

A photograph of a fire burning in a laboratory setting. The fire is bright yellow and orange, with a large, billowing plume of smoke rising from it. The fire is contained within a metal structure, possibly a fire test chamber or a controlled environment. The background is dark and industrial, with various pipes and structural elements visible. The overall scene is dimly lit, with the fire providing the primary light source.

Welcome

Workshop on Fire Growth And Spread on Objects

March 4-6, 2002



SOME U.S. STATISTICS

2000 (NFPA J.):

1,708,000 fires (-6.3 %)

505,500 in structures with 75% in residences

4045 fire deaths (+18 %)

(3445 residential, 90 non-residential)

22,350 fire injuries (+2.2 %)

(17,400 in residences (+5.9 %))

\$10.2 billion in property losses (+1.8 %)

(\$8.5 B in structures, \$5.7 B in residences)



SOME MORE U.S. STATISTICS

1997 (NFPA FPH)

<i>Extent of Damage</i>	<i>Fires</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>
<i>Confined to Room</i>	71 %	21 %	58 %	19 %
<i>Beyond Room, Confined to Floor</i>	5 %	12 %	11 %	9 %
<i>Beyond Floor</i>	24 %	67 %	31 %	72 %



FLASHOVER IMPLICATIONS

- Eliminating flashover could reduce U.S. fire deaths by 80 % and injuries by 50 %.
- Eliminating flashover could reduce direct U.S. fire property losses by 80 %.
- Improved understanding of flashover would allow more effective testing and cut time-to-market for new products.
- Trade implications. Examples are ISO 9705 and European Single Burning Item (SBI) test.



PRINCIPAL MEANS FOR LIMITING THE RATE OF HEAT RELEASE

Reducing the fire spread and growth rates is crucial

Passive

- Control fuels (e.g., wall linings and contents) and/or ventilation.

Active

- Early detection followed by manual intervention.
- Early detection followed by automatic suppression.



OBJECTIVE

To reduce flashover risk cost-effectively by adapting measurement and predictive methods to better understand conditions leading to flashover; to enable early and certain fire and environment sensing; to advance fire suppression technologies; and to enable new/improved materials whose fire resistance does not negatively impact performance, cost, or the environment.



Reduced Risk of Flashover Program: 2002 STRS Projects

Materials:

1. Micro-scale High Throughput Optimization of Flame Retarded Polymers (Nyden)
2. Bench-scale High Throughput Flame Retardancy Measures (Gilman)

Detection:

1. Early, Fault-Free Detection (Cleary)

Fire Growth and Spread:

1. Flame Radiation (Pitts)
2. Fuel Generation Rates for Solid Fuels Under Fire Conditions (Baum and Linteris)
3. Real-Scale Specification and Testing (Notarianni, Peacock, and Johnsson)



NEW DIRECTION: DEVELOP MODEL FOR FIRE GROWTH ON ROOM CONTENTS

- Most models for fire growth and spread have been developed for wall linings
- Models for fire spread and growth on room contents are very limited
- Statistics indicate that most enclosure fires develop on room contents
- Models are required to characterize effectiveness of various approaches for limiting heat release rate



REALISTIC FIRE GROWTH MODEL

- Coordinate experimental and modeling investigations
- Limit fuels and configurations (realistic and challenging)
- Use ISO 9705 as basis for enclosure
- Characterize uncertainties in experiments and models
- Emphasize first and second burning item



WORKSHOP PURPOSES

- Review current understanding of fire growth and spread on objects.
- Review current status of models for fire spread and growth on objects.
- Provide a forum for active discussion of topic.
- Provide a common thorough review of field for BFRL staff members.
- Identify primary obstacles and opportunities for characterizing and modeling fire spread and growth on objects.



WORKSHOP ORGANIZATION

- **Five Sessions:**
 1. Ignition and Flammability: Tom Ohlemiller
 2. Materials and Response: Greg Linteris
 3. Fundamental Flame Spread and Flame Spread on Surfaces: Kathy Notarianni
 4. Flame Spread on Objects: Rick Peacock
 5. Field Models: Howard Baum
- Talks are 45 minutes long. Each session is followed by half hour discussion period designed to generate one or two themes, conclusion, or issues.
- During last hour of workshop on Wednesday will return to these topics to form basis for workshop conclusions.



SOME PRACTICAL DETAILS

- Rest Rooms
- Coffee, tea, and hot chocolate in rear, soda machine at end of hall
- Lunch in NIST cafeteria
- Banquet tonight (Maggiano's Little Italy, get directions)
- Visitors on travel orders please see Paula to sign vouchers.
- Proceedings released as NIST Internal Report (Abstracts, Presentations, and Conclusions)
- Program in Abstract Book (Matti Kokkala, Peter Van Hees)