PHOENIX REGIONAL STANDARD OPERATING PROCEDURES	
Policy Name: **LARGE-SPACE BUILDING COLD SMOKE FIRES**	Policy Number: **M.P. 202.04A**
This policy is for internal use only and does not expand an employee's legal duty or civil liability in any way. This policy should not be construed as creating a duty to act or a higher duty of care, with respect to third party civil claims against employees or the Phoenix Fire Department (PFD). Remedies for violations of this policy, if proven, are limited to administrative disciplinary action against PFD employees.	
Related Policies: 201.01A, 201.01B, 201.03, 201.06, 202.05, 202.19, 202.19A, 205.20, 205.20A, 205.02B	
Other Reference: NFPA Fire Protection Handbook, 2018	
Date Implemented: 12/2021-R	Review Date: 12/2026

PURPOSE

The purpose of this procedure is to establish guidelines for regional consistency regarding fire incidents in large-space buildings with fire sprinklers (cold smoke fires). Large-space buildings are structures with big, non-compartmentalized space(s). For example, warehouses, distribution centers, shopping centers, data centers, churches, bowling alleys, gymnasiums, public assembly occupancies, etc. Early incident operations necessitate controlling the advancement of interior companies due to the increased potential of firefighters becoming disoriented. This requires a strong command presence and focus on incident organization, communication, accountability, hose line management, air management, work cycles, etc.

RISK MANAGEMENT

Fire sprinkler systems have over a 100-year history of protecting life and property from the destructive forces of fire. History establishes that civilian fire fatalities in sprinklered buildings of any type are extremely rare. In the absence of a report of people trapped, we can anticipate our actions being focused on property protection and our application of risk management must align as such.

Fire incidents in large-space buildings with fire sprinkler systems expose firefighters to many challenges and hazards. These include but are not limited to:

- Cold smoke refers to smoke that has lost its velocity and flows calmly. In other words, smoke that lacks the speed, turbulence, or energy. Cold smoke is extremely dangerous. The presence of cold smoke identified during size up is significant. Cold smoke can be present with or without fire sprinkler control.

- Regarding large-space buildings, a small amount of smoke from one or more locations can mean a significant fire.
- Factors of storage configuration such as height and type (e.g., rack storage, floor storage). As materials get wet, they get heavier, and packaging can begin to break down causing rack storage collapse.
- Construction features including type, building size, fire rated enclosures, and large opened areas.
- Signs of an incident of any significance will typically require a first alarm or greater response.
- Large open interior spaces typically require truss construction. These large spans and construction methods can lead to early structural collapse if fire is not contained by the fire sprinkler system. Partial roof collapse should be assumed to have compromised the fire sprinkler system.
- Large-space buildings may have atypical roof characteristics that can be challenging for roof operations to include vertical ventilation.
- The types and quantities of materials stored may include hazardous materials.
- Presence, type, and suitability of fire protection and detection systems.
- Methods to facilitate ventilation such as roof vents, sky lights, doors, rollup doors, smoke control and exhaust systems.
- Available water supply and adequacy.
- Fixed and mobile equipment/machines for material handling.
- Warehouses with rolled paper storage are a significant hazard. In 1978, the fire sprinkler system had contained a fire in a warehouse storing large bales of rolled paper. Three Canadian firefighters were killed instantly during overhaul when 600-pound paper rolls became unstable and toppled over burying them.
- If the fire sprinkler system fails to control the fire for any reason, the fire will grow quickly. We should anticipate fire control necessitating defensive operations and exterior fire suppression via master streams outside of the collapse zone.

PRE-INCIDENT PLANNING

Pre-incident planning is critical as information gathered during planning visits before the incident is used by Company and Command Officers during an actual incident. Pre-incident planning allows personnel the opportunity to view conditions and factors within the structure or the site. This allows for an evaluation of how these conditions and factors are likely to develop in the event of an emergency incident. The following should be considered during pre-incident planning for large-space buildings:

- Exterior wall construction: Concrete, metal panel, masonry, wood frame, etc. This information is important as it relates to fire extension potential, exposure protection, collapse, and others.

- Occupancy type: Office, retail, manufacturing, warehouse, etc. Each occupancy has unique factors. Warehouses have rack storage, retail may have large storage areas (to include rack storage areas not immediately evident), manufacturing may have specialized equipment and hazardous materials.
- Many new data centers and other large-space buildings may have battery energy storage systems and/or photovoltaic systems (see M.P. 205.20, 205.20A, 205.02B)
- Roof construction: The type and construction of the roof will impact ventilation. Wood joist, steel joist, steel beam, etc. Decking material, wood plank, concrete, metal panel, etc. Roof covering may have built up tar and gravel or insulated membrane systems. Pre-incident planning should address how ventilation can be accomplished, to include the presence and location of skylights, and any manual or automatic vents.
- Ceilings and attics: False ceilings and common attics can lead to fire spread throughout the structure. False ceilings and common attics can result in fires burning undetected in areas not visible and absent fire sprinklers.
- Interior configuration and storage: Presence and height of rack storage, large-opened spaces, office areas and other separated spaces, fire walls, fire doors, smoke barriers, etc.
- Fire protection systems: Automatic sprinkler systems, fire pumps, special protection systems (e.g., dry chemical, foam, carbon-dioxide, etc.), standpipes, fire alarm systems, smoke control systems, and water supply.
- Site factors: Apparatus access and tactical positioning, security, exposures, utilities, etc.
- Environmental: Runoff from fire sprinklers or other suppression efforts contaminated with hazardous materials must be considered. This should include the location of drainage and collection points as well as other potential exposures.

Premises alerts for rolled paper, hazardous materials, rack storage, and other hazards should be entered into the CAD system when identified during pre-incident planning.

INCIDENT GUIDELINES

Early assessment of the seven sides of the structure is a high priority on these incidents. Size up should include the identification of smoke, flames, or water runoff. Look for signs for fire protection systems and the buildings Fire Department Connection (FDC). Look for a red bell on the outside of the building. If the bell is ringing, water is very likely to be flowing out of the fire sprinkler system. Some systems incorporate horn/strobe notification devices, listen for horns and look for flashing strobes. Also, identify signs of hazardous materials to include particulate scrubbers, containment areas, tanks, NFPA 704 Diamond(s), other signage, etc.

Determining the best access point(s) to the fire necessitates good size up of the building. Ideally, firefighters have an awareness of the building established through pre-incident planning. When operating in interior positions, firefighters must stay on the hose line, no complacency. Conditions can change quickly. Fire companies should recognize the importance of utilization of thermal imaging cameras (TIC), especially on these types of incidents due to the size of the building and

presence of cold smoke. The TIC camera is an excellent tool to support accountability and locating the fire.

All personnel within the incident organization must effectively manage their responsibilities with regard to work cycles, accountability, air management, communication (radio management), hose line management, etc. Companies must not extend hose lines more than 150 feet into the building.

If you cannot find the fire, pull the firefighters out of the building and implement another plan. The Incident Commander must be decisive with making the decision to switch to another plan, understanding the dangers of interior companies operating in a hazardous position with a limited air supply. Once firefighters are out of the building, regroup and implement plan B (this is the Incident Commanders responsibility). Consideration should be given to pumping the FDC and ventilating the building. Cold smoke fires should be approached in a similar manner to a hazardous materials incident, recognizing the hazards and where the incident resides from a risk management perspective. Ventilation options can include the utilization of fans, vertical ventilation, opening sky lights, using specialty building systems, and/or hydraulic ventilation with portable monitors. Ventilation will often utilize a variety of different options coordinated to ensure effectiveness and realizing that ventilation of cold smoke is a slow process.

Pumping the FDC is a good thing. Additional GPM and pressure can have a major positive impact on the effectiveness of fire sprinklers. Remember, every decision made should be coordinated. Prior to pumping the FDC, consider if firefighters are interior and if a sudden increase in volume and pressure may contribute to a rack storage collapse.

Note: Some large-space building fire protection systems are supported by a fire pump. Connecting to the FDC in this instance is a precaution in the event of a fire pump failure.

Conversely, we should not shut down the fire sprinkler system prior to verification of fire control. The outcome of testing after the Southwest Supermarket fire established the maximum distance a fire company will enter any building is 150 feet, without additional support mechanisms put in place by command. For cold smoke fires, if the fire cannot be located or accessed due to 150-foot limitations, command must pull firefighters from interior positions, pump the FDC, and ventilate the building. Command and operating personnel recognize that these tactics will take time. Once smoke has cleared out and we have assurances that the incident has stabilized, fire companies may go deeper than 150 feet into the building, if it is safe to do so. A Shift Commander should be present to review and approve any plan that takes fire companies more than 150 feet in the building. In this instance, a Battalion Chief with a Battalion Safety Officer should be in place to manage the Sector. Remember, the incident commander controls the incident, not the other way around. On cold smoke fires, we shall operate in the correct risk management position. If firefighters cannot reach the fire, pull them out of the building. At this point, time is on your side.