

The Department is not alone in research on solid wastes. The Public Health Service, Department of Health, Education and Welfare, conducts a program twice as large as Interior's which includes research, training, demonstrations, and community planning in the field of municipal waste disposal (but not constituent recovery). Individual states and cities are becoming interested and co-operating with the HEW program.

Industry is moving as rapidly as possible to develop new machines to treat auto scrap and make it acceptable to steel manufacturers. But the total effort to date has made only a dent on the massive problem of solid waste accumulation.

In spite of increasing public concern, solid waste disposal lacks the glamor and urgency that surround air- and water-pollution control. Yet it is virtually certain that solving solid waste disposal problems will require as much or more technical creativity as that demanded by other fields. The challenges will call for all the imagination that can be generated by the combined physical and biological sciences; all the ingenuity that can be brought to bear by chemical, metallurgical, mechanical, civil, and sanitary engineers; and the integrated application of sophisticated systems analysis on the Federal, State, and community levels.

RESEARCH ON EARTHQUAKES

Introduction

Hundreds of damaging earthquakes have occurred during historic time in the earthquake belt of the western United States. Many more can be expected to occur in the future. In the California-Nevada region alone, about 60 earthquakes of magnitude 6 or greater have been recorded in this century, and many have been experienced in other states of the western earthquake belt: in coastal Oregon and Washington, Utah, and Montana. Less severe earthquakes have been widespread in the west, and in the area east of the Rocky Mountains as well.

Although great earthquakes—those of magnitude 8 or greater—are relatively rare, they can be expected to cause large future losses in life and property unless we can expand our knowledge so as to minimize their effects. Three great earthquakes have occurred in California during the past 110 years: on the famed San Andreas fault in 1857 and 1906, and in Owens Valley in 1872. Others recorded in the United States occurred in 1811 and 1812 in the vicinity of New Madrid, Missouri—in the Mississippi Valley region—illustrating that the portion of our country lying east of the Rocky Mountains is by no means immune from the hazard of great earthquakes.

The Good Friday earthquake in Alaska in 1964 stimulated present interest in research on the nature and causes of these phenomena and the reduction of the hazards attending them.

Populations in earthquake-prone areas in the western United States are expected to increase to at least one-fifth of the total national population by the year 2000. The Urban Land Institute estimates that, by then, one-seventh of our total population will be concentrated in less than one-third of the area of the State of California, primarily in the coastal region; the "earthquake country" of the San Andreas fault. Many moderate, a few severe, and perhaps one great earthquake can be expected to occur in California and other earthquake-prone areas during this period of rapid population growth.

Recognizing the critical and immediate need to develop sound guidelines for safe and economic urban development for this expanding population, the U.S. Geological Survey has organized a broad, coordinated, interdisciplinary earthquake research program at its National Center for Earthquake Research (NCER) in Menlo Park, California. About 100 geologists, geophysicists, mathematicians, and technicians are engaged in this research program. The various elements of this program are:

Seismological studies

Small earthquakes and aftershocks are being studied along a segment of the San Andreas fault zone that stretches from San Francisco 200 miles south to Cholame, near which a sequence of moderate earthquakes occurred in June and July, 1966 (fig. 37). A network of fixed seismograph stations is being established in this area. Thirteen such stations, primarily in the San Francisco Bay area south of San Francisco, are now in operation, and a total of 31 are scheduled for installation by the end of FY 1967. Earthquake signals from these seismograph stations are transmitted (telemetered) over telephone lines to NCER and recorded there for study.