
SUMMARY MINUTES

NEVADA EARTHQUAKE SAFETY COUNCIL (NESC)

The Nevada Earthquake Safety Council (NESC) met from 9:00 a.m. to approximately 4:00 p.m. at the University of Nevada, Reno Reynolds School of Journalism, Room 304, 1664 N Virginia Street, Reno, NV. These and previous minutes are posted on the NESC website (<http://www.nbmng.unr.edu/nesc/index.html>).

Ron Lynn chaired the meeting. Individuals attending the meeting are members of the Council:

John G. Anderson, NV Seismological Laboratory (NSL)
Elizabeth Ashby, Nevada Division of Emergency Management (DEM)
Alan Bennett*, City of Reno
Ian Buckle*, Civil & Environmental Engineering UNR
Craig dePolo, Nevada Bureau of Mines and Geology (NBMG)
Diane dePolo, Nevada Seismological Laboratory (NSL)
Rick Diebold, Las Vegas Office of Emergency Management
Bill Hammond, Nevada Bureau of Mines and Geology (NBMG)
Jeffrey Hahn, Corporate Emergency Management, Boyd Gaming Corporation, Las Vegas
Jenelle Hopkins*, Clark County School District, Las Vegas
Eric Hubbard*, Geological consultant, Reno
Graham Kent*, Nevada Seismological Laboratory (NSL)
Samantha Laditch, NV Attorney General's Office
Jennifer Lynette, Federal Emergency Management Agency, Region IX
Ron Lynn*, Clark County Department of Development Services
Henna Rasul, NV Attorney General's Office
Jim Reagan*, NV Energy
Woody Savage*, U.S. Geological Survey (retired)
Ken Smith, Nevada Seismological Laboratory (NSL)
Jim Walker*, Nevada Department of Transportation (NDOT)
Erik Williams, Nevada Seismological Laboratory (NSL)

* Indicates member of the Board of Directors.

Members of the Board of Directors and Guest Speakers who were unable to attend:

Mike Blakely*, Blakely, Johnson, and Ghushn

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Jeffrey Brewer*, American Red Cross, Las Vegas
Wayne Carlson*, Nevada Public Agency Insurance Pool
Joe Curtis*, Storey County Emergency Management
Steven Koenig*, City Center, Las Vegas
Jim O'Donnell*, Geophysical Contractor, Boulder City
Christine Quatro, Reno Chamber of Commerce
Wanda Taylor*, UNLV Department of Geoscience
Jess Traver*, Northern Nevada Builders Association
Jim Werle*, Converse Consultants

A quorum of directors (the necessary 11) was not present.

The minutes of the May, 2012 meeting was unanimously approved.

THE CANTERBURY EARTHQUAKES 2010 -11: AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE.

Ian Buckle, Director of Civil Engineering Earthquake Research at UNR, outlined the fault architecture in New Zealand. In particular, he highlighted that Wellington was at greatest risk for a large damaging earthquake due to its proximity to the Alpine fault. Ironically, Christchurch was not thought to be at a high risk from a large damaging earthquake, but the Canterbury sequence showed the folly of that argument. Dr. Buckle said that the country has a good record of following seismic codes and building to them (for their more recent buildings).

He showed a slide of earthquake epicenters in New Zealand from 2002-2012. This mapped provided context to the larger tectonic environment that consists of subduction zones at either end of the island(s) and the large strike-slip Alpine fault slicing through the south and north islands. The largest historical earthquake in New Zealand was in 1855, and was a magnitude M8.2 near Wellington. Five earthquakes have occurred in the last 50 years that were greater than magnitude M 6.5. An earthquake in Napier in 1931 left 256 dead. The June and December 2011 Canterbury earthquake aftershocks left the Christchurch area with significant damage and it has been New Zealand's costliest disaster hitting \$20-30 billion USD, which is 10-20% of GDP. In comparison, the Tohoku M9.0 event off of Japan and the ensuing nuclear disaster was only ~2.2% of GDP.

Ian showed a slide of the earthquake damage in Christchurch from Port Hills on February 22, 2011. The mid-afternoon earthquake left a big dust cloud in the middle of the city. He explained that the dust is from collapsed masonry and concrete structures; he mentioned reports of people ranging from severe respiratory problems to dying from asphyxiation—not necessarily from earthquake structural collapse.

Ian said the type of damage that occurred to the masonry structures in New Zealand isn't new and has been documented before (in NZ and elsewhere). Interestingly, he said that the most damage from these events seemed to happen to homes that were wood frame (stick construction) with a brick façade (with the latter part peeling off).

The cathedral in Christchurch is causing the gravest concern. It lost its steeple and stained glass windows. The Church of England owns the building and they've decided that they can't afford to fix this church since there are so many others with earthquake damage in the area. So, they started the demolition of the building. The church is a landmark building and it's so popular that even people with no affiliation are donating money to fix the cathedral structure.

Liquefaction is seen throughout the area and is responsible for the many sinkholes that dot the region; also parts of Christchurch are now below sea level because of ground settling issues post earthquakes. He next showed a slide of back fill behind a bridge due to liquefaction. It looked as though the asphalt had been bunched up in front of the bridge. He said the bridge is structurally OK, but the abutment is now misaligned and the long-term solution is to take it apart and fix it.

He also showed a slide of the collapse of concrete structures, including the Pyne Gould Guinness Building and CTV. He asked the question why these building, if built to code, still collapsed? They are now looking at the damaged buildings to find answers. He then talked about the CTV building, which also collapsed. The owner had brought in an engineer for an opinion, who said it needed to be retrofitted (which was done), but it wasn't adequate enough. 115 people died in the CTV building collapse during the earthquake.

Dr. Buckle showed a slide of the AMI Sports Stadium, which visibly looks OK, but has nevertheless been condemned. He explained that most of the public buildings have been condemned. The city engineer said that the buildings were up to code, since people were able to get out of them, even though they were condemned afterwards because they couldn't withstand another earthquake.

The reasons for damage were the higher than expected ground motions, poor soil conditions under most of the city, that most of the buildings predate modern codes, and retrofitting was sporadic. Damage to bridges was light and newer buildings did well.

The financial impact was the loss of 1400 commercial properties, and 10,000 homes were demolished. It's estimated that the cost will be \$20 billion USD to respond, repair and rebuild. 20 billion is 3.7 times the net assets of the city of Christchurch and recovery is only feasible with outside help. 20 billion is 11.8% of New Zealand's gross domestic product (GDP). The Tohoku earthquake in Japan was only 2.2% of Japan's GDP.

Christchurch is under pressure to sell its assets to cover "infrastructure" costs. Instead, the city has proposed a property tax increase of 1.76% and reduced spending for next 20 years. The city of Christchurch has put out a draft annual plan for 2012-2013 and has asked for public comments on the plan. The plan also asks for public input on rebuilding the city.

Unanticipated consequences of earthquakes such as the Canterbury sequence include the break-up of communities, the migration of people and businesses to other regions, a decline in tax revenues, and employee concern about workplace safety. Workers have

been going to their unions requiring employers to bring buildings up to code. If this happened, most of Wellington would be on strike because the buildings can't be certified as being safe.

Ian's conclusion of the situation in New Zealand is that we need to invest in the safety of our buildings to insure that such a disaster would not be as devastating in the U.S. (including Reno for example).

Woody Savage asked if Ian was aware of processes that could be implemented for the building of more resilient buildings. Ian said education was the key, and to fight back and say that buildings aren't safe even if they're cheaper to build, and there's a long term cost when disaster strikes.

Ken Smith asked if retrofitting was prevention? What would the cost be for say the City of Reno? Ian answered that he wasn't sure what the cost would be. Ron Lynn answered that FEMA shows that for every \$1 for prevention equals \$4 for the cost of mitigation. Graham Kent said that after a disaster the costs are much greater from the economic impact. The council discussed where those numbers could come from. Ron Lynn said that the building codes are only meant to protect life, limb and property and that society decides if these cities will be abandoned after a disaster. This point was debated and it was suggested that it was the engineers who ensured if these buildings/cities were safe after the disasters, not society as a whole. Craig dePolo suggested that the Earthquake Engineering Research Institute (EERI) should be in charge of educating engineers about this issue.

CHANGES TO THE NEVADA OPEN MEETING LAW

Henna Rasul from the Nevada Attorney General's office introduced herself and said that she oversees many boards in the state, and since we're a public body, the Nevada Earthquake Safety Council (NESC) would be subject to Nevada's open meeting law. She explained that the open meeting law applies not only to the NESC, but also to its subcommittees. She said that she would be attending our future meetings in Reno, and would be available to offer us advice on the application of open meeting law.

Ron Lynn asked if the meetings could be conducted by teleconference, or video to which Henna said yes they could be. Jim Regan asked about how the law applied to working groups vs. committees? Henna said that they were both subject to the law and that either one has to be open to the public. Jenelle Hopkins then asked if sub-committee members could ask questions of each other via email. Henna explained that you could not have a quorum of members communicating via email without having a meeting, that includes posting an agenda. She said that communications via email without a public forum is considered circumvention of the law (up to a \$500 fine per person and per violation).

Henna said our agenda looks like it is in compliance with the law. She gave the example of a "member of the public" who files a complaint: then the body has to add to its agenda that it violated the law. The Attorney General's Office may seek civil penalties if

you knowingly violate the open meeting law and that fines can be up to \$500 per member.

Diane dePolo asked how they could communicate with other members of the sub-committees if such restrictions were put in place?

There was lively debate between many of the NESC committee members as to which communications between committee members could be construed as being connected to NESC and which were not, since many members of the council work with each other in professional capacities outside of council business, but communicate with each other on the same subjects that are discussed by the Council and its committees or similar subjects.

The question was also asked if communications that create the agenda are in violation of the law? Samantha Laditch from the Attorney General's Office said no, since Elizabeth Ashby and Erik Williams aren't members of NESC, then their communications to the other council members are not considered in violation of the law

Henna will ask the open meeting law expert from her office to come to an upcoming meeting and give his presentation

REPORT FROM THE AWARENESS AND EDUCATION COMMITTEE.

Diane dePolo, committee co-chair, discussed her progress on 2012 Great Nevada ShakeOut and continued contacts with the Nevada Business Community. As of this morning 88,882 people have signed up for ShakeOut. Chrisie Quatro won't be attending due to illness. She will be sending her PowerPoint. All of the school districts have been contacted. Almost ½ of the school districts have new superintendents which makes it more difficult since the contacts have changed but; Diane is working through that issue. Craig suggested that we have information on hospitals and they may pursue that avenue. Jenelle is trying to get the word out on ShakeOut 2012 as well.

REPORT FROM THE RESEARCH COMMITTEE.

Report on sponsorship of the Association of Engineering Geologists Annual Meeting symposium, planning for a Las Vegas Earthquake Planning Scenario, and possible activities for the 1915 Pleasant Valley earthquake centennial. Craig reported 2015 will be anniversary of biggest earthquake in NV history. One idea is to begin a special volume about earthquakes in the Basin and Range, and publish in on the anniversary. They will be looking for cultural anecdotes for the volume. Perhaps making some form of a media event about the anniversary with the historical society would be worthy of pursuit. Or maybe get the annual SSA meeting going for that event. Craig is continuing to think about doing an "Earthquake Scenario" for Las Vegas that would cost approx. \$200K with a match. He asked if there would be any way to solicit donations from Las Vegas. He also asked for ideas for this project. On another note,

Craig said paleoseismic trenches will be open in the Carson City area starting on Monday.

REPORT FROM THE STRATEGIC PLANNING COMMITTEE.

Jim Regan noted that the strategic planning committee submitted their report for 2011 and there was only one correction to the annual report. There will be a vote for its submission at the next meeting.

REPORT FROM THE COMMITTEE ON VISITORS.

Jeff Hahn reported that his company was going through their properties in Las Vegas for related earthquake emergency procedures. He said that their old approach was dated, and he brought to the council a template for Casino/Resort Emergency Response Plans.

Woody Savage asked who the plan was directed to? Jeff said that it would be directed to their employees. He said it's a broad overview of what to do but how does he get ACT-20 for his facilities personnel?

Elizabeth Ashby suggested that Jennifer Lynette would be the person to contact for ACT-20 training. Jennifer said they could arrange a training date but the minimum number of people is 25.

Ron Lynn said his office would do the training as well. Alan Bennett said that that he could give some left over materials from a previous ACT training class; he would contact Jeff Hahn.

Craig dePolo asked what is the resistance, if any, for an emergency info placard on the back of the hotel room door. Jeff said that they don't name the instructions as "for earthquake", since they are more appropriate for fires rather than anything else. Woody Savage suggested that the audience (who it's for) should be added to the top of the template.

REPORT FROM THE NEVADA WORKING GROUP ON QUATERNARY FAULT SURFACE RUPTURE HAZARDS.

Eric Hubbard presented a short discussion on the timeline for the completion of the working groups activities and will distribute abstracts to the upcoming surface rupture symposium.

Eric Hubbard highlighted that the working group on quaternary fault surface rupture hazards is putting on a symposium next month in AEG in Salt Lake City regarding fault surface rupture. This discussion will help them draft a white paper to the council. There will be a panel discussion at this conference regarding this endeavor.

BYLAWS REVISIONS FOR NESC

Elizabeth Ashby reported that the proposed changes to the bylaws were made so there would be a consistent format for all committees under DEM, and to meet with open meeting law requirements.

Graham Kent asked if having legislators' serve on the council is a good idea with respect to maintaining a quorum from meeting to meeting. He explained that their absence might raise the possibility that the council would have no quorum in attendance. Henna Rasul said that we could have a legislator without worrying about a quorum because a vacant seat doesn't count towards the quorum. Ron Lynn asked if the Deputy Nevada Attorney General for the Council could help address balancing the committees with regards to Northern and Southern Nevada membership. He said that the lack of balance between the two halves of the state has caused problems in the past.

Ron Lynn also suggested the possibility that the council meet via teleconference, or videoconference because we can't vote with a 2/3 majority, and remove the rule from the bylaws that an item up for vote must be discussed at two consecutive meetings.

Graham Kent proposed that we could get more public participation by holding the meetings at UNR/UNLV and have a keynote speaker in the evening. Ron Lynn argued that it would be inconsistent to have a speaker one day, and the meeting the next morning. Graham asked if this could be possible if we changed the times that the council meets. Ron suggested that Staff look into the costs of the issue.

Jim Regan asked if these revisions are new bylaws, or a correction to the existing bylaws. Elizabeth Ashby said that this was just a draft that's open to suggestions. Henna Rasul said that these are an amendment to the existing bylaws.

REPORT FROM THE NOMINATING COMMITTEE.

Elizabeth Ashby reported that we still have two vacancies on the council from the legislature, and we have a request in to fill those positions. Ron Lynn asked if we have another vacancy with the Insurance Industry. Elizabeth said that we do, and Craig dePolo suggested we contact someone who was involved with the Wells quake who is in the insurance industry. Elizabeth said that she knew of an individual and would contact them soon.

REPORT FROM THE DIVISION OF EMERGENCY MANAGEMENT

Elizabeth Ashby reported that the Nevada National Guard is doing an earthquake scenario in Las Vegas. She said that there are several exercises pending. Ms. Ashby said they have emergency support function presentations available for preview. Elizabeth will give Erik Williams the schedule to distribute to the council members. Jeff Hahn asked if they have video conferencing capability for people in Las Vegas to participate in those exercises. Elizabeth said yes they do.

Elizabeth also reported that the current grant opportunities are with the National Earthquake Hazards Reduction Program (NEHRP), and that the hazard mitigation program is currently on hold. She said that the Nevada Division of Emergency Management (DEM) still taking notices of intent for those projects.

PRESENTATION ABOUT THE HOMELAND SECURITY GRANT PROCESS IN NEVADA

Rick Diebold from Las Vegas Emergency Management showed Nevada's complicated process, guidelines, and the documentation necessary to apply for funding under this grant program. He explained that the Emergency Management Preparedness Grant (EMPG) is a funding stream for emergency management agencies from local, tribal and states offered by Federal Emergency Management Agency (FEMA) and by the Department of Homeland Security (DHS).

He explained that there are various funding streams for these grants, which include: Law Enforcement Terrorism Prevention Activity (LETA), the Citizens Corp Program (CCP), the Metropolitan Medical Response System (MMRS), the Urban Area Security Initiative (UASI), and the Homeland Security grant program (HSGP). He said that various restrictions apply to these grants, and that this year the funding streams are UASI, and HSGP. He also said that the program funding is shrinking rapidly.

He outlined the core program priorities, which are protecting the United States from terrorist threats, securing the nation's borders, facilitating legal immigration and

naturalizing new Americans, while prosecuting those who violate the country's laws, and helping communities prepare, respond, and recover from disasters.

He said that the Homeland Security Commission sets their priorities and that if your proposal's goals fit the commission's goals; you can then submit the proposals that best fit into their priorities. He said that after one's proposal is complete and you have the support of a project lead, you can then send it to the Homeland Security Group. He said that it could be three weeks to a month before you'll receive notification.

Elizabeth Ashby said that these grant proposals should go through the Nevada Division of Emergency Management.

Graham Kent asked where a grant for seismometers located at schools would go. Rick Diebold suggested critical infrastructure. Graham asked for further clarification on who the grant proposal would go to, and who would manage the grant. Elizabeth suggested that Graham talk to the project lead for that funding stream.

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) REGION IX UPDATE

Jennifer Lynette talked about the National Earthquake Hazards Reduction Program (NEHRP) agreements and said there are some changes concerning the cost share matches for those programs and said that they're still being reviewed.

She thanked Alan Bennett, and the City of Reno, for the National Earthquake Technical Assistance Program (NETAP) training. She said they have a lot of funding that will be available for training next year. Alan thanked her in return for arranging for the training. Jennifer said that it was no problem, and that she can help anyone receive the same type of training.

She reminded the council that FEMA has free publications available and to get any needed orders in now because the orders take 4-6 weeks to fulfill. She also mentioned their free publications located on their web site. Jennifer also brought several CD's with her to the meeting, including: "Rapid Visual Screening of Buildings for Potential Seismic Hazards", "Rapid Observation of Vulnerability and Estimation of Risk", and ATC 20-1 "Field Manual Post Earthquake Safety Evaluation of Buildings". All CDs are available for distribution.

INCREASING BUSINESSES PARTICIPATION IN THE GREAT NEVADA SHAKE OUT

Christine Quatro was unable to attend the meeting.

RECENT GEODETIC RESEARCH RESULTS FROM THE NEVADA GEODETIC LABORATORY

Nevada Geodetic Laboratory, part of Nevada Bureau of Mines and Geology (NBMG), does both basic and applied research. They also provide education in geodetic techniques, process and analyze GPS data, and maintain solutions for an extensive Global array of GPS sensors. Their regional network, which is called Mobile Array of GPS for Nevada Trans-tension (MAGNET) spans the Great Basin. They can provide rapid access to results that are available after collection of data (by-in-large most instruments are not available in real-time). They respond to large earthquakes, and check the coseismic deformation (change in line lengths or strain) after the earthquake. Their main tool, GPS, can very precisely measure changes in line length to about a millimeter.

Bill Hammond showed a slide of the GPS data from one of their stations, and a 40mm drift of the station over a 10-year period. He showed a slide of MAGNET with a mobile array of GPS sensors and said that for Nevada's transtensional environment, they can survey a lot of sites with less cost and more efficiently.

He showed a map of their network and the other adjacent networks, remarking that they process the GPS data from all of these networks together to be able to formulate their results. He showed a summary map of the various domains and rates of movement within Nevada/Eastern California and the rates of movement within these geological boundaries. He also showed a slide of the geological movement of North America that highlights that most of the Basin and Range movement is located in W. Nevada/E, California, due to movement of the Sierra Nevada microplate. He showed the Strain Rate Map from NBMG that shows the "geodetic strain rate model for the Pacific-North American Plate Boundary, Western United States".

He showed block models of several regions within Nevada, which highlights an analytical technique for using GPS data to estimate the slip rates on faults. He said that if you think of the Earth as a spherical map with sliding shells (aka plate tectonics) one can take measurements of their motion using GPS.

He showed a map that estimated slip rates that made the comparison between the slip rates estimated geologically, and the slip rates according to GPS. It does show that GPS is a good tool for estimating slip rates. GPS shows greater slip rates when compared to the geological earthquake record.

The vertical rate of movement from GPS time series shows that the Western slope of the Sierra Nevada is popping up 1-2 mm per year. Bill also showed GPS velocities that contrast the Sierra Nevada uplift with Eastern Nevada as it is much more stable than the Western portion.

He said that they have models of post seismic deformation from different areas of Nevada (big earthquakes like Dixie Valley). He also said that their data show an upward "doming" trend for central Nevada.

John Anderson asked if measurements were taken in the valleys as well as the mountains. Bill responded that they generally look for hard rock (high sites) since it doesn't affect their instrumentation because of water issues.

He showed a profile of vertical GPS velocity across the state and then a slide about the post-seismic models. He also discussed Interferometric Synthetic Aperture Radar (InSAR) results aligned with GPS. What does the data mean for the age of the range Sierra Nevada Range? It shows 6 million years as an age for the elevation of the range. You can either argue that the Sierra Nevada range has been growing according to other studies, or you can assume that it's ancient and that there's some other factor at work that's created the basin range.

He said they're frequently asked the question "What about erosion rates?" His answer is that Geodesy doesn't measure these rates, because they're probably less than one tenth of a millimeter per year and won't make much difference in the face of geologic uplift.

2012 INTERNATIONAL CODE COUNCIL CODE (ICC) ADOPTION STATUS FOR NORTHERN NEVADA

Alan Bennet said that these codes need to be adopted by local planning commissions, city councils etc. He said that Reno, Carson City, Lyon County, and Storey County, are all making an effort to use the same building codes to make it easier for developers.

The codes will have different amendments for different areas of the state. For instance most of the amendments are for environmental factors that affect different areas of the state according to climate (wind loads, snow loads, etc.,). He said that there are other issues that come to light within the amendments. He gave an example of some seismic standards that were written into the amendments. He brought up the ICC code adoption to NESC as information about some of these amendments. He said that the new amendments include maps from the United States Geological Survey (USGS) that show fault locations, and the engineers don't want to do the additional calculations to determine the location of the building sites. He said the codes could be adopted somewhere between April - July for the 2012 codes.

DISCUSSION OF THE URM JOINT RESOLUTION WITH THE UTAH SEISMIC SAFETY COMMISSION

Ron Lynn reported that there is no new news on the joint resolution.

EARTHQUAKE UPDATE (INFORMATION/DISCUSSION) – KEN SMITH

Ken Smith's presentation highlighted the most recent earthquakes in Nevada concentrating on a swarm of earthquakes that have occurred in the Sierraville, CA area, which has shown a lot of earthquake activity during the last few years. He showed the Nevada Seismological Lab's (NSL) earthquake monitoring stations that detected the activity in that area. Ken explained that there have been numerous small earthquakes in the area over the past few months. Other areas of activity include Hawthorne, Nevada, which has seen quite a lot of activity these past few years—and not just associated with the 2011 earthquake swarm. Also Ken reported some relatively large events near Incline Village, Nevada and north of Pyramid Lake, Nevada.

M9 MEGATHRUST EARTHQUAKES IN CASCADIA –

AN OFFSHORE PERSPECTIVE

Graham Kent reported on recent ocean expedition, where he went off the coast of Washington State to image the geometry of the megathrust fault system that will give rise to very large earthquakes in the future. He showed slides from the Cascadia trip he took aboard the R/V Marcus Langseth, a National Science Foundation (NSF) owned vessel that at one time was owned by the oil industry (M/V Western Legend). Graham said that this particular subduction zone is capable of generating earthquakes up to a magnitude M9.2 affecting areas from Northern California to British Columbia.

He showed an image of the Megathrust M 9.2 capable subduction zone off the coast of the Pacific Northwest. The zone goes from Northern California to Vancouver Island. He explained that the Juan de Fuca tectonic plate is subducting beneath the North American plate, and that friction with the North American plate is creating magma under North Western U.S. giving rise to volcanoes such as Mount St. Helens.

He said that the Cascadia project has also been deploying broadband seismometers and high-data-rate GPS instruments to survey the area. These data will also feed into future scenarios of ground shaking. Graham showed a slide of unreinforced Masonry buildings (URM's) in the Pacific Northwest and pointed out that they have some of the most egregious URM's given the faults near by and potential ground motion.

He showed an airgun array that makes sounds pulses that travel through the Earth and are ultimately recorded on receiver array (i.e., streamer). He showed a slide of their 5-mile-long hydrophone array that was used for testing. He also showed faults in the sediment of the ocean floor near the toe of the subduction zone.

Jim Reagan said that a national collaboration of utility companies are planning a scenario about a possible large seismic event taking place on this fault zone.

Eric Hubbard asked about where the magnitude 9.2 number came from? Graham answered that there are some paleoseismic data that shows that some fault movement may have occurred on small segments of the fault, while other data suggest are some that the entire fault ruptures resulting in an estimated 9.2 earthquake. Both may be true, but at different times.

LESSONS FROM THE 2011 JAPAN EARTHQUAKES FOR GROUND MOTION HAZARDS IN NEVADA (PRESENTATION/DISCUSSION) – JOHN ANDERSON

Dr. Anderson reported that the Cascadia subduction zone has the potential for an earthquake the same size as the 2011 Tohoku earthquake (MW=9.0). Reno is near enough to Cascadia that an M9 Cascadia event would be felt here. At equivalent distances in Japan, it appears that there was no damage during the Tohoku earthquake. Dr. Anderson does not rule out the possibility of damage to fragile URMs in Reno, since that type of construction is not present in Japan. A more serious concern is triggered earthquakes throughout Nevada, considering that there were several triggered events throughout Japan, and that Nevada has seen earthquakes triggered by several other causes including the Landers earthquake in southern California.

A second lesson comes from ground motions in an earthquake triggered by the 2011 Tohoku event. The Fukushima Hamadori earthquake occurred on April 11, 2011, one month after the Tohoku earthquake. This had a normal faulting mechanism, i.e. the same type of event as is prevalent in Nevada, and moment magnitude Mw=6.7. The earthquake caused surface rupture of up to 2 meters. This is by far the most thoroughly recorded normal faulting earthquake in the world. The amplitudes of these ground motions are significantly greater than the amplitudes predicted by the NGA ground motion prediction equations. The NGA equations were used by the US Geological Survey to calculate the 2008 National Seismic Hazard Map. For that reason, Dr. Anderson is concerned that the hazard on the 2008 map may be underestimated.

The meeting adjourned at approximately 3:30 P.M.

Respectfully submitted, Graham Kent
NEVADA EARTHQUAKE SAFETY COUNCIL
C/O NEVADA SEISMOLOGICAL LABORATORY
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NEVADA EARTHQUAKE SAFETY COUNCIL

Members of the Board of Directors and Officers

(As of August 8, 2012)

Business and Industry, Southern Nevada	Steve Koenig Bellagio Resorts
Business and Industry, Northern Nevada	Jess Traver Builders Association of Northern Nevada
Insurance Industry (statewide)	vacant
State Government (statewide)	Jim Walker Nevada Department of Transportation
Local Government, City	Wayne Carlson Nevada Public Agency Insurance Pool
Local Government, County	Joe Curtis Storey County Emergency Management
Seismology (statewide)	Graham Kent Nevada Seismological Laboratory (UNR)
Geosciences, Southern Nevada	Woody Savage U.S. Geological Survey (retired)
Geosciences, Northern Nevada	vacant
Engineering, Southern Nevada	Jim Werle Converse Consultants (Las Vegas)
Engineering, Northern Nevada	Mike Blakely Structural Engineers Association of NV
Education (statewide)	Jenelle Hopkins Clark County School District, Las Vegas
Community Organizations, Southern Nevada	Jeffrey Brewer American Red Cross
Community Organizations, Northern Nevada	Jim Reagan Sierra Pacific Power Company
University, Southern Nevada	Wanda Taylor UNLV Geoscience Department
University, Northern Nevada	Ian Buckle UNR Center for Civil Engineering Earthquake Research
Building Official, Southern Nevada	Ronald L. Lynn Clark County Department of Development Services
Building Official, Northern Nevada	Alan Bennett City of Reno
State Senate	vacant Nevada State Senator
State Assembly	vacant Nevada State Assemblyperson

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Member at Large, Southern Nevada

Jim O'Donnell
UNLV

Member at Large, Northern Nevada

Eric Hubbard
Geological consultant, Reno

Members of the Executive Committee

Chair

Ronald L. Lynn

First Vice Chair-South

Wanda Taylor

First Vice Chair-North

Jim Reagan

Second Vice Chair-South

Jim Werle

Second Vice Chair-North

vacant

Secretary

Graham Kent

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