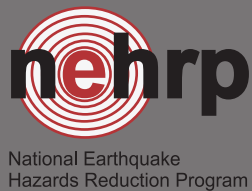




2005 National Earthquake Program Managers Meeting

August 16 - 17, 2005
Indianapolis, Indiana



National Earthquake
Hazards Reduction Program



FEMA



MEETING SPONSORED IN PARTNERSHIP WITH DHS/FEMA AND THE NEHRP SUPPORTED CONSORTIA

2005 National Earthquake Program Managers Meeting

August 16-17, 2005
Downtown Marriott Hotel
Indianapolis, Indiana

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Welcome Earthquake Program Managers:

On behalf of the meeting organizing committee, the Federal Emergency Management Agency, the Northeast States Emergency Consortium, Western States Seismic Policy Council, Cascadia Regional Earthquake Workgroup, and the Central United States Earthquake Consortium I would like to welcome you the 2005 National Earthquake Program Managers Meeting.

The earthquake program today finds itself in an ever changing emergency management environment. These changes, coupled with other issues such as budgetary concerns, the weight of additional duties as assigned, and competing program priorities can all have an effect on your efforts as earthquake program managers.

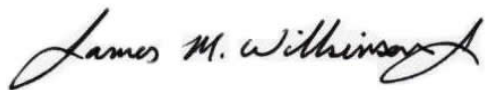
This meeting is the first in what is hoped will be a continuing effort to bring earthquake program managers together to share program ideas, goals, and achievements, with one another as a means of building a feeling of empowerment. As has been demonstrated in the past this sharing of ideas and concepts is essential in developing not only a strong earthquake program at the state level but a network which promotes collaboration and interaction across the country.

As earthquake program managers you play a pivotal role in fulfilling the goals of the National Earthquake Hazards Reduction Program. Your efforts ultimately can make the difference in how our communities handle the next significant earthquake.

Although this meeting is designed to provide you with the knowledge, tools, and program guidance to help you make the most of your program, it ultimately requires a commitment from you. Your input and involvement in the development of future meetings, as well as the interaction between you and your counterparts, is essential.

Again, welcome and thank you for your participation.

Sincerely,

A handwritten signature in cursive script that reads "James M. Wilkinson". The signature is fluid and stylized, with a large, sweeping initial 'J'.

Jim Wilkinson
Executive Director
Central United States Earthquake Consortium

HOTEL INFORMATION & MAPS

Downtown Marriott Hotel

350 W. Maryland St.

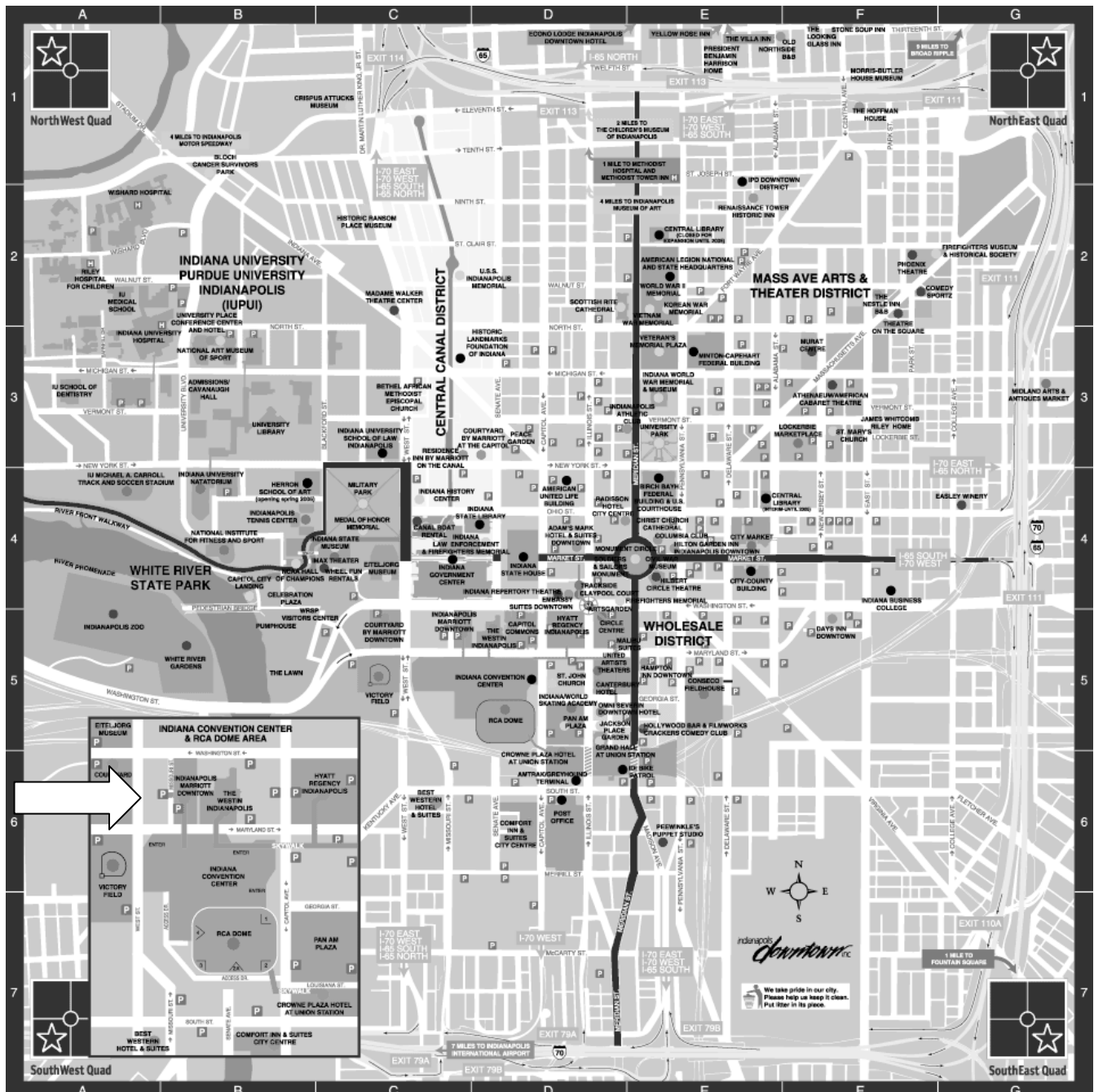
Indianapolis, Indiana 46225

Phone: (317) 822-3500

Fax: (317) 8221002

[http:// www.indymarriott.com](http://www.indymarriott.com)

****Hotel is located within the map inset below, north of the RCA Dome*



ACKNOWLEDGEMENTS

We would like to express our gratitude for the cooperation and hard work of the many individuals, organizations, and firms that helped bring this meeting together. Their time and effort is greatly appreciated. We would also like to thank the Department of Homeland Security's Federal Emergency Management Agency (FEMA) for their financial support, which made this meeting possible.

Organizing Committee

Brian Blake - Central United States Earthquake Consortium
John Cartwright - Mississippi Emergency Management Agency
George Crawford - Washington Emergency Management Division
Jim Goltz - California Office of Emergency Services
Marshall Mabry - Federal Emergency Management Agency
John Steel - Indiana Department of Homeland Security
Jim Wilkinson - Central United States Earthquake Consortium
Jay Wilson - Oregon Emergency Management

Contributing Organizations

This meeting is sponsored in partnership with the Department of Homeland Security's Federal Emergency Management Agency and the National Earthquake Hazard Reduction Program supported Consortia.

Central United States Earthquake Consortium (CUSEC)

CUSEC is a partnership between the Federal Government and the States of Alabama, Arkansas, Illinois, Indiana, Kentucky, Mississippi, Missouri, and Tennessee, the states most affected by earthquakes in the New Madrid Seismic Zone. Ten adjacent states also participate as associates in CUSEC. Established in 1983 with FEMA funding, the mission of CUSEC is to reduce deaths, injuries, property damage, and economic losses resulting from earthquakes in the Central United States.



Cascadia Region Earthquake Workgroup (CREW)

CREW is a non-profit coalition of private and public representatives working together to increase the ability of Cascadia Region communities in the Pacific Northwest to reduce the effects of earthquake events. CREW, which was established in 1996 by the scientific community, promotes efforts to reduce the loss of life and property; conducts education to motivate key decision-makers to reduce risks associated with earthquakes; and fosters productive linkages among scientists, critical infrastructure providers, businesses, and governmental agencies to improve the viability of communities after earthquakes.



National Earthquake Hazards Reduction Program (NEHRP)

The National Earthquake Hazards Reduction Program (NEHRP) is the Federal Government's program to reduce the risks to life and property from earthquakes. The NEHRP agencies are FEMA, the National Institute of Standards and Technology (NIST), the lead agency; the National Science Foundation (NSF); and the United States Geological Survey (USGS).



Northeast States Emergency Consortium (NESEC)

NESEC develops, promotes, and coordinates natural disaster and emergency management activities throughout the Northeast. This includes natural hazard evaluation and assessment, public awareness and education programs, hazard mitigation, and information technology transfer. The States of Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Rhode Island, and Vermont form the NESEC.



Western States Seismic Policy Council (WSSPC)

WSSPC is a regional earthquake consortium funded primarily by FEMA. WSSPC draws its membership from the emergency manager and geoscientist directors of 13 western states, 3 U.S. territories, a Canadian territory, and a Canadian province. The mission of the WSSPC is to help reduce future earthquake losses by providing a forum to advance earthquake programs throughout the Western Region and by developing and facilitating the implementation of seismic policies and programs through information exchange, research application, and education.



Meeting Schedule

August 15, 2005

- 4 - 6:00 p.m. Meeting Check - In
5 - 7:30 p.m. Opening Night Reception
7:00 p.m. Indianapolis Indians Minor League Baseball Game**

August 16, 2005

- 7:00 am. Check - In Continued
8:00 a.m. Welcome & Opening Remarks
Meeting Overview and Objectives
8:30 a.m. Participant Introductions
9:00 a.m. State Earthquake Program Updates, Products, and Initiatives
10:15 a.m. *Break*
10:30 a.m. State Earthquake Program Updates, Products, and Initiatives (cont.)
12:00 p.m. *Lunch*
1:15 p.m. FEMA Earthquake Program Updates, Products, and Initiatives
3:00 p.m. *Break*
3:15 p.m. NEHRP – Overview and Relationships with NIST/FEMA/USGS/NSF
4:30 p.m. Group Discussion:
Earthquake Program Perspectives
5:00 p.m. Conclude 1st Day
7:00 p.m. Indianapolis Indians Minor League Baseball Game**

August 17, 2005

- 8:30 a.m. Seismic Advisory Boards, Commissions & Councils – How they can help
your program
9:45 a.m. Informational and Assistance Resources
- FEMA Regions
- National Earthquake Technical Assistance Contract
- EMI
10:30 a.m. *Break*

Meeting Schedule Continued

August 17, 2005

10:45 a.m. Breakout Sessions

- Urban Search and Rescue
- Earthquake & Hazard Mitigation

12:00 p.m. *Lunch*

1:15 p.m. Breakout Sessions

- Secondary Effects of Earthquakes
- Tools of the Trade – Shake Map, HAZUS, Tsunami Warning Systems

2:45 p.m. *Break*

3:15 p.m. 2006 Program Managers Meeting

- Establishing a Committee
- Possible Locations, Dates
- Topic Development

4:15 p.m. Wrap Up / Closing Comments

Optional Regional Breakouts after Meeting Close

Meeting Overview

State Earthquake Program Updates, Products, and Initiatives

August 16, 2005

General Session - Group Discussion

Program Managers will discuss current projects and initiatives in their state earthquake program. Also will share recent successful products/tools/workshops, etc. that have been developed.

FEMA Earthquake Program Updates: Products & Initiatives

August 16, 2005

General Session – Group Discussion

FEMA Program Managers and Headquarters representatives will update states on projects and initiatives at the regional and national level. The regions will also update the group on recent successful federal earthquake related programs.

NEHRP – Overview and Relationships with NIST/FEMA

August 16, 2005

General Session – Panel

This session is for both new and experienced Earthquake Program Managers. New Program Managers will learn about the National Earthquake Hazards Reduction Program, the different NEHRP agencies, staffing of NEHRP, and what guidance is being provided. Both new and experienced Program Managers will benefit from the discussion of the current transition of NEHRP, and relationships with NIST & FEMA, with NIST as the lead NEHRP agency.

State & FEMA Earthquake Program Perspectives

August, 16, 2005

General Session – Group Discussion

With experienced earthquake Program Managers at the state and federal levels, the group will explore problems of the earthquake program in the past and look towards creating solutions to those problems and rejuvenate the earthquake program on both levels.

Seismic Advisory Boards, Commissions, and Councils – How they can help your program

August 17, 2005

General Session – Panel

This session will focus on state and regional seismic advisory boards and how these boards can help state earthquake programs maintain successful momentum and increase public awareness and education efforts.

Meeting Overview Continued

Informational and Assistance Resources

August 17, 2005

General Session – Group Discussion

There are many resources available to maintain a successful earthquake program at the state level. This discussion will highlight those resources, including – FEMA Regional assistance, earthquake Consortia resources, National Earthquake Technical Assistance Contract and the Emergency Management Institute.

Urban Search and Rescue

August 17, 2005

Breakout Session – Panel

As seen in the September 11, 2001 terrorist attacks and the December 2004 Sumatra earthquake and resulting tsunami, and countless other disasters, Urban Search and Rescue is one of the most important aspects of responding to a disaster. This panel will highlight different approaches to building a successful USR program.

Earthquake and Hazard Mitigation

August 17, 2005

Breakout Session – Panel

This breakout session will include a panel of earthquake Program Managers who have implemented successful earthquake and all-hazard mitigation programs in their states. Examples of techniques, best practices, and methods of spreading awareness will be highlighted.

Secondary Effects of Earthquakes

August 17, 2005

Breakout Session – Panel

As seen in the December 2004 Sri-Lankan earthquake, there can be devastating secondary effects from earthquakes. Tsunamis, liquefaction, and landslide are all capable of producing widespread damages. This panel will discuss the science behind these hazards and how to convey these hazards to the public.

Tools of the Trade – Shake Map, HAZUS, & Tsunami Warning Systems

August 17, 2005

Breakout Session – Panel

This breakout session will highlight different methods of earthquake mitigation, planning, warning, and response technologies. How these systems work and why they are important, to the earthquake program and the general public, are topics that will be addressed.

National Earthquake Hazards Reduction Program

Overview

Earthquakes cannot be prevented, but their impacts can be managed to a large degree so that loss of life and property can be reduced. To this end, the National Earthquake Hazards Reduction Program (NEHRP) seeks to mitigate earthquake losses in the United States through both basic and directed research and implementation activities in the fields of earthquake science and engineering.

The NEHRP is the Federal Government's coordinated approach to addressing earthquake risks. Congress established the program in 1977 (Public Law 95-124) as a long-term, nationwide program to reduce the risks to life and property in the United States resulting from earthquakes. The NEHRP is managed as a collaborative effort among the Federal Emergency Management Agency (FEMA), the National Institute of Standards and Technology (NIST), the National Science Foundation (NSF), and the United States Geological Survey (USGS).

NEHRP Agencies

The four NEHRP agencies work in close coordination to improve the Nation's understanding of earthquake hazards and to mitigate their effects. The missions of the four agencies are complementary, and the agencies work together to improve our understanding, characterization, and assessment of hazards and vulnerabilities; improve model building codes and land use practices; reduce risks through post-earthquake investigations and education; improve design and construction techniques; improve the capacity of government at all levels and the private sector to reduce and manage earthquake risk; and accelerate the application of research results.

Federal Emergency Management Agency

The programmatic responsibilities of the Federal Emergency Management Agency (FEMA), which is now a component of the Department of Homeland Security (DHS), include the following:

Translates research results into technical publications

- Supports state and local governments by providing multi-hazard loss estimation capability for use in planning and response
- Prepares technical documents aimed at improving the seismic safety of new and existing buildings
- Works with national standards organizations to develop seismic standards for new and existing lifelines
- Prepares and disseminates information about building codes and practices

National Institute of Science and Technology

The National Institute of Standards and Technology (NIST) has the primary responsibility for leading, planning, implementing, and coordinating the overall NEHRP effort. The NIST also conducts problem-focused research and development to improve building codes, standards, and practices, including the following:

NEHRP Agencies continued

- Promotes better building practices among architects and engineers
- Works with national standards organizations to develop improved seismic standards for new and existing lifelines
- Chairs and provides the secretariat for the Interagency Committee on Seismic Safety in Construction (ICSSC), which recommends practices and policies to reduce earthquake hazards in federally owned, leased, assisted, and regulated facilities

National Science Foundation

The National Science Foundation (NSF) supports research on the causes and dynamics of earthquakes, earthquake engineering, and the human response to earthquakes, including the following:

- Supports research on plate tectonics
- Funds engineering research on geotechnical, structural, architectural, and lifeline systems
- Supports research on the social and economic aspects of earthquake hazard mitigation
- Supports the education of new scientists and engineers in the field

United States Geological Survey

The United States Geological Survey (USGS) conducts and supports earth science research that increases knowledge about the origins and effects of earthquakes, including the following:

- Provides national and regional seismic hazard and risk maps
- Conducts engineering seismology studies of the ground-shaking phenomenon
- Develops methods and standardized procedures for forecasting earthquakes
- Supports an external cooperative grants research program
- Operates national seismograph networks

NEHRP - Recommended Advocacy and Partnerships Strategies

This information is taken from FEMA's web resource for Earthquake Program Managers
- <http://www.training.fema.gov/emiweb/EarthQuake/index.htm>

Public Advocacy Strategies

Reducing the risk from earthquakes involves:

- Identifying the hazards
- Characterizing the risk
- Considering the strategies to address that risk.
- Selecting a strategy
- Implementing that strategy

For a strategy to be successful, it must:

- Develop solid information about the risk
- Include methods to reduce the risk.
- Provide technical information or sources where needed
- Take into consideration all interested parties
- Develop a constituency to support risk reduction

Developing a Strategy

A good way to develop a local seismic safety strategy is by preparing a “white paper” that discusses the community’s seismic risk and suggests mitigation activities.

The following topics should be covered in a white paper:

- Seismic hazard
- Community risks
- Mitigation activities
- Input from interested public and private sector organizations

It may be useful to use HAZUS to develop a scenario earthquake for the area, and use the HAZUS results with the white paper.

To succeed in seismic safety advocacy, keep the following tips in mind:

Be both persistent and patient. Before a community takes steps to reduce seismic risk, that community must first be convinced through education that a serious risk exists.

Have a clear message that identifies the problem.

Propose specific solutions. Understand the audience and try to link seismic safety to other issues. Create partnerships and build coalitions.

Public Advocacy Sources

Many institutions, agencies, and individuals may be called on to assist with seismic safety and public advocacy projects. Sources of assistance include experts and publications, both published and on-line.

Whatever the source, be sure to verify the credibility of the experts and accuracy of the information by looking at more than one source or checking with colleagues.

NEHRP - Recommended Advocacy and Partnerships Strategies (cont.)

This information is taken from FEMA's web resource for Earthquake Program Managers
- <http://www.training.fema.gov/emiweb/EarthQuake/index.htm>

Experts

Citizen activists and others working for seismic safety will often need to call upon an expert in another field for assistance.

To find an appropriate, credible expert, start with State geological surveys, State licensing boards for geologists and engineers, local universities, or professional associations.

Become familiar with the different specialty fields—geology, structural engineering, seismology, etc.—in order to match the most appropriate expert to the situation at hand.

Web Links

Association of American State Geologists
<http://www.kgs.ukans.edu/AASG>

National Association of State Boards of Geology
<http://www.asbog.org/>

Central United States Earthquake Consortium
<http://www.cusec.org/>

Northeastern States Emergency Consortium
<http://www.serve.com/NESEC/>

Western States Seismic Policy Council
<http://www.wsspc.org/>

Cascadia Region Earthquake Workgroup
<http://www.crew.org/>

Partnerships

While it is true that individuals can make a difference, partnerships can leverage the power of individuals. For any program to be successful, it is critical to form and maintain partnerships.

When building partnerships, first determine how the different stakeholders and the community in general will benefit. Every member of the community—from private citizens to businesses to government officials—has a potential stake in earthquake risk reduction.

NEHRP - Recommended Advocacy and Partnerships Strategies (cont.)

This information is taken from FEMA's web resource for Earthquake Program Managers

- <http://www.training.fema.gov/emiweb/EarthQuake/index.htm>

Developing Partnerships

To help build and maintain partnerships with other agencies and organizations:

- Understand how different stakeholders view seismic safety
- Build on existing networks
- Include public safety professionals from the community.
- Link seismic safety to other issues, such as historic preservation, school safety, or economic sustainability
- Get experts in your group.
- Use other communities as examples.

Federal Government

At the Federal Government level, there are several potential sources of assistance -

- *FEMA* has developed extensive information and training programs on mitigation, planning and earthquake risks
- *USGS Earthquake Hazards Program* has developed maps and written and electronic publications for the general and scientific public on seismic research topics

Private Non-Profits

Private organizations can be an invaluable source of information and assistance in efforts to plan and carry out seismic mitigation strategies.

The Earthquake Engineering Research Institute (EERI) is a national, non-profit group of scientists, public officials, and others concerned with all aspects of earthquake hazard mitigation.

The Consortium of Universities for Research in Earthquake Engineering (CUREE) is a non-profit organization involved in earthquake engineering research, education, and implementation.

Partnership Examples

Washington Highways

In 2001, FEMA funded a study to evaluate the earthquake vulnerability of Washington State highways. A large team of agencies and organizations at the Federal, State, and local level conducted the study.

The study identified serious vulnerabilities in the State's highway and bridge system, noting that a moderate earthquake could halt commerce in the area for months. As an added benefit, this study formed new bonds between private and public entities and promoted intergovernmental cooperation.

Central U.S. Housing

In 1998, CUSEC organized the New Madrid Housing Recovery Working Group, with members from Federal, State, and local governments, and the American Red Cross.

NEHRP - Recommended Advocacy and Partnerships Strategies (cont.)

This information is taken from FEMA's web resource for Earthquake Program Managers
- <http://www.training.fema.gov/emiweb/EarthQuake/index.htm>

The Working Group developed a coordinated strategy for short-term shelter and long-term housing in the event of an earthquake in the Central States. In cities such as St. Louis and Memphis, 30 to 40 percent of the population may require emergency housing after a significant earthquake.

California Quake '06

Quake '06 is a campaign to reduce earthquake risk in Northern California to coincide with the 100th anniversary of the 1906 San Francisco earthquake. The campaign is a partnership between the Northern California chapter of EERI, and cities, agencies, and other groups at risk in Northern California.

As part of the Quake '06 activities, committees are developing and implementing seismic risk reduction programs addressing commercial and residential buildings, health care, lifelines, local governments, and other areas.

Web Links

National Emergency Management Association
<http://www.nemaweb.org>

Association of Bay Area Governments
<http://quake.abag.ca.gov>

Earthquake Engineering Research Institute
<http://www.eeri.org>

Consortium of Universities for Research in Earthquake Engineering
<http://www.curee.org/>

Earthquake Information Network
<http://www.eqnet.org>

NEHRP - Recommended Program Priorities

This information is taken from FEMA's web resource for Earthquake Program Managers

- <http://www.training.fema.gov/emiweb/EarthQuake/index.htm>

Program Priorities

In addition to carrying out the NEHRP goals, earthquake coordinators should work toward the following program priorities for seismic safety:

- Increasing earthquake awareness
- Promoting preparedness and mitigation
- Encouraging training
- Reducing risk
- Improving emergency response plans
- Evaluating local codes

Developing an Implementation Plan for your program, to include the items above and any additional items and how you plan to accomplish your priorities, will help you to think out best strategies. Having an Implementation Plan that covers a number of years, such as three to five, can also help you build support for your program within your department and other departments you wish to work with. It is recommended you update your Plan each year to reflect needed changes in program directions and priorities and in State priorities. State earthquake program activities can be easily planned according to these documents, once they are in place.

Increasing Earthquake Awareness

Before taking steps to reduce earthquake risks, a community generally has to be aware of the area's earthquake hazard. Knowledge of the local or regional earthquake hazard and the potential losses from a future earthquake may encourage better disaster preparedness and seismic safety decisions.

Earthquake Awareness Activities

- Working with FEMA to provide HAZUS training courses for State and local users
- Providing a seismic hazards expert during local, regional, and State mitigation and recovery planning processes
- Developing and expanding safety information for the public and explain the basics of earthquake hazards and the risks they present to buildings and infrastructure
- Identifying and educating key public officials at the county and community level
- Providing earthquake risk and safety information to local and regional businesses and industry

HAZUS

A HAZUS estimate can be used when planning:

- Land-use and facility siting
- Prioritization of retrofit or abatement
- Regional, State, and local emergency response and contingencies
- Medical and relief agency preparedness and response
- Development of community and State mitigation plans

NEHRP - Recommended Program Priorities (cont.)

This information is taken from FEMA's web resource for Earthquake Program Managers
- <http://www.training.fema.gov/emiweb/EarthQuake/index.htm>

State Geologists

State geologists can be a source of information and help increase seismic awareness at the State level. While the responsibilities of State geologists differ from State to State, most function as a basic information source on hazards for their State governments' executive, legislative, and judicial branches. Many State geologists also provide earthquake hazard information to local governments and community groups. Some State geologists also have regulatory responsibilities for natural resources and land use.

Promoting Earthquake Preparedness and Mitigation

It's important to keep in mind that promoting preparedness and mitigation is a long-term project. Although some steps may be implemented immediately, other steps may take 15 years or more between development and implementation.

Some short-term activities that may be taken as first steps in promoting earthquake preparedness include encouraging:

- Creating family disaster plans
- School groups to practice earthquake drills
- Community members to have first aid kits and emergency supplies on-hand
- Homeowners to take simple mitigation actions, such as strapping water heaters

A next step in increasing a community's seismic safety is to encourage preparedness and mitigation efforts at hospitals, schools, police and fire stations, retirement homes, daycare centers, and other critical facilities.

Provide specific information to the people that staff or manage critical facilities on:

- Activities such as planning and conducting drop, cover, hold drills
- Methods and materials for structural and non-structural retrofitting

Long Term Activities

Earthquake mitigation activities that may take longer to develop and implement include:

- Adopting up-to-date building codes to incorporate modern seismic provisions
- Constructing new, seismically designed buildings
- Implementing tax credits or other incentives for seismic strengthening of hazardous buildings and preparedness
- Establishing hazard impact area councils consisting of appropriate State and local agencies, business and industry, private non-profits, and academia
- Engaging existing hazard mitigation partnerships or councils to increase the knowledge and capability to carry out mitigation activities and programs
- Promoting the creation of a State seismic safety commission board

NEHRP - Recommended Program Priorities (cont.)

This information is taken from FEMA's web resource for Earthquake Program Managers

- <http://www.training.fema.gov/emiweb/EarthQuake/index.htm>

Encouraging Training

Depending on the course and content, training can make community members more aware of earthquake hazards, help members of the press cover seismic issues more accurately, or give building professionals a better understanding of seismic design and construction.

Training in support of seismic safety can cover a variety of topics, such as:

- Hazard identification and risk assessment
- Mitigation planning
- Building design and construction
- Community disaster exercises
- Post-earthquake building evaluation

Reducing Risk

While there are many approaches to reducing a community's risk, some methods include:

- Offering Rapid Visual Screening and other building evaluation courses to promote the identification of seismic risks to critical facilities and high occupancy buildings
- Targeting State chapters of national engineering and architectural associations to advocate the use of technical materials for reducing risks to both new and existing buildings
- Identifying effective State and local pre-disaster activities that will serve to reduce the damages from seismic hazards
- Targeting State planning chapters, insurance groups, and local contingency planning associations to advocate pre-disaster mitigation planning

Improving Emergency Response Plans

In the event of an earthquake or other disaster, communities are well served by having an emergency response plan in place. To improve an emergency response plan, consider the following:

- Protection of building occupants during an earthquake
- Locations of shelters. Make decisions related to emergency relocation and evacuation
- Readiness of building safety systems
- Responsibilities for planning, training for, and implementing relocation and evacuation strategies
- Combination of all these elements into a plan of action
- Practice the plan through table top, function, or full-scale exercises

NEHRP - Recommended Program Priorities (cont.)

This information is taken from FEMA's web resource for Earthquake Program Managers
- <http://www.training.fema.gov/emiweb/EarthQuake/index.htm>

Evaluating Local Codes

Building codes can be a powerful aid in improving seismic safety. There is a stark difference in earthquake damage in communities where modern seismic building codes were followed compared to areas with lax or no codes.

It is not enough to ensure that sufficient building codes are adopted; the codes must be enforced and updated. Activities to evaluate and improve local building codes include:

- Identifying the current status of natural hazard components of adopted building codes at both the State and local levels
- Developing a strategy with the appropriate State agencies and commissions to increase the number of jurisdictions with state-of-the-art disaster resistant building codes; large local jurisdictions are likely to have the interest and expertise to adopt state-of-the-art codes, or to upgrade current codes to best meet local needs

Building Code Effectiveness Grading Schedule

The Insurance Services Office (ISO) has developed a Building Code Effectiveness Grading Schedule (BCEGS) to measure a community's efforts to mitigate damage from natural disasters such as earthquakes.

The grading schedule assesses:

- Building codes in effect in a particular community
- Enforcement of a community's building codes, with special emphasis on mitigation of losses from natural hazards

The grading schedule can help determine which communities are in need of code upgrades or improvements.

BCEGS and Insurance

Municipalities are graded on a scale of 1 to 10, with 1 representing exemplary commitment to building-code enforcement.

A community's insurance rates may be affected by its BCEGS grade. Higher BCEGS grades may mean higher insurance rates or even denial of insurance coverage.

Web Links

FEMA: HAZUS

http://www.fema.gov/hazus/eq_est.shtm

FEMA: Building for the Earthquakes of Tomorrow:

<http://training.fema.gov/EMIWeb/IS/is8.asp>

NEHRP - Recommended Program Priorities (cont.)

This information is taken from FEMA's web resource for Earthquake Program Managers

- <http://www.training.fema.gov/emiweb/EarthQuake/index.htm>

FEMA: Community Disaster Exercises

<http://training.fema.gov/EMIWeb/IS/is120.asp>

Applied Technology Council: Post-Earthquake Safety of Buildings (ATC-20)

<http://www.atcouncil.org/atc-20.shtml>

FEMA: Mitigation Planning Workshop

http://www.fema.gov/fima/planning_toc4.shtm

FEMA: Exercise Design Course

<http://training.fema.gov/emiweb/STCourses/g120dsc.htm>

BCEGS

www.isomitigation.com/bcegs1.html

Priorities for Individual Earthquake Coordinators

After reviewing the NEHRP priorities, consider setting seismic safety priorities for your program using the following steps:

1. Break down the recommended program goals into activities that you can carry out.
2. Decide which activities can be completed in a set time period, whether it is 1, 3, or more years.
3. Develop a schedule of specific steps to be accomplished in each quarter of a fiscal year that will lead to completion of a bigger goal.

Setting Goals

Whatever seismic safety goals you decide upon, these goals should be:

- Specific
- Measurable
- Achievable
- Realistic
- Time-limited

To help determine the shortest critical path to completion of your goal, consider the following key questions:

- What tasks must be accomplished?
- Who or what will complete each task?
- When must each task be completed?
- What happens if work is not completed on time?
- What resources are available to provide any necessary funding for the task?

NEHRP - Recommended Program Priorities (cont.)

This information is taken from FEMA's web resource for Earthquake Program Managers

- <http://www.training.fema.gov/emiweb/EarthQuake/index.htm>

Long-Term Planning

To accomplish your goals, long-term planning and coordination is essential. Consider using a computerized project management program such as MS Project® or TimeLine®. These programs help plan and manage large or long-term projects.

Web Links

Mind Tools: Project Planning and Management Tools

http://www.mindtools.com/pages/main/newMN_PPM.htm

State of Washington Department of Personnel: Managing Your Priorities

http://hr.dop.wa.gov/training/Courses/achieveglobe/managing_your_priorities.htm

Exercises

Emergency preparedness and recovery plans developed with careful attention to detail may be improved by conducting tabletop, functional, or full-scale exercises. Scenario earthquakes for disaster drills can be developed for a given area by estimating the location and length of a fault rupture and the magnitude of the ground motion.

Points to Practice

When designing and conducting a disaster drill, all aspects of a community's disaster response should be included. Consider the following actions that take place during the earthquake:

- Use of drop, cover, hold
- Evacuation procedures
- Actions of rescue teams
- Coordination of media
- Coordination between local, state, and non-profit organizations that deal with response

Points to Practice: After the Earthquake

Post-earthquake actions should also be exercised in the drill, including:

- Building damage assessments
- Establishment of temporary shelters
- Prioritization of repairs to critical facilities and utilities
- Recovery plans so the community remains economically viable

Exercise Evaluation

All parties should participate in a "hot wash" following the exercise to:

- Evaluate how the exercise followed the plan
- Identify needed changes to the plan

NEHRP - Recommended Program Priorities (cont.)

This information is taken from FEMA's web resource for Earthquake Program Managers

- <http://www.training.fema.gov/emiweb/EarthQuake/index.htm>

Web Links

USGS: Scenario Earthquakes

<http://earthquake.usgs.gov/shakemap/sc/shake/about.html#scenario>

Encinitas Union School District: Conducts District Wide Disaster Drill

<http://www.eusd.k12.ca.us/news/pressreleases/disastrdrill3.htm>

FEMA: Earthquake Mitigation and Recovery Exercise

<http://training.fema.gov/emiweb/downloads/seta.pdf>

Success Stories

The following success stories represent examples from States that have successfully raised awareness of earthquakes and have taken steps to improve seismic safety.

Oregon: Building Rehabilitation

Due to long-term efforts by the Oregon Seismic Safety Policy Advisory Council (OSSPAC), the State geologic agency, and a supportive legislator, ballot measures were approved in 2002 for seismic rehabilitation of education and emergency service buildings. The ballot measures passed in part due to:

- Efforts by OSSPAC and other agencies to increase seismic awareness
- Input and comments from stakeholder groups
- Support from respected and credible sources

Missouri: Seismic Safety Legislation

In many communities, seismic safety is generally not a wide concern. Yet, through a series of newspaper articles, a St. Louis reporter was able to increase public awareness of seismic safety. From the interest that the articles generated, a State legislator was able to lead the enactment of two key pieces of legislation:

- The Geologic Hazard Preparedness Act, addressing seismic building codes, earthquake emergency procedures for schools, and geologic hazard assessment
- The Seismic Safety Commission Bill, creating the Missouri Seismic Safety Commission

Arkansas: Seismic Mitigation

Clay County, Arkansas obtained funding from FEMA and technical assistance from the University of Arkansas for earthquake mitigation projects. The Clay County Disaster Resistant Community Council, a volunteer organization, emphasized earthquake safety of schools, hospitals, and businesses, as well as increasing community awareness. Their work included:

- Preparing a county hazard mitigation plan
- Installing earthquake-sensitive gas valves on all school buildings
- Completing a seismic engineering survey and structural seismic retrofits for the school districts

State & Territory Program Overviews

Alaska

Program Manager - R. Scott Simmons

- Develop effective practices and policies for earthquake loss-reduction and accelerate their implementation

The State of Alaska's Division of Homeland Security and Emergency Management (DHS&EM) combines its mitigation, earthquake, tsunami, and preparedness programs to ensure the public is educated about their natural hazard threats. We take great pride in our partnerships with the University of Alaska Fairbanks Geophysical Institute (UAF/GI), Alaska Department of Natural Resources Division of Geological and Geophysical Survey (DNR/DGGS), Alaska Earthquake Information Center (AEIC), Alaska Department of Transportation and Public Facilities (AKDOT&PF), West Coast / Alaska Tsunami Warning Center (WC/ATWC), National Weather Service (NWS), National Oceanographic and Atmospheric Administration's Pacific Marine Environmental Laboratory (NOAA/PMEL) and Tsunami Inundation Mapping Effort (TIME), Federal Emergency Management Agency, the U.S. Department of Interior, and Alaska's boroughs, local, and tribal governments. Very few projects would be accomplished without quality partnerships and willing participation.

DHS&EM aggressively supports and funds the statewide use of the Municipality of Anchorage's (MOA) Building Safety Officer to manage and coordinate our Post Disaster Damage Assessment (PDDA) training program. The PDDA Coordinator conducted six Post Disaster Damage Assessment courses resulting in an increase of 195 damage assessment evaluators between the spring of 2003 and summer 2004. He also managed refresher training for 47 students, contributed to developing a statewide training database and identification cards. These efforts allow tracking training while ensuring trained individuals can be contacted and deployed statewide during disasters to support Search and Rescue operations with timely building assessments. These efforts will directly benefit the State's ability to respond quickly and skillfully to future disaster assessment needs. Sitka, Alaska is the first community to adopt a section into their statutes concerning damage assessment and allowing the use of volunteer evaluators from other areas of the State.

The NOAA and State of Alaska sponsored Tsunami Inundation Mapping project for Homer and Seldovia, Alaska is nearing completion for publishing in late 2004. This project provides potential tsunami mapping coverage to provide the local community partners the ability to tailor the information obtained from the inundation maps toward effective planning efforts. These maps will assist the communities prepare for and mitigate against potential tsunamis. The Alaska Division of Geological and Geophysical Survey produces the final maps for planning and distribution by the local government and emergency management. Seward, Alaska is currently in the beginning stages of this mapping effort and Sitka, Alaska has recently undergone bathymetric (undersea) mapping by the National Oceanic Service. This information is vital to completing inundation modeling and the subsequent maps after the models are validated.

Alaska continued

- Improve techniques to reduce seismic vulnerability of facilities and systems

The University of Alaska Fairbanks/Geophysical Institute (UAF/GI) installed real time earthquake monitoring equipment in the State Emergency Coordination Center (SECC). The system provides immediate earthquake notification showing seismic station depictions of the quake, scientific data, and graphically relates the earthquake to adjacent communities. It allows the SECC to quickly contact communities to gather impact data for potential damage estimates. We are working to install this system in other emergency operation centers around the state.

-Improve seismic hazard identification and risk assessment methods and their use

The State is using VRISKMap® software to facilitate risk and vulnerability analysis from earthquake and other natural hazards. The software allows Mitigation Staff to overlay hazard maps, delineate by degree of hazard and run queries giving population and infrastructure associated information for use to determine potential impact and estimated losses. The State is currently assisting its largest communities and boroughs with developing Local All-Hazard Mitigation Plans to fulfill the Disaster Mitigation Act of 2000 criteria. These plans are essential for identifying the risks, vulnerabilities, and the economic impact to the State's population and infrastructure from natural hazards like the State's extensive earthquake hazard. These plans cover approximately 83% of the State's population. Mitigation Plans will soon be coordinated with a world-wide web interface using MitigationPlan.com® software to facilitate associating their local hazard mitigation plans, hazard data, strategies, goals, and initiatives with the State Plan.

-Improve the understanding of earthquakes and their effects

The Alaska Denali Fault 7.9 earthquake, the largest earthquake in the world for 2002, spurred a vast interest of our earthquake hazard. Subsequently, the Division's outreach tools, the "Quake Cottage" earthquake simulator and the "Earthquake Resistant Model Home," have experienced a surge of requests for non-structural seismic hazard mitigation demonstrations. These tools provide audiences effective earthquake preparedness and mitigation lessons as well as building visual relationships to the effects of hazards affecting structures. Over 11,500 people attended these presentations at 23 public and private schools; at safety events with major petroleum corporations, health institutions, government agencies, and State Fairs. Additionally, the Division coordinated a multi-agency effort to update and reprint our earthquake and tsunami preparedness booklet: "Are You Prepared for the Next Big Earthquake in Alaska." This was a major undertaking; 250,000 copies were printed with 130,000 copies of the booklet inserted into newspapers statewide commemorating the 40th anniversary of the 1964 Great Alaskan Earthquake.

The State's tsunami partnership led to significant mitigation program results. The group conducted remote community assistance visits bringing Earthquake Preparedness, TsunamiReady® and StormReady®, Tsunami Sign Program Awareness, and Disaster Preparedness information to Chignik and Perryville in the Aleutians and Craig, Klawock, Thorne Bay and Hydaburg, located along the Southeast Alaska panhandle. The City of Kodiak, Alaska became Alaska's fifth TsunamiReady® community in February 2004, furthering preparedness initiatives for Alaska's population and its visitors.

Arkansas

Program Manager - Shanene Thomas

The Arkansas EQ program is in the Mitigation Branch under the Preparedness Division within the Arkansas Department of Emergency Management. Currently the EQ program is managed by Shanene Thomas, who also manages the Pre-Disaster Mitigation Grant Program. Currently AR is updating the earthquake literature available through ADEM and participating in EQ 101 to help Arkansans prepare for a catastrophic earthquake and help them cope with the frequently occurring tremors.

Accomplishments over the last year:

- Held two Arkansas Governor's Earthquake Advisory Council Meetings. The Council holds biannual meetings to discuss seismic and mitigation program implementation needs throughout the state
- Participated in the Blytheville Town Meeting in May
- Created an Earthquake Preparedness Flyer
- Revised Earthquake Annex in the State EOP
- Requested ATC 20 and 21 classes
- Held Benefit Cost Analysis Class covering the seismic structural and nonstructural modules
- Assisted counties in the Earthquake prone areas identify mitigation goals and action items that can help mitigate the effects of earthquakes for their Hazard Mitigation Plans

Connecticut

Program Manager - Douglas Glowacki

In the past, under the old MAP Program, the State Geologists in the Dept of Environmental Protection updated some soils databases in the HAZUS datasets, which DEP has the capability to run. There are also certain seismic standards in the State building code and in the engineering and design of bridges and other public works. It has been a good number of years since CT OEM (now part of the new DEMHS) undertook any activities (e.g. PSAs, public information materials, conferences, FEMA-funded mitigation projects, etc.) related specifically to earthquakes.

In terms of response planning, earthquake response would be included in our State Natural Disaster Plan and the Catastrophic Disaster Plan, though there are no procedures specific to just earthquakes in either of those documents. Earthquakes are, however, recognized as a possible hazard for our State in the Natural Disaster Plan. This is a hazard that hasn't received a lot of attention in CT because it is generally perceived as a minor threat compared to other things.

Indiana

Program Manager - John Steel

The Indiana Department of Homeland Security (IDHS) Earthquake Program continually works with all interested parties that include both the public and private sectors on all issues with earthquake mitigation, preparedness, response and recovery. Indiana primarily is vulnerable to earthquakes within the New Madrid Seismic Zone, the Wabash Valley Seismic Zone and the Anna Seismic Zone in Western Ohio. These seismic zones

are seismically active, have a history of producing damaging earthquakes and the potential of producing catastrophic earthquakes. Earthquakes could occur anywhere in the state that has little or no known history or seismic activity. The geologic conditions in Indiana and surrounding states would permit the further transmission of the earthquakes energy. This would result in a multi-state natural disaster that has never been experienced before in Indiana and the Central United States. The goal of this program is to minimize the loss of life and injuries; damage to building inventory; infrastructure and economic impact a damaging earthquake will have on Indiana.

In an ongoing effort this program continuously works within the following four areas:

- 1) Mitigation
- 2) Preparedness
- 3) Response
- 4) Recovery

New Hampshire

Program Manager - Gregory Champlin

In the mid 1990's New Hampshire Emergency Management blended all natural hazards into one program. This was done because the state has and will suffer the effects of all natural hazards save one; the state has no active volcano. Like earthquakes, these hazards don't have the frequency they do in other parts of the country but, again like earthquakes, they have been as large and devastating as those in high hazard areas. For example; on average two small tornados strike New Hampshire annually, but the largest, believed to have been an F-4, killed 10 people, injured hundreds and left thousands homeless.

With that said the following are some activities that can be directly connected to New Hampshire's earthquake hazard.

Drop, Cover and Hold Drills

Along with five other drills recommended through the Comprehensive Emergency Management Planning for Schools program, which has been delivered to over 85% of the state's schools, many schools practice D, C&H annually as part of their multi-hazards preparedness program.

NH Public Works Mutual Aid

In its eighth year, this statewide program has seen steady growth. Though formed after the ice storm in 1998 this mutual aid program has opened many opportunities for multi-hazard training. The program manager is a founding board member and as such regularly aids in training and exercises.

Tsunami Training

The Earthquake Program Manager has incorporated the work of George A. Maul of Florida Institute of Technology into his presentations. This is because in the last 150 years 2,584 people have been killed during North Atlantic tsunamis and between them the Caribbean and the Western Atlantic account for 14.2% of the world's tsunamis, by comparison the Eastern Pacific accounts for 8.9%.

Training for Structural and Civil Engineers

The following trainings are being offered this year;

- Screening of Buildings (ATC-21 altered)
- Assessment of Buildings Subjected to Dynamic and Impact Forces (ATC-20 altered)
- Computerized Databases, Evaluation Programs and Their Uses
INCAST
HAZUS

New Mexico

Program Manager - Evonne Gantz, Mitigation Specialist

Years in Position - approximately 4 years

Percentage of time allocated to Earthquake Program - approximately 5-10%

Organization - The earthquake program is part of the Mitigation and Program Compliance Bureau in the Office of Emergency Management. Responsibilities include working with the PDM program and all the local mitigation plans.

Current activities, projects, program goals - We work with the New Mexico Institute of Mining and Technology (NM Tech) on earthquakes and geology. NM Tech is the geological survey for the state. We fund small earthquake research projects and occasionally help with printing costs for earthquake maps and articles published by NM Tech. We also fund an annual teachers' geology workshop (which discusses earthquake risk) taught by NM Tech. A program goal is to get more communities to realize they have an earthquake risk and look at ways to mitigate, or at least prepare for, that risk.

Program Difficulties- convincing local communities that earthquakes are a risk and that the communities should spend time dealing with the hazard when other hazards are more immediate (wildfires and floods).

New Jersey

Program Manager - Kathleen Lear

The New Jersey earthquake hazard reduction program consists of a continuing effort to populate the HAZUS (Hazards U.S.) loss estimation model in concert with New York State and New York City through a cooperative, multi-agency organization known as NYCEM (New York Area Consortium for Earthquake Loss Mitigation). Under this multi-year program, data for six northern New Jersey counties radiating outward from the New York metropolitan area has been developed and integrated into the HAZUS model. Additional counties will be included in coming years.

New Jersey data for the HAZUS earthquake model is provided by two organizations under contract from the New Jersey Office of Emergency Management. The New Jersey Geological Survey (NJGS) provides geological and earthquake history data. During 2005 the NJGS will be completing the geologic database for Morris County. Tantala

Associates, an engineering consulting firm, provides structural and census information. During 2005 Tantala Associates will be completing a study for Somerset County.

Funding for these programs is provided through the annual EMPG. Each year \$10,000 is provided to the NJGS and Tantala Associates respectively.

New York

Program Manager - Susan Bergmann

The New York State Emergency Management Office (NYSEMO) has been an active user of HAZUS since it was first introduced by FEMA in 1994. Major efforts have included NYSEMO's collaboration with the New York City Area Consortium for Earthquake Loss Mitigation (NYCEM) study of the New York metro area; spearheading efforts with the NYS Geological Survey in shear wave velocity testing of the state's surficial geology, leading to the development of county level HAZUS ready soil site classification maps; a HAZUS validation study based on a comparison of observed vs. modeled losses from the Ausable Forks, NY earthquake; incorporation of HAZUS based risk assessments into the State Hazard Mitigation Plan; and assisting New York City Office of Emergency Management (NYCOEM) in adopting and using HAZUS.

Most recently, NYSEMO has worked closely with software developers at PBS&J in testing and evaluating HAZUS-MH, including several pre-release builds of HAZUS-MH SR1. NYSEMO has been able to identify previously unknown problems and provide valuable feedback to PBS&J.

Missouri

Acting Program Manager: Randy Scrivner

Earthquake Awareness Week was held from January 30th through February 5, 2005. The activities focused on risk awareness, mitigation and post-earthquake recovery for citizens and businesses. The week ended with children participating in hands-on activities, a "earthquake knowledge hunt," and exhibits at the St. Louis Science Center. We are working on new activities for Earthquake Awareness Week January 29th through February 3, 2006.

SEMA continues to be in contact with the 19 Missouri Regional Planning Commissions (RPC's) to encourage them to become familiar with HAZUS-MH for future local planning updates. SEMA sponsored the Chairperson of the Heartland HAZUS Users Group (HUG) (also a member of the MO SAVE Coalition Board of Directors) to attend the Advanced HAZUS-MH Training. SEMA has broadened the use of HAZUS in the State Hazard Mitigation Plan. We have also assisted in incorporating HAZUS into all local mitigation plan updates that are funded by FEMA.

SEMA continues to conduct damage assessment courses and/or exercises to be held throughout the year, as developed in conjunction with the SAVE (Structural Assessment and Visual Evaluation) Coalition. We have also conducted earthquake presentations and processed request for earthquake information through out the year. SEMA has been

participating in the planning activities for the Spills of National Significance (SONS) exercise scheduled for 2007.

Puerto Rico

Program Manager - Nazario Lugo

Puerto Rico continues to develop and establish a Seismic School Program in at least 4 big Municipalities such as Carolina, Caguas, Mayaguez and Ponce.

- Mayaguez Seismic Network continues to provide community education.
- In March/2004 a Tsunami Workshop was performed. The tsunami warning signs with evacuation routes were posted in all the coastal municipalities.
- For response purposes, the protocol of Tsunami warnings is under discussion.
- Puerto Rico participated at the National Earthquake Conference in September/2004 and stated the interest in becoming part of the States that on a National Level are dealing with the Tsunami issues.
- A technical handbook regarding Tsunami is in process. This task is under the UPR/Mayaguez with PRSEMA.

South Carolina

Program Manager - Tammie L. Dreher

The SC Earthquake Program Coordinator is a part of the Preparedness Section in the Division. Responsible for managing, administering, and coordinating the earthquake program activities statewide with federal, state, and local governments. This involves developing the state earthquake plan and the procedures for earthquake preparedness. Conducting training, managing grants, developing program budget, and evaluating exercises to validate plans. Program Manager also serves as an area coordinator for the State. This involves coordinating with eight (8) local emergency managers to implement plans, local emergency program grants, evaluating exercises, providing training, and interpreting and analyzing policies.

The Earthquake Program is designed to provide a comprehensive earthquake mitigation and preparedness program through planning, education, training and project tasks to reduce loss of life and decrease damage from earthquake. The percentage of time spent in earthquake related activities is 75%.

The barrier to success is still hampered by lack of funds. The program would be enhanced at all levels if a consistent and adequate source of funding were available. Many initiatives, especially with special projects with universities, must be put on hold or be permanently deferred due to a lack of funds. These initiatives will not only better prepared the state for earthquakes, but more importantly will enhance the education and awareness elements to the citizens of the state. The belief that earthquakes can and do occur in South Carolina is slowing being acknowledged by the citizens; however, the

awareness and mitigation elements need to be constantly view in the public's eye if the program is to be successful.

U.S. Virgin Islands

Program Manager - Karen Fretts

The Virgin Islands continue to focus on Community Earthquake preparedness activities on the 3 islands.

- The Seismic Commission was integrated into the Hazard Mitigation Committee headed by VITEMA.

- The University of Virgin Islands continues to support seismic education. They have established a Multi-hazards course which emphasizes preparedness, prevention and planning actions for hurricanes, earthquakes or tsunami events as part of the basic freshman curriculum.

Utah

Program Manager - Bob Carey

Years in Position - 10+

Percentage of time allocated to Earthquake Program - 50%

The Utah Earthquake Program (UEP) is currently in the Office of Emergency Services (OES) that was created on the July 13, 2005. This is part of a reorganization of the Department of Public Safety. Emergency Services has been downgraded from Division Status. Utah OES is now part of the Division of Homeland Security.

With changes in the State Mitigation Program, there been more opportunities to participate in mitigation activities like PDMC, HMGP, PDA, the State Hazard Mitigation Team and the state hazard mitigation plan development.

Major Program activities are the creation of three HAZUS-related documents. The one document will detail the damage for an earthquake specifically for Salt Lake County. The second document will examine a Salt Lake County earthquake regionally. The final document will be a statewide look at annualize losses.

Utah Earthquake Program supports the Utah Seismic Safety Commission. By status, OES sits as staff to the Commission. Many of the Commission's activities are supported programmatically by the UEP. One example is the Commission's Student Research Grant Program for secondary schools. The program is overseen and administered through UEP and OES.

Washington

Program Manager - George Crawford

Years in Position - 8

The Earthquake Program is under the Programs Section effective Jul 1, 05 (presently it resides in the Mitigation Section). The earthquake position is responsible for managing the seismic safety efforts in the state through the earthquake, tsunami and volcano

programs. The position also staffs the Seismic Safety Committee that is charged with providing policy recommendations to the Washington State Emergency Management Council. Other duties include: State representative to the National Tsunami Hazard Mitigation Program; Chair, WSSPC Tsunami Committee; Chair, State/Local Tsunami Workgroup; NEMA Alt representative to the National ANSS Steering Group; member of the Regional ANSS Committee; and a member of the Board of Directors for the Cascadia Regional Earthquake Working Group (CREW). The Earthquake Program is extremely active in earthquake mitigation and preparedness activities that includes two state-wide Drop, Cover and Hold Drills a year. HAZUS is actively used at the state and local level and the state teaches HAZUS MH 3 to the local jurisdictions. The state also has a HAZUS users group. The Tsunami Program is the model for the nation and is actively working mapping, mitigation and preparedness issues at both the local, state, national and international level – this program is time intensive since the Sumatra Earthquake and Tsunami in December 2004. A major thrust right now is getting the hospitality industry on the coast to actively participate in tsunami preparedness and contingency planning for such an event. Washington State has five active volcanoes and managed by four working groups. The program is presently rewriting contingency plans and will be exercising all volcano plans in 2005 – 2006. The Earthquake Program suffers from limited staffing that is presently being addressed – in reality, it's 3 major programs that is rolled into one. With NEHRP funds mixed into EMPG, funding is a challenge and leaves the program under-funded to meet current demands and NEHRP planning strategies. FEMA's role is still being determined and Department of Homeland Security develops policy and procedures geared towards man-made hazards that create further confusion and new ground when trying to merge natural hazards into the "all hazards" theme of DHS. With these disconnects and the growing funding issue within natural hazards, natural hazard personnel will need to look at creative ways to work within the framework of DHS policies and procedures if it is to grow and effectively reduce the risk of seismic events.

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Speaker Biographies

David Applegate

Senior Science Advisor for Earthquake & Geologic Hazards

U.S. Geological Survey

David Applegate is the senior science advisor for earthquake and geologic hazards at the U.S. Geological Survey. In that capacity, he leads the Earthquake Hazards, Global Seismographic Network, and Geomagnetism Programs and provides coordination for geologic hazards activities across the USGS. He also serves as Vice-Chair of the National Science and Technology Council's interagency Subcommittee on Disaster Reduction.

In addition to his USGS duties, Applegate is an adjunct faculty member of the University of Utah's Department of Geology and Geophysics. Prior to joining USGS in February 2004, he spent eight years at the American Geological Institute as director of government affairs and, for the last four years there, as the editor of *Geotimes*, AGI's newsmagazine of the earth sciences. Before coming to AGI, Applegate served with the U.S. Senate Committee on Energy and Natural Resources as the American Geophysical Union's Congressional Science Fellow and as a professional staff member for the minority.

Born and raised in Chambersburg, Pennsylvania, Applegate holds a B.S. in geology from Yale University and a Ph.D. in geology from the Massachusetts Institute of Technology

Doug Bausch

Earthquake Program Manager

Federal Emergency Management Agency

Doug is the FEMA Region VIII Earthquake Program Manager and Physical Scientist in Denver, Colorado. He assists States and communities in developing sound risk assessments to support all hazard mitigation planning, including the incorporation of FEMA's HAZUS Loss Estimation and Map Modernization programs. Before starting with FEMA in May of 2001, he was both a Research Associate at Northern Arizona University and a Consulting Engineering Geologist with a southern California firm for 11 years. His research and consulting efforts primarily included preparing General Plans for local governments that addressed seismic safety, land use, and code adoption issues to reduce the impacts of natural disasters and improve community sustainability in a disaster. Recently, these efforts have benefited from FEMA's HAZUS (HAZards U.S.) loss-estimation software. HAZUS is used to evaluate and prioritize mitigation measures, to evaluate risk and support code-adoption. Doug is an experienced HAZUS user and is one of only a few certified instructors nation-wide.

Bob Carey

Earthquake Program Manager

Utah Office of Emergency Services

Earthquake Program Manager, Utah Office of Emergency Services, Division for Homeland Security, Department of Public Safety serving in that position for 12 years and in state service for over 15 years. Also serves as Assistant Operations Officer.

- Staff to the Utah Seismic Safety Commission
- Chair of the Awareness and Education Standing Committee
- Committee Member on the URM Adhoc Committee
- Committee Member on the Utah Committee for Urban Strong Motion Monitoring
- State Delegate to the Western States Seismic Policy Council
- Committee Member on the Basin and Range Subcommittee
- Chair of the Utah HAZUS Data Users Group
- Member of the Utah State Hazard Mitigation Team
- Team Leader of Multi-Agency Evaluation Task Force for the 1994 Northridge Earthquake
- Team Member Utah Division of Comprehensive Emergency Management Response Team for the 1992 St. George Earthquake

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John Cartwright

Earthquake Program Manager

Mississippi Emergency Management Agency

John Cartwright is the Natural Hazards Planner with the Mississippi Emergency Management Agency. As the Natural Hazards Planner he oversees the Earthquake and Hurricane Programs for the State. After completing an Bachelor of Technology degree from Appalachian State University, where he received academic honors, he began his career in the private sector. Mr. Cartwright joined Mississippi State Government in 1996 as the Distance Education Program Manager with Mississippi Educational Television. He then accepted a position with the Mississippi Department of Education before joining the Mississippi Emergency Management Agency in 2001.

Steve Cauffman

Program Manager

National Institute of Standards and Technology

Stephen Cauffman joined the Structures Division of the Building and Fire Research Laboratory in 1999. His work at NIST includes coordination of the Interagency Committee on Seismic Safety in Construction (ICSSC) as its Technical Secretariat. Mr. Cauffman also serves as Technical Secretariat for the U.S.-side panel of the U.S.-Japan Joint Panel on Wind and Seismic Effects (UJNR). Mr. Cauffman is the technical point of contact for the Partnership for Advancing Technology in Housing Cooperative Research Program. Mr. Cauffman has also provided support to the Advanced Technology Program in outreach to the construction materials industry.

Prior to joining NIST, Mr. Cauffman was a Senior Program Manager with the Civil Engineering Research Foundation (CERF). In that capacity, Mr. Cauffman was responsible for conducting studies related to advanced technology for the construction industry. Mr. Cauffman also served as Secretariat to the High-Performance CONstruction MATerials and Systems (CONMAT) Council, an industry/government group dedicated to promoting research, development and deployment of advanced construction materials.

Working with CONMAT and NIST, Mr. Cauffman developed an industry plan for participation in the Advanced Technology Program (ATP) and conducted workshops to educate industry on ATP.

George Crawford

Earthquake Program Manager

Washington Emergency Management Division

George Crawford is the Earthquake Program Manager for Washington State Emergency Management Division. He is responsible for managing the seismic safety efforts in the state through the earthquake, tsunami, and volcano programs. He staffs the Seismic Safety Committee that is charged with providing policy recommendations to the Washington State Emergency Management Council on seismic safety issues related to hazards presented by earthquakes, volcanoes, and tsunamis. George serves as the Chair for the State/Local Tsunami Work Group who is developing the approaches for tsunami preparedness and mitigation efforts in tsunami hazard zones. He has also concentrated his efforts in partnerships with United States Geological Survey, National Forest Service, and local county emergency managers in developing mitigation, preparedness, and planning strategies for the many communities that surround the state's volcanoes.

J. Eric Dietz

Executive Director

Indiana Department of Homeland Security

J. Eric Dietz, Ph.D., is the first executive director of Indiana's Department of Homeland Security, which combines the state's emergency management and homeland security efforts. He comes to the position from Purdue University where he served as the associate director of the e-Enterprise Center at Purdue's Discovery Park.

Dietz was managing director of the Purdue Homeland Security Institute from May 2004 to February 2005 and was involved in the establishment of a cooperative research and development agreement with the Naval Surface Warfare Center (NSWC) Crane, Indiana University, the Counter-Terrorism and Security Council and Purdue to develop technology, tactics and training for military and first responders. He also developed weapons of mass destruction exercise proposal that will be conducted at Purdue later this year.

He recently retired from the U.S. Army after a 22-year career. While in the military, he oversaw a number of technology-oriented projects, including development of detection programs for weapons of mass destruction, military power sources, chemical demilitarization and decision-making software.

An Indiana native, Dietz earned his undergraduate degree in chemical engineering and Masters of Science from Rose-Hulman Institute of Technology and a Ph.D. in Chemical Engineering from Purdue University.

Tammie Dreher

Earthquake Program Manager

South Carolina Emergency Management Division

Ms. Dreher has been employed with the division since 1984 and has been the earthquake coordinator since December 1995. With twenty years of experience as an emergency management planner, she has been involved in all facets of emergency preparedness.

As the earthquake coordinator, Ms. Dreher is responsible for managing the state's earthquake program and the South Carolina Earthquake Plan. This is the second year of the Earthquake Plan and since its inauguration; the plan has been exercised twice at the full-scale level. She is also an area coordinator/liaison to eight counties in the state, ensuring that emergency operation plans and emergency management program grants are in compliance with state and federal guidelines. Tammie is a graduate of South Carolina State University with a Bachelor of Arts degree in Political Science.

Jim Goltz

Earthquake & Tsunami Program Manager

California Governor's Office of Emergency Services

Jim Goltz is Deputy State Earthquake and Tsunami Program Manager for the California Governor's Office of Emergency Services and is based at the California Institute of Technology in Pasadena. Jim has been involved with earthquake planning and research for 28 years and has worked in the field of natural hazards in both the public and private sectors. Prior to joining the Office of Emergency Services in 2003, he was Manager of the Office of Earthquake Programs at Caltech and chaired the working group on technology transfer for a major upgrade of the Southern California Seismic Network from 1997 to 2002. He holds both Bachelors and Masters degrees from the Ohio State University and will complete a PhD in Social Psychology from UCLA in March of 2006.

Paula Gori

Associate Coordinator, Landslide Hazard

U.S. Geological Survey

Paula Gori is the Associate Coordinator of the Landslide Hazard Program at the U.S. Geological Survey. Ms. Gori's primary mission with the U.S. Geologic Survey (USGS) is to encourage other federal agencies, state and local governments, and the private sector to use geologic hazards information to reduce losses through informed natural hazard management. Ms. Gori holds a Master of Public Administration from The American University in Washington, D.C. She is the author of articles on earthquake and landslide hazards loss reduction and the application of research by decision makers. In that capacity, she has conducted research on the consequences of the Iben Browning pseudo-scientific earthquake prediction. During Ms. Gori's 25+ years at USGS, she convened numerous multi-disciplinary conferences in the United States and the Caribbean in conjunction with other federal agencies. For many years, Ms Gori designed and led training courses for emergency managers on earthquake hazards. She has also served as an expert on review panels and advisory boards for the Federal Emergency Management Agency, the National Science Foundation, the National Research Council, and university researchers.

Prior to joining the USGS, Ms Gori worked as an urban planner for the Maryland-National Capital Park and Planning Commission. At USGS, she serves as a liaison with other federal agencies, states and local government on issues related to natural hazard planning, response, mitigation and recovery. She is involved with her agency's response to Hurricane Mitch and led a mitigation project on landslide issues in Madison County, Virginia. Ms. Gori is currently managing a project with the American Planning Association that will result in a handbook for planners on landslide hazards.

Norman C. Hester

Technical Director

CUSEC Association of State Geologists

Dr. Norman C. Hester earned his Ph.D. in Geology from the University of Cincinnati in 1968. He taught at Eastern Kentucky University, University of Kentucky and Indiana University. He is a Professor Emeritus from Indiana University.

Dr. Hester has worked at the Illinois, Kentucky, and U.S. Geological Surveys, and from 1968 to 1998 served as the director of the Indiana Geological Survey. In 1992 he served as the first Chairman of the Association of CUSEC State Geologists.

Since 1998, Dr. Hester has been on contract with the U.S. Geological Survey Earthquake Hazards Program, serving as Technical Director of the Association of CUSEC State Geologists.

Thomas L. Holzer

Engineering Geologist

U.S. Geological Survey

Dr. Thomas L. Holzer is a research engineering geologist with the U.S. Geological Survey. He has extensive experience conducting post-earthquake investigations. His primary area of research interest is earthquake-induced liquefaction. He currently is developing a new field-based methodology to produce probabilistic liquefaction hazard maps. The first application of this methodology was for Project Impact in Oakland and Berkeley, California, published in 2002. He recently extended his field investigations to several areas in the central and eastern United States, including Evansville, Indiana, the Mississippi River valley, and Charleston, South Carolina.

Jeff Lusk

Natural Hazards Specialist

Federal Emergency Management Agency

Mr. Lusk has been with the Federal Emergency Management Agency (FEMA) Region IX since 1995. From 1995 until August of 2002, Jeff worked with the National Flood Insurance Program, and was responsible for conducting much of the NFIP training for State and local stakeholders. He was the first member of the NFIP planning staff to receive accreditation as a Certified Floodplain Manager, and worked closely with Napa County on its groundbreaking comprehensive floodplain management project.

Since August 2002, Jeff has served as the Regional Earthquake Specialist for Region IX, and is responsible for implementing the National Earthquake Hazards Reduction Program (NEHRP) and overseeing the continuing promotion of the Hazards U.S. GIS platform (HAZUS). Mr. Lusk's other duties at FEMA's Oakland office include acting as the Operations Section Chief on the Regional Support Team for disaster response. Jeff has responded to disasters from winter floods in Virginia to SuperTyphoons in Guam, as well as activities on the Northridge, Napa, and San Simeon earthquakes.

Mr. Lusk works closely with state emergency managers and other local, state, and federal partners in NEHRP, and serves as the liaison to consortia including the Western States Seismic Policy Council, the Earthquake Engineering Research Institute, and the State seismic safety commissions of California, Guam, Hawaii, and Nevada.

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- *State Government:* KY Department for Military Affairs, Executive Staff Advisor for Adjutant General; KY Division of Emergency Management, Earthquake Program Coordinator, State Mitigation Officer, Public communications, intra-government liaison (Program coordination, grant management for federal disaster and disaster-resistance funds)

- *University of Kentucky:* Kentucky Geological Survey, Technology Transfer Officer (internal and external communications: news releases, newsletters, brochures and event announcements; coordination for workshops and seminars, photography)

Marshall Mabry

Senior EMP Specialist

Federal Emergency Management Agency

Marshall Mabry was born and raised in a small town in Oklahoma. He received a Bachelor of Liberal Studies from Oklahoma University, an M.S. in Sociology from Virginia Tech, and also an M.P.A. from their Center for Public Administration and Policy. He is currently in a conflict resolution study program.

Mabry entered FEMA as an intern in their Outstanding Scholar Program and worked primarily in financial analysis and budget, personnel, and policy analysis. His assignments took him into the Federal Insurance Administration, National Preparedness, the Office of the Deputy Director, and the Office of General Counsel.

Marshall then came to the FEMA Region II office in Manhattan where he works as the Earthquake Program Manager handling New York and New Jersey. He frequently works on declared disasters as the Federal Mitigation Officer and serves as the Mitigation Cadre Manager working with our Stafford Act Employees; the Hurricane Program Manager which includes the FEMA Hurricane Liaison Team at the National Hurricane Center; and the Wildfire Program Manager working with FireWise.

Mike Mahoney

*Senior Geophysicist, Mitigation Division
Federal Emergency Management Agency*

Since 1991, Mr. Mahoney has been responsible for FEMA's National Earthquake Hazards Reduction Program (NEHRP) technical activities relating to new construction and for FEMA's Problem Focused Studies. He served as Acting Director of the National Earthquake Program Office in 1998, and has served as Project Officer for numerous projects, including the FEMA/SAC *Steel Moment Frame Buildings Project*. From 1984 to 1991, Mr. Mahoney was with FEMA's Office of Loss Reduction, part of the National Flood Insurance Program. From 1978 to 1984, he was employed as a Loss Prevention Consultant with Factory Mutual Engineering. He holds Bachelor's and Master's Degrees in physics.

David Maurstad

*Acting Director, Mitigation Division and Federal Insurance Administrator
Federal Emergency Management Agency*

David I. Maurstad was appointed acting director of FEMA's Mitigation Division and acting Federal Insurance Administrator in June 2004. In this position, Mr. Maurstad provides leadership for some of the nation's leading multi-hazard risk reduction programs, which seek to secure the homeland from hazards both natural or manmade. His areas of oversight include the National Flood Insurance Program, the National Earthquake Hazards Reduction Program, the National Dam Safety Program and the National Hurricane Program. In his position, Mr. Maurstad works closely with public and private risk managers, as well as leaders in government, industry, research and academia.

Mr. Maurstad had served as Regional Director of FEMA's Region VIII since October 2001, where he coordinated FEMA's prevention, preparedness, and disaster response and recovery activities in Colorado, Montana, North and South Dakota, Utah and Wyoming.

Prior to that appointment, Mr. Maurstad was the Lieutenant Governor of Nebraska, a position to which he was elected in 1998. In that position, Mr. Maurstad served as federal liaison and tribal liaison and chairman of the Nebraska Information Technology Commission. During his tenure as lieutenant governor, he also worked with the Department of Education and the Department of Health and Human Services on early childhood learning issues and created a program to recognize young people from across Nebraska for their achievements and personal courage.

Mr. Maurstad had previously served as a member of the Nebraska Unicameral Legislature. He had also previously served on the Beatrice School Board and was mayor

of that city. Mr. Maurstad holds a Bachelor of Science degree in business administration and an MBA from the University of Nebraska, Lincoln.

Norb Schwartz

*Division Director, Federal Insurance & Mitigation Division, Region V
Federal Emergency Management Agency*

Presently Mr. Schwartz is the Division Director for the Federal Insurance and Mitigation Division, FEMA Region V, part of the Department of Homeland Security. He has oversight for several programs within a six state region including the National Flood Insurance Program, the EQ Hazards Reduction Program, and other pre and post-disaster hazard mitigation programs. Previous to his management positions, he served as a FEMA Regional coordinator for a dam safety program and the National Flood Insurance Program that included flood risk mapping, floodplain management, and flood insurance. Early in his career, he worked as a hydrologic and hydraulic engineer for the Army Corps of Engineers in Chicago.

Mr. Schwartz received a MS in Water Resource Engineering from the University of Maryland in 1978 and BA from University of Michigan.

John Steel

*Earthquake Program Manager
Indiana Department of Homeland Security*

Prior to joining the Indiana State Emergency Management Agency (SEMA), Mr. Steel was in the fire service for 17 years both as a career and volunteer firefighter/MET. Responsibilities included firefighting, EMS and hazardous materials response, fire prevention and inspection, operating apparatus and incident command. In 1996 he was hired by the Indiana SEMA as the agency's Earthquake Program Manager. During this time he assisted in finding funds to structurally retrofit seven fire stations in southwestern Indiana. He was involved in the non-structural retrofit of hospitals and technical training of engineers in structural assessment of buildings for retrofitting. In addition, he has worked with different agencies in promoting earthquake education and awareness. Current projects include developing an earthquake educational video for the State of Indiana, and working with Purdue University in developing an ATC-21 program and a post-disaster building inspection program.

Cecil Whaley

*Director, Natural Hazards
Tennessee Emergency Management Agency*

Cecil has served the public and Tennessee State Government for nearly twenty years. He serves at Present as Planning Administrator and Director of Natural Hazards for the Tennessee Emergency Management Agency (TEMA). Cecil also serves as Supervisor of Planning for Domestic Preparedness and Weapons of Mass Destruction. His division provides long-range strategic planning supervision to the Tennessee Office of Homeland Security. Cecil has served with TEMA since 1988.

Cecil's previous positions with TEMA include: Director, Earthquake Preparedness Program; Director of the Disaster Preparedness Program; Director of the FEMA Accredited Urban, Search and Rescue Program, which provided the Memphis-Area "Tennessee Task Force One" Team to the Pentagon Crash site on Sept. 11, 2001. Cecil served as Assistant to the Commissioner of Employment Security, and Director of Public Relations 1975 to 1980

Jim Wilkinson

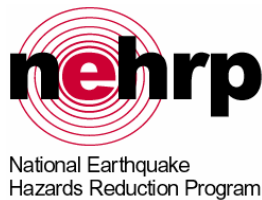
Executive Director

Central United States Earthquake Consortium

Mr. Wilkinson is a graduate of the University of Southern Mississippi, with a degree in Urban & Regional Planning. Mr. Wilkinson has worked in the field of emergency management for the past fourteen years. Three of those years were with the Mississippi Emergency Management Agency, where he served as a Population Protection Planner, and, later, as the state's Earthquake Program Manager. In 1994, Mr. Wilkinson accepted a position with the Central United States Earthquake Consortium as Mitigation Specialist. In this position, Mr. Wilkinson worked closely with the seventeen states, (eight Charter, nine Associate) that make up CUSEC, in helping to develop a strong earthquake program that addresses the regional impact of earthquakes in the central U.S. emphasizing an all hazards approach.

In December 1999, Jim was appointed to his current position as Executive Director. In this position he is responsible for accomplishing the CUSEC programs and activities that are defined by four areas:

- 1) To raise the level of public awareness of the earthquake hazard in the central U.S.;
- 2) To promote the adoption of mitigation programs, tools, and techniques to reduce the vulnerability of the Central U.S. to earthquakes and other hazards;
- 3) To foster multi-state planning for response and recovery to a damaging earthquake;
- 4) To promote the application of research and lessons learned to improve the level of preparedness.



These FEMA publications concerning Seismic Safety of Buildings and other Seismic Issues can be obtained free from the FEMA Distribution Center. To order, call 1-800-480-2520. Many of the publications described are available on FEMA's web site as PDF or Text files at: <http://www.fema.gov/hazards/earthquakes/nehrp/index.shtm>

FEMA-74 Reducing the Risks of Nonstructural Earthquake Damage: A Practical Guide Third Edition. Prepared for FEMA by Wiss, Janney, Elstner Associates, Inc. Washington, DC, 1994. 131 pages.

This well-illustrated publication describes the sources of nonstructural earthquake damage and provides information on effective methods of reducing potential risks from such damage. Meant primarily for building owners, facilities managers, maintenance personnel, homeowners, store or office managers, business proprietors, organizational department heads, and others concerned with building safety and the continuation of business, this book assists in identifying potential hazards, and provides specific guidance with upgrade details that readers can do themselves. The publication contains diagrams and photographs, a glossary, and references, as well as an annotated bibliography for those who wish additional information. A nonstructural inventory form, a checklist of nonstructural earthquake hazards, and an explanation of nonstructural risk ratings are included as appendices.

FEMA-83 Seismic Considerations for Communities at Risk Prepared for FEMA by the Building Seismic Safety Council. Washington, DC, 1995. 114 pages. Supersedes previous editions of **FEMA-83**.

This publication is a companion volume to the 1994 edition of NEHRP Recommended Provisions for Seismic Regulations for New Buildings. It is designed to provide interested individuals and community decision-makers with information for assessing seismic risk and making informed decisions about seismic safety in their communities and in determining what might be done to mitigate that risk. Included is information on the scope of earthquake risk in the U.S., the effects of earthquakes on buildings, how design can reduce earthquake effects, as well as the importance of seismic codes and the NEHRP Provisions. Also included are factors to consider when deciding whether and how to take action to reduce earthquake risk and suggestions for stimulating community action.

FEMA-84 Societal Implications: Selected Readings. Prepared for FEMA by the Building Seismic Safety Council. Washington, DC, 1985. Approximately 160 pages.

This book of readings is meant to provide participants in the building process at the local, state, and regional levels with information on the most significant societal implications of adopting new or improved seismic regulations for new buildings. Included are papers on such topics as estimated impact of the NEHRP Recommended Provisions on design and construction costs, seismic hazards in various areas of the U.S., seismic safety codes, current seismic hazard

mitigation practices and programs, and recent seismic safety policy research. Also contains an extensive bibliography, a list of information sources, and a glossary of terms.

FEMA-99 Non-Technical Explanation of the 1994 NEHRP Recommended Provisions. Prepared for FEMA by the Building Seismic Safety Council. Washington, DC, 1995. 82 pages. Supersedes previous editions of **FEMA-99**.

This publication serves as an introduction to the 1994 edition of the NEHRP **Recommended Provisions for Seismic Regulations for New Buildings**. It includes an explanation of the nature of ground motion generated by earthquakes, how such ground motion affects buildings, what techniques are used to design against earthquake forces, and how the **Provisions** translate this information into simple, uniform criteria and requirements to be followed by designers and builders.

FEMA-140 Guide to Application of the 1991 NEHRP Recommended Provisions in Earthquake-Resistant Building Design. Prepared for FEMA by J.R. Harris and Company under agreements with the Building Seismic Safety Council. Washington, DC, 1995. Approximately 467 pages. Supersedes previous editions of **FEMA-140**.

This publication is a companion publication and guide to the application of the 1991 **NEHRP Recommended Provisions**. Applications are illustrated with examples that cover various building materials and systems, including structural steel, reinforced concrete, timber, and masonry, as well as nonstructural elements. The Guide also contains flow charts, which provide overviews of the processes for satisfying the **NEHRP Recommended Provisions**.

FEMA-154 Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook. Second Edition. Prepared for FEMA by the Applied Technology Council. Redwood City, CA, 2002. Approximately 162 pages. Supersedes **FEMA-154**, 1988.

This **Handbook** presents a method to quickly identify, inventory, and rank buildings posing risk of death, injury, or severe curtailment in use following an earthquake. The Rapid Visual Screening (RVS) procedure can be used by trained personnel to identify potentially hazardous buildings on the basis of a 15 to 30-minute exterior inspection, using a data collection form included in the **Handbook**. A significant difference in the second edition is the need for a higher level of technical engineering expertise on the part of the users. The structural scoring system has been revised, based on new information, and the **Handbook** has been shortened and focused to facilitate implementation. Building inspectors are the most likely group to implement an RVS, although this report is also intended for building officials, engineers, architects, building owners, emergency managers, and interested citizens.

FEMA-155 Rapid Visual Screening of Buildings for Potential Seismic Hazards: Supporting Documentation. Second Edition. Prepared for FEMA by the Applied Technology Council. Redwood City, CA, 2002. Approximately 118 pages. Supersedes **FEMA-155**, 1988.

A companion document to **FEMA-154**, this Supporting Documentation contains the technical basis for the updated Rapid Visual Screening procedure, including a summary of results from the efforts to solicit user feedback, and a detailed description of the Basic Structural Hazard Score and the Score Modifier developmental effort.

FEMA-156 Typical Costs for Seismic Rehabilitation of Existing Buildings: Volume 1: Summary. Second Edition. Prepared for FEMA by the Hart Consultant Group, Inc. Santa Monica, CA, 1994. Approximately 70 pages. Supersedes **FEMA-156**, 1988.

This publication provides a methodology that enables users to estimate the costs of seismic rehabilitation projects at various locations in the United States. This edition is based on a sample of almost 2100 projects. The data were collected by use of a standard protocol, given a stringent quality control verification and a reliability rating, and then entered into a database that is available to practitioners. A sophisticated statistical methodology applied to this database yields cost estimates of increasing quality and reliability as more and more detailed information on the building inventory is used in the estimation process. Guidance is also provided to calculate a range of uncertainty associated with this process.

FEMA-157 Typical Costs for Seismic Rehabilitation of Existing Buildings: Volume 2: Supporting Documentation. Second Edition. Prepared for FEMA by the Hart Consultant Group, Inc. Santa Monica, CA, 1995. Approximately 102 pages. Supersedes **FEMA-157**, 1988.

A companion volume to **FEMA-156**, this **Supporting Documentation** contains an in-depth discussion of the approaches and methodology that were used in developing the second edition of **FEMA-156**.

FEMA-159 Tremor Troop: Earthquakes: A Teacher's Packet for K-6. Revised Edition. Developed jointly by FEMA and the National Science Teachers Association (NSTA) under contract with FEMA. Washington, DC, 2000. Approximately 200 pages. Available on CD.

This teacher's package for grades K-6 produced by the Federal Emergency Management Agency (FEMA) and the National Science Teachers Association (NSTA) provides ready-to-use hands-on activities for students and teachers explaining the science of earthquakes. This edition contains assessments throughout the units, matrices linking activities to the National Science Education Standards, and a new glossary. Divided into five units, the lessons covered include defining an earthquake, why and where earthquakes occur, physical results of earthquakes, measuring earthquakes, and earthquake safety and survival. Each of the first five units is divided into three levels: Level 1, for grades K-2; Level 2, for grades 3-4; and Level 3, for grades 5-6. At the end of each unit, masters ready to reproduce are provided for use in the classroom.

FEMA-172 NEHRP Handbook of Techniques for the Seismic Rehabilitation of Existing Buildings. Prepared for FEMA by the Building Seismic Safety Council. Washington, DC, 1992. 197 pages.

Intended for engineers, this **Handbook** presents techniques for solving a variety of seismic rehabilitation problems for existing buildings. The **Handbook** identifies and describes seismic rehabilitation techniques for a broad spectrum of building types and building components (both structural and nonstructural). Techniques are illustrated with sketches, and the relative merits of the techniques are discussed. This publication is based on a preliminary version prepared by URS/John A. Blume and Associates, **Techniques for Seismically Rehabilitating Existing Buildings** (**FEMA-172**, 1989).

FEMA-173 Establishing Programs and Priorities for the Seismic Rehabilitation of Buildings: Supporting Report. Prepared for FEMA by Building Systems Development, Inc. with Integrated Design Services and Claire B. Rubin. Washington, DC, 1989. 190 pages.

This Supporting Report includes additional information and commentary such as supporting documentation, annotated bibliographies, and reproductions of selected laws and ordinances that are presented in summary form in establishing programs and priorities for the Seismic Rehabilitation of Buildings: Handbook (FEMA-174).

FEMA-174 Establishing Programs and Priorities for the Seismic Rehabilitation of Buildings: Handbook. Prepared for FEMA by Building Systems Development, Inc. with Integrated Design Services and Claire B. Rubin. Washington, DC, 1989. 122 pages.

This **Handbook**, together with **FEMA-173, Supporting Report**, provide the information needed to develop a seismic rehabilitation program, with particular reference to establishing priorities. The **Handbook** is intended to assist local jurisdictions in making informed decisions on rehabilitating seismically hazardous existing buildings by providing nationally applicable guidelines. It discusses the pertinent issues that merit consideration, both technical and societal, and suggests a procedure whereby these issues can be resolved.

FEMA-198 Financial Incentives for Seismic Rehabilitation of Hazardous Buildings – An Agenda for Action. Volume 1: Findings, Conclusions, and Recommendations. Prepared by Building Technology, Inc. Silver Spring, MD, 1990. 104 pages.

The intent of this document, together with **Volume 2 (FEMA-199)** and **Volume 3 (FEMA-216)**, is to identify and describe the existing and potential regulatory and financial mechanisms and incentives for lessening the risks posed by existing buildings in an earthquake. **Volume 1** includes a discussion of the methodology used for these documents, background information on financial incentives, as well as findings, conclusions and recommendations for use by decision makers at local, state, and national levels.

FEMA-199 Financial Incentives for Seismic Rehabilitation of Hazardous Buildings – An Agenda for Action. Volume 2: State and Local Case Studies and Recommendations. Prepared for FEMA by Building Technology, Inc. Silver Spring, MD, 1990. 130 pages.

The intent of this document, together with **Volume 1 (FEMA-198)** and **Volume 3 (FEMA-216)**, is to identify and describe the existing and potential regulatory and financial mechanisms and incentives for lessening the risks posed by existing buildings in an earthquake. **Volume 2** includes detailed descriptions of the twenty case studies that were examined as part of the project.

FEMA-216 Financial Incentives for Seismic Rehabilitation of Hazardous Buildings – An Agenda for Action. Volume 3: Applications Workshops, Prepared for FEMA by Building Technology, Inc. Silver Spring, MD, 1990. Approximately 200 pages.

The intent of this document, together with **Volume 1 (FEMA-198)** and **Volume 2 (FEMA-199)**, is to identify and describe the existing and potential regulatory and financial mechanisms and

incentives for lessening the risks posed by existing buildings in an earthquake. **Volume 3** reports on workshops for the development of local agendas for action in seismic rehabilitation. It includes directions for convening additional workshops and teaching materials, which can be used in such workshops. This information is directed primarily to groups that are interested in planning for local seismic mitigation in existing buildings who wish to convene a workshop to initiate the process.

FEMA-232 Home Builder's Guide to Seismic Resistant Construction. Prepared for FEMA by SOHA Engineers. Washington, DC, 1998. Approximately 80 pages. Supersedes previous editions of **FEMA-232**.

The purpose of this **Guide** is to encourage homeowners and builders of one- and two-family residences to employ construction practices intended to provide resistance to damage from earthquakes. Well-illustrated with numerous diagrams and photographs, the **Guide** presents background information on how earthquake forces impact conventional residential construction and the principles of seismic resistance, as well as more detailed information on architectural considerations; site selection; foundation and foundation details; floors; shear walls; and roofs. Also included are discussions of masonry and stone elements, such as chimneys and veneers. Tables present excerpts from the seismic requirements of the **Uniform Building Code (UBC)**, **Standard Building Code (SBC)**, the **National Building Code (NBC)** and the **Council of American Building Officials (CABO) One and Two Family Dwelling Code**. Also included are examples of typical floor plans for earthquake resistant one- and two-story homes and a home builders checklist.

FEMA-237 Development of Guidelines for Seismic Rehabilitation of Buildings – Phase 1: Issues Identification and Resolution. Prepared for FEMA by the Applied Technology Council. Redwood City, CA, 1992. 150 pages.

This report was intended to assist in the preparation of **Guidelines for the Seismic Rehabilitation of Existing Buildings**. The report identifies and analyzes issues that might impact the preparation of the **Guidelines** and offers alternative as well as recommended solutions to facilitate their development and implementation. Also discussed are issues concerned with the scope, implementation, and format of the **Guidelines**, as well as coordination efforts, and legal, political, social, and economic aspects. In addition to issues concerning historic buildings, research and new technology, seismicity and mapping, engineering philosophy and goals are discussed. The report concludes with a presentation of issues concerned with the development of specific provisions for major structural and nonstructural elements.

FEMA-253 Seismic Sleuths: Earthquakes: A Teacher's Package on Earthquakes for Grades 7-12. Developed jointly by FEMA and the American Geophysical Union (AGU) under contract with FEMA. Washington, DC, 1994. Approximately 375 pages.

This volume was prepared to provide middle and high school teachers with information about the causes and effects of earthquakes. Activity sheets for students and background material for teachers are provided in each of the volume's six units. The first unit is designed to assess students' knowledge about earthquakes and provides information about preparedness and emergency management. The second unit concentrates on the causes of earthquakes, including crustal stresses and the earth's structure. Lessons on geologic time and paleo-seismology are featured. The unit also includes information about the effects of earthquakes, tsunamis,

liquefaction, and landslides. The third unit focuses on seismic waves and the development of seismology and instruments used to measure an earthquake's magnitude. Worldwide seismicity is also discussed. The fourth unit is designed to explain the effects of earthquakes on buildings and earthquake resistant design techniques. The fifth unit discusses earthquake preparedness and various populations' reactions to historical earthquakes. The final unit provides a variety of summing-up and assessment activities (essay topics, a quiz, and a disaster simulation), as well as an extensive list of additional resources.

FEMA-254 Seismic Retrofit Incentive Programs: A Handbook for Local Governments. Prepared for FEMA by the Bay Area Regional Earthquake Preparedness Project (BAREPP) and the California Seismic Safety Commission. Washington, DC, 1994. 133 pages. Supersedes previous editions of **FEMA-254**.

Intended to assist local government officials in developing their own seismic retrofit incentive programs, this book summarizes several case studies which describe the steps that seven California cities have taken to promote and implement retrofitting in their own communities. The **Handbook** also includes sections on using zoning as an incentive to retrofit; local government finance options; a description of the Unreinforced Masonry Buildings (URM) law and of recent legislation; liability implications and considerations in the event of an earthquake; and a list of contacts whose names appear in the **Handbook**.

FEMA-255 Seismic Rehabilitation of Federal Buildings: A Benefit/Cost Model. Volume 1: A User's Manual. Prepared for FEMA by VSP Associates, Inc. Sacramento, CA, 1994. Approximately 158 pages.

This **User's Manual** and accompanying software present a second-generation cost-benefit model for the seismic rehabilitation of federal and other government buildings. Intended for facility managers, design professionals, and others involved in decision making, the cost/benefit methodology provides estimates of the benefits (avoided damages, avoided losses, and avoided casualties) of seismic rehabilitation, as well as estimates of the costs necessary to implement the rehabilitation. The methodology also generates detailed scenario estimates of damages, losses, and casualties. The **Manual** describes the computer hardware and software required to run the program. It also explains how to install the program, how to use Quattro Pro for Windows, and how to enter necessary data. A tutorial provides a fully worked example. Benefit/Cost analyses of eight federal buildings are included. (**Note:** Computer software to run the benefit/cost model is available on 3½" diskettes and can be used on IBM compatible personal computers with at least 386 CPU. The computer must also have Windows and Quattro Pro.)

FEMA-256 Seismic Rehabilitation of Federal Buildings: A Benefit/Cost Model. Volume 2: Supporting Documentation. Prepared for FEMA by VSP Associates, Inc. Sacramento, CA, 1994. Approximately 71 pages.

This **Supporting Documentation** contains background information for the **User's Manual**, including information on valuing public sector services, discount rates and multipliers, the dollar value of human life, and technical issues that affect benefit/cost analysis, such as seismic risk assessment and sensitivity analysis. (**Note:** Computer software to run the benefit/cost model is available on 3½" diskettes and can be used on IBM compatible personal computers with at least 386 CPU. The computer must also have Windows and Quattro Pro.)

FEMA-266 Creating a Seismic Safety Advisory Board: A Guide to Earthquake Risk Management. Prepared for FEMA by the Seismic Safety Commission of California. Washington, DC, 1995. Approximately 84 pages.

The purpose of this **Guide** is to assist interested states, coalitions of states or confederations of local governments in creating, developing, and nurturing seismic safety advisory boards. The first part includes such chapters as *Why Create a Board?*; *Creating a Board*; *Selecting Advisory Board Members*; and *Operations: Getting to Work*. Chapters are also devoted to staffing and funding a board. Other chapters provide guidelines for strategic planning and developing a model seismic risk management program by which to measure progress. Appendices include: a model executive order; a model enabling legislation; an example of an interstate compact; an example of articles of incorporation; an example of corporate bylaws; model staff duty descriptions; model workshop design and roster; a list of existing seismic safety advisory boards, and a lexicon of terms.

FEMA-274 NEHRP Commentary on the NEHRP Guidelines for the Seismic Rehabilitation of Buildings. Prepared with FEMA funding by the Applied Technology Council and the American Society for Civil Engineers for the Building Seismic Safety Council. Washington, DC, 1997. Approximately 400 pages. Available online at http://www.degenkolb.com/0_0_Misc/0_1_FEMADocuments/fema356/fema274pdf.html.

This publication is intended to provide commentary on the NEHRP guidelines for the seismic rehabilitation of buildings. It should be used in connection with **FEMA-356, Prestandard and Commentary for the Seismic Rehabilitation of Buildings**.

FEMA-275 Planning for Seismic Rehabilitation: Societal Issues. Developed for the Building Seismic Safety Council by ROA (Robert Olson Associates, Inc.) with support of FEMA. Washington, DC, 1998. 102 pages.

This publication is intended to provide users of the NEHRP materials for the seismic rehabilitation of buildings with an understanding of the social and public policy issues that may accompany seismic rehabilitation, such as demographic, social and economic impacts; historic property restrictions; resident dislocations; and business interruptions. It also highlights the difficulties that may arise in implementing seismic rehabilitation recommendations. Designed primarily for local officials, private owners, and design professionals, this guide presents a four-step decision process to assist in determining the necessity for rehabilitation. It includes an “escalation ladder” to assist in understanding the degree of conflict that might be generated and the implications when choosing particular strategies.

FEMA-306 Evaluation of Earthquake-Damaged Concrete and Masonry Wall Buildings, Basic Procedures Manual. Prepared for the Partnership for Response and Recovery by the Applied Technology Council (ATC). Redwood City, CA, 1999. 270 pages. Available online at <http://www.conservationtech.com/FEMA-Publications/FEMA-306-8.htm>.

This document provides practical criteria and guidance for evaluating earthquake damage to concrete and masonry wall buildings. Component Damage Classification Guides and Test and Investigation Guides are included. Detailed drawings accompany the text.

FEMA-307 Evaluation of Earthquake Damaged Concrete and Masonry Wall Buildings, Technical Resources. Prepared for the Partnership for Response and Recovery by the Applied Technology Council (ATC). Redwood City, CA, 1999. 271 pages. Available online at <http://www.conservationtech.com/FEMA-publications/FEMA-306-8.htm>.

This document provides background and theoretical information to be used in conjunction with the guidelines given in **FEMA-306**. Relevant analytical and experimental findings are included, as well as additional background information on the Component Damage Classification Guides.

FEMA-308 The Repair of Earthquake-Damaged Concrete and Masonry Wall Buildings. Prepared for the Partnership for Response and Recovery by the Applied Technology Council (ATC). Redwood City, CA, 1999. 81 pages. Available online at <http://www.conservationtech.com/FEMA-publications/FEMA-306-8.htm>.

Intended for design engineers, building owners, building officials, insurance adjusters, and government agencies, this document provides practical guidance for the repair and upgrading of earthquake-damaged concrete and masonry wall buildings. The publication contains sections on performance-based repair design, repair technologies, categories of repair, and nonstructural considerations. The last section includes repair guides, which provide outline specifications for typical repair procedures.

FEMA-313 Promoting the Adoption and Enforcement of Seismic Building Codes: A Guidebook for State Earthquake and Mitigation Managers. Prepared for FEMA by the Department of Urban and Regional Planning, University of Illinois at Urbana-Champaign under the direction of Robert Olshansky. Washington, DC, 1998. Approximately 200 pages.

This publication provides background information and education materials to help state officials promote the adoption and enforcement of state and local model building codes that contain the latest seismic provisions. Intended for state officials, especially earthquake program managers and hazard mitigation officers in the emergency management agencies of states and territories prone to earthquakes, this **Guidebook** includes the purpose, function, and effectiveness of building codes in general and seismic codes in particular. It presents a step-by-step process for adopting state or local codes and for administering codes. Appendices provide information regarding: the history and principles of seismic design; a state-by-state listing of state codes and their code influences; seismic design practices in the United States; examples of state building codes; examples of state legislation; examples of local codes; services of three model code organizations in the United States; sources of further information; recommended readings; educational materials for making local presentations; sample press releases for the media; sample brochures aimed at local audiences; and a glossary of relevant terms.

FEMA-315 Seismic Rehabilitation of Buildings: Strategic Plan 2005. Prepared for FEMA by the Earthquake Engineering Research Institute (EERI). Washington, DC, 1998. Approximately 115 pages. Supersedes **FEMA-90**, 1998.

In addition to providing a discussion of the mission, history, and previous results of FEMA's Existing Building Program (EBP), this publication provides four objectives and 25 tasks to be carried out through the EBP in the years to come. The four objectives are to: 1) promote seismic

rehabilitation and advance the implementation of previously developed materials; 2) monitor the use of and refine existing materials; 3) develop new seismic rehabilitation tools; and 4) consider new program directions for the EBP. Estimated costs for the next 10-15 years and guidelines for plan implementation are also included. The **Plan** broadens the EBP's original goal by emphasizing the protection of the nation's economy by limiting fatalities, life-threatening injuries, as well as property and economic losses from earthquakes by increasing the number of seismically resistant buildings in all areas of identified earthquake risk. This publication is expected to provide FEMA managers with guidance on the conduct of the EBP program in the years to come and takes the EBP to a new threshold: implementation through support of commitments to seismic rehabilitation in the United States.

FEMA-349 Action Plan for Performance Based Seismic Design. Prepared for the FEMA by the Earthquake Engineering Research Institute (EERI). Washington, DC, 2000. 66 pages.

This document, published as a "final draft" for informational purposes only, explores the steps required to successfully implement performance-based seismic design (PBSD). Topics discussed include the need for changes in current seismic design practice, the definition of performance-based design, and the products necessary for its effective adoption. Products include: 1) A Planning and Management Program; 2) Structural Performance Products (SPP); 3) Nonstructural Performance Products (NPP); 4) Risk Management Products (RMP); 5) PBSD Guidelines; 6) A Stakeholders' Guide. The costs involved in obtaining both a basic framework and full implementation for PBSD are outlined.

FEMA-350 Recommended Seismic Design Criteria for New Steel Moment-Frame Buildings. Prepared for SAC Joint Venture Partnership by Guidelines Development Committee. Washington, DC, 2000. Approximately 220 pages. Available online at <http://www.fema.gov/hazards/earthquakes/fema350.shtm>. Errata list online at <http://www.aisc.org/ContentManagement/ContentDisplay.cfm?ContentID=4216>

Intended primarily as a resource document for organizations engaged in the development of building codes and standards, this publication provides recommended guidelines for the design and construction of steel moment-frame buildings and alternative performance-based design criteria. It supplements the **NEHRP Recommended Provisions for Seismic Regulations for New Buildings and other Structures**. A series of pre-qualified connection details, as well as a detailed procedure for performance evaluation, is included.

FEMA-351 Recommended Seismic Evaluation and Upgrade Criteria for Existing Welded Steel Moment-Frame Buildings. Prepared for SAC Joint Venture Partnership by Guidelines Development Committee. Washington, DC, 2000. Approximately 255 pages. Available online at <http://www.fema.gov/hazards/earthquakes/fema351.shtm>.

This publication provides recommended methods for evaluation of the probable performance of existing steel moment-frame buildings in future earthquakes. It presents guidelines on how to retrofit these buildings for improved performance. Also included are a simplified procedure for estimating the probable post-earthquake repair costs and methods for developing building-specific vulnerability and loss functions for steel moment-frame buildings.

FEMA-352 Recommended Postearthquake Evaluation and Repair Criteria for Welded Steel Moment-Frame Buildings. Prepared for SAC Joint Venture Partnership by Guidelines Development Committee. Washington, DC, 2000. Approximately 200 pages. Available online at <http://www.fema.gov/hazards/earthquakes/fema352.shtm>.

This report provides recommendations for performing post-earthquake inspections to detect damage in steel moment-frame buildings following an earthquake, evaluating the damaged buildings' safety in a post-earthquake environment, and repairing damaged buildings. Chapters cover inspection and classification of damage; preliminary post-earthquake assessment; detailed post-earthquake evaluations; and post-earthquake repair. The appendices include procedures for performance evaluation; sample placards that may be used to post buildings following preliminary post-earthquake evaluations; and sample inspection forms that may be used to record damage detected in beam-column connections as part of a detailed post-earthquake inspection program.

FEMA-353 Recommended Specifications and Quality Assurance Guidelines for Steel-Moment Frame Construction for Seismic Applications. Prepared for SAC Joint Venture Partnership by Guidelines Development Committee. Washington, DC, 2000. Approximately 200 pages. Available online at <http://www.fema.gov/hazards/earthquakes/fema353.shtm>. Errata list online at <http://www.aisc.org/ContentManagement/ContentDisplay.cfm?ContentID=4215>.

This publication provides recommended specifications for the fabrication and erection of steel moment frames for seismic applications. The recommended design criteria contained in the three companion reports (**FEMA-350**, **FEMA-351**, and **FEMA-352**) are based on the material and workmanship standards contained in this document. The report has been prepared in two parts. Part one covers recommended specifications, including information on products; execution; welded joint details; fabrication details; quality control; and quality assurance. Part two outlines quality assurance guidelines; contractor qualifications and quality tasks; quality assurance agency qualifications and quality assurance tasks; and recommended methods for determining whether structural steel materials, welded joints, and bolted joints meet the applicable standards.

FEMA-354 A Policy Guide to Steel Moment-Frame Construction. Prepared for SAC Joint Venture Partnership by Guidelines Development Committee. Washington, DC, 2000. Approximately 27 pages. Available online at <http://www.fema.gov/hazards/earthquakes/fema354.shtm>.

Written for building owners, local community officials, and other non-technical audiences, this document addresses the social, economic, and political issues related to the earthquake performance of steel moment-frame buildings. Also included is a discussion of the relative costs and benefits of implementing the design criteria recommended in **FEMA-350-FEMA-353**.

FEMA-355 Seismic Design Criteria for Steel Moment-Frame Structures. CD-ROM. Prepared for FEMA by the SAC Joint Venture. Washington, DC, 2001.

This CD-ROM contains a library of technical reports on the seismic design criteria, evaluation, repair, and specifications of steel moment-frame buildings. The reports are in PDF format. Produced by the SAC Joint Venture and FEMA as part of the *Program to Reduce the Earthquake Hazards of Steel Moment-Frame Structures*, the first four reports are primarily intended as

resource documents for organizations engaged in the development of building codes and standards for regulation of the design, construction, repair and upgrading of steel moment-frame structures that may be subject to the effects of earthquakes: **Recommended Seismic Design Criteria for New Steel Moment-Frame Buildings (FEMA-350)**; **Recommended Seismic Evaluation and Upgrade Criteria for Existing Welded Steel Moment-Frame Buildings (FEMA-351)**; **Recommended Postearthquake Evaluation and Repair Criteria for Welded Steel Moment-Frame Buildings (FEMA-352)**; and **Recommended Specifications and Quality Assurance Guidelines for Steel Moment-Frame Construction for Seismic Applications (FEMA-353)**. Additionally, the CD-ROM contains six state of the art reports prepared in parallel with these resource documents (**FEMA-355 A-F**). The state of the art reports provide detailed explanations of the basis for the design criteria and evaluation recommendations for base metals, welding, systems performance, connection performance, and past and predicted performance included in the resource reports. Also included is **A Policy Guide to Steel Moment Frame Construction (FEMA-354)**, prepared for building owners, local community officials and other non-technical audiences who need to understand this issue. This guide discusses the social, economic, and political issues related to the earthquake performance of steel moment-frame buildings, as well as the relative costs and benefits of implementing the recommended criteria.

FEMA-356 Prestandard and Commentary for the Seismic Rehabilitation of Buildings. Prepared by the American Society of Civil Engineers (ASCE). Reston, VA, 2000. Approximately 481 pages. Supersedes **NEHRP Guidelines for the Seismic Rehabilitation of Buildings (FEMA-273)**. Available online at http://www.degenkolb.com/0_0_Misc/0_1_FEMADocuments/fema356/ps-fema356.html.

This publication supersedes **NEHRP Guidelines for the Seismic Rehabilitation of Buildings (FEMA-273)** and related **NEHRP Commentary (FEMA-274)**, and converts these publications into mandatory prestandard language. This prestandard is intended to serve as a nationally applicable tool for design professionals, code officials, and building owners undertaking the seismic rehabilitation of existing buildings. The publication contains two parts: **Provisions**, which include technical requirements for seismic rehabilitation; and **Commentary**, which explains the **Provisions**. Commentary for a given section immediately follows the pertinent section. Chapters include: requirements; analysis procedures; foundations and geologic site hazards; steel; concrete; masonry; wood and light metal framing; seismic isolation and energy dissipation; simplified rehabilitation; architectural, mechanical, and electrical components; and use of this **Standard** for risk mitigation programs.

FEMA-357 Global Topics Report on the Prestandard and Commentary for the Seismic Rehabilitation of Buildings. Prepared by the American Society of Civil Engineers (ASCE). Reston, VA, 2000. Approximately 443 pages. Available online at http://www.degenkolb.com/0_0_Misc/0_1_FEMADocuments/fema356/gtfema357.html.

This report chronicles the development process as the NEHRP Guidelines for the Seismic Rehabilitation of Buildings (FEMA-273) evolved into Prestandard and Commentary for the Seismic Rehabilitation of Buildings (FEMA-356) by providing a narrative discussion and permanent record of the technical changes made to the original Guidelines (FEMA-273). Also included is a brief discussion of new concepts introduced to the engineering profession in the original Guidelines and Commentary (FEMA-274).

FEMA-366 HAZUS 99: Estimated Annualized Earthquake Losses for the United States. Prepared for FEMA by the National Institute of Building Sciences (NIBS) with Durham Technologies, Inc. Washington, DC, 2001. 33 pages. Available online at http://www.fema.gov/hazus/dl_eqpub.shtm.

Intended for policy makers, practitioners, and researchers in the public and private sectors who have roles in assessing risk and responding to natural disasters, this study is based on loss estimates generated by Hazards U.S. (HAZUS). HAZUS is a Geographic Information System (GIS)-based earthquake loss estimation tool, developed by the Federal Emergency Management Agency (FEMA) in cooperation with the National Institute of Building Sciences (NIBS). The report summarizes ways to identify earthquake risk and describes the procedures used to develop the economic loss estimates. Through a series of maps and tables, the actual loss estimates are presented at the county, metropolitan, and state levels. The appendices include a glossary, an overview of HAZUS, and probabilistic hazard data.

FEMA-399 Communicating with Owners and Managers of New Buildings on Earthquake Risk.

This publication has been developed to facilitate the process of educating building owners and managers about seismic risk management tools that can be effectively and economically employed by them during the building development phase. Written principally for design professionals (architects and structural engineers), the document introduces and discusses (1) seismic risk management and the means to develop a risk management plan; (2) emerging concepts in performance based seismic design, and (3) seismic design and performance issues related to six specific building occupancies—commercial office facilities, retail commercial facilities, light manufacturing facilities, health care facilities, local schools (kindergarten through grade 12), and higher education (university) facilities. The document also provides guidance for identifying and assessing earthquake-related hazards during the site selection process, including the potential seismic hazards of ground shaking, surface fault rupture, soil liquefaction, soil differential compaction, landsliding and inundation, as well as other potential hazards affecting building performance—vulnerable transportation and utility systems (lifelines), the hazards posed by adjacent structures, the release of hazardous materials, and post earthquake fires.

FEMA-395 Incremental Seismic Rehabilitation of School Buildings

This publication provides school administrators with the information necessary to assess the seismic vulnerability of their buildings, and to implement a program of incremental seismic rehabilitation for those buildings. The manual consists of three parts: Part A, Critical Decisions for Earthquake Safety in Schools, is for superintendents, board members, business managers, principals, and other policy makers who will decide on allocating resources for earthquake mitigation. Part B, Managing the Process for Earthquake Risk Reduction in Existing School Buildings, is for school district facility managers, risk managers, and financial managers who will initiate and manage seismic mitigation measures. Part C, Tools for Implementing Incremental Seismic Rehabilitation in School Buildings, is for school district facility managers, or those otherwise responsible for facility management, who will implement incremental seismic rehabilitation programs.

This is one of a series of six publications devoted to the seismic safety of building types with special occupancy and functional characteristics. Additional publications in the series:

FEMA-396 Incremental Seismic Rehabilitation of Hospital Buildings
FEMA-397 Incremental Seismic Rehabilitation of Office Buildings
FEMA-398 Incremental Seismic Rehabilitation of Multifamily Apartment Buildings
FEMA-399 Incremental Seismic Rehabilitation of Retail Buildings
FEMA-400 Incremental Seismic Rehabilitation of Hotel and Motel Buildings

FEMA-412 Installing Seismic Restraints for Mechanical Equipment.
FEMA-413 Installing Seismic Restraints for Electrical Equipment.
FEMA-414 Installing Seismic Restraints for Duct and Pipe.

All 3 publications were developed by the Vibration Isolation and Seismic Control Manufacturers Association (VISCMA) under a cooperative agreement between FEMA and the American Society of Civil Engineers (ASCE). Washington, DC, 2002. approximately 161 pages each.

These guides are intended to show equipment installers how to attach mechanical equipment, electrical, and duct and pipe to a building to minimize earthquake damage. Many examples using anchoring and seismic restraint devices are included. The guides describe various types of equipment and include a chart that identifies types of equipment, the recommended configuration for restraint, and the type of attachment needed. Examples of attachment types are provided with instructions for installing equipment in different configurations (rigid floor-mounted attachment/pad-mounted attachment; roof-mounted attachment; suspended attachment; vibration-isolated/floor-mounted attachment; and wall-mounted attachment). Examples of anchors are also provided, showing various types of anchors used to connect equipment to a building (general; cast-in-place anchors; lag bolts; masonry and drywall anchors; steel bolt connections; welding; and anchor sizes for equipment less than 400 pounds). Special cases are presented including housekeeping pads, cable assemblies, supports for control panels, and residential equipment. Step-by-step instructions are given for each type of equipment, the method for installing the equipment, and the attachment type needed. Special precautions are indicated. The guide does not cover non-building structural framing required to elevate equipment above the floor. These publications are fully illustrated with diagrams and photographs. A glossary and index are also included in each.

FEMA-424 Design Guide for Improving School Safety in Earthquakes, Floods, and High Winds

This publication is concerned with the protection of schools and their occupants against natural hazards. It concentrates on grade schools (K-12) and its intended audience is design professionals and school officials involved in the technical and financial decisions of school construction, repair, and renovations. This publication is intended to provide design guidance for the protection of school buildings and their occupants against natural hazards. It focuses on the design of new schools but the repair, renovation, and extension of existing schools is also addressed. This manual introduces two core concepts: multihazard design and performance-based design. It stresses that identification of hazards and their frequency and careful consideration of design against hazards must be integrated with all other design issues, and be present from the inception of the site selection and building design process. Performance-based design suggests that, rather than relying solely on the building code for protection against hazards, a more systematic investigation is conducted to ensure that the specific concerns of building owners and occupants are addressed.

FEMA-450 NEHRP Recommended Provisions and Commentary for Seismic Regulations for New Buildings and Other Structures, 2003 Edition. Prepared for FEMA by the Building Seismic Safety Council (BSSC). Washington, DC, 2001. 392 pages. Available online at <http://www.bssconline.org/pubs/downloads.html>.

Seismic design maps from the 1997 edition can be ordered separately from FEMA and used with the 2000 edition. These maps are also available on CD-ROM (Seismic Design Parameters) and can be purchased from the BSSC at <http://www.bssconline.org/pubs/seismic.html>.

The latest edition of the NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures is the 7th edition of this document, and like the editions that preceded it, has the consensus approval of the Building Seismic Safety Council membership. These Provisions present criteria for the design and construction of new buildings, additions and alterations to existing buildings, and nonbuilding structures, such as vessels, silos, piers, hydraulic structures, chimneys, and towers to enable them to resist the effects of earthquake ground motions. The purpose of the Provisions is to: 1) provide minimum seismic design criteria for structures, appropriate to their function and use, to protect the health, safety, and welfare of the general public by minimizing the earthquake-related risk to life; and 2) to improve the capability of essential facilities and structures containing substantial quantities of hazardous materials to function during and after design earthquakes.

This update consists mostly of new material in select areas intended to keep the document at the cutting edge of seismic design practices, such as new material on: anchorage to concrete; pushover design; glass in glazed curtain walls, glazed storefronts, and glazed partitions; simplified design procedures; a comprehensive procedure for the design of structures with energy dissipating devices; and a comprehensive treatment of design of steel moment frame structures based on the research results of a FEMA-funded project started after the 1994 Northridge earthquake. Please note that the previous (2000) edition of the NEHRP Provisions and Commentary are available as FEMA-368 and 369, respectively.

Upcoming FEMA Publications: These NEHRP related publications will be available from FEMA in the near future.

Earthquake Safety Checklist FEMA 526

A 12 page brochure with individual and family earthquake safety information

Earthquake Home Hazard Hunt Poster FEMA 528

This poster provides visuals and descriptions so that homeowners can identify and fix at-risk areas of their homes to reduce future earthquake damage and disruption

Homeowner's Guide to Earthquake Safety FEMA 530

This detailed guide was developed by the California Seismic Safety Commission and provides recommendations that homeowners can reduce damage from an earthquake

Promoting Seismic Safety: Guidance for Advocates FEMA 474

This 40 page booklet offers research-based advice so that seismic safety advocates can more effectively present risk reduction information and ideas

The Adventures of Terry the Turtle and Gracie the Wonder Dog FEMA 531

This storybook was developed by Washington Military Department's Emergency Management Division for children in grades 3-6

Drop, Cover, and Hold on Poster FEMA 529

This poster is intended for classroom use and updates a previous edition

Earthquake Safety Activities FEMA 527

This updated publication provides classroom activities for elementary school teachers on earth science and earthquake hazards

Seismic Sleuths CD FEMA 253-CD

This CD contains the previously printed curriculum supplements that provide middle and high school teachers with activity sheets for students and background material for teacher

Earthquake Program Managers - Updates & Comments

If you need to update your state contact information, please do so in the following spaces

Name_____

Position_____

Agency_____

Address 1_____

Address 2_____

City_____

State_____

Zip_____

Phone_____

Fax _____

Email_____

Agency Webpage_____

If you have any comments or suggestions to add to the NEHRP overview section, please use the space below or attach an extra sheet of paper if necessary -