

National Construction Safety Team Investigation

The Station Nightclub Fire

NCST Advisory Committee
June 22-23, 2004

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Overview

Rationale to conduct NCST investigation:

- Rapid spread of fire and smoke requires technical investigation to determine how life safety features of building failed to provide sufficient evacuation time, leading to 100 fatalities.
- Potential exists to mitigate future building failures like this with changes in building practices and/or building standards, codes, and regulations.
- Technical competencies required for successful investigation are available at NIST and its community, and no local or state investigation with equivalent analytical quality exists.
- Funds on hand are sufficient to conduct an investigation.

Overview

Elements of NIST Technical Investigation

- Establishment of initial conditions
- Simulation of thermal and tenability environment
- Testing and validation experiments to support simulation
- Examination of possible impact of sprinklers
- Documentation of evacuation process
- Documentation of emergency response
- Recommendations for specific improvements to model building standards, codes and practices

Overview

Recent activities:

- Contract reports submitted on Model Building & Fire Codes and Practices (Koffel) and on Analysis of Egress (Arup)
- NIST has received the cooperation of RI AG's Office in getting access to important information, including data obtained by ATF on the heat release rate of polyurethane foam recovered from site.
- Detailed timeline of egress from fire has been assembled, and is coming together regarding fire department response.
- Temperature, heat release and concentration data taken during real-scale fire recreations (w & w/o sprinklers) have been reduced and analyzed.
- FDS has been run and compared to measurements in real-scale fire recreation.
- NIST SP 1000-101 published: **"Fire Spread Through a Room with Polyurethane Foam Covered Walls."**

Presentation Outline

6/22/04

- Overview - W. Grosshandler

6/23/04

- Egress study, and review of model building and fire codes - W. Grosshandler
- Documentation of emergency response - K. Kuntz
- Testing and validation experiments to support simulation - N. Bryner
- Simulation of fire and smoke movement in laboratory reconstruction - D. Madrzykowski

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Status of Technical Investigation

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Egress study -

Contract to Ove Arup & Partners of Massachusetts for evaluating limitations to egress through doorways in emergency situations

Status:

- contract completed
- established timeline for egress based upon WPRI video and other published accounts
- identified in-place life safety features
- extensive review of previous evacuation incidents
- key aspects of contractor's report to be incorporated into final NIST report

Lights turned off for show.



Band takes stage.



Pyrotechnic display initiated.



Note: still-frames taken with permission from WPRI-TV video

-00:33

-00:14

-00:08

Timeline - 1/4

START OF FIRE

00:00

00:09

minutes:seconds

First flames, upper wall, left of stage.



Flames on upper wall, right of stage.



Video Time	Fire Time	Description
0:05:49	- 0:00:33	Stage lights turned off for beginning of show.
0:06:08	- 0:00:14	Band first shown on stage.
0:06:14	- 0:00:08	Pyrotechnic display initiated.
0:06:22	0:00:00	First flames on upper wall, left of stage.
0:06:31	0:00:09	Flames on upper wall, right of stage. Pyrotechnic display ends.

Band members first notice flames.



Flames reach ceiling, right of stage.



Camera operator begins to evacuate.



00:11 00:16 00:18

Timeline - 2/4

00:25 00:30 00:32 00:41

Flames touching ceiling, both sides.



Band stops playing, begins to evacuate.



Flames extend fully above stage.



Alarm sounds; strobes begin to flash.



Video Time	Fire Time	Description
0:06:33	0:00:11	Band members first notice flames.
0:06:38	0:00:16	Flames reach ceiling to right of stage.
0:06:40	0:00:18	Camera operator begins to evacuate.
0:06:47	0:00:25	Flames touching ceiling on both sides of stage.
0:06:52	0:00:30	Band stops playing, begins to evacuate.
0:06:54	0:00:32	Flames extend fully across ceiling above stage.
0:07:03	0:00:41	Fire alarm sounds and strobes begin to flash.

Camera operator reaches exit lobby.



Smoke in exit lobby.



Camera operator exits building.



00:54

01:06

01:11

Timeline - 3/4

01:26

01:30

01:42

Smoke from stage exit, flames inside



Smoke out of poolroom windows.



Occupants jammed in doorway.



Video Time	Fire Time	Description
0:07:16	0:00:54	Camera operator reaches exit lobby.
0:07:28	0:01:06	Smoke in outer exit lobby.
0:07:33	0:01:11	Camera operator exits building.
0:07:48	0:01:26	Smoke coming out of stage exit. Flames visible inside at this location.
0:07:52	0:01:30	Thick black smoke from pool room windows. Smoke appears to be at floor level inside. Occupants egressing through windows.
0:08:04	0:01:42	Camera operator returns to main exit. People piled up in doorway. Smoke pouring out above people.

Camera operator returns to stage door.



Flames near eave at rear of building.



Flames out front of building.



Timeline - 4/4

04:38

04:56

05:12

05:21

05:34

05:43

Fire department confirmed on scene.



Fire department runs first hose line.



Flames extend from front windows.



Video Time	Fire Time	Description
0:11:00	0:04:38	Camera operator returns to stage exit. Smoke ~1 ft above floor inside. Flames near door.
0:11:18	0:04:56	Flames outside building at roof level in rear.
0:11:34	0:05:12	Flames first recorded out front of building.
0:11:43	0:05:21	Fire department confirmed on scene.
0:11:56	0:05:34	Fire department commences running first hose line. Flames extending from main exit ~8-10 ft.
0:12:05	0:05:43	Flames extend from front windows.

Model building standards, codes and practices

Contract to Koffel Associates, Inc., of Maryland, for analysis of model building/fire codes and practices applicable to a building like The Station nightclub.

Status:

- contract completed
- extensive review of applicable model building/fire code history
- life safety features of code highlighted
- key aspects of contractor's report to be incorporated into final NCST report

Timeline of major construction and changes of use

<u>Date</u>	<u>Activity</u>
1946	Original construction as nightclub
1964	Change of ownership, converted to meeting house (same Use Group as restaurant)
1967	Change of ownership and name, converted to nightclub
1969	Nightclub closed
1970	Change of ownership and name
1971	Bank foreclosed - reopened as nightclub
1972	Fire, club may have remained closed until 1974
1974	Change of ownership, converted to restaurant, commercial alterations, interior paneling and partitions
1975	Addition of 330 ft ²
1985	Change of ownership, change of name, converted to “pub”
Late 1980’s	Pub closed
1991	Reopened as nightclub
1993	Change of ownership, renamed
1995	Change of ownership
2000	Change of ownership renamed
2001	Repair damage from car ramming building

Applicable model fire codes during modifications

Permit Dates	Description of Work	BOCA: Fire Code	NFPA 101
1946	Original construction	Nat. Board of Fire Underwriters ¹	
1967	Install paneling, new sign; rebuild two porches	Basic FPC ² 1965	LSC ³ 1967
1970	Roofing, paneling, etc.	Basic FPC 1970	LSC 1970
1971	Alterations and remodeling	Basic FPC 1970	LSC 1970
1974	Interior paneling and partitions	Basic FPC 1970	LSC 1973
1975	Exterior alterations, renovations, addition 330 ft ²	Basic FPC 1975	LSC 1973
1981	Request of variation under building code, not to enclose stair to basement	Basic FPC 1981	LSC 1981
1985	Remodel and renovation to existing restaurant	Basic/National FPC 1984	LSC 1985
1999	Unspecified construction	National FPC 1999	LSC 1997
2001	Repair front from car	National FPC 1999	LSC 2000

¹ Unconfirmed, but common during this period; later referred to as the American Insurance Assoc.

² FPC - Fire Prevention Code; ³ LSC - Life Safety Code

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