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PRELIMINARY REPORT OF THE CAMPANIA-BASILICATA, ITALY EARTHQUAKE OF NOVEMBER 23, 1980

This report is being made by the investigative team of the Earthquake Engineering Research Institute jointly with the United States National Academy of Sciences. Members of the investigative team are as follows:

Mr. James L Stratta, Engineer (Team Leader); Specialty, Structural Engineering

Mr. Luis E. Escalante, Engineer; Specialty, Lifeline Engineering

Mr. Ellis L. Krinitzsky, Engineer; Specialty, Geotechnical Engineering

Mr. Ugo Morelli, Social Scientist; Specialty, Social Science

The specific purpose of the investigation in Italy by the scientific team is to determine what can be learned about the earthquake and its effects on structures and on man.

Seismic Effects:

The earthquake had a magnitude (M_s) of 6.8 to 7.0 with a focal depth of 20 km. The area of severest shaking (mercalli intensity X) was bounded by San Angelo del Lombardi, Calitri, Pescopagano and Calabritto. The shock caused damage as far east as Potenza, north to near Ariano Irpino, Avellino and Napoli, and south to Capaccio.

There were three main shocks, each with epicenters in a different place, within 80 seconds. The largest shock registered a peak acceleration of 0.38g with 10 seconds of motion greater than 0.1g. The record was made in Sturno. The three main shocks combined produced 70 seconds of shaking greater than 0.01g. according to personnal of CNEN.

Thus the shaking was severe and lasted a long time. Some topographic amplification may have occurred in the villages located on mountain peaks.

No evidence was found of surface ground breakage from movements on faults. There were no major landslides, except at Calitri, though the countryside has steep slopes with many evidences of past landslides that are not earthquake related. There apparently has been no evidence of soil liquification. Our queries to date indicate that no damage was don in tunnels or at dams.

Structural Aspects:

1. Almost all structures which collapsed were homes constructed over 100 years ago utilizing rubble stone masonry walls. This type of construction has collapsed in previous Italian earthquakes and can be expected to fail in future earthquakes which are certain to occur. When these future earthquakes will occur cannot be predicted at this time with any meaningful timeframe.

2. Newer construction which collapsed was not constructed with any degree of seismic resistance.

3. If the U.S.A. is to construct any new facilities of any type of occupancy it should make absolutely certain that proper seismic engineering and construction is employed. It is strongly recommended that the Earthquake Engineering Research Institute be contacted for aid in this matter. This item cannot be overemphasized.

Lifelines:

Damage to lifelines--electric power, water, sewerage, transportation and communication systems--varied from slight to moderate.

Power systems suffered slight to moderate damage, particularly to the local distribution network. Generating stations and major transmission systems were not damaged. Power distribution systems were quickly repaired and supplemented by portable generators; they were also extended into tent cities and trailer parks.

Because of the fear of contamination and water-borne diseases water systems were shut off in various towns. Therefore, it is not possible to assess damage to shut-off systems. Temporary water lines were constructed with spigots located at street corners, tent cities, trailer parks, etc. Some cities had underground reservoirs which were apparently not damaged. Major water supply trunk lines were not damaged and remained functional.

In towns where the water supply was shut off sewerage systems became inoperative; damage assessment was therefore not possible. Otherwise, sewerage systems remained operable.

Transportation facilities suffered slight damage. Cracks in road pavements occurred in various locations and several bridges were slightly damaged. Temporary repairs sufficed to make almost all roads and bridges useful. The most severe impact on transportation was the blocking of streets by the debris of collapsed or damaged buildings. Heavy rains and the wear and tear caused by heavy equipment has contributed to the deterioration of streets and highways.

Communication systems--mostly telephones--were moderately to severely affected due to loss of electric power, broken conductors, and unknown causes, probably including increased demand. Restoration of telephone service was progressing, although service in some areas was erratic.

In general, lifeline systems did not suffer such severe damage as to significantly contribute to the suffering of the populace. The restoration of lifeline systems to a near normal state has been satisfactorily accomplished.

The Response:

The area hardest hit by the earthquakes covers some 27,000 sqare kilometers, with a population of some six to seven million people, or just under 10 percent of the area and population of the country. Except for Naples and Salerno, it is primarily agricultural.

As of December 12, 1980, casualties amounted to 12,360, comprising 3,114 dead, 7,671 wounded, and 1,575 missing. The number of persons requiring temporary housing totals about 170,000 about 37,000 of whom are in tents, 43,000 in trailers, 37,000 in railroad cars, and about 53,000 in ships, public buildings, and other facilities. There are over 22,000 rooms available in hotels and other accommodations in the provinces surrounding those hardest hit (i.e. Napoli, Avellino, Salerno, and Potenza) but only about 10 percent of them are occupied because the disaster victims are very reluctant to leave their towns and villages.

The recovery forces total some 43,000 consisting mainly of members of the armed forces. Carabinieri (national police) and fire fighters (Vigili del Fuoco). They are employing some 39 helicopters and light fixed-wing aircraft, 2,400 trucks and similar vehicles, and 200 special corps of engineers and pieces of equipment (construction and heavy moving).

Preliminary observations indicate that the emergency phase of response continues (and might last for several more months) with the main objective of:

(a moving the victims now in tents to trailers;

(b) keeping the homeless fed and in good health; and

(c demolishing the heavily damaged structures and removing the debris.

Special benefits were authorized for the victims by a decree issued by the President of the Republic on November 26,1980. The beneficiaries will be the inhabitants of the localities to be specifically identified by the Special Commissioner named a few hours after the earthquake, in acordance with the law of December 8, 1970. The localities are expected to number some 200.

A long-range reconstruction program is supposed to be ready by December 14, 1980 and is being prepared by an interministerial committee created for this express purpose.

The investigative team is willing to aid any group working on the tragedy of this earthquake and to help formulate any policy within its expertise.