# Fire Testing and Reality

Elizabeth C. Buc, PhD, PE
Fire & Materials Research Lab LLC
Livonia, Michigan USA

# Experience

- Education Background
  - Science & Engineering
- Professional Experience
  - Fire loss investigations (40%)
  - Fire-related research (40%)
  - Non-fire related failure analysis (10%)
  - Technical Committees (10%)
    - Hazardous Materials
    - Hazards of Furnishings and Contents

## Outline

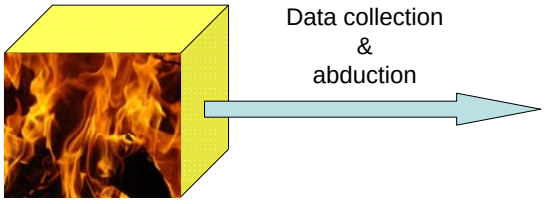
- Fire and Safety
- Fire Loss Investigations
- Fire Tests
- Fire Test Development
- Rules to Remember

## FIRE AND SAFETY

MATERIAL + IGNITION SOURCE

# Fire Loss

# Fire Loss Investigations



Fire Loss

Data collection
&
abduction

MATERIAL(S),
PRODUCT
ASSEMBLY
FIRST IGNITED
+
IGNITION SOURCE
+
CIRCUMSTANCES

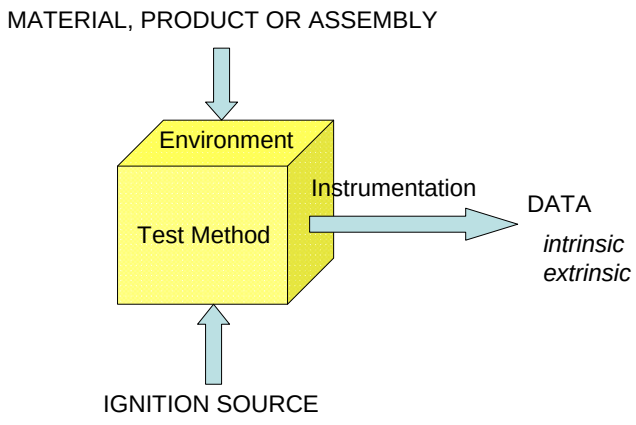
***Data (Cause)***

*Historical*
*Fire Statistics*
*Was it foreseeable?*
*Could it have been prevented?*

# Fire Tests

- …methods for measuring a property or behavioral characteristic of a material, product or assembly as an aid to predicting its performance in application
- Variety of types of fire tests
- Best tests are:
  - Well-defined
  - Data is operator-independent and meaningful

# Fire Tests



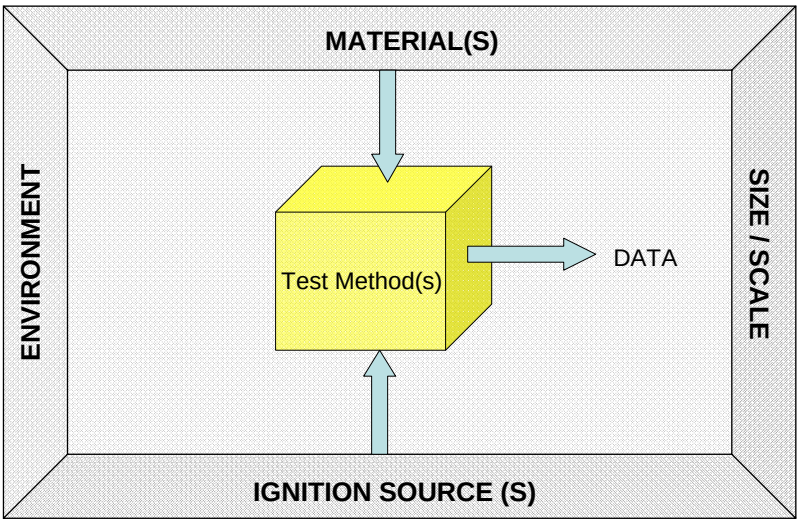

How well does it correspond with reality?

# Classification of Fire Tests

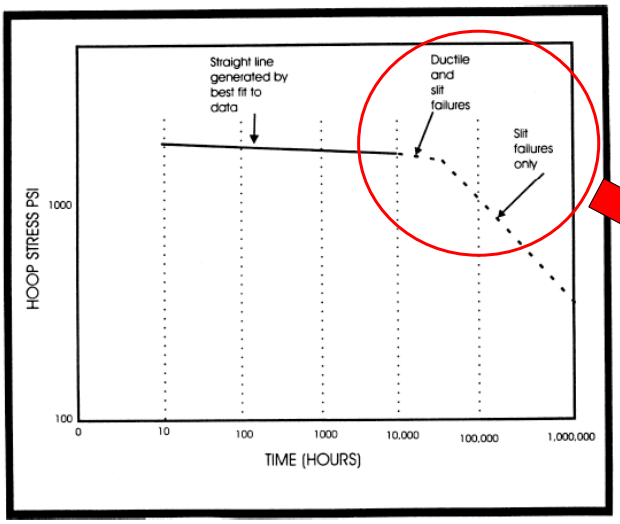
- Research
- Property
- System
- Prototype/ Ad hoc/ Full Scale

- …full scale tests provide the most reliable measure of hazard potential

# Fire Tests



# Materials Performance




**Gas leak**

**Figure 9 -- Stress rupture data plotted as best-fit straight line transitioning to downturn in strength.** (Derived from *A.G.A. Plastic Pipe Manual for Gas Service.*)

# Fire Test Development

- Must demonstrate a rational relationship to the hazards they are designed to simulate and control
- Guidance available:
  - ASTM E 1546 Standard Guide for Development of Fire-Hazard Assessment Standards
  - This conference

## Knowledge Base

….we have a knowledge-base from which to draw

- ❖Historical fires & statistics
- ❖Available literature
- ❖Standard test methods
- ❖Guidance

## Rules to Remember

- Research the fire problem
- Understand the value and limitations of fire tests
- Avoid regulatory test capture
- Re-evaluate
  - New technologies
  - New environment
  - New materials