



**Risk Communication, Building Codes,
and Consequences:
The Future of Earthquake Safety in the U.S.**

**WSSPC Annual Conference
With the International Code Council
September 30-October 3, 2007
Grand Sierra Resort
Reno, Nevada**

**FINAL TECHNICAL REPORT
AWARD No. 07HQGR0076**

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Acknowledgments

The idea to hold the WSSPC annual conference with the International Code Council (ICC) this year was suggested by Ron Lynn, Affiliate member of WSSPC and Board member of ICC. We are pleased for the opportunities to interact with the members of ICC and to provide a “Seismic” education track to their annual meeting.

We would like to extend special thanks to ICC’s Wally Bailey, Rick Weiland, and Mike Armstrong for their support. We worked closely with the ICC staff over the past year – particularly Sheila Lomax, Jackie Claus, Robert Blanton, Rick Carroll, Brian Campbell, Jay Thabet, Dianna Hallmark, and Karen Johnson.

We also would like to thank David Maurstad, Assistant Administrator of FEMA’s Mitigation Directorate, for his unwavering support of the conference and making it possible for FEMA’s staff to attend the conference.

The WSSPC team of Sherri Aragon, Kit Gonzalez, Sylvia Burgess, and Ralph Clouse, our Nevada hosts Jonathan Price, Craig dePolo, and Terri Garside, and all of the speakers and moderators are gratefully acknowledged.

The Western States Seismic Policy Council is funded through a cooperative agreement with the Department of Homeland Security/Federal Emergency Management Agency.

In addition, a grant from the Department of the Interior, U.S. Geological Survey, under Grant Agreement No. 07HQGR0076, supported the pre-conference publicity, printing, and field trip. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either express or implied, of the U.S. Government.

Our Affiliate members help defray the costs not covered by these federal agencies.

WSSPC Affiliate members in 2007 are:

- Bishop Indian Tribal Council
- Clark County Development Services Building Division
- Degenkolb Engineers, Inc.
- Earthquake Engineering Research Institute (EERI)
- San Francisco Department of Building Inspection
- Southern California Earthquake Center
- State Farm Insurance Companies

RENO/HOTEL

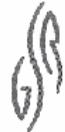
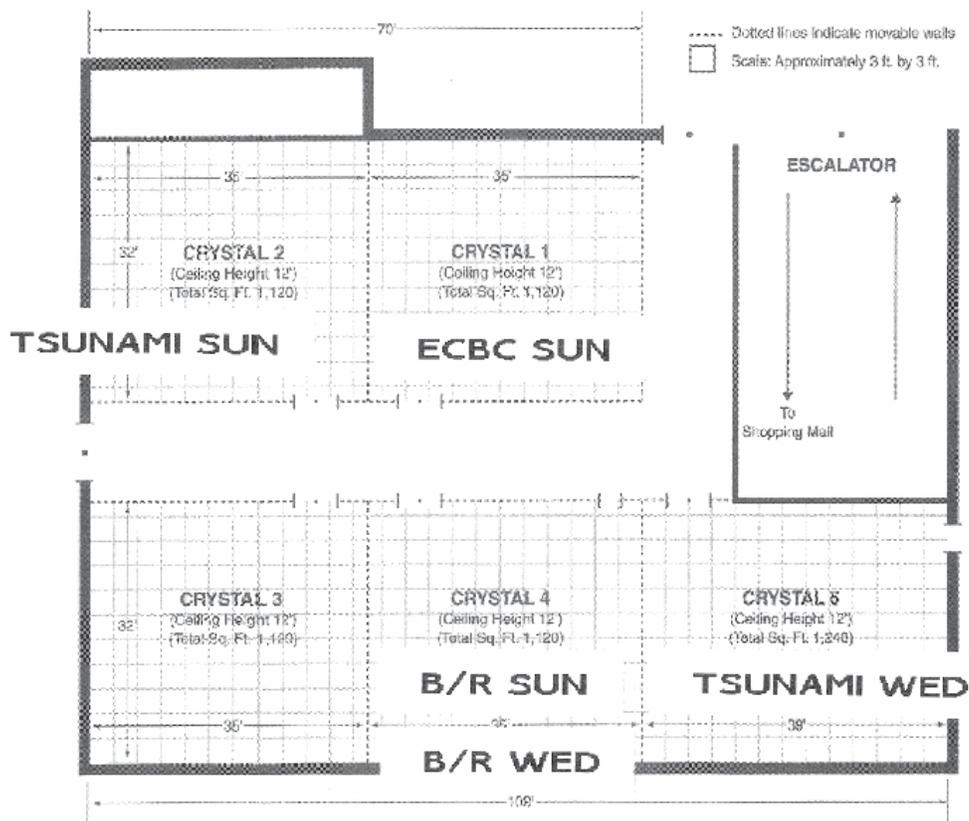
DIRECTORY



Crystal Ballroom

	Capacities*			
	Theatre Style	Schoolroom Style	Banquet Style	Reception
Crystal 1	95	60	50	95
Crystal 2	95	60	50	95
Crystal 1 & 2	190	120	100	190
Crystal 3	95	60	50	95
Crystal 4	95	60	50	95
Crystal 3 & 4	190	120	100	190
Crystal 5	95	60	50	95
Crystal 3 - 5	285	180	150	285

*Capacity figures are subject to change, depending on space allocations for fixed table, dance floor, staging, and box offices layout.



GRAND SIERRA RESORT
AND CASINO

Grand Ballroom

Sound
Atrac concealed ceiling speakers, two PM 1000 Yamaha sound consoles, PL intercommunication headsets.

Lighting
Kaleli and Almasa stage lights, three supercomputer carbon arc follow spots, five Grand 50 position Rongli lightboards.

Power
Three 400 amp 3 phase disconnect boxes, 208 and 220 volt single and 3 phase power, complete ceiling track system, 3 phase 60 amp service.

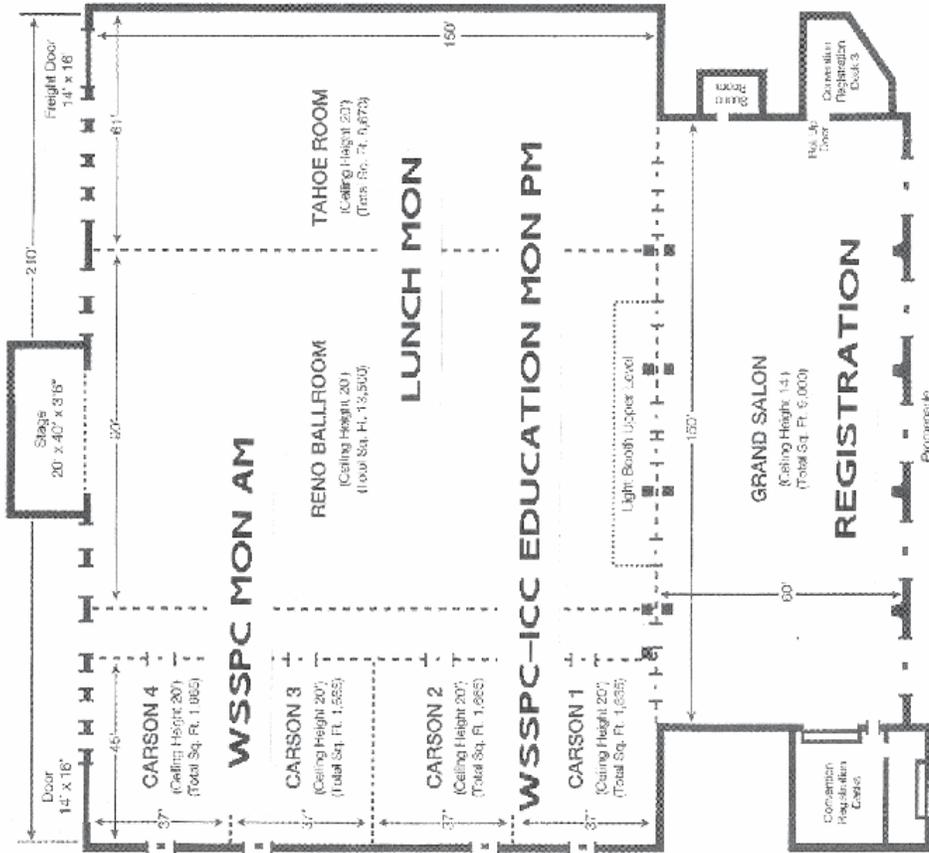
Staging
Portable stage and dance floor available upon request.

--- Dotted lines indicate movable walls.

□ Booth: Approximately 3 ft. by 3 ft.

■ Pillars

Booths for Reno Ballroom and Grand Salon
Total Sq. Ft. 16,000



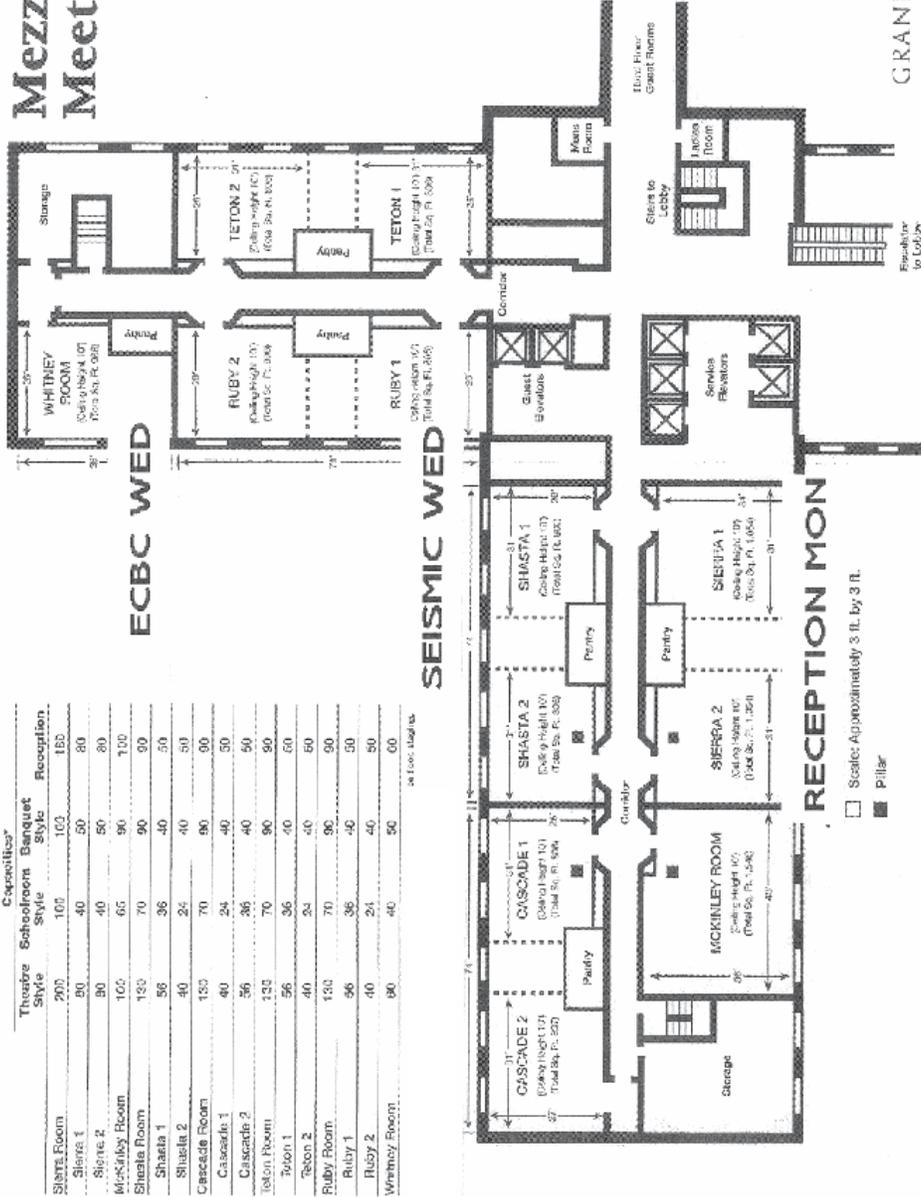
	Theatre Seats	Schoolroom Style	Ballroom Style	Reception
Grand Ballroom	3,000	1,700	1,200	3,000
Grand Salon	750	450	500	800
Tahoe Room	1,200	750	800	1,000
Reno Ballroom	900	375	400	900
Carson 1	150	80	80	100
Carson 2	150	80	80	100
Carson 3	150	80	80	100
Carson 4	150	80	80	100

*Square footages are subject to change, depending on space requirements for booth tables, stage, floor, lighting, and scenic requirements.



GRAND SIERRA RESORT
AND CASINO

Mezzanine Meeting Rooms



Room Name	Capacities*		
	Theatre Style	Schoolroom Style	Banquet Style
Sierra Room	200	100	100
Sierra 1	90	40	50
Sierra 2	90	40	50
McKinley Room	100	65	90
Sierra Room	120	70	90
Sierra 1	56	36	40
Sierra 2	40	24	30
Cascade Room	130	70	90
Cascade 1	40	24	30
Cascade 2	56	36	40
Teton Room	130	70	90
Teton 1	56	36	40
Teton 2	40	24	30
Ruby Room	130	70	90
Ruby 1	56	36	40
Ruby 2	40	24	30
Whitney Room	90	40	50

*in two stages

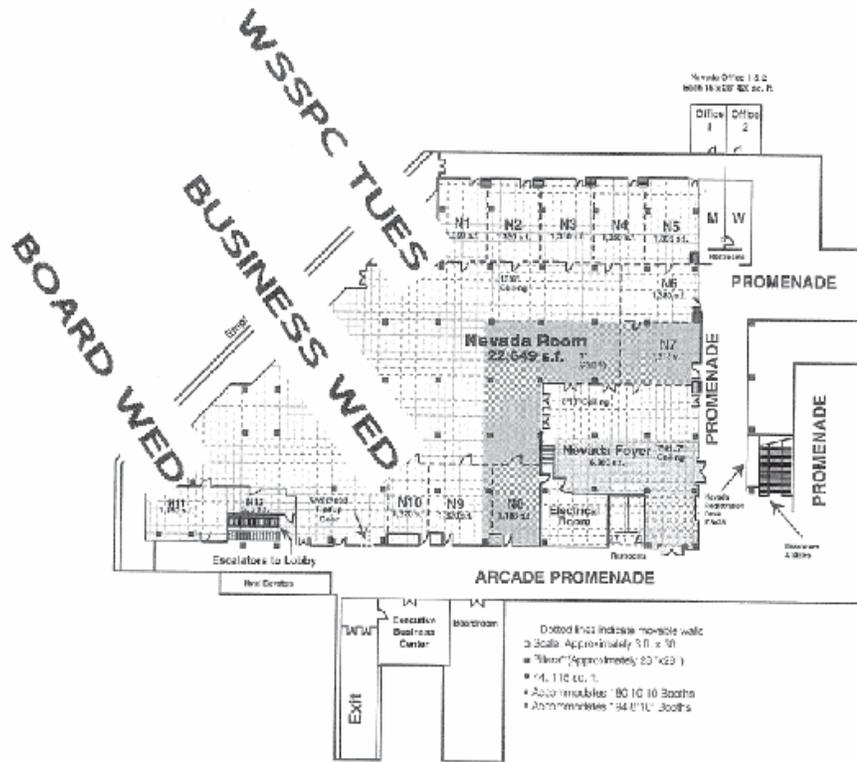


GRAND SIERRA RESORT
AND CASINO

Scale: Approximately 3/8" by 3/8"

□ Sealer
■ Pillar

Nevada Conference and Exhibition Center



Room Capacities*

	Theater	Classroom	Banquet	Reception
Nevada Conference & Exhibition Center	1,200	600	2,200	3,376
Nevada Room	400	300	300	1,850
N1-R (each)	50	70	60	30
N1	100	50	70	100
N5	30	50	50	50
N1-10 (each)	90	70	60	90
N11	80	60	50	80
N1-2	30	30	20	30
Boardroom	Permanent Conference Seating for 18			

*Capacities listed in document were based on typical room configurations and are subject to change depending on space allocation, in-lieu-of, date, floor, staging, and catering requirements. **TR as per contract, view in some configurations.

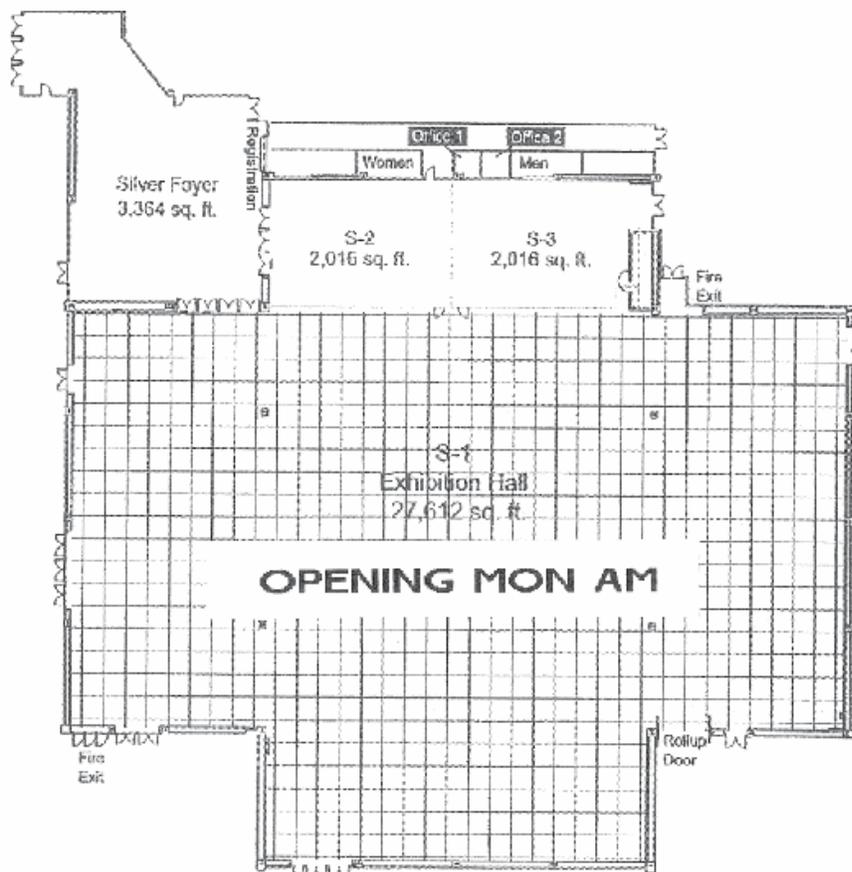
Sound: Sound advice has full use of ceiling speakers with Bose Sound (Vad DSP processing).

Lighting: Dimmable ceiling track system.

Power: Four 400 amp 208 volt 3 phase disconnect boxes and complete ceiling drop system 30 amp 200 volt 3 phase.



Silver State Pavilion



• 36,816 sq. ft. • 35' ceiling

• Accommodates 210 10'x10' Booths • Accommodates 240 8'x10' Booths

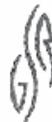
Room Capacities*

	Theater Style	Classroom Style	Banquet Style	Reception Style
Silver State Pavilion	2,240	1,326	1,760	2,700
S-1	2,200	1,200	1,200	900
S-2	210	108	120	90
S-3	210	108	120	90

*Capacity figures are subject to change depending on space allocations for head table, dance floor, staging, and catering requirements.

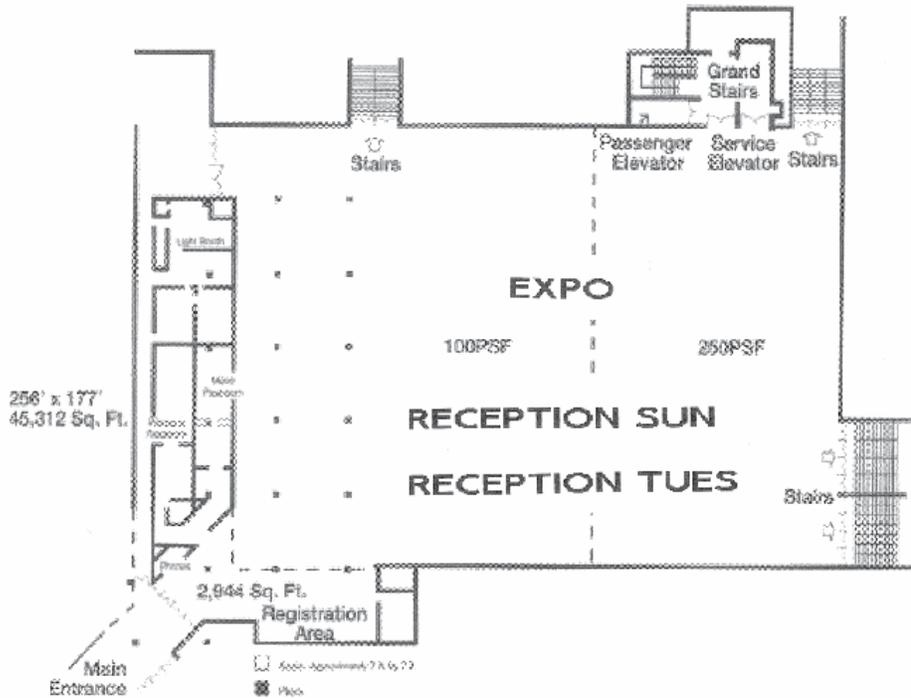
Sound, Lighting & Power

Sound	JBL Control 29AV Ceiling Speakers w/BSS Sound Web DSP Processing.
Lighting	Dimmable Unistrat System for Pars and Lekos (25" high) with Stand Lightboard.
Power	2- 400 amp 3 Phase Disconnect Boxes, 208 Single Phase and 3 Phase Power and Complete Ceiling Drop System 30 amp 3 Phase.



GRAND SIERRA RESORT
AND CASINO

Summit Pavilion



- 45,312 square feet • 2,944 square feet Entry/Registration Area
- 25' ceiling • Full power and water
- Floor load - 100/250 lbs. per square foot • Accommodates 261 10x10 booths
- Accommodates 300 8x10 booths

Capacities*

	Theatre Style	Schoolroom Style	Banquet Style	Reception
Summit Pavilion	4,000	1,700	2,100	4,000

* Capacity figures are subject to change, depending on space allocations for head table, dance floor, staging and catering requirements.

Sound

Affec coaxial ceiling speakers, two PM 1000 Yamaha sound consoles, clear-com intercommunication headset system.

Lighting

Three supertruper xenon follow spots, Strand entry matrix memory lighting console. Dimmable overhead house lighting and high intensity (HID) exhibit lighting.

Power

Five 400 amp 208 volt 3 phase disconnect boxes with 208 volt single phase power. Complete ceiling track system with 20 amp 208 volt 3 phase service. Fifty-five 30 amp 208 volt 3 phase floor pockets with 20 amp 110 volt dedicated circuit.

Staging

Portable stage and dance floor available upon request.



GRAND SIERRA RESORT
AND CASINO

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GRAND SIERRA RESORT RESTAURANTS

The Grand Sierra Resort offers dining to fit every taste. From the elegant tableside service of a truly gourmet steak house, a sandwich on the go, or a casual breakfast, you'll find just what you're looking for at the Grand Sierra Resort.

FINE DINING

Dolce Enoteca E Ristorante offers classic, high-end Italian cuisine, glamorous ambiance, and thousands of the world's finest wines. Dinner is served daily 5 pm–10 pm. Reservations are recommended. (775) 324-9444

Charlie Palmer Steak features the finest cuts of Artisan meats and trademark eclectic wines. Dinner is served daily 5:30 pm–10:30 pm, and the Lounge is open 5 pm – Midnight. (775) 789-2456

Fin Fish is Charlie Palmer's fresh take on seafood with a premium raw bar and simply presented seafood specialties. Dinner is served daily 5:30 pm–10:30 pm, and the Lounge is open 5 pm – Midnight. (775) 789-2458

CASUAL DINING

Casino Level

Café Sierra is open Sunday-Thursday 6 am – 10 pm, and 24 hours Friday and Saturday. (775) 789-2269

The Lodge Buffet is Reno's newest buffet featuring cooking stations, seafood and prime rib nightly, international entrees, a pizza oven, and pastry bar with a make-your-own sundae station. Breakfast, lunch and dinner are served daily, and a brunch on Saturday and Sunday. (775) 789-2000

Johnny Rockets offers classic, contemporary American cooking in a vintage 50's counter-top diner with singing staff. Open Sunday – Thursday 10 am – Midnight, Friday – Saturday 10 am–2 am. (775) 789-2555

Arcade Level

Port of Subs sandwiches are prepared to-order using freshly sliced, top quality meats and cheeses, freshly baked breads and zesty dressings and spices. Open Sunday – Thursday 7 am – 8 pm, Friday – Saturday 7 am – 11 pm. (775) 786-0108

Round Table Pizza offers an affordable variety of thin and thick crust pizzas, all available with a multitude of toppings, as well as a sampling of Italian favorites. Open Sunday–Thursday 11 am – 10 pm, Friday – Saturday 11 am – 11 pm. (775) 789-2452

About Reno

“The Biggest Little City in the World,” Reno is the center of a growing metropolitan area that lies in the foothills in the northeastern area of the Sierra Nevada Mountains. Attracting more than five million visitors annually, the area has something for everyone. The Reno/Tahoe region offers unlimited recreational activities and has been rated “Number One for Outdoor Fun” by Rand-McNally.

Truckee River

One of Reno’s more distinguishing features is a river running through the city. Carrying the crystal waters of Lake Tahoe, the Truckee River is popular among anglers, rafters, joggers, and wildlife. The Raymond I. Smith Truckee River Walk follows several miles of the shoreline through the downtown area and offers a beautiful and peaceful respite for walkers and bicyclists. The River Walk has seven water features and original sculptures of native Nevada wildlife.

Truckee River Arts District

The north end of the district offers galleries, coffee shops, great dining, and a movie theater. The southern end, CalAve, is quickly becoming Reno’s pre-eminent neighborhood retail, restaurant, entertainment, and business district. The retail options on CalAve will satisfy the serious shopper, offering a variety of upscale clothing, shoe, and home décor shops.

Antique Stores

The Reno-Sparks area has a wide variety of antique and collectible stores. Spend a few hours or an entire day exploring great shops. You never know what rare treasures of days gone by can be discovered.

Art Galleries

Reno’s blue skies, quality of light, crisp mountain air, and sublime vistas attract a brilliant mix of talented artists. You will be pleasantly surprised at the diversity and quality of art work available.

Museums

The Nevada Museum of Art features world-class traveling exhibits along with a permanent collection of more than 1,900 works of art organized around the general themes of land and environment: The Altered Landscape, Contemporary Collection, Sierra Nevada/Great Basin Collection, Historical Collection, and the E.L. Wiegand Collection.

The Fleischmann Planetarium and Science Center offers public star shows and large-format films shown daily in its dome theater. After undergoing recent upgrades, Fleischmann is now one of the few in the world to utilize the Spitz SciDome digital projector – a high-resolution, state-of-the-art immersive visualization tool that produces extraordinarily bright and colorful 3-D images.

Nevada State Museum begins in the former Carson City Mint building. The Earth Science Gallery explores Nevada’s geologic history up to 1,750 million years ago through illustrations, rock specimens, field photographs, as well as a walk-through Devonian Sea. Visit America’s largest exhibited Imperial mammoth found in Nevada’s Black Rock Desert, reconstructed in his death scene fight for life in a small, mud-glazed water hole.

The Nevada State Railroad Museum preserves the railroad heritage of Nevada, including locomotives and cars of the famous Virginia & Truckee Railroad and other railroads of the Silver State.

W.M. Keck Earth Science and Mineral Engineering Museum houses an outstanding collection of minerals, ores, and fossil specimens with a special emphasis on early Nevada mining history. The museum is also home to some of the spectacular Mackay Silver Collection, created by Tiffany & Co. for John Mackay and completed in 1878.

For more information about things to do and see in Reno, visit the Reno/Sparks Convention and Visitors Authority at www.visitrenotahoe.com.



Attractions/Malls Welcome Centers

- | | | |
|--|--|---|
| 1. Downtown Riverwalk | 10. National Bowling Stadium | 19. Reno Events Center |
| 2. Fleischmann Planetarium | 11. Arlington Gardens | 20. Reno-Sparks Convention & Visitors Authority |
| 3. Great Basin Adventure | 12. Airport Welcome Center | 21. Reno-Sparks Convention Center |
| 4. National Auto Museum & 1935 Reno Arch | 13. Downtown Sparks, Victorian Square Welcome Center | 22. Reno-Sparks Livestock Events Center |
| 5. Nevada Historical Society | 14. Franktown Corners | 23. Shoppers Squar |
| 6. Nevada Museum of Art | 15. Mayberry Landing | |
| 7. Pioneer Theatre | 16. Meadowood Mall | |
| 8. Sparks Heritage Museum | 17. Park Lane Mall | |
| 9. Sparks Marina Park | 18. Plumgate Shopping Center | |

PROGRAM

2007 WSSPC Annual Conference

Risk Communication, Building Codes, and Consequences: The Future of Earthquake Safety in the U.S.

Conference Summary

At the 2007 Western States Seismic Policy Council (WSSPC) Annual Conference, the Nation's top-caliber scientists and engineers will be speaking about the National Earthquake Hazards Reduction Program; earthquake provisions in the International Building Code; creating a new generation of effective earthquake safety, preparedness, and mitigation messages; performance-based engineering issues; and earthquake disaster scenarios for major cities in the United States, including San Francisco, Salt Lake City, and Seattle.

WSSPC Field Trip

An optional, pre-conference field trip will overview local earthquake geology and emergency response issues, and will visit engineering and seismological laboratories and a base-isolated building at the University of Nevada, Reno. Reno's Cenozoic geology and earthquake hazard will be presented including its earthquake history and local active faults. The field trip will visit and be briefed on the Washoe County Emergency Operations Center, where there will be a short presentation on post-disaster building inspections. At the University of Nevada, Reno tours will learn about large-scale shake tables used for earthquake load testing, the base isolation of a building that is over a century old, and the Nevada Seismological Network and how earthquakes are recorded, processed, and displayed.

WSSPC Opening Session

The Opening Session will set the stage for the WSSPC-ICC joint education session by addressing the new technical changes to the National Seismic Hazards Maps. What we have learned from a recent earthquake in Hawaii will be factored in, concluding with an understanding of the role the state seismic commissions play in influencing building code decisions.

WSSPC/ICC Joint Education Session: Earthquake Hazards and Building Codes

The Joint WSSPC-ICC education session, Earthquake Hazards and Building Codes, will cover national earthquake programs and research that provide input into the earthquake aspects of the International Building Code. First, the National Institute of Standards and Technology, the lead agency for the National Earthquake Hazards Reduction Program, and the Federal Emergency Management Agency will present overviews of their earthquake programs. The U.S. Geological Survey will review the earthquake hazards of the United States and present the new National Seismic Hazard Maps, which serve as the ground-motion basis for calibrating levels of seismic-resistance design. New seismic provisions for the building codes based on contemporary research and lessons learned from earthquakes will be presented along with their rationale for adoption. There will be a discussion on the many realities of building code adoption including culture, economics, local politics, and human resources. Successful code adoptions and issues that inhibit code adoption will be presented.

Effectively Communicating Earthquake Risk Mitigation

Communicating earthquake messages, especially when earthquakes are low-frequency events with great consequences, is a challenge. Recent reviews of the public state of awareness and preparedness associated with the 1906 San Francisco earthquake centennial provide a benchmark to gauge the effectiveness of an earthquake message. This session on creating a new, effective earthquake message will use strategies in marketing, communications, and sociology as a basis for success. We seek to develop language and approaches for effectively communicating earthquake hazard, risk safety, preparedness, and mitigation. Our goal is to have messages that will significantly increase the number of earthquake-savvy and prepared citizens, and promote an earthquake-aware culture in the United States.

Earthquake Scenarios and Performance-Based Codes

As a reality check to the more statistical or empirical methods involved in codes and risk analysis and to appreciate the high consequence nature of earthquakes, three earthquake scenarios of major cities in the United States will be presented. The scenarios will include potential loss information, impacts on infrastructure and economics, and the spatial extent of impacts from major earthquakes near these cities. A fundamental cornerstone of an earthquake-resistant society is well-designed and constructed buildings and other structures. For some buildings life-safety considerations may be adequate, but for buildings that are expected to be operational following an earthquake, a higher level of performance is required. The evolving engineering practice of performance-based design is the answer and future directions will be illustrated. Lastly a Department of Homeland Security Federal Emergency Management Agency (DHS/FEMA) representative will describe FEMA's role and resources following a disaster, such as the earthquake scenarios being presented.

The presentation format of the technical sessions will be 20-minute talks followed by a short question-and-answer period. A joint speaker panel discussion will be held at the end of each session to develop overarching ideas and answer important questions.

2007 WSSPC - ICC Annual Conference

Risk Communication, Building Codes, and Consequences: The Future of Earthquake Safety in the U.S.

September 30 - October 3, 2007
Grand Sierra Resort
Reno, Nevada

WSSPC PROGRAM

Sunday, September 30, 2007

TIMES	EVENT	LOCATION
9:00 AM - 6:00 PM	Registration	Grand Salon
9:00 AM - 11:00 AM	WSSPC Committee Meetings Basin & Range Province Committee (see WSSPC Tab for Agenda)	Crystal 4
	Engineering, Construction & Building Codes Committee	Crystal 1
	Tsunami Hazard Mitigation Committee	Crystal 2
11:00-11:45 AM	Field Trip Check In and Box Lunch Pickup Bus leaves from South Entrance of Grand Sierra Resort	Lobby
Noon-5:00 PM	WSSPC Field Trip <i>Earthquakes and Earthquake Research in Western Nevada</i> Leader: Craig dePolo	Offsite
4:00-6:30 PM	EXPO with Seismic Safety Zone	Summit Pavilion
5:30-6:30 PM	Joint WSSPC/ICC Welcoming Reception	Summit Pavilion
7:00-10:00 PM	ICC Welcoming Event Dinner and Entertainment	Grand Theater

Monday, October 1, 2007

7:00 AM - 5:00 PM	Registration	Grand Salon
	WSSPC/ICC Joint Opening Session	
9:00 - 9:45 AM	Joint WSSPC/ICC Opening Session	Silver State Pavilion
9:45 -10:00 AM	BREAK	
	WSSPC Opening Session	Carson 3 & 4
	Moderator: Rick Allis Utah Geological Survey and WSSPC Board Chair	
10:00 AM	Mark Petersen US Geological Survey <i>The 2007 USGS National Seismic Hazard Maps</i>	
10:40 AM	Ian Robertson University of Hawaii, Honolulu <i>Reconnaissance Following the October 15, 2006 Kiholo Bay Earthquake, Hawaii</i>	
11:00 AM	Barry H. Welliver BHW Engineers,LLC <i>Understanding the Role of Seismic Safety Commissions in Influencing Building Code Decisions</i>	
11:20-11:30 AM	Speaker Panel Discussion and Questions	
11:30 AM-1:00 PM	JOINT WSSPC/ICC LUNCH ("General Assembly Luncheon") Reno/Tahoe Ballroom	
	WSSPC/ICC Education Session	Carson 1 & 2
	Earthquake Hazards and Building Codes	
	Moderator: Ronald L. Lynn Clark County, Nevada, Department of Development Services, Building Division	
1:00 PM	Jack Hayes National Institute of Standards and Technology <i>National Earthquake Hazards Reduction Program Update</i>	
1:30 PM	David Maurstad (Presented by Deb Ingram) DHS/FEMA <i>FEMA's Mitigation Role in the National Earthquake Hazards Reduction Program</i>	
2:00 PM	David Applegate US Geological Survey <i>Earthquakes: National Threat, National Challenge</i>	
2:30 PM	John Henry International Code Council <i>New Seismic Provisions in Building Codes</i>	
3:00 PM	Ronald L. Lynn Clark County, Nevada, Department of Development Services, Building Division <i>Realities of Building Code Application</i>	
3:30 PM	Speaker Panel Discussion	
4:15 PM	ADJOURN to EXPO	Summit Pavilion
6:00 PM	EXPO concludes	
7:00 - 11:00 PM	ICC Hospitality and Cash Bar ("Minneapolis Reception")	Sierra 1 & 2

Tuesday, October 2, 2007

7:00 AM -5:00 PM	Registration	Grand Salon
	WSSPC Session	N 1 & N 2
	Effectively Communicating Earthquake Risk Mitigation	
	Moderator: Craig dePolo Nevada Bureau of Mines & Geology	
8:00 AM	Introduction	
8:05 AM	Richard J. McCarthy State of California Alfred E. Alquist Seismic Safety Commission <i>Where We Stand Today in Communicating Earthquake Preparedness and Risk</i>	
8:35 AM	Robert J. Meyer University of Pennsylvania, Wharton Risk Center <i>Why We Under-Prepare for Hazards: The Case of Earthquake Mitigation</i>	
9:05 AM	Corinne Shefner-Rogers University of New Mexico, School of Medicine <i>How to Effectively Communicate Risk, Safety, and Mitigation Messages</i>	
9:35 AM	Suzanne Frew Circle Point <i>Reality Check: Making Our Risk Communications Investments Work</i>	
10:05 AM	BREAK	
10:35 AM	Craig dePolo Nevada Bureau of Mines & Geology <i>Emphasizing Safety and Protection of Personal Property in an Earthquake Preparedness Message</i>	
10:50 - 11:30 AM	Speaker Panel Discussion	
11:45 AM -1:15 PM	AWARDS in EXCELLENCE LUNCHEON	N 1 & N 2

Tuesday, October 2, 2007

WSSPC Session

N 1 & N 2

Earthquake Scenarios and Performance-Based Codes

Moderator: Michael Mahoney
DHS/FEMA

- 1:30 PM **Richard Eisner**
Fritz Institute
Testing Response to a Catastrophic Urban Earthquake: Golden Guardian '06 – A Region-Wide Emergency Response Exercise
- 2:00 PM **Bob Carey**
Utah Division of Homeland Security
Salt Lake City Earthquake Scenario
- 2:30 PM **George Crawford**
Washington Military Department, Emergency Management Division
Cascadia Subduction Zone Scenario – A Catastrophic Event
- 3:00 PM BREAK
- 3:30 PM **Chris D. Poland**
Degenkolb Engineers
Defining Performance-Based Engineering Objectives for Communities: A Call for Agreement and Transparency
- 4:00 PM **David Kennard**
DHS/FEMA Region IX
Misconceptions About FEMA Emergency Response and Recovery
- 4:30 PM **Speaker Panel Discussion**
- 5:00 PM Summation
- 5:10 PM ADJOURN to EXPO
- 6:00 - 8:00 PM Exhibitor Reception
- 8:00 PM EXPO concludes

Summit Pavilion

Wednesday, October 3, 2007

7:30 - 9:00 AM	WSSPC Committee Meetings Basin & Range Province Committee (see WSSPC Tab for Agenda)	Crystal 4
	Engineering, Construction & Building Codes Committee	Whitney
	Tsunami Hazard Mitigation Committee	Crystal 5
9:00 -10:00 AM	WSSPC Board Meeting (see WSSPC Tab for Agenda)	N 11
10:00 -11:45 AM	WSSPC Annual Business Meeting (See WSSPC Tab for Agenda)	N 10
Noon-4:00 PM	Seismic Safety Councils and Commissions Meeting with optional BOX LUNCH (See WSSPC Tab for Agenda)	Ruby 1
4:00 PM	ADJOURN WSSPC Meeting	

Western States Seismic Policy Council

Abstracts

Alphabetical by Author

Earthquakes: National Threat, National Challenge

**David Applegate
U.S. Geological Survey**

ABSTRACT

The national seismic hazard maps produced by the U.S. Geological Survey (USGS) make clear that reducing vulnerability to earthquakes is a national challenge with over seventy-five million Americans in 39 states facing significant risk. Urban areas, with their increasing concentrations of population and infrastructure, are particularly at risk for catastrophic losses with far-reaching economic repercussions. The USGS has statutory and mission responsibilities to deliver the best science available to help policy makers, emergency managers, and citizens prepare for earthquakes and build a safer, more resilient society. The USGS is committed to delivering this information when and where it is needed and in the form most useful to those directly responsible for mitigation, preparedness, response and recovery.

As a Federal science agency, USGS relies on collaborations to carry out this mission, including federal partners in the National Earthquake Hazards Program (NEHRP) as well as state and local government, universities and the private sector. Partnerships with engineers and code officials make possible the translation of USGS seismic hazard assessments into seismic provisions in model building codes, which are the foundation of earthquake mitigation. Local partnerships are key to translating USGS information into public preparedness products and exercises that engage communities in building awareness of earthquake threats and encouraging individual and collective action. Partnerships also are at the heart of the Advanced National Seismic System (ANSS), which is modernizing the Nation's seismic monitoring capabilities to deliver rapid, reliable information in the immediate aftermath of damaging earthquakes, providing situational awareness of where shaking was most intense in order to prioritize response.

The hazards associated with major earthquakes extend far beyond the shaking itself, including liquefaction in which soils lose their ability to support the foundations of structures, landslides especially when soils are already saturated by heavy rains, and fires that result from ruptured gas lines, made all the more difficult to combat if water mains are also damaged. Multi-hazard scenarios designed to capture this full range of impacts can be valuable tools for identifying the activities that can reduce those impacts. Working with a broad coalition of partners, USGS is currently piloting an approach to multi-hazard scenarios in southern California that can then be applied across the Nation.

Salt Lake City Earthquake Scenario

Bob Carey
Utah Division of Homeland Security

ABSTRACT

In 2004, the Utah Geological Survey released a special study, "Earthquake-Hazards Scenario for a M7 Earthquake on the Salt Lake City Segment of the Wasatch Fault Zone, Utah". The purpose of the report is to discuss and map geologic hazards that may result from this scenario earthquake. The geologic hazard maps coupled with data on the built environment will provide a basis for a better understanding of estimated losses. The geologic maps developed for this scenario include peak horizontal acceleration (ground shaking), liquefaction (lateral spreading and settlement), landslide (wet and dry conditions), and tectonic-subsidence hazard.

Based on the 2000 census, 1.7 million people, or over 70% of the state population, would be affected by this Salt Lake City Segment earthquake. This area includes nine counties as well as the cities of Ogden and Provo. The disruption of basic services, the damage to the built environment, and the number of casualties can be quantified by using HAZUS, a loss-estimation model. HAZUS can generate estimates of losses due to geologic effects as well as losses by building types. It can provide emergency planners, county emergency managers, first responders, and state and local government officials with the number of fire starts, amount of debris generated, number of shelters that will be needed, cost to repair or replacement of damaged buildings, and damage to infrastructure and critical facilities.

In moving beyond a Level One HAZUS analysis, state emergency management planners discovered that by importing the geologic hazard maps from a scenario earthquake into HAZUS that estimated building-related losses doubled. This clearly illustrates the need for local data in HAZUS. Like the geologic hazard maps, the importing of the county assessor's database into HAZUS provides an opportunity to research which building types contribute to the number of casualties. In analyzing the HAZUS outputs, an unexpected relationship was discovered in the amounts of structural to non-structural damage. HAZUS outputs indicate non-structural damage occurs at a rate about 3.5 times that of structural damage. The outputs also indicated that the majority of injuries are coming from the non-structural components of buildings, whereas unreinforced masonry (URM) buildings are the main contributor for fatalities.

Cascadia Subduction Zone Scenario – A Catastrophic Event

G. L. Crawford

Washington Military Department, Emergency Management Division

ABSTRACT

The Cascadia Subduction Zone extends 700 miles from Vancouver Island, Canada, to Cape Mendocino, California, and resembles the Sunda Trench that produced a giant earthquake off the coast of Sumatra Island, Indonesia on December 26, 2004. The earthquake and ensuing tsunami in the Indian Ocean killed an estimated 283,000 people, displaced 1.1 million people, with another 14,000 people still reported missing. Scientific evidence shows earthquakes of magnitude 8 to 9 or greater occur about every 500 years on the Cascadia Subduction Zone. Japanese written history pinpoints the most recent event in the Cascadia Subduction Zone to the evening of January 26, 1700. This estimated M 9.0 earthquake produced a tsunami that struck the Pacific Coast and traveled to Japan, damaging coastal communities there. In North America, the earthquake and its tsunami left abundant evidence along the Pacific Coast, and is recorded in Native American oral history. The United States Geological Survey currently estimates there is a 10 to 14 percent chance a M 9.0 earthquake will occur on this zone in the next 50 years.

A similar earthquake today would be catastrophic, causing widespread damage to the region's infrastructure, transportation and utility systems. The ground could shake for four minutes or more. During the December 2004 Sumatra earthquake, the ground shook for 8 to 10 minutes in some locations. The earthquake and its associated hazards – ground shaking, landslides, liquefaction, subsidence, tsunamis, fires, and hazardous material spills will create significant damage and potentially thousands of deaths and injuries.

This earthquake could result in major economic loss. Help from the national and international level – both the United States and Canada – will be needed. Tsunami damage and trade disruptions could affect not only the United States, but also other Pacific Rim trading partners for years to come. If the earthquake causes major damage to the region's major urban centers of Seattle, Washington, and Portland, Oregon, economic loss could reach tens of billions of dollars. Any loss of facilities at the Ports of Seattle, Tacoma & Portland will ripple through the regional and national economy. Transportation and utility lines in the Interstate 5 / U.S. Highway 99 corridor could be severely damaged and be nonfunctional for months. This particular type of earthquake is especially hazardous to tall buildings causing mass casualties. It will be critical to get businesses running as soon as possible to provide materials and supplies needed for recovery and provide the jobs necessary for the long-term economic health of states impacted by Cascadia.

Cascadia presents a regional challenge to mitigate, prepare and respond. Public education and exercises are key for citizens, the public and private sector to clearly understand the risk and vulnerabilities they face and why mitigation and preparedness are so critical. The public sector must take a regional approach: they can not respond to such a catastrophic event without prior mutual agreements to provide the needed recovery assets. Business must also think "regional" and provide backup support outside of Cascadia. Mitigation efforts such as land use

planning, strict compliance of building codes and location of critical facilities outside of the hazard area are key to reducing the risk. Finally, business must develop continuity plans that build on a strategy of short and long-term mitigation and develop pre-disaster plans that will deal with long-term electrical outages, lifeline disruption and damage/loss of their assets. Communities that build strong public/private partnerships and together build predisaster mitigation plans will recover more quickly, providing jobs and resources needed to create economic stability and resources for the community to recover from a Cascadia event.

Emphasizing Safety and Protection of Personal Property in an Earthquake Preparedness Message

Craig M. dePolo
Nevada Bureau of Mines and Geology

ABSTRACT

The traditional format of an earthquake preparedness message is what to do before, during, and after an earthquake: Have a kit and a plan before an earthquake. Drop, cover, and hold during an earthquake. And stay away from damaged buildings and aid people after an earthquake.

An earthquake preparedness message should also include the most important reasons for taking action. We want people to be safe and their property not lost when strong shaking occurs. Emphasizing safety and protection of your property reinforces the value of taking action.

“Safety is Number One” is a message many people know. Earthquake safety is straightforward enough, but there are many things to consider, such as the abilities of uninjured people to help in the response effort and the fact that recovery is easier without doctor’s visits and bills. We assume that buildings are built with life-safety resistance, so actions taken by individuals are principally to protect themselves from nonstructural threats. The most common and consistent message is to know where safety spots are to **drop** down to, take **cover** under, and **hold** onto to stay under for protection. Running in or out of buildings during an earthquake, a typical response of people who feel their lives are threatened by building collapse, is a leading cause of injury and death. Thus, not running in or out of buildings during earthquakes is another important safety message.

The protection of your valuables makes sense. In some cases, such as relocation of an antique book from a vulnerable lofty position to a lower place of protection, action is easy – just a little thought and time. Other solutions challenge people more. Computers are assets of increasing importance, and there are several solutions for helping computers survive earthquakes. These involve strapping or bracing a computer; this takes a little money, some supplies, and a little effort in installation, but the value of having an intact and operating computer after an earthquake is worth it.

An earthquake preparedness message should be as simple, clear, and attractive as possible. For more detailed information the Internet can be a valuable resource. An example of grouping of actions under a safety and protection of property framework is provided to help envision this type of message.

Examples of Actions in an Earthquake-Safety and Property-Protection Framework:

Earthquake Safety

- Drop, Cover, and Hold;
- Identify safety spots to take cover during an earthquake,
- Earthquake safety behavior (before, during, and after, e.g., don't run in or out of buildings during an earthquake);
- Make a disaster kit; prepare to survive on your own for five days;
- Make a family plan; talk about earthquakes with family, neighbors, and friends;
- Secure your water heater; for safety and for an emergency water supply;
- Clear nonstructural hazards from exits, beds, desks, and gathering areas.

Protect Your Property

- Secure or protect your computer;
- Secure or protect irreplaceable personal items like photographs;
- Secure or protect items of high value (for example, an expensive painting);
- Secure, back up, or protect family financial, medical, and other records;
- Secure, back up, or protect irreplaceable work or research.

**Testing Response to a Catastrophic Urban Earthquake:
Golden Guardian '06 — A Region-Wide
Emergency Response Exercise**

**Richard Eisner, FAIA
Fritz Institute**

ABSTRACT

Responding to a catastrophic urban earthquake poses many challenges, including assessing the amount and extent of damage, understanding the interdependence of response and relief, and lifeline damage; staffing local, regional and state response organizations, setting priorities for critical resources, and managing regional, state and federal resource allocation. In November 2006, in partnership with the California Office of Homeland Security, the Federal Emergency Management Agency, the United States Geological Survey, the California Geological Survey, Kircher & Associates, ABS, Inc., PBS&J, Pacific Gas and Electric Company, California Department of Transportation and the Bay Area Rapid Transit District and the Earthquake Engineering Research Institute, the California Governor's Office of Emergency Services designed and executed a region-wide disaster response exercise to test communication and coordination among 6 counties, more than 6 state agencies and supporting private entities -- representing more than 5 million residents. Ground motions were modeled by the USGS. Buildings damaged were modeled by Kircher & Associates, ABS, and PBS&J using the FEMA HAZUS™ software. BART, PG&E and Caltrans provided assessments of their response and expected damage. This exercise was the largest response exercise carried out in California in more than 20 years, and the first to be played out in real time.

The exercise started at 5:12 AM in the morning, requiring activations and redirection of staff as would actually occur in a rapid onset disaster event. Exercise "play" continued for 36 continuous hours, testing both administrative and organizational capabilities, as well as disaster response and management capabilities. More than 200 state and federal agency staff were activated and participated over three 12-hour shifts in local, regional and state operations centers. Adding to the complexity of the play was the expected damage and disruption to regional transportation and communications systems, extensive damage to hospitals and government facilities, the ignition of more than 400 fires and the physical isolation of half of the San Francisco Bay Region by failures in BART and the Bay Bridges. As in a real event, information about damage, losses and disruption was generated at the local level and then communicated, along with resource requests, from the local level to the state.

This presentation will describe the development of the scenario, the management of the scenario inputs to the exercise; the Federal response; challenges in assessing damage, allocating resources, and communications; and gaps in emergency management systems and capabilities that need to be addressed.

National Earthquake Hazards Reduction Program Update

Jack Hayes
National Institute of Standards and Technology

ABSTRACT

This presentation will provide an overview of recent activities in the National Earthquake Hazards Reduction Program (NEHRP). It will summarize new statutory requirements of the most recent NEHRP reauthorization (Public Law 108-360) and outline the responses of the four NEHRP agencies (Federal Emergency Management Agency – FEMA, National Institute of Standards and Technology – NIST, National Science Foundation – NSF, and US Geological Survey – USGS).

New Seismic Provisions in Building Codes

**John R. Henry, P.E.
International Code Council**

ABSTRACT

This presentation identifies the National Earthquake Hazards Reduction Program (NEHRP) *Recommended Provisions for Seismic Regulations for New Buildings* as the source of the seismic design provisions in the model building codes and briefly describes the process by which the seismic provisions are developed and incorporated into the *International Building Code (IBC)* and the American Society of Civil Engineers (ASCE) *Minimum Design Loads for Buildings and Other Structures (ASCE 7)* standard. The presentation emphasizes by two simple examples the importance of enforcing the seismic provisions of the code to the fullest extent possible. The goal of the seismic provisions is to reduce the risks to life and property from future earthquakes in the United States. Without adequate enforcement of the provisions by the jurisdictions that adopt the code, our nation's goal of providing safer buildings and communities through seismic resistant construction cannot achieve its fullest potential. Many lessons learned from past earthquakes indicate the need for more rigorous and enforcement of the seismic provisions of the code and better construction quality control in the field. In addition, a tremendous amount of resources and effort by many dedicated people are required to develop the NEHRP seismic provisions and process them into the ASCE 7 standard referenced by the IBC. If the seismic requirements are not adequately enforced by the jurisdiction, then all these efforts and resources are wasted. Although this is certainly secondary to the primary goal of improving seismic safety in the built environment, making such an immense investment without making every effort to reap maximum benefit would be a shame.

Introduction

Where do seismic design provisions come from?

The goal of the Federal Emergency Management Agency (FEMA) and the National Earthquake Hazards Reduction Program (NEHRP) is to reduce the risk of losses due to earthquakes. The model codes are the most effective way to ensure adequate seismic resistant construction. The 1997 edition of the NEHRP *Recommended Provisions for Seismic Regulations for New Buildings (FEMA 302/303)* was the basis for the seismic provisions in the 2000 *International Building Code (IBC)*. The 2000 NEHRP (FEMA 368/369) was the basis for the changes to the seismic provisions in the 2003 IBC and the 2002 edition of the American Society of Civil Engineers (ASCE) *Minimum Design Loads for Buildings and Other Structures (ASCE 7)* standard. The 2003 NEHRP (FEMA 450) is the basis for changes to the seismic provisions in the 2006 IBC and ASCE 7-05 standard.

How do seismic design provisions get in the code?

The NEHRP provisions are not a code or a standard. The NEHRP is a resource document containing recommended seismic design guidelines of the NEHRP committees and as such must be reformulated into mandatory code language before incorporation into the IBC or ASCE 7 standard. This code work is done by FEMA/BSSC Code Resource Support Committee (CRSC) which is responsible for developing seismic proposals to the IBC and ASCE 7 standard. The CRSC also monitors all seismic changes to codes and standards to ensure that they are consistent with the intent of the provisions.

Why do we need to enforce the seismic provisions of the building code?

First and foremost, rigorous enforcement of seismic provisions is essential to ensure that the building's structural system is designed and constructed properly to have sufficient strength, stiffness and ductility to resist code prescribed seismic forces. If the seismic force resisting system is not properly designed, constructed and inspected, then the design earthquake could cause the building to collapse and endanger the lives of the occupants. Many lessons learned from past earthquakes indicate the need for more rigorous and enforcement of the seismic provisions of the code and better construction quality control in the field¹.

Second, it requires a tremendous amount of resources and the efforts of many dedicated people to develop the NEHRP seismic provisions and process them into the ASCE 7 standard to be referenced by the IBC. If the seismic requirements are not adequately enforced by the jurisdiction, then all these efforts and resources are wasted. Although this is secondary to the primary goal of improving seismic safety, to make such an immense investment without making every effort to reap maximum benefit would be a shame.

What do you mean by “enforce the seismic provisions of the building code?”

The building code is the legally adopted code in jurisdictions across the nation. The code provisions are enforced by the jurisdiction through the building permitting process which consists of structural plan review, approval and field inspection services. In addition, enforcement of the special inspection, special inspection for seismic resistance, structural testing for seismic resistance and structural observation requirements of IBC Chapter 17 are essential to ensure minimum levels of quality assurance during the construction process.

What is the most essential ingredient in the recipe for building seismic safety?

The most essential ingredient is enforcement of the seismic code provisions through competent plan review, inspection, and implementation of the seismic quality assurance provisions of Chapter 17. The “Jewel in the Crown” of seismic design is IBC Section 1604.4 which states, “Such analysis shall result in a system that provides a complete load path capable of transferring loads from their point of origin to the load-resisting elements.”

¹ Earthquake Engineering Research Institute. Construction Quality, Education, and Seismic Safety. EERI Endowment Fund White Paper, Oakland, California (1996).

The most important aspect of load path design is in providing clear shear transfer details so that design seismic forces are transferred from the point of origin (out-of-plane walls and roof diaphragm) through the various elements of the lateral force resisting system to the ultimate resisting element which is the foundation and supporting soil.

Without a properly designed, detailed and constructed load path, the seismic forces will not go to the resisting elements that were specifically designed to resist them. We are sure that the seismic force will go somewhere; if the forces do not go to the resisting elements that were designed to resist them, they will go to other resisting elements that were not designed to resist these forces.

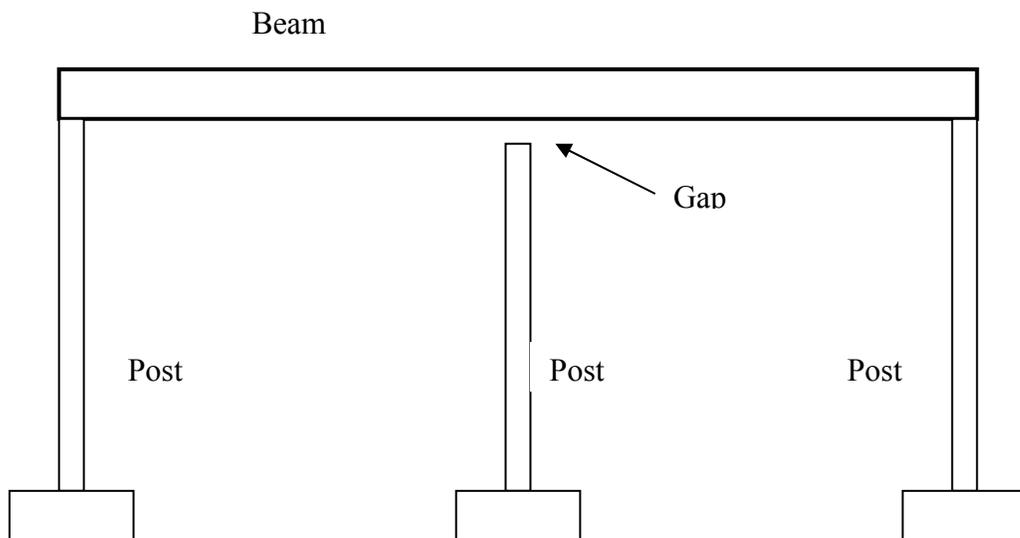
Example: Assume an interior shear wall is not properly connected to the roof diaphragm. There are four possible reasons that an interior shear wall is not properly connected to the roof diaphragm: (1) the engineer did not design the connection to the shear wall and the plan reviewer did not require it; (2) the engineer designed the connection but the plans do not show the collector and shear transfer detail so the builder knows how to construct it; (3) the engineer designed the collector and connection but the builder did not construct it according to the approved plan and the inspector did not catch it during the inspection process. (4) The interior shear wall creates a boundary in the roof diaphragm that must be boundary nailed, not just edge nailed or field nailed. If there is no concerted effort on the part of the engineer and plan reviewer to ensure that there is a collector with boundary nailing that is designed and detailed on the plan, or the builder does not properly construct the collector and boundary nail the roof diaphragm along that line (and the inspector does not catch it in the field), then that portion of the diaphragm load ($\frac{1}{2}$ of the total story shear) will never get to the interior shear wall.

Any one of the four scenarios is not uncommon in the real world. In any case, three dramatic things will result in the event that the building is subjected to the design earthquake:

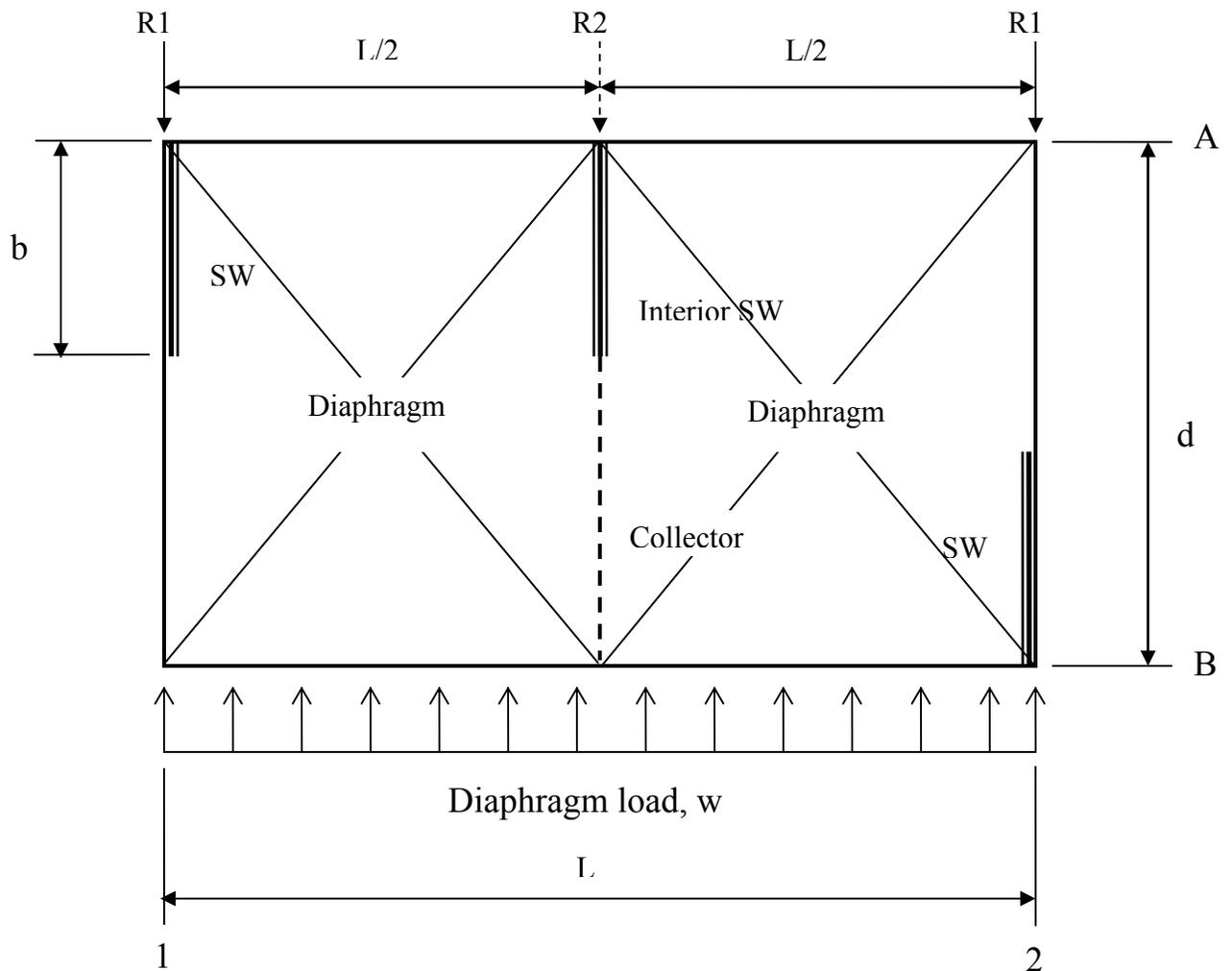
- 1) The diaphragm was designed to be supported by the interior shear wall but it is not. Instead the diaphragm spans between the exterior shear walls. The result: **The diaphragm shear is twice what it was designed for. In other words the diaphragm is 100% overstressed in shear.**
- 2) The diaphragm chord was designed to span between the interior shear wall and the exterior shear walls at each side of the building. But the diaphragm chord actually spans all the way from exterior shear wall to exterior shear wall, doubling its span. The result: **The diaphragm chord force (tension and compression) is four times what it was designed for.**
- 3) The interior shear wall was designed to take $\frac{1}{2}$ of the total story shear (for a flexible diaphragm with an interior shear wall centered in the building), with the exterior shear walls designed to take $\frac{1}{4}$ of the total story shear. With the interior shear wall not connected, it does not take its share of the story shear and this shear goes to the exterior shear walls instead. The result: **Each of the exterior shear walls will have to carry $\frac{1}{2}$ of the total story shear instead of $\frac{1}{4}$ of the total story shear meaning that the exterior wall shear is twice what it was designed for. In other words, the exterior shear walls are 100% overstressed.**

The above scenario is not theoretical. In many wood frame structures, especially in complicated custom residential construction, it is often very challenging and difficult to detail and construct the interior shear wall connections to the roof diaphragm. The collector design and the boundary nailing along that line is also often overlooked.

Perhaps the simplest analogy of the above scenario is a two span continuous beam that is designed to be supported by a post at each end and a post in the center. The beam spans from each end post to the center post. The center post takes approximately $\frac{1}{2}$ the total load on the beam. Imagine there is a 1 inch gap between the center post and the beam. What will happen? Three things will happen: (1) the shear stress in the beam at the end posts will double (like the diaphragm shear doubled), (2) the load on each end posts will double (like the wall shear doubled), and (3) the bending moment in the beam will quadruple (like the diaphragm chord force quadrupled).



Calculations for the above example follow.



1) With interior shear wall properly designed, detailed and constructed:

$$\text{Diaphragm unit shear at line 1, } v = \frac{1}{2} w \frac{L}{2d} = w \frac{L}{4d}$$

$$\text{Wall unit shear at line 1, } v_w = w \frac{L}{4b}$$

$$\text{Chord force at line A \& B, } T = C = \frac{w\left(\frac{L}{2}\right)^2}{8d} = \frac{wL^2}{32d}$$

2) Without interior shear wall properly designed, detailed or constructed:

$$\text{Diaphragm unit shear at line 1, } v = w\frac{L}{2d}$$

$$\text{Wall unit shear at line 1, } v_w = w\frac{L}{2b}$$

$$\text{Diaphragm chord force at lines A \& B, } T = C = \frac{wL^2}{8d}$$

The above calculations show that when the interior shear wall is disconnected from the diaphragm, the diaphragm shear and wall shear are doubled, and the diaphragm chord force is quadrupled.

Another example involves the code requirement that all concrete and masonry walls that are supported by floors or roofs (not cantilevered and intrinsically stable or “self supporting”) must be anchored to the floor and roof framing. The anchorage system must be capable of resisting the governing condition of (1) the out-of-plane seismic force on the wall or (2) a minimum of 200 pounds per lineal foot of wall (allowable stress design level)². The out-of-plane seismic force is a function of the short period spectral response acceleration, S_{DS} . For buildings in areas of low or moderate seismicity, the minimum of 200 plf (ASD) will generally govern the anchorage design³.

Assume that an 8 inch masonry wall building is located in an area of relatively low seismicity⁴ where the minimum anchorage force governs. The design engineer did not consider the minimum anchorage requirements but detailed a very typical connection using ½ inch diameter anchor bolts spaced 6 feet on center in a 2X plate on top of the CMU wall. To make matters worse, the plan reviewer did not catch it during the plan check process. According to the code, the minimum out-of-plane anchorage load is 200 pounds (ASD) per lineal foot of wall. For the anchor bolt spacing of 6 feet on center, the minimum anchorage force is 200 plf x 6 feet = 1200 lbs per bolt. According to Table 11E of the 2005 National Design Specification for Wood Construction (NDS), the capacity of a ½ inch diameter anchor bolt in a 2X Douglas Fir-Larch plate loaded

² This requirement dates back to the 1961 UBC and is now found in ASCE 7 Section 11.7.5 for Seismic Design Category A and Section 12.11.2 for other seismic design categories. Since all seismic forces are at strength level under current codes and standards, the requirement is 280 pounds per lineal foot of wall (1.4 x 200).

³ For an ordinary building with importance factor 1.0, Section 12.11.2 of ASCE 7 requires the anchorage connection to be designed for the greater of $0.4S_{DS}W$, $400S_{DS}$ or 280 plf (strength level forces).

⁴ Where $S_{DS} < 0.5g$ which corresponds to Seismic Design Category A, B or C for an Occupancy Category II building on Site Class D soils. In this case the minimum force of 280 plf would govern.

perpendicular to grain is 380 pounds x 1.6 = 608 pounds per bolt⁵. **What this means is the minimum code prescribed seismic demand on the bolts is 2 times their design capacity (1200/608). The ½ inch diameter anchor bolts should be spaced no more than 3 feet on center to meet the minimum code requirement.** Note that even a bolt spacing of 4 feet on center, which is often misconstrued to be adequate in Seismic Design Category D, is insufficient as well.

Conclusion

The first example illustrates that omission or inadequate connection of a seemingly insignificant element in the seismic force resisting system can cause other elements of the structural system to be seriously overstressed. In many cases the remaining elements of the seismic force resisting system probably will not have enough reserve capacity to resist additional seismic loads, especially when overloaded by a factor of 2. Failure of these overloaded elements can lead to partial or even complete collapse of the building, depending on the configuration. This is especially critical in wood frame bearing wall buildings where the shear walls often serve as bearing walls that provide support for gravity loads. The second example illustrates that typical concrete or masonry construction anchorage details are not always adequate when viewed in terms of the most current seismic design requirements. In the case presented, what is commonly considered typical masonry construction in many parts of the country does not even meet the minimum anchorage requirements of the code.

These examples illustrate that it is essential that the seismic provisions of the code be enforced to the maximum extent possible. To accomplish this requires that the design engineer, plan reviewer, building department inspector, and special inspector be as familiar as possible with the seismic requirements of their adopted code. Without adequate enforcement of the seismic provisions of the code, we cannot possibly achieve our nation's goal of providing safer buildings and communities.

⁵ The load duration factor for wood members resisting seismic forces is 1.6.

Misconceptions about FEMA Emergency Response and Recovery

**David Kennard
Department of Homeland Security/
Federal Emergency Management Agency
Region IX**

ABSTRACT

One of the biggest problems that FEMA faced in both Mississippi and Louisiana after hurricane Katrina was a misperception of FEMA's responsibilities and authorities. This presentation will shed light on the actual actions that FEMA takes after a disaster, the programs they bring to the table to assist individuals, and the things in the works that will enhance the ability of the Federal government to do more to assist the states with their response to, and recovery from, natural and man-made events.

Realities of Building Code Application

Ronald L. Lynn
Clark County Department of Development Services

ABSTRACT

Building codes, which enhance the safety of occupants, continue to evolve by both scientific research and empirically derived data. The testing of buildings in sequential disasters provides us some of the best information to enhance future construction. The two most significant challenges to the realization of safe, code-compliant construction are neither science nor engineering, but rather adoption and enforcement. Perceptions are that codes result in increased costs. This belief is exacerbated when dealing with events of very infrequent occurrences. This requires education as well as political savvy combined with pre-formulated legislation if an incident should occur. Nevertheless, the adoption of codes and standards is not enough if enforcement and contractor education do not produce our desired end results.

FEMA's Mitigation Role in the National Earthquake Hazards Reduction Program

**David Maurstad
Department of Homeland Security/
Federal Emergency Management Agency**

ABSTRACT

Responsibility for reducing earthquake risks is shared by Federal, state, and local governments and the private sector. The National Earthquake Hazards Reduction Program (NEHRP) is the Federal government's coordinated approach to addressing earthquake risks. NEHRP was established by Congress in 1977; and consists of four agencies: the Federal Emergency Management Agency (FEMA), the National Institute of Standards and Technology (NIST), the National Science Foundation (NSF), and the United States Geological Survey (USGS). The NEHRP agencies work jointly and in cooperation with other Federal and State agencies, local governments, private companies, academic institutions, and other organizations to improve the Nation's understanding of earthquake hazards and their risk, and to develop policies, practices, and risk reduction methods to reduce their effects.

The activities of the NEHRP agencies are complementary. The basic research supported and conducted by NSF and USGS is used by NIST and the industry to produce innovative technologies through problem-focused research and development. FEMA then uses this information to promote policies and practices to reduce future earthquake losses through State programs and the development and dissemination of design and construction guidance to promote and support the use of building codes and standards.

The foremost challenge facing NEHRP is encouraging risk reduction actions among local and State agencies and private entities. It is this implementation role that is FEMA's programmatic responsibility. Within the NEHRP, FEMA works to translate and transfer the results of research and technology development into effective earthquake loss reduction measures. In order to accomplish this responsibility, we have a long history of assisting State and local governments; providing tools to estimate of potential losses due to earthquake and other hazards; developing earthquake risk-reduction tools and measures; preparing technical design and construction guidance aimed at improving the seismic safety of new and existing buildings and lifelines; and preparing information for and about building codes and practices.

Within the NEHRP, FEMA has the following specific programmatic responsibilities:

1. Work closely with national standards and model building code organizations to promote the implementation of research results.
2. Promote better building practices within the building design and construction industry including architects, engineers, contractors, builders, and inspectors.
3. Operate a program of State grants and assistance to fund various risk reduction activities, and encourage multi-State groups for such purposes.
4. Support the implementation of a comprehensive earthquake education and public awareness program.

5. Assist in the preparation, maintenance, and dissemination of seismic resistant design guidance and related information on building codes, standards, and practices, and aid in the development of performance-based design guidelines.
6. Develop, coordinate, and execute the National Response Plan when required following an earthquake, and support the development of State and local plans.
7. Combine measures for earthquake hazards reduction with measures for reduction of other hazards including performance-based design approaches.
8. Provide preparedness, response, and mitigation recommendations to communities after an earthquake prediction or other earthquake advisory by the USGS and the National Earthquake Prediction Evaluation Council.
9. Establish demonstration projects on earthquake hazard mitigation.

Under these program responsibilities, FEMA carries out a variety of activities. Many involve organizations that can reach out and improve the nation's ability to reduce future earthquake losses. Foremost among these are the nation's building codes. FEMA has a long history as one of the first Federal agencies to work within the building code development process. Since 1984, we have worked within each of the model code legacy organizations and we were instrumental in helping develop the seismic provisions of the International Codes when the International Code Council was first formed.

FEMA has developed a series of guidance documents including the NEHRP Recommended Provisions for New Buildings and the NEHRP Guidelines for the Seismic Rehabilitation of Buildings, both of which serve as a resource for the nation's model building codes and standards. We work with the USGS and fund the development of seismic design maps based on the USGS hazard maps that are then adopted directly into the model building codes. We are currently working to develop the next-generation of Performance-Based Seismic Design Guidelines, which will encourage the use of innovative technologies and allow the selection of design and construction performance criteria for new and existing buildings based on owner and user needs.

In addition to our work within the building code process, it is our goal to improve earthquake awareness, and to that end, we are pursuing initiatives to improve communication to better reach our customers. FEMA also promotes seismic risk reduction at the State and local government levels through strong partnerships with State emergency management agencies and multi-state earthquake consortia, by providing technical assistance to communities and States, and by providing NEHRP State program funds as part of the Emergency Management Performance Grant (EMPG) program, although it is up to the States to determine how these are used.

While the latest NEHRP reauthorization shifted the lead agency responsibilities of the Program from FEMA to NIST, FEMA's primary responsibilities within the program did not change, and we are still charged with the implementation of the program's goal of reducing future losses. FEMA's responsibilities under the Department of Homeland Security have increased, and this has resulted in additional responsibilities for the Mitigation Division. We are working to identify opportunities to provide additional support to the NEHRP through opportunities such as a series of "ramp-up" initiatives that are being developed jointly by the NEHRP agencies. We remain committed to the NEHRP, its customers, and to the American public that live under the threat of an earthquake that could occur at any time.

Where We Stand Today in Communicating Earthquake Preparedness and Risk

Richard J. McCarthy
California Seismic Safety Commission

ABSTRACT

Californian's fear earthquakes more than any other natural disaster, but most people in the State are surprisingly unprepared for—if not oblivious to—the threat posed by a catastrophic seismic event.* As an example, after two years of education/outreach preceding the 100th anniversary of the 1906 San Francisco earthquake, Mayor Newsom stated that only 10 per cent of the city's residents were prepared for another major earthquake. This is not the exception but the norm for many in earthquake risk states. Why is it so difficult to motivate decision-makers and the public to be more pro-active and take action?

The process of communication of earthquake risk to decision-makers today is the same as it was 30 years ago. At that time, earthquake mitigation and preparedness programs had relatively minor competition for funds from the other natural disasters. Today, the situation is dramatically different. The public is bombarded with bad news continually by the news media. This in turn, has a major impact on how decision-makers prioritize some of their actions. Now other societal concerns provide direct competition for earthquake preparedness and risk programs within states at risk from earthquakes in the U.S. These disaster and societal needs competitors include but are not limited to, the following:

- Terrorism
- Global Warming
- Sea Level Rise
- Pandemic
- Budget Deficits
- Crumbling Infrastructure
- Gangs
- Hospital Induced Fatalities (infection, malpractice)
- Recession Fears
- Trans Fats
- Hurricanes
- Drought
- Wildfires
- Loan defaults

Although this list of competing societal issues may seem overwhelming, developing a new strategy that demonstrates how earthquake mitigation programs can apply to some of the issues listed above may be the best approach. For example, many of the pre and post event actions now being developed in business continuity plans to respond to a global pandemic have already been identified in many earthquake strategic plans.

Many individuals approach decision-makers with the belief that earthquake risk is “obvious” and there is no need to spend the time to explain the problem clearly. Unfortunately, in many cases, it is not obvious. Therefore, information must be presented to a decision-maker in a form that illustrates that earthquakes present the most significant risk to his or her constituents while they are in office.

The earthquake community has outstanding risk communicators and educators. The challenge now is to draw on the best and the brightest of them, close ranks, support them, and craft a totally new strategy on how to get the message to the decision-makers in a style that will result in action.

*Quote from Art Center College of Design’s the Los Angeles Earthquake Project: Get Ready

Why We Under-Prepare for Hazards: The Case of Earthquake Mitigation

Robert Meyer
The Wharton School
University of Pennsylvania

ABSTRACT

When viewing damage caused by natural disasters we often question why more was not done in advance to mitigate potential losses. In the case of hurricane Katrina, for example, residents and policy makers were fully aware of the imminent threat posed by hurricanes striking the New Orleans area, but the storm was preceded by a marked under-investment in mitigation, such as a tendency to permit levees to fall into a state of disrepair, and for the city to fail to develop an effective evacuation plan. Likewise, policy makers in Minnesota recently fell under criticism for having failed to invest in needed bridge repairs that might have prevented the I-35 collapse in Minneapolis. In this paper I explore the reasons that individuals and institutions often under-invest in mitigation against known hazards, and what can be done to increase compliance both by individuals and communities.

A central thesis is that what makes tactics for encouraging enhanced mitigation difficult to implement is that as individual decision makers we are not cognitively well engineered to make efficient decisions about how best to protect against low-probability, high-consequence hazards. We tend to quickly forget the past, have poor insights into likely futures, and prefer to make decisions by imitating the decisions made by friends and neighbors who are no better equipped to overcome these biases than we are. Moreover, these biases are exacerbated by the sparse and unreliable nature of the feedback we receive about hazards, something that makes it difficult for even the most rational among us to efficiently learn.

I illustrate these biases using data on how individuals learn to invest in protection against earthquakes in a real-time laboratory simulation. In the simulation participants live in a hypothetical country prone to periodic earthquakes, and they have the opportunity to purchase structural improvements to their homes that potentially mitigate the effects of quakes should one arise. Participants are paid based on the effectiveness of their decisions, and to aid learning they can continuously observe the investment decisions being made by others, as well as damage others suffer from quakes.

Mimicking biases that are often observed in real-world contexts, investments in mitigation are shown to be asymptotically below that which would be optimal, with the two main drivers of investments being whether or not a participant has suffered a recent direct loss from a quake and, more critically, the average investment made by others in their community. In addition, attempts to de-bias mitigation errors by planting a fully-informed participant in each community are only partially successful. While participants appeared willing to follow the lead of informed participants who know that mitigation investments is *not* cost effective, they are less willing to follow the lead of participants who are told that mitigation is long-run cost effective.

I then explore the implications of these and other related findings for how we might develop policies that encourage safe societies. I explore two general approaches: increasing voluntary compliance through the design of educational instruments that are directly designed to counteract specific cognitive biases that impede investments (such as the inability to mentally visualize future damages), and, for cases where large individual investments in mitigation are, in fact, not cost-effective, all-hazard insurance policies that facilitate after-the-fact recovery at a reasonable cost.

The 2007 U.S. Geological Survey National Seismic Hazard Maps

**Mark Petersen*, Arthur Frankel, Stephen Harmsen, Charles Mueller,
Kathleen Haller, Russell Wheeler, Robert Wesson, Oliver Boyd,
Yuehua Zeng, David Perkins, and Nicolas Luco**

ABSTRACT

The USGS National Seismic Hazard Mapping Project (NSHMP) is updating the National Seismic Hazard Maps in 2007 for consideration by the Building Seismic Safety Council in their update of the 2008/9 *NEHRP Recommended Provisions for Seismic Regulations for New Buildings*, the design guidelines adopted in past building codes. Several workshops by the USGS, Western States Seismic Policy Council (WSSPC), Southern California Earthquake Center (SCEC), California Geological Survey (CGS), Pacific Earthquake Engineering Research Center (PEER), and the Applied Technology Council (ATC) were convened to elicit new seismic hazard information that was used in developing the input parameters and seismic hazard models. These products have been available for public review on the Internet and for formal review by an advisory panel on the national maps and an expert panel on ground motions. As a result of this process, the 2007 National Seismic Hazard Maps incorporate significant amount of newly published or well-vetted research on earthquake ground motions and sources throughout the country.

The NSHMP obtained new information from scientists and engineers on seismic hazard at regional and topical workshops that were held in 2006 for the Pacific NW region, Central and Eastern U.S., Intermountain West, and California. Additional workshops were held on attenuation relations in the central and eastern U.S. region (by Jack Boatwright) and the western U.S. region. Additionally, an expert panel was commissioned to provide advice on implementation of attenuation relations for the western U.S. A user workshop (ATC-35) provided feedback from hazard end-users on interim maps and their engineering implications. The NSHMP also benefited from interactions with several other organizations that have provided new input data, models, and relationships that were used in producing the 2007 hazard maps. Workshops on these issues included: (1) interactions with the Working Group on California Earthquake Probabilities (WGCEP) to develop a uniform California earthquake rupture forecast model for the California Earthquake Authority through a USGS/CGS/SCEC partnership, (2) meetings sponsored by WSSPC and state geological surveys to develop new criteria for assessing earthquake recurrence in the Intermountain West region, (3) discussions with a newly formed Pacific NW Fault Working Group that provided advice on fault parameters, and (4) participation in several workshops held as part of the PEER NGA - Next Generation Attenuation relation process.

Reviews of the maps included: (1) a review by the USGS and CGS on the new PEER NGA attenuation relations, (2) A review of an early version of the maps by the National Seismic Hazard Map Advisory Panel (3) a public Internet review period from June-July 2007, (4) reviews from state geological surveys, (4) the Senior Science Advisory Panel review of the WGCEP for California, and (5) a second email review that will be held by the National Seismic Hazard Map Advisory Panel before the final maps are released. The Building Seismic Safety Council has

*Mark Petersen, Chief, National Seismic Hazard Mapping Project,
U.S. Geological Survey, Denver Federal Center MS 966, Box 25046,
Denver, CO 80225
Tel. (303) 273-8546, mpetersen@usgs.gov

requested that a version of the map be available for discussion by the “Seismic Design Procedures Reassessment Group”, PROJECT-07, a committee that evaluates potential changes to building code design criteria. The final design maps (MCE) are expected at the end of 2007.

Updated models and data being considered for the new maps include: (1) new ground motion attenuation relations for crustal interplate, intraplate, and subduction-interface earthquakes, (2) new earthquake recurrence models and fault geometries suggested in the WSSPC recommendations for the Intermountain West region, (3) updated earthquake recurrence rates for the San Andreas fault system and for some other California faults introduced by the WGCEP, (4) new Cascadia earthquake source model that includes earthquake probabilities for subduction zone earthquakes with magnitudes between 8.0 and 9.0, (5) a new logic tree for earthquake recurrence in the New Madrid Seismic Zone that includes earthquake clustering and alternative earthquake recurrence rates, (6) new faults in the western U.S., and (7) updated earthquake catalogs and background seismicity models that include magnitude uncertainties.

Recently published attenuation relations and source models result in lower ground motions, compared to the 2002 ground motions, at 1 s spectral accelerations for most parts of the western and eastern U. S, except for the Pacific Northwest region where the subduction-zone interface attenuation relations contribute to the higher ground motions. However, compared to the 2002 seismic hazard maps, most parts of the western U. S. are within $\pm 10\%$ of the former values for 5 hertz spectral accelerations. Ground motions in the central and eastern U.S. at 5 hertz spectral accelerations are in general 10-15% lower than the 2002 values.

Defining Performance Based Engineering Objectives for Communities: A Call for Agreement and Transparency

Chris D. Poland
Degenkolb Engineers, San Francisco, California

ABSTRACT

For over a century, cities in earthquake country have taken an interest in preparing for the inevitable; major earthquakes that endanger lives and wreak economic havoc. Designers and builders have sought ways to protect people and infrastructure from the effects of shaking, land movement, and fire that often follows the initial destruction.

By the early 1980's, design and construction standards had matured to the point that would allow buildings and infrastructure to be reliably designed to designated performance objectives; safe and useable during repairs, safe and usable after repairs, or safe and requiring replacement. Building Codes have emerged that set minimum standards for new construction and other standards for the rehabilitation of existing construction with these performance levels in mind.

As we move well into the 21st century, seismic design technology continues to advance at a rapid pace. New research, high speed computing, new materials, and new systems are providing a refined understanding of the seismic hazard nationwide and new products and tools have emerged that allow designers to better predict the performance of structures. When properly implemented in new projects, seismic strengthening to any level can be inexpensive, good insurance and a significant contribution to a community's sustainability and disaster resilience. Rehabilitation of existing construction remains expensive, but in many cases, has become affordable and cost beneficial.

Unfortunately, when stock is taken of the impact major earthquakes will have on our cities in high seismic regions; we are forced to recognize that we are still facing thousands of casualties, hundreds of thousands of displaced households, and losses in the 100's of billions. The problems: (1) design and construction requirements for new construction still focus mostly on safety and ignore the question of usability, (2) there is only an inconsistent and unregulated approach to providing and maintaining lifeline systems that will support economic recovery, and (3) little is being done to rehabilitate structures built without earthquake resistant features because we can't seem to get past the cost and who is going to have to pay.

The Earthquake Professionals that organized the conference commemorating the 100th Anniversary of the 1906 Earthquake developed an action agenda for the region's residents, businesses, earthquake professionals, and governments to increase safety, reduce losses, and ensure a speedier recovery when the next major earthquake strikes. The agenda looks specifically at what is needed to develop a culture of preparedness beyond 72 hours, and calls on all residents, businesses and governments to know their risks and take responsibility for risk management and preparedness. It challenges governments, public agencies, building owners, and the engineering

community to target the most dangerous buildings, essential facilities and community-serving infrastructure for strategic investments in mitigation. It calls on governments, insurers and the region's major industries to collaborate to ensure that adequate resources are available for recovery.

To actually move forward and implement the needed actions, however, multi-disciplinary, broad based strategic objectives need to be developed and integrated into a set of seismic mitigation policies that will provide a community with the resilience it needs to respond to and recover from the major earthquakes that can occur. Resilience is not just understanding the hazard and limiting the damage to the satisfaction of the earthquake professionals. Communities also need to recognize their ability to tap into their robustness, redundancy, and resourcefulness and ability to provide critical community services and drive economic recovery regardless of the condition of their buildings and infrastructure. Buildings and infrastructure need to be designed and constructed or rehabilitated just enough to allow a community to recover given its inherent ability to act in the face of disaster.

There appear to be two serious, perhaps insurmountable, barriers to achieving such a holistic approach. They are foundational problems that affect perception and thereby block proper consideration and decision-making. Both are fueled by the actions of the earthquake professional community. The first is the significant public misperception related to how serious the hazard is and how buildings and infrastructure will perform. The second is the lack of coordination and common messaging from within the community of earthquake professionals.

The tools are available, and the vocabulary has been established to overcome these barriers. We need the earthquake professionals to agree on a hazard level, and commit to making seismic vulnerability transparent and understandable. Let's support the hazard levels established and refined by USGS. Let's insist that our communities in turn require that every building and infrastructure system declare its expected seismic performance, in simple, concise, and understandable terms; safe and usable during repair, safe and usable after repair, safe but not repairable, unsafe. It is a declaration that must be apart of the public record, allowed to adjust the economic value of individual buildings, and a community's economic development potential. Let's depend on the market to define the appropriate level of seismic safety each community needs.

There is strong evidence that the public and the governing officials want to make knowledgeable choices about seismic safety. They are, in fact, making those choices every day/every year based on what they understand and perceive. With clarity on the hazard level, and transparency on the risk, appropriate new design standards will be adopted and enforced that will arrest the growth of seismic risk. In addition, voluntary, triggered, and mandatory seismic programs will appear that will deal with the existing buildings and infrastructure in a community specific and appropriate manner.

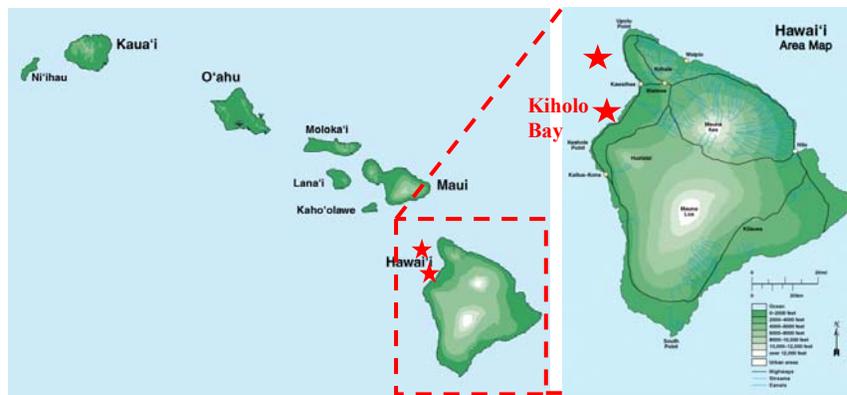
Defining performance based engineering objectives for each community will become a natural outcome on the understanding. Agreement and transparency will lead to achieving seismic safety in a timely and affordable manner.

Reconnaissance Following the October 15, 2006 Kiholo Bay Earthquake, Hawaii

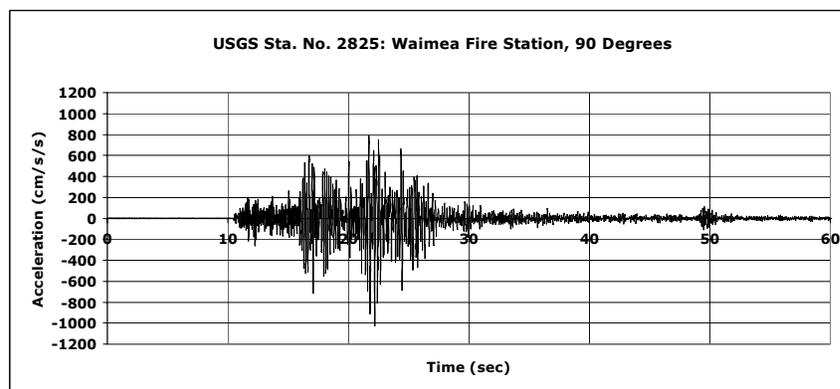
Ian N. Robertson
Department of Civil & Environmental Engineering
University of Hawai'i

ABSTRACT

On October 15th, 2006, two earthquakes with magnitudes of Mw6.7 and Mw6.0 struck in close succession just off the Northwest coast of the Island of Hawai'i. The first of these, the Kiholo Bay event, produced a PGA of 1.03g in the nearby town of Waimea-Kamuela. Structural damage occurred to bridges, hotel buildings, harbor facilities and numerous light-framed residential structures. The structural damage was primarily in the Northwestern portion of the Island of Hawai'i. This presentation summarizes the structural observations from a fact-finding reconnaissance performed by the author, along with geotechnical engineering colleagues Peter Nicholson and Horst Brandes, two days after the earthquakes.



Locations of Kiholo Bay Earthquakes



Recorded E-W ground motion at Waimea Fire Station

Structural damage occurred at a number of buildings, bridges and port facilities, particularly those closest to the earthquake epicenters. Much of the damage to buildings was in the form of failure of non-structural elements such as ceilings, light fixtures, plumbing and other utility lines; however, certain buildings experienced more serious structural damage. The Mauna Kea Hotel located just 11 miles from the Kiholo Bay epicenter suffered significant structural and non-structural damage leading to closure of the hotel. The Honokoa Bridge located within 24 km of both earthquake epicenters, suffered significant damage to the precast concrete girder webs. Liquefaction-induced lateral spreading at the Kawaihae Harbor resulted in damage to the concrete piers and metal frame warehouses. Historical buildings such as the Kalahikiola Church in Hawi suffered significant damage due to failure of unreinforced rock walls.

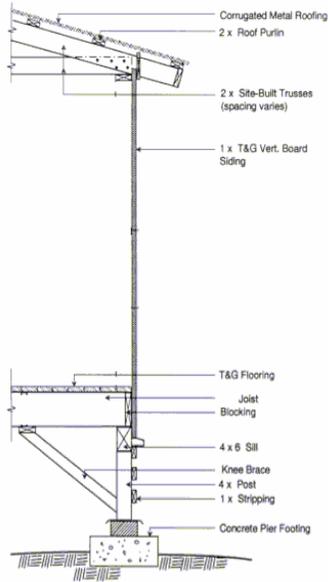


Mauna Kea Hotel damage



Kalahikiola Church damage

Over 1,800 individual residences were damaged to varying degrees. Many of the homes that were destroyed or experienced severe damage were built using single-wall construction on post-and-pier foundation systems resting on small loose concrete foundation blocks. This foundation system is considered inadequate for both hurricane and seismic events. A high proportion of the damage homes were located on volcanic ash deposit sites which tend to magnify the ground motion similar to deep alluvial deposits.



A complete report of the reconnaissance findings is available for download at:
http://www.cce.hawaii.edu/reports/Kiholo_Bay_Report.pdf.

How to Effectively Communicate Risk, Safety, and Mitigation Messages

Corinne L. Shefner-Rogers

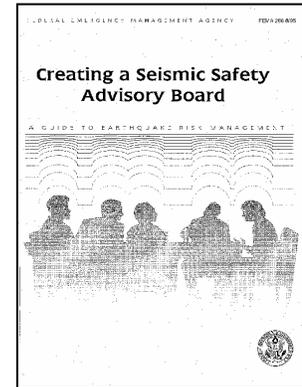
ABSTRACT

The meaning of risk, safety, and mitigation is qualitatively different for lay people and “experts.” Lay individuals’ response to information about risks is strongly influenced by their interpersonal interactions and experiences. Effective communication about risk, safety, preparedness, and mitigation begins with understanding the audience’s current knowledge, perceptions, attitudes, experiences, and behaviors with regard to earthquakes. Effective messages address the audience’s perceived severity of the risk, perceived susceptibility to the risk, and self-efficacy in preparing for, or responding to, a seismic event. This presentation discusses (1) theoretical foundations for developing effective mass media messages, (2) how to translate formative research into effective messages, (3) the messenger(s), and (4) strategies to motivate individuals to preparedness behavior change. Mass media messages that are delivered through multiple channels, and that motivate interpersonal communication, are more likely to result in preparedness behavior change.

Understanding the Role of Seismic Safety Commissions in Influencing Building Code Decisions

Barry H. Welliver
BHW Engineers, LLC

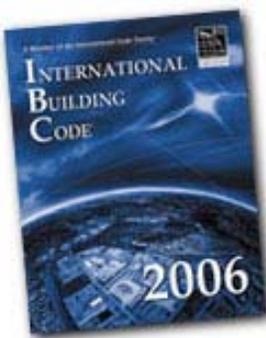
Look at the defining statutes of Seismic Safety Commissions or Advisory Boards and you'll find language describing their role in providing policy, guidance and direction for the implementation of a wide-ranging earthquake risk reduction and management program consistent with the state's responsibilities. Behind this statement there may also be some justifying reasons for the creation of such a commission or board. Generally this consists of the recognition that earthquakes have, or conceivably will cause future loss of life, injury, destruction of property, and economic and social disruption. To complete this reasoning this statement is usually followed with the acknowledgment that these dangers can be substantially reduced by implementing earthquake hazard reduction measures.



FEMA 266

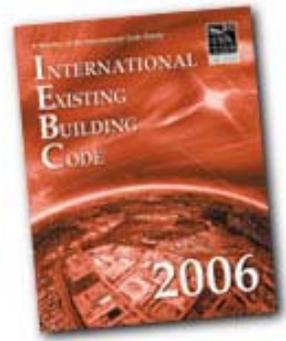
This is the call for commissions and boards to be closely familiar with the benefits of building codes since they clearly address four out of the five issues associated with the devastating effects of earthquakes. Encouraging the adoption of current seismic codes is one way to help ensure that buildings and structures are constructed to at least a minimum standard.

The process for adoption of state and local building codes can vary considerably. It is complicated by the need to have provisions not only for the engineering aspects of design, but also for fire-resistance, occupancy, means of egress, energy efficiency and many other factors any of which can complicate the wholesale adoption of a uniform model code. In the past, this left opportunities to reject adoption of building codes on the basis of disagreement with even a portion of the body of regulations.

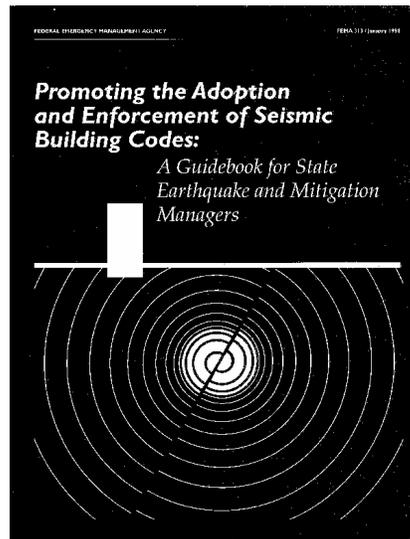


Building construction codes deal with the anticipated loads to be placed on structures during their expected lifetime. These include gravity, wind, earthquake, floods and other natural and man-made forces. The design for earthquake loads is a relatively new part of building codes and is improving with each new code cycle. This is in part due to the process of how we understand the effects of earthquakes on buildings. Many of the proposed revisions are the direct result of observed failures or weaknesses in structures following an earthquake. This fact should help advocates for seismic safety appreciate the need to understand the importance of maintaining current seismic design regulations.

Building codes historically have primarily addressed new construction. The need to protect the public health, safety, and welfare is fairly evident when considering allowable forms of construction suitable for new construction. This has not been the case for existing buildings and it is only relatively recently that seismic design requirements have been available for this large class of buildings. Codes addressing the seismic design needs of existing buildings are generally more lenient in an attempt to encourage the rehabilitation of these structures. Considering that many older buildings were constructed without the benefit of any building code requirements for earthquake loadings, this group of buildings should require special consideration.



As Seismic Safety Commissions and Boards consider their mandate to promote greater protection of life and property from the risks associated with earthquakes, there is a need to keep in mind the importance of advocating strong building codes. This one key component is essential to helping in the creation of a resilient building stock.



FEMA 313

AWARDS

**Western States Seismic Policy Council
2007 Awards in Excellence**

**Presented at 2007 WSSPC-ICC Conference
Awards Luncheon
Grand Sierra Resort
Reno, Nevada
October 2, 2007**

**2007 Award in Excellence for
Lifetime Achievement in Earthquake Risk Reduction**
Richard K. Eisner, FAIA

Overall Award for Excellence in Mitigation
Presented to: Hawaii State Civil Defense, Hawaii State Earthquake Advisory
Committee, and Hawaii Coastal Zone Management Program for *Earthquake
Hazards and Estimated Losses in the County of Hawaii*
Accepting: Ian Robertson

Award Category: Non-Profit Agency Efforts
Presented to: Pacific Tsunami Museum for
Walking & Driving Tours of Historical Tsunami Sites
Accepting: Genevieve Cain

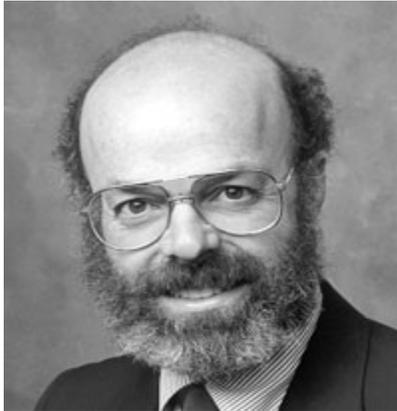
**Award Category: Outreach to Business/Government,
Schools and General Public**
Presented to: Lincoln County (Oregon) School District
for *Earthquake and Tsunami Preparedness Program*
Accepting: Susan Graves

Award Category: Innovations (Public-Private Partnerships)
Presented to: Oregon Natural Hazards Workgroup at the University of Oregon for
Partners for Disaster Resistance & Resilience
Accepting: Jay Wilson

Award Category: Research Efforts
Presented to: Utah Geological Survey/
WSSPC Basin & Range Province Committee for
Basin & Range Province Earthquake Working Group
Accepting: William Lund

**Western States Seismic Policy Council
2007 Award in Excellence for Lifetime Achievement
in Earthquake Risk Reduction**

Richard K. Eisner, FAIA



In 2006 Richard Eisner retired from the California Governor's Office of Emergency Services (OES) where he had served as Manager for the California Integrated Seismic Network (CISN) and Earthquake Programs and as Coastal Region Administrator. He was responsible, as CISN Manager, for implementing OES funding for the expansion of the TriNet seismic network to northern and central California and the maintenance of the program in southern California. Prior to his appointment as CISN Manager in 2002 he served for eight years as Coastal Region Administrator, responsible for California's responses to disasters in the San Francisco Bay Region and north coast counties. Prior to that appointment he served as the founding Director of the Bay Area Regional Earthquake Preparedness Project (BAREPP), a FEMA and state funded program, providing planning and technical assistance to promote and support earthquake preparedness and hazard mitigation by local governments and businesses throughout the San Francisco Bay area.

An architect, urban planner, and urban designer, Eisner, for the last 30 years, focused his career on issues of seismic design and urban earthquake hazard reduction, including serving as program manager on a National Science Foundation funded project to develop model hazard reduction and preparedness techniques based on Japanese practice. A key element of his work at BAREPP was the implementation of these models and integration of knowledge from the earth and social science communities into mitigation and preparedness programs.

Eisner participated in several post-earthquake investigations, including those for El Centro (1979), Coalinga (1983), Morgan Hill (1984), Palm Springs (1986), Whittier (1987) and Cape Mendocino (1992). In addition to his research work, he served on the State's investigative team that visited Mexico City after the devastating earthquake in 1985 and reported on their findings to the State Legislature. In his role as Director of BAREPP, he participated in the state's response to the Loma Prieta (1989), Cape Mendocino and Landers/Big Bear (all in 1992) and Northridge (1994) earthquakes. He implemented the Earthquake Clearinghouse after Northridge to gather information and provide support to researchers visiting the disaster. Since 1993, he has served on the project working group, overseeing the development of FEMA's HAZUS earthquake loss estimation tool.

As a recognized expert in community preparedness, Eisner has presented papers on California's comprehensive approach to earthquake preparedness in the US, Japan, China, Kyrgystan and the Ukraine. He has consulted on issues of hazard mitigation and emergency management including serving on the Global Assessment of Earthquake Countermeasures in

Kobe, Japan (1999 and 2000), an international evaluation of the response to the 1995 Great Hanshin-Awaji Earthquake, sponsored by Hyogo Prefecture. From 1988 until 2003, he Chaired EERI's US --Japan Urban Earthquake Hazard Mitigation Committee that organized collaborative workshops with the Japanese in 1991, 1995, 1998, 1999 and 2003. He also served as Co-Chair of the 1st International Conference on Urban Disaster Reduction convened in Kobe in 2005 on the 10th anniversary of the Hanshin-Awaji earthquake. He was elected to the Board of Directors of the Northern California Chapter of EERI in 2003 and the Board of Directors of EERI in 2004 and participated on the Steering Committee for the 2006 Centennial Conference of the San Francisco Earthquake.

Richard Eisner was elected in 1996 to the College of Fellows of the American Institute of Architects in recognition of his contribution to improving the quality of the built environment and to the architectural profession. He also serves on the Board of Directors of the National Institute of Building Sciences and the California Earthquake Safety Foundation. Rich Eisner is one of 15 distinguished experts named to the National Earthquake Hazards Reduction Program Advisory Committee on Earthquake Hazards Reduction (ACEHR). In 2007 he joined the Fritz Institute as a Senior Consultant on the Bay Area Disaster Preparedness Initiative.

**Western States Seismic Policy Council
2007 Awards in Excellence**

Overall Award for Excellence in Mitigation

**Presented to: Hawaii State Civil Defense, Hawaii State Earthquake
Advisory Committee, and Hawaii Coastal Zone Management
Program for *Earthquake Hazards and Estimated Losses in the
County of Hawaii***

1. Summary

The Hawaii State Earthquake Advisory Committee (HSEAC) was founded in 1990 by the Hawaii State Civil Defense Agency (SCD) to bring together seismic expertise from the Hawaii scientific, engineering, and emergency management communities. HSEAC serves as a technical advisory committee to SCD for identifying and implementing seismic hazards mitigation programs.

The risks to property from earthquakes in the County of Hawaii are among the highest in the nation, with only San Francisco and San Jose, California having a greater annual loss per million dollars of building value. Earthquake occurrence rates in the County of Hawaii are as high as that near the most hazardous fault areas on the mainland United States.

HSEAC identified the need prepare for these earthquakes by developing an understanding and knowledge of potential losses – to humans, buildings, infrastructure, businesses – and potential needs – hospital beds, shelter, transportation and utilities, debris removal - in order to mitigate both short and long term losses.

HSEAC began the process of customizing FEMA's loss estimation model, HAZUS 99, in 2000. Customization included three major areas: (a) ground motion attenuation function was customized to produce the closest fit to the ground motion acceleration data from past earthquakes striking the County of Hawaii, (b) building inventory was revised to account for Hawaii's unique building construction types, including single-wall construction, the number and locations of specific building types, and Hawaii construction costs, and (c) soil types were customized to account for general locations of volcanic ash and alluvium deposits, and a comprehensive soil profile type survey of the island of Hawaii was accommodated in the soil type assignments for each census tract. This is the highest level of customization possible, requiring a unique combination of expertise in Hawaii seismicity, structural engineering, local building construction, geographical information systems, in-depth knowledge of HAZUS software file structure for data base files, and the ability to customize data files. This customization was necessary because the default parameters of HAZUS 99 would result in inaccurate results in Hawaii not reflecting local conditions.

The work under this project is used by the emergency management and hazard mitigation communities. *Earthquake Hazards and Estimated Losses in the County of Hawaii*, a 29-page report, was published in 2005 to extend the reach of this project to decision makers and other segments of the community who play a vital role in the event of a destructive earthquake. Shortly after its publication, HSEAC held a workshop in the County of Hawaii which included the work done under this Report. It was attended by over 100 county leaders, including the Mayor, county council members, building officials, planners, emergency managers, police, fire, and hospital officials, scientists and others who have a role in earthquake hazards mitigation. The Report was also the subject of an article in NOAA's Coastal Services Magazine in 2006.

The accuracy of the customization was validated in the wake of the October 2006 Kiholo Bay Earthquake, the most powerful seismic event in the United States that year. Comparisons with the reported losses demonstrated that the entire set of model improvements were necessary to produce comparable results. Conversely, a Hawaii-based disaster center not using all customizations produced results that were orders of magnitude different than the actual losses.

2. Inception of work: 2000

3. Purpose: Develop an understanding and knowledge of potential losses – to humans, buildings, infrastructure, businesses – and potential needs – hospital beds, shelter, transportation and utilities, debris removal - in order to mitigate both short and long term losses from earthquake hazards, and extend this knowledge to decision makers and other segments of the community who play a vital role in the event of a destructive earthquake.

Problem designed to address: The high risks to life, property, and business from earthquake hazards in the County of Hawaii. The risks to property from earthquakes in the County of Hawaii are among the highest in the nation, with only San Francisco and San Jose, California having a greater annual loss per million dollars of building value. Earthquake occurrence rates in the County of Hawaii are as high as that near the most hazardous fault areas on the mainland United States.

4. Describe the specific activities and operations of the program.

Through a series of studies beginning in 2000, the HAZUS 99 software Hawaii-database was customized and validated to incorporate Hawaii County-specific building inventories, code adoption and enforcement policy histories, and geospatial and soil type information GIS layers, Hawaii-specific seismological and attenuation parameters, building damage functions including single wall construction, and local construction cost data parameters. The final report has been used to educate: In 2005, HSEAC held a workshop in the County of Hawaii which included the work done under this Report. It was attended by over 100 county leaders, including the Mayor, county council members, building officials, planners, emergency managers, police, fire, and hospital officials, scientists and others who have a role in earthquake hazards mitigation. The Report has been used in geology classes at the University of Hawaii at Hilo. The Report has been distributed outside of Hawaii, to countries affected by the Indian Ocean tsunami, and was the subject of an article in National Oceanic and Atmospheric Administration's (NOAA) Coastal Services Magazine in 2006, as an example of how the latest science can be translated to a form that planners and decision makers can readily use.

5. Does this program take a new and creative approach or method?

The project is new and creative both technically and in presentation. The level of customization of HAZUS represents an uncommonly high level of effort to apply HAZUS to a region with unique geologic and construction features. The delivery of the information developed under this project is both unique and creative: the highly technical information is presented in a form that is readable, understandable, and attractive to decision makers and other segments of the community who have a role in earthquake hazards mitigation. This was accomplished without sacrificing accuracy, so it is a document usable by technical as well as lay persons. It was recognized by NOAA's Coastal Services Center in its Coastal Services Magazine (February 2006) and distributed in worldwide venues after the December 2004 Indian Ocean tsunami.

6. Start up costs: \$120,000. Sources of funding: Hawaii Coastal Zone Management Program

Annual operating costs: \$0. Sources of funding: Not applicable

7. Employees working on the project: 2 employees work part of the time on earthquake hazard mitigation – one in State Civil Defense and one at the Hawaii Coastal Zone Management Program.

8. Did the project originate in Hawaii?

Yes, the customization of HAZUS-99 to Hawaii's circumstances originated in Hawaii.

Are there similar programs in other states?

Not to our knowledge, in terms of the intensity of the validation of the modeling and level of customization to a specific region.

9. Is the project fully implemented?

Yes, the report has been fully sanctioned by the Hawaii State Department of Defense and distributed locally, nationally, and internationally.

10. Is there evidence that the program has been effective in achieving its stated purpose?

The Structural Engineers Association of Hawaii conducted an in-depth analysis of the October 2006 Kiholo Bay Earthquake and data on losses and found that increased vulnerability of single wall construction, as indicated by the customization work done under this project, was validated by ATC-20 building evaluation surveys, and the number of buildings damaged and economic losses, were found to be quite similar to the customized HAZUS output, which also validated the work done under this project.

11. Has the project changed since its inception?

The project will be refined and taken to a higher level as a result of the 2006 Kiholo Bay Earthquake. The National Earthquake Hazards Reduction Program, Hazard Mitigation Technical Assistance Program, will be funding the further validation of the customization and data migration to the Federal Emergency Management Agency's (FEMA) latest loss estimation model, HAZUS Multi-Hazards (HAZUS MH), which covers earthquake hazards.

What limitations or obstacles might other states expect to encounter if they attempt to adopt the program?

During this effort, the project team discovered numerous software issues that needed correction, documented these issues in writing in great detail, and discussed them with the software developer. This ultimately resulted in many improvements to HAZUS 99, which were incorporated in HAZUS MH. Consequently, others utilizing HAZUS models will encounter fewer obstacles than Hawaii did in its precedent-setting role.

**Western States Seismic Policy Council
2007 Awards in Excellence**

Award Category: Non-Profit Agency Efforts

**Presented to: Pacific Tsunami Museum for
*Walking & Driving Tours of Historical Tsunami Sites***

1. Summary

The “Walking & Driving Tours of Historical Tsunami Sites” is an innovative approach to tsunami education and awareness. The tours have expanded the reach of the Pacific Tsunami Museum into the community and the environment by showcasing sites that were once devastated by past tsunamis. The mission of the museum – that no one in Hawaii should ever again die in a tsunami – is conveyed to a wider audience of local residents and visitors by the tours’ use of tsunami signage and awareness publications.

The Pacific Tsunami Museum designed the “Walking & Driving Tours of Historical Tsunami Sites” in a way that creatively meets the needs of patrons with special needs. The tours are also suitable for all ages and all levels of physical ability. It has been 47 years since a disastrous tsunami hit Hawaiian shores and many island residents have developed a sense of complacency. The recent earthquake activity of October 2006 emphasized the need for heightened awareness and more thorough education for Pacific-wide and locally generated tsunamis. The sites featured on the walking and driving tours are permanent reminders of the devastation tsunamis are capable of causing. The tsunami signage acts as an educational tool and also symbolizes the need for communities to remain vigilant.

The “Walking & Driving Tours of Historical Tsunamis Sites” features two tours. The walking tour visits five sites and circles a peninsula that was devastated by the 1960 tsunami. The driving tour includes in-depth information about earthquakes and locally generated tsunamis and visits sites affected by the tsunami of 1946. The tours also include a full-color, 12-page booklet (free of charge) that provides information, stories, and quotations about the sites. During summer months, children on the tours are also given 2-page activity pamphlets that feature tsunami-related word puzzles and tour-relevant games.

The Pacific Tsunami Museum has received extremely positive feedback from visitors and local residents who have experienced the walking and driving tours. Patrons often comment that the tours have a powerful, emotional impact on their lives; more so than some of the other features offered by the museum. The ability to interact with the natural environment and historical sites increases the tourists’ experience and allows them to be more receptive to tsunami awareness information and education. The Pacific Tsunami Museum is extremely proud to offer the “Walking & Driving Tours of Historical Tsunami Sites” as a unique and educational way to preserve history and continue tsunami awareness and preparedness in Hawaii.

2. The program has been operational since March 2005.

3. The ultimate purpose of the program is to provide education about tsunamis and to create awareness so that no one in Hawaii will die in a future tsunami disaster. The program is dedicated to providing tourists (local and visiting) of all ages and abilities with an educational, accurate, and interactive experience of Hawaii's tsunami history.

4. The specific activities and operations of the "Walking & Driving Tours of Historical Tsunami Sites" program include:

- a. Walking Tour, designed for those individuals who are interested in strolling
- b. Driving Tour, designed for those who have a vehicle and want to travel farther than the walking tour
- c. 2-page activity pamphlets for children that feature tsunami-related word puzzles and tour-relevant games available during the summer months
- d. Activities require no guides, allowing tourists to be self-sufficient and complete the activities at their own pace.

5. The program was built around oral histories of tsunami survivors that have been collected since the museum opened. The stories recount survivors' personal experiences at each of the sites featured of the walking and driving tours. Photographs contributed from survivors' personal collections also provide accurate portrayals of the pre- and post-disaster differences of each location. Combining the stories, photographs, and the aspect of physically being at the sites where devastating tsunamis once washed upon Hawaiian shores creates a historical, educational, and interactive experience for tourists.

6. The program was proposed to the Hawaii Tourism Authority by the Pacific Tsunami Museum and accepted in 2005. The original budget was \$12,000.00. The Hawaii Tourist Authority awarded \$6000.00 to be matched by funds provided by the Pacific Tsunami Museum.

A grant was awarded by the Hawaii Tourist Authority to redesign and replace all tsunami signage. \$6000.00 was awarded for the design and fabrication of new signage. The new signs are presently being installed; the new tsunami signage should be in situ by June, 2007. The funding is derived from this grant and Pacific Tsunami Museum funds. Total funding, including HTA funding, is \$18,000.00

7. The program was designed and implemented by museum staff consisting of fulltime volunteer Genevieve Cain, volunteer Executive Director, Donna Saiki, and volunteer Scientific Advisor, Walter Dudley, PhD.

8. The program originated in Hilo, Hawaii, at the Pacific Tsunami Museum. At this time, the museum is unaware of similar programs existing in other states or countries.

9. The "Walking & Driving Tours of Historic Tsunami Sites" is one of the Pacific Tsunami Museum's signature programs. The program was fully implemented in March 2005 and has grown increasingly popular since its inception. Routine maintenance occurs to accommodate

the growth of the program. New, graphically upgraded tsunami signage is currently being installed to replace outdated signage.

10. Evidence of the success of the “Walking & Driving Tours of Historic Tsunami Sites” comes by way of positive verbal feedback from both local residents and visitors who express that the tours are educational, fun, and that the information provided is applicable to coastlines all over the world. Based on these comments, the Pacific Tsunami Museum feels that the tours have been successful in meeting all objectives.

The museum has not received any criticism or critical reviews about the program.

11. Since its inception, the tours have experienced only minor changes, such as the inclusion of booklets for distribution, and signage maintenance. The new signs that are currently being installed are composed of a more durable material that will add to signs’ longevity.

12. This unique program could be used as a model for other areas with a history of tsunami destruction.

**Western States Seismic Policy Council
2007 Awards in Excellence**

**Award Category: Outreach to Business/Government,
Schools and General Public**

**Presented to: Lincoln County (Oregon) School District
for *Earthquake and Tsunami Preparedness Program***

1. Summary

Lincoln County is located along the Central Oregon coast with the majority of its population based near the shoreline and around estuaries. These communities are vulnerable to many naturally occurring hazards. Floods, beach erosion, landslides, high winds and winter storms occur annually with ongoing losses to public and private property. But this area is also vulnerable to a less frequent but potentially catastrophic Cascadia Subduction Zone earthquake and tsunami that will someday recur just 50 miles off the Oregon Coast. This anticipated Magnitude 9 earthquake will cause severe ground shaking that will last for 4-5 minutes with estimated tsunami inundation to approximately 40 feet above existing tidal conditions. Since much of the developed areas along the coast will be significantly impacted by these hazards, the Lincoln County School District (LCS D) has undertaken a comprehensive approach to earthquake and tsunami preparedness, starting with students and extending their involvement with emergency officials and the general public.

Here is a list of activities undertaken to promote earthquake & tsunami preparedness in Lincoln County, both in the community and in schools.

***Tsunami Safety Poster/Flyers** were made in August 2005 for all Coastal cities in Lincoln County: Yachats, Waldport/Seal Rock, Newport, Depoe Bay, Gleneden Beach, and Lincoln City. Produced have English & Spanish versions and have distributed them on multiple occasions and through many different venues.

***Tsunami & Earthquake Safety DVD** was made August 2005 by students in Newport & Waldport Middle Schools. It includes information on how to make an emergency kit, earthquake procedures, difference between distant & local tsunami, NOAA Weather Alert Radio, signage, etc. This DVD has been used in schools, at community meetings, in fairs, at civic clubs, etc. Over 500 copies have been distributed at no charge.

Waldport City-Wide Tsunami Drill - October 2005. 18 agencies and two schools participated in this exercise.

***Lincoln City Tsunami Preparedness Fair** – April 29, 2006. Over 29 agencies/businesses participated in this fair held at the Tanger Outlet Center. Each agency contributed financially to make this happen. Tanger Outlets donated the space, Mo's Restaurants donated Clam Chowder, Sprint paid for the booths, several local businesses paid for 15 emergency kits to raffle, etc. Over 450 members of the public came to the fair.

***City-wide Tsunami Drill** (Taft & Cutler City areas of Lincoln City) - May 2006. Over 59 agencies/businesses participated. 276+ citizens checked in at pre-designated high-ground locations. Taft Elementary School evacuated to high ground. Taft High School was activated by the American Red Cross as a Community Emergency Shelter.

NOAA Weather Alert Radios purchased and programmed for all schools, public & private, teachers throughout the county.

Family Emergency Preparedness Training

- Newport, Waldport, Toledo, Lincoln City Schools
- Gleneden Beach Community Center
- Home Schools
- Red Cross Family Safety Days
- Newport Home Show
- Demonstrations at all schools during registration in August

Upgraded Schools Designated as Community Emergency Shelters:

- Evacuation Site Signage
- Emergency Water Storage
- Generator & blankets
- Emergency Food and portable toilets
- Comprehensive First Aid Trauma Kits
- Search & Rescue Kits
- Shelter Operations & Management Workshops

Post Earthquake Safety Evaluation of Buildings ATC-20. February 2007. Trained people from all areas of Lincoln County

Toledo Mass Casualty Earthquake Training Exercise February 2007

Waldport High School/City of Waldport – ongoing: planning for earthquake & tsunami preparedness, mitigation, response & recovery.

Tsunami Watch/Warning Procedures were developed and added to:

- LCSD Emergency Plan
- Mid Columbia Bus Company's Plan

Closed Schools in Tsunami Inundation Zone

- Waldport Middle School – Closed and moved 300 students/staff to Waldport Elementary School)
- Taft Elementary School – Closed as of June 15th (moving 400+ students/staff to Taft Middle School)

Parent Wallet Cards May 2006. These cards show where to get information in an emergency and give parents a place to write their own emergency evacuation areas and out-of-state and in-state emergency contacts.

Funding:

- *Emergency Response Crisis Management* Grant from the U.S. Department of Education's Office of Safe & Drug-Free Schools: funds all grant activities and half of Ms. Graves's salary. LCSD received their first grant in October 2004 and their second grant in October 2005.
 - Lincoln County School District provides housing for Ms. Graves, pays half of her salary and contributes financially to part of the shelter upgrades, training time for staff, planning time, etc.
 - Multiple Emergency Service Agencies in Lincoln County have contributed staff time, money and resources to all the full-scale exercises. Individual cities here have contributed also. Others from around the state have contributed their time to assist with planning and evaluate exercises, participate in the Tsunami Fair, and provide consultation on plans, etc.
2. The program been operational since October 2004.
 3. What are the major purposes of the program? What problem(s) or issue(s) was it designed to address?

Purpose is to elevate earthquake/tsunami awareness and provide education and materials for appropriate preparedness measures for students and the general public. Designed to leverage existing resources through multi-agency collaborations and enhance response capacity through procurement of emergency communications equipment. Additional benefits of positively affecting public policies on location of vulnerable public schools in tsunami hazard zones.

4. Describe the specific activities and operations of the program.

Producing original education posters, flyers and DVDs for EQ/tsunami preparedness

- Planning and conducting preparedness drills with multi-agency involvement
- Purchasing emergency communications equipment like satellite phones and NOAA Weather Radios for schools, teachers and public officials
- Conducting emergency preparedness training and ATC-20 training

5. Does the program take a new and creative approach or method? If yes, please describe.

The creative method to recognize with this nomination is simply the determination, resourcefulness and passion that the Program Coordinator brings to this effort. In Oregon we like to recognize these people as "Champions" who are determined to make a difference.

6. What were the program's start-up costs and source(s) of funding?

Budget: \$187,826 for 2005-05

Source: Emergency Response Crisis Management Grant from the U.S. Department of Education's Office of Safe & Drug-Free School and Lincoln County School District salary 0.5 FTE match.

What are the program's annual operational costs and source(s) of funding?

Budget: \$216,946 for 2006-07

Source: Emergency Response Crisis Management Grant from the U.S. Department of Education's Office of Safe & Drug-Free School and Lincoln County School District salary 0.5 FTE match.

7. How many employees (full-time equivalent) work(ed) with the program?

One FTE plus brokered partial FTE funding each year for FTE Admin support during the 2006-07 period.

8. To the best of your knowledge, did the program originate in your state? Yes

I believe most school safety programs emphasize law enforcement or operational safety, rather than multiple-community scale earthquake/tsunami preparedness activities. I am unaware of similar programs in other states.

9. Has the program been fully implemented? No. What actions remain to be taken?

Continuation of Family Emergency Preparedness Training for remaining 50 families of teachers to create community network of prepared teacher/families for target of all 175 staff members.

10. Is there evidence that the program has been effective in achieving its stated purpose(s)? Briefly summarize evaluations (pro and con) of how well the program has addressed the defined problem(s) or issue(s).

In my opinion, the best possible means of measuring the effectiveness of the LCSD Earthquake and Tsunami Preparedness Program is the cultural shift that has occurred in two communities (City of Waldport and City of Lincoln City) and within the Superintendent's Office of the LCSD to approve closing two schools (Waldport Middle and Taft Elementary) located within the tsunami hazard zone.

The City of Waldport is even working on a long-term master plan to relocate all of its remaining K-12 schools outside of the tsunami hazard zone. The City Council of Waldport wrote letters to the Superintendent, based on the stated increased risk perception from the LCSD EQ/Tsu Program, to request the relocation of the students and closure of their elementary school.

For Taft Elementary, school officials realized during tsunami drills that difficulty with evacuation timelines may require leaving some children behind and necessitated relocation of Elementary School students to share Taft Middle School.*

11. How has the program changed since its inception? What limitations or obstacles might other states expect to encounter if they attempt to adopt the program?

The program never planned for conducting a preparedness fair, but expanded their outreach activities to maximize awareness of their Taft/Cutler City tsunami drill.

Potential limitations/obstacles are dependencies or impacts on external factors as teachable moments. The LCSD Program took advantage of the Sumatra event, and the June 14, 2005 tsunami West Coast warning to gain public and political involvement. These types of external benefits cannot be anticipated, but should be exploited.

The Program suffered low public participation during a planned tsunami drill in Waldport following a National Weather Service mistaken tsunami warning issued just days earlier. Due to mistaken tsunami siren activations, many of the expected public participants did not attend.

12. Additional comments:

This comprehensive earthquake and tsunami preparedness program reflects so many strong examples of creative products, collaboration between multiple agencies and tireless enthusiasm for public safety that, in my emergency management opinion, should serve as a showcase for excellence.

*Attached materials:

- Tsunami Safety: It's Up to You –Flyers (Copy in English/Spanish Language)
- Tsunami Fair Post-Event Report
- Tsunami Drill: Taft & Cutler City
- Tsunami Safety DVD (Sent separately by LCSD)
- Copy of Letter from North Lincoln Fire Chief to LCSD Board of Directors

**Western States Seismic Policy Council
2007 Awards in Excellence**

Award Category: Innovations (Public-Private Partnerships)

**Presented to: Oregon Natural Hazards Workgroup at the
University of Oregon for *Partners for Disaster Resistance &
Resilience***

1. Summary

Oregon has experienced devastating floods, landslides, earthquakes, and wildfires that have resulted in the loss of life and property damage. These events strained taxpayers' ability to pay for the losses, governmental and non-profit relief agencies' ability to respond and insurers' ability to keep insurance affordable and available. These issues underscore the need for coordinated risk reduction efforts. Despite the growing recognition of the need for long-term coordination to reduce risk from natural disasters, many communities continue to experience difficulty in developing and implementing natural hazard risk reduction plans, policies and activities. Communities regularly suffer from a lack of technical and funding assistance, as well as insufficient coordination among public, private, and non-profit sectors at the local, regional, and statewide levels.

The Oregon Natural Hazards Workgroup (ONHW) and the Partners for Disaster Resistance & Resilience (Partnership) work to address these issues and offer a model of how increased communication, coordination and collaboration among diverse partners can assist communities in reducing their risk from natural hazards. Since 2001, ONHW has worked collaboratively with state agencies and local communities in various regions of the state to write grants to provide both funding (at the community level) and technical assistance (regionally through ONHW) to support the development of natural hazard mitigation plans. This approach allows ONHW and the Partnership to invest dedicated resources to build local capacity within a region. These resources include:

Partnership Web Page – The web page is a communication tool that allows participating communities, partners, and other interested parties to download planning tools, view a calendar of upcoming planning events, and search hazard-specific resources (www.OregonShowcase.org).

Community Plan Development Work Sessions – The work sessions are offered on a quarterly basis and address specific stages in the mitigation planning process. They provide an opportunity for communities to “check in” and share their experiences with state partners and other communities. The sessions involve various partners including: USGS, FEMA, Oregon Emergency Management, Department of Land Conservation & Development, Department of Geology and Mineral Industries, and City/County Insurance Services.

Community Work Session Manual – The manual breaks down the planning process into four phases and provides readers with the planning requirements as well as suggested steps to

meet those requirements. The phases are not meant to be prescriptive or linear; instead each community applies the ideas and principles locally in the way that is most appropriate.

ONHW Plan Template – The plan template provides communities with a framework with which to develop their mitigation plan.

Partnerships in Action newsletter – The Partnerships in Action newsletter is produced bi-annually and is sent to all elected officials in the state as well as other federal, state, regional and local partners. The newsletter highlights mitigation successes around the state and provides updates on the various community planning efforts. The most recent version of the newsletter highlights seismic retrofit projects and a statewide seismic vulnerability study taking place.

The entire program, including the resources described above, is focused on professional development and building local community capacity to sustain the plan once it is developed. Participating communities have access to these resources and work collaboratively using diverse Steering Committees to develop mitigation plans aimed at reducing their overall risk to natural hazards. The outcome of these regional planning efforts is the adoption of FEMA-approved local natural hazard mitigation plans, which enable communities to seek mitigation project funds through the Pre-Disaster Mitigation (PDM) Competitive Grant program. Presently, the majority of PDM dollars in the state are being used to seismically upgrade or retrofit critical facilities.

2. How long has the program been operational? Since: January 2000
3. What are the major purposes of the program? What problem(s) or issue(s) was it designed to address?

The purpose of the Oregon Natural Hazards Workgroup (ONHW) and the Partners for Disaster Resistance & Resilience (the Partnership) is to provide statewide collaboration and coordination of natural hazard risk and loss reduction efforts, including:

- (1) Coordination of the Partners for Disaster Resistance & Resilience: Oregon Showcase State Initiative (The Partnership),
- (2) Regional and community natural hazard planning, and
- (3) Coordination of community outreach, workshops, trainings, public education, and information dissemination.

In part, ONHW and The Partnership were formed in response to findings of an evaluation of how well local governments were addressing the risks posed by natural hazards. In that study, conducted by ONHW in 1998, communities identified that the scarcity of information, money, and expertise was a significant obstacle to improved hazard planning at the local level. ONHW and the Partnership were developed to help address the issues of limited local resources and looked to assist communities leverage limited resources to address natural hazards.

4. Describe the specific activities and operations of the program.

Provide leadership, direction and hands on support for local and regional hazard mitigation planning, including grant writing assistance and technical assistance throughout the planning and plan approval process. Provide technical assistance for hazard mitigation project proposals to implement the plan recommendations.

5. Does the program take a new and creative approach or method? If yes, please describe.

The regional, collaborative planning model employed by ONHW and The Partnership is unique in that it focuses on building local capacity to address risk reduction. A quarterly series of plan development workshops guides local emergency managers, planning departments, and other community staff through a planning process designed to identify the hazards that impact the community and appropriate risk reduction strategies. The model takes federal, state, and regional resources directly to communities to help them develop local natural hazard mitigation plans that address local needs, characteristics and issues; tie directly to the State's Natural Hazard Mitigation plan; and also meet federal planning requirements.

6. What were the program's start-up costs and source(s) of funding?

Budget: \$300,000 (first 3 years) Source: Safeco/PERI/Local/FEMA

What are the program's annual operational costs and source(s) of funding?

Budget: \$200,000 Source: PDM Grants local match

7. How many employees (full-time equivalent) work(ed) with the program? 2 FTE plus students and field representatives

8. To the best of your knowledge, did the program originate in your state? Yes

Are you aware of similar programs in other states? No

9. Has the program been fully implemented? Yes If no, what actions remain to be taken?

10. Is there evidence that the program has been effective in achieving its stated purpose(s)? Briefly summarize evaluations (pro and con) of how well the program has addressed the defined problem(s) or issue(s).

The success of the program is evident through the development and adoption of local natural hazard mitigation plans and the subsequent implementation of mitigation activities on the ground. To date, 22 out of 36 counties have adopted mitigation plans and the remaining 14

counties are currently engaged in the planning process or will be beginning before the end of 2007. These adopted plans have been successful in generating nationally competitive mitigation dollars. Since 2003, 19 mitigation projects have been awarded to Oregon communities through the Federal Emergency Management Agency's Pre-Disaster Mitigation grant program. Those projects total over \$18 million in mitigation dollars that communities are using to reduce future losses from natural hazards before they occur. Nearly 80% of the mitigation projects awarded have been seismic upgrades to critical facilities.

11. How has the program changed since its inception? What limitations or obstacles might other states expect to encounter if they attempt to adopt the program?

The program has become more institutionalized as more stable funding has become available. In the beginning of the program, training and technical assistance were provided to any community that wanted to participate. As the FEMA Pre-Disaster Mitigation Grant programs emerged, the program changed its basic mode of operation to focus assistance and resources in designated regions within the state in a given year. This allows neighboring jurisdictions to engage together in the planning process and allows for the infusion of more federal, state and regional resources, since activities are all concentrated in one geographical area in the state.

According to program staff, the biggest obstacle to overcome in developing this program was the amount of time and energy it takes to develop and sustain partnerships. Creating such a program quickly and without a diverse group of partners is impossible. Other states should not discount the amount of time it took staff to create relationships and develop partnerships over the last ten years. Maintaining these relationships is the only way that this program can be sustained.

**Western States Seismic Policy Council
2007 Awards in Excellence**

Award Category: Research Efforts

**Presented to: Utah Geological Survey
WSSPC Basin & Range Province Committee for
*Basin & Range Province Earthquake Working Group***

1. Summary

In May 2004, the Western States Seismic Policy Council (WSSPC), the U.S. Geological Survey (USGS), the Federal Emergency Management Agency, and several Basin and Range Province state geological surveys jointly sponsored the Basin and Range Province Seismic-Hazard Summit II (BRPSHSII) in Sparks, Nevada. The purpose of BRPSHSII was to report and discuss recent advances in earthquake-hazard research in the Basin and Range Province (BRP) and to evaluate the implications of the new research results for hazard reduction and public policy in the region.

Scientists attending BRPSHSII identified five seismic-hazard-policy issues in the BRP that were relevant to the updated version of the 2007 National Seismic Hazard Maps (NSHM). The five issues were: (1) use and relative weighting of time-dependent, Poisson, and clustering models of fault behavior, (2) the application of magnitude-frequency distributions (Gutenberg-Richter versus characteristic earthquake models) for BRP faults, (3) the use of length versus displacement relations to estimate earthquake magnitude, (4) the probabilities and magnitudes of multi-segment ruptures on BRP faults, and (5) resolving discrepancies between geodetic extension rates and geologic slip rates.

In response to BRPSHSII, the WSSPC Board adopted the WSSPC Policy Recommendation 04-5: Basin and Range Province Earthquake Working Group (BRPEWG) that recommended convening a broad-based technical working group to develop scientific consensus regarding fault behavior, ground shaking, ground-failure modeling, and research priorities relevant to seismic policy in the BRP and the USGS NSHMs. In 2006, the WSSPC Basin and Range Province Committee (BRPC) and the Utah Geological Survey (UGS) accepted responsibility to implement WSSPC PR 04-5 under the auspices of the USGS NSHM Project.

The BRPEWG, consisting of 27 BRP subject-matter experts from federal and state government, academia, and private industry, met in March, 2006, in Salt Lake City to examine the five seismic-hazard-policy issues incorporated in Policy Recommendation 04-5. The three-day meeting consisted of six four-hour sessions. Two subject-matter experts led sessions for each of the policy issues and were charged with succinctly framing their issue for the BRPEWG members, facilitating discussion during their session, and guiding the BRPEWG toward consensus recommendations to the USGS for the 2007 NSHMs. A series of summary recommendations define the Working Group's consensus on best professional practice for the 2007 NSHM update. Recognizing that these critical issues can only be accommodated, not resolved, in the 2007 NSHMs, the BRPEWG also made recommendations for long-term research priorities and goals that will help both the USGS and other researchers eventually resolve the issues to better refine the NSHMs in the future.

The BRPEWG process and recommendations were summarized in UGS Open-File Report 477, and after approval by the WSSPC Board at their April, 2006, meeting in San Francisco, the recommendations were presented to the USGS at the NSHM Intermountain West Regional Meeting held in Reno, Nevada in June, 2006.

The cumulative impact of the UGS and Mr. Lund organizing the BRPEWG, conducting the meeting, and publishing the resulting recommendations are widespread and enduring because the recommendations identify issues and technical weaknesses in the BRP that need further examination. The report and recommendations provide a road map for short-term and long-term research activities that will contribute to a better understanding of fundamental scientific issues in the region and ultimately lead to more robust seismic-hazard assessments in many of WSSPC's member states.

2. How long has the program been operational?

Since March, 2006

3. What are the major purposes of the program? What problem(s) or issue(s) was it designed to address?

The purpose of the program was to evaluate five critical seismic-hazard-policy issues in the Basin and Range Province (see #1 above), and to provide recommendations to the USGS regarding how to either accommodate those issues in the 2007 update of the NSHMs, or to direct future research to resolve the issues.

4. Describe the specific activities and operations of the program.

The BRPEWG consisted of 27 technical subject-matter experts who met to consider the five seismic-hazard-policy issues incorporated in WSSPC PR 04-5. The three-day meeting was divided into sessions, and each session had two leaders who framed their assigned issue succinctly for the BRPEWG (usually through a series of technical presentations by other subject-matter experts), facilitated discussion during their session, and guided the BRPEWG toward consensus recommendations to the USGS for the 2007 NSHM update. The sixth session was used to review and polish the recommendations generated by the five preceding sessions. The resulting short- and long-term recommendations reflect the Working Group's consensus on best professional practice for the 2007 NSHM update and for future research priorities regarding the BRP seismic-hazard-policy issues. The BRPEWG process and recommendations were published in UGS Open-File Report 477, the recommendations were reviewed and adopted by the WSSPC Board, and the recommendations were then presented to the USGS NSHM Project for their consideration.

5. Does the program take a new and creative approach or method? If yes, please describe.

The USGS has long solicited input for creating and updating the NSHMs, usually by hosting regional meetings to solicit input from interested scientists. This is the first time that an organized, deliberative process has been implemented in advance of those regional meetings to systematically identify critical seismic-hazard-policy issues on a region-wide basis and to assemble a group of technical experts to evaluate those issues and provide recommendations to the USGS with a single voice.

6. (A) What were the program's start up costs and source(s) of funding?

Budget: \$35,000

Source: USGS/UGS

The USGS provided partial funding through the National Earthquake Hazard Reduction Program. The UGS, which hosted the BRPEWG meeting in Salt Lake City, prepared UGS Open-File Report 477, and presented the BRPEWG results to the USGS at their NSHM Intermountain West Regional meeting, provided both partial funding for the meeting and salary support for UGS personal that participated in the BRPEWG process and produced OFR-477.

(B) What are the program's annual operating costs and source(s) of funding?

Budget: \$0*

Source: NA*

*There are no continuing operating costs. Once the BRPEWG recommendations were presented to the USGS, the BRPEWG process formally ended. However, the recommendations from this process will be used for years to come in directing, evaluating, and prioritizing research on these topics in the BRP. The UGS continues to implement these recommendations in its annual state earthquake working group meetings, and other states will likely do the same.

7. How many employees (full-time equivalent) work(ed) with the program?

Five UGS geologists and two UGS Editorial staff worked on various aspects of the BRPEWG process. William Lund, UGS Senior Scientist and Chair of the BRPC, organized and facilitated the meeting and compiled the final report. A total of 27 subject-matter experts from federal and state government, academia, and private industry volunteered to serve on the Working Group. The success of the BRPEWG is directly related to the organizational efforts and skills of the UGS staff.

8. To the best of your knowledge, did this program originate in your state?

The concept of establishing a BRPEWG was an outgrowth of the BRPSHSII process, which was further refined in WSSPC PR 04-5. The BRPC and the UGS (William Lund filled both positions as BRPC Chair and UGS BRPEWG organizer) then took responsibility for organizing and hosting the BRPEWG in Salt Lake City. The success of both of these efforts can be attributed to Mr. Lund's commitment, dedication and organizational skills.

Are you aware of similar programs in other states?

No.

9. Has the program been fully implemented?

Yes.

10. Is there evidence that this program has been effective in achieving its stated purpose(s)?

Yes. At the recently completed (February 27-28, 2007) Utah Ground-Shaking and Quaternary Fault Parameters Working Group meetings in Salt Lake City, Mark Petersen and Kathy Haller of the USGS National Seismic Hazard Mapping Project made presentations in which they described how the BRPEWG recommendations have been incorporated into the 2007 NSHMs to date, and the effects of the recommended changes on the new maps. A summary of Kathy's presentation is attached. It is clear that the BRPEWG process has had a direct effect on seismic-hazard-policy issues in the BRP, on improving the next update of the NSHMs, and on helping establish long-term earthquake-hazard research priorities in the BRP.

11. How has the program changed since its inception? What limitations or obstacles might other states expect to encounter if they attempt to adopt the program?

Although the original intent of WSSPC PR 04-5 has been accomplished, the policy is up for its three-year review in 2007, and is being recommended for modification and re-adoption at the 2007 WSSPC Annual Meeting. Specifically it is being recommended that WSSPC convene a series of “single-state” technical Basin and Range Province Earthquake Working Group meetings consisting of subject-matter experts to arrive at consensus average recurrence intervals (RI) and slip rates (SR) with related uncertainties for faults with sufficient paleoseismic trenching data in BRP states. Best available RI and SR values with appropriate uncertainties are critical to USGS seismic-hazard evaluations and for determining which faults should be included on the NSHMs. This process has already been accomplished in Utah, and the results of that effort provide a model for other BRP states. A similar process is presently underway in the State of Nevada.

ATTACHMENT

Summary of Kathy Haller's Presentation BRPEWG Recommendations and the 2007 Update of the NSHMs

The BRPEWG recommendations for updating the NSHMs were presented to the USGS at the NSHM Intermountain West Regional Meeting in Reno, Nevada, in June 2006. Kathy Haller (USGS) reviewed the most important effects that resulted from incorporating the recommendations in the 2007 NSHM update.

Issue 5 – Resolving Discrepancies Between Geodetic Extension Rates and Geologic Slip Rates

The BRPEWG recommended changing the fault dip used to model BRP normal faults on the NSHMs from 60° to $50 \pm 10^\circ$. An examination of the literature has shown that there is no consensus on this issue. Reducing the fault dip raises the hazard, and the effect is non-linear. Changing the dip from 50° to 40° has a greater effect on the hazard than changing the dip from 60° to 50° . This may be the result of a spectral acceleration period-dependent effect due to saturation at various magnitudes.

The BRPEWG recommendation to use the province-wide kinematic (GPS) boundary condition (12-14 mm/yr) as a constraint on the sum of geologic slip rates, and to modify the boundaries of the geodetic zones in the western Great Basin used in the 1996 NSHMs to better reflect the areas of high strain depicted on the GPS-based strain-rate map, were implemented on the 2007 NSHMs.

Issue 1 – Use and Relative Weighting of Time-dependent, Poisson, and Clustering Models in Characterizing Fault Behavior

The BRPEWG recommended that the USGS incorporate uncertainties in VSR and RI for significant BRP faults. This was done for those faults in Utah included on the NSHMs and for which the UQFPWG provided consensus VSR estimates and uncertainty limits. For most other BRP faults, VSRs are poorly constrained and their associated uncertainty limits are large and imperfectly known. In the BRP only the WFZ has reasonably well-constrained segment RIs. The UQFPWG consensus RI estimates were used for five of the six Holocene active segments of the WFZ. The sixth segment (Levan) lacks trench-documented RI data and retained the same recurrence as the 2002 version of the NSHMs.

The West Cache fault zone (Clarkston fault), and the Southern Oquirrh Mountain fault zone were added to the NSHMs and assigned VSRs as recommended by the UGS (see above). As per the UQFPWG's recommendation, the two Joes Valley fault sources shown on the 2002 NSHMs were combined into a single seismic source and modeled using a RI of 10,000 years.

Issue 4 – Probabilities and Magnitudes of Multi-Segment Ruptures

The BRPEWG recommended that hazard calculation for the NSHMs consider the possibility of multi-segment ruptures on BRP faults, and that the two faults that ruptured together in the 1959 Hebgen Lake earthquake be treated as a single seismic source.

Most BRP faults are not characterized as segmented, so for the NSHMs, those faults are modeled as if the whole fault ruptures in an earthquake up to M 7.5. The Gutenberg-Richter part of the magnitude-frequency distribution assigned to BRP faults allows smaller parts of the fault to rupture at random, thus avoiding the problem of creating artificially high hazards at poorly constrained segment boundaries. The exception is the Wasatch fault, which is modeled as 90% single segment rupture using the UQFPWG consensus segment recurrence intervals, and 10% using a floating M 7.4 earthquake with no fixed end points.

The two faults that ruptured together during the Hebgen Lake earthquake were combined to create a single source on the NSHMs.

Issue 3 – Use of Length Versus Displacement Relations to Estimate Earthquake Magnitude

The BRPEWG recommended (a) including uncertainty in surface rupture length (SRL) and its consequences for magnitude, (b) using magnitude-displacement regressions to improve magnitude estimates where the magnitude from SRL appears inconsistent, and (c) constraining the minimum magnitude assigned to surface-faulting earthquakes to M 6.5 to be consistent with the hazard related to background seismicity.

Implementation of these recommendations requires considerable analysis and testing, and the USGS has not yet had time to perform those tasks.

Issue 2 – Proper Magnitude-Frequency Distributions (Gutenberg-Richter versus Characteristic Earthquake Models) for BRP Faults

The BRPEWG recommended that the weights assigned to the maximum magnitude and “floating exponential” models used for BRP faults on the 2007 NSHMs should, at a minimum, have the same weights as those used for BRP faults in California ($2/3-1/3$) unless there is a technical basis for deviating from this characterization.

The USGS had not resolved this issue by the time of the UQFPWG meeting, and was considering a variety of possible options, including changing the weights used for California “B” faults to 50/50 ($1/2-1/2$), which is the same weight presently assigned to most BRP faults.

PARTICIPANTS

WSSPC – ICC Annual Conference Participants

Leighton Ah Cook

Branch Chief
Hawaii State Civil Defense
3949 Diamond Head Rd
Honolulu, HI 96816
808-733-4301
lahcook@scd.hawaii.gov

Rick Allis

Utah Geological Survey
PO Box 146100
Salt Lake City, UT 84114-6100
801-537-3300
rickallis@utah.gov

Dave Allsop

Zone Catastrophe Coordinator
State Farm Insurance
1000 Wilmington Dr
DuPont, WA 98327
253-912-7933
dave.allsop.gk8l@statefarm.com

John Anderson

Director
NV Seismological Laboratory
University of Nevada Reno MS 0174
Reno, NV 89507
775-784-4625
jga@seismo.unr.edu

Robert Anderson

Senior Engineering Geologist
CSSC
1755 Creekside Oaks Dr Ste 100
Sacramento, CA 95833
916-325-3800
andersonb@calquake.com

Toby Anderson

General Manager
Bay Bolt
4610 Malat St
Oakland, CA 94601
510-532-1188
Fax: 510-821-6319
baybolt@pacbell.net

David Applegate

Sr. Science Advisor
US Geological Survey
12201 Sunrise Valley Drive 905 National Center
Reston, VA 20192
703-648-6714
applegate@usgs.gov

David Bain

Business Development
DYK Incorporated
PO Box 696
El Cajon, CA 92022
619-440-8181
carly@dyk.com

Jim Barnes

Associate Civil Engineer
State of California Governor's
Office of Emergency Services
1790 Klamath Rd
West Sacramento, CA 95691
916-845-8273
Fax: 916-845-8386
jim.barnes@oes.ca.gov

Doug Bausch

Physical Scientist
FEMA Region VIII
Denver Federal Center Bldg 710
Denver, CO 80211
303 235-4859
douglas.bausch@dhs.gov

Richard Baytosh

Zone Catastrophe Coordinator
State Farm Insurance
900 Old River Rd
Bakersfield, CA 93311
661-663-5926
rick.baytosh.gf6k@statefarm.com

James Bela

Oregon Earthquake Awareness
PO Box 33464
Portland, OR 97292-3464
503-761-3539
sasquake@access4less.net

Steve Besemer

Earthquake Program Manager
Missouri State Emergency Management Agency
PO Box 116
Jefferson City, MO 65102
573-526-9232
Fax: 573-634-7966
steve.besemer@sema.dps.mo.gov

Maiclaire Bolton

Seismologist, Head of Seismic Safety Program
British Columbia Provincial Emergency Program
PO Box 9201 Stn Prov Govt
Victoria, BC V8W 9J1
250-952-4891
maiclaire.bolton@gov.bc.ca

Peter Bruck

Building Official
City of Rohnert Park
6750 Commerce Blvd
Rohnert Park, CA 94928
707-588-2257
Fax: 707-588-2238
pbruck@rpcity.org

Genevieve Cain

Pacific Tsunami Museum
130 Kamehameha Ave
Hilo, HI 96720
808-935-0926
Fax: 808-935-0842
tsunami@tsunami.org

Bob Carey

Earthquake Program Manager
Utah Division of Homeland Security
1110 State Office Bldg
Salt Lake City, UT 84114
801-538-3784
bcarey@utah.gov

Cathleen Carlisle

Project Officer
DHS/FEMA
500 C St
Washington, DC 20472
202-248-9107
cathleen.carlisle@dhs.gov

Wayne Carlson

Executive Director
Nevada Public Agency Insurance Pool
201 S Roop St Ste 102
Carson City, NV 89701-4790
7758857475
waynecarlson@poolpact.com

Ken Cooley

California Cities Commissioner
Calif. Seismic Safety Commission
City of Rancho Cordova
c/o 2729 Prospect Park Dr
Rancho Cordova, CA 95670
916-705-3674
kcooley@cityofranhocordova.org

George Crawford

Earthquake Tsunami Program Manager
WA State Military Department
MS 20 TA-20 Bldg 20
Camp Murray, WA 98430
253-512-7067
g.crawford@emd.wa.gov

Craig DePolo

Research Geologist
Nevada Bureau of Mines and Geology
University of Nevada Reno MS 178
Reno, NV 89557
775-682-8770
cdepolo@unr.edu

Diane DePolo

Seismologist
Nevada Seismological Laboratory
University of Nevada Reno MS 174
Reno, NV 89557
775-784-4976
diane@seismo.unr.edu

Richard Eisner

Fritz Institute
50 Fremont St Ste 1150
San Francisco, CA 94105
510-465-4887
rich.eisner@fritzinstitute.org

Rolf Erickson

Mitigation Pgm Coord.
California Earthquake Authority
801 K St Ste 1000
Sacramento, CA 95814
916-325-3821
rerickson@calquake.com

George Estrella

Chief Building Official
City of Santa Barbara
630 Garden St
Santa Barbara, CA 93101
805-564-5485
mmurillo@santabarbaraca.gov

David Freeborn

State Hazard Mitigation Officer
NM Dept. of Homeland Security &
Emergency Management
PO Box 27111
Santa Fe, NM 87502
505-476-0871
david.freeborn@state.nm.us

Carol Freinkel

Seismic Systems Administrator
Nevada Seismological Laboratory
University of Nevada Reno
1664 N Virginia St MS 174
Reno, NV 89557
775-784-4317
cfreinkel@seismo.unr.edu

Suzanne Frew

Senior Risk Communications Manager
CirclePoint
555 12th St Ste 290
Oakland, CA 94607
510-268-8400 x142
s.frew@circlepoint.com

Terri Garside

Executive Assistant
Nevada Bureau of Mines & Geology
University of Nevada MS 178
Reno, NV 89557
775 784-4415
tgarside@unr.edu

Patricia Gavelda

Regional Field Manager
Colorado Division of Emergency Management
Ft Lewis College
1000 Rim Dr DoLA/CDEM
Durango, CO 81301
970-247-7674
patricia.gavelda@state.co.us

Michael Golini

Seismic Dept. Mgr.
TOLCO a brand of NIBCO
1375 Sampson Ave
Corona, CA 92879
951-737-5599
golinim@nibco.com

James Goltz

Earthquake and Tsunami Program Manager
State of California Governor's
Office of Emergency Services
1200 East California Blvd MC 104-44
Pasadena, CA 91125
626-356-3810
jim.goltz@oes.ca.gov

Joan Gomberg

Geophysicist
US Geological Survey
University of Washington Department of Earth
and Space Sciences PO Box 351310
Seattle, WA 98195
206-616-5581
gomberg@usgs.gov

Paula Gori

Landslide Hazards Program Coordinator
U.S. Geological Survey
908 National Center
Reston, VA 20192
703 648-6707
pgori@usgs.gov

Susan Graves

Lincoln County School District
825 NE 7th St
Newport, OR 97365
541-270-4367
kevinandsue@centurytel.net

Roger Hansen

State Seismologist/Professor
University of Alaska Geophysical Institute
903 Koyukuk Dr UAF PO Box 757320
Fairbanks, AK 99775-7320
907-474-5533
Fax: 907-474-5618
roger@giseis.alaska.edu

John Hayes

NEHRP Director
NIST/BFRL
100 Bureau Dr MS 8610
Gaithersburg, MD 20899-8610
301-975-5640
jack.hayes@nist.gov

Werner Hellmer
Senior Engineer
Clark County Development Services
4701 W Russell Rd
Las Vegas, NV 84118
702-445-8095
Fax: 702-244-4195
wkh@co.clark.nv.us

John Henry
Principal Engineer
International Code Council
Address PO Box 968
Knights Landing, CA 95645
530-735-6407
Fax: 530-735-6360
jhenry@iccsafe.org

Ron Hess
Chief Information Officer
Nevada Bureau of Mines & Geology
University of Nevada MS 0178
Reno, NV 89557
775-784-6692
rhess@unr.edu

Robert Hester
Claim Section Manager
State Farm Insurance Companies
1475 66th St
Emeryville, CA 94608
510-985-6220
bhester3@yahoo.com

Desmond Heyliger IV
Hazard Mitigation Planner
Wasatch Front Regional Council
295 N Jimmy Doolittle Rd
Salt Lake City, UT 84116
801-363-4250
dheyliker@wfrfc.org

Gary Hubbard
Operations Manager
State Farm Insurance
1000 Wilmington Dr PO Box 5000
DuPont, WA 98327
253-912-7411
Fax: 253-912-7374
gary.hubbard.akl7@statefarm.com

Larry Hultengren
DHS/FEMA
500 C Street SW
Washington, DC 20472
202-646-3759
larry.hultengren@dhs.gov

Deborah Ingram
DHS/FEMA
500 C St SW
Washington, DC 20472
202-646-2856
deborah.ingram@dhs.gov

David Jackson
Mitigation Program Manager
Idaho Bureau of Homeland Security
4040 Guard St Bldg 600
Boise, ID 83705
208-422-3047
djackson@bhs.idaho.gov

David Kennard
HMA Branch Chief
DHS/FEMA Region IX Mitigation Division
1111 Broadway Ste 1200
Oakland, CA 94706
510-627-7269
david.kennard@dhs.gov

Sharron Leason
Director, Disaster & Emergency Management
CaliforniaVolunteers
1110 K St Ste 210
Sacramento, CA 95814
916-327-1081
sharron.leason@californiavolunteers.ca.gov

William Leith
US Geological Survey
12201 Sunrise Valley Dr 905 National Center
Reston, VA 20192
703-648-4000
wleith@usgs.gov

Gary Lepori
Building Official
City of San Bruno
567 El Camino Real
San Bruno, CA 94066
650-616-7020
glepori@sanbruno.ca.gov

John Louie

Professor
Nevada Seismological Lab
University of Nevada Reno
1664 N Virginia St MS 174
Reno, NV 89557
775-784-4219
louie@seismo.unr.edu

William Lund

Senior Scientist
Utah Geological Survey
88 E Fiddler Canyon Rd Ste C
Cedar City, UT 84720
435-865-9041
lund@utah.gov

Ronald Lynn

Director
Clark County Development Services
Building Division
4701 W Russell Rd
Las Vegas, NV 89118-2231
702-445-8040
Fax: 702-221-0630
rll@co.clark.nv.us

John Madden

Alaska Dept of Military & Veterans Affairs,
Homeland Security & Emergency Mgmt
PO Box 5750
Fort Richardson, AK 99505

Michael Mahoney

Senior Geophysicist
FEMA
500 C St SW
Washington, DC 20472
202-646-2794
mike.mahoney@dhs.gov

Thomas Manning

Director, Commissioner OSSPAC
Tillamook County
Office of Emergency Management
5995 Long Prairie Rd
Tillamook, OR 97141
503-842-6238
Fax: 503-815-3195
tmanning@co.tillamook.or.us

Rick Martin

Program Manager
Nevada Dept of Public Safety
2478 Fairview Dr
Carson City, NV 89711

Vince Matthews

State Geologist of Colorado
Colorado Geological Survey
1313 Sherman St Ste 715
Denver, CO 80203
303-866-3028
vince.matthews@state.co.us

Carrie Maylum

California Earthquake Authority
801 K St Ste 1000
Sacramento, CA 95814
916-325-3800
maylumc@calquake.com

John McAllister

Building Official
Washington County
155 N 1st Ave Ste 350 MS 12
Hillsboro, OR 97124
503-846-6757
Fax: 503-546-8111
john_mcallister@co.washington.or.us

Richard McCarthy

Executive Director
California Seismic Safety Commission
1755 Creekside Oaks Dr Ste 100
Sacramento, CA 95833
916-263-5506
mccarthy@stateseismic.com

Peter McDonough

Chairman
Utah Seismic Safety Commission
144 Whitesides St
Layton, UT 84041
801-324-3136
pete.mcdonough@questar.com

Robert Meyer

Co-director
University of Pennsylvania
Center for Risk & Decision Process
3730 Walnut St
Philadelphia, PA 19104
215-898-1826
meyerr@wharton.upenn.edu

Scott Morris

Staff Director - Research
State Farm Insurance Companies
1 State Farm Plaza
Bloomington, IL 61710
309-763-3975
scott.morris.aptu@statefarm.com

Brent Nichols

Emergency Management Specialist
State of Alaska, DHS&EM
PO BOX 5750
Fort Richardson, AK 99505
907-428-7071
deanna.humphreys@alaska.gov

Susan O'Brien

Supervising Plan Review Engineer
WC3-West Coast Code Consultants
475 Queens Ct
Campbell, CA 95008
925-997-2770
Fax: 925-275-0600
susan@wc-3.com

Rebecca Ossa

Architectural Historian
State Historic Preservation Office
100 N Stewart St
Carson City, NV 89701
775-684-3441
rossa@clan.lib.nv.us

Suzanne Park

Sr Plan Check Engineer
Shums Coda Associates
5776 Stoneridge Mall Rd Ste 180
Pleasanton, CA 94588
925-463-0651
Fax: 925-463-0691
suzanne.park@shumscoda.com

John Parrish

State Geologist
California Geological Survey
801 K St MS 1230
Sacramento, CA 95814
916-445-2036
Fax: 916-445-5718
john.parrish@conservation.ca.gov

Esteban Pauli

Principal
Pauli Engineering Inc
944 N Van Ness Ave
Fresno, CA 93728
559-237-4408
Fax: 559-237-4409
pauliengineering@sbcglobal.net

Mark Petersen

Seismologist
US Geological Survey
Denver Federal Center
PO Box 25046 MS 966
Denver, CO 80225
303-273-8546
mpetersen@usgs.gov

Celia Petitpas

CEA Liaison/General Adjuster
Farmers Insurance
PO Box 920607
Sylmar, CA 91342
818-362-8096
celia.petitpas@farmersinsurance.com

Manh Pham

Team Manager
State Farm Insurance
1000 Wilmington Dr PO Box 5000
DuPont, WA 98327
253-912-7411
Fax: 253-912-7374
manh.pham.clue@statefarm.com

William Phillips

Research Geologist
Idaho Geological Survey
University of Idaho
PO Box 443014
Moscow, ID 83844-3014
208-885-8928
phillips@uidaho.edu

Chris Poland

President, Chairman & CEO
Degenkolb Engineers
235 Montgomery St 5th Fl
San Francisco, CA 94104
415-354-6424
cpoland@degenkolb.com

Jonathan Price

State Geologist and Director
Nevada Bureau of Mines & Geology
University of Nevada Reno MS 178
Reno, NV 89557-0178
775-784-6691
jprice@unr.edu

Gerard Quinn

Maximus Inc
4320 Auburn Blvd Ste 2000
Sacramento, CA 95842
916-351-1831
jqquinn@ulink.net

Jason Rapich

Project Engineer
Dunn Associates Inc
380 West 800 S
Salt Lake City, UT 84101
801-575-8877x104
Fax: 801-575-8875
jrapich@dunn-se.com

Michael Reichle

Chief Seismologist
California Geological Survey
801 K St MS 1232
Sacramento, CA 95814
916-327-1813

Mark Roberts

Hazard Mitigation Officer
State of Alaska, DHS&EM
PO BOX 5750
Fort Richardson, AK 99505
907-428-7071
deanna.humphreys@alaska.gov

Ian Robertson

Professor
University of Hawaii at Manoa
Dept of Civil & Env Engineering
2540 Dole St Holmes Hall 381
Honolulu, HI 96822-2303
808-956-6536
Fax: 808-956-5014
ianrob@hawaii.edu

Anne Rosinski

Sr Engineering Geologist
California Geological Survey
345 Middlefield Rd MS 520
Menlo Park, CA 94025
650-688-6373

Corinne Schefner-Rogers

Adjunct Professor
University of New Mexico School of Medicine
1 University of New Mexico MPH MC 11-6145
Albuquerque, NM 87131-0001
505-797-0492
clschefner@hotmail.com

John Schulties

Bldg Codes Inspector III
Kent County Inspection & Enforcement
555 Bay Rd
Dover, DE 19901
302-744-2445
Fax: 302-736-2123
christina.morton@co.kent.de.us

Lawrence Scorzelli

Construction Official
Borough of Ho-Ho-Kus
100 Highwood Ave
Waldwick, NJ 07463
201-444-5816
Fax: 201-460-8434
lscorz@optonline.net

David Slater

Seismic Systems Analyst
Nevada Seismological Laboratory
University of Nevada Reno
1664 N Virginia St MS 174
Reno, NV 89557
775-722-0381
dslater@seismo.unr.edu

Adam Smith

Seismic Specialist
TOLCO a brand of NIBCO
1375 Sampson Ave
Corona, CA 92879
951-737-5599
smitha@nibco.com

Ken Smith

Seismic Network Mgr
UNR Seismological Laboratory
1664 N Virginia St MS 174
Reno, NV 89557
775-784-4218
ken@seismo.unr.edu

Paul Spengler

Disaster & Emergency Svcs Coord
Lewis & Clark County
221 Breckenridge St
Helena, MT 59601-4230
406-447-8285
pspengler@co.lewis-clark.mt.us

Mike Staley

Assistant Director, Department of
Emergency Management
California Volunteers
1110 K St Ste 210
Sacramento, CA 95814
916-445-6687
mike.staley@californiavolunteers.ca.gov

Walter Stefanacci

Construction Official
Township of Denville
31 Hopper Ln
Wayne, NJ 07470
973-628-1724
Fax: 973-389-2130
jstefanacci@wayneschools.com

Carl Strand

President
Strand Earthquake Consultants
1436 S. Bentley Ave Ste 6
Los Angeles, CA 90025
310-473-2426
strandcart@aol.com

Alireza Taale

Sales Manager
Terrascience Systems &
Weir-Jones Group of Companies
2040 W 10th Ave
Vancouver, BC V6J2B3
604-732-8821
alireza.taale@weir-jones.com

Greg Talkin

Director, NRC
Unified Government / NRC
4601 State Ave Ste 86
Kansas City, KS 66102
913-573-8628
gtalkin@wycokck.org

Scott Tanner

Inspections Administrator
Kent County Inspection & Enforcement
555 Bay Rd
Dover, DE 19901
302-744-2445
Fax: 302-736-2123
christina.morton@co.kent.de.us

Jennifer Thornburg

Sr Engineering Geologist
California Geological Survey
801 K St MS 1232
Sacramento, CA 95814
916-445-5488

Mai (Mike) Tong

Physical Scientist
FEMA
500 C St SW
Washington, DC 20472
202-646-4115
mai.tong@dhs.gov

Eugene Trahern

Principal
Cascade Crest Consulting Engineers
17655 Mountain View Rd
Sisters, OR 97759
541-549-1331
cccengr@msn.com

Sue Traugott

Building Inspector
City of Alturas
200 W North St
Alturas, CA 96101
530-233-5232
Fax: 530-233-3559

Maillian Uphaus

Programs Section Manager
Washington Military Department
MS 20 TA-20 Bldg 20
Camp Murray, WA 98340-5122
253-512-7062
m.uphaus@emd.wa.gov

Linda VerMaas-Hamilton

Section Manager
State Farm Insurance
3159 Montecito Meadow Dr
Santa Rosa, CA 95404
312-952-3500
linda.vermaas-hamilton.aw0g@statefarm.com

Raquel Vernola

Emergency Manager
City of Norwalk Emergency Management
12700 Norwalk Blvd
Norwalk, CA 90650
562-929-5743
rvernola@ci.norwalk.ca.us

Yumei Wang

Geohazards Section Leader
Oregon Dept of Geology
800 NE Oregon St #28 Ste 965
Portland, OR 97232
971-673-1551
Fax: 971-673-1562
yumei.wang@dogami.state.or.us

Zhenming Wang

Seismologist
Kentucky Geological Survey
University of Kentucky 228 MMRB
Lexington, KY 40506
958-257-5500
zmwang@uky.edu

Barry Welliver

BHW Engineers LLC
13065 South 132 E Ste 210
Draper, UT 84020
801-553-0162
barrywelliver2@earthlink.net

John Wilson

Earthquake, Tsunami &
Volcano Program Coordinator
Oregon Emergency Management
PO Box 14370
Salem, OR 97309
503-378-2911
jmwilson@oem.state.or.us

Seth Wittke

Wyoming State Geological Survey
PO Box 1347
Laramie, WY 82073
307-766-2286
wittkesj@uwyo.edu

Ivan Wong

Principal Seismologist/Vice President
URS Corporation
1333 Broadway Ste 800
Oakland, CA 94612
510-874-3014
ivan_wong@urscorp.com

WSSPC



**Western States Seismic Policy Council
2007 Annual Conference Meetings**

September 30, 2007

WSSPC Committee Meetings

9:00 – 11:00 a.m.

October 3, 2007

WSSPC Committee Meetings

7:30 – 9:00 a.m.

Board of Directors' Meeting

N11

9:00 – 10:00 a.m.

Annual Business Meeting

N10

10:00 a.m. – Noon

**Seismic Safety Councils and Commissions
Meeting**

Ruby 1

Noon - 4:00 p.m.



AGENDAS
BASIN and RANGE PROVINCE COMMITTEE MEETINGS
2007 WSSPC - ICC Annual Conference
September 30 & October 3, 2007
Grand Sierra Resort
Reno, Nevada

MEETING 1
Sunday, September 30, 2007
9:00 – 11:00 A.M.
Crystal 4

The purpose of this meeting is to review and modify as necessary the two Draft WSSPC Policy Recommendations assigned to the BRPC. These policy recommendations were originally proposed and drafted by the BRPC, and have been revised by a BRPC subcommittee for re-adoption in 2007. The two draft policy recommendations are:

Policy Recommendation 07-3

Post-Earthquake Technical Clearinghouses

STATUS: *Basin & Range Province Committee revised PR 04-3.*

Policy Recommendation 07-5

Basin and Range Province Earthquake Working Group(s)

STATUS: *Basin & Range Province Committee revised PR 04-5.*

The draft policy recommendations are available at:

<http://www.wsspc.org/PublicPolicy/PolicyRecs/2007/policy071.html>

Please review these policy recommendations prior to the meeting and bring any suggested changes in writing for the committee to consider. Any committee member unable to attend this meeting who wishes to make comments or suggest changes can submit them in writing to Bill Lund at billlund@utah.gov by 4 p.m. (Utah time) Friday, September 28th. If you wish to comment on any of the other draft policy recommendations, please contact the chairs of those committees directly.



MEETING 2
Wednesday, October 3, 2007
7:30 – 9:00 A.M.
Crystal 4

1. Nevada Basin and Range Province Earthquake Working Group –
Craig dePolo
2. National Earthquake Conference
(www.earthquakeconference.org)
 - A. General information – Bill Lund
 - B. Workshop: Establishing State Post-Earthquake
Clearinghouses - Bob Carey/Bill Lund
3. Rural Disaster Summit – Craig dePolo
4. Election of new BRPC chair at 2008 National Earthquake
Conference - nominations/selfless volunteers – Bill Lund
5. Other

**WSSPC Board Meeting
Grand Sierra Resort
Room N11**



**October 3, 2007
9:00 - 10:00 a.m.**

A G E N D A

Time	Item	Lead
9:00 AM	Call to Order, Welcome, and Introductions	Rick Allis, WSSPC Chair
	Approval of Minutes of WSSPC Board of Directors' Meeting – June 5, 2007	* Allis
	Review of Annual Business Meeting Agenda and Minutes of April 17, 2006	* Board
	WSSPC Executive Director's Report	* Patti Sutch, WSSPC Executive Director
	WSSPC Financial Report	
	FEMA Grant 2006	
	USGS Grant 2007	
	2008 National Earthquake Conference Progress Report	* Sutch
	Review of WSSPC Board of Directors' Nominations	Allis
	Proposed 2007 Policy Recommendations – Discussion and Board Recommendations for Adoption	* Allis
	Review of Policy Recommendations for Renewal in 2008 (April)	* Allis
	New Business	Allis
	Reminder -- Next Board Meeting January 15, 2008, Sacramento, California	Allis
10:00 AM	Adjournment to Annual Business Meeting	Allis

* See Attachment

**WSSPC Annual Business Meeting
Grand Sierra Resort
Room N10**



October 3, 2007
10:00 a.m. – Noon



A G E N D A

Time	Item	Lead
10:00 a.m.	Call to Order, Welcome, and Introductions	Rick Allis, WSSPC Chair
	Roll Call and Distribution of Ballots	Patti Sutch, WSSPC Executive Director
10:15	Visit by Rick Weiland, CEO, International Code Council	
	Approval of Minutes of WSSPC Annual Business Meeting – April 17, 2006	* Allis
	WSSPC Executive Director's Report	* Sutch
	WSSPC Financial Report	
	2007 & 2008 Earthquake Program Managers Meetings	Bob Carey, Utah DHS
	WSSPC Board of Directors Nominations and Elections	Allis
	Proposed 2007 Policy Recommendations – Discussion and Recommendations for Adoption or Deletion: 07-1 & 07-2, 07-3, 07-4, 07-5, 07-6, 04-6, 04-7	* Allis
	Review of Policy Recommendations For 2008: 05-1, 05-2, 05-3	* Allis
	DHS/FEMA Update	Ed Laatsch, FEMA
	USGS Update	Bill Leith, USGS
	Results of Board of Directors' Election	Sutch
	WSSPC Committee Reports	
	Basin & Range Province Committee	Bill Lund, Chair
	Engineering, Construction, and Building Codes Committee	Ron Lynn, Chair
	Tsunami Hazard Mitigation Committee	John Parrish, Chair
		Allis
	New Business	
	Reminder – Next Annual Business Meeting – April 22, 2008, 7-9 PM – at National Earthquake Conference, Seattle, Washington	
Noon	Adjournment	Allis

* See Attachments

**WSSPC Annual Conference
Seismic Councils and Commissions Meeting
Grand Sierra Resort
Room Ruby 1**

**October 3, 2007
Noon – 4:00 p.m.**

A G E N D A

Pick up Box Lunch (For those who have paid for it)

Goal: To improve working relationships among the state seismic councils and commissions in the western states

Lead: Dick McCarthy, State of California Alfred E. Alquist Seismic Safety Commission

Call to Order and Introductions

Recap from Last Meeting at 2004 National Earthquake Conference

Commissions' Status

What Works, What Doesn't

- Improving Communications
- Major Challenges

Break

Recent Model Legislation

Products and Projects

Policies

- Policy Gaps in States
- WSSPC Policy Recommendations
- Joint Grant Opportunities

Next Commissions Meeting:

2008 National Earthquake Conference April 22, 2008 1-5 p.m.
Westin, Seattle, Washington

Adjourn

**WESTERN STATES SEISMIC POLICY COUNCIL
BOARD OF DIRECTORS' MEETING
Nevada Bureau of Mines and Geology
Scrugham Engineering Building Room 401
University of Nevada Reno
Reno, Nevada
June 5, 2007**

MINUTES

Present were:

Rick Allis, Utah Geological Survey
Dave Cassel, Oregon Emergency Management (proxy for Ken Murphy)
Craig dePolo, Nevada Bureau of Mines and Geology
Terri Garside, Nevada Bureau of Mines and Geology
Jim Goltz, California Governor's Office of Emergency Services (proxy for Henry Renteria)
Monique Lay, Montana Division of Disaster Services (proxy for Dan McGowan)
John Madden, Alaska Dept of Homeland Security & Emergency Management
Vince Matthews, Colorado Geological Survey
John Parrish, California Geological Survey
Jonathan Price, Nevada Bureau of Mines and Geology
Woody Savage, USGS
Patti Sutch, WSSPC

Call to order and introductions - Allis

All present introduced themselves.

Welcome to John Madden – Board

John gave a brief account of his background working in the federal government. The new Alaska governor appointed him in January 2007. In one of his previous positions he helped with the modernization of the Alaska tsunami warning center.

Agenda Review - Allis

The meeting was shortened to one day, extending the meeting time on June 5.

Approval of Minutes of March 8-9, 2007 - Board

MOTION: To approve the minutes of March 8-9, 2007 (Vince Matthews).

SECOND: Jim Goltz

VOTE: Unanimously approved.

Rick Allis asked Jon` Price for a clarification of his statement in the minutes, about the lack of funding opportunities for detailed hazards mapping. The conclusion of the discussion was that WSSPC should develop a position statement so detailed hazards mapping would be more seriously considered as a project that falls within the scope of

mitigation projects that should be funded by FEMA. Jon Price volunteered to write a draft statement for the Board to consider at the Reno conference.

Executive Director Report – Patti Sutch

WSSPC Budget

WSSPC finances from December through April are covered primarily by the FEMA agreement, with the exception of meals and conference printing costs of approximately \$2200 covered by the USGS agreement. At the current time, the \$3000 Affiliate membership income covers those items not covered by the FEMA or USGS grants.

The FEMA cooperative agreement period is from August 1, 2006 through July 31, 2007, but we have not been notified yet by FEMA about our agreement renewal. We have a new Project Officer – Larry Hultengren – who is replacing Anita Vollmer.

FEMA Report – Larry Hultengren (on speakerphone)

The deadline for submitting our documents for the next FEMA cooperative agreement is June 15. Larry will email Patti the information needed to get started.

Recent FEMA Activities in April and May:

- Cathleen Carlisle conducted training for hospital nonstructural seismic mitigation that was well attended.
- NEHRP Advisory Committee – one member asked if FEMA should promote and partner more with the state seismic commissions. Financial support is being considered.
- ASCE published ASCE-41 (old FEMA 356).
- FEMA 547 (Techniques for Seismic Rehabilitation) should be available in hard copy.
- FEMA 626 and FEMA 529 (Duck, Cover and Hold) posters have been translated into other languages.
- The next generation of NEHRP rehabilitation publications- a group is meeting in San Francisco in the fall of 2007.
- FEMA 154 and ATC-20 screening conducted in Washington.
- Doug Bausch gave a report on the statistics of success within the Pre-Disaster Mitigation grant program.
- Mike Mahoney – next generation NEHRP documents were presented to the public last week to get feedback from communities.

Larry's previous employment was with the overseas State Department where he worked in the earthquake program strengthening their building stock. He is a structural engineer.

Larry was asked if there was an update on the status of ATC 64 (tsunami resistant design); he will check and get back to us.

WSSPC Budget discussion, continued –

The WSSPC budget allocated funds to a full time staff person in the WSSPC office, but we have been unable to hire someone. Therefore, the 2006 FEMA cooperative agreement has been under-spent. WSSPC should be able to re-allocate funds for other purposes. The Board decided to support travel to the WSSPC conference in September/October, and directed Patti to clarify with FEMA if that is possible.

BREAK

2008 National Earthquake Conference Report – Patti Sutch

Patti reviewed the conference program recently completed by the Program Committee. It will be posted on the www.earthquakeconference.org website by the end of the week.

USGS Report – Woody Savage

The funding for the earthquake program remains static.

PAGER (Prompt Assessment of Global Earthquakes for Response) is a global alert system used internationally. USAID provided much of the development money as part of US foreign policy for US policymakers to be aware of earthquakes around the world.

2008 Southern California Planning Initiative – Jim Goltz

The southern California planning initiative was initiated by the 1906 earthquake commemoration. It is based on a M7.9 earthquake scenario on the southern San Andreas fault and a subsequent exercise. For the scenario, OES is enhancing the HAZUS database with building data. They have data only for Los Angeles County; they would like the other regional counties to update their building databases. The scenario will be finished in the spring of 2008.

The exercise with FEMA, State, Counties, and the private sector is planned for November 13, 2008. It will be region-wide over five days, representing different earthquake response time frames:

Day 1 - Day of the earthquake

Day 2 - 1 week later

Day 5 - 6 months later.

All of the southern California activities are included in the overarching “Dare to Prepare” campaign. Mark Benthien of the Southern California Earthquake Center (SCEC) developed a power point presentation on the campaign for anyone’s use. “Roots” is being distributed to over a million people. SCEC is conducting a survey of preparedness statewide as an attempt to link to products. The campaign kicked off January 9, 2007.

Report on Utah-Nevada Seismic Commissions Meeting – Rick Allis

Commissions have very different styles but have similar agendas; because of that, cross-pollination of ideas occurred at the meeting. It was helpful that $\frac{3}{4}$ of each commission

was present. Jon Price's minutes were very complete. At the meeting they learned that NEIC at Golden is not 24/7 for ShakeMap. Similar meetings could take place every 2 years—and include the California Commission. Rural disasters may be a future issue.

LUNCH BREAK

Nomination of Board of Directors - Board

MOTION: To nominate the slate of Dan McGowan, John Parrish, Ken Murphy, and Henry Renteria (Vince Matthews).

SECOND: John Madden

VOTE: Unanimously in favor.

2007 Annual Conference

Field Trip – Craig dePolo

Craig described the field trip agenda which includes a look at local faulting and geologic history of the Cenozoic basin, a visit to the Washoe County Emergency Operations Center, talks on post-earthquake inspections, and a visit to 3 stops on the University of Nevada Reno (UNR) campus – the shake table where the Bay Bridge was tested, a base-isolated building, and the UNR Seismological Lab. Lunch will be at a stop overlooking the basin. Three buses are reserved.

Awards in Excellence – Rick Allis

The Board voted to give the following Awards in Excellence:

- Hawaii State Civil Defense, Hawaii Coastal Zone Management Program, and Hawaii State Earthquake Advisory Committee were selected for the Overall Award in Excellence in Mitigation.
- Lincoln County School District for Outreach to Business/Government, Schools and General Public.
- Utah Geological Survey/Basin & Range Province Committee for Research Efforts.
- Oregon Natural Hazards Workgroup for Public-Private Partnerships.
- Pacific Tsunami Museum for Non-Profit Agency Efforts.

BREAK

Policy Recommendations – Board

Comments received on Policy Recommendations 07-1, 07-2, 07-3, 07-4, 07-5, 07-6 were reviewed. Language in the policy recommendations was revised and the changes accepted by the Board to be submitted to the membership to vote on at the Reno meeting. Patti will post them on the WSSPC website for a final viewing.

New Business - Board

Ken Murphy sent an email to the Board asking for input on a proposed FEMA policy on “Seismic Safety - New Construction”. The Board supports public policies that improve safety for the public, but there were questions -- What are “reasonable” costs? Are there

unintended consequences of supporting this policy? John Madden will give it to his staff to review and get back to Ken Murphy. He will ask state Public Assistance officers to consider the ramifications of this policy.

Set 2008 Board meetings - Board

Tuesday January 15, 2008, Sacramento

Wednesday April 23, 2008, (only free evening for Board meeting)

Tuesday August 12, Salt Lake City

Closed Session – Board

Executive Director 2006 Review

Adjourn – Rick Allis

Meeting was adjourned at 5:30 p.m.

Respectfully submitted,

Patricia L. Sutch
Secretary

**WESTERN STATES SEISMIC POLICY COUNCIL
2006 ANNUAL BUSINESS MEETING
Westin St. Francis Hotel
San Francisco, California**

**MINUTES
April 17, 2006**

Present:

***WSSPC Member
+Proxy for WSSPC Member**

*+Rick Allis, Utah Geological Survey
Doug Bausch, DHS/FEMA
++Susan Bilek, New Mexico Institute of Mining & Technology
+Bob Carey, Utah Office of Emergency Services
+Dave Cassel, Oregon Emergency Management
+Rod Combellick, Alaska Division of Geological & Geophysical Surveys
+George Crawford (not present at roll call for establishing quorum), Washington Military Department, Emergency Management Division
+Craig dePolo, Nevada Bureau of Mines and Geology
Terri Garside, Nevada Bureau of Mines and Geology
*Roger Hansen, Alaska Seismic Safety Hazards Commission
++Dave Jackson, Idaho Bureau of Homeland Security
+Jeanne Branch Johnston, Hawaii State Civil Defense
Ed Laatsch, DHS/FEMA
*Dave Liebersbach, Alaska Division of Homeland Security & Emergency Management
William Lund, Utah Geological Survey
*Thomas E. Manning, Oregon Seismic Safety Policy Advisory Commission
*++Vince Matthews, Colorado Geological Survey
*Vicki McConnell, Oregon Department of Geology & Mineral Industries
*Dan McGowan, Montana Disaster and Emergency Services Division
*+John Parrish, California Geological Survey
*Jon Price, Nevada Bureau of Mines and Geology
Michael Reichle, California Geological Survey
*Ian Robertson, Hawaii State Earthquake Advisory Committee
Woody Savage, USGS
R. Scott Simmons, Alaska Division of Homeland Security & Emergency Management
Patti Sutch, WSSPC
Anita Vollmer, DHS/FEMA
Jay Wilson, Oregon Emergency Management

Call to Order, Welcome, and Introductions – Rick Allis
All present introduced themselves.

Roll Call and Establishment of Quorum – Patti Sutch

Twenty-three out of 36 WSSPC members were present, establishing a quorum.

Approval of Minutes – Rick Allis

MOTION: To approve the minutes of September 12 and 14, 2005 (Rod Combellick).

SECOND: Jon Price

VOTE: Approved unanimously.

Executive Director Report – Patti Sutch

A re-allocation of the FEMA budget categories, allowing for delegate travel to the San Francisco meeting and \$10,000 towards the Earthquake Program Managers meeting in Salt Lake City in June, was approved by the WSSPC Board and would be submitted to FEMA for their approval. Because there is no WSSPC conference in 2006, WSSPC will need to use its own money for certain expenses not covered by the FEMA grant. Dave Liebersbach re-emphasized that the Board is comfortable with spending up to an estimated \$30K of WSSPC money this year.

Six State Seismic Safety Councils and Commissions – Alaska, California, Colorado, Hawaii, Oregon and Utah – have accepted the invitation to join. Nevada will consider the invitation at their next meeting. Patti welcomed representatives from all of the attending commissions.

The 2007 WSSPC Annual Conference is planned to be held jointly with the International Code Council (ICC) in Reno, Nevada. John Henry and Dominic Sims of the ICC will make a presentation on codes to the WSSPC members following this meeting.

A 2008 National Earthquake Conference is in the beginning planning stages with the other consortia. CREW is taking the lead and the preferred venue is Seattle.

Earthquake Program Managers Meeting – Bob Carey

The WSSPC Board approved \$5000 for meeting costs and \$5000 for travel reimbursements for the June 25-28, 2006 meeting in Salt Lake City.

USGS Coalition & Congressional Hazards Caucus Workgroup – Rick Allis

WSSPC signed on to support the Coalition support of the USGS FFY '07 budget.

WSSPC Board of Directors Nominations and Elections – Rick Allis

Board Chair Rick Allis asked for additional nominations for Board members - there were none. Rick Allis expressed concern about the emergency manager side and their ability to participate in WSSPC. He suggested WSSPC may need to change its Bylaws to include Earthquake Program Managers as Board members or Seismic Safety Council or Commission representatives as the At-Large member.

Proposed Policy Recommendation 06-1 – Discussion

Vicki McConnell agreed with the broadening of the policy from community level mitigation to include the states. Scott Simmons commented that comprehensive mitigation planning comes from the community level. Rick Allis said the policy recommendation goes to the heart of what WSSPC stands for.

Questions were raised about the wording of the Assessment section. Roger Hansen stressed the importance of using the word “risk”. Rod Combellick and Dan McGowan suggested changes be made to the Assessment paragraph.

MOTION: To adopt Policy Recommendation 06-1 with a rewrite of the Assessment section and to resubmit it to the WSSPC Board and Executive Director for final approval (Dave Liebersbach).

SECOND: Rod Combellick.

DISCUSSION:

Vicki McConnell clarified that the word “risk” would be added to “earthquake mitigation policies” and/or “plans”.

VOTE: Unanimously in favor.

Scott Simmons, Rod Combellick, and Dan McGowan volunteered to edit the Assessment section.

DHS/FEMA Report – Doug Bausch

1. Pre-disaster mitigation (PDM-C) grants totaling \$50 Million are available this year (a reduced amount). Western states were successful in getting funding for earthquake programs and planning and assessment activities. PDM grant money is a line item in the FEMA budget.

Jon Price stressed the importance of knowing what the President’s request is.

Dave Liebersbach noted that the new organizational structure of the Preparedness Directorate includes mitigation, and asked if preparedness money was available. Ed Laatsch replied that even though grant money went to preparedness, it should be available for earthquake mitigation.

Vicki McConnell asked if PDM would be moved into FEMA’s Preparedness Directorate. Ed replied that is not being discussed.

2. WSSPC funding has been increased to \$200K for next year (2006).

3. A report of the Multihazard Mitigation Council of National Institute of Building Sciences has concluded that there is a 4:1 Benefit/Cost ratio to mitigation projects and processes. Earthquakes scored higher than other hazards on processes versus projects.

Earthquake education scored well. NATURAL HAZARD MITIGATION SAVES: An Independent Study to Assess the Future Savings from Mitigation Activities is available at http://www.nibs.org/MMC/MitigationSavingsReport/natural_hazard_mitigation_saves.htm.

4. FEMA regions are active in catastrophic planning processes and identifying vulnerabilities.

5. The earthquake clearinghouse concept was borrowed for Hurricanes Katrina and Rita, and used Geographic Information Systems extensively. Lessons learned will be helpful for the states. The link from the clearinghouse to mitigation funding comes from the Federal Coordinating Officer (FCO) – thus there is a need to include and educate the FCO.

Jay Wilson asked if there was a representative at the program level in FEMA for tsunami issues. Ed Laatsch replied that he and Mike Mahoney at headquarters have the desire to deal with tsunami issues.

Dave Liebersbach remarked that the tsunami program is vested in NOAA, not FEMA. Scott Simmons added that NOAA is a warning agency and is not adept at outreach and education.

Tom Manning said that FEMA was not represented after the Indian Ocean tsunami. At a state level, Oregon's siren warning systems are not consistent with the other states.

Jeanne Johnston commented that TsunamiReady communities are not eligible for the tsunami funds in Hawaii.

U.S. Geological Survey (USGS) Report – Woody Savage

1. The National Earthquake Information Center began 24/7 operations January 1.
2. USGS Earthquake Hazards Program has a refurbished website and links to WSSPC.
3. Briefing of Congressional Hazards Caucus, Multihazard Mitigation Council report, and the National Academy of Sciences study are also linked on the website.
4. The National Earthquake Prediction Evaluation Council (NEPEC) has been formed again and will coordinate with CEPEC. James Dieterich, University of California, Riverside, is Chair. The Council, which is conducting its initial meeting May 4-5 in Menlo Park, California, will advise the director of the USGS on earthquake prediction, forecasting and hazard assessment.
5. A National Earthquake Hazards Reduction Program (NEHRP) forum will follow the WSSPC meeting, led by Jack Hayes, the new NEHRP Director from National Institute of Standards and Technology.
6. The USGS Multi-Hazards Initiative is in the President's budget for \$1.5M. Lucy Jones heads up the project and has held 3 stakeholder meetings. A southern San Andreas fault scenario is being used in cooperation with Southern California Earthquake Center.
7. A USGS tsunami workshop in Menlo Park will be held this week.

Election of Board of Directors – Rick Allis

Rick announced that David Liebersbach, Vince Matthews, and he were re-elected to serve Board terms until 2008.

WSSPC Committee Reports

Basin & Range Province Committee – Bill Lund

Policy Recommendation 04-5 was an outgrowth of the WSSPC co-sponsored Seismic Hazards Summit II and recommended the formation of the Basin and Range Province Earthquake Working Group (BRPEWG). The Summit identified six seismic hazard policies that have bearing on the Basin and Range Province and National Seismic Hazards Mapping program.

BRPEWG coordinated with the USGS and 27 Subject Matter Experts in Salt Lake City for a 3-day workshop in March. Results were 20 consensus recommendations and 17 long-term recommendations for the USGS. A draft document was forwarded to WSSPC Board members, and will be posted on the WSSPC website. The report will be presented to the USGS as a WSSPC initiative.

Woody Savage commended the report as a positive model for approaching state- and regional-level hazards and establishing a benchmark as a way to work on broad regional earthquake issues.

Engineering and Building Codes Committee – Terri Garside for Ron Lynn

Proposed Policy Recommendation 05-4 that did not pass is being re-worked with Barry Welliver.

Tsunami Hazard Mitigation Committee – George Crawford

British Columbia has been invited to attend the National Tsunami Hazard Mitigation Program. WSSPC can play a major role in the new program. A five-governor letter needs California's governor to sign. \$10 Million is available.

FEMA HQ Report – Ed Laatsch

The Mitigation Division has re-organized. Deborah Ingram is now Ed's boss and she reports to David Maurstad.

Performance measurement and performance-based programs are the focus of FEMA headquarters, with an increasing priority on putting measures in place. Strategic communication of risk will be emphasized.

New Business – Rick Allis

The USGS publication *Putting Down Roots in Earthquake Country* has a section containing thoughtful recommendations before, during, and after an earthquake.

Lloyd Cluff will be stepping down as Chair of the Scientific Earthquake Studies Advisory Committee (SESAC).

Adjournment – Rick Allis

MOTION: To adjourn the meeting (Dave Liebersbach).

SECOND: Vince Mathews.

VOTE: Unanimously in favor.

Respectfully submitted,

Patricia L. Sutch
WSSPC Secretary

Western States Seismic Policy Council

SEMI-ANNUAL REPORT #2, February 1, 2007 – July 31, 2007

For FEMA Grant 2006 Work Plan

Contract No. EMW-2005-CA-0435 Mod 001

Grant Year August 1, 2006 to July 31, 2007

The mission of the Western States Seismic Policy Council is to develop seismic policies and share information to promote programs intended to reduce earthquake-related losses.

The activities in this Work Plan directly support the WSSPC mission and the NEHRP goals, especially Goals A and C. These key goals are:

- A. Develop effective practices and policies for earthquake loss-reduction and accelerate their implementation.
- C. Improve seismic hazards identification and risk assessment methods and their use.

1. Administrative and Personnel

- A. Maintain an office staffed by a full time Executive Director and administrative support staff as budget constraints permit.

The office staff consists of full-time Executive Director Patricia Sutch and Program Manager Sherri Aragon, who works 24-29 hours a week. Her responsibility is the newsletter and database. Three contractors were hired to help with the conference registration and tasks at the 2007 WSSPC conference. The office continues to utilize a part-time contractor for the website maintenance.

- B. Provide quarterly reports to the WSSPC Board of Directors and the FEMA Project Officer detailing activities and travel relating to this Work Plan.

Reports were provided to the Board at meetings in March and June 2007 and emailed to the FEMA Project Officers Anita Vollmer and Larry Hultengren.

- C. Provide approved minutes of each Board meeting to the FEMA Project Officer and Board and post them on the WSSPC website.

Approved minutes from the December 5-6, 2006 and March 8-9, 2007 Board meetings are posted on the WSSPC website and were provided to FEMA Project Officers Anita Vollmer and Larry Hultengren.

- D. Provide draft minutes of the Annual Business meeting to the WSSPC membership and post approved minutes on the WSSPC website.

Draft minutes of the WSSPC Annual Business Meeting April 17, 2006 were posted on the WSSPC website for comment and review by the WSSPC members. Minutes will be approved at the 2007 Annual Business meeting.

E. Maintain a roster of members in a database and on the WSSPC website.

A roster of members is continually renewed on the WSSPC website, Microsoft Outlook Contacts, and in the office database. Sherri Aragon is updating the database with zip+4, websites, and organizations, and the updated information will be printed in a general directory for distribution at the WSSPC conference, which, as of July 31, is not yet completed.

2. WSSPC Finances

A. Manage WSSPC's finances - including corporate tax returns, corporate filings and licenses, and grants management - and arrange for monthly oversight of finances and an annual audit to be conducted by a certified public accountant.

The 2005-2006 financial review was completed and presented to the Board in March.

A request for reimbursement (Req #2) from November 1, 2006 through January 31, 2007 for \$48,856.10 was made on March 5, 2007. A request for reimbursement (Req #3) from February 1, 2007 through June 30, 2007 for \$41,522.49 was made on August 27, 2007. The amount left to be billed on the agreement for July 2007 is \$24,903.34, of which \$7476.92 has been accrued.

Payment systems for federal grants were kept current (ASAP, CCR, PMS). Dun & Bradstreet (in March, after 9 months) was finally able to populate the CCR database correctly with our Sacramento address and deleted a duplicate D&B number for WSSPC. This allowed us to finally be able to apply online for our cooperative agreement in June.

In June, WSSPC submitted its budget and work plan for the next cooperative agreement period on e-grants.

B. Provide quarterly financial reports to the Directors analyzing the financial health of the organization.

Financial status reports are part of the Executive Director's report and were provided to Board members with other meeting materials. Reimbursement of travel expenses were provided for those Board members who requested it.

3. Conferences and Meetings

- A. Coordinate with the International Code Council to jointly convene a conference in Reno, Nevada in September 2007 that focuses on building code issues and policy recommendations that can be adopted by the WSSPC membership.

Most of our efforts were devoted to this task. WSSPC coordinated with ICC, Nevada Bureau of Mines & Geology, and hotel personnel. WSSPC set up an online registration capability and supplemented our merchant account to be able to manually enter credit card transactions online. WSSPC came to an agreement with ICC about how the EXPO would be handled. WSSPC submitted information on the joint education session to ICC for consideration of obtaining continuing education credits. Publicity for the conference consisted of a printed " Save the Date" postcard and conference brochure that was mailed out to approximately 4000 people. A conference website was created with options to register by credit card, fax, purchase order, or voucher. The technical program was set up, speakers were invited, and a field trip and meeting with the state seismic councils and commissions were arranged. I solicited a vendor who could bring his shake table to give EXPO participants a "ride" on various earthquakes.

- B. Plan for a National Earthquake Conference in 2008 with the Earthquake Consortia.

The Executive Director led the Program Committee to a completed 2008 National Earthquake Conference program by the end of May 2007. The Program Committee had bi-monthly conference calls through the end of May; the Steering Committee conference calls are continuing monthly. We are currently working on a marketing plan and comprehensive budget.

- C. Conduct quarterly Board of Directors' meetings to update the Directors on the status of WSSPC business and activities. One of the quarterly meetings shall occur during the WSSPC Annual Conference.

Four Board meetings have been arranged for 2007, including one at the joint WSSPC-ICC annual conference. In this report period, two Board meetings were held – March 5-6, 2007 and June 5, 2007.

4. Outreach Programs

- A. Provide media for information exchange and dissemination, communication, and education via: WSSPC's award-winning website (www.wsspc.org), WSSPC's quarterly newsletter, *EQ*, and the WSSPC membership directory.

A webpage of "Earthquake Resources" that compiles a list of publications and webpages from each WSSPC member agency was completed and linked from the WSSPC website home page.

Three Newsletters were printed and distributed in this time period. The last printed newsletter was Winter 2007. At the March Board meeting, the Board decided to change to an annual report and two online newsletters per year.

The database that supports the WSSPC membership directory was updated throughout this report period with zip+4, emails, websites, and organizations. A Directory will be printed and distributed at the WSSPC-ICC Conference. The updated information will also be used for marketing the 2008 National Earthquake Conference.

- B. Conduct the “Awards in Excellence” program at the WSSPC Annual Conference to publicly recognize agencies for outstanding earthquake programs or products in mitigation and other categories.

Award nominations received in the office were collated and sent to each Board member for review before the June Board meeting. The Board selected the award winners and notices were sent to each entry, and an announcement including a press release was posted on the website. Plaques and trophies were ordered and engraved for presentation at the WSSPC annual conference.

- C. Serve as an information clearinghouse and coordination point among WSSPC members for damaging earthquakes or tsunamis in the western states.

No activity in this report period.

- D. Interface with the California Earthquake Clearinghouse and attend meetings.

I was not able to attend a meeting due to a scheduling conflict.

- E. Post adopted policy recommendations on the WSSPC website.

All policy recommendations approved by the WSSPC membership are posted on the WSSPC website. In addition, draft policy recommendations being considered for adoption were posted on the WSSPC website for members to review and comment upon. Policy recommendations that had changes recommended by the Board were added and re-posted on the website in July. A compilation of policy recommendation adoption was presented to the Board in March.

5. Partnerships

- A. Maintain and strengthen partnerships with CUSEC, NESEC, and CREW, by participating in quarterly conference calls with the Earthquake

Consortia Directors and the FEMA Project Officer. Attend local and regional meetings of EERI and participate in the EERI Local Government Committee as the budget and/or schedule permits.

Coordination with the other Earthquake Consortia, Earthquake Engineering Research Institute (EERI), and FEMA is done through the frequent conference calls for the 2008 National Earthquake Conference and the 2007 National Earthquake Program Managers meeting. In April the Executive Director attended the National Earthquake Program Managers meeting in Tennessee and delivered a Welcome address.

B. Continue the WSSPC Affiliate member program as outreach to local governments and the business community for their support and involvement in seismic risk reduction issues.

The seven organizations who are Affiliate members in 2007 have been included in the policy emailing and many are participating in the 2007 WSSPC annual conference as participants, speakers or vendors.

C. Attend the Natural Hazards Center Conference in Boulder, Colorado in July as an opportunity to meet and network with others in the natural hazards community.

The Executive Director attended the conference as well as a meeting for heads of hazards centers.

6. Develop and Implement Seismic Policies

A. Work with WSSPC Committees, partners, and others to develop seismic policies for adoption by WSSPC.

The Executive Director has communicated with the WSSPC Committee Chairs about the policy recommendations that are up for renewal or sunset in 2007.

B. Facilitate adoption of WSSPC policy recommendations by local, state, and Federal agencies.

No activity.

7. Strategic Plan

A. Revise WSSPC Strategic Plan for 2007-2009.

The 2007-2009 Strategic Plan was adopted by the Board at the March 2007 Board meeting.

B. Track progress on implementing the WSSPC Strategic Plan.

No activity.

Submitted by Patricia L. Sutch
WSSPC Executive Director
September 14, 2007

Western States Seismic Policy Council
Profit & Loss
December 2006 through August 2007

	Dec '06 - Aug 07
Ordinary Income/Expense	
Income	
401.0 · Interest Inc	
401.1 · Money Mkt Interest Income	37.61
401.2 · CD Interest Income	166.91
Total 401.0 · Interest Inc	204.52
410.0 · Membership Dues	3,000.00
420.0 · Conf Registration Fees	
428.0 · 2007 Conference Income	23,430.00
Total 420.0 · Conf Registration Fees	23,430.00
450.0 · Grants Earned	
460.0 · FEMA Grants Earned	
460.2 · 2006 FEMA Grants Earned	148,138.03
Total 460.0 · FEMA Grants Earned	148,138.03
465.0 · USGS Grants Earned	
465.2 · 2007 USGS Grants Earned	7,712.08
Total 465.2 · USGS Grants Earned	7,712.08
Total 450.0 · Grants Earned	155,850.11
470.0 · Publication Income	
470.1 · Insurance Summit Pub Sales	80.00
Total 470.0 · Publication Income	80.00
475.0 · Newsletter Subscription Income	25.00
Total Income	182,589.63
Expense	
500.0 · P/R Expenses	
500.1 · Salary	76,405.75
500.2 · Benefits	
500.7 · Employer IRA Contribution	
500.701 · Sutch IRA Employer Contribution	1,800.30
Total 500.7 · Employer IRA Contribution	1,800.30
500.2 · Benefits - Other	3,513.24
Total 500.2 · Benefits	5,313.54
500.3 · Employer Contrib/Taxes	7,500.98
500.4 · Workers' Comp	1,487.97
500.5 · Payroll Service	3,315.00
Total 500.0 · P/R Expenses	94,023.24
506.0 · Prof Fees Accounting	7,200.00

**Western States Seismic Policy Council
Profit & Loss
December 2006 through August 2007**

509.0 · Prof Fees Other	9,050.00
510.0 · Office Supplies	2,064.21
515.0 · Telephone	1,128.30
522.0 · Postage and Delivery	659.94
525.0 · Internet Services	1,053.37
530.0 · Staff Expenses	
530.1 · Staff Meals	246.58
530.2 · Staff Mileage	162.74
530.3 · Staff Transportation	1,938.28
530.4 · Staff Hotel	1,445.27
530.0 · Staff Expenses - Other	<u>375.00</u>
Total 530.0 · Staff Expenses	4,167.87
535.0 · Executive Committee Expense	
535.1 · Meals Exec Comm	1,804.35
535.2 · Mileage Exec Comm	200.69
535.3 · Transportation Exec Comm	4,497.34
535.4 · Hotel Exec Comm	<u>3,363.99</u>
Total 535.0 · Executive Committee Expense	9,866.37
550 · Workshops	
550.2 · EQ Program Managers Meeting	<u>80.00</u>
Total 550 · Workshops	80.00
553.0 · 2007 WSSPC-ICC Annual Conf Reno	
553.1 · AC 07 Transportation	300.00
553.2 · AC 07 Contractors	398.25
553.6 · AC 07 Printing	5,507.50
553.7 · AC 07 Shipping	<u>1,904.58</u>
Total 553.0 · 2007 WSSPC-ICC Annual Conf Reno	8,110.33
565.0 · Newsletter	
565.1 · Production	360.00
565.2 · Printing	4,692.00
565.3 · Postage	<u>339.22</u>
Total 565.0 · Newsletter	5,391.22
570.0 · Insurance	
570.1 · Liability Insurance	1,020.00
570.3 · Insurance Other	<u>166.00</u>
Total 570.0 · Insurance	1,186.00
575.0 · Rent	15,520.00
580.0 · Bank Service Charges	1,332.63
581.0 · Equipment Rental	
581.3 · Postage meter	<u>193.86</u>
Total 581.0 · Equipment Rental	193.86

Western States Seismic Policy Council
Profit & Loss
December 2006 through August 2007

583.0 · Miscellaneous Expenses	0.00
591.0 · Licenses and Permits	<u>60.00</u>
Total	
Expense	<u>161,087.34</u>
Net Ordinary Income	<u>21,502.29</u>

**Western States Seismic Policy Council
FEMA Grant 2006 Income & Expense
August 2006 through July 2007**

	Aug '06 - Jul '07	Budget
Ordinary Income/Expense		
Income		
450.0 · Grants Earned		
460.0 · FEMA Grants Earned		
460.2 · 2006 FEMA Grants Earned	192,523.08	200,000.00
Total 460.0 · FEMA Grants Earned	192,523.08	200,000.00
Total 450.0 · Grants Earned	192,523.08	200,000.00
Total Income	192,523.08	200,000.00
Gross Profit	192,523.08	200,000.00
Expense		
500.0 · P/R Expenses		
500.1 · Salary	94,608.17	102,630.00
500.2 · Benefits		
500.7 · Employer IRA Contribution		
500.701 · Sutch IRA Employer Contribution	2,180.40	2,143.00
Total 500.7 · Employer IRA Contribution	2,180.40	2,143.00
500.2 · Benefits - Other	4,584.50	9,494.00
Total 500.2 · Benefits	6,764.90	11,637.00
500.3 · Employer Contrib/Taxes	9,209.44	6,454.00
500.4 · Workers' Comp	1,855.55	1,450.00
500.5 · Payroll Service	4,280.00	2,040.00
Total 500.0 · P/R Expenses	116,718.06	124,211.00
506.0 · Prof Fees Accounting	9,000.00	10,700.00
509.0 · Prof Fees Other	12,859.99	5,000.00
510.0 · Office Supplies	2,503.31	2,900.00
515.0 · Telephone	1,645.23	2,200.00
522.0 · Printing		2,000.00
522.0 · Postage and Delivery	865.86	1,000.00
525.0 · Internet Services	1,545.73	1,417.00
530.0 · Staff Expenses		
530.2 · Staff Mileage	420.86	
530.3 · Staff Transportation	2,259.88	
530.4 · Staff Hotel	2,104.93	
530.0 · Staff Expenses - Other	387.00	
Total 530.0 · Staff Expenses	5,172.67	3,489.00
535.0 · Executive Committee Expense		
535.2 · Mileage Exec Comm	227.39	
535.3 · Transportation Exec Comm	7,830.58	
535.4 · Hotel Exec Comm	4,016.29	
Total 535.0 · Executive Committee Expense	12,074.26	14,720.00

**Western States Seismic Policy Council
FEMA Grant 2006 Income & Expense
August 2006 through July 2007**

550 · Workshops		
550.2 · EQ Program Managers Meeting	100.35	0.00
Total 550 · Workshops	<u>100.35</u>	<u>0.00</u>
553.0 · 2007 WSSPC-ICC Annual Conf Reno		
553.2 · AC 07 Contractors	175.00	0.00
Total 553.0 · 2007 WSSPC-ICC Annual Conf Reno	<u>175.00</u>	<u>0.00</u>
565.0 · Newsletter		
565.1 · Production	2,415.00	6,000.00
565.2 · Printing	6,148.00	5,312.00
565.3 · Postage	350.42	600.00
Total 565.0 · Newsletter	<u>8,913.42</u>	<u>11,912.00</u>
570.0 · Insurance		
570.1 · Liability Insurance	1,020.00	1,222.00
570.3 · Insurance Other	166.00	0.00
Total 570.0 · Insurance	<u>1,186.00</u>	<u>1,222.00</u>
575.0 · Rent	18,624.00	18,624.00
580.0 · Bank Service Charges	722.88	0.00
581.0 · Equipment Rental		
581.3 · Postage meter	296.32	360.00
Total 581.0 · Equipment Rental	<u>296.32</u>	<u>360.00</u>
583.0 · Miscellaneous Expenses	7,476.92	0.00
591.0 · Licenses and Permits	120.00	245.00
Total Expense	<u>200,000.00</u>	<u>200,000.00</u>

**Western States Seismic Policy Council
USGS Grant 2007 Income & Expense
February 1 through September 21, 2007**

	<u>Feb 1 - Sep 21, 07</u>	<u>Budget</u>
Income		
465.2 · 2007 USGS Grants Earned	7,983.14	10,000.00
Expense		
553.0 · 2007 WSSPC-ICC Annual Conf Reno		
553.1 · AC 07 Transportation	571.06	1,350.00
553.6 · AC 07 Printing	5,507.50	7,775.00
553.7 · AC 07 Shipping	<u>1,904.58</u>	<u>875.00</u>
Total 553.0 · 2007 WSSPC-ICC Annual Conf Reno	<u>7,983.14</u>	<u>10,000.00</u>
Total Expense	<u>7,983.14</u>	<u>10,000.00</u>

NATIONAL
EARTHQUAKE
CONFERENCE



**Understanding Earthquakes:
From Research to Resilience**

April 22-26, 2008
Westin Hotel, Seattle

CONFERENCE AGENDA

(As of 5/31/07)

MISSION STATEMENT: The purpose of the conference is to provide a national forum for dialogue among emergency managers, earthquake researchers, government officials, and business leaders that build common ground to mitigate losses from earthquakes and increase social and economic resiliency.

Tuesday, April 22, 2008 (Pre-meeting)

- | | |
|-------------------|--|
| 8:00 AM – 5:00 PM | State Earthquake Program Managers |
| 1:00 PM – 5:00 PM | State Seismic Councils and Commissions Meeting |
| 4:00 PM | Registration |
| 5:30 PM – 7:00 PM | Hosted Hospitality Mixer (At hotel, possible hosted event in Vendor area) |
| 7:00 PM – 9:00 PM | WSSPC Annual Business Meeting |

Wednesday, April 23, 2008 (Learning from the past)

7:00 AM **Registration**

7:00 AM **Breakfast Meetings (Continental Breakfast and Meeting Rooms Provided – First Come First Served)**

8:00 AM **Welcome**

Speakers: Bob Zimmerman, Chairman, CREW
Susan Reinertson, Director, DHS/FEMA Region X (invited)
Jim Mullen, Director, Washington State Military Dept, Emergency Management Division (invited)
Christine Gregoire, Governor, State of Washington (invited)

Earthquake Retrospectives -- A short film of past events produced by Global Net Productions

8:30 AM **PLENARY 1: TOWARD RESILIENCY: WHAT WE'VE LEARNED FROM PAST EVENTS**

This opening session will set the state for the conference by focusing on what we have learned from past events and putting a face on resiliency. Dennis Mileti will introduce the concept of resiliency, Lawrence Vale will offer examples from around the world and Anselm Smolka will present resiliency lessons learned from Hurricane Katrina.

Moderator: Bob Zimmerman

Speakers: Dennis Mileti, Professor Emeritus, University of Colorado, Boulder
Lawrence Vale, Professor and Head, Department of Urban Studies and Planning, Massachusetts Institute of Technology
Anselm Smolka, Head of Geological and Geophysical Risks, GeoRisks Research Group at MunichRe

10:00 AM **Break -- 30 minutes**

10:30 AM **PLENARY 2: NEHRP STRATEGIES AND CHALLENGES**

The NEHRP Strategic Plan has been updated and NIST has settled in as the lead agency with a designated NEHRP Director. What changes have resulted from new leadership? What are the recent program accomplishments? What are the challenges continuing to face the NEHRP program? A panel consisting of representatives from each of the NEHRP agencies – NIST, FEMA, USGS, and NSF – will discuss their strategies for meeting their goals, coordinating with their agency counterparts, and responding to the Advisory Committee on Earthquake Hazards Reduction (ACEHR).

Moderator: Chris Poland

Speakers: David Applegate, USGS
Ed Laatsch, DHS/FEMA (invited)
Joy Pauschke, NSF (invited)
Jack Hayes, NIST

12:00 PM **Lunch**
Luncheon Speaker: Mark Myers, USGS Director (invited), USGS Hazards Initiative

1:30 PM **PLENARY 3: SCIENTIFIC AND ENGINEERING LESSONS FROM PAST EARTHQUAKES**
Earthquakes are our best teachers, providing us with the observations that advance our understanding - usually incrementally, but occasionally in enormous leaps. In this session we learn about the major surprises and lessons nature has presented to us, during and following significant earthquakes, that have led to major advances in our understanding of earthquake science and engineering.
Moderator: David Applegate
Speakers: Hiroo Kanamori, Professor Emeritus, Caltech
Chris Poland, CEO, Degenkolb Engineers

2:45 PM **Break -- 45 minutes**

3:30 PM **Concurrent Workshops:**

Session A

Critical Infrastructure. Critical Infrastructure is an integral component of communities large and small. A community's dependence on their critical infrastructure goes largely unnoticed until it is disrupted. This session will explore a number of critical infrastructure issues highlighting the dependence and vulnerability of these complex systems.

Moderator: Don Ballantyne

Speakers: Tim Ceis, Seattle Deputy Mayor, Alaska Way Viaduct Replacement policy and planning issues

Ron Tognazzini, Formerly with Los Angeles Dept of Water and Power during Northridge EQ
Ken McCool, Former Public Works Director for Cleveland, Mississippi - Katrina-related water issues

Session B

Impact of Earthquakes on Rural Communities

The vulnerability of rural communities often goes unnoticed, due largely to the perception that there isn't a significant risk. The argument to place resources in larger, more urban communities rests on the perception that smaller populations are less at risk and have less infrastructure exposure to hazards. In reality, rural communities collectively represent a large percentage of the nation's population, while serving as the backbone of this nation. The vulnerability of these communities on a day-to-day basis is much greater than it is with larger communities. This session will explore those vulnerabilities and look at the role of mitigation in helping reduce these vulnerabilities.

Moderator: Laurie Johnson

Speakers: Peter Johnson, Federal Co-Chairman or Rex Nelson, Alternate Federal Co-Chairman, Delta Regional Authority

Kelly Donoghue, Assistant Director, Clinton County (New York) Emergency Services - Au Sable Forks EQ

Dave Jackson, Idaho State Hazard Mitigation Officer - Borah Peak EQ

Session C

Spreading the Risk: The Role of Earthquake Insurance in Economic Recovery

Insurance dollars are a major contributor to economic recovery following a natural disaster. This session will clarify what homeowners and business owners can expect from their earthquake insurance, what is included and excluded, and why. It will address what the challenges are to making earthquake insurance available and affordable, what motivates or deters homeowners and business owners from purchasing that insurance, and what is being done to improve market penetration.

Moderator: Paula Flowers

Speakers: Lenita Blasingame, NAIC New Madrid Working Group

Anselm Smolka, MunichRe

Candysse Miller, Executive Director, Insurance Information Network of California

Session D

Business Continuity Lessons Learned from Past Events: Hurricane Katrina, Kobe, Japan, Earthquake and Research Findings

What has made the difference between business survival and failure following a disaster? This session will include experiences of businesses affected by Hurricane Katrina and the Kobe, Japan earthquake, and research findings from major disasters across the country. It will explore how business continuity planning, involvement with disaster-resistant and resilient community initiatives, and the ability to adapt to a changed environment affect businesses' ability to survive, remain viable, and ultimately recover from a major disaster.

Moderator: Diana McClure

Speakers: Dana Eness, Stay Local! Program Coordinator, The Urban Conservancy

Tsutomu Shigemura, University of Kobe (invited)

Dan Alesch, Emeritus Professor, University of Wisconsin

Session E

Land Use Planning / Policy and Earthquakes 101

This session will help demystify the world of land use planning, policy and zoning as a tool for reducing loss of life and property from seismic events, highlighting the challenges and opportunities from academic and practitioners' perspectives.

Moderator: Andre LeDuc

Speakers: Kenneth Topping, Lecturer, Cal Poly University (Former Los Angeles Planning Director)

Timothy Beatley, Professor, Dept of Urban and Environmental Planning, University of Virginia

Thomas A. Birkland, Professor, Dept of Political Science and Public Administration, North Carolina State University

Session F
Scientific and Engineering Lessons from Past Earthquakes

This series builds on the plenary session, examining specific earthquakes and the lessons learned from them. We focus on both the scientific and engineering aspects of past earthquakes and related phenomena, and touch upon today's research and where it is heading.

Moderator: Stacy Bartoletti

Speakers: Shri Krishna Singh, National Autonomous University of Mexico

Gary Rogers, Geological Survey of Canada

Jim Malley, Senior Principal, Degenkolb Engineers

5:00 PM

Close

6:30 - 9:30 PM

Fee Event (Optional) - Boat Cruise to Blake Island. As participants, you will be driven from the conference center to Seattle's waterfront, board a large boat and cruise over the Seattle fault to Blake Island State Park. There you will dine in an authentic cedar longhouse while the Tillicum Village dancers present traditional Northwest Coast dances. (Cost \$100, guests are welcome).

Thursday, April 24, 2008 (Dealing with the Present)

7:00 AM

Registration / Open Breakfast Meetings

8:00 AM

Welcome

Speakers: Patti Sutch, Executive Director, WSSPC
Tim Lowenberg, Adjutant General, Washington State (invited)
Maria Cantwell, Washington Senator (invited)

8:30 AM

PLENARY 4: EARTHQUAKE HAZARDS IN THE U.S.

Earthquakes are a national problem, posing a significant risk to 75 million Americans in 39 states from Alaska to Maine. Planning for and responding to the risk requires understanding why, when, and where past earthquakes have occurred, the engineering issues they raise, and the processes that may govern future occurrences. The plenary focuses on understanding earthquake hazards nationwide, providing overviews of the geologic settings and processes and of the built environment they will affect.

Moderator: Jill McCarthy

Speakers: Mary Lou Zoback, Vice President, Risk Management Solutions

Speaker TBA

10:00 AM

Break -- 30 minutes

-
- 10:30 AM **PLENARY 5: NATIONAL EARTHQUAKE RISK - IMPACTS AND VULNERABILITIES**
Although most earthquakes are concentrated along the west coast of the United States, the earthquake risk in the U.S. (as measured by FEMA's Annualized Earthquake Loss Ratios comparing annualized earthquake loss to the national building stock) is a real threat in nearly every state. An earthquake occurring in the Midwest or Northeastern U.S., although it may occur less frequently than a west coast earthquake, could have similar devastating effects on the economy. This plenary focuses on conveying the national earthquake risk, social and economic impacts, and vulnerabilities.
Moderator: Ron Eguchi
Speakers: Eric Berman, DHS/FEMA, HAZUS99 Estimated Annualized Earthquake Loss for the United States 366 update.
Susan Cutter, Director, Hazards & Vulnerability Research Institute, University of South Carolina
- 12:00 PM **Lunch: National Awards in Excellence and "Disaster resilient businesses within disaster resilient communities: a case study of EPICC"**
Are businesses and industries in your community prepared and ready to cope with a disaster? Surviving the "Big One" is just as important for businesses as it is for communities. Emergency Preparedness for Industry and Commerce Council of British Columbia (EPICC) is a nonprofit government-endorsed society supported by, and for the benefit of, businesses and institutions throughout British Columbia to influence and help businesses prepare for emergencies and disasters. By forming partnerships with businesses, governments, and organizations such as the Cascadia Region Earthquake Workgroup and the Vancouver Board of Trade, EPICC strives to educate and motivate businesses and communities to endorse the principles of business continuity and emergency planning.
Presenters: Jim Stanton, President, Stanton and Associates
Jack Hayes, NIST
- 1:30 PM **PLENARY 6: EARTHQUAKE RISK MANAGEMENT FROM A FINANCIAL ACCOUNTABILITY VIEWPOINT**
There are many ways to manage financial risks created by earthquakes -- redundancy, hardening, insurance, take a chance and do nothing, or some combination of these. A panel of speakers will represent a financial accountability viewpoint from a variety of business types, and share how they currently manage their earthquake risk.
Moderator: Ines Pearce
Speakers: Jill Combs, VP, Asst. Risk Manager, Wells Fargo Bank
Joel Gaither, Property Insurance Manager, Weyerhaeuser
Rebecca McQuade, Director of Risk Management, Paccar
Steve Miller, Executive Vice President, PEMCO Insurance
- 3:00 PM **Break -- 45 minutes**

3:30 PM

Concurrent Workshops:

Session A

Tools of the Trade: ShakeMap, ShakeCast, PAGER, ENS, HAZUS, GIS, Scenarios, AGORA

Over the past two decades, a number of technologies have emerged that have greatly benefited earthquake response and hazard mitigation. Some of these tools are available to emergency managers in near real-time and provide critical information including earthquake magnitude, location, distribution of ground shaking and probable damage. Others provide estimates of dollar loss, casualties, displaced population, damage to critical facilities and other parameters for hazard mitigation, scenario development, and recovery. This session will feature both designers of these tools and their users.

Moderator: Jim Goltz

Speakers: Rich Eisner, Former Earthquake Manager, California Governor's Office of Emergency Services

Doug Bausch, Physical Scientist, DHS/FEMA Region VIII

Dave Wald, USGS

Keith A. Porter, Senior Researcher, Dept of Civil Engineering and Applied Mechanics, Caltech

Session B

Building Earthquake Science and Engineering into Codes and Policies

This breakout session will explore how the National Seismic Hazards Maps produced by the U.S. Geological Survey are used and integrated into the building codes, the differences between probabilistic and scenario hazard assessments, and the impacts the codes have from a state perspective.

Moderator: Mike Mahoney

Speakers: Mark Petersen, USGS

John Henry, International Code Council (invited)

Paula Flowers, Former Insurance Commissioner, Tennessee

Session C

Temporary Populations: Evacuation, Planning, Problems and Procedures

This session will examine the role of emergency management when dealing with transient populations and large scale special events such as the Olympics. The session will begin with how earthquakes affect the tourism industry, why tourists are "different" from a sociological perspective, and some of the best practices for dealing with this population. The following presentations will focus on large scale events and key points will include preparing for "worst-case" scenarios, the importance of developing strong leadership skills, and the need for excellent communications skills. The Salt Lake City Winter Olympics and upcoming 2010 Olympics will serve as a backdrop for discussions of the lessons learned and planning initiatives in the Vancouver area.

Moderator: Larry Pearce

Speakers: Mike Stever, Salt Lake City Emergency Manager

Peter Tarlow, President, Tourism & More Consulting

Kevin Wallinger, Provincial Emergency Program - British Columbia

Session D

Addressing Tsunami Risk

Emergency managers ask for increasing levels of certainty from different scientific fields to best determine tsunami hazard areas, the level of exposure to the public, and the most effective means to detect and warn for a potential tsunami. This session will connect state-of-the-art hazard assessment, vulnerability analysis, and warning methodology to improve public education and emergency decision-making.

Moderator: Jay Wilson

Speakers: George Priest, Oregon Dept of Geology and Mineral Industries

Nate Wood, USGS

Vasily Titov, NOAA/PMEL

Session E

Communicating Risk and Risk Reduction

Communicating risk and vulnerabilities is not easy. This session will focus on the communication from two different but interrelated perspectives. The first part will focus on strategies and tools for understanding and communicating vulnerabilities related to critical infrastructures and interdependencies to different audiences. The second part will examine how risk and vulnerability factors can be used to engage and encourage community initiatives to reduce the likelihood of hazardous events and their adverse impacts.

Moderator: Kathleen Tierney

Speakers: Laurie Pearce, University of British Columbia

Stephanie Chang, University of British Columbia

Session F

Turning Mitigation into an Economic Advantage

Mitigation is a choice for businesses, but those who have seen the value to protect their employees, property, and customers before disaster strikes are also seeing the economic advantage it provides. This could take the form of a better prepared workforce, employee or customer loyalty, reduction in post-disaster costs, and better resiliency. Every company customizes its solutions and choices to fit their specific business priorities and culture for long-term gains.

Moderator: Ines Pearce

Speakers: Contingency Planners and Recovery Managers (CPARM) business representatives

W. Kent Lim, National Economic Development Representative, U.S. Department of Commerce (invited)

5:00 PM Close

7:00 PM LEARNING FROM THE DECEMBER 2004 TSUNAMI

A panel of practitioners from impacted countries will discuss the steps taken toward recovery and making their countries more resilient. This plenary session will permit representatives from impacted countries to participate remotely. Questions will be received from Seattle based and virtual participants and translators will be available. The session is being held in the evening to allow for participation across the Indian Ocean and will be open to the general public.

Moderator: George Crawford

Friday, April 25, 2008 (Future Directions)

- 7:00 AM **Registration / Open Breakfast Meetings**
- 8:00 AM **Welcome**
Speakers: Ed Fratto, Northeast States Emergency Consortium
Director of King County Emergency Management (invited)
Ron Sims, King County Executive (invited)
- 8:45 AM **PLENARY 7: OVERVIEW OF RESILIENCY -- A Working Goal**
This session will provide an overview of the latest in research and knowledge on community resiliency; showcasing the latest thinking on how to create a groundswell for change in communities, influencing policy makers, facilitating and activating change in local communities, regions, countries, and new approaches.
Moderator: Andre LeDuc
Speakers: Kathleen Tierney, Director, Natural Hazards Center, University of Colorado, Boulder
David Maurstad, Assistant Administrator of Mitigation, DHS/FEMA (invited)
Stephen Flynn, Council on Foreign Relations (invited)
- 10:00 AM **Break -- 45 minutes**
- 10:45 AM **PLENARY 8: BUILDING COMMUNITY RESILIENCE -- Applications of Resiliency**
This plenary highlights applied, on-the-ground initiatives that are succeeding in making communities more disaster-resilient. Initiatives to be covered range from business preparedness and recovery, to downtown and neighbor retrofit programs, to a statewide partnership for pre-disaster mitigation.
Moderator: Diana McClure
Speakers: Andre LeDuc, Oregon Natural Hazards Workgroup, University of Oregon
Clair Clark, City of San Luis Obispo (invited)
William Matthews, Resilient Communities Project, Canadian Red Cross
- 12:00 PM **Lunch:** An open discussion of the future directions and setting the stage for the New Madrid National Earthquake Conference in 2011 or 2012 through the use of hand-held polling devices.
Moderator: Jim Wilkinson

1:30 PM

Concurrent Workshops:

Session A

Establishing State Post-Earthquake Technical Clearinghouses

Many states have either not considered or not accomplished setting up a post-earthquake technical clearinghouse for the large influx of researchers who may visit their state after an earthquake. As data is being collected, how is the data captured by the state? The WSSPC model of how to establish a clearinghouse plan will be presented, followed by an example of an operational state plan and how the clearinghouse concept was adapted in Hurricane Katrina.

Moderator: Doug Bausch

Speakers: Gary Christenson, Utah Geological Survey

Craig dePolo, Nevada Bureau of Mines & Geology

John Pine, Director, Katrina Clearinghouse, University of Louisiana (invited)

Session B

Public/Private Partnerships for Economic Resiliency

Communities cannot survive a disaster unless the economy survives. Small to medium-sized businesses are the backbone of the American economy, but most do not plan for a major business interruption. Two available models will illustrate how to motivate business owners to develop plans, to recognize that their recovery is tied to community-wide disaster resistance and resilience, and to institutionalize business continuity planning into their business practices.

Speakers: Diana McClure, Institute for Business and Home Safety

Ines Pearce, Chief Executive, Pearce Global Partners

Session C

Creating and Using Earthquake Scenarios

Scenarios provide an opportunity to examine alternative futures and stimulate creative thinking about policies and programs. They make real what can be a remote risk, enabling policy makers and others to better understand and plan for the inevitable. Scenarios provide a vehicle to transfer knowledge from research to implementation, and transform current scientific and technical knowledge into socially beneficial uses. Currently earthquake scenarios are being developed in the central U.S., Southern California, and Cascadia.

Moderator: Susan Tubbesing

Speakers: Greg Hempen, VP and President-elect of the New Madrid Chapter of EERI

Matt Morrison, Executive Director, Pacific NorthWest Economic Region

Lucile Jones, Multi Hazards Coordinator, Southern California USGS

Session D

Cultural Implications of Earthquakes and Tsunamis

Major earthquakes and tsunamis have affected settled populations for thousands of years, but written history documents only a few of these events. This session will feature the oral history, legends, and myths of indigenous people through which these events have been passed from generation to generation and are available to us through the research and documentation of our panelists. We will also hear how these stories and the experiences they embody have been integrated into public information materials and planning activities among tribes of the Pacific Coast as well as the general population, and have both deepened and enriched our understanding of these hazards.

Moderator: Jim Goltz

Speakers: Ruth Ludwig, University of Washington
George Lankford, Lyon College Arkansas, The Tecumseh Prophecy
Viola Riebe, Hoh Tribe
Vicki Ozaki, Redwood National and State Parks

Session E

Motivating and Preparing the Next Generation

This student-led panel discussion will evaluate the effectiveness of the Conference with respect to motivating and educating students who may become tomorrow's leaders in the natural hazards science, engineering, policy, and preparedness fields. Results and suggestions for future Conferences will be summarized in the closing session. All meeting attendees are encouraged to participate and listen.

Coordinator: Arleen Hill

Speakers: Students who were offered scholarships to attend the conference.

Session F

Volcano Science, Hazard, and Risk

Volcanic Processes and the hazards they pose vary widely, from slow, localized emission of environmentally dangerous gases to violent eruptions that potentially alter the global climate. This session provides an overview of the richness of these processes, from a scientific perspective and from the view of those who assess, prepare for, and respond to them. Discussion of the challenges and strategies for meeting these hazards will follow the overviews.

Moderator: Marianne Guffanti

Speakers: Stephanie Prejean, USGS Alaska Volcano Observatory
Steve Malone, University of Washington
Steve Bailey, Director, Pierce County Dept of Emergency Management

3:00 PM

PLENARY 9: CLOSING EVENT

NEHRP Agency leads, joined by student and Canadian representatives, will lead a discussion concerning future directions of the earthquake community. Discussion will be driven by results from luncheon real-time survey, student observations, and insights by panelists. Conference attendees will express their concerns by voting on offered concerns as was done during lunch.

Moderator: Kathleen Tierney

Speakers: Kathleen Tierney (Moderator), University of Colorado

David Applegate, USGS

Ed Laatsch, DHS/FEMA

Joy Pauschke, NSF

Jack Hayes, NIST

Laurie Pearce, University of British Columbia

Student

4:45 PM

END OF CONFERENCE

Saturday, April 26, 2008 (Field Trips)

Field Trip 1

Field Trip to Tsunami Sites (Guide: Brian Atwater, USGS). Examine geologic evidence behind today's building codes and tsunami preparedness in the Cascadia region. Board a bus at the Westin at 6:00 a.m. sharp for a 2.5-hour drive to the southwest Washington coast. Continue by canoe, riding an ebb tide down a sluggish tidal stream tributary to a coastal bay. Examine muddy creek banks exposed at low tide. (Cost: \$100, includes bus ride, lunch, waterproof clothing and canoe rental).

Field Trip 2

Field trip to UW Seismic Lab (Guide: Bill Steele, Director of Seismology Lab). Tour the University of Washington Seismology Lab and Campus. Meet in the Westin lobby at 9 a.m.

Field Trip 3

Tour of Seattle Fault (Guide: Tim Walsh, Geologist, Washington DNR). This tour will begin 9:00 a.m. from the Seattle Ferry Terminal. Participants will ride the Ferry over the Seattle Fault and view escarpments from the Ferry's top deck. (Cost: Ferry ticket purchased at the Ferry Terminal).

Field Trip 4

Tour of Seismic Retrofit Projects (Guide: Cale Ash, Chair, Structural Engineers Association of Washington Young Members Forum). This tour will leave the hotel at 9:00 a.m. and return by noon. Participants will walk and ride the Seattle light rail (if completed) through both older and new downtown commercial districts comparing the impact of existing codes and retrofitting measures on the Seattle cityscape as well as viewing damage from the 2001 Nisqually Earthquake. (Cost: Light Rail Ticket).

Field Trip 5

Visit to Washington State Emergency Operation Center (Guide: George Crawford, Washington EMD). Tour the Washington Military Department, Emergency Management Division's two-story, 28,000 square-foot Emergency Operations Center. The Building was designed to survive and be operational during and following a major earthquake with a steel-braced and framed building and a base-isolation foundation that acts as a shock absorber. With its own emergency power and auxiliary communications systems, the facility is a showcase for preparedness and hazard mitigation. The \$50 cost will cover transportation to the EOC and lunch. Tour will leave hotel at 9:30 a.m. and return by 2:00 p.m.

Field Trip 6

Visit to an Active Trench (Guide: Brian Sherrod). Participants will be picked up at the hotel and be driven to a site (or sites) to review Puget Sound earthquake hazards. If available, we will visit an active fault excavation and discuss the potential hazards. Alternative sites will examine evidence for past activity along the Seattle fault zone. Bus will leave the hotel at 8:30 and return at 11:30. (Cost: \$25).

History of WSSPC Policy Recommendations

Key A=Adopted, R=Re-adopted,
 D=Deleted, N=Not Adopted

Adopted	Title	1997	1998	1999	2000	2001	2002
PR 06-1	Developing Earthquake Risk Reduction Strategies						
PR 05-1	Improving Tsunami Warning, Preparedness, and Mitigation Procedures for Distant and Local Sources			A 99-1	>>>>>	>>>>>	R 02-1
PR 05-2	Active Fault Definition for the Basin and Range Province	A 97-1	>>>>>	>>>>>	>>>>>	>>>>>	R 02-3
PR 05-3	Real-Time Earthquake Monitoring Networks	A 97-4	>>>>>	>>>>>	>>>>>	>>>>>	R 02-5
PR 04-1 & PR 04-2	Rapid Tsunami Identification and Evacuation Notification					A 01-1 & 01-2	>>>>>
PR 04-3	Post-Earthquake Technical Clearinghouses					A 01-3	>>>>>
PR 04-4	Seismic Provisions in the International Building Code					A 01-4	>>>>>
PR 04-5	Basin and Range Province Earthquake Working Group(s)						
PR 07-6	Post-Earthquake Information Management System						
PR 04-6	Priorities for Applied Research on Earthquake Hazards						
PR 04-7	Supporting Non-technical Explanation of USGS Uncertainty Maps to Accompany Probabilistic Seismic Hazard Maps						
D	Development of National Earthquake Hazard Risk Mitigation Priorities	A 97-3	>>>>>	>>>>>	>>>>>	>>>>>	D
D	Developing Guidelines for Fault Trace Setbacks	A 97-2	>>>>>	>>>>>	>>>>>	>>>>>	R 02-4
D	Building Safe and Strong to Reduce Vulnerability to Earthquakes through Partnerships and Code Adoption						A 02-2
Proposed	To Reduce the Earthquake Vulnerability of Existing Public Buildings and Schools						
Proposed	Generic State Executive Order for Earthquake Safety for Existing State-Owned Buildings						

History of WSSPC Policy Recommendations

Key A=Adopted, R=Re-adopted,
D=Deleted, N=Not Adopted

Adopted	Title	2003	2004	2005	2006	2007	2008
PR 06-1	Developing Earthquake Risk Reduction Strategies	A 03-1	>>>>>	>>>>>	R 06-1	>>>>>	>>>>>
PR 05-1	Improving Tsunami Warning, Preparedness, and Mitigation Procedures for Distant and Local Sources	>>>>>	>>>>>	R 05-1	>>>>>	>>>>>	
PR 05-2	Active Fault Definition for the Basin and Range Province	>>>>>	>>>>>	R 05-2	>>>>>	>>>>>	
PR 05-3	Real-Time Earthquake Monitoring Networks	>>>>>	>>>>>	R 05-3	>>>>>	>>>>>	
PR 04-1 & PR 04-2	Rapid Tsunami Identification and Evacuation Notification	>>>>>	R 04-1 & 04-2	>>>>>	>>>>>	R 07-1 & 07-2	
PR 04-3	Post-Earthquake Technical Clearinghouses	>>>>>	R 04-3	>>>>>	>>>>>	R 07-3	
PR 04-4	Seismic Provisions in the International Building Code	>>>>>	R 04-4	>>>>>	>>>>>	R 07-4	
PR 04-5	Basin and Range Province Earthquake Working Group(s)	A 04-5	>>>>>	>>>>>	>>>>>	R 07-5	
PR 07-6	Post-Earthquake Information Management System					A 07-6	
PR 04-6	Priorities for Applied Research on Earthquake Hazards	A 04-6	>>>>>	>>>>>	>>>>>	D?	
PR 04-7	Supporting Non-technical Explanation of USGS Uncertainty Maps to Accompany Probabilistic Seismic Hazard Maps	A 04-7	>>>>>	>>>>>	>>>>>	D?	
D	Development of National Earthquake Hazard Risk Mitigation Priorities						
D	Developing Guidelines for Fault Trace Setbacks	>>>>>	>>>>>	D			
D	Building Safe and Strong to Reduce Vulnerability to Earthquakes through Partnerships and Code Adoption	>>>>>	>>>>>	D			
Proposed	To Reduce the Earthquake Vulnerability of Existing Public Buildings and Schools		N				
Proposed	Generic State Executive Order for Earthquake Safety for Existing State-Owned Buildings			N			

WESTERN STATES SEISMIC POLICY COUNCIL
DRAFT POLICY RECOMMENDATIONS 07-1 and 07-2

Rapid Tsunami Identification and Evacuation Notification

DRAFT Policy Recommendation 07-1

Promote the development of tsunami evacuation and re-entry notification systems, supplemented with an education campaign, that insure all populated coastal areas in the WSSPC coastal states, territories and provinces are guided by at least one type of system, appropriate to local conditions.

DRAFT Policy Recommendation 07-2

WSSPC recommends the implementation of modern technological systems that rapidly identify the tsunami potential generated from a local earthquake and that immediately alert locally responsible emergency operations personnel about coastal areas likely to be affected by a tsunami. Information provided by these systems would augment any area evacuation decisions based on ground shaking.

Background

Tsunamis have caused considerable damage and casualties to populated areas in the Pacific region over the last 100 years. Tsunamis usually are created by the rapid uplift of the sea floor during subduction zone earthquakes. Tsunamis not only affect nearby coastlines within a few minutes following an earthquake, but they travel long distances and impact distant shorelines within a few hours.

Where nearby coastlines are affected, the public is instructed to move away from the shoreline and to high ground whenever strong ground shaking is felt, or in some cases, when any ground shaking is felt. People would only return to low lying coastal areas following receipt of an official all clear message. Whether the tsunami is generated from a distant source or from a local source, effective notification of the public is paramount.

Permanent residents and tourists are found in a variety of geographical locations and structures along the shoreline. Therefore, the use of redundant warning systems (such as radio broadcasts and outdoor sirens on beaches) would increase the immediacy and the coverage of the evacuation

notification. Only with multiple systems can the best and most immediate coverage be obtained, thereby potentially minimizing the number of injuries and loss of life from the tsunami.

In some instances, ground shaking may be a precursor, and an “early warning”, to the hazard of a tsunami. Coastal communities that are known to be vulnerable to the hazards of a tsunami should be prepared to evacuate for higher ground when ground shaking is experienced. Because few earthquakes cause tsunamis, a tsunami warning system should also be able to determine if evacuation activities are necessary as quickly as possible. Unnecessary evacuations are costly not only in terms of lost commerce, but in the public's negative reaction to the next earthquake experienced on the coast. The warning system should include: 1) earthquake and tsunami detection by a modern seismic network and Tsunami Warning Centers, respectively; 2) tsunami warning transmissions from the Tsunami Warning Centers to state emergency operations personnel; and, 3) direct notification to the coastal inhabitants, through the use of broadcast media, to initiate emergency response plans.

Facilitation and Communication

1. Encourage representatives from state agencies and state lobbyists to use Policy Recommendation 07-1 in efforts with their legislative delegations to develop rapid, multiple tsunami education and notification systems in their respective states, territories and provinces. This includes promoting tsunami task forces or similar groups, soliciting local government support, and requesting funds. In addition, education and evacuation planning are critical components of overall tsunami risk reduction and, therefore, should be promoted along with tsunami notification systems.

2. Forward Policy Recommendation 07-2 to the National Oceanic and Atmospheric Administration (NOAA), National Aeronautics and Space Administration, United States Geological Survey, and other organizations as appropriate, for their budget and technical support.

Assessment

The assessment of these policies can be measured by: 1) the adoption of tsunami hazard policies at state, territorial and provincial, as well as local governments on tsunami warning dissemination and evacuation; 2) comprehensiveness of notification systems adopted by state, territorial, provincial and local jurisdictions; 3) Public Law 109-424 that requires improvement in tsunami detection, forecasting, warning, notification, outreach, and mitigation in tsunami communities; 4) number of TsunamiReady™ Communities designated by the National Weather Service; and 5) number of public education workshops and surveys completed in at-risk tsunami communities.

History

Policy Recommendations 07-1 and 07-2 were first adopted as Policy Recommendations 01-1 and 01-2. PR 01-1 was revised and adopted as PR 04-1 by unanimous vote of the WSSPC membership at the Annual Business meeting September 30, 2004. PR 01-2 was re-adopted as PR 04-2 by unanimous vote of the WSSPC membership at the Annual Business meeting September 30, 2004.

WESTERN STATES SEISMIC POLICY COUNCIL
DRAFT POLICY RECOMMENDATION 07-3

Post-Earthquake Technical Clearinghouses

DRAFT Policy Recommendation 07-3

WSSPC recommends that each member state, province, and territory establish a plan for a post-earthquake technical clearinghouse to be activated within 24 hours after each major earthquake within its jurisdiction.

Background

Post-earthquake technical clearinghouses have been an important component of emergency response, recovery, and mitigation following large earthquakes. Seismologists deploy instruments that measure aftershocks and investigate the mechanics of earthquakes. Geologists and geotechnical engineers document ground failures, including fault displacements, fissures, landslides, rock falls, and liquefaction. Geodesists investigate ground deformation and related strain. Structural engineers evaluate the effects of the earthquake on various types of buildings, bridges, dams, utilities, and other structures. Social scientists study direct and indirect impacts to people and businesses. This information is then used to improve our assessments of earthquake hazards, earthquake engineering, mitigation strategies for nonstructural hazards, and emergency response to damaging earthquakes.

The data collected in the days immediately following a major earthquake can be critical during emergency response and recovery. Scientists and engineers can determine the likelihood that landslides will move (from rain or aftershocks), and can assess the susceptibility of structures to collapse. Some data are perishable and must be collected as soon as possible, before erosion or bulldozers eliminate the evidence or before aftershocks die out.

Data collected through clearinghouses help us to be better prepared for future large earthquakes. In addition, data on strong ground motion and damage to buildings helps to calibrate loss-estimation models. The Federal Emergency Management Agency's (FEMA) HAZUS, can be an important component of a Governor's or the President's disaster declaration as well as provide useful information for response, recovery and hazard mitigation.

A technical clearinghouse can serve to coordinate post-earthquake investigations and to share resources and information among investigators. The clearinghouse also serves to integrate and disseminate information so that it is available to decision makers.

Post-earthquake technical clearinghouses were successfully implemented following the Landers, California (1992); Northridge, California (1994); and Nisqually, Washington (2001) earthquakes. A clearinghouse provides a place for scientists and engineers to report on their findings each day. In some post-earthquake situations, a clearinghouse may serve as one of the chief mechanisms for relaying critical information from scientists and engineers investigating the earthquake to emergency managers.

Only California, Utah, and Nevada have developed plans for post-earthquake technical clearinghouses. Few WSSPC members have the resources to fully staff and operate a clearinghouse. Opportunities exist for members to collaborate with one another and to coordinate with the U. S. Geological Survey (USGS), FEMA, Earthquake Engineering Research Institute (EERI), university researchers, and other groups. The National Earthquake Hazards Reduction Program (NEHRP) agencies (USGS, FEMA, National Institute for Standards and Technology, and National Science Foundation) developed *The Plan to Coordinate Post-Earthquake Investigations* in 2003 (USGS Circular 1242) that includes provisions for cooperating with states to establish post-earthquake technical clearinghouses. Under this plan, the NEHRP agencies can step in and take the lead if WSSPC members are not prepared to establish a clearinghouse.

Facilitation and Communication

WSSPC recommends that its members establish a plan for a post-earthquake technical clearinghouse to be activated within 24 hours after a major earthquake within its jurisdiction. WSSPC further encourages its members to form MOAs to facilitate the operation of clearinghouses, including sending employees from one jurisdiction to another to assist in collection of field data and in staffing a clearinghouse. WSSPC will construct a roster of experts who are willing to participate and disseminate information on clearinghouses that are established after an earthquake.

The NEHRP agencies' post-earthquake investigations plan specifies coordination with states to operate clearinghouses. WSSPC members should develop MOAs with NEHRP agencies to facilitate clearinghouse staffing and operations, and to specify whether a member wishes the

NEHRP agencies to take responsibility for establishing a clearinghouse. These MOAs could include triggers, such as USGS or EERI deployment only if moment magnitude exceeds certain values for an urban epicenter or for a rural earthquake. WSSPC members may wish to activate clearinghouses at lower triggers for purposes of training or when sufficient resources exist to respond to the earthquake. Any MOA should recognize the considerable role and interest of FEMA in post-earthquake technical clearinghouses.

To achieve the above goals, WSSPC will establish a Post-Earthquake Technical Clearinghouse Committee (PTCC) to update the WSSPC model post-earthquake technical clearinghouse plan, and to develop model MOAs for use among members and between members and NEHRP agencies for post-earthquake technical clearinghouse operation and assistance. PTCC should conduct workshops and use other means to help members establish individual post-earthquake technical clearinghouse plans and implement clearinghouse MOAs.

WSSPC recommends that the USGS provide mirrored or parallel access to its post-earthquake website. One ultra-high volume portal should be available to the general public. A second, password-protected site should be maintained. State emergency management agencies, state geological surveys, state seismic safety commissions and councils, earthquake consortia, university seismological laboratories and engineering-research centers, and the press should have access to the password-protected site.

WSSPC recommends that emergency response and recovery plans incorporate and refer to post-earthquake technical clearinghouse plans. There should be links between the technical clearinghouse and emergency management operations. Because the clearinghouse can provide vital information during emergency response and recovery, FEMA should work with emergency managers to assure that appropriate federal funding and FEMA staff support are provided for the clearinghouse, whenever a clearinghouse is established following an earthquake.

Once members have established post-earthquake technical clearinghouse plans, WSSPC recommends that they hold regular training sessions and exercises to ensure readiness and compatibility with other emergency response functions. WSSPC also recommends that those responsible for mobilizing post-earthquake clearinghouses participate in large-scale earthquake exercises sponsored by states or local jurisdictions to test procedures that link research activities with emergency operations centers.

Funding will be required to pay travel to update WSSPC's model post-earthquake technical clearinghouse plan, prepare model MOAs, and hold workshops. WSSPC and the PTCC should take the lead in developing a proposal to acquire the necessary funding if work cannot be performed at WSSPC annual meetings and by electronic means.

Assessment

Measures of the success of this Policy Recommendation will be (1) the number of additional WSSPC members that develop post-earthquake technical clearinghouse plans, and (2) the number of MOAs established to facilitate clearinghouse operation. A periodic assessment should be made to determine the number of functioning clearinghouse plans and supporting MOAs. WSSPC will periodically update its model post-earthquake technical clearinghouse plan, and will post this and individual member plans on the WSSPC website.

History

Policy Recommendation 07-3 was first adopted as Policy Recommendation 01-3 by unanimous vote of the WSSPC membership at the Annual Business meeting October 24, 2001. PR 01-3 was revised and re-adopted as PR 04-3 by unanimous vote of the WSSPC membership at the Annual Business meeting September 30, 2004.

WESTERN STATES SEISMIC POLICY COUNCIL
DRAFT POLICY RECOMMENDATION 07-4

Seismic Provisions in the International Building Code

DRAFT Policy Recommendation 07-4

WSSPC endorses the prompt adoption and enforcement by states, territories, provinces and/or local jurisdictions of the seismic provisions of the *International Existing Building Code*, the *International Building Code*, and the *International Residential Code*. WSSPC also encourages Code organizations to continue the development and refinement of building codes to include National Earthquake Hazards Reduction Program (NEHRP) provisions with a specific focus on purpose, education, incentives, lifelines and the business/industry and homeowner sectors.

Background

Policy Session Number 5 (Earthquake Building Codes in the 21st Century) of the National Earthquake Risk Management Conference in Seattle, Washington (September 2000) generated considerable discussion and resulted in a number of recorded points from the audience. A process to compile the comments into grouping and distilling actions resulted in a potential arena for a WSSPC Policy Statement relative to “codes”. A consensus at the Conference from the presenters and the structured audience participation concluded that adoption by local jurisdictions of the 2000 *International Building Code* and the *International Residential Code* should be the first order of business. Some states, and many jurisdictions, have not adopted the *International Building Code*, potentially leaving their citizens at continued risk. States should be encouraged to remove obstacles which hinder adoptions, and to motivate local jurisdictions to diligently update existing codes. It is recognized that some jurisdictions which have adopted the International Codes have drastically modified or omitted the seismic provisions in the Codes. This action not only jeopardizes their structures by not providing for earthquake resistant structures, but provides a false sense of security to their communities. Once adopted, the Codes must be uniformly and consistently enforced if they are to be effective. This will necessitate the training of building inspectors to some required standards for certification. Partnerships with the homeowners, residents, builders, insurers, owners, elected officials, scientific groups, etc., with focused concerns on lifelines and public safety will be required to overcome the inertia of commitment to meet the desired outcomes.

Facilitation and Communication

Incentive measures will need to be developed that involve federal, state, territorial, provincial and local funding to “encourage” adoption of building codes that recognize local natural hazards caused by earthquakes. Education of the public on the need and purpose for codes must work towards a mindset to mitigate damage from earthquakes before they happen. Local building code inspectors will require training and certification in the new codes.

Assessment

A measure of the acceptance of this policy recommendation is the number of states, provinces, territories and local jurisdictions that have adopted seismic provisions that meet or exceed the seismic provisions in the *International Building Code*, *International Residential Code* and *International Existing Building Code*.

History

Policy Recommendation 07-4 was first adopted as Policy Recommendation 01-4. PR 01-4 was revised and redesigned as 04-4 and re-adopted by unanimous vote of the WSSPC membership at the Annual Business Meeting September 30, 2004.

WESTERN STATES SEISMIC POLICY COUNCIL
DRAFT POLICY RECOMMENDATION 07-5

Basin and Range Province Earthquake Working Group(s)

DRAFT Policy Recommendation 07-5

WSSPC recommends convening a technical Basin and Range Province Earthquake Working Group(s) (BRPEWG) to meet with experts from Basin and Range Province (BRP) states to arrive at consensus average recurrence intervals (RI) and slip rates (SR) with related uncertainties for faults with sufficient paleoseismic trenching data. Best available RI and SR values with appropriate uncertainties are critical to U.S. Geological Survey (USGS) seismic-hazard evaluations and for determining which faults should be included on the National Seismic Hazard Maps (NSHMs). The BRPEWG(s) should be convened under the auspices of the USGS NSHM project.

Background

With release of the Quaternary fault and fold database of the U.S. by the USGS, based in part on completion of databases by states, the need arises to look critically at existing paleoseismic-trench data, and where the data permit, develop consensus regarding appropriate average RI and SR values and related uncertainties for faults in each state.

Only two BRP states (California and Utah) have completed comprehensive reviews of their paleoseismic trenching data to determine consensus RI and SR values, and the process is currently underway in a third state (Nevada). In most instances, currently available RI and SR values are the result of individual studies performed over a period of decades by a variety of investigators with varying levels of experience and resources. Older studies lack the advantage of recent advances in paleoseismic techniques, particularly refinements in sampling strategies and dating technologies. Consequently, available RI and SR values are not all of equal reliability, and often uncertainties associated with those data are either poorly defined or not reported.

Achieving consensus on complex technical issues requires a process of inquiry, discussion, and agreement. Technical working groups have successfully reached consensus in many instances, including the Working Groups on California Earthquake Probabilities, the Utah Quaternary Fault Parameters Working Group, and various Utah geologic-hazards-mapping working groups. A

previously convened BRPEWG successfully brought together scientists to identify issues, discuss evidence, and define strategies for resolving issues regarding fault behavior in the BRP important to the next update of the NSHMs.

Facilitation and Communication

WSSPC recommends that individual BRP states identify the faults for which sufficient paleoseismic trenching data are available to develop average RI and SR values and related uncertainties. The national Quaternary fault and fold database and state Quaternary fault databases form the basis for identifying these faults. Once identified, the BRPEWG(s) can meet with appropriate state experts to arrive at consensus RI and SR values as has already been done in California and Utah. Where consensus can be achieved, the BRPEWG can make recommendations for the USGS to consider in future updates of the NSHMs. Where consensus is not yet possible, an interim recommendation can be made for consideration in the NSHMs, and a research program outlined to resolve the issues so that consensus can ultimately be reached. Thus, a principal product of the process will be a list of priorities for future studies needed to achieve consensus that can provide support for the USGS in setting priorities both for internal studies and for the National Earthquake Hazard Reduction Program (NEHRP) External Grants program.

Funding will be required to pay travel and some salary expenses to hold workshops and to prepare reports. The WSSPC Basin and Range Committee, BRP state geological surveys, or other organizing entity should take the lead in developing a proposal to acquire funding. The BRPEWG(s) will serve only for the time it takes to complete their work, and then will be disbanded until additional information becomes available for consideration.

Given the importance of RI and SR data to the NSHMs, the completion of such reviews is critical in all WSSPC BRP states. WSSPC should work with the USGS to encourage such work by giving it a priority in the annual NEHRP Request for Proposals to help provide necessary funding. Other potential funding sources include the Federal Emergency Management Agency and internal funding from individual BRP states.

Assessment

The success of this Policy Recommendation can be assessed based on: (1) the number of states that empanel a BRPEWG to develop consensus RI and SR values, (2) the use of the resulting consensus RI and SR values by the USGS in future updates of the NSHMs, and by states and local governments in regulations and ordinances, and (3) the presentation of BRPEWG results to state emergency managers to ensure that the results reach the general public in a timely manner. A periodic assessment should be made to determine the extent to which the consensus RI and SR values are being incorporated into the NSHMs; individual probabilistic seismic hazard analyses; and state and local seismic-hazard rules, regulations, and guidelines.

History

Policy Recommendation 07-5 was first adopted as Policy Recommendations 04-5 by unanimous vote of the WSSPC membership at the Annual Business meeting September 30, 2004.

WESTERN STATES SEISMIC POLICY COUNCIL
DRAFT POLICY RECOMMENDATION 07-6

Post-Earthquake Information Management System

DRAFT Policy Recommendation 07-6

WSSPC supports the development of a national Post-Earthquake Information Management System. The Management System would provide permanent archiving of essential data related to the performance of the built environment in earthquakes within the United States, and could be combined with similar systems to assemble and archive data from other natural hazards events.

Background

Future improvements in the ability to engineer and construct buildings and other structures and infrastructure systems that can perform as needed in strong earthquakes depends on knowing about the performance resulting from current and past design and construction practices. No mechanisms are in place to systematically collect and archive these performance data for future use. Technical clearinghouses provide a means to assemble damage data reports that provide decision support for emergency management operations immediately following a significant event; however, much of that data is incompletely documented and becomes essentially lost soon thereafter. Data collected through post-earthquake technical clearinghouses (see WSSPC **DRAFT** Policy Recommendation 07-3) and activities such as those sponsored by the Earthquake Engineering Research Institute (EERI) can help us to be better prepared for future earthquakes – if the data are adequately documented, securely archived, and identified in a manner to make them available for use decades into the future.

The Management System data archive would contain technical information collected by post-earthquake clearinghouses as well as other information related to the particular event. The Post-Earthquake Information Management System would be consistent with the recommendations in National Earthquake Hazards Reduction Program (NEHRP) Plan to Coordinate Post-Earthquake Investigations (USGS Circular 1242):

“It is critical to develop strategies for the formal and systematic archiving of data collected during post-earthquake investigations. These data, which focus on the natural, built, and socioeconomic environments, address a wide variety of phenomena. The data are voluminous and are acquired in

many forms (for example, digital recordings, digital images, clipboard survey sheets, photographs, and narratives). If not organized and archived soon after an earthquake event, these data are often lost. No mechanism currently exists either to archive these data or to make them readily accessible to the research community. Because of this failure to adequately document, preserve, and access data, an enormous volume of highly relevant data has been effectively lost.”

Facilitation and Communication

Adequate funding is necessary to establish this data collection guidance, and WSSPC supports use of federal funding, through NEHRP and/or the Stafford Act to support these activities for significant events. Earthquake clearinghouses may be established through specific mission assignments under the Stafford Act or through individual state authorizations.

WSSPC supports the development of a pilot or demonstration Post-Earthquake Information Management System project as soon as possible. This pilot could use data previously collected from a recent disaster, and would serve as a model to facilitate the implementation of a more general Management System following the next earthquake disaster.

WSSPC members are encouraged to develop public and private partnerships and Memoranda of Understanding with owners and regulators for the purpose of assuring that earthquake performance and damage information would be collected and made available for future use. These partnerships would identify critical data gaps and work to develop data collection strategies to fill those gaps in the aftermath of a significant event. These memoranda will need to address such issues as the need for inventory information, restrictions on facility access, security of confidential or sensitive data, etc.

WSSPC encourages its members to support operation of a standardized national Post-Earthquake Information Management System. Members are encouraged to coordinate their data post-earthquake collection and clearing house activities with the national Management System, and provide collected data and information to the post-earthquake data archive that is a component of the Management System. A key element in the Management System is standards for the specification of the types and formats of information necessary to be collected to ensure a thorough and accurate documentation of performance of the built environment during the earthquake.

Assessment

Measures of the success of this policy will be (1) the annual communication of WSSPC members' support to NEHRP (and to other federal agencies as appropriate) for the establishment of a national Post-Earthquake Information Management System, (2) written support for the establishment of a pilot or demonstration Post-Earthquake Information Management System as developed by the American Lifelines Alliance or some other entity, and (3) preparation of an annual summary of WSSPC members' state-level progress in establishing in their jurisdictions one or more local or regional partnerships and agreements for the purpose of assuring the collection of post-earthquake performance and damage information for long-term use. This assessment procedure assumes that the success of the policy may take many years to accomplish.

History

[This section will be added upon approval of the Policy Recommendation by the WSSPC membership.]

WESTERN STATES SEISMIC POLICY COUNCIL POLICY RECOMMENDATION 04-6

Priorities for Applied Research on Earthquake Hazards

Policy Recommendation 04-6

Projects supported by the National Earthquake Hazards Reduction Program through the U.S. Geological Survey should focus on work that has significant impact on the reduction of earthquake risks in the near to mid term.

Background

WSSPC has been a strong supporter of the National Earthquake Hazards Reduction Program and the work done by the Federal Emergency Management Agency, National Institute of Standards and Technology, National Science Foundation, and U.S. Geological Survey (USGS), each of which have major roles in reducing risks from earthquakes. Key components of the U.S. Geological Survey's efforts are monitoring of earthquakes and their effects, assessing earthquake hazards throughout the country, determining why earthquakes occur where and when they do, and communicating the results of applied research to the public and policy makers. The USGS's scientific work has direct societal applications in the near term (up to five years) and mid term (up to ten years), whereas the earthquake-related fundamental research funded by the National Science Foundation has more likelihood of yielding direct benefits in the longer term.

WSSPC has expressed its support for the USGS's initiative to develop the Advanced National Seismic System through Policy Recommendation 02-5 (revised from 97-4). This system, as envisioned with funding at the fully authorized level, will greatly improve the ability to monitor earthquakes, measure effects of earthquakes on buildings, and provide information to aid in the assessment of earthquake hazards and in the basic understanding of earthquake processes. The system will also provide vital information for emergency response and recovery. Funding has been far short of that needed for full deployment of the system.

The USGS has made excellent progress in evaluating earthquake hazards, including creation of the Quaternary Fault and Fold Database of the United States and related probabilistic seismic hazard analysis, which is a currently a key element in building codes and insurance considerations. Much more work needs to be done, particularly on those factors that are uncertain and may significantly change the seismic hazard analysis, which the USGS periodically

updates as part of the building-code adoption process. Among these factors are identification of previously unknown seismic sources (potentially active faults and folds); resolution of discrepancies between geodetic, geologic, and historical or instrumental seismic observations; and uncertainties regarding local effects, such as attenuation in opposing fault blocks and in different tectonic environments, near-surface shaking characteristics (soil conditions, liquefaction potential, lateral spreading), ruptures (fault displacements and fissuring), directivity (effects in different directions from the hypocenter of the earthquake), and effects related to the thickness, structure, and geometry of sedimentary basins in which many towns and cities are built.

Facilitation and Communication

WSSPC should communicate this policy recommendation, background, and implementation plan to the Director of the USGS and to the Chair of the Scientific Earthquake Studies Advisory Committee. WSSPC should follow up through dialog with the USGS to evaluate how well the specific recommendations in this implementation plan have been incorporated into the USGS's strategic plan for its Earthquake Hazards Program and what progress has been made. WSSPC periodically should revisit the specific recommendations listed below and consider revising them as science progresses.

Funding constraints have limited the USGS's ability to maintain expertise in all areas of earthquake science, develop and apply new technologies, and expand into new areas of science that may be relevant to earthquake risk reduction. In an effort to better cover these bases, the USGS has developed a competitive external grants program and established an external Scientific Earthquake Studies Advisory Committee. WSSPC feels that such external help and advice is vital to the USGS's ability to address top priorities by engaging the expertise of the external science community. WSSPC feels that the top priority for the USGS's Earthquake Hazards Program should be growth of the external grants program.

Because funding has been insufficient to do all the applied research that is needed to ensure that earthquake hazards are characterized to a minimally acceptable level, priorities need to be established for the expenditures of funds that are available. WSSPC has identified the following topical research areas that have the potential to significantly reduce risks from earthquakes in the near term and mid term.

- Mapping of earthquake hazards (locations of faults, ground-shaking potential deduced from the three-dimensional geologic framework combined with measurements of near-surface shear-wave velocity and basin effects, liquefaction, and landslides).
- Evaluation of the effects of basin geometry and structure on ground shaking.
- Improvement of ground-motion models, including attenuation relations, near-field effects in different tectonic regimes, directivity of ground shaking, and innovative approaches to measuring effects of past earthquakes, such as studies of precarious rocks.
- Evaluation of relations between earthquake magnitude and multiple parameters, including length and area of fault ruptures and complexity of fault displacements in single earthquakes.
- Analysis of the causes of geodetic signals, including both transient and apparently constant changes seen in observations made with the global positioning system and interferometric synthetic aperture radar, and discrepancies with seismic and geologic observations.

WSSPC feels that these should be considered as key areas for funding within both the internal and external programs of the USGS. The USGS should engage the Scientific Earthquake Studies Advisory Committee and working groups composed of internal and external experts to further set priorities among these areas.

Assessment

History

Policy Recommendation 04-6 was first adopted as Policy Recommendation 04-6 by unanimous vote of the WSSPC membership at the Annual Business Meeting September 30, 2004.

**WESTERN STATES SEISMIC POLICY COUNCIL
POLICY RECOMMENDATION 04-7**

**Supporting Non-technical Explanation of USGS Uncertainty Maps to
Accompany Probabilistic Seismic Hazard Maps**

Policy Recommendation 04-7

WSSPC encourages the USGS to provide, in addition to the uncertainty maps, a narrative that characterizes the uncertainties; explains non-technically how that uncertainty affects interpretation of the probabilistic hazard map, and explains why maps change from version to version.

Background

WSSPC supports the continuing attempts of the United States Geological Survey (USGS) to refine the seismic hazards mapping of the western United States. Recognizing that probabilistic seismic hazard maps are evolutionary and that the impacts of change affect a broad public of emergency managers, building officials, real estate and lending institutions as well as scientists and engineers, WSSPC applauds the USGS' intent to release uncertainty maps in conjunction with its new hazard maps.

Probabilistic seismic hazard maps produced by the USGS become the National Earthquake Hazard Reduction Program (NEHRP) maps that (1) are the basis for community preparedness and response planning and (2) underlie the International Building Codes' seismic provisions. As these maps change in response to changes in methodologies for estimating seismic risk—even with maps that indicate uncertainty in the mapped hazard—they may seem confused or even capricious to the affected communities.

Especially if the results are *decreased* requirements for seismic strength, there are negative consequences for planning and regulatory officials. Emergency managers will have to explain to elected officials how public safety issues can change apparently so capriciously and how the economical impacts can be justified. Those involved in hazard assessment and response planning will be undermined. Officials who implement building codes will be forced to explain or defend changes that they may not be technically prepared for. Building owners who have previously built to higher requirements will be skeptical if not angry about the changes. Thus the integrity of NEHRP programs and building codes themselves will be compromised.

A narrative that interprets the effect of uncertainties on the hazard maps should identify the issues in non-technical terms that affect the map changes and result in increases or decreases to hazard probabilities and code requirements. Such a narrative should explain data considerations that affect computation or methodological revisions in computation. Although these interpretations might have to be more specific than general, it is essential to preserve the public's confidence in hazard assessment and its application to hazard reduction.

Facilitation and Communication

WSSPC should communicate this policy recommendation to the Director of the USGS and the office of Earthquake Studies. WSSPC should also communicate the recommendation to the other NEHRP partners and those agencies and organizations concerned with quantifying seismic hazard and reducing loss exposure to earthquakes. It would not be inappropriate to offer to assist the USGS in developing narratives by providing a forum for end-user commentary on drafts.

Assessment

History

Policy Recommendation 04-7 was first adopted as Policy Recommendation 04-7 by unanimous vote of the WSSPC membership at the Annual Business Meeting September 30, 2004.

WESTERN STATES SEISMIC POLICY COUNCIL POLICY RECOMMENDATION 05-1

WSSPC Policy Recommendation 05-1: Improving Tsunami Warning, Preparedness, and Mitigation Procedures for Distant and Local Sources

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. 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 mapping the tsunami inundation zone, developing tsunami evacuation maps, conducting research aimed at developing rapid warnings, 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 the nearby coastal areas but also to those areas 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 nondestructive tsunamis have always been a major problem associated with warnings. Unnecessary evacuations not only create financial burdens on communities along the coast, but may also cause people to ignore the 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 will insure that the messages from the tsunami centers are more accurate and timely and that they significantly reduce the number of unnecessary evacuations along the coast.

However, Pacific Rim States must plan for local coastal earthquakes that will allow little to no time to issue a 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 once the ground shaking stops. In areas where no high ground is nearby, vertical evacuation in approved man-made structures may be the only option to escape the tsunami. Through the use of scientifically researched and developed tsunami inundation models and maps, community evacuation maps 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 tsunamigenic earthquakes, and long-term risk reduction efforts.

WSSPC will write letters to key congressional representatives encouraging them to support S.B. 50 and House Bill 1674 that will lead to passing the Tsunami Preparedness Act, and to support expansion of the NTHMP in areas of highest risk. This Act will authorize and strengthen NTHMP's tsunami detection, forecast, warning, and mitigation programs.

Assessment

The effectiveness of the support letters would 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 adoption of the Tsunami Preparedness Act.

In turn, the effectiveness of the seismic monitoring and tsunami detection systems would be measured by the progress made in reducing the frequency of unnecessary evacuations at specific locations by modeling the threat under various scenarios to determine when warnings need to be issued. The effectiveness would also be measured by the successful and timely identification of a destructive tsunami from a distant source.

The effectiveness of the 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 by quickly moving to higher and safer ground.

History

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 Policy Recommendation 05-2

WSSPC Policy Recommendation 05-2: Active Fault Definition for the Basin and Range Province

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 along faults that have had prior Quaternary activity. When the last major earthquake occurred along 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 period of time. For example, a fault that has a major earthquake every 50 years is more hazardous than one that has a major earthquake every 300,000 years. It is up to the user to decide what degree of fault activity is considered “dangerous.” Depending on the intended use of the land (residences, hospitals, schools, picnic grounds, etc.), different degrees of fault activity and risk may be acceptable. Understanding the degree 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 recurrence intervals in the Basin and Range Province. All but one of the major historical earthquakes occurred in the Province along 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 along 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 that appear to be involved in contemporary deformation. Large earthquakes in the Province commonly involve multiple, distributed faults and have occurred along 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 some 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 case 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 historical 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 ruptured major portions of fault traces that lacked prior Holocene displacement (Bell and Katzer, 1990). Major earthquakes have occurred along 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 fault setback distances 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.

Consideration of the historical earthquake record and average earthquake recurrence intervals are principally geologic constructs. They should be evaluated along with other considerations related to levels of acceptable risk and the costs and benefits associated with addressing earthquake hazards for a specific purpose. It is ultimately up to the user to decide how the hazard 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 would be impractical. The expense of risk-reduction measures must be justified based on the probability of occurrence and resulting risk to society in terms of public safety and potential economic loss. Use of these three broad 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.

WSSPC recommends the Basin and Range Province Earthquake Working Group discuss the application of these active fault definitions at their planned 2006 meeting(s) to determine whether consensus can be reached regarding appropriate active fault definitions in the Basin and Range Province for various facility types. If consensus is achieved, the results can then be communicated to regulators and other users by WSSPC state representatives in their respective states to try to get them adopted and widely used.

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 will be made to determine the extent to which these definitions are being incorporated into future seismic-hazard rules, regulations, and guidelines.

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History

First adopted in 1997 as WSSPC Policy Recommendation 97-1. Reviewed and readopted 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 Policy Recommendation 05-3

Policy Recommendation 05-3: Real-Time Earthquake Monitoring Networks

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 analyses. Automated processing of earthquake information by seismic networks in the United States provides near-real time information on earthquake locations and magnitude. 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 1970s, 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. Data from seismic networks throughout the U.S. 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 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 population of the Nation’s seismic risk is in the western states. Large 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 7.5 1959 Hebgen Lake, MT; and magnitude 7.3 1983 Borah Peak, ID). Yet, the Northern Rocky Mountain region remains the largest seismically active region of the lower 48 states without 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 modern analysis techniques rapidly provide data 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 movements—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 eastwest) are recorded (as opposed to the single 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 research.

The vision of a next-generation National Seismic System, the Advanced National Seismic System (ANSS) has been prepared 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 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 400 free-field monitoring stations in 13 states since its inception. The largest numbers are in Alaska, California, Nevada, Utah and Washington, and most stations 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 severity of ground shaking developed from groundmotion data recorded by the newly installed ANSS instrumentation. 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 good distribution of strong-motion seismometers, ShakeMap can help emergency managers identify areas most likely to have been exposed to strong shaking in the immediate aftermath of an earthquake 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 designs to achieve improved earthquake resistance in both new construction and retrofitted structures. Following damaging earthquakes, real-time monitoring of the performance 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 creation of better construction standards and designs. To accomplish such expansion, WSSPC encourages the USGS to form partnerships to further these efforts with the emergency managers, engineers, 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 seismic and GPS instruments, WSSPC encourages the USGS to take full advantage of EarthScope instruments in fulfilling the mission of ANSS.

WSSPC will communicate this recommendation to the USGS and to key members of Congress.

History

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.

WSSPC Policy Recommendation 06-1: Developing Earthquake Risk-Reduction Strategies

WSSPC strongly encourages the development of long-term, comprehensive statewide and community-level earthquake risk-reduction strategies as part of an all-hazards plan to reduce injury, loss of life, property damage and economic disruption from earthquakes.

WSSPC believes comprehensive statewide and local plans and strategies should include the following elements:

- Assessment of all seismic hazards to quantify and define the risk to communities;
- Implementation of land-use and development policies to reduce exposure to earthquake hazards;
- Adoption and enforcement of the International Building Codes for the seismic design, inspection, and construction of new buildings and structures;
- Adoption of the International Existing Building Code for the maintenance and retrofit of seismically “at risk” structures;
- Development and implementation of retrofit, redevelopment, grant, and abatement programs to help strengthen existing structures, where necessary;
- Support of [ongoing] public-education efforts and public/private partnerships to raise awareness of seismically induced threats and build constituent support for earthquake hazard reduction programs.

Background

WSSPC has long supported reduction of losses from seismic events through policy recommendations and annual conferences. One of the WSSPC Policy Recommendations (PR04-4) states that WSSPC supports the adoption and enforcement of the International Building and Residential Codes to reduce vulnerability to earthquakes. Given the high seismic activity in the western United States, Pacific territories, and Canada, mitigation of earthquake hazards is a common interest among all the western states, territories, and provinces. FEMA’s Report 366, “HAZUS 99 Estimated Annualized Earthquake Losses for the United States”, clearly shows that the western states are most at risk, with 88% of the nation’s estimated annual dollar losses from earthquakes. WSSPC, as a consortium of 13 western states, 3 Pacific territories, and a Canadian territory and province, is the ideal organization to promote the benefits of earthquake risk-mitigation policies, to promote collaboration among its members and the federal government, and to share mitigation successes between WSSPC and other organizations. WSSPC should mentor parties who are responsible for public safety about the necessity and benefits of earthquake risk-mitigation policies and activities. WSSPC should promote the development of educational materials on mitigation for the general public.

WSSPC encourages private and public organizations to form partnerships that will develop earthquake risk-mitigation plans and risk-reduction strategies that will WSSPC Policy Recommendation 06-1 Page 2 of 2 benefit local communities. Mitigation policies and activities are long-term, multifaceted processes where effective coordination, collaboration and communication among partners are critical. WSSPC is partnering with various organizations to promote these processes.

The Seismic Safety Boards and Commissions of the various states are important WSSPC partners. Each member state, territory and province has other affiliations with potential partners, such as the Oregon Natural Hazards Workgroup (ONHW), the Partners for Disaster Resistance & Resilience: Oregon Showcase State Program, and the Cascadia Region Earthquake Workgroup (CREW).

WSSPC should encourage its partners to seek potential outreach activities, mitigation plan development, or construction projects that can be submitted for funding through FEMA's various mitigation program grants. These efforts complement FEMA's Pre-Disaster Mitigation initiatives.

Facilitation and Communications

This policy recommendation will be sent to all identified policy and decision makers (elected officials, heads of key departments, such as emergency managers, building officials and planners and chairs of the State Seismic Safety Commissions and Boards) as well as to WSSPC representatives in the member states. Policymakers' decision to support earthquake risk mitigation and foster partnerships is the key to effective mitigation in their state.

Assessment

Successes in policy implementation are occasions when mitigation actions or requirements are incorporated into public policies and decisions, and subsequently integrated into important public or private projects.

This statement of earthquake risk-reduction strategies should be adopted by all WSSPC partners. Successes should be submitted in a timely manner to WSSPC for posting on its website.

History

First adopted in 2003 as WSSPC Policy Recommendation 03-1. Reviewed, revised, and re-adopted as WSSPC Policy Recommendation 06-1 by unanimous vote of the WSSPC membership at the WSSPC Annual Business Meeting April 17, 2006.

**BYLAWS
OF
WESTERN STATES SEISMIC POLICY COUNCIL
A CALIFORNIA NONPROFIT PUBLIC BENEFIT
MEMBERSHIP CORPORATION**

**ARTICLE 1
OFFICES**

SECTION 1. PRINCIPAL OFFICE

The principal office of the corporation for the transaction of its business is located in Sacramento County, California.

SECTION 2. CHANGE OF ADDRESS

The county of the corporation's principal office can be changed only by amendment of these Bylaws and not otherwise. The Board of Directors may, however, change the principal office from one location to another within the named county by noting the changed address and effective date below, and such changes of address shall not be deemed an amendment of these Bylaws:

_____ Date: _____

_____ Date: _____

_____ Date: _____

SECTION 3. OTHER OFFICES

The corporation may also have offices at such other places, within or without the State of California, where it is qualified to do business, as its business may require and as the Board of Directors may, from time to time, designate.

**ARTICLE 2
PURPOSES**

SECTION 1. MISSION, OBJECTIVES AND PURPOSES

The mission of the Western States Seismic Policy Council is to help reduce future earthquake losses by providing a forum to advance earthquake programs throughout the Western Region and by developing and facilitating the implementation of seismic policies and programs through information exchange, research application and education.

The primary objectives and purposes of this corporation shall be:

- Promote regional cooperation and the interaction of the members' Emergency Management Program and Geoscience Program representatives on seismic policy.
- Raise the overall awareness at all levels of earthquake hazards and methods to mitigate these associated risks; develop strategies to enhance earthquake preparedness, mitigation, response, recovery programs, and related activities; and support earthquake studies and earthquake preparedness activities that will reduce or eliminate deaths, injuries and property damage that result from earthquakes.
- Serve as a resource for earthquake related materials, information and activities, in coordination with other regional earthquake organizations.
- Provide advice and counsel to federal agencies on issues and research related to earthquake hazards.
- Sponsor regional and sub-regional research projects and develop funding as required.
- Establish and sponsor Western States Seismic Policy Council training programs and related activities.

SECTION 2: POLICY POSITIONS

The Western States Seismic Policy Council can issue policy statements on behalf of the membership. No policy position can be issued without the majority approval of other member states, with exception of a Board of Directors resolution. The policy statement should reflect the degree of approval, such as unanimous, majority, etc.

(a) Any voting member can submit a written proposed policy position statement for consideration by the Board of Directors.

(b) The Board of Directors will vote on whether or not to submit the proposed policy position proposal to a vote of the general membership. A majority vote of the Board is necessary before a proposed policy position statement can be submitted to the general membership for a vote.

(c) Members of the Board of Directors may not issue a minority opinion in the event that they disagree with the opinion of the majority on the policy position.

(d) A resolution of the Board of Directors can be passed by a majority vote. Such a resolution should reflect the fact that it is a Board resolution and not that of the member states.

**ARTICLE 3
DIRECTORS**

SECTION 1. NUMBER

The corporation shall have seven Directors derived from the voting membership as follows: three state geological survey directors, three state emergency management directors, and one member-at-large. The member-at-large may be drawn from any member agency. Collectively they shall be known as the Board of Directors. The number may be changed by amendment of this Bylaw, or by repeal of this Bylaw and adoption of a new Bylaw, as provided in these Bylaws.

Representatives from Federal Emergency Management Agency, the United States Geological Survey, or other interested parties may attend meetings of the Board of Directors by invitation of the Board.

The state emergency manager and geoscientist directors hosting the upcoming WSSPC annual meeting shall be ex-officio members of the Board for the year preceding the annual meeting.

SECTION 2. POWERS

Subject to the provisions of the California Nonprofit Public Benefit Corporation law and any limitations in the Articles of Incorporation and Bylaws relating to action required or permitted to be taken or approved by the members, if any, of this corporation, the activities and affairs of this corporation shall be conducted and all corporate powers shall be exercised by or under the direction of the Board of Directors.

SECTION 3. DUTIES

It shall be the duty of the Directors to:

(a) Perform any and all duties imposed on them collectively or individually by law, by the Articles of Incorporation of this corporation, or by these Bylaws;

(b) Appoint and remove, employ and discharge, and, except as otherwise provided in these Bylaws, prescribe the duties and fix the compensation, if any, of all officers, agents and employees of the corporation;

(c) Supervise all officers, agents and employees of the corporation to assure that their duties are performed properly;

(d) Meet at such times and places as required by these Bylaws;

(e) Register their addresses with the Secretary of the corporation and notices of meetings mailed, faxed, or emailed to them at such addresses shall be valid notices thereof.

(f) The Board shall establish committees as needed and select the chairs of the committees.

(g) Depending on the availability of funds, Board of Directors shall employ an Executive Director, who will assist the Board of Directors in carrying out the mission of Western States Seismic Policy Council.

SECTION 4. TERMS OF OFFICE

Each Director shall hold office for a two year term, which will terminate at the end of the fiscal year specified in Article 8, Section 1 for election of the Board of Directors as specified in these Bylaws, and until his or her successor is elected and qualifies. Members of the Board will serve at least one year. In the first year after these by-laws are enacted, one Director each from a state geological survey and a state emergency management agency, chosen by lot, and the Director-at-large will be replaced. In the third year, the remaining four Board members will be replaced. Henceforth from then, Board members will be replaced in groups of three and four in alternating years. New replacement Directors will be nominated by the member states and approved by a majority of the full voting membership. Any Board member may serve more than one term. At all times, there will be at least three directors of state geological surveys and three directors of state emergency management agencies on the Board.

SECTION 5. COMPENSATION

Directors shall serve without compensation except that they shall be allowed and paid for their actual and necessary expenses incurred in attending Directors' meetings. In addition, they shall be allowed reasonable advancement or reimbursement of expenses incurred in the performance of their regular duties as specified in Section 3 of this Article. Directors may not be compensated for rendering services to the corporation in any capacity other than Director unless such other compensation is reasonable and is allowable under the provisions of Section 6 of this Article.

SECTION 6. RESTRICTION REGARDING INTERESTED DIRECTORS

Notwithstanding any other provision of these Bylaws, not more than forty-nine percent (49%) of the persons serving on the Board may be interested persons. For purposes of this Section, "interested persons" means either:

(a) Any person currently being compensated by the corporation for services rendered it within the previous twelve (12) months, whether as a full- or part-time officer or other employee, independent contractor, or otherwise, excluding any reasonable compensation paid to a Director as Director; or

(b) Any brother, sister, ancestor, descendant, spouse, brother-in-law, sister-in-law, son-in-law, daughter-in-law, mother-in-law, or father-in-law of any such person.

SECTION 7. PLACE OF MEETINGS

Meetings shall be held at the principal office of the corporation unless otherwise provided by the Board or at such place within or without the State of California which has been designated from time to time by resolution of the Board of Directors. In the absence of such designation, any meeting not held at the principal office of the corporation shall be valid only if held on the written consent of all Directors given either before or after the meeting and filed with the Secretary of the corporation or after all Board members have been given written notice of the meeting as hereinafter provided for special meetings of the Board. Any meeting, regular or special, may be

held by conference telephone or similar communications equipment, so long as all Directors participating in such meeting can hear one another.

SECTION 8. REGULAR AND ANNUAL MEETINGS

Regular meetings of Directors shall be held at least twice, including one to be held immediately preceding the annual meeting of members. The Board is authorized to meet quarterly, if necessary.

SECTION 9. SPECIAL MEETINGS

Special meetings of the Board of Directors may be called by the Chairperson of the Board, the President, the Secretary, or by any two Directors, and such meetings shall be held at the place, within or without the State of California, designated by the person or persons calling the meeting, and in the absence of such designation, at the principal office of the corporation.

SECTION 10. NOTICE OF MEETINGS

Regular meetings of the Board may be held without notice. Special meetings of the Board shall be held upon four (4) days' notice by first-class mail or forty-eight (48) hours' notice delivered personally or by telephone, facsimile, or email. If sent by mail, facsimile or email, the notice shall be deemed to be delivered on its deposit in the mails or on its receipt by the Director's facsimile machine, or email in-box. Such notices shall be addressed to each Director at his or her address as shown on the books of the corporation. Notice of the time and place of holding an adjourned meeting need not be given to absent Directors if the time and place of the adjourned meeting are fixed at the meeting adjourned and if such adjourned meeting is held no more than twenty-four (24) hours from the time of the original meeting. Notice shall be given of any adjourned regular or special meeting to Directors absent from the original meeting if the adjourned meeting is held more than twenty-four (24) hours from the time of the original meeting.

SECTION 11. CONTENTS OF NOTICE

Notice of meetings not herein dispensed with shall specify the place, day and hour of the meeting. The purpose of any Board meeting need not be specified in the notice.

SECTION 12. WAIVER OF NOTICE AND CONSENT TO HOLDING MEETINGS

The transactions of any meeting of the Board, however called and noticed or wherever held, are as valid as though the meeting had been duly held after proper call and notice, provided a quorum, as hereinafter defined, is present and provided that either before or after the meeting each Director not present signs a waiver of notice, a consent to holding the meeting, or an approval of the minutes thereof. All such waivers, consents, or approvals shall be filed with the corporate records or made a part of the minutes of the meeting.

SECTION 13. QUORUM FOR MEETINGS

A quorum shall consist of a simple majority of the Board of Directors.

Except as otherwise provided in these Bylaws or in the Articles of Incorporation of this corporation, or by law, no business shall be considered by the Board at any meeting at which a quorum, as hereinbefore defined, is not present, and the only motion which the Chair shall entertain at such meeting is a motion to adjourn. However, a majority of the Directors present at such meeting may adjourn from time to time until the time fixed for the next regular meeting of the Board.

When a meeting is adjourned for lack of a quorum, it shall not be necessary to give any notice of the time and place of the adjourned meeting or of the business to be transacted at such meeting, other than by announcement at the meeting at which the adjournment is taken, except as provided in Section 10 of this Article.

The Directors present at a duly called and held meeting at which a quorum is initially present may continue to do business notwithstanding the loss of a quorum at the meeting due to a withdrawal of Directors from the meeting, provided that any action thereafter taken must be approved by at least a majority of the required quorum for such meeting or such greater percentage as may be required by law, or the Articles of Incorporation or Bylaws of this corporation.

SECTION 14. MAJORITY ACTION AS BOARD ACTION

Every act or decision done or made by a majority of the Directors present at a meeting duly held at which a quorum is present is the act of the Board of Directors, unless the Articles of Incorporation or Bylaws of this corporation, or provisions of the California Nonprofit Public Benefit Corporation Law, particularly those provisions relating to appointment of committees (Section 5212), approval of contracts or transactions in which a Director has a material financial interest (Section 5233) and indemnification of Directors (Section 5238e), require a greater percentage or different voting rules for approval of a matter by the Board.

SECTION 15. PROXY

Voting of Directors by proxy is hereby permitted by this section. If a Director is unable to be present during a vote, the Director may designate a proxy to vote on his/her behalf.

SECTION 16. CONDUCT OF MEETINGS

Meetings of the Board of Directors shall be presided over by the Chairperson of the Board, or, if no such person has been so designated or, in his or her absence, the President of the corporation or, in his or her absence, by the Vice President of the corporation or, in the absence of each of these persons, by a Chairperson chosen by a majority of the Directors present at the meeting. The Secretary of the corporation shall act as secretary of all meetings of the Board, provided that, in his or her absence, the presiding officer shall appoint another person to act as Secretary of the Meeting.

Meetings shall be governed by Robert's Rules of Order, as such rules may be revised from time to time, insofar as such rules are not inconsistent with or in conflict with these Bylaws, with the Articles of Incorporation of this corporation, or with provisions of law.

SECTION 17. ACTION BY UNANIMOUS WRITTEN CONSENT WITHOUT MEETING

Any action required or permitted to be taken by the Board of Directors under any provision of law may be taken without a meeting, if all members of the Board shall individually or collectively consent in writing to such action. For the purposes of this Section only, "all members of the Board" shall not include any "interested Director" as defined in Section 5233 of the California Nonprofit Public Benefit Corporation Law. Such written consent or consents shall be filed with the minutes of the proceedings of the Board. Such action by written consent shall have the same force and effect as the unanimous vote of the Directors. Any certificate or other document filed under any provision of law which relates to action so taken shall state that the action was taken by unanimous written consent of the Board of Directors without a meeting and that the Bylaws of this corporation authorize the Directors to so act, and such statement shall be prima facie evidence of such authority.

SECTION 18. VACANCIES

Vacancies on the Board of Directors shall exist (1) on the death, resignation or removal of any Director, and (2) whenever the number of authorized Directors is increased.

The Board of Directors may declare vacant the office of a Director who has been declared of unsound mind

by a final order of court, or convicted of a felony, or been found by a final order or judgment of any court to have breached any duty under Section 5230 and following of the California Nonprofit Public Benefit Corporation Law.

If the corporation has less than fifty (50) members, Directors may be removed without cause by a majority of all members, or, if the corporation has fifty (50) or more members, by vote of a majority of the votes represented at a membership meeting at which a quorum is present.

Any Director may resign effective upon giving written notice to the Chairperson of the Board, the President, the Secretary, or the Board of Directors, unless the notice specifies a later time for the effectiveness of such resignation. No Director may resign if the corporation would then be left without a duly elected Director or Directors in charge of its affairs, except upon notice to the Attorney General.

All vacancies in the Board of Directors, with the exception of the Vice-Chair, will be filled by appointment of the Chair, with the consent of the Board of Directors.

A person elected to fill a vacancy as provided by this Section shall hold office until the next annual election of the Board of Directors or until his or her death, resignation or removal from office.

SECTION 19. NON-LIABILITY OF DIRECTORS

The Directors shall not be personally liable for the debts, liabilities, or other obligations of the corporation.

SECTION 20. INDEMNIFICATION BY CORPORATION OF DIRECTORS, OFFICERS, EMPLOYEES AND OTHER AGENTS

To the extent that a person who is, or was, a Director, officer, employee or other agent of this corporation has been successful on the merits in defense of any civil, criminal, administrative or investigative proceeding brought to procure a judgment against such person by reason of the fact that he or she is, or was, an agent of the corporation, or has been successful in defense of any claim, issue or matter therein, such person shall be indemnified against expenses actually and reasonably incurred by the person in connection with such proceeding.

If such person either settles any such claim or sustains a judgment against him or her, then indemnification against expenses, judgments, fines, settlements and other amounts reasonably incurred in connection with such proceedings shall be provided by this corporation but only to the extent allowed by, and in accordance with the requirements of, Section 5238 of the California Nonprofit Public Benefit Corporation Law.

SECTION 21. INSURANCE FOR CORPORATE AGENTS

The Board of Directors may adopt a resolution authorizing the purchase and maintenance of insurance on behalf of any agent of the corporation (including a Director, officer, employee or other agent of the corporation) against any liability other than for violating provisions of law relating to self-dealing (Section 5233 of the California Nonprofit Public Benefit Corporation Law) asserted against or incurred by the agent in such capacity or arising out of the agent's status as such, whether or not the corporation would have the power to indemnify the agent against such liability under the provisions of Section 5238 of the California Nonprofit Public Benefit Corporation Law.

ARTICLE 4 OFFICERS

SECTION 1. NUMBER OF OFFICERS

The officers of the corporation shall be a President, a Secretary, and a Chief Financial Officer who shall be designated the Treasurer. The corporation may also have, as determined by the Board of Directors, a Chairperson of the Board, one or more Vice Presidents, Assistant Secretaries, Assistant Treasurers, or other officers. Any number of offices may be held by the same

person except that neither the Secretary nor the Treasurer may serve as the President or Chairperson of the Board. The Executive Director of the corporation shall serve as the Secretary and the Chief Financial Officer, unless the Board of Directors appoints another person to the position.

SECTION 2. QUALIFICATION, ELECTION, AND TERM OF OFFICE

Any person may serve as officer of this corporation. Officers shall be elected by the Board of Directors, at any time, and each officer shall hold office until he or she resigns or is removed or is otherwise disqualified to serve, or until his or her successor shall be elected and qualified, whichever occurs first.

SECTION 3. SUBORDINATE OFFICERS

The Board of Directors may appoint such other officers or agents as it may deem desirable, and such officers shall serve such terms, have such authority, and perform such duties as may be prescribed from time to time by the Board of Directors.

SECTION 4. REMOVAL AND RESIGNATION

Any officer may be removed, either with or without cause, by the Board of Directors, at any time. Any officer may resign at any time by giving written notice to the Board of Directors or to the President or Secretary of the corporation. Any such resignation shall take effect at the date of receipt of such notice or at any later date specified therein, and, unless otherwise specified therein, the acceptance of such resignation shall not be necessary to make it effective. The above provisions of this Section shall be superseded by any conflicting terms of a contract which has been approved or ratified by the Board of Directors relating to the employment of any officer of the corporation.

SECTION 5. VACANCIES

Any vacancy caused by the death, resignation, removal, disqualification, or otherwise, of any officer shall be filled by the Board of Directors. In the event of a vacancy in any office other than that of President, such vacancy may be filled temporarily by appointment by the President until such time as the Board shall fill the vacancy. Vacancies occurring in offices of officers appointed at the discretion of the Board may or may not be filled as the Board shall determine.

SECTION 6. DUTIES OF PRESIDENT

The President shall be the chief executive officer of the corporation and shall, subject to the control of the Board of Directors, supervise and control the affairs of the corporation and the activities of the officers. He or she shall perform all duties incident to his or her office and such other duties as may be required by law, by the Articles of Incorporation of this corporation, or by these Bylaws, or which may be prescribed from time to time by the Board of Directors. The Chairperson of the Board of Directors shall serve as the President. He or she shall preside at all meetings of the Board of Directors. If applicable, the President shall preside at all meetings of the members. Except as otherwise expressly provided by law, by the Articles of Incorporation, or by these Bylaws, he or she shall, in the name of the corporation, execute such deeds, mortgages, bonds, contracts, checks, or other instruments which may from time to time be authorized by the Board of Directors.

SECTION 7. DUTIES OF A VICE PRESIDENT

The Board of Directors may choose to select a member to serve as a Vice-President. In the absence of the President, or in the event of his or her inability or refusal to act, the Vice President shall perform all the duties of the President, and when so acting shall have all the powers of, and be subject to all the restrictions on, the President. The Vice President shall have other powers and perform such other duties as may be prescribed by law, by the Articles of Incorporation, or by these Bylaws, or as may be prescribed by the Board of Directors.

SECTION 8. DUTIES OF SECRETARY

The Secretary shall:

Certify and keep at the principal office of the corporation the original, or a copy of these Bylaws as amended or otherwise altered to date.

Keep at the principal office of the corporation or at such other place as the Board may determine, a book of minutes of all meetings of the Directors, and, if applicable, meetings of committees of Directors and of members, recording therein the time and place of holding, whether regular or special, how called, how notice thereof was given, the names of those present or represented at the meeting, and the proceedings thereof.

See that all notices are duly given in accordance with the provisions of these Bylaws or as required by law.

Be custodian of the records and of the seal of the corporation and see that the seal is affixed to all duly executed documents, the execution of which on behalf of the corporation under its seal is authorized by law or these Bylaws.

Keep at the principal office of the corporation a membership book containing the name and address of each and any members, and, in the case where any membership has been terminated, he or she shall record such fact in the membership book together with the date on which such membership ceased.

Exhibit at all reasonable times to any Director of the corporation, or to his or her agent or attorney, on request therefor, the Bylaws, the membership book, and the minutes of the proceedings of the Directors of the corporation.

In general, perform all duties incident to the office of Secretary and such other duties as may be required by law, by the Articles of Incorporation of this corporation, or by these Bylaws, or which may be assigned to him or her from time to time by the Board of Directors.

SECTION 9. DUTIES OF TREASURER

Subject to the provisions of these Bylaws relating to the "Execution of Instruments, Deposits and Funds," the Treasurer shall:

Have charge and custody of, and be responsible for, all funds and securities of the corporation, and deposit all such funds in the name of the corporation in such banks, trust companies, or other depositories as shall be selected by the Board of Directors.

Receive, and give receipt for, monies due and payable to the corporation from any source whatsoever.

Disburse, or cause to be disbursed, the funds of the corporation as may be directed by the Board of Directors, taking proper vouchers for such disbursements.

Keep and maintain adequate and correct accounts of the corporation's properties and business transactions, including accounts of its assets, liabilities, receipts, disbursements, gains and losses.

Exhibit at all reasonable times the books of account and financial records to any Director of the corporation, or to his or her agent or attorney, on request therefor.

Render to the President and Directors, whenever requested, an account of any or all of his or her transactions as Treasurer and of the financial condition of the corporation.

Prepare, or cause to be prepared, and certify, or cause to be certified, the financial statements to be included in any required reports.

In general, perform all duties incident to the office of Treasurer and such other duties as may be required by

law, by the Articles of Incorporation of the corporation, or by these Bylaws, or which may be assigned to him or her from time to time by the Board of Directors.

SECTION 10. COMPENSATION

The salaries of the officers, if any, shall be fixed from time to time by resolution of the Board of Directors, and no officer shall be prevented from receiving such salary by reason of the fact that he or she is also a Director of the corporation, provided, however, that such compensation paid a Director for serving as an officer of this corporation shall only be allowed if permitted under the provisions of Article 3, Section 6 of these Bylaws. In all cases, any salaries received by officers of this corporation shall be reasonable and given in return for services actually rendered for the corporation which relate to the performance of the charitable or public purposes of this corporation.

ARTICLE 5 COMMITTEES

SECTION 1. MEMBERSHIP AND RESPONSIBILITIES

Committees of the Western States Seismic Policy Council shall be comprised of at least two (2) members of the organization. Western States Seismic Policy Council affiliates and other interested parties may sit on committees, but shall not have a vote during committee meetings. The responsibilities of the committees shall be determined by the Board of Directors, consistent with Section 5212 of the California Nonprofit Public Benefit Corporation Law, and delegate to such committee any of the powers and authority of the Board in the management of the business and affairs of the corporation, except with respect to:

- (a) The approval of any action which, under law or the provisions of these Bylaws, requires the approval of the members or a majority of all the members.
- (b) The filling of vacancies on the Board or on any committee which has the authority of the Board.
- (c) The fixing of compensation of the directors for serving on the Board or on any committee.
- (d) The amendment or repeal of Bylaws or the adoption of new Bylaws.
- (e) The amendment or repeal of any resolution of the Board which by its express terms is not so amenable or repealable.
- (f) The appointment of committees of the Board or the members thereof.
- (g) The expenditure of corporate funds to support a nominee for director after there are more people nominated for director than can be elected.
- (h) The approval of any transaction to which this corporation is a party and in which one or more of the directors has a material financial interest, except as expressly provided in Section 5233(d)(3) of the California Nonprofit Public Benefit Corporation Law.

By a majority vote of its members then in office, the Board may at any time revoke or modify any or all of the authority so delegated, increase or decrease but not below two (2) the number of the its members, and fill vacancies therein from the members of the Board. The Committee shall keep regular minutes of its proceedings and cause them to be filed with the corporate records.

SECTION 2. STANDING COMMITTEES

There shall be four standing committees: the Annual Conference and Meeting Committee, the Strategic Planning Committee, the Membership Committee and the Finance Committee. The Board selects the chairs and members of these committees. Committee members shall serve a term for one year and may serve more than one consecutive term.

SECTION 3. OTHER COMMITTEES

The corporation shall have such other committees as may from time to time be designated by resolution of the Board of Directors. Such other committees may consist of persons who are not also members of the Board. These additional committees shall act in an advisory capacity only to the Board and shall be clearly titled as "advisory" committees. The Board selects the chairs and members of these committees. Committee members shall serve a term for one year and may serve more than one consecutive term.

SECTION 4. MEETINGS AND ACTION OF COMMITTEES

Meetings and action of committees shall be governed by, noticed, held and taken in accordance with the provisions of these Bylaws concerning meetings of the Board of Directors, with such changes in the context of such Bylaw provisions as are necessary to substitute the committee and its members for the Board of Directors and its members, except that the time for regular meetings of committees may be fixed by resolution of the Board of Directors or by the committee. The time for special meetings of committees may also be fixed by the Board of Directors. The Board of Directors may also adopt rules and regulations pertaining to the conduct of meetings of committees to the extent that such rules and regulations are not inconsistent with the provisions of these Bylaws.

ARTICLE 6 EXECUTION OF INSTRUMENTS, DEPOSITS AND FUNDS

SECTION 1. EXECUTION OF INSTRUMENTS

The Board of Directors, except as otherwise provided in these Bylaws, may by resolution authorize any officer or agent of the corporation to enter into any contract or execute and deliver any instrument in the name of and on behalf of the corporation, and such authority may be general or confined to specific instances. Unless so authorized, no officer, agent, or employee shall have any power or authority to bind the corporation by any contract or engagement or to pledge its credit or to render it liable monetarily for any purpose or in any amount.

SECTION 2. CHECKS AND NOTES

Except as otherwise specifically determined by resolution of the Board of Directors, or as otherwise required by law, checks, drafts, promissory notes, orders for the payment of money, and other evidence of indebtedness of the corporation over \$5000 shall be signed by the Treasurer and countersigned by the President of the corporation on a facsimile copy.

SECTION 3. DEPOSITS

All funds of the corporation shall be deposited from time to time to the credit of the corporation in such banks, trust companies, or other depositories as the Board of Directors may select.

SECTION 4. GIFTS

The Board of Directors may accept on behalf of the corporation any contribution, gift, bequest, or devise for the charitable or public purposes of this corporation.

ARTICLE 7 CORPORATE RECORDS, REPORTS AND SEAL

SECTION 1. MAINTENANCE OF CORPORATE RECORDS

The corporation shall keep at its principal office in the State of California:

(a) Minutes of all meetings of Directors, committees of the Board and, if this corporation has members, of all meetings of members, indicating the time and place of

holding such meetings, whether regular or special, how called, the notice given, and the names of those present and the proceedings thereof;

(b) Adequate and correct books and records of account, including accounts of its properties and business transactions and accounts of its assets, liabilities, receipts, disbursements, gains and losses;

(c) A record of its members, if any, indicating their names and addresses and, if applicable, the class of membership held by each member and the termination date of any membership;

(d) A copy of the corporation's Articles of Incorporation and Bylaws as amended to date, which shall be open to inspection by the members, if any, of the corporation at all reasonable times during office hours.

SECTION 2. CORPORATE SEAL

The Board of Directors may adopt, use, and at will alter, a corporate seal. Such seal shall be kept at the principal office of the corporation. Failure to affix the seal to corporate instruments, however, shall not affect the validity of any such instrument.

SECTION 3. DIRECTORS' INSPECTION RIGHTS

Every Director shall have the absolute right at any reasonable time to inspect and copy all books, records and documents of every kind and to inspect the physical properties of the corporation.

SECTION 4. MEMBERS' INSPECTION RIGHTS

Each and every member shall have the following inspection rights, for a purpose reasonably related to such person's interest as a member:

(a) To inspect and copy the record of all members' names, addresses and voting rights, at reasonable times, upon five (5) business days' prior written demand on the corporation, which demand shall state the purpose for which the inspection rights are requested.

(b) To obtain from the Secretary of the corporation, upon written demand and payment of a reasonable charge, an alphabetized list of the names, addresses and voting rights of those members entitled to vote for the election of Directors as of the most recent record date for which the list has been compiled or as of the date specified by the member subsequent to the date of demand. The demand shall state the purpose for which the list is requested. The membership list shall be made available on or before the later of ten (10) business days after the demand is received or after the date specified therein as of which the list is to be compiled.

(c) To inspect at any reasonable time the books, records, or minutes of proceedings of the members or of the Board or committees of the Board, upon written demand on the corporation by the member, for a purpose reasonably related to such person's interests as a member.

SECTION 5. RIGHT TO COPY AND MAKE EXTRACTS

Any inspection under the provisions of this Article may be made in person or by agent or attorney and the right to inspection includes the right to copy and make extracts.

SECTION 6. ANNUAL REPORT

The Board shall cause an annual report to be furnished not later than one hundred and twenty (120) days after the close of the corporation's fiscal year to all Directors of the corporation and, if this corporation has members, to any member who requests it in writing, which report shall contain the following information in appropriate detail:

(a) The assets and liabilities, including the trust funds, of the corporation as of the end of the fiscal year;

(b) The principal changes in assets and liabilities, including trust funds, during the fiscal year;

(c) The revenue or receipts of the corporation, both unrestricted and restricted to particular purposes, for the fiscal year;

(d) The expenses or disbursements of the corporation, for both general and restricted purposes, during the fiscal year;

(e) Any information required by Section 7 of this Article.

The annual report shall be accompanied by any report thereon of independent accountants, or, if there is no such report, the certificate of an authorized officer of the corporation that such statements were prepared without audit from the books and records of the corporation.

If this corporation has members, then, if this corporation receives TWENTY-FIVE THOUSAND DOLLARS (\$25,000), or more, in gross revenues or receipts during the fiscal year, this corporation shall automatically send the above annual report to all members, in such manner, at such time, and with such contents, including an accompanying report from independent accountants or certification of a corporate officer, as specified by the above provisions of this Section relating to the annual report.

SECTION 7. ANNUAL STATEMENT OF SPECIFIC TRANSACTIONS TO MEMBERS

This corporation shall mail or deliver to all Directors and any and all members a statement within one hundred and twenty (120) days after the close of its fiscal year which briefly describes the amount and circumstances of any indemnification or transaction of the following kind:

(a) Any transaction in which the corporation, or its parent or its subsidiary, was a party, and in which either of the following had a direct or indirect material financial interest:

(1) Any Director or officer of the corporation, or its parent or subsidiary (a mere common directorship shall not be considered a material financial interest); or

(2) Any holder of more than ten percent (10%) of the voting power of the corporation, its parent or its subsidiary.

The above statement need only be provided with respect to a transaction during the previous fiscal year involving more than FIFTY THOUSAND DOLLARS (\$50,000) or which was one of a number of transactions with the same persons involving, in the aggregate, more than FIFTY THOUSAND DOLLARS (\$50,000).

Similarly, the statement need only be provided with respect to indemnifications or advances aggregating more than TEN THOUSAND DOLLARS (\$10,000) paid during the previous fiscal year to any Director or officer, except that no such statement need be made if such indemnification was approved by the members pursuant to Section 5238(e)(2) of the California Nonprofit Public Benefit Corporation Law.

Any statement required by this Section shall briefly describe the names of the interested persons involved in such transactions, stating each person's relationship to the corporation, the nature of such person's interest in the transaction and, where practical, the amount of such interest, provided that in the case of a transaction with a partnership of which such person is a partner, only the interest of the partnership need be stated.

If this corporation has any members and provides all members with an annual report according to the provisions of Section 6 of this Article, then such annual report shall include the information required by this Section.

**ARTICLE 8
FISCAL YEAR**

SECTION 1. FISCAL YEAR OF THE CORPORATION

The fiscal year of the corporation shall begin on the first day of December and end on the last day of November in each year.

**ARTICLE 9
AMENDMENT OF BYLAWS**

SECTION 1. AMENDMENT

Subject to any provision of law applicable to the amendment of Bylaws of public benefit nonprofit corporations, these Bylaws, or any of them, may be altered, amended, or repealed and new Bylaws adopted as follows:

(a) These Bylaws and any proposed changes to them shall be approved and in force upon a majority vote of the voting membership, or

(b). Any proposed changes to these Bylaws shall be approved and in force upon a two-thirds majority vote of the Board of Directors. Any changes to the Bylaws made by the Board of Directors must be reported to the voting membership, or

(c) Subject to the power of members, if any, to change or repeal these Bylaws under Section 5150 of the Corporations Code, any voting member can submit a written proposed change in the Bylaws for consideration by the Board of Directors, in accordance to Article 9, Section 1(b).

**ARTICLE 10
AMENDMENT OF ARTICLES**

**SECTION 1. AMENDMENT OF ARTICLES BEFORE
ADMISSION OF MEMBERS**

Before any members have been admitted to the corporation, any amendment of the Articles of Incorporation may be adopted by approval of the Board of Directors.

**SECTION 2. AMENDMENT OF ARTICLES AFTER
ADMISSION OF MEMBERS**

After members, if any, have been admitted to the corporation, amendment of the Articles of Incorporation must be adopted by both the approval of the Board of Directors and by the approval of the members of this corporation.

SECTION 3. CERTAIN AMENDMENTS

Notwithstanding the above sections of this Article, this corporation shall not amend its Articles of Incorporation to alter any statement which appears in the original Articles of Incorporation of the names and addresses of the first Directors of this corporation, nor the name and address of its initial agent, except to correct an error in such statement or to delete such statement after the corporation has filed a "Statement by a Domestic Non-Profit Corporation" pursuant to Section 6210 of the California Nonprofit Public Benefit Corporation Law.

**ARTICLE 11
PROHIBITION AGAINST SHARING CORPORATE
PROFITS AND ASSETS**

**SECTION 1. PROHIBITION AGAINST SHARING
CORPORATE PROFITS AND ASSETS**

No member, director, officer, employee, or other person connected with this corporation, or any private individual, shall receive at any time any of the net earnings or pecuniary profit from the operations of the corporation, provided, however, that this provision shall not prevent payment to any such person of reasonable compensation for services performed for the corporation in effecting any of its public or charitable purposes, provided that such compensation is otherwise permitted

by these Bylaws and is fixed by resolution of the Board of Directors; and no such person or persons shall be entitled to share in the distribution of, and shall not receive, any of the corporate assets on dissolution of the corporation. All members, if any, of the corporation shall be deemed to have expressly consented and agreed that on such dissolution or winding up of the affairs of the corporation, whether voluntarily or involuntarily, the assets of the corporation, after all debts have been satisfied, shall be distributed as required by the Articles of Incorporation of this corporation and not otherwise.

**ARTICLE 12
MEMBERS**

**SECTION 1. DETERMINATION AND RIGHTS OF
MEMBERS**

The corporation shall have only one class of members. No member shall hold more than one membership in the corporation. Except as expressly provided in or authorized by the Articles of Incorporation or Bylaws of this corporation, all memberships shall have the same rights, privileges, restrictions and conditions.

SECTION 2. QUALIFICATIONS OF MEMBERS

The qualifications for membership in this corporation are as follows: A member is defined as a director of a state emergency management agency, state geological survey, or a state seismic safety commission, board, or council in a state of the United States, a United States territory, a Canadian province, a Canadian territory or a state of Mexico.

SECTION 3. ADMISSION OF MEMBERS

Requests for membership into Western States Seismic Policy Council must be in writing to the Board of Directors, indicating the reasons for wanting to be a member and outlining the state's current and projected seismic programs. The Board of Directors will review the application and make its decision known to the membership at the annual meeting.

SECTION 4. FEES, DUES AND ASSESSMENTS

(a) There shall be no fee charged for making application for membership in the corporation.

(b) There shall be the option of creating an annual dues structure payable to the corporation by members.

(c) Memberships shall be non-assessable.

SECTION 5. NUMBER OF MEMBERS

There is no limit on the number of members the corporation may admit.

SECTION 6. MEMBERSHIP BOOK

The corporation shall keep a membership book containing the name and address of each member's representative government agency. Termination of the membership of any member shall be recorded in the book, together with the date of termination of such membership. Such book shall be kept at the corporation's principal office and shall be available for inspection by any Director or member of the corporation during regular business hours.

The record of names and addresses of the members of this corporation shall constitute the membership list of this corporation and shall not be used, in whole or part, by any person for any purpose not reasonably related to a member's interest as a member.

SECTION 7. NONLIABILITY OF MEMBERS

A member of this corporation is not, as such, personally liable for the debts, liabilities, or obligations of the corporation.

**SECTION 8. NONTRANSFERABILITY OF
MEMBERSHIPS**

No member may transfer a membership or any right arising therefrom.

SECTION 9. TERMINATION OF MEMBERSHIP

(a) Grounds for Termination. The membership of a member shall terminate upon the occurrence of any of the following events:

(1) Upon his or her notice of such termination delivered to the President or Secretary of the corporation personally or by mail, such membership to terminate upon the date of delivery of the notice or date of deposit in the mail.

(2) Upon a determination by the Board of Directors that the member has engaged in conduct materially and seriously prejudicial to the interests or purposes of the corporation.

(3) If this corporation has provided for the payment of dues by members, upon a failure to renew his or her membership by paying dues on or before their due date, such termination to be effective thirty (30) days after a written notification of delinquency is given personally or mailed to such member by the Secretary of the corporation. A member may avoid such termination by paying the amount of delinquent dues within a thirty (30)-day period following the member's receipt of the written notification of delinquency.

(b) Procedure for Expulsion. Following the determination that a member should be expelled under subparagraph (a)(2) of this section, the following procedure shall be implemented:

(1) A notice shall be sent by first-class or registered mail to the last address of the member as shown on the corporation's records, setting forth the expulsion and the reasons therefor. Such notice shall be sent at least fifteen (15) days before the proposed effective date of the expulsion.

(2) The member being expelled shall be given an opportunity to be heard, either orally or in writing, at a hearing to be held not less than five (5) days before the effective date of the proposed expulsion. The hearing will be held by the Board of Directors in accordance with the quorum and voting rules set forth in these Bylaws applicable to the meetings of the Board. The notice to the member of his or her proposed expulsion shall state the date, time, and place of the hearing on his or her proposed expulsion.

(3) Following the hearing, the Board of Directors shall decide whether or not the member should in fact be expelled, suspended, or sanctioned in some other way. The decision of the Board shall be final.

(4) If this corporation has provided for the payment of dues by members, any person expelled from the corporation shall receive a refund of dues already paid. The refund shall be pro-rated to return only the unaccrued balance remaining for the period of the dues payment.

**SECTION 10. RIGHTS ON TERMINATION OF
MEMBERSHIP**

All rights of a member in the corporation shall cease on termination of membership as herein provided.

**SECTION 11. AMENDMENTS RESULTING IN THE
TERMINATION OF MEMBERSHIPS**

Notwithstanding any other provision of these Bylaws, if any amendment of the Articles of Incorporation or of the Bylaws of this corporation would result in the termination of all memberships or any class of memberships, then such amendment or amendments shall be effected only in accordance with the provisions of Section 5342 of the California Nonprofit Public Benefit Corporation Law.

**ARTICLE 13
MEETINGS OF MEMBERS**

SECTION 1. PLACE OF MEETINGS

The annual meeting shall be held on a rotating basis among the participating member states, as may be designated from time to time by resolution of the Board of Directors.

SECTION 2. ANNUAL AND OTHER REGULAR MEETINGS

The members shall meet annually at a date and time to be determined by the Board of Directors, for the purpose of electing Directors and transacting other business as may come before the meeting. The annual meeting of members for the purpose of electing Directors shall be deemed a regular meeting and any reference in these Bylaws to regular meetings of members refers to this annual meeting.

If the day fixed for the annual meeting or other regular meetings falls on a legal holiday, such meeting shall be held at the same hour and place on the next business day.

SECTION 3. SPECIAL MEETINGS OF MEMBERS

(a) Persons Who May Call Special Meetings of Members. Special meetings of the members shall be called by the Board of Directors, the Chairperson of the Board, or the President of the corporation. In addition, special meetings of the members for any lawful purpose may be called by twenty percent (20%) or more of the members.

SECTION 4. NOTICE OF MEETINGS

(a) Time of Notice. Whenever members are required or permitted to take action at a meeting, a written notice of the meeting shall be given by the Secretary of the corporation not less than ten (10) nor more than ninety (90) days before the date of the meeting to each member who, on the record date for the notice of the meeting, is entitled to vote thereat, provided, however, that if notice is given by mail, and the notice is not mailed by first-class, registered, or certified mail, that notice shall be given twenty (20) days before the meeting.

(b) Manner of Giving Notice. Notice of a members' meeting or any report shall be given either personally or by mail or other means of written communication, addressed to the member at the address of such member appearing on the books of the corporation or given by the member to the corporation for the purpose of notice; or if no address appears or is given, at the place where the principal office of the corporation is located or by publication of notice of the meeting at least once in a newspaper of general circulation in the county in which the principal office is located. Notice shall be deemed to have been given at the time when delivered personally or deposited in the mail or sent by facsimile or other means of written communication.

(c) Contents of Notice. Notice of a membership meeting shall state the place, date, and time of the meeting and (1) in the case of a special meeting, the general nature of the business to be transacted, and no other business may be transacted, or (2) in the case of a regular meeting, those matters which the Board, at the time notice is given, intends to present for action by the members. Subject to any provision to the contrary contained in these Bylaws, however, any proper matter may be presented at a regular meeting for such action. The notice of any meeting of members at which Directors are to be elected shall include the names of all those who are nominees at the time notice is given to members.

(d) Notice of Meetings Called by Members. If a special meeting is called by members as authorized by these Bylaws, the request for the meeting shall be submitted in writing, specifying the general nature of the business proposed to be transacted and shall be delivered

personally or sent by registered mail or by facsimile to the Chairperson of the Board, President, Vice President or Secretary of the corporation. The officer receiving the request shall promptly cause notice to be given to the members entitled to vote that a meeting will be held, stating the date of the meeting. The date for such meeting shall be fixed by the Board and shall not be less than thirty-five (35) nor more than ninety (90) days after the receipt of the request for the meeting by the officer. If the notice is not given within twenty (20) days after the receipt of the request, persons calling the meeting may give the notice themselves.

(e) Waiver of Notice of Meetings. The transactions of any meeting of members, however called and noticed, and wherever held, shall be as valid as though taken at a meeting duly held after regular call and notice, if a quorum is present either in person or by proxy, and if, either before or after the meeting, each of the persons entitled to vote, not present in person or by proxy, signs a written waiver of notice or a consent to the holding of the meeting or an approval of the minutes thereof. All such waivers, consents and approvals shall be filed with the corporate records or made a part of the minutes of the meeting. Waiver of notices or consents need not specify either the business to be transacted or the purpose of any regular or special meeting of members, except that if action is taken or proposed to be taken for approval of any of the matters specified in subparagraph (f) of this section, the waiver of notice or consent shall state the general nature of the proposal.

(f) Special Notice Rules for Approving Certain Proposals. If action is proposed to be taken or is taken with respect to the following proposals, such action shall be invalid unless unanimously approved by those entitled to vote or unless the general nature of the proposal is stated in the notice of meeting or in any written waiver of notice:

- (1) Removal of Directors without cause;
- (2) Filling of vacancies on the Board by members;
- (3) Amending the Articles of Incorporation; and
- (4) An election to voluntarily wind up and dissolve the corporation.

SECTION 5. QUORUM FOR MEETINGS

A quorum shall consist of fifty percent (50%) plus one of the voting members of the corporation.

The members present at a duly called and held meeting at which a quorum is initially present may continue to do business notwithstanding the loss of a quorum at the meeting due to a withdrawal of members from the meeting provided that any action taken after the loss of a quorum must be approved by at least a majority of the members required to constitute a quorum.

In the absence of a quorum, any meeting of the members may be adjourned from time to time by the vote of a majority of the votes represented in person or by proxy at the meeting, but no other business shall be transacted at such meeting.

When a meeting is adjourned for lack of a sufficient number of members at the meeting or otherwise, it shall not be necessary to give any notice of the time and place of the adjourned meeting or of the business to be transacted at such meeting other than by announcement at the meeting at which the adjournment is taken of the time and place of the adjourned meeting. However, if after the adjournment a new record date is fixed for notice or voting, a notice of the adjourned meeting shall be given to each member who, on the record date for notice of the meeting, is entitled to vote at the meeting. A meeting

shall not be adjourned for more than forty-five (45) days.

Notwithstanding any other provision of this Article, if this corporation authorizes members to conduct a meeting with a quorum of less than one-third (1/3) of the voting power, then, if less than one-third (1/3) of the voting power actually attends a regular meeting, in person or by proxy, then no action may be taken on a matter unless the general nature of the matter was stated in the notice of the regular meeting.

SECTION 6. MAJORITY ACTION AS MEMBERSHIP ACTION

Every act or decision done or made by a majority of voting members present in person or by proxy at a duly held meeting at which a quorum is present is the act of the members, unless the law, the Articles of Incorporation of this corporation, or these Bylaws require a greater number.

SECTION 7. VOTING RIGHTS

Each member state agency or their appointed representative shall have one vote. Voting at duly held meetings shall be by voice vote. Election of Directors, however, shall be by ballot.

SECTION 8. PROXY VOTING

Members entitled to vote shall be permitted to vote or act by proxy. If membership voting by proxy is not allowed by the preceding sentence, no provision in this or other sections of these Bylaws referring to proxy voting shall be construed to permit any member to vote or act by proxy.

If membership voting by proxy is allowed, members entitled to vote shall have the right to vote either in person or by a written proxy executed by such person or by his or her duly authorized agent and filed with the Secretary of the corporation, provided, however, that no proxy shall be valid after eleven (11) months from the date of its execution unless otherwise provided in the proxy. In any case, however, the maximum term of any proxy shall be three (3) years from the date of its execution. No proxy shall be irrevocable and may be revoked following the procedures given in Section 5613 of the California Nonprofit Public Benefit Corporation Law.

If membership voting by proxy is allowed, all proxies shall state the general nature of the matter to be voted on and, in the case of a proxy given to vote for the election of Directors, shall list those persons who were nominees at the time the notice of the vote for election of Directors was given to the members. In any election of Directors, any proxy which is marked by a member "withhold" or otherwise marked in a manner indicating that the authority to vote for the election of Directors is withheld shall not be voted either for or against the election of a Director.

If membership voting by proxy is allowed, proxies shall afford an opportunity for the member to specify a choice between approval and disapproval for each matter or group of related matters intended, at the time the proxy is distributed, to be acted upon at the meeting for which the proxy is solicited. The proxy shall also provide that when the person solicited specifies a choice with respect to any such matter, the vote shall be cast in accordance therewith.

SECTION 9. CONDUCT OF MEETINGS

Meetings of members shall be presided over by the Chairperson of the Board, or, if there is no Chairperson, by the President of the corporation or, in his or her absence, by the Vice President of the corporation or, in the absence of all of these persons, by a Chairperson chosen by a majority of the voting members, present in person or by proxy. The Secretary of the corporation shall act as Secretary of all meetings of members, provided that, in his or her absence, the presiding officer shall appoint another person to act as Secretary of the Meeting.

Meetings shall be governed by Robert's Rules of Order, as such rules may be revised from time to time, insofar as such rules are not inconsistent with or in conflict with these Bylaws, with the Articles of Incorporation of this corporation, or with any provision of law.

SECTION 10. ACTION BY WRITTEN BALLOT WITHOUT A MEETING

Any action which may be taken at any regular or special meeting of members may be taken without a meeting if the corporation distributes a written ballot to each member entitled to vote on the matter. The ballot shall set forth the proposed action, provide an opportunity to specify approval or disapproval of each proposal, provide that where the person solicited specifies a choice with respect to any such proposal the vote shall be cast in accordance therewith, and provide a reasonable time within which to return the ballot to the corporation. Ballots shall be mailed or delivered in the manner required for giving notice of meetings specified in Section 4(b) of this Article.

All written ballots shall also indicate the number of responses needed to meet the quorum requirement and, except for ballots soliciting votes for the election of Directors, shall state the percentage of approvals necessary to pass the measure submitted. The ballots must specify the time by which they must be received by the corporation in order to be counted.

Approval of action by written ballot shall be valid only when the number of votes cast by ballot within the time period specified equals or exceeds the quorum required to be present at a meeting authorizing the action, and the number of approvals equals or exceeds the number of votes that would be required to approve the action at a meeting at which the total number of votes cast was the same as the number of votes cast by ballot.

Directors shall be elected by written ballot. Such ballots for the election of Directors shall list the persons nominated at the time the ballots are mailed or delivered. If any such ballots are marked "withhold" or otherwise marked in a manner indicating that the authority to vote for the election of Directors is withheld, they shall not be counted as votes either for or against the election of a Director.

A written ballot may not be revoked after its receipt by the corporation or its deposit in the mail, whichever occurs first.

SECTION 11. REASONABLE NOMINATION AND ELECTION PROCEDURES

This corporation shall make available to members reasonable nomination and election procedures with respect to the election of Directors by members. Such procedures shall be reasonable given the nature, size and operations of the corporation, and shall include:

- (a) A reasonable means of nominating persons for election as Directors.
- (b) A reasonable opportunity for a nominee to communicate to the members the nominee's qualifications and the reasons for the nominee's candidacy.
- (c) A reasonable opportunity for all nominees to solicit votes.
- (d) A reasonable opportunity for all members to choose among the nominees.

Upon the written request by any nominee for election to the Board and the payment with such request of the reasonable costs of mailing (including postage), the corporation shall, within ten (10) business days after such request (provided payment has been made) mail to all members or such portion of them that the nominee may reasonably specify, any material which the nominee shall furnish and which is reasonably related to the election, unless the corporation within five (5) business days after the request allows the nominee, at

the corporation's option, the right to do either of the following:

(1) inspect and copy the record of all members' names, addresses and voting rights, at reasonable times, upon five (5) business days' prior written demand upon the corporation, which demand shall state the purpose for which the inspection rights are requested; or

(2) obtain from the Secretary, upon written demand and payment of a reasonable charge, a list of the names, addresses and voting rights of those members entitled to vote for the election of Directors, as of the most recent record date for which it has been compiled or as of any date specified by the nominee subsequent to the date of demand.

The demand shall state the purpose for which the list is requested and the membership list shall be made available on or before the later of ten (10) business days after the demand is received or after the date specified therein as the date as of which the list is to be compiled.

If the corporation distributes any written election material soliciting votes for any nominee for Director at the corporation's expense, it shall make available, at the corporation's expense, to each other nominee, in or with the same material, the same amount of space that is provided any other nominee, with equal prominence, to be used by the nominee for a purpose reasonably related to the election.

Generally, any person who is qualified to be elected to the Board of Directors shall be nominated at the annual meeting of members held for the purpose of electing Directors by any member present at the meeting in person or by proxy. However, if the corporation has five hundred (500) or more members, any of the additional nomination procedures specified in subsections (a) and (b) of Section 5221 of the California Nonprofit Public Benefit Corporation Law may be used to nominate persons for election to the Board of Directors.

If this corporation has five thousand (5,000) or more members, then the nomination and election procedures specified in Section 5522 of the California Nonprofit Public Benefit Corporation Law shall be followed by this corporation in nominating and electing persons to the Board of Directors.

SECTION 12. ACTION BY UNANIMOUS WRITTEN CONSENT WITHOUT MEETING

Except as otherwise provided in these Bylaws, any action required or permitted to be taken by the members may be taken without a meeting, if all members shall individually or collectively consent in writing to the action. The written consent or consents shall be filed with the minutes of the proceedings of the members. The action by written consent shall have the same force and effect as the unanimous vote of the members.

SECTION 13. RECORD DATE FOR MEETINGS

The record date for purposes of determining the members entitled to notice, voting rights, written ballot rights, or any other right with respect to a meeting of members or any other lawful membership action, shall be fixed pursuant to Section 5611 of the California Nonprofit Public Benefit Corporation Law.

ARTICLE 14 AFFILIATES

SECTION 1. DETERMINATION AND RIGHTS OF AFFILIATES

Except as expressly provided in or authorized by the Articles of Incorporation or Bylaws of this corporation, all affiliates shall have the same rights, privileges, restrictions and conditions.

SECTION 2. QUALIFICATIONS OF AFFILIATES

The qualifications for affiliation in this corporation are as follows: An affiliate is defined as a non-member of the Western States Seismic Policy Council who is from a state, regional, county, or local government or governmental agency in a state of the United States, a United States territory, a Canadian province, a Canadian territory or a state of Mexico; a private corporation; a non-profit organization; a university or department of a university; or a private citizen residing in a member state, province or territory.

SECTION 3. ADMISSION OF AFFILIATES

Requests for affiliation into Western States Seismic Policy Council must be in writing to the Board of Directors. The Board of Directors will review the application and make its decision known to the membership at the annual meeting.

SECTION 4. FEES, DUES AND ASSESSMENTS

(a) There shall be no fee charged for making application for affiliation in the corporation.

(b) There shall be the option of creating an annual dues structure payable to the corporation by affiliates.

SECTION 5. NUMBER OF AFFILIATES

There is no limit on the number of affiliates the corporation may admit.

SECTION 6. NONLIABILITY OF AFFILIATES

An affiliate of this corporation is not, as such, personally liable for the debts, liabilities, or obligations of the corporation.

SECTION 7. NONTRANSFERABILITY OF AFFILIATION

No affiliate may transfer an affiliation or any right arising therefrom. All rights of affiliation cease upon the affiliate's death or termination.

SECTION 8. TERMINATION OF AFFILIATION

(a) Grounds for Termination. The affiliation of an affiliate shall terminate upon the occurrence of any of the following events:

(1) Upon his or her notice of such termination delivered to the President or Secretary of the corporation personally or by mail, such affiliation to terminate upon the date of delivery of the notice or date of deposit in the mail.

(2) Upon a determination by the Board of Directors that the affiliate has engaged in conduct materially and seriously prejudicial to the interests or purposes of the corporation.

(3) If this corporation has provided for the payment of dues by affiliate, upon a failure to renew his or her affiliation by paying dues on or before their due date, such termination to be effective thirty (30) days after a written notification of delinquency is given personally or mailed to such affiliate by the Secretary of the corporation. An affiliate may avoid such termination by paying the amount of delinquent dues within a thirty (30)-day period following the affiliate's receipt of the written notification of delinquency.

SECTION 9. RIGHTS ON TERMINATION OF AFFILIATION

All rights of an affiliate in the corporation shall cease on termination of affiliation as herein provided.

WSSPC Conference Evaluation

September 30-October 3, 2007 Reno, Nevada

1. What did you like MOST and LEAST about the conference?

2. How effective was the overall conference in helping you achieve your personal conference goals? Please circle:
1 2 3 4 5

NOT EFFECTIVE

HIGHLY EFFECTIVE

If you didn't rate the conference a 5, what improvement would you recommend to give it a 5?

3. Please rate the relevance of each of the conference sessions to you:

WSSPC Opening Session *LOW* 1 2 3 4 5 *HIGH*

Comments: _____

**EQ Hazards and Building Codes
Joint WSSPC-ICC Education Session**

LOW 1 2 3 4 5 *HIGH*

Comments: _____

Effectively Communicating EQ Risk Mitigation

LOW 1 2 3 4 5 *HIGH*

Comments: _____

EQ Scenarios & Performance-Based Codes

LOW 1 2 3 4 5 *HIGH*

Comments: _____

4. What suggestions do you have for the next WSSPC Conference?

Please return to the WSSPC Registration Desk by Wednesday Noon.

After that, FAX to WSSPC at 916-444-8077. We appreciate the feedback!

Name (Optional): _____ **email** _____