Appendix A: The National Earthquake Hazards Reduction Program

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The 1964 Alaska and 1971 San Fernando, California, earthquakes increased public awareness of U.S earthquake risks and led to numerous task forces, reports, and proposals for establishing a federal earthquake program. Then, in the mid-1970s, a number of events led to the growing momentum for federal legislation:

- China successfully predicted a major earthquake before it occurred, saving at least tens of thousands of lives.
- China and Guatemala suffered large and damaging earthquakes.
- The "Palmdale" bulge, a section of the San Andreas fault showing uplift, was identified.
- Various expert panels and committees released reports on earthquakes, some of which stated or implied that the United States was behind China, Japan, and Russia in its commitment to and understanding of earthquake prediction.
- There was considerable optimism in the scientific community that earthquake prediction was feasible. For example, a National Academy of Sciences report recommended that the United States make a national commitment to a long-term earthquake prediction program.[1]
- The President's Commission on Science and Technology put together a panel that produced a report (commonly known as the Newmark-Stever report) laying out a preliminary plan and budget for a federal earthquake program.

EARTHQUAKE HAZARDS REDUCTION ACT

Various bills to establish a federal earthquake program were introduced in Congress in the early and mid-1970s. However, none were enacted until 1977, when the Earthquake Hazards Reduction Act[2] was passed. Several aspects of the original legislation are worthy of note. First, it was developed and enacted in an era of great optimism about the potential for earthquake prediction—that is, accurate short-term forecasts of the location, magnitude, and timing of earthquakes. The legislation reflects this, for example, stating:

[1] National Research Council, *Predicting Earthquakes: A Scientific and Technical Evaluation—with Implications for Society* (Washington, DC: National Academy of Sciences, 1976), p. 3.

[2] Public Law 95-124, Oct. 7, 1977.

> A well-funded seismological research program in earthquake prediction could provide data adequate for the design of an operational system that could predict accurately the time, place, magnitude, and physical effects of earthquakes.[3]

Second, although the bill listed a number of nonresearch objectives, including public education and code development, much of the original legislation was directed toward research. For example, the bill authorized agency appropriations only for the U.S. Geological Survey (USGS) and the National Science Foundation (NSF), to conduct or fund earthquake-related research. Third, the legislation did not make clear how the nonresearch objectives were to be implemented. Instead, responsibility for implementation was given to the President, who was charged with developing an implementation plan. Thus, the program began with immediate activity by two relatively strong research organizations, USGS and NSF, but without a clearly defined implementation component and without a lead agency.

The President's implementation plan,[4] sent to Congress in 1978, gave much of the responsibility for implementation to a "lead agency," although just *which* agency was not specified. Other federal agencies were given specific tasks, including participation in a multiagency task force that was to develop design standards for federal projects. Executive Order 12148, dated July 20, 1979, designated the then newly created Federal Emergency Management Agency (FEMA) as the lead agency.[5]

REAUTHORIZATION HISTORY

The National Earthquake Hazards Reduction Program (NEHRP) has been reauthorized eight times since its inception (see table A-1); however, only two of these reauthorizations made significant changes to the program. The 1980 reauthorization[6] established FEMA as the lead agency, and extended NEHRP authorizations to FEMA and to the National Bureau of Standards (now the National Institute of Standards and Technology, NIST).

The 1990 reauthorization (Public Law 101-614) made several substantial changes. The Senate report accompanying the final bill noted several congressional concerns with NEHRP, including,

> . . . the slow and, in the view of many experts, inadequate application of research findings to earthquake preparedness; . . . the need to improve coordination of the agencies in the program and define better their roles; . . . the need to update and broaden the scope of the [NEHRP].[7]

In response to these and other concerns, the following major changes were made:

- references to earthquake prediction and control were downplayed;
- program objectives were clarified and expanded, for example, education, lifeline research, earthquake insurance, and land-use policy;
- the role of FEMA as lead agency was clarified and defined, for example, program budgets, written program plans, reports to Congress, a

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[3] Ibid., sec. 2(4).

[4] Executive Office of the President, "The National Earthquake Hazards Reduction Program," June 22, 1978.

[5] U.S. Congress, General Accounting Office, "Stronger Direction Needed for the National Earthquake Program," GAO/RCED-83-103, July 26, 1983, p. 2.

[6] Public Law 96-472, Oct. 19, 1980.

[7] U.S. Congress, Senate Committee on Commerce, Science, and Transportation, *NEHRP Reauthorization Act*, Report 101-446 (Washington, DC: Aug. 30, 1990), p. 3.

TABLE A-1: Reauthorization H

Public Law number	Date of passage	Provided reauthorization for fiscal years	Significant changes or additions
95-124	Oct. 7, 1977	1978, 1979, 1980	Defined and initiated program. Authorized funds for U.S. Geological Survey and National Science Foundation only. Directed President to select lead agency for implementation.
96-472	Oct. 19, 1980	1981	Defined Federal Emergency Management Agency (FEMA) as lead agency. Authorized funds for FEMA and National Bureau of Standards (now National Institute of Standards and Technology).
97-80	Nov. 20, 1981	1982	None.
97-464	Jan. 12, 1983	1983	None.
98-241	Feb. 22, 1984	1984, 1985	None.
99-105	Sept. 30, 1985	1986, 1987	None.
100-252	Feb. 29, 1988	1988, 1989, 1990	None.
101-614	Nov 16, 1990	1991, 1992, 1993	Eliminated some references to prediction consequences and to earthquake control. Clarified objectives of National Earthquake Hazards Reduction Program, emphasizing implementation. Required seismic regulations for new federal buildings, and the adoption of seismic regulations for existing federal buildings. Clarified agency roles.
103-374	Oct. 20, 1994	1994, 1995, 1996	None.

SOURCE Off Ice of Technology Assessment, 1995

comprehensive education program, and grants to states;

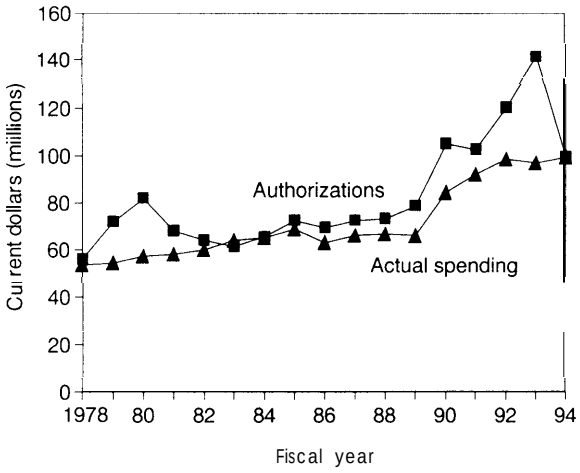
- the roles of USGS, NSF, and NIST were clarified (but not altered significantly); and
- the President was required to ensure that federal agencies issue seismic safety regulations for new buildings, and adopt seismic standards for existing federal buildings lacking adequate seismic resistance.

The 1994 reauthorization made no substantive changes in NEHRP, however the hearings and language in the report accompanying HR 3485 out of the House Committee on Science, Space, and Technology (now the Committee on Science) provide some insight into congressional views of and concerns with NEHRP. The report stated:

> The [House Science, Space, and Technology] Committee is concerned about the effectiveness of the NEHRP. Recent hearings have raised long-standing concerns about NEHRP—lack of an overall strategic plan; insufficient coordination among the agencies to shape a unified, coherent program; insufficient application of results of NEHRP research to limit losses; and inadequate emphasis on research to mitigate earthquake damage.[8]

[8] U.S. Congress, House Committee on Science, Space, and Technology, "Earthquake Hazards Reduction Act Reauthorization," Report 103-360, Nov. 15, 1993, p. 6.

FIGURE A-1: NEHRP Authorizations and Actual Spending, FY 1978-94



SOURCE: Office of Technology Assessment, 1995

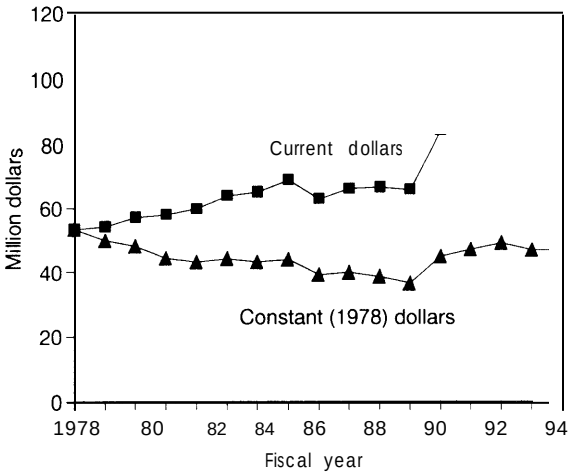
The Committee took two steps to address these concerns: first, members of the House of Representatives sent a letter to the President requesting an executive branch review of NEHRP. The executive branch review was given to the White House Office of Science and Technology Policy, which as of August 1995 had not yet issued their findings. Second, the Committee sent a letter to the director of the congressional Office of Technology Assessment (OTA) requesting that OTA "review Federal efforts to reduce earthquake damage." This report is OTA's response to that request.

BUDGET

As for all federal programs, the budget process for NEHRP involves two separate congressional processes, authorizations, and appropriations. NEHRP's authorizations give permission to the agencies to spend up to the amount authorized for the activities discussed in the legislation. The appropriations process, however, provides the actual funding to do the work. For NEHRP, as for almost all government programs, authorizations and appropriations are under separate committees of Congress. As NEHRP is a relatively small component of the agency budget, the congressional appropriations committees generally do not directly specify the amount of money to be spent on NEHRP activities. Instead, each agency determines its own budget priorities in conjunction with the Office of Management and Budget, and submits this budget (which specifies NEHRP spending levels) in the President's annual budget request. The appropriations committee, in turn, either accepts this overall budget level or sets it at a different level.

In the past, NEHRP authorizations have usually exceeded the actual spending (see figure A- 1). Actual spending has increased in current dollars, but has decreased overall in constant dollars (see figure A-2).

FIGURE A-2: NEHRP Spending, FY 1978-94 (in current and constant dollars)



SOURCE Off Ice of Technology Assessment, 1995