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Hearing on "The Investigation of the World Trade Center Collapse: Findings, Recommendations and Next Steps"

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Chairman Boehlert, Ranking Member Hall, and Members of the Committee, I want to thank you for this opportunity to testify on the National Institute of Standards and Technology's proposed investigation into the collapse of the World Trade Center (WTC) buildings.

I will outline the proposed *NIST response plan* today, and show how it complements and is responsive to the efforts of the Building Performance Assessment Team, or BPAT, led by the American Society of Civil Engineers (ASCE) and sponsored by the Federal Emergency Management Agency, FEMA. The response plan addresses all major recommendations contained in the BPAT report. I commend Dr. Gene Corley and the BPAT members for their excellent report and detailed recommendations. The National Institute of Standards and Technology (NIST) has also identified other critical issues that need study, especially in areas that impact life safety and engineering practice.

The NIST proposed response plan consists of three key program elements – including an investigation – to be conducted in parallel (*graphic to be projected on video monitors*). These are:

- First, a 24-month *building and fire safety investigation* into the collapse of the Twin Towers (WTC 1 and 2) and WTC 7. The goal of this program element is to investigate the building construction, the materials used, and the technical conditions that combined to cause these disasters following the initial impact of the aircraft. While WTC 4, 5, and 6 will not be investigated specifically in this phase, what we learn in examining WTC 1, 2 and 7 would benefit buildings of all designs.
- Second, a multi-year *research and development (R&D) program* to provide the technical basis to support improved building and fire codes, standards, and practices. This program element addresses work in critical areas such as structural fire safety, prevention of progressive collapse, and equipment standards for first responders. It includes BPAT recommendations for WTC 3, 4, 5, and 6, Bankers Trust, and peripheral buildings as well as recommendations for future studies to address specific issues of broader scope not covered by the BPAT. The program outputs and recommendations will support the voluntary consensus process that is used to develop building and fire codes and standards in the United States.
- Third, an industry-led *dissemination and technical assistance program (DTAP)* that will provide practical guidance and tools to better prepare facility owners, contractors, designers, and emergency personnel to respond to future disasters. The DTAP will also be an important complement to the R&D effort to demonstrate and gain acceptance of proposed changes to practice, standards, and codes. This program element addresses BPAT recommendations for the training and education of stakeholders.

All the BPAT recommendations can be seen to map into the three above elements in this graphic (graphic on screen).

We have shared the overall response plan approach extensively with public and private sector organizations and have welcomed their inputs since the middle of October 2001. The plan was

modified in January 2002 when FEMA requested NIST to initiate an investigation under NIST's unique legislative authorities to conduct structural and fire investigations. This request was in direct response to a growing demand for a broad-based federal investigation into the World Trade Center disaster from technical experts, industry leaders, and families of building occupants and first responders who lost their lives on September 11, 2001. We continue to revise the plan as more technical information becomes available and to be responsive to the suggestions and needs of these many stakeholders.

The Commerce Department and NIST have received letters supporting our proposed response plan from key industry leaders responsible for U.S. building and fire standards, codes, and practices, including the American Society of Civil Engineers, the National Fire Protection Association, the American Institute of Architects, the Council on Tall Buildings and Urban Habitat, the Construction Industry Institute, the Society of Fire Protection Engineers, and the International Association of Fire Chiefs.

We agree with the BPAT recommendations that additional study of the Twin Towers and WTC 7 should be conducted. The NIST investigation will focus on these buildings. We believe strongly that the results of such an investigation could lead to major changes in both U.S. building *and* fire codes and in engineering practice, despite the unique design features or circumstances under which the buildings collapsed. We also believe strongly that the lessons to be derived from such an investigation will be applicable to a broad range of buildings types, not just the specific buildings that are studied. Let me now give you some examples to illustrate why we believe this to be the case.

The Twin Towers and WTC 7 are the only known cases of total structural collapse where fires played a significant role. These disasters provide a unique source of information to understand the complexities associated with the dynamics of real building fires and the collapse vulnerability of buildings to fires. We expect to analyze that information to validate generally applicable methodologies for use in fire safety design and retrofit of structures, and to evaluate the performance of fireproofing materials and connections used in steel structures.

In addition, these building disasters provide a unique source of information to study:

- The safety and performance of open-web steel trussed joists under fires. This type of trussed joist is used widely in floor and roof systems for commercial and institutional buildings nationwide.
- New mechanisms not considered previously that could initiate progressive collapse in buildings as a result of fires and impact loads, including the critical role of pivotal components such as transfer girders and floor diaphragms.
- The mechanical and metallurgical behavior of many different grades of structural steel under fires using steel recovered from the WTC site that is being stored at NIST.

There are equally important lessons for life safety – which were outside the scope of the BPAT study:

• Firefighting technologies and practices for tall buildings, including occupant behavior, evacuation, emergency response, and the performance of built-in fire protection systems such as sprinklers and fire alarms.

• The control of fire spread in buildings with large open floor plans, and the effectiveness of compartmentation as a means to isolate fires in such buildings.

There are also important lessons to be learned for engineering practice – areas that were not the focus of the BPAT study:

- The performance of the design, construction, and approval processes used to assure safety whenever an innovative structural system is used or there is a need for variances from building and fire codes.
- The provision of adequate structural reserve capacity to accommodate abnormal loads such as blast, impact, and accidental fires especially those that can be anticipated prior to construction balanced properly against the need to achieve design efficiency.

The proposed NIST investigation will include world-class technical expertise from both within and outside NIST. External experts will be drawn from both academia and practice and several of those may well have contributed to the BPAT study.

We propose to charter a Federal Advisory Committee to guide all aspects of the NIST investigation, including the review of major investigation reports. Members of this group will be recognized for their distinguished professional service, possess broad technical expertise and experience, and have a reputation for independence, objectivity, and impartiality.

I have appointed a Secretariat within NIST to coordinate NIST-level activities in support of the WTC investigation and to maintain ongoing liaison with members of Congress, the public, and the media.

NIST will assign a special liaison to interact with the families of building occupants and first responders. We recognize the vital role that those individuals and groups have to play in providing input on the scope of the proposed NIST investigation. We also understand that it is appropriate and important to keep these families and organizations informed about the progress of the proposed investigation.

We will maintain ongoing liaison with the professional communities over the course of the investigation through periodic briefings, presentations, and opportunity for comment on key investigation reports.

A summary of the proposed NIST investigation plan is attached for the record and is being made available to the general public on the NIST website beginning today. NIST will use an open and inclusive process in planning and conducting the investigation, and in publishing its findings and recommendations. We consulted extensively with technical experts and groups in developing the plan and briefed the BPAT experts at their January 2002 meeting, and again last Wednesday. Yesterday, we briefed representatives of the parent organizations comprising the BPAT coalition. We will hold a public meeting in New York City in the near future to share the details of the proposed NIST plan, which will be made available to the general public two weeks prior, and seek the public's informed comment on its scope before we adopt the plan as final.

Following our statutory requirements, before we begin a building investigation, we consult with local authorities. In this case, we consulted with local authorities in New York, including the Port Authority of New York and New Jersey, the Mayor's Office of Emergency Management, the New York City Department of Design and Construction, and the Fire Department of New York. These organizations have expressed written support for NIST and agreed to cooperate in its investigation.

The Administration has expressed strong commitment for the NIST response plan and has requested \$16 million as part of the Federal Emergency Management Agency's FY 2002 supplemental budget request – now in Congress – to support the NIST investigation. The President's FY 2003 budget request to Congress also requests an increase of \$2 million in base funding to support other elements of the NIST response plan. The Building and Fire Research Laboratory within NIST has already redirected approximately \$2 million of its existing base funds to support the response plan. Future resource requirements for the broader research and development and dissemination and technical assistance program will be considered in the Fiscal Year 2004 budget process and beyond.

Finally, Mr. Chairman, I look forward to working with you and members of this Committee as NIST embarks on a very important technical investigation. FEMA and NIST are committed to ensuring a smooth transition. Mr. Robert Shea and I recently signed a Memorandum of Understanding to strengthen our collaborative bonds by designating NIST to serve as a research and technical resource for FEMA. With your permission, I would like to submit a copy of that MOU for the record. We have agreed to develop and sign, by the end of May 2002, an operational protocol for a quick deployment mechanism that could be activated when a NIST response to extreme events is needed.

This concludes my prepared remarks. I will be pleased to answer your questions.