

**National Construction Safety Team Investigation**

**The Station Nightclub Fire:  
Simulation of fire and smoke movement in  
laboratory reconstruction**

NCST Advisory Committee  
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## Objectives:

Develop FDS/Smokeview based simulation to:

- Assess fire conditions in real-scale laboratory recreation
  - Fire growth rate
  - Thermal conditions
  - Smoke obscuration
  - Tenability (temperature, heat flux, and oxygen concentration)
  - W & w/o sprinklers
- Assess conditions and smoke movement in simulated Station nightclub fire

# FDS/Smokeview Simulation Status

Draft models completed for experiment.

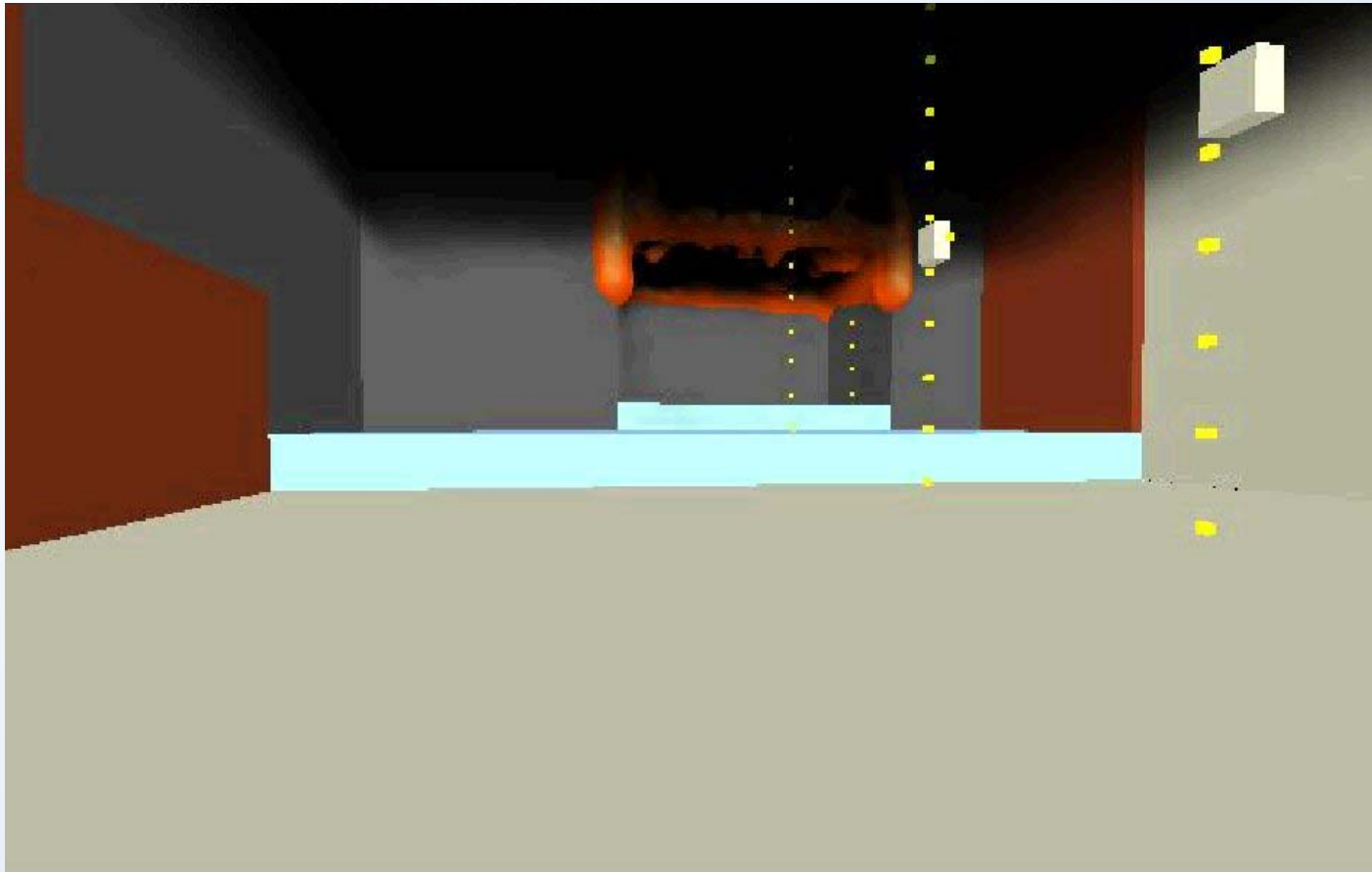
Nightclub model currently being revised to incorporate:

- Additional information included revised dimensions
- Thermal properties of materials
- Modifications to FDS

## Full-scale Recreation of Stage Area Fire

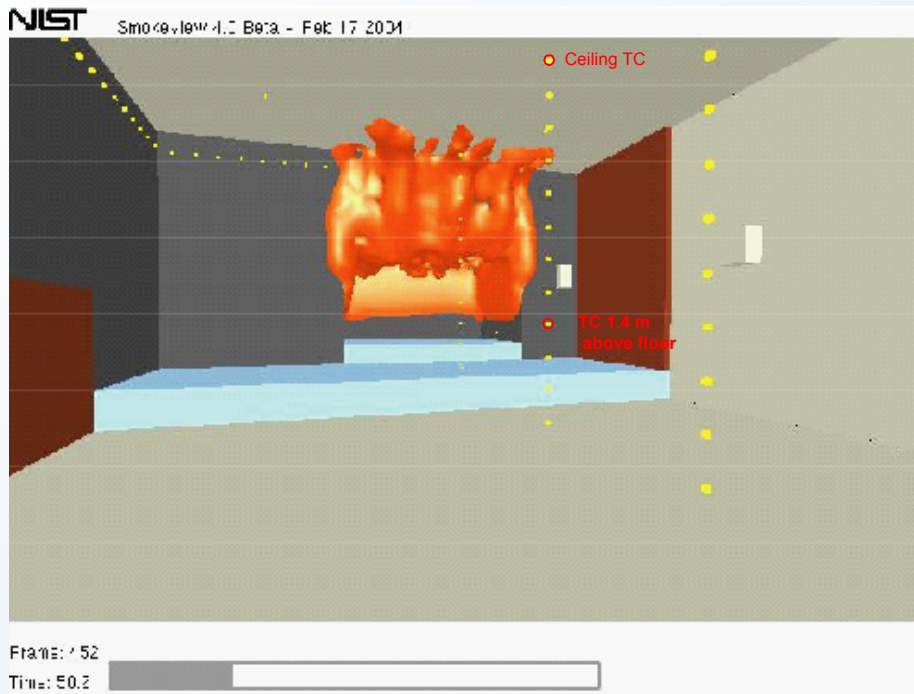


# Preliminary Simulation Un-sprinklered Experiment

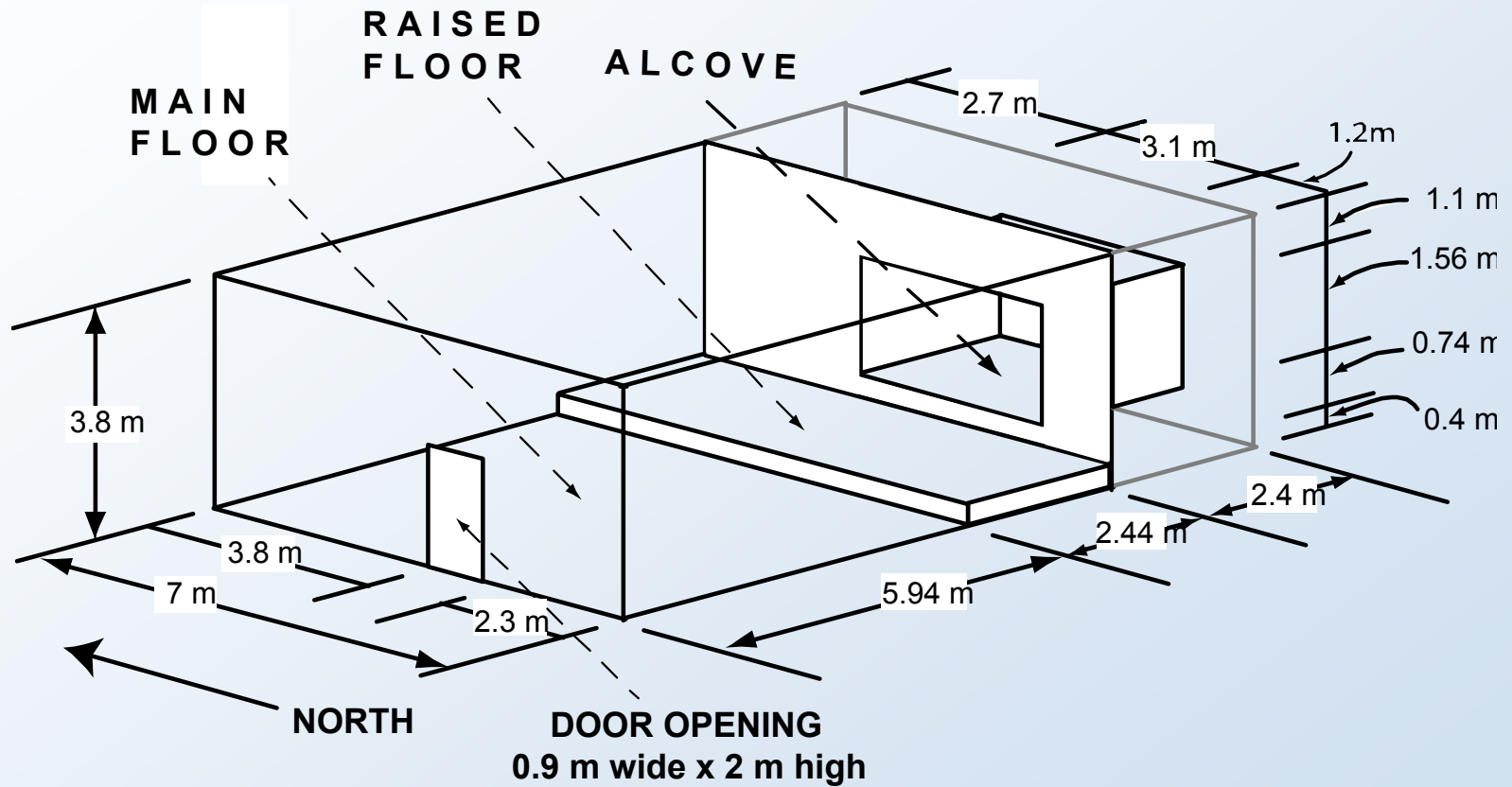


# FDS vs. Experiment

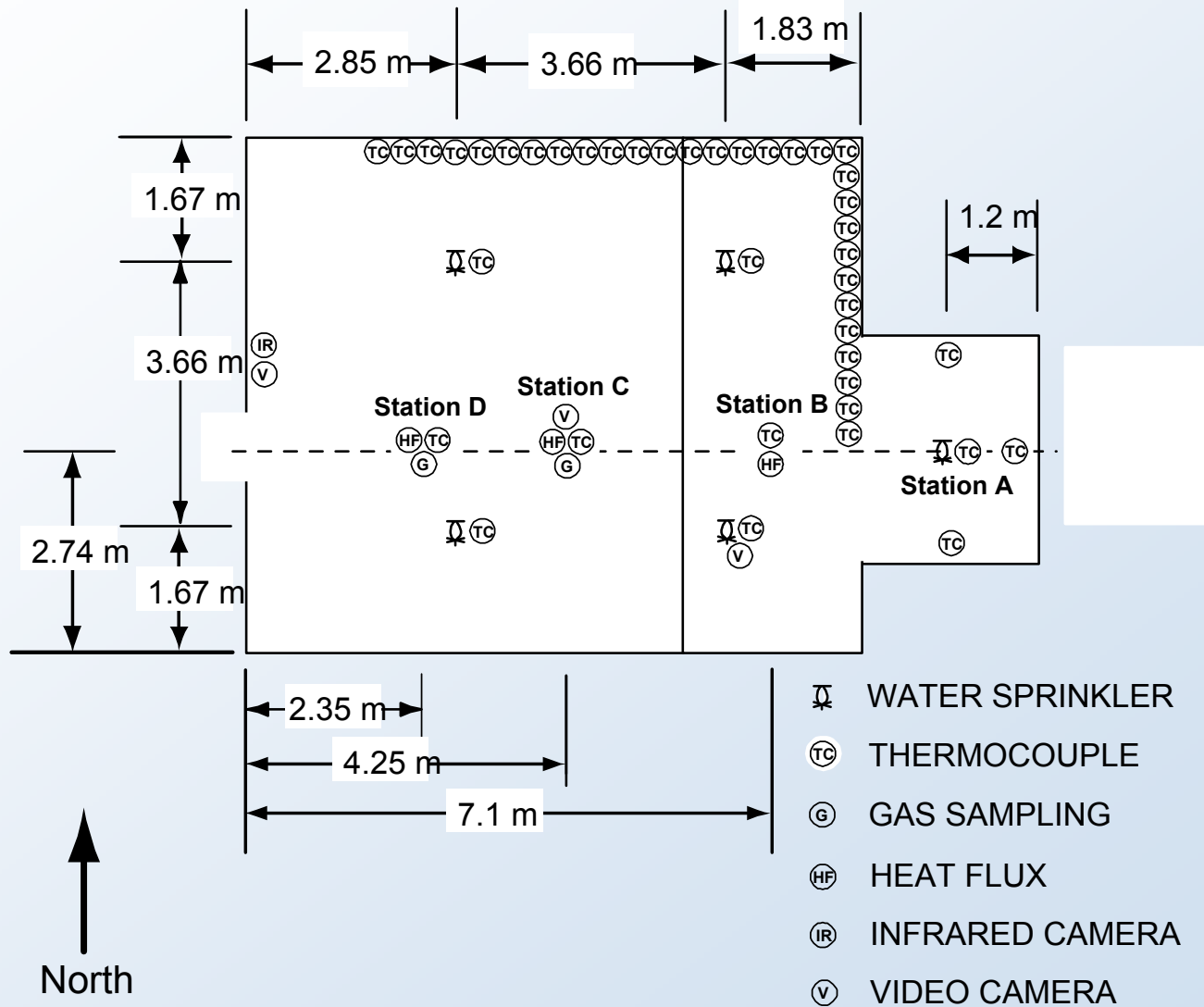
## Observation at 50 s after ignition



# Isometric View of Test Compartment

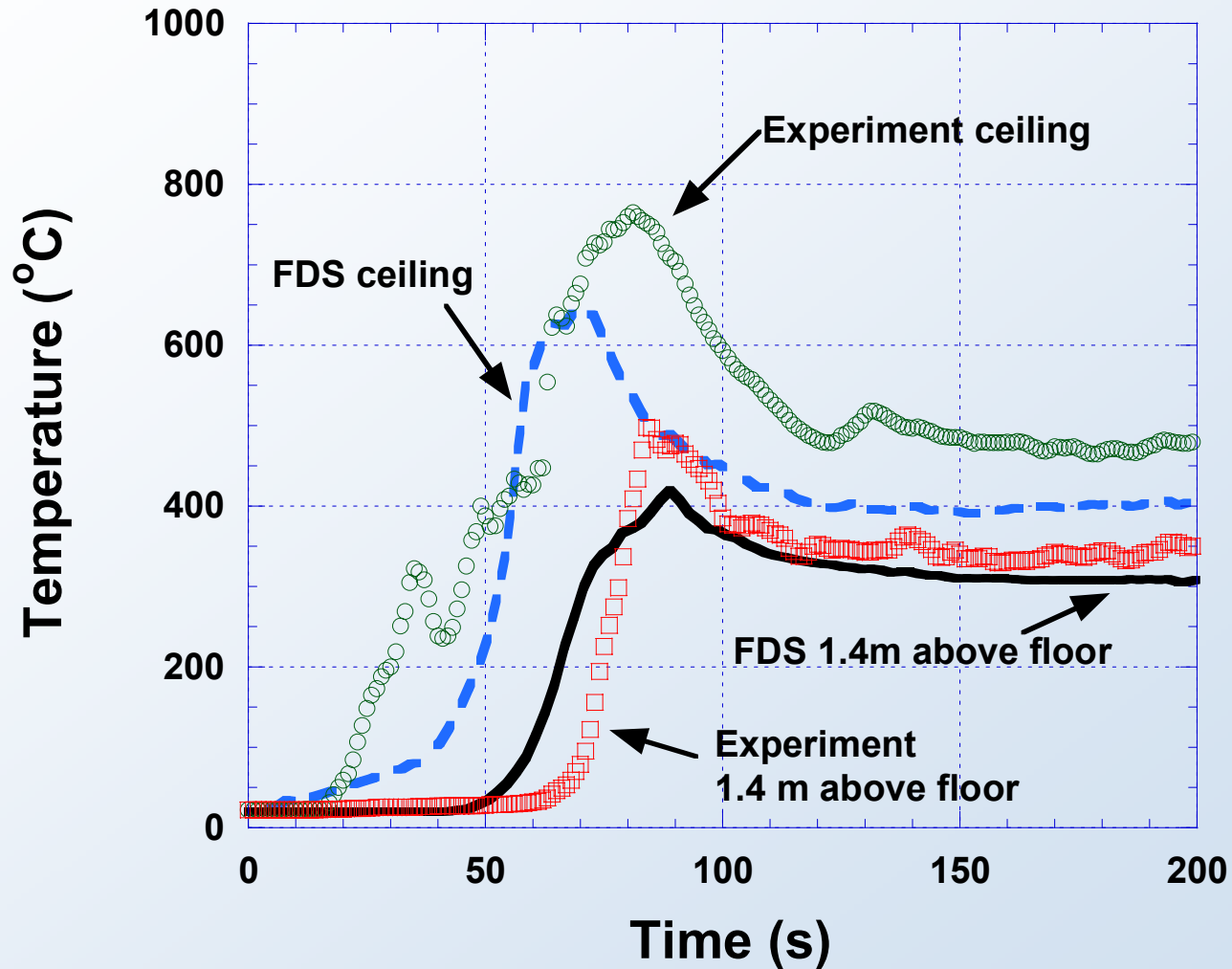


# Instrumentation Locations

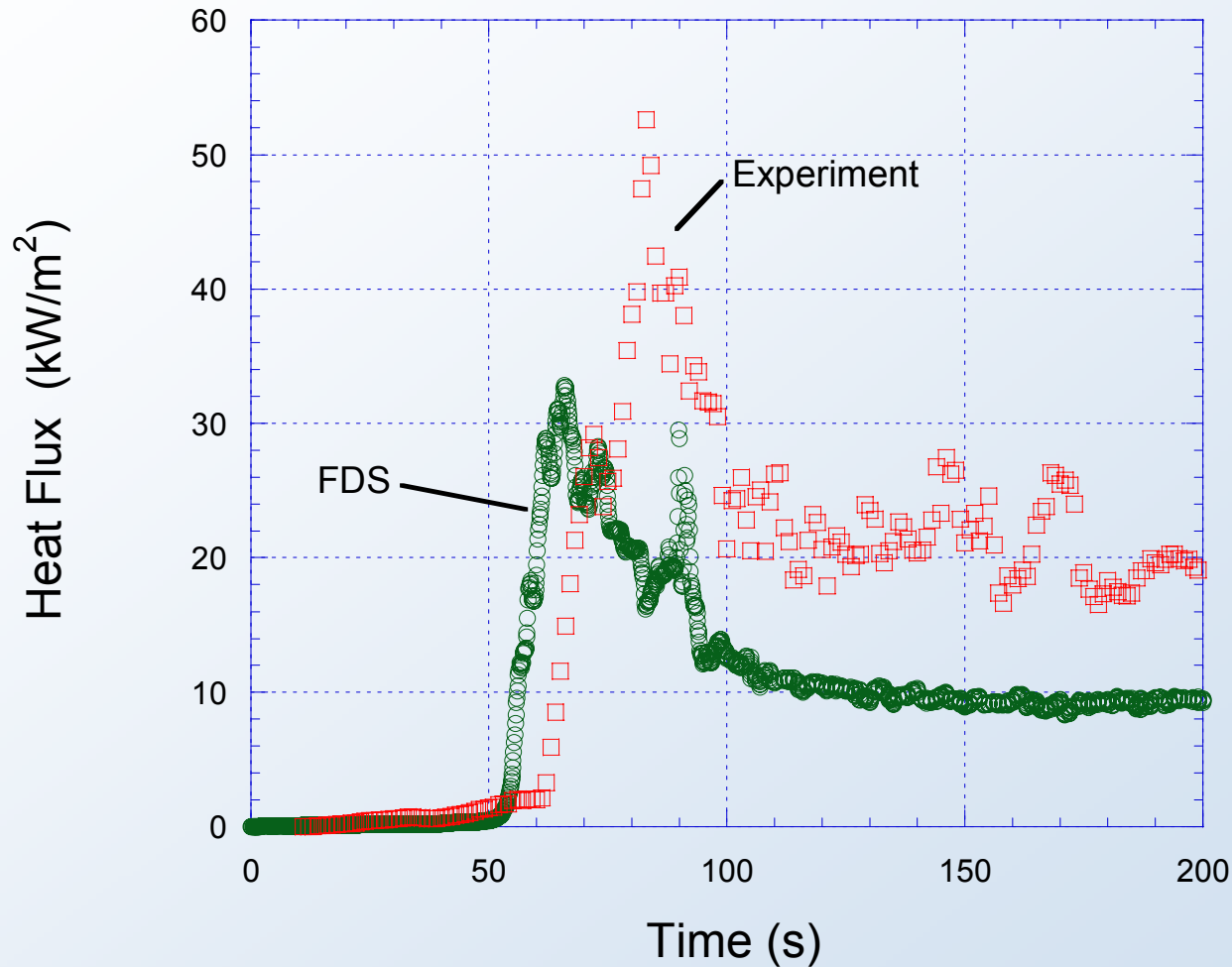




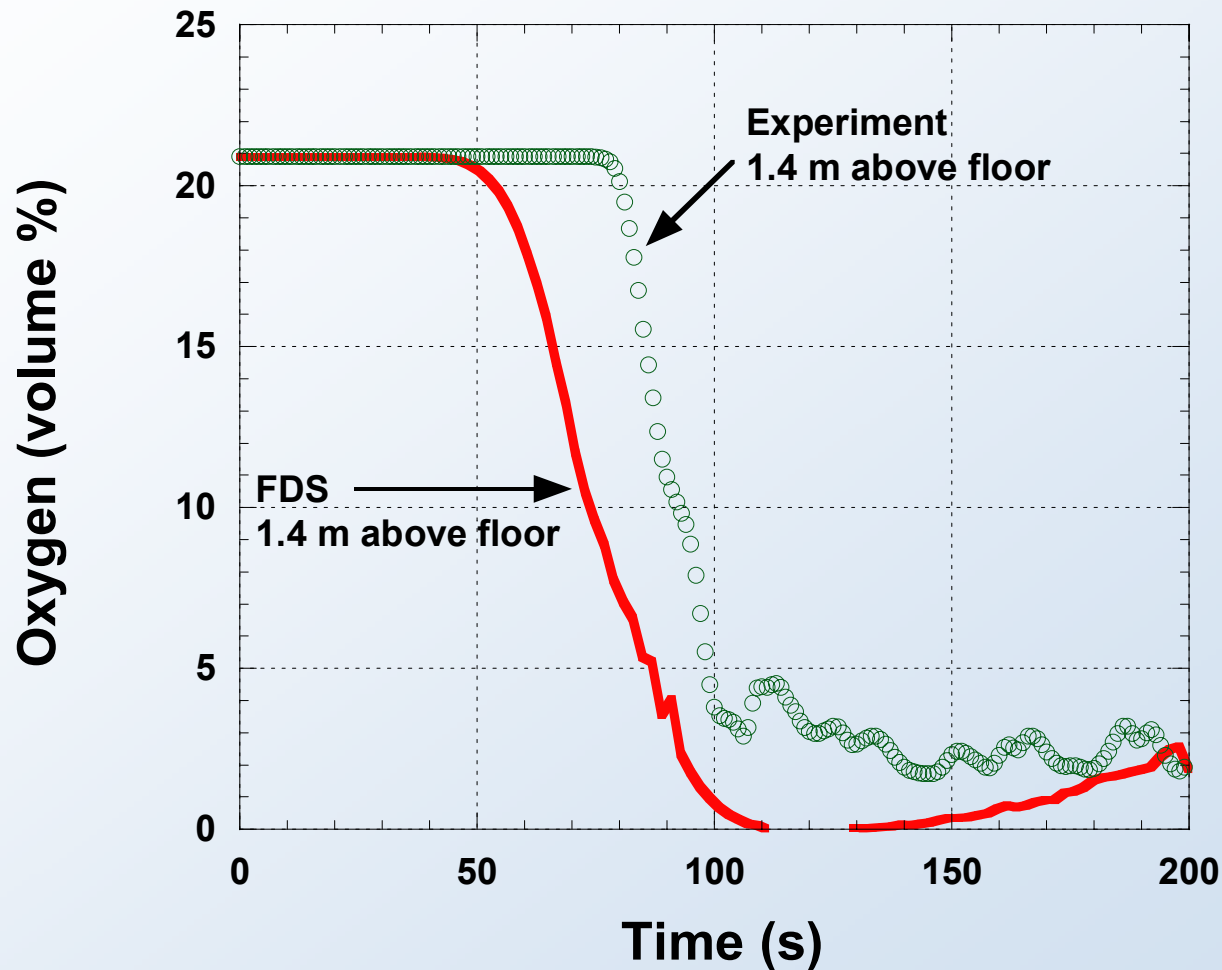
# FDS vs. Experiment: Temperature



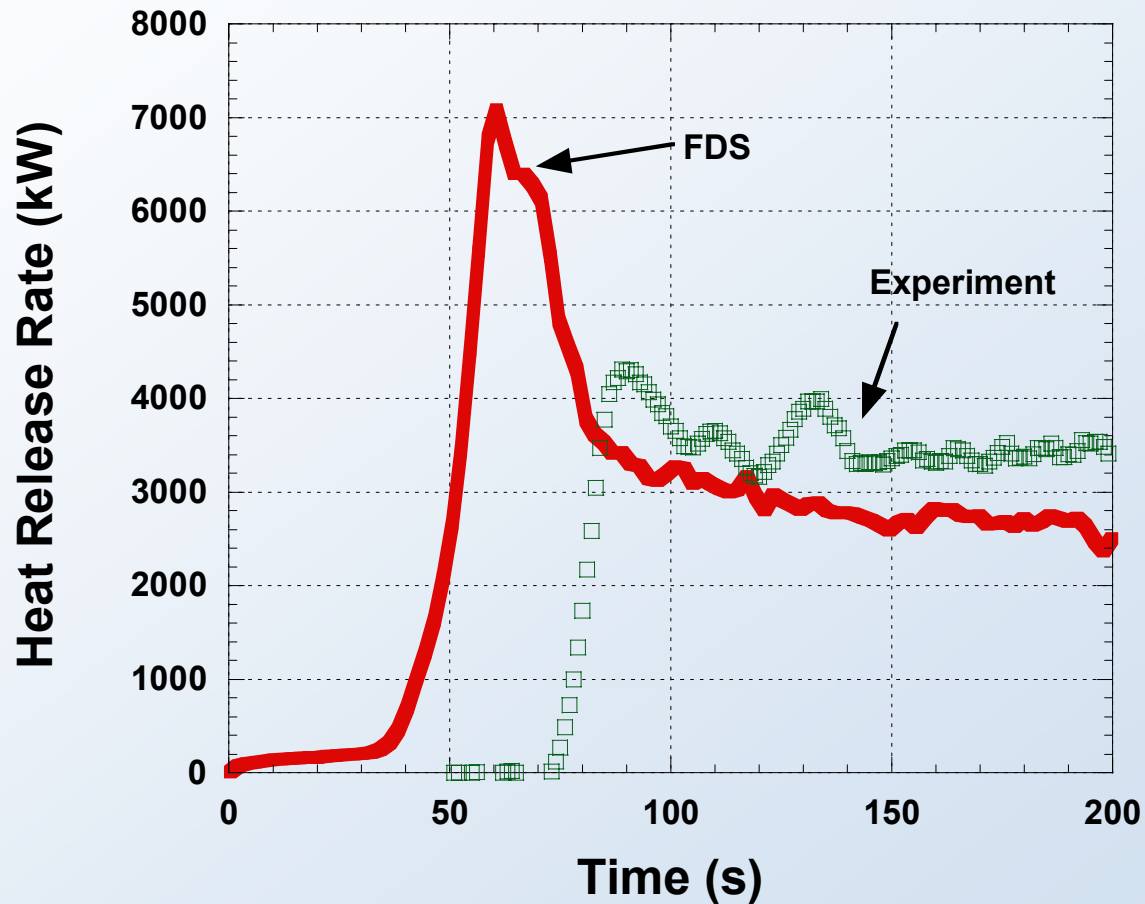
# FDS vs. Experiment: Heat Flux



# FDS vs. Experiment: Oxygen Concentration



# FDS vs. Un-sprinklered Experiment: Heat Release Rate



# Full-scale Recreation, Stage Area Fire + sprinklers



# **Preliminary Simulation Sprinklered Experiment**

**SPRINKLERED MOVIE**

# Station Model

Nightclub model currently being revised to incorporate:

- Additional information including revised dimensions
- Thermal properties of materials
- FDS
  - Heat Transfer
  - Suppression Algorithm/sprinkler

## Summary

- FDS provides opportunity to compare computer model results with a known fire condition, prior to applying model to actual nightclub geometry.
- Model trends are in qualitative agreement with measurements.
- FDS will be used to predict fire and smoke spread throughout nightclub and results compared to the available video recording.



# References

- NIST SP 1000-101, Fire Spread Through a Room With Polyurethane Foam Covered Walls, Madrzykowski, D., Bryner, N., Grosshandler, W., Stroup, D., June 2004
- Test Videos –  
[http://www.nist.gov/public\\_affairs/releases/nightclubfire\\_release.htm](http://www.nist.gov/public_affairs/releases/nightclubfire_release.htm),  
November 25, 2003
- NCST information – <http://wtc.nist.gov>