National Construction Safety Team Investigation

# Press Briefing on
# The Station Nightclub Fire

Providence, Rhode Island
November 25, 2003

**Dr. William Grosshandler**
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**National Institute of Standards and Technology**
**U.S. Department of Commerce**

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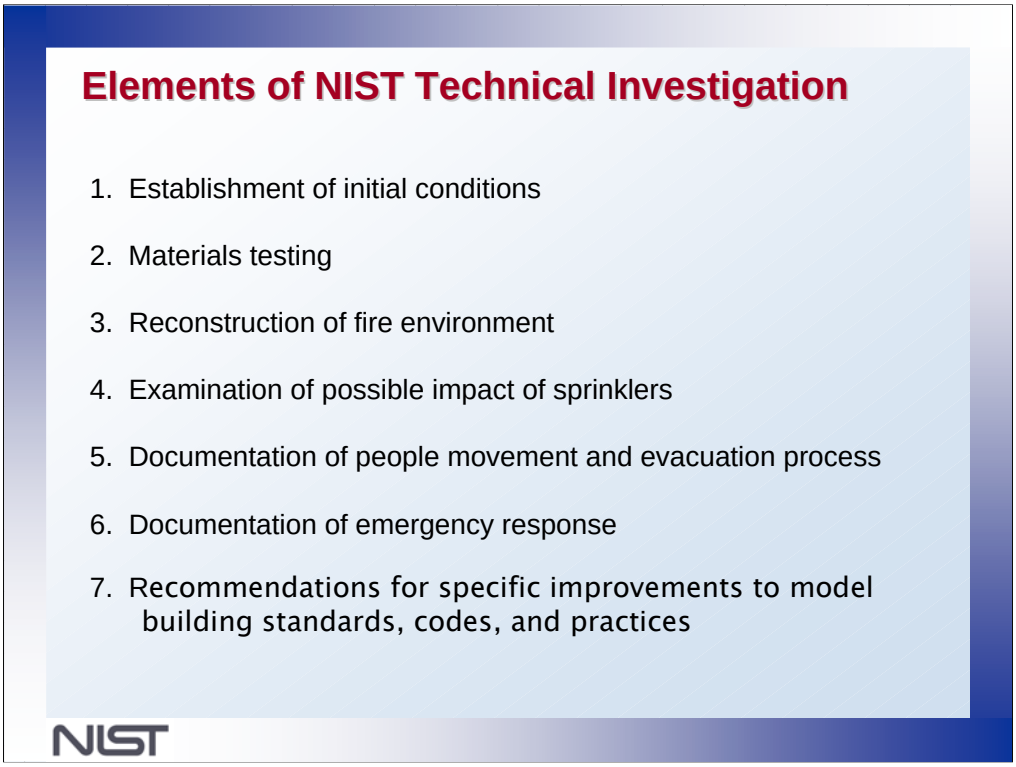


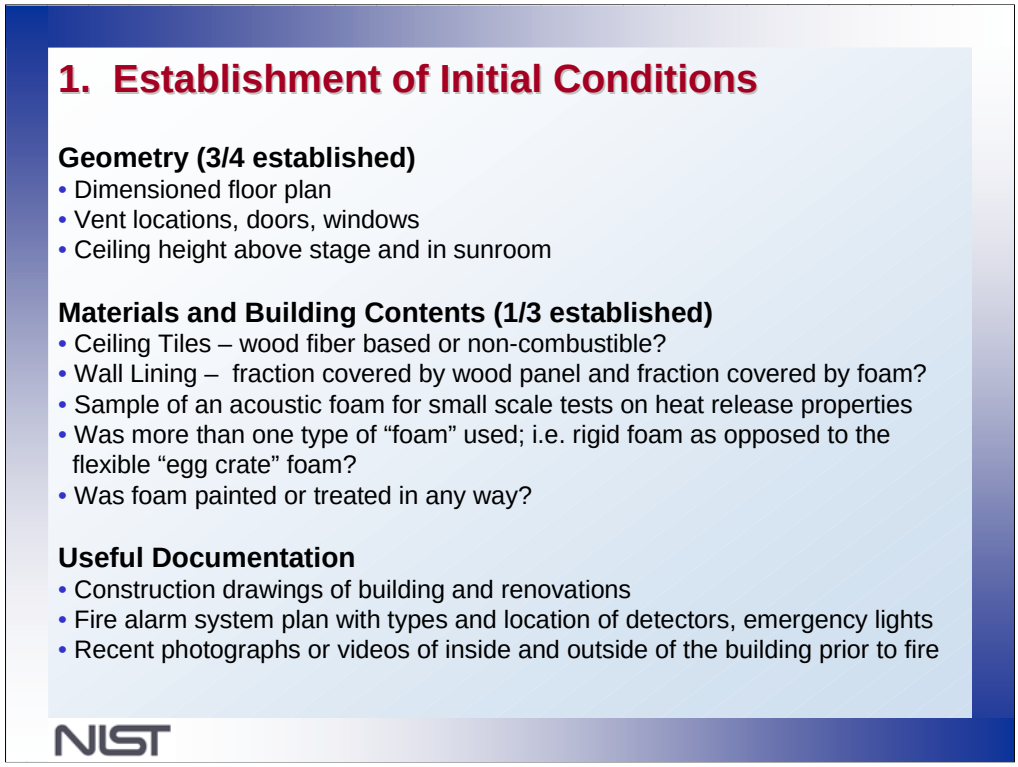

Thank you Dr. Hill, and good morning to you all. Jim has explained to you who NIST is and why we are here; I would now like to explain what NIST is doing and how it is being done.

My message is two-fold:

(1) NIST is employing its best experts and methods to help understand the technical aspects of the fire that killed 100 people in West Warwick last February 20; and

(2) you and the public can play a significant role by providing us additional information that could lead to improved model building practices, codes, and standards and prevent a similar occurrence from happening anywhere in this country.

There are seven elements of the technical investigation: first, the establishment of the conditions within the building just prior to the fire; second, testing of materials that are thought to have influenced the rapid fire spread; a reconstruction of the fire environment is the third element; the examination of the impact of sprinklers had they been installed is the fourth; documentation of people movement and the evacuation process is the fifth; sixth, documentation of the emergency response; and finally the recommendations for specific improvements to model building standards, codes, and practices that may warrant revision based upon our technical findings. I will highlight the progress to date made on some of these elements.




We are making good progress on establishing the conditions in the building prior to the fire. We have about 75% of the building geometry identified, including the floor-plan, vent locations, doors, windows, and ceiling heights. The materials used in construction and in finishing the walls, ceiling, and floors, plus the building contents, are less well established. We are still seeking more construction drawings of the building, fire alarm system plans including the type and location of detectors and emergency lights, and recent photographs and videos of the inside and outside of the building. The ceiling tiles, paneling on the walls, and the type of foam can have a big influence on the fire spread, so as much information as possible about these materials is required to accurately reconstruct the fire and smoke movement in the nightclub. We are asking the public to help us fill in the details that will allow us to understand the spread of the fire and evacuation from The Station nightclub. People with information to share should feel free to contact NIST at 877-451-8001 or by the other means indicated previously.

## 2. Materials Testing

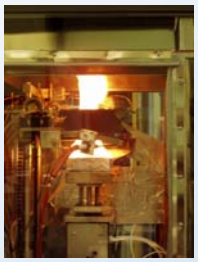
**Objectives:**

- Develop source term data for modeling
- Assess material burning behavior to determine a correlation to the materials in the nightclub

**Bench-scale testing**

3 common types of foam

- 2 – ether based polyurethane
- 1 – ester based FR PU foam



**Full foam panel tests**

- small flame ignition
- inside and outside corner configurations
- measuring mass loss and and heat released

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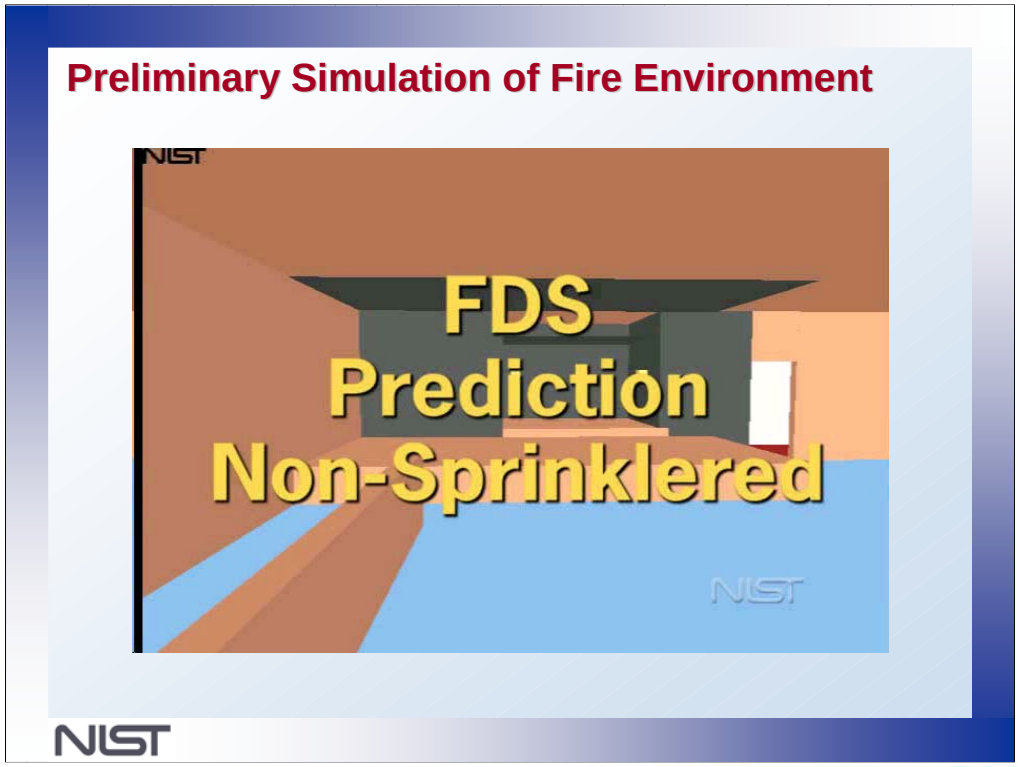
NIST has a large data base of the heat released in a fire by common materials used in construction and furnishings. Because the foam was the first item ignited, it is particularly important to accurately characterize the behavior of the foam in a fire. Since we do not have access to the actual foam used in The Station, we have selected three common types to test to get a range of behaviors. We are specifically asking the public for information on the actual foam installed since its burning behavior is a critical piece of information that feeds into our computer simulations. In addition to the small-scale tests, NIST has burned 8 ft by 4 ft wood panels covered with a common non-fire retarded foam to observe flame spread in an exterior and interior corner arrangement.




What you are about to see is a preliminary simulation of the fire environment as viewed from the dance floor. The Fire Dynamic Simulator (FDS) used in this calculation was developed by NIST over a 20-year period of sustained research. Although the video may look realistic to you, keep in mind that it is based on preliminary information. The measurements of the behavior of the foam assumed to be used in this fire, our knowledge of the way typical building materials (e.g., wood paneling and floor coverings) burn, and our preliminary understanding of the building geometry and internal arrangement of the nightclub allow us to at least get a feel for how the fire may have appeared from inside the building. The uncertainty in the geometry and materials assumed to be present is large enough that conclusions regarding times to survivability, or whether or not the smoke was exiting a particular door or window, can be substantially altered.

The gray portion in the video represents the foam. The open door at the right of the stage is included in this simulation. Ignition is simulated by two hot spots half-way up the wall on each corner of the drummer's stand. The fire grows modestly at first, but accelerates quickly until at the end of the clip the room is totally obscured by smoke. Many of the details of the club have been ignored in this preliminary study; the video as played is considered informative but not exact. Additional information from the public on The Station nightclub would enable us to produce a simulation that is closer to reality.

## 3. Reconstruction of Fire Environment

**Construction**

- Similar dimensions to stage area of nightclub (~ 36 ft x 24 ft x 13 ft high)
- Convoluted non-fire retarded polyurethane foam, plywood paneling
- Carpeted stage & drummer's platform, gypsum ceiling over dance floor area

**Measurements:** Temperature, CO, $CO_2$, $O_2$, HCN, heat flux, heat release rate

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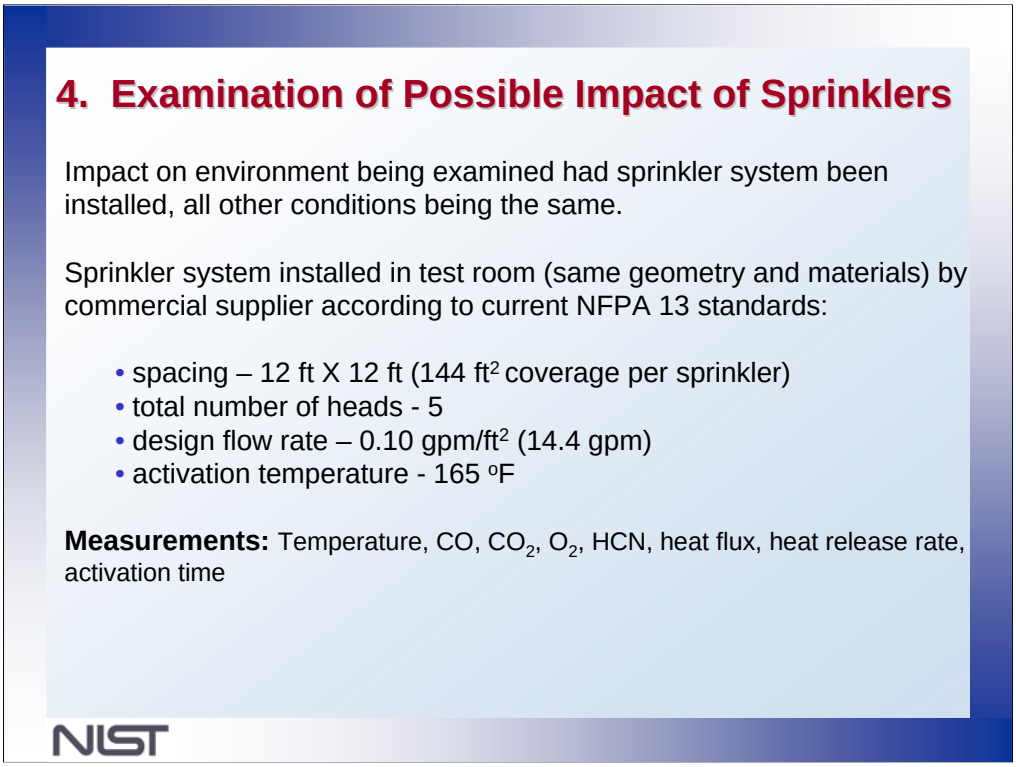
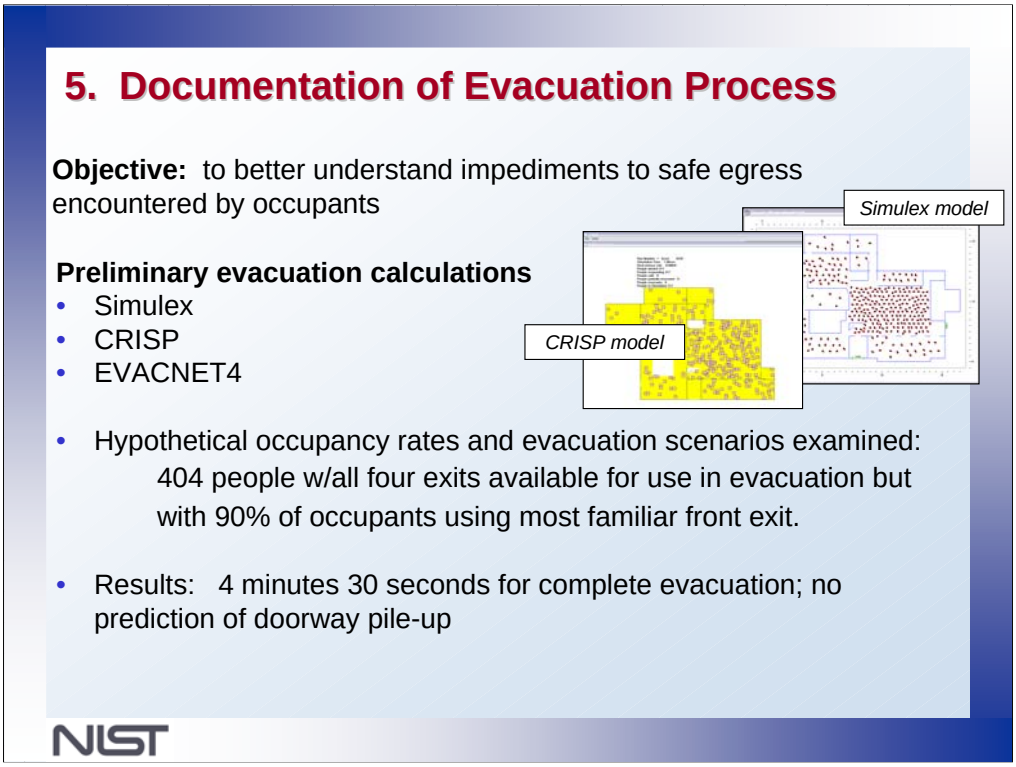
From the video provided to us by WPRI-TV and our preliminary computer simulation, the team has a rough idea of how the fire and smoke developed inside the nightclub. To add credence to the simulation and to collect quantitative information on the environmental conditions inside the building during the time that people were evacuating, the stage area was reconstructed full-scale within the Large Fire Laboratory at NIST. The dimensions of the stage area were approximated in the mock-up and the same non-fire retarded foam used in the smaller scale test was placed on the wall. The total volume of the reconstructed room was about 1/4 that of the total nightclub; a single door was located at the far wall opposite the stage. These differences in geometry are thought not to impact the general nature of the environment during the first minute or so of the fire. In addition to video taping the test, measurements were made of the temperature, carbon monoxide, carbon dioxide, oxygen, hydrogen cyanide, and the heat generated.


This view of the stage is similar to what was seen in the computer simulation. As with the computer simulation, our lack of detailed information on room geometry and construction materials has led us to make assumptions that impact the behavior of the fire. The metal foil covered stands seen in the video support the instrumentation used to measure temperature, heat flux, and gas concentration. In this test, ignition occurs simultaneously on both sides of the drummer's platform with an electrically heated match book. The video is operating in real time, shown in minutes and seconds at the bottom left. For the first 45 seconds, the fire is confined primarily to the drummer's stand, but beyond 1 minute it quickly descends uniformly over the dance floor. The heat radiated from the upper layer is sufficient to ignite the wall and floor remote from the fire (this is called flashover) at 1 minute and 10 seconds, and the room becomes totally blocked by the smoke at 1 minute 30 seconds. The importance of this test is not its ability to reproduce exactly what occurred within The Station nightclub, but to validate our ability to simulate the behavior of a similar fire with the computer simulation; additional information on the geometry and materials from the public can be of great help here.

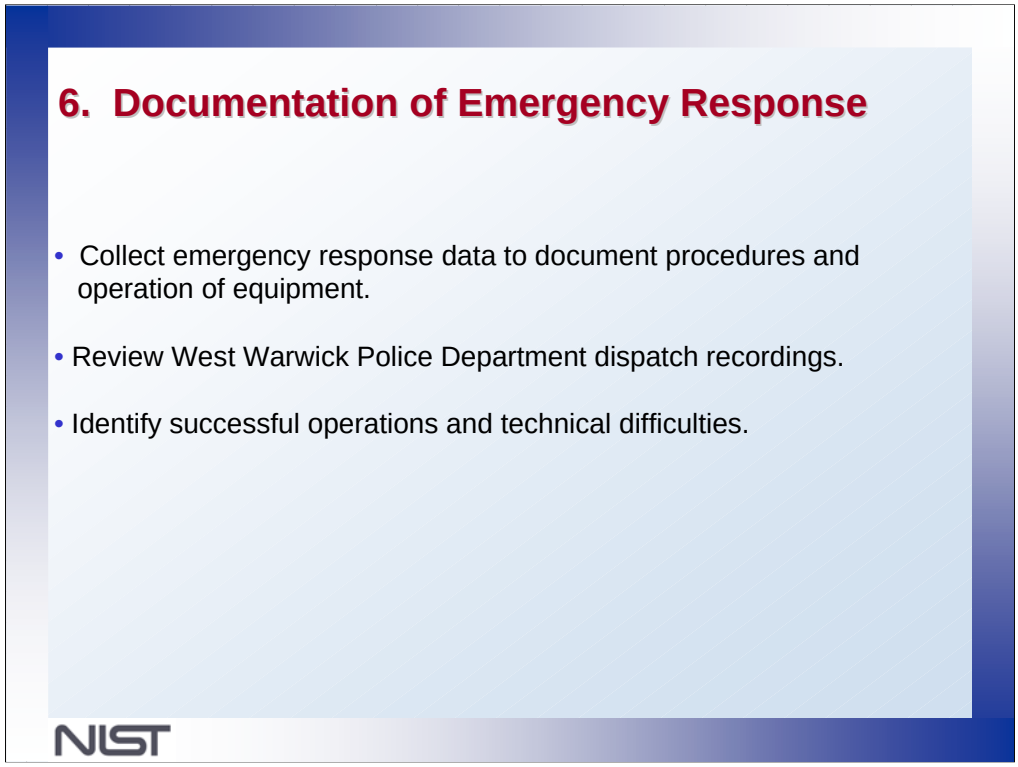



The question of how the environment might have been affected had sprinklers been installed has been raised by a number of people in different organizations. To help us answer this question, an identical mock-up of the stage area used in the previous test was constructed in the NIST laboratory, with the only difference being the addition of a sprinkler system. The current National Fire Protection Association (NFPA) 13 standard on sprinkler installation was followed by a commercial supplier. The same series of measurements was conducted (temperature, heat, and gas concentration) as in the test just discussed.


This is the same view as before, with the same caveat: the accuracy of the recreation is limited by incomplete information on the geometry and materials. Three of the five sprinklers can be seen in this frame: two are near the dance floor, two are above the stage, and one is inside the drummer's stand. You will see that initially the fire progresses in a manner similar to the other test, until at 24 seconds the sprinkler above the right side of the stage is activated, followed 2 seconds later by the sprinkler above the left side of the stage. After a short burst of increased flame intensity, the ability of the first two sprinkler heads to slow down the fire spread is evident. At 30 seconds, the sprinkler head in the drummer's platform is activated. The visibility at head height remains sufficient to see across the room until about one minute into the fire. By the end of the test the visibility has been reduced substantially due to the water mist, but the light on the left hand side of the stage can still be discerned. The purpose of this test was to gain insight into how the sprinkler interacts with the fire. While the sprinklers clearly retarded the fire spread, and the visibility during the first minute of the fire was greatly enhanced by the presence of the sprinklers, the temperature, gas concentration, and heat release data need to be analyzed before a determination can be made on how long the conditions in the room would have remained survivable.

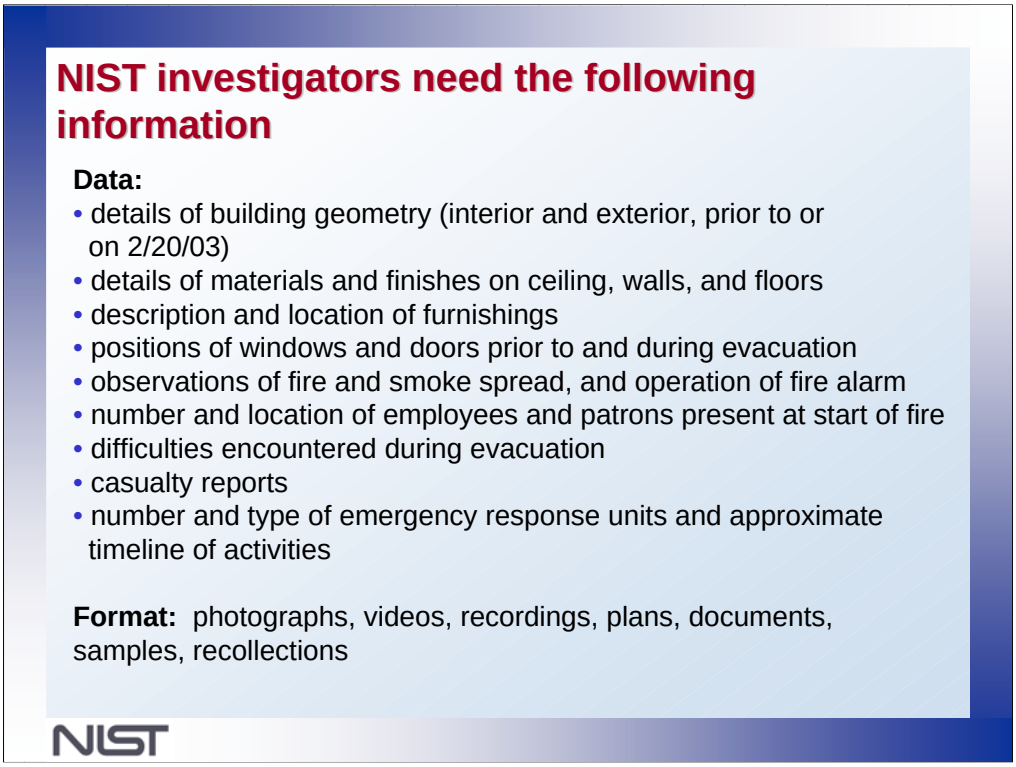



The objective of this task is to better understand the impediments to a safe evacuation that were encountered by the occupants. Software is available to assist architects and designers in their estimates of the flow patterns established by people when exiting a structure, and the amount of time needed for total evacuation. Within the limitations of our knowledge of the exact number and locations of the occupants in the nightclub at the time the fire started, and the exact arrangement of the doors, partitions, and furniture, NIST used commercially available models to estimate the time for evacuation using different assumptions. For example, if one assumes that 404 people were in the building, that 4 exits were available, and that 90% of the occupants selected the front entrance of the building, then the software predicts that it would take about 4 ½ minutes to evacuate the building. These calculations do not account for the severe degradation of the environment that occurs in an actual fire that the occupants might have to pass through. No model is available to predict the crowd crush and pile-up that occurred during the evacuation of The Station on February 20.




The Team will determine how the fire department was notified and will establish a timeline starting with the initial notification and running through all stages of the firefighting operation, including rescue, fire suppression, victim recovery, and mop-up. Emergency response data will be collected in cooperation with the local fire department to identify successful operations and technical difficulties. In this process the Team will review the West Warwick Police Department dispatch recordings that were recently released.


The team is reviewing model building and fire codes that would have governed building design, construction, and modification of structural and fire safety systems. The team also will identify differences, if any, among historical requirements and provisions of current national model building and fire codes, and document practices and procedures used for the operation of, maintenance of, and modifications to structural and fire protection systems. Based upon technical findings from all tasks, the team will recommend specific areas for improvement in model building and fire codes, standards, and practices as warranted, and will recommend a course of research for those improvements for which a strong technical basis is beyond the state of the art.



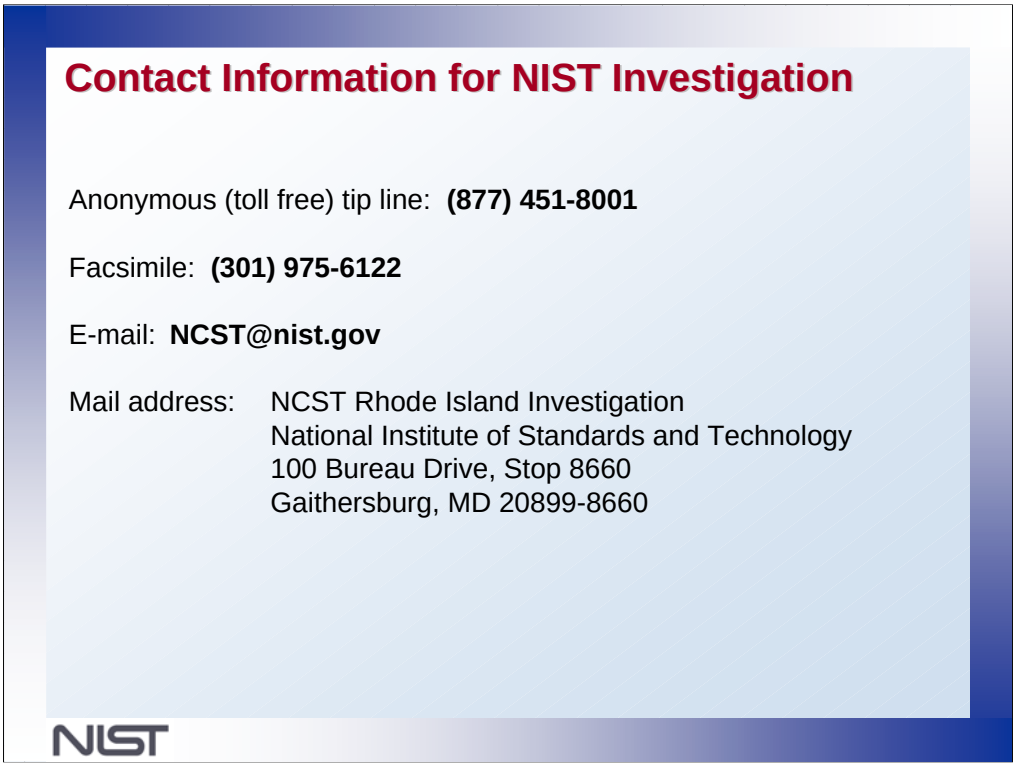

## NIST investigators need additional information on the following items:

- the details of building geometry (interior and exterior, prior to or on 2/20/03);
- the details of materials and finishes on ceiling, walls, and floors;
- the description and location of furnishings;
- the positions of windows and doors prior to and during evacuation;
- the observations of fire and smoke spread, and operation of the fire alarm;
- the number and location of employees and patrons present at the start of the fire;
- the difficulties encountered during evacuation;
- casualty reports; and
- the number and type of emergency response units and approximate timeline of activities.

We are soliciting all forms of information including photographs, videos, recordings, plans, documents, samples, and recollections.


**Most important, we need persons who can provide this information to come forward.**

People with many different experiences and in very different roles could have useful information to share, including employees, survivors, families of victims, emergency responders, the media, and other witnesses with first-hand knowledge of events on February 20, 2003. Also, former employees, previous patrons, contractors, suppliers, retired first responders, and friends of victims with second-hand knowledge might help us piece together the technical facts. People can contact us in whatever way is most convenient.




There is a toll free number where information or tips can be left with assured anonymity—**(877) 451-8001—**as well as a FAX line—**(301) 975-6122**. E-mail can be addressed to **NCST@nist.gov.** Finally, information for the Rhode Island fire investigation can be mailed to NIST at: **NCST Rhode Island Investigation, National Institute of Standards and Technology, 100 Bureau Drive, Stop 8660, Gaithersburg, MD 20899-8660.**