

# Beyond Impacts: The Use & Benefits of the EERI New Madrid Earthquake Scenarios

Plenary Session 7 at the National Earthquake  
Conference & EERI Annual Meeting

April 13, 2012

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New Madrid Chapter

## New Madrid Earthquake Scenarios' (NMES') Development

- The NMES are being developed from concepts within the New Madrid Chapter of EERI.
- Stakeholders' Meetings were used to guide its creation.
- Catastrophic Earthquakes & their losses have been studied.
- The NMES' Team hopes to produce a useful work for the New Madrid Bicentennial.

## The NMES' Interests

- Aid other Earthquake and All-Hazard Studies.
- Encourage needed education, out-reach, research and mitigation.
- Complement other plans, studies, and actions.
- Apply recently developed hazard information.
- A great deal of work needs to be accomplished. Educating the public and professional sectors is particularly important.
- Use the breadth of EERI's professions, *seismology to sociology*, for the scope of evaluation.
- Utilize EERI's "Guidelines for Developing an Earthquake Scenario."

## New Madrid Earthquake Scenarios

- Development Phase of the NMES will be completed with placement of a report on the EERI website. This will be a "living" report that may be revised for, and in, the next phase.
- Six different study areas and six different scenario "probable earthquakes" make the NMES plural.
- The NMES Team hopes to transition from customers to partners in the Implementation Phase. The interest will be to put into practice for various sectors "all-hazard" planning, preparedness, mitigation, and prepare for disaster response & recovery.

## NMES EXECUTIVE COMMITTEE

- Bob Bauer, Engineering Geologist, Illinois State Geological Survey, NMES Asst. Project Manager
- Jay Berger, Executive Director of EERI
- Steve Bessemer, Earthquake Program Manager, Missouri Emergency Mgmt Agency
- Brian Blake, Earthquake Program Coordinator, CUSEC
- Oliver Boyd, Research Geophysicist, Central and Eastern U.S. Earthquake Hazards, USGS
- Sue Evers, Earthquake Program Manager, FEMA, VII
- Nathan Gould, Director, ABS Consulting
- Rose Grant, Program Director, State Farm Insurance
- Greg Hempen, NMES Project Manager, URS Corp.
- Arleen Hill, Asst. Professor, University of Memphis
- Theresa Jefferson, Asst. Professor, Virginia Polytechnic Institute & State University
- Jim Wilkinson, Executive Director of CUSEC

## The NMES' Friends

- Several organizations have been very supportive: Earthquake Engineering Research Institute, New Madrid Chapter of EERI, US Geological Survey, Federal Emergency Management Agency (FEMA), State Farm Insurance Companies, St. Louis Area Earthquake Hazard Mapping Project, Illinois State Geological Survey, AEG Foundation, Missouri Seismic Safety Commission, URS Corporation, American Society of Civil Engineers, & St. Louis Section of ASCE.
- Several individuals have made personal contributions to the NMES besides the Executive Committee:
  - Chris Cramer, CERl, University of Memphis
  - Doug Bausch, FEMA
  - Mike Eddings, Heartland HAZUS Users' Group (HHUG)
  - Shanna Michael, HHUG

## The NMES' Present to Future Work

- Development Phase of the NMES will be completed with placement of a report on the EERI website. This will be a "living" report that may be revised for, and in, the next phase.
- We hope to transition from customers to partners in the Implementation Phase. The interest will be to put into practice for various sectors "all-hazard" planning, preparedness, mitigation, and prepare for disaster response & recovery.

## The NMES' Six Study Areas

- Use a "probable earthquake" as the area-specific hazard for six regional areas.
  - Jackson County, IL,
  - St. Louis Metropolitan Area (Madison County, IL, and St. Louis City & County, MO),
  - Vanderburgh County (Evansville), IN,
  - McCracken County, KY,
  - Scott County, MO, and
  - Shelby County (Memphis), TN.
- Develop Loss Estimations (HAZUS) to compare "likely earthquake impacts" to the National Level Exercise – 2011.

## Prior NMES' Products

- Seismic Symposium for Central U.S. Earthquake Sources (September 2008),
- Shlemon Specialty Conference on Central U.S. Time History Determination (June 2010), and
- Conceptual Model of Daily MMI Impacts from the 1811-1812 New Madrid Earthquake Series (Hempen, Cramer & Moran, 2011).

## NMES' Products in Development

- Assembling into the web-based report the typical scenario information.
- Providing resources for
  - the general public & emergency management,
  - Businesses, and
  - the owner – designer relationship.
- Seek research and legislative actions:
  - Fragility from aftershocks on weakened structures, dispersion effects in low attenuation regions, appreciation of Central & Eastern US implications on earthquake ground failure.
  - Uniform code adoption and structural inspection.

## OBJECTIVES

Putting scenarios into action.

Tools for awareness and preparedness;

Tools for planning and decision making.

NMES provides picture of what to expect in a probable event.

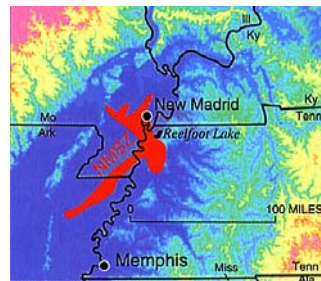


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## CHALLENGE – what to expect?

A prepared and resilient community has the ability to absorb a disruption while maintaining identity and function.

- Anticipation
- Communication
- Response
- Recovery
- Adaptation

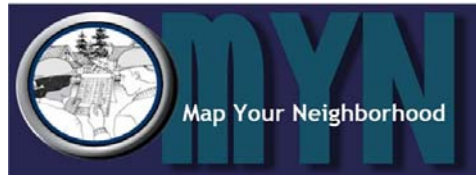


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## ACTIONS



Scenario such as NMES provide basis for preparedness, protection, and beyond.



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## ACTIONS



Scenario such as NMES as a foundation for planning and training.



Proactively bringing together partners.

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# ACTIONS



Scenario such as NMES as input to exercises.

Hospital Function

School Function

Casualties



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## Structural Retrofit – Essential Services Facility



External seismic bracing of a telecommunication facility, New Madrid, MO

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## Non-Structural Retrofit – Big Business

An understanding of the risk leads owners to retrofit critical system components. Non-structural retrofitting - bracing of fire sprinkler piping & HVAC ducts.



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## Agricultural Impact

- Approximately 60 percent of US agricultural exports originate in the Midwest
- More than 90 percent of the grain exported from the Midwest reaches port via the inland waterways or by rail
- 92 of the locks are more than 60 years old, and 30 were built in the 1800s (of 191 structures)
- The Olmsted Lock & Dam will cost \$3.1B and take more than 24 years to build

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## Small & Medium Businesses

### Benefits to Small & Medium Businesses

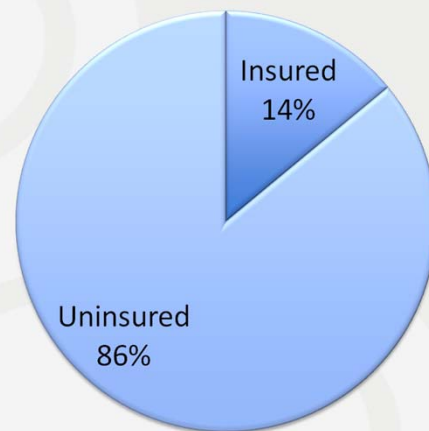
- Increased Awareness of the Risk
- Awareness of the Mitigation Alternatives
- Awareness of Risk Transfer Mechanisms
- Need for Business Continuity Planning

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## Risk Transfer

According to A.M. Best, nationwide, between 86% to 90% of U.S. homeowners lack earthquake insurance coverage.



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## 2006/2009 IBC and ASCE 7-05

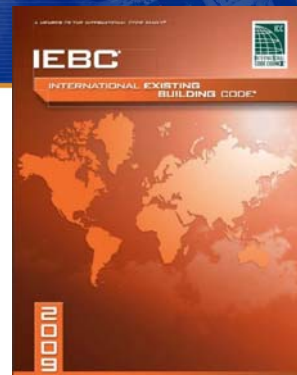


- 2006/2009 ICC International Building Code & ASCE 7-05 Include the USGS Seismic Maps
- 2002 USGS Ground Motion Maps (1996 maps referenced in 2003 IBC and ASCE 7-02)
- Spectral Acceleration values from printed maps, or USGS software using the zip code or Lat/Long of the site (check local requirements as well)

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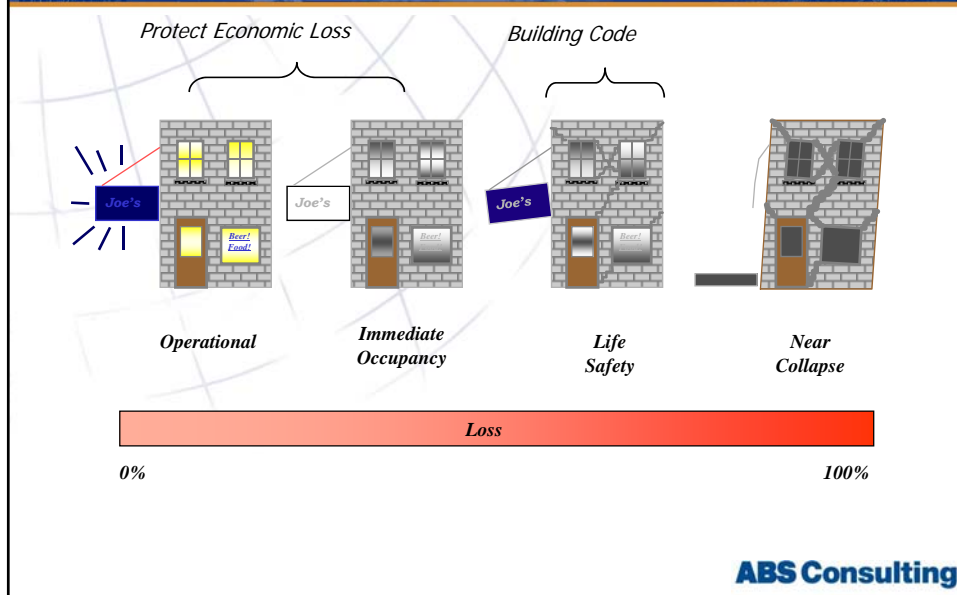
## Existing Structures

- Multiple ICC Codes
  - 2006/2009 IBC
  - 2006/2009 IEBC
- 2006/2009 IBC – Chapter 34
  - 2006 IBC Sec 3403: Additions, Alternations or Repairs
  - 2009 IBC: Sections have been expanded



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## Alternative Performance Levels



## Voluntary Seismic Retrofit

- Owner wants to *voluntarily* upgrade the seismic capacity of their building
- May not be able to afford to upgrade to the full code forces or perhaps a full code seismic upgrade would not be feasible due to building operations
- NMES data may provide a means for the Owner and Engineer (and building official) to have a conversation about seismic rehabilitation performance objectives

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## NMES' Coming Actions

- Actively pursue education and outreach to various sectors with our web-based report.
- Seek endorsements of the "Map Your Neighborhood," Preparedness & Response Program at all levels in the region, as public outreach.
- Transition to the Implementation Phase.
  - Develop an Executive Committee.
  - Seek partnerships to advance the implementation goals of the NMES.

## THANKS FOR YOUR INTEREST

- Our team would like to gain ***YOUR*** involvement in the New Madrid Earthquake Scenarios' Implementation Phase.
- Contact Greg Hempen or EERI for more information.
- The website report is being developed at [www.eeri.org/projects/earthquake-scenarios/new-madrid-earthquake-scenarios/](http://www.eeri.org/projects/earthquake-scenarios/new-madrid-earthquake-scenarios/)