May 03rd, 2016
NCST Advisory
Committee Meeting

Wildland-Urban Interface (WUI) Fires and National Fire Research Laboratory (NFRL) Updates

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NIST

*WUI Fires**

- Amarillo, TX
  - February 2011
  - Tanglewood Community
  - 70 homes destroyed
  - 25,000 acres burned

- Waldo Canyon, CO
  - June 2012
  - Mountain Shadow Community
  - 344 homes destroyed
  - 18,200 acres burned

*Neither Amarillo or Waldo Canyon fire reconstructions were conducted under the NCST Act

WUI Fires - Amarillo

- Tanglewood Complex
  - 77 homes
    35 destroyed / 9 damaged
  - Unknown ignition source
  - Winds 35 – 48 mph
  - RH 6 – 8 %
- Post-fire data collection
  - Electronic - first time
  - WUI I
    - Broad observations
    - Across entire fire perimeter
  - WUI II
    - Timeline
    - Fire behavior
    - Destroyed & damaged
    - Response of different structures

Findings - Amarillo

- Destroyed structures
  - limited information on which building component ignited first
    - deck, roof, or attic
  - Fire spread
  - Impact of nearby structures
- Damaged structures
  - More information- must be collected
  - Identify vulnerabilities
  - Response of structure to fires
- Defensive actions
  - Need to be documented
- Current WUI Fire Hazard Rating systems
  - Limited understanding of vulnerabilities
  - Reducing surface fuels does not prevent embers from igniting roof
  - False sense of security in terms of WUI fire resistance

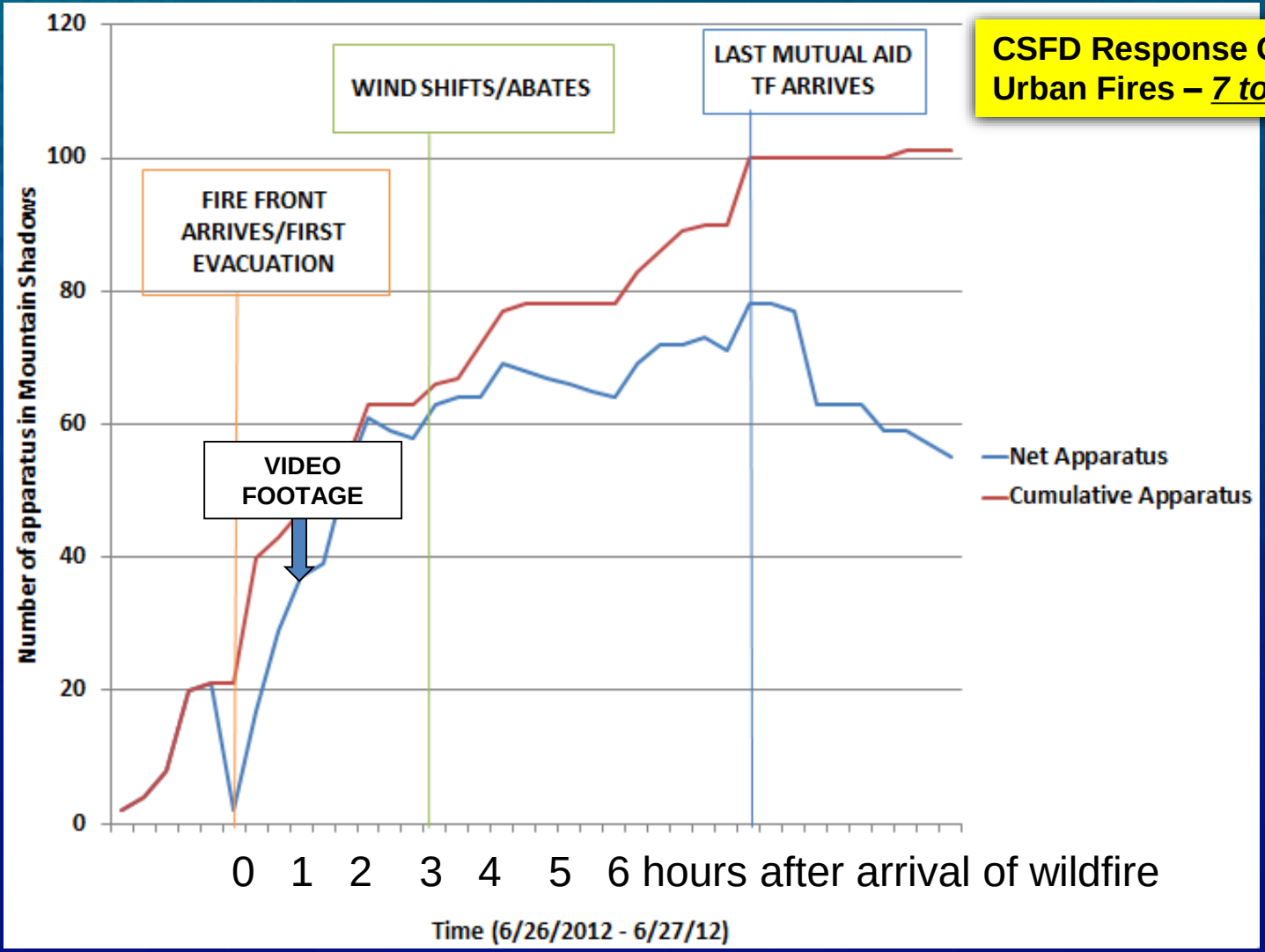
Waldo Canyon Fire

- June 26 to 27, 2012
- Wildland fire spreads into WUI
- Colorado Springs Communities affected:
  - Peregrine – 0 homes destroyed
  - Mountain Shadows – 344 homes destroyed – 95% in 6 hours
  - Cedar Heights – 0 homes destroyed
- Data Collection:
  - Over 200 technical discussions with first responders
  - 4,500 distinct fire observations and/or defensive actions for ~8 hours of incident.

Waldo Canyon Fire

- **48 ignitions from wildland fire:**
  - **overwhelmed the traditional fire response**
  - **100 structures on fire first hour**
- **Structure to structure fire spread majority of structural losses**

Apparatus in Mountain Shadows

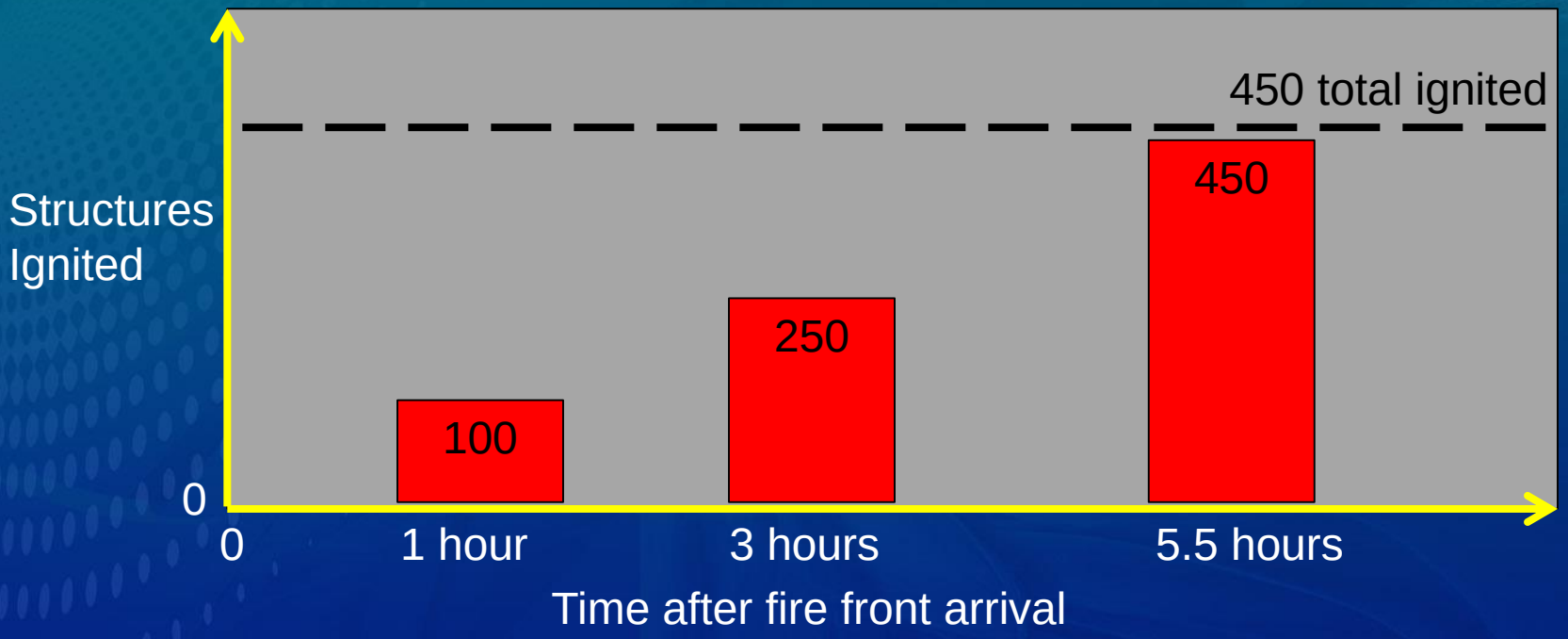


CSFD Response Goal for Urban Fires – *7 to 9 Minutes*

WUI Fires are Different – Fire and Ember Exposure

Fire and ember exposure varies over sub-parcel scales

Structure Ignitions During Waldo



~ 1 home/minute destroyed

100 initial ignitions in the first hour trigger an additional 350 ignitions

WUI Fires Require Rapid Response

Urban Response	Urban Fire Extent of Damage	WUI Response	WUI Fire Extend of Damage	Wildfire Response	Wildland Fire Extent of Damage
One Fire Department Multiple Fire Stations	Room of origin (*seconds to minutes*)	Multiple Fire Departments and Jurisdictions ***Mutual Aid***	Interface boundary (*minutes to hours*)	Multiple Land Owners and Jurisdictions ***Mutual Aid***	100 acres (*hours to days*)
	Floor of origin		Neighborhood		1,000 acres
	Building of origin		Community		10,000 acres
	Surrounding buildings		Part of City		100,000 acres
SOPs in place to work together across stations		**Incident response must be developed BEFORE the Incident**		Time available to coordinate deployment	

Urban fires: seconds count
WUI fires: minutes count
Wildland fires: hours count

Findings - Waldo

- WUI fires are different from Wildland or Urban fires
  - Time scale
  - Ignition rates
- Defensive actions very successful
  - Saving structures
  - Containment
- Cascading Ignitions- multiply impact of early structural ignitions
  - 50 wildland fire ignitions trigger additional 400 ignitions

National Fire Research Laboratory

- Completed commissioning of all structural and fire measurement and control systems
- Resumed normal operations and completed 3 experimental projects
- Developed new measurement capabilities
  - Digital Image Correlation (DIC) and fiber optic strain measurement in fire
  - Precise control and measurement of 20 MW fire
- Completed design of the first test series - composite steel-concrete floor beams in fire

Questions?

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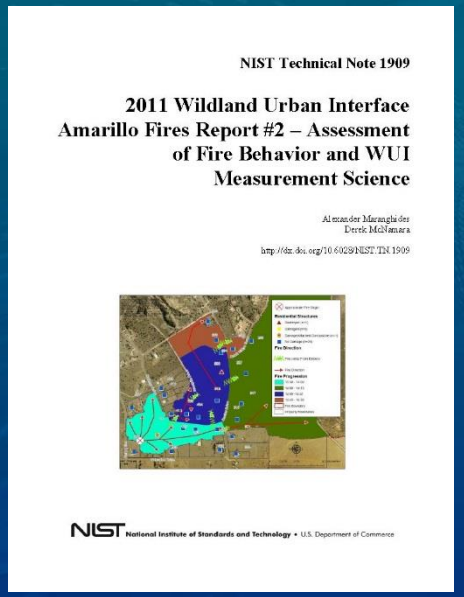
NIST Technical Note 1909

2011 Wildland Urban Interface Amarillo Fires Report #2 – Assessment of Fire Behavior and WUI Measurement Science

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http://dx.doi.org/10.6028/NIST.TN.1909

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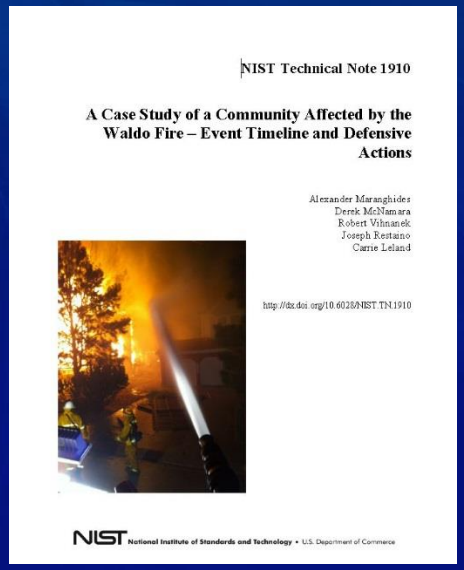
NIST Technical Note 1910

A Case Study of a Community Affected by the Waldo Fire – Event Timeline and Defensive Actions

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