International

SprinklerScene

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Sprinklers Performed Well in 1998 Cruise Ship Fire

The U.S. National Transportation Safety Board (NTSB) is not expected to release its official report on the July 1998 fire aboard the Carnival cruise ship Ecstasy until the Spring of 2000. When it is released, however, it is expected to credit the partial automatic sprinkler system on board the ship with helping to contain the fire, even though the areas of origin and development were not protected. More than 50 sprinklers activated to protect fire exposures and extinguish spot fires that resulted from heat from the unsuppressed fire, preventing considerably more damage. Some early news reports had suggested that sprinklers were ineffective in controlling the fire.

The fire took place as the Ecstasy was leaving Miami, Florida on Tuesday, July 21, 1998. The ship was provided with an automatic sprinkler system that substantially met international criteria, but there were no sprinklers in the exhaust duct from the laundry room, which was considered the area of origin, and no sprinklers on the rear mooring deck, which was the major area of burning. The mooring deck is where the heavy polypropylene ropes used to tie up to the dock are collected and stored. Even though the area is substantially enclosed, it has no windows and is therefore considered an open deck area.

The SOLAS (Safety Of Life At Sea) sprinkler requirements used for international cruise ships call for sprinklers or equivalent systems in accommodation and service spaces, stairway enclosures and corridors. Service spaces are defined as "those spaces used for galleys, pantries containing cooking appliances, lockers, mail and specie rooms, store-rooms, workshops other than those forming part of the machinery spaces, and similar spaces and trunks to such spaces." At the time it was built in 1991, the Ecstasy had been provided with sprinklers on a voluntary basis. Because the ship is not required to comply with the SOLAS sprinkler retrofit provisions until the year 2006, it is unknown whether the mooring deck would have been scheduled to receive sprinklers as a "store-room", but considered unlikely. It is expected that this issue will be addressed when the National Transportation Safety Board releases its report.

Ironically, the mooring deck would have been required to be protected with sprinklers under the provisions of the National Fire Protection Association's NFPA 301 – *Code for Safety to Life From Fire on Merchant Vessels*. Requested by the U.S. Coast Guard, the standard applies to all types of vessels other than pleasure craft, and may someday replace existing U.S. federal regulations. The first edition of NFPA 301 was approved for release by the NFPA Standards Council on July 16, 1998, a few days prior to the Ecstasy fire. The standard requires sprinkler protection for all vessels with overnight accommodations for passengers, but contains more flexible ship design and construction provisions than the existing international (SOLAS) requirements. Under the NFPA 301 definitions, an area can only qualify as a covered open deck area if all portions of the overhead are less than 5 m (16.4 ft) from the nearest opening to the weather. The mooring deck on the Ecstasy would not have qualified as an open deck area and, as a storage space exceeding 5 m^2 in area, would have been required to be protected with a fixed automatic fire protection system.

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Mist Standard Being Revised

The NFPA Committee on Water Mist Fire Suppression Systems is preparing final changes for the 2nd edition of NFPA 750 – *Standard on Water Mist Fire Protection Systems*. Expected to be adopted at the NFPA Fall Meeting in November of 1999, the year 2000 edition will replace the present 1996 edition, but will continue to rely upon the use of listed water mist equipment or systems that have demonstrated performance in fire tests conducted during the listing process.

The definition of water mist will continue to be "a water spray for which the Dv 0.99, for the flow weighted cumulative volumetric distribution of water droplets, is less than 1000 microns at the minimum design operating pressure of the water mist nozzle." However, a water mist nozzle will be required to either meet this definition or the specific requirements of an approved water mist fire test protocol. A new appendix D will provide the following examples of existing fire test protocols for water mist nozzles:

Agency	Water Mist Fire Test Protocols
International Maritime Organization England	Ship machinery spaces and pump rooms Passenger ship accommodation spaces, public spaces and service areas
Factory Mutual Research Corporation USA	Gas turbines in enclosures Machinery spaces Light hazard occupancies Wet benches
Underwriters Laboratories, Inc. USA	Machinery spaces Shipboard passenger cabins and public spaces Residential areas Light hazard areas Ordinary hazard 1 and 2 areas
Verband der Schadenversichen eV Germany	Cable conduits

Some of the other significant proposed changes:

Information will be added on the unique design considerations and safety features associated with positive displacement or “plunger” pumps used in high pressure systems.

Information on minimum temperature ratings based on distances from heat sources will be added similar to what is provided in sprinkler standards.

Use of the Hazen-Williams calculation method will be extended to intermediate and high pressure systems with minimum ¾-inch (20 mm) pipe, provided velocities do not exceed 25 ft/s (7.6 m/s).

A new Appendix E will address system reliability, and will include a questionnaire intended to help develop a record of system performance.

World Sprinkler News

- Recent fires in China have highlighted the need for sprinkler protection of department stores. A fire on December 7, 1998 in the Shaanxi province killed 8 and injured 23 others, and required 400 firefighters and 31 pieces of fire apparatus to control. Another department store fire in the Sichuan province on January 10, 1999 killed at least 9 people while injuring 100 more.

- The fire that burned in the Mont Blanc tunnel in Chamonix, France from March 24th to March 26th has demonstrated the need for sprinkler protection of tunnels. The intense heat generated in the 7-mile tunnel killed at least 40 people, reducing some of the bodies to ashes. The fire is reported to have started on a Belgian truck carrying flour and margarine. The truck driver survived, but only a few other motorists reached one of the 17 heat-resistant bunkers lining the tunnel. About 20 tractor-trailers and 11 cars were destroyed in the fire, which was finally brought under control by dozens of firefighters from France, Italy and Switzerland. Opened in 1965 as the longest tunnel in the world, the Mont Blanc serves as a major truck route connecting France and Italy through the Alps.

- The Swedish fire testing organization SP has released a new research report evaluating antifreeze for automatic sprinkler systems. Published in Swedish with an English abstract, the report addresses the question of whether some antifreeze solutions contribute additional energy to an established fire, potentially operating an excessive number of sprinklers. Intermediate scale wood crib fire tests were conducted using calcium chloride, ethanol, glycerine, methanol, potassium acetate, propylene glycol and urea. In general, two tests were conducted with each type of antifreeze, one with a solution with a freezing point of –15°C (5°F), and one with a freezing point of –30°C (-22°F). The tests indicated that only two of the solutions, calcium chloride and potassium acetate were comparable to or better than plain water in terms of reducing total energy release from the fires. The other solutions resulted in a significant increase in heat release rate of the fire source, in some cases up to twice as much. The results reportedly correlated well with theoretical calculations.

- The British Loss Prevention Council has released a new set of updates to its *Rules for Automatic Sprinkler Installations.* The release contains new Technical Bulletin 26, Additional General Requirements, which identifies and proposes updates to specific clauses in BS5306 Part 2: 1990 (as amended in 19980 for insurance purposes. It also contains a new version of Technical Bulletin 5, now titled *Passive Fire Protection of Sprinklered Buildings,* which refers to the provisions of the LPC *Design Guide for the Fire Protection of Buildings.* The publication can be ordered by fax at +(0181 236 9701.

- In an article in the November 1998 issue of *Fire Technology,* Richard Gann of the U.S. National Institute of Standards and Technology provided an update on the organization's 8-year "Next Generation Fire Suppression Technology Program." Funded by the U.S. Department of Defense, the $46 million project is aimed at finding a retrofittable, environmentally acceptable and economically feasible replacement for Halon 1301 in weapon systems by the year 2004. Part of this effort is aimed at investigating better use of water. Some of the specific projects being funded involve suppression effectiveness of aerosols and particles, droplet interactions with hot surfaces, the use of electrically charged water mists, and the development of a self-atomizing form of water. The latter two projects have been completed. It was found that charging the water spray induced significant spreading of the spray and reduced extinguishing times. The self-atomization project was considered a failure since it was ineffective at extinguishing an obstructed flame.

- The British Local Government Association (LGA) has endorsed the National Fire Sprinkler Network campaign aimed at amending the building regulations to require that all superstores over 2,000 m^2 in area be protected with sprinklers. The endorsement took place at the Labour Party Local Government / European Conference held in Manchester in February.

- The NFPA has launched an *NFPA Journal em Português* as a companion to its *NFPA Journal en Español*. With respective circulations of 5,000 and 7,500, the publications are aimed at the fire protection industry leaders in Latin America, many of whom are part of the growing NFPA Latin America membership section. NFPA estimates the total fire protection market in Latin America to be over $250 million per year.

- The National Research Council of Canada has tested three different water mist systems in a mock-up of a restaurant cooking area to determine their effectiveness in suppressing fires in commercial propane-fired deep-fat fryers. One of the mist systems, a low flow-rate system, was unable to extinguish the cooking oil fire, but the other two were successful. There was a momentary (less than 1 second) flare-up of the fires at the time of initial water application, but no drops of cooking oil were dispersed outside the fryer by the water-mist discharge. To avoid re-ignition, it was necessary for the water mist to be applied until the temperature of the cooking oil dropped significantly below its autoignition temperature. The NRC notes that almost half of all accidental fires in hotels, restaurants and fast-food outlets involve cooking oil or fat. Dr. Zhigang Liu (Fax 613-954-0483 or zhigang.liu@nrc.ca) directed the research.

- The first phase of the largest residential sprinkler system installation in social housing was launched on June 4, 1999 at Studley Green estate in Trowbridge, Wiltshire, England. This phase will include 212 houses to be equipped with residential sprinklers through a project organized by the West Wiltshire Residential Sprinkler Partnership. The Residential Sprinkler Association (RSA) is calling for mandatory sprinklers in such projects.

- The British Fire Protection Systems Association has initiated a new quarterly newsletter. The BFPSA is a trade association of manufacturers and installers of fire detection and fixed fire extinguishing systems other than sprinklers, and claims to represent 95 percent of the UK's market in that area.

Upcoming Meetings, Seminars, and Exhibitions of Interest

September 16-18, 1999 – NFSA Annual Seminar and Alternate Year Exhibition, Chicago, Illinois, USA (Fax 1-914-878-4215)

October 4-8, 1999 – Third International Conference on Fire Research and Engineering, Chicago, Illinois, USA, c/o SFPE (Fax 1-301-718-2242)

November 10-12, 1999 – Fire Australia 1999 and 7th Asia-Pacific Fire Trade Fair – "Buildings, Boats, and Bushfires," Tasmania, Australia, Fire Protection Association Australia (Fax +61 3 9890 1577 or www.fpaa.com.au)

November 13-17, 1999 – NFPA Fall Meeting, New Orleans, Louisiana, USA, National Fire Protection Association (Fax 1-617-770-0700 or www.nfpa.org)

February 23-25, 2000 – "Suppression and Detection Research & Practice: Bridging the Gap", Fire Suppression and Detection Research Application Symposium, Orlando, Florida, USA, The Fire Protection Research Foundation (Fax 1-617-984-7010 or www.nfpa.org)