



December 10, 2013
NCST Advisory
Committee Meeting

Technical Investigation of the May 22, 2011, Tornado in Joplin, MO

Overview

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Joplin Tornado Investigation Presentation Outline

- **Background and Progress** – *Marc Levitan*
- Tornado Hazard Characteristics / Findings – *Frank Lombardo*
- Performance of Buildings, Designated Safe Areas and Lifelines / Findings – *Long Phan*
- Emergency Communications and Public Response / Findings – *Erica Kuligowski*
- Recommendations – *Joplin Team*

Joplin Tornado Overview

- Touched down at 5:34 PM CDT, Sunday, May 22, 2011.¹ Stayed on ground for about 22 miles (6 miles in City of Joplin) and 15 minutes
- Enhanced Fujita Scale EF-5 tornado¹ (highest category)
- Estimated maximum wind speeds: 200+ mph
- Damaged/destroyed ~ 8,000 buildings.² Affected ~41% of City's population (20,820 of 50,175³). Costliest tornado on record (~\$1.8 billion insured loss²)
- 161 fatalities, >1,000 injuries. Deadliest single tornado on record. Exceeds U.S. average deaths/year for all tornados (91.6)¹, hurricanes(50.8)¹, & earthquakes (7.5)⁴
- Official warning time of 17 minutes (national average is 14 minutes¹)

Sources: ¹National Weather Service, ²City of Joplin, ³U.S. Census Bureau, 2010 Census, ⁴U.S. Geological Survey

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National Construction Safety Team

Following a preliminary reconnaissance that began on May 24, 2011, the NIST Director established a Team under the NCST Act on June 29, 2011, to conduct a technical investigation of the Joplin Tornado.

- Team Members

- NIST Engineering Laboratory employees

- Dr. Marc Levitan: Investigation Team Leader, Wind Engineer, Leader of NIST NWIRP R&D
 - Dr. Erica Kuligowski: Fire Protection Engineer and Sociologist
 - Dr. Frank Lombardo: Wind Engineer and Meteorologist
 - Dr. Long Phan: P.E., Structural Engineer

- National Oceanic and Atmospheric Administration (NOAA) employee

- Dr. David Jorgensen: Research Meteorologist and Chief, National Severe Storms Lab (NSSL)/Warning R&D Div.

Goals

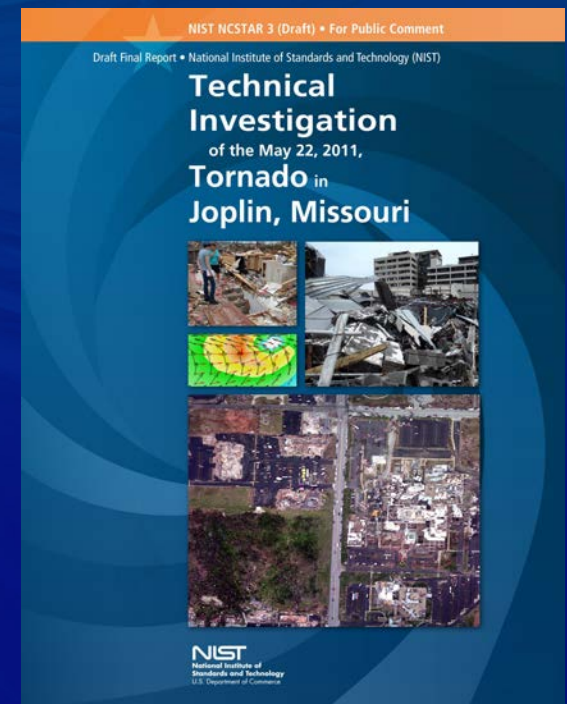
- To investigate the wind environment and technical conditions associated with fatalities and injuries, the performance of emergency communications systems and the public response to such communications, and the performance of residential, commercial, and critical buildings, designated safe areas in buildings, and lifelines
- To develop findings and recommendations that can serve as the basis for:
 - Potential improvements to requirements for design and construction of buildings
 - designated safe areas, and lifeline facilities in tornado-prone regions
 - Potential improvements to guidance for tornado warning systems and emergency response procedures
 - Potential revisions to building, fire, and emergency communications codes, standards, and practices
 - Potential improvements to public safety

Objectives

1. Determine the tornado hazard characteristics and associated wind fields in the context of historical data
2. Determine the response of residential, commercial, and critical buildings, including the performance of designated safe areas
3. Determine the performance of lifelines as it relates to the continuity of operations of residential, commercial, and critical buildings
4. Determine the pattern, location, and cause of fatalities and injuries, and associated emergency communications and public response
5. Identify, as specifically as possible, areas in current building, fire, and emergency communications codes, standards, and practices that warrant revision

Publications

- Investigation Plan published May 2012
- Progress Report published November 2012
- Draft Final Report for Public Comment published November 2013
 - 47 findings
 - 16 recommendations



Investigation and Report Timeline to Completion

- Nov. 21, 2013 - draft for public comment released
- Dec. 10, 2013 – NCSTAC briefing
- Jan. 6, 2014 – public comments due
- Spring 2014 – address public comments and publish final report
- Spring 2014 – complete and publish the Joplin Tornado Data Repository
- Spring 2014 – begin effort to implement recommendations