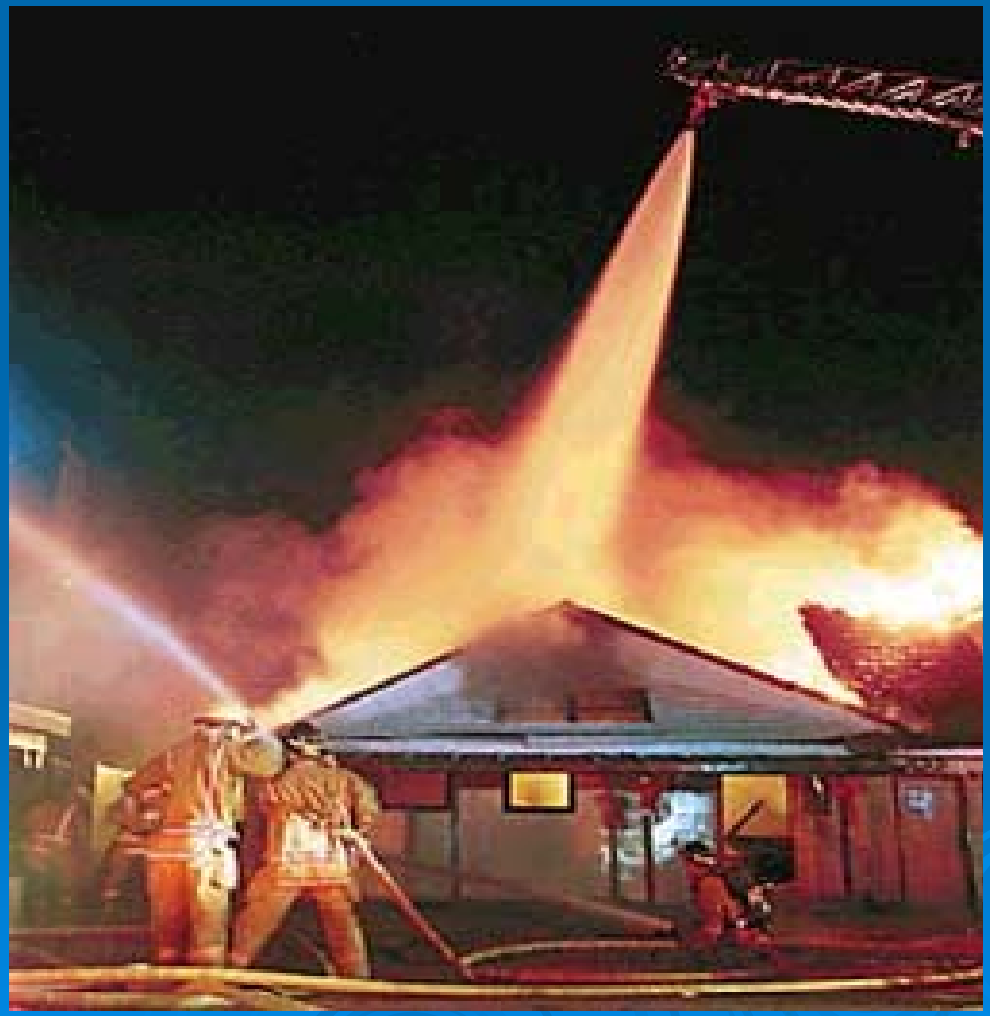
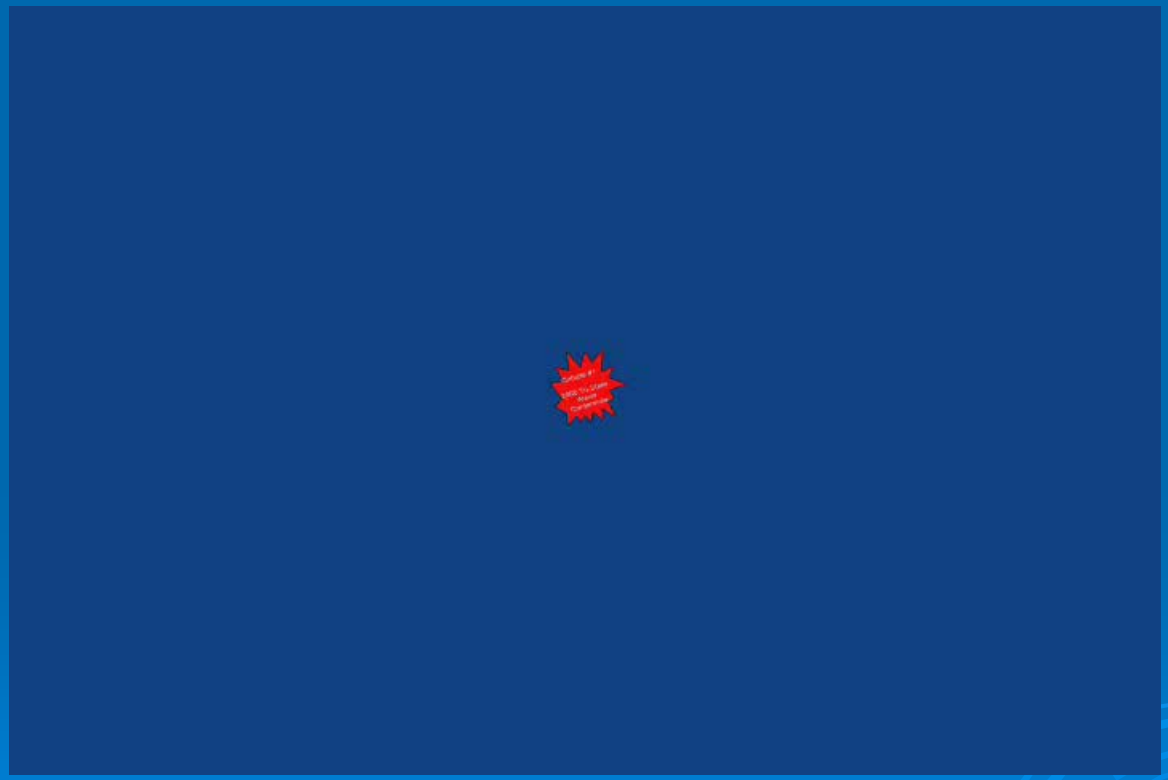
Preventing Laboratory Fires



Agenda

- Flash over Video
- Laboratory Fire Loss
- Lab Fire Regulations
- Fire Safety Equipment
- General Safety Guidelines

Tri-State Flash over Video



Laboratory Fire Loss

- Structure Fires in Laboratories

- Annual Average

	Incidents	Fatalities	Injuries	Loss
1980-1994	532	1	24	$7.0M
1995-1999	279	0	17	$3.5M

Laboratory Fire Loss

- *Extent of Flame Damage*

Confined to object of origin	153	55%
Confined to area of origin	65	23.3%
Confined to room of origin	29	10.2%
Confined to Fire-rated Compartment of origin	4	1.4%
Confined to floor of origin	5	2.0%
Confined to structure	18	6.5%
Extended beyond structure	5	1.6%
	279	100%

Laboratory Fire Loss

- Sprinkler Performance

• Operated	34	12.3%
• Should have operated	6	2.1%
• Fire too small	93	33.4%
• None present	142	50.7%
• Other	4	1.6%
	279	100%

Laboratory Fire Loss

- Sprinkler Performance

• Operated	34	$ .46M	9.5%
• Should have operated	6	$ .65M	13.5%
• Fire too small	93	$ .45M	9.4%
• None present	142	$3.2M	65.7%
• Other	4	$ .96M	2.0%
	279	$4.82M	100%

UNL Laboratory Fires

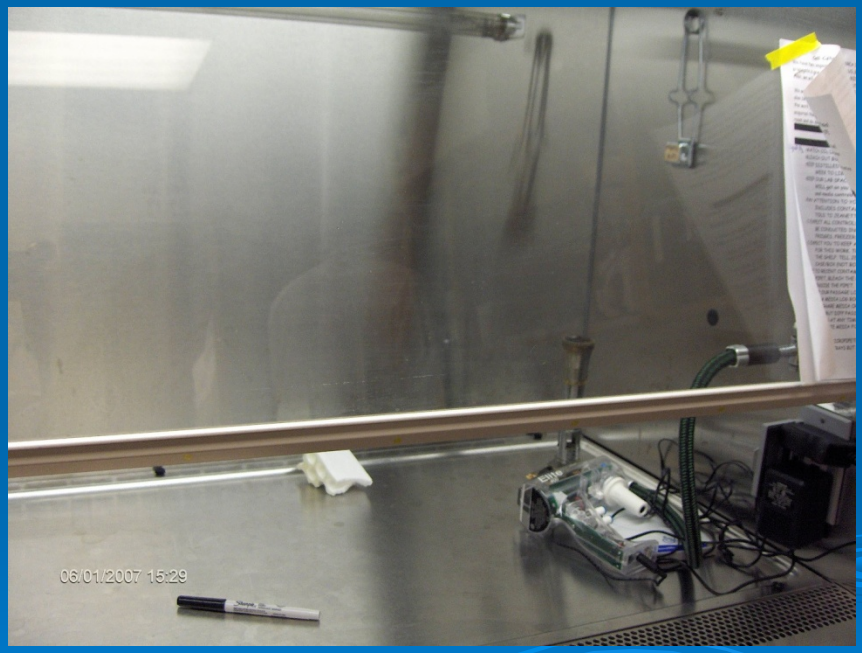
- Hamilton Hall September 1992
- Behlen Laboratory 2002
- Manter Hall oven fire June 2006

Hamilton Hall

- September 1992
- Explosion Rm. 619
- 30 year old Graduate student
- Solvent Distillation
  - Tetrahydrofuran
  - Chloroform
  - Toluene
  - Acid

Behlen Explosion 2002

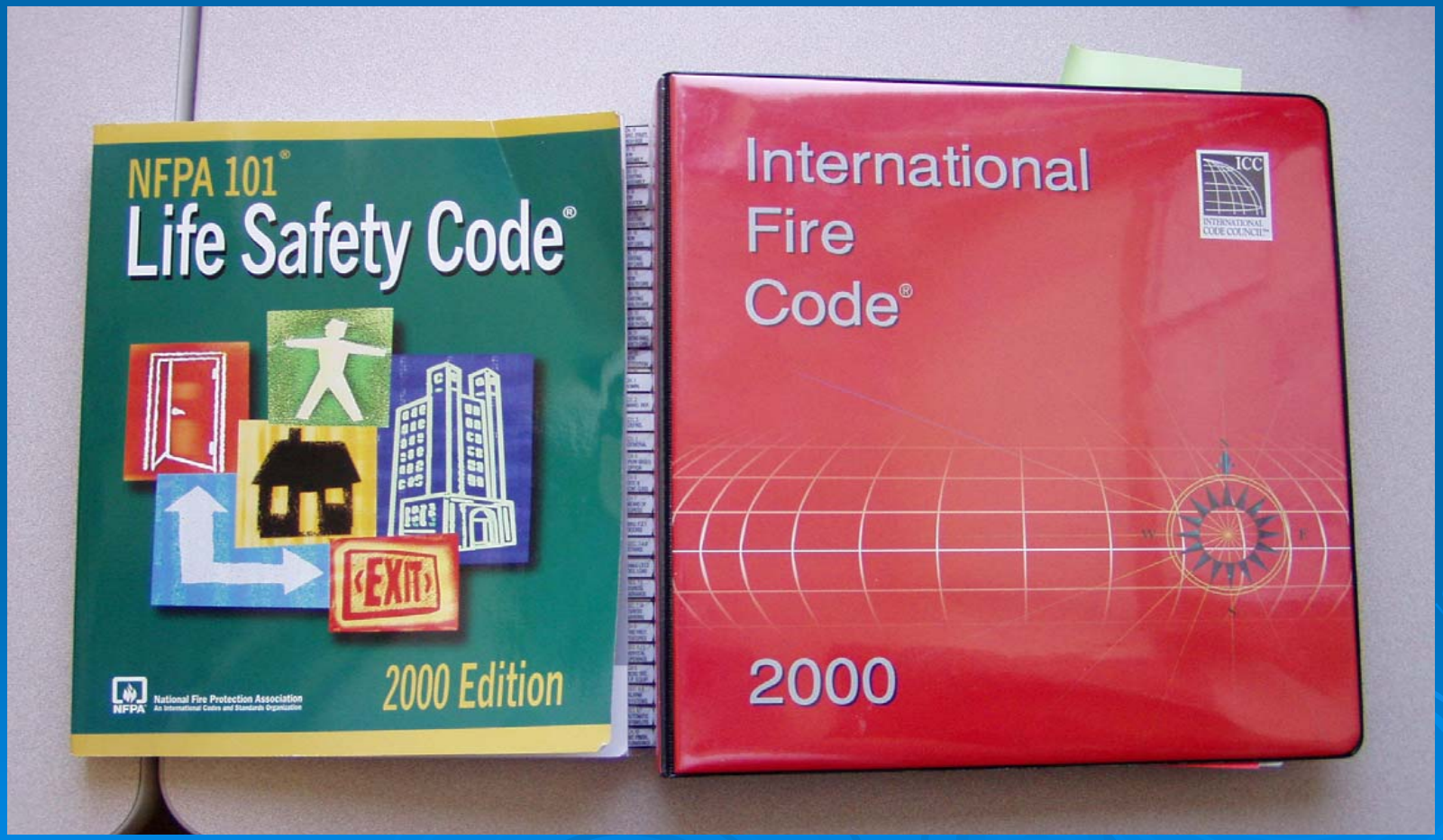
- Explosion in ventilation hood, no fire or damage to building
- Occurred about 5:30 p.m.
  - Nitric Acid
  - Sulfuric Acid
  - Acetone



Manter Hall

- Fire in baking oven 5-30-06
- Fire limited to oven
- Cause:
  - Didn't follow manufacture requirements.
  - Oven too hot for contents.

Laboratory Fire Code Regulations



National Fire Protection Association (NFPA)

- NFPA 1 – General Protection against Fire
- NFPA 10 – Fire Extinguishers
- NFPA 30 – Flammable and Combustible Liquids
- NFPA 45 – Laboratories using Chemicals
- NFPA 70 – National Electrical Code
- NFPA 101 – Life Safety Code

International Fire Code (IFC)

- International Fire Code is approximately the same as NFPA 1

Lab vs. Office

First Step

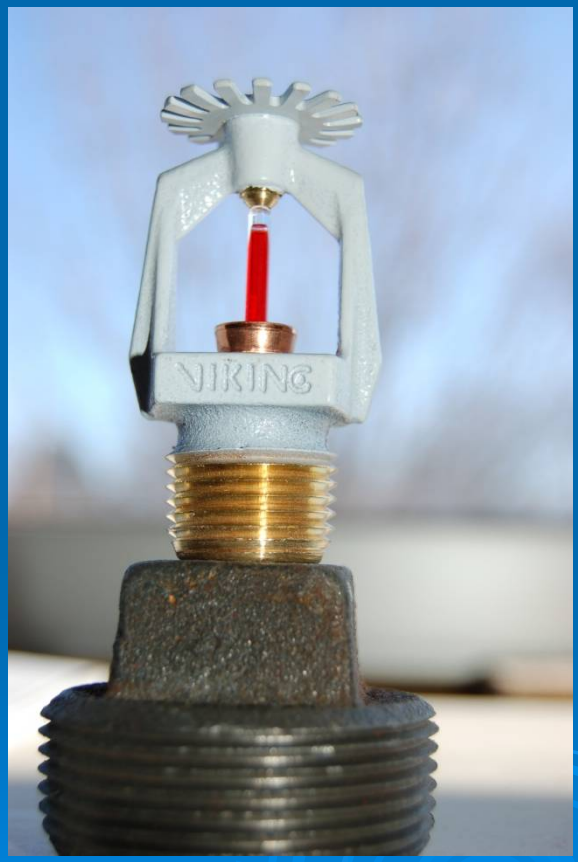
- Review of Current Chemicals.
- How much of these Chemicals do I have?
- What are the Hazards of these Chemicals?

Fire Safety Equipment

- Fire Sprinklers
- Fire Alarm Systems
- Fire Doors
- Fire Construction
- Emergency Lights
- Exit Paths
- Fire Extinguishers

Fire Sprinklers

- Serviced Annually.
- Storage 18 inches from ceiling.
- Non - Sprinklered buildings 24 inches from ceiling.



Fire Alarms

- Inspected each 6 months
- Keep unobstructed
- Could Include:
  - Manual Pull Stations
  - Heat Detectors
  - Smoke Detectors

Fire Doors: Close/Latch 703.2

- Fire doors and smoke barrier doors shall not be blocked or obstructed or otherwise made inoperable.
- Allowed to have a magnetic hold open device.

Fire Door Protection

Fire Doors at Work

Fire Construction

- Determined by the classification of the laboratory.
- Varies depending on Hazards.
- Penetrations must be repaired or replaced.

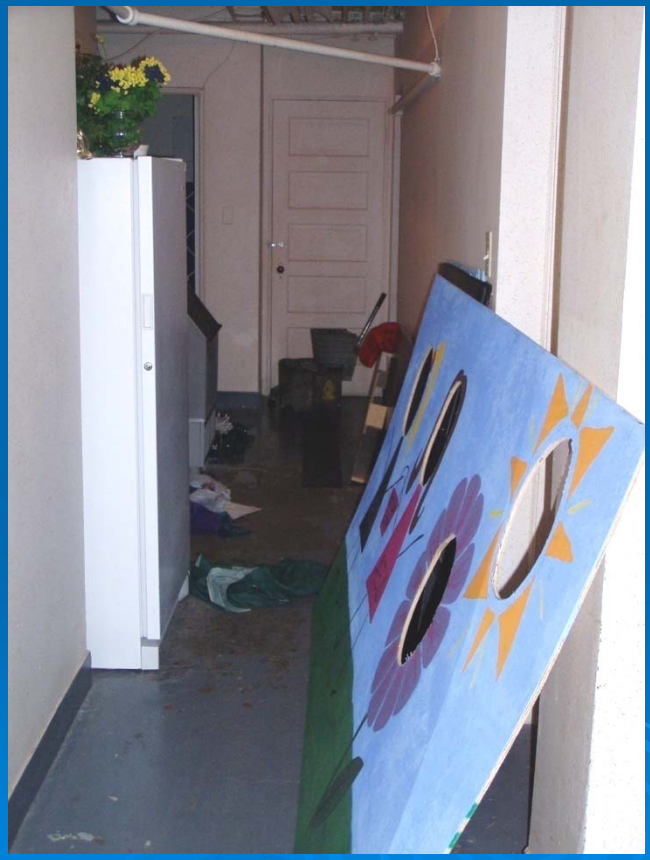
Emergency Lights

- Tested monthly.
- Illuminate path of egress.
- Report damaged equipment.

Exit Signs

- Operational and properly Illuminated
- Report damaged equipment

Exit Paths



Fire Protection

General Fire Safety

- Flammable Liquid Storage
- Compressed Gas Cylinders
- Heat Sources
- Electrical Safety
- Ventilation and Vent Hoods
- Combustible Storage

Flammable Liquid Storage

- Requirement is based on quantities and hazard ranking.
- Located away from use and Ignition sources.
- More is NOT better.

Compressed Gas Cylinder

Compatibility of Gases

Ignition Sources

Storage of Unused Cylinders

Heat Sources

Open Flames

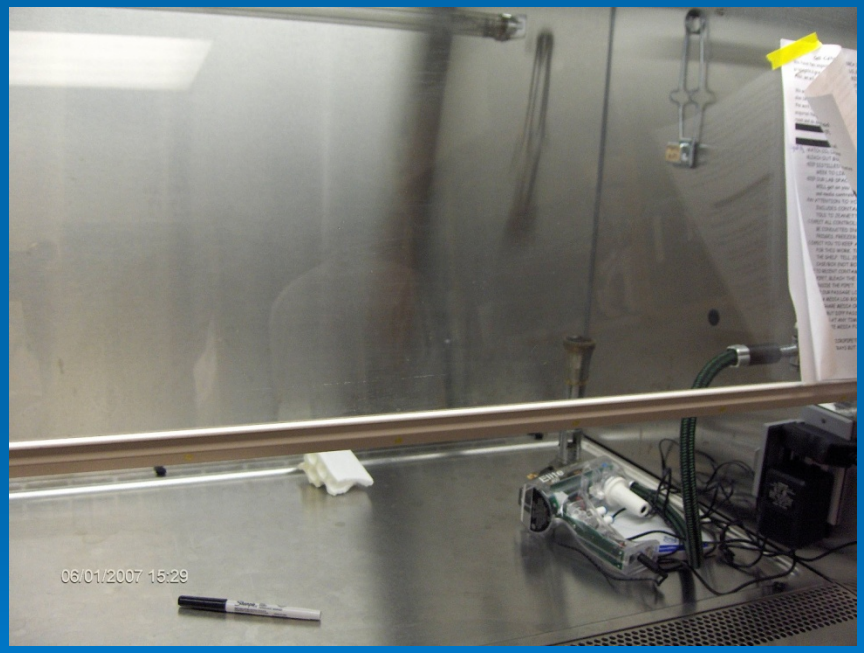

132
716

Heat Sources

Hoods


MINIGLAZE/2
620

Vent Hoods

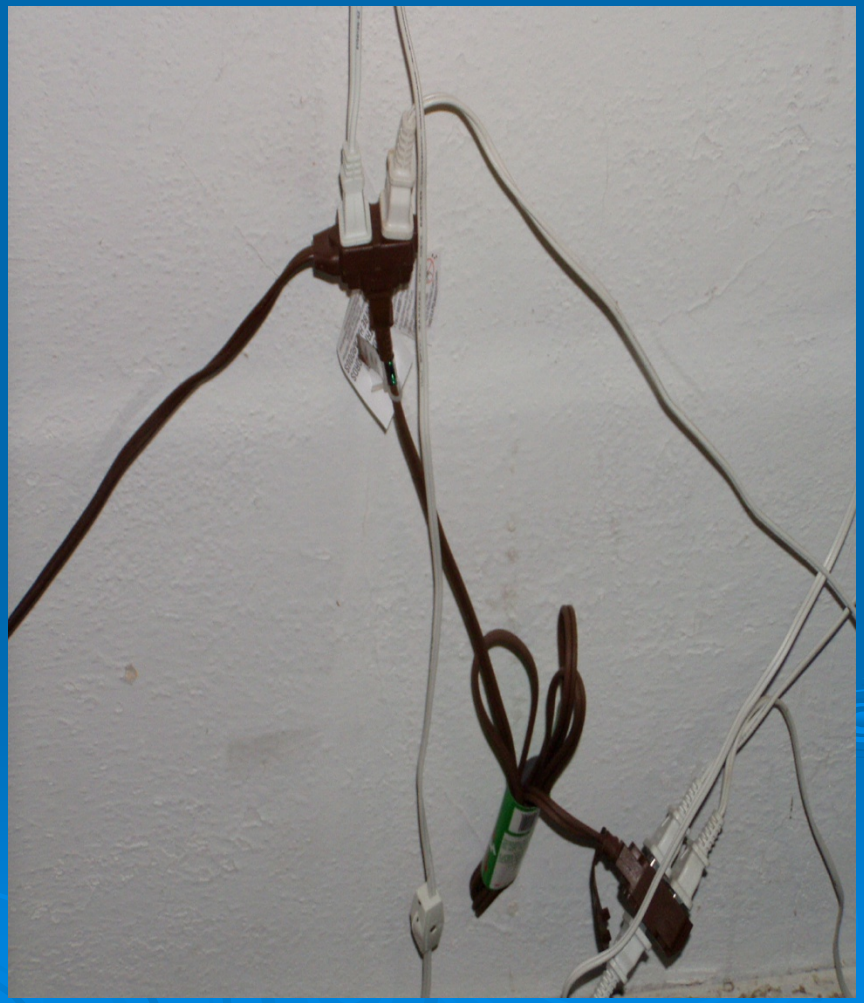


- General Ventilation

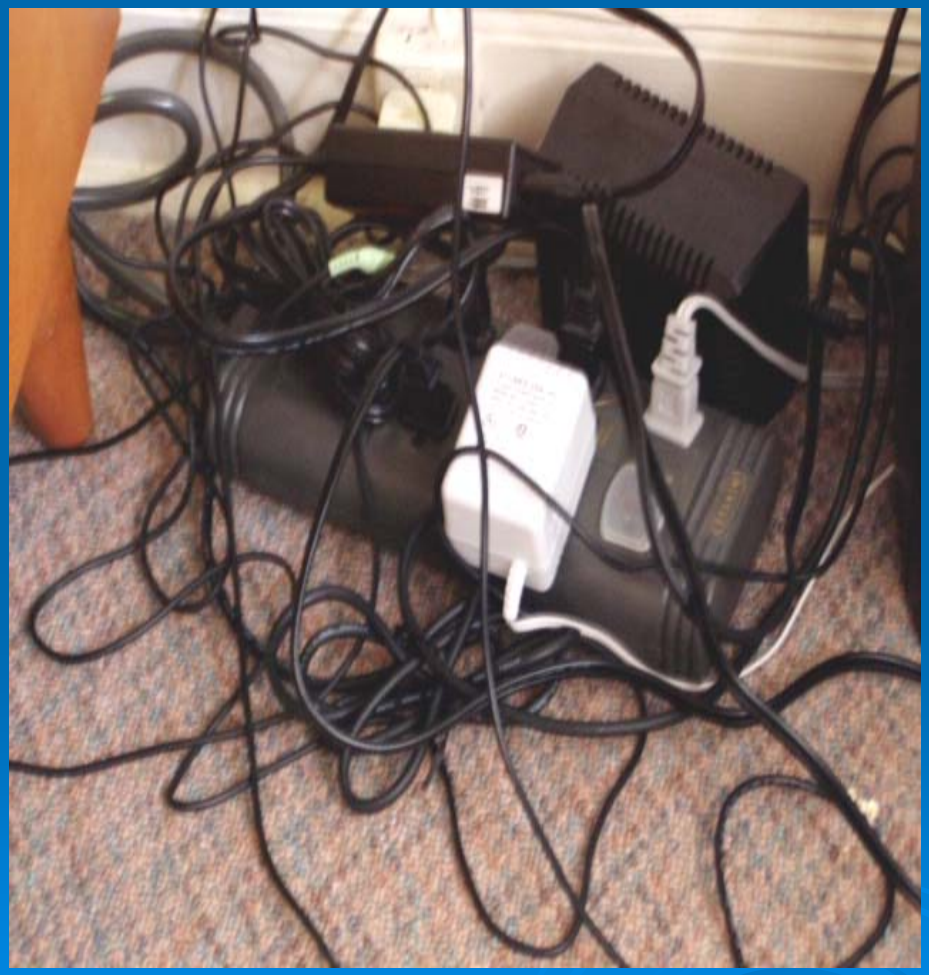
VS.

- Point Ventilation

Electrical Safety



Power Taps



Combustible Storage

Proper Storage

Ceiling Clearance

Electrical or Heat Sources

Additional Hazards

Fire Extinguisher
PASS Method


INSTRUCTIONS
1. HOLD UPRIGHT, PULL RING PIN
2. STAND BACK 10 FEET
1.
2.
10'
3. AIM AT BASE OF FIRE
SQUEEZE LEVER
4. SWEEP SIDE TO SIDE
3.
4.
10'
TRASH • WOOD • PAPER
LIQUIDS • GREASE
ELECTRICAL EQUIP.
UL

Fire Extinguisher Service

Classes of Fire

- Class A – Fires are ordinary materials such as burning paper, lumber, cardboard, and plastics.

- Class B – Fires involve flammable or combustible liquids such as gasoline, kerosene, and common organic solvents used in the laboratory setting.

Classes of Fire

- Class C – Fires involve energized equipment such as appliances, switches, panel boxes, and power tools. Water can be a dangerous extinguishing medium for class c fires because of the risk of electrical shock.

- Class D – Fires involve combustible metals, such as magnesium or titanium.

Fight-or-Flight Checklist

- ✓ The building is being evacuated.
- ✓ The fire department is being called.
- ✓ The fire is small, contained and not spreading beyond its starting point.
- ✓ The exit is clear, and you can fight the fire with your back to the exit.

Fight-or-Flight Checklist

- ✓ You can stay low and avoid smoke.
- ✓ The proper extinguisher is immediately at hand.
- ✓ You have read the instructions and know how to use the extinguisher.

REVIEW

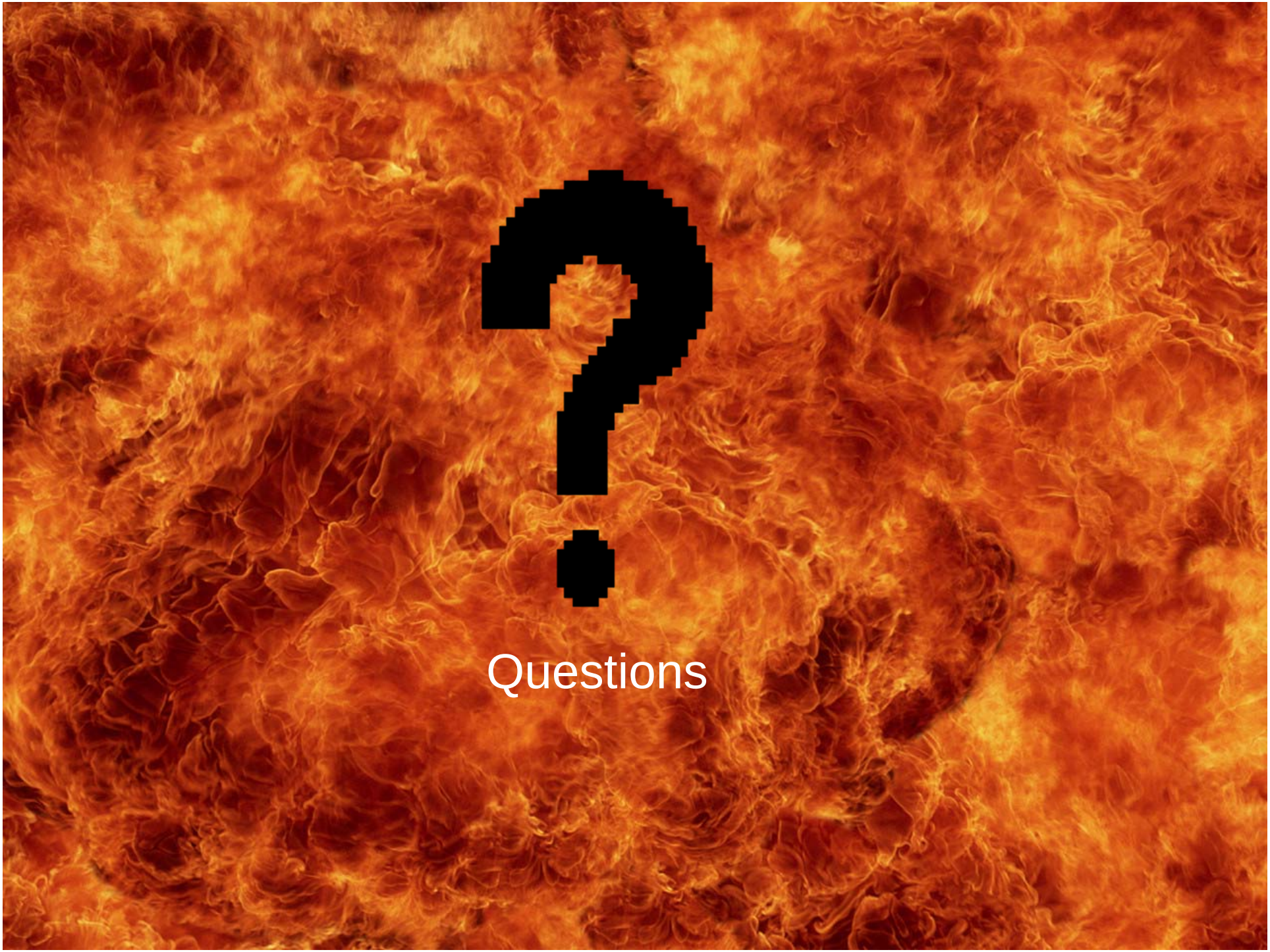
- Flash over Video
- Laboratory Fire Loss
- Lab Fire Regulations
- Fire Safety Equipment
- General Safety Guidelines

Additional Information

- Environmental Heath and Safety (EHS) (402) 472-4925, ehs@unl.edu
- University of Nebraska Virtual Manual http://ehs.unl.edu/vmanual/

- State Fire Marshal's Office (402) 471-2027
- In Lincoln, Bureau of Fire Prevention (402) 441-7791

Hazard of the Week


Questions