SPRINKLER SYSTEM OPERATIONS

10. SPRINKLER SYSTEM OPERATIONS

10.1 The first line of defense against fire in many occupancies is an automatic sprinkler system. Properly operating sprinkler systems have a success record of better than 96%. Most automatic sprinkler system failures can be traced to human error, sabotage, vandalism, or explosions which knock out sprinkler system piping. It is essential that all firefighters have a sound, working knowledge of automatic sprinkler systems and the specific tasks required of the engine company to support them.

10.1.1 Automatic sprinkler systems are found in many types of occupancies including mercantile, commercial, industrial, warehousing and assembly. Increasingly, sprinkler systems are being installed in residential occupancies--both permanent (multiple dwellings) and transient (hotels and motels).

10.1.2 Pre-incident Planning

Engine and ladder companies should be familiar with automatic sprinkler systems found in their response areas and any special characteristics or problems with these systems. Many buildings equipped with automatic sprinkler systems are already included in CIDS for various reasons, but CIDS information related to the sprinkler system itself may not be available. Engine company chauffeurs should pay particular attention to the location and condition of siamese connections and nearby hydrants.

10.2 TYPES OF SPRINKLER SYSTEMS

10.2.1 There are several types of automatic sprinkler systems found in New York City. Water supplies for automatic sprinkler systems include city main and usually one other source--gravity tank, pressure tank, cistern or suction tank.

A. **WET PIPE**: Wet pipe sprinkler systems contain water in the riser and piping at all times. As soon as a sprinkler head activates due to the heat of a fire, water is immediately discharged through the open head.

B. **DRY PIPE:** Dry pipe sprinkler systems contain air (or sometimes nitrogen) in the riser and piping at all times. The air (or nitrogen) is under pressure and this pressure maintains a "differential dry pipe valve" in the closed position. When a sprinkler head activates, the air (or nitrogen) is exhausted through the open head, thus allowing the differential dry pipe valve to open and water to be admitted to the riser and piping. Some dry pipe systems are equipped with quick opening devices (QOD's) which assist in exhausting the air or nitrogen from the system thus allowing water to reach the open head more quickly. Dry pipe systems are installed where there is a danger of freezing.

C. **DELUGE:** Deluge type sprinkler systems are equipped with a "deluge" valve which opens upon an electrical signal received from a smoke, heat, or infrared (flame) detector. In a deluge system, all sprinkler heads (or nozzles) are open and will flow water simultaneously. Deluge systems are often found in aircraft hangars or where large quantities of flammable liquids are used in industrial processes.

D. **PRE-ACTION:** A pre-action type of sprinkler system consists of fusible sprinkler heads, dry piping, and a valve which is opened upon an electrical signal from a smoke, heat, or infrared (flame) detector. Pre-action systems are most often found in computer rooms or where other sensitive electronic equipment is used. The idea is that once a fire is detected, the valve opens admitting water to the piping. If manual fire control efforts are unsuccessful, the sprinkler system actuates and will quickly control the fire. By maintaining the piping dry during normal operations, the danger of a large water damage loss due to a break in the piping or accidental damage to a sprinkler head, is avoided.

E. **COMBINATION:** A combination sprinkler system or combination sprinkler-standpipe consists of sprinkler heads and standpipe hose outlets attached to a common riser. Combination systems may be either "wet" or "dry."

10.2.2 *Non-automatic* sprinkler systems are also encountered. They are usually found in cellars and sub-cellars of older commercial buildings. Non-automatic sprinkler systems depend solely upon the fire department to supply water for firefighting. These systems may contain fusible sprinkler heads, open sprinkler heads, or even perforated pipes.

10.3 AUGMENTING SPRINKLER SYSTEMS

10.3.1 Siamese connections are color coded for ease of identification. Either the caps or the entire siamese connection may be painted. Sprinkler siamese connections are painted **green**. For reference, the other colors used and what they indicate are as follows:

Green	Automatic Sprinkler System
Red	Standpipe System
Aluminum	Non-automatic Sprinkler or Perforated Pipe
Yellow	Combination Sprinkler/Standpipe

If no color coding is present, each siamese connection should be identifiable as to the type of system it supplies. This information is usually embossed or stamped on a plate or the siamese connection itself.

10.3.2 Sprinkler systems should **always** be supplied with 3 1/2-inch hose.

10.3.3 If a building is equipped with both a standpipe system and automatic sprinklers, the first supply line must be stretched to the standpipe siamese. If the first due engine is supplying both the standpipe and sprinkler systems, the second and third due engine companies **must** stretch additional lines to augment **both** systems.

10.3.4 If a sprinklered building **is not** equipped with a standpipe system, the first line stretched should be a handline (either 1 3/4-inch or 2 1/2-inch, depending upon fire conditions) and the second line used to augment the sprinkler system.

10.3.5 In the case of a combination sprinkler-standpipe system, water flow demands will be great. Every effort must be made to augment the system with additional supply lines from other first alarm engine companies.

10.3.6 Difficulties may be encountered with siamese connections. These difficulties include missing caps, defective threads, debris stuffed into the connection, tight caps, frozen female swivels, and clappers either broken or jammed open. Never insert any part of your hand inside the connection to clear debris. In addition to broken glass and sharp metal edges, junkies have been known to store or discard hypodermic needles inside siamese connections. A spare 3-inch male cap should be carried by all engine companies in the event it becomes necessary to cap one side of the siamese connection to prevent an outflow of water due to a malfunctioning clapper valve. Immediately stretching and connecting a second 3 1/2-inch line is another potential remedy for this problem. Fig. 9-2A to 9-2D in Chapter 9 illustrates various solutions to the problem of caps stuck in place, defective threads and frozen female swivels.

10.3.7 Many siamese connections are equipped with either metallic or plastic vandal proof ("break away") caps. These caps are usually attached with screw eyes placed over the pin lugs on the female swivel (see Fig. 9-3 in Chapter 9). Both metal and plastic caps are best removed by striking the center of the cap with a tool. Caps can also be removed by prying one of the screw eyes off the pin lug.

10.3.8 Whenever possible, sprinkler systems should be augmented by at least two different engine companies.

10.3.9 Supply hose connected to sprinkler systems should be charged when necessary. The engine company officer should order the sprinkler system augmented/supplied upon indication of a working fire (smoke, heat, visible fire, reports from employees or security guards) or based on reconnaissance information from ladder company personnel indicating same. Water flow alarms indicate *only* that water is flowing, but it may be due to reasons other than a fire--such as broken piping or a dislodged sprinkler head.

10.3.10 Pump discharge pressure for supplying a sprinkler system should *start* at 150 psi. This pressure will have to be adjusted accordingly based on reports of sprinkler system performance received from ladder company personnel, if more than two lengths of 3 1/2-inch hose are needed to reach the siamese connection and for fires on upper floors.

10.4 OPERATING IN SPRINKLERED BUILDINGS

10.4.1 Due to the potential danger of high concentrations of carbon monoxide gas being present where sprinkler heads are operating, masks shall be used and facepieces properly affixed. (Refer to AUC 220 for SCBA usage policy at fires and emergency operations.)

10.4.2 Both engine company and ladder company personnel should carry wooden sprinkler wedges or sprinkler tongs to stop the flow of water from a sprinkler head in order to facilitate operations and reduce water damage.

10.4.3 The sprinkler system control valve should **only** be shut down on orders from the Incident Commander once it is determined that the fire has been controlled and hoselines are in position.

10.4.4 Sprinkler system control valves may be one of four basic types:

- Outside Stem & Yoke (OS&Y)
- Post Indicator Valve (PIV)
- Wall Indicator Valve (WIV) or Wall Post Indicator Valve (WPIV)
- Butterfly Type Indicating Valve

The Outside Stem & Yoke (sometimes called an Outside Screw & Yoke) and Post Indicator Valve are the most commonly encountered. See Fig. 10-1A to 10-1D for illustrations of each type of valve. The OS&Y's and PIV's may also be found in standpipe systems for use as section or zone control valves.

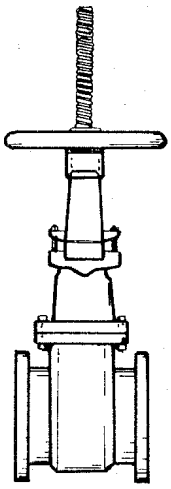

Fig. 10-1A

OS & Y
OUTSIDE
STEAM & YOKE

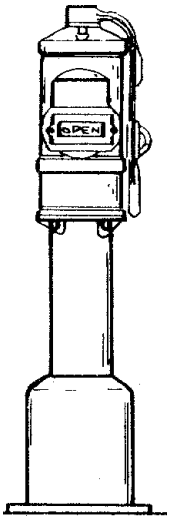

Fig. 10-1B

PIV
POST
INDICATOR
VALVE

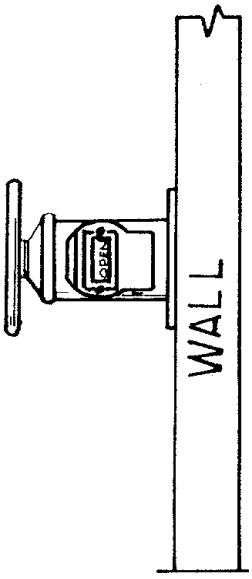

Fig. 10-1C

WALL PIV
WALL POST
INDICATOR
VALVE

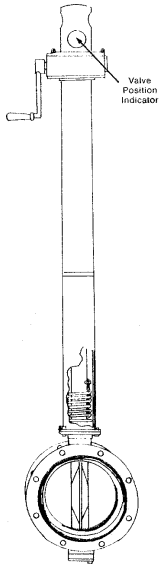

Fig. 10-1D

UNDERGROUND
BUTTERFLY
VALVE

10.4.5 The member assigned to the sprinkler system control valve (oftentimes a ladder company chauffeur) must be equipped with a handie-talkie and prepared to re-open any shut valve immediately on orders of the Incident Commander.

10.4.6 Chief officers are reminded of the fact that the New York Fire Patrol possesses specialized equipment in order to protect commercial property from unnecessary water damage.