

# National Earthquake Loss Reduction Program a New Approach For The United States

by

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## ABSTRACT

The United States' National Earthquake Hazards Reduction Program has been expanded, based on a study requested by the Congress and completed by the Office of Science and Technology Policy. The study resulted in the establishment of the National Earthquake Loss Reduction Program, which brings twelve or more additional Federal agencies into the Federal government's effort to reduce the Nation's seismic vulnerability.

**KEYWORDS:** earthquakes; earthquake hazards reduction; NEHRP; seismic design; vulnerabilities

## 1. INTRODUCTION

The United States has had a national program of earthquake hazards reduction since 1977, when the Congress passed the Earthquake Hazards Reduction Act. The stated purpose of the Act is "...to reduce the risks of life and property from future earthquakes in the United States through establishment and maintenance of an effective earthquake hazards reduction program." The Act's aims include improved understanding, characterization and prediction of seismic hazards and vulnerabilities; improved model building codes and land use practices; development and improvement of seismic design and construction techniques; accelerated application of research results, and reduced risk through post-earthquake investigations and education.

The Act created the National Earthquake Hazards Reduction Program (NEHRP),

consisting of the closely coordinated efforts of four Federal agencies – the Federal Emergency Management Agency (FEMA), the United States Geological Survey (USGS), the National Science Foundation (NSF) and the National Institute of Standards and Technology (NIST). The premise of NEHRP is that while earthquakes may be inevitable, earthquake disasters are not. The activities of the NEHRP agencies include basic and applied research, technology development and transfer, training and education, and advocacy for seismic risk reduction measures. In these activities, the NEHRP agencies work collaboratively with each other, with other Federal and state agencies, private companies, universities, and regional, voluntary and professional organizations.

## 2. THE ROLES OF THE NEHRP AGENCIES

The NSF funds earthquake-related research in the fields of earth science, earthquake engineering, and social science, as well as multi-disciplinary projects. It supports earthquake engineering experimental research facilities and the integration of education and research to develop the next generation of educators, researchers and practitioners.

The USGS monitors seismic activity, identifies and characterizes earthquake hazards, conducts research in support of improved hazard assessment methods, disseminates scientific data and information, and demonstrates the application of earth-science knowledge in effective loss-reduction strategies.

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The NIST conducts problem-focussed research and development to improve standards and practices for buildings and lifelines. It also chairs and provides technical secretariat support to a Federal interagency committee through which 33 agencies develop and incorporate earthquake hazard reduction measures into their respective programs.

The FEMA works to translate the results of research and technology development into effective earthquake hazards reduction measures at state and local levels of government. We administer a program of grants and technical assistance designed to increase the awareness of the earthquake risk and to foster plans and actions to reduce seismic vulnerability. We also support the development and dissemination of improved seismic design and construction techniques for new buildings and rehabilitation guidelines and techniques for existing buildings.

Over the past 20 years, the NEHRP has been successful in developing basic knowledge about seismically vulnerable areas in the United States, about the effects of earthquakes on the built environment, and about measures that can be taken to reduce their impact.

For fiscal year 1998 (October 1, 1997 – September 30, 1998), the Clinton Administration is requesting the Congress to appropriate \$96.9 million for NEHRP. Of this total, \$28.9 million (30%) is requested for NSF, \$47.3 million (49%) is requested for USGS, \$18.7 million (19%) is requested for FEMA, and \$1.9 million (2%) is requested for NIST.

In recent years, one of the consistent concerns of the Congress and of certain segments of the earthquake hazards community in the United States has been what we call the “implementation gap.” By this we mean that, as a society, we in the United States know a lot more about how to reduce our seismic vulnerability than we are putting into practice. In November of 1993, nine Members of our House of Representatives wrote to the

President expressing their concerns about the Federal government’s efforts to reduce the nation’s earthquake losses. Their main concerns focussed on NEHRP and on what they perceived to be a lack of strategic planning, insufficient coordination and implementation of research results, and a lack of emphasis on earthquake loss reduction practices.

### 3. NATIONAL EARTHQUAKE LOSS REDUCTION PROGRAM

In March of 1994, Dr. John H. Gibbons, the President’s Science Advisor and Director of the Office of Science and Technology Policy (OSTP) directed that a study be undertaken to review the research and implementation issues related to earthquake hazards. The results of this effort were formally released in April of 1996 in a document titled *Strategy for National Earthquake Loss Reduction*. The study found that, besides the four agencies that constitute NEHRP, there are a number of other Federal agencies that also have a fundamental interest in, and have significantly investigated, earthquake risk reduction, but that the activities of these agencies lacked an integrating mechanism. The Strategy called for providing an integrating mechanism through the formation of a National Earthquake Loss Reduction Program (NEP). This Program, led by FEMA, is designed to formally associate the earthquake-related activities of twelve or more additional agencies with the ongoing work of the four NEHRP agencies.

Examples of agencies that constitute NEP include:

- o The Department of Veterans Affairs, that has been developing seismic standards for hospitals since 1971;
- o The Nuclear Regulatory Commission and the Department of Energy, that have been developing seismic standards for nuclear power plants and other critical facilities;
- o The Department of Transportation, that has done extensive work on the seismic safety of bridges and elevated roadways;

- o The National Aeronautics and Space Administration, that has used space-based platforms to assist in monitoring ground deformation in seismically active areas;
- o The General Services Administration, that is responsible for the design, construction or leasing of Federal buildings; and
- o The Department of Housing and Urban Development, that administers programs having a major impact on housing and community development.

This brief list suggests two ways in which the formation of NEP will contribute to earthquake loss reduction in the United States. First, it provides a forum in which agencies can share information and experience in developing and applying seismic risk reduction measures. For example, there is increasing interest in performance-based design concepts. Building codes in the United States are based on the life-safety standard. A building built to this standard and subjected to the design seismic event will not collapse or inflict life-threatening injuries on its occupants, even though it may be so severely damaged it is subsequently demolished. Such a standard is clearly inappropriate for structures that the owners would like to have functional – or functional with only minor repairs – immediately after an earthquake, such as hospitals, fire stations and emergency operating facilities. As we proceed to develop performance-based standards, much of the work done by the Departments of Energy and Veterans Affairs and by the Nuclear Regulatory Commission should be of material assistance to the other NEP agencies.

The second opportunity presented by the formation of NEP is the potential for closing the implementation gap by incorporating seismic hazard reduction considerations into the day-to-day conduct of programs administered by the NEP agencies. In the United States, the decision to adopt and enforce building codes rests with the State and local governments, not with the Federal

government. However, the Federal government may influence the process by the conditions it attaches to the grant and loan programs it administers. The NEP provides a forum in which such policies and program administration can be discussed. Currently, the NEHRP agencies are developing a strategic plan to guide the Federal seismic loss reduction program into the future. As the planning effort matures, the views of the NEP agencies will be requested and incorporated.

#### 4. CONCLUSIONS

It is important to note that NEP does not replace NEHRP. Rather, NEP will build upon the framework provided by the four NEHRP agencies to improve the linkages in earthquake loss prevention and mitigation between the Federal government, State and local governments and the private sector, where much of the loss reduction measures must be taken.

