

National Construction Safety Team Technical Investigation Plan: The Station Nightclub, W. Warwick, RI

William Grosshandler
Lead Technical Investigator
Building and Fire Research Laboratory

**Presented to the NCST Federal Advisory Committee
April 29, 2003**

The NCST Act requires that we relinquish investigative priority in the event of a criminal investigation. We are assessing how this will affect the Rhode Island investigation and its schedule. The information in the following slides represents our best present thinking but is subject to change.



The Station Nightclub Fire

When: February 20, 2003

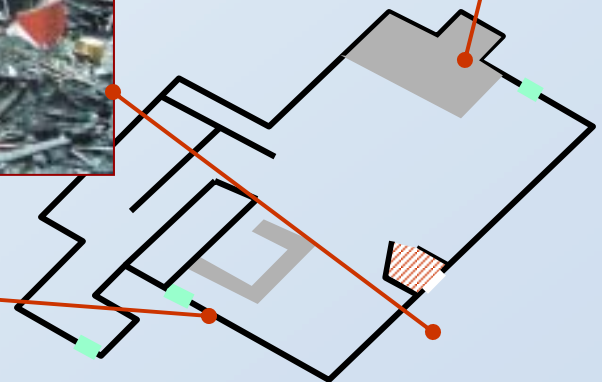
Where: West Warwick, RI

What:

- pyrotechnics ignited wall covering on stage
- rapid spread of flames and smoke
- captured on WPRI-TV video
- main entrance became blocked by people trying to escape
- 99 fatalities



NIST team on site
within 36 hrs.



Purpose of W. Warwick Investigation

To establish the likely technical cause or causes of the building failure that led to a high number of casualties.

- Document all technical aspects of event.
- Recommend, as necessary, specific improvements to building standards, codes and practices based upon the findings.
- Recommend any research and other appropriate actions needed to improve the structural fire safety of buildings and evacuation procedures.

Guiding Principles for Investigation

- Independent, objective, and within limits of available resources
- Consideration of concerns and issues of all interested parties
- Ensuring that evidence is preserved
- Coordinated with Federal, State and local entities
- Investigative priority relinquished to law enforcement agencies conducting ongoing criminal investigations
- No findings of fault nor negligence will be assigned to any individual or organization

NCST Participation and/or Liaison

NIST members

- W. Grosshandler (lead)
- N. Bryner
- D. Madrzykowski

State/local Agencies

- I. Owens, RI State Fire Marshal's Office
- C. Hall, West Warwick Fire Dept.
- P. Nolan, RI Dept. of Public Health
- E. LaPosta, RI Office of the Medical Examiner
- RI Attorney General's office (to be established)
- RI Office of Emergency Management (to be established)

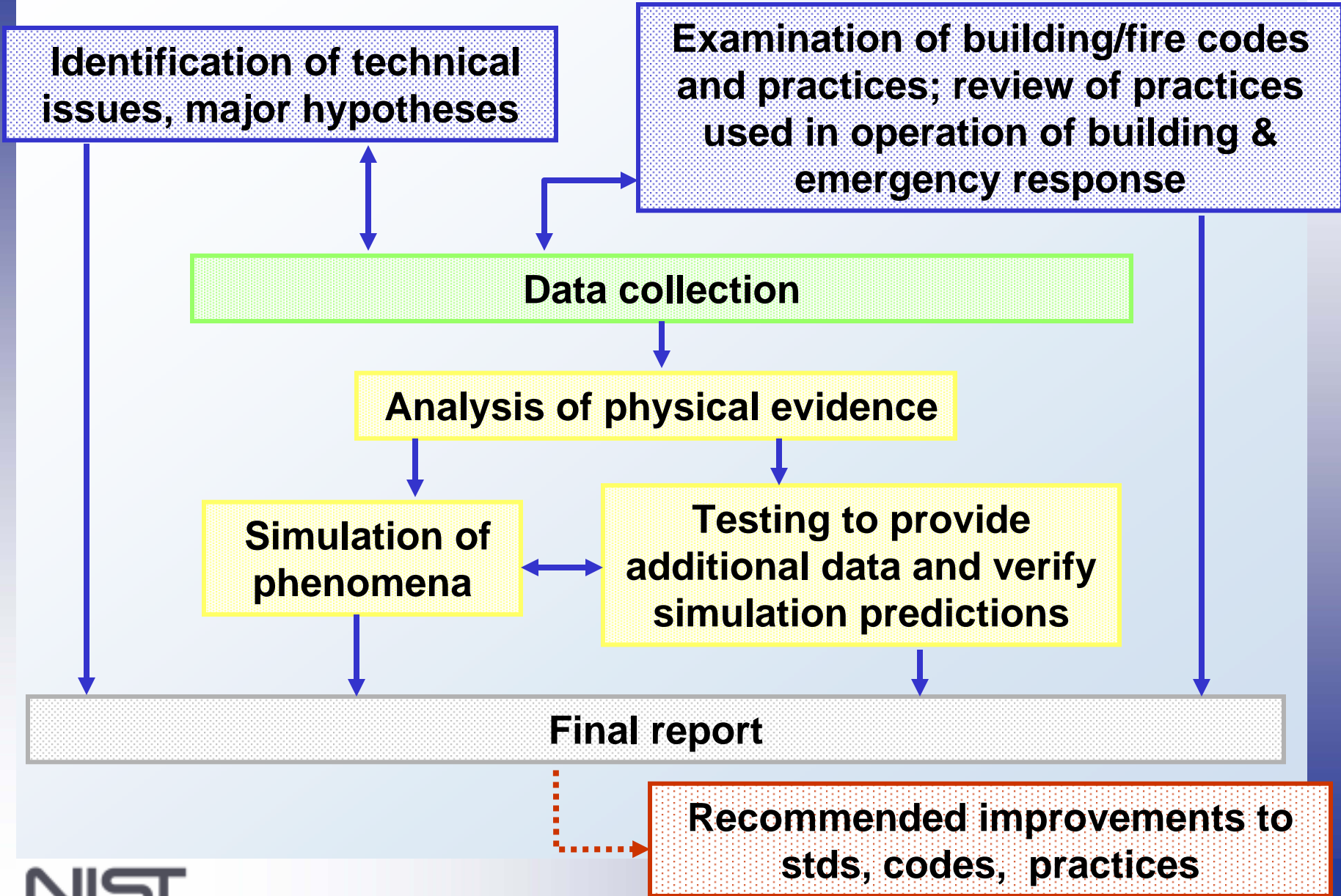
Primary Federal Agency Liaisons

- K. Kuntz, DHS/FEMA, US Fire Administration
- C. Porreca, Bureau of Alcohol, Tobacco and Firearms

Secondary Federal agency liaisons

- P. Makak, DHS Office for Domestic Preparedness
- K. Hartmann, DoL Occupational Safety and Health Administration
- L. Doll, Centers for Disease Control and Prevention

General Approach



Specific Tasks

1. **Establishment of initial conditions**
2. **Materials testing**
3. **Reconstruction of thermal and tenability environment**
4. **Determination of occupant behavior and egress**
5. **Documentation of emergency response**
6. **Examination of the impact of sprinklers on survivability**
7. **Identification of building and fire codes that warrant revision**

1. Establishment of Initial Conditions

Information sought:

- Materials of construction and contents
- Location, size and conditions of doors, windows, and ventilation
- Installed fire protection systems
- Number of occupants and their approximate locations

Sources:

- Construction plans, maintenance records, building inspections
- Videos, photographs, news articles
- Measurements/observations of site after the fact
- Interviews with contractors, building owner, employees, survivors, and witnesses familiar with the operation of building on similar occasions

2. Materials Testing

Experiments conducted to provide data on materials of construction and contents that affect growth of fire:

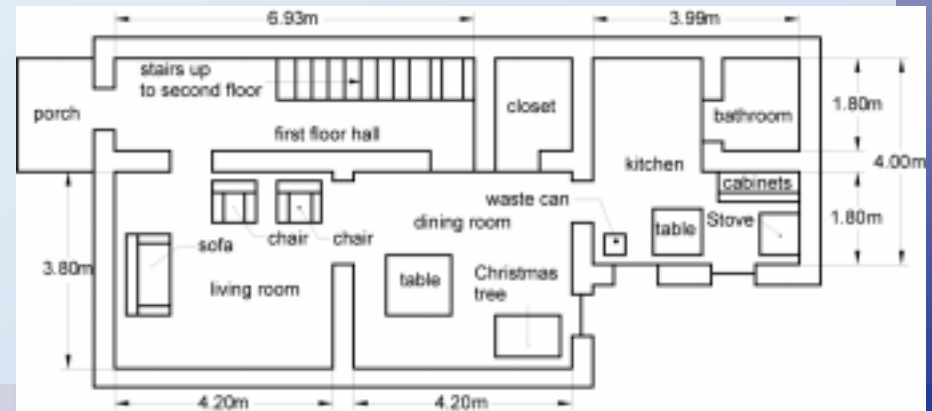
- Convoluted foam, wall paneling, ceiling tiles, carpeting and other materials identified as contributing to fuel load inside structure
- Heat release rate, minimum ignition temperature, smoke production over range of incident heat fluxes
- Wall and corner fire tests with convoluted-foam-covered wood paneled walls to develop heat release rate time histories
- Standard tests for flammability of plastic materials and standard tests for surface burning characteristics of building materials on interior finish materials
- Thermal response experiments on exemplar heat detectors

3. Reconstruction of Thermal and Tenability Environment

- Develop computer-based reconstruction of interior from dimensioned drawings, video, and still photos.
- Examine impact of varying properties of interior finishes on smoke and fire spread.
- Examine impact of ventilation from changes in openings of doors and windows.
- Compare simulation to WPRI-TV videotape and witness testimony.
- Seek information on location/cause of fatalities for each victim (from ME's report) to establish consistency with simulation.

Example Previous Reconstruction: Keokuk, Iowa, 12/22/99

Conducted for NIOSH, 6 fatalities
(3 children, 3 firefighters)



4. Determination of Occupant Behavior and Egress

Objective: to better understand impediments to safe egress encountered by occupants

- Comparison of life safety features in structure with requirements from the Life Safety Code.
- Egress of occupants calculation using simple hydraulic-type models as well as more complex behavior-based models to compare to tenability predictions from FDS.
- Examination of parameters that affected egress, including hazard recognition and response (1st, 2nd, 3rd actions), staff response, blood alcohol levels of victims, age and sex of occupants, location and identification of exits, condition of exits, and changing conditions inside structure (i.e. smoke and heat build-up, loss of lighting)
- Comparison to similar incidents (e.g., Arundel Park Hall, MD; Chicago nightclub; Fine Line Music Café, MN)

5. Documentation of Emergency Response (USFA lead)

Collect emergency response data in cooperation with local fire department to document procedures and operation of equipment; identify successful operations and technical difficulties.

- Records of interest: dispatch logs, recorded radio communications, run logs, 911 records, data recorded by Fire Department operations and Police Department, and fire ground positioning of emergency apparatus
- Operations and function of communications systems, on-site emergency information systems, fire alarm panels, standpipes and fire hoses, and other emergency equipment
- Data collected from witnesses, those in control of emergency operations, and first responders

6. Impact of Sprinklers on Survivability

Impact on survivability will be examined had sprinkler system been installed, all other conditions being the same.

- Determine sprinkler design criteria that comply with NFPA 13 for this occupancy.
- Identify recreation from task 3 that provides best match with timeline developed from WPRI-TV video and witness statements.
- Add sprinkler system to model, and conduct parametric study to suggest how tenability conditions might have been altered for same initial conditions and ignition sequence.

7. Building and Fire Codes that Warrant Revision

Review building/fire codes and practices, and examine practices used in operation of building.

Recommend specific areas for improvement in building and fire codes, standards and practices based upon technical findings from the other tasks, including areas covered by Tentative Interim Amendments (TIAs) to NFPA 101-2003

- sprinklers in clubs with occupant loads > 300
- crowd managers and staff training for occupant loads > 250
- prohibit festival seating without approved life safety evaluation

Questions?

william.grosshandler@nist.gov
(301) 975-2310