State Of California

ALFRED E. ALQUIST SEISMIC SAFETY COMMISSION

Governor Edmund G. Brown Jr.

Granlibakken Conference Center
725 Granlibakken Road
Sunnyside-Tahoe City, California
Minutes of August 12, 2014 Regular Meeting

Members Present

Timothy Strack, Chairman
Tracy Johnson, Vice Chair
Greg Beroza
Salud Carbajal
Michael Gardner
Mark Ghilarducci
Randall Goodwin
Peggy Hellweg
Elizabeth Hess (for Ken Cooley)
Helen Knudson
Emir Macari
Ian Parkinson
David Rabbit
Fuad Sweiss

Commissioners Absent

Jim McGowan
Kit Miyamoto
Daniel Torrez (for Ellen Corbett)

Staff Present

Richard McCarthy, Executive Director
Karen Cogan, Administrative Officer
Robert Anderson, Senior Engineering Geologist
Henry Reyes, Special Projects Manager
Fred Turner, Structural Engineer

I. CALL TO ORDER/ROLL CALL

Chairman Timothy Strack called the regular meeting of the Alfred E. Alquist Seismic Safety Commission to order at 3:00 p.m. and welcomed all participants. Administrative Officer Karen Cogan called the roll and noted a quorum was not yet present.

Executive Director Richard McCarthy suggested deferring approval of the minutes until another commissioner arrived.

III. CHAIRMAN'S REMARKS (Out of Order)

Introduction of New Commissioner Ian Parkinson

Chairman Strack welcomed the Commission's newest member, Ian Parkinson, from San Luis Obispo. Commissioners and staff took turns introducing themselves. Commissioner Parkinson said he was a 31-year law enforcement veteran, currently serving as the sheriff/coroner in San Luis Obispo County, home of the Diablo Canyon power plant.

Report on Meeting with Jet Propulsion Lab

Chairman Strack reported that he, Mr. McCarthy, Secretary Anna Caballero, and others visited the Jet Propulsion Laboratory (JPL) for a comprehensive overview of their work in the areas of ground motion and spatial measurement technology. He noted that JPL is interested in partnering with the state in seismic projects and water resources work.

Mr. McCarthy said Dr. Woon and Dr. Ohn were in the audience, along with representatives from the Nevada Seismological Laboratory. He suggested having guests and audience members introduce themselves. Mr. Graham Kent and representatives from Nevada took turns introducing themselves.

Committee Assignments

Mr. McCarthy drew attention to the proposed committee rosters and described each committee's purpose. He said he was representing the Commission on the Earthquake Early Warning Group, and he suggested that commissioners serve on the following working groups: Commissioner Tracy Johnson on the Management Working Group, Commissioner Michael Gardner on the Stakeholder Liaison Working Group, Commissioner Parkinson on the Funding Options Working Group, Commissioner Greg Beroza on the Modeling Working Group, Commissioner Peggy Hellweg on the Standards Working Group, and Commissioner Helen Knudson on the Education and Training Working Group.

Commissioner Hellweg said her recollection was that the Commission's representative on the Stakeholder Liaison Working Group would serve as the chair of that group. Mr. McCarthy indicated that he would check on that provision. Commissioner Hellweg expressed her support for Commissioner Gardner chairing that working group.

Mr. McCarthy reviewed the proposed rosters for the other committees. He said he was aware the Governor's office was interviewing candidates for the Commission's insurance representative, and he recommended appointing that person to the Insurance Committee. Mr. McCarthy proposed that Commissioner Widom serve as the Commission's representative on the State Historical Buildings Safety Board, Commissioner Jim McGowan serve on the Hospital Building Safety Board, and Commissioner Parkinson and Ms. Cogan serve on the Cal-EMA Statewide Emergency meeting. Mr. McCarthy suggested having Commissioner Macari report on liaison work with Mexico.

II. APPROVAL OF MAY 8, 2014 MINUTES (Continued)

Chairman Strack noted that a quorum was present, and he recommended approving the May 8 minutes.

ACTION: Commissioner Gardner made a motion, seconded by Commissioner Randall Goodwin, that:

Commissioner Knudson pointed out that the tally for that vote on the election of the new chair should be "14 – 0 – 2," not "14 – 0 – 1," and that Commissioners McGowan and Knudson abstained.

The Commission approve the minutes of the May 8 meeting as amended.

* Motion carried, 10 – 0 (Commissioners Beroza, Carbajal, Ghilarducci, and Hess absent during voting.)

IV. EXECUTIVE DIRECTOR'S REPORT

Budget

Mr. McCarthy said it was too early in the fiscal year to provide reliable budget projections but more data would be available at the October meeting. He explained that the Commission pays Contracted Fiscal Services (CFS) to handle its accounting functions, and their rate increased from $64,000 to $73,000 this year with a increase to $84,000 next year. McCarthy added that the Commission's available overhead reimbursement for research projects is more than sufficient to cover that amount. Ms. Cogan pointed out that the Commission will also have some savings for a few months of the vacant position.

Commissioner Ghilarducci offered to check with OES staff to see if another group could provide accounting services for the Commission at a lower cost. Mr. McCarthy thanked Commissioner Ghilarducci for his assistance.

Mr. McCarthy said he hoped to have more accurate projects for the Commission to review at the October meeting.

Filling Staff Services Manager I Specialist Position

Mr. McCarthy informed the Commission that Legislative and Special Projects Manager David King had resigned to accept a position with a Regional Water Quality Control District. He said the staff has updated the job description and recruiting would begin soon for the Staff Services Manager I Specialist, a position that entails both legislative and budgeting responsibilities.

V. OCTOBER MEETING IN SAN FRANCISCO

Chairman Strack invited Commissioner Fuad Sweiss to provide an update on plans for the Commission's October 9 meeting in San Francisco.

Commissioner Sweiss noted the Commission voted last fall to move the Commission's regular September meeting to October 9, 2014, in San Francisco, to coincide with the 25th anniversary of the Loma Prieta earthquake. He said he booked the Board of Supervisors Chamber at City Hall and invited Mayor Lee, Board of Supervisors President David Chu, and City Administrator Naomi Kelly to address the Commission. He noted that San Francisco has been engaged in many projects to prepare for the next major earthquake. Commissioner Sweiss stated that he

intended to invite the heads of the police and fire departments, the Director of Emergency Management, and other departmental directors.

Commissioner Sweiss advised that a number of people have requested an opportunity to make presentations at the October 9 meeting, including the City's Resiliency Director, Patrick Otellini, who has been working on the City's soft-story ordinance and seismic upgrades of private schools in San Francisco. He said Mr. Otellini will describe a special funding program the City has established to assist owners of soft-story buildings in retrofitting their buildings. Commissioner Sweiss noted that others presenter will be Brian Strong, Director of Capital Planning; Ann Kronenberg, Director of Emergency Management; and Tom Huey, Director of the Building Department. He added that he had not yet invited a representative from the San Francisco Public Utilities Commission. He welcomed ideas and suggestions from commissioners about other potential speakers.

Commissioner Sweiss stated that the Commission's October 9 meeting at the Board of Supervisors Chamber will be aired live on SFTV and archived on the Website. He noted the Commission's visit to San Francisco coincides with Fleet Week, an annual event that includes seminars, exhibits, and exercises in emergency management. He said he emailed a Fleet Week calendar to the Commission staff and offered to send an updated version. He invited commissioners to contact him to arrange to participate in any of the Fleet Week seminars or activities. Commissioner Sweiss recommended booking hotel rooms fast because the City will be busy that week.

Ms. Cogan reported that she had reserved a block of rooms at the Hotel Whitcomb and would be sending email reminders to make reservations. Commissioner Sweiss observed that the hotel is only two blocks from City Hall and across the street from a BART station.

VI. LOMA PRIETA 25-YEAR ANNIVERSARY CONFERENCE

Mr. McCarthy advised the Commission that a conference will be held October 16 at Oakland's Kaiser Center from 9:00 a.m. to 5:00 p.m., and the official title of the conference is, "Loma Prieta 25: Still on Shaky Ground; Building Bay Area Resilience, a Public Policy Conference to Commemorate the 25th Anniversary of the Loma Prieta Earthquake and Support Future Resilience Action." Mr. McCarthy said the conference will focus on public policy and will consist of panels of decision-makers, local government representatives, and leaders of organizations, and the proposed format would be for panelists to make short presentations, and then engage the audience with questions.

Mr. McCarthy encouraged commissioners to consider attending the October 16 conference in San Francisco.

VII. UPDATE ON EARTHQUAKE EARLY WARNING SYSTEM

Commissioner Ghilarducci reported that progress was being made in small increments in a number of areas. He said people were working hard to develop the model for operating California's statewide system, but various issues still need to be addressed, including a

sustainable public-private financing source. He advised that certain potential government funding streams have been identified, and a number of private-sector investors have expressed interest in providing funding. Commissioner Ghilarducci stated that the working group had met with representatives of utilities, transportation systems, the insurance industry, and the Treasurer's office to consider funding options.

Commissioner Ghilarducci noted that key next steps will be arriving at a consensus on the model and the public and private messaging that will be communicated. He observed that the system has a great foundation, but much still needs to be done. He estimated a two-year rollout timeframe, but acknowledged that meeting this goal will be challenging.

Commissioner Ghilarducci remarked that California has been talking about an earthquake early warning system for 28 years, and although there has been some progress, the effort has been at a plateau for over a decade. He emphasized the need for a drastic change in approach in order to move forward rapidly.

Mr. McCarthy said Agency is very interested in assisting with funding for an earthquake early warning system. He urged the working group to institute a pilot program as quickly as possible to refine actual costs, time, and end results over a defined, short-term period. He noted that many people are concerned about the possibility and nuisance of false warnings, so an actual pilot program will provide evidence of how frequently that occurs.

Mr. McCarthy said representatives from the Japanese Chamber of Commerce will make a presentation at the October meeting about Japan's early warning system. He recommended inviting representatives from some of the 600 Japanese companies doing business in California to participate on the stakeholder groups to provide their input and perspective from what they experience in Japan.

Commissioner Ghilarducci advised that there are two pilot projects of the early warning system, a private-sector venture in the Coachella Valley and Imperial County, and a public-sector project in Long Beach. He said another private company has submitted a proposed project for Riverside Valley. He noted that California's effort has attracted interest from other potential partners. Commissioner Ghilarducci emphasized the importance of having sound standards and criteria in place for inclusion in California's network, noting that reliability is the number one requirement. He remarked that the systems in both Japan and Mexico have had issues pertaining to false positive warnings.

Commissioner Ghilarducci commented that he and many others are excited about the prospect of finally implementing an early warning system in California, but he stressed the need to conduct thorough evaluations and due diligence in these last stages to ensure that the system works as desired.

VIII. UPDATE ON GOVERNOR'S TRADE MISSION TO MEXICO: POTENTIAL PARTNERSHIPS/PROJECTS

Commissioner Ghilarducci reported that Governor Brown led a trade mission to Mexico in July that was a huge success. He said California officials had an opportunity to engage with counterparts in Mexico at the local, state, and federal level, as well as representatives from private-sector businesses and organizations. He stated that he and the director of Mexico's national emergency management agency led a working group in Mexico City to discuss Mexico's earthquake early warning system.

Commissioner Ghilarducci noted that Veracruz, Mexico, experienced a 6.5 magnitude earthquake three hours before the conference, which he felt on the 19th floor of his hotel, so this event served as a great platform to start the discussions. He said Mexican officials talked about the successes and challenges of their earthquake early warning system, and participants had a chance to see the real-time data. He observed that Mexico's system does not cover the entire country, and there are still problems with false positives. Commissioner Ghilarducci commented that the next step will be to disseminate early warning information via cell phones and other modern technology.

Commissioner Ghilarducci remarked that Mexican officials shared the lessons they learned, and the best result of the trade mission was identification of various partnership opportunities, particularly throughout Baja and the U.S. border. He said the developers of California's system hope to be able to exchange real-time information with the Mexican system, including ground motions, levels of shaking, and damage assessments, and there was considerable discussion at the meetings about these topics.

Commissioner Ghilarducci stated that the governor signed several agreements dealing with wide-ranging issues in climate, transportation, emergency management, education, security and law enforcement.

Commissioner Macari noted that the Mexican earthquake early warning system had issued a false positive warning earlier that day, which caused disruptions in traffic and other problems. He reported that he visited the early warning system facilities during the trip and was impressed with what he saw. He noted that the current director's goal is to become less focused on emergency management and more focused on research. He added that the system was initially formed after the 1985 Mexico City earthquake with funding from the Japanese government.

Commissioner Ghilarducci expressed support for working with the California Earthquake Authority to tie in with the early warning systems to encourage more people to purchase earthquake insurance.

IX. UPDATE ON COMMISSION'S ANNUAL REPORT & FINANCIAL INFORMATION SYSTEM FOR CALIFORNIA

Ms. Cogan reported that she planned to have a draft version of the annual fiscal report to the Commission for review at the October meeting and approval in December. She said the report needs to be submitted through the Agency Secretary and will probably be published in early 2015. She asked commissioners to review the report and contact her if they had any proposed changes.

X. OVERVIEW OF AUGUST 13 WORKSHOP WITH NEVADA EARTHQUAKE SAFETY COUNCIL

Mr. McCarthy expressed the Commission's pleasure for the opportunity to meet with the Nevada Earthquake Safety Council the following day. He said the Commission will hear presentations about geological conditions along the border and possible partnership projects. He noted that Secretary Anna Caballero would be present to discuss the joint projects.

Mr. McCarthy observed that this is the first time the Commission has held a joint meeting with a neighboring state counterpart. He said the Commission will hear presentations during the morning, followed by an opportunity to interact with Nevada representatives at lunch, and then consider recommendations about potential projects.

XI. PUBLIC COMMENT

Mr. Graham Kent, Nevada Seismological Laboratory, welcomed the Commission and expressed appreciation to the staff for arranging the meeting. He said he was excited to hear about some of the Commission's projects and looked forward to sharing information about Nevada's projects the next day. Mr. Kent noted that he planned to attend future Commission meetings, and he invited Commission representatives to attend Nevada meetings as well.

Chairman Strack thanked Mr. Kent and the Nevada Earthquake Safety Council for hosting the meeting.

XII. GOOD OF THE MEETING

Commissioner Hellweg announced that the Berkeley Seismological Laboratory at UC Berkeley will be hosting the third international meeting on earthquake early warning systems September 3 through 5 at Memorial Stadium, and she encouraged commissioners and staff to attend. She offered to provide more details about the Memorial Stadium seismic renovations and discuss the systems that exist with their developers and users. She noted the conference will be broadcast online, and she said she could provide a link and assist with registration for anyone interested in participating.

There were no other items brought to the Commission's attention.

XV. ADJOURN

There being no further business, the meeting was adjourned at 4:45 p.m.

_____
Sue Celli
Office Manager

Approved by:

_____
Richard McCarthy
Executive Director

State Of California

ALFRED E. ALQUIST SEISMIC SAFETY COMMISSION

Governor Edmund G. Brown Jr.

Granlibakken Conference Center
725 Granlibakken Road
Sunnyside-Tahoe City, California
Minutes of August 13, 2014 Joint Meeting

Commissioners
Timothy Strack, Chairman
Tracy Johnson, Vice Chair
Greg Beroza
Salud Carbajal
Michael Gardner
Randall Goodwin
Peggy Hellweg
Elizabeth Hess (for Ken Cooley)
Mark Johnson (for Mark Ghilarducci)
Helen Knudson
Emir Macari
Ian Parkinson
David Rabbit
Fuad Sweiss

Nevada Earthquake Safety Council Members
Ron Lynn, Chair
Michael Blakely
Ian Buckle
Craig de Polo
Jim Faulds
Jeff Hahn
Graham Kent
Connie Morton
Jim O'Donnell
Vance Payne
Woody Savage
Wanda Taylor
Jim Walker
Jim Werle

Commission Staff Present
Richard McCarthy, Executive Director
Karen Cogan, Administrative Officer
Robert Anderson, Sr. Engineering Geologist
Henry Reyes, Special Projects Manager
Fred Turner, Structural Engineer

NDEM Staff Present
Chris Smith, Chief
Debbie Tanaka
Janell Woodward

Others Present
Ron Blom, Jet Propulsion Laboratory
Anna Caballero, Secretary, California Business, Consumer Services, and Housing Agency
Tina Daley, California Business, Consumer Services, and Housing Agency
Diane de Polo, Nevada Seismological Laboratory
David Donovan, Hydrogeologist
Michael Hardy, FEMA
Gary Hourt, NDOT
Ann Kell, Nevada Seismological Laboratory
Jeff Lusk, FEMA
Robert McCord, FEMA
Dan Murphy, Small Business Development Centers
Dennis Nolan, State Public Works
Gus Nunez, State Public Works
Susan Owen, Jet Propulsion Laboratory
Ken Smith, Nevada Seismological Laboratory
Ross Stein, Global Earthquake Model
Kate Stillwell, Global Earthquake Model

I. CALL TO ORDER AND ROLL CALL

California Seismic Safety Commission Chairman Timothy Strack called the meeting to order at 9:30 a.m. and welcomed everyone to the first joint meeting of the Nevada Earthquake Safety Council (Council) and the California Seismic Safety Commission (Commission). He introduced Ms. Anna Caballero, Secretary, Business, Consumer Services, and Housing Agency, and thanked her for attending.

Chairman Strack asked all participants to identify themselves, and members of the Commission, Council, staff, guests, and audience introduced themselves.

II. INTRODUCTIONS AND OPENING STATEMENTS

Ron Lynn, Chair, Nevada Earthquake Safety Council, thanked Secretary Cabellero, the California Seismic Safety Commission, and the other guests for attending the meeting. He said California and Nevada have long had a mutually helpful relationship in terms of emergency and disaster response. He pointed out that the two states share a common boundary, seismic issues, and emergency management concerns. Mr. Lynn noted that the Nevada Earthquake Safety Council has met with counterparts in Utah, Colorado, and Idaho. He applauded this opportunity to develop greater synergy and stronger partnerships.

Mr. Lynn stated that the Nevada Earthquake Safety Council has been active for many years. He said key products include strategic plans, NASA plans, seismic policies, state legislative initiatives, and influence on local adoption of codes to deal with surface fault ruptures, liquefaction, and other issues.

Mr. Lynn noted that California is a fantastic partner to share information with Nevada, and he welcomed the opportunity to work together.

III. EARTHQUAKE PRIMER

Historical Earthquakes on the California-Nevada Border

Mr. Craig de Polo, Nevada Bureau of Mines and Geology, gave a presentation about historical earthquakes along the border of California and Nevada. He showed a map of earthquake faults along the California-Nevada border; reviewed large earthquakes in the past; discussed intensities, far-field shaking effects, and seismic triggering of earthquakes; mentioned collateral hazards; and identified earthquake response challenges along the border.

Mr. de Polo noted there were about 35 known historical earthquakes of magnitude 6 or greater, many of which caused damage in both Nevada and California, including a 7.9 earthquake in 1872 at Owens Valley. He discussed some of the large earthquakes and the types of damage they produced. He talked about intervals between events, and pointed out that some events are multiple-earthquake sequences occurring over days or weeks, a factor that has great importance during response and recovery times. Mr. de Polo showed photographs of some of the damage

from historical earthquakes. He observed that there would be much more extensive damage if some of those earthquakes occurred today.

Mr. de Polo discussed the potential for far-field effects of earthquakes along the California-Nevada border, including pockets of high ground-shaking intensities in locations as far away as Sacramento. He advised that officials in Nevada worry about the threat of a Death Valley earthquake causing strong motions in the Las Vegas basin and other areas.

Mr. de Polo cautioned that there is evidence suggesting that earthquakes in one area can trigger seismic events in other areas, and he displayed maps showing the locations and timing of past earthquakes.

Mr. de Polo said potential collateral hazards include miles of surface faulting, landslides, rock falls, snow avalanches, liquefaction, lake tsunami and lake seiche events, fires sparked by rock falls. He noted that earthquake response challenges include terrain, mountain valleys and passes, inhospitable weather, and weak buildings. He displayed a map showing unreinforced masonry buildings in Reno. He acknowledged that most of Nevada consists of open space, with large populations centered in two areas, Las Vegas and Reno, but an earthquake affecting either of those areas could be very disruptive. Mr. de Polo emphasized the need for public education and preparedness.

Earthquake Potential in the Tahoe-Truckee Corridor

Mr. Graham Kent, Nevada Seismological Laboratory, gave a presentation about seismic risks in the Tahoe-Truckee area. He said a major seismic event about 50,000 years ago generated a huge mega-slide on the west shore of Lake Tahoe and a seiche that would have catastrophic effects if they were to occur today. He advised that Lake Tahoe does experience tsunamis about 10 meters high every few thousand years. Mr. Kent added that there are historic reports of waves 40 to 50 feet high near Cave Rock. He advocated more modeling of smaller landslides to identify factors that generate large waves.

Mr. Kent commented that Lake Tahoe has not experienced much seismic activity for nearly sixty years, and the population of Nevada increased 13 times since then. He presented a map depicting Great Basin seismicity over past years. He pointed out the potential for lots of earthquakes in the Walker Lake area, and he traced the edge of the Great Valley-Sierra Microplate moving toward the northwest.

Mr. Kent said the Truckee Basin includes three normal faults that are part of the same fault system. He stated that the hole that became Lake Tahoe was created as the result of 500 to 1,000 earthquakes; and the rest of the last two million years has been polishing and moving soil around. He reported that paleoseismic trenching on both sides of the lake has revealed more data about the West Tahoe Fault. He noted that researchers started their imaging studies in the water, and then expanded the imaging effort to the surface around Incline Village. He remarked that the Tahoe-Truckee area, like Cascadia, tends to have steep walls, so every strong shake produces a slide, and studying sedimentation records and turbidites helps date those historic events. Mr. Kent advised that Lake Tahoe has been having major slides approximately every 750 years.

Mr. Kent said new LIDAR evidence was collected in 2010, and scientists have now been able to create a reliable and comprehensive map of the land and water in the Lake Tahoe Basin.

Mr. Kent described the seismicity of the area around Truckee. He showed a map depicting normal faulting transitioning to strike-slip faults. He pointed out that a magnitude-6 earthquake on the Dog Valley Fault in the 1960's caused damage on the campus of the University of Nevada at Reno, and the fault system near Truckee area is capable of producing magnitude-7 events. Mr. Kent showed maps of faulting in the Donner Lake area near Highway 80. He said scientists have found evidence of three major events that caused large slides, and one was likely a magnitude-9 Cascadia event at Mohawk Valley and the Tahoe Fault concurrently. Mr. Kent noted that the concept of multiple events and seismic triggers is a hot topic for future research.

Chairman Strack thanked Mr. de Polo and Mr. Kent for the overview.

IV. PRESENTATION BY THE NEVADA EARTHQUAKE SAFETY COUNCIL

Background

Mr. Lynn described the background and composition of the Nevada Earthquake Safety Council. He said the organization's biggest challenge is getting the message of preparedness and safety to members of the public in the north, south, and rural parts of the state. He noted that having such a large tourist population is an ongoing challenge, and many building owners construct structures that exceed current code requirements to ensure occupant safety and business functionality.

Mr. Lynn stated that Nevada's participation in the great Shake-Out event is second only to California's. He said important Nevada Earthquake Safety Council products include Surface Fault Rupture Guidelines, Liquefaction Guidelines, and Rock Wall Guidelines. He noted that the Nevada Seismological Laboratory received awards from the Nevada Earthquake Safety Council and the Western States Seismic Policy Council for its cost-effective building retrofit.

Mr. Lynn reported that the Nevada Earthquake Safety Council is using FEMA funds to develop a proposal to retrofit the state's 24,000-plus unreinforced masonry buildings (URM's). He said the plan calls for compliance with certain standards and a choice of retrofit, future occupancy restrictions, or demolition. He talked about buildings in Carson City and Reno that had been retrofitted.

Goals

Mr. Lynn said the Nevada Earthquake Safety Council's goal is to work with its neighbors and share information for the benefits of citizens in the western United States. He pointed out that a disaster in one state will take resources from all its neighbors in order to recover in an effective manner.

Chairman Strack thanked Mr. Lynn for his presentation.

V. PRESENTATION BY THE CALIFORNIA SEISMIC SAFETY COMMISSION

Background

Executive Director Richard McCarthy described the background and composition of the California Seismic Safety Commission. He invited participants to listen to the presentations on current and future projects to identify potential partnership opportunities.

Global Earthquake Model

Mr. McCarthy introduced Dr. Ross Stein and Ms. Kate Stillwell, Global Earthquake Model (GEM), and said the Commission is pleased to be a member of GEM to advance programs for earthquake risk reduction worldwide. He invited Dr. Stein to describe GEM in more detail.

Dr. Stein talked about his recent trip to Kenya to help establish a school in an outlying village. He said that when he visited the site, he noticed that it was directly over a major fault in the Rift Valley, so the school his group had worked so hard to build would be a clear collapse risk to the students. He noted that none of the sponsoring agencies, including the charity in Kenya, the charity in Kenya, or the government of Kenya had any idea the school site was so risky. Dr. Stein emphasized that this situation illustrates a widespread global problem: if people do not know about the risk, they cannot begin to address it. He added that the school easily could have been built differently, so the problem is a matter of education.

Dr. Stein displayed maps showing the seismicity of the area in Kenya where the school was built. He said the problem is magnified in other parts of the world, such as India and China. He pointed out the staggering number of people in dense urban areas who are vulnerable to earthquake hazards.

Dr. Stein stressed the need to make people aware of hazards as a first step in making changes in the way structures are built. He said GEM was founded five years ago to promote earthquake awareness, promote the use of building codes and financial risk transfer, and create a global model of seismic hazard occurrences. He noted that GEM's research will be of value both scientifically and for humanitarian purposes.

Dr. Stein said GEM's strategy is simple: 1) Collect global data sets for seismic hazard assessment; and 2) Develop an integrated seismic risk model that can be applied worldwide. He stated that GEM began by creating a global seismic data catalog for the last century, and then a global model of strain, that are combined global model of earthquake activity. Dr. Stein indicated that the model was about to be submitted for independent testing. He showed charts depicting results of applying the global model to particular past earthquakes and noted the consistency.

Dr. Stein observed that people need to know only when an earthquake will occur, but also where buildings are, a principle that applies in all disaster response. He said GEM has just begun developing a global building inventory showing building location and fragility.

Dr. Stein stated that GEM's software is completely open source, state-of-the-art, and cutting-edge, and available for the world to use. He showed examples of the OpenQuake platform. He presented a list of countries that plan to use the OpenQuake GEM software for their next national hazard models.

Dr. Stein projected maps and slides of Quito, Ecuador, a perched basin with about 1.6 million people on top of an active thrust fault. He said GEM's products allowed Ecuadorean scientists to develop their first-ever seismic model, which led the government to adopt its first-ever building code, which in turn led to earthquake insurance being offered to consumers. He pointed out that GEM's role is to empower scientists to improve seismic safety within their own countries. He expressed his appreciation to the Commission for helping GEM move ahead with projects consistent with its mission.

Ms. Stillwell noted that the Commission is a member of an impressive group of participants in GEM's public-private partnership, and she displayed a list of GEM sponsors and governing board members. She said GEM has engaged over 250 scientists around the world to work on its projects, and more than 350 users are testing the alpha version of the OpenQuake platform.

Ms. Stillwell stated that OpenQuake estimates the consequences of hypothetical or historical earthquake, both from a single event or a probabilistic suite of earthquakes. She noted that consequences including shaking, damage, cost of damage, and fatalities. She advised that with the Commission's assistance, OpenQuake will also be able to estimate recovery times. Ms. Stillwell displayed shaking and damage maps associated with a large earthquake in Istanbul.

Ms. Stillwell said GEM is developing a retrofit benefit tool to estimate damage before versus after an earthquake and compare costs and savings. She noted that GEM is creating a policy planning tool to estimate the effects of policy decisions and actions taken before an earthquake on recovery time, resulting in identification of specific actions and evidence of their effectiveness. She showed a graph depicting housing stock recovery time before and after certain types of mitigation.

Ms. Stillwell advised that the Commission is contributing $181,000 for a project that entails testing the underlying assumptions on model outputs. She noted that insurance industry representatives have expressed interest in this issue, so there is potential for future collaboration. She said the Commission is also contributing $440,000 for GEM's "Back to Normal" recovery modeling project. She observed that both of these projects leverage off prior investments and are being matched by funds from GEM.

Ms. Stillwell outlined some of GEM's goals for the next five years, including expansion of OpenQuake, integrating secondary hazards related to liquefaction, landslides, and fire following earthquakes. She remarked that GEM tackled some "big fish" in its first five years, but now that a global model is in place, GEM wants to expand the science through case studies and use them as the mechanism to further populate the global data sets and expand the science.

An audience member asked if the URM inventory mentioned by Mr. Lynn could be integrated into the global OpenQuake platform. Ms. Stillwell responded that Nevada's URM data might make a good case study on how damage in Las Vegas could affect California's economy.

Another person asked how OpenQuake was different from a system like the HAZUS model. Dr. Stein responded that OpenQuake is completely open, unlike HAZUS. He clarified that GEM's interest is not focused on post-earthquake issues; rather, GEM's goal is to understand the consequences of earthquakes and articulate them in ways that can influence decision-makers.

Mr. McCarthy thanked the guests for their remarks.

Jet Propulsion Laboratory

Mr. McCarthy noted that Secretary Caballero led a team that visited the Jet Propulsion Laboratory (JPL) to identify potential collaborative projects. He introduced Dr. Susan Owen and invited her to address the Commission.

Dr. Owen displayed a picture of the Mars Rover, one of JPL's most famous products. She introduced her associate, Dr. Ron Blom, and said she and Dr. Blom would be on hand after the presentation to answer questions.

Dr. Owen explained that JPL is a federally funded research and development center that is part of both NASA and Caltech. She said JPL has a diverse set of missions, using spacecraft and instruments to monitor changes in the atmosphere and the earth's surface. She stated that for many years, JPL has been working to improve understanding of earthquakes through imaging using data from space, with both GPS and radar technology. Dr. Owen showed a series of photos depicting displacements measured by GPS and instruments in space. She showed images from the Baja earthquake and pointed out areas of displacement. She said having very detailed mapping of deformation helps identify damaged areas.

Dr. Owen stated that JPL uses coherence change from radar to map earthquake damage. She displayed a shake map for the 2011 magnitude-6.3 earthquake near Christchurch, New Zealand. She showed a radar image of the damage estimated before the before and after images were available. She noted that projected areas of building collapse, liquefaction, and landslides matched consistently with the official maps released by the government months later.

Dr. Owen described how the same radar coherence change technology can be used to predict damage after other kinds of disasters, and she showed an example of typhoon-related damage in the Philippines. She noted that JPL worked with the Department of Homeland Security and NASA to develop a hand-held radar "finder" tool that can be used to detect heartbeats within rubble, a very useful technology for earthquake response.

Dr. Owen reported that JPL has been using UAVSAR, a new type of technology to measure deformations from earthquakes in California and identify likely infrastructure damage. She said this technology can be used to look at levees for deformation and seepage over time.

Dr. Owen stated that JPL is also involved in projects involving wildfire hazard and response, using data from space to estimate surface and fuel moisture content to predict fire hazards. She showed a map looking at the fire hazard in the area of last year's Rim Fire near Yosemite. Dr. Owen said JPL uses radar to map damage after wildfires to identify potential hazards from flooding or mud flows.

Dr. Owen noted that JPL also uses radar and airborne instruments to map subsidence and volume changes from groundwater or oil extraction in the Central Valley, assess landfill compaction, and detect citrus tree disease. She observed that many JPL projects are of great importance to both California and Nevada, and she said she looked forward to working with the California Seismic Safety Commission and Nevada Earthquake Safety Council.

Dr. Blom remarked that JPL has begun building the "finder" technology for the military, but JPL is still seeking a partner to build a "finder" tool for search-and-rescue applications. He estimated that each unit would cost about $10,000, and this tool could be very helpful for local agencies.

A participant asked how the device worked. Ms. Owen explained that the device emits a pulse of microwave radar, and if a person's heart is beating or breathing or moving enough, the microwave radar can detect that motion. She said the device takes about 30 seconds of measurements and about 60 seconds of analysis.

Chairman Strack thanked Dr. Owen and Dr. Blom for their presentation.

Disaster Resource Guide for Small Businesses

Mr. McCarthy introduced Mr. Dan Ripke, Small Business Development Centers (SBDC). He said the Commission contracted with SBDC to work with small businesses to develop a recovery guide for small businesses. He distributed extra copies and invited Mr. Murphy to discuss the guidebook.

Mr. Ripke noted that the guidebook is posted on the Commission's Website and SBDC Websites throughout the state. He said the guidebook provides a number of industry-specific, simple checklists covering both pre-disaster planning and post-disaster response.

Mr. Ripke explained that federal government established a network of Small Business Development Centers across the country in 1974 to provide one-on-one consultations and assistance for small businesses. He said SBDC serves about 65,000 small businesses per year across California and holds 5,000 training events for small businesses in California each year. He stated that California's 37 Small Business Development Centers are distributed based on population.

Mr. Ripke reported that the Commission contributed funds for SBDC to create a simple survey of small businesses to ascertain their levels of disaster preparedness. That survey identified seismic preparation as third on the list of small businesses' priorities, and most have done nothing to prepare for earthquakes. Mr. Ripke said the second phase of the project involved creating a resource guide to assist small businesses with disaster preparation. He noted that

SBDC made use of materials developed by other states to cope with disasters like hurricanes and floods. He encouraged participants to visit the SBDC Website to download a copy of the resource guide.

Mr. McCarthy recalled that the small businesses surveyed identified their greatest risks as, one, civil disobedience; number two, fire; and number three, earthquakes. He pointed out that the first two problems can occur as a result of the third. Mr. Murphy agreed, noting that power outages affect the ability of businesses to accept credit cards for payment, and many do not maintain a cash reserve for emergencies. He pointed out that stores often maintain an inventory of supplies that can help their communities until services are restored.

Guidebook for Local Governments to Manage the Risks of Collapse-Prone Buildings in California

Mr. McCarthy said the Cities of San Francisco and Los Angeles have established retrofit programs for different types of buildings, and some local jurisdictions have adopted mandates, but a mandate for all local governments in California is not feasible politically. He noted the Secretary suggested that the Commission consider promulgating guidelines for local governments to help them deal with collapse-prone buildings within their jurisdictions, citing case studies and success stories, and providing contact and resource information for local governments. Mr. McCarthy indicated that Staff Structural Engineer Fred Turner and a Commission committee have been working on this project, and he asked Mr. Turner to describe the guidebook in more detail.

Mr. Turner stated that the Commission has an existing guidebook that was produced over twenty years ago for unreinforced masonry buildings, and this effort was essentially an updating and expansion of that document to address other types of collapse-prone buildings. He advised that the revised guidebook was currently in a rough draft state. He said the Commission hired an editor and graphic artist, and the staff is working on an executive summary. Mr. Turner observed that the 60-page, in-depth, detailed narrative will likely become an appendix to the main 10-page document.

Mr. Turner commented that Nevada's building stock is very different from California's, a factor that needs to be taken into account when setting priorities. He said Nevada has 2.8 million people and 24,000 URM's, 12 to 15 times more URM's on a per-capita basis than California. He noted that California has about 34 million people and about 30,000 URM's. He added that Utah has far more URM's than either California or Nevada.

Mr. Turner stated that inventories and characterizations of collapse-prone risks vary dramatically from one community to another, so the guidebook focuses on more common types of collapse-prone buildings, including URM's, concrete soft-story apartment buildings, and tilt-ups. He noted that only one out 150 buildings in California are known to be collapse-prone, a very small percentage.

Mr. Turner described the four steps the guidebook suggests for local governments to manage their risks: 1) Create opportunities for the public to engage in a dialogue, gain an understanding

of the relative risks, and participate in decisions about buildings; 2) Estimate the size and the nature of the collapse risk; 3) Develop one or more of the seven options to identify and mitigate collapse risks; and 4) Consider incentives, financing mechanisms, future land use policies to encourage mitigation, and rigorous regulatory oversight. Mr. Turner said local governments also need a plan to manage risks and expedite recovery after future earthquakes. He advocated management by metrics to monitor long-term progress and revise strategies over time.

Mr. Turner said the guidebook's draft executive summary will be ready for dissemination soon. He noted the committee will decide what materials, checklists, success stories, and references should be included in the appendices. He added that the issue of whether the guidebook will be published in hard-copy form as well as electronically has not yet been decided. He welcomed feedback from Nevada participants.

A Council member observed that the federal government offers community block grants for energy conservation without any regard as to the structural condition of a building, so it is up to local building departments to review the building to confirm their suitability for improvements. Mr. Turner said California has a number of parallels, including façade improvement programs that allow new paint and signs on buildings that later fall down.

Commissioner Gardner remarked that many old and vulnerable buildings are cherished by their communities because of their historic nature, so retrofit might be preferable to replacement in those cases. He cautioned that states need to avoid giving a perception that their regulations are unfriendly to businesses.

A Council member commented that tourists to Nevada enjoy the old buildings in Virginia City. He expressed his opinion that building owners should bear some of the responsibility to keep their structures safe. Mr. Turner observed that there are a number of historic building financing mechanisms, including a federal tax credit and a proposed state tax credit for historic building renovations.

Participants talked about mitigation programs for historic buildings and noted there are few programs available to deal with unsafe, non-historic buildings.

One Council member pointed out that the only reliable way for a local jurisdiction to deal with collapse-prone buildings was to impose a mandate. He said that in large cities like San Francisco, the costs of economic disruption and shutdown would be far greater than the cost of upgrading the building, but this attitude is not shared by many people in Nevada.

At 12:00 noon, the joint meeting was recessed for lunch. Chairman Strack reconvened the joint meeting at 1:15 p.m.

VI. OPENING REMARKS

Secretary Anna Caballero, California Business, Consumer Services, and Housing Agency, extended greetings from Governor Brown, and she expressed her appreciation to the improvements in the state's economy during his administration. She said she was quite interested to hear about Nevada's and California's mutual interests in seismic safety and ways to work collaboratively. She recommended bringing other states in the region into these kinds of discussions.

Secretary Caballero noted that her own mother volunteered as a nurse for Red Cross for many years and stressed individual preparedness. However, many people have become complacent and have not been conscientious about earthquake preparedness, so the government faces a constant education process to increase the community's understanding of how to prepare, both as individuals and as businesses. She said California officials have meet with people in Japan many times after earthquakes, and the national level of public education, awareness, preparedness in Japan has always been very impressive. She advocated projects with other states and countries to share data and utilize the best information available to reduce earthquake damage and facilitate recovery. Secretary Caballero pointed out that California needs to be prepared for other disasters like tsunamis and fire after earthquakes. She thanked the Commission and the Council for providing this opportunity for California and Nevada to work together.

Chairman Strack expressed the Commission's appreciation to Secretary Caballero for her support and assistance.

V. PRESENTATION BY THE CALIFORNIA SEISMIC SAFETY COMMISSION (Continued)

Chairman Strack suggested spending the rest of the meeting brainstorming about potential joint projects. He invited everyone to attend the next Commission meeting on October 9 in San Francisco.

Commissioner Macari suggested talking about the five Commission-sponsored projects listed on the agenda as a starting point for discussion.

Selected Project Examples

<u>Seismic Hazard Investigation of Lake Tahoe</u>

Mr. McCarthy reported that the Commission had sponsored a hazard survey at Lake Tahoe to identify seismic risk throughout the Lake Tahoe Basin. He added that he would provid written descriptions of each project after the meeting.

Fire Following Earthquake

Mr. McCarthy said the public in California tends to focus on "Drop, Cover, and Hold On" and dealing with shaking issues, but little attention is paid to the threat of fire following earthquakes. He noted that losses from fires following earthquakes under strong wind conditions have been huge, especially in Southern California.

Totally Unprepared – Native American Outreach

Mr. McCarthy advised that the Commission is sponsoring an outreach campaign using social media to spread messages about preparedness. He said the award-winning project "Totally Unprepared" campaign was a partnership with the California Office of Emergency Services and California Earthquake Authority. He encouraged participants to visit the Totally Unprepared Website to see examples of the video spots.

Mr. McCarthy noted that Governor Brown has a new outreach program to Native American communities, who tend to be vulnerable populations in California. He suggested that Nevada might want to consider joint venture opportunities in this area.

Earthquakes and California Agriculture: Where are the Vulnerabilities?

Mr. McCarthy said agriculture, including planted crops, cattle, and poultry, is California's largest industry, accounting for $40 million per year. He stated that the Commission sponsored a study to examine vulnerabilities in specific sectors of the agriculture industry, and the second phase will entail finding ways to reach out to vulnerable facilities. He observed that processing facilities are often the most vulnerable, and they are also critical links in the supply chain.

Post-Disaster Economic Recovery Plan Project

Mr. McCarthy reported that the Commission worked with Deloitte to survey business customers around the world to find out what is being done to help industries recover after disasters. He said California respondents said they would like to see an agency like Red Cross for companies. He encouraged participants to read the study and welcomed suggestions before embarking on phase two of that study.

Other Projects

Mr. McCarthy advised that the Commission is planning to sponsor a law enforcement project, perhaps dealing with post-disaster cybersecurity.

Mr. McCarthy encouraged commissioners to review the description of the proposed projects so they are prepared to discuss them at the October meeting in San Francisco.

VII. DISCUSSION AND IDENTIFICATION OF COMMON AREAS OF INTEREST AND POTENTIAL JOINT PROJECTS FOR PARTNERSHIPS

Commissioner Sweiss commented that listening to the presentations displays the wealth of expertise and knowledge of the Commission and the Council. He expressed support for the idea of pooling resources and sharing ideas as a way of moving projects of joint interest forward.

Mr. Lynn cautioned that Nevada is a small state, and the same people have been involved in the Council for many years. Like many small organizations, the Council lacks the budget and staff necessary to accomplish as much as California.

Mr. Lynn expressed support for the Commission and the Council sharing their programs and projects with each other.

Commissioner Hellweg suggested arranging future meetings with counterparts in other states, and she encouraged Nevada to reach out to neighboring states. She said she spoke with a representative from Alaska who expressed interest in talking with people in California.

Commissioner Hellweg noted that induced seismicity has been identified as a big problem in California, whether from geothermal resource development, fracking, or oil and gas production. She welcomed Nevada's input on those issues.

Commissioner Randall Goodwin expressed concern that some local building departments, especially in smaller jurisdictions, are quietly being privatized. He observed that as traditional regulatory staff people retired or left, and the recession caused many engineering and design schools in California close, local jurisdictions were forced to turn elsewhere.

A Council member pointed out that Nevada transmits data for California's seismic network in both northern California and Caltech in southern California. He said Nevada would be particularly interested in enhancing the seismic instrumentation in the state's urban areas and receiving information from the earthquake early warning system.

Chairman Strack asked if Nevada considered installing instruments at unpopulated locations in its remote desert areas to provide early warnings to people in the urban centers. The Council member said central and eastern Nevada are currently sparsely covered, but efforts are being made to build out basic capabilities statewide.

Commissioner Parkinson said he had a special interest in fire and response issues, including use of volunteers to supplement scarce resources in some disaster areas. He noted that fire resources can be depleted quickly during the post-disaster response period, so having a plan to manage volunteers would help officials deploy resources most effectively. He expressed interest in working together to create such a plan that can be shared with local response agencies.

Nevada representatives pointed out that it can be easier and faster for response crews from Nevada to reach certain areas along the border than for California crews to respond. They

expressed support for the idea of collaborating and sharing resources that will encourage citizens of both states to be better prepared for earthquakes.

Commissioner Hellweg observed that the Earthquake Engineering Research Institute (EERI) provides teams of trained people to inspect and red-tag buildings after disasters. She suggested that Nevada find ways of establishing similar programs to identify structural problems.

A FEMA representative noted that FEMA sponsors a number of emergency management classes. He encouraged the Commission and the Council to identify particular areas that FEMA and OES can address through their recovery divisions to move programs forward in both California and Nevada. He added that funds are available in next year's budget for this kind of joint effort.

Mr. Jeff Lusk, FEMA talked about EMAC, the Emergency Mutual Aid Cooperative, a network that defines standards of care and dispatches trained emergency response teams to disasters in other states. He suggested that the Commission and Council invite a presentation on EMAC's capabilities at a future meeting.

Chairman Strack talked about his experiences as a member of a Hurricane Katrina response team. He noted there is often a flurry of activity in the period soon after a disaster, but people become complacent over time.

A Council member pointed out that in the period immediate following an earthquake, design professionals are busy with their own families as well as their clients, so mutual aid teams are essential to fill the gaps after a devastating event.

Commissioner Macari observed that some utility companies have arrangements to help each other out after big storms.

A Nevada representative commented that with 5,000 URM's in Reno alone, Nevada will need considerable help after a large earthquake. He expressed support for having a plan in place before an event to ensure adequate outside assistance to deal with the expected level of damage.

A Council member asked about Caltrans' role in response and recovery after a large earthquake in California. Chairman Strack responded that the Commission's enabling legislation did not provide for Caltrans representation on the Commission, but Caltrans works closely with Cal OES and other state agencies. Mr. McCarthy clarified that legislation was passed about five years ago to include representatives from OES, the Building Standards Commission, and the State Architect on the Commission.

Commissioner Hellweg commented that over the years, the Commission has looked at a variety of infrastructure issues involving BART, utility companies, telecommunications, and transportation. She said all of these issues are highlighted in the state's five-year plan. She suggested sharing the five-year plan with the Nevada Council as a basis for discussion.

Commissioner Macari talked about his work as director of the California Smart Grid Center at Sacramento State. He advised that he gave a presentation last year about energy independence

and distributive generation. He said he was currently reviewing the seismic standards for Mexico's entire electrical system. He suggested offering to share resources to identify vulnerabilities and reduce earthquake damage.

Chairman Strack noted that the Commission has been asked many questions about the San Francisco Bay Bridge, and he clarified that the Commission has no regulatory or review role in that project.

A Council representative said the Nevada Council can introduce legislative initiatives, formulate new policies, and make state law. He added that Nevada is an active member of the WSSPC.

A Council member asked about the goal of the five-year plan. He asked if the plan anticipates accomplishing certain goals during the next five years, or whether it identifies key priorities and highlights issues. Mr. McCarthy said the Commission has not updated the plan recently, but the purpose of the document is to support Cal OES' statewide mitigation plan. He clarified that considering numerous recommendations and arriving at a consensus on which should be the top priorities has been a difficult challenge. He noted that none of the recommendations comes with a funding source, so implementation depends on identifying a funding mechanism.

Participants talked about incentive programs to encourage building owners to retrofit vulnerable structures.

Chairman Strack proposed adding the members of the Nevada Council to the Commission's resource directory.

Mr. Woody Savage said he participated at a hearing in Washington, D.C., about reauthorizing an appropriation for the NEHRP agencies, USGS, NIST, and FEMA, and spoke on lifeline utilities. He reported being asked how well utilities are prepared for large disasters, and he noted his response was that there are two ways: first, to develop models that will allow accurate prediction of component failures, and then to use the models to analyze how well prepared the utility is. Mr. Savage remarked that the other alternative is waiting until the next big earthquake. He recommended building models and finding out more in advance.

Chairman Strack said the Commission welcomes suggestions for new projects as well as ways the Nevada Council can help with ongoing efforts.

Mr. Lynn thanked the Commission for its hospitality and the exchange of ideas. He remarked that California and Nevada have opportunities to learn from each other about ways to approach common problems. As one example, he commended California for its Alquist-Priolo seismic zoning system, noting that many neighboring states still allow building directly on faults. He said he looked forward to working with the Commission in the future.

VIII. NEXT STEPS

Identification of Possible Projects

Chairman Strack thanked all participants for attending and said the Commission looks forward to working collectively with a whole new group of friends and partners. He said the Commission staff will work on scheduling future meetings, and he encouraged everyone to brainstorm for ideas for joint projects.

One participant requested more clarity with respect to response roles and agencies available to respond to disasters across state lines in Nevada or California. A Council member responded that there are mutual aid agreements in place that limit liability, and he suggested having a future presentation on that issue.

Commissioner Hellweg recommended gathering contact information and posting links to resources on mutual aid on both the Commission's and Council's Websites.

Mr. Robert Anderson, Senior Engineering Geologist, California Seismic Safety Commission, encouraged commissioners and Council members to formulate a list of follow-up actions. He said PG&E and other companies proposed a project a number of years ago for a system-level review of critical infrastructure in a particular corridor in California, a project that would be extremely useful to utility users. He suggested contacting user utilities to gauge their support for this kind of project.

Mr. Anderson noted that it would be helpful to contact the federal Bureau of Land Management (BLM) and the California Department of Forestry to identify areas suitable for housing sensors or repeater switches to support the earthquake early warning system.

One participant expressed support for having drills based on real disaster scenarios so people experience the kinds of issues entailed.

Next Steps

Mr. McCarthy advised the Commission will start sending documents about possible partnership projects to the Council for review and comment. He said he looked forward to some positive outcomes as a result of this meeting.

Mr. McCarthy invited Council members to attend the Commission's October meeting in San Francisco. Mr. Lynn said the Council's next meeting would be in November, and he extended an invitation to commissioners to attend.

IX. ADJOURNMENT

Chairman Strack thanked everyone for coming. There being no further business, the joint meeting was adjourned at 3:00 p.m.