“Of course we enforce NFPA 25”

Richard M. Ray, PE
Cybor Fire Protection Company
Downers Grove, IL

DISCLAIMER:

- Though I am a member of the NFPA 25 Technical Committee, I am NOT representing nor speaking on behalf of the entire NFPA 25 Technical Committee

History of NFPA 25

- ITM used to be covered by NFPA 13A – which was only a recommended practice, NOT a standard
- The 1st NFPA 25 was the 1992 edition – Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
- NFPA 25 was revised for 1995, 1998, 2002, 2008, and 2011
- NFPA 25 is now in cycle for the 2014 edition

Inspection, Testing and Maintenance of SPRINKLER SYSTEMS

NFPA
13A
1987 Edition

National Fire Protection Association
1 Batterymarch Park, Quincy, MA 02269

ANSI/NFPA 25 An American National Standard February 10, 1992

NFPA 25 Water-Based Fire Protection Systems 1992 Edition

National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101

25

NFPA 25 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems 1995 Edition

National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Standards-Making Organization

Row's

NFPA 25

Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

1998 Edition

National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101, USA
An International Codes and Standards Organization

NFPA 25

Inspection, Testing, and Maintenance of

Water-Based Fire Protection Systems

2002 EDITION

An International Codes and Standards Organization

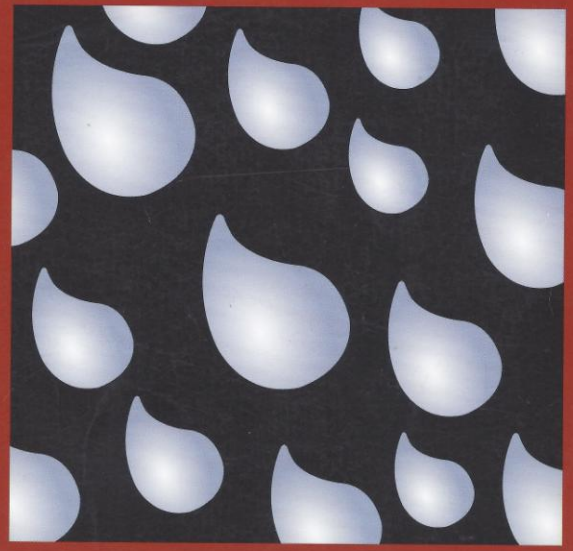
NFPA® INTERNATIONAL

NFPA® 25

Standard for the Inspection, Testing, and Maintenance of

Water-Based Fire Protection Systems

2008 EDITION



JACK'S BOOK

NFPA

NFPA® 25 2011 edition

Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

NFPA®

Where does the 2014 ed. of NFPA 25 stand?

- We are thru the ROP & ROC meetings & ballots
- The document is set to be voted on this June at the NFPA Association Technical Meeting in Chicago
- There may be NITMAMs filed which means “floor fights”
- NFPA 25 will then be published in the fall of 2013 and be called the 2014 edition
- Stay tuned

Why is NFPA 25 important??

- From John R. Hall "*US Experience with Sprinklers*" March 2012 (NFPA Fire Analysis & Research Foundation)

When sprinklers **fail to operate**, the reason most often given (63% of failures) was shutoff of the system before fire began…other leading reasons included manual intervention that defeated the system (18%), component damage (8%), ***lack of maintenance (6%),*** and inappropriate system for the type of fire (5%).

When sprinklers operate **but are ineffective**, the reason usually had to do with an insufficiency of water applied to the fire, either because water did not reach the fire (53% of cases of ineffective performance) or because not enough water was released (18% of cases of ineffective performances). Other leading reasons were manual intervention that defeated the system (9%), system component damage (9%), ***lack of maintenance (8%),*** and inappropriate system for the type of fire (3%).

Why is proper system operation important??

- Consider the myriad of “tradeoffs” that the model building codes allow when fire sprinkler systems are installed…….

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **<u>Assembly Occupancy Specific Sprinkler Advantages</u>**

- Sprinklers permit unlimited areas in one-story A-4 buildings. 507.3
- Sprinklers permit unlimited areas in one-story A-3 buildings. 507.6
- Sprinklers permit unlimited areas for Motion Picture theaters of 1 story and type II construction. 507.11
- Multiple manual pull stations not required when sprinklers are present in A occupancies. 907.2.1
- Sprinklers permit an increase from 200 ft to 250 ft in assembly buildings. 1028.7

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **<u>Business Occupancy Specific Sprinkler Advantages</u>**

- Sprinklers permit unlimited areas in one story group B, F, M, or S buildings 507.3
- Sprinklers permit unlimited areas in two-story group B, F, M, or S buildings. 507.3
- Sprinklers eliminate smoke dampers at shafts in groups B and R buildings. 716.5.2
- Multiple manual pull stations not required when sprinklers are present in B occupancies. 907.2.2
- Sprinklers allow 100 ft of common path of egress travel in occupancies B, F, S. 1014.3(1)
- Sprinklers allow 100 ft of travel distance in buildings with one exit. Table 1021.2

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **<u>Educational Occupancy Specific Sprinkler Advantages</u>**

- Sprinklers permit unlimited areas in one story E building of type II, IIIA, or IV. 507.9
- Multiple manual pull stations not required when sprinklers are present in E occupancies. 907.2.3

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Factory Occupancy Specific Sprinkler Advantages**

- Sprinklers permit unlimited areas in one story group B,F,M, or S buildings 507.3
- Sprinklers permit unlimited areas in two-story group B, F, M, or S buildings. 507.4
- Multiple manual pull stations not required when sprinklers are present in F occupancies. 907.2.
- Sprinklers allow 100 ft of common path of egress travel in occupancies B,F,S. 1014.3(1)
- Sprinklers allow up to 400 ft of travel distance in groups F-1 and S-1. 1016.2

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Institutional Occupancy Specific Sprinkler Advantages**

- In group I-2, sprinklers allow waiting rooms constructed as corridors open to the corridors. 407.2.1
- In group I-2, sprinklers allow gift shops and their storage up to 500 sq ft open to the corridor. 407.2.4
- Sprinklers permit the elimination of emergency escape opening in group's I-1 and R. 1029.1
- Sprinklers eliminate the need for smoke detectors in habitable areas in group's I-1 and I-3. 907.2.6.1 and 907.2.6.3.3

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **<u>Mercantile Occupancy Specific Sprinkler Advantages</u>**

- Sprinklers permit unlimited areas in one-story M buildings. 507.3
- Sprinklers permit unlimited areas in two-story M buildings. 507.4
- Sprinklers permit unlimited or increase of 100% in groups M and S control areas (non-flammable liquids, non-combustible solids). Table 414.2.5(1) sub (b) and (i)
- Sprinklers permit increase in control areas of group M per Table 414.2.5(2) (flammable & combustible liquids)
- Multiple manual pull stations not required when sprinklers are present in M occupancies. 907.2.7

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **<u>Residential Occupancy Specific Sprinkler Advantages</u>**

- Sprinklers reduce the fire resistance rating of fire partitions between dwelling/sleeping units to ½
- hour. 708.3
- Sprinklers reduce the fire resistance rating of horizontal assemblies between dwelling/sleeping units to ½ hour. 711.3
- Sprinklers eliminate smoke dampers at shafts in groups B and R buildings. 716.5.3 (2)
- Sprinklers eliminate draftstopping in floors of all R groups. 717.3.2
- Sprinklers eliminate draftstopping in attics of groups R-1 and R-2. 717.4.2
- Multiple manual pull stations not required when sprinklers are present in R-1 and R-2 occupancies. 907.2.8.1 and 907.2.9
- Sprinklers increase common path of travel to 125 ft. 1014.3(4)
- Sprinklers allow R-2 occupancies up to 3 stories with one exit. Table 1021.2
- Sprinklers permit the elimination of emergency escape opening in group's I-1 and R. 1029.1

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **<u>Storage Occupancy Specific Sprinkler Advantages</u>**

- Indoor and Outdoor Control Areas Sprinklers permit unlimited or increase of 100% in groups M and S control areas. Table 414.2.5 (1) sub (b) and (i) (Non-flammable liquids, Non-combustible Solids)
- Sprinklers permit unlimited areas in one-story S buildings. 507.3
- Sprinklers permit unlimited areas in two story S buildings. 507.4
- Sprinklers allow additional building height of open parking garages with mechanical access. Table 406.3.5
- Where ESFR (early suppression fast response) sprinklers are provided, smoke and heat vents are
- not required. 910.1
- Sprinklers allow 100 ft of common path of egress travel in occupancies B, F, S. 1014.3(1)
- Sprinklers allow up to 400 ft of travel distance in groups F-1 and S-1. 1016.2
- Quantities can be increased in a control area 100% when sprinkled (physical hazard). Table 307.1(1)
- Quantities can be increased in a control area 100% when sprinkled (health hazard). Table 307.1(2)
- Sprinklers eliminate control area floor fire rating in type II-A, III-A, and V-A. 414.2.4

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **High-Rise Buildings**
- Sprinklers permit the fire resistance rating reductions for high-rise buildings that have sprinkler control valves equipped with supervisory initiating devices and water flow initiating devices for each floor. 403.2.1
- Sprinklers permit the required fire resistance rating of the fire barrier walls enclosing vertical shafts, other than exit enclosures and elevator hoistway enclosures, to be reduced to 1-hour where automatic sprinklers are installed within the shafts at the top and at alternate floor levels. 403.2.1.2
- **Atrium Floor Areas**
- Sprinklers permit the atrium floor area to be used for any approved use where the individual space is provided with an automatic sprinkler system. 404.2
- **Atriums**
- Sprinklers permit a glass wall forming a smoke partition where automatic sprinklers are provided along both sides of the separation wall. 404.6

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Stages**
- Sprinklers installed in the space below the stage eliminate the requirement for a fire resistance rated floor. 410.3.1 (2)
- Proscenium wall water curtains may be used in lieu of fire curtains for proscenium openings. 410.3.5
- Sprinklers allow 1 ½" hose connections instead of 2 ½" hose connections installed near stages. 905.3.4
- **Attics and Crawl Spaces**
- Sprinklers delete the 1-hour fire resistance rating for attics and under-floor concealed spaces used for storage of combustible materials. 413.2
- **Mezzanines**
- Sprinklers increase mezzanine area up to one half of the floor area in construction types I and II. 505.2
- Sprinkled mezzanines in 2 story buildings, other than H and I uses, having two or more means of egress are not required to exit into the area of the mezzanine 505.4 (5)

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Area Increase**
- Sprinklers add 300% for one story and 200% for multiple stories in building area. 506.3
- **Height Increases**
- Sprinklers permit a height increase of 20 ft and one story. 504.2
- **Unlimited Areas**
- Sprinklers permit unlimited areas in one and two-story group B, F, M, or S buildings. 507.3 & 507.4
- **Furnace Rooms**
- Sprinklers eliminate the 1-hour wall requirement around furnace rooms having equipment with over 400,000 BTU per hour input. Table 508.2.5
- **Boiler Rooms**
- Sprinklers eliminate the 1-hour wall requirement around boiler rooms having boilers over 15 psi and 10 horsepower. Table 508.2.5
- **Storage Rooms**
- Sprinklers eliminate the 1 hour wall requirement for storage rooms over 100 sq. ft. Table 508.2.5

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Refrigerant Machinery**
- Sprinklers eliminate the 1-hour wall requirement around refrigerant machinery rooms. Table 508.2.5
- **Occupancy Separations**
- Sprinklers permit up to a 1-hour reduction in the fire resistance rating of fire separation walls. Table 508.4
- **Heavy Timber**
- Sprinklers permit a reduction of lumber width from 4 in. to 3 in. for type IV construction (Heavy Timber, HT) protected by automatic sprinklers under the roof deck. 602.4.3
- **Fire Rating Reduction**
- Sprinklers can be substituted for 1-hour fire resistance rated construction provided such system is not otherwise required in types IIA, IIIA & VA construction. Note d of Table 601e
- **Exterior Wall Opening**
- Sprinkled maximum allowable area of unprotected opening to be the same as for protected opening. Table 705.8
- Sprinklers eliminate the requirements for flame barriers protecting window separations, separated by five feet or less. 705.8.5
- Sprinklers delete the protection requirements of openings in an exterior wall where buildings are equipped with sprinklers and water curtains are installed on the exterior. 705.8.2

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Fire Walls**
- Sprinklers permit openings in firewalls to exceed the 156 sq ft limit where both buildings are sprinklered. 706.8
- Sprinklers allow the firewall to terminate to the inside surface of the non-combustible exterior wall. 706.5 (3)
- **Fire Barriers**
- Sprinklers permit openings in fire barriers to exceed the 156 sq ft. where both fire areas are sprinkled. 707.6
- **Shaft Enclosure**
- The bottom of a shaft is not required to be closed off provided it terminates in room protected by sprinklers. 708.11
- **Stairs or Escalators**
- Sprinklers modify enclosure requirements for stairs or escalators. 708.2
- **Elevator Lobby**
- Sprinklers delete the elevator lobby separations from a street level floor in office buildings. 708.14.1
- Other than occupancies I-2, I-3, and high rises sprinkler delete the need for enclosed elevator lobbies. 708.14.1 (4)
- Sprinklers replace the fire partition requirement, with smoke barriers on each floor. 708.14.1 (5)

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Sprinkler Penetration**
- The annular space created by the penetration fire sprinkler covered by a metal escutcheon plate requires no additional firestopping. 713.3.2 - 713.4.1.1.2
- **Draftstopping**
- Sprinklers eliminate the requirement for draftstopping at 1,000 sq ft in floor ceiling assembly.717.3.3
- Sprinklers eliminate the requirement for draftstopping in attics and concealed spaces at 3,000 sq ft. 717.4.3
- **Exit Enclosure Doors**
- Sprinklers delete the maximum transmitted temperature end point for door assemblies in exit enclosures. 715.4.4
- **Glazing in Fire Doors**
- Sprinklers delete the maximum transmitted temperature end point for glazing in doors in exit enclosures. 715.4.4.1
- **Fire Dampers**
- Sprinklers eliminate the required fire dampers in ducts for HVAC systems, fire barrier walls that have a required fire resistance rating of 1-hour or less. 716.5.4

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Set Out Construction**
- Sprinklers permit a reduction in the class finish requirements for walls or ceilings that are set out or dropped. 803.11.2
- **Interior Wall and Ceiling Finishes**
- Sprinklers reduce the wall and ceiling finishes to a lower category. Table 803.9
- **Textile Wall Covering**
- Sprinklers eliminate the requirement of materials to pass ASTM E-84 requirements for class A materials. 803.1.4
- **Combustible Decorative Materials**
- Sprinklers increase the amount of combustible decorations up to 75% (versus 10%) in assembly occupancies. 806.1.2 (1)
- **Interior Floor Finish**
- Sprinklers reduce the requirements for floor finish materials in vertical exits and exit passageways and exit access corridors. 804.4.1

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Standpipes**
- Sprinklers allow Class I standpipes where Class III standpipes are required. 905.3.1
- Sprinklers allow Class I standpipes to have 50’ more travel. 905.4
- Sprinklers allow the risers and laterals of standpipes not to be covered by fire resistive material. 905.4.1
- **Fire Alarms**
- Heat detectors are not required when sprinklers are present. 907.4.3.1
- Sprinklers eliminate smoke detection in R-4 occupancies. 907.2.10.2
- Locations exempt from sprinklers do not require smoke detectors if sprinklered. 907.2.13.1.1
- Sprinklers eliminate the need for smoke detection at the locations of each fire alarm control unit, notification appliance circuit power extenders, and supervising station transmitting equipment.907.4.1
- Multiple manual pull stations not required when sprinklers are present in A, B, E, F, M, R-1, R-2 occupancies. 907.2.1 thru 907.2.4, 907.2.7, 907.2.8.1, 907.2.9
- Fire sprinkler zones are not limited to fire alarm zones. 907.6.3

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Elevators**
- Elevators are not required to serve as the means of egress as required by ADA in sprinkled buildings 1007.2.1
- Sprinklers eliminate elevator hoistway venting in occupancies other than R-1, R-2, I-1, and I-2. 3004.1
- **Accessibility Stairs**
- Sprinklers delete the accessibility requirement for 48” egress stairs and for areas of refuge. 1007.3
- **Revolving Doors**
- Sprinklers permit the use of revolving doors for other than a means of egress. 1008.1.4.1.2
- **Automatic Locking**
- Sprinklers permit the use of access controls egress doors. 1008.1.3.4
- **Travel Distance**
- Sprinklers increase the travel distances for all occupancies. Table 1016.1
- **Egress Separations**
- Sprinklers reduced the required egress separation distance to 1/3 the diagonal of the building or space. 1015.2.1 (2)

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Corridor Rating**
- Sprinklers delete the corridor fire resistance rating. Table 1018.1
- **Dead End Corridors**
- Sprinklers allow dead end corridors up to 50 ft. in the following occupancies: B, E, F, I-1, M, R-1, R-2, R-4, S and U. 1018.4
- Sprinklers allow the space between the corridor ceiling and the floor or roof structure above corridors to serve as return air. 1018.5.1
- **Exit Discharge**
- Sprinklers eliminate the fire separation requirement for exterior exit ramps and stairs. 1026.6(4)
- Sprinklers permit of maximum of 50 percent of the occupants to exit through exit enclosures. 1027.1
- **Egress Windows**
- Except for R-3 occupancies, sprinklers eliminate the need for emergency and escape openings. 1029.1
- **Balcony Fire Ratings**
- Sprinklers permit balconies and similar appendages on buildings of types III, IV and V to be of type V construction without a fire resistance rating. 1406.3 (3)
- Sprinklers eliminate the aggregate width requirement of balconies. 1406.3 (4)

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Foam Plastic Insulation**
- Sprinklers allow foam plastic insulation to increase from 4” to 10” in thickness. 2603.3
- **Light Diffusing Systems**
- Sprinklers permit the use of light-diffusing systems with an occupant load of 1,000 or more, theaters with the stage and proscenium opening and an occupant load of 700 or more, group I-2, group I-3 exit stairways and exit passageways. 2606.7
- Areas of light diffusing systems that are protected with fire sprinkler systems shall not be limited. 2606.7.4
- Sprinklers permit a 100 percent increase in the maximum percentage area for light transmitting plastic wall panels. 2607.5
- **Plastic Glazing**
- Sprinklers permit the allowable area of glazing to 50 percent of the wall face. 2608.2 (1)

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Light Transmitting Roof Panels**
- Sprinklers permit unlimited height for light transmitting plastics. 2608.2 (3)
- Sprinklers eliminate flame barriers for adjacent stories. 2608.2 (2)
- Sprinklers permit light transmitting plastic roof panels in buildings required to be of fire rated construction without complying with the roof covering requirements. 2609.1
- Sprinklers permit a 100 percent increase in an aggregate area of plastic roof panels.2609.4 (1)
- Sprinklers eliminate the 4 ft minimum separation requirement between individual plastic roof panels. 2609.2 (1)
- **Skylight Separations**
- Sprinklers eliminate the minimum separation distance of 4 ft between skylights. 2610.6
- **Plastic Skylights**
- Sprinklers eliminate the 100 sq ft maximum area for skylights. 2610.4

Examples of Tradeoffs for Fire Sprinklers in the 2009 IBC

- **Pedestrian Walkways**
- Sprinklers permit an increase to 2/3 of the floor area of the room or space. 2610.5
- Sprinklers eliminate the requirement for fire barriers between pedestrian walkways and buildings. 3104.5
- Sprinklers permit increased height and stories for pedestrian walkways and buildings. 3104.5
- Sprinklers permit an increase from 200 ft to 250 ft for exit access travel distance in pedestrian walkways. 3104.9
- Sprinklers allow any increase from 200 ft to 400 ft of exit access travel systems in a pedestrian walkway constructed with both sides at least 50 percent open. 3104.9

So…….

- Obviously the benefits of fire sprinklers are widely recognized & adopted by the code makers……
- WHAT IF THE SYSTEM FAILS? - NOW WHAT ARE YOU UP AGAINST???
- And, if the system is not being maintained, should the building still have a certificate of occupany? Can you count on the system performing properly?
- IF THERE'S A LOSS WILL INSURANCE PAY??

Overview of NFPA 25

- Chapter 1: Administration
- NFPA 25 establishes the **MINIMUM** requirements for periodic inspection, testing, & maintenance
- NFPA 25 addresses the **OPERATING CONDITION** of fire protection systems as well as impairment handling and reporting
- NFPA 25 applies to systems that have been **PROPERLY INSTALLED** (ouch!)

Overview of NFPA 25

- NFPA 25 **DOES NOT** require the inspector to verify that the system *was properly installed*
- NFPA 25 **DOES NOT** require the inspector to verify the *adequacy of the design* of the system
- NFPA 25 **DOES NOT** apply to systems installed in accordance with NFPA 13D
- NFPA 25 provides requirements to ensure a *reasonable* degree of protection for life & property from fire

Overview of NFPA 25

- Chapter 2: Referenced Publications
- Chapter 3: Definitions
- Chapter 4: General Requirements

  Now it starts getting good……

Chapter 4 – Property Owner's Responsibilities

- The **property owner** (or designated rep) is responsible for:
- Properly maintaining their systems
- Ensuring water filled pipe is kept at 40F
- Notifying AHJs & alarm receiver of shutdowns or testing
- Notifying AHJs & alarm receivers that systems are back in service

Chapter 4 – Property Owner's Responsibilities

- The **property owner** (or designated rep) is responsible for:
- **Correcting** or repairing deficiencies or impairments found during inspection & testing procedures
- **Maintaining the records** of inspection, testing & maintenance and making them available to AHJs "upon request" (must keep them for 1 yr)
- **Keeping a copy of** "as-built" system installation drawings, hydraulic calculations, original acceptance test results, and device data sheets FOR THE LIFE OF THE SYSTEM

Chapter 4 – Property Owner's Responsibilities

- The property owner (or designated rep) **shall not make changes** in the occupancy, the use or process, or the materials used or stored in the building without evaluation of the fire protection systems for their capability to protect the new occupancy, use, or materials

Chapter 4 – Property Owner's Responsibilities

- Where changes in the occupancy, hazard, water supply, storage commodity, storage arrangements, *building modification*, or other condition that affects the installation criteria of the system are identified, the **property owner** (or designated rep) shall promptly take steps to evaluate the adequacy of the installed system in order to protect the building or hazard in question

Chapter 4 – Property Owner's Responsibilities

- Where the evaluation reveals that the installed system is inadequate to protect the building or hazard in question, the **property owner** (or designated rep) shall make the required corrections and these corrections shall be approved
- So, what could go wrong??

Fire Engineering

04/01/2012

BY JEFFREY A. HARWELL

Large-loss fires involving fully sprinklered buildings are extremely rare these days. Consequently, when the large-loss fire described below occurred in February 2011 at a warehouse with high piled storage in the Regency I Warehouse in Grand Prairie, Texas, the nation's interest was piqued. What especially caused the fire service and related industries to ask what went wrong was the fact that this warehouse had been equipped with an Early Suppression Fast Response (ESFR) sprinkler system. At the time, this fire was thought to be the first large-loss fire involving the new ESFR technology.

Background

- The 400,000 square foot warehouse building was constructed with ESFR fire sprinklers and a fire pump. Owners like the ESFR systems because they normally allow storage of a wide variety of materials without the need for troublesome in-rack sprinklers
- The height from the floor to the bottom of the steel bar-joist roof assembly ranged from 27 to 33 feet

Background/Variances

- During the building design, three variances were requested:
- 1) Elimination of all ceiling-mounted smoke and heat vents and providing a manual mechanical smoke exhaust system in their place. The request also asked for a reduction in the capacity of the smoke exhaust fans (justified based on the quick extinguishment and limited smoke production from any fire involving an ESFR system) – 3 air changes/hour instead of the code required 10

Background/Variances

- 2) Elimination of smoke curtains. Once again, the request was based on the limited fire size and smoke production from a fire protected by an ESFR system
- 3) Increased travel distance from the middle of the warehouse to an exit (from 200’ to 300’) - again, the justification for this request was the expected fast response and rapid extinguishment provided by the ESFRs

Background/Variances

- All three variances were APPROVED and approval was based on the presence of the ESFR technology
- So far so good…

What Happened Next?

- Soon after the building was completed, a tenant leased the eastern half of the building. The tenant stored carpet rolls on double-row racks up to 20 feet high on **mostly solid shelving**
- Based on NFPA Standards and the tenant's insurer's requirements, changes had to be made to the existing ESFR sprinkler system. The tenant was required to change out all ESFR heads and replace them with extra large orifice heads at the roof level AND TO ADD in-rack sprinklers to the carpet storage racks (solid shelving)

What Happened Next?

- The new roof level sprinkler system design for the carpet storage area was .30 gpm per square foot over the most remote 2,000 square feet
- Also, in-rack sprinklers were added to the carpet storage racks, as required
- This level of protection matched the use
- So far, so good…

Uh-oh

- Soon after all of this, the carpet tenant moved out…
- A distribution company took the tenant space over…
- According to records, there were no additional modifications to the sprinkler system based on the new tenant occupying the building (although the in-rack sprinklers had to be removed when the racks associated with the carpet storage were removed…)
- Also, there is no record that a new maximum storage height was established and the ESFR sprinklers were never “re-installed” at the roof level…

Uh-oh

- The storage in the area of the fire consisted of palletized storage on plastic pallets with no racks. Each pallet consisted of 8,153 empty METAL soda cans (with no lids) and was reported to be seven to eight feet in height. Group A plastic slip sheets were situated between each row of cans; the slip sheets covered the top of the cans with an unknown number of bands around the piles. According to employees, pallets were stored three high on the floor with a maximum height of 20 to 24 feet. The fire department's later investigation revealed the actual storage height was generally more than 27 feet.

Empty metal cans…but on plastic pallets with plastic slip sheets…

You guessed it:

- **FIRE**

400,000 sq ft building burns to the ground…..

LESSON LEARNED

- Develop a way to track variances for each building to **evaluate them as the building occupants change**. The initial variances for the building should have been reevaluated once the ESFR system was removed because each **variance was totally dependent on the ESFR system's being present**
- When the carpet company left and the distribution company moved in, this could have provided the emphasis for **reinstalling the ESFR heads** to avoid reopening the variance issues

LESSON LEARNED

- THE BEST WAY to stay out of a potential large-loss fire involving a warehouse with high piled storage is to **implement aggressive inspection measures to reduce the chances that the sprinkler system may be compromised**
- This includes multiple inspections and/or walk-thrus to **ensure proper storage height, storage arrangements, and commodity classification**

LESSON LEARNED

- Many large-loss warehouse fires are the result of improper storage arrangements, particularly storage piled too high so that it blocks the sprinkler spray pattern. At the time of this fire, *there were no regularly scheduled fire inspections for the building following the initial inspection* when the Certificate of Occupancy was issued

LESSON LEARNED

- All of this could have been prevented had the OWNER of the building been required to comply with NFPA 25, Chapter 4:
- Where **changes** in the occupancy, hazard, water supply, storage commodity, storage arrangements, building modification, or other condition that affects the installation criteria of the system are identified, the property owner (or designated rep) shall promptly take steps to evaluate the adequacy of the installed system in order to protect the building or hazard in question

So, an Annual inspection is good enough…..??

- Most municipalities are happy with an “annual” inspection of the fire sprinkler system
- But they are forgetting this: the building or fire code they have adopted will reference NFPA 13 (and other NFPA documents)
- And NFPA 13 says “all systems must be inspected & tested in accordance with NFPA 25”.

So, an Annual inspection is good enough

- Are you really doing what your adopted code SAYS you are supposed to do??
- What about a municipality's liability??
- See "Widmar vs. City of Marysville" – the "Marysville Fire" of July 24, 1974

Background

- The City of Marysville, through its Fire Dept, was aware of the fact that unsafe conditions existed at a four-story, multiple occupant structure located in downtown Marysville
- They had inspected the building more or less regularly, at least annually, for 20 years prior to the fire
- The fire dept. knew, among other things, that the stairwells were not enclosed

Background

- Failure to enclose the stairwells was a primary factor in this case.
- The City had adopted the 1970 UBC and 1971 UFC, including Appendix I. That appendix made those codes applicable to old construction as well as new
- Unfortunately, the fire chief, deputy chief and fire inspector were generally aware of the fact that this (and other) defects existed in the building

The Fire

- On July 24, 1974, a fire occurred at the Downtown Apartments. It started on the third floor in an apartment unit. Cause was never really determined
- Originally confined to the apartment, the fire spread after a passerby kicked the door in and searched for possible victims. 25 tenants escaped without incident
- Two tenants, Mr. Widmar and Mrs. Edwards, did not escape

The Fire

- By the time Widmar realized what was happening, the smoke and fire had spread up the two open stairwells and had trapped him on the fourth floor
- Edwards got out and for some reason went back in. Widmar was later rescued, but after he had suffered severe burns. Edwards jumped out

The Lawsuit

- Plaintiffs filed suit against the City of Marysville and Robert Miller, Fire Chief. The trial concluded on April 21, 1978 In Sutter County. The jury awarded the plaintiffs $325,000. Of that, the City of Marysville and Chief Miller owed $134,000. **Why were they liable?**

Why were they liable?

- Government Code 815.6 basically says that if there's a law that says the fire service must watch out for a particular problem, and a public entity fails to watch out for that particular problem, unless it can show that its' failure was reasonable, it WILL BE LIABLE for what happens as a consequence of its' failure
- Another point was made - that if a public entity has a duty to warn someone about a known danger, and they have become involved (i.e. **inspected or required inspections be performed**) then they in fact must warn and fulfill their duty

The Lessons

- The jury *could not have found liability* if the City of Marysville did not inspect at all or codify that inspections were required
- They also *could not have found liability* EVEN if they negligently inspected
- But they **can find liability** if they do inspect (or codify that inspections be performed), if they find a defect (or are made aware of it) and then fail to enforce the law. This is a **mandatory** duty

The Lessons

- From a legal standpoint, you are much better off if you choose not to inspect at all rather than to inspect (or SAY that you inspect or codify inspections to be performed)
- Liability arises when you find something or are made aware of something and then fail to have it fixed

So what can be done?

- **Get current on all applicable fire safety laws (NFPA 25??)**
- Follow through the citation process
- If you have done all that you can do, pass it on to the next highest level (i.e. City Attorney, D.A., Village Council) - **get it out of your department**
- Warn the affected people by posting citations and notices on the building
- By all means DOCUMENT everything you do

- *(This information was extracted from a presentation by Jerry Duncan, the defense attorney for the City of Marysville.)*

Another example:

FROM firerescue1.com Feb 2013

By Thomas Caywood
Telegram & Gazette
CHARLTON, Mass. — A state probe of a blaze that destroyed part of the Spring Brook Mills complex last July, displacing several businesses, **faulted the Charlton Fire Department for failing to follow up on safety concerns at the building.**

The state Department of Fire Services report notes that investigators could find **no documented follow-up to a Fire Department report in 2007 detailing problems with the building's fire sprinkler system,** which did not work at the time of the fire, or to a 2009 report of fire code violations at an automobile dismantling business there.

The Telegram & Gazette reported in August that town officials **knew of serious fire hazards** at a car dismantling business in the complex, known as Charlton Mills, more than two years before the inferno that destroyed the rear warehouse.

The investigators found **no documented follow-up to a Fire Department inspection that found serious problems with the mill building's automatic sprinkler system**. That system didn't work on the night of the fire. "The building's automatic sprinkler system appears to have been turned off due to maintenance issues," noted Trooper Daniel C. Jones of the state police Fire and Explosion Investigative Section.

In addition to the 2007 Fire Department report about sprinkler system problems, the State fire investigation file includes a 2011 letter from a Leicester sprinkler company that documented a host of problems with the building's sprinklers. The report from Colby Fire Protection Inc., addressed to Charlton Mills, found that the water supply to parts of the system had been cut and capped underground and that many sprinkler heads were broken or painted over, among other problems.

"There was no follow-up documentation," the state investigator reported.

"After the structure fire at 6 City Depot Road the Fire Department discovered that documentation of follow-up inspections could be better. As a small department with only 13 full-time staff, it is extremely difficult to accomplish that task," Chief Cloutier said……

So, what should you REALLY be requiring from building owners if you've "adopted NFPA 25"?

Back to the Chapters…

- Chapter 5 – Sprinkler Systems
- Chapter 6 – Standpipe & Hose Systems
- Chapter 7- Private Fire Service Mains
- Chapter 8 – Fire Pumps
- Chapter 9 – Water Storage Tanks
- Chapter 10 – Water Spray Fixed Systems
- Chapter 11 – Foam/Water Sprinkler Systems
- Chapter 12 – Water Mist Systems
- Chapter 13 – Valves, Valve Components & Trim
- Chapter 14 – Obstruction Investigation
- Chapter 15 - Impairments

NFPA 25 2011
Daily requirements

- During cold weather, check dry pipe valve enclosure temperature if enclosure is not equipped with a low temperature alarm – 13.4.4.1.1
- During cold weather, check pre-action & deluge valve enclosure temperature if enclosure is not equipped with a low temperature alarm – 13.4.3.1.1

NFPA 25 2011
Weekly requirements

- Inspect dry pipe system gauges if valve is not equipped with a low air alarm – 13.4.4.1.2.5
- Inspect water supply gauges on pre-action & deluge valves – 13.4.3.1.3
- Inspect gauges on dry, pre-action, and deluge valves for standpipe systems – 6.2.2.2
- Inspect position of control valves (if sealed) – 13.3.2.1
- Inspect RPZs for discharge – 13.6.1.2
- During cold weather, check dry pipe valve enclosure temperature if enclosure is equipped with a low temperature alarm – 13.4.4.1.1.1

NFPA 25 2011
Weekly requirements

- During cold weather, check pre-action & deluge valve enclosure temperature if enclosure is equipped with a low temperature alarm – 13.4.3.1.1.1
- Perform churn test on diesel fire pumps – 8.3.1.1
- Inspect the following items related to fire pumps as per Chapter 8:
- Pump House (8.2.2 (1) items a & b)
- Pump System (8.2.2 (2) items a thru g)
- Electrical System (8.2.2 (3) items a thru f)
- Diesel Engine System (8.2.2 (4) items a thru m)

NFPA 25 2011
Monthly requirements

- Inspect wet pipe system gauges – 13.2.7.1 and 6.2.2.1
- Inspect dry pipe system gauges if valve is equipped with a low air alarm – 13.4.4.1.2.4
- Inspect air system gauges on standpipe system if the valve is equipped with a low air alarm – 6.2.2.3
- Inspect position of control valves (if chain/locked and/or tampered) – 13.3.2.1.1
- Inspect dry pipe valve exterior for damage, correct orientation of trim valves, and to verify that the intermediate chamber is not leaking – 13.4.4.1.4

NFPA 25 2011
Monthly requirements

- Inspect alarm check valve exterior for damage, the correct orientation of trim valves, verify gauges indicate normal water supply pressure, and to verify that the retard chamber or alarm drains are not leaking – 13.4.1.1
- Inspect pre-action & deluge valve exterior for damage, the correct orientation of trim valves, and to verify that the valve seat is not leaking and all electrical components are in service – 13.4.3.1.6

NFPA 25 2011
Monthly requirements

- Inspect gauges monitoring detection systems and supervisory air pressure of pre-action & deluge valves – 13.4.3.1.4 and 13.4.3.1.5
- Inspect tamper switches – 13.3.2.1.1
- Perform churn test on electric fire pumps – 8.3.1.2

NFPA 25 2011
Quarterly requirements

- Perform main drain test (if sole water supply is run thru a PRV or BFP) and every time a control valve is closed and reopened – 13.2.5.1 and 13.3.3.4 – **10% drop triggers more investigation needed**
- Test priming water level on dry pipe valve – 13.4.4.2.1
- Test priming water level on pre-action valve – 13.4.3.2.1
- Test QODs on dry pipe system – 13.4.4.2.4
- Test low air alarm on dry pipe valve – 13.4.4.2.6

NFPA 25 2011
Quarterly requirements

- Test low air alarm on pre-action valve – 13.4.3.2.13
- Test mechanical type water flow devices (water motor gongs) – 13.2.6.1
- Inspect alarm devices (waterflow switches, tampers, alarm pressure switches)
- Inspect hydraulic placard on fire sprinkler system – 5.2.6
- Inspect fire department connection – 13.7.1
- Perform phase reversal testing on fire pumps

NFPA 25 2011
Semiannual requirements

- Test waterflow and alarm pressure switches – 13.2.6.2
- Test tamper switches – 13.3.3.5.1

NFPA 25 2011
Annual requirements (we finally got there!! You feeling better yet?)

- Perform non-flooding trip test of dry pipe & pre-action valves – 13.4.4.2.2 & 13.4.3.2.4
- Perform full flow trip test of deluge valve – 13.4.3.2.2
- Test automatic air maintenance device on dry pipe valve – 13.4.4.2.8
- Test automatic air maintenance device on pre-action valve – 13.4.3.2.15
- Inspect interior of dry pipe valve – 13.4.4.1.5
- Inspect interior of pre-action & deluge valve – 13.4.3.1.7
- Perform main drain test (if no PRV or BFP) and every time a control valve is closed and reopened – 13.2.5 and 13.3.3.4 – **10% drop triggers more investigation needed!**

NFPA 25 2011
Annual requirements (we finally got there!! You feeling better yet?)

- Operate control valves – 13.3.3.1 and 13.3.3.2
- Lubricate all OS&Y valves – 13.3.4.1
- At beginning of heating season, inspect and test low temperature alarms on dry pipe valve enclosures – 13.4.4.1.1.2 and 13.4.4.2.7
- At beginning of heating season, inspect and test low temperature alarms on pre-action & deluge valve enclosures – 13.4.3.1.2 and 13.4.3.2.14
- Drain dry pipe system low points (also drain as-needed)
- Perform forward flow test of all BFPs – 13.6.2.1

NFPA 25 2011
Annual requirements (we finally got there!! You feeling better yet?)

- Test specific gravity of antifreeze solutions – 5.3.4
- Inspect hangers – 5.2.3
- Inspect pipe & fittings – 5.2.2
- Inspect installed sprinkler heads – 5.2.1.1
- Inspect spare head box for proper quantity & type of heads and wrenches – 5.2.1.4
- Inspect general information sign – 5.2.8

NFPA 25 2011
Annual requirements (we finally got there!! You feeling better yet?)

- Perform full flow capacity test on all fire pumps – 8.3.3.1
- Test fire pump alarm signals – 8.3.3.5
- Inspect hose cabinets, hose, nozzles (NOTE: see NFPA 1962 for the requirements of hydrostatic testing hose) – 6.2.1
- Inspect hydraulic placard on standpipe system – 6.2.3

NFPA 25 2011
Required every 3 years

- Perform full-flooding trip test of dry pipe & pre-action valves – 13.4.4.2.2.2 & 13.4.3.2.3 (freezers have exceptions)– NOTE: this is also required whenever the system is altered in any way
- Perform air leakage test on all dry pipe & pre-action systems – 13.4.4.2.9 & 13.4.3.2.6

NFPA 25 2011
Required every 5 years

- Perform internal inspection of piping
- Compare gauges to calibrated gauges or just replace with new (3% window allowed) – 13.2.7.2, 5.3.2.1, 6.3.4.1
- Inspect interior of dry pipe valve including strainers, filters and restricted orifices – 13.4.4.1.6
- Inspect interior of alarm check valve including strainers, filters and restricted orifices - 13.4.1.2

NFPA 25 2011
Required every 5 years

- Inspect interior of pre-action & deluge valves including strainers, filters and restricted orifices – 13.4.3.1.8
- Inspect interior of check valves – 13.4.2.1
- Destructively batch test extra high temperature rated solder-type sprinklers (350F) or just replace with new & repeat at 5 year intervals – 5.3.1.1.1.4

NFPA 25 2011
Required every 5 years

- Destructively batch test sprinkler heads located in corrosive or harsh environments or just replace with new – 5.3.1.1.2 (“…cold storage areas…”???)
- Hydrostatically test manual & semi-automatic dry standpipe systems – 6.3.2.1
- Perform flow test on all automatic standpipe systems – 6.3.1.1

NFPA 25 2011
Required every 10 years

- Destructively batch test dry barrel type sprinklers or just replace with new & repeat at 10 year intervals – 5.3.1.1.1.6

NFPA 25 2011
Required every 20 years

- Destructively batch test sprinklers manufactured with fast response elements or just replace with new & repeat at 10 year intervals – 5.3.1.1.1.3 (this includes ESFRs, quick response sprinklers, most residential sprinklers, and MANY extended coverage sprinklers that MAY be listed as “standard response” but have a “fast response” element)

NFPA 25 2011
Required every 50 years

- Destructively batch test sprinklers that have been in service for 50 years or just replace with new & repeat at 10 year intervals – 5.3.1.1.1

NFPA 25 2011
Required every 75 years

- Destructively batch test sprinklers that have been in service for 75 years or just replace with new & repeat at 5 year intervals (sprinklers manufactured prior to **1920** shall be replaced outright) – 5.3.1.1.1.2 & 5.3.1.1.1.5

Quick note on Chapter 14…

- “Obstruction Investigation”
- BIG airport by Chicago
- Dry pipe system
- Found during pipe demo for remodeling

A Few More Examples


PEST CONTROL LOG

And the winner is……

- Found at the end of a 4” crossmain in a west suburb……


Hometown

I’m surprised it wasn’t a can of beer…

Beyond all of that…

- That was just for fire sprinkler systems, standpipe systems, and fire pumps
- NFPA 25 has a similar list for foam systems, water storage tanks, water spray systems, and water mist systems
- OBVIOUSLY, NFPA 25 requires MUCH MORE than an “annual inspection”…
- What does YOUR Fire Code SAY you require????????

Questions???

Thanks for your time & attention!

My contact info:
Richard M. Ray, PE
Cybor Fire Protection Co.
5123 Thatcher Road
Downers Grove, IL 60515
Office (630) 810 1161
Cell (630) 774 1616
Email
rmr@cyborfireprotection.com