MINUTES

NFPA Technical Committee on Special Effects (SPE-AAA)
NFPA 160/1126 First Draft Meeting (A2025)

October 24th, 2023
9:00 am – 5:00 pm (Eastern)

Quincy, MA

1. **Call to order.** Brian Panther, chair, called the meeting to order at 9:00 am on 10/24.
2. **Introductions.** Attendees introduced themselves and identified their affiliation and NFPA staff took attendance.
3. **Chair report.** Brian Panther welcomed attendees and provided an overview of the meeting.
4. **Staff liaison report.** Alex Ing provided an overview of the standards development process and the revision cycle schedule.
   a. The following Technical Committee Members disclosed the have been retained by another interest:
      i. Joshua Lazarus stated that he had been retained by Sparktacular on issues regarding RESquibs, and ESP.
5. **Previous meeting minutes.** The minutes from October 2019, Omaha, NE were approved without revision.
6. **NFPA 160 First Draft.**
   a. **Review of Public Inputs.** The Technical Committee reviewed the Public Inputs and developed First Revisions and Committee Inputs as necessary. These will be available in the First Draft Report at www.nfpa.org/160.
   b. **Task group report.** The following task groups provided their reports and recommendations.
      i. **Emerging Technologies**. Jimmy Beardmore. The task group provided a report. The task group was reconstituted to continue work.
      ii. **Flame Effect**. Brian Panther. The Brian ceded the chair temporarily to Josh Lazarus and provided the task group report, and revisions were made. The task group was reconstituted to continue work. The task group added members and the chair changed (see below)
   c. **Presentation(s).** The committee heard presentations from the following individuals.
      i. **Reusable Squib Technology.** Wayne Sawka. See related First Revisions

ii. **Flammable Liquid Fireball Effect.** Trip Barber. Presentation attached.

d. **New task groups.** The following task groups were appointed to work subsequent to the meeting:

i. **Flame Effect**. TG Chair: Josh Lazarus. Members: Eric Smith, Scott Schaffner, Bob Bauer, Daryl Marmon, Ed Kaminski, Ashley Bertling. The task group is charged with updating the flame effect appliance and performers chapters and maintaining coordination between them..

ii. **Flame Effect Classification and Control**. TG Chair: Eric Smith. Members: Glenn Birket, Nick Noch, Andy Nicholls, Ashley Bertling, Charley Weeth. The task group is to look at requirements and definitions in NFPA 160 around flame effect safety controllers and such variations such as control systems. The task group is also to look at the flame effect classification definitions as well.

7. NFPA 1126 First Draft.

a. **Review of Public Inputs.** The Technical Committee reviewed the Public Inputs and developed First Revisions and Committee Inputs as necessary. These will be available in the First Draft Report at www.nfpa.org/1126.

8. Other Business.

9. Future meetings. The next committee meeting will be in the September-November range. A meeting notification will be posted at www.nfpa.org/160next when the meeting is scheduled.

10. Adjournment. The meeting was adjourned at 6:13 pm on 10/24/23.

Attendees

Committee Members:

✓	**Panther, Brian**	Chair	Pyrotek Special Effects Inc.
	Bauer, Robert	Principal	The Doyle Street Group
✓	**Beardmore, James**	Principal	
✓	**Bertling, Ashley**	Principal	Pyrotechniq, Inc.
✓	**Birket, Glenn**	Principal	Birket Engineering, Inc.
✓	**Cappadocia, Peter***	Principal	ImageSFX
✓	**Christopoulos, Chris***	Principal	Universal Parks & Resorts
✓	**Dawe, Nicholas***	Principal	Cobb County Fire Marshal's Office
	Day, Richard	Principal	Michigan State Fire Marshal's Office
✓	**Dell, Jacob**	Principal	National Fireworks Association
	Desmares, Letisha	Principal	Jefferson Parish Fire Department
	Dumansky, Gregory	Principal	Global Asset Protection Services, LLC

	Fields, June	Principal	
	Frantz, H. Stephen	Principal	Pyro Solutions
✓	**Freedman, Max***	Principal	Sparktacular
✓	**Heckman, Julie**	Principal	American Pyrotechnics Association
✓	**Hock, Nick**	Principal	Image Engineering
	Larsen, Eric	Principal	Explosive FX Inc.
✓	**Lazarus, Joshua**	Principal	J Lazarus Consulting & Training, LLC
✓	**Marmon, Daryl**	Principal	Pyrotechnics Guild International, Inc.
✓	**Meyers, Craig**	Principal	Clark County Department of Building and
✓	**Nicholls, Andrew**	Principal	Orlando Special Effects, Inc.
✓	**O'Lena, Mike**	Principal	US Bureau of Alcohol, Tobacco, Firearms
✓	**Robbins, Rachel**	Principal	National Rescue Consultants
✓	**Rodgers, John**	Principal	John T. Rodgers, PE
✓	**Rossol, Monona***	Principal	Arts, Crafts & Theater Safety, Inc.
✓	**Sawka, Wayne**	Principal	Digital Solid State Propulsion Inc. (DSSP)
	Schoeneman, Larry	Principal	Entertainment Services and Technology
✓	**Smith, Eric**	Principal	Propane Solutions, LLC
	Stone, Jay	Principal	Ocean State Pyrotechnics
✓	**Streett, James***	Principal	International Alliance of Theatrical Stage
✓	**Torres, Yvonne***	Principal	Renegade Carnies, MDSO
✓	**Tran, Don***	Principal	CSA Group
✓	**Weeth, Charles***	Principal	Weeth & Associates, LLC
✓	**Wyman, Christopher***	Principal	National Association of State Fire
	Zmorenski, Tony	Principal	Walt Disney World
	Baur, Tassilo	Voting Alternate	The Alliance of Special Effects &
	Finan, Justin	Voting Alternate	International Fire Marshals Association
✓	**Pier, David***	Voting Alternate	MP Associates, Inc.
	Hamaric, John	Alternate	Universal Studios Orlando
	Kaminski, Edward	Alternate	Clark County Department of Building and
	Makuc, Paul	Alternate	National Association of State Fire
✓	**McManus, Tara***	Alternate	Combustion Entertainment & Safety LLC.
✓	**Newhouse, Ruth**	Alternate	

✓	**Ruling, Karl***	Alternate	Entertainment Services and Technology
	Russell, David	Alternate	Birket Engineering, Inc.
✓	**Sloan, Katherine***	Alternate	Propane Solutions LLC
✓	**Steinberg, John**	Alternate	Pyrotechnics Guild International, Inc.
	Stevens, Shawn	Alternate	US Bureau of Alcohol, Tobacco, Firearms
	Hagemann, Mark	Nonvoting Member	Occupational Safety & Health
✓	**Ing, Alex**	Staff Liaison	National Fire Protection Association

Guests:

Holly Burgess*	NFPA
Erin Grabe*	ESTA
John Canton	
Trip Barber	Pyrotechnics Chair/ NAR
Ronald Johnson*	

*Participated by teleconference
Total number in attendance: 38

6 AUG 2023 (Revised 9/7)

NFPA Task Group on Flammable Liquid Fireball Effects

Background.

This Task Group was a joint effort between the NFPA Pyrotechnics and Special Effects Committees, established by the Chairs of these two committees with the following charge:

1. Discuss and determine whether flammable liquid fireball effects properly belong in NFPA 1123, Code for Fireworks Displays, or if would it be more appropriate for them to be within the purview of NFPA 160, Standard for the Use of Flame Effects Before an Audience. The discussion and determination should be confined to the **concept** of placement within 1123 or 160 without developing any technical language or specifications on the effect itself.
2. Discuss what the consequences may be (i.e., licensure, credentials, enforcement and the like) if retained in NFPA 1123 or if transferred to NFPA 160 and how that may influence retention in NFPA 1123 or movement to NFPA 160.
3. Discuss and determine, to the best of the Task Group's ability, what changes would be needed to the scope of the PYR-AAA or SPE-AAA committees that would clarify and solidify retention in NFPA 1123 or movement to NFPA 160. (This would subsequently be put before the Standards Council for action.)

Members of the Task Group were as follows:

Trip Barber, TG Chair
John Steinberg
Mike O'Lena
Ed Kaminski
Jacob Dell
Scott Shaffner
Pete Cappadocia
Chad Beebe
Phil Grucci
Tony Zmorenski
Charley Weeth
Alex Ing, NFPA Liaison

Actions:

The Task Group met twice virtually (Teams), on February 1 and February 18, 2022, and had numerous e-mail exchanges among the members before and after these meetings.

The Task Group participants discussed the issue of placement of the "fireball effects" coverage within NFPA Codes from three perspectives. The discussion is summarized below.

Discussion of NFPA Code scope for the fireball effect.

These effects use a significant pyrotechnic charge, generally black powder (ignoring the use of high explosives, which are covered by other Codes), to aerosolize and ignite a substance (liquid or solid) that produces the fireball flame effect. If they are deemed to be fundamentally "pyrotechnic devices"

because they use such a charge (their current Code status) then the scope language for the Pyrotechnics Committee and NFPA 1123 sufficiently covers them. If they are deemed to be "flame special effects" and are further considered to be an effect that is not used before a proximate audience (with large quantities of flammable liquid/solid involved this appears to be true), then the scope language of the Special Effects Committee which is specifically focused on effects before a proximate audience, would have to be changed. The scope of NFPA 160 is not specifically confined to proximate audiences but covers flame effects for all audiences, so it would not need to be changed.

Discussion of licensing and permitting.

These flammable liquid fireball effects require the use of substantial black powder charges, which requires BATFE licensing as well as state pyrotechnics licensing of the operators and AHJ pyrotechnics permitting for an event using them. BATFE licensing is generally not required for proximate-audience pyrotechnics (at least when the operation is conducted strictly with UN 0431 "articles pyrotechnic" devices) or for flame effects. Operators of these events require a different state licensing and AHJ permitting that is based on which NFPA Code (160 or 1126) the event is operating under. So operators of shows with flammable liquid fireball effects require pyrotechnics licensing and permitting and a BATFE license, and have to meet the transportation, storage, and insurance requirements for pyrotechnics. This would be in addition to licenses and permits for flame effects, if these effects were in NFPA 160. The operators would not require flame effects licensing/permits if these effects were in NFPA 1123, as long as they are not mentioned in NFPA 160 and thereby appear to AHJ's to be "flame effects".

Discussion of Code Language.

NFPA 160 (and 1126) defines a "hybrid flame effect" as a "flame effect that is used in combination with a pyrotechnic material or device" and says "that portion of the hybrid flame effect that is governed by NFPA 1126 shall meet all of the requirements of NFPA 1126". An Annex to each of these two codes offers as one of the three examples of such an effect a "flammable liquid fireball effect" and says that the aerosolizing and igniting charges fall under the purview of NFPA 1126…or possibly NFPA 1123 (if bulk black powder is used rather than UN 0431 devices, which is generally the case). This language creates confusion. There is no language in either Special Effects Code (160 or 1126) providing standoff or safety requirements for flammable liquid fireball or hybrid flame effects, and unless they are quite small these fireballs are out of place in codes about effects done before a proximate audience and effects that are required to not drop burning material on the ground.

NFPA 1123 characterizes a "flammable liquid fireball effect" without defining it and does not mention or define any "hybrid flame effect" that should be covered in some manner by NFPA 1123 under that name based on the hand-off language used in NFPA 160 Annex A. This NFPA 1123 language also does not cover fireball effects that use solid powders rather than flammable liquids, so it appears to not be broad enough to cover the full range of fireball effects that use large pyrotechnic charges.

Conclusions:

1. These effects should be covered solely by NFPA 1123 because they use a significant pyrotechnic charge to function and require large and specified safety standoff distances like everything else in NFPA 1123; they are not used before proximate audiences. Although a flame effect is

produced, the way it is produced is through the use of a large charge of regulated pyrotechnic material.

2. These effects do not belong under the jurisdiction of the Special Effects Committee because they are not used before a proximate audience, which is the scope of that Committee.

3. The language about “hybrid flame effects” in Annex A to NFPA 160 that cites flammable liquid fireball effects that use significant pyrotechnic charges as an example of a “flame” effect should be removed to eliminate confusion as to where these effects belong.

4. The language in NFPA 1123 5.1.3.7 characterizing these effects as “flammable liquid Fireball effects” should be broadened to encompass solid fuel effects and should include the word “pyrotechnic” due to the nature by which they are created.

5. The language characterizing the scope of the Pyrotechnics Committee should be broadened to include jurisdiction over “pyrotechnic fireball effects”, potentially with appropriate adjustments to standoff distances and units of measure for solid fuel effects. Proposed language has been added to the report below.

All Material is new proposed material.

5.1.3.8* Solid Fuel Fireball Effects

5.1.3.8.1*

For effects using black powder or a black powder equivalent as a propellant and using solid fuels for fireball effects, whether discharged from mortars or other devices, the separation distance to the audience shall be as follows:

1. For round devices, the separation distances shall be 20 ft./in. (6.1 m/25 mm) of the internal diameter of the largest device to be fired.
2. For rectangular devices, the separation distances shall be 20 ft./in. (6.1 m/ 25 mm) of the largest dimension (width or length) of the largest device to be fired.
3. For volume-based calculation, Table 5.1.3.8.1(3) shall apply.

Table 5.1.3.8.1(3) Volume base separation distance

Volume (US gal)	Audience Separation Distance (ft)
<1	50
1 to 4	75
>4 to 10	150
>10 to 25	200
>25 to 100	250
>100 to 200	300
>200 to 400	350
>400	600

Note: 1 US gal is 3.8 liters

A.5.1.3.8.1: Calculated volume can be used to determine a lesser required separation distance consistent with industry experience and safety than the separation distance based upon device size. The volume of a cylinder in cubic inches is as follows:

$$V = \pi \times r^2 \times h$$

$$V = Volume\ (in^3)$$

$$r = radius\ (in)$$

$$h = height\ (in)$$

To obtain that volume in gallons, multiply the number of cubic inches by **0.0043** for converting into US gallons or by 0.0036 for Imperial gallons.

5.1.3.8.2

If multiple devices are separated by less than ten feet between each device to create a single fireball effect, the combined volume of all devices shall determine the audience separation distance.

5.1.3.8.3 If the solid fuel fireball effect contains any type of insert such as stars or other effects that split, burst, or provide additional effects other than simple combustion, the audience separation distances shall be increased by 50%.

5.1.3.8.4 Solid fuel fireball effects shall be fired from any of the following devices:

1. Display fireworks mortars.
2. Plastic containers, provided all handles, metal parts, and attachments are removed.
3. Cardboard containers
4. Metal containers with minimum wall thickness of 1/8” (3.18mm) for all containers with a volume over 5 gallons (0.02 m^3).

5.1.3.8.5* When prevailing winds are oriented toward the audience a 20% increase in audience separation distance shall be required.

A.5.1.3.8.5 Wind at the time of the display can differ from wind at the time of display set up and may require repositioning of fireball devices. 8.1.4.2 provides further guidance with respect to wind effects on display safety.

5.1.3.8.6 Solid fuel fireball effects shall be assembled in their respective firing locations and not moved or transported after assembly.

5.1.3.8.7* Solid fuel fireball effect devices using black powder or an equivalent propellant that are used in a display with projectile or other firework devices shall be protected from premature ignition from debris or other components of the projectile fireworks by means of a plastic or foil or similar covering.

A.5.1.3.8.7 If utilizing metal bowls to contain the black powder or other lift charge and the solid fuel is not to be immediately loaded, an opaque covering such as foil or similar cover to prevent premature ignition of the e-match or other igniter should be used.