CLM Claims & Litigation Management Alliance™

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CLM 2016 Boston Conference
July 14-15, 2016
Boston, MA

Determining Liability Associated with Fire Suppression Sprinkler Systems Failures

I. Introduction

Fire Sprinkler Systems are commonly found in both commercial and residential structures throughout the United States. These systems are often installed to fulfill requirements of local building codes, fire codes, and in some cases voluntarily by the building owner. In fact, fire sprinkler systems were installed as far back as the early 1800's to protect factories, well before any building codes required them. The first systems consisted of perforated pipes installed in factories to which the fire department could connect and discharge water. The first automatic sprinklers were invented in the mid 1800's, and consisted of fusible link actuated sprinkler heads installed on pipes. By the late 1800's, formal specifications were being developed to standardize the design and installation of these sprinkler systems. In 1895 the National Fire Protection Association (NFPA) was founded, and in 1896 the first standard for the installation of automatic fire sprinklers was written.

Today, most fire sprinkler systems are still installed in accordance with the NFPA standards. *NFPA 13: Standard for Installation of Sprinkler Systems* is the primary relevant standard, although other standards exist for specialty systems and system appurtenances. The content of the 2016 edition of *NFPA 13* is quite different from the content back in 1896, however. This standard is updated every three years by a committee of interested parties, including insurance representatives, installers, and special experts. The NFPA process is one by which anyone can suggest a revision to the standard, and the technical committee of interested parties will consider the revision for inclusion in the next edition. This process is designed to ensure that the standards adjust with the introduction of new technology, and properly implement design changes which may be supported by ongoing fire research.

II. Types, Features, & Operation of commonly found Fire Protection Systems

The fundamental operation of a fire sprinkler system is simple: detect a fire rapidly, and discharge water onto the fire as quickly as possible to control it. Control of a fire means slowing or preventing fire spread beyond the initial area of fire involvement until firefighting personnel can arrive on scene and extinguish the fire completely. It is not the purpose of a fire sprinkler system to extinguish a fire absent manual firefighting efforts.

Sprinkler Heads

The most fundamental part of a fire sprinkler system is the fire sprinkler itself. Typically, the sprinkler head consists of an orifice (where water will flow out), a deflector (which re-directs the water forming a spray pattern), and a heat-detecting element (which detects heat from the fire and causes operation). The heat-detecting element is installed by the manufacturer in a manner which it blocks the flow from the sprinkler orifice during normal "stand-by" conditions. When the heat-detecting element is heated to a certain temperature, it will separate or otherwise fail, falling away from the orifice (along with the orifice plug it supports) and allowing water to flow. As the water is discharged from the orifice, it impacts the deflector, which changes the direction of the water and forms a water-droplet spray pattern.

The water droplets from a sprinkler serve to cool the fuel involved in fire, and wet the fuels adjacent to the area involved impeding fire spread. This slows fire growth, and in some cases will stop fire growth entirely. The amount of water which flows from a single sprinkler head is dependent upon the orifice size, and the water pressure at the head's location within the sprinkler system.

Wet Pipe Sprinkler Systems

The most common type of sprinkler system is a wet pipe system. This type of sprinkler system has water in all of the system piping from the water supply inlet to the sprinkler heads themselves. A wet pipe system will discharge its water onto a fire and the neighboring fuels immediately upon activation of the heat-sensing element.

Dry Pipe Sprinkler Systems

A dry-pipe sprinkler system is installed in an area of a building or structure which is unheated, and may reach temperatures close to freezing. Under such conditions, it is unadvisable to have water in the piping or it may freeze. This type of system contains water only up to an automatic valve (called a dry pipe valve) located in a heated space. The remainder of the piping between the dry pipe valve and the sprinkler heads is filled with pressurized air (or nitrogen). In the event a sprinkler head operates, the gas pressure in the piping system drops, and the dry-pipe valve opens filling the entire system with water.

Dry pipe systems must be kept dry in order to prevent freeze-ups. This requires specialty pitching of the piping to allow all the water to be drained from the system and preventing any "low points" which might collect water which could freeze. Additionally, any time a dry pipe system is activated, it must be serviced by a qualified individual who will drain the water from the system and reset the dry-pipe valve.

Specialty Systems

Other types of sprinkler systems can be utilized for specialty purposes. These include water or foam deluge systems, pre-action systems, and anti-freeze system. A deluge system operates similar to a sprinkler system, except when activated (typically by an electronic sensor or manual switch), water will discharge from all the available orifices (modified sprinkler heads) at one time. A pre-action system utilizes both electronic detection and heat-activated heads to detect a fire. Water does not discharge from a pre-action systems heads until both the electronic and heat-activated heads have activated. Finally, anti-freeze systems were installed for years in unheated spaces. Recent research has indicated that currently available anti-freezes may perform unfavorably under some fire conditions. As such, no new anti-freeze systems are being installed today; however, existing anti-freeze sprinkler systems may remain in service.

III. Common Modes of Sprinkler System Failures

Fire sprinkler systems can fail in three functional ways. An inadvertent discharge can occur if a system discharges water through the sprinklers when no fire is present. A fire sprinkler system can also leak water from a pipe, fitting, or head. The third way a fire sprinkler system can fail is when it does not deliver water to the sprinkler heads in the manner it was designed in the presence of a fire, and therefore does not control the fire.

Inadvertent Activations

Inadvertent sprinkler head activations are rare. They can occur when a fire sprinkler head is mechanically impacted, when the head becomes too hot, or if the fusible link in a system becomes damaged. Inadvertent fire sprinkler head activations typically occur to only one head at a time, limiting the total water discharged, which will often limit the damages. However, for sprinkler heads protecting high value areas, even the discharge from one sprinkler head can cause a large monetary loss.

Piping Leaks & Breaks

Fire protection piping systems are subject to pipe leaks and breaks just like any other piping system. However, sprinkler installations standards, such as *NFPA 13*, address this hazard by requiring protections and support of the piping. Maintenance standards, such as *NFPA 25: Standard for Inspection, Testing, and Maintenance of Water-based Fire Protection Systems* require that these hangars be inspected routinely. None-the-less, leaks and breaks can still occur. One of the most common modes for leaks and breaks in sprinkler piping is freezing of water within the piping, expanding, and cracking or breaking the pipe. As such, it is imperative that wet pipe systems not be installed in unheated areas, and that such heat be maintained throughout cold weather. In the event a dry pipe system is installed, it must be properly installed and completely drained of water before the onset of freezing conditions.

Non-operation of Sprinkler System

Fire sprinkler systems are designed to detect a fire and then discharge water onto the fire to control it. If no water, or insufficient water, discharges from the sprinkler heads, the fire may

continue to grow and cause further damage. There are numerous ways in which a fire sprinkler system can fail to operate effectively, including an obstruction in the piping, a closed valve in the water supply piping, or insufficient pressure from the water supply, among others. One primary purpose of the Inspection, Testing, and Maintenance standard for sprinkler systems (*NFPA 25*) is to inspect for, and correct, conditions which might result in non-operation on a regular basis.

IV. Sources of Information to Aid in Liability Determination

An incident involving a fire sprinkler system may result in damages to the structure which the system was supposed to protect. Damages may be water-related or fire-related. Regardless of the source of the damages, a thorough investigation is necessary in order to appropriately determine liability of responsible parties.

Code Requirements

For any building or structure, there may be local, state, and even in some cases federal codes and regulations that dictate the proper installation and inspection, testing, and maintenance of a fire sprinkler system. Such local codes will often adopt national standards such as *NFPA 13*, *NFPA 25*, etc. An important consideration when determining what the local codes require include the specific edition of these standards which is adopted (represented by a year), and if any amendments to the standards were made by the authority having jurisdiction.

National Fire Protection Association (NFPA) Standards

Once the relevant standards have been identified by reviewing the local jurisdictions regulations, an investigator, attorney, or claims person can review the adopted standards as published by the NFPA. A detailed interpretation of these codes and standards can be provided by an fire protection engineering expert. Depending upon the nature of the loss, one or more NFPA standards may be relevant. For example, if the loss included a fire sprinkler system, it is likely best to consider both NFPA 13 and NFPA 25 requirements.

There is an important distinction regarding the applicability of NFPA standards, however. These documents are only enforceable when they area adopted by the local, state, or federal jurisdiction through law. In the event such standards were not specifically adopted by the local jurisdiction, they solely represent the unenforceable national industry standard.

> *The model fire codes issued by the National Fire Protection Association (NFPA) supply the prevailing national standards for purposes of section 11. The applicable NFPA code on alarm signaling, NFPA 72, establishes that a fire protection agency may designate any of three different types of supervisory entities to receive transmission signals from fire alarm devices: (1) the "central stations" of private alarm companies (like plaintiffs in this case); (2) a "remote supervising station" operated by a governmental agency (like the District's preferred system); or (3) "proprietary supervising stations" (stations operated by the building owners themselves — an alternative that is not at issue in this case). See NFPA 72: National Fire Alarm and Signaling Code §§ 26.1, 26.3-26.5 (2010 ed.).*

- ***See* ADT Sec. Servs. v. Lisle-Woodridge Fire Prot. Dist., 672 F.3d 492, 500 (7th Cir. 2012).**

Example NFPA Standards which may be relevant to a loss involving a fire sprinkler system include:

- NFPA 13: Installation of Sprinkler Systems
- NFPA 13R & 13D: Installation of Sprinklers in Residential Occupancies
- NFPA 14: Standard for Installation of Standpipe and Hose Systems
- NFPA 15: Standard for Water Spray Fixed Systems for Fire Protection
- NFPA 16: Standard for Installation of Foam-Water Sprinkler and Foam-Water Spray Systems
- NFPA 24: Standard for the Installation of Private Fire Service Mains and their Appurtenances
- NFPA 72: National Fire Alarm & Signaling Code
- NFPA 25: Standard for the Inspection, Testing, and Maintenance of Water-based Fire Protection Systems.

Interpretations and explanations of the interaction between these standards can be provided by a fire protection engineering expert.

Permitting Documents

When it comes to determining the installation standards relevant for a particular system, one must understand what the local jurisdictional requirements were at the time of the installation. This can sometimes be identified by referencing the building or installation permits for a fire sprinkler system which may be held by the building owner, or local jurisdiction's building office, or the fire department. Sometimes, these building permits will outline specifically what installation standard and code requirements the installation must meet. Other times, this information is not specifically stated on the permit, and one must research the code in effect at the time of the permit application within the jurisdiction in order to determine the relevant requirements.

Design Documents & Plans

If the fire sprinkler system failure may be related to the original design and installation of the sprinkler system, original construction documents may shed light on who exactly was responsible for the failure. Some important design documents to consider requesting include:

- Initial Design Specifications
- Initial Design Drawings
- Shop Drawings
- As-Built Drawings
- Functional test reports
- Written communications between responsible parties
- Any other written documentation regarding the design, installation or construction of the system

Review of these documents may shed light on which entities knew of relevant design and installation flaws during the design stage.

Inspection, Testing, and Maintenance Records

NFPA 25 requires specific records be taken and maintained regarding the Inspection, Testing, and Maintenance of sprinkler systems. Such records document the date upon which work was done, any deficiencies that were observed, as well as the reported system water and/or air pressures, just to name a few.

V. Potentially-liable Parties and their Responsibilities

A fire sprinkler system is a complex system which was likely designed, installed, and maintained by various parties. As such, each party should be considered for their possible contribution to liability for the subject claim.

System Design Engineer

The system design engineer is typically responsible for providing the initial design and specifications of the system. Depending on the specific project, the design engineer may simply outline the performance requirements for the system, and define (via specification documents) the installation requirements, or he may create design drawings of the entire system. Often times, the design specifications will reference NFPA standards for the installer to follow when constructing the system, even if they are not specifically adopted by the local jurisdiction.

System Installer

The system installer is responsible for performing the installation in accordance with the design drawings and specifications outlined by the design engineer. In the event the design engineer provided only performance-based requirements, the installer may also prepare the specific system installation drawings, referred to as "shop drawings", and submit those to the design engineer for review and approval. Once the "shop drawings" are approved, the installer should install the piping in accordance with the drawings, and the design specifications.

Building Owner

The building owner holds substantial responsibility for ensuring their system remain operationally ready. These requirements are outlined in NFPA 25, and specifically put the responsibility on the building owner. However, there are options under NFPA 25 for the building owner to hire a qualified contractor to perform the owner's duties for them. The specific contracts between the owner and his qualified contractor, coupled with an understanding of the requirements of NFPA 25, may shed light on specifically which party is responsible for which required services.

NFPA 25 places the responsibility for inspecting, testing, and maintaining wet sprinkler systems on the owner of the property. NFPA 25 4.1.1. This responsibility can be delegated through "specific provisions" NFPA 25 4.1.2.3. Furthermore, NFPA 25 provides inspections shall be performed by those who have "developed competence through training and experience." NFPA 25 4.1.2.2.

- **See Mid-Century Ins. Co. v. Insulvail, LLC, 592 F. App'x 677, 685 n.16 (10th Cir. 2014).**

Inspection, Testing, & Maintenance Contractor

An Inspection, Testing, and Maintenance (ITM) contractor may service a building under contract with the building owner. This ITM contractor should be competent in ITM services, and likely outlined his responsibility in a written contract or agreement with the building owner. The ITM contractor is responsible for notifying the building owner in the event they identify any deficiencies in the system that require attention, and may correct the deficiencies if asked to do so by the owner.

VI. Case Strategic Approaches

Use of Experts

It is of critical importance to identify the appropriate experts for a given loss and coordinate their retention as early in the process as possible. When notified of a loss involving a fire protection system, it should be immediately recognized that a Fire Protection Engineering Expert may be able to provide substantial value to the case assessment. In the event the incident also involves a fire (e.g. non-operation of the system), an Origin & Cause Expert may be added to the expert team.

If you are a downstream party defending subrogation, it is a good strategy to retain your own Fire Investigator and Fire Protection Engineer in order to gather your own independent evaluation so as to support your defense or to know that you are a target party and attempt early and cost effective resolution. You can also identify further downstream parties early in the handling of the case to place them on notice as well.

Expert purportedly followed standards set forth by the National Fire Protection Association in its publication NFPA 921: Guide for Fire and Explosion Investigations (1998). This guide qualifies as a reliable method endorsed by a professional organization.

- ***See* Fireman's Fund Ins. Co. v. Canon U.S.A., Inc., 394 F.3d 1054, 1057-58 (8th Cir. 2005).**

Preservation of Evidence

The purpose of evidence preservation is to support all appropriate subrogation arguments so that all parties have equal access to the evidence. It is imperative to establish a secured site so that all parties tendered to will have a chance to review the scene and evaluate the damaged properties to the best of their abilities, and to support your damage proofs when pursuing subrogation by transparent evaluation from all parties. If you are a "downstream" party defending a subrogation claim, it is imperative that you evaluate all potential arguments in your defense and that you establish a well-documented chain of custody for any pieces of evidence or equipment removed from a scene.

It is valuable to have a Fire Protection Engineering Expert get an opportunity to inspect and document the scene system prior to any system modifications. This may be in addition of a fire Origin & Cause investigator if the loss also included a fire event. Sometimes, getting such an inspection can be difficult, given the Authority Having Jurisdiction's requirements to place the system back in service as soon as possible. Under such a situation, assigning a Fire Protection Engineer and getting them to the site immediately to document the system as-is can help prevent later claims related to spoliation of evidence.

A litigant is under a duty to preserve evidence which it knows or reasonably should know is relevant to the action. That duty arises as soon as a potential claim is identified.

Documentary Evidence

It is critical to obtain all available documents from your client/insured as soon as possible. In many cases, it may be years after a loss before discovery demands from opposing parties may be made leading to situations where the documents necessary are no longer available. The collection and preservation of documents related to installation, inspections and maintenance of the fire suppression system should be gathered and preserved to prevent spoliation of the evidence.

Witnesses

All potential witnesses should be contacted and interviewed. Personal contact information should be gathered under the assumption that employees may not be working for your client at a later date. Signed statements should be obtained from any critical witness as soon as possible while their recollection is still fresh and to guard against their future unavailability. In addition to eye-witnesses of the incident itself, you should also consider adding the building manager and maintenance personnel as well as the party responsible for ITM of the system to your list of individuals to interview.

Theories of Liability

The liability theory varies depending on the circumstances. If you represent the affected property owner, you will likely want to spread a wide net in order to find as many potentially liable parties as possible. In order to properly establish this, you will need to review the specific

cause of the fire as reported by your O&C Expert and the specific cause of the sprinkler system failure by the Fire Protection Engineering Expert. This will give you the proper blueprint on who to target next as potentially responsible for the suppression system failure, including whether it was due to issues with the maintenance of the suppression system or the design of the system.

As a rule of thumb, liability can be determined through these three ways:

1. Direct liability when a contractor is liable through its own acts of negligence.
2. Vicarious liability when the contractor is liable solely because of its relationship with a subcontractor that was ultimately responsible.
3. Assumption of liability when one party assumes liability for another's actions.

Understanding what role you play in the loss, whether you are the insurer of the affected Property Owner, System Installation Contractor, System Maintenance Contractor, or even the manufacturer of a component part of the system, anticipating the liability arguments from other parties against you can allow you to prepare for an early and cost effective resolution.

Contractual Responsibilities / Obligations

It is imperative to obtain any and all contracts that exist between your insured and any other parties involved in the subrogation, as the availability of insurance coverage often depends on the contractual relationship between and among the owner, contractor, subcontractor, and insurer. Insureds (and adjusters) must understand what relationship they are seeking, and why they are seeking it to ensure that they are adequately covered.

It is best to be in a position of strength, and to understand your duties when you owe indemnity to other parties and what other parties would owe you. The earlier you can make any of the determinations, the better position you will be in as you can better control the investigation and control costs and target other subcontractors or liable parties. Such party could be manufacturers of the fire suppression system parts. One should obtain all manufacturer information for all involved fire suppression equipment and analyze potential points of failure. Should you identify an faulty elbow joint or a recalled fire sprinkler head, you may be in a position to pursue your own subrogation claim against the manufacturer. The earlier you can grasp the contractual responsibilities owed to you and the responsibilities that you owe to others, the more successful your defense or pursuit of indemnification will be.

In addition, Additional Insured obligations (typically triggered by contract and either ISO or manuscript policy endorsement) will have to be analyzed as well. As you are aware, while indemnity can be enforced on both Contractual and Common Law grounds – Additional Insured obligations will provide direct access to the downstream party's CGL policy, which means that the owner can look to the contractor's CGL policy to defend a claim that potentially could be covered by the policy. It is important to understand this early so that you can make the appropriate determinations, as the earlier this defense can be coordinated in a cost-effective manner. It should be noted that AI status will also help in preventing subrogation – as a general

rule, the insurer's basic right to pursue subrogation does not extend to its own insured, including any party covered as an additional insured under the policy.