

**National Construction Safety Team Advisory Committee  
2004 Report to Congress**

**2004 REPORT TO CONGRESS  
OF THE  
NATIONAL CONSTRUCTION SAFETY  
TEAM ADVISORY COMMITTEE**

**DECEMBER 2004**

**National Institute of Standards and Technology**

# **The National Construction Safety Team Advisory Committee 2004 Report to Congress**

## **2004 Annual Report to Congress of the National Construction Safety Team Advisory Committee**

### **1.0 Executive Summary**

Pursuant to Public Law 107-231 Section 11(b)-Annual Report, the National Construction Safety Team Advisory Committee (the Committee) presents its 2004 Report on the implementation of the National Construction Safety Team Act (the Act) by the National Institute of Standards and Technology (NIST). (See Attachment I for Committee's Charter).

The Committee met three times during 2004, predominantly in open sessions, during which it reviewed progress on the two continuing investigations involving the 2001 World Trade Center building collapses following a terrorist attack and the Station nightclub fire in February 2003 in which 100 persons were killed. During open sessions, the Committee received and took under advisement a number of recommendations and comments from the public.

In addition to providing technical advice on the investigations, the Committee continued review of NIST's leading hypothesis of the most likely sequence that led to the collapse of the two World Trade Center towers as well as the subsequent recommendations for implementing future code changes. At year-end, the Committee was reviewing the conclusions of the Station Night Club fire investigation. Further comments and recommendations on both investigations and the investigation of the World Trade Center 7 collapse (scheduled to be completed in 2005) will be addressed by the Committee either in an interim report to Congress or in our 2005 Annual Report.

The Committee continues to be very concerned that the Congress did not address two issues identified and reported last year to Congress. We reiterate that successful implementation of the Act is dependent on approval of these two funding recommendations by Congress now:

- Creation of a National Construction Safety Team Office within the Building and Fire Research Laboratory of NIST with permanent staff and initial funding of \$2,000,000.
- Establishment of a Safety Team Investigation reserve fund of \$2,000,000 to be used at the discretion of the Director of NIST to fund investigations.

This report also includes additional recommendations and comments needed to further the successful implementation of the Act.

# **The National Construction Safety Team Advisory Committee 2004 Report to Congress**

## **2.0 Committee Activities**

### **2.1 Committee Membership**

With one exception, the Committee's membership remained unchanged during 2004. The term of Dr. John L. Bryan, Professor Emeritus of the Fire Protection and Life Safety Department at the University of Maryland, expired. Although Dr. Bryan was eligible for an additional term, he reluctantly declined a new appointment. The Committee thanks Dr. Bryan for his many contributions and wise advice to the Committee's work during our inaugural year. Attachment II lists the Committee's current membership.

### **2.2 Summary of Committee Meetings**

2.2.1 The Committee met three times during the year at NIST facilities in Gaithersburg, MD. The Committee received and took under advisement public comments at all three meetings. Detailed minutes of the three meetings and public comments either have been or will be posted on the NIST Web Site by the end of January 2005.

2.2.2 Most Committee organizational matters were resolved during 2003. The Final Interim Rule outlining the procedures governing implementation of the Act was published in April of 2004. Therefore, recommendations made by Committee members during the three 2004 meetings were almost exclusively concerned with the two on-going Safety Team investigations. Because the advice offered to NIST during the year was very detailed, technically specific and often dependent on extensive background technical information, full explanations of the recommendations are not included in this report. Attachments III and IV contain brief summaries of recommendations made during the Committee's June and October meetings.

#### **2.2.3 Summaries of the Three Committee Meetings**

##### **2.2.3.1 June 2004 Meeting**

2.2.3.1.1 NIST Comments on the Recommendations in the Committee's 2003 Report to Congress: Dr. Hratch Semerjian, Acting Director of NIST reported on the status of the recommendations contained in the Committee's 2003 Annual Report to Congress. Dr. Semerjian indicated there was general agreement within NIST with the recommendations calling for the development of procedures for conducting investigations pursuant to the Act. There was also agreement on the need to seek relief from Federal Regulations that might impact the speed of response and improved awareness on the part of local authorities, including those authorities involved in criminal prosecutions, of the Act and NIST's role in conducting Safety Team Investigations. Dr. Semerjian indicated that because of the workload associated with the World Trade Center investigation, limited progress was made in implementing those recommendations. He also commented that NIST had recently signed an MOU with the Chemical Safety Board that spelled out the roles of each agency in events where both agencies

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had jurisdiction. The Committee noted the cooperation that had developed between NIST, the Chemical Safety Board, the Bureau of Alcohol, Tobacco and Firearms and other Federal agencies as a positive step in helping NIST staff gain the necessary skills to investigate incidents more effectively while helping assure cooperation where jurisdictional issues might exist.

Dr. Semerjian also addressed the Committee's recommendation that a Safety Team Office be established within the Building and Fire Research Laboratory with both permanent staff funding and a discretionary fund under the control of the Director of NIST to further the implementation of the Act and permit rapid decisions and deployment of Safety Teams to an event site. Dr. Semerjian reported that such funding was "...not...likely to occur anytime soon." The Committee was extremely disappointed and agreed that fulfillment of this recommendation was necessary if the Act was to be successfully implemented in the future. Therefore, it was agreed this recommendation would be carried over into the Committee's 2004 Report to Congress.

2.2.3.1.2 Clarification of the Committee's 2003 Report to Congress: In the Committee's 2003 Report to Congress, the Committee addressed the issue of whether Safety Team investigations should be made following a natural disaster. Examples were given of natural disasters such as earthquakes, hurricanes and other windstorms and floods. Committee member Williams, citing the high frequency of wild fires in the Western United States during 2003 disagreed with a comment in the report that no major natural disasters had occurred during the year. He recommended that wild fires, especially wild fires at the urban-wild land interface, be specifically addressed as falling within the scope of the Act. The Committee re-visited this matter, agreed with Professor Williams and further concluded that based on the Act, any event, regardless of cause – natural or man-made -- "*...causing a failure of a building or buildings that has resulted in substantial loss of life or that posed a significant potential for loss of life*" warrants a Safety Team investigation. In the particular case of urban-wild land interface fires, the Committee noted that in some cases other Federal agencies may have jurisdiction over such fires while other fires might be managed by local authorities. The Committee noted close cooperation would be necessary between NIST and these agencies and authorities but also recognized NIST has developed such cooperative agreements in the past.

### 2.2.3.1.3 Briefings

2.2.3.1.3.1 World Trade Center Investigation: The majority of the meeting concerned discussions regarding the interim findings NIST published on June 18, 2004. The discussions were wide-ranging with Committee members questioning the assumptions associated with aircraft impact into the two towers, the effect of the impact on fire proofing, underlying design details that led the buildings to perform the way they did and other matters associated with the original design.

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Several technical suggestions were made for NIST's consideration in finalizing the early hypothesis on factors that led to the global collapse of the buildings.

In addition to reviewing the details of the collapse of the two towers, the Committee received a briefing on the progressive collapse of WTC 7. Unlike certain unique design features of the two towers, WTC 7 was of a more conventional design. The Committee agreed the preliminary working hypothesis seemed reasonable. Unfortunately, however, because of the need to dedicate personnel to the tower investigations, the Committee subsequently agreed with NIST's proposal to defer completion of the WTC 7 investigation until mid-2005.

2.2.3.1.3.2 Station Nightclub Fire Investigation: The Committee was briefed on the progress of the investigation into the deadly fire at the Station Night club in West Warwick Rhode Island in February 2003. Experimental and computational models simulating the fire were reviewed. In addition to the technical presentation by NIST staff, Mr. Kenneth Kuntz of the U.S. Fire Administration reported on his site investigation as well as the preliminary findings of the emergency response.

The Committee had no specific suggestions regarding the experimental or modeling work, but again, the Committee expressed concern that because of the criminal investigation that was underway, there was a lack of access to first party witnesses to the event. Lacking direct and timely access to eyewitnesses will hinder future investigations, especially investigations that do not have the fortuitous advantage of video of the first few moments of the event. It is likely some of the future events that fall within the purview of the Act will involve criminal investigations. Therefore, lack of timely access to evidence and eyewitnesses could hamper the effectiveness of future Safety Teams by compromising their ability to gather needed data.

2.2.3.1.3 Public Comments Received: The Committee received and took under advisement comments from Mr. David Lau of Continental Container Corporation, Mr. Jake Pauls of Consulting Services in Building Use and Safety, Mr. Robert Polk representing the National Association of State Fire Marshals (NASFM) and Professor Zia Razzaq of Old Dominion University. Mr. Lau questioned the failure mechanism associated with the collapse of WTC 7 and also indicated the failure of the central core of the two WTC towers had to be explained. Mr. Pauls was critical of the effort in assessing egress performance from the two WTC towers and suggested that NIST use the techniques developed by him, while also cautioning NIST not to accept at face value information provided through interviews. Mr. Polk reiterated NASFM's support of the Act and NIST's role in investigating building failures while urging NIST to cooperate with the Safe Building Coalition, sponsored by NASFM and other public and private sector organizations. Professor Razzaq presented a brief technical paper outlining his analysis of why the structure of the WTC towers failed.

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## **2.2.3.2 October 2004 Meeting**

2.2.3.2.1 Briefings: The Committee received detailed technical presentations on the leading hypotheses for the collapse of the two World Trade Center towers developed from NIST's investigation. Emphasis was given to the fire modeling and the prediction of fire spread throughout the towers before their collapse. The leading collapse hypotheses differ somewhat from an earlier working hypothesis. Studies of the egress of the towers and WTC-7 building occupants before the collapse and the many communications issues associated with emergency responders before and after the collapse were re-visited with new insights and potential recommendations.

The Committee received a preliminary format for consideration of potential recommendations resulting from these investigations. The format under consideration was as follows:

- (a) Findings From the Investigation Objectives – Building performance, evacuation and emergency response, and procedures and practices;
- (b) Whether the Finding Was Unique to September 11, 2001 -- Initial or post-impact conditions and/or associated with building construction;
- (c) What Technical Solutions are Needed; and
- (d) Whether The Risks are Associated with All Buildings or Selected Building Types.

The Committee provided substantial and significant input to help NIST develop reasonable and practical recommendations. NIST will continue to develop the recommendations for consideration by the Committee.

2.2.3.2.2 Station Nightclub Fire Investigation: The investigation is complete and preliminary recommendations have been formulated. The Committee was briefed on these recommendations and will provide comments after reviewing the final report.

2.2.3.2.3 Public Comments Received: The Committee received and took under advisement comments from Mr. Jake Pauls of Consulting Services in Building Use and Safety, Professor James Quintiere of the University of Maryland, Ms. Sally Regenhard representing the Skyscraper Safety Campaign, Mr. Robert Polk representing the National Association of State Fire Marshals (NASFM), and Mr. Richard Kuchnicki representing the International Code Council. Mr. Pauls provided 42 specific questions raised by the June 2004 Progress Report that he would like answered in the final report. Professor Quintiere's comments focused on the fire temperatures and duration, and their relationship to the collapse mechanism. Ms. Regenhard provided many comments on the June 2004 Progress Report. In general, she is concerned that the final report must have more specificity and that it provide a narrative of the investigations and not a

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series of task reports. Mr. Polk provided additional information on their efforts to improve passive fire requirements in the model building codes. He provided copies of code change proposals submitted to the ICC. Mr. Kuchnicki described the ICC model code process to support Mr. Polk's statements.

### **2.2.3.3 November 2004 Meeting**

**2.2.3.3.1 Briefings:** The Committee held a one-day meeting in November specifically to discuss recommendations arising from the World Trade Center investigation.

Although portions of the meeting were held in open session, a portion of this meeting was held in closed session to permit the Committee to review NIST's preliminary recommendations associated with building codes and supporting standards, emergency evacuation from buildings, response of fire, police and medical resources to an incident and communication problems identified during the World Trade Center incident.

Specifically, the Committee reviewed NIST's proposal to structure recommendations in four key areas: Increased Structural Integrity; Enhanced Fire Protection (both suppression and fire proofing); Improved Building Evacuation (including egress system design, emergency communications to occupants, occupant preparedness and egress technology); and Improved Emergency Response (including access and firefighting, emergency communications and command and control). The Committee addressed the matter of increased public awareness of building safety issues and that engineering and architectural education and practice should place inclusion of safety issues in undergraduate, graduate and continuing education curricula at a higher level of importance. Increased awareness and improvement in discipline and practice can be particularly important in landmark structures such as tall or signature buildings. The Committee encouraged NIST to include specific recommendations in these areas in the final draft report.

**2.2.3.3.2 Other Agenda Items:** During the open portion of the meeting, the Committee reviewed the processing of its 2004 report to Congress. During this discussion, NIST announced the draft report on the Station Nightclub fire would be distributed within a few days to the Committee for review and comment. Because the final draft report on the World Trade Center tower collapses and World Trade Center 7 would not be available until early in 2005 and the summer of 2005, respectively, it was agreed that the Committee would address these reports and any significant public response to them during mid-year 2005 or in the Committee's 2005 Annual Report to Congress.

**2.2.3.3.3 Public Comments:** Also during the open session, the Committee received public comments from Mr. Jake Pauls of Consultant Services in Building Use and Safety; Professor James Quintiere of the University of Maryland; and Chief Peter Hayden of the New York City Fire Department. In addition, the

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Committee received a copy of a paper by retired New York Battalion Chief Arthur Scheuerman offering his thoughts on the collapse of the towers and the appropriate measures that should be taken into consideration in future building design. Mr. Pauls reiterated his concern about the egress portion of the investigation and made suggestions to improve the investigation in these areas. He also distributed a letter from the Skyscraper Safety Campaign that protested the closing of the meeting later in the day when preliminary recommendations were to be discussed. Dr. Quintiere expressed concern over some of the preliminary findings and suggested that the investigation had not developed sufficient physical evidence to document the current hypotheses. Dr. Quintiere also expressed his belief that the use of bar joist framing for the floor systems was the prime reason the towers collapsed the way they did. Chief Hayden apprised the Committee of the many significant changes and improvements the New York fire department had made since the attack on the towers on September 11, 2001, and on future enhancements planned in the near future.

## **2.3 Committee Comments on Implementation of the Act and Investigations**

2.3.1 Action on Committee Recommendations: Communications between the Committee and NIST management and staff remain open and candid on both sides and the exchange of information has been excellent. NIST, as Dr. Semerjian noted during his remarks at the Committee's June meeting, had not been able to address several Committee recommendations during 2003 because of the intensity of the World Trade Center investigation and the corresponding absence of staff needed to address these suggestions. The Committee re-affirms these recommendations as necessary to fully implement the Act.

2.3.2 Response to Potential Safety Team Investigations: The Committee continues to be very concerned about NIST's inability to address significant building design and safety events because of shortage of both personnel and other resources needed to launch Safety Team investigations. Last year, the Committee reported on two specific incidents involving a crowd crush during an egress situation and a multi-death fire in a governmental office building. During 2004, the country again experienced a rash of wild fires at the urban-wilderness interface and several major hurricanes that wreaked havoc in the southeastern United States. As this report was being prepared, a suspected arson fire in a housing development under construction destroyed numerous structures and a high-rise office building fire in which no fatalities occurred. Although at this writing there are insufficient details on either incident to draw any conclusions, the housing development fire was reminiscent of the concerns raised in 2003 by representatives of the Prince William County, Virginia, fire department about 'community fires'. The response of the fire department to the high-rise fire was credited in the press with helping evacuate the building and minimizing structural damage. NIST must have the ability to investigate all such incidents because of the potential for gaining a greater understanding of potential loss of life that might occur in similar events. The ability to investigate reported success stories (such as the recent high rise fire) would allow NIST

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to better understand and report on improvements that can be shared with the public, the architectural and engineering communities and code and standards bodies.

## **3.0 Dissemination and Technical Assistance Program**

An important aspect of NIST's implementation of the Act is the Dissemination and Technical Assistance Program (DTAP). DTAP's objectives are to provide input to the development of Codes and Standards as well as to the field of building and safety sciences. The Committee is working with NIST to specifically identify the appropriate code and standards bodies as well as appropriate educational, architectural and engineering societies to effectively transfer information that can improve education and professional practice in a variety of fields. Presently, the Committee has no specific comments or recommendations regarding DTAP, but anticipates that considerable effort will be required in this area in 2005 and 2006.

## **4.0 Committee Recommendations**<sup>1</sup>

### **4.1 NIST Implementation of the NCST Act**

The Committee commends NIST on the progress made during 2004 on the two active investigations. The Committee also notes the continuing outreach efforts NIST has made to keep the public informed of its progress and plans. Although these efforts have been successful, several issues identified in our 2003 Report remain outstanding and those as well as the need for the development of a comprehensive procedures manual should be addressed as soon as practical:

4.1.1 Overall Implementation of the Act: While the Final Rule for the "Procedures for Implementation of the NCST Act" has been established, it is critical that NIST quickly develop a set of *detailed* protocols for conducting the investigation itself. While the Interim Final Rule speaks about investigations, it lacks detail. A comprehensive procedures manual is called for.

For example, the Final Rule speaks of collecting and analyzing physical evidence but provides no specifics on how this is to be accomplished. A procedures manual would detail the specific test or analysis technique to be used for a particular type of evidence. Investigation procedure manuals of the National Transportation Safety Board and the U.S. Chemical Safety and Hazard Investigation Board would provide good models for the preparation of a NCST Procedures Manual. National guidelines such as the National Fire Protection Association's *Guide for Fire and Explosion Investigations* (NFPA 921) are also useful.

2004-4.1.1.1 Develop and maintain a detailed investigation procedures manual covering such basic investigating topics as selection and preservation of evidence,

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<sup>1</sup> Recommendations are numbered by the year of introduction in the Annual Report to Congress (2004 for new recommendations introduced this year, 2003 for recommendations reported last year, etc.).

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eyewitness interviewing, scenario development, etc. that will enable Safety Team investigators to consistently and accurately conduct forensic investigations into any event covered by the Act.

4.1.2 Timeliness: Forensic investigations are extremely dependent on the timeliness of on-site, first-hand examination of the physical evidence and access to eyewitnesses. It is imperative that Safety Teams be able to respond to an incident in as timely a manner as possible to gather and preserve crucial evidence and data.

2003-4.1.2.1 Review and seek relief from those Federal regulations and procedures (e.g., the Paperwork Reduction Act, etc.) that could affect the rapid deployment of Safety Teams to a site or impede access to information needed to complete a thorough and timely Safety Team investigation.

2003-4.1.1.2 Develop 'first call' investigating teams who are prepared on a moment's notice to visit the site of an incident within the 48 hours required by the Act, and following reconnoitering the site, report to the Director as soon as possible on the advisability of a Safety Team investigation. Consider retaining individuals as members of the reconnaissance team who know local authorities to improve immediate access to an investigation site.

4.1.3 Cooperation with Local Authorities: The Act is clear that when the Attorney General determines a criminal act may be involved in a building failure, the criminal investigation by the appropriate law enforcement agency takes priority over a Safety Team investigation. The Act is also clear that Safety Teams are expected to work cooperatively with local authorities, other Federal agencies and other research organizations in conducting an investigation. Some of these investigators may take possession of evidence needed to complete the Safety Team investigation. The Committee cannot emphasize enough how critical timely access to information held by local authorities is to a Safety Team investigation. In both the World Trade Center and the Station Nightclub fire, greater familiarization by local authorities with NIST's Safety Team responsibilities might have accelerated the release of information. Because the Act is new, many local authorities may not know of the Safety Team initiative and the assistance available to them from NIST.

2003-4.1.3.1 Institute a program designed to educate local authorities on the Act and NIST's role in investigations so that these authorities will look to NIST for positive assistance in conducting and investigation by working with and through them, rather than independently.

2003-4.1.3.2 Where delays occur in gathering information, collecting physical evidence or gaining access to eyewitnesses, NIST should use the power provided by the Act to subpoena documents and to hold public meetings to solicit testimony in order to facilitate and improve future investigations.

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## **4.2 World Trade Center Investigation**

The WTC Safety Team addressed most of the suggestions made by the Committee during 2004 during their investigation and analysis. While complete agreement was not attained on every technical issue, these differences did not affect the Committee's overall understanding of the leading hypotheses of the investigation. During the first half of 2005, the Committee will closely follow public discussion after the release of the draft investigation report (as well as the completion of the WTC-7 report). If necessary, the Committee will prepare an interim report summarizing its assessment of the investigation and offer any improvements it feels will strengthen implementation of the Act. Therefore, recommendations have not been submitted at this time.

## **4.3 Station Nightclub Fire and Research Programs**

4.3.1 As described the Committee's 2003 report, the Station Nightclub fire investigation was slowed by the lack of access to certain key pieces of information. Although this problem was mitigated to some degree by the large amount of information available in the press and through media videotapes, the investigation would benefit from having access to both the physical evidence being held by law enforcement authorities and individual attorneys. During 2004, both NIST and the Department of Commerce reviewed and reported to the Committee ways in which Safety Team investigations could work with local authorities in cases where a criminal investigation might be involved. In such cases, the Committee remains concerned about delays in the investigation, especially being able to interview survivors of an incident in a timely fashion but recognizes the constraints that criminal investigations present.

The Station Nightclub fire and the incident at a Chicago nightclub a few days earlier in February 2003 clearly indicates that the factors affecting crowd egress during emergencies are not well understood. Therefore, the Committee continues to recommend that:

2003-4.3.1.1 A research project be initiated to study evacuation decision-making and human behavior during major building emergencies, including the phenomenon of crowd crush as seen in the Chicago nightclub and the Station Nightclub incidents.

## **4.4 Objectives of the Act and Program Funding**

The Committee is disappointed that Congress has not appropriated the necessary funding to provide the necessary resources as recommended by the Committee in its 2003 Report needed to support the investigative activities envisioned under the National Construction Safety Team Act (Public Law 107-231). While the investigation for the World Trade Center disaster was specifically funded and the final report will be available in 2005, other building failures such as those that occurred during the hurricanes of 2004 were not investigated owing to this shortage of resources. Until a permanent

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Office within NIST is established, the Committee is concerned that this will limit the ability of NIST to conduct thorough Safety team investigations in the future and to develop needed building technologies that could improve life safety nationwide.

The Committee wishes to stress that because disaster events are by their very nature unpredictable, funds must be set aside for immediate post-disaster reconnaissance and the collection of perishable data. Rapid and thorough data collection is essential for successful investigations; expert teams must be able to mobilize and begin collecting data within 24 hours of an event. Experience shows unequivocally that unless investigators are deployed immediately, evidence necessary for forensic studies is typically lost or destroyed. To ensure that teams are able to go into the field immediately after disasters occur, funding must be available on an ongoing basis.

For example, the 2004 Congressional supplemental appropriation for hurricane disaster relief did provide funding for post-event investigations, but unfortunately, those monies became available too late to allow for the collection of essential perishable data. While supplemental appropriations can and should be used to augment investigations where such use is warranted, separate funding should be provided specifically for the initiation of investigations immediately following events that have resulted in (or that could have caused) major loss of life.

The Advisory Committee reiterates its 2003 recommendations regarding post-event investigations and urges Congress to appropriate the recommended funding as soon as possible. Those recommendations are:

2003-4.4.1. Section 15 of the Act authorizes the use of NIST funds otherwise authorized by law to carry out this Act. This should provide sufficient funds for the immediate post-event observation, but will not provide sufficient funds to perform the Investigation to achieve the objectives of this Act. Nor is there sufficient time for the Director of NIST, through the Department of Commerce, to request a special appropriation for the selected Investigation. Annual funds should be made available to the Director of NIST to cover one year of investigations. This would provide time to request a supplemental appropriation to fund the Investigation. On that basis the following recommendation is made:

2003-4.4.2 Establish a National Construction Safety Team Office within the Building and Fire Research Laboratory at NIST with annual funding in the amount of \$2,000,000 and an additional \$2,000,000 reserve fund appropriated for use by the Director of NIST to initiate major investigations of building failures in a timely manner as required by the Act. This investigation reserve fund should be maintained year-to-year so that investigations can begin promptly and not have to await final budget or appropriation approvals.

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## **ATTACHMENT I**

### **CHARTER OF THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY NATIONAL CONSTRUCTION SAFETY TEAM ADVISORY COMMITTEE**

#### **ESTABLISHMENT:**

In accordance with the requirements of Section 11 of the National Construction Safety Team Act (P. L. 107-231), hereinafter referred to as the Act, the Secretary of Commerce hereby establishes the National Construction Safety Team Advisory Committee, hereinafter referred to as the Committee, pursuant to the Federal Advisory Committee Act, 5 USC App. 2.

#### **OBJECTIVES AND DUTIES:**

The Committee will act in the public interest to:

1. Advise the Director of the National Institute of Standards and Technology, hereinafter referred to as the NIST, on carrying out the Act by:
  - a. Providing advice on the functions of National Construction Safety Teams, hereinafter referred to as Teams, as described in section 2(b)(2) of the Act.
  - b. Providing advice on the composition of Teams under section 3 of the Act.
  - c. Providing advice on the exercise of authorities enumerated in sections 4 and 5 of the Act.
  - d. Providing such other advice as necessary to enable the Director to carry out the Act.
2. Review and provide advice on the procedures developed under section 2(c)(1) of the Act.
3. Review and provide advice on the reports issued under section 8 of the Act.
4. Function solely as an advisory body, in accordance with the provisions of the Federal Advisory Committee Act.

#### **MEMBERS AND CHAIRPERSON:**

1. The Director of NIST shall appoint the members of the Committee, and they will be selected on a clear, standardized basis, in accordance with applicable Department of Commerce guidance. Members shall be selected on the basis of established records of distinguished service in their professional community and their knowledge of issues affecting the National Construction Safety Teams. Members shall serve as Special Government Employees. Members serve at the discretion of the NIST Director.
2. Members shall reflect the wide diversity of technical disciplines and competencies involved in the National Construction Safety Teams investigations. Members will be drawn from industry and other communities having an interest in the National Construction Safety Teams investigations, such as, but not limited to, universities, state and local government bodies, non-profit research institutions, and other Federal agencies and laboratories.
3. The Committee shall consist of not fewer than 5 nor more than 10 members. The term of office of each member of the Committee shall be three years, except that

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vacancy appointments shall be for the remainder of the unexpired term of the vacancy and that the initial members shall have staggered terms such that the committee will have approximately 1/3 new or reappointed members each year. Members who are not able to fulfill the duties and responsibilities of the Committee will have their membership terminated.

4. Any person who has completed two consecutive full terms of service on the Committee shall be ineligible for appointment for a third term during the one year period following the expiration of the second term.

5. The Director of NIST shall appoint the Chair from among the members of the Committee. The Chair's tenure shall be at the discretion of the Director of NIST.

### **ADMINISTRATIVE PROVISIONS:**

1. The Committee shall report to the Director of NIST.

2. The Building and Fire Research Laboratory (BFRL) within NIST will provide staff support for the Committee.

3. The Committee shall meet at least once per year at the call of the Chair. Additional meetings may be called whenever one-third or more of the members so request it in writing or whenever the Chair or the NIST Director requests a meeting.

4. Members of the Committee shall not be compensated for their services, but will, upon request, be allowed travel and per diem expenses in accordance with 5 U.S.C. 5701 et seq., while attending meetings of the Committee or subcommittees thereof, or while otherwise performing duties at the request of the Chair, while away from their homes or regular places of business.

5. The Committee shall provide an annual report through the Director of BFRL and the Director of NIST, to the Secretary of Commerce for submission to the Committee on Science of the House of Representatives and to the Committee on Commerce, Science, and Transportation of the Senate, to be due at a date to be agreed upon by the Committee and the Director of NIST. Such report will provide an evaluation of National Construction Safety Team activities, along with recommendations to improve the operation and effectiveness of National Construction Safety Teams; and an assessment of the implementation of the recommendations of the National Construction Safety Teams and of the Committee. In addition, the Committee may provide reports at strategic stages of an investigation, at its discretion or at the request of the Director of NIST, through the Director of the BFRL and the Director of NIST, to the Secretary of Commerce, to be due on dates to be agreed upon by the Committee and the Director of NIST.

6. The Committee may establish subcommittees subject to the provisions of the Federal Advisory Committee Act and the Department of Commerce Committee Management Handbook. Subcommittee members shall be selected from the parent committee.

7. The annual cost of operating the Committee is estimated at \$175,000, which includes 0.5 work years of staff support.

8. The Committee shall not act in the absence of a quorum, which shall consist of a simple majority of the members of the Committee not having a conflict of interest in the

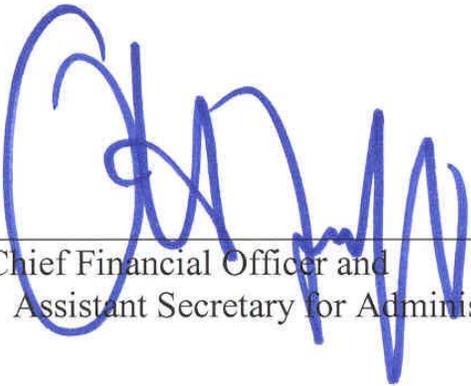
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matter being considered by the Committee, except that, if the number of members on the Committee is even, half will suffice.

9. NIST will report to the Committee actions taken in response to recommendations by the Committee.

### **DURATION:**

While the duration of the Committee is continuing, the Charter shall be renewed every two years from the date of filing.



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Chief Financial Officer and  
Assistant Secretary for Administration

OCT 8 2004

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Date

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**ATTACHMENT II**

**National Construction Safety Team  
Advisory Committee - 2004**

John M. Barsom, President  
Barsom Consulting, Ltd.  
Pittsburgh, PA  
Term Expires: March 31, 2005

David S. Collins, President  
The Preview Group, Inc.  
Cincinnati, OH  
Term Expires: March 31, 2007

Glenn P. Corbett, Professor  
Public Management - Fire Science  
John Jay College of Criminal Justice  
New York, NY  
Term Expires: March 31, 2006

Philip J. DiNenno, President  
Hughes Associates, Inc.  
Baltimore, MD  
Term Expires: March 31, 2005

Paul M. Fitzgerald, Chair  
Executive Vice President (retired)  
FM Global, Johnston, RI  
Term Expires: March 31, 2006

Robert D. Hanson, Professor Emeritus  
University of Michigan  
Walnut Creek, CA  
Term Expires: March 31, 2006

Charles Thornton, Co-Chairman and Managing Principal  
The Thornton-Tomasetti Group, Inc.  
New York, NY  
Term Expires: March 31, 2005

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Kathleen J. Tierney, Director  
Natural Hazards Research and Applications Information Center  
Institute of Behavioral Science  
University of Colorado at Boulder  
Boulder, CO  
Term Expires: March 31, 2007

Forman A. Williams, Professor  
Department of Mechanical and Aerospace Engineering and  
Director, Center for Energy Research  
University of California at San Diego  
San Diego, CA  
Term Expires: March 31, 2005

# The National Construction Safety Team Advisory Committee 2004 Report to Congress

## ATTACHMENT III – RECOMMENDATION SUMMARY JUNE 2004 COMMITTEE MEETING

June 2004 Recommendation	NIST Response	Status	Responsible Party
<i>Formal Recommendations</i>			
The Committee Chair will develop a calendar and issue it to all members for agreement on how to process the 2004 Annual Report to Congress, including full review by all members before issue.	NA	NA	Paul Fitzgerald
<i>Informal Suggestions</i>			
NIST should find out the occupancy load and egress width for Windows on the World.	Accept	This information has been included in draft report NCSTAR 1-1, the Project 1 investigation report.	H.S. Lew R. Bukowski
NIST should coordinate the fire alarm system report with the results of interviews from Projects 7 and 8.	Accept	Observations of fire alarm system performance from Projects 7 and 8 have been added to draft report NCSTAR 1-1, the Project 1 investigation report.	W. Grosshandler
NIST should provide a rationale for using the combustible load of 4 lb/ft <sup>2</sup> and provide comparison with other studies of combustible loads in the final report.	Accept	Both the rationale and comparison have been included in draft report NCSTAR 1-5, the Project 5 report. There is also a sensitivity check using Fire Dynamics Simulator.	R. Gann
NIST should explain why the fire modeling analysis of the floor truss considered the temperature at a height above the floor rather than at the floor level.	Accept	This explanation has been included in the draft Project 5 investigation reports.	K. McGrattan
NIST should explain the rationale for using the 2½ in. fireproofing and make it defensible; check measurements in audit reports versus photographs.	Accept	Method was explained to the Advisory Committee after the June meeting and has been included in the draft Project 6 investigation reports.	J. Gross
NIST should determine whether the splice plates in WTC 7 were welded or bolted.	Accept	This will be provided. The WTC 7 work is deferred until the investigation of the WTC towers is completed.	J. Gross T. McAllister
NIST should provide the thermal-structural analysis of the initiating mechanism of WTC 7 to Robert Hanson when completed.	Accept	This will be provided. The WTC 7 work is deferred until the investigation of the WTC towers is completed.	J. Gross T. McAllister
NIST should consider the behavior of more conventional floor truss systems, e.g., confirm the failure of the floor truss by analyzing the WTC 2 mechanical floors as W27 wide flange sections.	Decline	This is not within the scope of the investigation. It will be suggested for follow-on research, however, based on final findings and recommendations.	J. Gross T. McAllister
NIST should document the elevator conditions on 9/11/01, including the time that the elevators were functioning.	Accept	This information has been included in draft report NCSTAR 1-7, the Project 7 investigation report.	J. Averill

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<b>June 2004 Recommendation</b>	<b>NIST Response</b>	<b>Status</b>	<b>Responsible Party</b>
In the final report, use a timeline to put important events into perspective relative to what was going on; write in a narrative format.	Accept	The approach to final report organization was presented at the October 19-20, 2004, NCST AC meeting. It is explained in the main investigation report.	R. Gann et al.

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## ATTACHMENT IV – RECOMMENDATION SUMMARY OCTOBER 2004 COMMITTEE MEETING

October 2004 Recommendation	NIST Response	Status	Responsible Party
<i>Informal Recommendations</i>			
NIST should consider adding topical reports to support the Investigation Program Report for Project 2.	Accept	Two technical topical reports on baseline analysis and aircraft impact are being prepared, in addition to draft report NCSTAR 1-2, the Project 2 report.	F. Sadek
<i>Informal Suggestions</i>			
NIST should identify factors that could have delayed or prevented collapse.	Accept	A list of factors will be identified.	All
NIST should identify factors that could have reduced or minimized the loss of life.	Accept	A list of factors will be identified.	All
NIST should consider the hierarchy of importance of the roles (e.g., architect, structural engineer, fire protection engineer, mechanical engineer) in designing the core of a tall building.	Accept	NIST will consider this in formulating its recommendations. Model codes are starting to define Design Professional in Responsible Charge (106.3.4.1 IBC 2003) and Principal Design Professional (103.3.1.2 ICCPC 2003) who would be an architect for the design of a high-rise building. AIA could develop a practice guide to discuss this hierarchy.	H.S. Lew R. Bukowski
NIST should list the range of uncertainties in all steps of the investigation. For example, NIST should include a statement on the range of uncertainties in the material properties and the estimates of damage.	Accept	Uncertainties will be addressed and defined in the final reports as appropriate.	R. Gann et al.
NIST should recommend that building codes be changed to include a requirement that a building can demonstrate it can survive burnout without collapse.	Accept	NIST will consider this in formulating its recommendations. Requires the definition of design fires and associated limit states. Several organizations have task groups working this issue.	H.S. Lew R. Bukowski
NIST should clearly state why the simulation has the landing gear hung up in the core rather than exiting the building.	Accept	The draft Investigation Program Report for Project 2 includes a comparison between the simulation results and observables, including the landing gear exiting the towers.	F. Sadek

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October 2004 Recommendation	NIST Response	Status	Responsible Party
NIST should qualify the statement that the amount of recovered steel is sufficient for its investigation.	Accept	NIST has modified the wording in its reports to: <i>“The collection of steel from the WTC towers is sufficient for determining the quality of the steel and for determining mechanical properties as input to models of building performance.”</i>	F. Gayle
In the analysis of the core column tensile tests (shown in the meeting presentation), three low yield data points were found. NIST should explain the reasons for these results (e.g., compression, damaged steel) in its report.	Accept	This is addressed by adding a comment directly on the graphs (a statement about expected distributions and loss of yield point).	F. Gayle
NIST should make a statement regarding the availability of fire alarm and detection systems that perform at levels exceeding minimum code requirements.	Accept	This explanation has been included in the draft report NCSTAR 1-4, the Project 4 investigation report.	W. Grosshandler
NIST should clearly state that the intent of the fire dynamics modeling is to show overall trends (e.g., not matching observables window by window with model results). We need to be clear with the public on expectations for the models.	Accept	NIST has stated this in draft report NCSTAR 1-5, the Project 5 investigation report.	R. Gann
NIST should consider conducting further insulation tests with the use of charges to fully explore the time-scale range for dynamic removal of insulation.	Partially accept.	NIST is examining further tests with ballistics, rather than charges.	J. Gross W. Grosshandler
Model the floor failure on floor 82 east face of WTC 2	Accept	Under way as part of the global analyses.	J. Gross T. McAllister
NIST should include examples of observations from the impact zones that show core column buckling, creep, and shortening.	Accept	In progress as part of the global analyses.	J. Gross T. McAllister
Alternate collapse hypotheses (e.g., floor sagging) should be included in the report with the analytical reasons in favor of them or against them.	Accept	In progress as part of the collapse hypothesis evaluation.	J. Gross T. McAllister
NIST should provide an explanation for the kink at floor 106.	Accept	In progress as part of the global analyses.	J. Gross T. McAllister
NIST should include a section in its main report to discuss the truss floor system and put it into context. For example, cite the performance of the floor in the 1975 fire; the performance of floors on September 11, 2001; and the Underwriters Laboratories tests. Note that NIST is not condemning nor endorsing such systems for high rises. Clarify that this type of floor system is commonly used in two-story buildings and rarely used in tall buildings.	Accept	This issue is being addressed in the draft Project 6 investigation reports and the main report.	J. Gross T. McAllister

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<b>October 2004 Recommendation</b>	<b>NIST Response</b>	<b>Status</b>	<b>Responsible Party</b>
NIST should discuss the remoteness criteria for stairwells in terms of the 1968 code language so that the recommendation is understandable.	Accept	The 1968 remoteness criteria, along with current remoteness requirements, have been included in the draft report NCSTAR 1-7 (the Project 7 investigation report), adding context to the subsequent recommendations.	J. Averill