

**Nevada Earthquake Safety Council
Recommendation to DEM for a Policy Statement on
Earthquake Planning Scenarios
Policy Number 2009-02**

Purpose:

Earthquake planning scenarios provide policy makers and emergency preparedness personnel with realistic assessments of the areas and types of structures and lifelines that are at most risk of damage, and estimated human casualties. Equally important, scenarios identify areas and infrastructure that are most likely to sustain little or no damage and remain functional following an earthquake.

Minimizing future earthquake damage through prior planning, loss-reduction measures, and providing information to facilitate quick recovery is critical for maintaining earthquake-resilient communities.

Policy Statement:

NESC recommends that the Division of Emergency Management establish an active program to produce Earthquake Planning Scenarios for areas with high risk of earthquake losses. NESC also recommends that DEM support the production of these Earthquake Planning Scenarios through its funding resources including grants. NESC will establish priority areas for scenarios so that key economic and population centers have the opportunity to conduct planning scenario development with a recommended target of every five years as funding becomes available.

Legislative Interest:

To the extent DEM can implement this policy within its current framework and budget, no legislative action will be required.

Fiscal Impact:

The cost to prepare planning scenarios, and to update them regularly, is insignificant compared to the future savings from reduced losses to infrastructure, business economics, and human life when the information is used to develop effective seismic-safety policies. Depending upon the complexity of the scenario, and the extent to which those who are likely to be affected by an earthquake are engaged in the development and use of the scenario, each scenario may cost up to \$100,000 to develop and publish for distribution to officials responsible for implementation of solutions. Federal, State and local funding sources could be sought.

Benefits and Detriments of Implementation:

BENEFITS: Policy makers and public agencies at all levels of government must balance the desired needs for community growth and development with concerns for ensuring the safety of the citizenry. Planning scenarios have proven to be an effective means for communicating these risks. In addition, the scenarios assist with planning for emergency preparedness, emergency management, public safety training, hazard reduction and community education.

DETRIMENTS: Funding sources may not readily be available. Scenario-development activities are most effectively implemented by involving and coordinating with federal geosciences and emergency management agencies and with public/private sector organizations identified as critical infrastructures/key resources in the State. Cooperation with stakeholders and contributors may be difficult due to divergent interests and funding problems.

Communications:

Knowledgeable professionals must provide government decision makers, community planners, and developers with factual, timely, and unbiased scientific and engineering assessments of a community's vulnerability to geologic hazards.

Emergency management agencies can utilize scenarios to facilitate and manage available resources to lessen the impacts of a damaging earthquake through mitigation and to hasten a community's recovery.

Assessment of Effectiveness:

The effectiveness of this policy recommendation will be evaluated by identifying future earthquake planning scenario efforts that culminate in production of a published scenario report. Ultimately, the effectiveness of a planning scenario will be evaluated by identifying earthquake loss-reduction actions or policies that are developed in response to the published scenario. Utilization of the scenarios by State and local agencies for exercise planning and training are good measures of effectiveness.

An example of such an assessment is the 1996 Nevada Bureau of Mines and Geology (NBMG) produced detailed scenario for a Reno-Sparks-Carson City earthquake. That scenario, published as NBMG Special Publication 20, has been used numerous times in emergency response and recovery exercises, most recently in June 2008. No additional detailed planning scenario has been done in Nevada since 1996 in spite of significant population, building stock and infrastructure growth.

Resources for scenario development

New and valuable analytical tools are available for incorporation into Earthquake Planning and Mitigation Scenarios. HAZUS is a powerful risk assessment software program developed by FEMA for analyzing potential losses from earthquakes (as well as from other types of natural hazards). HAZUS combines current scientific and engineering knowledge with geographic information systems (GIS) technology to produce estimates of hazard-related damage before or after an earthquake. For HAZUS to be most effective, users should employ a current inventory of the built environment, including transportation and lifeline infrastructure. NBMG has produced a series of reports on HAZUS simulations for Nevada earthquakes and floods, but none of these has been expanded to the level of detail or with the engagement of local experts and officials as in NBMG Special Publication 20.

Two other new analytical tools are available from the U.S. Geological Survey (USGS); these are ShakeMap and PAGER. ShakeMap combines measurements of ground shaking (actual or modeled) with information about local geology and earthquake location and magnitude to estimate shaking variations within a geographic region. Produced maps are a valuable tool for emergency response, public information, loss estimation, earthquake planning and modeling, and post-earthquake engineering and scientific

analyses. ShakeMap output can be the input for more accurate HAZUS runs than simply using the epicenter location, depth, and magnitude of an earthquake from the Nevada Seismological Laboratory and the USGS. FEMA is currently supporting efforts to combine ShakeMap with HAZUS for Nevada and other states.

PAGER (Prompt Assessment of Global Earthquakes for Response) is an automated system designed to rapidly estimate the number of people, cities, and regions that have been exposed to severe ground shaking by an earthquake. PAGER products can be sent automatically to affected emergency responders, government agencies, and others with information as to the estimated scope of a potential disaster.