

The National Earthquake Hazards Reduction Program

FEMA Accomplishments in Fiscal Year 2010

Report Submitted March 2011



FEMA



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I. INTRODUCTION

The National Earthquake Hazards Reduction Program (NEHRP), which was first authorized by Congress in 1977, seeks to mitigate earthquake losses in the United States through basic and directed research and implementation activities in the fields of earthquake science and engineering. As one of the four NEHRP federal agencies, FEMA is responsible for developing effective earthquake risk reduction tools and promoting their implementation, as well as supporting the development of disaster-resistant building codes and standards. FEMA's NEHRP activities are led by the FEMA Headquarters, Federal Insurance and Mitigation Administration, Risk Reduction Division, Building Science Branch, in strong partnership and coordination with the FEMA Regions, the states, the four multi-state earthquake consortia, and other partners.

Section II of this annual report includes selected FEMA NEHRP accomplishments (HQ and Regional), followed by highlights from the states and organizations which received FEMA support for NEHRP activities in Fiscal Year (FY) 2010, including the earthquake consortia and the Earthquake Engineering Research Institute. Section III provides contact information for FEMA HQ and FEMA Regional Earthquake Program Managers.

The accomplishments described in this report show how FEMA and its partners, working in collaboration, are continuing to make progress toward earthquake loss-reduction nationwide. Work completed in FY 2010 will have applications immediately or in the near term in reducing earthquake risk. Work advanced in FY 2010 also is creating a strong foundation for realizing similarly effective outcomes in future years.

II. FEMA NEHRP ACCOMPLISHMENTS IN FY 2010

This section of the annual report highlights a cross-section of successful FEMA NEHRP projects and programs in FY 2010. The accomplishments are presented for FEMA HQ and the FEMA Regions, followed by highlights from the states and organizations which received FEMA support for NEHRP activities in FY 2010, including the regional earthquake consortia and the Earthquake Engineering Research Institute (EERI).

A. FEMA HQ and the FEMA Regions

Earthquake Website Enhancement Project

In FY 2010, FEMA HQ, with contractor support, completed Phase II of its project to update and enhance the content and organization of the FEMA earthquake website (www.fema.gov/hazard/earthquake/index.shtm). When completed in FY 2011, the new website will be designed to enhance the FEMA earthquake program's visibility and to better meet FEMA goals for outreach and dissemination to its constituents. Improvements in FY 2010 included the streamlining of information, improved navigation and improved page-to-page linkages, and the elimination of redundant and outdated material.

International Code Council

In 2010, the International Code Council (ICC) held its Code Change Hearings and Final Action Hearings for the International Building Code (IBC), International Existing Building Code (IEBC), and International Residential Code (IRC). FEMA, under its Code Resource Support Committee (CRSC), attended and provided testimony on several proposed code changes for the 2012 edition of the model codes. Overall, FEMA was very successful in submitting and defending several important codes, including the approval of new seismic design maps for the IBC and IRC developed under the 2009 NEHRP Recommended Seismic Provisions, FEMA P-750, and adopted by ASCE/SEI 7-10; improved special inspection requirements for steel frame construction, most of which were originally developed under the FEMA/SAC Steel Moment Frame Guidelines Project after the Northridge earthquake and published by FEMA in FEMA 353; and improved IRC provisions for braced wall systems.

FEMA HQ staff also successfully submitted a code change representing the National Oceanic and Atmospheric Administration (NOAA) National Tsunami Hazard Mitigation Program that added a new Appendix L, Tsunami Generated Flood Hazard. In addition, FEMA and the CRSC provided testimony in support of changes with which they concurred as well as in opposition to changes that weakened the seismic provisions of the code, thereby ensuring that these model codes continue to adequately address natural hazards. As a result of agency involvement with the code change process that now dates back 25 years, FEMA continues to be well respected within the code community.

Codes and Standards Adoption of the 2009 NEHRP Recommended Seismic Provisions for New Buildings and Other Structures

The NEHRP Recommended Seismic Provisions for New Buildings and Other Structures, FEMA P-750 and P-750CD, is one of the most important FEMA NEHRP publications and a national resource for design professionals and the standards and codes development community. The 2009 edition of the Provisions is presented in a new one-volume format with three parts. Part 1, Provisions, presents consensus-approved technical modifications of the seismic requirements in the reference standard, including the adoption of new seismic design maps based on seismic hazard maps issued in 2008 by the USGS. Part 2, Commentary, provides a completely rewritten, up-to-date commentary for the reference standard. Part 3, Resource Papers, presents a series of resource papers focusing on emerging seismic design concepts and on issues that have proven historically difficult or complex. The FEMA P-750CD contains the digital version of the Provisions, the USGS Seismic Design Maps, the Provisions-based design maps proposed to ASCE7-10 and 2012 I-codes, and other supporting materials. A major accomplishment of this resource document was the quick adoption of most of the technical changes in the Provisions by ASCE/SEI 7-10 and IBC 2012.

Building Code Adoption Tracking

One of the effective ways to reduce the seismic risk for local communities is to adopt and implement proper seismic-resistant building codes. The adoption of hazard-resistant codes has been considered the number one performance measurement in the FEMA NEHRP scorecard. To track the code adoption by local communities, FIMA, with contractor support, developed and maintained the Building Code Adoption Tracking (BCAT) system. This system uses the Building Code Effectiveness Grading Schedule (BCEGS) from Insurance Service Organization (ISO) as the primary source to monitor the building code adoption and implementation by the high seismic jurisdictions. As of September 2010, 43 percent of jurisdictions registered in BCEGS with high and very high seismic risk have adopted proper codes without any weakening amendments to protecting their at-risk building stocks. This is an 18 percent increase from FY 2009. Additional code adoption tracking data was collected for BCAT from Hawaii, Idaho, Kansas, and Washington.

Mobile Seismic Risk Assessment Tool

Many communities in earthquake-prone areas need to evaluate the seismic risks of their building stocks to make informed risk mitigation decisions. The challenge has been that these evaluations have historically been expensive and time consuming to perform. FEMA first addressed this need in 1988 with the publication of a screening methodology, FEMA 154, Rapid Visual Screening (RVS) of Buildings for Potential Seismic Hazards, to standardize and simplify the evaluations. FEMA 154 was broadly welcomed by communities, but it was labor intensive. FIMA, through the Applied Technology Council (ATC), has developed an IT-based tool called the Rapid Observation of Vulnerability and Estimation of Risk, or ROVER. ROVER converts the paper-based RVS procedure into an electronic version for smart phone devices. This software enables the handheld mobile device to be a data collection and evaluation tool. It greatly reduces the burden of data collection, storage, processing, and management and will provide a

faster and more efficient way to conduct field evaluation of large numbers of buildings to determine their seismic risks. By the end of 2010, ROVER was tested through several demonstration projects. One project is reported for Utah as a state assistance earthquake program activity. The software is currently under FEMA IT evaluation and is expected to be released to the public soon.

Chile Earthquake

On February 27, 2010, a magnitude 8.8 earthquake occurred off the coast of Maule, Chile. The earthquake and resulting tsunami caused almost 600 fatalities. Unlike Haiti, where the January 2010 magnitude 7.0 earthquake killed more than 222,000, Chile has a modern building code similar to building codes in the United States. This event provided an excellent opportunity to evaluate the performance of building codes and construction practices. FEMA staff participated in one of the first engineering groups to visit Chile to observe the impact of the earthquake, which was led by EERI under its Learning From Earthquakes (LFE) program funded by the NSF. The EERI LFE Team, which was in Chile the week of March 15, 2010, included individual teams assigned to investigate buildings, bridges, tsunami damage, social science issues, and the performance of hospitals. The Chile earthquake has provided a valuable opportunity to evaluate the performance of structures and their contents built in a manner similar to those in the United States. The EERI LFE Team documented valuable lessons and FEMA plans to work with the other NEHRP agencies to document findings and translate them into lessons for the United States.

Performance-Based Seismic Design Project

FEMA, with the ATC, completed the 75 percent draft of the Guidelines for Seismic Performance Assessment of Buildings, FEMA P-58, and the accompanying data calculation tool, IMPACT, Information Management and Performance Assessment Calculation Tool. When completed, this performance assessment methodology will allow a designer to assess seismic performance of individual buildings in future earthquakes. These products are the first phase of the development of Performance-Based Seismic Design Guidelines for New and Existing Buildings. The goal of this project is to be able to evaluate how a building is likely to perform in a given earthquake, considering uncertainties inherent in both the potential hazard and the actual building response. The project will permit design of new buildings or upgrade of existing buildings with a realistic understanding of the risk of casualties, occupancy interruption, and economic loss that may occur as a result of future earthquakes.

Seismic Rehabilitation Training for One- and Two-Family Wood-Frame Dwellings

This new FEMA publication was released in January 2010 as FEMA P-593. This CD-only product contains PowerPoint slide presentations, an Instructional Guide, and speaker's notes for training contractors, code officials, and other interested parties in the seismic retrofitting of existing light frame dwellings. This product has been used by the ICC as the basis for a series of webinars for their membership.

Quantification of Building Seismic Performance Design Factors

FEMA, with the ATC, completed the final draft of *Quantification of Building Seismic Performance Design Factors: Component Equivalency Methodology*, FEMA P-795. This publication presents a methodology to allow for comparison between new building components and existing building components with established seismic performance factors. This project was undertaken at the request of the ICC's Evaluation Service, which needs this methodology to evaluate new building components located in seismic zones. FEMA also conducted an educational seminar to introduce the publication to about 40 industry experts and obtain their review comments. The document is based on the recently completed publication *Quantification of Building Seismic Performance Design Factors*, FEMA P-695, which presents a new methodology for reliably quantifying building system performance and response parameters for use in seismic design.

QuakeSmart

When disaster strikes, local businesses are often not prepared to resume operations, a critical part of a community's ability to fully recover. FEMA created the *QuakeSmart* program to help local businesses mitigate earthquake losses and get back up and running as quickly as possible after a disaster. A cornerstone of the program is FEMA's recognition that partnerships are key to raising awareness, and to making sure that businesses take action to become "QuakeSmart."

In support of its mission, *QuakeSmart* developed materials, delivered training, and increased its partnerships with internal and external stakeholders in FY 2010. Activities included a successful dialogue between FEMA and local chambers and businesses in the New Madrid Seismic Zone (NMSZ) area during the *QuakeSmart* Memphis Roundtable, which also resulted in a formal public-private partnership with ServiceMaster. ServiceMaster hosted an employee awareness campaign during Preparedness Month, September 2010. As part of the campaign, *QuakeSmart* staff provided information to ServiceMaster HQ employees on basic earthquake risk reduction techniques for employees and homeowners and formal training to its technical field staff on non-structural earthquake mitigation. With *QuakeSmart* coordination, the Central United States Earthquake Consortium (CUSEC) was able to work with ServiceMaster on marketing ShakeOut information. This served as an important step in enhancing outreach efforts in the NMSZ.

Building on the success of these events, FEMA plans to bring *QuakeSmart* to additional at-risk communities and cities in 2011 and beyond. The program also will reach out to other government agencies, non-profit organizations, hazard mitigation product vendors, and large and small businesses that share FEMA's goal of taking action to mitigate losses from a future earthquake.

National Earthquake Technical Assistance Program (NETAP)

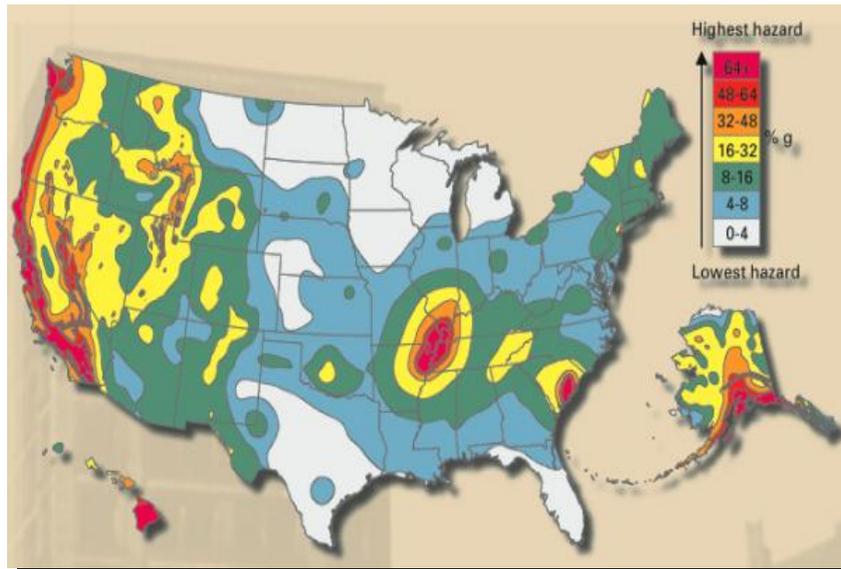
Through the National Earthquake Technical Assistance Program (NETAP), FEMA HQ and the FEMA Regions supported the development of training curricula on earthquake mitigation topics and provided courses for state and local officials and businesses throughout the United States. In FY 2010, there was a high demand for NETAP training, including Procedures for Post

Earthquake Safety Evaluation of Buildings, ATC-20; RVS of Buildings for Potential Seismic Hazards, FEMA 154; Earthquake Hazard Mitigation for Hospitals, FEMA P-767; and Non-Structural Mitigation, FEMA 74. Through these and other courses, FEMA was able to increase state and local knowledge of earthquake mitigation, which in turn supported the effective implementation of local NEHRP-funded projects.

FEMA also continued to update and maintain the NEHRP Earthquake Coordinators website. This website provides state and federal earthquake coordinators with training on earthquake basics, hazards, risks, building techniques, advocacy and partnerships, and priorities and successful activities (www.training.fema.gov/emiweb/EarthQuake/welcome.htm).

B. FEMA Earthquake State Assistance Program

The Earthquake Hazards Reduction State Assistance Program (Cooperative Agreements) is a FEMA responsibility under Public Law 108–360, which directs the agency to support state efforts to mitigate seismic risks and reduce future losses from earthquakes. Under the program, FEMA provides funds each year to eligible states and U.S. territories with moderate to high seismic risk, as illustrated below in the USGS 2008 Earthquake Hazard Risk Map. In FY 2010, FEMA awarded \$2.3 million to 33 states and territories.



In partnership with FEMA, states used the funds to support the effective implementation of earthquake risk reduction activities: earthquake training and awareness, seismic mitigation plans, property inventory, and seismic safety inspections, building codes adoption, and the development of multi-state groups. Highlights of successful state, territorial, and local government efforts in FY 2010 are presented by FEMA Regions I-X (see below).



Region I

Maine

Maine used its assistance funds in FY 2010 to train a Natural Hazards Planner in the use of HAZUS-MH and for updating the State Hazard Mitigation Plan using HAZUS and ArcGIS. Work also was carried out with federal, state, and local stakeholders to gather additional GIS data for use with HAZUS. Additional accomplishments in Maine included outreach for building officials on the adoption of the new State Building Code, specifically on seismic provisions; the development of an earthquake safety and informational pamphlet for public outreach; and an earthquake seminar held with staff from the Weston Observatory. NETAP funds also were used to train about 50 local building officials in the RVS Screening of Buildings for Potential Seismic Hazards, FEMA 154.

Vermont

Vermont accomplishments included the development of site class, amplification, and liquefaction hazard maps through detailed geologic/engineering analysis for the Burlington quadrangle, which includes the City of Burlington. The objectives of the study are to develop GIS-compatible site class, amplification, and liquefaction hazard maps for the study area; evaluate seismic vulnerability of representative essential facilities; update the HAZUS-MH damage analysis for the area; and provide outreach to the local government and private practice engineering community, owners of essential facilities, other relevant agencies, and the public.

Region II

New York

The “Inventory of State Buildings” project was initiated in New York in 2010. Integration of inventory data collection with existing state building fire code inspections by the New York State (NYS) Office of Fire Prevention and Control emerged as the most appropriate approach. Among the tools being evaluated for potential use is the DHS “Integrated Rapid Visual Screening (iRVS)” tool. Efforts are underway to schedule training in the spring 2011 for fire inspectors. State emergency management officials also worked with the NYS Geological Survey and the Lamont-Doherty Earth Observatory to establish portable seismic stations at three locations in the Town of Berne, where more than 30 minor seismic events occurred over a 2-year period. While geologists are hesitant to assign any portents to this swarm for a larger event due to uncertainty as to the geologic conditions causing the seismic activity, this swarm reminds emergency managers of the need to be prepared. A special article on the Berne Earthquakes, including HAZUS-MH loss estimation results for a “what if” 6.0M at this location, was co-authored by project staff and appeared in the March 2010 issue of the NYS “Emergency Management Times”: http://www.semo.state.ny.us/uploads/2010_03_EMT.pdf

Puerto Rico

Educational and training activities in Puerto Rico (PR) included the development of natural disaster interactive courses for the public, educational campaigns, and training sessions on Earthquake, Tsunamis, and Family Plans, which attracted more than 8,700 participants from January 2009 to May 2010. An initiative of the PR Seismic Network and the National Weather Service was the “LANTEX 2009” and “LANTEX 2010” exercise. The objective of the exercise was to evaluate the reception and dissemination of messages needed to activate Evacuation Plans in 44 participating coastal municipalities. FEMA assistance funds also were used to support earthquake drills held in schools island-wide (1,100 in 2009 and 2010) and to provide ongoing educational material and workshops for senior citizens in Geriatric Centers located in at-risk areas. The Puerto Rico Emergency Management Agency (PREMA) has trained 30,000 members of community groups to maintain radio communications throughout the island in the event of a disaster. As part of an Interagency Agreement with the PR Seismic Network, PREMA funded the support of the 24-hour operations of the PR Seismic Network. PREMA also launched an Internet portal for the public to learn how to prepare for catastrophic events.

Virgin Islands

The Virgin Islands Emergency Management Agency has begun a project with its FEMA assistance funds to prepare inventories and conduct seismic safety inspections of critical structures and lifelines. The primary goal of this project, which is a collaborative effort between the Department of Planning and Natural Resources and the Department of Public Works, is to enhance seismic safety and reduce loss of life and property associated with emergencies caused by earthquakes.

Region IV

Alabama

In FY 2010, Alabama created 20,000 earthquake brochures, delivered them to county emergency management offices for public awareness, and distributed the brochures at different venues throughout the state. Alabama also supported several multi-group meetings, conferences, and workshops to encourage cross-functional development in the earthquake program. Other activities included updating the 6th grade science curriculum to include a focus on state earthquake awareness and promoting The Great Central US ShakeOut to be held in April 2011.

Georgia

Georgia used its FY 2010 assistance funds to establish an earthquake program. Activities undertaken as part of this initiative included the development of a partnership with Georgia Tech and the identification of a seismologist to serve as the Georgia Seismologist/State Earthquake Specialist; development of an Emergency Managers Guide to Earthquakes and an Emergency Managers Mini Guide to Earthquakes; creation of a State Earthquake Plan; and the conduct of multi-state coordination efforts, such as attending CUSEC annual program managers meetings and other earthquake-related events.

Kentucky

Kentucky conducted public outreach through participation in the Kentucky Center for Safe Schools Annual Conference, creation and distribution of a new earthquake preparedness brochure, and the development of a portable display booth for its earthquake program. Both Kentucky and South Carolina, along with Mississippi, Maryland, Washington, and FEMA Regions IV, VIII and X, also developed and participated in the first virtual rollout of the FEMA EMI-credentialed E-313 Basic HAZUS-MH class in which technical GIS and earthquake loss estimation methodologies were taught to federal, state, local, and private industry students. The class was unique in its coupling of local, regional, and national participants, as well as in its demonstration and teaching of internationally significant methodologies relative to the HAZUS For Haiti earthquake scenario developed by FEMA Regions IV and VIII.

Mississippi

In Mississippi, assistance funds were used to develop an Earthquake Incident Annex to the State Catastrophic Emergency Management Plan. Other activities included NLE 2011 planning workshops and the provision of media coverage for the NLE 2011 and ShakeOut during Earthquake Awareness Week.

North Carolina

North Carolina conducted three outreach seminars in Western North Carolina on earthquake risk and non-structural retrofit techniques. A wide variety of stakeholders attended the seminars, including emergency managers, educators, and members of the banking and finance

industries. As a direct outcome of the seminars, a non-structural retrofit project was piloted for an Emergency Operations Center in a western North Carolina county particularly vulnerable to earthquake hazard.

South Carolina

In FY 2010, South Carolina held a state-specific HAZUS course targeting county emergency managers. Other highlights included coordination with state agencies to inspect and evaluate critical lifelines, updating of seismic hazards maps, printing and distribution of South Carolina earthquake guides and brochure for homeowners, and producing a new isoseismic map of the 1913 Union County Earthquake and a summary report of geologic and geophysical investigations on the nature of the 1913 earthquake. In partnership with other states, universities, and earthquake research centers, South Carolina held a USArray coordination meeting in Columbia, South Carolina to decide potential locations for the placement of US Arrays. South Carolina also hosted a very successful Earthquake Awareness Week in 2010, with 100 percent public school participation by two counties in the earthquake drill.

Tennessee

Tennessee partnered with the 249th Eng. Battalion, a reserve component of the U.S. Army Corps of Engineers (Corps), to complete an on-site comprehensive electric generator power survey of 225 critical infrastructure facilities in 5 highly vulnerable counties (Dyer, Obion, Weakley, Lake, and Gibson) in the NMSZ in West Tennessee. The critical facilities (law enforcement stations, fire stations, emergency medical stations and collection points, and emergency management operations centers) do not have permanent back-up generators for emergency power in the event of seismic events on the NMSZ. The completed surveys will allow for the delivery and placement of temporary generators within 72 hours of an event in cooperation with the Corps, as tasked through FEMA in the Federal Response Framework.

Region V

Illinois

Illinois used its FY 2010 assistance funds for a number of activities, including enhancing its website to include an earthquake hazard hunt for the home and other information; the purchase of a portable earthquake exhibit for use at events throughout the state; enhancing the Earthquake Annex to the Illinois Emergency Operations Plan; and conducting earthquake awareness activities during the April Earthquake Awareness Month and throughout the year, including the distribution of news releases and publications.

Region VI

Arkansas

Outreach and educational activities in Arkansas included the “New Madrid Seismic Zone: What We Know and How to Prepare,” at Arkansas State University on February 2-3 as part of Earthquake Awareness Week; an Earthquake Preparedness presentation for the Home Instruction for Parents of Preschool Youngsters (H.I.P.P.Y.) Program of Northeast Arkansas in Pocahontas on April 19; and a teachers’ in-service workshop on August 10. Workshops also were conducted on Post Earthquake Safety Evaluation of Buildings, ATC-20, and RVS of Buildings for Potential Seismic Hazards, FEMA 154, in partnership with the Arkansas Department of Emergency Management, CUSEC, the Arkansas Geological Survey, the American Society of Civil Engineers (Arkansas Chapter), the University of Arkansas, and the Arkansas Electric Cooperative Corporation.

New Mexico

New Mexico has undertaken a number of activities with its FY 2010 assistance funds, including team building efforts in support of the statewide earthquake program and preparations for upcoming training courses scheduled for FY 2011.

Oklahoma

Based on the new seismic risk criteria in the 2012 IRC map, Oklahoma was one of three new states to join the FEMA assistance program in FY 2010. The majority of Oklahoma’s activities in FY 2010 were focused on obtaining a better understanding of seismic risk throughout the state and establishing an earthquake program in partnership with FEMA and state universities. The earthquake program includes plans to educate emergency managers, local engineers, schools, and private citizens across Oklahoma in earthquake mitigation.

Texas

Texas, similar to Oklahoma, was a newcomer to the FEMA state assistance program based on the new seismic risk criteria in the 2012 IRC map. Activities included the development of a work plan to establish an earthquake program and the implementation of procedures for working with partners throughout Texas, including universities, the emergency management community, educational groups, and local and private organizations.

Region VII

Missouri

Activities in Missouri included ramp-up work for the New Madrid Bicentennial; earthquake mitigation outreach to schools, including a “Drop, Cover & Hold On” video and a manual for schools; “Drop, Cover & Hold On” exercises; participation in meetings with school administrators, principals, teachers, and facilities managers; and Incremental Seismic Mitigation

for Schools training. Other activities included preparations for the Great Central US ShakeOut and the NMSZ Conference held in Cape Girardeau, Missouri, with about 150 local and state participants.

Region VIII

Montana

The objective of the 2010 Montana Seismic Project was to obtain a better understanding of the seismic vulnerabilities of state-owned buildings located within the Intermountain Seismic Belt, specifically those state-owned facilities essential for continuity of government operations where seismic evaluation may be needed. The 2010 project accomplished 61 Tier 1 Evaluations, an Inventory Report, and a database to track the Tier 1 results.

Utah

FEMA provided funds, training support, and technical assistance to Utah to plan and execute a building assessment pilot project targeting 80 public and charter schools. The pilot project, which screened about 10 percent of the public schools in the Wasach Front, will lead the way in developing a complete inventory of vulnerable school buildings in the area. Twenty local engineers who participated in the project used FEMA 154, a nationally accepted standard procedure for rapid assessment, so local communities can understand vulnerabilities in their existing building stock. During the process, Utah volunteers also tested FEMA's ROVER tool to digitize its data collection and building assessment records. The project will enable Utah to identify those schools requiring further engineering evaluation and future seismic retrofitting. The project will also provide a model that Utah can employ toward a more comprehensive building assessment project for other state-owned critical facilities.

Wyoming

The Wyoming Geological Survey (WSGS) completed a draft report on 16 earthquake scenarios for Wyoming. Using HAZUS-MH and assistance from FEMA Region VIII, earthquake scenarios for 12 quaternary faults and 4 historic epicenters were completed to provide earthquake loss estimates for state and local mitigation plans. The WSGS is working on an Internet Map Service which will provide online maps and reports relating to the earthquake scenarios to the public through a web interface. The WSGS also purchased 30 earthquake response kits (72-hour response) for placement in schools at high seismic risk.

Region IX

Arizona

In Arizona, activities were focused on the Arizona Shake Campaign, a statewide outreach initiative designed to raise public awareness and education of seismic risks. In FY 2010, state

efforts included the establishment of a multi-state group of cooperative networks and partnerships to coordinate seismic hazard information and activities.

California

California continued to broaden its network of earthquake education stakeholders, the Earthquake Country Alliance (ECA), which is responsible for coordinating California's annual public earthquake drill, The Great California ShakeOut. In 2010, the ShakeOut included 8 million participants, a 13 percent increase over the 2009 ShakeOut. California is now providing lessons learned and coaching to other states and countries that are joining the ShakeOut. To support the ECA, the California Emergency Management Agency (EMA) and its partners conducted nine regional workshops to broaden the base of earthquake education stakeholders and to promote educational tools to unify earthquake preparedness messaging for the public. California also partnered with the California Earthquake Authority to co-fund market research to further social science on public emergency preparedness. In 2011, the results will contribute to identifying the "value" that the public places on preparedness. All earthquake education stakeholders will have access to this information to position their existing and new public messaging for maximum impact. The first campaign to use this product will be a statewide PBS TV project rolling out in the summer 2011 and culminating in ShakeOut 2011.

Guam

A significant accomplishment for Guam was the adoption of the 2009 IBC and delivery of 2009 IBC fundamentals training to more than 150 engineers, architects, building officials, building owners and facility managers, emergency managers, and first responders, at least 29 of whom were supported by FEMA assistance funds. In addition, nearly 39,000 participants took part in Guam's first island-wide earthquake drill, "The Great Guam Shakeout." Participants included schools, families, public and private organizations, volunteer groups, and the military. Guam produced and distributed earthquake awareness outreach materials, including brochures, posters, and items for school children, and conducted earthquake outreach for more than 1,500 elementary school children. Community outreach and public education also were part of "National Preparedness Month" activities in September 2010.

Hawaii

In FY 2010, the Hawaii State Earthquake Advisory Committee continued its work in the following areas: assisting counties in updating seismic portions of their local mitigation plans; conducting seismic safety inspections and inventories of critical structures and lifelines; increasing seismic awareness and earthquake education; and making recommendations on earthquake mitigation projects through the State Hazard Mitigation Forum.

Nevada

The Nevada Earthquake Safety Council (NESC) advises the Nevada Division of Emergency Management on earthquake issues and carries out programs to encourage mitigation and preparedness. In FY 2010, NESC accomplishments included updating the book "Living with Earthquakes in Nevada," distributing copies to citizens throughout the state, and posting it on

the web at <http://www.nbmj.unr.edu/dox/sp27.pdf>; honoring students at Carson High School in Carson City for their preparation of an animation to accompany a song on “Drop, Cover, and Hold,” <http://www.nbmj.unr.edu/Geohazards/Earthquakes/EarthquakeResources.html>; reaching out to county and city officials in rural communities through earthquake and other hazard presentations at quarterly meetings of the Nevada Hazard Mitigation Planning Committee; joining with California to heighten earthquake awareness during the ShakeOut on October 21; and focusing on safety of tourists and business continuity for the tourism industry through an *ad hoc* committee on visitors.

Region X

Alaska

In FY 2010, Alaska supported an active earthquake mitigation program in close partnership with the State Seismic Hazard Safety Commission. An important accomplishment was the earthquake exercise, Alaska Shield/Northern Edge, in which state, federal, and local partners tested their response to a major earthquake with tsunamis in terms of casualties, rescue, and sheltering. Another successful initiative was the “Quake Cabin,” an earthquake motion simulator used to teach non-structural seismic hazard mitigation and preparedness. Through this tool, audiences experienced the effects of an earthquake on the contents of a typical residence. The “Quake Cabin” and accompanying educational materials visited schools, community fairs, and company safety days. Other activities in FY 2010 included the continued deployment of a near real-time earthquake-monitoring system in seven emergency operations centers and the cataloguing of active earthquake faults in an online database; the assessment of the seismic structural safety of elementary, middle, and high schools in the Kodiak Island Borough (seismic retrofits were completed on several at-risk schools); and additional seismic retrofit projects, including the installation of seismic safety gas shut-off valves in schools, fire stations, and critical facilities in the Municipality of Anchorage. Funds also were used to support the statewide Post-Disaster Damage Assessment training program.

Idaho

In Idaho, NEHRP soil classification and liquefaction susceptibility maps were completed in partnership with the Idaho Geological Survey (IGS) for the Idaho Falls area. Similar projects are scheduled for Teton County and the Treasure Valley metro area, including Boise, Meridian, and Nampa. The Idaho Bureau of Homeland Security (IBHS) completed a project to collect structural data sets for critical facilities in Bingham, Bonneville, Jefferson, Madison, and Teton Counties in Eastern Idaho. The data from both these projects will significantly improve seismic hazard modeling using HAZUS. IGS researchers from Idaho State University also reported the discovery of a previously unknown active fault in the Sawtooth Range, about 65 miles east of Boise. The fault, which was imaged in heavy forest cover using LiDAR, is estimated by researchers to have been active twice in the last 10,000 years. Additional accomplishments include the updating by the IBHS of the Earthquake Hazard Annex to the Idaho Emergency Operations Plan; the delivery of training to engineers interested in participating on a state damage assessment team; and delivery of training on Procedures for Post Earthquake Safety Evaluation of Buildings, ATC-20,

and RVS Screening of Buildings for Potential Seismic Hazards, FEMA 154, in partnership with the Structural Engineers Association of Idaho.

Oregon

In FY 2010, Oregon initiated a Seismic Rehabilitation Grant Program which awarded \$15 million to 14 schools and 11 emergency services facilities. In the first round of awards to K-12 schools, every \$1 million from the program will help protect more than 800 children. K-12 grant awards ranged from \$120,000 to \$1,490,000, with an average award of about \$777,000 for the high- to very-high risk of collapse buildings. With its FEMA earthquake assistance funds, Oregon produced a case study on seismic retrofit projects to help guide future retrofits. Oregon also continued to support the Oregon Seismic Safety Policy Advisory Commission, the mission of which is to reduce exposure to earthquakes, influence agencies in meeting the goals of earthquake resilience, and improve public understanding of earthquakes in Oregon.

Washington

In Washington, a Pilot School Seismic Safety Assessment Project was conducted to evaluate all public school buildings and critical facilities and establish the seismic risk for each. This will result in the prioritization of structures needing seismic retrofit and permit a targeted approach for alleviating the risk of potentially dangerous structures. The assessments were conducted by volunteer engineers from the Structural Engineering Association of Washington using ASCE 31, Seismic Evaluation of Existing Buildings. The Washington Geological Survey also completed local site class assessments at each school facility to determine soil conditions and assess liquefaction potential. Another significant accomplishment was the development of a Seismic Mitigation Policy Gap Analysis & Database that identified and catalogued every seismic risk reduction policy, plan, executive order, and program in the United States. The new Seismic Policy Database classifies each risk reduction strategy identified from State Hazard Mitigation Plans into each phase of emergency management. This will help identify the most effective seismic policies for Washington. Washington State Emergency Management also supported the FEMA Integrated Emergency Management Course Earthquake functional exercise for Snohomish County on September 13-17, 2010 (the scenario was a M7.2 Southern Whidbey Island Fault earthquake); developed templates for K-12 School Earthquake Procedures for school administrators, classroom teachers, students, and custodial and maintenance personnel; and trained more than 200 professionals on seismic mitigation techniques.

C. Regional Earthquake Consortia

Cascadia Region Earthquake Workgroup (CREW)

The Cascadia Region Earthquake Workgroup (CREW) is a coalition of private and public representatives working together to improve the ability of the Cascadia Region to reduce the effects of earthquake events. In FY 2010, CREW created a public education document to address the Crustal Earthquake risk in the Cascadia region of Northern California, Oregon, Washington, and British Columbia. The CREW document discusses how science, safety, and preparedness can help private and public sectors in the area to be more resilient to earthquake

effects. CREW, in coordination with Pacific Northwest Seismic Network, EERI, and Urban Design and Planning, also organized an open educational discussion to discuss lessons learned from local and global impacts and responses to the Haitian and Chilean earthquakes and how they relate to the Cascadia area.

Central United States Earthquake Consortium (CUSEC)

The eight-state CUSEC region, which also includes FEMA Regions IV, V, VI, and VII, was very active in FY 2010. In the area of public outreach, CUSEC worked in close partnership on 1811/1812 Bicentennial activities with the University of Memphis Center for Earthquake Research and Information (CERI), EERI, and the USGS that will take place throughout 2011. CUSEC also worked with the Southern California Earthquake Center (SCEC) to develop the ShakeOut program for the Central United States. The goal of 1 million participants has been set for the first ShakeOut, with more than 300,000 already signed up. Work also is continuing on the educational CUSEC State GeoCache Initiative, the first of its kind in the United States. This project is utilizing a fun and family-oriented geocaching experience to expand the outreach efforts of CUSEC in a new and unique way. CUSEC also completed and distributed the Central U.S. Earthquake Guide, which provides information on Earthquake Science, Past/Historical Earthquakes, Earthquake Preparedness Tips, and mitigation information, and continued to publish the CUSEC Journal, a quarterly email and web-based publication.

Training continued to be a mainstay of CUSEC efforts. A Non-Structural Mitigation for Hospitals workshop focused on providing hospital officials with a greater understanding of earthquake mitigation techniques. A “Get Your Home Ready for Earthquakes” Seminar helped homeowners to understand the importance of earthquake risk reduction, and participants learned the method of inspecting buildings through a session of RVS of Buildings for Potential Seismic Hazards, FEMA 154. In addition, Post-Earthquake Safety Evaluations, ATC-20, was taught at the local level throughout 2009 and 2010 on the accepted method for post-earthquake building inspections.

Northeast States Emergency Consortium (NESEC)

The most effective way to reduce seismic vulnerability is for government jurisdictions to adopt and enforce building codes that include strong seismic provisions. In the Northeast, where many jurisdictions have not yet adopted strong seismic building codes, it is important to promote and support their adoption and enforcement. To address this issue, NESEC continued the development and enhancement of an on-line Hazard-Resistant Building Code Database that allows the public in the Northeast States to determine if their state and local community has building code regulations for earthquakes and other hazards. By entering their zip code at http://www.nesec.org/building_codes/, citizens can obtain state level building code and enforcement data. NESEC also provides the public with information on how to request building code enforcement ratings and grades for their community.

NESEC continues to operate a HAZUS-MH and GIS Emergency Management Risk Assessment Center. NESEC’s priority is to provide direct HAZUS-MH and GIS support to states and local

jurisdictions that do not have an in-house capability (they can click this link to request assistance <http://www.nesec.org/resources/>). HAZUS-MH information provides the spatial and temporal backdrop on which effective and efficient earthquake risk and loss assessment can be accomplished. This information, coupled with infrastructure data, can help to mitigate the impact of earthquakes and other hazards. NESEC has conducted numerous HAZUS-MH studies of the potential impact of earthquakes striking in New York City, Boston, and New England. The results of the impact of these events have been used to support the development of state and local hazard mitigation plans and strategies in the Northeast.

In November 2009, NESEC hosted a national meeting of State Earthquake Program Managers and other NEHRP partners from across the Nation. The group met in Cambridge, Massachusetts to learn from past earthquakes, share best practices, and discuss programs and policies to accelerate the implementation of earthquake loss reduction and mitigation strategies.

Western States Seismic Policy Council (WSSPC)

WSSPC, a regional earthquake consortium in the western states, is headquartered in Sacramento, California. WSSPC members are the State Geological Survey and Emergency Management Directors of 13 western states, 3 U.S. territories, a Canadian territory and a Canadian province, and liaisons to 7 western state seismic safety councils and commissions.

In FY 2010, WSSPC adopted nine policy recommendations in the areas of tsunami identification and evacuation notification, post-earthquake clearinghouses and information management systems, adoption of seismic provisions in the IBC, seismic design of new schools, and identifying and mitigating hazards in seismically vulnerable schools. WSSPC member states were surveyed about their adoption of the WSSPC policy recommendations, which will be used as a baseline for gauging future progress on adoption of policies that reduce earthquake losses. Policy survey results are available on the WSSPC website at www.wsspc.org.

WSSPC organized an Earthquake Early Warning session held at the Natural Hazards Center Workshop. Speaker presentations were filmed and are posted on the WSSPC website. In FY 2010, WSSPC also redesigned its website and added content on Earthquake and Tsunami Resources and Mitigation. Annual state reports and WSSPC Annual Reports are also available.

D. Earthquake Engineering Research Institute

In 2009, EERI organized a new seminar series on the topic of soil liquefaction during earthquakes. The seminars discussed recent progress in the evaluation of liquefaction hazards during earthquakes and gave participants the tools to estimate the potential for triggering liquefaction, its consequences, and its mitigation. More than 300 participants attended the seminars. A second series of seminars focusing on practitioners on the East Coast and the Midwest were held in April and May 2010.

Each year, EERI issues at least one new Oral History with FEMA support. These important publications help preserve the historical record of earthquake science and engineering and are critical to providing a sense of history to those active in the earthquake field as well as those young people considering it as a career. In 2009, an oral history of Professor Vitelmo Bertero, a world renowned leader in earthquake engineering at the University of California, was published and in early 2010, EERI published the oral history of Professor Robert Whitman of MIT.

The long-awaited Contributions of Earthquake Engineering was completed and distributed in FY 2010. EERI believes this document is a valuable tool in demonstrating how investments in earthquake engineering and science have resulted in technical advances that apply beyond earthquakes to other hazards, civil infrastructure, applied information technology, and homeland security. This publication will also help demonstrate the value and far-ranging consequences of earthquake engineering and science research and implementation to other federal agencies, Congress, and state and local governments.

EERI and the Canadian Association for Earthquake Engineering held the 9th US National and 10th Canadian conference on Earthquake Engineering: Reaching Beyond Borders, July 25 – 29, 2010, in Toronto, Ontario, Canada. More than 700 papers were accepted for oral presentations and another 200 for poster presentations. Attendance topped 900, with participants from throughout North and South America, Europe, and Asia.

Two prestigious NEHRP FEMA/EERI fellowships are awarded annually, one to a senior graduate student and the other to a professional in an earthquake field, to enable qualified individuals to enhance their knowledge and improve their professional capabilities. The current Professional Fellow is working on multidisciplinary research into a novel approach to improve seismic hazard assessment and ground motion simulation by applying machine learning tools.

Since 2006, EERI's Student Activities Committee has overseen the Undergraduate Seismic Design Competition (SDC). Today the competition is an exciting fixture of EERI Annual Meetings. This past February in San Francisco, approximately 200 undergraduate students from 22 teams took part in the largest SDC competition to date.

The mission of the EERI Earthquake Mitigation Center is to promote and encourage reduction of earthquake risk through the development and dissemination of information related to the assessment and mitigation of earthquake risks. The Mitigation Center continues to be a work in progress, aimed at providing products and programs to encourage the seismic rehabilitation of buildings and lifelines in all seismically prone regions of the United States. Last year, EERI gained access to the slide library of the California Office of Emergency Services, Bay Area Regional Earthquake Preparedness Project. EERI scanned the annotated slide presentations and added them to the resources of the Mitigation Center website, making them available to seismic safety advocates, engineers, and others throughout the United States and the world. EERI also has completed preliminary work on a web interface to provide access to a photo database of thousands of images from earthquakes taken over the past several years by team members of EERI's LFE Program. The images are now accessible through the Mitigation Center

website, along with those images obtained from the California Office of Emergency Services. In the coming year, more attention will focus on organizing images by themes so that seismic safety advocates can quickly download images and slide shows that illustrate specific topics.

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