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GOVERNMENT RELATIONS COMMITTEE
SEISMOLOGICAL SOCIETY OF AMERICA
BEFORE THE
COMMITTEE ON NATURAL RESOURCES
SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES
UNITED STATES HOUSE OF REPRESENTATIVES
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Chairman Lamborn, Ranking Member Holt, and Members of the Subcommittee, I thank you for inviting me to testify on HR 3479, the Natural Hazards Risk Reduction Act of 2011. I'm here on behalf of the Seismological Society of America (SSA), of which I have been a member for my entire professional career, but please also consider my testimony to be on behalf of the people who live in areas that are threatened by earthquakes. For several years I was Director of the Nevada Seismological Laboratory, and while I took my turn to perform that service, the experience gave me extensive contact with the public that the seismological community serves. This includes providing information about earthquakes throughout Nevada and elsewhere, and living among and interacting with a highly threatened population for some months in 2008 when a swarm of earthquakes occurred beneath the urbanized area of west Reno.

SSA was founded to promote research in seismology, the scientific investigation of earthquakes and related phenomena, to promote public safety by all practical means, and to enlist the support of the people and the government in the attainment of these ends. SSA is the largest and most respected society of seismologists in the world and is aligned with other scientific and engineering organizations to promote earthquake risk reduction worldwide.

In brief, my message today is simple. First, we strongly support the reauthorization of the National Earthquake Hazard Reduction Program (NEHRP) as contained in HR 3479. SSA is pleased with the tremendous amount of work that has gone into the bill, and feels that NEHRP is the government's most effective tool in mitigating the potentially devastating impacts of an earthquake. As a program, NEHRP is an excellent example of diverse agencies, organizations and individuals collectively working toward a common goal – an earthquake resilient nation.

Second, while we understand the current fiscal environment, and the extreme challenges Congress faces, we are concerned about reductions in the authorization levels of the included NEHRP agencies. In particular, since it is the oversight of this Subcommittee, we are concerned that the authorization for US Geological Survey (USGS) is not sufficient to provide the level of services that

the public expects and needs when earthquakes occur. We would recommend authorization levels more consistent with what was appropriated for FY2009 and FY2010.

While it might seem that earthquakes are confined to a small segment of the nation, the fact is earthquakes pose significant risk to 75 million Americans in 39 States. The regions of lower hazard on the national map, produced by the U. S. Geological Survey (and attached as Figure 1), are often at lower hazard because earthquakes there happen with less frequency than they do in the high hazard areas, but not necessarily because earthquakes are less severe when they do occur.

When an earthquake strikes anyplace in the nation, the emergency response community, public, news media, businesses that have facilities in the affected area, and relief agencies now expect that seismic information will be available rapidly and reliably. Rapid availability of seismic information is made possible by the robust seismic instrumentation, monitoring and seismic research that NEHRP supports. The instrumentation is operated by a close collaboration of the US Geological Survey, as lead agency, and universities in various regions of the country. Timely earthquake information provides situational awareness that governments, relief agencies, and citizens can use to efficiently allocate resources and aid in the recovery efforts.

The USGS is the only Federal agency with responsibility for recording and continuously reporting earthquake activity nationwide and globally. The USGS, as part of NEHRP and through its Earthquake Hazard Program, provides citizens, emergency responders, and engineers with the most accurate and timely information available from any source on where an earthquake occurred, how much the ground shook in different locations, and immediate estimates on fatalities and economic loss. These products are now available for global earthquakes as well as US earthquakes, allowing US relief organizations to anticipate more quickly when they might be able to help victims anyplace in the world. Uncertainties in the estimates could be reduced by completion of the Advanced National Seismic System (ANSS). ANSS is a proposed upgrade of the nation's seismic system to modern technology. It was previously authorized by Congress, and remains a priority of the seismological community because we believe that our public expects it.

The seismic recording stations have a long-term benefit as well as an earthquake response benefit. Earthquakes are rare enough that there are many outstanding questions about the characteristics of the shaking that they cause. Some general trends are apparent, but there are also significant uncertainties. I would like to speak in a little more detail about the importance of these uncertainties.

While the National Seismic Hazard Maps do capture the state-of-the-art of our knowledge of the hazard in the country, uncertainties have an effect on the

result. Being involved in the preparation of the maps, I am highly aware of the uncertainties that are present, and the need to reduce those uncertainties, since we want the map to strike an equitable balance between protection from earthquakes in our building codes and avoidance of unnecessary construction costs. The impact of uncertainties is very often to increase the estimate of the hazard, and thus the cost of construction.

The uncertainties affecting the national hazard maps come from several sources. The first source of uncertainties is more easily tackled, and is currently addressed by the external grants program of the US Geological Survey, a component of NENRP. This program, a longstanding partnership of the USGS and the nation's universities, is highly focused on involving researchers to improve the national seismic hazard maps. I should point out that the research often funds students who later fill the manpower need of the US to have highly trained professionals able to help corporations with earthquake-resistant engineering. I believe the skilled scientists also increase the ability of US engineering firms to compete worldwide on projects that require earthquake resistant designs. Cuts that will become necessary in the NEHRP external grants program under reduced appropriations will significantly delay the process of mitigating uncertainties currently present in seismic hazard maps, and have a negative impact on manpower development.

Some uncertainties are inevitable because our period of observations is short compared to the time interval between earthquakes. They can eventually be reduced by seismic observations including a completed and fully funded Advanced National Seismic Network. A report released by the National Research Council of the National Academy of Sciences in 2005 is still relevant. The report is entitled *Improved Seismic Monitoring—Improved Decision-Making: Assessing the Value of Reduced Uncertainty*. This report concluded that the benefits of completing the Advanced National Seismic System would be far greater than the costs. At present, every earthquake that occurs and is not adequately recorded is, in a sense, a wasted resource. I dream of the day when the US might have a seismic network comparable to the network in Japan, so that all significant earthquakes will be recorded adequately. When we reach that goal, every earthquake will help to improve our understanding, and leave a legacy to future generations of the knowledge to both reduce our earthquake hazards and reduce the cost of overdesign of structures due to uncertainty in what the hazard actually is.

Our seismologists are an amazingly dedicated group of scientists. Many are in the field because of their eagerness to help society deal with the problem of earthquakes, and have a history of being very creative in finding ways to operate the seismic networks in the face of insufficient funding. Thus our seismic networks are already very efficient and cost effective data collection and processing systems. According to the 2008-2009 USGS Director's Scientific Earthquake Studies Advisory Committee (SESAC), ANSS has been the highest

scoring major information technology capital investment made by the Department of the Interior, and my understanding is that standard of efficiency has been maintained since that time. In the report, the top recommendation for the USGS to be able to continue to carry out its mission and continue to provide essential data products to dramatically lower earthquake effects, calls for the full funding of ANSS, (<http://earthquake.usgs.gov/aboutus/sesac/reports.php>). Given that efficiency, further budget cuts are even more difficult to absorb. Besides that, the budget challenges we face now are unprecedented in their severity. For instance, seismic monitoring in southern Nevada suffered a severe blow when the Yucca Mountain project was discontinued, since a side effect of monitoring that proposed repository was to provide a higher level of coverage of seismic activity for the Las Vegas region, which is currently by far the most poorly monitored county of over a million residents with a comparable seismic hazard.

What makes earthquake hazards such a difficult issue is that the earthquakes we worry about most have a very low probability but a very high consequence. It is easy to forget about the hazard in the pressures of many other urgent problems. However, with this kind of problem, a modest, steady effort is a better approach than a crash program to try to make up for lost time when a large, but foreseeable, earthquake occurs. Continual improvements to building codes, building practices and community preparedness are our best weapon in reducing loss of life and property from a seismic event. NEHRP makes these improvements a national priority, and that is the strongest reason why I believe HR 3479 needs to be enacted.

Finally, I would like to note that in January 10, 2010, Dr. Stuart Nishenko testified before this committee on behalf of the Seismological Society of America. His testimony gives an excellent, and still relevant, summary of the benefits of reauthorization of NEHRP. I would like to commend his testimony as a supplement to what I have prepared.

Mister Chairman, this concludes my testimony. I will be pleased to answer questions from you or the subcommittee at any time.

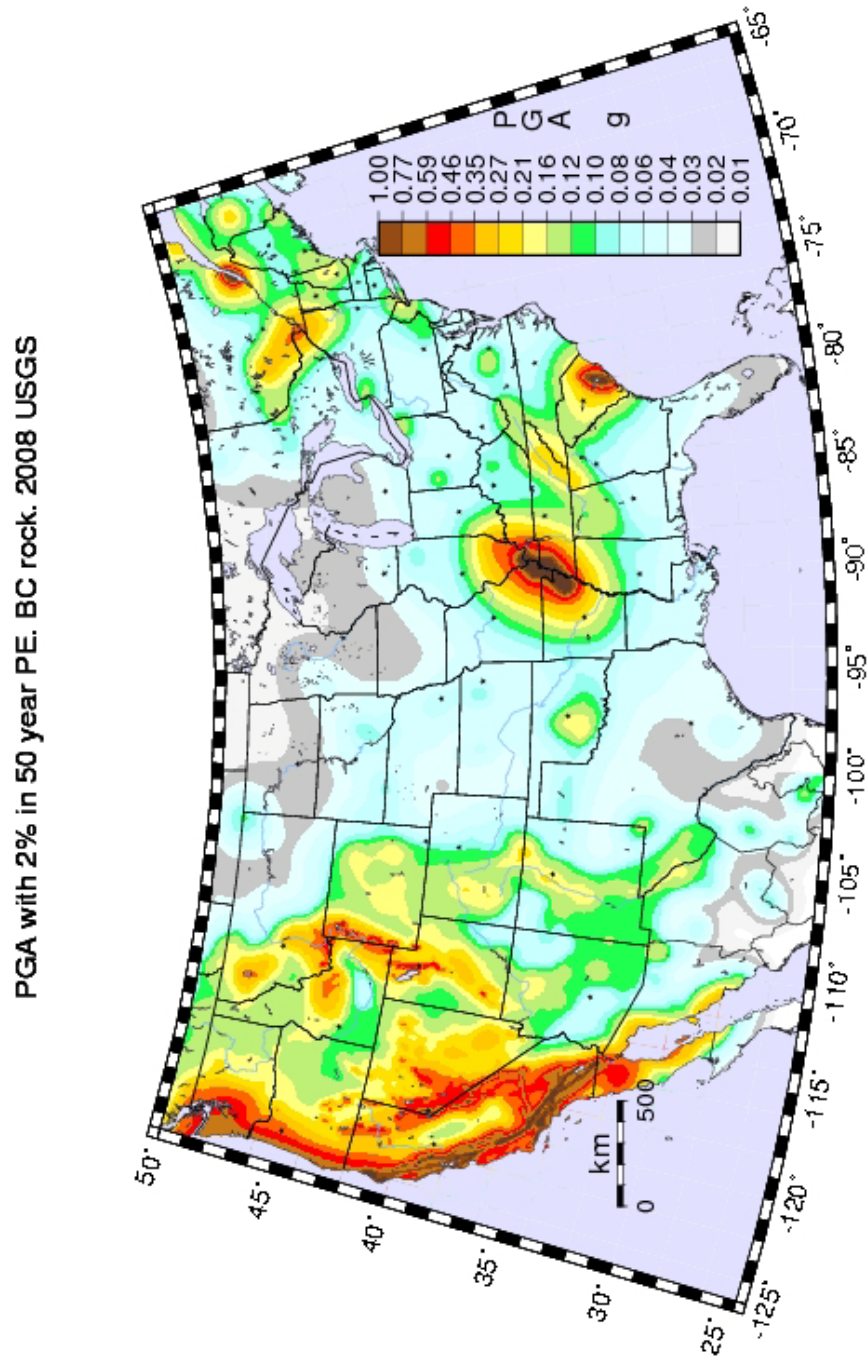


Figure 1. National Seismic Hazard Map. The preparation of this map is described by Petersen et al (2008). Full documentation is provided by the US Geological Survey on their web site, <http://earthquake.usgs.gov/hazards/>.

Petersen, Mark D., Frankel, Arthur D., Harmsen, Stephen C., Mueller, Charles S., Haller, Kathleen M., Wheeler, Russell L., Wesson, Robert L., Zeng, Yuehua, Boyd, Oliver S., Perkins, David M., Luco, Nicolas, Field, Edward H., Wills, Chris J., and Rukstales, Kenneth S., 2008, Documentation for the 2008 Update of the United States National Seismic Hazard Maps: U.S. Geological Survey Open-File Report 2008-1128, 61 p.