Aerosol Products Committee

First Draft Meeting on NFPA 30B
Crowne Plaza Providence-Warwick Hotel
Warwick, RI
September 12-13, 2012

AGENDA

1. Chair Willse calls meeting to order at 8:30 AM on September 12th.

2. Welcome & Self-Introduction of Committee Members & Guests

3. Chair & Staff Liaison Remarks

4. Technical Committee Update: (including Training on new standards development process)
   a. Review changes in Membership (See Attachment A – TC List)
   b. Review guidelines for change of employment and committee membership & Special
      Experts affiliations/representation

5. Approve minutes from ROC meeting in Quincy, MA, in October 2009 (See Attachment B –
   ROC Draft Minutes)

6. Old Business:
   a. Quick review of Task Group work (3 Active Task Groups)

7. New Business:
   a. Review of Public Inputs (Proposals). There are approximately 20 Public Inputs (Proposals)
      to review. These will be prioritized prior to the meeting.
   b. Review of Task Groups work and review of without Public Input (proposals)
   c. Review of technical inquiries on NFPA 30B since last revision
   d. Potential issues to be addressed in the Second Draft meeting.
   e. Determination of Second Draft meeting date and location.

8. Adjournment
Aerosol Products

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<table>
<thead>
<tr>
<th>Name</th>
<th>Alternate</th>
<th>Date</th>
<th>Company/Association</th>
<th>Phone</th>
<th>Address</th>
<th>Principal</th>
</tr>
</thead>
</table>
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<table>
<thead>
<tr>
<th>Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Martha H. Curtis</td>
<td>4/22/2008</td>
</tr>
<tr>
<td>Staff Liaison</td>
<td>AER-AAA</td>
</tr>
</tbody>
</table>

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471
I. Attendance:

Members and Alternates – Present:
- Peter J. Willse, XL Global Asset Protection Services, Chair, CT
- Martha Curtis, NFPA, Staff Liaison, MA
- Tom Arch, Global Risk Consultants Corporation, Alternate, MN
- James A. Bloome, Packaging Technologies, Inc., Principal, IA
- David L. Fredrickson, Fredrickson & Associates LLC, Principal, WI
- Edward S. Goldhammer, Aon/Schirmer Engineering Corporation, Alternate, NV
- David Grandaw, Kidde-Fenwal, Inc., Principal, IL
- James Koskan, SUPERVALU, Inc., Principal, MN
- John A. LeBlanc, FM Global, Principal, MA
- Martin J. Pabich, Underwriters Laboratories Inc., Principal, IL
- Donald E. Rowson, Industrial Hydrocarbons, Inc., Principal, CA
- George A. Seuss, Verlan Fire Insurance Company, Principal, MD – Via Live Meeting and Conference call
- David C. Tabar, The Sherwin-Williams Company, Principal, OH
- Tim N. Testerman, Procter & Gamble, Principal, OH
- Daniel J. Venier, Wells Fargo Insurance Services, Principal, MI – Via Live Meeting and Conference call
**Guests:**
Casper Chiang, The Clorox Company, CA
Tom Curran, ConAgra Foods Inc., Naperville, IL?
Casey Grant, Fire Protection Research Foundation, MA
Sara McClure, Procter & Gamble, OH
Michael Pleus, Reckitt Benckiser Inc., NJ
Al Smith,
Scott Smith, Procter & Gamble, OH
Andrew Taylor, Procter & Gamble, OH

**Members and Alternates – Not in Attendance:**
Richard A. Familia, Giant Resource Recovery Company, Principal, SC
Michael J. Madden, Hughes Associates, Principal, CA

**II. Minutes of Meeting:**

1. The meeting was called to order at 8:35 A.M. on Wednesday, October 12, 2009, at NFPA Headquarters, in Quincy, MA. This ROC meeting was being conducted as a Hybrid Meeting, as it was being projected over the Internet using NFPA’s Live Meeting software for those members not able to attend in person.

2. All members and guests were self-introduced. Martha Curtis, NFPA 30B Staff Liaison, reviewed the essential dates in the A2010 revision cycle in a PowerPoint Presentation. The ROC Ballot will be sent electronically to all TC Members after the meeting. The ROC Ballot just needs to be downloaded and saved, and then it can be resubmitted to NFPA.

   The Chair, Peter Willse, welcomed everyone to the NFPA 30B ROC meeting. The Chair pointed out that the deadline for NITMAM for the Annual 2010 cycle is April 9, 2010. If no NITMAM is filed, then NFPA 30B would proceed to the Standards Council for issuance (in early 2010) and would not be required to be debated at the Technical Committee Report Session at the June 2010 NFPA Conference and Expo Meeting in Las Vegas, NV.

3. Martha reviewed the Committee size and the distribution of interests on the Committee. There are 21 Voting Members consisting of: 6 Manufacturers; 5 Insurance Representatives; 4 Users; 4 Special Experts; 1 Installer/Maintainer; and 1 Research/Testing. Recently appointed Committee members include: Tom Arch appointed in March 2009; with Emre Ergun, Jeff Koehn, and Dave LeBlanc appointed in August 2009.

4. The minutes of the previous meeting (February 29, 2009 in Orlando, FL) were approved as submitted.
5. The Committee began work on the 7 comments that were submitted by the public. The Committee completed their actions on 7 public comments and developed 2 additional Committee comments. The Committee actions will appear in the NFPA 30B Annual 2010 ROC after they are balloted.

6. The Committee had a discussion focused on the fire protection of aerosol products in plastic containers. They were shown video footage from three fire tests on aerosol products in plastic containers by John LeBlanc, where the fire protection effectively controlled the fire. They were also shown fire test footage of aerosol products in plastic containers by Dave Fredrickson, where the fire protection did not effectively control the fire. They were also shown fire test video by Tim Testerman, where the fire protection effectively controlled the fire involving aerosol products in plastic containers.

The Committee discussed the protection strategy used in NFPA 30 for flammable liquids in plastic containers. They only have the previous fire tests on aerosol products in metal containers to compare their recent results to. They are looking for a validation of the test methodology for the determination of fire protection. The Committee agreed that they should try to identify the boundary protection for the various aerosol commodities in plastic containers by conducting further fire tests. They were willing to consider a performance-based protection strategy using ESFR sprinklers.

7. The Committee heard a proposal by Casey Grant of the Fire Protection Research Foundation about conducting further fire test work on aerosol products in plastic containers. Casey described that the Foundation incorporates well-rounded representation for solving fire protection problems for challenging commodities. He advised the Committee that the Foundation can be used as a “Lifeline” for solving such fire protection challenges. He described that the Foundation manages and facilitates research programs to achieve a good strategy for fire protection and that they further the strategic thinking on the problem.

8. No further meetings are scheduled for the NFPA 30B Committee, unless the document receives a NITMAM in this revision cycle. That will allow plenty of time for the companies that are developing aerosol products in plastic containers to conduct fire tests for the protection of those aerosol products.

9. The meeting was adjourned at 4:00 P.M. on Wednesday, October 14th, 2009.

Respectfully submitted,

Martha H. Curtis, Staff Liaison
Douglas Hohbein, Northcentral Regional Fire Code Development Committee

**Recommendation:** Change the term “Large Drop” to “Control Mode Special Application (CMSA)” throughout the document.

**Substantiation:** NFPA 13 has changed the designation of “large drop” sprinklers to “Control Mode Special Application (CMSA) sprinklers. This change will make NFPA 30B consistent with NFPA 13 for the type of sprinkler protection required.
Tracey D. Bellamy, Telgian Corporation

Recommendation: Change Large Drop to CMSA.

Substantiation: The term Large Drop in reference to a sprinkler type has been changed to CMSA in NFPA 13. This change is needed to correct the reference.
The protection criteria in this chapter are for metal containers only. Protection criteria for glass or plastic containers greater than 118 ml (4 fl oz) is beyond the scope of this chapter, with the exception of the maximum allowable quantities (MAQ) and those aerosol products covered by Section 6.2.1.1.

Aerosol products in plastic containers larger than 118 ml (4 fl. oz.) shall be considered to be equivalent to Class III commodities, as defined in NFPA 13, where any of the following conditions are met:

(a) Base product has no fire point when tested in accordance with ASTM D 92, Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester, and nonflammable propellant.

(b) Base product has no sustained combustion as tested in accordance with “Method of Testing for Sustained Combustibility”, Title 49 Code of Federal Regulations, Part 173, Appendix H, or the UN publication Recommendation on the Transport of Dangerous Goods, and nonflammable propellant.

(c)* Base product contains up to 20% by volume (15.8% by weight) of ethanol and/or isopropyl alcohol in an aqueous mix and nonflammable propellant.

(d)* Base product contains 4% by weight or less of an emulsified flammable liquefied gas propellant within an aqueous base. The propellant shall remain emulsified for the life of the product. Where such propellant is not permanently emulsified then the propellant shall be nonflammable.

Fire testing with alcohol and water at this percentage in plastic bottles has been successful. Small-scale burn tests of aerosol products in plastic containers have shown the aerosol with a nonflammable propellant to behave the same as the aerosol with no propellant.

A fire test with a formula of this type using liquefied petroleum gas was successful. An emulsion, in an aerosol product, would be a mixture of two or more liquids in which one is present as droplets, of microscopic or ultramicroscopic size, distributed throughout the other. Emulsions are formed from the component liquids either spontaneously or, more often, by mechanical means, such as agitation, provided that the liquids that are mixed have no (or a very limited) mutual solubility. Emulsions are stabilized by agents that form films at the surface of the droplets (e.g., soap molecules) or that impart to them a mechanical stability (e.g., colloidal carbon or bentonite). Colloidal distributions or suspension of one or more liquid(s) with another will have a shelf life that varies with the efficiency of the recipe used.

4. Modify 6.2.2 as follows:

6.2.2 In cases where the storage of Level 1 aerosol products or aerosol products in plastic containers as meeting the requirements of paragraph 6.2.1.1 is required to be protected, such storage shall be protected in accordance with the requirements for Class III commodities set forth in NFPA 13, Standard for the Installation of Sprinkler Systems.

Substantiation:

Include 30B_L2_Sub
At the close of the 2011 revision cycle, only preliminary fire testing had been completed on aerosol products in plastic containers. The testing clearly demonstrated the severe fire hazard created by one product type and hinted that a significantly lower fire hazard may be created by another. It did not provide any guidance on how to protect the lower hazard products. The US DOT has allowed the transport of aerosol products in plastic containers however, the guidance provided in the 2011 edition of NFPA 30B limits a manufacturer’s ability to develop and sell low hazard versions of this product. Since the release of the 2011 edition, a significant amount of new research has been completed on aerosol products in plastic containers that clearly defines a “low hazard” version of the product that can be stored in general purpose warehouses without significantly increasing the fire hazard. The following discussion provides an overview of the work that was done and the conclusions from the effort.

1) Aerosol Products in Plastic Containers – Propellant: Nonflammable; Base: Liquid Content that Does not Support Combustion

The fire hazard created by aerosol products in metal containers is driven by their propellant and the liquid content. An aerosol product that contains a nonflammable propellant and a liquid content that does not support combustion would have a Chemical Heat of Combustion of 0 kJ/g and be classified as a Level 1 aerosol product. Level 1 aerosols are protected using the same protection criteria needed for Class III commodities provided by NFPA 13.

The fire hazard of an aerosol product in a plastic container cannot be directly compared to aerosol products in metal containers. However, using commodity classification information for plastic containers filled with liquids that do not burn supports proposing a protection level for equivalent aerosol products. In this case, the content of the aerosol would not contribute to a fire. Only the primary (plastic container) and secondary (carton) packaging would contribute. If the aerosol was not pressurized, it would directly compare to products listed in NFPA 13 Annex A and FM Global Property Loss Prevention Data Sheet 8-1 as shown below.

**NFPA 13 Annex A**

Table A.5.6.3
- Milk in Plastic – Class I
- Bottles, Jars / Filled noncombustible liquids / Plastic, PET – Class I

**FM Global Property Loss Prevention Data Sheet 8-1**

2.2.2.2 Examples of Class I Commodities
- 4. Other – Noncombustible liquids in 5 gal (19 l) or smaller plastic containers

Both standards treat a plastic container filled with a liquid that does not burn as a Class I commodity. The addition of a nonflammable propellant to a plastic container will not change the burning properties of the commodity (it may result in a violent rupture with no change in burning rates or severity). The above discussion would point to classifying the aerosol products in plastic containers charged with a nonflammable propellant and liquid that does not burn as a Class I commodity. However, in an effort to provide consistency in the protection of aerosols, the protection proposal targets using the same protection currently recommended for Level 1 aerosols.

2) Aerosol Products in Plastic Containers – Propellant: Nonflammable; Base: Liquid Content Consists of up to 20% Ethanol or Isopropyl Alcohol in Aqueous Solution
An aerosol product in a plastic container that contains a liquid that burns will create a fire hazard at least as severe as the same liquid in an unpressurized plastic container. The fire hazard may increase because the container is pressurized and will definitely increase if it is pressurized with a flammable propellant. As the fire hazard of the aerosol’s content increases, the fire hazard of the actual aerosol will increase as well. If on the other hand, the aerosol product in a plastic container was charged with liquid components that can easily be protected in an unpressurized plastic container, similar to the discussion under item 1, there is a good chance that the aerosol products in plastic containers can be protected with a similar level of protection. The only question might be the impact of adding nonflammable propellant.

FM Global has developed protection criteria for several alcohol water mixtures in plastic bottles. The alcohols used in the testing are ethanol and isopropyl alcohol. The mixtures ranged from 100% alcohol (approximate) down to 20% by volume alcohol/80% by volume water. The 20% alcohol/80% water mixture in a plastic bottle in cartons was tested in a full-scale array with the overview of the test presented in Table 1. This alcohol/water mixture does have a definable fire point; however, it produces unstable burning.

<table>
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<tr>
<th>Test Parameters</th>
<th>Commodity</th>
<th>Storage Arrangement</th>
<th>Storage Height (ft) [m]</th>
<th>No. Tiers</th>
<th>Ceiling Height (ft) [m]</th>
<th>Aisle Width (ft) [m]</th>
<th>Sprinkler Type (K factor gpm/psi(^{0.5}) [L/min/bar(^{0.5}), Temperature Rating)</th>
<th>Sprinkler Spacing (ft x ft) [m x m]</th>
<th>Discharge Density (gpm/ft(^2)) [mm/min]</th>
<th>First Sprinkler Operated (min:sec)</th>
<th>Total Sprinklers Operated</th>
<th>Peak Gas Temperature (°F) [°C]</th>
<th>Peak Steel Temperature (°F) [°C]</th>
<th>Test Concluded (min:sec)</th>
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</tbody>
</table>

Table 1. FM Global Test Summary

Based on the results of this test, FM Global has recommended protecting 20%\(_{vol}\) alcohol/80%\(_{vol}\) water mixtures in plastic bottles with the same protection recommended for liquids that do not burn in plastic containers, i.e.,
Class I commodity. A final question is does pressurizing a plastic container filled with a 20% _vol_ alcohol/80% _vol_ water mixture with nonflammable propellant change the burning properties of the product.

Since the propellant will not burn, the only real opportunity to change the burning behavior would be to cause the alcohol/water mixture to burn more severely (e.g., maybe produce fireballs when the mixture is ejected from the container under pressure). To evaluate this potential, a small-scale test series was contracted with Underwriters Laboratories to investigate the impact of pressurizing aerosol products in plastic containers, filled with a 20% _vol_ alcohol/80% _vol_ water mixture, with nonflammable propellants. A summary of 5 tests that were run is provided in Table 2. Two filling methods were investigated, direct fill (liquid and propellant in same space) and bag-on-valve (liquid in one compartment, propellant in outer compartment). UL reported the number of container failures. The overall fire behavior was provided through direct observation. The tests looked at two cases of six containers arranged with a 6 in. (15 cm) flue between them and a point igniter in the flue space. The cases were in a small pan.

### Table 2 UL Testing Summary

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<th>Test #</th>
<th>Description</th>
<th>Fill Type</th>
<th>Test Results</th>
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<tbody>
<tr>
<td>1</td>
<td>15% ethanol and 85% water</td>
<td>Direct Fill</td>
<td>12 containers ruptured but burned in place No fire balls during rupture No pool fire Bottom of boxes unburned after 6 min</td>
</tr>
<tr>
<td>2</td>
<td>15% ethanol and 85% water</td>
<td>Bag on Valve</td>
<td>12 containers ruptured with some ejected away from case 50% of one carton unburned after 4 min No fire balls during rupture No pool fire</td>
</tr>
<tr>
<td>3</td>
<td>20% ethanol and 80% water</td>
<td>Direct Fill</td>
<td>12 containers ruptured but burned in place No fire balls during rupture No pool fire Bottom of boxes unburned after 5 min</td>
</tr>
<tr>
<td>4</td>
<td>20% ethanol and 80% water</td>
<td>Direct Fill</td>
<td>12 containers ruptured but burned in place No fire balls during rupture No pool fire Bottom of boxes unburned after 10 min</td>
</tr>
<tr>
<td>5</td>
<td>20% ethanol and 80% water</td>
<td>Bag on Valve</td>
<td>5 containers ruptured Fire extinguished by rupturing containers</td>
</tr>
</tbody>
</table>

None of the tests produced a pool fire or fireball. In all five tests, portions of the aerosol products in plastic containers and cardboard cases remained unburned. Based on these tests, it appears that the fire properties of alcohol/water mixture remained unchanged when pressurized and that using Class III commodity protection will provide fully adequate protection for the aerosol products in plastic containers.

### 3) Aerosol Products in Plastic Containers – Propellant: 4% by Weight Nonflammable Propellant or Flammable Propellant that is Emulsified in Liquid Base; Base: Aqueous Base with no Fire Point.

An emulsion, in an aerosol product, would be a mixture of two or more liquids in which one is present as droplets, of microscopic or ultramicroscopic size, distributed throughout the other. Emulsions are formed from the component liquids either spontaneously or, more often, by mechanical means, such as agitation, provided that the liquids that are mixed have no (or a very limited) mutual solubility. Emulsions are stabilized by agents that form films at the surface of the droplets (e.g., soap molecules) or that impart to them a mechanical stability.
A Level 1 aerosol (metal can) was defined by the fire performance of shave cream. This product had limited amounts of flammable liquefied gas propellant to eject the mixture and to cause foaming of the mixture. In a fire, the hydrocarbon propellant would be ejected and burn, but the large quantities of foam mix and water tended to produce a very limited fire severity. A similar product was evaluated when placed in a plastic aerosol container.

The product consisted of several liquid components that do not support combustion mixed with water and a maximum of 4% by weight flammable liquefied gas propellant. The liquefied gas was held within the liquid mixture as an emulsion. The gas would eject the liquid product and cause the liquid mixture to foam. Since the liquid components do not burn, the main concern centers around the flammable liquefied gas propellant. The evaluation used small, intermediate, and full-scale fire testing to evaluate the fire hazard created by this product. All of the testing was completed at Underwriters Laboratories.

The intermediate and large-scale testing are summarized in Table 3. The large-scale test used the 12-Pallet Aerosol Classification Test protocol. This methodology only applies to metal aerosol products but, lacking any test data, it was considered a good starting point. The 12 pallet load palletized array operated 4 sprinklers in 10 seconds at around a minute and a half after ignition. The fire was quickly knocked down. The test was run for 32 minutes. The liquid product was released during the test and did not contribute. The flammable liquefied gas did create brief flare-ups of the fire when released and continued to create small fireballs throughout the test. The high sprinkler discharge density (0.79 gpm/ft²) (32 mm/min) easily extinguished the majority of the array and limited the fire spread to the ignition flue located in the center of the array. The fire test seemed to demonstrate that the limited amount of flammable liquefied gas in the product would not produce a severe fire; however, the high water density does not permit easy comparison to a Class III commodity fire.

An intermediate-scale test was run under the calorimeter at UL to evaluate the effect of a significantly lower water density (0.25 gpm/ft²) (10 mm/min) on this product. The product was placed in a double row rack with a storage height of 15 ft (4.6 m). Four open sprinklers were located 10 ft (3 m) above the top of the array and arranged to deliver a 0.25 gpm/ft² (10 mm/min). The sprinklers were activated at approximately one minute after ignition. The test was terminated at 4 minutes since the fire was extinguished. The percent damage was not provided in the UL report; however the pictures indicate that the fire was again confined to the ignition flue.

NFPA 13 requires a 0.25 gpm/ft² (10 mm/min) to protect 15 ft (4.6 m) high double row rack storage of Class III commodity in a 25 ft (7.6 m) high building using low temperature ceiling sprinklers [NFPA 13, Table 16.2.1.3.2, Figure 16.2.1.3.2(c) curves E & F, Figure 16.2.1.3.4.1]. The intermediate-scale test indicates that this same protection level easily controlled/extinguished a fire involving the foam shave cream in a plastic aerosol container.
In addition to the intermediate and large-scale fire test, a number of small-scale tests were also done to provide a visual documentation on how a plastic aerosol container with a shave foam type product behaves when exposed to fire without sprinkler protection. These tests consisted of placing two cases of six containers on each side of a standard igniter. The containers were contained in a cardboard box. A shave cream and a hair mousse were tested. A general description of the test results is provided in Table 4. Test 9 used a product that was very similar to what was tested in the intermediate and large-scale testing. It was a shave cream product that had a small percentage of a flammable liquefied gas that was in a stable emulsion with a multi-component liquid mixture. The liquid mixture did not support combustion. The product in Test 10 had a higher weight percent flammable liquefied gas that did not form a stable emulsion in the bottle. A liquefied gas layer formed in the container. It was not clear what the liquid mixture was made up of. In both products, the flammable liquefied gas was used to eject the liquid mixture out of the container and cause the liquid product to create foam.

In Test 9, all but two of the containers failed. The shave foam covered the cases, containers and pan after the test. The product burned weakly and extinguished the igniter used in the test. The product used in Test 10 did appear to burn more vigorously. Container failure produced momentary fireballs. While this limited-scale test
cannot predict the behavior of a product in a full-scale arrangement, it did demonstrate that there were differences between the shave cream and the hair mousse, and that the hair mousse produced a more vigorous fire.

Table 4 UL Testing Summary

<table>
<thead>
<tr>
<th>Test #</th>
<th>Description</th>
<th>Fill Type</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Shave Cream Emulsion (4% by weight hydrocarbon propellant – the emulsion was stable, no propellant layer was noticeable in container)</td>
<td>Direct Fill</td>
<td>Initially flames are about 3 to 4 ft (0.9 to 1.2 m) high. First container ruptures at :50 seconds. Multiple container ruptures follow. The igniter is extinguished by a container rupture at approximately 1:15. The fire goes out at approximately 6 minutes. The two cases are covered in foam shave cream and two containers did not fail. There was no pool fire. The ruptures did not produce noticeable fireballs or increased burning.</td>
</tr>
<tr>
<td>10</td>
<td>Mousse and conditioner (6% by weight hydrocarbon propellant – the emulsion was not stable and a propellant layer formed in container)</td>
<td>Direct Fill</td>
<td>Initially flames are about 3 to 4 ft (0.9 to 1.2 m) high. First container ruptures at :48 seconds. Multiple container ruptures follow. The flames increase in intensity with the container ruptures. Eventually all of the containers are breached. A small pool of burning liquid formed but went out quickly. An increase in burning was noticeable with each container failure.</td>
</tr>
</tbody>
</table>

The results of the intermediate-scale testing, the full-scale testing, and the small-scale testing, indicate that an aerosol product in a plastic container filled with a liquid mixture that does not support combustion and no more than 4% by weight flammable liquefied gas in a stable emulsion with the liquid mixture can be protected using criteria recommended for a Class III commodity.

Emergency Nature: This issue meets two of the factors used by the NFPA in Section 5.3 of the Regulations Governing Committee Projects the define “Emergency Nature” (e and f), which are discussed below:

e) The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.

The current version of NFPA 30B (2011) recognizes the existence of aerosol products in plastic containers; however, it does not provide any specific fire protection options for these products. Unfortunately, the US DOT recognizes and allows aerosol products in plastic containers to be transported which will result in these products being stored in warehouses without clearly defined protection options. The research that has been completed has defined a low fire hazard aerosol product in a plastic container that can be stored in general purpose warehouses without significantly increasing the overall fire hazard. This information will help code officials and warehouse owners identify what aerosol products in plastic containers can be safely stored in their buildings.

f) The proposed TIA will correct a circumstance in which the revised document has resulted in an adverse impact on a product or method that was without adequate technical justification.

Many aerosol manufacturers feel they cannot begin producing aerosol products in plastic containers until clear protection criteria is available in NFPA 30B and the data needed to define protection criteria was not available to the NFPA 30B Committee before the previous revision cycle was completed. The first step of a larger test program for aerosol products in plastic containers has been completed. A low hazard category of aerosol products in plastic containers has been developed. The information in this TIA releases this information to manufacturers so they can begin producing low hazard aerosol products in plastic containers. This code change
is required to properly allow the products covered by this TIA to be stored and handled in the normal channels of commerce moving products from the manufacturer to the consumer. The technical justification was not available to the Technical Committee during the revision process.
Submitter: James A. Bloome, ONA - Davenport

Recommendation: Add a new term to read:

Propellant Heater. A device that heats the propellant before the propellant enters the propellant filler to enhance filler operation.

Substantiation: Definition is missing for a device that is commonly used in the propellant filling operation. Further guidelines for this device are required in other sections and a definition is needed for reference in these guidelines.
3.4.2* Button Tipper (Actuator Placer). The machine that places the valve actuator (spray tip) onto the aerosol container valve after the aerosol has had the base product has been, a crimped valve and propellant added.

Substantiation: Definition is incorrect. Text that has been eliminated refers to valve insertion, not actuator placement. New text accurately defines where the actuator is placed and at what stage in the aerosol production that this step occurs.
Aerosol container test baths shall and button tippers shall be enclosed and provided with exhaust ventilation. Ventilation requirements for button tippers are not defined in the standard. Clarification is necessary similar to the clarification provided for the test bath. Each time a button is placed a small amount of propellant is released. Enclosing and ventilating the space at which buttons are placed will provide protection for the operator and will prevent a cloud of explosive vapor from forming.
5.5.4 The area within 1.5 m (5 ft) in all directions of the hot tank shall be classified as a Class I, Division 2 or Class I, Zone 2 location.

Substantiation: This section uses an alternate name for the test bath rather than the principle name. In section 5.5.3 directly preceding this section the name test bath is used. Changing to an alternate name in this section may cause confusion as to whether or not the requirements of each section refer to the same piece of equipment.
30B- Log #7 (5.5.4 (New) )

Submitter: James A. Bloome, ONA - Davenport

Recommendation: Add a new section to read:

The area enclosed by the button tipper (actuator placer) shall be classified as a Class I, Division 1 or Class I, Zone 1 location.

Substantiation: The hazard rating of button tippers is not mentioned in the standard. This section will clarify the requirements similar to the clarification for test baths in the same sub-chapter. Propellant is discharged each time a button is placed onto an aerosol valve. The discharge is usually pure propellant if the aerosol has been filled with a thru-the-valve propellant filler. Class I, Division 1 or Class I, Zone 1 is required when an explosive atmosphere is expected during normal operation.
Submitter: James A. Bloome, ONA - Davenport
Recommendation: Add a new section to read:

The area within 1.5 m (5 ft) in all directions of the button tipper (actuator placer) shall be classified as a Class I, Division 2 or Class I, Zone 2 location.

Substantiation: The button tipper classification is not mentioned in the standard. Clarification of the electrical classification is necessary similar to the classification verification for test baths in the same sub-chapter. This input relates to the simultaneous input for classifying the area enclosed by a button tipper as Class I, Division 1 or Class I, Zone 1 location. Explosive levels of propellant gas can be expected within the area enclosed by the button tipper. The area surrounding the enclosure can be subject to the propellant gas under abnormal conditions. This is consistent with the definition of the proposed Division 2 (Zone 2) classification.
5.13.4 Flammable Liquid Propellant Pump and/or Propellant Heater.

5.13.4.1 If located inside a building, the propellant pump and/or propellant heater shall be located either in the propellant charging room or in a separate pump room having suitable ventilation, as described in Section 5.4.

5.13.4.2 If located outside, the propellant charging pump and/or propellant heater shall be located at least 7.6 m (25 ft) from the following:

(A) The propellant charging pump and/or propellant heater shall be placed on a finished noncombustible hard surface.

Substantiation: The propellant heater is a common device used with many aerosol propellant filling machines. Reference to this device has been missing from the standard. The definition has been added in a simultaneous input to bring awareness to the hazards of this device and bring clarity to using it safely. It is used in conjunction with the propellant pump and presents many of the same hazards, therefore it should be treated in the same way.
Propellant heater heat exchangers, piping, pumps, and valves shall have a working pressure rating that meets the pressure of the application.

Propellant heaters are commonly used in propellant filling operations. It may not be obvious to the designer that the components used in such devices need to have high pressure ratings to be safe. This requirement highlights the need to check this type of equipment and the application for safe operation.
5.13.5.1 When test baths are heated, they shall be heated with steam or hot water or electric immersion heaters that are properly rated for the products being tested and the hazard rating of the location.

With current restrictions only steam or hot water can be used to heat test baths. Electric immersion heaters are now available that can be safely operated in Class I, Division 1 or Class I, Zone 1 locations. This option is desirable for small or seldom used test baths, such as in laboratories, or in locations where steam or hot water are not readily available.
Propellant Heaters.

- Propellant heaters shall use hot water only for the heat exchanger that heats the propellant.

- A separate steam or hot water heat exchanger shall be used to heat the water that is used to heat the propellant.

Substantiation: Propellant heaters are used widely in propellant filling operations. This standard has not defined proper safety precautions necessary for this type of equipment. Hot water only, with a separate heat exchanger to heat the water, is necessary to prevent propellant from entering an open flame or unrated water heater or boiler. If the water for the propellant heat exchanger were directly fired a hazard would occur if the heat exchanger failed and propellant entered the heating water and was carried back to an unrated or open flame heating device. A separate, closed water system is needed to isolate the propellant from this hazard.
Submitter: Tracey D. Bellamy, Telgian Corporation

Recommendation: Section 6.3.2.7 would not allow revision on the Terra View System:
- For Tables 6.3.2.7 (e) and (g) change the type of in-rack sprinkler for the entire column from Spray K-80 or K-115 to Spray $\geq$K-80.
- For Tables 6.3.7 (f) and (h) change the type of in-rack sprinkler for the entire column from Spray K-5.6 or K-8 to Spray $\geq$K-5.6.
- For Tables 6.3.2.7 (i) and (k) change the type of in-rack sprinkler for the entire column from Spray K-115 or K-160 to Spray $\geq$K-115.
- For Tables 6.3.7 (j) and (l) change the type of in-rack sprinkler for the entire column from Spray K-8 or K-11.2 to Spray $\geq$K-8.0.

Substantiation: The change allows for larger orifice in-rack sprinklers based on demonstrated performance improvements for larger orifice sprinklers.
Submittal: Kenneth E. Isman, National Fire Sprinkler Association, Inc.

Recommendation: Replace the figures with the following new figures:

***Insert Figures 6.3.2.7(a), (b), (c) and (e) Here***

Substantiation: The current figures do not show the correct plan views. Some of them show a slice horizontally through the rack, but they are labeled and “Plan View”, but they do not show higher or lower in-rack sprinklers. Others show lower in-rack sprinklers, so they are inconsistent with the philosophy of showing a slice horizontally through the rack. It is better to just show the true plan view.

The 6 inch vertical clearance statements were removed from the figures and placed in the text by one of our other proposals.
FIGURE 6.5.2.7(a) In-Rack Sprinkler Layout, Cartoned Level 2 and Level 3 Aerosols.
FIGURE 6.3.2.7(b) In-Rack Sprinkler Layout, Cartoned Level 3 Aerosols.
FIGURE 6.3.2.7(c) In-Rack Sprinkler Layout, Cartoned Level 2 and Level 3 Aerosols, Clearance Greater Than 4.6 m (15 ft).
FIGURE 6.3.2.7(c) In-Rack Sprinkler Layout, Uncartonied Level 2 and Level 3 Aerosols, Racks up to 7.6 m (25 ft) High Storage.
### 30B- Log #17
(Table 6.3.2.7(b))

<table>
<thead>
<tr>
<th>Submitter:</th>
<th>Tracey D. Bellamy, Telgian Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendation:</td>
<td>Correct the two K11.6 entries in Table 6.3.2.7(b) to K11.2.</td>
</tr>
<tr>
<td>Substantiation:</td>
<td>The correct K Factor designation is K11.2.</td>
</tr>
</tbody>
</table>
Add new sections to read:

6.3.2.7.1 The ordinary-temperature design criteria correspond to ordinary-temperature rated sprinklers and shall be used for sprinklers with ordinary- and intermediate-temperature classification.

6.3.2.7.2 The high-temperature design criteria correspond to high-temperature rated sprinklers and shall be used for sprinklers having a high-temperature rating.

Substantiation: The clarifying language is needed to allow the use of intermediate temperature sprinklers within spaces that are unconditioned and have temperatures above 100F. This language matches that provided in NFPA 13, Sections 12.6.8.1 and 12.6.8.2.
Add new sections to read:

6.3.2.7.1 The protection criteria in Tables 6.3.2.7(a) through 6.3.2.7(l) shall only be used with ceilings having a pitch of 2 in 12 or less.

6.3.2.7.2 Fire protection requirements for more demanding commodity and clearance situations shall be permitted to be used for less demanding situations.

Substantiation: All of the fire tests that have been performed to develop the sprinkler criteria in NFPA 30B have been done under horizontal ceilings. Experience has shown that in situations where the slope exceeds 2 in 12, sprinklers up the slope and remote from the fire can activate first, skewing the design area and pulling critical water from the water supply, without having an effect on the fire. At the same time, the hot gasses moving up the slope and away from the sprinklers directly over the fire causes a delay in activating sprinklers directly over the fire. This delay calls into question the ability of the discharge to actually control or suppress the fire once the sprinklers open because aerosol fires have such fast growth rates.

Without a section such as this in the standard, people think that they can just use the criteria from NFPA 30B and then apply a 30% increase to the design area as referenced by NFPA 13 section 11.2.3.2.4. But this section of NFPA 13 was not intended to be used to protect aerosol fires and there is no evidence that a 30% increase to the design area and no increase to the density is sufficient protection for the commodities and storage arrangements handled by the tables in NFPA 30B.

6.3.2.7.2 While this concept has always been implicit in the codes and standards, it needs to be explicit for many AHJ’s. We originally thought that we would propose changes to the tables to add all of the potential options, but they got too difficult to identify and specifically add to the tables.

An example of what we are talking about can be seen in Table 6.3.2.7(h), which requires ceiling sprinklers at a design of 0.6 gpm per sq ft over 2300 sq ft and in-rack sprinklers at every level except the top for protection of 30 ft storage of Level 3 aerosols under a 43 ft roof (13 ft clearance) using the Unlimited Roof Height portion of the table and the interpolation allowance. But if the roof of the building were 2 ft higher, the last row of the table would allow us to put a barrier over the top of the storage and add a level of in-rack sprinklers while dropping the ceiling sprinkler criteria to 0.3 gpm per sq ft over 2500 sq ft. This dramatically lowers the water supply requirement and should be permitted for the lower clearance situations.
Insert a new 6.3.2.9.2 through 6.3.2.9.9 as follows:

6.3.2.9.2 Where in-rack sprinklers are required in conjunction with ESFR sprinklers as a part of the protection criteria in Table 6.3.2.7(e) through Table 6.3.2.7(l), all of the following conditions shall be met:

1. Roof height shall not exceed 9.14 m (30 ft).
2. Storage height shall not exceed 7.62 m (25 ft).
3. Clearance between top of storage and sprinkler deflectors shall be at least 0.91 m (3 ft).
4. Ceiling sprinkler design criterion shall be 12 sprinklers operating at a gauge pressure of at least 517 kPa (75 psi).
5. All in-rack sprinklers shall be quick-response type. (adapted from 30B:A.6.3.9.2)

6.3.2.9.3 Where in-rack sprinklers are not shielded by horizontal barriers, water shields shall be provided above the sprinklers, or listed intermediate level/rack storage sprinklers shall be used. (adapted from 13:8.13.3.2)

6.3.2.9.4 When in-rack sprinklers are necessary to protect a higher hazard commodity that occupies only a portion of the length of a rack, the following shall apply:

1. In-rack sprinklers shall be extended a minimum of 8 ft (2.44 m) or one bay, whichever is greater, in each direction along the rack on either side of the higher hazard. (adapted from 13:17.1.7.2)
2. The in-rack sprinklers protecting the higher hazard shall not be required to be extended across the aisle. (adapted from 13: 17.1.7.2.1)

6.3.2.9.5 Where a storage rack, due to its length, requires less than the number of in-rack sprinklers specified, only those in-rack sprinklers in a single rack need to be included in the calculation. (adapted from 13: 17.1.7.3)

6.3.2.9.6 In-rack sprinklers shall be located at an intersection of transverse and longitudinal flues while not exceeding the maximum spacing rules. (adapted from 13: 17.1.7.4)

A.6.3.2.9.6 In-rack sprinklers have proven to be the most effective way to fight fires in rack storage. To accomplish this, however, in-rack sprinklers must be located where they will operate early in a fire as well as direct water where it will do the most good. Simply maintaining a minimum horizontal spacing between sprinklers does not achieve this goal, because fires in rack storage develop and grow in transverse and longitudinal flues, and in-rack sprinklers do not operate until flames actually impinge on them. To ensure early operation and effective discharge, in-rack sprinklers in the longitudinal flue of open-frame racks must be located at transverse flue intersections. (adapted from 13: A.17.1.7.4) The commodity loads shown in Figure 6.3.2.7(a) through Figure 6.3.2.7(e) are typically 4 ft (1.2m) cubes. Accounting for flue spaces and vertical clear space between loads, this puts the in-rack sprinklers shown in the figures approximately 4.5 ft (1.4m) apart horizontally when they are between each load and approximately 9 ft (2.7m) apart horizontally when they are spaced at every other load. If the length or width of loads exceeds 4 ft (1.2m), in-rack sprinklers should still be positioned at flue intersections, but additional sprinklers may be necessary between the loads.

6.3.2.9.7 Where no transverse flues exist, in-rack sprinklers shall not exceed the maximum spacing rules. (adapted from 13: 17.1.7.4.2)

6.3.2.9.8 Horizontal Barriers and In-Rack Sprinklers. (adapted from 13: 17.1.8)

6.3.2.9.8.1 Horizontal barriers used in conjunction with in-rack sprinklers to impede vertical fire development shall be constructed of sheet metal, wood, or similar material and shall extend the full length and depth of the rack.

6.3.2.9.8.2 Barriers shall be fitted within 2 in. (51 mm) horizontally around rack uprights.

6.3.2.9.9 In-Rack Sprinkler Clearance. The minimum of 6 in. (15 cm) vertical clear space shall be maintained between the sprinkler deflectors and the top of a tier of storage. (adapted from 13: 17.2.4.2.1) Substantiation: The rules for in-rack placement in NFPA 13 are mostly in Chapters 16 and 17. However, these rules only apply to commodity Class I-IV and Group A plastics. These rules are not written to apply to other commodities such
as aerosols. If the NFPA 30B committee wishes these rules to apply, they need to specifically put them in NFPA 30B.

In each case, the location where the rules have been taken from is included in the proposal. However, the intent is not to consider these extract sections since they needed to be edited to work with the aerosol rules.

Proposed section 6.3.2.9.2 is taken from the annex to NFPA 30B. It contains information that is mandatory and should be in the body of the standard rather than the annex.
7.1.2.1 Cartoned display of Level 2 and Level 3 aerosol products shall be permitted, provided the area is protected in accordance with Table 6.3.2.7(a) through Table 6.3.2.7(l) or where the maximum quantity of cartoned display complies with 7.1.3.1.

Substantiation: Small quantities of cartoned product should be allowed within a mercantile occupancy without having to provide protection in accordance with Table 6.3.2.7(a) through Table 6.3.2.7(l). The proposal sets a quantity limit to that allowed within an unsprinklered or under sprinklered area.