do not present a flash-fire hazard or explosion hazard by test.” The Committee, and particularly the Standards Council need to be cognizant of the fact that NFPA 499 is a recommended practice, whereas NFPA 654 is a standard. Just because flawed definitions appear in 499 do not justify their adoption in NFPA dust standards. Similarly, NFPA 70 committee sorely lacks the combustible dust expertise. Adopting their flawed definitions into combustible dust standards will be unconscionable.

The current language in 654 is the result of 20 years of loss history that supported the idea that the determination of hazard of a combustible particulate could NOT be based on a simple single dimensional criterion. Hence the reliance on ASTM E 1226. The proposed TIA returns a dimensional criterion to 654 in spite of the numerous caveats regarding particle attrition elsewhere in the standard. The Standards Council erred when it placed the responsibility for these definitions outside the combustible dust technical committees. This TIA only serves to compound that mistake.

I agree that there is a gap in agreement between the combustible dust and electrical standards, but this is an extremely complicated TIA with many nuances. I believe that this should be discussed in a committee meeting to allow people to ask questions in areas of concern, such as applicability changes, losing references to flakes, and area/location wording changes.
Thomas C. Scherpa

After reviewing proposed TIA 1520 (for NFPA 70) and approved TIA 21-1 (for NFPA 499), I noticed that the use of the term “ignitable fibers/flyings” within the context of Group IIIA materials is not consistent between NFPA 499 and NFPA 70. TIA 1520 proposes language for 506.6(C) that matches neither the approved TIA 21-1 language for Group IIIA materials nor the existing NFPA 499 language, despite using the extract tag [499:3.3.8.2.3]. Given that inconsistencies in usage between NFPA 499 and NFPA 70 still persist, I see neither the benefit nor the emergency nature in adding flawed definitions that include ambiguous terms such as “nominal size” and “not likely to be in suspension” into the combustible dust standards at this time.

Abstain
0

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the instructions box.

Eligible to Vote: 31
Not Returned : 6
Paul F. Hart,
Stephen T. Greeson,
James L. Roberts,
Tony L. Thomas,
Philip J. Parsons,
Eric Jandrain

Vote Selection  Votes  Comments
Agree  19
Samuel A. Rodgers  B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.
Ashok Ghose Dastidar  The standard contains an error or an omission that was overlooked during the regular revision process.
Jack E. Osborn  this should be done immediately as waiting for the next cycle would be delay it for many months.
Jeffery W. Sutton  B
Walter L. Frank  For reason B.
Jeffrey R. Roberts  I agree with this
Ali Reza  Agree
Burke Desautels  agree
Richard Pehrson  Agree.
Tony DiLucido  A.
Bruce McLelland  A, D
James F. Koch  Agree
Niels H. Pedersen  I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the instructions box.
Soph R. Davenberry  Reason D.
Andrew Ryerson  A and B
Jason Krbec  This is an important emergency change.
Geoffrey A. Raifsnider  B
Robert D. Taylor  New information present that compliments the mission of fire and life safety.
Important safety improvement opportunity. Why wait?

**Disagree**

Eric P. Maynard

Hastily correlating NFPA dust standards into NFPA 70 is not an emergency, but is a big mistake. The real emergency is the need to correct the flawed definitions in NFPA 70 and NFPA 499, rather than adopting them into the combustible dust standards. The Committee, and particularly the Standards Council need to be cognizant of the fact that NFPA 499 is a recommended practice, whereas NFPA 654 is a standard. Just because flawed definitions appear in 499 do not justify their adoption in NFPA dust standards. Similarly, NFPA 70 committee sorely lacks the combustible dust expertise. Adopting their flawed definitions into combustible dust standards, particularly in haste, will be unconscionable.

Erdem A. Ural

The submitter has not established that an emergency exists necessitating a change outside of the normal process for amending standards.

John M. Cholin

This can be addressed in teh next revision cycle.

Mark L. Runyon

Disagree

Daniel W Deaver

These changes do not resolve a conflict as written, and would be better addressed through the normal revision process providing opportunity for discussion and modification of each section as appropriate.

Thomas C. Scherpa

Abstain

I am uncertain that the proposed TIA is of an emergency nature, therefore I abstain.

Martin P. Clouthier

Abstain
MEMORANDUM

TO: Correlating Committee on Combustible Dusts

FROM: Yiu Lee, Committee Administrator

DATE: September 9, 2021

SUBJECT: NFPA 654 Proposed TIA No. 1526 FINAL CC BALLOT RESULTS

The public comment circulation has passed, therefore, according to Section 5.6(a) in the NFPA Regs, the final results show this TIA **HAS NOT** achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

<table>
<thead>
<tr>
<th>Correlation Issues:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>11 Agree</td>
<td>10 Agree (w/comment: Frank)</td>
</tr>
<tr>
<td>3 Disagree (Aiken, Cholin, Sapper)</td>
<td>4 Disagree (Aiken, Cholin, Sapper, Yount)</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[16 \text{ eligible} ÷ 2 = 8 + 1 = 9\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is **11** (rounded up).

\[(16 \text{ eligible to vote} - 2 \text{ not returned} - 0 \text{ abstentions} = 14 \times 0.75 = 10.5)\]

Ballot comments are attached for your review.

The Regs at Section 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with Section 4.2.6.

**Appeal Closing Date** for this TIA is **September 14, 2021**
QUESTION NO. 1: I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.

Eligible to Vote: 16
Not Returned: 2
Gregory F. Creswell, Jef Snoeyns

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>John A. LeBlanc</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jeffery W. Sutton</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Scott G. Davis</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jeffrey R. Roberts</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Walter L. Frank</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Kevin Kreitman</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jack E. Osborn</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>J. Anthony Yount</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Matthew J. Bujewski</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Martin P. Clouthier</td>
<td></td>
<td>No comment</td>
</tr>
<tr>
<td>Jason Krbec</td>
<td></td>
<td>Agree</td>
</tr>
</tbody>
</table>

Disagree  3

John M. Cholin

The proposed TIA creates inconsistencies between the text and the applicable annex material as it fails to address the caveat that all particulates tend to undergo attrition over time changing the mass-median particle dimensions.

Arthur G. Sapper

Enough technical objections have been raised to indicate that the issues raised need to go through the regular committee process.

It appears TIAs were submitted for several standards (484, 652 and 654). I did not see a correlation issue when reviewing the TIA for 484 which did not pass. However, now that I am aware that changes to definitions in multiple standards are requested via multiple TIAs, I am voting disagree until a full review of impact across all the standards can be evaluated.

Chris Aiken

Abstain 0

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 16
Not Returned: 2
Gregory F. Creswell, Jef Snoeyns

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>John A. LeBlanc</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Jeffery W. Sutton</td>
<td></td>
<td>B.</td>
</tr>
<tr>
<td>Scott G. Davis</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jeffrey R. Roberts</td>
<td></td>
<td>Agree</td>
</tr>
</tbody>
</table>
Reason B. This TIA addresses a serious inconsistency between the dust standards and NFPA 499/70. While it has taken years to come to this point of agreement between the two standards groups, the issue is no less of an emergency than it was when the need to address the inconsistencies was first identified.

Kevin Kreitman
Jack E. Osborn
Matthew J. Bujewski
Martin P. Clouthier
Jason Krbec
Disagree

John M. Cholin
Arthur G. Sapper

Chris Aiken
J. Anthony Yount
Abstain

A&B agree

A
B

The subject is a pressing issue but should be addressed via the normal standard revision process.

The TIA process has been greatly abused and this is just another example. This problem has been known for years. It is not an emergency and the short circuiting of the regular process is unjustified.

I do not see the emergency nature of the TIA
don't feel it is an emergency nature
TIA No. 1526 is incorrect and must not be published as proposed.

It was agreed by the Standards Council Combustible Dust Task Group that the EEC-AAA Committee has purview over the definitions for Combustible Dust.

The intent of the Standards Council to align NFPA 654 with NFPA 499 and NFPA 70 is not achieved with this proposal. The definition for Combustible Dust does not align with the NFPA 499 TIA nor the NFPA 70 TIA. This TIA must be revised to align with TIA 21-1 for NFPA 499 or years of effort to align these documents will not be realized.

The definition of Combustible Dust in TIA No. 21-1 for NFPA 499 does not contain combustible fibers/flyings. Combustible fibers/flyings has its own definition. Class III was revised to include combustible fibers/flyings. Where metal combustible fibers/flings exist, the area is classified as if the material is Class I, Group E metal dust.

Additionally, the definition of Combustible Dust in TIA No. 1520 for NFPA 70 does not contain combustible fibers/flyings. Combustible fibers/flyings has its own definition. Class III was revised to include combustible fibers/flyings. Where metal combustible fibers/flings exist, the area is classified as if the material is Class I, Group E metal dust.

Please refer to TIA No. 21-1 for NFPA 499 for the correct information.

Best,

Don Ankele
UL Principal Member EEC-AAA
UL Principal Member NEC CMP-14

Donald W. Ankele
Principal Engineer-Hazardous Locations
Energy & Industrial Automation
Distinguished Member of the Technical Staff - William Henry Merrill Society
UL LLC
333 Pfingsten Road
Northbrook, IL 60062-2096 USA

W: ul.com/hazloc

Download the complimentary UL HazLoc app to have UL expertise at your fingertips and opt in for push notifications to receive exclusive HazLoc technical insights
Ladies and gentlemen,

We have previously submitted comments on the subject TIA in support of it. We are respectfully offering the following comments in opposition to the particular item addressed in this message.

3.3.7 definition of Combustible Dust. Do not add, “including combustible fibers/flyings” to the definition of combustible dust. NFPA Standards Council has stated that the Committee on Electrical Equipment in Chemical Atmospheres (EEC‐AAA), responsible for NFPA 499, has purview over the definition of combustible dust. The proposed definition conflicts with NFPA 499 TIA 21‐1, issued April 15, 2021. The definition that is included in the 499 TIA is as follows (legislative text omitted for clarity).

3.3.3 Combustible Dust. Solid particles that are 500 um or smaller (i.e., passing a U.S. No. 35 standard sieve as defined in ASTM E11‐17, Standard Specification for Woven Wire Test Cloth and Test Sieves) that can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature.

The proposed definition of combustible dust in TIA 1526 is also in conflict with proposed new 3.3.x of NFPA 654, that separately defines Combustible Fibers/Flyings. A fiber or a flying can’t be a fiber/flying and a dust. It’s one or the other. We recently discussed this with a member of the Committee on Fundamentals of Combustible Dust (CMD‐FUN), who suggested that the committee’s intent is that “combustible dust” is an encompassing term that includes combustible fibers/flyings, but does not include ignitable fibers/flyings. If the member has correctly described the committee’s intent, the committee has translated its intent to the written document very poorly. In our view, so poorly that anyone who had not been present during the committee discussion would never guess that combustible fibers/flyings are dusts.

As noted in our previous comments on this TIA and on NFPA 652 Proposed TIA 1525, this is part of a concerted effort to resolve inconsistencies among NFPA 70, 484, 499, 652 and 654. If the definition of Combustible Dust in Proposed TIA 1526 is accepted, NFPA 654 will be in conflict with NFPA 70 and 499.

Thank you for the opportunity to comment on the subject TIA. Please feel free to contact us if you have any questions.

Best regards,

Bill Fiske

William T. Fiske, P.E.
Senior Director – Technical Affairs
Electrical & Network Assurance

Intertek
3933 Route 11
Cortland, NY 13045

www.intertek.com
The revised 1.4.2 language is vague as it implies that the 654 document applies to ignitable fibers/flyings "specifically with regard to fire hazards' but could apply to other, presently not defined hazards.
A1.4.2 for no apparent reason conflicts with NFPA 499 and TIA 1520 in which ignitable fibers/flyings with different criteria. TIA 1520 correctly addresses ignitable fibers/flyings which are not likely to be in suspension to produce an explosive mixture but could produce a fire hazard. This fire hazard may in fact become a flash fire hazard.

3.3.7 This term is different from that defined by NFPA 499 and TIA 1520. There should be no reason for having a different defined term. NFPA 654 should consider replacing the term 'combustible dust' with 'combustible particulate solid'.

A3.3.7 TIA correctly points out that a combustible fiber/flying is not a combustible dust as each have different definitions. However here 654 states a contradiction with very confusing texts and yet 652 still supports a different defined term for combustible fibers/flyings.

I strongly recommend against moving forward with this TIA and I do not support TIA 1526 for the reasons stated above.
Ladies and gentlemen,

We respectfully offer the Public Comments on the subject TIA that appear in the attached document. Please feel free to contact me if you have any questions.

Kind regards,

Bill Fiske

William T. Fiske, P.E.
Senior Director – Technical Affairs
Electrical & Network Assurance

Intertek
3933 Route 11
Cortland, NY  13045

www.intertek.com

Total Quality. Assured.
To be clear, I support the TIA. The reason that I offered comments is that the TIA is intended to resolve some differences among NFPA 70, 484, 499, 652 and 654. As you doubtless know, the NFPA Standards Council directed the respective technical committees to coordinate and issue TIAs to accomplish this. There are some very minor differences in this TIA - as well as 1526 for NFPA 654 - compared to the 499 TIA 21-1 and the 70 TIA to be submitted shortly by NEC-P14 Chair Michael W. Smith, and I commented on those small differences.
Name, affiliation, and address of the appellants

Samuel Rodgers, PE
Honeywell International
15801 Woods Edge Rd, Colonial Heights, VA 23834
Member of:
- Technical Committee on Fundamentals of Combustible Dust
- Technical Committee on Handling and Conveying of Dusts, Vapors, and Gases
- Technical Committee on Combustible Metals and Metal Dusts
- Technical Committee on Electrical Equipment in Chemical Atmospheres

Walter Frank, PE, CCPSC
Frank Risk Solutions, Inc.
116 Ridgewood Drive, Landenberg, PA 19350
Member of:
- Correlating Committee on Combustible Dusts
- Technical Committee on Fundamentals of Combustible Dusts
- Technical Committee on Handling and Conveying of Dusts, Vapors, and Gases

Statement identifying the particular action to which the appeal relates

This appeal relates to the decisions by the Correlating Committee on Combustible Dusts (CC) to not approve NFPA 652 Proposed TIA No. 1525 or NFPA 654 Proposed TIA No. 1526 based upon the conclusion that neither TIA was of an emergency nature.

Argument setting forth the grounds for the appeal

Proposed TIA No. 1525 addresses NFPA 652 and proposed TIA No. 1526 addresses NFPA 654. Together with proposed TIA No. 1527 addressing NFPA 484, these three TIAs seek to resolve inconsistencies between the combustible dust standards and NFPA 70. The TIAs were made necessary by the revision of the definition of combustible dust in NFPA 70, said revision being inconsistent with the definition of the term as used in the combustible dust standards. As a consequence, several of the combustible dust standard technical committees determined that it was necessary to remove from their standards the authorization to use the Zone system for electrical hazardous (classified) locations as related to dusts. The proposed TIAs seek to 1) add content to the combustible dusts standards to reconcile the disparate definitions and 2) restore recognition of and allow the use of the Zone system that is currently denied to users of the affected combustible dust standards.

In 2018, the Standards Council tasked the NEC Correlating Committee, Technical Committee on Electrical Equipment in Chemical Atmospheres, Technical Correlating Committee on Combustible Dusts, Technical Committee on Fundamentals of Combustible Dusts, and Technical Committee on Combustible Metals and Metal Dusts to resolve the conflict between these standards...
as it pertains to the use of Zone electrical classifications for combustible dusts (Standards Council Action 18-4-26). The proposed TIAs represent the culmination of that effort.

When balloting a proposed TIA, a correlating committee must consider only two issues:

1. The merits of the amendment (as it relates to the correlating committee authority and responsibilities) and
2. Whether the amendment involves an issue of an emergency nature.

On its final ballot of NFPA 652 Proposed TIA No. 1525, the CC voted in the affirmative on the merits of the TIA (11 affirmative votes vs 11 required). Thus, the merits of the TIA are not at issue. However, the CC denied the emergency nature of the TIA. Similarly for NFPA 654 Proposed TIA No. 1526, the CC voted in the affirmative on the merits (11 affirmative votes vs 11 required). Yet again, the CC denied the emergency nature of the TIA.

We believe that there are at least two compelling reasons that the proposed TIAs should be considered to be of an emergency nature, as defined in the *NFPA Regulations Governing the Development of NFPA Standards*:

- “The NFPA standard contains a conflict within the NFPA standard or with another NFPA standard.” There are clear and substantive conflicts between the content of NFPA 484 and NFPA 70. The nature of these conflicts was significant enough for the Standards Council to instruct the various technical and correlating committees to resolve the conflicts.

- “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.” The proposed TIA would restore to users the ability to apply the Zone system for electrical hazardous (classified) locations, an option that is currently denied to them by NFPA 652 and 654.

Both of these matters warrant expeditious resolution. To wait for release of a subsequent standard would be an unnecessary delay. It should be noted that the combustible dust standards are being consolidated into the new NFPA 660. It is uncertain when NFPA 660 will be released and the above matters would remain unresolved until this occurs.

**Statement of the precise relief requested**

We respectfully request that the Standards Council either approve NFPA 652 Proposed TIA No. 1525 and NFPA 654 Proposed TIA No. 1526 or remand them to the Correlating Committee on Combustible Dusts for reconsideration of the emergency nature.

**Whether a hearing on the appeal is being requested**

We do not anticipate, nor request, a hearing on this appeal.
1. Revise paragraph 5.1.2 to read as follows:

5.1.2* Ordinary Hazard (Group 1) (OH1). Ordinary hazard (Group 1) occupancies shall be defined as occupancies or portions of other occupancies where combustibility is low, the quantity of combustibles is moderate, stockpiles of contents do not exceed 8 ft (2.4 m), and fires with moderate rates of heat release are expected, and combustibility of the contents do not exceed the amount of miscellaneous storage of Class 2, 3, 4, plastics, tires, and roll paper provided in Table 4.3.1.7.1 of NFPA 13.

Substantiation: The 2019 version of NFPA 750 includes information to describe an Ordinary Hazard Group 1 (OH1) occupancy classification that was taken from the definition for OH1 occupancies as indicated in the 2019 edition of NFPA 13. The NFPA 13 definition was revised for the 2022 edition of NFPA 13 since it included information that was not correct. The AUT-SSI Committee Statement for making this revision to the 2022 edition of NFPA 13 included the following:

“As it is currently written, the definition is not correct. It compares an OH1 occupancy to the combustible contents of miscellaneous storage of Class 2, 3, 4, plastics, tires, and roll paper provided in Table 4.3.1.7.1. However, review of the Table indicates that OH1 design criteria for miscellaneous storage is only appropriate for Class 1 commodities stored to 12 ft and Class 2 commodities to 10 ft. All other miscellaneous storage configurations require a greater level of protection, such as OH2, EH1 and EH2.”

This TIA aligns the description of the OH1 occupancy with the 2022 edition of NFPA 13.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process. 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. 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 of the action.

The published 2019 edition of NFPA 750 has an error in description of an OH1 occupancy in that it references a higher hazard commodity (such as plastics, tires and roll paper) than what should be permitted for this hazard. The correction of this error is of an emergency nature and prompt action is needed to address it.
MEMORANDUM

TO: Technical Committee on Water Mist Fire Suppression Systems

FROM: Kelly Carey, Committee Administrator

DATE: November 19, 2021

SUBJECT: NFPA 750 Proposed TIA No. 1613 FINAL TC BALLOT RESULTS

The public comment closing date has passed, therefore, according to Section 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

<table>
<thead>
<tr>
<th>26</th>
<th>Eligible to Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Not Returned</td>
</tr>
<tr>
<td>(Back, Barter, Houin, Howe, Johns, Osburn, Purdy, Tanner, Tweedie)</td>
<td></td>
</tr>
</tbody>
</table>

**Technical Merit:**  
- 0 Abstentions  
- 17 Agree (w/ comment, Clarke)  
- 0 Disagree

**Emergency Nature:**  
- 0 Abstentions  
- 17 Agree (w/ comment, Clarke)  
- 0 Disagree

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

1. In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.  
   
   \[
   26 \text{ eligible } \div 2 = 13 + 1 = (14) 
   \]

2. The number of affirmative votes needed to satisfy the ¾ requirement is 13.  
   
   (26 eligible to vote - 9 not returned - 0 abstentions = 17 \times 0.75 = 12.75)

Ballot comments are attached for your review.

The Regs at Section 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with Section 4.2.6.

**Appeal Closing Date** for this TIA is **November 24, 2021**.
QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1613 to revise paragraph 5.1.2.

Eligible to Vote: 26
Not Returned : 9
Eric J. Houin, Scott Tweedie, Gerard G. Back, Matthew Osburn, Gary Thomas Howe, Russell Tanner, Joseph C. Barter, Bill Johns, P.E., Steven Mark Purdy

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>17</td>
<td>I agree. As it is currently written, the definition is not correct.</td>
</tr>
<tr>
<td>Robert Kasiski</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Brad T. Stilwell</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Milosh T. Puchovsky</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Rick J. Jackson</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Raymond N. Hansen</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Jeff Hebenstreit</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Sean Cutting</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Lee Patrick Schmelyun</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Sean Ramsey</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Robert J. Ballard</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Ruediger Kopp</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Larry D. Shackelford</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Paul J. Felch</td>
<td>AGREE</td>
<td></td>
</tr>
<tr>
<td>Dagoberto Gonzalez</td>
<td>I Agree</td>
<td></td>
</tr>
<tr>
<td>Mohamed Sorour</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 26
Not Returned : 9
<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>17</td>
<td>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.</td>
</tr>
<tr>
<td>Daniel J. Hubert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bruce H. Clarke</td>
<td></td>
<td>As it is currently written, the definition is not correct.</td>
</tr>
<tr>
<td>Robert Kasiski</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process. 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.</td>
</tr>
<tr>
<td>Brad T. Stilwell</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Milosh T. Puchovksy</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Rick J. Jackson</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Raymond N. Hansen</td>
<td>Reason A</td>
<td></td>
</tr>
<tr>
<td>Jeff Hebenstreit</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Sean Cutting</td>
<td>C, D</td>
<td></td>
</tr>
<tr>
<td>Lee Patrick Schmelyun</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Sean Ramsey</td>
<td></td>
<td>The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.</td>
</tr>
<tr>
<td>Robert J. Ballard</td>
<td>A,D</td>
<td></td>
</tr>
<tr>
<td>Ruediger Kopp</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Larry D. Shackelford</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Paul J. Felch</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Dagoberto Gonzalez</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Mohamed Sorour</td>
<td>C. The proposed TIA intends to correct a previously unknown existing hazard.</td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
1. Revise Table 4.3.9 to read as follows:

<table>
<thead>
<tr>
<th>Specimen 1–3</th>
<th>Specimen 4–6</th>
<th>Specimen 7–9</th>
<th>Specimen 10–12</th>
<th>Specimen 13–15</th>
<th>Specimen 16–18</th>
<th>Specimen 19–21</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech Quality Test (Section 8.2)</td>
<td>Speech Quality Test (Section 8.2)</td>
<td>Speech Quality Test (Section 8.2)</td>
<td>Speech Quality Test (Section 8.2)</td>
<td>Speech Quality Test (Section 8.2)</td>
<td>Speech Quality Test (Section 8.2)</td>
<td>Speech Quality Test (Section 8.2)</td>
<td>Display Surface Abrasion Test (Section 8.7)</td>
</tr>
<tr>
<td>Heat and Flame Test (Section 8.9)</td>
<td>Power Source Performance Test (Section 8.18)</td>
<td>Impact Acceleration Resistance Test (Section 8.5)</td>
<td>Water Drainage Test (Section 8.13)</td>
<td>Case Integrity Test (Section 8.12)</td>
<td>TIA Transmit Power Test (Section 8.15)</td>
<td>Tumble Vibration Test (Section 8.14)</td>
<td>—</td>
</tr>
<tr>
<td>Speech Quality Test (Section 8.2)</td>
<td>Vibration Test (Section 8.4)</td>
<td>Cable Pullout Test (Section 8.11)</td>
<td>Speech Quality Test (Section 8.2)</td>
<td>Speech Quality Test (Section 8.2)</td>
<td>TIA Carrier Frequency Stability Test (Section 8.16)</td>
<td>Speech Quality Test (Section 8.2)</td>
<td>—</td>
</tr>
<tr>
<td>Antenna VSWR Swept Frequency Test (Section 8.20)</td>
<td>Speech Quality Test (Section 8.2)</td>
<td>Speech Quality Test (Section 8.2)</td>
<td>Corrosion Test (Section 8.6)</td>
<td>High Temperature Functionality Test (Section 8.8) includes Speech Quality Test (Section 8.2)</td>
<td>TIA Receiver Sensitivity (Section 8.17)</td>
<td>Antenna VSWR Swept Frequency Test (Section 8.20)</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
<td>Antenna VSWR Swept Frequency Test (Section 8.20)</td>
<td>Speech Quality Test (Section 8.2)</td>
<td>Product Label Durability Test (Section 8.10)</td>
<td>Electronic Temperature Stress Test (Section 8.19)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Product Label Durability Test (Section 8.10)</td>
<td>Antenna VSWR Swept Frequency Test (Section 8.20)</td>
<td>Heat and Immersion Leakage Resistance Test (Section 8.3)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Antenna VSWR Swept Frequency Test (Section 8.20)</td>
<td>—</td>
<td>Product Label Durability Test (Section 8.10)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Speech Quality Test (Section 8.2)</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Antenna VSWR Swept Frequency Test (Section 8.20)</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

2. Revise 6.11 to read as follows:

6.11 Failure Detection of Connected RSMs.

6.11.1 The RF device shall detect a failure of a wired RSM or total loss of connection within 500 ms of the failure in hazard zone mode.

6.11.2 The RF device shall detect a failure of Bluetooth® devices or total loss of connection within 5 seconds of the failure in hazard zone mode.

6.11.3 When a failure as specified in 6.11.1 and/or 6.11.2 occurs, at a minimum, the RF device shall perform the following actions:

1. All functions of the RF device shall be enabled, including those functions that had been disabled by connection to the RSM.
3. A visual alert message, “FAIL ACC” shall appear on the RF display.
4. A change to the backlight as specified in 6.15.1 shall occur.
6.11.3 Audible and visual alert messages specified in 6.11.2 shall be canceled when the user completes any one of the following actions:
(1) Reinitiating a pairing with or reconnecting to a wireless accessory
(2) Power cycling the RF device
(3) Connecting a new or repaired wired accessory

3. Revise 6.20 to read as follows:

6.20 RF Wireless Interface (RFWI).
6.20.1 The RF device shall be capable of operating with a wireless RSM using classic Bluetooth® audio.
6.20.1.1 The RF device shall support the Bluetooth® headset profile (HSP) and the hands-free profile (HFP).
6.20.1.2 The RF device shall exchange speaker and microphone audio with a wireless RSM via HSP or HFP.
6.20.3.2 A wireless RSM or compatible device shall support the HSP or the HFP.

4. Revise Table 6.21.1(b) to read as follows:

<table>
<thead>
<tr>
<th>Command</th>
<th>Format</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACK</td>
<td>&lt;cr&gt;&lt;lf&gt;ACK_OK&lt;cr&gt;&lt;lf&gt;</td>
<td>Command received successfully</td>
</tr>
<tr>
<td>NACK</td>
<td>&lt;cr&gt;&lt;lf&gt;NACK_ERROR&lt;cr&gt;&lt;lf&gt;</td>
<td>Command not received, rebroadcast</td>
</tr>
</tbody>
</table>

Error with command

5. Revise 8.2.1.13 through 8.2.1.18 to read as follows:

8.2.1.13 RF Device RFDC Transmit Audio Speech Quality Test. The RF device RFDC transmit audio speech quality test shall be conducted in accordance with the following procedure (see Figure 8.2.1.13):
(1) The radio test set/service monitor shall have de-emphasis enabled, IF bandwidth of 12.5 kHz, and audio band pass filter of 300 Hz to 3.0 kHz.
(2) For wired connection, the audio signal from the speech quality test set shall be fed to the transmitting specimen via the RFDC at nominal a level of −38 dBV as specified by the manufacturer.
(3)* The audio signal from the radio test set/service monitor to the speech quality test shall be adjusted to achieve a 0.0 dBu nominal level.
(4) The RF signal between the RF device test set and the device under test (DUT) shall be directly connected (i.e., wired).
(4-5) The measurement shall be started and the speech quality reading measured and reported.
A.8.2.1.13(3) The reference level 0.0 dBu is interpreted to be the level of audio quality analysis that achieves the best score.

Figure 8.2.1.13 Measurement Setup for RF Device RFDC Transmit Audio Speech Quality Test.

8.2.1.14 RF Device Bluetooth® Transmit Audio Speech Quality Test. The RF device Bluetooth® transmit audio speech quality test shall be conducted in accordance with the following procedure (see Figure 8.2.1.14):

1. The radio test set/service monitor shall have de-emphasis enabled, IF bandwidth of 12.5 kHz, and audio band pass filter of 300 Hz to 3.0 kHz.
2. The audio signal from the speech quality test set shall be fed to the transmitting specimen via Bluetooth® as specified by the manufacturer at a nominal 80 percent modulation.
3. The audio signal from the radio test set/service monitor to the speech quality test shall be adjusted to achieve a 0.0 dBu nominal level.
4. The RF signal between the RF device test set and the device under test (DUT) shall be directly connected (i.e., wired).
5. The measurement shall be started and the speech quality reading measured and reported.

A.8.2.1.14(3) The reference level 0.0 dBu is interpreted to be the level of audio quality analysis that achieves the best score.
Figure 8.2.1.14 Measurement Setup for RF Device Bluetooth® Transmit Audio Speech Quality Test.

8.2.1.15 RF Device Internal Microphone Transmit Audio Speech Quality Test. The RF device internal microphone transmit audio speech quality test shall be conducted in accordance with the following procedure (see Figure 8.2.1.15):

1. The RF device shall be set in accordance with the following procedure:
   a. The RF device shall be mounted in front of the artificial mouth via the manufacturer-provided fixture.
   b. The RF device internal microphone shall be centered to the artificial mouth at a horizontal axis distance of 50 mm ±5 mm (2 in. ±0.2 in.).

2. The radio test set/service monitor shall have de-emphasis enabled, IF bandwidth of 12.5 kHz, and audio band pass filter of 300 Hz to 3.0 kHz.

3. The audio signal shall be adjusted from the radio test set/service monitor to the speech quality test set for 0.0 dBu nominal.

4. The audio signal from the speech quality test set shall be fed to the transmitting specimen via the calibrated mouth.

5. The RF signal between the RF device test set and the DUT shall be directly connected (i.e., wired).

6. The measurement shall be started and the speech quality result reading reported.
8.2.1.16 RF Device RFDC Receive Audio Speech Quality Test. The RF device RFDC receive audio speech quality test shall be conducted in accordance with the following procedure (see Figure 8.2.1.16):

1. The volume of the RF device shall be set to the maximum rated audio as specified by the manufacturer.
2. The audio output shall be scaled and ground referenced for the speech quality test system to achieve the best mean opinion score (MOS).
3. The RF device test set/service monitor shall have pre-emphasis enabled and transmit power set initially to a level that provides a power level measured at the device under test (DUT) of $-100 \pm 60 \text{ dBm} \pm 3 \text{ dBm}$.
4. The audio levels shall be adjusted from the speech quality test system until the FM peak modulation is between 2.0 kHz and 2.2 kHz from the service monitor using the “Male1_1st_Set_8k.wav” file.
5. The RF signal between the RF device test set and the DUT shall be directly connected (i.e., wired).
6. The measurement shall be started and the speech quality result measured and reported.
8.2.1.17 **RF Device Bluetooth® Receive Audio Speech Quality Test.** The RF device Bluetooth® receive audio speech quality test shall be conducted in accordance with the following procedure (see Figure 8.2.1.17):

1. The volume of the RF device shall be set to the maximum rated audio as specified by the manufacturer.
2. The audio output shall be scaled and ground referenced for the speech quality test system to achieve the best MOS.
3. The RF device test set/service monitor shall have pre-emphasis enabled and transmit power set initially to a level that provides a power level measured at the device under test (DUT) of $-100 \pm 30$ dBm.
4. The audio levels shall be adjusted from the speech quality test system until the FM peak modulation is between 2.0 kHz and 2.2 kHz from the service monitor using the “Male1_1st_Set_8k.wav” file.
5. The RF signal between the RF device test set and the DUT shall be directly connected (i.e., wired).
6. The measurement shall be started and the speech quality result measured and reported.
8.2.1.18 RF Device Speaker Receive Audio Speech Quality Test. The RF device speaker receive audio speech quality test shall be conducted in accordance with the following procedure (see Figure 8.2.1.18):

1. The receiving RF device speaker shall be set in accordance with the following procedure:
   a. The receiving RF device speaker shall be mounted in front of the artificial ear via the manufacturer-provided fixture.
   b. The RF device speaker shall be centered to the artificial ear at a horizontal distance of 50 mm ±5 mm (2 in. ±0.2 in.).

2. The volume of the RF device shall be set to the maximum rated audio as specified by the manufacturer.

3. The RF device test set/service monitor shall have pre-emphasis enabled and transmit power initially set to a level that provides a power level measured at the device under test (DUT) of −100 –60 dBm ±3 dBm.

4. The audio levels shall be adjusted from the speech quality test system until the FM peak modulation is between 2.0 kHz and 2.2 kHz from the radio test set/service monitor using the “Male1_1st_Set_8k.wav” file.

5. The input sensitivity of the speech quality analyzer shall be set to the level of the artificial ear calibration to maximize MOS (see 8.2.1.11).

6. The RF signal between the RF device test set and the DUT shall be directly connected (i.e., wired).

7. The measurement shall be started and the speech quality result reading reported.
Substantiation:
1. For Table 4.3.9: Table 4.3.9 Order of Testing, originally included 3 tests that were lost when the table was formatted for printing. These tests are integral to Section 8.20 and need to be restored.

2. For 6.11: The wording in NFPA 1802 6.11.1 states "The RF device shall detect a failure of an RSM or total loss of connection within 500 ms of the failure in hazard zone mode" It is recommended that this section follows the BT standard of 5 seconds for a Blue Tooth device and 500 ms for a wired RSM.

3. For 6.20: The wording in NFPA 1802 6.20 specifies support for the hands-free profile (HFP). HFP Bluetooth® certification requires support for full duplex audio which is not consistent with push to talk communications that are inherently half duplex.
Therefore, HFP should be deleted from requirement 6.20.1.1, 6.20.1.2, 6.20.3.2.

4. For Table 6.21.1 (b): The wording in NFPA 1802 Table 6.21.1(b) specifies a reply of <cr><lf>ACK<cr><lf> or <cr><lf>NACK<cr><lf>. This is inconsistent with the normal AT command responses, which use “OK” and “ERROR”. It is recommended to use “OK” and “ERROR”.

5. For 8.2.1.13 – 8.2.1.18: The standard is unclear if certain tests are performed with a wired RF connection or over the air. Therefore, diagrams and wording have been changed to more clearly specify the standard’s intent.
The standard specifies an RF signal level for the DUT receiver testing as described in sections 8.2.1.16, 8.2.1.17, and 8.2.1.18 as -100 dBm +/- 3dB. However, this low level imposes complexities for test integrity and theoretical performance margin. First, care must be taken even in a wired environment to ensure that RF interference is not present that could degrade RF signal integrity with signals that are -100 dBm and lower. Second, little margin is provided for passing acceptable voice quality with the current specified level. Pre-certification testing with existing and prototype RF devices has shown that voice quality scores show high variability from test to test. Therefore, the specified level should be raised from -100dBm to -60 dBm.

**Emergency Nature:** The standard contains an error or an omission that was overlooked during the regular revision process. 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 inadvertentely overlooked in the total revision process or was without adequate technical (safety) justification for the action.

[1 – 5] The standard contains an error or an omission that was overlooked during the regular revision process. The proposed TIA intends to offer the public a benefit that would alleviate a known impediment to the certification process.
MEMORANDUM

TO: Technical Committee on Electronic Safety Equipment

FROM: Yvonne Smith, Committee Administrator

DATE: November 1, 2021

SUBJECT: NFPA 1802 ProposedTIA No. 1607 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA **HAS** achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

40 Eligible to Vote
3 Not Returned *(Lasa, Tarver, Wolf)*

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>37 Agree <em>(3 w/comment; Facella, Storti, Borders)</em></td>
<td>37 Agree <em>(4 w/comment; Agi, Facella, Storti, Borders)</em></td>
</tr>
<tr>
<td>0 Disagree <em>(names, if any)</em></td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

   \[40 \text{ eligible} \div 2 = 20 + 1 = (21)\]

2. The number of affirmative votes needed to satisfy the ¾ requirement is **28**.

   \[(40 \text{ eligible to vote} - 3 \text{ not returned} - 0 \text{ abstentions} = 37 \times 0.75 = 27.75)\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is November 6, 2021.
I AGREE with the TECHNICAL MERITS of the Proposed TIA Log 1607 on Table 4.3.9, 6.11, 6.20.1.1, 6.20.1.2, 6.20.3.2, Table 6.21.1(b), 8.2.1.13 thru
Eligible to Vote: 40
Not Returned: 3
Santiago Lasa, Gerry W. Tarver, Timothy W. Wolf

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Jason L. Allen</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Bruce H. Varner</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Christina Spoons</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Kamil Agi</td>
<td>I have reviewed and agree with the changes.</td>
<td></td>
</tr>
<tr>
<td>Louis Chavez</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Michael F. McKenna</td>
<td>AGREE</td>
<td></td>
</tr>
<tr>
<td>John A. Facella</td>
<td>Agreed but there is a missing word which should be fixed in two of the sections (see added word in CAPS): 8.2.1.13 RF Device RFDC Transmit Audio Speech Quality Test (3) * The audio signal from the radio test set/service monitor to the speech quality test SET shall be adjusted to achieve a 0.0 dBu nominal level. 8.2.1.14 RF Device Bluetooth® Transmit Audio Speech Quality Test. (3)* The audio signal from the radio test set/service monitor to the speech quality test SET shall be adjusted to achieve a 0.0 dBu nominal level.</td>
<td></td>
</tr>
<tr>
<td>Angelina Seay</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Chad A. Morey</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Craig Gestrler</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Robert J. Athanas</td>
<td>AGREE</td>
<td></td>
</tr>
<tr>
<td>Timothy R. Rehak</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>David A. Little</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>William Forsyth</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Wayne C. Haase</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Matt E. Bowyer</td>
<td>Agree</td>
<td></td>
</tr>
</tbody>
</table>
All updates make product sense without endangering safety. Reqs. should not be technologically infeasible with standards that are only peripheral to its main purpose.

Based on my limited background on this matter, I do agree with the technical merits of the proposed TIA.

<table>
<thead>
<tr>
<th>Name</th>
<th>Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael T. Richardson</td>
<td>AGREE</td>
</tr>
<tr>
<td>Joseph Namm</td>
<td>Agree</td>
</tr>
<tr>
<td>Joseph Francis Brooks</td>
<td>Agree</td>
</tr>
<tr>
<td>Albert J Bahri</td>
<td>Agree</td>
</tr>
<tr>
<td>Christopher M. Samplo</td>
<td>agree</td>
</tr>
<tr>
<td>Mac Hartless</td>
<td>agree</td>
</tr>
<tr>
<td>Michael P. Quinn</td>
<td>Agree</td>
</tr>
<tr>
<td>John H. Morris</td>
<td>agree</td>
</tr>
<tr>
<td>Michael C. Hussey</td>
<td>Agree</td>
</tr>
<tr>
<td>Barry Leitch</td>
<td>Agree</td>
</tr>
<tr>
<td>Jeffrey Curtis Cook</td>
<td>Agree</td>
</tr>
<tr>
<td>William Storti</td>
<td></td>
</tr>
<tr>
<td>Kevin D. Lentz</td>
<td>AGREE</td>
</tr>
<tr>
<td>Jon Turner</td>
<td>Agree</td>
</tr>
<tr>
<td>Michelle Donnelly</td>
<td>Agree</td>
</tr>
<tr>
<td>Marcus Berney-Smith</td>
<td>Agree</td>
</tr>
<tr>
<td>Landon Borders</td>
<td></td>
</tr>
<tr>
<td>Don Herbert</td>
<td>Agree</td>
</tr>
<tr>
<td>John Rehayem</td>
<td>Agree</td>
</tr>
<tr>
<td>Cody Worrell</td>
<td>Agree</td>
</tr>
<tr>
<td>Lorenzo Cruger</td>
<td></td>
</tr>
<tr>
<td>DISAGREE</td>
<td>0</td>
</tr>
<tr>
<td>ABSTAIN</td>
<td>0</td>
</tr>
</tbody>
</table>
I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 40
Not Returned: 3
Santiago Lasa, Gerry W. Tarver, Timothy W. Wolf

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>37</td>
<td></td>
</tr>
</tbody>
</table>

Jason L. Allen
Bruce H. Varner
Christina Spoons
Kamil Agi
Louis Chavez
Michael F. McKenna
John A. Facella
Angelina Seay
Chad A. Morey
Craig Gestler
Robert J. Athanas
Timothy R. Rehak
David A. Little

A. The standard contains an error or an omission that was overlooked during the regular revision process.

F. 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.

Agree
This needs to be addressed immediately.
Reason A.
AGREE
Agreed. The omissions in the tables and the change to wired, and the other changes are all necessary for proper testing of manufacturers samples. Without them there will be inconsistency in testing across manufacturers and across radios. This must be changed urgently.

a
Item A
A
AGREE F. 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.

A. The standard contains an error or an omission that was overlooked during the regular revision process.

agree
William Forsyth  
Wayne C. Haase  
Matt E. Bowyer  
Michael T. Richardson  
Joseph Namm  
Joseph Francis Brooks  
Albert J Bahri  
Christopher M. Sampl  
Mac Hartless  
Michael P. Quinn  

John H. Morris  
Michael C. Hussey  
Barry Leitch  
Jeffrey Curtis Cook  
William Storti  
Kevin D. Lentz  
Jon Turner  
Michelle Donnelly  
Marcus Berney-Smith  
Landon Borders  

agree  
F  
A  
A. The standard contains an error or an omission that was overlooked during the regular revision process.  
A. The standard contains an error or an omission that was overlooked during the regular revision process.  
Agree  
F.  
agree  
agree  
I agree that 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. (F)  
A. The standard contains an error or an omission that was overlooked during the regular revision process.  
agree  
Agree, Reason A for Emergency Nature  
Reason F  
Since the old testing was virtually impossible, these new reqs. will allow radios to pass and get into circulation faster.  
A  
A  
A  
A  
It is my understanding that the standard is currently untestable. This error can and should be corrected per the proposed TIA.
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.

John Rehayem
Cody Worrell
Lorenzo Cruger

DISAGREE

ABSTAIN

D
F
Reasons: A, B, F

0

0
MEMORANDUM

TO: Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment

FROM: Yvonne Smith, Committee Administrator

DATE: November 1, 2021

SUBJECT: NFPA 1802 Proposed TIA No. 1607 FINAL CC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

27    Eligible to Vote
7     Not Returned (Area, Fargo, Farley, Johnston, Legendre, Mauti, Szalajda)

<table>
<thead>
<tr>
<th>Correlation Issues:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Abstentions (Hess)</td>
<td>Abstentions (Hess)</td>
</tr>
<tr>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Disagree</td>
<td>Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

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

\[27 \text{ eligible} \div 2 = 13.5 = (14)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 15.

\[(27 \text{ eligible to vote} - 7 \text{ not returned} - 1 \text{ abstentions} = 19 \times 0.75 = 14.25)\]

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is November 6, 2021.
I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.

Eligible to Vote: 27
Not Returned : 7
Cristine Z. Fargo, Jeff Legendre, Jonathan V. Szalajda, Benjamin Mauti, James B. Area, Edmund Farley, Ronald Johnston

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Jason L. Allen</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Joseph Arrington</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Amanda H. Newsom</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Bruce H. Varner</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Karen E. Lehtonen</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Roger L. Barker</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Rick L. Swan</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Stephen R. Sanders</td>
<td></td>
<td>I Agree</td>
</tr>
<tr>
<td>Michael F. McKenna</td>
<td></td>
<td>AGREE</td>
</tr>
<tr>
<td>David G. Matthews</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Harry P. Winer</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Thomas M. Hosea</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Jeffrey O. Stull</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>William A. Van Lent</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Beth C. Lancaster</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Robert D. Tutterow, Jr.</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>John H. Morris</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Douglas Menard</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Dick Weise</td>
<td></td>
<td>I agree</td>
</tr>
</tbody>
</table>

DISAGREE

ABSTAIN

Diane B. Hess

limited to no knowledge on the subject matter
I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 27
Not Returned: 7
Cristine Z. Fargo, Jeff Legendre, Jonathan V. Szalajda, Benjamin Mauti, James B. Area, Edmund Farley, Ronald Johnston

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>19</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process</td>
</tr>
</tbody>
</table>

- Jason L. Allen
- Joseph Arrington
- Amanda H. Newsom
- Bruce H. Varner
- Karen E. Lehtonen
- Roger L. Barker
- Rick L. Swan

- Stephen R. Sanders
- Michael F. McKenna
- David G. Matthews
- Harry P. Winer
- Thomas M. Hosea
- Jeffrey O. Stull
- William A. Van Lent
- Beth C. Lancaster
- Robert D. Tutterow, Jr.

Reason A
AGREE
A
A
A
A, F
A
A. The standard contains an error or an omission that was overlooked during the regular revision process.
John H. Morris

Douglas Menard
Dick Weise

DISAGREE

ABSTAIN

Diane B. Hess

A. The standard contains an error or an omission that was overlooked during the regular revision process.

A

I agree

0

1

limited to know knowledge on the subject matter
MEMORANDUM

TO: Dawn Michele Bellis
   Secretary, Standards Council

FROM: Barry D. Chase
   Standards Lead, Emergency Response & Responder Safety

DATE: December 2, 2021


On behalf of the Technical Committee on Gaseous Fire-Extinguishing Systems, please make the following revision cycle adjustments:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>2022</td>
<td>Annual 2024</td>
<td>Fall 2024</td>
</tr>
<tr>
<td>12A</td>
<td>2022</td>
<td>Annual 2024</td>
<td>Fall 2024</td>
</tr>
<tr>
<td>2001</td>
<td>2022</td>
<td>Annual 2024</td>
<td>Fall 2024</td>
</tr>
</tbody>
</table>

These documents are normally processed during Fall cycles on a 3-year basis. Due to the COVID-19 pandemic, the Second Draft meeting for the most recent revision cycle was postponed, causing all 3 standards to move from the Fall 2020 cycle to the Annual 2021 cycle. The above requested adjustments would realign these documents with a Fall cycle and would maintain the 3-year revision frequency.

Thank you.
National Fire Protection Association Standards Council
1 Batterymarch Park
Quincy, MA 02067

To NFPA Standards Council:

The Technical Committee on Pyrotechnics would like to request a cycle change for NFPA 1125 to an Annual 2025 Document Cycle. In addition to this change, the Technical Committee on Pyrotechnics would also like to change the cycles on NFPA 1122, NFPA 1125, and NFPA 1127 to 4 year cycles to align with the rest of the PYR-AAA documents (NFPA 1123 and NFPA 1124). The requested change would be permanent and not a one time change. This change would help to make Technical Committee meetings more efficient and have a more inclusive participation from the Technical Committee members.

Respectfully Submitted

Glenn Dean
Chair for the Technical Committee on Pyrotechnics

CC:
Alex Ing
Staff Liaison for the Technical Committee on Pyrotechnics
MEMORANDUM

TO: Standards Council
FROM: Chelsea Rubadou, NFPA 1022 Staff Liaison
DATE: November 9, 2021
SUBJECT: Request for approval to release Draft NFPA 1022 for Public Input

According to Section 4.3.2.1(b) of the NFPA Regulations Governing the Development of NFPA Standards prior to entering into a Revision Cycle and approved for public review a Ballot of the Committee is required by at least a simple majority. The results of the ballot to release of NFPA 1022 Preliminary Draft, Standard for Fire and Emergency Service Analyst Professional Qualifications, was finalized on October 29, 2021. The ballot received the necessary affirmative votes to pass.

Based upon the ballot results, the recommendation to the Standards Council is that NFPA 1022 enter the Annual 2024 revision cycle, with a Public Input closing date of June 1, 2022.

Enclosures: NFPA 1022 Draft
             NFPA 1022 Preliminary Release Final Ballot Results
MEMORANDUM

TO: Technical Committee on Fire Service Analysts and Informational Technical Specialists Professional Qualifications

FROM: Jenny Depew, Technical Committee Administrator

DATE: November 12, 2021

SUBJECT: Ballot to Release NFPA 1022 Preliminary Draft - Final Results

According to the final ballot results, the ballot on the release of the preliminary draft of NFPA 1022, Standard for Fire and Emergency Services Analyst Professional Qualifications, HAS received the necessary affirmative votes to pass ballot. The Technical Committee recommends that NFPA 1022 enter the A2024 revision cycle. Please see the attached report for results and any comments received.

19 Eligible to Vote
5 Not Returned (Baszler, Blythe, Decremer, Montgomery, Roux)

The criteria necessary to pass ballot is a simple majority of the Technical Committee and Correlating Committee, if any. See Section 4.3.2.1(b) of the Regulations Governing the Development of NFPA Standards.
Per section 4.3.2.1(b) of the Regs, prior to entering a future revision cycle and approval for public review, a ballot of the committee is required to pass by at least a simple majority. Note: This ballot is for formally voting on whether you are in agreement with the release of the NFPA 1022 draft.

Eligible to Vote: 19
Not Returned : 5
Baszler, Blythe, Decremer,
Montgomery, Roux

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affirmative</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Affirmative with Comment</td>
<td>1</td>
<td>understood</td>
</tr>
<tr>
<td>Thomas Breyer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Total Voted : 14

For Simple majority, the affirmative votes needed are 10
Important Notice: This document is the property of the National Fire Protection Association (NFPA) and has been provided to you in Microsoft Word format solely for the purpose of Technical Committee/Task Group work. You are prohibited from using this document for any other purpose. You are also prohibited from publishing or transmitting this document to any other persons or parties outside of the NFPA Technical Committee and are required to delete it (and any copies of it) following completion of your Technical Committee/Task Group work.

NFPA® 1022  
Standard for Fire and Emergency Services Analyst Professional Qualifications  
Preliminary Draft
Chapter 1 Administration

1.1 Scope.
This standard identifies the minimum job performance requirements (JPRs) for personnel who use, manage, review, analyze, support, or evaluate public safety data and related technical systems.

1.2 Purpose.
The purpose of this standard is to specify the minimum job performance requirements (JPRs) for serving as a fire and emergency services analyst.

1.2.1 The intent of the standard is to define levels of performance required for various roles related to data and information analysis. The authority having jurisdiction has the option to combine or group the functional areas to meet its local needs and to use them in the development of job descriptions and specifying promotional standards.

1.2.2 It is not the intent of this standard to restrict any jurisdiction from exceeding or combining these minimum requirements.

1.2.3 This standard shall cover the requirements for four functional areas – Data Analyst, GIS Analyst, Business Analyst, and Data and Analytics Manager.

1.3 General

1.3.1 All of the standards for any functional area shall be performed in accordance with recognized practices and procedures or as defined by an accepted authority.

1.3.2 It is not required for the objectives to be mastered in the order in which they appear. The local or state/provincial training program shall establish both the instructional priority and program content to prepare individuals to meet the performance objectives of this standard.

1.3.3 The fire and emergency service analyst shall remain current with the general knowledge and skills and job performance requirements addressed in the functional area qualification.

1.3.4 Prior to employment in line with the requirements of this standard, personnel shall meet the following requirements:
   (1) Educational requirements established by the AHJ
   (2) Security clearance (if applicable) as established by the AHJ

1.3.5 When employed in one of the positions identified in this standard, personnel shall meet the general knowledge requirements outlined in Chapter 8.

1.3.6 Wherever in this standard the terms rules, regulations, policies, procedures, supplies, apparatus, or equipment are referred to, it is implied that they are those of the AHJ.
Chapter 2 Referenced Publications

2.1 General.
The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications.
National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

2.3 Other Publications.


2.4 References for Extracts in Mandatory Sections.

NFPA 1021: Standard for Fire Service Officer Professional Qualifications Accreditation and Certification Systems, 2022 edition. – Chapter Five - Fire Officer II
Chapter 3 Definitions

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

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment, or materials, the "authority having jurisdiction" may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The “authority having jurisdiction” may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

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

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA standards in a broad manner, because jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

3.2.3* Code. A standard that is an extensive compilation of provisions covering broad subject matter or that is suitable for adoption into law independently of other codes and standards.

A.3.2.3 Code. The decision to designate a standard as a “code” is based on such factors as the size and scope of the NFPA standard, its intended use and form of adoption, and whether it contains substantial enforcement and administrative provisions.

3.2.4 Guide. An NFPA standard 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 NFPA standard as a whole is not suitable for adoption into law.

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

3.2.6* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.
A.3.2.6 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

3.2.7 Recommended Practice. An NFPA standard that is similar in content and structure to a code or standard but that contains only nonmandatory provisions using the word "should" to indicate recommendations in the body of the text.

3.2.8 Shall. Indicates a mandatory requirement.

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

3.2.10 Standard. An NFPA standard, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA manuals of style. When used in a generic sense, such as in the phrases "standards development process" or "standards development activities," the term "standards" includes all NFPA standards, including codes, standards, recommended practices, and guides.

3.3 General Definitions.

3.3.1 Business Analyst. A person responsible for bridging the gap between information technology and the fire and emergency services organization’s lines of business using data analytics to assess processes, determine requirements and deliver data-driven recommendations and reports to executives and stakeholders.

3.3.2 Data. The lowest fractional element from which information and then knowledge can be derived; as electronically acquired, captured, stored, queried, analyzed, or transmitted; electronic or computerized in nature.

3.3.3 Data Analyst. The data analyst serves as an administrator for an organization’s data so stakeholders can understand data and use it to make strategic business decisions.

3.3.4 Data and Analytics Manager. A data and analytics manager is responsible for the security and vitality of the databases that inform and drive the fire and emergency services organization and manages both people and processes.

3.3.5 Data visualization. The graphical representation of information or data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data.

3.3.6 Generally Accepted Accounting Principles (GAAP). Standards that encompass the details, complexities, and legalities of business and corporate accounting.

3.3.7 Geographic Information System. Often referred to as GIS; a system that creates, manages, analyzes, and maps various types of data.

3.3.8 Geographic Information System (GIS) Analyst. A person who designs, develops, and implements systems and databases to access and store geospatial data.

3.3.9 Job Performance Requirement (JPR). A written statement that describes a specific job task, lists the items necessary to complete the task, and defines measurable or observable outcomes and evaluation areas for the specific task. [1000,2022]
3.3.10 **Policy.** A course or principle of action adopted or proposed by a government, party, business, or individual.

3.3.11 **Procedure.** A series of actions conducted in a certain order or manner.

3.3.12 **Process map.** A planning and management tool that visually describes the flow of work. Using process mapping software, process maps show a series of events that produce an end result.

3.3.13 **Program.** A set of related measures or activities with a particular long-term aim.

3.3.14 **Project.** An activity with a defined start and end date. This is versus ongoing operational work in organizations.

3.3.15 **Project Plan.** A series of formal documents that define the execution and control stages of a project.

3.3.16 **Public.** Of, relating to, or affecting a population or a community as a whole.

3.3.17 **Quality Assurance.** Often referred to as QA. A process by which all the planned and systematic activities implemented can be demonstrated to provide confidence that an activity will fulfill requirements for quality.

3.3.18 **Requisite Knowledge.** Fundamental knowledge one must have in order to perform a specific task. [1030, 2023]

3.3.19 **Requisite Skills.** The essential skills one must have in order to perform a specific task. [1030, 2023]

3.3.20 **Root cause analysis (RCA).** The process of discovering the root causes of problems in order to identify appropriate solutions.

3.3.21 **Stakeholder.** One who is involved in or affected by a course of action.

3.3.22 **Task.** A specific job behavior or activity. [1002, 2017]
Chapter 4 Data Analyst

4.1 General

For qualification as a Data Analyst, the candidate shall meet the job performance requirements defined in Sections 4.2 through 4.8 of this standard.

4.1.1 General Prerequisite Knowledge

The Data Analyst must be familiar with identifying, querying, and visualizing data in order to assist the fire department in providing information required by external and internal agencies and for analytical and decision-making purposes. This role also necessitates a pursuit of data integrity and sustainable data management for reliable, efficient, and long-term use.

4.1.2 General Prerequisite Skills

(Reserved)

4.2 Identify, Access, and Extract Data

4.2.1 Identify data needs and parameters given a request for information so that everyone involved understands what the data need is, what data sources may need to be accessed and an estimated level of effort to complete.

(A) Requisite Knowledge. Organization’s data sharing policies and organization’s data sources.

(B) Requisite Skills. The ability to clearly ask clarifying questions regarding the data request.

4.2.2 Access data from one or more internal or external sources given a set of parameters and appropriate database access so that the information can be organized into a staging format.

(A) Requisite Knowledge. Content of data sources, methods of extracting the information into a readable format and, if necessary, who to ask for any additional data source access.

(B) Requisite Skills. Ability to pull data, potentially from multiple sources, using the appropriate program(s) and to request data from inaccessible data sources (if necessary).

4.2.3 Extract dataset into staging format for initial assessment given available data available so that extraction problems can be identified, and output can be standardized.

(A) Requisite Knowledge. Database structure/schema, Data relationship structures and types (Like Date vs Datetime, Int vs Decimal, etc), and conversion options.

(B) Requisite Skills. Produce formatted data in a readable, accessible format. / Prepare data for validation

4.3 Validate data extraction process & output

4.3.1 Identify and resolve problems with the output dataset given review tools and the ability to re-export the data as needed so that a complete dataset is generated.
(A) **Requisite Knowledge.** Common data output issues, such as duplicates or invalid information, that may indicate an issue with the extraction process, referencing incorrect data, or faulty conversions.

(B) **Requisite Skill.** Ability to recognize gaps in data and formatting issues.

4.3.2 Assess data quality given appropriate data review tools so that illogical or missing data entries are identified.

(A) **Requisite Knowledge.** Organizational standards and common data results (e.g. NULLs vs Empty values).

(B) **Requisite Skills.** Ability to efficiently locate data quality issues in a large or small dataset.

4.4 Resolve / Repair

4.4.1 Resolve and repair data quality issues discovered as result of error checking and identifying outliers given access to the checked data manually or electronically so that data accuracy and completeness are ensured and maintained.

(A) **Requisite Knowledge.** Knowledge of the organization’s guidelines, policies, or procedures for modifying data (e.g., who can alter a report); knowledge of the data set’s requirements and relational edits (e.g., a fire service casualty report is required if a fire service injury or death is reported)

(B) **Requisite Skill.** The ability to assess the impact changes made have on the whole data set (e.g., an incident report); attention to details

4.4.2 Document and report any needs for improvement in data reporting given the identified causes for the inaccurate, incomplete, or poor data so that the problems with the data and corrective actions are annotated and communicated to both owners and reporters of the data.

(A) **Requisite Knowledge.** Knowledge of how to recreate the causes of the problems or alerts and the steps to resolve them

(B) **Requisite Skill.** Have good oral and written communication skills

4.4.3 Confirm that repairs have been made given repairs to the data have been made or reported so that inconsistencies in the data have been corrected or confirmed (e.g., high reported fire dollar loss).

(A) **Requisite Knowledge.** Knowledge of the inconsistencies in the data and corrected actions needed to resolve the problems.

(B) **Requisite Skill.** The ability to search for data in the database; an acute attention to details for comparing and differentiating.

4.5 Organize the Data

4.5.1 Standardize Format given the data needs to be standardized for analysis so that all cleaned data is put into a standard format and comparable. (e.g., ensure dates are all mm/dd/yyyy versus yyyyymmdd).
(A) **Requisite Knowledge.** Awareness of database platforms and associated/relevant data schemas, meaning of data elements.

(B) **Requisite Skills.** Ability to modify data using formulas to be able to standardize data formats.

4.5.2 Structure Data for analysis given data from a variety of sources is required to achieve intent (need to bring them together for analysis, need to integrate various datasets) so that data from multiple sources can be used easily and efficiently for the project, making various sources interoperable.

(A) **Requisite Knowledge.** Database management, including for spatial data

(B) **Requisite Skill.** Database schema design, migration, capacity planning, other skills related to database organization and storage.

4.5.3 Document tasks, processes, and technical specifications for future reference given our analysis project needs to be repeatable and the process clear and transparent so that earlier iterations can be revisited if required, and the steps are re-traceable for any QA needs or further analysis.

(A) **Requisite Knowledge.** Firsthand knowledge of the preceding tasks.

(B) **Requisite Skill.** Written communication, attention to detail, ability to use the chosen documentation platform.

4.6 Analyze data

4.6.1 Identify the analysis methods and techniques. Given the available data and type of request so that the most appropriate analytical approach is used for the purpose of achieving a cohesive output in alignment with project goals.

(A) **Requisite Knowledge.** Fluency in data analysis concepts and standards. Experience selecting and applying existing data models and algorithms and an understanding of commercially available data analysis platforms/tools.

(B) **Requisite Skill.** Ability to recognize the most appropriate analytical technique or method, select most efficient analytical tool, and identify any additional resources to meet the project objectives.

4.6.2 Perform analysis given the application of data analysis techniques and methods so that knowledge and insights can be derived.

(A) **Requisite Knowledge.** Knowledge of statistical analysis and quality assurance techniques.

(B) **Requisite Skill.** Ability to utilize the most efficient analytical tool and apply the analytical techniques required to perform a statistical analysis of the given data.

4.6.3 Perform review and quality check of results given the information developed, knowledge gained, and insights created so that the conclusions coherently and rationally address the original request.

(A) **Requisite Knowledge.** Understand the real-world meaning of the relevant data elements, how they apply to the domain, and results. Ability to perform quality assurance and review technique, such as limits evaluation, sampling, and drill down analysis.
(B) **Requisite Skill.** Ability to QA results to ensure the analysis methodology/technique yielded accurate results

4.7 **Present Analysis**

4.7.1 Know your audience given the need to succinctly communicate results in a manner conducive to maximum retention and comprehension.

(A) **Requisite Knowledge.** Awareness that there are differences in social, cultural, education, experience, and individual engagement when presenting to any audience.

(B) **Requisite Skills.** Ability to tailor the presentation to the audience.

4.7.2 Communicate the results given the artifacts and visualizations created in the Analyze process so that executive leadership and stakeholders understand the analysis and use it for the basis of administrative and operational decisions.

(A) **Requisite Knowledge.** Use of presentation and visualization tools.

(B) **Requisite Skills.** The ability to communicate and understanding effectively through oral and written avenues.

4.8 **Develop Report Instructions**

4.8.1 Develop Report Instructions for each report/ dashboard to document data sources, data sets, query logic, filters and outliers’ logic, and any other report-specific requirement and/or findings that might be captured under 4.4.2. Ability to develop/maintain a standard Report Instruction template that aligns with organizational/departmental SOP.

(A) **Requisite Knowledge:** Knowledge of available data sources and datasets and their data structures. Knowledge of the organization’s guidelines for developing SOI and SOPs.

(B) **Requisite Skills:** Process thinking and policy/ instruction development skills.
Chapter 5 GIS Analyst

5.1 General

The Fire Service Analyst must be able to be proficient in the use of Geographic Information Systems in order to analyze, query, visualize and conduct geoprocessing of spatial data and attributes in order to assist the fire department in reporting and developing periodic reports, strategic plans, and Standards of Cover documents.

5.1.1 For qualification at GIS Analyst, the candidate shall meet the job performance requirements defined in Sections 5.2 through 5.9.

5.1.2 General Knowledge Requirements. Familiarity with geospatial concepts and basic cartographic knowledge. Knowledge of spatial and non-spatial data types and sources for use in GIS Analysis. Familiarity with data quality assurance methods and techniques. Knowledge of methods to manipulate and transform GIS data for geoprocessing and other spatial analysis procedures.

5.1.2 General Skill Requirements. Formal training in the use of Geographic Information Systems is essential. Understanding data source properties and use of metadata. The ability to query data for use in spatial analysis and statistical functions. Able to create visualizations that speak to the analysis that was conducted.

5.1 GIS Analyst

5.1.1 Gather Data Sources. The GIS Analyst, given various sources, identifies, extracts, and accesses data including fire department records management systems (RMS), computer aided dispatch systems (CAD), and non-fire department resources, so that data can be reviewed, examined, and evaluated.

(A) Requisite Knowledge. General knowledge of RMS and CAD software.

(B) Requisite Skills. The ability to identify relevant data within and outside of the agency

5.1.2 Extract Data For Use. The GIS analyst has the ability to extract collected data into different formats for analytical data use and evaluation. Data can be obtained in various formats to be utilized in other formats and reviewed. The GIS Analyst can extract data into usable formats that support data analysis to be used to demonstrate various components of a community and demonstrate a graphical output.

(A) Requisite Knowledge. General knowledge of RMS and CAD software.

(B) Requisite Skills. The ability to export data from various data sources and types.

5.2 Ensure Data Integrity and Suitability

5.2.1 Validity. Given a standard or non-standard data set, the GIS Analyst will ensure the data model is correct for the destination system.

(A) Requisite Knowledge. The ability to identify the correct procedures necessary to validate a file geodatabase and a feature class with default settings.
(B) Requisite Skills. the ability to use geographic information systems to validate appropriate data for a given workflow or use-case.

5.2.2 Reliability Given geospatial data from various sources, the GIS Analyst determines reliability to confirm the data meets accuracy and precision requirements, can apply the accuracy standards for different scales, and identify sources of imprecision and error.

(A) Requisite Knowledge. the ability to evaluate the reliability of a dataset and apply established workflows to correct issues.

(B) Requisite Skills. the ability to use geographic information systems to determine the reliability of data for a given workflow or use-case.

5.2.3 Credibility. Given geospatial data from outside sources, the GIS Analyst will determine credibility so that the geospatial data is appropriately applied, has been obtained using a proper acquisition method, the provider of data or source of data can be relied upon to ensure that the data is appropriate for the application.

(A) Requisite Knowledge. the ability to evaluate the suitability of a dataset, that the data is rationalized, and attributed, and to find and evaluate metadata.

(B) Requisite Skills. the ability to use geographic information systems to determine the credibility of data for a given workflow or use-case.

5.3 Manage Data (Organize)

5.3.1 Identify Geospatial Data Formats. The GIS Analyst is given access to various geospatial data types, so that the kinds of geospatial data can be interpreted as a vector, raster, tabular, and computer-aided drafting (CAD) types.

(A) Requisite Knowledge. Knowledge of geospatial data formats available for use in a geographic information technology system.

(B) Requisite Skills. To be able to interpret appropriate data and information for analyzing, query, editing, and visualization of a geospatial project.

5.3.2 Adding Data into a Geographic Information Technology System. Various geospatial data types, images, or GPS data that can be then entered into a geographic information technology system and arranged in a logical progression.

(A) Requisite Knowledge. the functions and input mechanisms of the particular geospatial software used to add the geospatial data.

(B) Requisite Skills. The ability to be familiar with the software platform and the concept of layers for project visualization.

5.3.3 Examining Geospatial Data Properties. The GIS analyst uses various geospatial data type properties information so that the individual geospatial data layers displayed can be examined for its properties such as reference source database, attribute table, coordinate system,
unit of measure, spatial extent, current symbology, labeling, and any associated outside tabular data.

(A) **Requisite Knowledge.** The knowledge of symbol properties and classes, along with coordinate system knowledge, tabular structure, scale references and display properties.

(B) **Requisite Skills.** The ability to interpret symbology as it relates to the data visualization, tabular schema and associations, coordinate systems, and labeling properties.

### 5.3.4 Examining Metadata

Because there are various geospatial data types metadata information, the metadata’s item details and descriptions can be examined for appropriate use, restriction, credit attribution, spatial extent, geographic and tabular properties, and attribute descriptions.

(A) **Requisite Knowledge.** The understanding of the spatial extent of a dataset, the data’s legal implications of use, and the attribute’s structure.

(B) **Requisite Skills.** The ability to examine geospatial metadata for attribute properties, spatial implications within the project, and legal ability for use.

### 5.3.5 Understanding Coordinate Systems

Because there are numerous coordinate system and projection properties of the geospatial data and the project interface, data and visualization alignment can be achieved for accurate geoprocessing analysis.

(A) **Requisite Knowledge.** Understand the geographic and projected coordinate types, the use of datums, and the appropriate types to use for the geographic locale applied.

(B) **Requisite Skills.** The ability to interpret coordinate system data to determine accuracy in geospatial analysis and to determine the need to convert the coordinate system to another.

### 5.3.6 Organizing Data

Because Geospatial data comes in various formats and perhaps varying data folders, the data needs to be organized and arranged into a single database with interrelated subsets for ease of access and use.

(A) **Requisite Knowledge.** The knowledge of geodatabase and relational geospatial data construction and storage.

(B) **Requisite Skills.** The ability to develop topology and relational databases for the construction of a geodatabase.

### 5.4 Manipulate Data (Transform)

**5.4.1 Convert Coordinate Systems.** The GIS Analyst must be able to recognize geospatial data with alignment or datum differences causing inaccuracies in analytic processes, so that the coordinate systems can be geographically transformed or projected to correct for differing visualization of data that is intended to be concurrent in location.

(A) **Requisite Knowledge.** The ability to understand coordinate systems and datums and the effect upon visualization and geoprocessing.
(B) Requisite Skills. The ability to use of geographic transformative and project coordinate system tools within the geographic information technology systems used.

5.4.2 Transform Tabular Data with Spatial Attributes. When a GIS analyst is given a data table with supplied coordinate XY or address attributes, the information may be transformed into a geographic dataset with plotted points for analysis in dispersion, clustering, and correlation.

(A) Requisite Knowledge. Understanding coordinate systems various XY representations and proper address components.

(B) Requisite Skills. The ability to leverage the geocoding capability of the geospatial software platform used.

5.4.3 Modify Layer Properties. The GIS analyst must be able to use a geospatial feature class layer with default properties and be able to configure the feature layer properties to be manipulated by transparency, symbology, visualization, labeling of features and attribute field information.

(A) Requisite Knowledge. The knowledge Cartographic principles as it relates to labels, symbology, and the ramifications of data classification methods.

(B) Requisite Skills. The Ability to change scale, apply color ramps according to cartographic principles, and manipulate labels.

5.4.4 Convert data to an appropriate format. When a GIS analyst has a geospatial data set format that desires to be changed, the analyst must be able to convert it either into a proper format, a different format for better visualization or a different format for use in analysis such as map algebra.

(A) Requisite Knowledge. Knowledge of data formats and methods of converting one data format to another for the intended use.

(B) Requisite Skills. Be able to convert geospatial data to other formats within the geographic information technology software being used.

5.4.5 Create, modify, and delete data. When a geospatial data set needs some additional data to be created, modified or certain data deleted, the GIS analyst must be able to complete the tasks necessary so that the geospatial layer can become more complete and/or accurate in its visualization or attribute information.

(A) Requisite Knowledge. A domain knowledge of the dataset to determine the need for modification and the information for entry or justification for data deletion.

(B) Requisite Skills. Be able to modify geospatial data within the geographic information technology software being used.
5.4.6 **Repair Data.** When a geospatial feature class is disconnected from its referenced source location, the GIS analyst must be able to repair the data in order for the data can be visualized and used in analysis and/or modified in representation or symbology.

(A) **Requisite Knowledge.** An understanding of the relationship between content geospatial data and its referenced source.

(B) **Requisite Skills.** The ability to resource a feature layer to its source via the tools within the geographic information technology software used.

5.4.7 **Apply Queries to geospatial data.** When provided with a geospatial data set where only a subset of attribute information or individual features are needed the GIS analyst must be able to provide specific detailed information depending upon the query build so that it can be answered using the dataset.

(A) **Requisite Knowledge.** A domain knowledge of the dataset attributes and spatial representation to determine the information need for the construction of a query expression.

(B) **Requisite Skills.** Be able to use the various tools and methods to query and select data within the geographic information technology software being used.

5.5 **Geoprocessing**

5.5.1 **Perform Data Management.** Using spatial and non-spatial data, convert, join, modify, and update a dataset.

(A) **Requisite Knowledge.** An understanding of geoprocessing functions capable of enhancing a dataset.

(B) **Requisite Skills.** An ability to load and run geoprocessing tools to appropriately join, modify, and update a dataset.

5.5.2 **Geocode Data.** Assigning a location, usually in the form of coordinate values, to an address by comparing the descriptive location in the address to those present in the reference material.

(A) **Requisite Knowledge.** An understanding of geocoding concepts.

(B) **Requisite Skills.** An ability to load the data source into an application that will use reference data to assign each unique feature its own coordinates of location.

5.5.3 **Create Tools and Models.** Based on job specific objectives, create tools and models to automate task and duties.

(A) **Requisite Knowledge.** Experience with programming language that can be used to create a standalone tool or a tool that can be incorporate in a GIS application.

(B) **Requisite Skills.** An ability to develop tools and models to use when analyzing data and when automating task and duties.
5.6 Analysis

5.6.1 **Evaluate Response Coverage.** Use staffing and deployment data provided in spatial and/or non-spatial formats, calculate response coverage based on industry standard and/or performance measures identified by authority having jurisdiction (AHJ).

(A) **Requisite Knowledge.** The understanding of how to configure and the necessary data to calculate response coverage using GIS software.

(B) **Requisite Skills.** The ability to run tools available in GIS software that calculate response coverage.

5.6.2 **Identify Optimal Location For Resources.** Identify the optimal location(s) for resources based on parameters established in the allocation model.

(A) **Requisite Knowledge.** Understand spatial concentration and distribution as well as allocation models.

(B) **Requisite Skills.** The ability to execute an allocation model using candidate locations and department identified parameters to determine optimal location to position resources to maximize emergency response effectiveness.

5.6.3 **Assess Community Risk.** Utilizing demographic, geographic, building stock, public safety resource agencies, community service organizations, hazards, economic, historical events, and critical infrastructure system data to evaluate areas of risk in a community based on criteria outlined by AHJ.

(A) **Requisite Knowledge.** Understand how these types of data affect risk in the community and potential ways to reduce risk.

(B) **Requisite Skills.** Use statistical processes to identify correlation/relationship between community factors (previously listed in given sections) and historical call volume to assist in making recommendations on how to mitigate risk in the community.

5.6.4 **Conduct Statistical Analysis.** Use principles and techniques of GIS to perform multiple forms of analysis using spatial and non-spatial data to identify spatial distribution, patterns, processes, and relationships with the data.

(A) **Requisite Knowledge.** An understanding of how to use statistical models and identify which model to use based on the objectives.

(B) **Requisite Skills.** Be able to use GIS statistical tools to incorporate geographic data directly into the statistical models to identify spatial distributions, patterns, processes, and relationship.

5.6.5 **Identify Geographic Concentration and Density.** Based on location, amount of, and proximity of data, the concentration/density of those data points can be identified.
(A) **Requisite Knowledge.** Understand how density models and spatial statistics work and how to set the parameters of these models to have accurate results.

(B) **Requisite Skills.** Ability to load and run processes that will produce an output that will identify the concentration and density of the data in a particular area.

5.6.6 **Conduct Spatial Analysis.** Use principles and techniques of GIS to perform multiple forms of analysis using spatial and non-spatial data.

(A) **Requisite Knowledge.** Knowledge of the various methods and tools GIS has to perform a spatial analysis.

(B) **Requisite Skills.** Experience using GIS applications to examine spatial data.

5.6.7 **Conduct Temporal Analysis.** Use principles and techniques of GIS to perform multiple forms of analysis to investigate patterns and trends over time.

(A) **Requisite Knowledge.** An understanding the use of temporal analysis in forecasting and predicting results.

(B) **Requisite Skills.** Know how to calculate and analyze short-term and long-term changes in patterns and trends.

5.7 **Visualization**

5.7.1 **Create Singular Map or Mapbook.** The GIS Analyst is given access to processed geospatial data so that the data is can be manipulated for consumption as a singular detailed map or series of maps in a mapbook.

(A) **Requisite Knowledge.** Understanding of map projections, scale, resolution and common output file types.

(B) **Requisite Skills.** Ability to turn geospatial data into consumable map-based output.

5.7.2 **Manipulate Projection of Output Data.** The GIS Analyst is given access to geospatial data to be manipulated so that the data can be shared across platforms which may not share the same map projections.

(A) **Requisite Knowledge.** Knowledge of map projections, how to identify what projection the current data lives in, and ability to output work in the appropriate format.

(B) **Requisite Skills.** Use of GIS software/tools to identify and manipulate map projections to create appropriate output.

5.7.3 **Create Static Content For Print Media.** The GIS Analyst is given access to geospatial data so that the results of the analysis can be shared as a static output for print media.

(A) **Requisite Knowledge.** Knowledge of static output types (vector versus rasterized) and data fields to include to limit misinterpretation of results (scale, date, version, etc).
(B) **Requisite Skills.** Create output in different formats and frame important contextual information within output.

5.7.4 **Create dynamic Content For Digital Media.** The GIS Analyst is given access to geospatial data so that the results can be shared/disseminated in web-based, interactive digital features.

(A) **Requisite Knowledge.** An understanding of how to work with data processing tools/languages needed to generate content to be consumed on digital platforms (e.g., mapping programs, websites, etc).

(B) **Requisite Skills.** Ability to use GIS centric as well as more generic data analysis tools to product output with web-based (e.g., html, js, java, etc.) interactions integrated into the output.

5.7.5 **Present Appropriate Uncertainty In Analysis.** The GIS Analyst is given access to geospatial data with statistical information so that results presented to the end user appropriately describe the level of confidence in the data.

(A) **Requisite Knowledge.** Knowledge in understanding of statistical analysis as it relates to geospatial analysis and how to present that information clearly for the end user.

(B) **Requisite Skills.** Ability to interpret statistical conclusions and integrate them into the output product.

5.8 **Sharing**

5.8.1 **Export Files To Variety Of Open Formats.** The GIS Analyst is given geospatial data to share in a specific file type and can export the results to open data formats so that the output of the project can be used by stakeholders independent of software used to produce said output.

(A) **Requisite Knowledge.** Knowledge of geospatial output formats available to be consumed in digital and print formats.

(B) **Requisite Skills.** Ability to interpret appropriate data and generate output to be displayed on platforms without the need for specialized support software.

5.8.2 **Develop And Maintain Metadata.** The GIS Analyst is given geospatial data to share and asked to produce an annotated output product such that relevant information regarding the development of the output is included within the file/project (e.g., projection, source, creator, etc.).

(A) **Requisite Knowledge.** Knowledge of what tools were used to create file, where the data came, and data usage rights.

(B) **Requisite Skills.** Ability to manipulate metadata of desired output type.
5.8.3 **Maintain A Version History Of Data Being Shared.** The GIS Analyst is given geospatial data to share and asked to ensure any concurrent or future users of the data are aware of any changes made so that they can trace the history of the work product.

**(A) Requisite Knowledge.** Knowledge of modern version control practices for both large file and plain text files.

**(B) Requisite Skills.** Ability to use modern software packages and tools to manage version history.

5.8.4 **Maintain Records Of Data Sources.** The GIS Analyst is given geospatial data to share and asked to document and maintain a record of data sources so that other researchers and analysts can use the data for their respective projects and trust the integrity of the processed and/or raw data.

**(A) Requisite Knowledge.** Knowledge of best practices for storing, versioning, sharing data, and tracking where/how data was created.

**(B) Requisite Skills.** The ability to work with data while preserving the integrity of the source (raw) data. Additionally, an ability to provide opportunity for others to obtain data and validate the history/origin of the information.
Chapter 6: Business Analyst

6.1 General
For qualification at Business Analyst, the candidate shall meet minimal education and the job performance requirements defined in 6.2 through 6.5 of this standard.

6.1.1 General Prerequisite Knowledge Effectively communicate both verbally and in writing: meeting facilitation requirements.

6.1.2 General Prerequisite Skills Develop and present data, given a target audience, so that appropriate charts, graphs, and projections, and reports are available and accurate. Understand, interpret and format spreadsheets.

6.2 Project/Program Management.

This duty involves time management, facilitation of teams and meetings to effectively lead a project or program to a successful conclusion. This duty also involves evaluating progress of the project or program, effectively communicating with internal and external stakeholders, and reporting on a as need basis the progress being made in regard to the project or program.

6.2.1 Develop a schedule of project tasks and activities given project goals, priorities, and objectives, to meet the established goal(s) so that deadlines and outcomes are met.

(A) Requisite Knowledge. time management techniques, software, and systems

(B) Requisite Skills. estimate workload distribution and timeframes; evaluate risk and anticipate delays; evaluate progress and adapt/adjust to align with available resources; manage changes to the project scope, project schedule and project costs using appropriate verification techniques

6.2.2. Provide team leadership and facilitation, given a group of team members/staff, so that coordination of meetings and project/program tasks are monitored, supported, documented, and evaluated against the agency’s project goals.

(A) Requisite Knowledge. tracking tools, spreadsheets, and process maps; verbal and nonverbal communication techniques and relationship management strategies; feedback processes and tools to evaluate team performance.

(B) Requisite Skills. develop spreadsheets, diagrams, and process maps to document needs; Develop comprehensive project plans to be shared with clients or other staff members; Delegate project tasks based on team strengths, skills, and experience levels; Motivate colleagues (peers, subordinates, partners). Regularly communicate results and the required corrective actions with project team, stakeholders, and management, delegating responsibilities to the appropriate parties.

6.2.3. Perform ongoing evaluation of the project plans, given status updates and project metrics, so that the project manager can adjust milestones, tasks, and responsibilities as needed to meet project goal(s).

(A) Requisite Knowledge. communication techniques, meeting facilitation and basic survey skills.
(B) **Requisite Skills.** collect verbal and written input from stakeholders to facilitate the development of effective objectives, project requirements, and intended outcomes; Measure project performance using appropriate tools and techniques.

6.2.4. Coordinate relevant internal and external reviews, given (a) project plan(s), so that the agency can identify and address project risks.

(A) **Requisite Knowledge.** basic legal terminology and ability to research and identify applicable federal, state, local, and agency standards and legislation that may impact a project.

(B) **Requisite Skills.** communicate with legal resources and governing bodies to evaluate potential risks and requirements related to project documents, contract, goals, and outcomes.

6.2.5. Create reports and documentation of varied design and visualization, given project/program metrics, goals, and method of distribution, so that information is effectively shared with a specified audience.

(A) **Requisite Knowledge.** data visualization and report presentation best practices.

(B) **Requisite Skills.** summarize data and information into a variety of formats for publishing and/or presentation.

6.2.6. Assess project/program performance given service level agreements and requirements so that project tasks meet organizational goals and objectives.

(A) **Requisite Knowledge:** common budgetary objectives/measures and financial analysis techniques.

(B) **Requisite Skills:** review project budgets and plan needs to maintain project efforts within an established budget and/or approved schedule; report performance objectives to the governing body, grantor and or project proposal owner; Manage stakeholder priorities in a deadline-oriented environment.

6.2.7. Evaluate project/program progress given a fire department strategic plan so that timelines are met in accordance with the agency’s strategic vision.

(A) **Requisite Knowledge:** project management, improvement models and business strategy processes (ex. Agile, Waterfall, Scrum, Lean, Kanban etc.)

(B) **Requisite Skills:** work with groups and individuals to establish performance indicators or metrics aligned with adopted goals and objectives; qualify/quantify and document success rates and/or progress metrics.

6.2.8. Complete a root cause analysis given a set of commonly accepted practices so that issue identified through the agency’s quality assurance or quality improvement process are corrected.

(A) **Requisite Knowledge:** problem identification, process improvement models.
(B) **Requisite Skills**: Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system; Compile and analyze reports and statistical data to support recommendations for process improvement implementations.

6.2.9. Identify outliers given a set of fire department data so that data quality benchmarks for the AHJ are achieved.

(A) **Requisite Knowledge**: statistical analysis methods, data normalization and data structure; Understanding of data constraints and data quality assurance/quality improvement processes.

(B) **Requisite Skills**: identify gaps in data collection processes; understand and interpret data limitations and contextual dependencies in relational data systems.

6.2.10. Propose control methods, given a list of fire department data quality issues, so that agency performance improvement initiatives are realized.

(A) **Requisite Knowledge**: data quality evaluation and data quality management (completeness, uniqueness, consistency, accuracy, timeliness, etc); business intelligence platforms and systems.

(B) **Requisite Skills**: Identify and create policies and procedures and data quality guidelines; evaluate data needs and appropriate data sets within the business or organizational context.

6.2.11. Select an appropriate research design methodology, given an assignment, so that issues relevant to the agency can be investigated appropriately.

(A) **Requisite Knowledge**: qualitative and quantitative research, descriptive, applied, and problem-oriented research methods.

(B) **Requisite Skills**: Strong analytical and organizational skills. design, evaluate, modify, and report results of programs and experiments based upon hypotheses, goals, outcomes, controls, and variables; use scientific rules and methods to solve problems.

6.2.12. Design a survey given a list of fire department programs so that stakeholder input can be obtained.

(A) **Requisite Knowledge**: Reading and writing skills, listening, and communicating effectively in multiple mediums.

(B) **Requisite Skills**: analyze and interpret the meaning of survey data, determine survey objectives, or suggest or test question wording.

6.2.13. Organize a group meeting given a list of attendees so that a task can be accomplished, or information can be identified.

(A) **Requisite Knowledge**: process improvement methodologies.

(B) **Requisite Skills**: Lead and facilitated the development and implementation of significant and focused process improvements across the organization.

6.3: Compliance Management
This duty involves conducting research; interpreting terms and conditions for achieving compliance; managing external relationships with accrediting, governing and/or other third parties; compiling requisite documentation to demonstrate compliance with established objectives, according to the following job performance requirements.

6.3.1. Manage third-party relationships given community expectations, service-level agreements, historical precedents, AHJ policies and procedures, accepted best practices, so that the current and anticipated needs of the community are met and compliance with established parameters is verified.

(A) **Requisite Knowledge:** Policies and procedures, community expectations, historical performance, goals and objectives, automatic-mutual aid parameters and performance.

(B) **Requisite Skills:** perform analysis, monitor performance, evaluate performance against stated goals and objectives, make public presentations, problem solve and make recommendations.

6.3.2. Appraise standards established by third parties on behalf of the AHJ given reviews of published requirements and observations of historical precedents, so that the current and anticipated needs of the community are met and compliance with established parameters is verified.

(A) **Requisite Knowledge:** Policies and procedures, gap analysis

(B) **Requisite Skills:** make public presentations, interpret competencies and standards, problem solve, and analyze data

6.3.3. Assess status in meeting applicable conditions, rules, regulations, and/or standards given published requirements, historical precedents, quantitative and qualitative performance data, and observations of the AHJ’s activities, so that gaps are identified and remedied, performance levels are communicated, current and anticipated needs of the community are met, and compliance with established parameters is verified.

(A) **Requisite Knowledge:** Rules, regulations, ordinances, policies, procedures, community expectations.

(B) **Requisite Skills:** perform analysis, monitor performance, evaluate performance against stated goals and objectives, make public presentations, problem solve and make recommendations.

6.3.4. Report compliance with contract conditions and/or established standards given legal requirements, written conditions, observations of outcomes, completion of deliverables so that the AHJ meets contractual obligations, current and anticipated needs of the community are met, and compliance with established parameters is verified.

(A) **Requisite Knowledge:** Rules, regulations, ordinances, policies, procedures, community expectations, GAAP, contract analysis and compliance.

(B) **Requisite Skills:** perform analysis, monitor performance, evaluate performance against stated outcomes and deliverables, make public presentations, and interpret contracts.
6.3.5. Create financial reports on collections, levies, grants, fees and/or billing projections, given program data (ex. EMS billing, Inspections fees, Permit fee, Fire assessment fees & taxes, service fees, levy rates), so that the agency can monitor and project revenue.

(A) Requisite knowledge: Rules, regulations, ordinances, policies, procedures, community expectations, GAAP, contract analysis and compliance.

(B) Requisite skills: perform financial analysis, monitor performance, evaluate performance against stated outcomes and deliverables

6.4: Strategic Management

This duty involves facilitating the development and implementation of a community driven strategic plan oriented towards emergency services and public safety. This duty also involves identifying community needs, determining prioritization of projects and programs, analyzing strategies to achieve organizational goals and objectives, and evaluating progress, according to the following job performance requirements. This duty also involves evaluating progress of the established goals and objectives, effectively communicating with internal and external stakeholders, and reporting on a as need basis the progress being made in regard to the established strategic plan, goals, and organizational mission.

6.4.1. Compile stakeholder input from internal and external sources given quantitative and qualitative data from surveys, focus groups, direct correspondence, and other sources so that the AHJ’s strategic vision, mission, plans, goals, objectives, and actions as well as its values reflect the needs of the community.

(A) Requisite Knowledge: fire department response operations, policies, and legal requirements. political, economic, and physical characteristics of the jurisdiction or service area.

(B) Requisite Skills: persuade stakeholders, identify necessary resources, explain the policy development process; Ability to use critical thinking and facilitating skills to accomplish gap analysis and risk assessments.

6.4.2. Identify gaps in addressing community public safety risk and meeting community needs given information provided by third parties, field observations by the AHJ, quantitative and qualitative performance data, subject matter expert opinions, industry best practices, and comparative examples so that the AHJ recognizes strengths and deficiencies when establishing a strategic plan with associated goals and objectives to address community needs.

(A) Requisite Knowledge: gap analysis methods and processes (example: SWOT, SOAR, PEST). fire department response operations, policies, and legal requirements.

(B) Requisite Skills: interpret qualitative and quantitative data, incorporate needs and requirements of diverse community groups and members; Track and evaluate progress of risk reduction and operational programs/processes as they relate to ongoing risk assessment and community needs or gaps; use critical thinking and facilitating skills to accomplish gap analysis and risk assessments.

6.4.3. Develop corrective actions in long term planning, given a list of GAP analysis findings, so that expectations match agency service levels.
(A) **Requisite Knowledge**: gap analysis methods and processes (example: SWOT, SOAR, PEST); fire department response operations, policies, and legal requirements.

(B) **Requisite Skills**: interpret/consider political and economic influences on strategic priorities. Interpret quantitative and qualitative data, calculate budget impact, evaluate consequences of different options, apply cost-benefit analysis; Evaluate effectiveness, efficiency, and resiliency of operations and programs.

6.4.4. Support the establishment of processes and compliance procedures, given a strategic direction and conceptual goals and objectives, so the agency can develop, document, and track strategic plans.

(A) **Requisite Knowledge**: planning and goal progress tracking systems and processes.

(B) **Requisite Skills**: Project management skills, tracking and monitoring of project and strategic planning using a variety of tools and methods.

6.4.5. Develop organizational goals, given a list of strategic initiatives, in alignment with best practices to develop goals that can be translated into objectives that can be assigned as critical tasks.

(A) **Requisite Knowledge**: common methods to design effective goals and objectives. (SMART, PEST, SOAR)

(B) **Requisite Skills**: persuade stakeholders, identify necessary resources, explain the policy development process

6.4.6. Analyze performance relative to benchmarks, given a list of planning team members, the analyst shall compose a tracking schedule and compliance methodology for implementing and facilitating progress of the strategic plan so that tasks are completed within an acceptable timeline and within estimated funding parameters.

(A) **Requisite Knowledge**: compliance methods and performance tracking procedures. Budgeting and finance practices; assess and validate statistical information and data related to program areas.

(B) **Requisite Skills**: prioritize and adjust goals and deadlines based on the environment and resources available.

6.4.7. Develop, evaluate, and disseminate Cost-Benefit Analysis material given departmental response data, capital asset information, service area demographics, and other financial data, so that the budget impact of decisions may be evaluated.

(A) **Requisite knowledge**: basic accounting and financial systems, procurement processes and legal requirements, contract management.

(B) **Requisite skills**: Management of funding from external sources; Crisis management procedures that coordinate authorization levels and appropriate control measures; Documenting financial expenditures incurred as a result of an incident and for compiling claims for future cost recovery. Identifying and accessing alternative funding sources; Managing budgeted and specially appropriated funds.
6.5: Policy Analysis

6.5.1. Recognize and evaluate policies that impact delivery of fire department services to the community/jurisdiction and evaluate those impacts so that decision making is supported and recommendations to strategic and operational oversight are provided.

(A) **Requisite Knowledge** – Fire department operations and applicable legal requirements.

(B) **Requisite Skills** – observe and recognize problems

6.5.2. Coordinate the interpretation of legal and regulatory requirements, given by an authorizing agency, so that the fire department ensures policy alignment and compliance.

(A) **Requisite Knowledge** – Applicable legal requirements and policy development process.

(B) **Requisite Skills** – interpret legal requirements, explain policy development process

6.5.3. Identify, collect, and compile research and information in support of developing policy proposals given adequate direction, clearly defined parameters and the end-state desired, so that management has the necessary information to evaluate options.

(A) **Requisite Knowledge** – Fire department operations, types, and sources of publications

(B) **Requisite Skills** – identify reliable information, devise means to collect data, interpret quantitative and qualitative data, analyze experience of other fire departments

6.5.4. Develop recommendations to create, revise or eliminate policies given an identified gap, shortfall or need, so that the effectiveness, efficiency and resiliency of the department is enhanced.

(A) **Requisite Knowledge** – Fire department operations and applicable legal requirements.

(B) **Requisite Skills** – interpret quantitative and qualitative data, calculate budget impact, evaluate consequences of different options, apply cost-benefit analysis

6.5.5. Coordinate, facilitate and advise implementation strategies for policies given the desired outcome, timeline, policy specifics and potential obstacles so that each policy is successfully deployed.

(A) **Requisite Knowledge** – Fire department operations and applicable legal requirements.

(B) **Requisite Skills** – persuade stakeholders, identify necessary resources, explain the policy development process

6.5.6. Develop and build stakeholder support for policy change given the desired outcome, timeline, policy specifics and potential obstacles so that each policy is successfully deployed.

(A) **Requisite Knowledge** – Fire department operations and applicable legal requirements.

(B) **Requisite Skills** – exercise strong interpersonal skills, problem solve, apply cost-benefit analysis
6.5.7. Evaluate the impact of a department's policies based on outcomes, including its secondary and tertiary effects, given the desired outcome, so that each policy's effectiveness can be measured.

(A) **Requisite Knowledge** – Fire department operations and applicable legal requirements.

(B) **Requisite Skills** – compile stakeholder feedback, interpret quantitative and qualitative data, apply cost-benefit analysis, project future trends
Chapter 7: Data and Analytics Manager

7.1 General

For qualification at Data and Analytics Manager, the candidate shall meet the requirements of Fire Officer II as defined in NFPA 1021 Section 5.1.

7.1.1 General Prerequisite Knowledge. The organizational structure of the department; geographical configuration and characteristics of response districts; departmental operating procedures for administration and operations, emergency and non-emergency operations, incident management system and safety; fundamentals of leadership; departmental budget process; information management and recordkeeping; the fire prevention and building safety codes and ordinances applicable to the jurisdiction; current trends, technologies, and socioeconomic and political factors that affect the fire service; cultural diversity; methods used by supervisors to obtain cooperation within a group of subordinates; the rights of management and members; agreements in force between the organization and members; generally accepted ethical practices, including a professional code of ethics; and policies and procedures regarding the operation of the department as they involve supervisors and members.

7.1.2 General Prerequisite Skills. The ability to effectively communicate in writing utilizing technology provided by the AHJ; write reports, letters, and memos; and operate in an information management system.

7.2 Management and Administration

This duty involves utilizing human resources to accomplish assignments in an efficient manner. This duty also involves supervising personnel during work periods, according to the following job performance requirements.

7.2.1 Assign tasks or responsibilities to members, given clear goals and direction, so that the instructions are complete, clear, and concise; and the desired outcomes are conveyed.

(A) Requisite Knowledge: Verbal communications, characteristics of leadership, techniques used to make assignments under stressful situations, and methods of confirming understanding.

(B) Requisite Skills: The ability to condense instructions for frequently assigned tasks based on standard operating procedures.

7.2.2 Identify and recommend action to address performance issues, interpersonal issues and issues effecting behavioral health, within the established policies and procedures.

(A) Requisite Knowledge: The indicators, and potential causes of performance issues, adverse effects of stress on the performance of personnel, and awareness of AHJ member assistance policies and procedures.

(B) Requisite Skills: The ability to recommend a course of action for a member in need of assistance.

7.2.3 Apply human resource policies and procedures, given an administrative situation requiring action.
(A) **Requisite Knowledge:** Human resource policies, procedures, applicable laws, and legal concepts.

(B) **Requisite Skills.** The ability to communicate both verbally and in writing and to relate interpersonally.

7.2.4 Coordinate the completion of assigned tasks and projects by members, given a list of projects, tasks, and the job requirements of members, so that the assignments are prioritized, a plan for the completion of each assignment is developed, and members are assigned to specific tasks, and both supervised and held accountable for the completion of the assignments.

(A) **Requisite Knowledge:** Principles of supervision, leadership, and basic human resource management.

(B) **Requisite Skills:** The ability to plan and to set priorities.

7.3 **Performance Evaluation**
This duty involves evaluating member performance, according to their job description requirements.

7.3.1 Evaluate the job performance of assigned members, given personnel records and evaluation forms, so that each member’s performance is evaluated accurately and reported according to human resource policies and procedures.

(A) **Requisite Knowledge:** Human resource policies and procedures, job descriptions, objectives of a member evaluation program, and common errors in evaluating.

(B) **Requisite Skills:** The ability to communicate both verbally and in writing, and to plan and conduct evaluations.

7.3.2 Create a professional development plan for a member of the organization, so that the individual acquires the necessary knowledge, skills, and abilities to improve and advance their career.

(A) **Requisite Knowledge:** Development of a professional development guide and job shadowing.

(B) **Requisite Skills:** The ability to communicate both verbally and in writing.

7.4 **Administration**
This duty involves general administrative functions and the implementation of departmental policies, and procedures at the unit level, according to the following job performance requirements.

7.4.1 Revise, develop, or eliminate policies, given organizational goals and identified gaps, so that efficiency of business processes can be improved.

(A) **Requisite Knowledge:** Written and oral communication, organizational goals, applicable legal requirements, existing contract terms. Cost-benefit analysis.

(B) **Requisite Skills:** The ability to relate interpersonally and to communicate change in a positive manner.
7.4.2 Execute routine administrative functions, given forms and record-management systems, so that the reports and logs are complete, and files are maintained in accordance with policies and procedures.

(A) **Requisite Knowledge:** Administrative policies and procedures and records management.

(B) **Requisite Skills:** The ability to communicate both verbally and in writing.

7.4.3 Develop a budget, given schedules and guidelines concerning its preparation, so that capital, operating, and personnel costs are determined and justified.

(A) **Requisite Knowledge:** The supplies and equipment necessary for ongoing or new projects; repairs to existing facilities; new equipment, apparatus maintenance, and personnel costs; and appropriate budgeting system.

(B) **Requisite Skills:** The ability to allocate finances, to relate interpersonally, and to communicate both verbally and in writing.

7.4.4 Prepare a budget request, given a need, so that the request is in the proper format and is supported with data.

(A) **Requisite Knowledge:** Policies and procedures and the revenue sources and budget process.

(B) **Requisite Skill:** The ability to communicate both verbally and in writing.

7.4.5 Describe the process of purchasing, including soliciting and awarding bids, given established specifications, to ensure competitive bidding so that the needs of the organization are met within the applicable federal, state/provincial, and local laws and regulations.

(A) **Requisite Knowledge:** Purchasing laws, policies, and procedures.

(B) **Requisite Skills:** The ability to use evaluative methods and to communicate both verbally and in writing.

7.4.6 Explain the purpose of each management component of the organization, given an organization chart, so that the explanation is current and accurate and clearly identifies the purpose and mission of the organization.

(A) **Requisite Knowledge:** Organizational structure of the department and functions of management.

(B) **Requisite Skills:** The ability to communicate both verbally and in writing.

7.4.7 Oversee the development and execution of corrective actions that address failures to comply with contracts, given the desired outcomes and deliverables, jurisdictional requirements, and generally accepted accounting principles (GAAP) so that fiscal standards are maintained, performance outcomes are met, and contract terms delivered.
(A) **Requisite Knowledge**: Rules, regulations, ordinances, policies, procedures, community expectations, GAAP, contract analysis and compliance.

(B) **Requisite Skills**: The ability to perform analysis, monitor performance, evaluate performance against stated outcomes and deliverables, effectively communicate both verbally and in writing, make public presentations, and interpret contracts.

### 7.5 Project/Program Management

Oversee multiple programs or projects being conducted by analysts assigned to the manager. Supervise the analyst conducting project risk analysis and assessing areas for process improvement.

This duty involves administering the development of plans and processes utilized for prioritizing projects based on organizational needs and identified risks while providing team leadership so that multiple projects can be managed to achieve the desired goals and outcomes.

7.5.1 Ability to supervise multiple projects simultaneously. Provide team leadership and support.

(A) **Requisite Knowledge**: Knowledge of tracking tools, and process maps. Knowledge of verbal and nonverbal communication techniques and relationship management strategies. Knowledge of feedback processes and tools to evaluate team performance.

(B) **Requisite Skills**: Develop comprehensive project plans. Delegate project tasks based on team strengths, skills, and experience levels. Motivate colleagues (peers, subordinates, partners). Regularly communicate results and the required corrective actions with project team, stakeholders, and management, delegating responsibilities to the appropriate parties.

7.5.2 Ability to manage the analysis of project risk conducted by the analysts.

(A) **Requisite Knowledge**: Project requirements and intended outcomes, organization, and stakeholder priorities.

(B) **Requisite Skills**: The ability to identify and analyze risks, dealing with ambiguity, conflict resolution, change management.

7.5.3 Manage and support the ongoing evaluation of the project plans, adjust milestones, tasks, and responsibilities as needed to meet project goal(s).

(A) **Requisite Knowledge**: Knowledge of communication techniques, meeting facilitation and basic survey skills.

(B) **Requisite Skills**: The ability to collect verbal and written input from stakeholders to facilitate the development of effective objectives, project requirements, and intended outcomes. Measure project
performance using appropriate tools and techniques.

7.6 Data Quality Assurance, Control, and Improvement Program

This duty includes the planning, developing, implementing, monitoring, and evaluating quality improvement and quality assurance program for data used for analysis or GIS within the fire department.

7.6.1 Periodically review all data inputs and samples of transformed data, given approved data entry tools and data structures, so that transformed data can be validated.

(A) **Requisite Knowledge**: Content of data sources, database schema, data relationships. Ability to effectively communicate, both verbally and written, with internal team members, stakeholders, and vendors, to explain process and workflow. Understanding outliers and deviations from norms or normally distributed data. Ability to efficiently locate data quality issues in a large or small data set.

(B) **Requisite Skills**: Experience working with implementing changes or processes related to data systems. Ability to implement and document controls for aberrant or outlying data in a given data set. The ability to examine data to determine completeness of the data, data relevancy related to multiple data sets, and the timeliness of the data that is being reported.

7.6.2 Conduct a current state assessment of architecture and ETL practices – help develop recommendation and ultimately help drive the execution of improvements to enhance the quality of the data ecosystem.

(A) **Requisite Knowledge**: An understanding of Extract, Translate, Load (ETL) best practices, Data Architecture, and data ecosystems.

(B) **Requisite Skills**: Strong analytical and reasoning skills; must be effective at summarizing and communicating complex information.

7.6.3 Develop and document data quality criteria and metrics, given best practices and the needs and goals or the organization, so that accuracy, completeness, timeliness and consistency of data can be evaluated.

(A) **Requisite Knowledge**: Data quality assurance and quality control best practices, organizational goals, performance measures, data definitions, data architecture, acceptable data values. A basic understanding of data terms and processes.

(B) **Requisite Skills**: Requisite skill: Effective verbal and written communication skills resulting in the development of reports and procedures. Strong analytical and problem-solving skills; ability to confront tough issues in a productive manner, creating buy-in for quality initiatives. The ability to define the business goals for data quality improvements, who are the data stakeholders, what business processes are impacted, and the rules being applied to the data. Quality assurance and review techniques, such as limits evaluation, sampling, and drill down analysis.

7.6.4 Manage and design a comprehensive data quality and assurance plan, given data quality criteria, so that all data complies with expected quality standards.
(A) **Requisite Knowledge**: A demonstrated understanding of best practices for data quality assurance processes and procedures. Organizational goals, performance measures, data definitions, data architecture, acceptable data values.

(B) **Requisite Skills**: Effective verbal and written communication skills resulting in the development of reports and procedures. Strong analytical and problem-solving skills; ability to confront tough issues in a productive manner, creating buy-in for quality initiatives. The ability to design and implement a data quality assurance program that incorporates steps for definitions, assessments, analyses, improvements, implementation, and controls.

7.6.5 Recommend control methods for data quality issues. Provided comprehensive analytical support and project management for performance improvement initiatives.

(A) **Requisite Knowledge**: Data quality assurance and quality control best practices, organizational goals, performance measures, data definitions, data architecture, acceptable data values.

(B) **Requisite Skills**: Effective verbal and written communication skills resulting in the development of reports and procedures. Strong analytical and problem-solving skills; ability to confront tough issues in a productive manner, creating buy-in for quality initiatives.

7.7 Business Process Improvement

This duty includes managing and supervising the mapping out of the business processes, the identification of inefficiencies, redesigning the process & benchmarking to initial metrics, while incorporating methodologies that reduce processing times, improving reported outputs, and reducing inefficiencies.

7.7.1 Review existing processes with assigned analysts

(A) **Requisite Knowledge**: Possess a basic understanding of reporting processes conducted by analysts within the organization.

(B) **Requisite Skills**: The ability to dissect the various processes that are conducted by the various analysts within the organization. Ability to seek inefficiencies within the process.

7.7.2 Assist the Analyst in measuring and improving existing processes

(A) **Requisite Knowledge**: Possess a basic understanding in a process improvement model utilizing best practices from six sigma or kaizen.

(B) **Requisite Skills**: The ability to measure the components of an existing process. Examine the components to determine the root of inefficiencies and identify improvement methods. Maintain control of the improved process and future performance to adjust and correct for any deviations before they result in additional process deficits.

7.7.3 Evaluate Analyst outputs to develop new processes for continuous improvement.

(A) **Requisite Knowledge**: process development
(B) **Requisite Skills:** The ability to defining the process, measure the factors that are critical to the process, analyze the design and development options, develop the process, and verify that the new process accomplishes the needed goals.

7.7.4 Act upon or escalate recommended new business processes

(A) **Requisite Knowledge:** organizational behavior, organizational culture, group dynamics, leadership styles, and communication delivery.

(B) **Requisite Skills:** The ability to communicate processes to both analysts and fire department command staff.

7.8 Communication

Duties include effectively communicating quantitative and qualitative data, results of data analysis, and performance metrics to department leadership, elected officials, and other community stakeholders.

7.8.1 Develop a plan to get input from the members of the department and the community, given the organization's strategic goals and approved policies and procedures, so that data can be used to determine if all needs are being met.

(A) **Requisite Knowledge:** Organizational goals, community expectations, policies and procedures, benchmark, and performance measures

(B) **Requisite Skills:** Written and verbal communication, strategic planning, customer service, report writing.

7.8.2 Attend and participate in meetings with executive leadership of the department and community so that the needs of the department and community are understood and the requirements for the data analysis team are communicated.

(A) **Requisite Knowledge:** Organizational structure, organizational goals, local community leaders, community expectations, policies, and procedures

(B) **Requisite Skill:** The ability to clearly explain legal and technical requirements and make public presentations.

7.8.3 Create and maintain collaborative relationships with members of the department, external partners, and the community, given relevant community demographic data, strategic goals, and policies and procedures, so that the organization and community needs are met.

(A) **Requisite Knowledge:** Community demographics, community needs, organizational goals, policies and procedures, current community issues

(B) **Requisite Skills:** Written and verbal communications, geographic information systems, conflict management/resolution
7.9 Oversee the Compliance Management Process

Duties shall include overseeing the compliance processes for contracts, formal agreements, recognized standards, accreditation, and/or regulations and requirements of the governing body. Administer the research needed in achieving compliance.

7.9.1 Oversee the Management and evaluative processes related to external relationships given community expectations, departmental policies and procedures, historical precedents, and service-level agreements so that the anticipated needs of the community are met, and the relationships conform to agreed-upon parameters.

(A) **Requisite Knowledge:** Policies and procedures, community expectations, historical performance, goals and objectives, automatic-mutual aid parameters and performance.

(B) **Requisite Skills:** The ability to provide guidance to members conducting performance analysis, monitor performance, evaluate performance against stated goals and objectives, effectively communicate both verbally and in writing, make public presentations, problem solve and make recommendations.

7.9.2 Manage and oversee the plan development processes needed to comply with various recognized standards, such as: Accreditation, ISO, NEMSIS, given the published requirements and standards so that competencies are met, and gaps are identified.

(A) **Requisite Knowledge:** Policies and procedures, gap analysis

(B) **Requisite Skills:** The ability to effectively communicate both verbally and in writing, make public presentations, interpret competencies and standards, problem solve, and analyze data.

7.9.3 Act upon or escalate recommended improvements to business processes, performance measures and monitoring activities in response to recommendations from the analysis of the organization's compliance with all applicable rules, regulations and ordinances required by the governing body given the published requirements and standards so that gaps in compliance can be corrected.

(A) **Requisite Knowledge:** Rules, regulations, ordinances, policies, procedures, community expectations.

(B) **Requisite Skills:** The ability to evaluate performance against stated goals and objectives, effectively communicate both verbally and in writing, make public presentations, problem solving, change management.
Chapter 8 Post-Hire

8.1 General.

For qualification at any of the applicable fire and emergency service analyst positions defined in chapters 4 through 7, the candidate shall meet the requirements in section 8.2 through 8.9 of this standard following the point-of-hire. This chapter has been developed to support the building of an analyst’s ability to apply respective knowledge and skills onto a fire and emergency services context to guide departmental decision-making.

8.1.1 General Prerequisite Knowledge.
Knowledge for the applicable fire and emergency service analyst position defined in chapters 4 through 7 of this standard.

8.1.2 General Prerequisite Skills.
Skills for the applicable fire and emergency services analyst position defined in chapters 4 through 7 of this standard; the ability to effectively communicate in writing utilizing technology provided by the AHJ; write reports, letters, and memos utilizing word processing and spreadsheet programs; operate in an information management system; and effectively operate at all levels in the incident management system utilized by the AHJ.

8.2 Jurisdiction Served
The fire and emergency services analyst shall understand characteristics and features of the jurisdiction served.

8.2.1 Understand the role of the AHJ in the fire and emergency service department’s administration and operations.

(A) Requisite Knowledge. Functions, processes, structure, and composition of the AHJ; relationship between the AHJ and the department; and appropriate avenues of communication with the AHJ.

(B) Requisite Skills. The ability to explain the role of the AHJ in the fire and emergency service department’s administration and operations.

8.2.2 Understand the role of any Labor Associations in the fire and emergency service department’s administration and operations.

(A) Requisite Knowledge. Functions, processes, structure, and composition of the Labor Association; relationship between the AHJ, the department, and Labor Association; and appropriate avenues of communication with the department.

(B) Requisite Skills. The ability to explain the role of the AHJ and labor associations in the fire and emergency service department’s administration and operations.

8.2.3 Understand the geographic configuration and characteristics of the jurisdiction served.
(A) **Requisite Knowledge.** Geographic, demographic, topographic, and cultural features and characteristics of the community served; physical and man-made boundaries within and of the community served; and underlying conditions of community risks.

(B) **Requisite Skills.** The ability to explain the characteristics of the community served.

8.2.4 Identify potential stakeholders and partners for the jurisdiction served.

(A) **Requisite Knowledge.** The presence and role of academic, non-profit, charitable, private, government, and other emergency service organizations for the jurisdiction.

(B) **Requisite Skills.** The ability to explain the characteristics of potential organizations for the jurisdiction.

8.3 Fire and Emergency Services
The fire and emergency services analyst shall understand general characteristics and features of the fire services, specifically of the department served.

(A) **Requisite Knowledge.** The organization of the fire department; the mission of fire service; departmental budget process; generally accepted ethical practices, including a professional code of ethics; current trends, technologies, and socioeconomic and political factors that affect the fire service; relationships between the organization and members; the fire department’s standard operating procedures (SOPs) and rules and regulations for administration, emergency operations, incident management system and safety; the value of health and safety initiatives in support of the fire department mission and to reduce fire fighter line-of-duty injuries and fatalities.

(B) **Requisite Skills.** The ability to explain the functions of the department and research current events in the fire service.

8.4 Community Risk Reduction
The fire and emergency services analyst shall understand the concept and need for a comprehensive community risk reduction plan and program.

(A) **Requisite Knowledge.** The concepts behind community risk reduction its importance in the department’s strategic plan; the process of creating a community risk assessment; familiarity with local organizations who can assist with the department’s community reduction plan; the 5 E’s of community risk reduction (education, enforcement, engineering, emergency response, economic incentive); applicable fire prevention, building safety codes, and ordinances applicable to the jurisdiction.

(B) **Requisite Skills.** Identify and explain the main fire and life safety risks and mitigation activities in the jurisdiction.

8.5 Health and Safety

8.5.1 The fire and emergency services analyst shall explain the benefits of being physically and medically capable of performing assigned duties, during emergency and non-emergency operations, and effectively
functioning during peak physical demand activities, given current fire service trends and agency policies, so that the need to participate in wellness and fitness programs is explained to members.

**Requisite Knowledge.** National death and injury statistics, suicide prevention initiatives, fire service safety and wellness initiatives, and agency policies.

**Requisite Skills.** The ability to communicate both verbally and in writing.

8.5.2 The fire and emergency services analyst shall understand and explain the negative consequences of exposure to dangerous, toxic and or hazardous materials, during emergency and non-emergency operations, that are produced as a product of combustion, the routes of exposure and absorption, the potential long-term effects of exposure.

**Requisite Knowledge.** Physiological changes to the body when exposed to high heat and high stress environments, physiological paths of absorption, products of combustion and consequences of long-term exposure. Necessary PPE to protect against the exposure and decontamination to reduce the risk of exposure.

**Requisite Skills.** The ability to communicate both verbally and in writing.

8.5.3 The fire and emergency services analyst shall understand and explain the negative consequences of repetitive motion injuries and the potential long-term effects of such injuries, both on and off station and during emergency and non-emergency operations.

**Requisite Knowledge.** Physiology of motion, proper lifting techniques, the importance of large crew size to distribute weight and tasks.

**Requisite Skills.** The ability to communicate both verbally and in writing.

8.5.4 The fire and emergency services analyst shall understand and explain the modes of disease transmission and the potential diseases that responders could be exposed to during patient care and management, both on and off station and during emergency and non-emergency operations.

**Requisite Knowledge.** The modes of disease transmission via contact (direct/indirect), droplet, airborne, vector and common vehicle. Possible consequences of disease transmission and the necessary PPE and procedures to reduce the risk of exposure.

**Requisite Skills.** The ability to communicate both verbally and in writing.

8.5.5 The fire and emergency services analyst shall understand and explain common behavioral health problems in the fire service and the consequences of exposure to potentially traumatic events.

**(A) Requisite Knowledge.** The definition and types of potentially traumatic events, common trauma-related conditions, the importance of self-care and resiliency, options for assistance including peer support.

**(B) Requisite Skills.** The ability to communicate both verbally and in writing.

8.6 Fire Department Communications.
The fire and emergency services analyst shall understand the process of initiating responses, receiving telephone calls, and using fire department communication equipment (at a fixed location and on emergency scene) to correctly relay verbal and written information.

**Requisite Knowledge.** Procedures for reporting an emergency; departmental SOPs for taking and receiving alarms, radio codes or procedures; information needs of the dispatch center; the response to a reported emergency, given the report of an emergency, fire department SOPs, and communication equipment, so that all necessary information is obtained.

**Requisite Skills.** The ability to explain the process of how emergencies are reported, processed, dispatched, and tracked.

8.7 Fireground Operations
The fire and emergency services analyst shall understand the equipment used and activities performed on the fireground that are necessary to ensure life safety, fire control, and property conservation.

8.7.1 SCBA and PPE Ensemble
Understand the parts and limitations of the PPE ensemble required for operating in an IDLH environment.

**Requisite Knowledge.** Conditions that require the use of SCBA and PPE ensemble, components of SCBA and PPE ensemble, uses and limitations of SCBA and PPE ensemble, indications and emergency procedures used with SCBA, physical requirements of SCBA and PPE ensemble wearer, departmental SOPs regarding use of PPE ensemble

**Requisite Skills.** The ability to explain the components of the SCBA and PPE ensemble.

8.7.2 Apparatus
8.7.2.1 Engine Companies Operations
Understand the function and capabilities of the engine apparatus, water supply and delivery, foam operations, responsibilities of the assigned company, hose selection, basic company tactics, and responsibilities per seat assignment.

**Requisite Knowledge.** General strategies appropriate for containing, attacking, and suppressing fires; fundamentals of water supply; various extinguishing agents; dangerous of exposure to toxic and or hazardous materials; potential long term effects of exposure, physical states of matter in which fuels are found, the process of burning, fire growth and fire spread; The classifications of fire; the types of, rating systems for, and risks associated with each class of fire; and the operating methods and limitations of portable extinguishers.

**Requisite Skills.** The ability to explain the function of the apparatus, equipment and company objectives.

8.7.2.2* Ladder Company Operations
Understand the function and capabilities of the aerial apparatus, forceable entry, search and rescue, ventilation, overhaul, salvage, responsibilities of the assigned company, equipment selection, basic company tactics and responsibilities per seat assignment.

**A.8.7.2.2** It is possible that a fire department may not have a physical ladder truck/aerial device. However, this does not mean that "ladder truck" work is not performed. Departments should consider
instructing fire and emergency services analysts on truck operations as it represents a series of critical fireground tasks.

**Requisite Knowledge.** Principles, advantages, limitations, and effects of ventilating a structure; fire behavior in a structure; products of combustion found in a fire; the signs, causes, effects and prevention of backdrafts; the relationship of oxygen concentration to life safety and fire growth; dangerous of exposure to toxic and or hazardous materials; potential long term effects of exposure, the process of burning and fire spread; use of forceable entry tools; principles, advantages, limitations with search and rescue; principles, advantages, limitations of operating on ground ladders

**Requisite Skills.** The ability to explain the function of the apparatus, equipment and company objectives.

### 8.7.3* Special companies

Understand the function and capabilities of the special companies that the department may support as part of operations

*A.8.7.3 Special Companies* The number and types of special companies that fire departments maintain are wide and varied across the industry. Similarly, how these apparatus and vehicles are staffed and deployed also varies from jurisdiction to jurisdiction. The AHJ should identify these special companies and develop educational content to familiarize newly hired fire and emergency services analysts with the knowledge required to perform their analysis. Such special companies may include, but are not limited to, brush trucks, technical rescue teams, marine units, community paramedic services, ARFF teams, Hazmat teams, etc.

**(A) Requisite Knowledge.** Purpose, principles, advantages, and limitations of these companies

**(B) Requisite Skills.** The ability to explain the function of the apparatus, equipment and company objectives.

### 8.8 EMS Operations

The fire and emergency services analyst shall understand the equipment used and activities performed on EMS incidents that are necessary to ensure safe patient access, care, and transport to a definitive care facility.

**8.8.1 Health Insurance Portability and Accountability Act (HIPAA)**

Understand the prohibitions and allowances of HIPAA and how it applies to the individual and department.

**Requisite Knowledge.** Statutory and regulatory background of HIPAA; who is covered by the security rule, the definition of a covered entity, the definition of a business associate, what information is considered protected, risk analysis and management of the security process, what constitutes a breach of data, what constitutes an incidental release, breach notification requirements, organizational requirements, state and AHJ requirements, technical safeguards.

**Requisite Skills.** The ability to explain the requirements of HIPAA, compliance, and outcomes associated with non-compliance.

**8.8.2 EMS Licensure Levels**

Understand the function and capability of each EMS certification level supported by the fire department.

**Requisite Knowledge.** Requisite knowledge shall be determined by the AHJ in accordance with the requirements associated with the EMS licensure levels provided by the department
**Requisite Skills.** The ability to explain the function and allowances of each EMS licensure level.

**8.8.3 First Response**
Understand the function and capabilities of the first responding fire department apparatus and vehicles.

**Requisite Knowledge.** Requisite knowledge shall be determined by the AHJ in accordance with the requirements associated with the EMS credential levels provided by the department

**Requisite Skills.** The ability to explain the function of the apparatus, equipment, and company objectives on the scene of an EMS incident.

**8.8.4 Ambulance Transport**
Understand the function and capabilities of ambulances.

**Requisite Knowledge.** Requisite knowledge shall be determined by the AHJ in accordance with the requirements associated with the EMS credential levels provided by the department

**Requisite Skills.** The ability to explain the function of the ambulance, equipment and patient management objectives on the scene of an EMS incident.

**8.9 Reporting**
The fire and emergency services analyst shall understand the purpose and functions of the reports developed, assessed, and retained by the AHJ including those defined from sections 8.8.1 to 8.8.4.

**8.9.1 Incident Reports**
Understand a basic incident report for emergency services, given the report forms, guidelines, and information, so that all pertinent information is recorded, the information is accurate, and the report is complete.

**Requisite Knowledge.** Content requirements for a basic fire and EMS incident report, the purpose and usefulness of accurate reports, consequences of inaccurate reports, how to obtain the necessary information, required coding procedures, procedures for continuous quality assurance

**Requisite Skills.** The ability to explain the reporting and identify key data points and their meaning

**8.9.2 Continuous Quality Improvement/Quality Assurance (CQI/QA)**
Understand the importance of, and associated process related to, the CQI/QA program for dispatch, EMS, and post-incident review as applicable to the AHJ.

**Requisite Knowledge.** Basic concepts behind CQI/QA, physician medical director’s criteria for EMS patient chart review, SOPs/SOGs addressing CQI/QA, protocols regarding variance

**Requisite Skills.** The ability to explain the CQI/QA process

**8.9.3 Inspection Reports**
Understand a fire inspection report, given the report forms, guidelines, and information, according to the AHJ’s adopted practices.

**Requisite Knowledge.** Content requirements for an inspection report, the purpose and usefulness of accurate reports, consequences of inaccurate reports, how to obtain the necessary information, required coding procedures, procedures for continuous quality assurance

**Requisite Skills.** The ability to explain the reporting and identify key data points and their meaning

**8.9.4 Arson Investigation Reports**
Understand an arson report, given the report forms, guidelines, and information, so that all pertinent information is recorded, the information is accurate, and the report is complete.
Requisite Knowledge. Content requirements for arson report, the purpose and usefulness of accurate reports, consequences of inaccurate reports, how to obtain the necessary information, required coding procedures, procedures for continuous quality assurance

Requisite Skills. The ability to explain the reporting and identify key data points and their meaning.
Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

[Material is following the section to which it applies.]
Annex B  Explanation of the Professional Qualifications Standards and Concepts of JPRs

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 Explanation of the Professional Qualifications Standards and Concepts of Job Performance Requirements (JPRs).

The primary benefit of establishing national professional qualifications standards is to provide both public and private sectors with a framework of the job requirements for emergency services personnel. Other benefits include enhancement of the profession, individual as well as organizational growth and development, and standardization of practices.

NFPA professional qualifications standards identify the minimum job performance requirements (JPRs) for specific emergency services levels and positions. The standards can be used for training design and evaluation, certification, measuring and critiquing on-the-job performance, defining hiring practices, job descriptions, and setting organizational policies, procedures, and goals.

Professional qualifications standards for specific jobs are organized by major areas of responsibility defined as duties. For example, the firefighter's duties might include fire department communications, fireground operations, and preparedness and maintenance, whereas the fire and life safety educator's duties might include education and implementation, planning and development, and evaluation. Duties are major functional areas of responsibility within a specific job.

The professional qualifications standards are written as JPRs. JPRs describe the performance required for a specific job and are grouped according to the duties of the job. The complete list of JPRs for each duty defines what an individual must be able to do in order to perform and achieve that duty.

B.2 The Parts of a JPR.

B.2.1 Critical Components. The JPR comprises three critical components, which are as follows:

(1) Task to be performed, partial description using an action verb (See Figure B.2.1 for examples of action verbs used in the creation of JPRs.)

(2) Tools, equipment, or materials that are to be provided to complete the task

(3) Evaluation parameters and performance outcomes

Figure B.2.1 Examples of Action Verbs.
Table B.2.1 gives an example of the critical components of a JPR.

### Table B.2.1 Example of a JPR

<table>
<thead>
<tr>
<th>Component</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Task to be performed</td>
<td>(1) Perform overhaul at a fire scene,</td>
</tr>
<tr>
<td>(2) Tools, equipment, or materials</td>
<td>(2) given PPE, attack line, hand tools, flashlight, and an assignment,</td>
</tr>
<tr>
<td>(3) Evaluation parameters and performance outcomes</td>
<td>(3) so that structural integrity is not compromised, all hidden fires are discovered, fire cause evidence is preserved, and the fire is extinguished.</td>
</tr>
</tbody>
</table>

**B.2.1.1 The Task to Be Performed.**

The first component is a concise statement of what the person is required to do. A significant aspect of that phrase is the use of an action verb, which sets the expectation for what is to be accomplished.

**B.2.1.2 Tools, Equipment, or Materials That Should Be Provided for Successful Completion of the Task.**

This component ensures that all the individuals completing the task are given the same tools, equipment, or materials when they are being evaluated. Both the individual and the evaluator will know what should be provided in order for the individual to complete the task.

**B.2.1.3 Evaluation Parameters and Performance Outcomes.**

This component defines — for both the performer and the evaluator — how well the individual should perform each task. The JPR guides performance toward successful completion by identifying evaluation
parameters and performance outcomes. This portion of the JPR promotes consistency in evaluation by reducing the variables used to gauge performance.

B.2.2 Requisite Knowledge and Skills.

In addition to these three components, a JPR describes requisite knowledge and skills. As the term requisite suggests, these are the necessary knowledge and skills the individual should have prior to being able to perform the task. Requisite knowledge and skills are the foundation for task performance.

B.2.3 Examples.

With the components and requisites combined, a JPR might be similar to the two examples in B.2.3.1 and B.2.3.2.

B.2.3.1 Example: Firefighter I. Perform overhaul at a fire scene, given PPE, attack line, hand tools, flashlight, and an assignment, so that structural integrity is not compromised, all hidden fires are discovered, fire cause evidence is preserved, and the fire is extinguished.

(A) Requisite Knowledge. Knowledge of types of fire attack lines and water application devices for overhaul, water application methods for extinguishment that limit water damage, types of tools and methods used to expose hidden fire, dangers associated with overhaul, signs of area of origin or signs of arson, and reasons for protection of fire scene.

(B) Requisite Skills. The ability to deploy and operate an attack line; remove flooring, ceiling, and wall components to expose void spaces without compromising structural integrity; apply water for maximum effectiveness; expose and extinguish hidden fires in walls, ceilings, and subfloor spaces; recognize and preserve signs of area of origin and arson; and evaluate for complete extinguishment.

B.2.3.2 Example: Fire and Life Safety Educator II. Prepare a written budget proposal for a specific program or activity, given budgetary guidelines, program needs, and delivery expense projections, so that all guidelines are followed, and the budget identifies all the program needs.

(A) Requisite Knowledge. Knowledge of budgetary process; governmental accounting procedures; federal, tribal, state, and local laws; organizational bidding process; and organization purchase requests.

(B) Requisite Skills. The ability to estimate project costs; complete budget forms; requisition/purchase orders; collect, organize, and format budgetary information; complete program budget proposal; and complete purchase requests.

B.3 Potential Uses for JPRs.

B.3.1 Certification. JPRs can be used to establish the evaluation criteria for certification at a specific job level. When used for certification, evaluation should be based on the successful completion of JPRs.

The evaluator should verify the attainment of requisite knowledge and skills prior to JPRs evaluation. Verification could be through documentation review or testing.
The individual seeking certification should be evaluated on the completion of the JPRs. The individual should perform the task and be evaluated based on the evaluation parameters and performance outcomes. This performance-based evaluation is based on practical exercises for psychomotor skills and written examinations for cognitive skills.

Psychomotor skills are those physical skills that can be demonstrated or observed. Cognitive skills cannot be observed but rather are evaluated on how an individual completes a task (process-oriented) or a task’s outcome (product-oriented).

Performance evaluation requires that individuals be given the tools, equipment, or materials listed in the JPR in order to complete the task.

**Table B.3.1 provides examples of how assessment methodologies can be utilized by a certifying body.**

<table>
<thead>
<tr>
<th>Assessment of...</th>
<th>How Assessed?</th>
<th>How Scored?</th>
<th>Methodology is Likely...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge/facts</td>
<td>A written test in which the candidate is required to provide specific answers to specific questions related to the JPRs. <em>Examples: multiple choice, sequencing, true/false, fill-in-the-blank.</em></td>
<td>Responses are scored in relation to the answer that has been determined to be correct.</td>
<td>Cognitive</td>
</tr>
<tr>
<td><strong>Action verb examples:</strong> identify, define, list, cite, state, choose, name</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A manipulative skill in real time</td>
<td>A skills test to evaluate a candidate's ability to perform physical tasks in real time. <em>Examples: donning SCBA, raising ladders, tying rescue knots.</em></td>
<td>The directly observed performance with the correct performance outcome of the skill is normally indicated as part of the yes/no or pass/fail scoring checklist.</td>
<td>Psychomotor (skills)</td>
</tr>
<tr>
<td><strong>Action verb examples:</strong> climb, build, perform, raise, haul, don</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A cognitive skill that cannot be directly observed; the application of knowledge to yield a product</td>
<td>A work product created by the candidate usually outside of the classroom setting. <em>Examples: creating a budget, report, proposal, lesson plan, incident action plan.</em></td>
<td>Scoring rubric for expected responses evaluating how a candidate completes the task outcome after submission.</td>
<td>Product</td>
</tr>
<tr>
<td><strong>Action verb examples:</strong> develop, create, write</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Assessment of... | How Assessed? | How Scored? | Methodology is Likely...
---|---|---|---
A mental activity to perform a cognitive skill in real time that cannot be directly observed | Candidate performs the activity in the presence of the evaluator; the verbalization of mental thought | Scoring rubric with questions and expected verbal responses. | Process

*Action verb examples:* inspect, investigate

*Examples:* performing an inspection, conducting an investigation

Documentation of the candidate's experience, training, and education against all JPRs | A list of acceptable documents or items for each and every JPR | This portfolio is evaluated using criteria that have been identified by the agency. | Portfolio

*Action verb examples:* attend, participate, testify

*Examples:* coursework at training or college, participation in a certain number of investigations, testifying at court

### B.3.2 Curriculum Development and Training Design and Evaluation. The statements contained in this document that refer to job performance were designed and written as JPRs. Although a resemblance to instructional objectives might be present, these statements should not be used in a teaching situation until after they have been modified for instructional use.

JPRs state the behaviors required to perform specific skills on the job, as opposed to a learning situation. These statements should be converted into instructional objectives with behaviors, conditions, and the degree to be measured within the educational environment.

While the differences between JPRs and instructional objectives are subtle in appearance, their purposes differ. JPRs state what is necessary to perform the job in practical and actual experience. Instructional objectives, on the other hand, are used to identify what students should do at the end of a training session and are stated in behavioral terms that are measurable in the training environment.

By converting JPRs into instructional objectives, instructors would be able to clarify performance expectations and avoid confusion caused by the use of statements designed for purposes other than teaching. Instructors would also be able to add jurisdictional elements of performance into the learning objectives as intended by the developers.

Requisite skills and knowledge could be converted into enabling objectives, which would help to define the course content. The course content would include each item of the requisite knowledge and skills ensuring that the course content supports the terminal objective.
B.3.2.1 Example: Converting a Firefighter I JPR into an Instructional Objective. The instructional objectives just two of several instructional objectives that would be written to support the terminal objective based on the JPR.

JPR: Perform overhaul at a fire scene, given PPE, attack line, hand tools, flashlight, and an assignment, so that structural integrity is not compromised, all hidden fires are discovered, fire cause evidence is preserved, and the fire is extinguished

Instructional Objective (Cognitive): The Firefighter I will identify and describe five safety considerations associated with structural integrity compromise during overhaul as part of a written examination.

Instructional Objective (Psychomotor): The Firefighter I will demonstrate the designed use of tools and equipment during overhaul to locate and extinguish hidden fires without compromising structural integrity.

B.3.2.2 Example: Converting a Fire and Life Safety Educator II JPR into an Instructional Objective. This instructional objective is just one of several instructional objectives that could be written to support the terminal objective based on the JPR.

JPR: Prepare a written budget proposal for a specific program or activity, given budgetary guidelines, program needs, and delivery expense projections, so that all guidelines are followed, and the budget identifies all program needs.

Instructional Objective (Cognitive): The Fire and Life Safety Educator II will list and describe the bidding process for the purchase of a published program using budgetary guidelines, program needs, and the guidelines established by local organizational procedures as part of a written examination.

Instructional Objective (Psychomotor): The Fire and Life Safety Educator II will lead in the purchase of a specific fire and life safety educational program by following the bidding process to completion, using local organizational guidelines, including budgetary procedures, program needs, and delivery expense projections.

B.4 Other Uses for JPRs. While the professional qualifications standards are used to establish minimum JPRs for qualification, they have been recognized as guides for the development of training and certification programs, as well as a number of other potential uses.

These areas might include the following:

(1) Employee Evaluation/Performance Critiquing. The professional qualifications standards can be used as a guide by both the supervisor and the employee during an evaluation. The JPRs for a specific job define tasks that are essential to perform on the job, as well as the evaluation criteria to measure completion of the tasks.

(2) Establishing Hiring Criteria. The professional qualifications standards can be helpful in a number of ways to further the establishment of hiring criteria. The authority having jurisdiction (AHJ) could simply require certification at a specific job level — for example, Firefighter I. The JPRs could also be used as the basis for pre-employment screening to establish essential minimal tasks and the related evaluation
criteria. An added benefit is that individuals interested in employment can work toward the minimal hiring criteria at local colleges.

(3) Employee Development. The professional qualifications standards can be practical for both the employee and the employer in developing a plan for the employee's growth within the organization. The JPRs and the associated requisite knowledge and skills can be used as a guide to determine the additional training and education required for the employee to master the job or profession.

(4) Succession Planning. Succession planning addresses the efficient placement of individuals into jobs in response to current needs and anticipated future needs. A career development path can be established for targeted employees to prepare them for growth within the organization. The JPRs and requisite knowledge and skills could then be used to develop an educational path to aid in the employee's advancement within the organization or profession.

(5) Establishing Organizational Policies, Procedures, and Goals. The professional qualifications standards can be functional for incorporating policies, procedures, and goals into the organization or agency.


NFPA 1022, Standard for Fire and Emergency Services Analyst Professional Qualifications
©2021 National Fire Protection Association (NFPA)

NFPA 1035, Standard on Fire and Life Safety Educator, Public Information Officer, Youth Firesetter Intervention Specialist, and Youth Firesetter Program Manager Professional Qualifications, 2015 edition.


Annex C An Overview of JPRs for Fire and Emergency Services Analyst

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

C.1 Overview of JPRs for Fire and Emergency Services Analyst. The JPRs outlined in Chapter 4 (Data Analyst), Chapter 5 (GIS Analyst), Chapter 6 (Business Analyst), and Chapter 7 (Data and Analytics Manager) complement each other.

They should not be seen as levels that build on each other. The AHJ in determining their local fire and emergency services analysis need may choose to adopt all chapters individually or combinedly. Chapters 4, 5, and 6 are specialty roles with Chapter 7 representing the managerial role overseeing these specialties.

Chapter 8 addresses the post hire requirements for an individual that joins a fire and emergency services agency from an unrelated field. While this individual may meet the JPRs outlined in Chapters 4, 5, 6, and 7, their familiarity with the fire and emergency services may be minimal. Chapter 8 outlines the JPRs that would build their familiarity with the fire and emergency services.
Annex D Knowledge and Skills for Database Administrators

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

D.1. Effective fire and emergency services analysis is not possible without robust database administration. Database administrator knowledge and skills are not within the scope of this standard. Provided below are some recommended knowledge and skills for fire departments to consider as part of their overall analysis programs.

D.1.1. Database design processes, logical data modeling and applications specification. Knowledge of data modeling (ERD’s, schemas, requirements/functionality tracking), data normalization, and conceptual and logical design theory. Understand the basic tenets of relational database technology and be able to accurately communicate them to others.

D.1.2. Metadata management and repository usage. Knowledge and understanding of systems (i.e. data dictionaries and indexes) used to collect, store, manage, and enable the ability to query the organization’s metadata.

D.1.3. Database schema creation and management. Knowledge of the processes and skills required to translate a data model or logical database design into a physical database, database implementation and database management (updates, security, permissioning, enhancements, and repair).

D.1.4. Backup and recovery. Understanding of appropriate database backup and recovery strategies based on data volatility and application availability. Understand storage hardware, software and/or service, including how it interacts with the DBMS.

D.1.5. Ensuring data integrity. Knowledge of database integrity including entity integrity, referential integrity, check constraints, and database triggers.

D.1.6. Data security. Understanding of database and system security infrastructure for local, hosted, cloud, and other data services. Knowledge of database auditing processes and compliance documentation.

D.1.7. Procedural skills. Knowledge and understanding of the procedural skills to design, debug, implement, and maintain stored procedures, triggers, and user-defined functions that are stored in the DBMS.

D.1.8. Web-specific technology expertise. Knowledge of Internet and Web technologies to enable databases to participate in Web-based applications. Examples of this type of technology include XML, CGI, Java, Ruby on Rails, TCP/IP, Web servers, firewalls, SSL, and so on.

D.1.9. Extensible data type administration. Understand how extended data types are implemented by the DBMS vendor and be able to implement and administer any extended data types implemented in their databases.

D.1.10. Performance management and tuning. Ability to proactively monitor the database environment and to make/support changes to data structures, code, application logic or the DBMS subsystem to optimize performance. Understand and review code and host language programs in order to recommend changes for optimization.
D.1.11. ERP and business knowledge. Understand the requirements of application users and be able to facilitate database administration to avoid interruption of work. Understanding of how ERP packaged applications impact business processes and operations.
Annex E Informational References

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

E.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

E.1.1 NFPA Publications.
National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


NFPA 1035, Standard on Fire and Life Safety Educator, Public Information Officer, Youth Firesetter Intervention Specialist, and Youth Firesetter Program Manager Professional Qualifications, 2015 edition.

E.1.2 Other Publications.


E.2 Informational References.
The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

E.2.1 NFPA Publications.


E.2.2 Other Publications.
Community Risk Assessment Guide v.1.5 - Vision 20/20

E.3 References for Extracts in Informational Sections. (Reserved)
MEMORANDUM

TO: Standards Council
FROM: Bob Fash, NFPA 1585 Staff Liaison
DATE: October 19, 2021
SUBJECT: Request for approval to release Draft NFPA 1585 for Public Input

According to Section 4.3.2.1(b) of the NFPA Regulations Governing the Development of NFPA Standards prior to entering into a Revision Cycle and approved for public review a Ballot of the Committee is required by at least a simple majority. The results of the ballot to release of NFPA 1585 Preliminary Draft, Standard for Exposure and Contamination Control, was finalized on October 18, 2021. The ballot received the necessary affirmative votes to pass.

Based upon the ballot results, the recommendation to the Standards Council is that NFPA 1585 enter the Annual 2024 revision cycle, with a Public Input closing date of June 1, 2022.

Enclosures: NFPA 1585 Draft
NFPA 1585 Preliminary Release Final Ballot Results
MEMORANDUM

TO: Technical Committee on Emergency Responders Occupational Health

FROM: Jenny Depew, Committee Administrator

DATE: October 18, 2021

SUBJECT: Ballot to Release NFPA 1585 Preliminary Draft - Final Results

According to the final ballot results, the ballot on the release of the preliminary draft of NFPA 1585, Standard for Exposure and Contamination Control, HAS received the necessary affirmative votes to pass ballot. Please see the attached report for results and any comments received.

49 Eligible to Vote
13 Not Returned (DeBobs, Devine, Hamrock, Hawthorne, Jack, Kingsbury, Klima, Kroll, Medley, Moffatt, Popp, III, Sparaco, Tomlinson)

The criteria necessary to pass ballot is a simple majority of the Technical Committee and Correlating Committee, if any. See Section 4.3.2.1(b) of the Regulations Governing the Development of NFPA Standards.
Per section 4.3.2.1(b) of the Regs, prior to entering a future revision cycle and approval for public review, a ballot of the committee is required to pass by at least a simple majority. Note: This ballot is for formally voting on whether or not you are in agreement with the release of the NFPA 1585 draft.

Eligible to Vote: 49
Not Returned: 13


<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affirmative</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Affirmative with Comment</td>
<td>1</td>
<td>I am in favor of releasing the draft version of NFPA 1585.</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Important Notice: This document is the property of the National Fire Protection Association (NFPA) and has been provided to you in Microsoft Word format solely for the purpose of Technical Committee/Task Group work. You are prohibited from using this document for any other purpose. You are also prohibited from publishing or transmitting this document to any other persons or parties outside of the NFPA Technical Committee and are required to delete it (and any copies of it) following completion of your Technical Committee/Task Group work.

NFPA®

1585

Standard for Exposure and Contamination Control

Preliminary Draft

Version 7

[June 16, 2021]
Chapter 1  Administration
Chapter 2  Referenced Publications
Chapter 3  Definitions
Chapter 4  Program Components
Chapter 5  Fire and Emergency Service Organization (ESO) Facilities
Chapter 6  Contamination Control for Response and Support Vehicles (RSVs)
Chapter 7  Emergency Operations and Training Exercises
Chapter 8  Personal Protective Clothing and Ensembles
Chapter 9  Cleaning of Equipment
Annex A  Explanatory Material
Annex B  Risk Management Plan Factors
Annex C  Informational References
Chapter 1 Administration

1.1 Scope.

This standard shall contain minimum requirements for an exposure and contamination control program for emergency services incident scene operations and training.

1.2 Purpose.

The purpose of this standard shall be to provide minimum criteria for exposure and contamination control in emergency services facilities, in emergency vehicles and apparatus, during procedures at an incident scene, and at any other area where emergency service members are involved in routine or emergency operations.

1.3 Application.

1.3.1 The requirements of this standard shall apply to public, military, private, and industrial emergency services departments providing law enforcement, rescue, fire suppression, fire investigation, and emergency medical services, as well as other emergency services and special operations.

1.3.2 This standard shall not apply to hazardous material incidents exposures or infectious disease exposures.

1.4 Retroactivity.

The provisions of this standard shall reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.4.1 Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard.

1.4.2 Where specified, the provisions of this standard shall be retroactive.

1.4.3 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard.
1.4.4

The retroactive requirements of this standard shall be permitted to be modified if, in the judgment of the authority having jurisdiction, their application would be impractical or it is evident that a reasonable degree of safety is provided.

1.5 Equivalency.

Nothing in this standard shall be intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.5.1*

The requirements of this standard shall be intended to meet or exceed the most current applicable federal regulations of the Occupational Safety and Health Administration (OSHA) and guidelines of the US Centers for Disease Control and Prevention (CDC).

1.5.2

Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.5.3

The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.6 Units.

1.6.1*

In this standard, values for measurement in US customary units are followed by an International System (SI) unit equivalent in parentheses, but only the first stated value shall be regarded as the requirement.

1.6.2

Equivalent values in parentheses shall not be considered as the requirement because these values are approximate.
Chapter 2 Referenced Publications

2.1 General.

The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


2.3 Other Publications.

2.3.1 ANSI Publications.

American National Standards Institute, Inc., 25 West 43rd Street, 4th floor, New York, NY 10036.


2.3.2 Other Publications.


2.4 References for Extracts in Mandatory Sections.


Chapter 3 Definitions

3.1 General.

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

3.2 NFPA Official Definitions.

3.2.1* Approved.

Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ).

An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3* Code.

A standard that is an extensive compilation of provisions covering broad subject matter or that is suitable for adoption into law independently of other codes and standards.

3.2.4 Guide.

An NFPA standard 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 NFPA standard as a whole is not suitable for adoption into law.

3.2.5 Labeled.

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

3.2.6* Listed.

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

3.2.7 Recommended Practice.
An NFPA standard similar in content and structure to a code or standard but that contains only nonmandatory provisions using the word “should” to indicate recommendations in the body of the text.

3.2.8 Shall.
Indicates a mandatory requirement.

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

3.2.10 Standard.
An NFPA standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA manuals of style. When used in a generic sense, such as in the phrases “standards development process” or “standards development activities,” the term “standards” includes all NFPA standards, including codes, standards, recommended practices, and guides.

3.3 General Definitions.

3.3.1 Ambulance.
A vehicle used for out-of-hospital medical care and patient transport, which provides a driver’s compartment; a patient compartment to accommodate an emergency medical services provider (EMSP) and one patient located on the primary cot so positioned that the primary patient can be given emergency care during transit; equipment and supplies for emergency care at the scene as well as during transport; safety, comfort, and avoidance of aggravation of the patient’s injury or illness; two-way radio communication; and audible and visual traffic warning devices. [1900, 2023]

3.3.2 Awareness.
Having knowledge of a situation or fact.

3.3.3 Cleaning.
The physical removal of dirt and debris, which generally is accomplished with soap and water and physical scrubbing. [1581, 2022]

3.3.3.1* Advanced Cleaning.
The act of removing both soiling and contamination generally associated with products of combustion. [1851, 2022]

3.3.3.2* Specialized Cleaning.
The act of removing hazardous materials, soiling associated with body fluids, or other forms of contamination. [1851, 2022]

3.3.4 Company.

A group of members (1) under the direct supervision of an officer; (2) trained and equipped to perform assigned tasks; (3) usually organized and identified as engine companies, ladder companies, rescue companies, squad companies, or multi-functional companies; (4) operating with one piece of fire apparatus (pumper, aerial fire apparatus, elevating platform, quint, rescue, squad, ambulance) except where multiple apparatus are assigned that are dispatched and arrive together, continuously operate together, and are managed by a single company officer; (5) arriving at the incident scene on fire apparatus. [1500, 2021]

3.3.5* Contaminants.

Harmful, irritating, or nuisance material foreign to the normal atmosphere. [1500, 2021]

3.3.6 Contaminated.

The presence or anticipated presence of contaminants on an item or surface.

3.3.7* Contamination.

The accumulation of products of combustion and other hazardous materials on or in an ensemble element that includes carcinogenic, toxic, corrosive, or allergy-causing chemicals, body fluids, infectious microorganisms, or CBRN terrorism agents. [1851, 2020]

3.3.8 Control Zones.

The areas at an incident that are designated based upon safety and the degree of hazard. [1500, 2021]

3.3.8.1 Cold Zone.

The control zone of an incident that contains the command post and such other support functions as are deemed necessary to control the incident. [1500, 2021]

3.3.8.2 Collapse Zone.

The area that is exposed to trauma, debris, and/or thrust should a building or part of a building collapse. [1500, 2021]

3.3.8.3 Hot Zone.

The control zone immediately surrounding a hazardous area, which extends far enough to prevent adverse effects to personnel outside the zone. [1500, 2021]

3.3.8.4 No-Entry Zone.
Those areas at an incident scene that no person(s) are allowed to enter, regardless of what personal protective equipment (PPE) they are wearing due to dangerous conditions. [1521, 2020]

3.3.8.5 Warm Zone.

The control zone outside the hot zone where personnel and equipment decontamination and hot zone support takes place. [1500, 2021]

3.3.9 Decontamination.

The removal of hazardous substances (e.g., biological, chemical, and radioactive materials) from an ESO’s vehicles and employees, as well as clothing, equipment, tools, and sites to the extent necessary to prevent occurrences of adverse health and environmental effects.

3.3.10 Emergency Incident.

Any situation to which an ESO responds to deliver emergency services.

3.3.11 Emergency Medical Services.

The treatment of patients, using first aid, cardiopulmonary resuscitation, basic life support, advanced life support, and other medical protocols prior to arrival at a hospital or other health care facility. [1581, 2022]

3.3.12 Emergency Services Apparatus.

Patrol cars, ambulances, fire apparatus, and other emergency services department vehicles, including patient compartments and areas used by emergency services firefighters or EMS providers.

3.3.13* Emergency Services Facility.

Any building or area owned, operated, occupied, or used by an emergency services provider on a routine basis.

3.3.14 Emergency Services Facility Areas.

Portion(s) of a building designated according to the likelihood of exposure to contamination and the permanent protective systems engineered to protect from that level of risk.

3.3.14.1* Contamination Control Area (Red Area).

Portions(s) of an emergency services facility likely to be exposed to contaminants or carcinogens.

3.3.14.2* Living, Administrative, or Public Areas (Green Areas).

Portion(s) of an emergency services facility considered uncontaminated.

3.3.14.3* Transition Area (Yellow Area).

Portion(s) of an emergency services facility used to remove or reduce contamination from people or equipment before transitioning to living, administrative, or public areas.
3.3.15* Emergency Services Organization (ESO).

Any public, private, governmental, or military organization that provides emergency response and other related activities, whether for profit, not for profit, or government owned and operated.

3.3.16 Emergency Service Organization (ESO) Vehicle.

Any vehicle operated by an ESO, including any privately owned vehicle (POV) operated by a member while performing ESO operations.

3.3.17* Environmentally Preferable Products (EPP) Cleaning Program.

Products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose.

3.3.18 ESO.

See 3.3.16, Emergency Service Organization.

3.3.19* Exposure.

The process by which members, PPE, and equipment are subjected to, or come in contact with, products of combustion or other harmful substances.

3.3.20 Exposure and Contamination Control Prevention Program.

The ESO's formal policy and implementation of procedures relating to preventing exposure and the control of contamination and contaminated waste where employees, patients, or the general public could be exposed to contamination or potentially contaminated materials in the emergency services work environment.

3.3.21 Exposure Management.

A contaminant control and reduction program to reduce the risk of contact with harmful substances and actions to mitigate harmful substance spread after it occurs.

3.3.22 Facility.

See 3.3.13, Emergency Services Facility.

3.3.23 Fire Apparatus.

A vehicle designed to be used under emergency conditions to transport personnel and equipment, and to support the suppression of fires and mitigation of other hazardous situations. [1900, 2023]

3.3.24 Fire Department.

An organization providing rescue, fire suppression, and related activities, including any public, governmental, private, industrial, or military organization engaging in this type of activity. [1002, 2017]
3.3.25 Fire Department Member.
See 3.3.36, Member.

3.3.26 Firefighting.

3.3.26.1* Proximity Firefighting.
Specialized firefighting operations that can include the activities of rescue, fire suppression, and property conservation at incidents involving fires producing high levels of radiant heat as well as conductive and convective heat. [1971, 2018]

3.3.26.2 Structural Firefighting.
The activities of rescue, fire suppression, and property conservation in buildings or other structures, vehicles, rail cars, marine vessels, aircraft, or like properties. [1710, 2020]

3.3.26.3 Wildland Firefighting.
The activities of fire suppression and property conservation in woodlands, forests, grasslands, brush, prairies, and other such vegetation, or any combination of vegetation, that is involved in a fire situation but is not within buildings or structures. [1977, 2022]

3.3.27 Fireground Contaminants.
Airborne, dermal, ocular, or respiratory hazards consisting of products of combustion, carcinogens, toxic chemicals, ultrafine particles, and other incident health hazards.

3.3.28 Garment.
The coat, trouser, or coverall elements of the protective ensemble designed to provide minimum protection to the upper and lower torso, arms, and legs, excluding the head, hands, and feet.

3.3.29 Handwashing Facility.
A facility providing a location with a supply of running potable water, liquid soap, and single-use towels or hot-air drying machines.

3.3.30* Hazardous Atmosphere.
Any atmosphere that is oxygen deficient or that contains a toxic or disease-producing contaminant. [1500, 2021]

3.3.31 Health and Safety Officer (HSO).
The member of the ESO assigned and authorized as the manager of the safety and health program.

3.3.32 Hot Zone.
See 3.3.8.3.

3.3.33 Immediately Dangerous to Life or Health (IDLH).

Any condition that would pose an immediate or delayed threat to life, cause irreversible adverse health effects, or interfere with an individual's ability to escape unaided from a hazardous environment. [2500, 2022]

3.3.34* Incident Management System (IMS).

A system that defines the roles and responsibilities to be assumed by responders and the standard operating procedures to be used in the management and direction of emergency incidents and other functions. [1561, 2020]

3.3.35* Kitchen.

An area designated for storage, preparation, cooking, and serving of food for members. [1581, 2022]

3.3.36* Member.

A person involved in performing the duties and responsibilities of an ESO under the auspices of the organization.

3.3.37 Occupational Exposure.

An exposure that resulted from performance of a member's duties.

3.3.38 Occupational Illness.

An illness or disease contracted through or aggravated by the performance of the duties, responsibilities, and functions of a member.

3.3.39 Occupational Injury.

An injury sustained during the performance of the duties, responsibilities, and functions of a member.

3.3.40 Patient.

An individual, living or dead, whose body fluids, tissues, or organs could be a source of exposure to the member.

3.3.41 Personal Protective Equipment (PPE).

Specialized clothing or equipment worn by a member for protection against a hazard.

3.3.42 * Preliminary Exposure Reduction (PER).

The systematic removal of contaminants acquired on the fireground that remain on tools, equipment, PPE, and ESO personnel.
3.3.43 Privately Owned Vehicle (POV).

A vehicle owned by a private party.

3.3.44 Procedure.

An organizational directive issued by the authority having jurisdiction or by the department that establishes a specific policy that must be followed. [1561, 2020]

3.3.45* Protective Ensemble.

Multiple elements of compliant protective clothing that when worn together can reduce, but not eliminate, the health and safety risks of emergency incident operations.

3.3.46 Recovery.

The process of returning a member’s physiological and psychological states to levels that indicate the person is able to perform additional emergency tasks, be reassigned, or released without any adverse effects.

3.3.47* Rehabilitation.

An intervention designed to mitigate against the physical, physiological, and emotional stress of firefighting in order to sustain a member’s energy, improve performance, and decrease the likelihood of on-scene injury or death. [1584, 2022]

3.3.48 Relative Risk.

The likelihood of occurrence of a given hazard and severity of its effects from products of combustion, carcinogens, fireground contaminants, and other incident-related health hazards.

3.3.49* Response and Support Vehicles (RSV).

Patrol cars, ambulances, fire apparatus, and other emergency services department vehicles.

3.3.50 Risk.

A measure of the probability and severity of adverse effects that result from an exposure to a hazard. [1451, 2018]

3.3.51 Risk Assessment.

The process of identifying threats and hazards to life, property, operations, the environment, and entities, and the analysis of probabilities, vulnerabilities, and impacts. [1600, 2019]

3.3.52* Risk Control.
The management of risk through stopping losses via exposure avoidance, prevention of loss (addressing frequency) and reduction of loss (addressing severity), segregation of exposures, and contractual transfer techniques. [1250, 2020]

3.3.53 Risk Management.

The process of planning, organizing, directing, and controlling the resources and activities of an organization in order to minimize detrimental effects on that organization. [1250, 2020]

3.3.54 Standard Operating Guideline (SOG).

A written organizational directive that establishes or prescribes specific operational or administrative methods to be followed routinely, which can be varied due to operational need in the performance of designated operations or actions.

3.3.55* Standard Operating Procedure (SOP).

A written organizational directive that establishes or prescribes specific operational or administrative methods to be followed routinely for the performance of designated operations or actions. [1521, 2020]

3.3.56 Supervisor.

An emergency services responder responsible for overseeing the performance of other responders assigned to a specific division or group.

3.3.57 Warm Zone.

See 3.3.8.5.

3.3.58 Wildland Firefighting.

See 3.3.26.3.
Chapter 4 Program Components

4.1 Program Overview.

4.1.1
The emergency services organization (ESO) shall have a written exposure and contamination control program designed to identify and limit the possibility of members exposure to contaminants during the performance of their assigned duties and within the ESO working and living environment.

4.1.2
As part of the overall ESO’s occupational safety and health program, ESO management shall implement an exposure and contamination control prevention program that meets the requirements of this standard, including the following:

(1) Program components, which includes the following:
   
   (a) Initial program risk assessment
   (b) Roles and responsibilities
   (c) Training requirements, both initial and updates
   (d) Ongoing education and awareness
   (e) Standard operating procedures and guidelines
   (f) Exposure reporting

(2) Emergency services facilities

(3) Contamination control for response and support vehicles

(4) Emergency operations and training exercises, including the following:
   
   (a) Ongoing risk assessment
   (b) Tactical considerations

(5) The cleaning, disinfecting, and disposal of personal protective clothing and ensembles

(6) Cleaning of equipment at the incident scene and postincident

4.2 Exposure and Contamination Control Prevention Program Risk Assessment.

4.2.1
Prior to establishing or updating an exposure and contamination control prevention program, ESO management shall conduct a risk assessment to determine potential contamination hazards and how to mitigate them.
4.2.2* A risk assessment shall incorporate the following:
   (1) Risk identification and assessment, including potential and actual hazards
   (2) Risk evaluation, including the relative risk of each hazard
   (3) * Establishment of priorities for action
   (4) * Risk control techniques
   (5) *Risk management monitoring

4.3 Roles and Responsibilities of Personnel Involved with the Exposure and Contamination Control Prevention Program.

4.3.1* Program Management.
It shall be the responsibility of ESO management and the health and safety officer (HSO) to verify or administer the development and implementation of an exposure and contamination control prevention program that recognizes and reduces workplace fire contamination and release risks involved in the operations of a fire and emergency services organization.

4.3.2 Responsibilities of ESO Management.

4.3.2.1* ESO management shall be responsible for compliance with all applicable laws and legal requirements with respect to the exposure and contamination control prevention program.

4.3.2.2 ESO management shall establish and enforce rules, regulations, and standard operating procedures (SOPs) to meet the requirements of this standard.

4.3.2.3 ESO management shall take corrective action to avoid repetition of accidental contamination control incidents, releases, and exposures that present a hazard to responders.

4.3.2.4 ESO management shall give the HSO the authority to administer the exposure and contamination control prevention program as part of the overall health and safety program.

4.3.2.5 ESO management shall make additional personnel or other resources available as needed to meet exposure and contamination control prevention program requirements.

4.3.2.6 ESO management shall oversee the exposure and contamination control prevention program requirements.

4.3.2.7
ESO management shall determine annually whether or not the program is accomplishing the goals set out in the risk assessment used to establish the exposure and contamination control prevention program.

4.3.3 Responsibilities of the ESO Health and Safety Officer (HSO).

4.3.3.1* The ESO HSO shall develop an organizational risk assessment and management plan that addresses the risks specified in Section 4.2.

4.3.3.2* The ESO HSO shall manage the exposure and contamination control prevention program plan, which includes the following:
   (1) Organizational activities
   (2) Risk management plan results
   (3) Program elements, including those in compliance with this standard
   (4) Communication methods for distributing the exposure and contamination control prevention program plan

4.3.3.3 The ESO HSO shall function as the ESO exposure and contamination control prevention program officer to ensure that the objectives of the ESO’s exposure and contamination control prevention program are met.

4.3.4 Laws, Codes, and Standards.
The ESO HSO shall ensure SOPs or standard operating guidelines (SOGs) for the exposure and contamination control prevention program comply with applicable laws, codes, and standards, and are reviewed and revised, as needed.

4.3.5 Training and Education.

4.3.5.1 The ESO HSO shall develop and distribute health and safety information to educate and train ESO members on the exposure and contamination control prevention program.

4.3.5.2* The ESO HSO shall implement the safety provisions of the organization’s exposure and contamination control prevention program plan into training and education programs.

4.3.5.3* The ESO HSO shall conduct an annual safety audit of the exposure and contamination control prevention program.

4.3.5.4
The ESO HSO shall develop a policy for reporting accident and injury investigations that involve exposure and contamination control prevention program incidents.

**4.3.6 Apparatus, Clothing, and Equipment.**

**4.3.6.1**

The ESO HSO shall recommend safety-related specifications for ESO apparatus and equipment that meet the ESO needs identified in the exposure and contamination control prevention program risk management plan.

**4.3.6.2**

The ESO HSO shall ensure safety-related specifications for ESO apparatus and equipment comply with federal, state/provincial, and local laws, as well as with the applicable NFPA codes and standards.

**4.3.6.3**

The ESO HSO shall verify the development, implementation, and maintenance of a protective clothing and protective equipment program that both provides for the selection, care, maintenance, storage, and periodic inspection and evaluation of all protective clothing and equipment and complies with the ESO exposure and contamination control prevention program.

**4.3.6.4**

The ESO HSO shall identify minimum criteria for a station exposure and contamination control prevention program.

**4.3.7 Responsibilities of the Member.**

**4.3.7.1**

Members shall participate in exposure and contamination control prevention activities as outlined in this standard.

**4.3.7.2**

Members shall minimize their exposure to contaminates as much as possible in accordance with the exposure and contamination control prevention program.

**4.3.7.3**

Members shall remain current of the elements of the exposure and contamination control prevention program.

**4.3.7.4**

Members shall be aware of the health and safety of other members of their crew in accordance with the exposure and contamination control prevention program.

**4.3.8 Responsibilities of the Company Officer.**
4.3.8.1

Company officers shall both maintain an awareness of the contamination exposure of each member operating within their span of control and ensure steps are taken to provide for each member’s safety and health.

4.3.8.2*

Company officers shall maintain compliance with the ESO exposure and contamination control prevention program in nonemergency activities.

4.3.8.3*

Company officers shall ensure personal protection equipment (PPE) is worn according to the manufacturer’s instructions.

4.3.8.4

Company officers shall ensure interfaces between PPE items for each member limit exposure and contamination.

4.3.8.5

Company officers shall ensure the following:

1. Members are decontaminated after every incident.
2. All equipment is decontaminated, isolated, or disposed of prior to returning to service whether at the scene or at the station.

4.3.8.6

Company officers shall ensure that members are trained in the elements of the ESO’s exposure and contamination control prevention program and the associated SOPs and SOGs.

4.3.8.7

Company officers shall ensure that each member within their span of control documents any exposures as part of the exposure recordkeeping process.

4.3.9 Responsibilities of the ESO Instructor.

4.3.9.1

The ESO instructor shall incorporate the ESO’s exposure and contamination control prevention program into any training activities.

4.3.9.2

Wherever personnel or students are exposed to contaminants during training, ESO instructors shall ensure PER actions are conducted in accordance with Chapter 6.

4.3.9.3
The ESO instructor shall inspect training participants’ PPE and self-contained breathing apparatus (SCBA) to determine that equipment is serviceable and worn in accordance with manufacturers’ instructions.

4.3.9.4

While operating on the training ground, ESO instructors shall ensure PPE is worn during all phases of training where contaminants exist.

4.3.9.5

Wherever personnel or students are exposed to fireground contaminants, ESO instructors shall ensure PER actions are conducted in accordance with Chapter 7.

4.3.9.6

The ESO instructor shall inspect live-training fire participants’ PPE and SCBA to determine that equipment is serviceable and worn in accordance with manufacturers’ instructions.

4.3.9.7

The ESO instructor shall ensure doffing of equipment and PER actions are conducted in accordance with 7.5.4.13.

4.3.9.8

ESO instructors shall be cognizant of fuel loads and their potential for increased contamination for members involved in training.

4.3.10 Training—Initial and Updates.

4.3.10.1

The ESO shall conduct initial and annual training on the exposure and contamination control prevention program for all members.

4.3.10.2

The ESO shall ensure that all training is in accordance with state, provincial, or federal regulations on exposure and contamination prevention.

4.3.11* Education and Awareness Program.

The education and awareness program shall provide the following:

1. Information on contamination control and exposure prevention
2. Ongoing education/awareness to responders on the hazards and protective measures
3. Means to encourage member support for the implementation of the exposure and contamination control prevention program
4.3.12 SOPs and SOGs.

4.3.12.1

ESO management shall develop SOPs and SOGs that outline a systematic approach for both exposure and contamination control and release prevention, and recovery of members operating at incidents and training exercises.

4.3.12.2*

SOPs and SOGs shall address the following:

1. Processes for contamination reduction, including the following:
   - Prevention and mitigation of firefighter and emergency responder exposure to contaminants
   - Decontamination of firefighters and emergency responders exposed to contaminants
   - Mitigation of on-scene exposure to contaminants for personnel exiting the warm and hot zones

2. Operation of laundry and cleaning facilities in the ESO facility, including the following:
   - SOPs shall require that protective ensembles or ensemble elements not be worn or stored in the living areas of ESO facilities.
   - The public shall not be exposed at any time, except during emergency operations, to soiled or potentially contaminated protective ensembles or ensemble elements.
   - Soiled or potentially contaminated ensembles or ensemble elements shall not be brought into the home, taken to public facilities, or transported in private vehicles.

3. Segregation of contaminated clothing from vehicles until that equipment can be decontaminated

4. Cleaning of vehicle equipment prior to being returned to the vehicle

5. Vehicle decontamination by outlining how to identify, evaluate, control, and decontaminate vehicles and their equipment where exposed to contaminants that could be harmful

6. How to minimize the public and ESO personnel’s exposure to soiled or contaminated tools and equipment during cleaning

7. Other SOPs, as needed, to implement the requirements of this standard as part of an exposure and contamination control prevention program

4.3.13 Exposure Reporting.

The ESO shall ensure that a member who has a confirmed or possible contamination or exposure receives immediate medical guidance, evaluation, and, if needed, postexposure prophylaxis and confidential postexposure testing and counseling.

4.3.13.1 Postincident Exposure Reporting.

ESO management shall ensure a record is made of all contaminant exposures to members as soon as possible after the exposure using a standardized form designed to allow for follow-up.

4.3.13.1.1
The AHJ shall establish an exposure reporting system for its members to use to record possible exposure to fireground toxic contaminants, airborne hazards, dusts, or chemicals.

4.3.13.1.2

Where the National Fire Operations Reporting System (NFORS) is used, the member making the report shall complete the documentation.

4.3.13.1.3

Where NFORS is not used, the exposed member’s direct supervisor shall complete the documentation.

4.3.13.2* Exposure Documentation.

The ESO shall retain employee documentation for 30 years after separation of that employee.

4.3.13.2.1

A member’s documentation shall include, at a minimum, the following:

1. Employee name
2. Incident number
3. Date of incident
4. Nature of incident
5. Cumulative on-scene time of the employee
6. Function of the employee at the incident
7. PPE worn
8. Any specific known extinguishing media or suspected contaminants
9. Highest level of exposure incurred at the incident as identified in an ongoing risk assessment

4.3.13.2.2

The requirements in 4.3.13.2 and 4.3.13.2.1 shall be satisfied by existing reporting channels where the requirements in Section 4.7 are met.

4.4. Emergency Services Facilities.

4.4.1

All ESO facilities shall comply with all applicable health and contamination control laws and regulations.

4.4.2

All ESOs shall implement a facility exposure and contamination control prevention program in accordance with Chapter 5 that includes each of the following components:

1. Protecting the public and personnel from exposure to fireground contamination as well as contamination inside and outside an emergency services facility
2. Designating areas in the facility based on the likelihood of exposure to contamination, such as the following:
4.5 Contamination Control for Response and Support Vehicles (RSVs).

The ESO shall address contamination control concerns in the specification, design, construction, acquisition, operation, maintenance, inspection, repair, and retirement of all RSVs in the following areas:

(1) Preventive contamination activities for vehicles
(2) On-scene activities for vehicles
(3) Vehicle staging by zone
(4) Condition at the scene
(5) Ongoing decontamination
(6) Contaminated equipment
(7) Post-incident and event activities for vehicles
(8) Documentation

4.6 Emergency Operations and Training Exercises.

4.6.1 Fireground Contaminants Identification.

For a given fire incident or training exercise, a site-specific hazard and risk assessment shall be performed to both identify all primary hazard contaminants that can potentially harm response personnel and ascertain the likelihood and effects of exposure to the specific hazard’s contaminants.

4.6.2* Ongoing Risk Assessment.

An on-going risk assessment for contamination hazards during emergency scene and training operations shall be conducted.

4.6.3 Tactical Considerations.

Incident hazard control zones shall be established according to the procedures in Chapter 7.

4.7* Personal Protective Clothing and Ensembles.

A PPE contamination control program should include each of the following components:

(1) Protecting the public and personnel from exposure to contaminated PPE
(2) Contamination control considerations for procurement of PPE
(3) Prerresponse activities for PPE
(4) On-scene activities
(5) Immediate post-incident analysis and cleaning
(6) Doffing of PPE
(7) Secondary postincident cleaning, inspection, and analysis
(8) Documentation of PPE
(9) Storage of PPE
(10) Disposal of PPE

4.8 Cleaning of Equipment.

4.8.1

The ESO shall develop preincident activities to ensure that tools and equipment are clean and disinfected as needed in accordance with Chapter 9.

4.8.2

The ESO shall define criteria to determine when tools and equipment have been contaminated postincident beyond the ability to remedy by cleaning and disinfecting in accordance with Chapter 9.

4.8.3

The ESO shall development specific cleaning actions in accordance with Chapter 9 for equipment and tools, including, but not limited to, the following:

1. Lifting bags and lifting bag components
2. Rescue tools and components
3. Hand tools and components
4. Life safety rope and equipment
5. Fire hose, couplings, nozzles and fire house appliances
6. Portable ladders

4.8.4

The public shall not be exposed at any time, except during emergency operations, to contaminated or potentially contaminated tools or equipment.
Chapter 5 Fire and Emergency Services Organization (ESO) Facilities

5.1* General.

A fire and emergency services facility exposure and contamination control program shall include each of the following components:

1. Protecting the public and personnel from exposure to fireground contamination as well as contamination interior and exterior of an emergency services facility
2. Designating areas in the facility based on the likelihood of exposure to contamination, such as the following:
   a. Contamination control areas
   b. Transition areas
   c. Living, administrative, or public areas
3. Identifying, cleaning, and maintaining all areas within the fire and ESO facility

5.2 Protecting Personnel and the Public from Exposure to Fireground Contamination.

5.2.1

The ESO shall design and implement an emergency services facility design approach that minimizes personnel and public exposure to contaminants within the facility.

5.2.2*

All facilities shall be designed to both prevent or minimize the spread of contaminants and facilitate cleaning and decontamination of the facility.

5.2.3*

All contamination control areas shall have posted signage that indicates any dangers or hazards related to that area in accordance with ANSI Z535.4, Product Safety Signs and Labels.

5.2.4*

Hand washing stations with soap and hot and cold running water shall be available in all areas of the facility.

5.2.5*

Where possible, doors, sinks, and all other fixtures shall be designed to minimize surface contact.

5.2.6*

All exposed floor and wall materials shall be hard surface, nonporous, and easy to clean or sanitize.

5.2.7*
The ESO shall design and implement a cleaning program based on the possible types of contamination present.

5.3 Designating Areas in the Facility Based on the Likelihood of Exposure to Contamination.

5.3.1 General.

5.3.1.1
All emergency services facility areas shall be designated by the likelihood of exposure to contamination.

5.3.1.2*
Each area shall have an isolated heating, ventilation, and air conditioning (HVAC) system.

5.3.2
Areas inside a facility shall be designated as follows:

   (1) Contamination control areas
   (2) Transition areas
   (3) Living, administrative, or public areas

5.3.2.1
Contamination control areas shall include areas of the facility that are likely to be exposed to contaminants or carcinogens.

5.3.2.2 Transition Areas (Yellow).

5.3.2.2.1*
Transition areas shall include areas of the facility used to remove or reduce contamination from members or equipment before transitioning to living, administrative, or public areas.

5.3.2.2.2
The transition area shall include restroom and shower facilities.

5.3.2.3 Living, Administrative, or Public Areas (Green).

5.3.2.3.1*
Living, administrative, or public areas shall include areas of the facility considered uncontaminated.

5.3.2.3.2*
The living, administrative, or public areas shall have higher air pressure than areas leading into it.

5.3.3
The ESO shall provide designated storage for items allowed in each area.

5.3.4
The ESO shall develop procedures for a systematic approach to clean and sanitize all areas of the facility based on the contamination level and risk.

5.3.5*
Ice machines shall not be located in contamination control or transition areas.

5.3.6*
The ESO shall consider the effect all materials used in the facility have on contamination control.

5.4* Identifying, Cleaning, and Maintaining All Areas Within the Emergency Services Facility.
The contamination control program shall include procedures to identify, clean, and maintain all areas within the emergency services facility.

5.5* Contamination Control Areas.

5.5.1
Contamination control areas shall be cleaned or sanitized following each use.

5.5.2
An independent storage area shall be provided for cleaning and housekeeping supplies used in the contamination control area so as not to spread contaminants to other areas of the facility.

5.5.3
Members shall limit time spent in the contamination control area to that which is necessary to complete their tasks.

5.5.4*
Public access to contamination control areas shall be restricted when the area is in use and until the area has been cleaned or sanitized.

5.5.5* Gross Contamination.

5.5.5.1*
Where possible, gross decontamination shall be completed outside the facility before apparatus and equipment are brought into the facility.

5.5.5.2
Where an outside location is not possible, the ESO shall designate a specific area within the facility where gross decontamination can occur.

### 5.6 Transition Areas.

**5.6.1**

The ESO shall create a transition area for personnel and equipment moving out of a contamination control area and into a living, administrative, or public area.

**5.6.2**

All transition areas shall have a shower and a changing room.

**5.6.3**

Transition areas shall have decontamination protocols, staging for responders to decontaminate, and cleaning equipment, including, but not limited to, the following:

1. *Hand wash sink or station with hot and cold running water and soap
2. *Boot washer or cleaner
3. Touchless towel dispenser filled with disposable towels
4. Trash receptacle
5. Walk-off mat—recessed or surface
6. Solid, nonporous surface bench or seating
7. Clothing hooks
8. Hamper for soiled clothing

**5.6.4**

Transition areas shall be cleaned and disinfected on a minimum regular schedule and as needed depending on use.

**5.6.5**

Entries into transition areas shall meet air pressure differential requirements as established by the AHJ.

**5.6.6**

Where the transition area is outside of the facility or located remotely, such transition areas shall have the minimum equipment and protocols as the described in 5.6.3.

### 5.7 Living, Administrative, or Public Areas.

**5.7.1**

Living, administrative, or public areas shall remain free from contamination.
5.7.2*

Contaminated personnel, clothing, and equipment shall not be permitted in the living, administrative, or public areas.

5.7.3

The ESO shall prevent both exhaust emission exposure to members and exhaust emission contamination of living, administrative, or public areas as required by NFPA 1500.

5.7.4

The ESO shall ensure that all personnel and equipment that enters the living, administrative, or public area has been cleaned and disinfected.

5.7.5*

HVAC units in living, administrative, or public areas shall be inspected, cleaned, and maintained, as recommended by the manufacturer.
Chapter 6 Contamination Control for Response and Support Vehicles (RSVs)

6.1 General.
The requirements of this chapter shall apply to any emergency response vehicle and related support vehicles.

6.1.1* For this standard, RSVs shall include, but not be limited to, the following:
   (1) Patrol cars
   (2) Ambulances
   (3) Fire apparatus
   (4) Other ESO vehicles

6.1.2 The emergency services organization (ESO) shall address contamination control in the specification, design, construction, acquisition, operation, maintenance, inspection, repair, and retirement of all RSVs.

6.1.3 All new RSVs shall be specified and ordered to meet all applicable NFPA standards.

6.1.4 The ESO shall develop standard operating procedures (SOPs) and standard operating guidelines (SOGs) in accordance with Chapter 7 to both manage and minimize contamination and cross-contamination of all RSVs during all incidents, events, and training exercises that include the following:
   (1) Preventative contamination activities
   (2) On-scene activities
   (3) Postincident or event activities
   (4) Documentation of exposure and decontamination

6.1.4.1 The ESO shall develop SOPs in accordance with 6.5.2 for all maintenance, transfers, and retirement of RSVs.

6.1.4.2 All RSVs shall park according to guidance received from incident command.

6.1.4.3 Where incident command has not yet been established or direction has not been provided, RSVs shall park in accordance with 6.1.4 and Chapter 7.

6.1.5 Where possible and practical, RSVs that have been contaminated with smoke or other contaminants shall receive PER actions prior to return to service.
6.1.5.1
All RSVs shall remain in the cold zone or staging area unless directed by incident command or SOGs.

6.1.5.2
Where an RSV is stationary and subject to contamination, both of the following shall apply:

   (1) Ventilation systems shall be engaged to use interior air only.
   (2) All windows shall be closed.

6.2 Preventive Contamination Activities for RSVs.

6.2.1
RSV interior materials shall be physically and chemically inert to detergents and other solvents or solutions used to clean and disinfect.

6.2.2
The ESO shall limit contaminated equipment in the interior cab of RSVs.

6.2.3*
The ESO shall establish a process to transport contaminated equipment and PPE in a container or outside of an RSV cab.

6.2.4
The ESO shall provide exhaust capture or diversion systems on RSVs.

6.2.5*
The ESO shall establish methods to minimize the cleaning and decontamination process for RSVs.

6.3 On-scene Activities for RSVs.

6.3.1 Procedures.
The ESO shall develop procedures for on-scene activities in accordance with Chapter 7.

6.3.2 Ongoing Decontamination.

6.3.2.1*
The ESO shall develop and implement a clean RSV plan to ensure that RSVs remain free from contamination between incidents.

6.3.2.2
The clean RSV plan shall include protocols to minimize the spread of contamination to privately owned vehicles (POVs), support vehicles, and the environment.
6.3.2.3
The clean RSV plan shall include protocols to minimize opportunities for cross-contamination of RSVs, POVs, and emergency service facilities.

6.3.2.4*
In the event an RSV apparatus provides treatment to or transport of a contaminated person, the RSV apparatus shall have advanced cleaning according to the clean RSV plan prior to return to service.

6.3.2.5*
The clean RSV plan shall ensure that postincident personal hygiene is conducted in an order that does not cause cross-contamination.

6.3.2.6
Decontamination procedures shall be conducted using PPE in accordance with Chapter 8.

6.3.3 Contaminated Equipment.

6.3.3.1*
Contaminated equipment (e.g., SCBA, spare air cylinders, tools, radios, PPE) shall be kept out of RSV occupant areas until PER actions have been completed and a risk assessment follow-up is conducted to determine if advanced cleaning or isolation is needed.

6.3.3.2
If a risk assessment determines advance cleaning is required, then equipment shall be isolated from RSV occupant areas.

6.3.3.3
RSV occupant areas exposed to contamination shall be identified for advanced cleaning.

6.4 Postincident or Event Activities for RSVs.

6.4.1 RSV Designation.

6.4.1.1*
The ESO shall establish procedures to designate RSVs as either clean or contaminated.

6.4.1.2*
Procedures shall include methods for transporting personnel and equipment in a manner that limits contamination in the crew cab.
6.4.2* RSV Occupant Area.
Contaminated equipment shall not enter or be stored in RSVs unless the ESO has an approved method to contain contamination.

6.4.3 RSV Preliminary Exposure Reduction (PER) Process.
The ESO shall establish a procedure for RSV PER.

6.4.3.1*
The RSV PER process shall be utilized for all incidents where RSVs are exposed to contaminants.

6.4.3.2
The PER process shall be performed after exposures at structural fires, brush fires, vehicle fires, training fires, or any other emergency or nonemergency incident where contamination is present.

6.4.3.3
The PER process shall be performed as close as practical to the scene so as to limit cross-contamination to other RSV.

6.4.4 Training Events.
If an RSV is exposed to contamination during a training event, it shall be decontaminated and cleaned in accordance with the ESO’s SOPs and SOGs.

6.5 Documentation.

6.5.1 RSV Maintenance, Service, and Asset Management.

6.5.1.1
All RSVs shall be serviced and maintained in accordance with NFPA 1910.

6.5.1.2
Prior to RSV service or maintenance, the ESO shall ensure PER actions have been completed.

6.5.1.3*
The ESO shall establish a documentation system to maintain permanent records on inspections, maintenance, out of service, and return to service on all RSVs in accordance with NFPA 1910.

6.5.2 Retirement of RSVs.

6.5.2.1
Where an RSV is retired, the ESO shall ensure the RSV is no longer used for emergency operations.
6.5.2.2
Where an RSV is retired, the ESO shall include with the vehicle the organization’s SOPs and SOGs for RSV gross decontamination and advanced cleaning.
Chapter 7 Emergency Operations and Training Exercises

7.1 General.

7.1.1 Emergency operations and training exercises shall be conducted in a manner that minimizes contamination of personnel, apparatus, and equipment.

7.1.2 Emergency services organizations (ESOs) shall incorporate the following to minimize exposure and contamination in emergency operations and training exercises:

1. The link between fire dynamics and health hygiene in exposure and contamination control
2. The principles of science-based research to minimize firefighters’ risk on the fireground, including training, to reduce secondary impacts of exposure and contamination before and after an incident

7.1.3 A contamination control program for emergency operations and training exercises shall include the following components:

1. Fireground contaminant identification
2. Emergency incident hazard control zones
3. Apparatus considerations
4. Responsibilities of on-scene personnel
5. Tactical considerations

7.2 Fireground Contaminant Identification.

7.2.1* An on-going risk assessment for contamination hazards shall be conducted during emergency scene and training operations.

7.2.2* For a given incident or training exercise, a site-specific hazard and risk assessment shall be performed to identify all primary contaminants and the likelihood and effects of exposure.

7.2.3* When engaged in any operation where members could encounter hazardous atmospheres that are IDLH or potentially IDLH, or where the atmosphere is undefined or hazardous, including overhaul, the ESO shall provide all members NFPA 1981–compliant SCBA.
7.2.4*

Members using SCBA shall not compromise the protective integrity of the SCBA for any reason when operating in IDLH, potentially IDLH, or undefined or in hazardous atmospheres (including overhaul) by removing the facepiece or disconnecting any portion of the SCBA that would allow the ambient atmosphere to be breathed. [1500, 2021]

7.3 Emergency Incident Hazard Control Zones.

7.3.1*

Hazard control zones shall be established in accordance with NFPA 1500 wherever the potential for contamination exists.

7.3.2

The perimeters of the hazard control zones shall be designated and communicated by the IC.

7.3.3

The perimeters of the hazard control zones shall be marked where possible.

7.3.4

The IC shall ensure that protective clothing and equipment for each control zone are commensurate with the hazards in the zone.

7.3.5

All supervisors and members shall ensure the use of personal protective equipment (PPE) within each zone.

7.3.6*

The use of hazard control zones shall continue until the incident hazards have been mitigated or the incident is over.

7.3.7 No-Entry Zone.

7.3.7.1

No person(s) shall be permitted to enter a no-entry zone, regardless of PPE, due to imminent hazard(s), dangerous conditions, or the need to protect evidence.

7.3.7.2

In the event that personnel are exposed to a no-entry zone, contamination reduction strategies for the hazards encountered shall be utilized.

7.3.8 Hot Zone.
7.3.8.1
All members shall be trained and equipped for operating in a hot zone.

7.3.8.2
The hot zone includes, but is not limited to, the area of the smoke plume, which shall be considered when the IC designates the hot zone.

7.3.9 Warm Zone.

7.3.9.1*
The warm zone shall serve as a limited-access area where contamination reduction activities are implemented.

7.3.9.2
PER actions shall be conducted in the warm zone.

7.3.10*
The cold zone shall be established outside the warm zone.

7.4 Apparatus Considerations.

7.4.1* Where possible, RSVs shall be positioned upwind or otherwise outside an area of potential or actual contamination.

7.4.2
All RSV cabs shall be both of the following:

(1) Kept shut during operations
(2) Aired out when operations have ended

7.4.3
The ESO shall be responsible for taking RSVs out of service if any of the deficiencies defined in this chapter or Chapter 6 are encountered.

7.4.4*
Incident hazard control zones shall be according to Section 7.3 and Chapter 8 of NFPA 1500.

7.4.5*
Each member shall be informed of the control zone perimeters as they arrive on scene.

7.4.6*
Any RSV arriving at a scene that is contaminated or potentially contaminated shall be staged in accordance with Section 7.4.
7.4.7
RSVs and RSV components, including, but not limited to, the following shall be positioned so as to limit their exposure during all operations in proximity to products of combustion:

(1) Pump panel of fire apparatus
(2) Command vehicles
(3) Rehabilitation vehicles

7.4.8
RSVs and RSV components shall be positioned so as to limit exposure due to wind shift, changes in scene dynamics, or on-scene complications.

7.4.9
Any RSV that does not support direct fire suppression or chemical hazard mitigation shall be staged in the cold zone.

7.4.10*
Any RSV involved in direct fire suppression or training activity where products of combustion (i.e., contaminants) are present shall be staged only as close to the hazard as necessary to perform the needed function.

7.4.11*
Where members respond to an incident in their personal vehicle, the ESO shall ensure that both PER actions are performed and the member’s PPE is bagged in accordance with NFPA 1851 prior to the member returning to their vehicle.

7.4.12
No RSV shall be staged or driven into a no-entry zone.

7.4.13
Any RSV located at a scene that is contaminated or potentially contaminated shall meet the conditions of Section 7.4.

7.4.14*
All RSV windows shall remain closed unless needed for emergency operations.

7.4.15
RSV heating, air conditioning, and ventilation systems shall be placed in recirculation mode if so equipped.

7.4.16
RSVs shall be staged to minimize exhaust emissions exposure.

7.4.17
RSV exhaust direction or filtration systems shall be engaged if so equipped.

7.4.18
Where personnel respond to an incident in their POV, the IC shall ensure that the member undergoes PER actions.

7.4.19
In the event an RSV provides treatment or transport, the RSV shall undergo advanced cleaning.

7.4.20
Where an RSV provides treatment to or transport of a member, the member’s PPE shall be removed where possible and as early as practical to avoid or minimize cross-contamination of the RSV and the emergency room of the receiving facility.

7.5 Responsibilities of On-Scene Personnel.

7.5.1* Responsibilities of the Incident Commander (IC).

The IC shall ensure that PER actions and gross decontamination is completed when needed.

7.5.1.1
The IC shall provide for relief of members exposed to contaminants to limit individual exposure to the lowest possible levels.

7.5.1.2
The IC or manager(s) shall identify the locations for the incident command post, the staging area, and the rehabilitation area with respect to on-scene contamination reduction efforts.

7.5.2* Responsibilities of Company Officers.

Company officers shall ensure PPE is worn per manufacturers’ instructions.

7.5.2.1
Company officers shall ensure that interfaces between PPE items for each member limit exposure and contamination prior to operations and thorough PER actions.

7.5.2.2
Company officers shall ensure that members adhere to on-scene PER operations.

7.5.3* Responsibility of Members.

7.5.3.1
Members operating on-scene of an incident or training exercise shall participate in contamination control and on-scene PER actions.

7.5.3.2

Members shall maintain their PPE in accordance with Section 7.5.

7.6 Tactical Considerations.

7.6.1

PPE shall be worn during all phases of fireground operations.

7.6.2

Staging area operations shall be located in the cold zone in a location where resources can be placed until given a tactical assignment.

7.6.3

The rehabilitation operations site shall be both conducted in accordance with NFPA 1584 and located in the cold zone in accordance with 7.3.10.

7.6.3.1

The rehabilitation site shall be free of exhaust fumes from apparatus, vehicles, or equipment.

7.6.3.2

Members shall perform PER actions prior to entering the rehabilitation site.

7.6.3.3

Members shall wash face and hands with soap and water or, at a minimum, with a wet wipe immediately after doffing and before consuming any food or drink.

7.6.4 PPE.

7.6.4.1*

The IC shall select PPE based on the on-going risk assessment.

7.6.4.2*

Where the on-going risk assessment dictates a change in PPE, the updated PPE shall be donned in the cold zone.

7.6.4.3

Members shall wear full PPE during all emergency incidents in accordance with NFPA 1500.
7.6.4.4*
Members shall wear PPE to emergency incidents in accordance with NFPA 1500.

7.6.4.5
Ensembles and ensemble elements that are contaminated or possibly contaminated with bulk chemicals; asbestos; other designated hazardous substances, body fluids, or other microbial contamination; or products of combustion from a structural or other fire shall be subject to PER actions as specified in 7.6.4 and NFPA 1851.

7.6.4.6
Ensembles and ensemble elements that are soiled but not contaminated shall be subject to PER actions as specified in 7.6.4 and NFPA 1851.

7.6.4.7
Where the form of contamination cannot be identified, contaminated ensembles and ensemble elements shall be both isolated and subject to PER actions as specified in 7.6.4 and NFPA 1851.

7.6.4.8
Where tools or equipment have become soiled or contaminated, they shall undergo PER actions prior to PER actions for members.

7.6.4.9
SCBAs shall be cleaned and disinfected according to manufacturers’ instructions.

7.6.4.10
ESOs shall be responsible for implementing PER procedures on-scene for ensemble and ensemble elements.

7.6.4.11
PER actions for PPE and firefighting equipment shall be completed in the warm zone before removal from the warm zone.

7.6.4.12*
Dry or wet mitigation techniques shall be conducted prior to removal of any ensemble or ensemble elements.

7.6.4.13
Members shall remain on supplied air or other designated respiratory protection during PER actions.

7.6.4.14
Members assisting with PER actions shall use designated protective equipment based on the on-going risk assessment.

7.6.4.15
Members shall carry out doffing of contaminated PPE in the warm zone as established by the IC in accordance with Section 8.7 of NFPA 1500.

7.6.4.16 Doffing of PPE.

7.6.4.16.1
Members shall doff their PPE in a manner to avoid transfer of contamination to themselves, other personnel, and the environment.

7.6.4.16.2
In cases where a member might be in distress, or exhibiting signs of distress, as a result of metabolic heat stress or high thermal exposures, both of the following shall apply:

1. Emergency doffing procedures shall be followed immediately upon exiting the structure.
2. No PER shall be performed.

7.6.4.17
Following dry or wet mitigation, ensemble or ensemble elements shall be isolated to avoid cross-contamination until further cleaning is completed.

7.6.4.18
Where possible, ensemble or ensemble elements, even when bagged, shall not be transported in the passenger areas of RSVs.

7.7* Investigation Operations.

The fire department shall conduct a risk assessment of all fire investigation activities.

7.7.1*
All rest, eating, and drinking shall be done in an uncontaminated location away from the incident scene or decontamination area.

7.7.2*
The fire investigator shall be trained in both personal decontamination methodologies and decontamination or disposal of PPE, standard cloth coveralls, and firefighting turnout gear to avoid exposure or cross-contamination from residues in clothing and gear.

**7.7.3***

Fire investigators shall either perform PER actions on all potentially contaminated PPE or change their clothes prior to leaving the incident scene so as to limit exposure to their vehicles, offices, and residences.

**7.7.4***

In situations where 7.7.3 is not utilized or practical, fire investigators shall employ a basic PER process that consists of scrubbing and rinsing contaminated gear and equipment with soap (i.e., detergent) and water.

**7.7.5***

Dermal and airway protection shall be used anytime the fire investigator is working in an environment where a fire occurred and soot is present.

**7.7.6**

The ESO shall develop SOPs for fire investigators outlining minimum levels of protection based on the incident timeline and activities on the fireground.

**7.7.7**

Fire investigators shall use a NIOSH-certified SCBA for any entry into a post-fire environment before or after overhaul for at least the first two hours after extinguishment.

**7.7.8***

K-9 dogs used by fire investigators shall be decontaminated to minimize cross-contamination with their handler.

**7.8* Training Exercise Operations.**

**7.8.1 Fuel.**

All live fire training that utilizes Class A fuels shall comply with the requirements of this chapter to minimize contamination and cross-contamination from fireground contaminates.

**7.8.2 Responsibility of Fire Instructors.**

While operating on the training ground, fire instructors shall ensure PPE is worn during all phases of the training where contaminants exist.

**7.8.2.1**
Wherever members or students are exposed to fireground contaminants, fire instructors shall ensure PER actions are conducted in accordance with the provisions outlined in this chapter.

### 7.8.2.2

The fire instructor shall inspect all live fire participants’ PPE and SCBA to confirm that all PPE and SCBA are serviceable and worn in accordance with manufacturers’ instructions.

### 7.8.2.3

The fire instructor shall ensure both doffing of equipment and PER actions are conducted in accordance with the provisions outlined in this chapter.

### 7.8.2.4

Fire instructors shall be cognizant of fuel loads and their potential for increased contamination for members involved in training.
Chapter 8 Personal Protective Clothing and Ensembles

8.1* General.
A personal protective equipment (PPE) contamination control program shall include the following components:

(1) Planning, resources, budgeting, and accountability
(2) Protecting members and the public from exposure to contaminated PPE
(3) Contamination control considerations for procurement of PPE
(4) Prereseponse activities for PPE
(5) On-scene activities requiring PPE
(6) Immediate post-incident analysis and cleaning of PPE
(7) Doffing of PPE
(8) Secondary postincident cleaning, inspection, and analysis of PPE
(9) Storage of PPE
(10) Documentation of PPE
(11) Disposal of PPE

8.2 Planning, Resources, Budgeting, and Accountability.

8.2.1
The emergency services organization (ESO) shall develop a contamination control program for personal protective clothing and ensembles that meets the requirements of this standard.

8.2.2
The contamination control program shall include the following:

(1) Responsibility of members
(2) Member accountability
(3) Program goals
(4) Key program metrics
(5) Program resources
(6) Program budget
(7) Project management processes and tools
(8) Other related program elements

8.3 Protecting Members and the Public from Exposure to Contaminated PPE.

8.3.1
The ESO shall develop SOPs to minimize member and public exposure to soiled or contaminated structural firefighting protective ensembles and ensemble elements in accordance with 4.5.1 of NFPA 1851.

8.3.2
The SOPs shall require that protective ensembles or ensemble elements be worn or stored in accordance with 4.5.2 of NFPA 1851.

8.3.3
The public shall not be exposed to soiled or potentially contaminated protective ensembles or ensemble elements in accordance with 4.5.3 of NFPA 1851.

8.3.4*
Soiled or potentially contaminated ensembles or ensemble elements shall not be brought home, taken to public facilities, or transported in private vehicles in accordance with 4.5.4 of NFPA 1851.

8.4 Contamination Control Considerations for Procurement of PPE.

8.4.1 Hazard and Risk Assessment.

8.4.1.1*
Prior to starting the PPE selection process, the ESO shall perform a hazard and risk assessment in accordance with NFPA 1500.

8.4.1.2*
The results of the hazard and risk assessment shall determine the PPE selection for an incident.

8.4.2*
The ESO shall review the hazard and risk assessment or conduct a new hazard and risk assessment every 2 years, at a minimum, or under specific circumstances, including, but not limited to, the following:
(1) Where changes affect the findings of the current risk assessment in terms of hazard identification or PPE product technology
(2) Where changes in the ESO’s SOPs affect the use of PPE ensembles
(3) Where any new personal protective ensembles or ensemble elements are selected or purchased.

8.4.3
ESOs shall either evaluate the effectiveness and compatibility of cleaning agents for PPE prior to procurement, or obtain recommendations for cleaning agents, procedures, and equipment from PPE manufacturers or from an independent service provider (ISP) verified in accordance with NFPA 1851.

8.4.4*
ESOs shall maintain a supply of PPE components to provide members, at a minimum, two complete, clean PPE ensembles per shift or incident deployment.

8.5 Prerresponse Activities for PPE.

8.5.1 Compatibility and Interfaces.

8.5.1.1* Where new gear is assigned and, at a minimum, yearly thereafter, members shall both assess the compatibility of their PPE and check for gaps in their PPE.

8.5.1.2 If any gaps are found in PPE interface areas, members shall notify their supervisor or ESO for replacement PPE or alterations to existing PPE.

8.5.2 To avoid cross-contamination of vehicles and to the public, members shall ensure that PPE is clean and ready for deployment.

8.5.3* Members shall verify the availability of, at a minimum, an assigned second set of PPE or spare gear from the PPE and equipment manager.

8.6 On-Scene Activities.
The on-scene incident commander (IC) shall follow the PPE-related requirements in 7.5.1.

8.7 Immediate Postincident Analysis and Disposition Activities.
ESOs shall follow the PPE-related requirements in 7.6.4.

8.8 Doffing of PPE.
ESOs shall follow the PPE-related requirements in 7.6.4.

8.9 Determination of Postincident Cleaning and Inspection.
After every incident, ensembles and ensemble elements shall be assessed and handled according to Chapter 7 of NFPA 1851.

8.10 Storage.
8.10.1
PPE shall be stored in accordance with NFPA 1500 to avoid contamination of emergency facility storage areas.

8.10.2
Ensembles and ensemble elements shall be transported, cleaned, dried, and stored in accordance with NFPA 1851.

8.11* Documentation.
Records related to the care and maintenance for PPE shall be maintained in accordance with Section 4.3 of NFPA 1851.

8.12 Disposal.

8.12.1*
Contaminated PPE shall be disposed of in accordance with the following:
(1) Subsection 10.2.1 of NFPA 1851
(2) NFPA 1500
(3) Manufacturers’ instructions
(4) Federal, state, and local regulations

8.12.2
PPE contaminated with hazardous materials shall be disposed of in accordance with federal, state, and local hazardous materials disposal regulations.

8.13 Structural- and Proximity-Specific PPE Considerations.
ESOs shall conform to the structural- and proximity-specific PPE requirements in NFPA 1851.

8.14* Wildland-Specific PPE Considerations.
ESOs shall conform to the wildland-specific PPE requirements of NFPA 1877.

8.15 Fire-Investigator-Specific PPE Considerations.

8.15.1
ESOs shall develop SOPs for field use by fire investigators that reflect the specific decision-making process requirements stated in Section 8.15.

8.15.1.1
ESOs shall conduct a risk assessment of all fire investigation activities in accordance with 7.11.1 of NFPA 1500.
8.15.1.2
ESOs shall develop SOPs in accordance with 7.11.2 of NFPA 1500 that outline minimum levels of protection for fire investigators based on the incident timeline and the activities on the fireground.

8.15.2*
PPE selection and use shall be the responsibility of each fire investigator.

8.15.3*
Wherever PPE is worn to provide protection from a hazardous environment, the fire investigator shall be trained in the donning, doffing, limitations, use, and decontamination of such equipment to ensure that it is worn and functioning as intended.

8.15.4
Fire Investigators shall wear respiratory protection when on-scene.

8.15.5
Fire investigators shall examine their clothing after each use to determine the method of decontamination and cleaning.

8.15.6*
Fire investigator clothing contaminated or possibly contaminated by products of combustion or other contaminants shall not be worn in vehicles, brought home, washed in home laundries, or washed in public laundries—unless the public laundry is a business dedicated to handling contaminated clothing.

8.15.7
In situations where decontamination measures are not utilized or practical, fire investigators shall employ a basic decontamination process that consists of scrubbing and rinsing contaminated PPE with soap (i.e., detergent) and water.

8.15.8
A basic decontamination process for PPE shall be implemented in accordance with all manufacturers’ recommendations.

8.15.9
Decontamination of people, and PPE, clothing, tools, and equipment used on-scene shall be completed in a manner so as to not cross-contamine or expose others.
8.15.10
On-scene decontamination efforts shall be commensurate with the identified hazards and the level of contamination.

8.15.11
Where fire investigators choose to wear standard cloth coveralls or firefighting turnout gear, such clothing and gear shall be handled so as not to create additional exposure.

8.15.12
Disposable protective coveralls shall be doffed and disposed of so as to avoid cross-contamination.

8.15.13
Following dry or wet mitigation, ensemble or ensemble elements shall be isolated to avoid cross-contamination until further cleaning is completed.

8.15.14
Where possible, ensemble or ensemble elements, even when bagged, shall not be transported in the passenger areas of RSVs or POVs in accordance with 7.2.2.5 of NFPA 1851.

8.15.15*
Fire investigators shall decontaminate all potentially contaminated PPE prior to leaving the incident scene so as to limit exposure to their vehicles, offices, and residences.

8.16* EMS-Specific PPE Considerations.
ESOs shall design and implement procedures to handle EMS garments exposed to fireground contamination.

8.17 Law-Enforcement-Specific PPE Considerations.
Law enforcement organizations shall design and implement procedures to handle members and PPE exposed to fireground contamination.

8.18* Technical-Rescue-Specific PPE Considerations.
ESOs that specialize in technical rescues shall implement the requirements of NFPA 1855.
Chapter 9 Cleaning of Equipment

9.1 Program Components.

9.1.1

A contamination control program for tools and equipment shall include each of the following components:

1. Preincident activities for tools and equipment
2. Postincident activities for tools and equipment

9.1.2

Emergency services organizations (ESOs) shall design and implement a contamination control program in accordance with NFPA 1937 to minimize exposure of members and the public to soiled or contaminated tools and equipment.

9.1.3

ESOs shall include contamination risks and contamination control features as part of a risk assessment prior to procurement of tools and equipment.

9.2 Preincident Activities for Tools and Equipment.

9.2.1 Routine Inspections.

9.2.1.1

During routine inspections, members shall assess the cleanliness of tools and equipment stored in emergency services facilities (ESFs) and emergency services vehicles (ESVs).

9.2.1.2

Any potentially contaminated tools or equipment found during routine inspections shall be both isolated and cleaned.

9.2.2 Storage.

Tools and equipment shall be stored in segregated storage areas dedicated to tools and equipment or on an apparatus within the ESF.

9.3 Postincident Activities for Tools and Equipment.

9.3.1 Cleaning and Disinfecting Lifting Bags and Lifting Bag Components.

The ESO shall design and implement a contamination control program for lifting bags and lifting bag components in accordance with NFPA 1937 with the following components:
(1) Drying lifting bags and lifting bag components prior to storage

(2) Identifying and tagging contaminated or potentially contaminated lifting bags and lifting bag components

(3) Cleaning and disinfecting lifting bags and lifting bag components

(4) Disposal of lifting bags or lifting bag components

9.3.2 Rescue Tools and Rescue Tool Components.

The ESO shall design and implement a contamination control program for rescue tools and rescue tool components in accordance with NFPA 1937 with the following components:

(1) Cleaning and disinfecting rescue tools and rescue tool components on-scene post-incident

(2) Identifying and tagging contaminated or potentially contaminated rescue tools and rescue tool components

(3) Cleaning and disinfecting rescue tools and rescue tool components at the ESF

(4) Identification, separation, and disposal of rescue tools and rescue tool components

9.3.3 Hand Tools and Hand Tool Components.

The ESO shall design and implement a contamination control program for hand tools and hand tool components in accordance with NFPA 1937 with the following elements:

(1) Cleaning and disinfecting hand tools and hand tool components on-scene post-incident

(2) Identifying, tagging, and removing contaminated or potentially contaminated hand tools and hand tool components from service until cleaned and sanitized

(3) Cleaning and disinfecting hand tools and hand tool components at the ESF

(4) Identification, separation, and disposal of hand tools and hand tool components where permanently removed from service

9.3.4 Life Safety Rope and Equipment.

The ESO shall design and implement a contamination control program for life safety rope and equipment in accordance with NFPA 1937 with the following elements:

(1) Cleaning and disinfecting life safety rope and equipment on-scene post-incident

(2) Identifying and tagging contaminated or potentially contaminated life safety rope and equipment

(3) Cleaning and disinfecting life safety rope and equipment at the ESF
(4) Identification, separation, and disposal of life safety rope and equipment

9.3.5 Fire Hose, Couplings, Nozzles, and Fire House Appliances.

The ESO shall design and implement a contamination control program for fire hose, couplings, nozzles, and fire house appliances in accordance with NFPA 1962 with the following elements:

1. Fire hose in-service requirements
2. Identifying and tagging contaminated potentially contaminated fire hose, couplings, nozzles, and fire house appliances
3. Cleaning and disinfecting fire hose, couplings, nozzles, and fire house appliances at the ESF
4. Identification, separation, and disposal of fire hose, couplings, nozzles, and fire house appliances

9.3.6 Ground Ladders.

The ESO shall design and implement a contamination control program for ground ladders based on the criteria for hand tools and hand tool components found in 9.3.3.
Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.5.1

The “applicable federal regulations of the Occupational Safety and Health Administration” refers specifically to 29 CFR 1910.

A.1.6.1

Metric units of measurement in this standard are in accordance with the modernized metric system known as the International System (SI) of Units.

A.3.2.1 Approved.

The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment, or materials, the “authority having jurisdiction” may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The “authority having jurisdiction” may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.3 Code.

The decision to designate a standard as a “code” is based on such factors as the size and scope of the NFPA standard, its intended use and form of adoption, and whether it contains substantial enforcement and administrative provisions.

A.3.2.6 Listed.

The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.3.3.3.1 Advanced Cleaning.

Advanced cleaning usually requires that ensemble elements be temporarily taken out of service. Examples include hand washing and machine washing, depending on the type of protective element involved. It should be noted that advanced cleaning might not remove all contaminants. [1851, 2022]
A.3.3.2 Specialized Cleaning.
This level of cleaning involves specific procedures and specialized cleaning agents and processes primarily for the removal of hazardous materials such as bulk chemicals and other designated substances but excluding disinfection or sanitization of microbial contamination. Different approaches can be used for removing specific types of contamination. Specialized cleaning can also be an enhanced form of advanced cleaning. [1851, 2022]

A.3.3.5 Contaminants.
These can be airborne, dermal, ocular, or respiratory hazards consisting of products of combustion, carcinogens, toxic chemicals, ultrafine particles, corrosive or sensitizing allergy-causing chemicals, potentially infectious body fluids, other infectious microorganisms, or CBRN terrorism agents and other incident health hazards. [1500, 2021]

A.3.3.7 Contamination.
Contamination occurs when a foreign substance gets on, or in, clothing, equipment, or the body (via absorption, ingestion, inhalation, and so forth). Contamination implies such substances be avoided because of their potential negative health effects.

A.3.3.13 Emergency Services Facility.
An emergency services facility can be a building that houses emergency services personnel, apparatus, or equipment.

Emergency services facilities do not include locations where an emergency services provider can be summoned to perform emergency operations or other duties unless such premises are normally under the control of the emergency services provider.

A.3.3.14.1 Contamination Control Area (Red Area).
Some examples of contamination control areas include areas used or reserved for decontamination, apparatus bays, disinfecting facilities, disposal facilities, and areas used to store contaminated equipment or PPE, including personnel decontamination showering facilities and personal clothing.

A.3.3.14.2 Living, Administrative, or Public Areas (Green Areas).
Some examples of living, administrative, or public areas include administrative office space, kitchens, dormitories, bathrooms, and TV rooms. Essentially, any area that is not considered a contamination control area or a transition area should be considered a living, administrative, or public area.

A.3.3.14.3 Transition Area (Yellow Area).
Some examples of transition areas include dedicated showers or bathroom facilities, lockers for clean clothes, or hand washing stations.

A.3.3.15 Emergency Services Organization (ESO).
ESOs can include law enforcement; emergency medical services; fire departments; the American Red Cross; the Salvation Army; public works; federal, state, or local government agencies; private contractors; environmental agencies; facility fire brigades; and other organizations.

A.3.3.17 Environmentally Preferable Products (EPP) Cleaning Program.

The product or service comparison might consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or disposal.

A.3.3.19 Exposure.

Exposure creates a situation or condition where someone is likely to be harmed, especially because the person has not been protected from something dangerous.

A.3.3.26.1 Proximity Firefighting.

Examples of fires that commonly produce high levels of radiant heat, as well as convective and conductive heat, and could result in incidents incorporating proximity firefighting operations include, but are not limited to, bulk flammable liquid fires, bulk flammable gas fires, bulk flammable metal fires, and aircraft fires. These operations usually are exterior operations but might be combined with interior operations. Proximity firefighting is not structural firefighting but might be combined with structural firefighting operations. Proximity firefighting also is not entry firefighting. The firefighting activities differ from “entry firefighting” as proximity firefighting does not include direct entry of firefighters into flames. Proximity operations are performed close to the actual fire where the high levels of radiant heat as well as the convective and conductive heat would overcome the thermal protection provided by structural firefighting protective ensembles and the proximity firefighting protective ensembles provide enhanced protection from these thermal exposures. After the fire and heat have been controlled at a proximity firefighting incident, entry into structures or enclosures by firefighters protected by proximity firefighting protective ensembles could be made where the incident requires additional operations for control of the incident. [1971, 2018]

A.3.3.30 Hazardous Atmosphere.

A.3.3.30.1 Hazardous atmosphere can be immediately dangerous to life and health. [1500, 2021]

A hazardous atmosphere can expose a person to the risk of death, incapacitation, impairment of ability of self-rescue, injury, or acute illness from one of the following causes: flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL); airborne combustible dust in a concentration that meets or exceeds its LFL; atmospheric oxygen concentration below 19.5 percent or above 23.5 percent; atmospheric concentration of any substance in excess of its published or permissible exposure limit; or any other atmosphere that is immediately dangerous to life or health.

A.3.3.34* Incident Management System (IMS).

A.3.3.34* The system is also referred to as an incident command system (ICS). [1561, 2020]
The implementation of HSPD-5 led to the development of the National Incident Management System (NIMS). The NIMS is a system mandated by HSPD-5 that provides a consistent nationwide approach for federal, state, local, and tribal governments; the private sector; and nongovernmental organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity. To provide for interoperability and compatibility among federal, state, local, and tribal capabilities, the NIMS includes a core set of concepts, principles, and terminology. HSPD-5 identifies these as the ICS; multi-agency coordination systems; training; identification and management of resources (including systems for classifying types of resources); qualification and certification; and the collection, tracking, and reporting of incident information and incident resources. [1561, 2020]

In addition to the NIMS, the process also incorporates the National Response Plan. The National Response Plan is defined as a plan mandated by HSPD-5 that integrates federal domestic prevention, preparedness, response, and recovery plans into one all-discipline, all-hazards plan. [1561, 2020]

A.3.3.35 Kitchen.

Cleaning and washing of food service equipment and utensils also occur in this area. [1581, 2022]

A.3.3.36 Member.

An ESO member can be a full-time or part-time employee or a paid or unpaid volunteer, can occupy any position or rank within the ESO, and can engage in emergency operation or support activities. Members can include, but are not limited to, operational firefighters, fire apparatus drivers/operators, law enforcement personnel, EMS personnel, support personnel, fire investigators, ARFF, wildland firefighters, industrial firefighters, and other public safety personnel.

A.3.3.42 * Preliminary Exposure Reduction (PER).

The primary purposes for preliminary exposure reduction (PER) actions are to reduce the exposure of the individual end users to soiling, products of combustion, and persistent contamination during doffing of ensembles and ensemble elements and to minimize the spread of that contamination to apparatus, vehicles, and the outside environment. PER techniques for the outside of the ensemble and ensemble elements include brushing off dry debris with a soft bristle brush, rinsing off debris with a low-pressure, low-volume water hose, and spot cleaning for non-aluminized elements. Only a soft cloth or sponge should be used to remove debris on aluminized element surfaces. [1851, 2020]

These actions, conducted by an individual with assistance, are intended to begin the removal of soiling and contamination as soon as practically possible following the exposure of the individual on the fireground or at the emergency scene. The goal of PER is reducing contamination for the exposed ensemble or ensemble elements prior to leaving the scene. These techniques should be applied while the member is still wearing their SCBA and is still on air to prevent respiratory exposure from any off-gassing of contaminants or to dust from airborne debris. It is realized that circumstances might not allow for this immediate action due to limitation of resources (e.g., spare ensembles or ensemble elements), inclement weather, and other factors. Therefore, PER can take place sometime or distance away from the specific exposure event. [1851, 2020]
In the hazardous materials industry, these actions are often referred to by the term *gross decontamination*, indicating the rinsing of the first responder or the actions to partially remove chemical residues or other hazardous substances after leaving the hot (contaminated) zone and before entering the cold (clean) zone during a hazardous materials incident. NFPA 1851 uses the term *PER* because the term *decontamination* suggests removal of contaminant. While there is an expectation that some of the surface contamination could be removed from protective ensembles or ensemble elements, gross decontamination or PER does not guarantee full cleaning or decontamination for all parts of the protective ensembles or ensemble elements. [1851, 2020]

A.3.3.45 Protective Ensemble.

The elements of the protective ensemble are coats, trousers, coveralls, helmets, gloves, footwear, and interface components.

A.3.3.47 Rehabilitation.

Rehabilitation efforts should include providing relief from extreme climate or incident conditions, rest and recovery, rehydration, replacement of calories and electrolytes (as needed for scheduled activities of moderate to high intensity and lasting 1 hour or longer), active or passive cooling as needed for incident type and climatic conditions, medical monitoring, and member accountability. [1584, 2022]

A.3.3.49 Response and Support Vehicles (RSV).

Additional examples of RSVs include buses, public works vehicles, privately owned vehicles (POV), trailers, and so on.

A.3.3.52 Risk Control.

A control for each should be implemented and documented. The two primary methods of controlling risk, in order of preference, are as follows:

1. Wherever possible, eliminate or avoid the risk or the activity that presents the risk, for example, remove contaminates before removing PPE.

2. Where it is not possible or practical to eliminate or avoid the risk, steps should be taken to control it. If the risk could not be removed, for example, PPE could not be cleaned after removal, then the PPE should be bagged to isolate the hazard from the responders and the apparatus returning to quarters.

A.3.3.55 Standard Operating Procedure (SOP).

The intent of standard operating procedures is to establish directives that must be followed. Standard operating guidelines allow flexibility in application. [1521, 2020]

A.4.2.2

After identifying the actual hazards, an assessment should be made of the relative risk (see 3.3.48) of each hazard.
A.4.2.2(3)
The establishment of priorities for action should be based on the degree of a hazard depending on the frequency, toxicity or severity, and risk of occurrence.

A.4.2.2(4)
Risk control techniques should utilize solutions for elimination or mitigation of potential hazards based on this standard and other fire service best practices.

A.4.4.2(5)
The ESO should evaluate the risk management plan on an annual basis for effectiveness of risk control techniques to ensure that exposure and contamination control goals are met.

A.4.3.1
The HSO is responsible for assisting in developing the overall exposure and contamination control prevention program and implementing it in an ESO. The incident safety officer is responsible for developing the incident-specific contamination and exposure elements as part of an incident action plan based on departmental SOPs and SOGs.

The exposure and contamination control prevention program implementation during emergency operations and training exercises using an incident management system’s roles and responsibilities are outlined in Chapter 7.

The member, as outlined Chapter 7, has specific roles and responsibilities during an emergency operations and training exercise under the incident management system and the exposure and contamination control prevention program. That same member has additional responsibilities before and after the incident as outlined in Chapter 4. For example, in many cases, decontamination of the SCBA will only involve a PER at the incident scene by the member as part of the incident management team. When the member returns to the station, they might do a complete decontamination of the SCBA as part of their role as a member of the ESO.

A.4.3.2.1
This is particularly important as it relates to proper disposal of contaminate such as fluorinated foam, which can pose a hazard to the public or other responders if not properly handled.

A.4.3.3.1
The ESO HSO should be provided with injury reports, vehicle incident reports, near-miss or equipment malfunction or failure reports, and other reports as determined by the AHJ, so that risks can be identified and categorized, and control measures can be implemented and monitored.
The exposure and contamination control prevention program plan should be communicated to the members of the organization and the plan should be integrated into the organizational operation. Any needed modifications should be identified and implemented.

A.4.3.5.2

The ESO’s risk management program should be incorporated into the training and education programs and records of the training and education programs should be maintained. The training and education programs should meet the stated operational safety goals and objectives for emergency and nonemergency incidents.

A.4.3.5.3

Based on the material outlined in this standard, and applicable federal, state/provincial, and local laws, codes, and standards, the ESO HSO should audit ESO operations, apparatus, equipment, facilities, training and education programs, SOPs and SOGs, and work practices and procedures annually. The safety audit report and recommendations should be communicated to the AHJ.

A.4.3.6.4

The ESO HSO should ensure a station exposure and contamination control prevention program considers basic construction plans, drawings, and design guides so that deficiencies can be identified, documented, and reported in accordance with US federal law, Code of Federal Regulations, Centers for Disease Control and Prevention (CDC), Occupational Safety and Health Administration (OSHA), National Institute of Occupational Safety and Health (NIOSH), National Fire Protection Association (NFPA), United States Fire Administration (USFA), and policies and procedures of the AHJ.

A.4.3.8.2

An example of nonemergency activity includes facility activities as outlined in Chapter 5.

A.4.3.8.3

PPE should be used in accordance with manufacturers’ PER actions and in accordance with NFPA 1584.

A.4.3.11

According to NIST, “Awareness is not training. The purpose of awareness presentations is simply to focus attention on exposure and contamination control prevention. Awareness presentations are intended to allow individuals to recognize health and safety concerns and respond accordingly.” (See also, 3.3.2 Awareness.)

A.4.3.12.2

The following is an example of what might be included in an SOP related to Chapter 7: Organizations shall develop SOPs for field use that reflect the specific operational dynamic decision-making process described in Chapter 7 of NFPA 1585.

A.4.3.13.2
NFORS provides a data set for tracking exposure to products with potential adverse health effects over the course of a career. It is an all-hazards system endorsed by the International Association of Fire Chiefs, the International Association of Fire Fighters, the Firefighter Safety Research Institute of Underwriters Laboratories, and other organizations. The NFORS system provides capabilities beyond the scope of this document but can be useful to suggest components of a minimum data set. The ESO preferring to establish a local system to track exposures to potentially dangerous chemicals can adapt the NFORS data elements specific to fire incidents. Some elements used in the NFORS system include the following:

1. Employee name
2. Employee date of birth
3. Employee gender
4. Employee race and ethnicity
5. Employee employment start date
6. Internal ESO incident or case number where the exposure occurred
7. Type of fire
8. Was foam used and, if so, what kind?
9. Fire conditions encountered by the employee
10. Activities performed by the employee at the scene
11. Did the employee participate in rehabilitation, and did he or she clean their hands and remove PPE before ingesting water or food?
12. Contamination level of PPE after exposure
13. Contamination of skin and nares after exposure
14. Was decontamination performed on scene and, if so, what kind?
15. How was PPE transported back to the emergency services facility (ESF)?
16. Was decontamination performed at the ESF and, if so, what kind?

These are not all the data elements contained in NFORS and ESOs are encouraged to investigate the system for a more comprehensive understanding of what NFORS has to offer. If the ESO prefers to establish a local system, this is important data to collect for each exposure and employee. The data should be retained for reference and tracking of individual employee health claims.

A.4.6.2

An ongoing risk assessment should be done in accordance with Chapter 5 of NFPA 475.

A.4.7
An ESO’s obligation is to minimize the public’s and the ESO personnel’s exposure to soiled or contaminated PPE. Considerations should be made for PPE component evaluations and integration, and for providing members with redundant PPE to maintain cleanliness throughout a shift or campaign. Pre-activity assessments of compatibility, interfaces, cleanliness, and availability of backup PPE should be made. The necessity of wearing appropriate PPE at each assignment on the fireground and areas subject to contamination, the appropriate location and timing of donning PPE, the importance of interface elements, and the importance of wearing PPE throughout the response should all be noted.

The ESO should establish an approach for deciding the handling, cleaning, and disposition of ensemble elements specific to the types of contamination encountered as well as PPE PER actions. Consideration to contaminated doffing techniques appropriate for the type of contamination encountered are also important as well as the need to separate and control PPE after doffing.

The ESO should determine the appropriate level of advanced or specialized cleaning postincident, including the need to separate PPE components to mitigate cross-contamination in the wash.

Documentation of exposures and cleaning should be kept by the ESO. PPE should be stored in a manner to avoid contamination of emergency facility storage areas and contaminated PPE should be disposed of in accordance with NFPA 1500 and the manufacturer’s instructions.

A.5.1

To protect the health and safety of ESO personnel and the public, exposure and contamination control efforts inside the facility must be supported by each individual in the department. For example, efforts to bypass systems meant to maintain air pressure differentials do not just affect one person, they affect and compromise the long-term health of everyone in the facility.

The goal is to keep contaminated personnel, equipment, and apparatus within the facility in an area meant to process the contamination. Emergency responders returning from an incident where they were exposed to fireground contaminants should enter the facility from the contamination control area, follow procedures to leave or process the contaminated items they need to discard in the contamination control area, enter the transition area to remove contamination from their bodies, and put on clean clothing in the transition area before entering the living, administrative, or public area.

These same parameters apply to firefighters working within contaminated areas.

The purpose here is to minimize exposure to contaminants, remove and destroy contaminants, and contain contaminants as best as possible in the contamination control area of the facility. In existing, older, or smaller stations that cannot be physically modified economically, the following guidelines should be referenced:

1. Highlight the department’s obligation to minimize the public’s and fire department personnel’s exposure to fireground contamination interior and exterior of an emergency services facility.
2. Select air-handling units and furniture, fixtures, and equipment (FF&E) based on the purpose and use of the contamination control area.
(3) Consider maintenance needs and the design of the contamination control area when selecting air-handling units and FF&E.

Areas designated in the facility based on the likelihood of exposure to contamination can also be referred to as red, yellow, or green zones. These zones are not to be confused with operational zones associated with a hazardous material response.

A.5.2.2

Where selecting surface materials, evaluate how the materials can be used, how the materials hold contamination, and how easy the materials can be cleaned or sanitized.

Nonporous materials or finishes and materials or finishes with antimicrobial properties should be used in kitchen and bathroom areas and for all other surfaces that can be exposed to contaminants.

Heating, ventilation, and air conditioning (HVAC) and air pressure system considerations go beyond controlling single systems or utilizing separate systems. For example, if airlock doors can be propped open or their alarms bypassed, the system is not going to protect the health of anyone in the facility. A system should be considered in terms of how it will be used and the consequences if it is bypassed after install.

A.5.2.3

Signs should be clear with simple graphics or messages. Signage should indicate current location and directions to the nearest contamination control area based on the level of contamination.

For contamination control areas, specifically the apparatus bay, signs should indicate what can and cannot be done in the area. For example, the bay is not the place to exercise (diesel engine exhaust is a known carcinogen) or watch television, it is the place to store apparatus and decontaminate PPE, equipment, and apparatus.

For transition areas, signage should note that the person is entering the transition area. People within the facility need to know that they are going from an uncontaminated space (i.e., living, administrative, or public area) to a potentially contaminated space (i.e., transition area); or from a likely contaminated space (i.e., contamination control area) to a potentially contaminated space.

Members working in the facility should be aware and trained on the hazards and risks present. The goal of identification is to ensure that those that are not as familiar with the procedures or the facility (e.g., the general public) are aware when entering an area that could possibly be contaminated.

Signs should reflect the guidance found in ANSI Z535.4, Product Safety Signs and Labels, and indicate and communicate hazard information quickly, including the use of safety symbols.

A.5.2.4
Soap and water are best for removing fireground or nonbiological contaminants. It is important to wash for at least 20 seconds with soap.

Contamination is not the same as germs. Over-the-counter antibacterial soaps, while popular, are no more effective at killing germs than regular soap. However, any soap, including antibacterial soap, is key to removing contaminants.

While hand-sanitizing products are useful for infection control (see NFPA 1581), they can be counterproductive where addressing fireground contamination. Hand sanitizers, including those that are alcohol based or contain aloe, which do not require water, are acceptable for disinfecting, but are not effective at removing contaminants. Such products can add to the penetration of contaminants.

Centers for Disease Control has up-to-date instruction for hand washing and hand sanitizing. For example, a study conducted by AJ Pickering, J. Davis, and AB Boehm describes the efficacy of alcohol-based hand sanitizer on hands soiled with dirt and cooking oil. The study can be found at: https://pubmed.ncbi.nlm.nih.gov/21976190/. The gist of the study is that alcohol-based hand sanitizer is not recommended when hands are visibly soiled.

Hand sanitizer should never be in the shower and should never be used before showering. Hand sanitizer is designed to be a leave-on product and, while it kills some germs, it does not remove dirt or fireground contamination. When considering contamination control efforts, firefighters should focus on using soap and water to remove contamination from skin. Alcohol-based hand sanitizer can be used to address germs when soap and water is not available but should never be used to address contamination, dirt, or sweat.

A.5.2.5

Eliminating the number of times members touch fixtures reduces the chances of contamination. Members or the public should not have to utilize door hardware, grasp sink faucets, or operate flush valves when touchless options exist. If touchless hardware or fixtures are not available, knee- or foot-operated controls should be used.

Touchless fixtures come with their own issues, which should be considered when making fixture selections. User comfort is important, because if touchless systems are not comfortable for the user, the user will find a way to bypass the touchless system.

A.5.2.6

Carpet and fabric upholstery should be avoided. Fireground contamination is difficult, if not impossible, to remove from soft, porous surfaces. Chairs, couches, or similar furniture should be made of hard, nonporous materials (e.g., metal) or covered with an easily cleanable material (e.g., leather or leather alternatives), where possible.

Products certified to National Sanitation Foundation (NSF) standards should be used, where possible.
Ceiling materials might be porous for acoustical properties in bunk rooms, day rooms, study areas, and similar spaces. Wall surface materials generally out of reach due to height or location might also be porous for acoustical properties.

Where moisture resistance is desirable, such as in kitchens, bathrooms, janitor closets, and so on, nonporous ceiling materials might be used.

A.5.2.7

Where selecting cleaning products, consideration should be given to protecting the health and safety of members by adopting an environmentally preferable purchasing (EPP) program. An EPP is a US EPA program that helps US federal government purchasers access private sector environmental innovations and procure environmentally preferable products.

Products and services that are “environmentally preferable” have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. This is important as the EPA has developed recommendations for specifications, standards, and ecolabels to help purchasers and end users identify and procure greener (i.e., environmentally preferable) products. In doing so, the program supports efficiency in operations by giving purchasers a convenient and streamlined way to make sense of over 460 environmental performance standards and ecolabels currently in the global marketplace.

A.5.3.1.2

The transition area should function as an air-pressure differential between areas.

A.5.3.2.1

Some examples of areas that would be included in a contamination control area include, but are not limited to, personnel decontamination showering facilities, areas used or reserved for decontamination, apparatus bays, disinfecting facilities, disposal facilities, and areas used to store contaminated equipment, PPE, or personal clothing. Areas such as these can present a risk of contamination regardless of whether the area has been cleaned or not.

Contamination control areas are also known as the red zone.

A.5.3.2.2.1

Some examples of areas that would be included in a transition area include, but are not limited to, dedicated showers or bathroom facilities, lockers for clean clothes, or areas where hand-washing stations are located. Areas such as these contribute to the reduction or elimination of contaminants before entering the next area.

Transition areas are also known as the yellow zone.

A.5.3.2.3.1
Some examples of areas that would be included in living, administrative, or public areas include, but are not limited to, administrative office space, kitchens, dormitories, bathrooms, and TV rooms. Essentially, any area that is not considered contaminated or that does not contribute to the reduction or elimination of any contaminants should be considered a living, administrative, or public area.

Living, administrative, or public areas are also known as the green zone.

A.5.3.2.3.2

Because the living, administrative, or public areas can be accessed from the outside or a transition area, 5.3.2.3.2 applies to all areas that lead into the living, administrative, or public areas.

A.5.3.5

Ice machines should not be exposed to residual diesel exhaust and off-gassing of contaminated equipment and PPE. [1500:A.10.5.5]

If ice is added to a beverage or a cooler to keep other items cool, everything the ice touches can be contaminated with carcinogens stuck to the ice. Ingesting these carcinogens and touching items that are covered in carcinogens leads to more contamination, not less.

Ice machines, regardless of how the ice is used, should only be allowed in living, administrative, or public areas.

A.5.3.6

Emergency services facilities might be occupied seven days a week in multiple shifts or occupied intermittently in volunteer or on-call facilities. Materials selections should be made with the understanding that materials need to hold up under constant use, cleaning, and decontamination.

The use of nontoxic building materials, system components, and FF&E promotes a healthy environment and protects occupants from additional exposure to hazardous materials and possible off-gassing. For example, low-VOC paints should contain fewer than 0.42 lb/gal (50 g/L) of volatile organic compounds to meet green seal standards for adhesives, sealants, and numerous other products.

Materials on the International Living Future Institute “Red List” of hazardous materials and compounds should be avoided. The “Red List” can be found at: https://living-future.org/declare/declare-about/red-list/.

A.5.4

Every area in a facility should be designated as a contamination control area, transition area, or living, administrative, or public area so that personnel know what activities are allowed and what cleaning and maintenance procedures are necessary in each area.
Each area has its own purpose for minimizing exposure to contamination and should be marked and maintained according to such purpose. Factors to consider for each area include proximity to other areas and procedures to control movement of airborne and physical contamination between areas.

Contamination control efforts inside the facility must be supported by everyone in the facility to be effective. Efforts to bypass systems meant to maintain air pressure differentials affect everyone in the facility and can compromise long-term health.

A.5.5

A contamination control area is also known as the red zone.

A.5.5.4

Visibility and public education are important in the community, and it is unreasonable to expect that only members can have access to areas such as the apparatus bay. For education, maintenance, or other reasons, public access to contamination control areas is necessary. However, if possible, apparatus should be pulled out of the bay onto the apparatus apron for public demonstrations.

Members that work in the facility daily risk cumulative exposure over the long term. The same level of risk does not apply to someone that has limited access for a specific need.

The goal is to limit or reduce the risk of any exposure contaminants. If members are exposed to contaminants, they should clean themselves appropriately as soon as practical.

A.5.5.5.1

The goal is to minimize contamination brought into the facility. Because of weather, temperature, or space limitations, the level of gross decontamination outside of the facility could vary.

A.5.6.1

The transition area is an area, a room, or a series of areas or rooms that personnel move through to travel from the contamination control area to the living, administrative, or public areas.

The protocol is to get less and less contaminated through the transition area so as to enter the living, administrative, or public area clean. Members of the public should not enter the transition area unless they are already in the contamination control area.

The exit from the transition area to the living, administrative, or public area should be to a corridor or a dedicated area, not a room or habitable space.

The design, size, layout, path of travel, type of equipment, and protocols fall under the jurisdiction of the ESO.

Transition areas can also exist as a detached or an exterior space. Such transition spaces should be considered a separate entity.
Transition areas can also serve as a direct route from the living, administrative, or public area to the contamination control area with no effect on contamination or contamination control. Responders do not need to utilize the cleaning equipment or decontamination protocols for movement from the living, administrative, or public area to the contamination control area.

A.5.6.2

Not all facilities have space or fixtures to place a shower and changing room in a transition area. In such cases, the responder can exit the contamination control area, enter a private area or room, doff soiled or contaminated clothing, move to a personal shower and drying area, don clean station wear, and then move into the living, administrative, or public area. There can be many variations of this procedure as long as the responder moves from dirty (i.e., contaminated) to progressively cleaner and then to clean before entering the living, administrative, or public area.

The goal is to keep as much contamination as possible out of the living, administrative, or public areas.

A.5.6.3

Transition areas are for personnel and clothing decontamination, not for decontamination of equipment or PPE. Chapter 9 contains information related to cleaning equipment. For information on cleaning and decontaminating structural firefighting PPE, refer to NFPA 1851.

Transition areas are not equipped to clean beyond personnel or clothing. Additional equipment, such as clothes washing and drying machines, personnel lockers, storage cabinets, and so on can be utilized for additional cleaning and decontamination.

Any additional cleaning and decontamination items in the transition area should be made of nonporous material that is easy to clean and sanitize.

While departments might use ultraviolet (UV) lights to disinfect, UV lights do not affect contamination and can damage PPE materials. UV lights are not useful for controlling contamination from products of combustion. For details on using UV lights against germs to disinfect, see NFPA 1581.

Where a fixed UV disinfecting light is used, it should have controls that prevent its use when unprotected personnel are present. The ESO should follow manufacturer’s instructions when using portable UV lights. In no case should a UV light be used for fireground contaminants; it will not have any effect on the contamination and can damage PPE and negatively affect performance capabilities.

A.5.6.3(1)
The sink or water station should utilize touchless or knee- or foot-operated controls. Soap should be either cartridge type or a portable unit.

A.6.5.3(2)
Boot clearing equipment can be excluded if the ESO has protocols or SOPs in place for removing contaminated footwear and donning clean footwear prior to entering the living, administrative, or public area.
A.5.6.4

Equipment used or stored in a transition area should be cleaned according to Chapter 9.

A.5.6.5

Transition areas should have an air pressure differential from higher pressure in the living, administrative, or public area to lower pressure in the transition area. The transition area pressure can be the same as or higher than the contamination control area, as long as it is less than the living, administrative, or public area pressure. The amount of pressure differential should be determined by the ESO or facility designer.

A nonporous-material door(s) between the living, administrative, or public area and the transition area should automatically close, have latching hardware, be fully weather-stripped, and have a threshold and view light. There is no need for a door between the transition area and contamination control area as far as air pressure differential is concerned.

This door(s) should remain closed due to the air pressure differential and potential for leaching of contaminants. The door should be on an alarm, separate from any building life safety alarms. The alarm should notify station personnel if the door remains open or fails to properly shut and latch.

Procedures should ban any activity that bypasses the alarm or allows anyone to chock the door open. Such actions can affect the long-term health of anyone who occupies the facility.

If the transition area serves as an emergency response route to the contamination control area, and, if code allows, the door should swing in the direction of the response.

Transition areas can be a series of areas or rooms as long as the path from the contamination control area to the living, administrative, or public area gets progressively cleaner. In such cases, personnel can exit the contamination control area, enter a private area or room, doff soiled or contaminated clothing, move to a personal shower and drying area, don clean station wear, and then move into the living, administrative, or public area. There can be many variations of this procedure as long as the responder moves from dirty (i.e., contaminated) to progressively cleaner and then clean before entering the living, administrative, or public area.

A.5.6.6

Depending on the location of the transition area, air pressure differential might not be needed.

The ESO should consider equipment needs and air pressure differentials according to the features of the transition area.

If using a remote transition area, responders should have a clean path of travel from the transition area into the living, administrative, or public area of the facility.

A.5.7
Living, administrative, or public areas are also known as the green zone. A.5.7.1 Living, administrative, or public areas are defined as all areas within the facility that have the lowest level of contaminants. These areas are to remain free from contamination and procedures should be in place that ensure contamination is not transferred from an area that is already contaminated.

Because Living, administrative, or public areas are free of contamination, ice machines and refrigerators can be installed and used in these areas.

A.5.7.5

To ensure contamination control efforts are effective, HVAC units should be inspected, cleaned, and maintained regularly. Regular cleaning removes contamination and regular maintenance ensures air pressure differentials and filtration are maintained to minimize contamination in the facility.

A.6.1.1

Additional RSVs could include buses, public works vehicles, privately owned vehicles (POVs), and trailers. The AHJ should have a policy to address vehicles other than RSVs.

A.6.2.3

The ESO should consider the following when designing the exterior of an RSV:

1. Provide a low-pressure hose line on either side of the RSV to conduct PER actions
2. Designate compartment space for decontamination equipment and supplies
3. Include compartmentation to separate firefighters from contaminated gear, equipment, and SCBA

A.6.2.5

In the design process, the ESO should also consider the following measures for cleaning RSVs:

1. Exhaust protection system or an exhaust system with vertical exhaust to minimize exposure to personnel on-scene
2. Exhaust capture devices on the RSV for on-scene and in-station use
3. Separate transport for contaminated PPE, tools, and equipment, where possible
4. Warm water decontamination outlets on both sides of the RSV
5. High-impact HVAC system filtration for the crew cab to minimize potential inhalation exposure to off-gassing materials
6. Alternative SCBA storage (e.g., fender compartments) to transport contaminated SCBA back to the station or facility for cleaning
7. Tough and durable spray-on protective coatings inside the cab for easier spray-outs and cleaning
8. External transverse compartments across the back of the cab to store SCBAs on a pullout board for easier access
9. Exterior compartments to store bunker gear
10. Automated disinfectant dispensers inside the cab
The clean RSV plan should pay special attention to high-touch areas, such as the following:

1. Seat belts and buckles
2. Door handles and grab rails
3. Compartment handles and latches
4. Steering wheel
5. Switches and touch pads
6. Arm rests and seats
7. Floors
8. Medical compartments, equipment, and bags
9. Pump control panel, handles, levers, and switches
10. RSV dash buttons and keys
11. RSV books, boards, and tags

A.6.3.2.4
Contaminated equipment and PPE should be removed prior to handing off the patient to the emergency department.

A.6.3.2.5
Contaminated RSVs and equipment should receive PER actions prior to leaving the scene. See Chapter 7, 8.7.2, and 8.7.3.

A.6.3.3.1
To keep the cab of the apparatus as clean as possible and to avoid transferring toxins and harmful products back to the station or facility, it is extremely important to perform PER actions prior to leaving the incident scene. Where possible, an additional crew can be assigned to oversee the cleaning process. A garden hose or booster line (i.e., hose reel) should be sufficient for a hose line. The driver/operator should ensure the pressure on the booster line is between 20 and 80 psi. Hydrant pressure is usually sufficient.

A.6.4.1.1
Procedures for designating a contaminated RSV should be developed by evaluating the following risk factors:

1. Occupant areas that provide shelter for exposed personnel from the elements, such as rain, snow, sleet, hail, dust, extreme heat, or extreme cold
2. Exposed personnel sheltering inside a contaminated area or exposed to contaminants at the incident
3. Time of exposure while returning from a response before personnel leave the interior of a contaminated area
4. Other means of shelter for exposed personnel if procedures include doffing contaminated PPE and donning clean PPE or clothing outside the shelter of the RSV area
5. Time an RSV is contaminated versus time it spends running decontaminated on nonexposure calls or tasks
A.6.4.2
ESO procedures should consider the following to ensure that contaminated personnel and equipment do not enter the cab of RSVs:

1. Limit or minimize exposure by conducting PER actions prior to reentry
2. Bag contaminated equipment in accordance with NFPA 1500
3. Store contaminated equipment outside the crew area
4. Clean equipment prior to storing it inside the crew area
5. Include procedures to transport exposed equipment

A.6.4.3.1
If conditions permit, any RSV staged in the warm or hot zone or otherwise exposed to contamination should undergo the PER process before leaving the scene.

A.6.5.1.3
The documentation system should identify any RSV exposed to known or suspected products of combustion, fireground contaminants, or other incident-related health hazards.

The record of contamination should include the following:

1. Type of RSV contaminated
2. Time, date, and type of contamination
3. Cause of contamination
4. Location on the RSV where contamination occurred
5. Time and date the RSV was decontaminated in accordance with NFPA 1581
6. Signature of approval for return to service

The record of contamination exposure should become part of the RSV’s permanent record and should be maintained by the owning ESO for the life of the RSV.

A copy of an RSV’s record of contamination should be available upon request.

A.7.2.1
An on-going risk assessment is the process of continually observing and analyzing risks and hazards in a changing or high-risk environment. This should be done in accordance with Chapter 5 of NFPA 475.

A.7.2.2
The incident commander (IC) should integrate a risk assessment for contamination hazards into the risk management strategy in accordance with A.8.4.2.1 of NFPA 1500.

A.7.2.3

Hazardous atmospheres requiring SCBA can be found in, but are not limited to, the following operations: structural firefighting, aircraft firefighting, shipboard firefighting, overhaul, confined space rescue, and any incident involving hazardous materials. [1500, 2021]

A.7.3.1

One of the first priorities during an incident is to establish hazard control zones throughout the site. These zones are administrative areas based on the hazards, situation, and the risk to personnel and the community. These operational areas are meant to protect the response personnel, minimize exposure of unprotected personnel, and prevent accidental spread of contamination. The zone designation is meant to be dynamic in nature and therefore must continually be reevaluated throughout the response. The commonly used nomenclature for hazard control zones includes hot, warm, and cold zones; however, the terms inner and outer cordons are also used in many areas. In most cases, the hazard control zones will shrink over the course of an incident response. An ongoing dynamic risk assessment should be used to ensure that the location, shape, and overall size of the control zones reflect the situation.

A.7.3.6

The size of hazard control zones often change throughout an incident due to the dynamic nature of the risk assessment. Hazard control zones tend to become smaller as the incident winds down.

A.7.3.8.1

The hot zone is the area presenting the greatest risks of contamination to members.

A.7.3.9.1

The chance of cross-contamination to contaminants is ever present in the warm zone. The warm zone should be considered the portion of the emergency scene where the contaminants could have been transported by the firefighters as they leave the hot zone with contamination.

PPE should still be worn by members while in the warm zone. In many respects, the risk of contamination in the warm zone is the same as in the hot zone. Until contaminants have been removed from the PPE or the contaminated PPE removed from members, the precautions used in the hot zone should continue to be used in the warm zone.

A.7.3.10

The cold zone is also known as the ‘clean zone.’ The cold zone represents the on-scene area where there are minimal risks for human injury or exposure. Contamination exposure has been mitigated in this area and no further control measures are necessary to protect against contamination.
Cold zone activities include, but are not limited to, member rehabilitation, incident debriefing, media interactions, patient treatment, public exclusion area, law enforcement vehicle and personnel actions.

A.7.4.1

This positioning might not be practical during initial operations; however, RSVs should be repositioned as time and conditions allow to minimize contamination.

A.7.4.4

Where RSVs are exposed to potentially contaminated environments, the presumption should be that the RSVs have been contaminated. Some examples of contaminated environments include, but are not limited to, the following:

1. Interior operations where any amount of smoke is present for any duration of time. The smell of products of combustion indicates a potential exposure.
2. Exterior operations, such as vehicle fires, brush fires, or trash or dumpster fires.

ESO members should be cognizant that exposure to products of combustion does not require visible smoke; inhalation and absorption of low doses of microscopic contaminants in the part per million (ppm) range are potentially carcinogenic.

A.7.4.5

The marking of formal isolation or control zones might not occur at every emergency incident; however, all members should be aware that isolation or control zones still exist. Research has shown modern day fires produce harmful toxins, which can include substances such as polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), carbon monoxide (CO), hydrogen cyanide (HCN), and numerous other gases, chemicals, and toxins. It is important to remember that many of these toxins are colorless and odorless gases. To limit the amount of exposure and the subsequent decontamination, RSV placement and approach should be considered during any emergency incident. Members can greatly reduce the amount of exposure by performing a fire attack from an upwind position, where possible, and utilizing the reach of the hose stream. RSVs and the following members can, and likely will, be exposed during all operations in proximity to products of combustion:

1. Driver/operator performing pumping operations at the apparatus panel
2. ICs where the command post is exposed
3. Safety officers
4. Undeployed rapid intervention crews and on-deck crews
5. Responders assigned to an exterior exposure assignment
6. Any member affected by a zone change due to significant wind shift, scene dynamics, or complications.

A.7.4.6
The IC must take smoke production and any associated contaminants’ potential impact on operating members, equipment, civilians, and the environment into account when conducting a fireground size-up. Special consideration can be given where known hazardous materials are allowed to burn under controlled conditions. RSVs should be positioned outside the hot zone in an effort to limit contamination whenever possible. Cab windows and other openings should be closed to limit contamination of the crew cab. Smoke and contaminant exposure to the apparatus and equipment should be avoided wherever possible. Apparatus and equipment that have been severely contaminated with smoke and contaminants should receive a gross on-scene decontamination prior to leaving the scene.

To limit the amount of exposure and the subsequent decontamination, RSV placement and approach should be considered during any emergency incident.

Members can greatly reduce the amount of exposure by staging RSVs in an upwind position and performing a fire attack from an upwind position, where possible, and utilizing the reach of the hose stream.

A.7.4.10
RSVs should not be placed directly into an area where the RSV would be subject to contamination unless the RSV is participating in direct life-saving operations and such operations are authorized by the IC.

A.7.4.11
Special consideration should be provided to any member who arrives in their POV when dealing with their PPE and associated equipment. All members should go through the PER process, and their equipment identified and packaged in such a way that no contamination is expected in their POV. All ESOs should have a SOPs and SOGs that address conditions for prevention of exposure to personal areas.

The Swedish Civil Contingencies Agency introduced a multifactorial system to manage firefighter exposure to unknown chemical substances. The system is called the Skellefteå Model and is implemented through three factors: tools, routines and workflows, and knowledge and insight. Of particular interest is the routine and workflows component. This includes the transportation of PPE to and from incident scenes, routines on scene, storing equipment after incidents, handling potentially contaminated equipment at the ESF, and methods of decontamination of equipment and personnel. ESOs wishing to establish comprehensive contamination control procedures are advised to look to the Skellefteå Model as an example of a comprehensive, evidence-based, and proven system.

The Swedish Civil Contingencies Agency has provided a comprehensive guide to Skellefteå Model implementation. It is available in English as a PDF at: www.msb.se/en under the Publications tab.

A.7.4.14
Dust inside RSVs has been found to be contaminated. RSV windows left open during a working fire can result in smoke transport through the cab, which can deposit on surfaces. Wearing contaminated PPE back to the fire station transfers contaminants to apparatus seats, resulting in exposure to the next member who sits there.
due to cross-contamination. Storing and transporting contaminated PPE within the apparatus cab, particularly with closed windows, can lead to an increase in the concentration of compounds off-gassing from PPE.

A.7.5.1
The IC should assign an exposure reduction officer (ERO) to oversee on-scene PER efforts.

A.7.6.4.1
Pathways for exposure to fireground contaminants include inhalation, ingestion, and dermal absorption. Selecting PPE to protect against each of these pathways is critical to achieve as high a level of protection as possible. Full turnout gear and SCBA should be donned where operating in the hot zone. Members operating in the warm and cold zone can be exposed to smoke and fireground contamination through changes in wind or off-gassing equipment. SCBA provides the highest level of airway protection, but a lower level of protection might be appropriate given a risk analysis of fireground operations.

Protection from fireground contaminants must be balanced with the need to allow a range of motion and field of vision to complete the fireground assignment, as well as risks from ambient dangers such as heat or cold stress, and slip, trip, and fall risks.

A.7.6.4.2
Where possible, clean structural firefighting PPE should be donned in the ESF prior to boarding an RSV. If an emergency incident necessitates the donning of HazMat PPE or wildland PPE after arrival on the scene, structural firefighting PPE should be removed, and clean HazMat or wildland PPE should be donned in the cold zone of the incident operation.

If an ESO has chosen a clean cab concept and policy that does not allow PPE inside the RSV cab, donning can occur on-scene. However, it is incumbent upon the RSV engineer and the company officer to stage the RSV in a location that allows enough space and light to don all PPE safely and ensure positive overlap of interface elements.

A.7.6.4.4
Reductions in protection, particularly inhalation exposure protection, must be carefully considered. Typical fire service multi-gas meters are not responsive to many of the contaminants found on the fireground. SCBA should be maintained through overhaul wherever possible, even if additional personnel are needed at the scene or firefighters need to rest and rehab prior to completing overhaul.

A.7.6.4.12
The choice between dry or wet mitigation depends on the resources available to the ESO and the conditions on-scene. Studies have shown that wet mitigation techniques are more effective at removing surface contamination as compared to dry mitigation techniques.

Wet mitigation techniques remove a significant amount of products of combustion, whereas dry mitigation techniques only remove a portion of this contamination. Techniques involving blowing air onto ensembles or ensemble elements, such as with a leaf blower, are not effective and can redistribute contaminates at the scene and create inhalation hazards for unprotected members, and therefore should be avoided. See Fent, Kenneth W., et al., "Contamination of firefighter personal protective equipment and skin and the effectiveness of decontamination procedures."

If used, dry mitigation techniques should be performed by brushing debris from the exterior of ensembles and ensemble elements with a soft bristle brush prior to removal. Results are best by starting at the top of the ensemble and working downward.

Wet mitigation techniques should be performed by gently rinsing the exterior of ensembles and ensemble elements using low-pressure and low-volume flow water. A mild detergent can be used to aid wet mitigation, followed by gentle rinsing. Heavy scrubbing or spraying with high-pressure water jets, such as a power washer, should be avoided.

There are several means by which wet mitigation techniques can be carried out. One method is to use a reducer from the apparatus pump panel to supply a small hose line, such as a forestry hose or a garden hose with an adjustable nozzle, at low pressure and low volume. Caution should be used when using ordinary fire hoses and nozzles for this technique where the lowest possible flow rate is used. Most departments have a booster line or trash line that is usually ¾ in. (19 mm) or 1 in. (25 mm) in diameter that can be applied at a low pressure [less than 30 psi (207 kPa)]. Portable decontamination showers that conform to ANSI/ISEA 113, American National Standard for Fixed and Portable Decontamination Shower Units, can also be used and can assist where weather, modesty, or other issues arise.

Wet mitigation should start at the top of the user's ensemble and move downward. Where necessary, a soft bristle brush can be used to gently scrub the ensemble or ensemble elements during the wet mitigation process. The important aspects of the wet mitigation technique are that the spray be light, not soak through the clothing, and be able to be applied over the entire member, as the goal is to remove surface contamination. Wet mitigation techniques cannot remove interior layer soiling or contamination.

It is further recommended that a mild detergent be used as an aid in wet mitigation where the surfactant in the detergent is helpful for removing exterior soils. Where a mild detergent is used, it should be followed by gentle rinsing of the ensemble or ensemble elements.

Organizations performing wet mitigation should apply procedures that take the runoff of any contaminated rinse water into consideration to minimize the spread of contamination to the environment.

If used in combination, dry mitigation should precede wet mitigation.
PER procedures should require members being decontaminated to remain in full PPE with face piece donned and breathing air on. Members performing decontamination should be in PPE appropriate to the ongoing risk assessment.

During PER actions, the use of a brush or any other abrasive cleaning devices on radiant reflective outer shells and other such components of protective ensembles and ensemble elements should not be permitted.

A.7.7

Fire scenes, by their nature, are dangerous places. Fire investigators have an obligation to themselves and others, such as other investigators, equipment operators, laborers, property owners, and attorneys, who could be endangered at fire scenes during the investigation process. Section 7.7 provides investigators with an overview and some basic recommendations concerning fireground contamination control. Investigators should refer to NFPA 921 for further information. The fireground atmosphere encountered by fire and explosion investigators as part of their normal work routine changes rapidly with time, might contain a combination of multiple respiratory hazards, and can be immediately dangerous to life and health (IDLH). The inhalation of harmful dusts, toxic gases, and vapors at fire and explosion scenes is a common hazard to investigators who typically arrive to initiate their investigation after fire suppression and overhaul operations are completed.

A.7.7.1

The hazards to fire investigators are not just through aspiration and absorption but also through ingestion, so it is essential that eating and drinking occur away from the incident scene after contaminated gear is removed and face and hands are washed with soap and water or, at a minimum, a wet wipe if soap and water are not available.

A.7.7.2

Decontamination efforts can be reduced through the use of outer disposable garments such as coveralls and latex booties over footwear.

A.7.7.3

If fire investigators opt to wash their clothing at home, contaminated clothing should not be washed with other “clean” clothing to avoid the potential for cross-contamination. Fire investigators should also consider using a commercial, specialty laundry service to clean potentially contaminated clothing. Such services offer the best options for removing potentially harmful contaminants from clothing.

A.7.7.4

The basic PER process should be implemented in accordance with this standard and any specific manufacturer’s recommendations for equipment, such as respirators.

A.7.7.5

A.7.7.8
Specific consideration should be made to clean the paws of K-9 dogs.

A.7.8
No smoke is good smoke. This includes smoke from pallets and hay, which are commonly used in any of the structures defined in NFPA 1403.

Live fire training exercises conducted in a structure designed for and utilizing propane props do not need to meet the requirements of Chapter 7.

Contamination control procedures should be practiced during training as they would be utilized during fireground operations, incorporating repetition to instill muscle memory so that members use them on a regular basis.

A.8.1
Chapter 8 establishes contamination control practices for PPE in terms of 11 specific elements individually addressed in Chapter 8. Chapter 8 primarily addresses contamination control as related to structural firefighting. Most of the information is related to existing requirements in NFPA 1500, NFPA 1584, and NFPA 1852. Chapter 8 does not address contamination control requirements related to PPE exposure to infectious agents (see NFPA 1581), wildland firefighting (see NFPA 1877), special operations (see NFPA 1855), and hazardous materials and biological agents (see NFPA 1891). The 11 specific elements in Chapter 8 include the following:

1. Description of the organizational framework for the contamination control program to meet the requirements of this standard, including the identification of the members with overall responsibility and accountability, program goals, key metrics, resources, budget, project management processes and tools, and other related plan elements
2. Highlight of department obligations to minimize public and member exposure to soiled or contaminated PPE
3. Considerations for PPE component evaluations and integration, and for providing members with redundant PPE to maintain cleanliness throughout a shift or campaign
4. Preactivity assessments of compatibility, interfaces, cleanliness, and availability of backups
5. Necessity of wearing appropriate PPE at each job assignment on the fireground, location and timing of donning PPE, importance of interface elements, and wearing appropriate PPE throughout the response
6. Approach for deciding the handling, cleaning, and disposition of ensemble elements specific to the types of contamination encountered as well as PPE PER practices
7. Contaminated doffing techniques appropriate for the type of contamination encountered as well as the need to separate and control PPE after doffing

Important Notice: This document has been provided for NFPA technical committee member use only. This document is the copyright property of the National Fire Protection Association (NFPA), Copyright © 2021 NFPA, and may not be used for any other purpose or distributed to any other persons or parties outside of the technical committee.

Posted: December 3, 2021
Standards Council Agenda: December 7-8, 2021
(8) Decision tree to determine the appropriate level of advanced or specialized cleaning postincident, including the need to appropriately separate PPE components to mitigate cross-contamination in the wash

(9) Storage of PPE to avoid contamination of ESO storage areas

(10) Documentation of exposures and cleaning by department quartermaster or firefighter

(11) Disposal of contaminated PPE in accordance with NFPA 1500 and manufacturer’s instructions

A.8.3.4
Some limited exceptions to 8.3.4 can be permitted for specific types of responses. For example, wildland firefighters deployed in remote areas might need to use public laundromats where precautions are followed in accordance with Chapter 7 of NFPA 1877.

A.8.4.1.1
As part of the hazard and risk assessment, the ESO should assess the extent to which members might be exposed to products of combustion and other hazardous material at an incident scene to account for specific PPE needs, such as thermal and physical fireground hazard protection, functional and ergonomic performance, and contamination control. Contamination control factors include both minimizing exposure to fireground and emergency scene contaminants and how PPE can be cleaned and decontaminated.

NFPA 1500 identifies contamination control as an exposure risk to firefighters and other response personnel.

A.8.4.1.2
Contamination control procedures for PPE used in different incidents are shown in Table A.8.4.1.2(a).

Table A.8.4.1.2(a) Contamination Control Procedures for PPE by Incident

<table>
<thead>
<tr>
<th>Type of Incident</th>
<th>Reusable PPE with Barrier</th>
<th>Reusable PPE w/o Barrier</th>
<th>Disposable</th>
<th>Special Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural firefighting</td>
<td>Sections 8.4–8.12</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Wildland firefighting</td>
<td>—</td>
<td>Section 8.13</td>
<td>—</td>
<td>Section 8.13</td>
</tr>
<tr>
<td>Fire investigation</td>
<td>Section 8.14</td>
<td>Section 8.14</td>
<td>Section 8.14</td>
<td>Section 8.14</td>
</tr>
<tr>
<td>EMS</td>
<td>—</td>
<td>Section 8.15</td>
<td>—</td>
<td>Section 8.15</td>
</tr>
<tr>
<td>Law enforcement</td>
<td>—</td>
<td>Section 8.16</td>
<td>—</td>
<td>Section 8.16</td>
</tr>
<tr>
<td>Technical rescue</td>
<td>Section 8.17</td>
<td>Section 8.17</td>
<td>—</td>
<td>Section 8.17</td>
</tr>
</tbody>
</table>

The applicability of specific requirements in this chapter depends on the type of PPE as shown in Table 8.4.1.2(b).

Table 8.4.1.2(b) Applicability of Specific Requirements to PPE for Contamination Control
A.8.4.4
ESOs should identify the amount of PPE components with consideration to sizes needed and typical fire call volume appropriate for the given station or department.

A.8.5.1.1
It is recommended that members pair off and observe each other kneeling, squatting, raising arms overhead and out to the side, and lifting each leg high as a form of dynamic fit test. Specific attention should be paid to areas around the SCBA facepiece, hood, helmet, coat, between coat sleeves and gloves, between pant legs and footwear, and between coat and pants, as well as any closures, particularly the front coat closure.

A.8.5.3
The ESO should develop contingency plans to have backup PPE available, such as a second set of PPE, or spare or rental gear in the event that PPE becomes contaminated and removed from service for cleaning and decontamination.

If a member does not have access to in-service PPE, the member is also out of service.

A.8.11.1
In NFORS, the first and second sets of gear are in the system to identify gear that has been exposed. This type of documentation is one of the benefits of tracking gear in NFORS.

A.8.12.1
The ESO should reference all available resources to determine the best options for minimizing contamination.
*A.8.14.1

NFPA 1877 includes a decision tool for wildland firefighting PPE similar to those decision tools found in NFPA 1851.

Most wildland firefighting PPE does not have a moisture barrier, so PER actions might need to be modified or forgone in the field.

Contaminated doffing methods need to be developed specifically for wildland PPE and should consider the need to clean hands, neck, and face prior to doffing PPE, and donning nitrile gloves before removing layers of PPE.

Special consideration should be given to wildland members who might be in the field for multiple days wearing the same PPE, oftentimes up to 14 days. Because it is unlikely for members to carry 14 sets of PPE, the PPE will likely have to be cleaned in the field.

It might be possible to clean PPE at a facility located within the field command staging area. Remote camps might have limited access to cleaning facilities, and therefore must wait to clean PPE.

In such cases, the decision tree [see Figure 7.1.1.2(a) of NFPA 1851] should be carefully reviewed, particularly where contaminated PPE that cannot be cleaned, decontaminated, disinfected, or sanitized must be condemned, retired, or disposed.

Storage requirements outlined in Chapter 9 of NFPA 1877 focus on storing clean, dry PPE outside of direct or indirect sunlight in well-ventilated areas and outside of airtight containers. Planning and preparation are needed to maintain such conditions for PPE transported to, from, and during deployment.

Appendix B of NFPA 1877 contains sample inspection forms.

A.8.15.2

PPE is one way to control or mitigate a hazard; others include limiting exposure, abating the hazard, or using other engineering controls. The effectiveness of PPE varies with the hazard and application of the PPE.

Although generally considered one of the least effective control measures, wearing proper PPE might be the only available control measure due to the nature of fire investigations. Wearing the proper level of PPE is an integral part of minimizing exposure. Care must be taken to determine the hazard present and to select the proper PPE for that hazard. Fire investigators must be trained on how to use PPE, understand the limitations...
of the PPE, recognize the need for effective personal decontamination after using the PPE, and know how to inspect and clean PPE to keep it in a ready state. See 13.6.1 of NFPA 921.

A.8.15.3
For more information, see 13.6.1.2 of NFPA 921.

A.8.15.6
Clothing that is soiled but not potentially contaminated can be laundered by normal means.

A.8.15.15
Fire investigators might change their clothes to avoid spreading contamination to “clean” areas away from the incident scene. Contaminated clothing should be bagged and isolated during transport to a designated PPE cleaning location.

A.8.16
Additional considerations might include differentiating between reusable and disposable PPE, and practicing contaminated doffing and isolation on-scene.

A.8.18
Technical rescue ESOs should have backup sets of clean technical rescue PPE for all members.

Only dry PER actions should be conducted on single-layer technical rescue PPE. A modified PER procedure should be developed because technical rescue PPE does not have a moisture barrier.

Changes in contaminated doffing procedures designed for structural firefighting PPE can be adapted for technical rescue PPE.

A.9.3
The Swedish Civil Contingencies Agency introduced a multifactorial system to manage firefighter exposure to unknown chemical substances. The system is called the Skellefteå Model and is implemented through three factors: tools, routines and workflows, and knowledge and insight. Of particular interest is the routine and workflows component. This includes the transportation of PPE to and from incident scenes, routines on scene, storing equipment after incidents, handling potentially contaminated equipment at the ESF, and methods of decontamination of equipment and personnel. ESOs wishing to establish comprehensive contamination
control procedures are advised to look to the Skellefteå Model as an example of a comprehensive, evidence-based, and proven system.

The Swedish Civil Contingencies Agency has provided a comprehensive guide to Skellefteå Model implementation. It is available in English as a PDF at: www.msb.se/en under the Publications tab.
Annex B Risk Management Plan Factors

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 Risk Management Plan.

Essentially, a risk management plan serves as documentation that risks have been identified and evaluated and that a reasonable control plan has been implemented and followed.

Some factors to consider for a risk management plan are shown in B.1.1 through B.1.6.

B.1.1 Risk Identification.

For every aspect of the operation of the emergency services organization (ESO), list potential problems. The following are examples of sources of information that could be useful in the process:

1. A list of the risks to which members are or can be exposed (i.e., contamination control and release hazards)
2. Records of previous accidents, illnesses, and injuries, both locally and nationally
3. Facility and apparatus surveys, inspections, and so forth

B.1.2 Risk Evaluation.

Evaluate each item listed in the risk identification process using the following two questions:

1. What is the potential frequency of occurrence?
2. What is the potential severity and expense of its occurrence?

This will help to set priorities in the risk management plan.

Some sources of information that could be useful include the following:

1. Safety audits and inspection reports
2. Prior accident, illness, and injury statistics
3. Application of national data to the local circumstances
4. Professional judgment in evaluating risks unique to the jurisdiction

B.1.3 Establishment of Priorities for Action.

Determining the frequency and severity of occurrence of risks can serve as a method for establishing priorities. Any risk that has a low probability of occurrence but would have serious consequences (i.e., high risk) deserves
immediate action and would be considered a high-priority item. Non-serious incidents with a low likelihood of occurrence are a lower priority and can be placed near the bottom of the “action required” list.

**B.1.4 Risk Control.**

Once risks are identified and evaluated, a control for each should be implemented and documented. The two primary methods of controlling risk, in order of preference, are as follows:

1. Wherever possible, totally eliminate or avoid the risk or the activity that presents the risk, for example, remove contaminatees before removing our personal protection equipment (PPE).

2. Where it is not possible or practical to avoid or eliminate the risk, steps should be taken to control it. For example, if the risk cannot be removed (e.g., clean PPE after removal), then the hazard should be bagged and isolated from members and RSVs returning to the ESF.

**B.1.5 Other Methods of Control.**

Other methods of control to consider include the following:

1. Safety program development, implementation, and enforcement

2. Standard operating procedures (SOP) development, dissemination, and enforcement

3. Training and education

4. Inspections or prefire plans

**B.1.6 Risk Management Monitoring and Follow-Up.**

As with any plan, it is important to evaluate whether the risk management plan is working. Periodic evaluations should be made, and, if the plan elements are not working satisfactorily, then modifications should be made.

**B.2 Sample Risk Management Plan.**

Figure B.2 shows a sample risk management plan.
[ANYTOWN]  
RISK MANAGEMENT PLAN

Purpose
The [Anytown] emergency services organization (ESO) has developed and implemented a risk management plan. The goals and objectives of the plan are as follows:

1. To limit the exposure of the ESO to situations and occurrences that could have harmful or undesirable consequences on the organization or its members
2. To provide the safest possible work environment for the members of the ESO while recognizing the risks inherent to the ESO’s mission

Scope
The risk management plan is intended to comply with the requirements of NFPA 1500.

Methodology
The risk management plan uses a variety of strategies and approaches to address different objectives. The specific objectives are identified from the following sources of information:

1. Records and reports on the frequency and severity of accidents and injuries in the [Anytown] ESO
2. Reports received from the [Anytown] ESO’s insurance carriers
3. Specific occurrences that identify the need for risk management
4. National trends and reports that are applicable to [Anytown]
5. Knowledge of the inherent risks that are encountered by ESOs and specific situations that are identified in [Anytown]
6. Any additional areas identified by ESO staff and personnel

Responsibilities
The fire chief has responsibility for the implementation and operation of the organization’s risk management plan. The organization’s health and safety officer has the responsibility to develop, manage, and annually review the risk management plan. The health and safety officer also has the responsibility to modify the risk management plan when warranted by changing exposures, occurrences, and activities.

All members of the [Anytown] ESO have responsibility for ensuring their own health and safety based upon the requirements of the risk management plan and the organization’s safety and health program.

Plan Organization
The risk management plan includes the following:

1. Identification of the risks members of the ESO could actually or potentially encounter, both emergency and nonemergency, defined as follows:
   a. Emergency risks include those presented at emergency incidents, both fire and non-fire (e.g., hazardous materials, emergency medical services incidents, and emergency response).
   b. Nonemergency risks include those encountered while performing functions such as training, physical fitness, nonemergency vehicle operation, and station activities (e.g., vehicle maintenance, station maintenance, daily office functions).
2. Evaluation of the identified risks based upon the frequency and severity factors
3. Development and implementation of an action plan for controlling each of the risks, in order of priority
4. Provisions for monitoring the effectiveness of the controls implemented
5. A periodic review of the plan with modifications made as needed

The plan requires a monitoring process which may be done by the health and safety committee or the health and safety officers.

Risk Management Plan Monitoring
The monitoring process for the risk management plan includes the following:

1. The [Anytown] ESO’s risk management program will be monitored annually, in January, by the health and safety officer.
2. Recommendations and revisions will be made based on the following criteria:
   a. Annual accident and injury data for the preceding year
   b. Significant incidents that have occurred during the past year
   c. Information and suggestions from organization staff and personnel
3. Every 3 years, the risk management program will be evaluated by an independent source. Recommendations will be sent to the fire chief, the health and safety officer, and the occupational safety and health committee.
For additional information, see NFPA 1250.
Annex C Informational References

C.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

C.1.1 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


NFPA 1585, Standard for Exposure and Contamination Control

June 2021, Virtual 6th draft development meeting

©2021 National Fire Protection Association (NFPA)
C.1.2.1 ANSI Publications.

American National Standards Institute, Inc., 25 West 43rd Street, 4th floor, New York, NY 10036.


C.1.2.2 ISEA Publications.


C.1.2.3 National Library of Medicine Publications.

National Library of Medicine, 8600 Rockville Pike, Bethesda, MD 20894.


C.1.2.4 US Government Publications.


National Institute of Standards and Technology (NIST), Building an Information Technology Security Awareness and Training Program, (NIST Special Publication 800-50), October 2003.


C.1.2.5 Other Publications.


C.2 Informational References.

The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

C.2.1 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


C.2.2 US Government Publications.
C.2.3 Other Publications.


International Fire Service Training Association (IFSTA), Fire Department Safety Officer, 2001.


C.3 References for Extracts in Informational Sections.


* Public Input Closing Dates may vary according to standards and schedules for Revision Cycles may change. Please check the NFPA Website for the most up-to-date information on Public Input Closing Dates and schedules at www.nfpa.org/document # (i.e. www.nfpa.org/101) and click on Next Edition tab.

<table>
<thead>
<tr>
<th>Process Stage</th>
<th>Process Step</th>
<th>Dates for TC</th>
<th>Wks</th>
<th>Dates for TC with CC</th>
<th>Wks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Input Stage</td>
<td>Public Input Closing Date</td>
<td>11/10/2021</td>
<td>31</td>
<td>11/10/2021</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Final date for TC First Draft Meeting</td>
<td>6/15/2022</td>
<td>12</td>
<td>3/16/2022</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Posting of First Draft and TC Ballot</td>
<td>9/7/2022</td>
<td>3</td>
<td>6/8/2022</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of TC First Draft ballot</td>
<td>9/28/2022</td>
<td>2</td>
<td>6/29/2022</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of TC First Draft ballot - recirc</td>
<td>10/12/2022</td>
<td>2</td>
<td>7/13/2022</td>
<td>1</td>
</tr>
<tr>
<td>(First Draft)</td>
<td>Posting of First Draft for CC Meeting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final date for CC First Draft Meeting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Posting of First Draft and CC Ballot</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of CC First Draft ballot</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of CC First Draft ballot - recirc</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Post First Draft Report</strong> for Public Comment</td>
<td>10/26/2022</td>
<td>10</td>
<td>10/26/2022</td>
<td>10</td>
</tr>
<tr>
<td>Comment Stage</td>
<td>Public Comment closing date</td>
<td>1/4/2023</td>
<td>25</td>
<td>1/4/2023</td>
<td>12</td>
</tr>
<tr>
<td>(Second Draft)</td>
<td>Notice published on Consent Standards (Standards that receive No Comments).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Date varies and determined via TC ballot.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Appeal Closing Date for Consent Standards (15 Days) (Standards That Received No Comments)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event Description</td>
<td>Date</td>
<td>Week</td>
<td>Year</td>
<td>Date</td>
<td>Week</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>------------</td>
<td>------</td>
<td>------</td>
<td>------------</td>
<td>------</td>
</tr>
<tr>
<td>Posting of Second Draft and TC Ballot</td>
<td>8/23/2023</td>
<td>3</td>
<td>2023</td>
<td>5/10/2023</td>
<td>3</td>
</tr>
<tr>
<td>Final date for Receipt of TC Second Draft Ballot</td>
<td>9/13/2023</td>
<td>1</td>
<td>2023</td>
<td>5/31/2023</td>
<td>1</td>
</tr>
<tr>
<td>Final date for receipt of TC Second Draft ballot - recirc</td>
<td>9/20/2023</td>
<td>2</td>
<td>2023</td>
<td>6/7/2023</td>
<td>2</td>
</tr>
<tr>
<td>Posting of Second Draft for CC Mtg</td>
<td>6/21/2023</td>
<td>6</td>
<td>2023</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final date for CC Second Draft Meeting</td>
<td>8/2/2023</td>
<td>3</td>
<td>2023</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posting of Second Draft for CC Ballot</td>
<td>8/23/2023</td>
<td>3</td>
<td>2023</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final date for Receipt of CC Second Draft ballot</td>
<td>9/13/2023</td>
<td>1</td>
<td>2023</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final date for Receipt of CC Second Draft ballot - recirc</td>
<td>9/20/2023</td>
<td>2</td>
<td>2023</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notice of Intent to Make a Motion (NITMAM) Closing Date</td>
<td>11/1/2023</td>
<td>6</td>
<td>2023</td>
<td>11/1/2023</td>
<td>6</td>
</tr>
<tr>
<td>Tech Session Preparation (&amp; Issuance)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posting of Certified Amending Motions (CAMs) and Consent Standards</td>
<td>12/13/2023</td>
<td>15</td>
<td>2023</td>
<td>12/13/2023</td>
<td>15</td>
</tr>
<tr>
<td>Appeal Closing Date for Consent Standards (15 Days after posting)</td>
<td>12/28/2023</td>
<td>10</td>
<td>2023</td>
<td>12/28/2023</td>
<td>10</td>
</tr>
<tr>
<td>SC Issuance Date for Consent Standards (10 Days)</td>
<td>1/7/2024</td>
<td></td>
<td>2024</td>
<td>1/7/2024</td>
<td></td>
</tr>
</tbody>
</table>
# 2024 ANNUAL REVISION CYCLE

*Public Input Closing Dates may vary according to standards and schedules for Revision Cycles may change. Please check the NFPA Website for the most up-to-date information on Public Input Closing Dates and schedules at www.nfpa.org/document # (i.e. www.nfpa.org/101) and click on Next Edition tab.*

<table>
<thead>
<tr>
<th>Process Stage</th>
<th>Process Step</th>
<th>Dates for TC</th>
<th>Wks</th>
<th>Dates for TC with CC</th>
<th>Wks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Input Stage (First Draft)</strong></td>
<td>Public Input Closing Date</td>
<td>6/1/2022</td>
<td>10</td>
<td>6/1/2022</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Final date for TC First Draft Meeting</td>
<td>11/9/2022</td>
<td>14</td>
<td>8/10/2022</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Posting of First Draft and TC Ballot</td>
<td>2/1/2023</td>
<td>3</td>
<td>11/2/2022</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of TC First Draft ballot</td>
<td>2/22/2023</td>
<td>1</td>
<td>11/23/2022</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of TC First Draft ballot - recirc</td>
<td>3/8/2023</td>
<td>2</td>
<td>11/30/2022</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Posting of First Draft for CC Meeting</td>
<td>12/14/2022</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final date for CC First Draft Meeting</td>
<td>1/25/2023</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Posting of First Draft and CC Ballot</td>
<td>2/15/2023</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of CC First Draft ballot</td>
<td>3/8/2023</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of CC First Draft ballot - recirc</td>
<td>3/15/2023</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Post First Draft Report for Public Comment</strong></td>
<td>3/22/2023</td>
<td>10</td>
<td>3/22/2023</td>
<td>10</td>
</tr>
<tr>
<td><strong>Comment Stage (Second Draft)</strong></td>
<td>Public Comment closing date</td>
<td>5/31/2023</td>
<td>25</td>
<td>5/31/2023</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Notice published on Consent Standards (Standards that receive No Comments). Note: Date varies and determined via TC ballot.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Appeal Closing Date for Consent Standards (15 Days) (Standards That Received No Comments)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final date for TC Second Draft Meeting</td>
<td>11/2/2023</td>
<td>8</td>
<td>8/23/2023</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Posting of Second Draft and TC Ballot</td>
<td>1/17/2024</td>
<td>3</td>
<td>10/25/2023</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of TC Second Draft Ballot</td>
<td>2/7/2024</td>
<td>1</td>
<td>2/14/2024</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Final date for receipt of TC Second Draft ballot - recirc</td>
<td>2/14/2024</td>
<td>2</td>
<td>11/1/2023</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Posting of Second Draft for CC Mtg</td>
<td>11/15/2023</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final date for CC Second Draft Meeting</td>
<td>12/27/2023</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Posting of Second Draft for CC Ballot</td>
<td>1/17/2024</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of CC Second Draft ballot</td>
<td>2/7/2024</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of CC Second Draft ballot - recirc</td>
<td>2/14/2024</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tech Session Preparation</strong></td>
<td>Notice of Intent to Make a Motion (NITMAM) Closing Date</td>
<td>3/27/2024</td>
<td>6</td>
<td>3/27/2024</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Posting of Certified Amending Motions (CAMs) and Consent Standards</td>
<td>5/8/2024</td>
<td>15 days</td>
<td>5/8/2024</td>
<td>15 days</td>
</tr>
<tr>
<td></td>
<td>Appeal Closing Date for Consent Standards (15 Days after posting)</td>
<td>5/23/2024</td>
<td>10 days</td>
<td>5/23/2024</td>
<td>10 days</td>
</tr>
<tr>
<td></td>
<td>SC Issuance Date for Consent Standards (10 Days)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Tech Session                        | Association Meeting for Standards with CAMs       | June 17-20, 2024 | June 17-20, 2024 |

| Appeals and Issuance                | Appeal Closing Date for Standards with CAMs (20 Days after ATM) | |
|                                    | Council Issuance Date for Standards with CAMs*       | |
### 2024 FALL REVISION CYCLE

*Public Input Closing Dates may vary according to standards and schedules for Revision Cycles may change. Please check the NFPA Website for the most up-to-date information on Public Input Closing Dates and schedules at www.nfpa.org/document # (i.e. www.nfpa.org/101) and click on Next Edition tab.

<table>
<thead>
<tr>
<th>Process Stage</th>
<th>Process Step</th>
<th>Dates for TC</th>
<th>Wks</th>
<th>Dates for TC with CC Wks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Input Stage (First Draft)</td>
<td>Public Input Closing Date</td>
<td>1/5/2023</td>
<td>10</td>
<td>1/5/2023 10</td>
</tr>
<tr>
<td></td>
<td>Final date for TC First Draft Meeting</td>
<td>6/15/2023</td>
<td>12</td>
<td>3/16/2023 12</td>
</tr>
<tr>
<td></td>
<td>Posting of First Draft and TC Ballot</td>
<td>9/7/2023</td>
<td>3</td>
<td>6/8/2023 3</td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of TC First Draft ballot</td>
<td>9/28/2023</td>
<td>1</td>
<td>6/29/2023 1</td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of TC First Draft ballot - recirc</td>
<td>10/12/2023</td>
<td>2</td>
<td>7/6/2023 2</td>
</tr>
<tr>
<td></td>
<td>Posting of First Draft for CC Meeting</td>
<td>7/20/2023</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final date for CC First Draft Meeting</td>
<td>8/31/2023</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Posting of First Draft and CC Ballot</td>
<td>9/21/2023</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of CC First Draft ballot</td>
<td>10/12/2023</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final date for Receipt of CC First Draft ballot - recirc</td>
<td>10/19/2023</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Post First Draft Report for Public Comment</td>
<td>10/26/2023</td>
<td>10</td>
<td>10/26/2023 10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comment Stage (Second Draft)</th>
<th>Process Step</th>
<th>Dates for TC</th>
<th>Wks</th>
<th>Dates for TC with CC Wks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Comment closing date</td>
<td>1/2/2024</td>
<td>25</td>
<td>1/4/2024 12</td>
<td></td>
</tr>
<tr>
<td>Notice published on Consent Standards (Standards that receive No Comments). Note: Date varies and determined via TC ballot.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appeal Closing Date for Consent Standards (15 Days) (Standards That Received No Comments)</td>
<td>6/27/2024</td>
<td>8</td>
<td>3/28/2024 6</td>
<td></td>
</tr>
<tr>
<td>Final date for TC Second Draft Meeting</td>
<td>8/22/2024</td>
<td>3</td>
<td>5/9/2024 3</td>
<td></td>
</tr>
<tr>
<td>Posting of Second Draft and TC Ballot</td>
<td>9/12/2024</td>
<td>1</td>
<td>6/6/2024 2</td>
<td></td>
</tr>
<tr>
<td>Final date for Receipt of TC Second Draft Ballot</td>
<td>9/19/2024</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final date for receipt of TC Second Draft ballot - recirc</td>
<td>6/20/2024</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posting of Second Draft for CC Mtg</td>
<td>8/1/2024</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final date for CC Second Draft Meeting</td>
<td>8/22/2024</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posting of Second Draft for CC Ballot</td>
<td>9/12/2024</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final date for Receipt of CC Second Draft ballot</td>
<td>9/19/2024</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final date for Receipt of CC Second Draft ballot - recirc</td>
<td>10/3/2024</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Second Draft Report for NITMAM Review</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tech Session Preparation (&amp; Issuance)</th>
<th>Process Step</th>
<th>Dates for TC</th>
<th>Wks</th>
<th>Dates for TC with CC Wks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notice of Intent to Make a Motion (NITMAM) Closing Date</td>
<td>10/31/2024</td>
<td>6</td>
<td>10/31/2024 6</td>
<td></td>
</tr>
<tr>
<td>Posting of Certified Amending Motions (CAMs) and Consent Standards</td>
<td>12/12/2024</td>
<td>15 days</td>
<td>12/12/2024 15 days</td>
<td></td>
</tr>
<tr>
<td>Appeal Closing Date for Consent Standards (15 Days after posting)</td>
<td>12/27/2024</td>
<td>10 days</td>
<td>12/27/2024 10 days</td>
<td></td>
</tr>
<tr>
<td>SC Issuance Date for Consent Standards (10 Days)</td>
<td>1/6/2025</td>
<td>1/6/2025</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tech Session</th>
<th>Process Step</th>
<th>Dates for TC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Association Meeting for Standards with CAMs</td>
<td>June 16-19, 2025</td>
<td>June 16-19, 2025</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appeals and Issuance</th>
<th>Process Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appeal Closing Date for Standards with CAMs (20 Days after ATM)</td>
<td></td>
</tr>
<tr>
<td>Council Issuance Date for Standards with CAMs*</td>
<td></td>
</tr>
</tbody>
</table>