NFSA
The Voice of the Fire Sprinkler Industry

Tuesday e-Tech Alert

Number 149 **June 9, 2009**

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Best Questions of May 2009

We have selected the following questions as the "Best of May 2009" answered by the engineering staff as part of the NFSA's EOD member assistance program:

Question 1 – Pressure Gauge on Backflow Preventer

Recently, one of my projects was reviewed by a local engineer. At the system riser, our shop drawings indicated a backflow preventer, a wet system with a riser manifold and a small, 2-inch dry valve. One of the engineer's review comments was that, per NFPA 13, 2007 edition, Section 7.1.1.2, a pressure gauge was required to be installed on the supply side of the system backflow preventer. Section 7.1.1.2 states: "Pressure gauges shall be installed above and below each alarm check valve or system riser check valve where such devices are present." As we discussed the issue, I referred to the definition found in Section 3.5.8.that defines system risers. The engineer still did not agree with my interpretation, being of the opinion that the backflow preventer was the system check valve. Was the engineer correct?

Answer: Whether or not the pressure gage was required depends on how the backflow preventer was being used. If it was being used to replace the system check valve, then, yes, it was required. But if the wet system and dry system had their own check valves, then it was not required. The reason that NFPA 13 wants a gauge on the water supply side of the system check valve is to be able to tell if the check valve is holding closed. Typically, higher pressures get trapped in the fire protection system, so the system gage is always reading a higher pressure than the supply gauge. We know by glancing at the gauges that the check valve is working. If the backflow preventer is replacing the check valve, then we need to know that device is working too. Since there are other ways to test a backflow preventer to see if it is working, some AHJ's might allow the supply gage to be eliminated where a backflow preventer is installed. Both Section 1.5 and 1.6 allow the alternate arrangement without the gauge, but it would be up the AHJ to decide if they really thought it was equivalent.

Question 2 – Hydraulic Balancing of Systems

Section 22.4.4.8.2 of the 2007 edition of NFPA 13 reads as follows: "Unless the requirements of 22.4.4.8.3 or 22.4.4.8.4 are met, mixing of sprinklers of different orifice sizes by reducing the orifice size of adjacent sprinklers on the same branch line leading back to the main for the purpose of minimizing sprinkler over discharge shall not be permitted." With this in mind, one could assume that it is acceptable to vary orifices in the same remote area as long as the k-factors of the differing orifices are not on the same branch line. The reasoning for this would be for the very purpose of minimizing the sprinkler over-discharge. This does not make any sense

to me. I call this type of hydraulic calculation Voodoo hydraulics. Is there any plan on clarifying this particular area of the standard?

Answer: The NFPA 13 Committee has been wrestling with this language for years, trying to clarify it. Every time it addresses one situation, another pops up. Basically there are concerns over improperly replacing sprinklers following a fire if orifice sizes are mixed. Situations with multiple orifice sizes need to be avoided. However, there are instances when they make a great deal of sense, such as when a sidewall sprinkler covers most of a room, but you need a small pendent sprinkler to cover a small area that the sidewall can't reach. In that case, it's easy to keep the wrong size sprinkler from being installed because they look so different.

Question 3 – Sprinklers with Mansard Construction

Consider a building with mansards over 4 feet wide constructed of metal trusses but with roofs constructed of plywood decking with concrete roof tiles. No wood trusses are used in the construction of the mansards and the bottoms of the mansards are stucco. Would sprinklers be required inside the mansards? Would sprinklers be required in the stucco bottoms of the mansards if there was no storage beneath them?

Answer: The two questions need to be addressed separately. Inside the mansards, the key question is whether combustible construction is visible. If the answer is "yes", then sprinklers would be required unless one of the exceptions regarding combustible concealed spaces were met. If no combustible construction is visible, then sprinklers would not be required because it would be a non-combustible concealed space. In the description that you have provided, it would appear that the only combustible is the underside of the plywood decking. This makes the space a combustible concealed space needing sprinklers, unless it is filled with non-combustible insulation or meets one of the other exceptions. One possibility to avoid having to put sprinklers in this space is to use fire retardant treated wood for the decking in accordance with Section 8.15.1.2.11. Another possibility is to put some non-combustible or limited combustible material on the underside of the decking so that the exposed surface within the concealed space is not combustible.

Under the mansard, the space would need to be sprinklered if combustibles are stored below or if the exposed materials of construction for the mansard are combustible. It would appear from your description that neither of these situations is the case. The exposed materials appear to be concrete and stucco and there is no storage beneath. Section 8.15.7.3 permits sprinklers to be omitted from under the mansard.

Question 4 – Sprinklers under Opaque Skylights

We are working on a project that requires us to find the origin of 1991 NFPA 13 Section 4-3.1.3.2 (d). The Section states: Sprinklers under glass or plastic skylights exposed to the direct rays of the sun shall be of the intermediate temperature classification. The
1991 edition of NFPA 13 represented a complete rewrite of the 1989 standard and therefore there is no identification of the section as being new. There is also no supplementary material in the appendix or the handbook that expands on why the section was added to the 1991 edition. Our specific concern is whether the section is applicable to opaque skylights. The code section specifically states "skylights exposed to <u>direct</u> rays of the sun." Although the skylight itself is exposed to direct rays from the sun, it only allows a reduced amount of heat to enter the building when compared to clear skylights.
Assistance from the NFPA librarian did not reveal any committee documentation that would shed light as to when and why this requirement was proposed. Any help you can provide would be appreciated.

Answer: The objective is to give guidance on the 100-degree rule. Basically, NFPA 13 wants intermediate or high temperature sprinklers to be used in any location where the sprinkler might be exposed to temperatures of

100 degrees F or higher. The list of items in Section 4-3.1.3.2 is an attempt to provide guidance on this performance-based requirement. If engineering judgment is that the sprinkler will not be heated to 100 degrees F, then ordinary temperature sprinklers should be acceptable, but the real test would be to monitor temperatures on the hottest, sunniest day. Skylights, even if opaque, are generally not as well insulated as ceilings. NFPA 13 requires the use of intermediate temperature sprinklers in uninsulated attics (Section 8.3.2.5(5)), so the standard can be considered consistent in this regard.

Question 5 – Conveyor Application Rates per NFPA 15

For protection of conveyor belts, Section 7.2.3.3.1 in NFPA 15 (2007 edition) requires the water spray system to automatically wet the top belt, its contents, and the bottom return belt. The following section specifies a "net rate" of discharge of not less than 0.25 gpm/sq ft for "the top and bottom belt surface area, conveyor surfaces where combustible materials are likely to accumulate, the structural parts, and the idler rolls supporting the belt". Does the net rate include the two spray nozzles at once (above and below the belt), meaning a combined 0.25 gpm/sq ft density for both operating, or is it for one of the nozzles, then the lower nozzle is the same rate?

Answer: The nozzle(s) protecting the top belt need to discharge enough water to cover the top belt with at least a 0.25 density and the nozzle(s) protecting the bottom belt also need to discharge enough water to cover the bottom belt with at least a 0.25 density. The nozzles need to be spraying simultaneously.

Question 6 – Room Design Method for Dry and Preaction Systems

Can we use the room design method with dry and preaction systems?

Answer: Yes, the room design method can be used with dry pipe and preaction systems. In such case, there is no requirement for an increase in the design area. The assumption is that all of the sprinklers are going to open in the room and that the walls will have enough fire resistance to keep the fire in the room until the sprinklers have suppressed it or the fire department has arrived to handle final suppression. You need to be very careful about following all of the rules regarding automatic door closers on all the doors and making sure that the doors have the right fire resistance rating. Only in light hazard occupancies can you ignore the door rules and add two sprinklers in the adjoining room.

Question 7 – Fire Pumps and PRVs

We have a hospital client who has two electric fire pumps (north and south) in the lower level of a hospital. Both serve a common fire loop that is above the ceilings in the basement and supplies all the standpipes in the hospital. We are in the early design stages of planning for a new high rise connected to the hospital that will require 100 psi at flow from the standpipes. The old code allowed 65 psi. The current proposal is to remove the north fire pump and install a new pump in the new high rise that will serve the higher pressure demand. In order to keep the redundancy in the fire loop we propose to connect the new higher pressure pump back into the loop with a pressure regulating valve (PRV) so as to avoid too much pressure on the old system. Is it the intent of Section 5.7.6.2 to prohibit PRVs downstream of the fire pump? The PRV would not be used in lieu of correctly sizing the new fire pump, but just to get the pressure down for a back-up supply to the old fire loop.

Answer: There are two issues. The first is that NFPA 20 does not want a pressure reducing valve in the discharge piping. Technically, the discharge piping is the portion of pipe between the discharge flange of the pump and the discharge control valve. Downstream of the discharge control valve is no longer in the jurisdiction of NFPA 20, so it might be possible to put a pressure reducing valve there.

But the second issue is NFPA 14. That document is not quite clear on this subject, but the intent of Section 7.2 is to prohibit the use of a single pressure regulating device where there are more than two hose connections downstream of the device. Instead, NFPA 14 permits a master pressure regulating assembly (Figure 7.2.2(b)) that consists of two pressure regulating valves in series. The second valve has to be a pilot operated type of device. The purpose of the second valve is to reduce the pressure in case the first valve fails in the open position. We don't want fire fighters exposed to high pressure water at a hose connection, so the committee wants the redundancy.

Question 8 – Requirements for Corrosion Resistance

Can you please tell me the intent of Section 8.16.4.2.3 of NFPA 13-2007: *"Where corrosive conditions exist or piping is exposed to the weather, corrosion-resistant types of pipe, fittings, and hangers or protective corrosion-resistant coatings shall be used."* Is the intent of this clause to require all piping in parking garages (with enclosed walls) to have the piping meet 8.16.4.2.3? We have a scenario of an enclosed parking garage with a dry system using black steel pipe. The only area that is exposed to the weather is the entrance to the parking garage, approximately 300 sq ft with no doors present. The local AHJ is requesting that all of the sprinkler piping be changed out in order to meet the requirements of 8.16.4.2.3 using galvanized pipe or other corrosion-resistant pipe and fittings.

Answer: This is one of the sections of NFPA 13 that is intentionally vague and needs to be interpreted by a professional knowledgeable with the specific site where the sprinkler system is going to be installed. An open parking garage near the ocean, for example, would tend to need corrosion resistant pipe, fittings, sprinklers and hangers because of the salt in the air. An enclosed parking garage that is not near any bodies of salt water would probably not require any special protection as long as the components were not directly subjected to rain falling on them or snow collecting on them. Ultimately, it is the specifying engineer that is supposed to make this decision. If the decision is made incorrectly, you will know soon enough when the materials start to show corrosion. Taking a look at similar installations in the area can help designers and specifiers make the decision.

Question 9 – Using a 2-inch Combined Domestic and Fire Line for NFPA 13

It has been proposed to use an existing 2-inch water supply line to supply both sprinkler demand and domestic demand for a retrofit application. Several sections of NFPA 13 appear to be applicable:

23.1.3.2* For mains that do not supply hydrants, sizes smaller than 6 in. shall be permitted to be used subject to the following restrictions: (2) Hydraulic calculations show that the main will supply the total demand at the appropriate pressure...
A.23.1.3.2 When a single main less than 6 inches in diameter serves both domestic and fire systems, the domestic demand should be added to the hydraulic calculations for the fire system at the point of connection...

Can I use Table A.6.6.5(b) from NFPA 13R to calculate total estimated domestic demand for this office building and include that flow at the base of my riser in my calculation for this retrofit? I should be covered conservatively in terms of domestic use as that chart applies to residential applications where domestic water use is generally higher than in an office type building. As long as hydraulic calculations prove that the existing main is capable of providing the flow required at the correct pressure, there appears to be nothing in the standard that would prevent the existing 2-inch line from being used to supply the fire protection system.

Answer: As long as the hydraulic calculations show that you can provide the pressure and flow necessary to meet the demand of the fire sprinkler system, while taking into account a reasonable simultaneous domestic

demand, the 2-inch main is acceptable. The domestic demand calculation method from NFPA 13R can be used as a reasonable approach, since it bases the estimated demand on a probability that a certain percentage of available downstream fixtures are being used at a given time.

Question 10 – Unsupported Armovers

Is it the intent of NFPA 13 Section 9.2.3.5.1 that hangers be installed on unsupported armovers within 24 inches of the end of the armover, or simply for a hanger to be installed on armovers that are longer than 24 inches? Our example involves a 1-1/2-inch Schedule 40 armover 8 ft in length, supplying one sprinkler below ductwork. We have a hanger within 40 inches of the sprinkler at the end of this armover in accordance with Section 9.2.3.4. Are we in compliance with NFPA 13?

Answer: Since the hanger does not have to be within 24 inches of the end, you are in compliance with NFPA 13. However, this does need further clarification. Once the armover is far enough from the branch line (noted by Section 9.2.3.5.1) it requires its own hanger. The hanger on that section should consider the unsupported lengths in Section 9.2.3.4.1 as maximum distances from the end. When an armover has its own hanger it acts physically the same as the end of the branch line with a sprinkler on it. Therefore, the same maximum distance from the unsupported end should be applied.

We are concerned by the example you provided that you may not be interpreting the 24-inch distance properly. The distance is best explained in Figure A.9.2.3.5. The figure shows the plan view of the system. The distance that Section 9.2.3.5.1 addresses is the horizontal distance of the armover. The length of the armover in the elevation view is not part of the consideration of this section. We should caution you that NFPA 13 is a minimum standard and there may be scenarios for which the length of the armover presents a significant weight and adding a hanger may be a wise decision. The Committee has discussed the length of armovers through the past two revision cycles but has not been able to agree on a specific length at which the concern begins.

Question 11 – Concealed Sprinklers within Beams

Can a concealed sprinkler be placed on the bottom of a false beam as long as it is within 12 inches of the ceiling? My opinion is that placing concealed sprinklers at the bottom of faux beams (less than 12 inches deep) should not be a problem. I have not yet found a specific technical justification against this position in NFPA 13 or the technical literature from manufacturers of concealed sprinklers. NFPA 13 (2002 edition) addresses this issue in section 8.6.4.1.1 for standard pendent spray sprinklers, which allows the deflector to be minimum of 1 inch and maximum 12 inches from the ceiling. Also note 8.6.4.1.1.2 for concealed, flush, and recessed sprinklers, which basically allows the 1-inch minimum to be an exempted based on specific listings. Your thoughts?

Answer: As you note, Section 8.6.4.1.1.1 of NFPA 13 (2007 edition) contains the rule requiring that sprinkler deflectors be positioned 1 to 12 inches below unobstructed ceilings. The following Section 8.6.4.1.1.2 exempts concealed, recessed and flush sprinklers from the rule, stating that such sprinklers can be installed with their operating elements and deflectors nearer to or above “the ceiling”. As such, the allowance to use concealed sprinklers in a faux beam face would depend on whether the AHJ considers the beam face to be part of the ceiling surface. Obviously, in an irregular ceiling, elevation changes take place and concealed sprinklers can be used in higher and lower areas. At some point the lower areas could become smaller and smaller so as to start resembling beams. This is why the decision would be that of the AHJ.

In some retrofit applications, the use of faux beams provides a means to conceal sprinkler piping and protect areas that could not otherwise be protected. There is a great deal of precedent for installing sprinklers in the

lower face of such beams, including flush and recessed sprinklers. As explained in A.3.6.1, however, it should be recognized that concealed sprinklers are slower to operate than other types of sprinklers. As they are moved toward the maximum 12 inches below the unobstructed ceiling surface their operating times can be expected to increase further. For this reason the AHJ should use caution in the allowance for concealed sprinklers in beam faces.

Question 12 – Sprinklers under Grated Walkways for Tire Protection

I have a small retail tire store project where the application of the 2007 edition of NFPA 13 is required. The tire storage racks are 16 ft high, each a little less than 4 ft wide (18-inch rack, 9.5-inch flue, and 18-inch rack), with a grated walkway about 4 ft to 4 ft 3 in. wide between them at the 9 ft elevation. The building height is less than 28 ft with open bar joists.

There are two options that I am considering:

- Per Section 18.4(a)(6) – Conventional sprinklers using 0.4/3000 gpm/sq ft at the roof with 12 in-rack sprinklers flowing at 30 psi in the longitudinal flue that I assume will protect the walkways, as they are less than 8 ft apart on center.

- Per Section 18.4(d) – ESFR protection at the roof (flowing 12 sprinklers), with sprinklers below the grated walkways.

Under "general continuous obstructions" in the ESFR rules, Section 8.12.5.3.3 says to use intermediate level/rack storage sprinklers or otherwise shielded sprinklers under open gratings. Sprinklers installed under the grating in this case are just protecting the walkways, since the ESFR sprinklers at the roof protect the rack storage. Sections 14.4.4, 15.4.4, 16.2.3.5, and 17.2.3.4 say "Where ESFR sprinklers are installed above and below obstructions, the discharge for up to two sprinklers for one of the levels shall be included with those of the other level in the hydraulic calculations." Is there somewhere in NFPA 13 that is more specific on the design for in-rack, mezzanine, and sprinklers under walkways? If I use the intermediate level sprinklers, how do I treat them? If I use ESFR sprinklers under there with shields, I assume the two extra sprinklers flowing. I have struggled to find information on how to calculate sprinklers in racks, mezzanines, or under obstructions such as these in NFPA 13, so I usually use FM Global's September 2002 Datasheet 2.2, *Installation Rules for Suppression Mode Automatic Sprinklers*. This has much more information, but in this case, Section 2.3.2.2 says sprinklers are not required under grated walkways less than 10 ft wide, provided the grating is at least 70% open.

Answer: When you use ESFR sprinklers at the ceiling, you need to include two sprinklers under the walkways in the system demand, regardless of what kind of sprinklers they are. Just balance the flow for these sprinklers to the pressure required at the ceiling for the ESFR sprinklers. Regardless of FM Global requirements regarding sprinklers under the walkways, NFPA 13 requires sprinklers in that location out of concern that, during a fire, product will fall off the rack onto the walkway and block the discharge of sprinklers to areas below.

Upcoming "Technical Tuesday" Online Seminar – June 16th

Topic: Sprinklers and the National Electrical Code
Instructor: Cecil Bilbo, Jr., C.E.T. – NFSA Consultant
Date: June 16, 2009

The National Electrical Code has specific information for the design and installation of fire sprinkler systems. Included in this seminar will be a discussion of the rules regarding the placement of sprinklers relative to energized electrical equipment, the bonding and grounding of sprinkler systems and the use of Article 695 for electric motor driven fire pumps.

Upcoming "Business Thursday" Online Seminar – June 18th

Topic: Strategic Planning for Contractors
Instructor: Don Pamplin, NFSA Northwest Regional Manager
Date: June 18, 2009

The majority of public and private sector organizations do not perform effective strategic planning. They think they do and in many situations, they even call it "strategic planning" but the planning model that they use is not really strategic. In the business world, the bottom line is to make profit and the more profit you consistently make, the better insulated you are from the disastrous effects of economic and/or social change. By practicing effective and efficient strategic planning, you can be better prepared to change direction to meet new market demands and technology shifts. All business organizations within the Fire Sprinkler Industry need to use effective strategic planning to create a realistic and achievable roadmap to lead them to where they want to be in the next three to five years.

Joint "Technical Tuesday" and "Business Thursday" ITM Effort to Start

Beginning in July of 2009, the NFSA will be sponsoring new series of "Technical Tuesday" and "Business Thursday" seminars that combine to present coordinated training aimed at helping individuals train for the work elements in the NICET Inspection and Testing certification program. As usual, ten "Technical Tuesday" online training programs will be offered for the second half of 2009, along with a series of six "Business Thursday" online seminars. What is unusual is that, for the first time ever, topics have been selected that allow a comprehensive review of both technical and nontechnical topics in the same overall subject area:

Technical Tuesdays – 2nd Half 2009

Date	Topic	Instructor(s)
July 21	System Terminology	V. Valentine
Aug 4	Wet Systems and Testing Preparations	J. Hugo
Aug 25	Field Identification of Sprinklers	R. Fleming
Sept 15	Basic Math	V. Valentine
Sept 29	ITM for Dry Systems	K. Isman
Oct 13	ITM for Backflow Devices	K. Wiegand
Oct 27	ITM for Hose, Hose Connections & Valves	K. Isman
Nov 10	Tank Inspections	K. Isman
Nov 24	Obstruction Inspections and Investigations	R. Fleming
Dec 8	ITM for Preaction and Deluge Systems	C. Bilbo

Business Thursdays – 2nd Half 2009

Date	Topic	Instructor(s)

July 30	Business & Professional Communications	R. Fleming
Aug 20	Impairment Procedures	K. Wiegand
Sept 24	Roles of the System Inspector and AHJ	R. Fleming & D. Kasmauskas
Oct 15	Inspection Contracts	M. Friedman
Nov 19	Planning and Scheduling	M. Friedman
Dec 3	Workplace Safety and the "Right to Know"	D. Bowman

Additional training opportunities available through the NFSA engineering department include…

Two-Week Layout Technician Training

September 14-25, 2009	Baltimore, MD
October 12-23, 2009	Phoenix, AZ

Inspection and Testing for the Sprinkler Industry

June 16-18, 2009	Leominster, MA

Advanced Technician Training

June 23-25, 2009	Denver, CO

For more information on the above classes, contact Nicole Sprague using Sprague@nfsa.org or by calling 845-878-4200 ext. 149.

In-Class Training Seminars

The NFSA training department also offers in-class training on a variety of subjects at locations across the country. Here are some upcoming seminars:

Introduction to Sprinkler Systems (1/2 Day)	Hillsboro, OR	June 15
Sprinkler Protection for General Storage	Hillsboro, OR	June 16
Hydraulics for Fire Protection	Hillsboro, OR	June 17
Basic Seismic (1/2 Day)	Hillsboro, OR	June 18
Advanced Seismic (1/2 Day)	Hillsboro, OR	June 18
Residential Sprinklers: Homes to High Rise	Albany, NY	June 23
Introduction to Sprinkler Systems (1/2 Day)	Albany, NY	June 24
Commissioning & Acceptance Testing (1/2 Day)	Albany, NY	June 24
Sprinkler Protection for Special Storage	Albany, NY	June 25
Hydraulics for Fire Protection	New Lenox, IL	July 7
NFPA 13 Overview	New Lenox, IL	July 8-9
Fire Pumps for Fire Protection	Denver, CO	July 7
Fire Pump Layout & Sizing (1/2 Day)	Denver, CO	July 8
Underground Piping for Fire Protection (1/2 Day)	Denver, CO	July 8
Inspection, Testing & Maintenance	Denver, CO	July 9
CPVC Piping Installation Requirements (1/2 Day)	Denver, CO	July 21
Sprinkler Protection for Flammable & Combustible Liquids	Denver, CO	July 21
Residential Sprinklers: Homes to High Rise	Denver, CO	July 22

Sprinkler Protection for Dwellings	Denver, CO	July 23
Commissioning and Acceptance Testing (1/2 Day)	Apple Valley, CA	July 28
CPVC Piping Installation Requirements (1/2 Day)	Apple Valley, CA	July 28
Inspection, Testing & Maintenance	Apple Valley, CA	July 29
Sprinkler Protection for Rack Storage	Apple Valley, CA	July 30
Inspection, Testing & Maintenance	Lake Jackson, TX	Aug 4
Hydraulics for Fire Protection	Lake Jackson, TX	Aug 5
NFPA 13 Update 2002	Lake Jackson, TX	Aug 6
Residential Sprinklers: Homes to High Rise	Rogers, AR	Aug 11
Sprinklers for Dwellings	Rogers, AR	Aug 12
Sprinkler Prot. for Flam. & Comb. Liquid Storage (1/2 Day)	Rogers, AR	Aug 13
CPVC Piping (1/2 Day)	Rogers, AR	Aug 13
NFPA 13 Overview	Kahului, HI	Aug 12-23
Inspection, Testing & Maintenance	Kahului, HI	Aug 14
NFPA 13 Overview	Brighton, MI	Aug 19-20
Sprinklers for Dwellings	Brighton, MI	Aug 21
NFPA 13 Update 2007	Aurora, IL	Aug 26
NFPA 13 Overview	Aurora, IL	Aug 27-28
Introduction to Sprinkler Systems (1/2 Day AM)	Alexandria, MN	Sept 8
NFPA 13 2002 Update (1/2 Day PM)	Alexandria, MN	Sept 8
Plan Review Policies & Procedures	Alexandria, MN	Sept 9
Inspection, Testing & Maintenance	Alexandria, MN	Sept 10
NFPA 13 2007 Update	Dayton, OH	Sept 16
Sprinkles for Dwellings	Dayton, OH	Sept 17
CPVC Piping Installation Requirements (1/2 Day)	Dayton, OH	Sept 18
Commissioning and Acceptance Testing (1/2 Day)	Dayton, OH	Sept 18
NFPA 13, 13R, 13D 2007 Update	Anaheim, CA	Sept. 22
Hydraulics for Fire Protection	Anaheim, CA	Sept. 23
Underground Piping (1/2 Day)	Anaheim, CA	Sept 24
Basic Seismic (1/2 Day)	Anaheim, CA	Sept 24
Plan Review Policies & Procedures	Berlin, VT	Sept 22
Sprinkler Protection for Rack Storage	Berlin, VT	Sept 23
CPVC Piping (1/2 Day)	Berlin, VT	Sept 24
Basic Seismic (1/2 Day)	Berlin, VT	Sept 24
Inspection, Testing & Maintenance	Concord, NH	Oct 13
Residential Sprinklers: Homes to High Rise	Concord, NH	Oct 14
Sprinklers for Dwellings	Concord, NH	Oct 15
Underground Piping (1/2 Day)	Woodland, CA	Oct 20
Commissioning & Acceptance Testing (1/2 Day)	Woodland, CA	Oct 20
Sprinkler Protection for General Storage	Woodland, CA	Oct 21
Sprinkler Protection for Special Storage	Woodland, CA	Oct 22
Pumps for Fire Protection	Edwardsville, IL	Oct 27
Sprinkler Protection for General Storage	Edwardsville, IL	Oct 28
Sprinkler Protection for Rack Storage	Edwardsville, IL	Oct 29
NFPA 13 Overview	Pembroke, MA	Oct 27-28
Plan Review Policies & Procedures	Pembroke, MA	Oct 29
Inspection, Testing & Maintenance	Irving, TX	Oct 27
Hydraulics for Fire Protection	Irving, TX	Oct 28
NFPA 13, 13R, 13D 2007 Update	Irving, TX	Oct 29

These seminars qualify for continuing education as required by NICET.

To register or for more information, contact: Dawn Fitzmaurice at (845) 878-4207, E-Mail: seminars@nfsa.org

About the National Fire Sprinkler Association

Established in 1905, the National Fire Sprinkler Association (NFSA) is the voice of the fire sprinkler industry. NFSA leads the drive to get life-saving and property protecting fire sprinklers into all buildings; provides support and resources for its members – fire sprinkler contractors, manufacturers and suppliers; and educates authorities having jurisdiction on fire protection issues. Headquartered in Patterson, N.Y., NFSA has regional operations offices throughout the country. www.nfsa.org.