

## Executive Summary

On December 9 and 10, 2013, the Fire Protection Research Foundation hosted a workshop in Chicago, IL that examined the performance of sprinkler systems. The objective of the workshop was to develop possible solutions to sprinkler system design and installation deficiencies that can lead to performance issues.

In John Hall's report, [\*US Experience with Sprinklers \(2013\)\*](#), reasons for sprinkler system ineffectiveness during fire events are cited. In instances where systems activated but were ineffective, 44% of these cases were a result of water not reaching the fire, while 30% were due to not enough water being released to control the fire. Some of the specific causes for these two types of system ineffectiveness include sprinkler obstructions, preventing water from reaching the fire, and the sprinkler system design not being appropriate (including delivered density) for the hazard present, possibly because the hazard had changed without a sprinkler system design evaluation. Some of the causes that contribute to sprinkler ineffectiveness during fire events are not addressed by [\*NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems\*](#), or any other NFPA standard.

Consequently, as a practice of good fire protection and life safety, the question becomes: what should be done? Some of the questions that were presented and discussed at the workshop included:

- Should NFPA 25's scope be reconsidered?
- Should a new standard on conducting design evaluations be developed?
- Should [\*NFPA 3, Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems\*](#), address a periodic system "re-commissioning activity" for some or all occupancies?
- Should these re-commissioning events be addressed by the occupancy chapters of [\*NFPA 101, Life Safety Code\*](#)?
- Should the provisions in [\*NFPA 1, Fire Code\*](#), be supplemented so as to require inspection reviews that can address the adequacy of a system?
- Should this just sit with the owners and regulatory process as it currently does, with the hope that the problem resolves itself organically?

Overall there was general consensus that NFPA 25 should remain a wear and tear document and that it is for the most part ok in its current state. Some suggestions were made to remove Sections 4.1.6 and 4.1.7 (addressing changes in occupancy and hazard) from the 2014 edition of NFPA 25 and move to another document (e.g. installation standards, fire code). Since it was agreed that NFPA 25 should remain a wear and tear document, it could include the triggers for design evaluations/hazard analysis, but the actual requirements for evaluations and analysis should be covered elsewhere, such as [\*NFPA 13, Standard for the Installation of Sprinkler Systems\*](#), NFPA 1, the building codes, or even NFPA 3 or 4, [\*Standard for Integrated Fire Protection and Life Safety System Testing\*](#). Some language from other documents ([\*NFPA 30, Flammable and Combustible Liquids Code\*](#)) was suggested as a template for a trigger in NFPA 25. A suggestion was made to develop an evaluation template for inclusion in the annex of NFPA installation standards. Another suggestion was made to form some interview questions for owners (e.g. have you done anything to change storage practice, room configuration, etc.). This could be something that is included as part of the inspection items in NFPA 25 or in another document (like the fire code) and could be a trigger for a design evaluation.

It was suggested by many that the requirements for design evaluations should be determined by occupancy type/hazard. For low hazard occupancies, design evaluations may not be required (or at least not on a frequent basis). Require design frequencies on a regular basis for those occupancies with higher hazards (e.g. warehouses, industrial facilities). It was also suggested that maybe complex systems (e.g. deluge and water mist) should not be included in NFPA 25 because they need hazard analysis. Design evaluations or hazard analyses should not be carried out by inspectors because the inspectors do not have the right skill set.

There were concerns raised that NFPA 25 is not being followed in its current state, so it is not ideal to add requirements. In fact, several suggestions were made to simplify the inspection, testing, and maintenance (ITM) frequencies in NFPA 25 by specifying a base frequency of quarterly or annual. There was also a question posed about having different ITM frequencies for low vs. high hazard occupancies. Some also questioned the frequency with which design evaluations should be required. A suggestion was that the frequency of design evaluations should be hazard/risk based.

Enforcement is a major concern. Fire and building department budgets continue to be cut, which reduces the resources available for enforcement. There is reliance on the annual inspections to catch any issues. It was noted during the insurer's panel that insurance inspections should not be relied on because they are often not covering 100% of properties. Enforcers need more tools at their disposal. For example, reporting mechanisms from inspectors could be one tool. Authorities Having Jurisdiction (AHJs) could require inspectors to send all inspection reports or at least those that identify any major impairments. Some suggested that it may be better for AHJs rather than inspectors to red tag systems. Also, a suggestion was made to survey AHJs to find out how NFPA 25 is being used (what provisions are they enforcing).

Everyone agreed that education around the design deficiency issue, as well as the current requirements of NFPA 25, is ultimately important. Education of all parties is required: inspectors, AHJs, owners, and the general public. It was noted that it is easier to educate the inspectors and AHJs than owners and the general public. A specific educational initiative would be to educate AHJs about enforcement mechanisms such as, requiring compliance letters when there are changes in occupancy. One group suggested having a training symposium open to contractors and AHJs to cover current NFPA 25 requirements and design issues. This could be implemented by working with related membership groups (e.g. International Fire Marshals Association, International Code Council, American Society for Healthcare Engineering, American Society of Safety Engineers).

If design evaluations are implemented, the evaluation triggers need to be reviewed with building owners. Building owners should be given a list of items that would trigger a design evaluation. Other education suggestions were to have an education program for owners and AHJs on what to expect from inspections. Owner expectations of inspections are different than what is often provided. A specific suggestion made by a couple of groups would be to develop an NFPA 25 guideline for owners/general public that is a few pages long and covers the major issues. One group suggested an ITM App that could be used by building owners that links to their calendars and sends reminders of ITM deadlines. Another suggestion to reach owners was to have an NFPA booth at trade shows directed at building owners and managers (e.g. Building Owners and Managers Association, International Facility Management Association) that specifically includes information on ITM of sprinkler systems.

Based on Marty's presentation the number one problem is closed valves. It was felt that we should focus on addressing this problem. It could be helpful to develop a PSA or another training module for building owners and facility managers to remind them to check their valves regularly to make sure that they are open. One suggestion was made for more root cause analysis of the specific issues related to shut valves and the lack of water problems discussed by Marty. It is unknown what changes may be needed without more detailed information. Marty suggested that the sprinkler industry should provide input into the next version of NFIRS (v 6.0).

