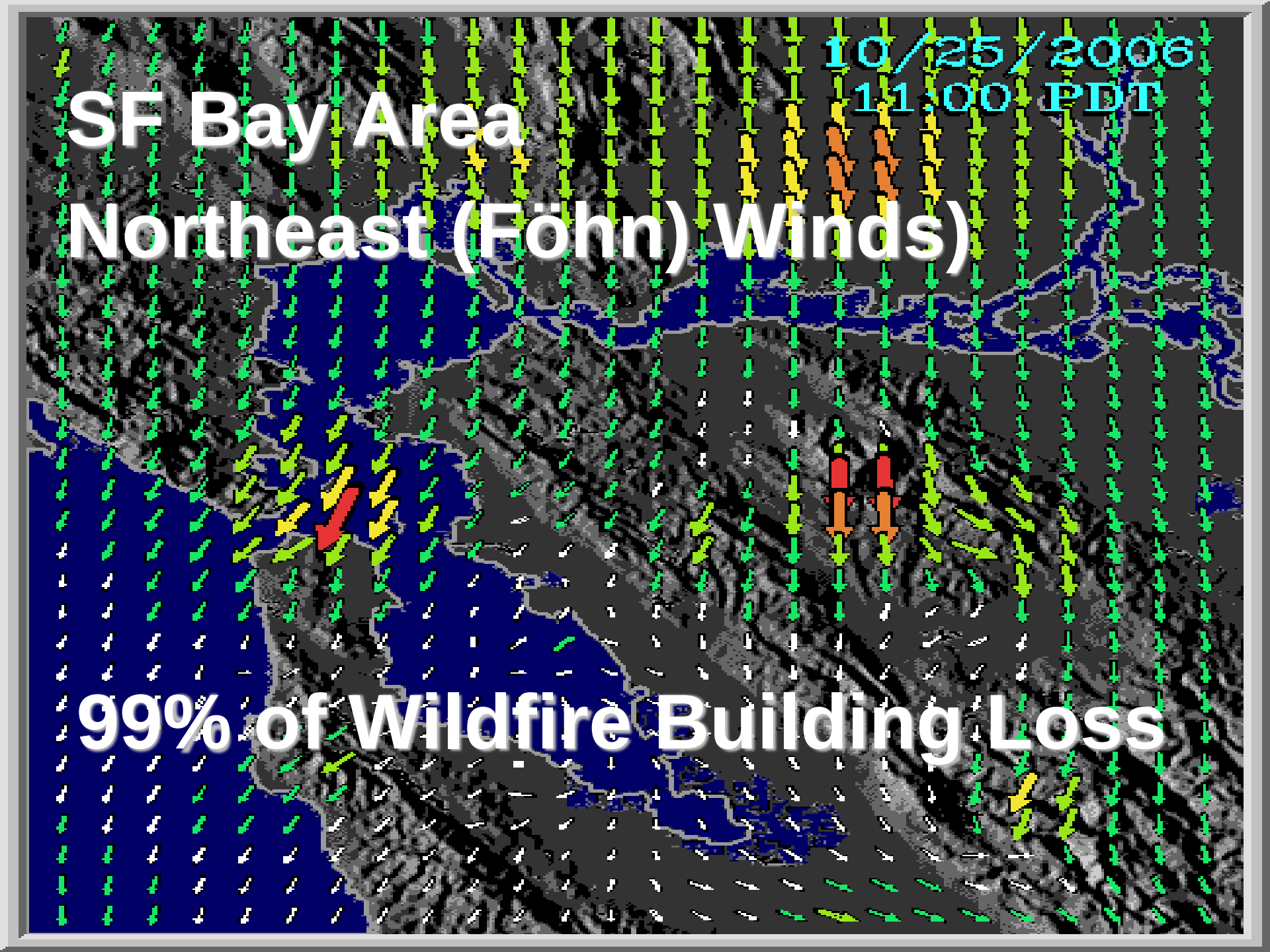
Reducing Wildfire Risks to Outdoor Camps Workshop

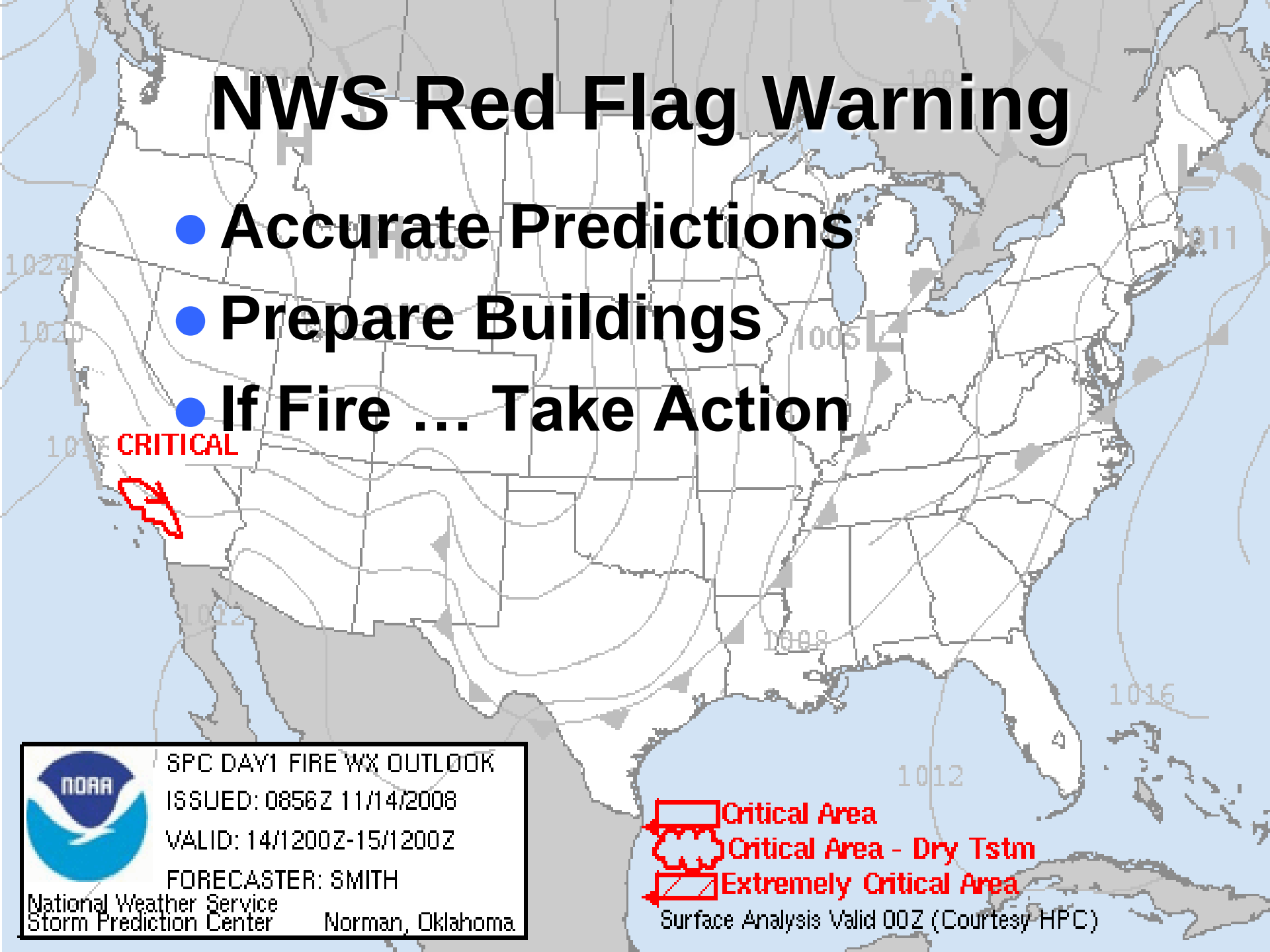
- Wildfire Risk and Structure Protection
- Ethan Foote, CALFIRE (retired)

Wildfire Risk


10/25/2006
11:00 PDT
SF Bay Area
Northeast (Föhn) Winds)
99% of Wildfire Building Loss

NWS Red Flag Warning

- Accurate Predictions
- Prepare Buildings
- If Fire … Take Action

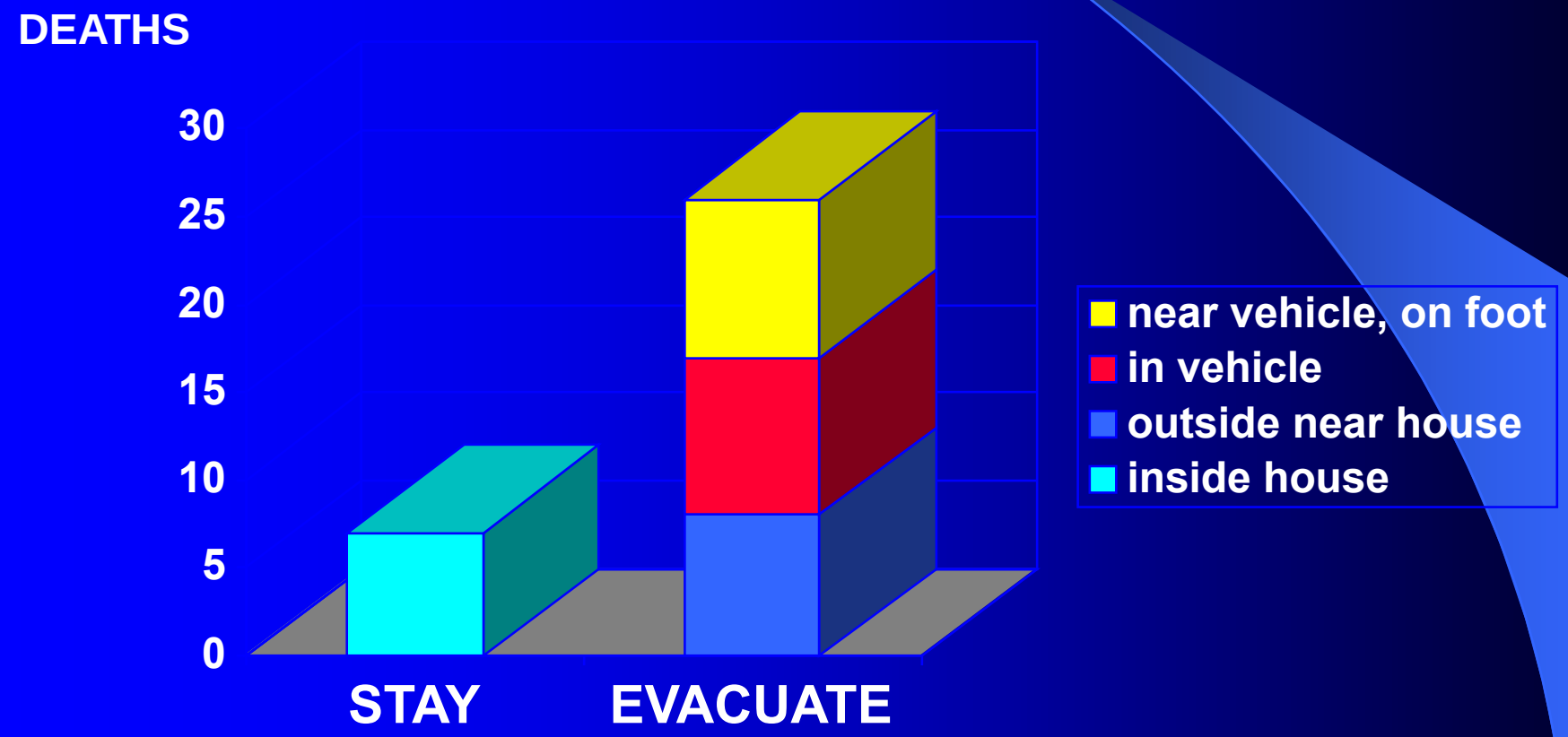


Evacuation Planning

Too Late

Case Study of Australian Fatalities

Mt. Macedon Fire, 1983



Wilson & Ferguson. 1992.


California Wildfires Inevitable
Crown Fires
&
Building Loss Preventable

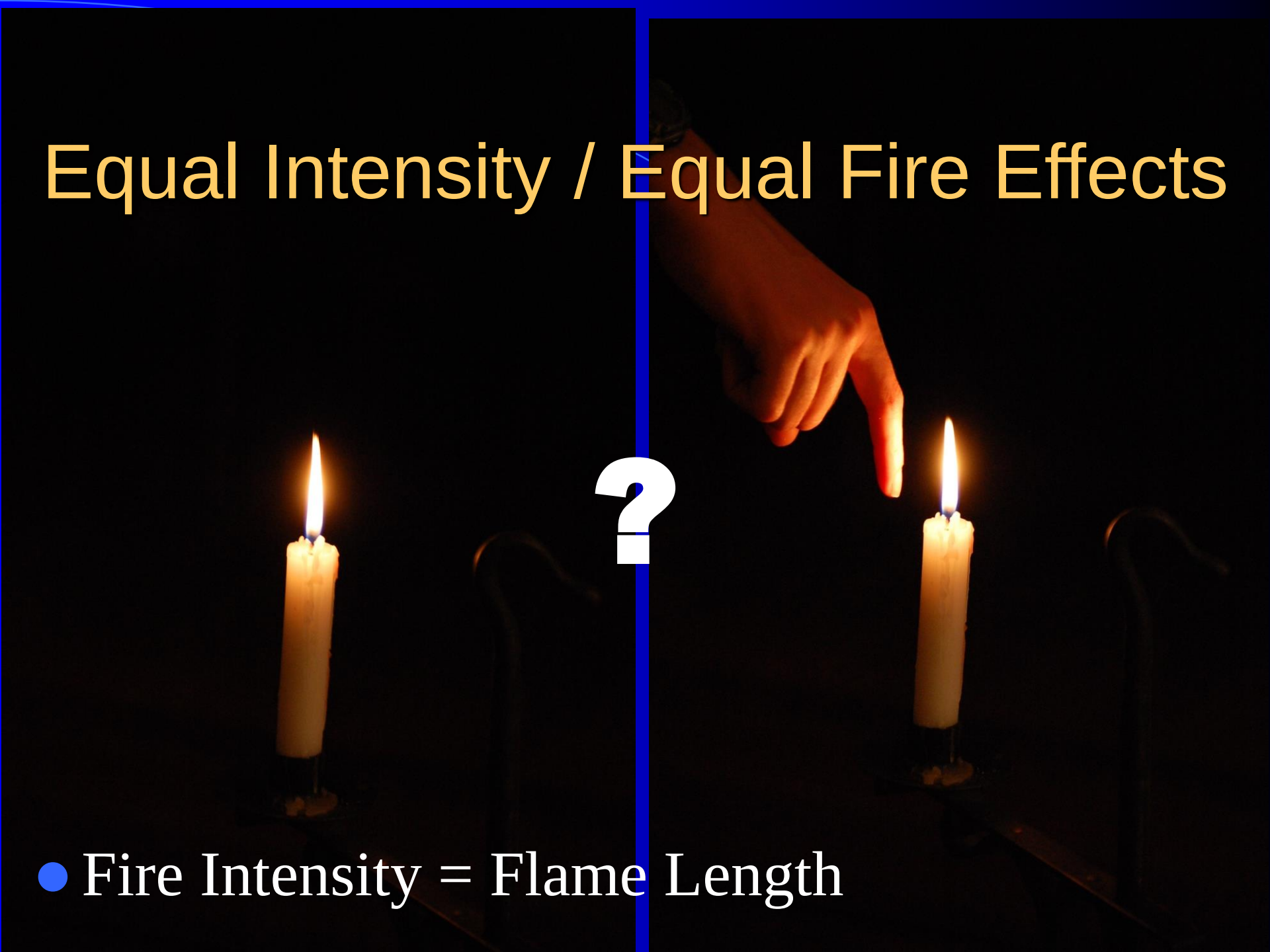
Exterior Wildfire Exposure

- **"Fire Intensity" vs. Fire Effects**
- **Types of Exposure (Heat Transfer)**
  - **Radiant Heat**
  - **Convective Heat** (e.g. under eaves)
  - **Direct Flame Contact** (Severe convection)
  - **Ember (Firebrand) Exposure**
- **Duration of Exposure**

Fire Intensity

- Fire Intensity = Flame Length

Equal Intensity / Equal Fire Effects



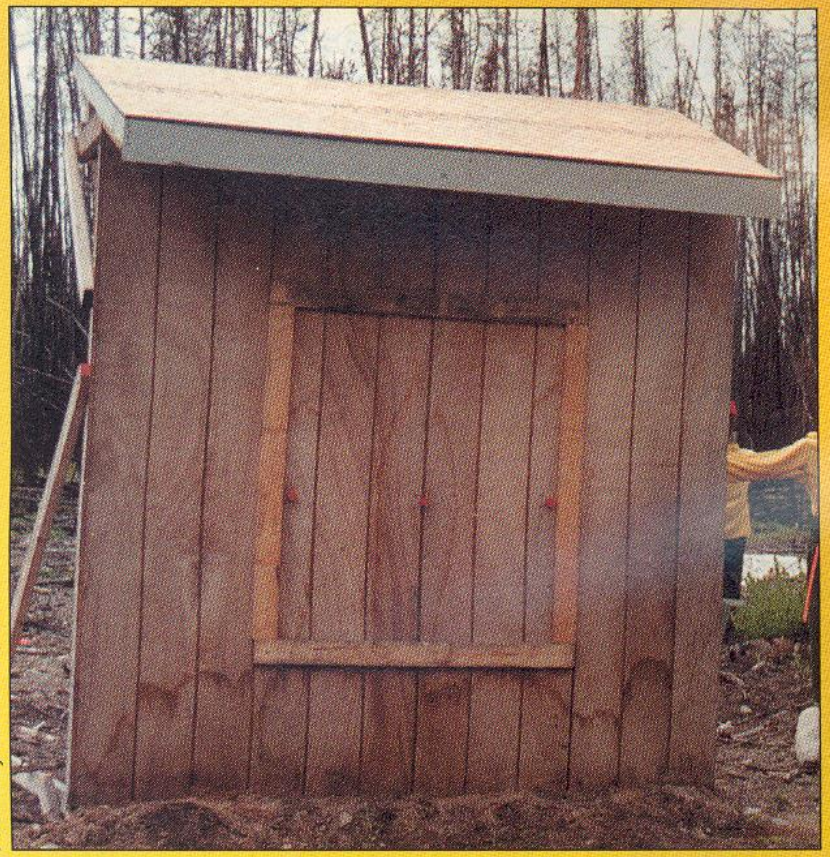
- Fire Intensity = Flame Length

Intensity ≠ Fire Effects

Fire Intensity ≠ Building Ignition

FHSZ & WUI Fire Area ≠ Building Ignition

Experimental Crown Fire Exposure (Jack Cohen)



Photos by Jack D. Cohen

(a) 10-meter wood wall section before the crown fire.

(b) Experimental crown fire.

Figure 3. International Crown Fire Modelling Experiment.


Actual Wildfire Exposure
70 Seconds - Watch for it:
Time-Temp Curve
Trees Off-Gassing
Spot Fires
Fuel Consumption
JUN 28 2000
3:10:40 PM

Actual Wildfire Exposure Duration

50
to
70
Seconds

3:10:48
260 F

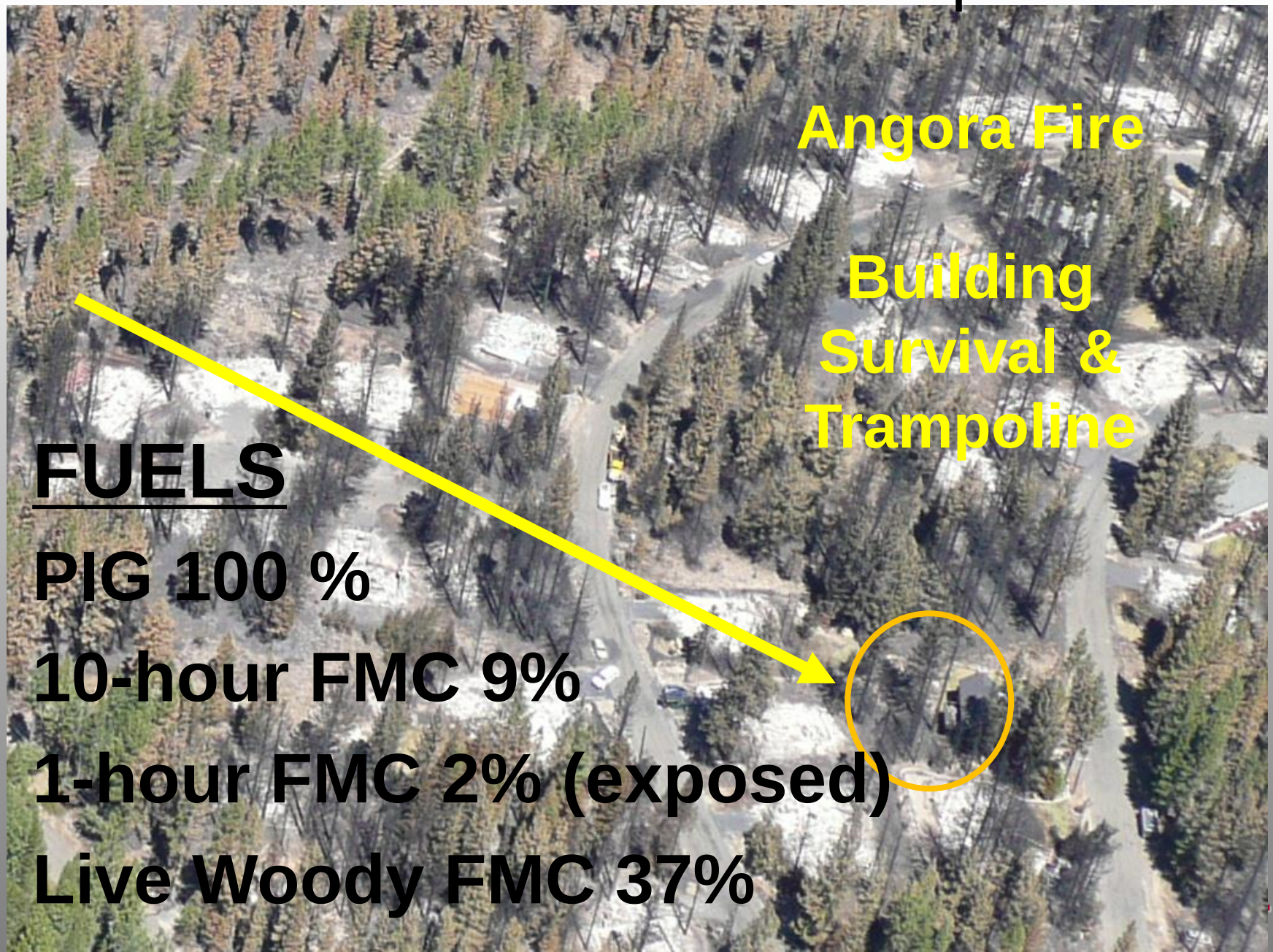
3:11:14
1,560 F

3:12:00
1,020 F

Crown Fire Exposure Mitigation

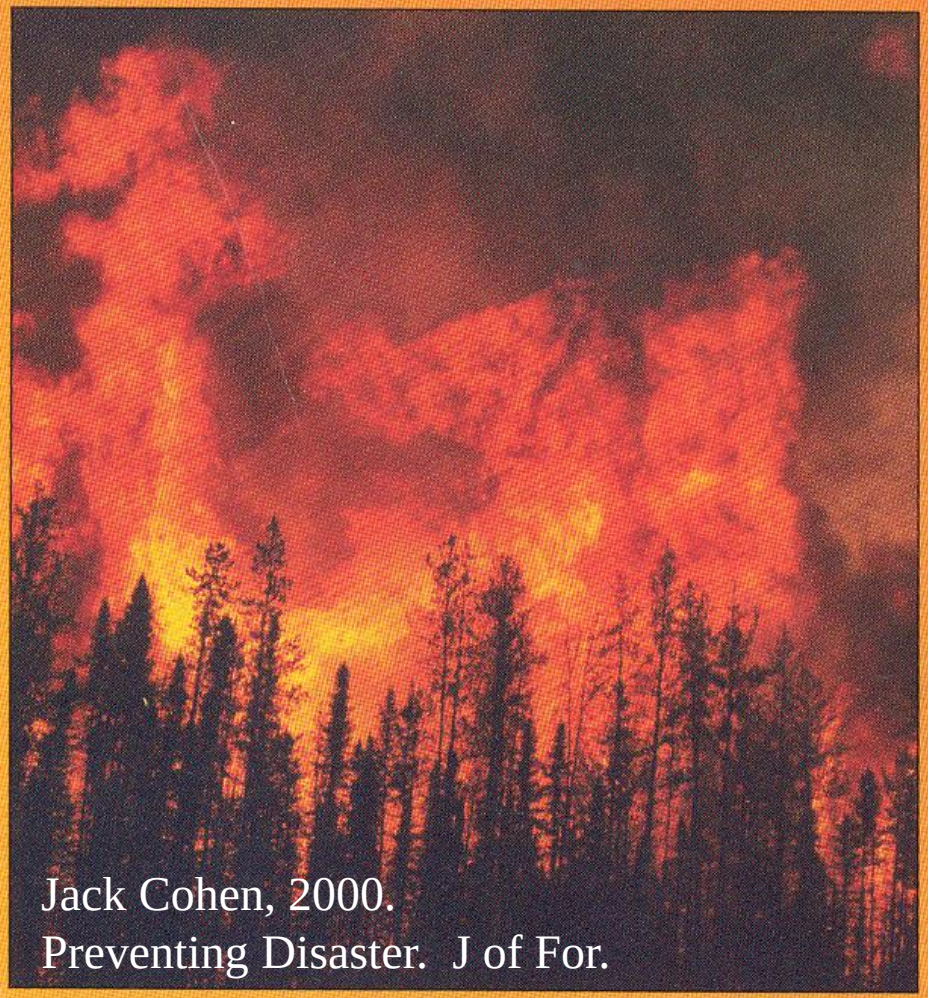

Angora Fire
Crown Fire Protection
Shaded Fuel Breaks
North
Crown Fire
80 ft Flame Length
Surface Fire / 4 ft Flame Length

Fuels & Direction of Fire Spread

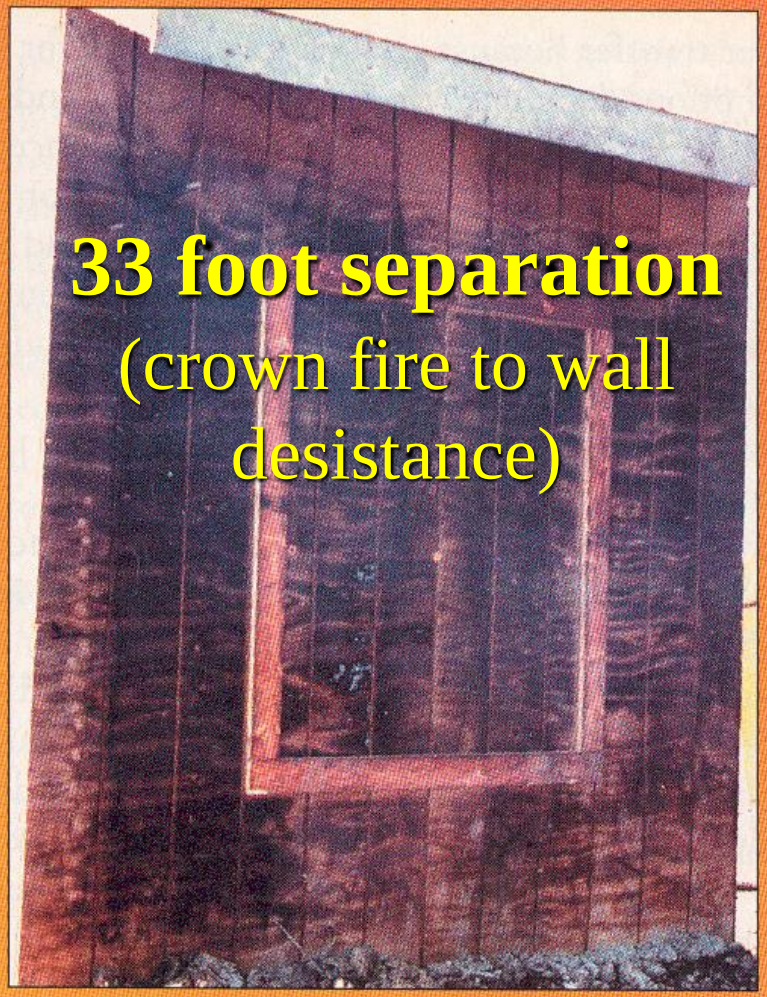



Angora Fire
Building
Survival


dish
500

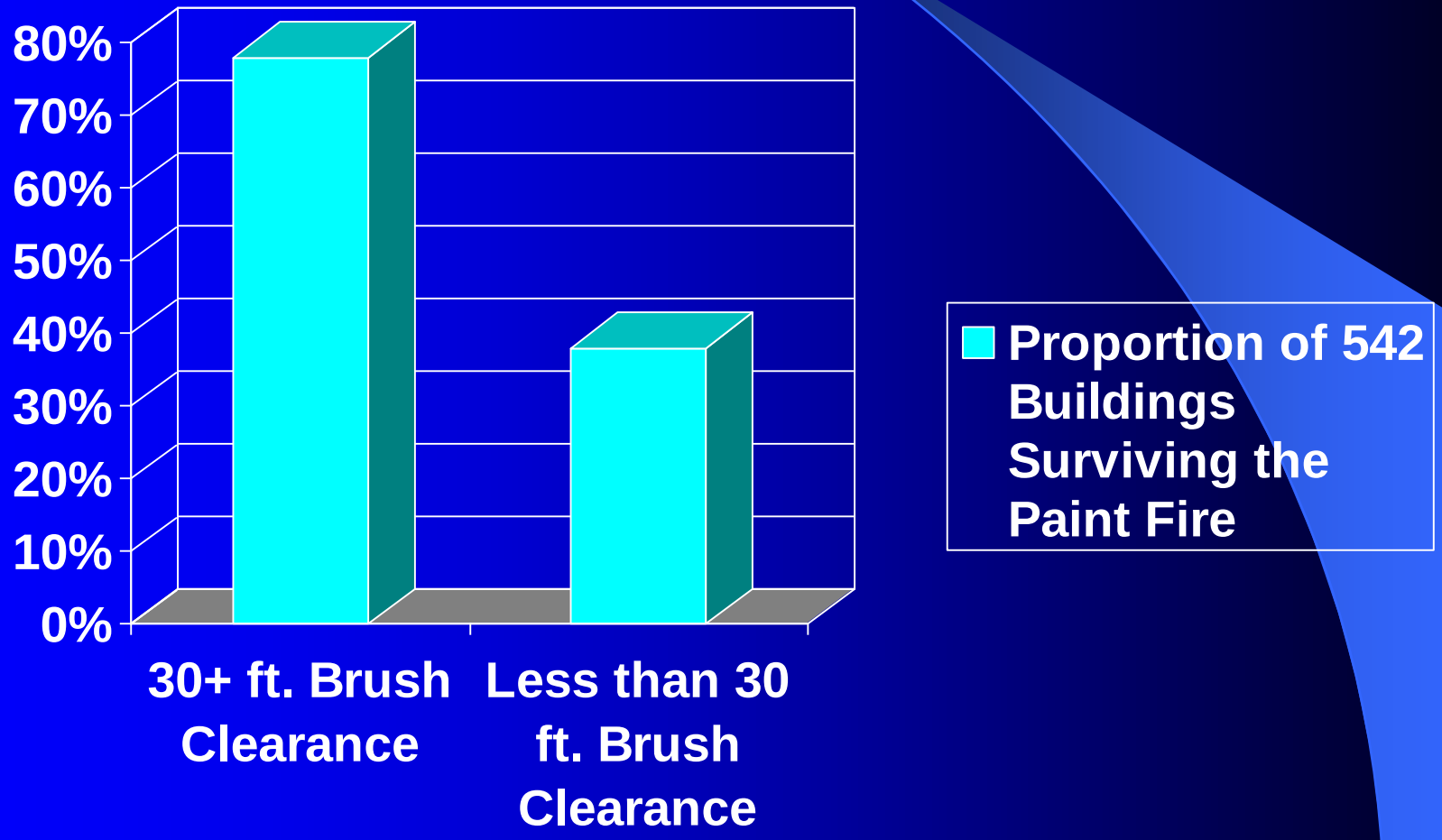


(c) Experimental crown fire.



(d) After crown fire exposure the wall scorched but did not ignite. Note the lack of wall scorch under the eave because of the radiation "shading" from the eave.

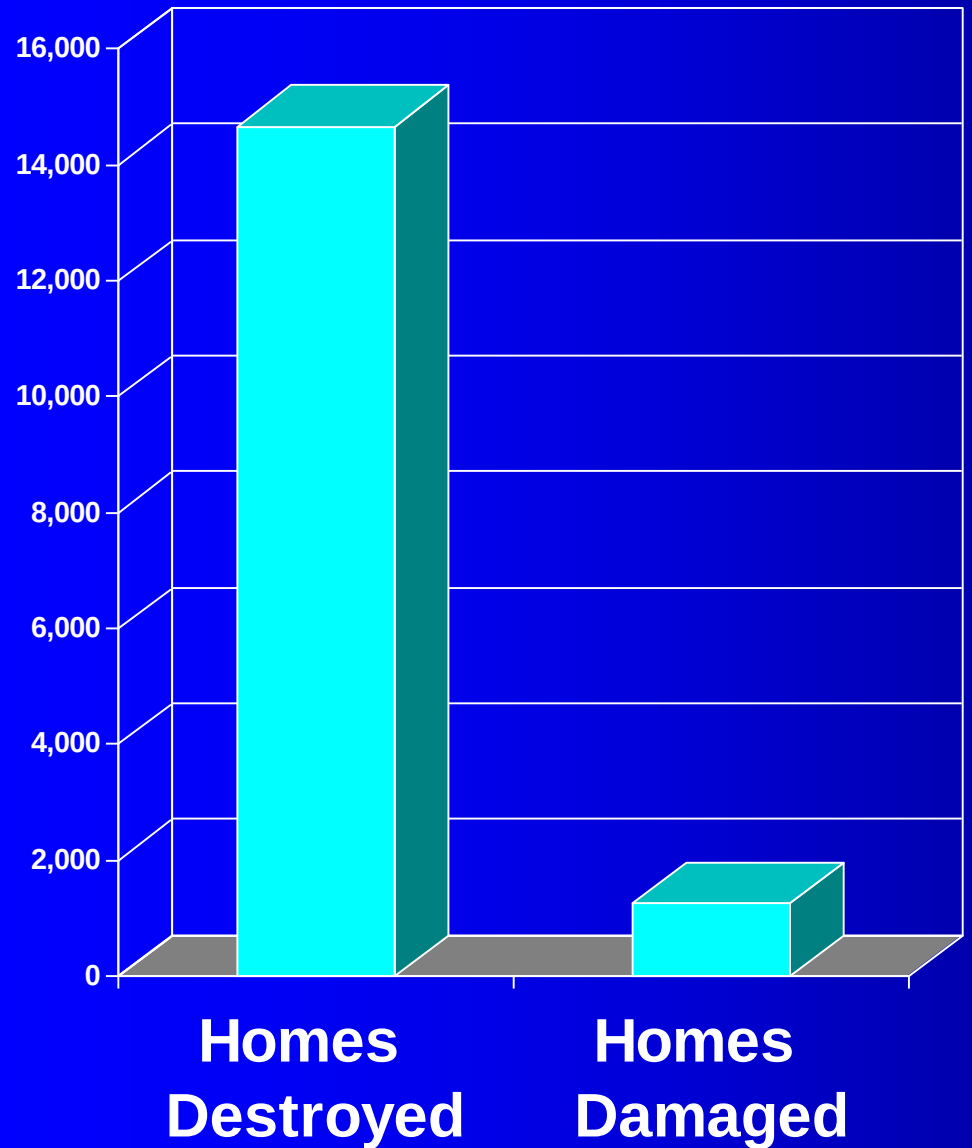
Haz-Mit Effectiveness – Firewise Vegetation



Ethan Foote (CDF/CNR). 1994. "*Structure Survival on the 1990 Santa Barbara Paint Fire…*" Figure 7-AD p. 119

Ember Exposure & Building Ignition

Why Building Ignition & not “Fire Resistive Construction”



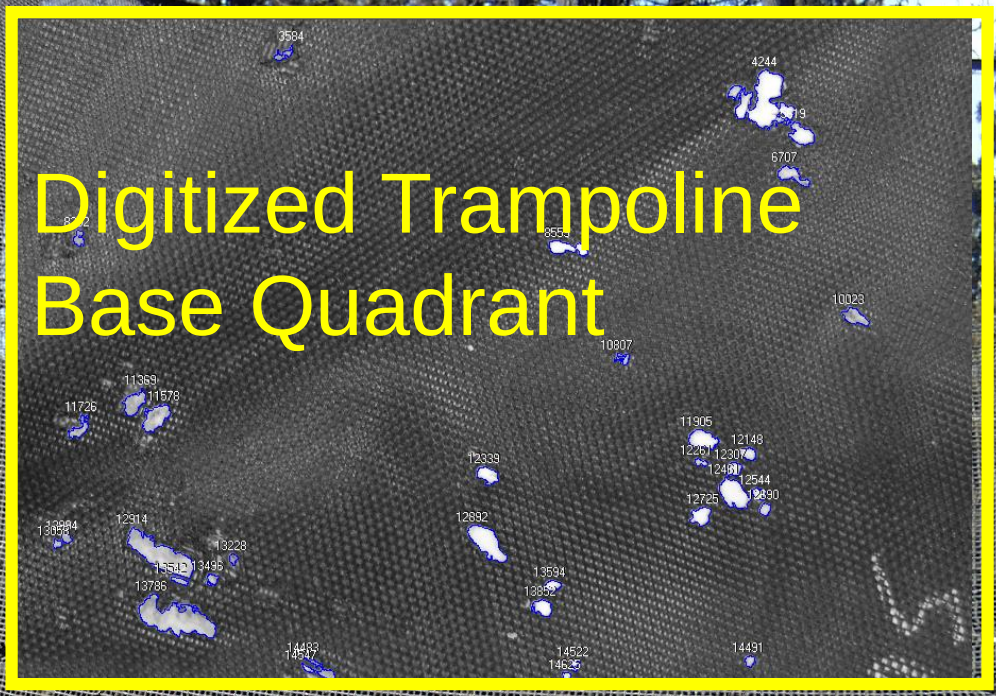
Once ignited, 90% of homes on interface fires are completely destroyed.

- Cursory survey of 253 interface fires from 1923 thru 2004 with a total of 22,837 structures burned.


Angora Fire
Trampoline

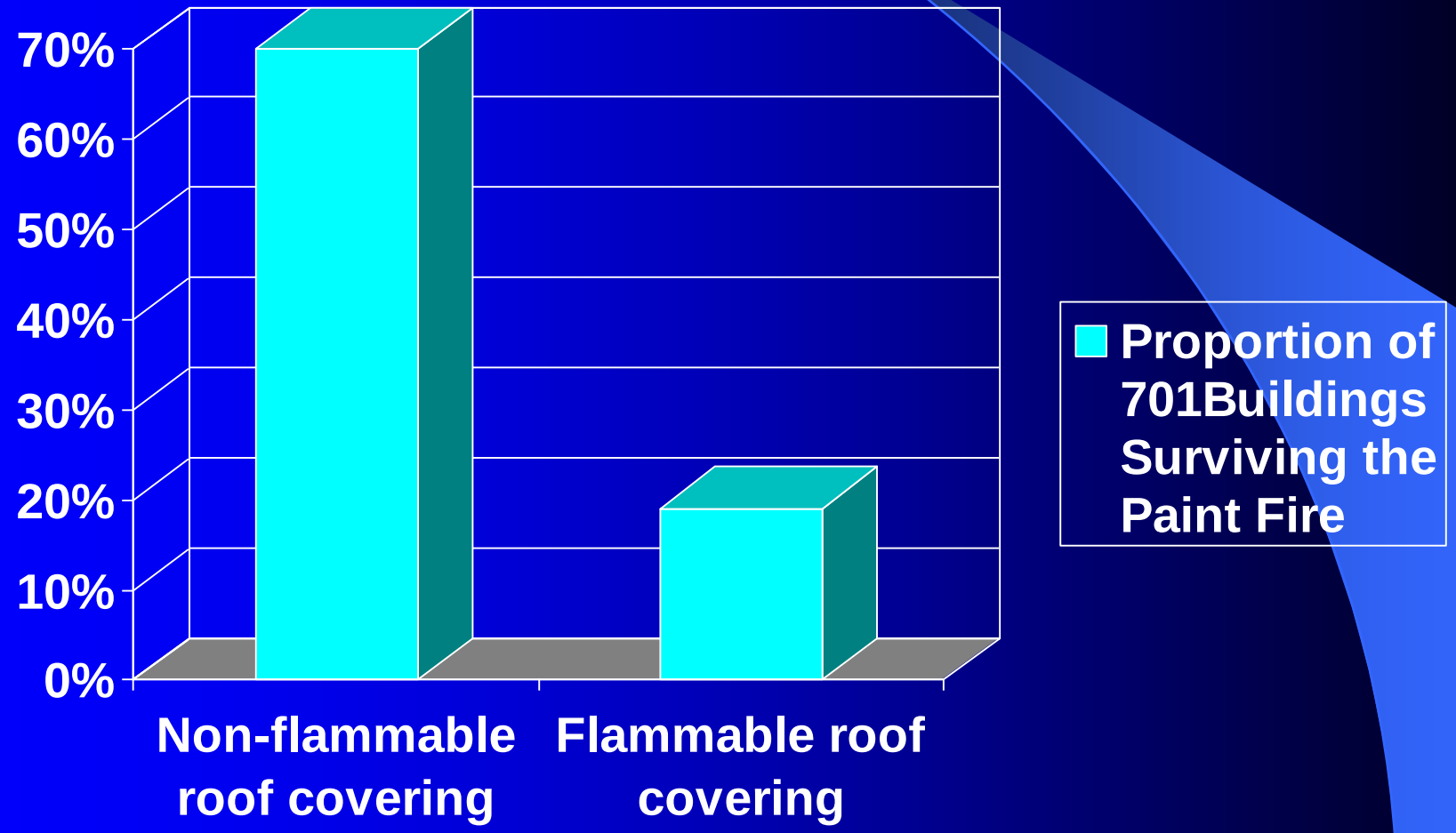
Angora Fire Trampoline

- 1,800 melted holes
- Largest 10 cm²
- Note melted holes in *vertical* mesh safety wall.



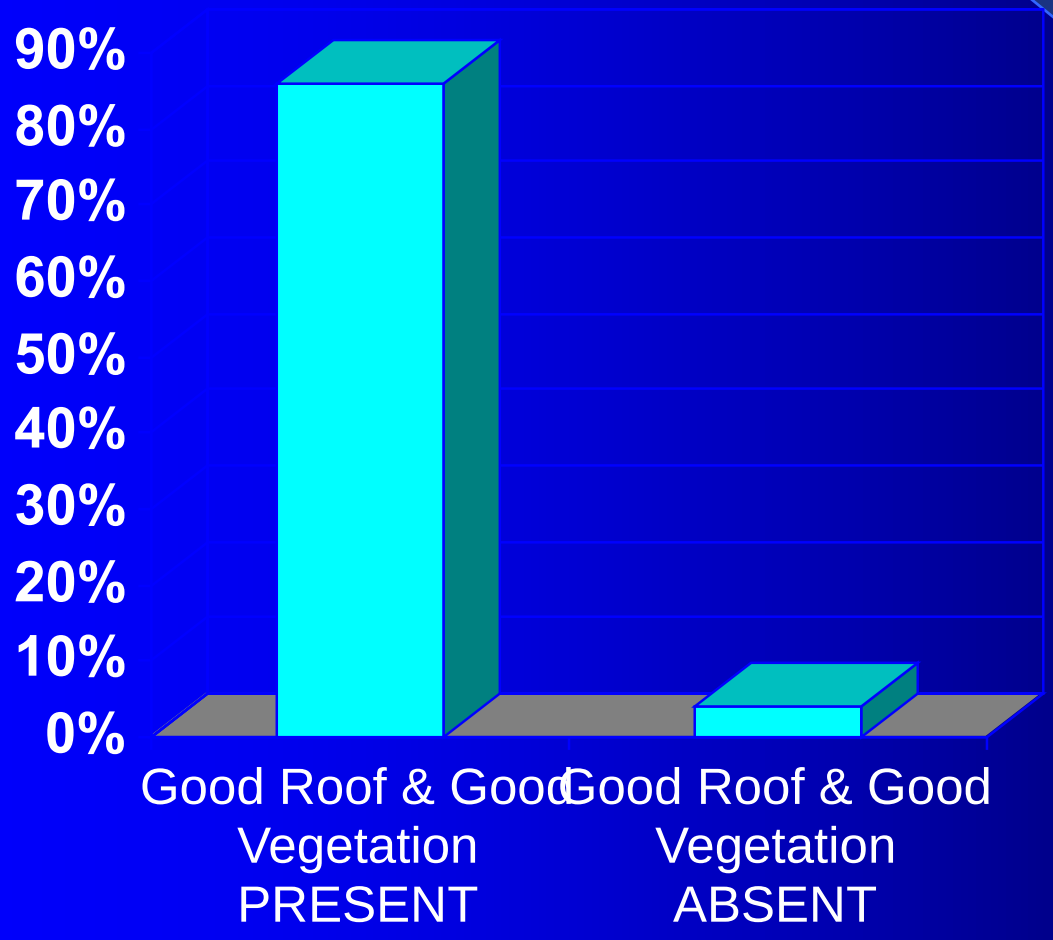
Building Ignitability Roof Type Hazards

Haz-Mit Effectiveness – Ignition Resistant Construction



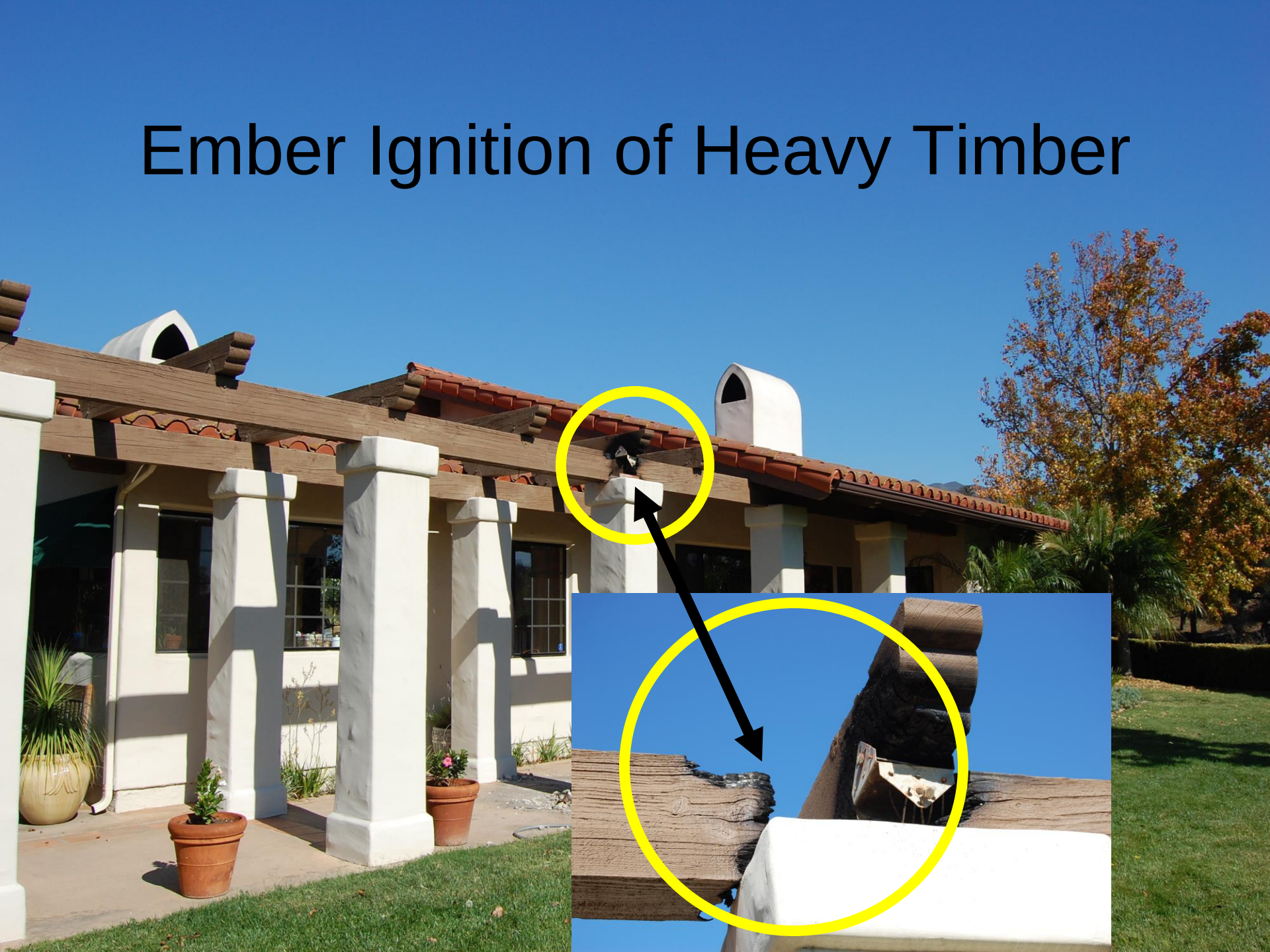
Ethan Foote (CDF/CNR). 1994. "*Structure Survival on the 1990 Santa Barbara Paint Fire…*" Figure 7-I p. 109

Haz-Mit R_x Effectiveness – Good Construction & Vegetation



Foote, Ethan (CDF/CNR). 1994. "*Structure Survival on the 1990 Santa Barbara Paint Fire…*" Table 14-Cii p. 132

Ember Ignition of Heavy Timber



Ember Ignition

California Building Code Ignition Resistant Materials

- Doesn't Exist Yet
- Wood Decks Burn

12-7A-5.4 Definitions.

Ignition-resistant material A type of building material that resists ignition or sustained flaming combustion sufficiently so as to reduce losses from wildland-urban interface conflagrations under worst-case weather and fuel conditions with wildfire exposure of burning embers and small flames, as prescribed in California Building Standards Code Section 703A.


CDF
FIRE

Thank You!

Questions?

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