



State Of California



# ALFRED E. ALQUIST SEISMIC SAFETY COMMISSION

*Governor Edmund G. Brown Jr.*

Alfred E. Alquist Seismic Safety Commission  
The Mission Inn  
3649 Mission Inn Avenue, Riverside, California  
Minutes of Workshop and Meeting  
September 12-13, 2012

## **Members Participating**

Michael Gardner, Chairman  
Mark Pazin, Vice Chairman  
Christina Curry (arrived at 10:35 a.m. 9/13)  
Peggy Hellweg  
Helen Knudson  
Kit Miyamoto (arrived at 10:35 a.m. 9/13)  
Mathew Ortiz  
Timothy Strack  
Ben Yousefi (for Chester Widom)

## **Members Absent**

Emir Macari  
Jim McGowan  
Kathy Smith

## **Staff Present**

Richard McCarthy, Executive Director  
Karen Cogan, Administrative Manager  
Robert Anderson, Sr. Engineering Geologist  
David King, Legislative & Special Projects Mgr

## **COMMISSION WORKSHOP – SEPTEMBER 12, 2012**

### **I. CALL TO ORDER/ROLL CALL**

Chairman Michael Gardner called the workshop session of the Alfred E. Alquist Seismic Safety Commission to order at 3:00 p.m. and welcomed all participants. The roll was called and the presence of a quorum was confirmed.

### **II. REVIEW OF BUDGET CHANGE PROPOSAL FY 13/14**

Executive Director Richard McCarthy reported that there is still considerable uncertainty about the state’s fiscal position. He noted that if Governor’s Brown’s tax increase is not approved in November, state agencies will be required to make further budget cuts. He said the Commission’s budget appears to be in good shape so far this fiscal year, but there were no projections available from Contracted Fiscal Services yet. He added that a budget reconciliation report will be available for the Commission to review at the November meeting

### **III. DISCUSSION OF CALIFORNIA EARTHQUAKE LOSS REDUCTION PLAN/ POST-EARTHQUAKE ECONOMIC RECOVERY PROJECT**

Mr. McCarthy stated that as part of the revision of the California Earthquake Loss Reduction Plan, the initiatives dealing with economic recovery had been pulled and compiled into a separate document on post-earthquake economic recovery. He said he and Commissioner Pazin had met with Mr. Michael Rossi, head of the Governor's Office of Business and Economic Development (GO-Biz), and then with the GO-Biz staff to talk about ways to complement each other's efforts. He explained that GO-Biz works on pre-disaster economic issues, while the Commission's focus is post-disaster recovery. Mr. McCarthy advised that the governor just appointed five more members to the GO-Biz group, and he noted that he and Dr. Guna Selvaduray would meet with the GO-Biz staff to discuss ideas for the economic recovery project as well as the Commission's membership in the Global Earthquake Model (GEM). He suggested providing GO-Biz with a draft version of the economic recovery plan as soon as it was available.

Mr. McCarthy reported that Chairman Gardner had reviewed the current California Earthquake Loss Reduction Plan and identified a number of mandates that should be eliminated from the revised version.

Dr. Selvaduray, San Jose State University, introduced his graduate student assistant, Ms. Laura Luong, and distributed three handouts. He said the first handout was an outline of the proposed economic recovery plan, the second was a chart of damaging earthquakes since 1960, and the third was a list of economic recovery issues that might be incorporated in the economic recovery plan.

Dr. Selvaduray reviewed the draft outline for the post-earthquake economic recovery plan. He noted the first section would describe the earthquake threat in California, the second would deal with loss reduction legislation, the third would address global impacts of earthquakes, the fourth would explain the need for speedy post-earthquake recovery, and the last section would list initiatives and strategies to facilitate economic recovery.

Chairman Gardner commented that besides facing international competition, California is vulnerable to losing businesses to other states if recovery takes too long, and he recommended including this point in the document.

Dr. Selvaduray drew attention to the table describing 20 major earthquakes since 1960. He pointed out that the damage amounts were described in terms of 2012 dollars to help put the impacts in perspective.

Senior Engineering Geologist Robert Anderson noted that the May 2012 earthquakes in northern Italy highlighted the importance of the agricultural sector to the economy of a nation or state, and the earthquake in Christchurch, New Zealand, provided useful lessons pertaining to business interruption and insurance impacts. He suggested including these seismic events in the chart for those reasons. Mr. Anderson observed that California has little in common with Haiti or Pakistan, so it might make sense to omit those earthquakes and replace them with the ones in Italy and New Zealand instead. Commissioner Peggy Hellweg remarked that the New Zealand

earthquake also highlights the hazard of damage from multiple aftershocks. She proposed expanding the chart to 25 major earthquakes so Italy and New Zealand could be included. Dr. Selvaduray supported this approach. He said the chart deals primarily with economic losses and loss of life, and noted that the economic recovery plan is aimed at a broader audience than just California. He pointed out that the chart also shows damaging tsunamis.

Commissioner Hellweg questioned whether tsunamis should be included in the chart, noting that California has not experienced significant damage from tsunamis so far. Mr. Anderson observed that California is vulnerable to both near- and far-field tsunami events, so he recommended leaving those entries in the chart.

Dr. Selvaduray invited commissioners to discuss ways to organize the initiatives and strategies in the economic recovery plan. Mr. McCarthy said the current Earthquake Loss Reduction Plan contains eleven elements, but not all of those elements are relevant to economic recovery. Dr. Selvaduray noted that one possibility might be to group topics under major categories or elements and then have sub-bullets under each main area. He sketched a “fishbone” style diagram with a series of “bones” leading to economic recovery. He pointed out that each “bone” could represent a major element or issue, with initiatives listed as subtopics along the “bones.” Ms. Cogan recommended including this kind of diagram in the document to illustrate how the plan is organized.

Dr. Selvaduray observed that the economic recovery plan is intended to complement, not supersede, the Earthquake Risk Reduction Plan. He encouraged commissioners to rethink the elements and identify just those that pertain to economic recovery.

Commissioner Tim Strack commented that it would be helpful to have some kind of outline or draft for commissioners to use as a framework for discussing the elements that should be included, and he asked Dr. Selvaduray how long it would take to create a written proposal. Dr. Selvaduray estimated that he could have a draft outline ready in a week or two.

Commissioner Helen Knudson recommended focusing on incentives and barriers that apply to individuals. She expressed her opinion that dealing with the private sector as a whole might be too broad to be useful. Ms. Cogan observed that economic recovery hinges on effective education and personal preparedness efforts, and she agreed with Commissioner Knudson that recovery plans should target individuals.

Commissioner Hellweg suggested that Dr. Selvaduray look at the resilient city proposal developed by the San Francisco Planning and Urban Research Association (SPUR) as a model for initiatives focusing on individual communities. She added that information is available on the SPUR.org Website.

Ms. Cogan asked if Dr. Selvaduray wanted commissioners to help identify the major elements or “fishbones” of the topics to be included in the economic recovery plan. Dr. Selvaduray referred to his third handout, titled “Factors that could influence Post-Earthquake Economic Recovery,” for a list of some key issues.

Mr. McCarthy recalled that the companies interviewed by Deloitte expressed a need for a central clearinghouse for information, like a Red Cross for businesses. Mr. King confirmed that having a trusted source of communication was cited as a critical problem. He noted that businesses reported that they were left on their own with no way to find out when power would be restored or streets would be cleared, which hampered their efforts to restore functionality. Dr. Selvaduray observed that businesses are typically left out of the disaster preparedness and planning process. Mr. McCarthy remarked that some people criticize efforts to help businesses as “corporate welfare,” but keeping businesses functional after disasters is a critical step in retaining jobs, tax revenues, and market share.

Commissioner Pazin noted that obtaining accurate information and access to resources was difficult even in the best of times, but lack of information becomes a huge obstacle after a disaster. He advocated establishing a one-stop center as a central point for businesses to have questions answered about government permitting processes, restoring vital infrastructure, and maintaining communication systems. He suggested creating emergency operations centers where all government agencies and utility companies could be accessed from a single point of contact. Commissioner Pazin recommended providing businesses with a flow chart showing how to deal with public safety issues, medical access, infrastructure needs, and communications. Other commissioners expressed support for this approach.

Chairman Gardner advised that the St. Louis Chamber of Commerce established a single-stop center for businesses after the 1994 floods. Mr. Anderson noted that Baton Rouge has a permanent emergency operations center for businesses that was formed after Hurricane Katrina. He suggested contacting the director of that center, Dr. Ramesh Kolluru, for more information.

Mr. McCarthy proposed that he and Dr. Selvaduray work together to identify some key issues and examples to discuss with GO-Biz. He said he would provide copies of the GO-Biz documents on pre-disaster issues, and then the Commission could use a similar format to coordinate its post-disaster efforts.

Dr. Selvaduray stated that he would try to pull these ideas together and identify key recovery issues and categories. He said he could probably have a draft ready for the Commission to review in a couple weeks. Mr. McCarthy indicated that he would contact GO-Biz and arrange a meeting with Dr. Selvaduray and the GO-Biz staff.

Dr. Selvaduray thanked commissioners for their input.

#### **IV. PROJECTS ON COMMISSION WEB PAGE**

Mr. Anderson recommended that the Commission highlight its value to the state by publicizing its important research work and beneficial products. He provided a draft document describing Commission-sponsored projects that he recommended including on the Commission’s Website. He suggested giving summaries of each project, deleting references to dollar values, and including links to other Websites for further information. As examples, he drew attention to the narratives describing the Fire Following Earthquake research project and the pilot program to evaluate seismically vulnerable schools.

Mr. Anderson proposed incorporating this information under a “Projects” tab on the Commission’s Home page and showing links to partners with rollover hot buttons.

Commissioners concurred that it would be worthwhile to include this feature on the Commission Website. Mr. McCarthy indicated that the staff would have a draft sample for the Commission to review at the November meeting.

## **V. COMMISSION MEMBERSHIP IN GLOBAL EARTHQUAKE MODEL (GEM)**

Mr. McCarthy said Commissioner Kit Miyamoto would be presenting a proposal at the September 13 meeting to allocate research funds to disseminate information on California’s earthquake hazards and structural vulnerabilities in furtherance of the goals of the Global Earthquake Model (GEM). He explained that GEM is an organization focused on developing damage models and sharing information on earthquake hazards to vulnerable communities worldwide. He noted that the Commission is now a nonvoting government entity member of GEM, along with the World Bank and many other prominent organizations, and it would be helpful to everyone to share some of California’s knowledge and resources. Mr. McCarthy stated that he planned to discuss GEM in more detail with Michael Rossi and the GO-Biz organization.

Ms. Cogan encouraged commissioners to visit the GEM Website for more information about opportunities worldwide. She expressed her opinion that membership in GEM would provide good exposure and educational vehicles for the Commission.

## **VI. GENERAL DISCUSSION**

Chairman Gardner noted that the full Commission meeting would start at 9:30 a.m. the following morning in the Spanish Galleria downstairs. Mr. McCarthy said lunch would be served in the San Gabriel Room for commissioners, staff, and guests, and the Commission meeting would finish before 3:00 p.m.

## **VII. ADJOURN**

The workshop was adjourned at 4:45 p.m.

## **COMMISSION MEETING – SEPTEMBER 13, 2012**

### **I. CALL TO ORDER/ROLL CALL**

Chairman Gardner called the meeting of the Alfred E. Alquist Seismic Safety Commission to order at 9:30 a.m. and welcomed everyone. Ms. Cogan called the roll and confirmed the presences of a quorum.

### **II. APPROVAL OF JULY 12, 2013 MINUTES**

Commissioner Hellweg said she had pointed out a typographical error to the staff.

**ACTION:** Commissioner Hellweg made a motion, seconded by Commissioner Pazin, that:

*The Commission approve the minutes of the July 12 meeting as amended.*

\* Motion carried, 7 – 0 (Commissioners Christina Curry and Kit Miyamoto absent during voting).

### **III. CHAIRMAN’S REMARKS**

Chairman Gardner welcomed the Commission to Riverside. He said he served on Riverside’s city council, and Commissioner Strack was a Riverside fire captain. Chairman Gardner noted that the Mission Inn was a historic building that was central to downtown Riverside. He stated that this privately owned facility was nearly demolished in the 1970’s, and the current owners are constantly upgrading and reinvesting their profits to ensure its continuity.

### **IV. EXECUTIVE DIRECTOR’S REPORT**

#### **Budget Update**

Mr. McCarthy noted that the budget was discussed at the September 12 workshop session, and he invited Mr. King to provide a short update.

Mr. King noted that the Commission’s primary funding source is now the state’s general fund. He reported that the Commission has approximately \$532,000 in money left from the Insurance Fund and overhead charges for its research projects so far, so the general fund appropriation for FY 2012-13 will be less than the amount required the following year.

Mr. McCarthy advised that Contracted Fiscal Services has not yet provided data on this year’s expenditures, but he promised to email commissioners with that information when it becomes available. He added that there will be more details at the November meeting.

#### **Lake Tahoe Project**

Mr. McCarthy reported that the Lake Tahoe research project has been split into two phases. He said a prototype of the remotely operated Sub Ice Rover will be ready in October, and a press conference will announce the beginning of that testing phase; meanwhile, the California Geological Survey (CGS) deployed other vehicles to test new equipment that will be carried by the Sub Ice Rover. He added that this research is attracting considerable media attention.

#### **Commission Participation on the Diablo Canyon and San Onofre Nuclear Power Generating Stations Independent Peer Review Panels**

Mr. McCarthy stated that the Commission will be receiving reimbursement for its participation on peer review panels to investigate seismic safety issues involving the Diablo Canyon and San

Onofre Nuclear Generating Stations. He said PG&E applied to the State Lands Commission for an offshore permit for Diablo Canyon, and the application will be considered by the Coastal Commission at its October 10 meeting. He promised to update the Commission at the November meeting on the status of the permit process. Mr. McCarthy also recommended that Commissioner Hellweg join the review group for the San Onofre facility.

### **Global Earthquake Model (GEM)**

Mr. McCarthy suggested deferring this item until Commissioner Miyamoto arrived.

### **V. OVERVIEW OF AUGUST EARTHQUAKE SEQUENCE IN BRAWLEY, CALIFORNIA**

Commissioner Hellweg gave a short briefing on the earthquake swarm at the southern end of the Salton Sea during the month of August. She stated that there have been previous seismic activity in that area, most notably a 6.6 magnitude earthquake in 1979 that caused significant damage. Using a paper model, she demonstrated the action of the releasing step-over activity at the intersection of the San Andreas and Imperial Faults. Commissioner Hellweg advised that seismologists believe there is no relationship between the recent earthquakes and geothermal energy production in the area. She added that the early warning system picked up 20 of the total of 22 earthquakes exceeding a 3.5 magnitude, and the two events that were not detected occurred very quickly after larger earthquakes.

### **VI. CALIFORNIA EARTHQUAKE LOSS REDUCTION PLAN/ECONOMIC RECOVERY PROJECT**

Dr. Guna Selvaduray, San Jose State University, expressed his appreciation to Commissioner Gardner and the staff for arranging to hold this meeting at the Mission Inn. He thanked commissioners for their input at the workshop session the previous day.

Dr. Selvaduray described plans to create a new post-earthquake economic recovery document to complement and supplement the existing California Earthquake Loss Reduction Plan. He said he envisioned two major sections, one giving background about California's earthquake hazards, the global importance of California's economy, and a summary of risk reduction legislation, and the second dealing with specific elements and strategies focusing on economic recovery. Dr. Selvaduray indicated that the document would incorporate lessons learned from past disasters as well as points raised by Deloitte about ways to help businesses recover quickly. He advised that he and Mr. McCarthy would be meeting with the staff of the Governor's Office of Economic Development to coordinate this project with their efforts to improve pre-disaster preparedness.

### **VII. SHAKEOUT 2012 UPDATE FROM CALIFORNIA EARTHQUAKE COUNTRY ALLIANCE**

Ms. Kate Long, Cal EMA Earthquake Program, discussed plans for the 2012 ShakeOut on October 18. She stated that Earthquake Country Alliance is working with many strategic partners and stakeholders to take advantage of common resources to produce useful products and

benefits for participants. She reported that the 2011 ShakeOut won an award from the Federal Emergency Management Agency and received national recognition from the White House.

Ms. Long said the 2012 ShakeOut makes use of social science research undertaken by Dr. Dennis Mileti and Michelle Wood to ensure that the event helps Californians better prepare for earthquakes. By focusing on value-based messaging, Earthquake Country Alliance hopes to persuade people with information, motivate them with emotion, and then connect values with actions to effect behavioral changes. She noted that social science studies identified control and survival as two of the major pathways that lead people to take constructive action, so instead of scaring the public about potential risks, messages will focus on the idea of being prepared to survive in order to recover quickly. She indicated that research also shows that people are more likely to change behavior if they see others like themselves getting ready, so the 2012 ShakeOut will provide opportunities for participants to share information, talk about risks and consequences, and identify actions that will help change outcomes.

Mr. Mark Benthian, Southern California Earthquake Center, traced the history of the ShakeOut event from its inception in 2008, when 5,000 people participated in a Golden Guardian exercise, to a wider regional event with 5.4 million participants in Southern California, and ultimately to a statewide exercise last year involving 8.6 million participants. He noted that ShakeOut is achieving its goals of engaging millions of people and encouraging them to talk with each other, take action, and spread the word. He showed pictures of individuals, schools, and businesses participating in past ShakeOuts.

Mr. Benthian observed that ShakeOut has been successful because of its broad partnerships, whole-community approach, media coverage, and the resources it provides on its Website and in other materials. He said Earthquake Country Alliance is establishing public information “epicenters,” and a number of communities are holding local exercises and events. As examples, he mentioned special exhibits at the San Bernardino County Museum, the Orange County Discovery Center, and the San Jose Tech Museum. He noted that a summit on the risk to public buildings is being held in Los Angeles the week before ShakeOut that will highlight engineering, policy, and earth science issues. In addition, there will be a transportation and commuter-focused exercise at Union Station in Los Angeles and activities in San Francisco on the day before this year’s statewide ShakeOut.

Mr. Benthian advised that ShakeOut has expanded to other states and areas of the U.S., including Arizona, Utah, the Northwest, central states, and areas of the southeast, and to other countries, including Japan, New Zealand, and Italy. He said there was a regional drill in the central U.S. last February, and FEMA will be sponsoring a nationwide drill next year. He indicated that 7.6 million people have already registered for the 2012 California ShakeOut, and over 14 million people worldwide will participate in some ShakeOut event this year. He stated that New Zealand and some individual states have established their own Websites, and Japan has adopted its own version of the event.

## VIII. 'GREAT CALIFORNIA SHAKEOUT' ASSESSMENT PROJECT

Mr. Benthian explained that Dr. Michelle Wood had been asked to make a special presentation at the White House and was unable to attend the meeting, so he would be discussing the assessment project in her place. He explained that the purpose of Dr. Wood's study was to analyze the results of participation in past ShakeOut events and make recommendations for the future. He said Dr. Wood presented a draft report to the Commission at its July meeting and then incorporated comments and suggestions in a revised version. Mr. Benthian pointed out that the executive summary was simplified and the section on lessons learned was expanded. He observed that Dr. Wood also added a list of key findings and narrowed the recommendations to focus on major priorities.

Mr. Benthian commented that although evaluations of ShakeOut had been done before, little funding was allocated to documenting the results and producing assessment reports. He expressed his appreciation to the Commission for its support of this effort.

Mr. Benthian reviewed the key findings and recommendations in Dr. Wood's report. He said future ShakeOut events will encourage businesses, community organizations, and schools to take an increased leadership role. He observed that the ShakeOut drill provides an opportunity to test public education and responses to early warning system, and he recommended a follow-up survey on household preparedness, noting the last comprehensive survey was conducted in 2008.

Mr. Benthian welcomed comments from commissioners.

Commissioner Knudson asked Mr. Benthian to inform Dr. Wood that the recommendations should be reworded to identify the appropriate responsible parties. She clarified that the Seismic Safety Commission's role is limited to advising the Legislature and Governor's Office, and other agencies are actually responsible for implementing the actions. Chairman Gardner explained that the Commission can facilitate and bring entities together. Mr. Benthian observed that the recommendations are really tools for the Commission to encourage others to take action.

Chairman Gardner expressed his opinion that Dr. Wood's report would make a valuable contribution to the social science literature. He noted that the document was still quite technical and should be further simplified to appeal to a broader audience. He drew attention to his written comments on the handout provided to commissioners earlier.

Chairman Gardner suggested that an ad hoc group of commissioners work with Dr. Wood to make the final revisions. Mr. Benthian said he was sure Dr. Wood would be willing to work with the Commission. Chairman Gardner proposed that he, Commissioner Strack, Dr. Wood, and the staff try to finish the report within the next 30 days.

Chairman Gardner thanked Mr. Benthian for his report.

## **IX. HOSPITAL SHAKE TABLE AND FIRE TESTS VIDEO – PRELIMINARY FINDINGS**

Dr. Tara Hutchinson, University of California San Diego, reported on her preliminary findings on the shake tests and fire tests of the full-scale, five-story model building constructed at UC San Diego to test nonstructural components of buildings. She stated that this research was funded by many partnership organizations, including the Seismic Safety Commission. Dr. Hutchinson noted that Commission funds paid for four major tasks: design of layout for the surgical suite on the fifth floor and ICU on the fourth floor, the base isolation system, an educational video, and research on fire following earthquake.

Dr. Hutchinson said the building was tested in three phases: Motion testing occurred in April with the base isolation system in place, and then again in May after the base isolation system was removed. Once those tests were completed, cameras and monitoring equipment was installed, and fire tests were conducted. Dr. Hutchinson advised that the building was demolished in June.

Dr. Hutchinson summarized her key findings. She reported that the accelerations and drifts were measured at four levels of ground motion, and those tests showed that the base isolation systems deamplified accelerations significantly, resulting in little deformation and minimal to no damage to the structure. However, when the isolators were removed, large accelerations were noted, although the building itself survived well at the design earthquake level. When motion was increased by 50 percent, several failures occurred, but the building still did not collapse.

Dr. Hutchinson showed pictures of interior portions and highlighted areas of nonstructural damage. She pointed out that anchoring of components was effective in keeping them in place, but unanchored components caused considerable damage. She reported that seismic damage impacted egress, as elevator doors were skewed, rendering elevators inoperable, and stairways in the building detached.

Dr. Hutchinson reported that the live fire tests at the end of May showed the spread of smoke and flames throughout the damaged building. She said the sprinkler system activated, and ceilings, fire dampers, and fire doors performed well. She showed pictures taken from the cameras inside and outside the building during the fire tests. Dr. Hutchinson identified particular issues of concern: she noted that gaps in the frame of the building created potential for fire and smoke to spread, structural damage could lead to collapse if a fire lasted longer than the 15-minute test burn time, and flames extending outside windows could spread fire to adjacent floors of the building.

Dr. Hutchinson played a preview video summarizing the results of the testing. She said some revisions still need to be made, including addition of music, replacement of the narration, and listing credits. She estimated that these tasks would be accomplished within the next two weeks, and then the video would be ready to release. Dr. Hutchinson noted that the broadcast premier will take place on October 31 at UC San Diego, and then the video will be distributed to the rest of the UC system and posted on the Web. She added that the researchers are working hard to make all the test data available to the public.

Dr. Hutchinson thanked the Commission for its support of this unprecedented set of tests that will improve the safety of hospitals and other buildings in the future.

Chairman Gardner congratulated Dr. Hutchinson for her work on this interesting and groundbreaking research.

Commissioner Miyamoto asked if the research revealed any specific recommendations for fire engineering of hospital buildings. Dr. Hutchinson responded that there are many important implications for hospitals, particularly with respect to the vulnerability of egress systems and subsystems like stairs, elevators, and door frames. She said a task force has been established to look at code changes in particular details, and an ATC working group is considering issues pertaining to egress, partitions, contents, and design documents.

Commissioner Miyamoto asked if the results of the research have been conveyed to the Office of Statewide Health Planning and Development (OSHPD), which oversees hospital construction in California. Dr. Hutchinson said she met with Mr. John Gillengerten in June and planned to follow up with Mr. Chris Tokas. She added that Mr. Gillengerten and Mr. Tokas were members of the advisory team for this project. Dr. Hutchinson stated that she was also working to disseminate the findings to equipment manufacturers, and some manufacturer representatives were present after the tests to inspect the structure and note damage to particular components.

Chairman Gardner thanked Dr. Hutchinson for her report.

#### **XI. REVIEW OF DELAYS TO THE SFPUC WATER SYSTEM IMPROVEMENT PROJECT (Out of Order)**

Mr. McCarthy recommended taking this item out of order while the next speakers were preparing their presentations.

Chairman Gardner drew attention to the letter in the meeting packet detailing the Commission's comments on changes to the SFPUC water system improvement project and the seismic safety impact of the delays in the latest schedule. He recommended authorizing the staff to submit the letter to the SFPUC.

**ACTION:** Commissioner Pazin made a motion, seconded by Commissioner Knudson, that:

*The Commission authorize sending the comments as proposed.*

\* Motion carried, 9 – 0.

#### **X. TSUNAMI RISK REDUCTION PLANNING AND RESPONSE FOR SAN DIEGO BAY**

Mr. McCarthy said the Commission is working in partnership with the California Emergency Management Agency (Cal EMA), the California Geological Survey (CGS), and the Navy to deal

with the threat of tsunamis to California ports. He invited the partner representatives to brief the Commission on what has been accomplished so far and their future plans.

Mr. Kevin Miller, Cal EMA, provided an overview of the state's tsunami program and responses to recent tsunamis. He advised that California has experienced eight tsunamis over the past 150 years, and some have been damaging, so Cal EMA works with the federal government, the weather service, and the 20 coastal counties in California to help people prepare for tsunamis. He reported that the state has developed inundation maps identifying areas with tsunami hazards, a tsunami warning sign program, an alert system for the northern California coast, and a range of educational tools. In addition, he said, Cal EMA conducts extensive training and evacuation drills, recognizes communities for their preparedness efforts, disseminates consistent preparedness and response messages, and provides a Website with various activities and resources.

Mr. Miller described Cal EMA's response to the 2011 tsunami that caused \$100 million in damage to 27 California ports and resulted in one death. He noted that the state opened three emergency operations centers, shared information hourly with counties, answered questions, assisted with damage assessments, and deployed clean-up crews. He said Cal EMA learned some important lessons from this event, including the need to assist maritime communities and provide educational materials to emergency managers so they are better aware of tidal conditions in their areas.

Mr. Miller stated that Cal EMA has three major goals to help prepare for future tsunamis: creating maps and modeling to identify offshore safety zones for vessels, looking at dangerous currents in individual harbors, and compiling statewide guidance for ports.

Mr. Rick Wilson, CGS, talked about how CGS is working with Cal EMA and the U.S. national program to help maritime communities prepare for and respond to tsunamis. He played a short video showing the effects of a tsunami and the strong currents it produces. He stated that CGS is in the process of updating inundation maps for the north coast to take probabilities of larger events into account, developing tsunami playbooks and harbor-specific maps to help communities identify likely areas of flooding, and working on new code provisions dealing with tsunami hazards. He added that these resources will also be useful tools for land use planning.

Mr. Wilson indicated that up until now, there have been no reliable models for predicting currents in harbors, so CGS has embarked on pilot studies to fill in these information gaps. Mr. Wilson noted that work has begun to model currents in San Diego Bay from seismic events in Chile, Asia, Cascadia, the Aleutian Islands, and local sources. He stated that CGS' next steps will be to gather and evaluate existing reports and videos, produce and validate high-resolution modeling, and refine other models to create current velocity maps and time threshold maps. Mr. Wilson added that this information will help boaters determine when they need to move boats, where safe areas are, and how much time they need to wait before returning.

Dr. P. F. Wang, U.S. Navy, Space and Naval Warfare Systems Command (SPAWAR), explained that SPAWAR is the Navy's research and development organization. He expressed his appreciation to the Seismic Safety Commission for facilitating a series of meetings to help the

Navy examine the threat of tsunamis and take proactive steps to protect its ships and facilities. He said the Navy's Third Fleet is based in San Diego Bay, so understanding currents and conditions in the harbor there will be very useful.

Dr. Wang reported that the Navy recently submitted a research proposal to the federal government to develop a tsunami planning and decision support system that will enable the Navy to make science-based determinations of appropriate actions for different threat levels and tsunami scenarios. He showed a flow chart illustrating the decision-making process and identified members of the research project team.

Mr. McCarthy indicated that the Commission had provided a letter of support for this research project and will continue to work closely with the Navy, Cal EMA, and CGS. He said the first phase of research will involve modeling currents and water level increases, and the second phase will focus on structural response. Dr. Wang advised that the Navy expects to hear by the end of September about the first phase and by year-end about the second phase.

Chairman Gardner commented that the flow chart seemed to be a clear and easy-to-use format for the proposed decision support system. He thanked the speakers for their presentations.

#### **IV. EXECUTIVE DIRECTOR'S REPORT (Continued)**

##### **Global Earthquake Model (GEM)**

Commissioner Miyamoto noted that the Commission's membership in the Global Earthquake Model (GEM) creates an opportunity for California to share information on seismic mapping, identification of hazards, and structural vulnerability to the public. He said California has gathered a considerable amount of data, but it tends to be scattered among various organizations and is not generally available to the public. He explained that GEM is a nonprofit, open-source organization that serves as a clearinghouse to disseminate useful information about risk reduction and economic recovery to communities around the world. He indicated that GEM has invested \$25 million so far, and it hopes to make information fully available globally within two years.

Commissioner Miyamoto proposed that the Commission consider investing research funds to disseminate California data through GEM. He observed that having access to this information would be a valuable communication tool for building owners, schools, hospitals, and local governments. He offered to develop a cost proposal and additional details for the Commission to consider at its November meeting. He added that he and Mr. McCarthy planned to attend GEM's December board meeting.

Mr. McCarthy recommended that he and Dr. Selvaduray discuss this project with the Governor's Office of Economic Development along with the economic recovery plan. He suggested that the Commission revisit this topic at the November meeting. Commissioners expressed support for this approach.

At 12:30 p.m., the meeting was recessed for lunch. Chairman Gardner reconvened the meeting at 1:33 p.m.

## **XII. PRESENTATION OF THE COACHELLA VALLEY (CREWS) AND IMPERIAL VALLEY REGIONAL EARTHQUAKE WARNING SYSTEMS (ICREWS)**

Mr. Blake Goetz, Fire Chief (Ret.), CREWS Project Manager, explained that Coachella Valley has a long history of major earthquakes, and officials in the area began investigating early warning systems for earthquakes over a decade ago. Although a prototype system was installed in a fire station at that time, the system was not activated until the region experienced a 5.1 magnitude earthquake on October 31, 2001. He said the threat of earthquakes was highlighted and publicized in a Golden Guardian exercise in 2007-08 that was based on a scenario of a major earthquake striking the region. He reported that early warning systems were then installed in four more fire stations and were used to conduct drills for first responders and the community as a whole, and eventually warning systems were installed in all fire stations in Palm Springs. Mr. Goetz noted that other cities in the Coachella Valley became convinced in later exercises that warning systems were an effective way to prevent injuries and property damage.

Mr. Goetz stated that the 2010 earthquake in Baja California reinforced the need for such a system in the Coachella Valley and Imperial Valley to protect agricultural infrastructure. Since that time, he said, early warning systems were installed in 16 more fire stations in the Coachella Valley, with four more under contract for future installations. He advised that Coachella Valley would like to expand the system to a regional network and connect to adjacent regional networks.

Mr. Jacob Alvarez, Management Analyst, Coachella Valley Association of Governments (CVAG), explained that CVAG is an organization focusing on regional transportation, public safety, environmental protection, and community resource issues. He said CVAG's Public Safety Committee introduced the concept of CREWS to CVAG, and then CVAG approved a public-private partnership in consultation with Cal Tech and Cal EMA, to deploy the early warning system throughout the region. Mr. Alvarez identified the members of the CREWS partnership. He said the warning system is being offered to subscribers, whose fees subsidize the cost of the providing warnings to the member partners. He noted this funding model makes CREWS and ICREWS sustainable and cost-effective. Mr. Alvarez indicated that CVAG plans to expand the system to 48 fire stations, four public health facilities, two hospitals, four tribal areas, 87 public schools, and a number of irrigation districts and other entities.

Mr. Michael Price, Chief Technical Officer, Seismic Warning Systems, showed a map of active earthquake faults in the Coachella Valley. He said the warning system was initially installed in fire stations to activate alarms and door openers so crews would have enough time to drive fire engines outside so they were available to respond after earthquakes. He displayed a map of the area and pointed out the locations of current installations. Mr. Price explained that hard-wired sensors detect P waves before ground shaking occurs; those signals are sent via servers in each of three school districts to a data center for processing, and then alerts are transmitted to the field. He noted the data center is presently located in San Francisco, but there will eventually be a data center in Los Angeles and other regional centers. He added that the ICREWS system is being offered to all organizations in the Imperial Valley.

Dr. Gilead Wurman, Ph.D., Chief Seismologist, Seismic Warning Systems, described how the early warning system works. He said Seismic Warning Systems uses proprietary technology, but the basic configuration consists of two ground sensors and an accelerometer at each monitoring station. Signals are transmitted via GPS antennas to a local processing box, and then to the data center for processing. He added that this entire process takes only fractions of a second, and users receive warnings ranging from several seconds to almost a minute, depending on their proximity to the epicenter. Dr. Wurman advised that Seismic Warning Systems currently has stations deployed at regular intervals on both sides of the San Andreas Fault through Coachella Valley and Imperial Valley. He added that the system provides continuous real-time monitoring and ongoing testing on small earthquakes, and it works even if the Internet link is disrupted.

Dr. Dennis Mileti, Director Emeritus, National Hazards Center, University of Colorado at Boulder, emphasized the urgent need for an early warning system in the Coachella Valley. He said people who live in the region know they are among the most vulnerable residents of the State of California, as experts predict the high probability that the southern segment of the San Andreas Fault will rupture in the foreseeable future. He noted that the region could very well experience 60 to 90 seconds of severe shaking and up to 120 seconds of strong ground motion. Dr. Mileti indicated that people who live in the Coachella Valley want as much warning as possible.

Dr. Mileti recognized that public funding was difficult to obtain. He said area residents would love to have \$100 million in federal funding for a statewide warning system, but in the meantime, a private company, Seismic Warning Systems, is able to provide a system that works well now. He observed that 99 percent of the risk reduction legislation passed in California over the past century came within 12 months of a major earthquake, so Congress is not likely to support this effort until there is another devastating disaster. He urged the Commission to do whatever it can to speed up the process and get a statewide early warning system in place as soon as possible.

Mr. Joe Gonzalez, Office of The Honorable Senator Bill Emmerson, 37<sup>th</sup> District, read a statement from Senator Emmerson in support of the CREWS and ICREWS project.

Mr. Gary Rosenblum, Emergency Manager (Ret.), Palm Desert, and member of CREWS Steering Committee, said he was speaking as a private citizen advocating moving forward with the CREWS project. He commented that efforts seem to have stalled in the past year, putting more schools, utilities, hospitals, manufacturers, and transportation systems at risk. Mr. Rosenblum stated that everyone in the region wants a warning system, and he urged the Commission to exert its influence and work diligently to protect the public. He expressed his appreciation for the work done by the Commission to improve seismic safety throughout the state. He noted that many school children in the Coachella Valley have never experienced a major earthquake, and he recommended pursuing more public education and training so people know how to respond to earthquakes.

Mr. Rosenblum asked Senator Emmerson's representative to convey these comments to the senator so he understands the urgency of obtaining more funding for the warning system.

Chairman Gardner thanked Mr. Rosenblum for his remarks.

Commissioner Strack supported encouraging more public-private partnerships, but he pointed out that interoperability was a key issue that needs to be addressed in the process. He emphasized the importance of finding a way to expand early warning systems to the entire state. He expressed his opinion that this issue was of critical importance to California and should be a high-priority, urgent task.

Commissioner Hellweg commented that Northern California has not received as much attention or funding as Southern California, but residents there were at risk of major damaging earthquake on the Hayward Fault. She advocated continuing to educate the public to drop, cover, and hold on when they feel strong shaking. She said early warning systems can provide enough time for people to turn off sensitive equipment and protect themselves and their property from serious damage. Commissioner Hellweg stressed the need for the state to also invest money in longer-term response resources like better shake maps and HAZUS assessment tools. She agreed with Commissioner Strack that people developing early warning systems must be able to share data more broadly so it benefits everyone.

Mr. Alvarez advised that Imperial County's grant application has been pending with FEMA for over a year, and the CVAG application was sitting at Cal EMA.

Chairman Gardner asked if Seismic Warning Systems had systems installed anywhere else. Mr. Scott Nebenzahl, Vice President of Sales and Director of Government Affairs, Seismic Warning Systems, replied that there no other regional systems, but there were installations in the San Francisco Bay Area, the NASA facility at Antelope Valley, and Los Angeles. Mr. Price clarified that public money was used only to install equipment in public facilities, and Seismic Warning Systems paid for creating the network. He added that the company was happy to share its data.

Chairman Gardner asked what lessons had been learned so far. Mr. Price said the company has learned a great deal about how well the technology works and other applications. Chairman Gardner expressed support for more sensors and greater networking capabilities. He observed that such a system would be better for everyone, and he encouraged the speakers to pursue both aspects.

Mr. George Dickson, Chief Executive Officer, Seismic Warning Systems, said he has been coming to the Seismic Safety Commission and legislators for ten years to promote use of an early warning system. He stated that the company and Commission have a common goal of saving lives and protecting infrastructure. He offered to work together with the Commission and other government agencies to promote that effort.

Chairman Gardner thanked all the presenters for their information.

### **XIII. LEGISLATIVE UPDATE**

Mr. King reported that all the bills the Commission was supporting died in the Appropriations Committee due to lack of funding, so there was nothing new to report. In particular, he said, SB 1271 (Corbett), the bill pertaining to the Division of the State Architect's Field Act review process, was held up in Appropriations, and SB 1065 (Alquist), dealing with fire following earthquake, was gutted and amended so it no longer focused on seismic issues.

### **XIV. PUBLIC COMMENT**

Mr. James Griffin, a resident of the Los Angeles port area, commented that a major earthquake would have a significant impact on the economy of the state. He expressed support for developing a statewide earthquake warning system so vulnerable businesses and facilities like pipelines and container yards would have time to respond.

### **XV. GOOD OF THE MEETING**

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

### **XVI. ADJOURNMENT**

There being no further business, the meeting was adjourned at 2:50 p.m.

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Sue Celli  
Office Manager

Approved by:

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Richard McCarthy  
Executive Director