

Relevance to WTC 7: A performance-based assessment of the effects of fire on WTC 7, had it considered all of the relevant thermal effects (e.g., thermal expansion effects that occur at lower temperatures), would have identified the vulnerability of the building to fire-induced collapse and allowed alternative designs for the structural system.

5.2.4 Group 4. Improved Active Fire Protection

Active fire protection systems (i.e., sprinklers, standpipes/hoses, fire alarms, and smoke management systems) should be enhanced through improvements to design, performance, reliability, and redundancy of such systems.

Recommendation H (NIST NCSTAR 1 Recommendation 12). NIST recommends that the performance and possibly the redundancy and reliability of active fire protection systems (sprinklers, standpipes/hoses, fire alarms, and smoke management systems) in buildings be enhanced to accommodate the greater risks associated with increasing building height and population, increased use of open spaces, high-risk building activities, fire department response limits, transient fuel loads, and higher threat profile.

Reliability is affected by (a) the redundancy such that when one water supply is out of service (usually for maintenance) the other interconnected water supply can continue to protect the building and its occupants, (b) automatic operation of water supply systems (not only for starting fire pumps but also for testing and tank replenishment with appropriate remote alarms to the fire department and local alarms for notifying emergency personnel), (c) the use of suitable equipment and techniques to regulate unusual pressure considerations.

Relevance to WTC 7: No water was available for the automatic suppression system on the lower 20 stories of WTC 7 once water from street-level mains was disrupted. This lack of reliability in the source of the primary and secondary water supplies allowed the growth and spread of fires that ultimately resulted in collapse of the building.

5.2.5 Group 6. Improved Emergency Response

Technologies and procedures for emergency response should be improved to enable better access to buildings, response operations, emergency communications, and command and control in large-scale emergencies.

Recommendation I (NIST NCSTAR 1 Recommendation 24). NIST recommends the establishment and implementation of codes and protocols for ensuring effective and uninterrupted operation of the command and control system for large-scale building emergencies.

- a. State, local, and federal jurisdictions should implement the National Incident Management System (NIMS). The jurisdictions should work with the Department of Homeland Security to review, test, evaluate, and implement an effective unified command and control system. NIMS addresses interagency coordination and establishes a response matrix—assigning lead agency responsibilities for different types of emergencies and functions. At a minimum, each