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Dr. David L. Evans
Assistant Administrator
U. S. Department of Commerce
NOAA
Office of Oceanic and Atmospheric Research
1315 East-West Highway
Silver Springs, Maryland 20910

Dear Dr. Evans:

Thank you for the opportunity to review the *National Tsunami Hazard Mitigation Program (NTHMP), A Federal/State Partnership.* The California Seismic Safety Commission has appreciated the assistance NOAA has provided over the last 10 years in helping to incorporate a tsunami mitigation program within the *California Earthquake Loss Reduction Plan* (Plan). Assistance and leadership provided by PMEL and the Governor's Office of Emergency Services (OES) were vital in helping the State focus on how tsunami mitigation should be addressed and prioritized as part of an overall strategic plan to reduce the risk from earthquakes. The Commission and OES are in the process of updating the Plan and I have attached the most recent draft for your information. Please note that initiatives that address tsunami mitigation are contained with the Land Use (5.3.3) and Geosciences (1.4.1) elements. Products developed under NTHMP specifically address the goals listed under these elements.

Question 1: Has the program successfully met the goals of the implementation plan?

Yes. The goals developed by the Working Group set forth in 1996 were extensive. At that time, the Commission was very impressed with the Implementation Plan due to its applied approach to reducing tsunami risk and its emphasis on using partnerships to achieve its goals. Specifically, the five programs have helped reduce the seismic risk in all five partner states:

1. **Inundation Maps**—Inundation maps prepared for California are invaluable for planning evacuations when tsunami warnings are issued. In addition, these maps are a first step in incorporating tsunami hazard zones into the existing Seismic Hazard Mapping Program. This program is a guide for local governments to require studies for development proposed to be located within zones of potential earthquake induced landslides and liquefaction. The inundation maps can now serve as a basis for legislation that could provide state assistance for local governments to identify and/or

construct evacuation routes or to select structures within the inundation zone that could be used for vertical evacuation (such as buildings).

Inundation mapping completes a balanced seismic hazard mapping program for California and will enable the State to prioritize its earthquake research programs presented with the *Research and Implementation Plan* for *Earthquake Risk Reduction* scheduled for updating this year (attached).

During the Program Review Session, several attendees compared the inundation maps prepared for California and Oregon. Discussions centered on the "worst case" criteria used for the development of the California maps and several attendees believed that the worst-case scenario lacked scientific credibility. One of the strengths of NOAA's lead in this Program was to allow each state to determine the best method for determining where and how inundation lines were placed on the maps. In California, local governments requested that the worst case be considered because multiple inundation lines on the same map were unworkable, politically and practically. In fact, several years ago, I also suggested that a worst-case condition be presented for the inundation maps in California. Oregon and the three other partners were given the appropriate freedom to develop their maps based on their individual political/social/emergency response needs.

2. **Seismic Networks.** California has invested heavily in its Strong Motion Instrument Program and in the deployment of seismometers statewide. The recent formation of the California Integrated Seismic Network and ANSS illustrate how partnerships will provide cost-effective seismic data to improve building codes, estimate damage, and provide advanced warning of the arrival of damaging seismic waves. The Consolidated Reporting of Earthquakes and Tsunamis Project (CREST) adds a significant practical component to existing operational seismic monitoring networks by reducing the time required to process seismic data in order to determine tsunamigenic potential of an earthquake. I highly commend Dr. David Oppenheimer of the USGS for his ability and hard word to bring the seismic community together under the CREST program.

3. **Deploy Tsunamic Detection Buoys.** The Commission was especially impressed with the Deep-ocean Assessment and Reporting of Tsunamis Project (DART). This project has been used as an example of how off the shelf technology can be applied to reduce earthquake risk. It will be used as an example in the revised *Research and Implementation Plan for Earthquake Risk Reduction on California (2002 to 2006).* Access to the data produced by the buoys on the internet will help reduce the number of false alarms, as well as provide information to emergency management officials that will allow them to determine when it is safe to return to the tsunami inundation zone after the first waves have struck.

4. **Hazard Mitigation Programs.** The Implementation Plan focuses on helping local governments become "tsunami resistant". This action should be commended for meeting the need of the "user." The program focus on meeting the needs of the coastal residents is an example of how education and the coordination of and exchange of information to better utilized existing resources can be used to properly

condition the public on how to respond to a hazard that represents a threat that has been historically underestimated.

5. **State/NOAA Coordination and Technical Support.** The five state/NOAA National Tsunami Hazard Mitigation Program can serve as a model on how federal/state/local government can work together to achieve common goals cost-effectively. This effort has certainly reduced the tsunami threat to all five states and procedures developed through this partnership should be used in other earthquake risk reduction partnerships.

Question 2: Are the products technically sound?

Yes, obviously there are great unknowns is implementing a program of this magnitude. When compared to California's Seismic Hazard Mapping Program (which zones areas of earthquake induced landslides and liquefaction) the Tsunami Hazard Mitigation Program (as defined in the Plan) has done an excellent job of using existing technology, science, engineering, education, and outreach, to protect the public from the tsunami hazard. The program has credibility because it was developed with thought and moved at a pace that did not present a "sky is falling" format to decision makers, especially at the local government and state levels. Building codes change over time as we learn lessons from each major earthquake. The tsunami mitigation program must do the same to maintain credibility. We must acknowledge this fact to decision makers and the public. To remain technically sound, new knowledge must be used to revise the inundation maps and applied to how tsunami warnings are issued to emergency responders and decision makers.

Question 3: Is the state/federal partnership working?

Yes, the federal/state partnership could only have been successful with NOAA as the lead element. This action provided unbiased leadership that permitted the states to work together as equal partners. In addition, only NOAA has the overall expertise and technology to attack the tsunami hazard effectively. Approaching the problem by individual states would have been a mistake. This is a regional problem and NOAA has provided a mechanism to attack it in an organized and cost-effective manner. Finally, NOAA had the political insight to realize that each state would have a different approach to reducing the tsunami threat. NOAA recognized these natural differences and allowed variability in its approach to build consensus among the partner states.

Question 4: Do you expect the products to have a positive impact on tsunami mitigation?

Yes, products developed and implemented by this program will have a major impact on tsunami risk reduction for all five states. Coastal communities and residents in all five states will directly benefit from the products, procedures, and educational outreach developed by this program.

Question 5: Are plans for the future appropriate?

Yes, but may have to be reduced due to budget constraints at the federal and state levels. Close examination of future plans reveals an ambitious program to continue to reduce the tsunami risk. However, California, Oregon, and Washington will undergo budget reductions due to the power

crisis. All five programs presented in the *Mitigation Implementation Plan* have developed excellent and well thought out plans for the future. However, I suggest that the partnership prioritize proposed future plans within each program and then select the overall most critical (five) actions as a top priority. Identification now of the top priorities for the future would enable the partnership to develop political and tactical funding strategies at the federal, state, and local level.

Question 6: Suggestions for improving the program

1. **Develop political support for tsunami risk reduction in the US Congress (top priority)**. Congressional representatives from all five states should be presented with a summation of the Program and what it intends to accomplish over the next five years. The five partner states acting as a block should request the President to add the needed $1.9 million to NOAA's budget to carry out the objectives of this program. State partners should collaborate on this effort. However, the partners should also seek state funding to support the program. The federal government should not be expected to supply stand-alone funding. I will request that the Seismic Safety Commission and OES consider discussing with the state's two US Senators a funding augmentation within NOAA's budget.

2. The Advanced National Seismic System (ANSS) is nationally operated network of weak and strong ground monitoring instruments and systems that is modernizing, enlarging, integrating and coordinating select local regional and national seismic monitoring systems in the United States into one major monitoring system. Near real time earthquake information provided by the ANSS in conjunction with information provided by DART stations, and tidal gauges will be available to tsunami warning centers regarding the generation of tsunamis and the size of the tsunami. The ANSS program integration approach could be used as an example of how to proceed.

3. **Establish a 24-hour manned Tsunami Warning Center**. Establishment of such a facility is long overdue. Expansion of existing NOAA facilities in Alaska or Hawaii would reduce tsunami warning times and provide improved 24 hour service to the 5 partner states and countries located around the Pacific Rim. All the state partners should support funding to achieve this goal. Establishment of the CREST Program reinforces the need to have personnel physically on duty at a Warning Center 24 hours a day. Elimination of the pager notification process during the off hours should reduce the overall time to issue warnings). Seek advice from FEMA on this issue.

4. **Request more and support applied research**. Funding for applied research has increased dramatically since the end of the cold war. Using research and technology to reduce the risk to the public from natural hazards has now become a top policy priority for the United States. This program is a model of how applied research and off-the-shelf technologies can be used to reduce damage and save lives. The partnership should call on the research community to help meet the needs of the user (coastal residents and communities). This program illustrates how

applied research and technology has been used to benefit all five states can only assist the partnership in obtaining funding to achieve its long-term tsunami risk reduction goals.

Thank you very much for the opportunity to review and comment on *the National Tsunami Hazard Mitigation Program.* I am very honored to have been involved in tsunami risk reduction programs in California and look forward to continued progress between NOAA and the five partner states. It is such a relief to see how much can be accomplished with so little funding when the proper leadership is exercised. NOAA provided that leadership and the program is a model success story on how to form partnerships between the federal, state, and local governments to reduce risk cost-effectively.

Should you have any questions regarding my comments, please give me a call at (916) 263-5502.

Sincerely,

RJ

Richard J. McCarthy
Executive Director