



NIST World Trade Center Investigation

Active Fire Protection Systems

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Statistics on Comments Received

Organizations submitting comments:

- Engineering firms
- Code and standards organizations
- Professional organizations, industry groups
- governmental organizations, private individuals

Number of specific comments received and disposition:

- 93 accepted or accepted in principle
- 59 considered; no change made
- 14 no action required

General Nature of Comments

- Majority of comments were editorial, and many of these were accepted because they clarified the reports or corrected minor errors.
- A recurring comment was that recommendations 12, 13, 14, and/or 15 did not have sufficient technical justification for adoption.
- A number of comments were fully supportive of all four of these recommendations, with no changes needed.
- The high reliability of sprinklers was cited numerous times as an argument against recommending redundancy in fire protection systems or for not allowing reductions in passive fire protection and egress systems that are currently permitted in codes.

Findings with Significant Revision

Sprinklers, Standpipes and Preconnected Hose Systems:

- Based upon documents examined, fire suppression systems in WTC 1, 2, & 7 appear to have been installed in a manner consistent with accepted engineering practices at time of their installation, with a few minor exceptions. Installations also appear to comply with current accepted engineering practices, with a few minor exceptions.
- Sprinkler protection was installed throughout WTC 1, 2, & 7 on 9/11, with exception of specific rooms and spaces where sprinkler protection was permitted to be omitted by BCNYC.
- No information was found that indicated the generator/fuel day-tank enclosures in WTC 7 on floors 5 and 7 were protected by automatic sprinklers or other special hazards protection; however, generator rooms on 8th & 9th floors were protected with sprinklers.

Findings with Significant Revision (2)

Fire Alarm Systems:

- Because design of WTC 1 and 2 fire alarm system required manual activation of alarm signal to notify building occupants, alarm signal was not transmitted until 12 min after impact in WTC 1.
- Fault tolerance performance standards for telephone communication circuits are not as well defined as compared to other types of fire alarm circuits. This limits survivability characteristics of telephone communication circuits in comparison to other types of fire alarm circuits.

Smoke Management Systems: no significant revisions

Significant Revisions to NCSTAR 1

E3 and 8.2. Summary of Findings

Objective 2: ...The active fire safety systems (sprinklers, smoke purge, fire alarms, and emergency occupant communications) were designed to meet or exceed current practice. However, *with the exception of the evacuation announcements (added phrase)*, they played no role in the safety of life on September 11 because the water supplies to the sprinklers were damaged by the aircraft impact. The smoke purge systems, operated under the direction of the fire department after fires, were not turned on, but they also would have been ineffective due to aircraft damage....

5.3.6 Active Fire Protection: ...The WTC towers were constructed *(deleted irrelevant reference to 1993 bombing.)* with a manually activated (by Port Authority staff at the direction of FDNY) smoke purge system whose use was integrated into the Port Authority's WTC Fire Safety Plan.

Significant Revisions to NCSTAR 1

Recommendation 13. NIST recommends that fire alarm and communications systems in buildings be developed to provide continuous, reliable, and accurate information on the status of life safety conditions at a level of detail sufficient to manage the evacuation process in building fire emergencies, and that standards for their performance be developed. This should include means to maintain communications with evacuating occupants that can both reassure them and redirect them if conditions change. While pre-installed fire warden telephone systems in buildings can serve a useful purpose and may be installed in buildings, they should be made available for use by emergency responders. (~~Deleted "Pre-installed dedicated firefighter telephone systems in buildings are of limited use and effectiveness, and their installation is not encouraged."~~)