



Fire Protection

By Richard G. Schutte, Schutte & Associates, Evanston, IL

The World Trade Center Collapse: Congressional Testimony

The fire protection column published in the January, 2003 *Plumbing Engineer* concluded with a question:

“... is the World Trade Center collapse incident simply being used by ‘experts’ to ‘wring’ more research funding out of the Federal Treasury?”

Rather than provide an answer to this question, the January column referred readers to the testimony of the director of the National Institute of Standards and Technology (NIST), Dr. Arden L. Bement, Jr., at the Congressional Science Committee hearings on the collapse of the World Trade Center towers on March 6, 2002. (A transcript of Dr. Bement’s testimony can be found on the NIST Web site at www.nist.gov/testimony/2002/abwtc.html.)

The Congressional hearings on the collapse of the World Trade Center held on March 6, 2002 opened with a statement from the chairman of the committee, Congressman Sherwood Boehlert (R-N.Y.), followed by the testimony from five witnesses. Congressman Boehlert’s opening statement included the following excerpts:

“The Committee decided to move forward for two fundamental reasons. First, we believe that we owe it to the victims and their families to learn everything possible about what happened in those horrifying first hours of September 11th—not just to satisfy their immediate needs and yearnings, but to ensure that such a catastrophic building failure, and the resulting loss of life, never happen again.

“Another significant lesson of the Trade Center collapse is that we need to understand a lot more about the behavior of skyscrapers and about fire, if we are going to prevent future tragedies.

“But this hearing is not so much about the past, as it is about ensuring that we protect lives in the future.”

The first witness before the committee was Robert F. Shea, Acting Administrator, Federal Insurance and Mitigation Administration of the Federal Emergency Management Agency (FEMA). Mr. Shea’s testimony included the following:

“... its conclusions and recommendations [referring to the FEMA study issued May, 2002] will help guide future investigative and research efforts connected primarily to understanding the performance of buildings when subjected to extreme conditions.

“This study [again referring to the FEMA study issued May, 2002] represents an important first step in suggesting how the technical resources of the nation can be brought to bear on protection of lives and property.”

The next witness before the committee was Glenn P. Corbett, an assistant professor of fire science at John Jay College in New York City. Professor Corbett is also a member of the advisory panel of the Skyscraper Safety Campaign, a group advocating more restrictive code requirements for high rise buildings. His testimony included the following:

“For example, our model building codes treat a 15-story building exactly the same as a 100-story building in terms of fire protection—we apply the same level of structural fire resistance, the same fire protection systems, the same everything. We place heavy reliance on automatic sprinkler systems, with little redundancy in terms of structural fire resistance to ensure that the building will stay up long enough to allow for firefighters to reach the fire area, rescue trapped inhabitants, and generally deal with the situation. Automatic sprinklers are the best protection against fire, but we need to have a backup when we are 1,000 feet high in a building on fire. We need a proper balance of passive and active protection in larger high-rise structures.

“This test, commonly known as A.S.T.M. E-119, was developed to provide assurance that the fire protection coating/encasement provided for beams and columns would allow them to be subjected to high temperatures and not collapse. This test, however, dates back to the 1920’s and is based upon the temperatures recorded when a set of buildings were burned back then for study purposes. Today, we basically still use the same test with the same ‘fire’ temperature and exposure conditions developed over 75 years ago. I would argue that the fires of the 1920’s are different than those of today, and that this nationally accepted test needs to be thoroughly reexamined in light of what happened on 9-11.”

The final witness before the committee was Dr. Bement, the director of NIST. Dr. Bement’s testimony included the following:

“The tragedy that the United States experienced on September 11, 2001, was unprecedented when compared with any prior accident, natural disaster, or terrorist/war

Continued page 10

Fire Protection

Continued from page 8

attack. The collapse of the twin World Trade Center towers was the worst building disaster in human history...

"The implementation of the results of such an investigation would be critical to restore public confidence in the safety of tall buildings nationwide, enhance the safety of fire and emergency responders, and better protect people and property in the future. To cite one example, the February 4th issue of 'Crain's New York Business' reports that an increasing number of tenants are leaving the Empire State Building, which is again the tallest building in New York City, because of fears of another terrorist attack. Anecdotal evidence also suggests that building vacancy rates have doubled in Manhattan, despite the 15 million square feet of space that was lost on September 11th.

"The Building and Fire Research Laboratory is the foremost fire research laboratory in the United States, and through the National Earthquake Hazards Reduction Program (NEHRP) NIST is the principal agency for research and development to improve building codes and standards...

"Fourth, to study procedures and practices used to provide adequate structural reserve capacity to resist abnormal loads (e.g. blast, explosion, impact due to aircraft or flying debris from tornadoes, accidental fires, and faulty design and construction), especially those that can be anticipated prior to construction (e.g. impact of a Boeing 707)...

"This broader program would address critically and urgently needed improvements to national building and fire standards, codes, and practices that have begun to be recognized in recent years. The events of September 11th have brought even more focus and priority to this already important issue.

"The goal of this broader program would be to produce cost-effective retrofit and design measures and operational guidance for building owners and emergency responders.

"Current building design practice does not consider fire as a design condition. Instead, structural fire

endurance ratings are prescribed in building codes using standard tests on individual components. The current testing standards are based on work carried out at NIST in the 1920s. They do not represent real fire hazards in modern buildings. They also do not consider the fire performance of structural connections or of the structural system as a whole, or the multiple performance demands on fire proofing materials.

"In short, NIST would provide the technical basis and guidance for fire safety design and retrofit of structures, the predictive tools and test methods for fire resistance determination, and the performance criteria for fireproofing materials. In addition, NIST proposes to develop guidance and retrofit

"The final program element supports a construction-industry-led roadmapping effort to reflect changed priorities for development and deployment of safety and security standards, technology, and practices.

"The effort would complement and support parallel efforts of technical organizations to improve standards, codes, and practices.

"In conclusion, I believe it is imperative for the U.S. to learn from the worst-ever building disasters in human history and take aggressive remedial action to minimize future losses.

"In the wake of September 11th, the private sector's willingness to take necessary corrective action to strengthen building codes and stan-

Perhaps if the Science Committee had heard from a more diverse group of "experts," the committee would have developed a far different perspective on the relative importance of a study of collapse of the World Trade Center Towers.

technologies to enhance building egress in emergencies, practical tools and guidance to enhance the safety and effectiveness of fire and emergency responders, and improved models of occupant behavior and response to enhance evacuation and communication in emergencies.

"Yet, the United States has not developed standards, codes, and practices to assess and reduce this vulnerability. Adding to the problem for modern structures is their smaller margin of safety—and the reserve capacity to accommodate abnormal loads—due to increased efficiency in the use of building materials and refinements in analysis techniques...

"The overwhelming majority of buildings in public use today are vulnerable to terrorist attack on a number of fronts...

dards is extraordinarily strong."

Following the March 6 hearings, members of the Science Committee issued a press release containing some of the members' reactions to the testimony which the committee heard. The reaction of one committee member, Representative Connie Morella (R-Md.) was as follows:

"The importance of this work can't be overstated. Research into this disaster is the only way we have any chance of preventing the next one and Congress needs to move swiftly to formalize the way we evaluate catastrophic building collapse. Fortunately, we have an advanced federal laboratory dedicated to such research. The National Institute of Standards and Technology is uniquely position[ed] to conduct extensive

Continued on page 14

February 2003

Fire Protection

Continued from page 10

investigations into the structural failures of the World Trade Center and suggest appropriate new standards and potential retrofits...

As a result of the hearings, the House Committee on Science drafted a letter to Mr. Mitchell Daniels, the director of the Office of Management and Budget (OMB), regarding funding for a federal government study of the collapse of the World Trade Center. The opening paragraph of the letter reads as follows:

"We are writing to you as a result of today's House Science Committee hearing on the collapse of the World Trade Center buildings. There was unanimity among the witnesses on the need for a comprehensive assessment and research agenda to address evacuation procedures, emergency response, and structural analysis of the site's buildings. The goal of such a study would be to improve the safety of both the public and the emergency responders in the event of another building collapse."

The letter to the director of OMB also includes the following excerpt:

"... the Federal Emergency Management Agency's (FEMA) Building Performance Assessment Team (BPAT) has estimated that \$40 million would be required to fund a comprehensive study of an event of this magnitude and complexity."

From the standpoint of the overall federal budget, a proposal to spend \$40 million for a study of the collapse of the World Trade Center is "chicken feed," but certainly any decision to devote this amount of taxpayer money (or the \$16 million which was actually allocated for the study) to studying a single disaster should be based upon credible testimony by witnesses before a Congressional committee. Unfortunately, the testimony from some of the experts at the March 6 hearing of the House Science Committee was less than factually accurate. Perhaps if the Science Committee had heard from a more diverse group of "experts," the committee would have developed a far different perspective on the relative importance of a study of collapse of the World Trade Center Towers.

Next month we will continue this series by presenting an analysis of the various statements presented on these pages. □

About the Author

Richard Schulte is a 1976 graduate of the fire protection engineering program at the Illinois Institute of Technology. After working in various positions within the fire protection field, he formed Schulte & Associates in 1988. His consulting experience includes work on the Sears Tower and numerous other notable structures. He has also acted as an expert witness in the litigation involving the fire at the New Orleans Distribution Center. He can be contacted by sending email to rschulte@plumbingengineer.com.

**Next month:
Analysis of Congressional
Testimony on the WTC
Collapse**