NEVADA EARTHQUAKE SAFETY COUNCIL
Wednesday, February 6, 2008
Washoe County Emergency Operations Center
5195 Spectrum Blvd. (off Dandini Blvd.), Reno, NV

Agenda

Time	***Agenda Item***	***Description***

The Council may take action on items marked by an asterisk (*). Items may be taken out of order presented on the agenda at the discretion of the chairperson.

9:45 a.m.	CALL TO ORDER/ROLL CALL *Chairman Lynn*	Confirm Quorum
9:50 a.m.	*APPROVAL OF MINUTES (see www.nbmg.unr.edu/nesc/ for a copy of the draft minutes) *Chairman Lynn*	Action
9:55 a.m.	COMMITTEE REPORTS Awareness and Education Committee – *Diane dePolo and Jenelle Hopkins* **No items will be discussed that will require an action or voting.** Research Committee – *Jim Werle and Craig dePolo* **No items will be discussed that will require an action or voting.** Policy Recommendations – *Wayne Carlson* *Review and possible adoption of the following: **1. Proposed policy statement on Special Planning Consideration Zones** **2. Proposed policy statement on Activating Applied Technology Council 20 Post Earthquake Inspections** **3. Proposed Bill Draft Request – Nevada Earthquake Safety Action Priority Act** **4. Unreinforced Masonry identification status report** Strategic Planning Committee – *Jim Reagan* **No items will be discussed that will require an action or voting.** Nominating Committee – *Chairman Lynn* Ad Hoc Committee on Department of Homeland Security – *Elizabeth Ashby and Jim Reagan* **No items will be discussed that will require an action or voting.** Ad Hoc Committee on Anchoring of Propane Tanks – *Werner Hellmer* **No items will be discussed that will require an action or voting.**	Information, Discussion, & Action
10:45 a.m.	**BREAK**	
11:00 a.m.	DIVISION OF EMERGENCY MANAGEMENT UPDATE a. Truckee River Irrigation Canal breach in Fernley b. Funding for the NESC from EMPG funds *Elizabeth Ashby*	Information
11:30 a.m.	*DISCUSSION ON A LETTER OF SUPPORT FROM NESC FOR EARTHQUAKE-HAZARD PARCEL MAPPING IN HENDERSON, NV and NEEDS FOR A USER-FRIENDLY EARTHQUAKE WEB SITE FOR NEVADA *John Louie, Seismological Laboratory*	Information & Discussion

Noon	**LUNCH (please let Terri Garside (tgarside@unr.edu) know if you'll be staying for lunch; we'll be taking a collection for the cost)**	
1:00 p.m.	UPATE ON THE NATIONAL EARTHQUAKE CONFERENCE APRIL 22-26, 2008, SEATTLE, WASHINGTON *Jon Price, Nevada Bureau of Mines and Geology*	Information
1:15 p.m.	*DISCUSSION ON NESC SUPPORT OF THE WESTERN STATES POLICY COUNCIL'S POLICY RECOMMENDATIONS (attached) *08-1 Improving Tsunami Public Education, Mitigation, and Warning Procedures for Distant and Local Sources* *08-2 Active Fault Definition for the Basin and Range Province* *08-3 Real-Time Earthquake Monitoring Networks* *08-4 Identification and Mitigation of Unreinforced Masonry Structures*	Information, Discussion, and Possible Action
2:00 p.m.	SEISMICITY REPORT AND SEISMIC MONITORING NEEDS FOR SOUTHERN NEVADA *John Anderson, Director* *Nevada Seismological Laboratory*	Information & Discussion
2:30 p.m.	**BREAK**	
2:45 p.m.	OLD BUSINESS Review of action items from the November 14th meeting *Chairman Lynn*	Information & Discussion
2:55 p.m.	NEW BUSINESS a. Future Meeting Dates: Wednesday, May 7, 2008 in Las Vegas Wednesday, August 6, 2008 in Reno Wednesday, November 12, 2008 in Las Vegas	Information & Discussion
3:10 p.m.	PUBLIC COMMENTS	
4:00 p.m.	ADJOURN no later than 4:00 p.m.	

Please post this agenda. For more information, please contact Jon Price (*jprice@unr.edu*) or Terri Garside (*tgarside@unr.edu;* telephone for either = 775 682-8746).

This is a public meeting. In conformance with the Nevada Open Meeting Law, I, Terri Garside, posted or caused the posting of this agenda on or before February 1, 2008, 9:00 a.m. at the following Locations:
Nevada Bureau of Mines and Geology – Reno
Division of Minerals – Carson City
Clark County Building Department – Las Vegas
On the Web at www.nbmg.unr.edu/nesc/index.html

We are pleased to make reasonable accommodations for disabled members of the public. If special arrangements are necessary, please notify the Council at 775 682-8746. Twenty-four hours advance notice is requested.

WESTERN STATES SEISMIC POLICY COUNCIL
DRAFT POLICY RECOMMENDATION 08-1

Improving Tsunami Public Education, Mitigation, and Warning Procedures for Distant and Local Sources

DRAFT Policy Recommendation 08-1

Tsunami Outreach

WSSPC supports the preeminent need to reduce loss of life from tsunamis through concentrated public education. Public education components must be institutionalized and consist of continuous instructional programs reinforced by exercises and training and subsequently measured using social science surveys to determine programmatic effectiveness. In the case of many local source tsunamis, the impact time is so short that the most effective means for protecting the public is not through warning systems, but through community outreach and education which occurs prior to the event. Buoys, sirens, and loudspeakers, etc., are meaningless if the general public does not know what to do in the immediate aftermath of an earthquake resulting in the potential for a tsunami.

Distant tsunamis

WSSPC supports the efforts of the U.S. Geological Survey (USGS) and National Oceanic and Atmospheric Administration (NOAA) to continue deployment, maintenance, and improvement of the nation's seismic monitoring system and deep-ocean tsunami detection system for the purposes of rapidly and accurately detecting distant tsunamis and reducing warnings and watches leading to unnecessary evacuations. WSSPC further supports NOAA's effort to develop tsunami forecasting tools for coastal communities.

Local tsunamis

WSSPC supports expanding the ongoing efforts of NOAA, USGS, and coastal members of WSSPC through the National Tsunami Hazard Mitigation Program (NTHMP) in research and mapping the tsunami inundation zone, developing tsunami evacuation maps and routes, implementing a public rapid warning system, and maintaining a continuous public education program about local tsunamis and the need to evacuate immediately after strong or sustained ground shaking stops.

Background

Tsunamis can be the most destructive aspect of an earthquake, not only to nearby coastal areas but also to regions distant from the source. The 1946 and 1964 Alaskan earthquakes produced tsunamis that caused damage and/or loss of life in Hawaii, American Samoa and along the coasts of British Columbia, Washington, Oregon and California. The Pacific and Alaska Tsunami Warning Centers were established as a result of these destructive tsunamis and the need to warn coastal populations of tsunamis from distant sources.

Alarms triggered by earthquakes that produced nondestructive tsunamis have been a major concern associated with the current warning system. Unnecessary evacuations not only create financial burdens on coastal communities, but also may cause people to ignore a real threat if too many false warnings are given. Additionally, unnecessary evacuations may be risky to public safety. Programs to reduce unnecessary evacuations have been developed and implemented through the NTHMP. These programs insure that the messages from the tsunami warning centers are more accurate and timely and that they significantly reduce the number of unnecessary evacuations.

However, Pacific Rim States must plan for local coastal earthquakes that will allow little to no time to issue a general public warning of a destructive tsunami. Subduction zone earthquakes, like the December 2004 Sumatra earthquake and tsunami, can cause the largest loss of life in tsunami at-risk coastal communities. Therefore, it is vitally important to educate the coastal residents, businesses, and visitors about the importance of immediate evacuation to high ground upon cessation of ground shaking. In areas where no high ground is nearby, vertical evacuation in approved engineered structures may be the only option to escape a tsunami. Through the use of scientifically researched and developed tsunami inundation models and maps, community evacuation plans are developed showing evacuation routing and safe zones.

Facilitation and Communication

The WSSPC Board will write letters to NOAA, USGS, and FEMA requesting continued support for increased deployment of deep-ocean tsunami detection systems, the development of a tsunami forecasting model, ongoing maintenance and improvement of seismic monitoring for tsunami-generating earthquakes, and other long-term risk reduction efforts.

WSSPC will write letters to key congressional representatives and to NOAA urging them to support and fund the Tsunami Warning and Education Act passed in 2006 and appropriate the fully allowed funds (27 percent) to the state programs as described in the Act.

Assessment

The effectiveness of the support letters will be measured by the continued financial support of the seismic monitoring system, the open ocean tsunami detection system, inundation mapping and mitigation by the NTHMP, and the appropriate program-level funding of the Tsunami Warning and Education Act.

In turn, the effectiveness of the seismic monitoring and tsunami detection systems will be measured by the successful and timely identification of destructive tsunamis from distant sources.

The effectiveness of the evacuation route maps and educational campaigns would be measured in the short term by public awareness polling funded through the National Tsunami Hazard Mitigation Program, and in the long term by the minimal loss of life from a local tsunami, because people responded appropriately.

History

Policy Recommendation 08-1 was first adopted in 1999 as WSSPC Policy Recommendation 99-1. Reviewed, revised and re-adopted as WSSPC Policy Recommendation 02-1 by unanimous vote of the WSSPC membership at the WSSPC Annual Business Meeting September 18, 2002. Reviewed, revised and re-adopted as WSSPC Policy Recommendation 05-1 by unanimous vote of the WSSPC membership at the WSSPC Annual Business Meeting September 14, 2005.

WESTERN STATES SEISMIC POLICY COUNCIL
DRAFT Policy Recommendation 08-2

Active Fault Definition for the Basin and Range Province

DRAFT Policy Recommendation 08-2

WSSPC recommends that the following definitions be used to categorize active faults in the Basin and Range physiographic province:

Holocene active fault – a fault that has moved in the past 10,000 years.

Late Quaternary active fault – a fault that has moved in the past 130,000 years.

Quaternary active fault – a fault that has moved in the past 1,800,000 years.

It should be emphasized that some historical magnitude 6.5 or greater earthquakes in the Basin and Range Province have occurred on faults that have not been active in the past 10,000 years; furthermore, earthquakes in the Province may occur on faults in all three categories. It is the prerogative of the user to decide what level of earthquake hazard (surface fault rupture and ground shaking) is acceptable.

Background

Future earthquakes in the Basin and Range Province most likely will occur on faults that have had prior Quaternary activity. When the last major earthquake occurred on a fault and the time interval between the most recent earthquake and earlier earthquakes are factors that influence the probability of a similar earthquake within a given time period. For example, a fault that has a major earthquake every 1000 years is more hazardous than one that has a major earthquake every 100,000 years. It is up to the user to decide what degree of fault activity is considered "hazardous." Depending on the intended use of the land (residences, hospitals, schools, picnic grounds, etc.), different levels of fault activity and risk may be acceptable. Understanding the level of fault activity is important when deciding whether to build across the fault, and when estimating probabilities of ground shaking at varying distances from the fault.

A **Holocene** criterion (10,000 years) for potential fault activity has significant precedence, principally from past usage in California. For purposes of implementing the Alquist-Priolo Earthquake Fault Zoning Act, California Code of Regulations defines an active fault as Holocene Active, that is, active within approximately the past 11,000 years, although local governments may use a broader definition. The Holocene Active definition also has a practical applicability, because climate change following the most recent glaciation has created many recognizable soil horizons and geomorphic surfaces used to date fault activity. However, the Holocene Epoch does not encompass the full range of typical average earthquake recurrence intervals (average earthquake repeat times) along faults in the Basin and Range Province, and major historical earthquakes have occurred in the Province along faults without previous Holocene activity.

A **late Quaternary** criterion (130,000 years) uses the onset of the Sangamon interglacial period as a datum and encompasses many of the average fault recurrence intervals in the Basin and Range Province. All but one of the major historical earthquakes in the Province occurred on faults with late Quaternary activity.

The **Quaternary** Period (1,800,000 years) represents the onset of a major climatic change to the current cycle of glacial/interglacial intervals, during which most of the surficial alluvial deposits and present landscapes in the Basin and Range Province were formed. All the major historical earthquakes in the Province have occurred on faults with Quaternary activity. A Quaternary criterion encompasses essentially all the faults that might produce future earthquakes.

The Basin and Range Province is a large extensional tectonic domain with thousands of normal-slip and strike-slip Quaternary faults involved in contemporary deformation. Large earthquakes in the Province commonly involve multiple, distributed faults, and have occurred on faults with a wide range in the time since their most recent surface-faulting earthquakes. This tectonic behavior contrasts with the more focused, higher slip-rate tectonics of the plate boundary system in western California. These different characteristics may warrant different considerations, such as the activity criterion used when establishing fault setbacks and identifying potential earthquake sources.

The identification of faults that pose earthquake hazards requires application of a fault-activity criterion to filter out ancient faults that are unlikely to rupture during future earthquakes. This criterion allows society to develop guidelines for potential surface-rupture sources and for potential ground-motion sources. Two fundamental pieces of information characterize fault activity: the displacements that occurred during earthquakes and the rate at which earthquakes occur, which for most faults can be measured as the average recurrence interval between earthquakes.

In the Basin and Range Province, major historical earthquakes have occurred on faults with Holocene activity and on faults that lacked Holocene activity. The most dramatic example of the latter is the 1887 Sonoran earthquake in northern Mexico. Different lines of reasoning suggest that 100,000 to 200,000 years had elapsed since the previous surface-faulting earthquake on that fault (Bull and Pearthree, 1988). The 1954 Fairview Peak, Nevada earthquake (Bell and others, 2004) is another example of a major historic earthquake on a fault that lacked Holocene displacement (Pearthree, 1990; Caskey and others, 2004). The 1954 Dixie Valley, Nevada earthquake occurred on a fault zone that has evidence of Holocene activity, but also ruptured major portions of fault traces that lacked prior Holocene displacement (Bell and Katzer, 1990). Major earthquakes have occurred on faults with Holocene displacement as well, such as the 1983 Borah Peak, Idaho earthquake (Hanks and Schwartz, 1987). More than half of the major historical earthquakes in the Province included surface faulting along traces which appear to lack Holocene activity. This is an important consideration when determining activity criteria for faults in the Basin and Range Province.

Earthquakes on faults within the Basin and Range Province have a wide range of recurrence intervals, from hundreds of years to hundreds of thousands of years. Recurrence intervals of a few thousand to tens of thousands of years are typical. One of the most recent and detailed paleoseismic studies in the Province was undertaken as part of the site characterization of the proposed high-level nuclear waste repository at Yucca Mountain, Nevada. That study revealed that average recurrence intervals for many of the faults at and near Yucca Mountain are between 20,000 and 100,000 years (e.g., Wong and others, 1995). A theoretical average earthquake recurrence interval can be determined by considering a typical range of slip rates for faults in the Basin and Range Province (0.01 to 0.3 mm/yr) and typical surface displacements during major earthquakes (1 to 3 m). This yields a range of hypothetical average recurrence intervals of 3,000 to 300,000 years.

Elapsed time since the most recent large earthquake and average earthquake recurrence intervals are important characteristics when determining fault activity levels and earthquake hazard. They should be evaluated along with other considerations related to levels of acceptable risk and the costs /benefit ratios when evaluating earthquake hazards for a specific purpose. It is ultimately up to the user to decide how earthquake hazards should be addressed.

Facilitation and Communication

WSSPC recommends that government agencies, regulators, and owners consider these active fault definitions when determining which faults are important for specific facilities or purposes. For some facility types, active fault definitions are already contained in state and federal regulations. Such regulations commonly use different active fault definitions based on the societal importance of the facility being built. Definitions including less active faults (or requiring more restrictive mitigation measures) are typically used for more critical facilities.

When assessing the importance of faults, factors to consider are the type of facility and its societal importance; level of acceptable risk; goals, costs, and benefits of risk reduction; and geologic practicality of applying the definition. An example of the latter is found in areas of the Basin and Range Province where pervasive latest Pleistocene pluvial lake or glacial deposits make use of a Holocene criterion straightforward and practical, but use of a late Quaternary criterion where faults of that age are deeply buried impractical. The expense of risk-reduction measures must be justified based on the probability of earthquake occurrence and resulting risk to society in terms of public safety and potential economic loss. Use of these three broad fault-activity definitions (Holocene, late Quaternary, Quaternary) should make choosing the appropriate activity class for a proposed facility relatively straightforward. It is ultimately up to the regulator and owner to decide how the hazard should be addressed, although uniform treatment among Basin and Range Province states is desirable.

Assessment

The success of this Policy Recommendation can be assessed based on the use of the definitions by states and local governments in regulations and ordinances. The U.S. Geological Survey, Utah, Nevada, Colorado, and Clark County, Nevada have already adopted these definitions of active faults in an earlier version of this WSSPC Policy Recommendation. A periodic assessment of these and other federal, state, and local entities should be made to determine the extent to which these definitions are being incorporated into future seismic-hazard rules, regulations, and guidelines.

References

Bell, J.W., Caskey, S.J., Ramelli, A.R., and Guerrier, 2004, Pattern and timing of faulting in the central Nevada seismic belt and paleoseismic evidence for prior belt-like behavior: Bulletin of the Seismological Society of America, v. 94, no. 4, p. 1229-1254.

Bell, J.W., and Katzer, T., 1990, Timing of late Quaternary faulting in the 1954 Dixie Valley earthquake area, central Nevada: Geology, v. 18, p. 622-625.

Bull, W.B., and Pearthree, P.A., 1988, Frequency and size of Quaternary surface ruptures of the Pitaycachi fault, northeastern Sonora, Mexico: Bulletin of the Seismological Society of America, v. 78, p. 956-978.

Caskey, S.J., Bell, J.W., Wesnousky, S.G., and Ramelli, A.R., 2004, Historical surface faulting and paleoseismology in the area of the 1954 Rainbow Mountain-Stillwater sequence, central Nevada: Bulletin of the Seismological Society of America, v. 94, no. 4, p. 1255-1275.

Hanks, T.C. and Schwartz, D.P., 1987, Morphologic dating of the pre-1983 fault scarp on the Lost River fault at Doublespring Pass Road, Custer County, Idaho: Bulletin of the Seismological Society of America, v. 77, p. 837-846.

Pearthree, P.A., 1990, Geomorphic analysis of young faulting and fault behavior in central Nevada: Tucson, University of Arizona, PhD Dissertation, 212 p.

Wong, I.G., Pezzopane, S.K., Menges, C.M., Green, R.K., and Quittmeyer, R.C., 1995, Probabilistic seismic hazard analysis of the exploration studies facility at Yucca Mountain, in Methods of seismic hazards evaluation, Focus '95: American Nuclear Society, Proceedings Volume, September 18-20, 1995, p. 51-63.

History

Policy Recommendation 08-2 was first adopted in 1997 as WSSPC Policy Recommendation 97-1. Reviewed and re-adopted as WSSPC Policy Recommendation 02-3 by unanimous vote of the WSSPC membership at the Annual Business Meeting September 18, 2002. Reviewed, revised, and re-adopted as WSSPC Policy Recommendation 05-2 by unanimous vote of the WSSPC membership at the WSSPC Annual Business Meeting September 12, 2005.

WESTERN STATES SEISMIC POLICY COUNCIL
DRAFT POLICY RECOMMENDATION 08-3

Real-Time Earthquake Monitoring Networks

DRAFT Policy Recommendation 08-3

WSSPC advocates the continuation and expansion of real-time earthquake monitoring networks as envisioned and supported by the Advanced National Seismic System (ANSS). ANSS emphasizes strong-motion instrumentation of urban ground-motion monitoring sites and selected engineered structures as well as increased broadband seismograph instrumentation. The resulting data provide better understanding of future ground shaking potential and insights for the design of more earthquake-resistant new and retrofitted construction.

WSSPC calls upon all parties committed to earthquake loss reduction to advocate greater support of the U.S. Geological Survey's efforts to expand ANSS monitoring and to standardize data collection, processing, and storage. WSSPC encourages the USGS to strengthen partnerships to further these efforts with emergency managers, engineers, and corporate response and business interruption planners, as well as State and local agencies.

Background

Earthquake monitoring networks are vital both to respond to earthquakes and to characterize earthquake hazards. The earthquake parameters produced by modern seismic networks, when combined with historic earthquake catalogs and the paleoseismic record, are essential input for developing the Nation's probabilistic seismic hazard maps and analyses. Automated processing of earthquake information by seismic networks in the United States provides near-real time information on earthquake locations, magnitudes, and patterns of moderate and damaging ground shaking. In the last few years, seismologists have expanded the capabilities of the seismic network system in some areas to routinely produce ShakeMaps, fault orientations and slip distributions, and aftershock probabilities. In California, ShakeMap has become a valuable tool to assist emergency responders in identifying the possible extent of earthquake damage. Finally, strong-motion data (now increasingly available in real-time) are essential to evaluate the engineering relationship of structural damage to severity of ground shaking.

During the 1960s, the U.S. Geological Survey (USGS) began to operate, support and coordinate local seismic networks that were sensitive enough to detect microearthquakes, including aftershocks of larger earthquakes.

Data from these early seismograph networks were used to delineate the spatial relationships between earthquake epicenters and active faults. Earthquake networks provide fundamental earthquake data in the form of catalogs describing hypocenter location, time of occurrence, and magnitude. These data find uses in diverse applications ranging from earthquake hazard analysis to disaster response. Seismic networks throughout the U.S. have provided fundamental data for the U.S. Geological Survey's National Seismic Hazard Mapping Project, which is generating state-of-the-art earthquake hazard maps for the U.S. The availability of earthquake monitoring network data has led to new and innovative research that has advanced the field of seismology through an improved understanding of the physics of earthquake occurrence.

Despite the importance of its products, earthquake monitoring in the United States faces many problems and challenges, the most notable of which are:

- Outdated, inadequate instrumentation
- Separation of functions between strong- and weak-motion monitoring systems
- Lack of sufficient and uniform geographic coverage in areas at risk
- Lack of uniform operational standards
- Well-established independent networks with non-standardized and even incompatible equipment, operations, products, and funding sources.

Many of the currently deployed instruments record only high frequency (1-25 Hz), vertical motions over a very limited dynamic range. Known as "short-period" seismographs, these analog instruments are extremely sensitive, recording even tiny microearthquakes. However, moderate and larger magnitude earthquakes drive short-period seismograph signals off-scale. The full amplitudes of shaking cannot be recorded and the resulting waveforms are highly distorted.

For the western states, modern monitoring of earthquakes is crucial. The largest proportion of the Nation's seismic risk is in the western states. However, large and damaging earthquakes are not limited to California. Two of the largest earthquakes in the lower 48 states during the past four decades have occurred in the Northern Rocky Mountain region (magnitude 7.3 1959 Hebgen Lake, MT; and magnitude 6.9 1983 Borah Peak, ID). Yet, the Northern Rocky Mountain region remains the largest seismically active region of the lower 48 states without sufficient modern instrumentation.

The recent advent of digital instrumentation has revolutionized seismology. High-fidelity earthquake data transmitted in real-time via terrestrial and satellite communication links and analyzed with modern techniques rapidly provide data and results essential for all aspects of seismology. Modern dataloggers coupled with broadband and strong-motion sensors have the capability to record the full spectrum of earthquake-related ground motions—everything from the high frequencies of nearby earthquakes to the low-frequency, rolling motion of distant earthquakes. Most importantly, digital instruments have dynamic range sufficient to detect tiny earthquakes and yet able to remain on-scale for a major, nearby earthquake. Additionally, all three axes of ground motion (up-down, north-south, and east-west) are recorded (as opposed to only the vertical direction of ground motion recorded by most current network seismographs). High-quality recordings by even a few broadband seismographs from earthquakes with magnitudes as small as 3.5 allow computations that uniquely characterize the type of faulting, amount of energy released, and the stress field responsible for the quake. Likewise, high-quality strong-motion recordings in the urban environment are necessary to understand how seismic shaking can cause damage to buildings and other structures. All this information is now immediately posted to the Internet, and datacenters provide ready access to the information for rapid response and recovery and long-term research.

The vision of the next generation of national earthquake monitoring, the Advanced National Seismic System (ANSS), was issued in 1999 by the U.S. Geological Survey, which has now begun its implementation. Its design has been developed in consultation with earthquake specialists in academia and the States together with the engineering community. The mission of the Advanced National Seismic System is to provide accurate and timely data and information on earthquakes and their effects on buildings and structures, employing modern monitoring methods and technologies.

Since the ANSS was established by Congress in 2000, the USGS has fostered the organization of seven regional networks developed through incorporation of local efforts into regional systems. The seven networks are in California, the Pacific Northwest, Alaska, Hawaii, the Intermountain region, the Central U.S. (including the Southeast), and the Northeast. With USGS support, the newly established ANSS regional networks have installed almost 800 new and upgraded monitoring stations in 24 states since its inception. The largest numbers of new stations are in Alaska, California, Nevada, Utah and Washington, and most have been installed in urban areas where seismic risk is high.

Automated processing of earthquake information by seismic networks provides near-real-time information on the Internet about earthquake location, magnitude, fault orientation, slip distribution, and aftershock probabilities. Together with other parties, the USGS has developed ShakeMap, an analytical methodology that creates maps of the severity of ground shaking developed from ground-motion data recorded by the newly installed ANSS instrumentation and other modern stations. ShakeMaps are posted to the Internet within minutes following earthquakes and also are distributed through technologies like CISN Display and

ShakeCast. The initial maps are automatically revised as new seismic data become available. In areas of California with a relatively dense distribution of strong-motion seismometers, ShakeMap can help emergency managers immediately identify areas that have been exposed to strong shaking before damage reports are available. ShakeMap is being used in conjunction with earthquake loss modeling to make preliminary estimates of earthquake damage costs.

The planned ANSS instrumentation of engineered structures to monitor their responses to earthquake ground motion is just beginning. Because of limited funding, only a few buildings have been instrumented so far. This type of monitoring is very important to the establishment of better building code requirements and design practices to achieve improved earthquake resistance in both new construction and retrofitted structures. Following damaging earthquakes, real-time monitoring of the response of lifelines and buildings will also be valuable in emergency response.

Facilitation and Communication

WSSPC recommends expansion of the regional free-field real-time earthquake monitoring in the western states and throughout the Nation. WSSPC also endorses the expansion of monitoring of engineered structures in order to use insights from investigation of their earthquake performances in the creation of better design procedures and construction standards. To accomplish such expansion, WSSPC encourages the USGS to form partnerships to further these efforts with the emergency managers, engineers, and corporate response and business interruption planners, as well as State and local agencies. In addition, recognizing the synergistic aspects of the National Science Foundation's EarthScope Program, which is deploying temporary seismic and GPS instruments, WSSPC encourages the USGS to take full advantage of EarthScope instruments in fulfilling the mission of ANSS. WSSPC commends those states that are partnering with ANSS to fund modernizing and increasing the numbers of seismic monitoring stations.

The ANSS funding to date as being a small fraction of the planned and requested capitalization needed to build out ANSS, although there has been some incremental growth. By 2009, most of the appropriated funds will be needed to maintain the operation of the current ANSS complement of stations, not to add more. There are more than 6,000 stations needed to meet the ANSS requirements.

Assessment

The success of this policy can be assessed by the increase in the number of engineered structures with strong motion instruments, the level of funding available for maintaining and enhancing networks, and the evidence of partnerships implementing seismic networks among the USGS, state and local agencies, and the private sector.

History

Policy Recommendation 08-3 was first adopted in 1997 as WSSPC Policy Recommendation 97-4. Reviewed, revised, and re-adopted as WSSPC Policy Recommendation 02-5 by unanimous vote of the WSSPC membership at the Annual Business Meeting September 18, 2002. Reviewed, revised, and re-adopted as WSSPC Policy Recommendation 05-3 by unanimous vote of the WSSPC membership at the WSSPC Annual Business Meeting September 12, 2005.

WESTERN STATES SEISMIC POLICY COUNCIL
DRAFT POLICY RECOMMENDATION 08-4

Identification and Mitigation of Unreinforced Masonry Structures

DRAFT Policy Recommendation 08-4

Unreinforced masonry bearing wall structures represent one of the greatest life safety hazards and economic burdens to the public during a seismic event. WSSPC recommends each state, province or territory adopt a program to identify the extent of risk that unreinforced masonry structures represent in their communities and develop recommendations which will effectively address the reduction of this hazard.

Background

During earthquakes, unreinforced masonry (URM) structures are vulnerable to catastrophic collapse and represent a significant life safety threat. Unreinforced masonry structures are made from brick, hollow clay tile, stone, concrete blocks, or adobe materials that are not strengthened by the addition of steel rods or other bracings. Common building examples include older industrial complexes, schools, mercantile establishments, and private residences.

Also of concern are components of these structures such as walls, unsupported parapets, and fireplace chimneys, which can fall on pedestrians or other people trying to exit a building. The masonry usually is held together with weak mortar and is unable to resist lateral forces. Wall and roof anchorage tend to be inadequate, allowing floors and roofs to separate from the walls and collapse. Historically, this has been a major contributing factor to loss of life in earthquakes throughout the world.

Unreinforced masonry is recognized by the Federal Emergency Management Agency as one of the structural types most prone to failure during an earthquake. A review of the USGS Hazards Program listing earthquakes which generated 1,000 or more deaths since 1900 shows that unreinforced walls are a significant contributing factor in losses to both the financial sector and in human lives .

WSSPC strongly believes that jurisdictions must be proactive to address this threat to their citizens. Legislatively mandated programs and/or local municipally adopted ordinances have proved effective at addressing this risk.

WSSPC recognized that there is a societal cost to the inventory and remediation of unreinforced masonry buildings, but in those areas of high seismicity, failure to address this issue will have chilling effects. In order to minimize the cost and make programs more politically acceptable, the three-stage approach of identifying the population of hazardous buildings, analyzing the risk presented by these buildings, and retrofitting those buildings deemed to be a hazard is recommended.

It is realized that resistance is to be expected when dealing with retroactive ordinances. However, as can be seen by those areas which have adopted fire sprinklers retroactively, versus those which have not, even minimal remediation can yield discernable life saving results. Standardized retrofit concepts for unreinforced masonry structures are available through FEMA publications; however, this in no way negates the need for local engineering analysis and design.

Facilitation and Communication

Implementation

WSSPC recommends that States adopt a program to identify the extent of risk that unreinforced masonry structures represent in a community.

The first phase involves creating an inventory of unreinforced masonry structures and is a relatively low cost process. State and local entities, including school districts, should be responsible for identifying their own URM structures. A review of the locally adopted codes is necessary. All structures built under the Uniform Building Code of 1961 or later should have been reinforced, although this should be verified by field inspections.

Private owners of structures erected prior to the effective date of the 1961 Uniform Building Code should be notified that their buildings may be a potential threat to human health and safety and require professional structural inspection with submittal of the inspection findings to an appropriate agency. This inventory process may take several years, but upon completion a more accurate assessment of a community's risk will be evident.

As a second step, the development of a plan to mitigate this hazard will need to be addressed. Using a multi-pronged approach, including obtaining grant funding when possible, incentives to reduce taxes, possible adjustment of permit application fees, or the providing of design and construction assistance, may make mitigation a more workable option. Neither litigation nor forced abandonment of these structures is desirable. The reduction in occupancy or limitations on use may be an acceptable risk option. Permits issued for the sole purpose of seismic retrofitting should not affect or trigger additional jurisdictional requirements or property tax increases.

Alternate Implementation Plan

WSSPC recommends that each State, province or territory implement the three-phase approach to reducing the risk presented by unreinforced masonry buildings by doing the following:

1. Adopt a legislative initiative requiring the inventory of unreinforced structures within a jurisdiction ;
2. Develop, or cause to have developed, a mitigation plan that identifies hazardous structures and includes a cost benefit analysis; and,
3. Implement a URM structures program through:
    a. Completing mitigation design and retrofit,
    b. Abandoning use of the structure, or
    c. Controlling use and occupancy to minimize the potential risk.

Assessment

The effectiveness of this policy can be determined by maintaining an inventory of states, provinces and territories with active programs to mitigate the dangers of unreinforced masonry bearing wall structures. By collecting and identifying these individual efforts, WSSPC will provide a clearinghouse of information which can be used to help promote the policy and advocate its use.

The inventory should be administered annually and contain sufficient detail to help identify the types of programs instituted and their effect in the affected regions.

History

A history section will be added upon approval of the WSSPC membership.

Proposed Policy Statement
Special Planning Consideration Zones

Purpose:

An effective construction planning process requires consideration of earthquake hazards and their effect on community resources and risk mitigation. Special Planning Consideration Zones can be an important tool for local governments to assess the earthquake risks associated with proposed construction projects. This policy recommends that local governments designate specific earthquake zones that are subject to special planning consideration. These areas are for the purpose of identifying and mitigating the earthquake risks.

Policy Statement:

It is the policy of the State of Nevada, through its Division of Emergency Management (DEM) and the Nevada Earthquake Safety Council (NESC), that local governments should designate Special Planning Consideration Zones. Their purpose is to evaluate projects that should require special planning considerations, i.e., identifying and mitigating the earthquake risks.

NESC supports development of Guidelines for Establishing Special Planning Consideration Zones to assist local governments similar to those adopted for fault setbacks and liquefaction hazards.

Local Government Responsibilities:

1. Work with knowledgeable professionals and organizations to determine the earthquake hazards throughout the community
2. Consult with local stakeholders to identify specific zones in which the earthquake hazard should be further evaluated and considered for mitigation efforts to reduce the risks of locating a project in the zone
3. Create development standards for each designated zone
4. Develop a protocol for review of development and construction plans by local government inspectors
5. Empower planning departments to require mitigation plans to be developed prior to project approval

Legislative Interest:

To the extent DEM can implement this policy within its current framework and budget, no legislative action will be required. If legislation is necessary, then Assemblyman Anderson and Assemblyman Mortensen may be interested in proposing a bill draft.

Fiscal Impact:

Additional board and staff time will be involved in identifying hazards, establishing zones and developing requirements for mitigation. The cost for this effort is unknown at this time.

Benefits and Detriments of Implementation:

BENEFITS: As with the NESC Guidelines on mitigation of liquefaction risks and setbacks from known faults, these Special Planning Consideration Zones will help mitigate earthquake risks as new developments are evaluated by local governments. To the extent these mitigation efforts prevent or reduce the potential damages that may occur following an earthquake, community lives and resources will be preserved. Our communities will perform better in significant earthquakes, resulting in a better image and less disruption to the tourism industry.

DETRIMENTS: Additional board and staff time and expense will be involved in identifying hazards, establishing zones and developing requirements for mitigation. Developers likely will experience delays in projects during the review process and additional costs for mitigation. Some developers may choose not to proceed with projects.

Communications:

NESC will need to contact local governments, various professionals and organization stakeholders to elicit their support and cooperation in this effort. Cooperation between legal advisors to develop appropriate ordinances that are consistent among local governments will be necessary to assure developers of a streamlined review process. NESC can facilitate workshops to explain the purpose of the zones and the earthquake hazards associated with each community.

Assessment of Effectiveness:

Measures to assess the effectiveness of these planning zones ultimately will be a post-disaster assessment. Local officials can utilize HAZUS scenarios to measure the effect of disasters within zones and inform key property owners and developers of the value of such special planning efforts in assuring the success of their developments, both short term and long term, through risk mitigation.

Proposed Policy Statement
Activating ATC 20 Post Earthquake Inspections

Purpose:

To assure an effective recovery process following an earthquake, qualified inspectors that rapidly can assess buildings for occupancy is critical This policy establishes an activation process for such inspectors, whether local, regional or from out of state and includes implementation of mutual aid agreements, and includes measures for assuring transportation and housing for the inspectors while they conduct inspections.

Policy Statement:

It is the policy of the State of Nevada, through its Division of Emergency Management (DEM) and the Nevada Earthquake Safety Council (NESC), that DEM develop and maintain a roster of Applied Technology Council ATC 20 certified inspectors in the State of Nevada for the purpose of activating them in the event of an earthquake. In conjunction with local governments, DEM will develop protocols for coordinating activation.

DEM Specific Responsibilities:

1. Consult with the local jurisdictions to determine how many certified inspectors likely will be needed by each jurisdiction in the event of a disaster
2. Consult with various professional organizations to garner support for the response protocols and recruiting inspectors
3. Promote and recruit sufficient personnel to obtain ATC 20 certifications for placement on the roster
4. Develop a call-out protocol for activation of inspectors and assignment of inspection sites

Legislative Interest:

To the extent DEM can implement this policy within its current framework and budget, no legislative action will be required. If legislation is necessary, then Assemblyman Anderson and Assemblyman Mortensen may be interested in proposing a bill draft.

Fiscal Impact:

Additional DEM staff time will be involved in developing the protocols, creating and maintaining the rosters and developing mutual aid agreements. The cost for this effort is unknown at this time.

Benefits and Detriments of Implementation:

BENEFITS: Reports about other states' experiences in activating ATC 20 inspectors indicated that delays in availability, inadequate number of trained inspectors and cost reimbursement issues were significant problems in actual disaster responses. By adopting and implementing this policy, DEM will have an opportunity to avoid inadequate responses by preplanning and monitoring the process.

DETRIMENTS: Additional staff time and expense will be necessary to implement protocols and to facilitate cooperation between DEM and the various organizations that can assist with a disaster. Rosters will be difficult to develop, but even more difficult to maintain current contact information and availability to assist.

Communications:

DEM will need to contact various professional organization stakeholders to elicit their support and cooperation in this effort. Once the protocols are developed, DEM will need to publish information about the response process to local officials and property owners so that they are aware of the available response efforts. Advance notification to the public of the protocols will enable better public acceptance and cooperation during a disaster as recovery efforts are undertaken.

Assessment of Effectiveness:

Measures to assess the effectiveness of these protocols ultimately will be a post-disaster assessment. Short of that, DEM can conduct test call-outs to determine availability for response based upon a few scenarios and record the results in terms of the number of available inspectors, their response times, transportation constraints and cost estimates for the response. DEM also can test the same scenarios with key property owners to determine awareness and cooperation with the process.

BILL DRAFT REQUEST
Assemblyman Anderson (potential sponsor)
Assemblyman Mortensen (potential sponsor)

Enact Nevada All Hazards Safety Action Priority Act

I. Intent of Proposed Bill: (Brief summary of intended effect)

Request that the Legislature adopt the Nevada All Hazards Safety Action Priority Act of 2009 incorporating the following elements that not only will save the lives of citizens and protect their property from damage, but will also demonstrate to potential visitors that Nevada takes an effective and proactive steps to deal with known risks and enhance emergency response and protect emergency responders.

a) Adopt for the State and strongly encourage local governments to adopt policies that promote public awareness of earthquake, flood, wildfire and other disaster risks, how to prepare for disasters and how to acquire disaster/emergency safety kits
b) Prepare for effective emergency response to a disaster by exercising existing response plans or encouraging the adoption of plans where they are not in place
c) Require Nevada's buildings to have life-safety resistance during an earthquake. Inventory the most seismically dangerous buildings and develop a plan for retrofitting or re-designating occupancy to reduce risks. The priority would be on critical structures and public life-line facilities including at least hospitals, emergency response facilities, energy generation facilities, and water and wastewater facilities.
d) Plan for quick recovery from any disaster by developing a plan through collaborative workshops throughout the State for regional local governments, major counties and cities and rural communities.
e) Plan for efficient tourist management and well being during and following a disaster by development of a Nevada Visitor's Disaster Response Plan working with hotel owners and other tourism facilities to distribute information to tourists, such as, an emergency response handout in hotel rooms and other public places.

II. Justification or Purpose: (Brief narrative of requirement. Use continuation sheet if necessary)

The Federal Emergency Management Agency, in its 2001 Report Number 366, estimated the annual earthquake loss for the state of Nevada to be $55 million per year, of which $28 million is in the Las Vegas metropolitan area and $17.8 million is in the Reno metropolitan area. These figures cover direct economic losses to the building inventory and do not include long-term, indirect economic losses for businesses, social losses, casualties, or damages to lifelines and other critical facilities.

These estimated annual losses take into account the buildings at risk and the frequency of earthquakes. A single, large urban earthquake in Nevada could cause billions of dollars in damage.

Nevada is the third most seismically active state in the Nation in terms of the frequency of major, magnitude 7 or greater, earthquakes. Only Alaska and California have major earthquakes more frequently than Nevada. Nevada ranks fifth in terms of estimated annual earthquake loss.

The seismic provisions in current building codes are meant to prevent loss of life and provide for public safety, not to assure that a building can be reoccupied after an earthquake. Since many public buildings are critical emergency facilities for shelter and serve as emergency response activation points, assuring that they have the ability to sustain operations following an earthquake or other disaster is critical.

Preparedness for earthquakes is comparable to preparedness for any major disaster, manmade or natural, particularly in terms of hardening of lifelines and critical infrastructure (e.g. water, sewer, electrical and communication systems), strengthening of buildings to withstand damage, for public safety during and after the event, pre-disaster preparedness and post-disaster recovery.

Since Nevada has significant hazards throughout the state, citizens of Nevada should be made aware of earthquake, flood, wildfire and other hazards and need to be prepared for these hazards and the aftermath of disasters. The State of Nevada Division of Emergency Management is charged with preparing for and responding to all hazards, educating the public and recommending preventative measures. This bill is to establish public policy that focuses on mitigation of the risks before a disaster, enhanced emergency response capabilities following a disaster due to better life safety for responders and the occupants of buildings, and awareness and preparedness by citizens and visitors.

The Nevada Earthquake Safety Council (NESC) is charged with the responsibility of recommending new research, mitigation projects, and other worthwhile projects that educate and provide information that helps the public understand earthquake hazards. The Division of Emergency Management has provided funds for recommended projects when available. NESC supported research resulted in development of the guidelines and the adoption of them further adds to Nevada's earthquake preparedness.

The purpose of the Nevada Hazard Mitigation Planning Committee is to advise the Nevada Division of Emergency Management (NDEM) concerning hazard-mitigation planning, activities and policies. All hazards, including natural and man-made, may be considered. The Committee implements the State Hazard Mitigation Plan including reviewing mitigation projects, overseeing mitigation grants and promoting activities to build disaster resistant communities.

III. <u>NRS Title, Chapter and Section affected:</u> (If applicable)

IV. <u>Effective Date:</u>

X Default (October 1, 2009)

o July 1, 2009

o Upon Passage and Approval

o Other _____________

V. <u>Suggested language:</u> (Optional) (Use continuation sheet if necessary)

VI. <u>FISCAL NOTE:</u>

<u>Effect on the State</u>

Yes_x__ No ___ Contains Appropriation___________________________

Executive Budget____________ Effect less Than $2,000_______________

Effect on Local Government

Yes_x__ No ___ Contains Appropriation____________________________

VII. Preprinting of Bill: (Subsection 3 of NRS 218.240)

May bill be preprinted? Yes _x__ No ___

VIII. Name of persons to be consulted if more information needed:

Name: Jonathan G. Price Telephone No.: (775) 784-6691 extension 5
E-mail: jprice@unr.edu
Jonathan G. Price, Secretary, Nevada Earthquake Safety Council, and
State Geologist and Director, Nevada Bureau of Mines and Geology, University of Nevada, Reno, Mail Stop 178, Reno, Nevada 89557-0178.

Name: Wayne Carlson Telephone No.: (775) 883-7863
E-mail: carlson_we@source.net
Wayne Carlson, Chair, Committee on Policy Recommendations, Nevada Earthquake Safety Council, 1761 E. College Parkway, Suite 113, Carson City, NV 89711

28 August 2007