DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

United States Earthquakes, 1980

By

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and

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Introduction

This publication describes all earthquakes that were reported felt in the United States and nearby territories in 1980. It has been compiled by the U.S. Geological Survey (USGS) and published jointly with NOAA, Environmental Data and Information Service (EDIS). Its purpose is to provide a continuous history of U.S. earthquakes for studying seismic risk, evaluating nuclear powerplant sites, designing earthquake-resistive structures, and answering inquiries from the scientific and general public.

The publication is composed of four major chapters: "Earthquake Descriptions," which includes a summary of macroseismic data reported for each earthquake and a chronological list of earthquakes by State (table 1); "Network Operations," which summarizes the results from local seismic networks; "Miscellaneous Activities," which contains information on crustal movement studies, tsunamis, and principal earthquakes of the world (table 6), and "Strong-Motion Seismograph Data" (table 8). The intensity and macroseismic data in "Earthquake Descriptions" are compiled from questionnaire canvasses (see next paragraph), newspaper articles, and reports prepared by other government organizations, State institutions, local organizations, and individuals. Each description includes date, origin time, hypocenter, and the source of the hypocenter computation, maximum intensity (Modified Mercalli), and macroseismic effects reported in the area.

The USGS collects intensity information primarily by mailing questionnaires, "Earthquake Report" forms, to postmasters in the earthquake area. Postmasters complete the forms and return them to the USGS, where they are evaluated and intensities are assigned. For damaging earthquakes, the questionnaires are supplemented by USGS field investigations. The USGS publishes preliminary intensity data in its quarterly circular, Earthquakes in the United States. The final information is published in the United States Earthquakes series, issued annually since 1928.

DISCUSSION OF TABLES

The earthquake parameters in tables 1 and 6 include date, origin time, hypocenter (epicenter and focal depth), and magnitude. Table 1 also contains the maximum observed Modified Mercalli (MM) intensity. The origin time and date are listed in Universal Coordinated Time (UTC). The epicenters were taken principally from the USGS Preliminary Determination of Epicenters, Monthly Listings[1] or Earthquakes in the United States[2]. The accuracy of the epicenters is that claimed by the institution supplying the hypocenter and is not necessarily the accuracy indicated by the number of decimals listed. The epicenters located by the USGS have a varying degree of accuracy, usually two-tenths of a degree or less, depending on their continental or oceanic location. The oceanic hypocenters are less accurate than those on the continent, even though both are listed to two decimals. Depths are listed to the nearest kilometer.

Magnitudes listed in the tables were furnished by cooperating institutions or determined by the USGS. The computational sources are indicated by letter codes identified in headnotes to the tables.

EPICENTER AND ISOSEISMAL MAPS

Figures 1-3 are computer plots of all earthquake epicenters in the conterminous United States, Alaska, and Hawaii listed in table 1. Each earthquake epicenter is indicated by a small circle or square.

Figures 4-6 are computer plots of 1980 earthquake epicenters in the conterminous United States, Alaska, and Hawaii by Modified Mercalli (MM) intensity. Maximum intensities are represented by Arabic numerals at the epicentral locations. Earthquakes of intensity I-IV are represented by solid circles.

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[1]For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

[2]Copies of these reports are available free on application to Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, Va. 22202.

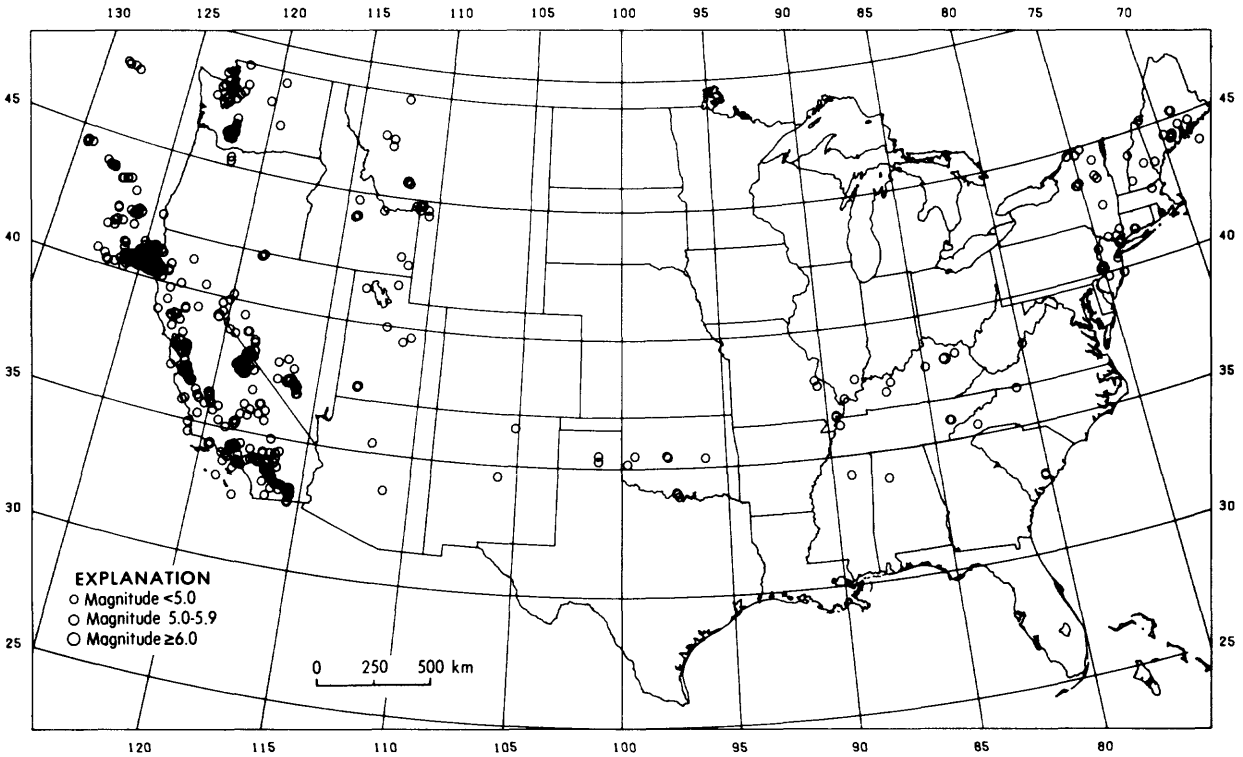

FIGURE 1.--Earthquake epicenters in the conterminous United States for 1980.

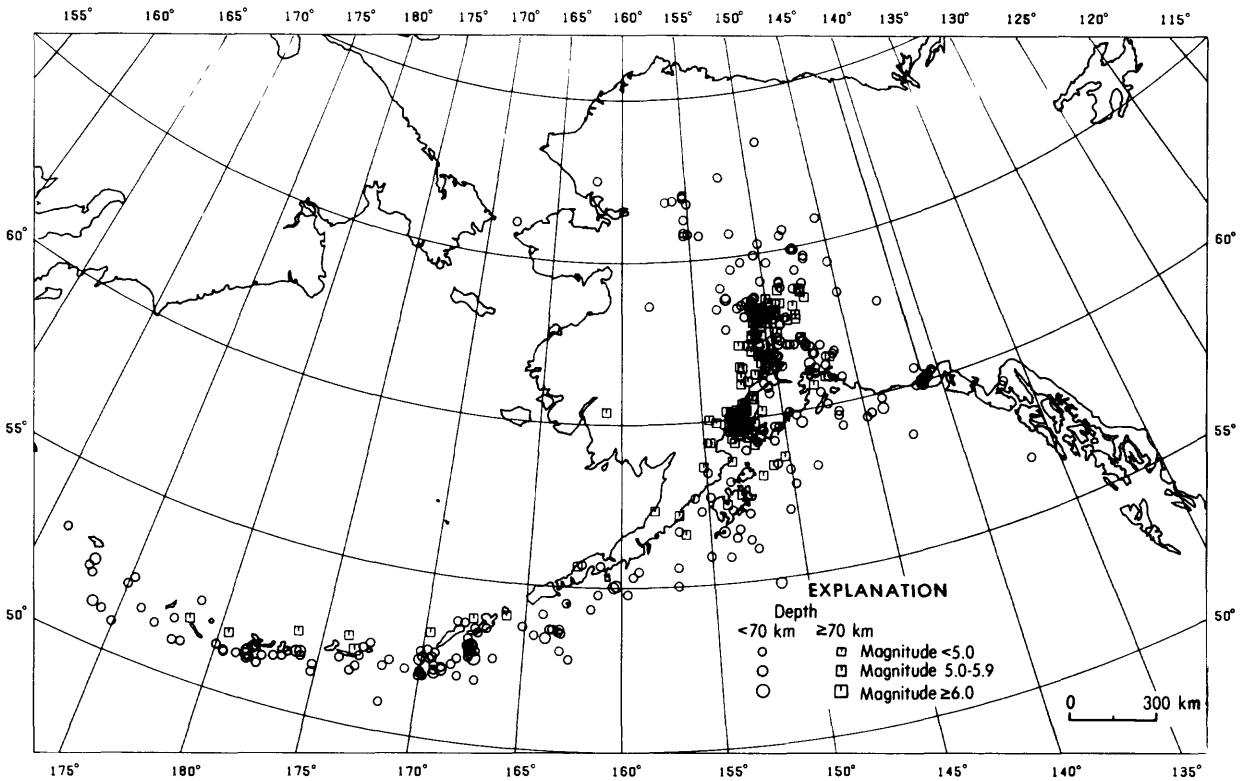

FIGURE 2.--Earthquake epicenters in Alaska for 1980.

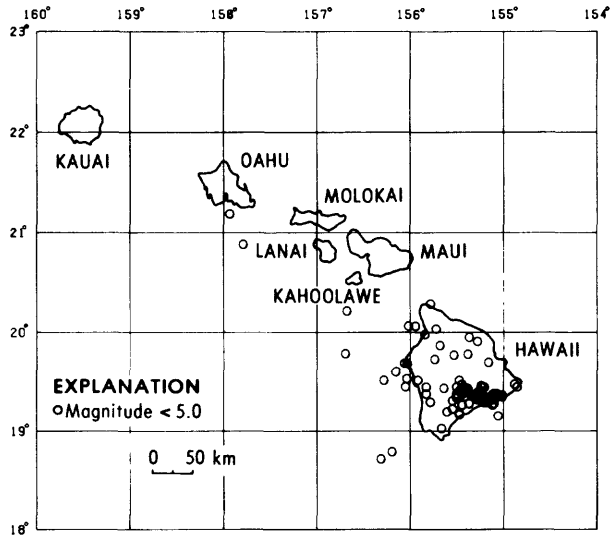

FIGURE 3.--Earthquake epicenters in Hawaii for 1980.

The USGS coordinates the collection of all types of earthquake information, with the special objective of correlating instrumentally determined earthquake locations with noninstrumental locations indicated by intensity data. This correlation is achieved through regional investigations of earthquakes by local organizations and the USGS. Primary data are gathered by a canvass of the epicentral area using questionnaire cards. When returned and analyzed, this information is used to prepare isoseismal maps which show the areal pattern of intensity associated with individual earthquakes.

The selection of intensity or isoseismal maps shown in the Earthquake Descriptions is governed largely by the size of the area affected. This means that sharp, localized shocks of intensity VI (which often occur in California) may not be represented by these maps, whereas more widely felt earthquakes of intensity V and VI (which are characteristic of the Eastern and Central States) often will be illustrated because of the larger felt areas. Arabic numerals on these computer-plotted maps represent the maximum MM intensities at sampled localities. Isoseismal contours are a generalization of intensity data and are extrapolated in regions that have few observations. The contours do not include each intensity observation.

EARTHQUAKE INFORMATION SERVICES

The National Geophysical Data Center (NGDC), one of the five major facilities of NOAA's Environmental Data and Information Service, is responsible for data activities in seismology. Its services include preparing local and regional seismic histories for engineers, actuaries, and other scientists and answering direct inquiries from the public on all aspects of historical earthquakes. Additional services and products include publishing annual earthquake summaries and revised historical earthquake reports; and making available copies of seismograms, accelerograms, displacement meter records, digitized strong-motion seismograms, and epicenter lists in several formats. Many of these products and services are based on seismic records or other data that have originated with USGS recording networks or with USGS data-reduction facilities. Information concerning services and products of NGDC may be obtained from the National Geophysical Data Center, NOAA/EDIS, Boulder, CO 80303.

MAGNITUDE AND INTENSITY RATINGS

Magnitude, a measure of the "size" of an earthquake, is roughly related to the energy release at the focus of an earthquake. Although the magnitude scale has neither "top" nor "bottom" values the highest ever recorded was magnitude 8.9 and the lowest about -3. On this logarithmic scale, a magnitude 6 shallow-focus earthquake represents elastic-wave energy about 30 times greater than that generated by a magnitude 5 earthquake, 900 times greater than that of a magnitude 4 shock, and so forth. Many factors enter into the determination of earthquake magnitude, including earthquake focal depth, frequency content of the sampled energy, and the earthquake radiation pattern. Magnitude values calculated by the USGS are based on the following formulas:

$$MS = \log (A/T) + 1.66 \log D + 3.3, \quad (1)$$

as adopted by the International Association of Seismology and Physics of the Earth's Interior (IASPEI; Bath, 1966, p. 153), where A is the maximum vertical surface-wave ground amplitude, in micrometers; T is the period, in seconds, and $18 \leq T \leq 22$; and D is the distance in geocentric degrees (station to epicenter), and $20° \leq D \leq 160°$. No depth correction is made for depth less than 50 km, and no MS magnitudes are computed for depths greater than 50 km.

$$mb = \log (A/T) + Q(D,h), \quad (2)$$

as defined by Gutenberg and Richter (1956), except that T, the period in seconds, is restricted to $0.1 \leq T \leq 3.0$, and A, the ground amplitude in micrometers, is not necessarily the maximum of the P-wave group. Q is a function of distance D and depth h, where $D \geq 5°$.

$$ML = \log A - \log A_o, \quad (3)$$

as defined by Richter (1958, p. 340), where A is the maximum trace amplitude in millimeters, written by a Wood-Anderson torsion seismometer, and $\log A_o$ is a standard value as a function of

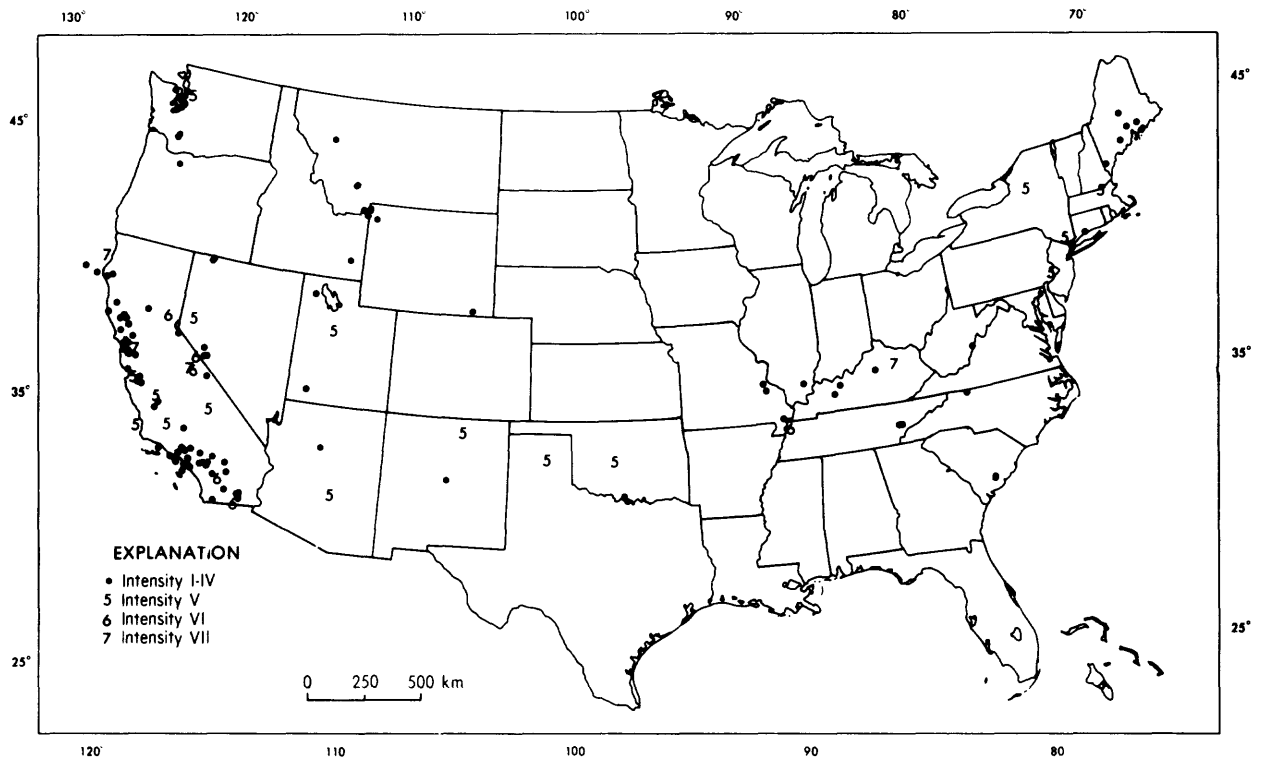

FIGURE 4.--Plot of earthquakes in the conterminous United States that were felt or caused damage in 1980.

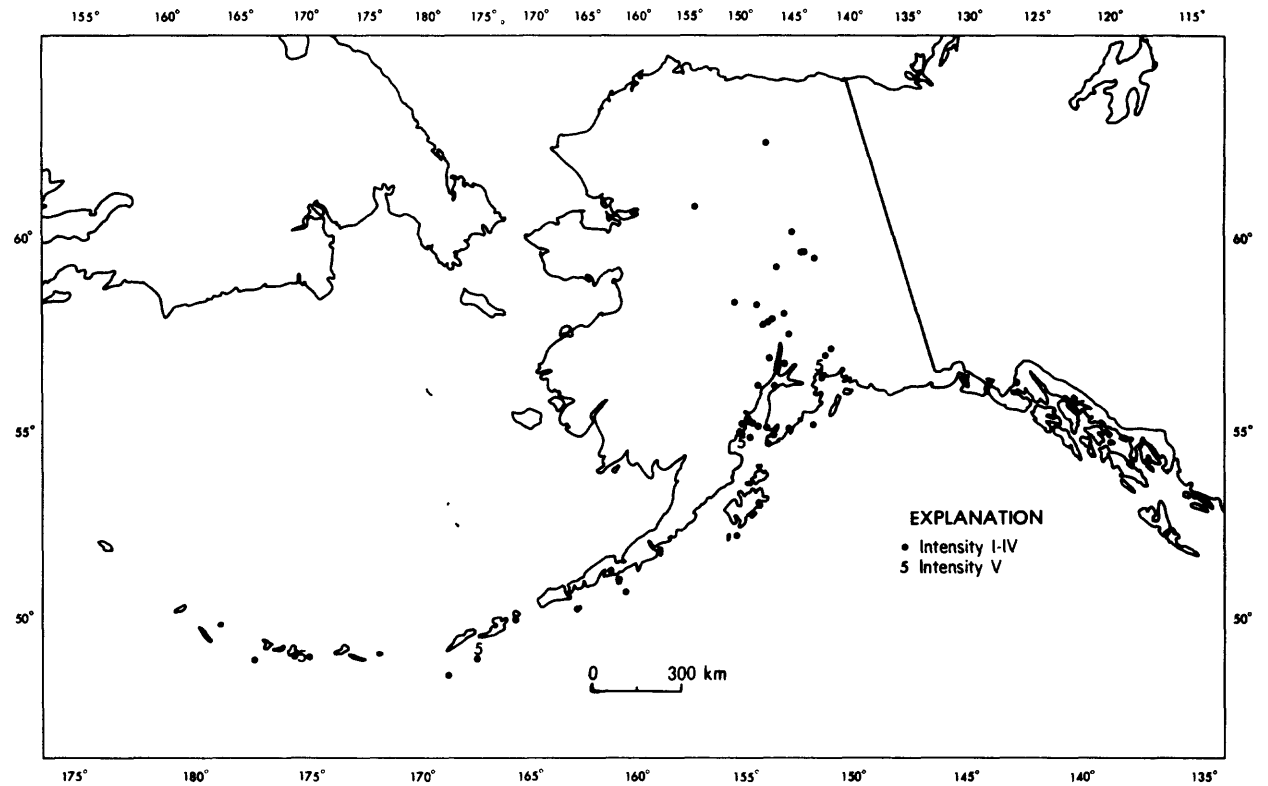

FIGURE 5.--Plot of earthquakes in Alaska that were felt or caused damage in 1980.

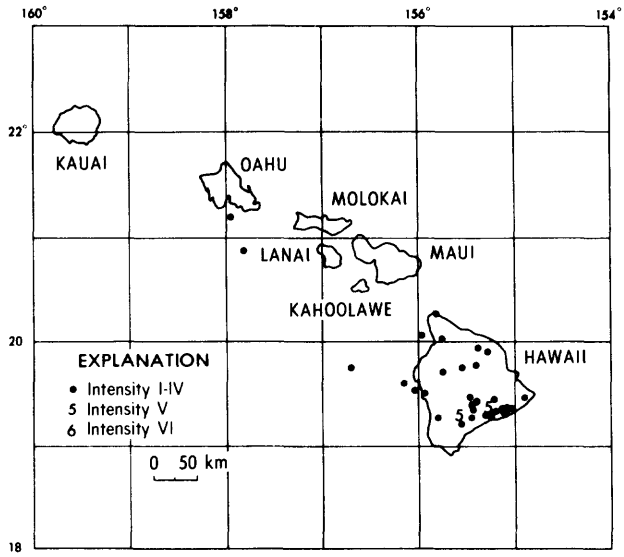

FIGURE 6.--Plot of earthquakes in Hawaii that were felt or caused damage in 1980.

distance, where the distance is $\leq$600 km. ML values are also calculated from other seismometers by conversion of recorded ground motion to the expected response of the torsion seismometer:

$$mbLg = 3.75 + 0.90(\log D) + \log (A/T) \quad 0.5° \leq D \leq 4°, \qquad (4)$$

$$mbLg = 3.30 + 1.66(\log D) + \log(A/T) \quad 4° \leq D \leq 30°,$$

as proposed by Nuttli (1973), where A/T is expressed in micrometers per second, calculated from the vertical-component 1-second Lg waves, and D is the distance in geocentric degrees.

MD is used in this publication for the duration or coda length magnitude. MD is usually computed from the difference, in seconds, between Pn or Pg-wave arrival time and the time the final coda amplitude decreases to the background-noise amplitude. These magnitudes are normally correlated with ML or mbLg so that resulting magnitudes are compatible. Thus the formulas vary for different geographic regions and seismograph systems.

Intensity, as applied to earthquakes, represents a quantity determined from the effects on people, manmade objects, and the earth's surface (landslides, ground fissures). Intensities are assigned according to the descriptions listed in the Modified Mercalli Intensity Scale of 1931 (Wood and Neumann, 1931). There are 12 discrete steps in the MM scale (see next section). An earthquake in a populated area will have different intensities at different localities, owing to the distance from the focus of the earthquake, type of focal mechanism, local geological conditions, structural design of buildings, and the earthquake magnitude.

The text of this publication gives the intensity at locations where the earthquake was reported felt and summaries of the strongest effects. Each earthquake is further characterized by its maximum intensity, which is given in the text and in table 1.

Although the Modified Mercalli Intensity Scale is in many instances inadequate for present-day requirements, the scale has been the guide used by the USGS and NOAA and will continue to be so used until a new scale has been devised and has acceptance in the engineering and seismological communities. Questions concerning the interpretation of historical earthquake intensities should be referred to the USGS.

MODIFIED MERCALLI INTENSITY SCALE OF 1931

Adapted from Sieberg's Mercalli-Cancani scale, modified and condensed.

I. Not felt - or, except rarely under especially favorable circumstances. Under certain conditions, at and outside the boundary of the area in which a great shock is felt: sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced; sometimes trees, structures, liquids, bodies of water, may sway--doors may swing, very slowly.

II. Felt indoors by few, especially on upper floors, or by sensitive, or nervous persons. Also, as in grade I, but often more noticeably: sometimes hanging objects may swing, especially when delicately suspended; sometimes trees, structures, liquids, bodies of water, may sway, doors may swing, very slowly; sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced.

III. Felt indoors by several, motion usually rapid vibration. Sometimes not recognized to be an earthquake at first. Duration estimated in some cases. Vibration like that due to passing of light, or lightly loaded trucks, or heavy trucks some distance away. Hanging objects may swing slightly. Movements may be appreciable on upper levels of tall structures. Rocked standing motor cars slightly.

IV. Felt indoors by many, outdoors by few. Awakened few, especially light sleepers. Frightened no one, unless apprehensive

from previous experience. Vibration like that due to passing of heavy or heavily loaded trucks. Sensation like heavy body striking building or falling of heavy objects inside. Rattling of dishes, windows, doors; glassware and crockery clink and clash. Creaking of walls, frame, especially in the upper range of this grade. Hanging objects swung, in numerous instances. Disturbed liquids in open vessels slightly. Rocked standing motor cars noticeably.

V. Felt indoors by practically all, outdoors by many or most: outdoors direction estimated. Awakened many, or most. Frightened few--slight excitement, a few ran outdoors. Buildings trembled throughout. Broke dishes, glassware, to some extent. Cracked windows--in some cases, but not generally. Overturned vases, small or unstable objects, in many instances, with occasional fall. Hanging objects, doors, swing generally or considerably. Knocked pictures against walls, or swung them out of place. Opened, or closed, doors, shutters, abruptly. Pendulum clocks stopped, started or ran fast, or slow. Moved small objects, furnishings, the latter to slight extent. Spilled liquids in small amounts from well-filled open containers. Trees, bushes, shaken slightly.

VI. Felt by all, indoors and outdoors. Frightened many, excitement general, some alarm, many ran outdoors. Awakened all. Persons made to move unsteadily. Trees, bushes, shaken slightly to moderately. Liquid set in strong motion. Small bells rang--church, chapel, school, etc. Damage slight in poorly built buildings. Fall of plaster in small amount. Cracked plaster somewhat, especially fine cracks chimneys in some instances. Broke dishes, glassware, in considerable quantity, also some windows. Fall of knick-knacks, books, pictures. Overturned furniture in many instances. Moved furnishings of moderately heavy kind.

VII. Frightened all--general alarm, all ran outdoors. Some, or many, found it difficult to stand. Noticed by persons driving motor cars. Trees and bushes shaken moderately to strongly. Waves on ponds, lakes, and running water. Water turbid from mud stirred up. Incaving to some extent of sand or gravel stream banks. Rang large church bells, etc. Suspended objects made to quiver. Damage negligible in buildings of good design and construction, slight to moderate in well-built ordinary buildings, considerable in poorly built or badly designed buildings, adobe houses, old walls (especially where laid up without mortar), spires, etc. Cracked chimneys to considerable extent, walls to some extent. Fall of plaster in considerable to large amount, also some stucco. Broke numerous windows, furniture to some extent. shook down loosened brickwork and tiles. Broke weak chimneys at the roof-line (sometimes damaging roofs). Fall of cornices from towers and high buildings. Dislodged bricks and stones. Overturned heavy furniture, with damage from breaking. Damage considerable to concrete irrigation ditches.

VIII. Fright general--alarm approaches panic. Disturbed persons driving motor cars. Trees shaken strongly--branches, trunks, broken off, especially palm trees. Ejected sand and mud in small amounts. Changes: temporary, permanent; in flow of springs and wells; dry wells renewed flow; in temperature of spring and well waters. Damage slight in structures (brick) built especially to withstand earthquakes. Considerable in ordinary substantial buildings, partial collapse: racked, tumbled down, wooden houses in some cases; threw out panel walls in frame structures, broke off decayed piling. Fall of walls. Cracked, broke, solid stone walls seriously. Wet ground to some extent, also ground on steep slopes. Twisting, fall, of chimneys, columns, monuments, also factory stacks, towers. Moved conspicuously, overturned, very heavy furniture.

IX. Panic general. Cracked ground conspicuously. Damage considerable in (masonry) structures built especially to withstand earthquakes: Threw out of plumb some wood-frame houses built especially to withstand earthquakes; great in substantial (masonry) buildings, some collapse in large part; or wholly shifted frame buildings off foundations, racked frames; serious to reservoirs; underground pipes sometimes broken.

X. Cracked ground, especially when loose and wet, up to widths of several inches; fissures up to a yard in width ran parallel to canal and stream banks. Landslides considerable from river banks and steep coasts. Shifted sand and mud horizontally on beaches and flat land. Changed level of water in wells. Threw water on banks of canals, lakes, rivers, etc. Damage serious to dams, dikes, embankments. Severe to well-built wooden structures and bridges, some destroyed. Developed dangerous cracks in excellent brick walls. Destroyed most masonry and frame structures, also their foundations. Bent railroad rails slightly. Tore apart, or crushed endwise, pipe lines

buried in earth. Open cracks and broad wavy folds in cement pavements and asphalt road surfaces.

XI. Disturbances in ground many and widespread, varying with ground material. Broad fissures, earth slumps, and land slips in soft, wet ground. Ejected water in large amounts charged with sand and mud. Caused sea-waves ("tidal" waves) of significant magnitude. Damage severe to wood-frame structures, especially near shock centers. Great to dams, dikes, embankments often for long distances. Few, if any (masonry) structures remained standing. Destroyed large well-built bridges by the wrecking of supporting piers, or pillars. Affected yielding wooden bridges less. Bent railroad rails greatly, and thrust them endwise. Put pipe lines buried in earth completely out of service.

XII. Damage total--practically all works of construction damaged greatly or destroyed. Disturbances in ground great and varied, numerous shearing cracks. Landslides, falls of rock of significant character, slumping of river banks, etc., numerous and extensive. Wrenched loose, tore off, large rock masses. Fault slips in firm rock, with notable horizontal and vertical offset displacements. Water channels, surface and underground, disturbed and modified greatly. Dammed lakes, produced waterfalls, deflected rivers, etc. Waves seen on ground surfaces (actually seen, probably, in some cases). Distorted lines of sight and level. Threw objects upward into the air.

COLLABORATORS

Active cooperation in earthquake investigations in the United States is provided by several seismological collaborators. The following served as collaborators to the USGS and NOAA during 1980.

Alaska.--Staff of NOAA-Alaska Tsunami Warning Center, Palmer.
Arizona.--Marc Sbar, University of Arizona, Tucson.
California (northern).--Bruce A. Bolt, University of California, Berkeley.
California (southern).--Clarence R. Allen, California Institute of Technology, Pasadena.
Connecticut.--Robert Miller, University of Connecticut, Groton.
Delaware.--Kenneth D. Woodruff, University of Delaware, Newark.
Florida and Georgia.--Leland T. Long, Georgia Institute of Technology, Atlanta.
Hawaii.--Robert Koyanagi, USGS, Hawaiian Volcano Observatory, Hawaii National Park.
Idaho.--James K. Applegate, Boise State University, Boise.
Indiana.--Robert F. Blakely, Department of Natural Resources, Geological Survey, Bloomington.
Iowa.--J. P. Kopp, Loras College, Dubuque.
Kansas.--Henry V. Beck, Kansas State University, Manhattan, and Don W. Steeples, Kansas Geological Survey, Lawrence.
Kentucky.--Ronald L. Street, University of Kentucky, Lexington.
Minnesota.--Harold Mooney, University of Minnesota, Minneapolis.
Missouri, Illinois, Arkansas area.--Otto Nuttli and Robert B. Herrmann, Saint Louis University, Saint Louis.
Montana.--Anthony Qamar, University of Montana, Missoula.
New England.--John E. Ebel, Boston College, Weston, Mass.
New York.--Lynn R. Sykes and Yash P. Aggarwal, Lamont-Doherty Geological Observatory, Palisades.
Ohio.--Edward J. Walter, John Carroll University, Cleveland.
Oklahoma.--James E. Lawson, Jr., Oklahoma Geological Survey, Leonard.
Oregon.--Richard W. Couch, Oregon State University, Corvallis.
Pennsylvania.--Benjamin F. Howell, Jr., Pennsylvania State University, University Park.
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Texas.--G. R. Keller, University of Texas, El Paso.
Utah.--R. B. Smith, University of Utah, Salt Lake City.
Virginia.--G. A. Bollinger, Virginia Polytechnic Institute and State University, Blacksburg.
Washington.--Robert S. Crosson, University of Washington, Seattle.
West Virginia.--R. W. Laird, West Virgina University, Morgantown.
Wisconsin.--David E. Willis, University of Wisconsin, Milwaukee.
Wyoming--R. A. Hutchinson, National Park Service, Yellowstone National Park.

Earthquake Descriptions

This section lists all earthquakes alphabetically by State. The origin time of earthquake occurrences is given in Universal Coordinated Time (UTC). Times are expressed continuously from midnight to midnight, or 0 to 24 hours.

Sources of noninstrumental information (macroseismic data) in this publication include questionnaire canvasses conducted by the USGS; newspaper articles; bulletins of the Seismological Society of America; and special earthquake reports of other organizations. Instrumental data are provided by the USGS, National Earthquake Information Service.

Roman numerals in the earthquake descriptions refer to the Modified Mercalli Intensity Scale of 1931 (see page 5), which gives about equal weight to the disturbance of inanimate objects and to personal reactions. When more than one degree of intensity is reported from a town, the town is assigned the highest intensity reported. All earthquake reports or press reports that contain only minimal information which preludes the assignment of an intensity are listed as "Felt."

[The following symbols are used to indicate authority for arrival or origin times, epicenters, and/or magnitudes: (B) University of California, Berkeley; (C) Arizona Bureau of Geology and Mineral Technology, Tucson; (D) University of Montana, Missoula; (E) U.S. Department of Energy, Las Vegas, Nevada; (F) Herrmann and others, 1982; (G) U.S. Geological Survey, National Earthquake Information Service, Golden, Colorado, or Network Operations Branch, Menlo Park, California; (H) U.S. Geological Survey, Hawaiian Volcano Observatory, Hawaii National Park; (J) Weston Observatory, Weston, Mass.; (K) Tennessee Earthquake Information Center, Memphis; (L) Lamont-Doherty Geological Observatory, Palisades, N.Y.; (M) NOAA, Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis, Mo.; (T) Oklahoma Geological Survey, Leonard; (U) University of Utah, Salt Lake City; (V) Virginia Polytechnic Institute and State University, Blacksburg; (W) University of Washington, Seattle; (Y) Baptist College, Charleston; (Z) Cockerham and others, 1980. N, Normal depth. Leaders (...) indicate information is not available]

Alabama

25 July (G) Northwestern Alabama
Origin time: 15 30 12.5
Epicenter: 33.94 N., 87.44 W.
Depth: 0 km
Magnitude: 3.1 Mn(G)

Probable explosion.

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

Alaska

4 January (G) Southern Alaska
Origin time: 03 47 36.9
Epicenter: 61.66 N., 147.44 W.
Depth: 66 km
Magnitude: 3.7 mb(G)

Felt at Anchorage (M).

19 January (G) Andreanof Islands, Aleutian Islands
Origin time: 07 02 35.0
Epicenter: 51.32 N., 178.49 W.
Depth: 50 km
Magnitude: 5.8 mb(G), 5.7 MS(G)

Felt on Adak Island.

3 February (G) Central Alaska
Origin time: 20 40 13.3
Epicenter: 64.65 N., 149.55 W.
Depth: Normal.
Magnitude: 3.0 ML(M)
Intensity III: Nenana (M).

8 February (G) Central Alaska
Origin time: 05 51 16.7
Epicenter: 64.68 N., 146.87 W.
Depth: 10 km
Magnitude: 3.3 ML(M)
Intensity IV: Eielson AFB.
Intensity III: Fairbanks.

13 February (G) Central Alaska
Origin time: 15 49 03.0
Epicenter: 64.95 N., 147.72 W.
Depth: Normal.
Magnitude: None computed.
Intensity III: North Pole (M).

2 March (G) Southern Alaska
Origin time: 00 28 23.0
Epicenter: 59.62 N., 151.36 W.
Depth: 13 km
Magnitude: 4.4 mb(G), 4.3 ML(M)
Intensity IV: Homer (M).

10 March (G) Alaska Peninsula
Origin time: 11 48 52.2
Epicenter: 54.47 N., 162.92 W.
Depth: 52 km
Magnitude: 4.8 mb(G)
Intensity IV: Cold Bay (M).

12 March (G) Umnak Island, Aleutian Islands
Origin time: 23 04 35.4
Epicenter: 52.15 N., 168.98 W.
Depth: 40 km
Magnitude: 5.4 mb(G), 5.2 MS(G)
Intensity II: Nikolski (M).

13 March (G) Central Alaska
Origin time: 03 29 35.8
Epicenter: 64.97 N., 147.57 W.
Depth: 21 km
Magnitude: 3.1 ML(M)
Intensity III: College (M), Fairbanks (M), Fort Wainwright (M), Murphy Dome (M), North Pole (M).

17 March (G) Southern Alaska
Origin time: 07 37 33.7
Epicenter: 59.99 N., 153.14 W.
Depth: 132 km
Magnitude: 4.9 mb(G)
Intensity III: Kenai (M).
Intensity II: Anchorage (M).

24 March (G) Fox Islands, Aleutian Islands
Origin time: 03 59 51.3
Epicenter: 52.97 N., 167.67 W.
Depth: Normal.
Magnitude: 6.2 mb(G), 6.9 MS(G), 6.9 ML(M)
Intensity V: Nikolski (M), Unalaska.
Intensity IV: Dutch Harbor (press report).
Intensity III: Akutan.

27 March (G) Fox Islands, Aleutian Islands
Origin time: 22 20 26.9
Epicenter: 52.79 N., 167.75 W.
Depth: Normal.
Magnitude: 4.7 mb(G)
Intensity IV: Nikolski (M).

28 March (G) Fox Islands, Aleutian Islands
Origin time: 09 23 40.9
Epicenter: 53.00 N., 167.62 W.
Depth: 30 km
Magnitude: 4.9 mb(G), 4.1 MS(G)
Intensity III: Nikolski (M).

3 April (G) Southern Alaska
Origin time: 03 46 04.3
Epicenter: 63.15 N., 149.57 W.
Depth: 92 km
Magnitude: 5.0 mb(G)
Intensity IV: Anchorage, Cantwell, Girdwood, Healy, McKinley Park, Palmer, Talkeetna, Usibelli, Wasilla, Willow (W).
Intensity III: Anchorage (Eastchester), Chugiak, Fairbanks (M), Hope, Skwentna, Spenard, Sutton, Tyonek.
Intensity II: Delta Junction, Whittier.

Alaska--Continued

3 April (G) Southern Alaska
Origin time: 08 37 29.5
Epicenter: 61.60 N., 150.56 W.
Depth: 58 km
Magnitude: None computed.

Felt in the Big Lake Area (M).

6 April (G) Southern Alaska
Origin time: 14 47 43.2
Epicenter: 61.38 N., 147.82 W.
Depth: 49 km
Magnitude: 4.9 mb(G), 5.2 MS(G), 5.2 ML(M)

Intensity V: Chugiak (small objects overturned; buildings shook strongly; windows, doors, and dishes rattled; felt by and awakened many), Gunsight Mountain Lodge--near Palmer (cracks in chimney, building shook strongly).
Intensity IV: Anchorage, Chickaloon, Cordova (M), Eastchester, Girdwood, Hope, King Mountain Lodge (near Palmer), Mountain View, Palmer, Sutton, Talkeetna, Valdez (M), Wasilla, Whittier.
Intensity III: Moose Pass, Skwentna, Tyonek.

13 April (G) Alaska Peninsula area
Origin time: 02 08 32.2
Epicenter: 55.04 N., 160.31 W.
Depth: 57 km
Magnitude: 5.4 mb(G)
Intensity IV: Sand Point.
Felt: Cold Bay (M).

14 April (G) Fox Islands, Aleutian Islands
Origin time: 22 07 36.8
Epicenter: 52.98 N., 167.84 W.
Depth: 46 km
Magnitude: 4.7 mb(G), 4.1 MS(G)
Intensity IV: Unalaska (M).

15 April (G) Andreanof Islands, Aleutian Islands
Origin time: 07 50 19.5
Epicenter: 51.87 N., 175.96 W.
Depth: 69 km
Magnitude: 5.1 mb(G)

Felt on Adak Island.

1 May (G) Southern Alaska
Origin time: 08 22 52.9
Epicenter: 61.89 N., 146.94 W.
Depth: 66 km
Magnitude: 4.3 mb(G)

Felt in the Matanuska Valley (M).

Intensity IV: Copper Center (M), Valdez.
Intensity III: Anchorage, Sutton.

7 May (G) Southern Alaska
Origin time: 03 06 16.0
Epicenter: 62.99 N., 150.80 W.
Depth: 118 km
Magnitude: 5.0 mb(G)
Intensity II: Palmer and Talkeetna (M).

14 May (G) Central Alaska
Origin time: 06 40 37.2
Epicenter: 68.41 N., 148.90 W.
Depth: 19 km
Magnitude: 4.4 mb(G), 4.4 ML(M)
Intensity III: Fairbanks (M).

29 May (G) Central Alaska
Origin time: 07 04 39.9
Epicenter: 64.91 N., 147.43 W.
Depth: Normal.
Magnitude: 3.6 ML(M)
Intensity III: College (M) and Fairbanks.

3 June (G) Southern Alaska
Origin time: 10 59 25.2
Epicenter: 60.00 N., 152.67 W.
Depth: 117 km
Magnitude: 3.7 mb(G)
Intensity II: Homer (M).

9 June (G) Southern Alaska
Origin time: 08 51 47.0
Epicenter: 61.51 N., 150.71 W.
Depth: 73 km
Magnitude: 4.5 mb(G)
Intensity IV: Houston (M), Willow (M).
Intensity III: Palmer (M), Wasilla (M).

12 June (G) Southern Alaska
Origin time: 10 49 23.3
Epicenter: 59.82 N., 151.75 W.
Depth: 97 km
Magnitude: None computed.

Felt at Homer (M).

25 June (G) Southern Alaska
Origin time: 07 22 19.6
Epicenter: 59.62 N., 150.31 W.
Depth: Normal.
Magnitude: None computed.
Intensity III: Anchorage (M), Eagle River (M).

28 June (G) Southern Alaska
Origin time: 18 51 49.4
Epicenter: 62.92 N., 151.10 W.
Depth: 124 km
Magnitude: 4.3 mb(G)

Felt at Palmer (M).

30 June (G) Southeastern Alaska
Origin time: 18 07 39.0

Alaska--Continued

Epicenter: 60.01 N., 141.05 W.
Depth: 13 km
Magnitude: 5.0 mb(G), 5.1 ML(M)
Intensity IV: Icy Bay.

30 June (G) Southeastern Alaska
Origin time: 18 59 31.7
Epicenter: 60.02 N., 141.11 W.
Depth: 15 km
Magnitude: 4.9 mb(G), 4.8 MS(G), 5.2 ML(M)
Intensity IV: Icy Bay, Yakutat.

4 July (G) Southern Alaska
Origin time: 05 45 14.5
Epicenter: 61.90 N., 151.06 W.
Depth: 80 km
Magnitude: 4.3 mb(G), 3.8 ML(M)

Felt from Houston to Anchorage (M).

5 July (G) Kenai Peninsula
Origin time: 15 50 24.5
Epicenter: 61.61 N., 150.11 W.
Depth: 49 km
Magnitude: 3.7 ML(M)

Felt at Palmer (M).

6 July (G) Kodiak Island region
Origin time: 18 45 30.8
Epicenter: 56.56 N., 154.24 W.
Depth: 26 km
Magnitude: 5.2 mb(G), 4.9 MS(G), 5.4 ML(M), 4.8 MS(B)

Felt strongly on Kodiak (M).

24 July (G) Andreanof Islands, Aleutian Islands
Origin time: 17 53 27.8
Epicenter: 51.75 N., 176.56 W.
Depth: 62 km
Magnitude: 4.1 mb(G)

Felt on Adak (M).

27 July (G) Central Alaska
Origin time: 09 05 35.0
Epicenter: 63.72 N., 152.79 W.
Depth: 21 km
Magnitude: 4.7 mb(G), 3.7 MS(G), 5.0 ML(M)
Intensity IV: Lake Minchumina, McGrath, Medfra, Ruby.
Felt: Fairbanks (M).

1 August (G) Kenai Peninsula
Origin time: 23 07 14.7
Epicenter: 59.62 N., 148.94 W.
Depth: 26 km
Magnitude: 5.4 mb(G), 5.1 MS(G), 5.3 MS(B), 5.7 ML(M)

Intensity IV: Anchorage, Cooper Landing, Moose Pass, Seward.
Intensity III: Chugiak, East Chester, Homer, Kenai, Ninilchik, Skwentna, Sutton.
Intensity II: Whittier.

4 August (G) Kenai Peninsula
Origin time: 17 31 00.8
Epicenter: 61.09 N., 151.87 W.
Depth: 96 km
Magnitude: 3.8 mb(G)
Intensity III: Chugiak (M), Eagle River (M).

7 August (G) Central Alaska
Origin time: 19 16 06.5
Epicenter: 63.52 N., 151.29 W.
Depth: 10 km
Magnitude: 5.2 mb(G), 5.4 ML(M)
Intensity IV: Cantwell, Ester, Ferry, McKinley Park, Talkeetna, Usibelli.
Intensity III: Anchorage, Clear AFB, Delta Junction, East Chester, Fairbanks, Healy, Nenana, Paxson, Skwentna, Sutton.
Intensity II: Lake Minchumina.
Felt: McGrath, Palmer, and several points along the Alaska Railroad (all from press reports).

13 August (G) Kenai Peninsula
Origin time: 03 52 55.8
Epicenter: 59.25 N., 151.78 W.
Depth: 53 km
Magnitude: 4.0 mb(G)
Intensity III: Homer (M).

18 August (G) Central Alaska
Origin time: 22 50 23.7
Epicenter: 63.05 N., 150.51 W.
Depth: 39 km
Magnitude: 4.5 mb(G), 4.0 ML(M)
Intensity III: Curry and Gold Creek (M).

30 August (G) Kenai Peninsula
Origin time: 00 18 21.1
Epicenter: 59.52 N., 152.84 W.
Depth: 81 km
Magnitude: 4.5 mb(G)
Intensity IV: Homer.
Intensity III: Seldovia.
Intensity II: Cooper Landing.

9 September (G) Kenai Peninsula
Origin time: 08 25 10.4
Epicenter: 61.01 N., 150.91 W.
Depth: 33 km
Magnitude: 3.6 mb(G), 3.7 ML(M)
Intensity III: Anchorage (M).

13 September (G) Kenai Peninsula
Origin time: 07 24 12.2
Epicenter: 59.84 N., 152.25 W.

Alaska--Continued

Depth: 100 km
Magnitude: 4.3 mb(G),

Felt at Anchor Point and Homer (M).

19 September (G) Central Alaska
Origin time: 22 34 50.2
Epicenter: 65.60 N., 148.05 W.
Depth: 16 km
Magnitude: 3.8 ML(M)

Felt at College and Fairbanks (M).

6 October (G) Central Alaska
Origin time: 14 57 35.2
Epicenter: 66.73 N., 155.06 W.
Depth: Normal.
Magnitude: 4.7 ML(M), 4.6 mb(G), 4.5 MS(G)
Intensity III: Indian Mountain (M).

14 October (G) Fox Islands, Aleutian Islands
Origin time: 15 53 38.8
Epicenter: 54.03 N., 165.99 W.
Depth: 85 km
Magnitude: 4.5 mb(G)
Intensity IV: Unalaska (M).

15 October (G) Alaska Peninsula
Origin time: 09 20 12.9
Epicenter: 55.67 N., 161.13 W.
Depth: 24 km
Magnitude: 5.0 mb(G), 4.9 ML(M)
Intensity IV: Cold Bay.

20 October Central Alaska
Origin time: 00 51
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.
Intensity III: Fairbanks.

30 October (G) Central Alaska
Origin time: 03 45 26.6
Epicenter: 62.51 N., 149.62 W.
Depth: 80 km
Magnitude: None computed.

Felt in the Susitna and Matanuska Valleys (press report).

Intensity III: Talkeetna (M).
Intensity II: Eagle River (M), Palmer (M), Willow (M).
Felt: Anchorage (M).

12 November (G) Southern Alaska
Origin time: 09 05 19.7
Epicenter: 59.64 N., 153.30 W.
Depth: 145 km

Alaska--Continued

Magnitude: None computed.
Intensity II: Homer (M), Kenai (M), and Soldotna (M).

21 November (G) Andreanof Islands, Aleutian Islands
Origin time: 14 56 13.4
Epicenter: 51.80 N., 176.14 W.
Depth: 53 km
Magnitude: 5.6 mb(G), 5.7 MS(G), 5.6 MS(B), 5.5 MS(P), 6.0 mb(P)
Intensity V: Adak (plaster cracked; small objects moved; hanging objects swung slightly; windows, doors, and dishes rattled; buildings creaked; felt by and awakened many).

23 November (G) Southern Alaska
Origin time: 18 52 52.6
Epicenter: 60.08 N., 152.83 W.
Depth: 138 km
Magnitude: None computed.
Intensity III: Kenai (M).

27 November (G) Southeastern Alaska
Origin time: 22 54 14.9
Epicenter: 59.19 N., 136.43 W.
Depth: Normal.
Magnitude: 4.1 mb(G), 4.2 ML(M)

Felt at Haines (M).

30 November (G) Southern Alaska
Origin time: 21 31 47.3
Epicenter: 59.43 N., 153.28 W.
Depth: 87 km
Magnitude: 4.9 mb(G)
Intensity V: Clam Gulch (hairline cracks in dry wall, hanging objects swung slightly, buildings trembled slightly).
Intensity IV: Homer, Kodiak (M), Seward.
Intensity III: Cooper Landing, Moose Pass, Pedro Bay, Seldovia.
Felt: Anchorage area (M).

11 December (G) Southern Alaska
Origin time: 22 10 57.4
Epicenter: 60.03 N., 152.70 W.
Depth: 118 km
Magnitude: None computed.
Intensity III: Kenai and Soldotna (M).

Arizona

1 June (G) Central Arizona
Origin time: 08 40 27.5
Epicenter: 35.39 N., 111.99 W.
Depth: 5 km
Magnitude: 3.6 ML(G)
Intensity II: Parks (C).

Arizona--Continued

9 June (G) Baja California, Mexico
Origin time: 03 28 18.9

See California listing.

15 September (G) Central Arizona
Origin time: 22 38 22.2
Epicenter: 33.59 N., 111.25 W.
Depth: 0 km
Magnitude: None computed.

Possible explosion.

Intensity V: Roosevelt.

California

1 January (P) Imperial Valley
Origin time: 04 28 41.4
Epicenter: 32.90 N., 115.50 W.
Depth: 5 km
Magnitude: 3.0 ML(P)

Felt in the Imperial Valley (press report).

7 January (B) Owens Valley area
Origin time: 19 56 56.2
Epicenter: 37.61 N., 118.92 W.
Depth: 5 km
Magnitude: 3.0 ML(B)

Felt at Mammoth Lakes (B).

8 January (P) Southern California
Origin time: 19 10 11.5
Epicenter: 34.02 N., 117.57 W.
Depth: 6 km
Magnitude: 3.3 ML(P)
Intensity IV: Etiwanda.
Intensity III: Ontario (press report).
Felt: Riverside (P), Upland (P).

9 January (B) Northern California
Origin time: 19 53 20.1
Epicenter: 38.46 N., 122.64 W.
Depth: 8 km
Magnitude: 3.0 ML(B)
Intensity IV: Santa Rosa.

12 January (P) Imperial Valley
Origin time: 20 11 05.9
Epicenter: 32.97 N., 115.55 W.
Depth: 5 km
Magnitude: 4.1 ML(P)
Intensity IV: Brawley, El Centro.
Intensity III: Heber, Imperial.

13 January (P) Imperial Valley
Origin time: 21 12 34.1
Epicenter: 33.12 N., 115.70 W.

Depth: 5 km
Magnitude: 3.5 ML(P)

Felt in the Imperial Valley (press report).

14 January (B) Northern California
Origin time: 08 54 32.3
Epicenter: 39.42 N., 123.20 W.
Depth: 9 km
Magnitude: 3.1 ML(B)
Intensity IV: Willits.

14 January (B) Owens Valley area
Origin time: 23 51 54.1
Epicenter: 37.61 N., 118.81 W.
Depth: 11 km
Magnitude: 4.0 ML(B), 4.2 ML(P)

Felt at Lake Crowley (P) and Mammoth Lakes (B).

15 January (B) Owens Valley area
Origin time: 00 00 19.0
Epicenter: 37.63 N., 118.87 W.
Depth: 5 km
Magnitude: 3.2 ML(B), 3.4 ML(P)

Felt at Lake Crowley (P).

15 January (P) Southern California
Origin time: 13 35 51.6
Epicenter: 33.70 N., 116.83 W.
Depth: 6 km
Magnitude: 2.8 ML(P)

Felt at Riverside (P).

15 January (P) Southern California
Origin time: 20 28 22.0
Epicenter: 36.18 N., 117.60 W.
Depth: 8 km
Magnitude: 3.7 ML(P), 3.9 ML(B)
Intensity V: Darwin (few windows cracked, light furniture and small objects moved, hanging pictures swung, felt by many).
Intensity II: China Lake.

17 January (B) Central California
Origin time: 01 11 39.5
Epicenter: 37.02 N., 121.82 W.
Depth: 15 km
Magnitude: 3.6 ML(B)

Felt at Gilroy, Los Gatos, Morgan Hill, San Jose, and Santa Cruz (B) and also as far north as southern San Francisco (press report).

17 January (P) Southern California
Origin time: 09 31 21.4
Epicenter: 33.83 N., 118.22 W.

California--Continued

Depth: 5 km
Magnitude: 2.2 ML(P)

Felt at Compton (P).

19 January (B) Northern California
Origin time: 17 05 28.9
Epicenter: 38.96 N., 123.53 W.
Depth: 8 km
Magnitude: 3.2 ML(B)

Felt in the Point Arenas area (B).

21 January (P) Southern California
Origin time: 06 30 56.4
Epicenter: 33.73 N., 117.98 W.
Depth: 6 km
Magnitude: 2.1 ML(P)

Felt at Huntington Beach (P).

24 January (B) Central California
Origin time: 19 00 09.7
Epicenter: 37.83 N., 121.79 W.
Depth: 8 km
Magnitude: 5.3 mb(G), 5.9 MS(G), 5.5 ML(B)

One death (possibly from a heart attack) and 44 injuries resulted from this earthquake. Most of the injuries were due to flying glass; overturned furniture, bookcases, and the like; and falling ceiling tile and light fixtures. Alameda County officials estimated the total damage at about $11.5 million, most of which about $10 million (Woods, 1980), occurred in the Lawrence Livermore Laboratory nuclear research center. The earthquake was felt over an area of approximately 75,000 sq km of central California (fig. 7).

The overpass at Interstate 580 and Greenville Road was closed temporarily for repairs because the paving settled nearly 30 cm as a result of shaking in the roadbed fill material on which the piers rested (Woods, 1980). The only damage to the bridge was some cracking and spalling of concrete to the southeast abutment of the overpass. The overpass is four lanes, with separate bridges for the east and west traffic.

The majority of the damage reported was of a non-structural type. Even Lawrence Livermore Laboratory experienced little structural damage to the buildings. The most commonly reported damage consisted of broken gas and water lines, broken windows

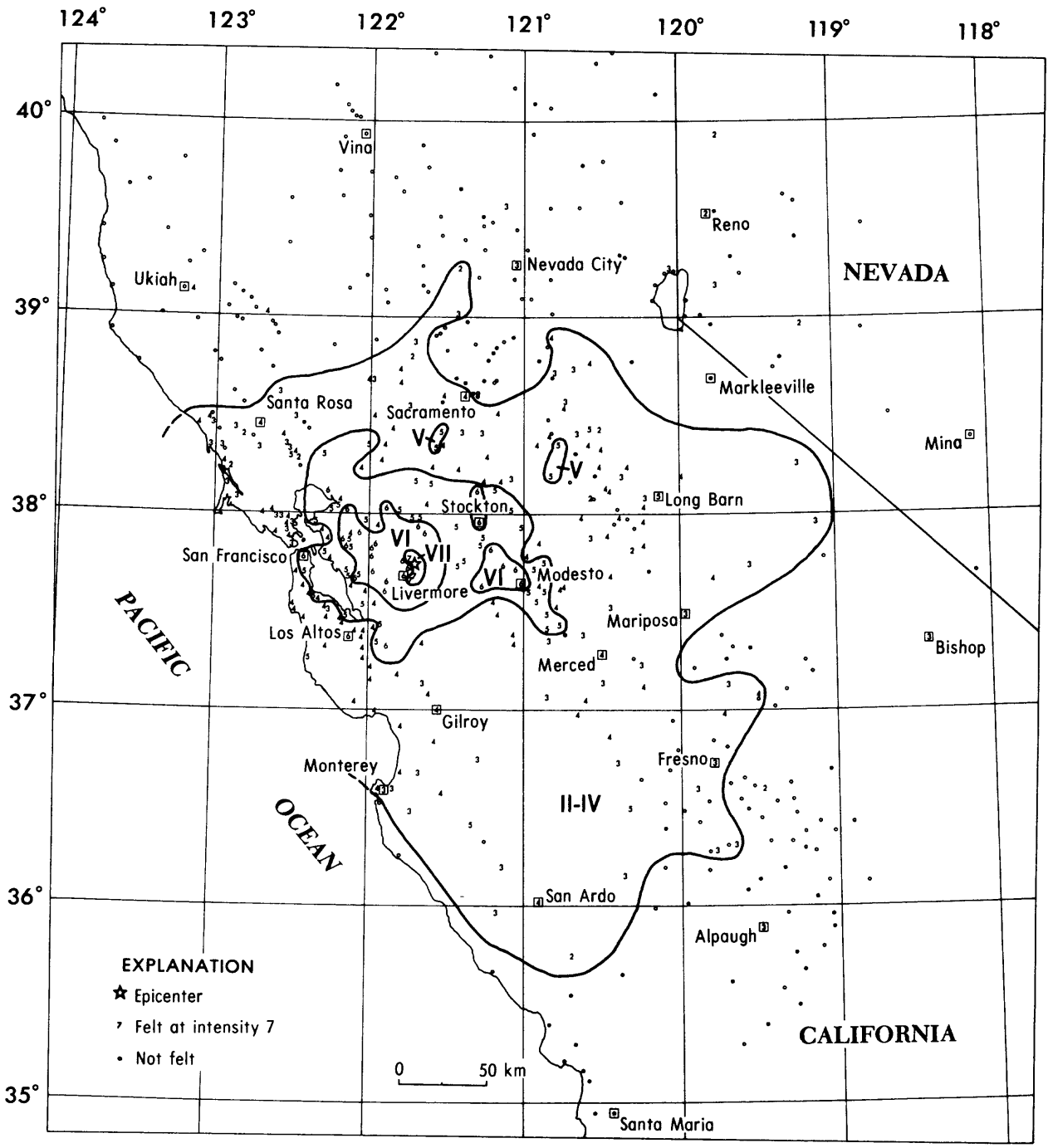

FIGURE 7.--Isoseismal map for the central California earthquake of 24 January 1980, 19 00 09.7 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

and glassware, some loss of bricks to tops of chimneys, overturned book shelves and furniture, mobile homes knocked off supports, cracked plaster, and falling of acoustical ceiling tile.

Woods (1980) noted that new zones of surface rupture were observed south of Vasco Road and across Laughlin Road along a projected trace of the Greenville fault. A discontinuous surface rupture was observed where the fault crossed Vasco Road, showing two cracks, each with as much as 2 cm of right-lateral offset. The cracks were traced approximately 2000 m to the northwest and 300 m to the southeast of Vasco Road. Right-lateral displacement showing 5-10 mm of offset was also observed on Laughlin Road and to the northwest for about 300 m.

Cockerham and others (1980) located one foreshock a little more than 1 min before this event at 1858 UTC and 568 aftershocks in the next 30 hours. Most of the aftershocks above magnitude 3.0 were felt in the Livermore area, however, they are not all listed as felt earthquakes in the listing below. This earthquake and its two largest aftershocks are significant because they are the largest earthquakes to have occurred in this area since the magnitude 5 event of June 11, 1903.

Intensity VII:

California--

Lawrence Livermore Laboratory--The press reported that damage, described as minor to moderate, was sustained in about 30 buildings and 29 trailer offices. The earthquakes damaged furniture, bookcases, ceiling tiles, light fixtures, scientific equipment, elevators, stairwells, storage racks, water and gas mains, and heavy equipment. Also damaged were concrete block walls used to shield workers from radiation.

Inside buildings, there was damage to light fixtures and acoustic tiles fell, TV monitors were knocked to the floor; lamps, bookcases, planters and blackboards were toppled to the floor or onto desks, and in many cases were broken. Pictures fell off walls and many windows were broken.

The Shiva Laser fusion equipment was slightly damaged when 12.7-by-1.9-cm (5-by-3/4-inch) bolts were sheared off from the four-story, 181,436 kg, 18 m high steel frame that held the laser. Realignment of the 20 laser arms will cost an estimated $200,000. Nearby, the Argus laser project sustained $100,000 damage when two laser amplifiers were tossed from their frames, and an amplifier used to intensify laser beams was knocked to the floor. One $10,000 piece of glasswork was damaged beyond repair. Damage was also done to the building housing the Argus project.

California--Continued

Vasco Road north of Livermore--At the Ordway Ranch, located near the Alameda-Contra Costa County line, the solid ranch-style house suffered severe structural damage. A 3.6-by-2.4-m (12-by-8-foot) fireplace of stone and brick cracked and parted from the wall as did a smaller fireplace in another room. Appliances in the kitchen were shifted about, tiles fell from the bathroom wall, stereo speakers were knocked off the living room wall and were tossed 1.2 m (4 feet) away from the wall, bottles of liquor and glassware were thrown to the floor in the dining room and broke, and part of a thick brick wall was knocked down. Horses and cattle ran wildly in circles.

At one home the fireplace was moved 2.5 cm (1 inch) away from the wall, the hot water heater was moved 0.3 m (1 foot) across the floor, the wall was cracked in some places, and a stereo system was destroyed. An observer reported the telephone poles near his home looked like rubber poles because they were shaking 0.3 m (1 foot) from side to side. He said even his two diesel trucks moved and the porch from the house separated by 2.5 cm (1 inch). A third person said it knocked out bricks in five different places in her home.

Wente Brothers Winery on Tesla Road, 4 km (2 1/2 miles) southeast of Livermore--The winery suffered the loss of more than 94,632 liters (25,000 gallons) of wine when three brewing tanks and two fermenting tanks tumbled from their foundations (fig. 8). More wine was lost when six oak barrels split open and 18 stainless-steel tanks buckled and wine overflowed from each tank. The shaking caused 168 of 208 wine tanks to suffer collapse or failure to some degree.

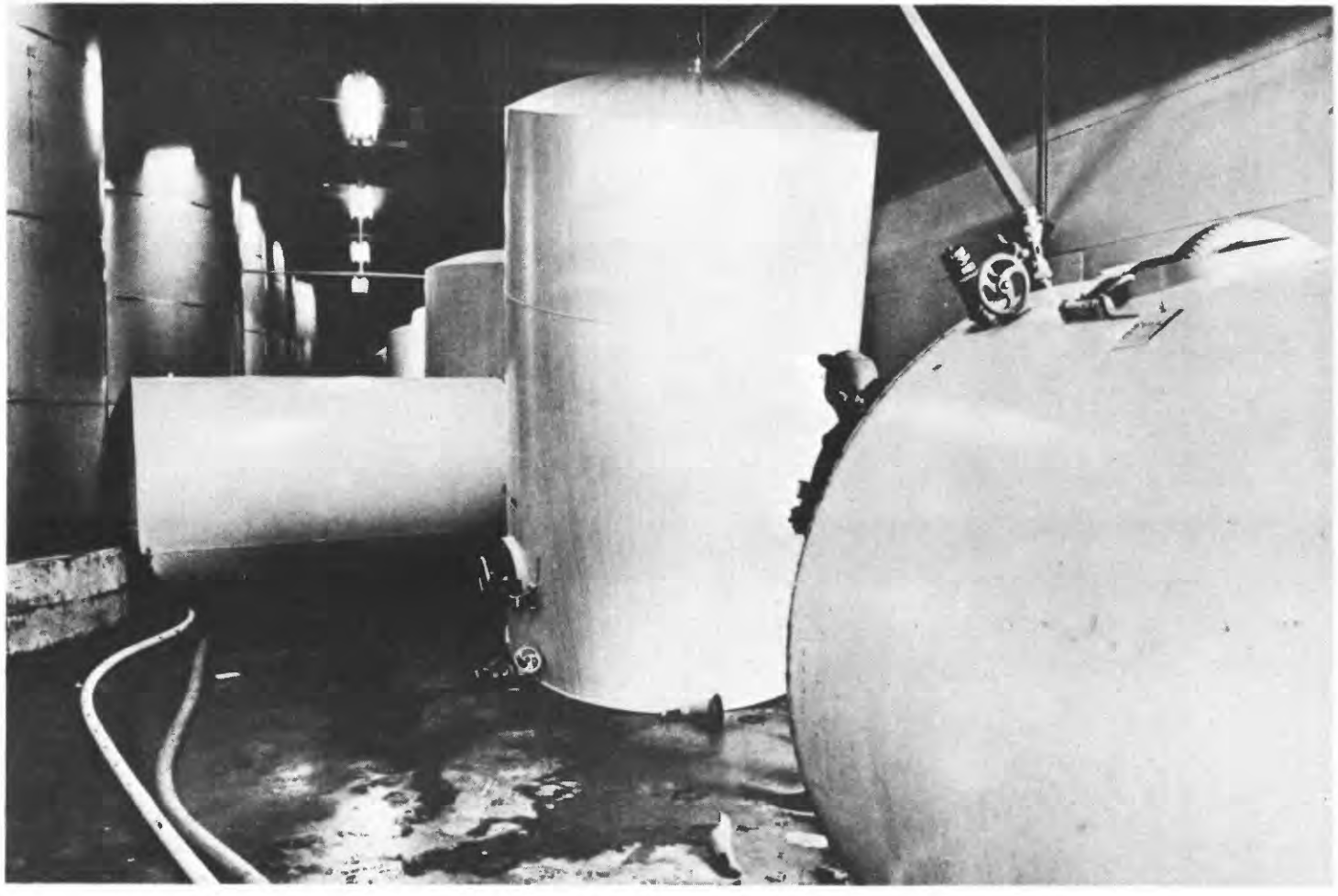

FIGURE 8.--Photograph of damage to fermenting tanks at the Wente Brothers Winery near Livermore, Calif. (photo provided by Tri-Valley Herald-News).

It also bent one of four supports of the elevated water tank near the winery (fig. 9).

Intensity VI:

California--

Brentwood--large cracks reported in stucco and dry wall and in exterior brick and cinderblock walls, bricks loosened in chimneys, underground pipes broke, water splashed onto sides of swimming pools, trees and bushes shook strongly, a few windows cracked, in grocery stores many jars and cans fell from shelves and some broke; the press reported that aisles in stores swayed too much to allow patrons to run outside; however, at a beauty shop everyone ran outside.

Byron--the press reported that at Byron School "the lunch trays went every which way and the refrigerators bounced across the floor, desks flew everywhere and the kids cried." Other reports included overturned knick-knacks or lamps, water splashed onto sides of swimming pools, buildings shook strongly, felt by many.

Danville--cracks in brick fences or walls, acoustical ceiling tiles fell, water splashed onto sides of swimming pools, trees and bushes shook strongly, hanging objects swung violently, some windows broke, felt by all.

Diablo--large cracks in the dry wall at the post office, ceiling tiles fell in the country club, water splashed onto sides of swimming pools, hanging objects swung violently, small objects overturned and broke, felt by many.

Dublin--The press reported considerable damage to businesses. The K-Mart store reported damage of $100,000 from numerous light fixtures and acoustical tiles falling and lots of damaged merchandise. Liquor stores in the area reported high loss from breakage due to bottles being knocked to the floor and broken. Some plate glass windows were broken, grocery stores had aisles cluttered with fallen goods, and schools reported minor damage including cracked plaster and broken light fixtures. There was one report of a cracked swimming pool.

Greenville North Subdivision (northeast of Springtown)--The press reported the

California--Continued

experiences of one resident as follows: "The door was 1.5 m (5 feet) from where I was, but I could not get to it. The force of the quake knocked me down. Glass was flying from the cabinets, the bookshelves fell over, all the dishes had fallen and broken, and the desk was 0.3 m (1 foot) deep in books. A neighbor's water heater had fallen over in the garage and broken the gas line."

On the south side of Dalton Avenue the subdivision was enclosed by a brick wall about 1.8 m (6 feet) high. Three sections, each about 1.8-2.4 m (6-8 feet) long, were knocked down in different places over a distance of about 3 blocks.

Hayward--large cracks in stucco and plaster wall with some falling, ceiling tiles fell in large amounts, 1.2-m (4-foot) cracks in exterior walls, small objects overturned and fell, hanging pictures fell, felt by many. At California State University, acoustical tiles fell from a gymnasium ceiling and some of the glassware in the science building tumbled off counters and broke.

Livermore--The damage in Livermore decreased from east to west across the city. Most of the damage to chimneys, homes, and businesses occurred in the downtown area and to the east toward the Lawrence Livermore Laboratory. The newspaper did not report any damage in the western parts of the city, which is primarily of newer construction.

The press reported minor damage in the business area such as broken windows in Al's Music House and Van's Health Food Store; vases were toppled over and broken at the Holiday Shop, a gift store; liquor was shaken off the shelves and broken at the Bottle, Book and Smoke Shop; many rows of wine and liquor crashed to the floor at Palomar Market; and goods fell to the floor in such numbers that grocery stores were closed temporarily for cleaning.

Other damage reported included fallen plaster and superficial damage to arches in front of St. Michael's Catholic Church on Maple Street; Intel Corporation at 250 Mines Road had seven employees injured, electronic manufacturing equipment that fell to

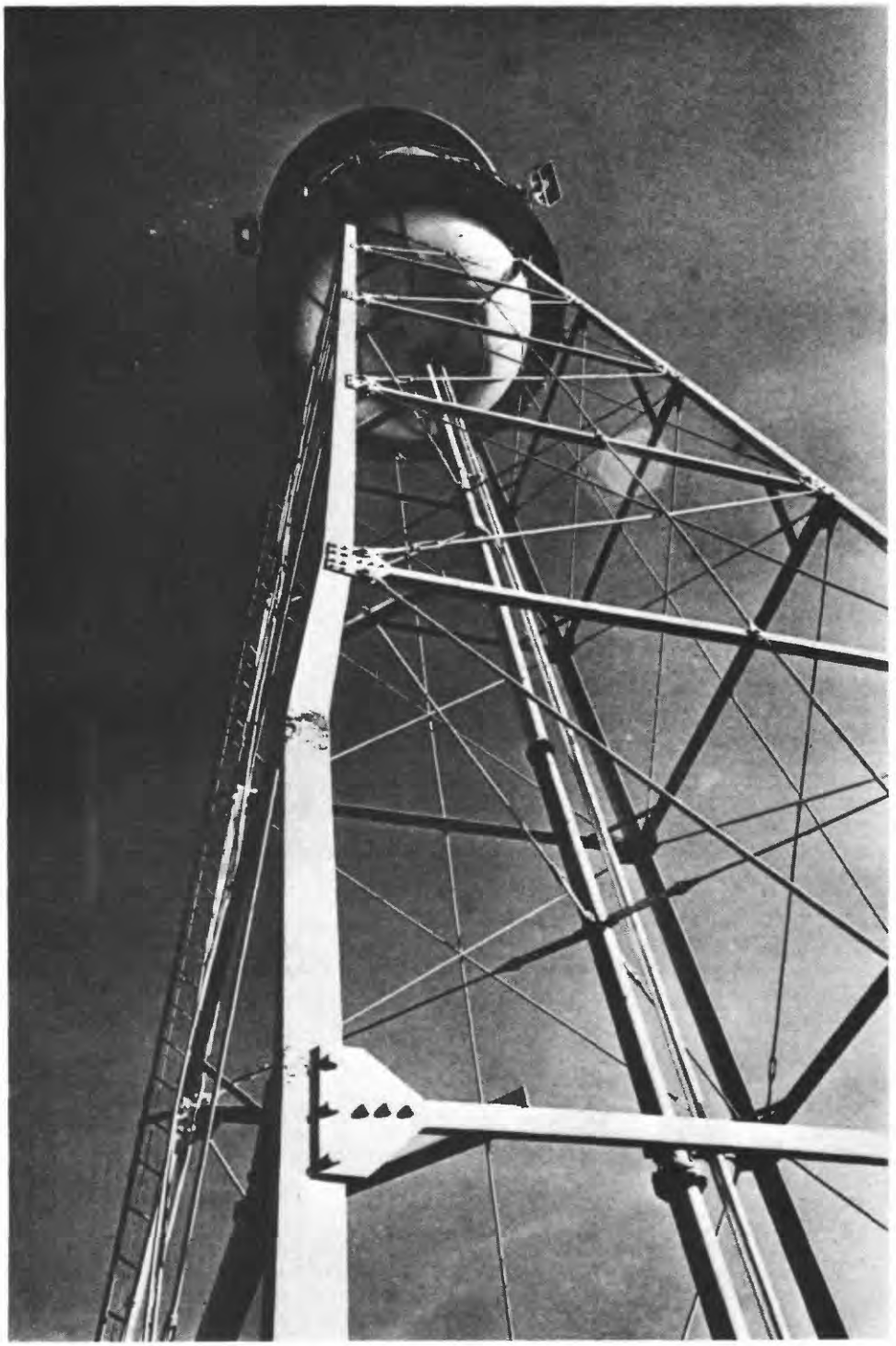

FIGURE 9.--Photograph of damage to one support of the elevated water tank at the Wente Brothers Winery near Livermore, Calif. (photo provided by Tri-Valley Herald-News).

the floor, and a ruptured water line; schools on the east side of Livermore reported books knocked off shelves in the library, objects on walls fell, tiles shaken loose from the ceiling. The Jackson Avenue school reported a broken 7.6-cm (3-inch) water main and the Junction Avenue school had a broken gas line, cracked walls and ceilings, and a buckled floor in one building. At the City Hall about 10 percent of the acoustical ceiling tile fell, bookshelves collapsed, and cracks appeared in the walls. On Trevarno Road cracks were reported in many stucco buildings, a 36 kg (80 lb) piece of chimney was reported thrown down, and a hot water heater was toppled.

Damage to chimneys in the eastern section of the city, especially to older chimneys, was mostly loosening of bricks or a few bricks knocked from the top. A few modern chimneys showed evidence of some cracking.

In Livermore there are many brick or cinderblock fences separating subdivisions from highly travelled streets. Most are about 1.8 m (6 feet) high and one brick or block thick. The only damage to these walls was found on Dalton Avenue west of Vasco Road in northeast Livermore where three 1.8-m (6-foot) sections over a two-block length were knocked down. There was no apparent exterior damage to houses in the area.

Lodi--The press reported ceiling and stucco cracks in the Delta Convalescent Home and a big crack in one wall of the Gross Convalescent Home. There were other reports of knickknacks falling off shelves, chandeliers swinging and water from a swimming pool being splashed 0.5 m (1 1/2 feet) over the sides.

Los Altos--large cracks in interior stucco walls and exterior cinderblock walls, light furniture and small objects moved, felt by many.

Manteca--The press reported some cracks in the ceilings and crumbling in the exterior stucco of the Manteca Community Hospital. Also, at Manteca East Union High School the earthquake was described as tremendously felt with tables and fish tanks jumping around the classroom.

California--Continued

Martinez--Some windows broke, light furniture and small objects moved, hanging pictures swung, buildings shook strongly, felt by many.

Modesto--The press reported the swimming pool cracked and two windows were shattered at the Suburban Lodge Motel on McHenry Avenue. Other damage reported was a cracked driveway at a home and a cracked wall at Enslen School. At a home near downtown, the people ran outside, a shelf smashed to the floor and cracks appeared in a bedroom ceiling.

Moraga--Some windows broke, light furniture and small objects moved, felt by many. At St. Mary's College Library books fell from stacks on the second floor.

Morgan Territory Road near the Alameda-Contra Costa County line--The press reported a half-built 11-room house swayed about 28 cm (11 inches) knocking everything out of alinement. The quake ripped nails from ceiling joists, snapped two-by-fours, popped out sliding glass doors and put a permanent ripple in one side of the house. The repairs were estimated to cost $30,000.

Orinda--Black's Grocery and Meat Market, located next to the Post Office suffered considerable breakage of bottles and dented cans as contents of shelves were shaken to the floor.

Pittsburg--The press reported cracks in the building support beams housing the Signode Corporation. Other reports were of cracked plaster and dry wall, walls separated from ceiling or floor, water splashed onto sides of swimming pools, few windows cracked, felt by many.

Pleasanton--Schools reported minor damage including cracked plaster and broken light fixtures. People ran into the streets, and a fire truck was bounced about (press report). Other effects were some windows broke, light and heavy furniture moved, water splashed onto sides of swimming pools, hanging pictures fell, felt by all.

Ripon--bricks were loosened on chimneys, water splashed onto sides of swimming pools, trees and bushes shook strongly, light furniture and small objects moved, felt by many.

Salida--a driveway was cracked and a heavy lamp moved (press report).

San Francisco--The press reported fallen plaster from a ceiling in City Hall and some cracks in the exterior ornate. The California Highway Patrol reported the Golden Gate and Bay Bridges swayed slightly but no structural damage was detected. A store owner reported a hanging bell over a door rang violently. Except for the minor damage to city hall, the San Francisco area suffered no damage.

San Jose--Some windows were broken, elevated water tanks were twisted, water splashed onto sides of swimming pools, light and heavy furniture moved, hanging pictures swung out of place, felt by all. The press described the motion as rolling and swaying, lasting for more than 10 seconds. People ran out of the County Administration Building. The motion was especially strong in the upper floors of high rise buildings. At Orchard Elementary School some books were toppled from shelves, people were reported nauseous, and a piano on rollers moved.

San Ramon--interior walls in a cinderblock building split, hanging pictures swung out of place, the building shook strongly, felt by all.

Springtown (suburb of Livermore)--the Holiday Inn had no structural damage but had more than 150 lamps and 80 television sets broken, many broken dishes in the kitchen and broken liquor bottles at the bar. All the bottles in the storeroom were broken. Some ceiling tiles fell in the lobby and a plate glass window was smashed. Some hairline cracks appeared in the cinderblock walls of the stairwells.

At the Beacon gas station several large windows were broken and tires were scattered over the floor. Also, at Springtown Towing Garage a van on a 1.2-m (4-foot) high jack rolled off the jack and crashed through the window (press report).

A resident reported to the press "All I remember is that I opened the door and it threw me down on the kitchen floor. The whole house started to move and the lamp in the kitchen was swinging so hard it looked like it was going to hit the ceiling. My son hid under the bed."

In the Sunrise Mobile Home Park, 95 of 133 mobile homes were damaged when they were knocked off their supports (fig. 10). The exterior damage included crumpled foundation skirts, broken gas and water lines, and damaged porches and other exterior additions. In the interior, furniture and loose items were thrown on the floor sometimes blocking doorways.

Stockton--The 1907 six-story Clark Hotel had large diagonal cracks across the face of the building and cracks in the parapet on the sixth floor. A man on the fourth floor was thrown out of bed. The State Employee Credit Union, 919 North Center, had a large crack that ran the length of the ground floor. The 1873 Weber Primary Building suffered a crack under the stairway leading to the second floor. The police facility at 22 East Market Street reported cracks in the wall. An estimated 12,000 volumes along with shelves fell to the floor in the Pharmacy School Library of the University of the Pacific. A gas line was broken at Pacific Horizon High School.

A man driving near the intersection of the Crosstown Freeway and Interstate 5 described the effect of the earthquake as follows: "When I first noticed, I was entering the highest part of the freeway, it felt like I had a flat tire. I started to lose control so I hit my brakes. I noticed in my rearview mirror that a guy in a station wagon behind me completely lost control and hit a guardrail. I also noticed about four or five other motorists stop and jump out of their cars. The freeway was really waving. The highway lamps were at a 45-degree angle. I have never seen anything like it."

A dining room chandelier was knocked to the floor and shattered at 1026 Sunny Oaks Way in north Stockton. Nearby a large front window was knocked out. All of the above information was taken from press reports.

Sunol--some windows broke, water splashed onto sides of swimming pools, light furniture and small objects

FIGURE 10.--Photograph of damage to a mobile home in the Sunrise Mobile Home Park in Springtown, Calif. (photo provided by Tri-Valley Herald-News).

moved, buildings shook strongly, felt by many.

Vallejo--large cracks in plaster and ceiling tile, elevated water tanks cracked, few windows cracked, hanging pictures and plants swung, felt by many.

Vernalis--bricks loosened on chimneys, water splashed onto sides of swimming pools, a few windows cracked, light furniture and small objects moved, hanging pictures swung, felt by many.

Walnut Creek--some windows broke, water splashed onto sides of swimming pools, trees and bushes shook moderately, light and heavy furniture moved, hanging pictures swung out of place, felt by all.

Intensity V: The most common effects reported for the places listed below were few windows cracked, light and heavy furniture moved, small objects moved or overturned and a few broke, water splashed onto sides of swimming pools, moving and standing vehicles rocked, buildings shook strongly, hanging objects swung in varying degree (slightly to violently), trees and bushes shook moderately to strongly, felt by many or all. All of these effects were not reported at every town or city. Some detailed effects published in newspapers are listed after the appropriate city names.

California--Antioch, Banta, Brisbane, Burlingame, Cantua Creek, Castro Valley, Clarksburg, Concord (St. Mary's College), Courtland, Crockett, Delhi, East Palo Alto (a man was reportedly knocked to the floor from a swivel chair, a candle and flag fell over, hanging lamps swung strongly), El Verano, Farmington, French Camp, Hilmar, Holt, Hughson, Isleton, Jackson, Keyes, Knightsen, Lathrop, Linden, Long Barn, Milpitas (an automobile assembly plant was shut down because of damage to a water main--press report), Napa (some cracks in the ceiling of a home), Newark, Oakland (a filing cabinet in the county administrative building moved; windows were broken on 39th Avenue in the eastern section of the city and in the 7300 block of Woodrow Drive in Montclair. This indicates the eastern part of the city may approach an intensity VI), Oakdale (cans fell to the floor in Gong's Grocery Store), Oakley, Pescadero, Pioneer, Rheem Valley, Richmond (one resident

California--Continued

reported a crack in the ceiling of her home, another said everything fell off her hutch), Rio Vista, Ripon, Riverbank, Rodeo, San Francisco International Airport, San Leandro, San Lorenzo, Santa Clara, Soledad, South San Francisco, Tracy, Turlock, Vacaville, Valley Springs (few dishes broke), Victor.

Intensity IV:

California--Acampo, Alameda, Alviso, Arnold, Auberry, Belmont, Benicia, Berkeley, Bethel Island, Boyes Hot Springs, Broderick, Ceres (press report), Chinese Camp, Chowchilla, Chualar, Clayton, Clearlake Oaks, Copperopolis, Crows Landing, Cupertino, Daly City, Denair, Dillon Beach, Dixon, Dos Palos, El Cerrito, El Granada, Elmira, El Portal, Empire, Escalon, Esparto, Fairfield, Firebaugh, Forest Knolls, Fremont, Friant, Georgetown, Gilory (press report), Glencoe, Groveland, Gustine, Half Moon Bay, Hayward, Herald, Hickman, Holy City, Hood, Ione, Jenner, Kenwood, Lafayette, La Grange, La Honda, Larkspur, Lockeford, Los Altos, Los Gatos, Marina, Menlo Park, Merced, Millbrae, Mill Valley, Moffett Field, Moss Beach, Moss Landing, Mountain Ranch, Mountain View, Mount Eden, Mount Hamilton, Mount Herman, Murphys, New Almaden, Newark, Newman, Pacifica, Pacific Grove, Palo Alto, Patterson, Pinecrest, Pollock Pines, Port Costa, Rail Road Flat, Redwood City, Redwood Estates, River Pines, Ryde, Sacramento, San Ardo, San Bruno, San Juan Bautista, San Leandro, San Martin, San Mateo, San Rafael, Santa Rita Park, Santa Rosa, Saratoga, Sloughhouse, Sonora, Soquel, South Dos Palos, South Lake Tahoe, South San Leandro, Stinson Beach, Sunnyvale, Sutter Creek, Talmage, Thornton, Travis AFB, Tuolumne, Twain Harte, Union City, Vallecito, Valley Home, Villa Grande, Waterford, Watsonville, Westley, Winters, Woodacre, Woodland, Yolo.

Intensity III:

California--Alpaugh, Belvedere-Tiburon, Bishop, Bodega, Bodega Bay, Bridgeport, Calistoga, Camino, Carmel Valley, Castle AFB, Clements, Coalinga (press report), Corte Madera, Cotati, Davis, Eldridge, Elk Grove, El Nido, Fairfax, Fresno (press report), Glen Ellen, Graton, Hanford (press report), Hathaway Pines, Inverness, Jolon, King City, Lee Vining, Le Grand, Lemoore, Los Banos, Madison, Mariposa, Marshall, Mendota, Mi-Wuk Village, Monte Rio, Morgan Hill, Monterey, Mt. Aukum, Nevada City, O'Neals,

Paicines, Pinegrove, Placerville, Raisin, Robbins, Saint Helena, Salinas, San Anselmo, San Carlos, San Quentin, Sausalito, Seaside, Snelling, Stevinson, Strawberry Valley, Tahoe Vista, Wheatland, Wilton, Winton, Yosemite National Park.
Nevada--Carson City.

Intensity II:
California--Angels Camp, Browns Valley, Knights Landing, Moccasin, Reedley, San Miguel, Sebastopol, Sonoma, Tomales, Weed Heights, West Point.
Nevada--Gardnerville, Reno.

Felt:
California--Lake Berryessa, Rio Vista, Rohnert Park, Stanford University (all from press reports).

24 January (Z) Central California
Origin time: 19 01 02.2
Epicenter: 37.80 N., 121.76 W.
Depth: 3 km
Magnitude: 5.1 ML(B)

Felt throughout the San Francisco area (B) aftershock of the 24 January 19 00 09.7 earthquake.

24 January (Z) Central California
Origin time: 19 01 45.2
Epicenter: 37.83 N., 121.74 W.
Depth: 2 km
Magnitude: 4.0 ML(B)

Felt throughout the San Francisco Bay area (B). Aftershock of the 24 January 19 00 09.7 earthquake.

24 January (Z) Central California
Origin time: 19 03 19.2
Epicenter: 37.84 N., 121.80 W.
Depth: 1 km
Magnitude: 4.8 ML(B)

Felt throughout the San Francisco Bay area (B). Aftershock of the 24 January 19 00 09.7 earthquake.

24 January (Z) Central California
Origin time: 19 12 42.1
Epicenter: 37.84 N., 121.80 W.
Depth: 3 km
Magnitude: 3.1 ML(B)

Felt in the Livermore area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

24 January (Z) Central California
Origin time: 19 56 05.2

California--Continued

Epicenter: 37.84 N., 121.81 W.
Depth: 9 km
Magnitude: 3.5 ML(B)

Felt in the Livermore area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

25 January (Z) Central California
Origin time: 05 12 43.2
Epicenter: 37.83 N., 121.78 W.
Depth: 6 km
Magnitude: 4.2 mb(G), 4.4 ML(B)

Felt throughout the San Francisco Bay area and in the San Joaquin Valley area from Sacramento to Fresno (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

Intensity IV: Daly City, Mill Valley (press report), San Francisco.
Intensity III: San Carlos.

25 January (Z) Central California
Origin time: 05 21 47.7
Epicenter: 37.85 N., 121.78 W.
Depth: 4 km
Magnitude: 3.4 ML(B)

Felt in the Livermore area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

25 January (Z) Central California
Origin time: 05 24 36.6
Epicenter: 37.85 N., 121.80 W.
Depth: 5 km
Magnitude: 4.2 mb(G), 4.6 ML(B)

Felt in the San Francisco Bay-San Joaquin Valley area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

Intensity IV: Daly City.

25 January (Z) Central California
Origin time: 05 29 45.2
Epicenter: 37.85 N., 121.80 W.
Depth: 5 km
Magnitude: 3.5 ML(B)

Felt in the San Francisco Bay-San Joaquin Valley area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

25 January (Z) Central California
Origin time: 07 45 59.8
Epicenter: 37.84 N., 121.80 W.
Depth: 3 km
Magnitude: 3.3 ML(B)

Felt in the Livermore area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

25 January (Z) Central California
Origin time: 13 39 02.5
Epicenter: 37.84 N., 121.79 W.
Depth: 3 km
Magnitude: 4.2 ML(B)

Felt in the San Francisco Bay-San Joaquin Valley area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

Intensity IV: Daly City.

25 January (Z) Central California
Origin time: 14 03 27.7
Epicenter: 37.84 N., 121.79 W.
Depth: 4 km
Magnitude: 4.0 ML(B)

Felt in the San Francisco Bay-San Joaquin Valley area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

27 January (P) Southern California
Origin time: 01 20 26.7
Epicenter: 34.05 N., 117.28 W.
Depth: 14 km
Magnitude: 2.9 ML(P)
Intensity IV: San Bernardino (press report).

27 January (Z) Central California
Origin time: 02 33 36.2
Epicenter: 37.75 N., 121.71 W.
Depth: 10 km
Magnitude: 5.0 mb(G), 5.0 MS(G), 5.8 ML(B)

This earthquake also occurred on the Greenville fault (Woods, 1980) at a location about 14 km south of the event of 24 January. It was located about 10 km northeast of Livermore and much closer than the 24 January event; however, it did much less damage to Livermore and the even closer Lawrence Livermore Laboratory. The worst damage documented was to the Tassajara Valley area and to Danville, which are located 17 and 28 km northwest of the epicenter.

Even though this earthquake occurred very near the Interstate 580 and Greenville Road intersection, the only additional damage was the sinking of the road bed about 2.5 cm and a few new cracks in the concrete overpass.

Six persons were treated at the Livermore hospital for cuts and bruises resulting from flying glass and falling ceiling tiles and supports. Electrical power was

California--Continued

off temporarily in some areas of Livermore, Dublin, Pleasanton, and Walnut Creek. Many residents of Livermore described the effect of this earthquake as a jarring motion while the effect of the one on 24 January was described as a more rolling motion.

Woods (1980) noted that new zones of surface rupture were observed south of Vasco Road and across Laughlin Road. The crack across Laughlin Road displayed 1-2 mm of additional right-lateral movement.

Intensity VII:
Danville--a brick chimney was broken at the roof line, a living room fireplace was damaged, 75 m of stone wall was demolished, a dining room hutch crashed to the floor shattering china, an archway was warped; and walls and ceilings were cracked; there were 1.3-cm cracks in some sidewalks and cracks in an asphalt patio (press reports).

Tassajaro Valley (east of Danville)--cracked walls, cracks in concrete, badly damaged fireplace, broken glassware and other items that fell to the floor. One home had the walls separate from the ceiling so much that one could see into the attic; another house had stones from the fireplace crash to the floor ripping a hole in it; another house reported that a chimney fell, two windows broke, and nearly everything on the walls and shelves fell to the floor. There was another report of stoves being torn loose and water tanks toppled.

At Rancho del Sol, the owner reported a swimming pool for horses was damaged when a filter system weighing several tons came off its foundation and all the pipes were broken. Inside the house, the bay windows broke, the refrigerator flew open and everything was thrown out, the refrigerator moved a foot from the wall, and the pipes to the water system were broken loose. A neighbor's horse corral was thrown down. About 50 homes in the community were damaged in this area (all from press reports).

Intensity VI:
Antioch--some windows broke, bricks loosened on chimneys, acoustical ceiling tile fell in Fry's supermarket and merchandise fell from shelves, light and heavy furniture moved, hanging pictures fell, felt by all.

Boulder Creek--large cracks occurred in stucco, bricks were loosened in chimneys, small landslides were reported, felt by many.

Brentwood--the press reported a double-wide mobile home was split and dishes and knickknacks were dumped from cupboards and shelves.

Diablo--large cracks in stucco and dry wall, water splashed onto sides of swimming pools, trees and bushes shook strongly, felt by all.

Dublin--The press reported a row of light fixtures at the K-Mart store on Dublin Boulevard fell to the floor injuring six people. At Mel's Liquors numerous bottles were broken but not as many as were broken in the 24 January shock. A restaurant, also on Dublin Boulevard, reported a false beam fell to the floor. There were also reports of merchandise knocked off shelves and fallen acoustical ceiling tiles.

Livermore--Six people were injured by flying window glass and falling acoustical ceiling tiles, and merchandise was thrown from shelves in supermarkets. The abutment of the overpass at Interstate 580 and Greenville Road was cracked. Bricks were loosened on chimneys, water splashed onto sides of swimming pools, felt by many.

At the Lawrence Livermore Laboratory the only effects reported were some bottles of chemicals broken and library books thrown from shelves. However, across the street at Sandia Laboratories some file cabinets were knocked over and a sprinkler pipe was broken.

Pittsburg--some broken windows, large cracks in interior and exterior walls, report of a chimney broken at the roof line, felt by many. The press reported the owner of the Cellar Bar was thrown off balance and the light fixtures swung. Also, a home at 61 Salano Avenue was damaged when a new addition separated from the house with a 0.6-cm crack. Many cracks appeared in the walls.

Pleasant Hill--The press reported fist-sized chunks of concrete fell from the ceiling of the Pleasant Hill Bay area Rapid Transit station.

California--Continued

Pleasanton--Many items were thrown to the floor in supermarkets. Cracks appeared in the First Street overpass and there were reports of broken gas lines and water leaks (press report). Other reports were windows cracked, water splashed onto sides of swimming pools, felt by many.

San Carlos--plaster fell in large amounts, small objects moved, felt by all.

San Ramon--plaster and dry wall cracked, foundation cracked, interior walls split, small objects overturned and broke, and hanging pictures fell. The press reported merchandise fell off shelves in large amounts.

Stockton--windows broke and new paint cracked, pictures shifted, shelf contents moved in the Central Valley area. In the Colonial Heights area of North Stockton one resident reported hairline cracks in his walls. A reporter said that his home had several cracks in the walls, that the whole house had moved, and that the dinner table moved 5 cm (2 inches) (press report).

Walnut Creek--store windows broke in the downtown area including two large plate glass windows at Afghan Imports (1442 North Main Street), one at the Crocker Bank and another at a stereo store on Broadway. Stock fell off shelves in stores and some acoustical ceiling tiles fell (press report).

Intensity V: The general effects reported were a few windows cracked, water splashed onto sides of swimming pools, small objects moved or overturned, hanging pictures swung out of place, light furniture moved, trees and bushes shook, standing vehicles rocked, and felt by many or all. All of these effects were not necessarily felt at every location.

Byron, Crockett, El Cerrito, Empire, Hayward, Lafayette, Millbrae, Mill Valley (press report), Mountain View, Mount Eden, Napa (press report), Palo Alto, Oakland, Ripon, Rio Vista, Salida, San Francisco, San Francisco International Airport (in the north terminal a false ceiling gave way near gates 81 and 27 and some acoustical tiles fell--press report), San Geronimo, San Mateo, Springtown-Holiday Inn, Vallejo.

Intensity IV: Alamo, Belmont, Ben Lomond, Brisbane, Burlingame, Campbell, Ceres, Concord, Courtland, Crows Landing, Daly City, El Granada, Farmington, Fairfield, Fremont (press report), French Camp, Holt, Isleton, Keyes, La Honda, Lathrop, Linden, Lodi, Manteca (press report), Modesto, New Almaden, Newman, Oakley, Port Costa, Redwood Estates, Richmond, Ross, San Jose, San Leandro, San Lorenzo, Santa Clara, Santa Rosa, Saratoga, South San Francisco, Thornton, Travis AFB, Union City, Vacaville (press report), Vernalis, Victor, Walnut Grove, Woodland.

Intensity III: Benecia, Crockett, Holy City, Keyes, Larkspur, Maxwell, Pleasant Hill, Rio Vista (press report), Rodeo, Ryde, Sacramento (press report), San Carlos, San Pablo, Sunnyvale, Sunol, Yosemite Valley.

Intensity II: San Martini.

Felt: Davis, Tracy, and the Lake Tahoe area (press reports).

27 January (Z) Central California
Origin time: 10 58 01.5
Epicenter: 37.84 N., 121.80 W.
Depth: 8 km
Magnitude: 4.1 ML(B)

Felt in the San Francisco Bay-San Joaquin Valley area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

29 January (Z) Central California
Origin time: 01 46 04.2
Epicenter: 37.79 N., 121.75 W.
Depth: 9 km
Magnitude: 3.6 ML(B)

Felt in the San Francisco Bay-San Joaquin Valley area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

29 January (P) Baja California
Origin time: 19 49 02.8
Epicenter: 32.05 N., 116.25 W.
Depth: 5 km
Magnitude: 4.4 ML(P)
Intensity III: San Diego (press report).

4 February (B) Central California
Origin time: 01 22 56.4
Epicenter: 37.29 N., 121.66 W.
Depth: 6 km
Magnitude: 3.3 ML(B)

Felt at San Jose (B).

4 February (B) Northern California
Origin time: 06 03 19.8

California--Continued

Epicenter: 38.74 N., 122.34 W.
Depth: 10 km
Magnitude: 3.0 ML(B)
Intensity IV: Angwin and Calistoga (press report).

9 February (P) Southern California
Origin time: 09 17 50.2
Epicenter: 33.80 N., 118.08 W.
Depth: 4 km
Magnitude: 2.7 ML(P)
Intensity IV: Lakewood, Long Beach, Los Alamitos (press reports).

13 February (B) Northern California
Origin time: 07 45 50.3
Epicenter: 38.95 N., 122.53 W.
Depth: 6 km
Magnitude: 3.5 ML(B)
Intensity IV: Clearlake Highlands, Lakeport (press report), Willits.
Intensity II: Santa Rosa.

14 February (B) Northern California
Origin time: 08 16 32.7
Epicenter: 38.88 N., 122.86 W.
Depth: 5 km
Magnitude: 3.0 ML(B)

Felt in the Clear Lake area (B).

16 February (P) Southern California
Origin time: 01 45 13.8
Epicenter: 34.27 N., 119.60 W.
Depth: 8 km
Magnitude: 3.1 ML(P)

Felt at Carpenteria (P).

16 February (P) Imperial Valley
Origin time: 15 09 08.2
Epicenter: 33.02 N., 115.62 W.
Depth: 5 km
Magnitude: 3.9 ML(P)

Felt at Brawley and nearby areas (press report).

16 February (B) Owens Valley area
Origin time: 18 27 25.5
Epicenter: 37.51 N., 118.81 W.
Depth: 8 km
Magnitude: 3.7 ML(B), 3.6 ML(P)

Felt at Mammoth Lakes (B).

20 February (P) Southern California
Origin time: 08 53 51.6
Epicenter: 34.05 N., 119.00 W.
Depth: 14 km
Magnitude: 3.2 ML(P)

Felt at Thousand Oaks (P).

20 February (P) Southern California
Origin time: 10 23 29.9
Epicenter: 33.97 N., 117.22 W.
Depth: 6 km
Magnitude: 2.5 ML(P)

Felt at Riverside (P).

21 February (B) Central California
Origin time: 18 57 29.8
Epicenter: 37.66 N., 121.68 W.
Depth: 6 km
Magnitude: 3.7 ML(B)
Intensity IV: Livermore.

22 February (B) Owens Valley area
Origin time: 02 30 41.3
Epicenter: 37.50 N., 118.69 W.
Depth: 12 km
Magnitude: 3.9 ML(B), 3.8 ML(P)

Felt at Mammoth Lakes (B) and in the Owens Valley (P).

22 February (P) Southern California
Origin time: 13 39 19.5
Epicenter: 33.23 N., 116.28 W.
Depth: 7 km
Magnitude: 3.5 ML(P)
Intensity III: Borrego Springs (press report).

22 February (P) Southern California
Origin time: 13 39 23.7
Epicenter: 33.22 N., 116.22 W.
Depth: 5 km
Magnitude: 3.9 ML(P)
Intensity III: Borrego Springs (press report).

22 February (P) Southern California
Origin time: 13 45 22.9
Epicenter: 33.23 N., 116.23 W.
Depth: 7 km
Magnitude: 3.1 ML(P)
Intensity III: Borrego Springs (press report).

22 February (B) Central California
Origin time: 22 26 26.7
Epicenter: 37.85 N., 121.79 W.
Depth: 5 km
Magnitude: 3.4 ML(B)
Intensity III: Livermore (press report).

25 February (P) Southern California
Origin time: 10 47 38.7
Epicenter: 33.52 N., 116.55 W.
Depth: 6 km
Magnitude: 5.1 mb(G), 4.7 MS(G), 5.5 ML(P), 5.6 ML(B)

California--Continued

The press reported several small landslides that forced the closing of State Highway 74 between Spring Crest and Palm Desert. Also, open cracks as much as 3.8 cm wide were reported in State Highway 74 near its junction with State Highway 71. This earthquake was felt over an area of approximately 46,000 sq km of the land area of southern California (fig. 11). No data was available from Mexico. The preponderance of intensity IV in figure 11 is due to the time of the earthquake, 2:47 a.m. local time and unless people were awakened or already awake the event went unnoticed.

Intensity VI:
Anza--large cracks in interior dry wall and plaster walls, small objects overturned and broke, a few windows cracked, felt by and awakened all.

Garner Valley (near Lake Hemet)--The press reported cracked plaster and items on shelves fell.

Idyllwild--Unconfirmed reports of slight damage to bridges or overpasses, bricks loosened on chimneys, water splashed onto sides of swimming pools, few windows cracked, felt by and awakened all.

Palm Desert--Plate glass windows in businesses broke, hanging pictures swung out of place, felt by all and awakened many. In the Rancho Mirage area a gas line broke causing an unoccupied home to catch fire and burn (press report).

Intensity V: The general effects reported were a few windows cracked, small objects moved or overturned, hanging pictures swung and a few fell, light furniture moved, people awakened, and buildings shook.

Alpine, Big Bear Lake, Bonsall, Cathedral City, El Cajon, Hemet (a mobile home moved on its foundation), Highland, Jacumba, La Quinta, Lucerne Valley, Mecca, Miramar, Mountain Center, North Palm Springs, Palomar Mountain, Redlands, San Jacinto, San Marcos, Sunset Beach, Temecula, Vista.

Intensity IV: Aguanga, Alta Loma, Anaheim, Angelus Oaks, Arcadia, Azusa, Beaumont, Blue Jay, Bonita, Boulevard, Brawley, Buena Park, Cabazon, Calexico, Calimesa, Campo, Canebrake Canyon, Carlsbad, Cedar Glen, Chino, Chula Vista, Claremont, Coachella, Colton, Corona, Coronado, Costa

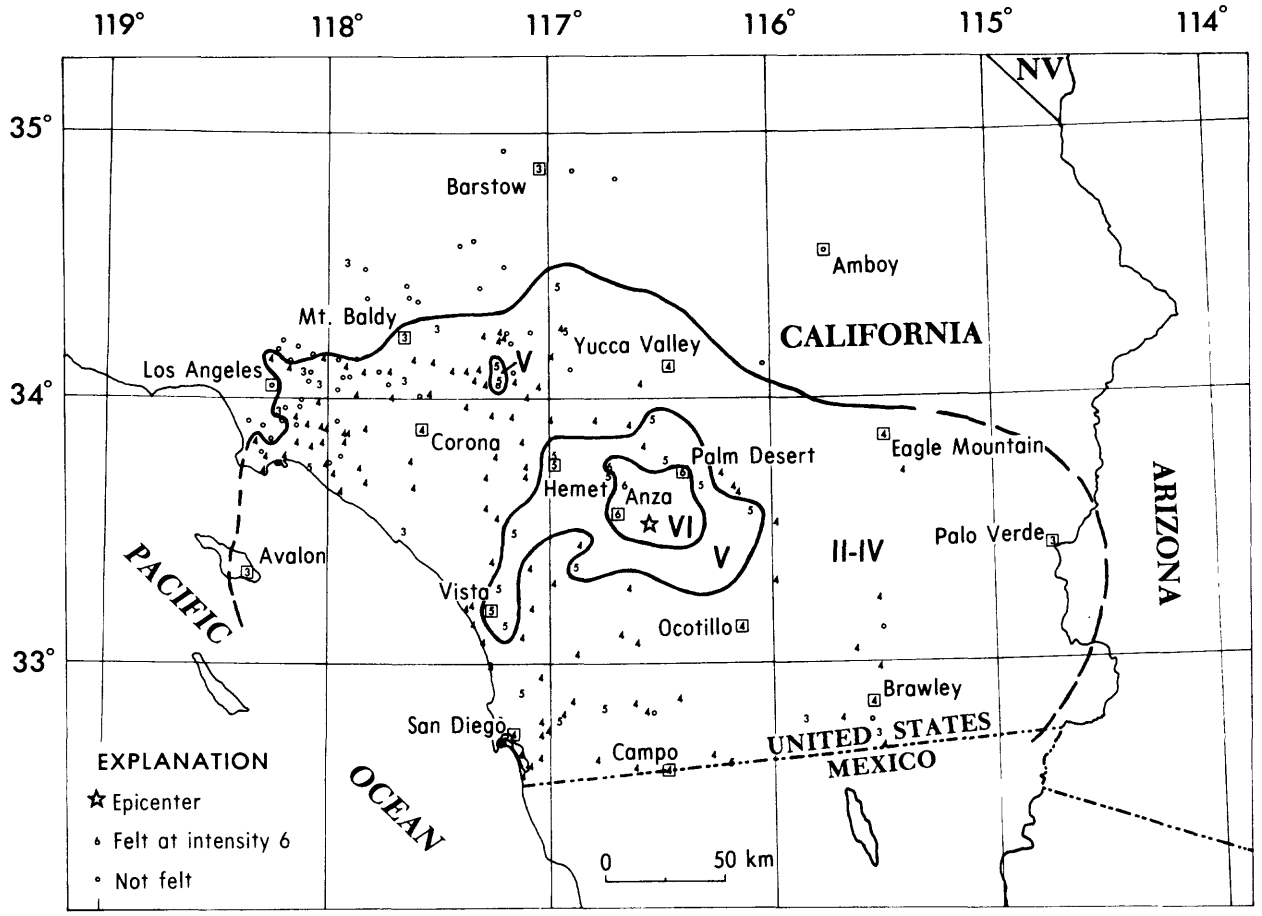

FIGURE 11.--Isoseismal map for the southern California earthquake of 25 February 1980, 10 47 38.7 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

California--Continued

Mesa, Crestline, Crest Park, Cypress, Dana Point, Darwin, Descanso, Desert Center, Downey, Dulzura, Eagle Mountain, Escondido, Etiwanda, Fallbrook, Fawnskin, Fontana, Fountain Valley, Fullerton, Glendale, Guatay, Homeland, Imperial, Imperial Beach, Indio, Irvine, Julian, Laguna Niguel, Lake San Marcos, Lakeside, Lakeview, Lakewood, La Mesa, La Mirada, Leucadia, Lemon Grove, Loma Linda, Long Beach, Los Alamitos, Mentone, Mira Loma, Monrovia, Moreno, Morongo Valley, Mount Laguna, Murrieta, National City, Niland, North Shore, Norwalk, Ocotillo, Oceanside, Pala, Palm Springs, Pauma Valley, Perris, Placentia, Potrero, Poway, Ramona, Rialton, Riverside, Salton City, San Bernardino, San Diego, San Diego (Lindbergh Field), San Dimas, San Luis Rey, San Pedro, Santa Ana, Santa Ysabel, Santee, Seeley, Silverado, South Pasadena, Spring Valley, Sun City, Sunnymead, Tecate,

California--Continued

Temecula, Thermal, Torrance, Trabuco Canyon, Twin Peaks, University City, Valley Center, Vista (press report), Walnut, Warner Springs, Westminster, Westmorland, White Water, Whittier, Wildomar, Wilmington, Winchester, Yorba Linda, Yucaipa, Yucca Valley.

Intensity III: Avalon, Barstow, El Centro (press report) El Monte, Heber, Lytle Creek, Mt. Baldy, Ontario, Palo Verde, Pearblossom, Plaster City, San Gabriel, San Juan Capistrano, Solana Beach, South Gate.

25 February (P) Southern California
Origin time: 11 05 08.8
Epicenter: 33.52 N., 116.52 W.
Depth: 16 km
Magnitude: 3.3 ML(P)
Felt at Indio. Aftershock of the 25 February, 10 47 38.7 earthquake.

25 February (P) Southern California
Origin time: 11 40 49.3
Epicenter: 33.52 N., 116.55 W.
Depth: 10 km
Magnitude: 3.0 ML(P)

Felt at Indio. Aftershock of the 25 February, 10 47 38.7 earthquake.

28 February (B) Northern California
Origin time: 11 39 22.9
Epicenter: 40.27 N., 124.05 W.
Depth: 10 km
Magnitude: 3.3 ML(B)

Felt in the epicentral area (B).

3 March (B) Central California
Origin time: 08 21 14.0
Epicenter: 36.79 N., 121.33 W.
Depth: 6 km
Magnitude: 2.7 ML(B)

Felt at Hollister.

6 March (B) Central California
Origin time: 11 03 44.8
Epicenter: 36.67 N., 121.35 W.
Depth: 7 km
Magnitude: 3.8 ML(B)
Intensity IV: Chualar, Hollister.
Intensity II: Paicines.
Felt: Cienega, Salinas, and Tres Pinos (B).

6 March (B) Central California
Origin time: 11 05 09.2
Epicenter: 36.66 N., 121.36 W.
Depth: 7 km
Magnitude: 4.0 ML(B)

Felt at Cienega, Hollister, Paicines, Salinas, and Tres Pinos (B).

10 March (P) Southern California
Origin time: 06 54 22.3
Epicenter: 33.88 N., 116.27 W.
Depth: 7 km
Magnitude: 3.7 ML(P)

Intensity IV: Thousand Palms, Palm Desert, Rancho Mirage.
Intensity III: Coachella, Indio.
Felt: Palm Springs (P).

15 March (B) Owens Valley area
Origin time: 15 30 45.6
Epicenter: 37.60 N., 118.82 W.
Depth: 9 km
Magnitude: 3.8 ML(B), 3.6 ML(P)

Felt at Mammoth Lakes (B).

California--Continued

19 March (B) Owens Valley area
Origin time: 13 54 24.9
Epicenter: 37.58 N., 118.85 W.
Depth: 6 km
Magnitude: 3.5 ML(B)

Felt at Mammoth Lakes (B).

20 March (B) Owens Valley area
Origin time: 11 05 42.1
Epicenter: 37.62 N., 118.90 W.
Depth: 15 km
Magnitude: 3.8 ML(B), 4.1 ML(P)

Felt at Mammoth Lakes (B).

20 March (B) Owens Valley area
Origin time: 16 42 47.7
Epicenter: 37.62 N., 118.92 W.
Depth: 9 km
Magnitude: 3.7 ML(B), 3.9 ML(P)

Felt at Mammoth Lakes (B).

20 March (B) Owens Valley area
Origin time: 22 14 33.4
Epicenter: 37.62 N., 118.91 W.
Depth: 8 km
Magnitude: 3.8 ML(B), 3.7 ML(P)

Felt at Mammoth Lakes (B).

20 March (B) Owens Valley area
Origin time: 23 54 12.2
Epicenter: 37.62 N., 118.91 W.
Depth: 5 km
Magnitude: 3.3 ML(B), 3.1 ML(P)

Felt at Mammoth Lakes (B).

22 March (B) Lake Tahoe area
Origin time: 14 12 55.2
Epicenter: 38.81 N., 119.81 W.
Depth: 17 km
Magnitude: 3.6 ML(B)

Felt at Markleville (B).

25 March (P) Southern California
Origin time: 05 31 43.1
Epicenter: 33.95 N., 118.67 W.
Depth: 8 km
Magnitude: 2.9 ML(P)

Felt at Malibu (P).

26 March (B) Owens Valley area
Origin time: 14 41 55.5
Epicenter: 37.62 N., 118.91 W.
Depth: 9 km
Magnitude: 3.5 ML(B), 3.8 ML(P)
Felt at Mammoth Lakes (B).

27 March (B) Owens Valley area
Origin time: 02 26 04.1
Epicenter: 37.61 N., 118.89 W.
Depth: 9 km
Magnitude: 4.3 ML(B), 4.3 ML(P)
Intensity IV: Lee Vining.
Intensity III: Bass Lake, Bishop, Crowley Lake, Mariposa.
Felt: Long Valley Dam (P), Mammoth Lakes (B).

27 March (B) Owens Valley area
Origin time: 02 29 13.9
Epicenter: 37.61 N., 118.90 W.
Depth: 9 km
Magnitude: 3.5 ML(B), 3.2 ML(P)

Felt at Mammoth Lakes (B).

29 March (B) Owens Valley area
Origin time: 06 14 07.6
Epicenter: 37.61 N., 118.92 W.
Depth: 9 km
Magnitude: 3.5 ML(B), 3.5 ML(P)

Felt at Mammoth Lakes (B).

30 March (B) Owens Valley area
Origin time: 08 34 09.5
Epicenter: 37.62 N., 118.90 W.
Depth: 5 km
Magnitude: 3.4 ML(B), 3.1 ML(P)

Felt at Mammoth Lakes (B).

2 April (B) Owens Valley area
Origin time: 08 04 40.7
Epicenter: 37.60 N., 118.84 W.
Depth: 8 km
Magnitude: 3.0 ML(B), 3.2 ML(P)

Felt at Mammoth Lakes (B).

3 April (B) Owens Valley area
Origin time: 03 00 45.0
Epicenter: 37.48 N., 118.67 W.
Depth: 13 km
Magnitude: 3.6 ML(B), 3.4 ML(P)

Felt in the Bishop area (B).

6 April (P) Imperial Valley
Origin time: 22 05 49.1
Epicenter: 33.18 N., 115.52 W.
Depth: 5 km
Magnitude: 3.3 ML(P)

Felt in the Imperial Valley (P).

7 April (B) San Francisco Bay area
Origin time: 05 17 30.6
Epicenter: 37.84 N., 122.23 W.

California--Continued

Depth: 5 km
Magnitude: 3.5 ML(B)

Intensity V: Oakland Hills--about 4 km southeast of Berkeley (books knocked off shelves--B).
Intensity IV: Berkeley (press report), Oakland, Oakland International Airport, Piedmont (press report), Pleasant Hill.
Intensity III: Martinez, San Francisco (press report), South San Francisco, Vallejo.
Intensity II: San Leandro.
Felt: Moraga (B), Orinda (B).

7 April (P) Imperial Valley
Origin time: 22 01 35.9
Epicenter: 33.20 N., 115.58 W.
Depth: 5 km
Magnitude: 3.0 ML(P)

Felt in the Imperial Valley (P).

7 April (P) Imperial Valley
Origin time: 22 40 52.1
Epicenter: 33.20 N., 115.55 W.
Depth: 5 km
Magnitude: 3.1 ML(P)

Felt in the Imperial Valley (P).

13 April (P) Southern California
Origin time: 03 52 27.5
Epicenter: 33.87 N., 118.18 W.
Depth: 6 km
Magnitude: 2.2 ML(P)
Intensity II: Long Beach (press report).

13 April (B) Central California
Origin time: 06 15 56.3
Epicenter: 36.77 N., 121.52 W.
Depth: 7 km
Magnitude: 4.5 mb(G), 4.7 ML(B)

This earthquake was felt over an area of approximately 20,000 sq km of the coastal region of central California (fig. 12).

Intensity V:
Monterey--small objects and light furniture moved; hanging pictures swung; windows, doors, and dishes rattled; felt by many.
Pebble Beach--few windows cracked, small objects and light furniture moved, water splashed onto sides of swimming pools, hanging pictures swung, felt by many.
San Martin--light and heavy furniture moved, small objects broke, hanging pictures fell, building shook strongly, felt by many.
Intensity IV: Aromas, Belmont, Boulder

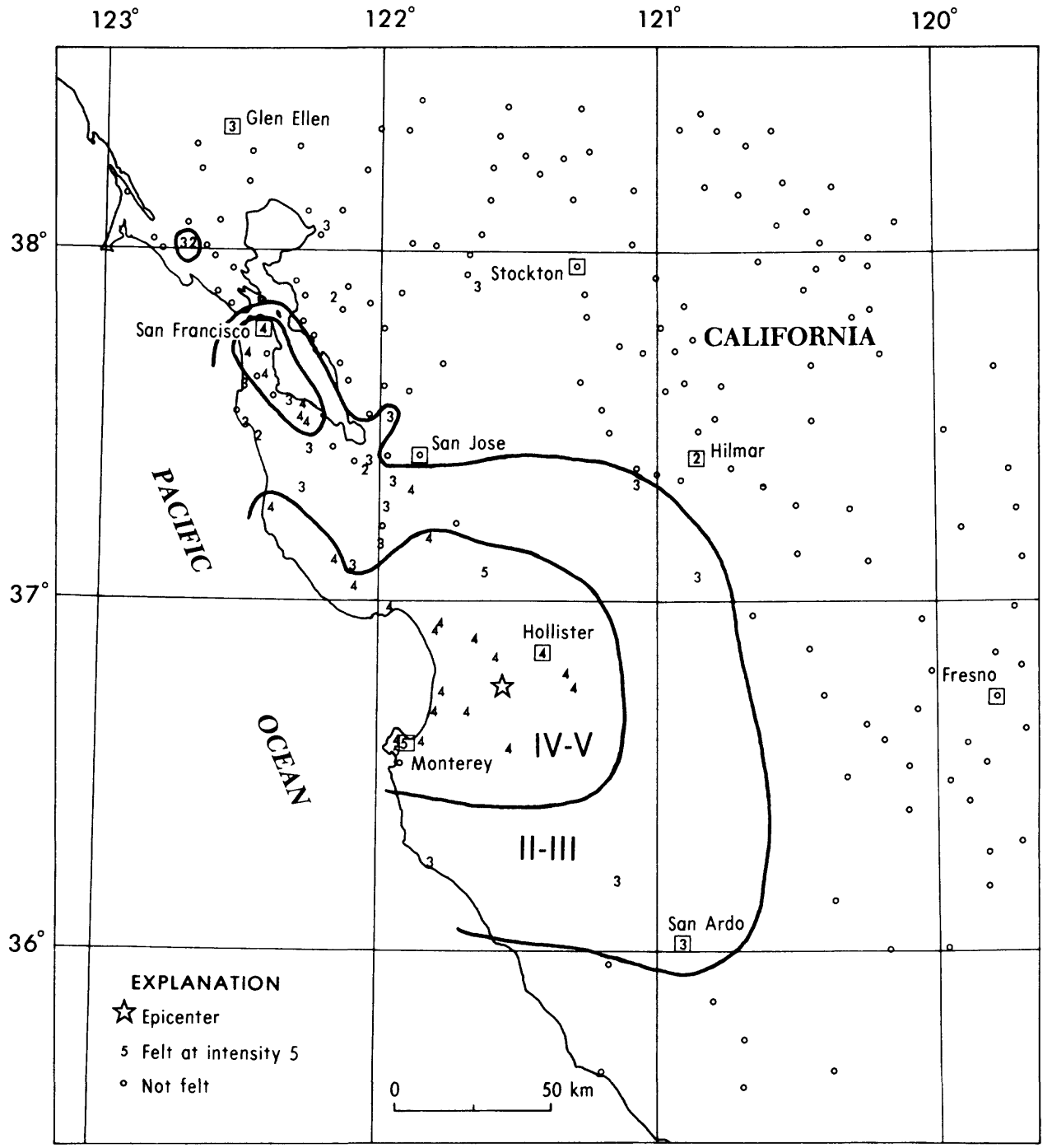

FIGURE 12.--Isoseismal map for the central California earthquake of 13 April 1980, 06 15 56.3 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Creek, Capitola, Castroville, Chualar, Daly City, Felton, Foster City, Freedom, Hollister, Marina, Moss Landing, Mount Hermon, New Almaden, Pacific Grove, Paicines, Pescadero, Salinas, San Carlos, San Francisco, San Jose, San Juan Bautista, Santa Cruz, Seaside, Soquel, South San Francisco, Tres Pinos, Watsonville.
Intensity III: Ben Lomond, Big Sur, Byron, Campbell, El Granada, Fremont, Glen Ellen, King City, Lagunitas, La Honda, Los Banos, Moffett Field, Newman, Pacifica, Port Costa, Redwood City, Redwood Estates, San Ardo, San Mateo, Santa Clara.
Intensity II: Half Moon Bay, Hilmar, Orinda, San Geronimo, Sunnyvale.
Felt: Hayward.

16 April (P) Southern California
Origin time: 20 26 14.9
Epicenter: 34.35 N., 119.60 W.
Depth: 8 km
Magnitude: 3.0 ML(P)
Intensity III: Santa Barbara (press report).

28 April (B) Central California
Origin time: 18 21 25.5
Epicenter: 36.79 N., 121.56 W.
Depth: 7 km
Magnitude: 3.3 ML(B)

Felt at Salinas (B).

29 April (P) Southern California
Origin time: 10 50 25.0
Epicenter: 34.08 N., 118.17 W.
Depth: 5 km
Magnitude: 2.1 ML(P)

Felt at Alhambra and Pasadena (P).

4 May (P) Southern California
Origin time: 19 50 39.7
Epicenter: 34.08 N., 118.17 W.
Depth: 4 km
Magnitude: 2.2 ML(P)

Felt at Pasadena (P).

8 May (B) Owens Valley area
Origin time: 18 00 51.5
Epicenter: 37.61 N., 118.90 W.
Depth: 10 km
Magnitude: 3.5 ML(B)

Felt in the Mammoth Lakes area (B).

11 May (P) Southern California
Origin time: 02 19 23.0
Epicenter: 34.38 N., 118.33 W.
Depth: 8 km
Magnitude: 3.1 ML(P)

Intensity IV: Eagle Rock (press report).
Intensity III: Glendale (press report).
Felt: Pasadena (P).

14 May (B) Owens Valley area
Origin time: 08 02 31.8
Epicenter: 37.60 N., 118.83 W.
Depth: 13 km
Magnitude: 4.0 ML(B), 3.9 ML(P)
Intensity IV: Crowley Lake.
Felt: Bishop (P), Mammoth Lakes (B).

14 May (B) Owens Valley area
Origin time: 11 18 03.4
Epicenter: 37.62 N., 118.85 W.
Depth: 6 km
Magnitude: 3.3 ML(P), 2.9 ML(B)

Felt at Bishop (P).

14 May (B) Owens Valley area
Origin time: 11 41 33.3
Epicenter: 37.61 N., 118.84 W.
Depth: 6 km
Magnitude: 3.3 ML(B), 3.4 ML(P)

Felt at Bishop (P).

14 May (B) Owens Valley area
Origin time: 12 03 55.0
Epicenter: 37.62 N., 118.84 W.
Depth: 13 km
Magnitude: 3.1 ML(B), 3.3 ML(P)

Felt at Bishop (P).

14 May (B) Owens Valley area
Origin time: 19 48 58.7
Epicenter: 37.61 N., 118.90 W.
Depth: 4 km
Magnitude: 3.7 ML(B), 3.7 ML(P)

Felt at Mammoth Lakes (B).

17 May (B) Owens Valley area
Origin time: 00 01 13.5
Epicenter: 37.60 N., 118.84 W.
Depth: 9 km
Magnitude: 4.3 ML(B), 4.3 ML(P)

Felt at Mammoth Lakes (B).

18 May (B) Owens Valley area
Origin time: 12 47 29.6
Epicenter: 37.61 N., 118.89 W.
Depth: 10 km
Magnitude: 4.0 ML(B), 4.2 ML(P)

Felt at Mammoth Lakes (B).

18 May (B) Owens Valley area
Origin time: 18 40 51.8

Epicenter: 37.59 N., 118.84 W.
Depth: 8 km
Magnitude: 3.6 ML(B), 3.7 ML(P)

Felt at Mammoth Lakes (B).

19 May (B) Owens Valley area
Origin time: 22 19 08.4
Epicenter: 37.61 N., 118.89 W.
Depth: 12 km
Magnitude: 3.5 ML(B)

Felt in the Mammoth Lakes area (B).

25 May (B) Owens Valley area
Origin time: 04 49 34.5
Epicenter: 37.62 N., 118.88 W.
Depth: 10 km
Magnitude: 3.9 ML(B)

Felt in the Mammoth Lakes area (B).

25 May (B) Owens Valley area
Origin time: 16 33 44.2
Epicenter: 37.59 N., 118.85 W.
Depth: 8 km
Magnitude: 6.1 mb(G), 6.1 MS(G), 6.1 ML(B), 6.4 ML(P)

Nine people were injured by the two largest events occurring on this date. Most of the injuries were due to falling rock. Another earthquake in the same magnitude range occurred on May 27 at 14 50 57.1 UTC. The preliminary estimation of damage to schools, other public buildings, and roads in the Mammoth Lakes region caused by these three earthquakes was $2 million (McJunkin and Bedrossian, 1980). This earthquake was felt over an area of approximately 272,000 sq km of California and Nevada (fig. 13).

There were hundreds of aftershocks throughout the year associated with this series of earthquakes, many of which were felt in the Mammoth Lakes area. Most of the events above magnitude 3.3 ML located by the Seismograph Station, University of California, Berkeley were also reported felt in the Mammoth Lakes area. Only a few of these are listed in the description below, but they are all listed in table 1.

The worst damage occurred at Mammoth Lakes where water mains broke, windows shattered, chimneys fell, and plaster cracked. There was also extensive damage in stores and restaurants when shelf stock was thrown to the floor. This type of damage also occurred in homes. The most extensive damage occurred to the Mammoth Elementary School, east of U.S. Highway 395, which apparently was caused by a fault underneath the building.

California--Continued

Landslides and rockfalls were common in the Mammoth Lakes area and Yosemite National Park. After the snow had melted in the higher elevations, a Forest Service ranger survey of the Sierras reported hundreds of rockslides in back-country canyons. In the First Recess, a steep heavily glaciated canyon that feeds into Mono Creek, a ranger reported a football-field-sized lake had disappeared. It was located at about the 3353 m elevation approximately 6.4 km east of Lake Thomas A. Edison. Another report indicated a loss of 30.5 m off the Coxcomb, a 3,267 m peak in the John Muir Wilderness 13 km northeast of Lake Edison. The Park Service also reported the collapse of five of the 18.3 m columns of the Devils Postpile, a 3.2-sq km national monument of blue-gray basaltic columns located 29 km north of Lake Edison. The damage of rockfalls and landslides prompted the closure of many wilderness areas usually filled with backpackers and campers.

McJunkin and Bedrossian (1980) reported ground cracks were abundant in the Mammoth Lakes region following the earthquakes of May 25-27. Many of these were in fill along paved and dirt roads. Clark and Yount (1981) reported a 17-km long zone of discontinuous surface fracture associated with the Hilton Creek Fault which had a net vertical displacement of less than 50 mm and more than 200 mm of slip on single fractures.

A ranger at the White Mountain Ranger Station in Inyo National Park said boulders and earthslides tumbled onto roads around Convict Lake. U.S. Highway 395 had several boulders blocking one lane and at some places the road had buckled. Some smaller roads had cracks of 50 mm (2 inches).

A first-hand report of this earthquake was published by the press. Excerpts from it are listed below.

"The 6.0 quake that started it all at 9:40 (actually 9:33) last Sunday morning came while I was reading the newspaper in my cabin in Old Mammoth beside Mammoth Creek. The shaking and creaking of the walls around me was intially dumbfounding. Then the crash of several paintings falling off the walls and the creaking of the walls and floor catapulted me out of my chair in terror. A glass vase crashed to the floor

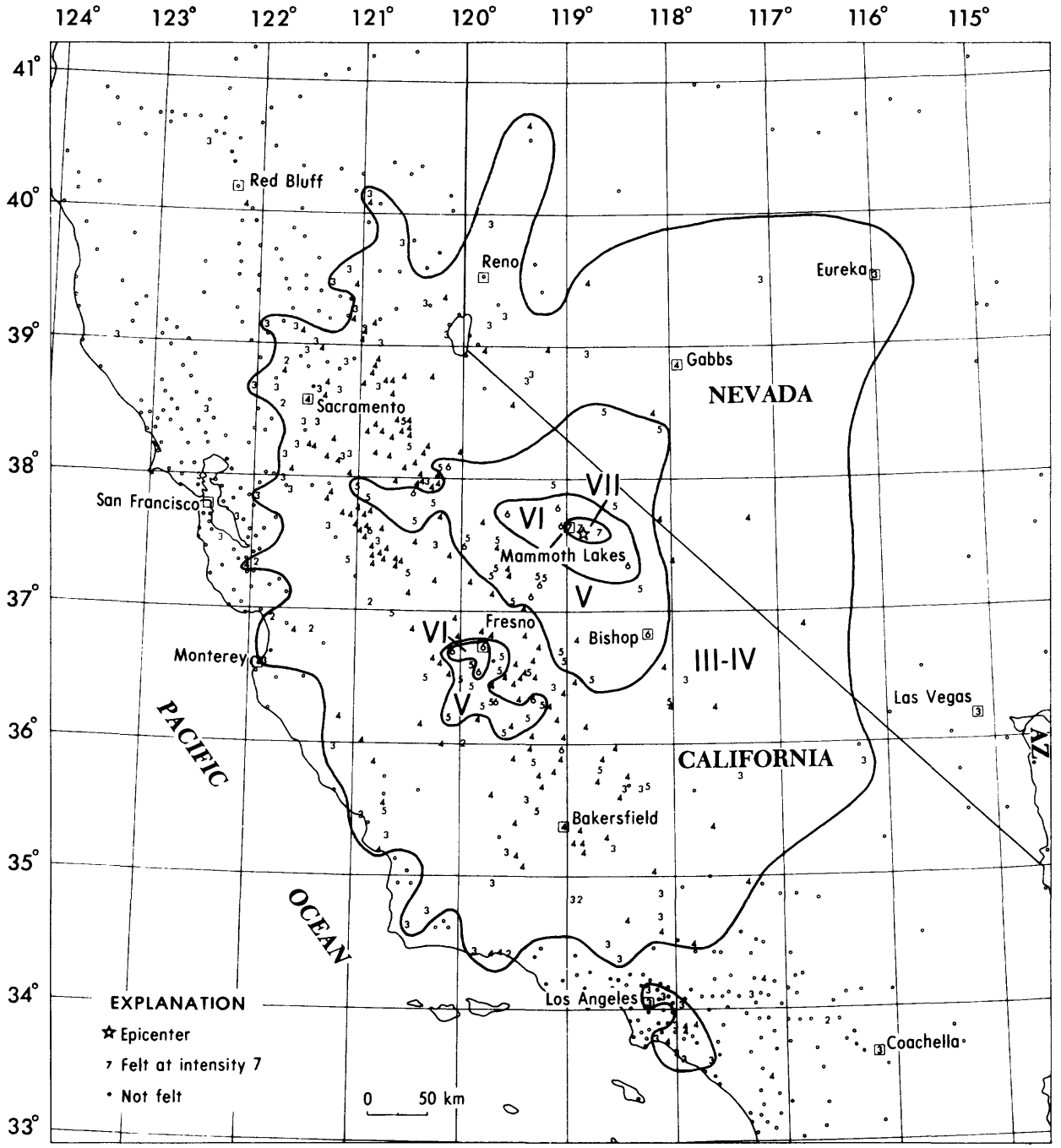

FIGURE 13.--Isoseismal map for the Owens Valley area, California, earthquake of 25 May 1980, 16 33 44.2 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

as I ran out the door and down a small slope to the stream.

There I turned to watch as the second quake hit (9:49 a.m.). The cabin shimmered and rocked. The chimney seemed to wobble totally independent of the structure to which it's attached. It went east the wall went west. It held and so did my breath. The lights went out."

The descriptions of damage and other effects listed below could not be differentiated by time from the press reports; therefore these effects are assumed to apply equally to this event and to the one at 19 44 51.4 UTC.

Intensity VII:

California--

Crowley Lake--The press reported cars were bouncing on the ground and refrigerators were knocked over in homes near the lake. The road over the dam was cracked but there was no apparent structural damage to the dam.

Mammoth Elementary School (located about 9 km east of Mammoth Lakes)--The 20-year-old school was severely damaged by faulting that passed under the school building. Large cracks zigzagged across the floors of the multi-purpose rooms, cafeteria and classrooms. The heating and water systems were destroyed; gas lines were pulled loose from large ovens when the shaking bounced the ovens across the floor; metal heating vents fell out of the ceiling; and there were piles of books, papers, pencils, and school supplies strewn over the floor in every classroom (press reports).

Mammoth Lakes--Water and sewer lines were broken, windows were shattered, and merchandise was dumped from store shelves. The Safeway store estimated $50,000 worth of groceries were thrown to the floor. The Kittredge Sporting Goods Store had plate-glass windows shattered, skis and camping equipment thrown from shelves, and office typewriters and calculators dumped on the floor. Mammoth Lakes Hospital had broken windows and a broken steam line. There were some chimneys knocked loose or partially thrown down and some ruptured gas lines causing several small fires. At the International Inn a large picture window was broken in the lobby, six television sets were knocked off tables onto the floor, ceilings were cracked, and all

California--Continued

the mirrors were shattered (press reports).

Intensity VI:

California--

Big Creek--bricks fell from chimneys, there were small landslides in the area, water splashed onto sides of lakes or ponds, light furniture and small objects moved, felt by all.

Bishop--large cracks in interior plaster walls, bricks loosened on chimneys, light and heavy furniture moved, a few windows cracked, felt by all.

Caruthers--large cracks in interior plaster walls, cracked foundation, moving vehicles rocked moderately, small objects overturned and broke, felt by all.

Chinese Camp--large cracks in old brick buildings, open cracks in old stone or brick fences, small objects and light furniture moved, felt by all.

Fresno--large cracks in interior plaster walls and exterior brick walls, bricks loosened on chimneys, a foundation cracked, some windows broke, felt by many.

Hanford--bricks fell from chimneys, large cracks in plaster and dry wall, light furniture and small objects moved, a few windows cracked, felt by many.

Hughson--some windows broke, water splashed onto sides of lakes or swimming pools, light furniture and small objects moved, felt by many.

Independence--a foundation cracked, standing vehicles rocked moderately, small objects moved.

June Lake--cement walkway at Boulder Lodge cracked, merchandise fell from store shelves, rocks dislodged and rolled across highway, moving vehicles rocked slightly, light furniture overturned, felt by all.

Kerman--a foundation cracked, moving vehicles rocked moderately, light furniture and small objects moved, felt by several.

Long Barn--a foundation cracked, small objects moved, hanging pictures out of place, felt by many.

Mammoth Mountain Ski Area (5.5 km west of Mammoth Lakes)--The Mammoth Lodge kitchen was in a shambles from objects thrown to the floor, glassware was thrown down and broken, bottles of liquor were knocked from shelves and broken, tables bounced around in the cafeteria and a chandelier fell. Concrete and mortar fell from the walls

of the gondola room, and people were stranded in the gondola and chair lifts when power failed. There were reported cracks in a four-plex apartment house (press reports).

Shaver Lake--bricks fell from chimneys, small landslides, small objects moved, hanging pictures out of place, felt by all.

Terra Bella--dry wall fell in large amounts, moving vehicles rocked slightly, felt by many.

Tom's Place--standing and moving vehicles rocked strongly, trees and bushes shook strongly, small objects moved, felt by all.

Visalia--some windows broke, water splashed onto sides of lakes or swimming pools, small objects moved, felt by many.

Yosemite National Park (Lodge area)--The press reported water pipes were shaken loose from water heaters, some plaster was cracked in the lodge, and everything in the grocery stores fell to the floor. A few windows were cracked and it was felt by all.

Intensity V: The most common effects reported at this intensity level were light furniture moved, a few windows cracked, moving vehicles rocked slightly, water splashed onto sides of swimming pools, and felt by many or all.

California--Armona, Atascadero, Auberry, Badger, Benton, Big Oak Flat, Big Pine, Burrel, Cantua Creek, Cartago, Caruthers, Coarsegold, Corcoran, Crows Landing, Del Rey, Dos Palos, Earlimart, Farmersville, Farmington, Huntington Lake, Huron, La Grange, Lakeshore, Lee Vining, Lemoore, Mariposa, Merced, Midpines, Miramonte, Mi-Wuk Village, Mountain Ranch, Oakhurst, Onyx, Pioneer, Posey, Raisin, Riverdale, Selma, Sequoia National Park, Shafter, Sultana, Tulare, Valley Home, Wawona.

Nevada--Nawthorne, Mina.

Intensity IV:

California--Alpaugh, Altaville, Anaheim, Arnold, Arvin, Atwater, Avenal, Avery, Avila Beach, Bakersfield, Ballico, Bass Lake, Bethel Island, Biola, Bishop, Bodfish, Bradley, Broderick, Burrel, Buttonwillow, Caliente, California Hot Springs, Camino, Camptonville, Carmichael, Castle Air Force Base, Catheys Valley, Ceres, Chinese Camp, Clovis, Coalinga, Coleville, Colfax, Coloma, Columbia, Copperopolis, Corocoran, Coulterville, Crescent Mills, Cupertino, Cutler, Darwin, Deep Springs, Delano, Delhi, Di Giorgio, Dinuba, Ducor,

Edison, El Nido, El Portal, Empire, Escalon, Exeter, Fair Oaks, Firebaugh, Fish Camp, French Camp, Fullerton, Garden Valley, Georgetown, Gerber, Glencoe, Glennville, Gold Run, Goshen, Grass Valley, Hathaway Pines, Helm, Herald, Hickman, Hilmar, Hume, Ione, Jackson, Jamestown, Johnsondale, Kaweah, Kernville, Keyes, King City, Kingsburg, Knights Landing, Kyburz, Lake Hughes, Lake Isabella, Lamont, Lathrop, Laton, Le Grand, Lemon Cove, Linden, Lindsay, Livingston, Llano, London, Lone Pine, Lost Hills, Madera, March Air Force Base (telegram), Maricopa, Mariposa, Mather AFB, McFarland, Miramonte, Moccasin, Modesto, Mojave, Mokelumne Hill, Morgan Hill, Mt. Aukum, Murphys, North Fork, Oakdale, Olancha, Olivehurst, O'Neals, Orange Cove, Palmdale, Piedra, Pine Grove, Pinecrest, Pinedale, Pixley, Pollock Pines, Porterville, Prather, Rail Road Flat, Rancho Cordova, Randsburg, Raymond, Reedley, Rescue, Richgrove, Rimforest, Ripon, River Pines, Riverbank, Roseville, Sacramento, Salida, San Andreas, San Ardo, San Joaquin, San Juan Bautista, Seal Beach, Sheridan, Sloughhouse, Smithflat, Snelling, Somerset, Sonora, Soulsbyville, South Dos Palos, Springville, Squaw Valley, Stevinson, Stratford, Strawberry, Summerland, Sutter Creek, Taft, Temecula, Templeton, Terra Bella, Thornton, Three Rivers, Tipton, Tollhouse, Topaz, Tranquillity, Traver, Truckee, Tuolumne, Turlock, Twain Harte, Vallecito, Valley Springs, Ventura, Victor, Visalia, Volcano, Walnut Grove, Waterford, Waukena, Weimar, West Point, Wilseyville, Winton, Wishon, Woodbridge, Yorba Linda.

Nevada--Beatty, Dyer, Fallon, Gabbs, Gerlach, Goldfield, Luning, Minden, Yerington.

Intensity III:

California--Angels Camp, Belmont, Blairsden, Boonville, Brownsville, Buena Park, Byron, Castaic, Cayucos, China Lake, Clarksburg, Clements, Coachella, Denair, Diablo, Diamond Springs, El Toro, Elk Grove, Esparto, Fellows, Foresthill, Frazier Park, Glendale, Goleta, Greenville, Homewood, Hornitos, Huntington Beach, Igo, Industry, Jolon, Keeler, Keene, Lancaster, Lockeford, Lompoc, Long Beach, Los Alamos, Los Angeles, Meridian, Nevada City, New Cuyama, Newcastle, Newhall, Newport Beach, North Highlands, Oakley, Orangevale, Rio Oso, Rio Vista, Rosamond, Ryde, Saint Helena, San Bernardino, San Gabriel, San Lorenzo, San Luis Obispo, San Rafael, Saugus, Seaside,

Soda Springs, Standard, Strawberry Valley, Tecopa, Tracy, Trona, Vernalis, Wasco, Weimar, Weldon, Wheatland, Woodlake, Woodland, Yuba City.
Nevada--Austin, Babbitt, Carson City, Dayton, Eureka, Gardnerville, Las Vegas, Nellis Air Force Base, Schurz, Smith, Wellington.

Intensity II:
California--Carpinteria, Davis (press report), Freedom, Hollister, Kettleman City, Lebec, Los Banos, Robbins, Santa Clara, White Water.
Nevada--Minden.

25 May (B) Owens Valley area
Origin time: 16 49 26.2
Epicenter: 37.62 N., 118.90 W.
Depth: 1 km
Magnitude: 5.5 mb(G), 6.0 ML(B), 5.8 ML(P)

This earthquake was felt over a large area of central California and western Nevada, but because it followed the intensity VII of 16 33 44.7 UTC event by only about 16 minutes, the effects could not be separated from the earlier event. Most press accounts combined the effects of these two earthquakes in their descriptions.

25 May (B) Owens Valley area
Origin time: 19 44 51.0
Epicenter: 37.54 N., 118.84 W.
Depth: 13 km
Magnitude: 5.5 mb(G), 5.8 MS(G), 6.1 ML(B), 6.5 ML(P)

The effects of this earthquake in the Mammoth Lakes and nearby areas could not be separated from those of the 16 33 44.7 UTC event on the basis of press and other reports. However, it is believed the shaking was equally as strong if not stronger than the earlier intensity VII event. It was felt over an area of approximately 223,000 sq km of California and Nevada (fig. 14). See table 1 for the list of felt aftershocks.

Intensity VII:
California--Crowley Lake, Mammoth Lakes.

Intensity VI:
California--
Benton--few buildings damaged, well water muddied, standing vehicles rocked moderately, trees and bushes shook strongly, small objects broke, felt by all.
Bishop--moving vehicles rocked moderately, trees and bushes shook strongly, light and heavy furniture moved, felt by and frightened all.
East Fresno--foundation cracked, light and heavy furniture moved, few windows cracked, felt by many.
Farmersville--large plaster or stucco cracks, moving vehicles rocked slightly, light and heavy furniture moved, few windows cracked, felt by many.
Hanford--large cracks in interior wall of plaster and dry wall, felt by many.
Independence--large cracks in interior plaster or stucco walls and in stucco exterior walls, moving vehicles rocked slightly, light and heavy furniture moved.
Lemoore--large cracks in interior plaster or stucco walls, trees and bushes shook strongly, few windows cracked, felt by all.
Shaver Lake--cracked foundation, some small landslides, a few windows cracked, felt by all.
Tranquillity--bricks loosened on chimneys, some new cracks in older buildings including the post office, felt by many.
Visalia--some windows broke, moving vehicles rocked slightly, light and heavy furniture moved, felt by many.

California--Continued

Intensity V: The most common effects at this intensity level were light furniture moved, few windows cracked, water splashed onto sides of lakes or swimming pools, moving vehicles rocked slightly to moderately, small objects overturned, and felt by many or all. All of these effects did not occur at every location listed below:
California--Armona, Avenal, Badger, Big Pine, Burrel, Caruthers, Clovis, Corcoran, Dos Palos, Earlimart, Fresno, Ivanhoe, Los Banos, Mariposa, Miramonte, Mi-Wuk Village, Posey, Raisin, Selma, Sequoia National Park, Shafter, Springville, Squaw Valley, Terra Bella, Turlock, Wawona, Wilseyville.
Nevada--Mina.

Intensity IV:
California--Ahwahnee, Altaville, Arnold, Arvin, Atascadero, Auberry, Avenal, Avery, Bakersfield, Ballico, Bass Lake, Big Creek, Biola, Bodfish, Camino, Cantua Creek, Catheys Valley, Ceres, Chinese Camp, Chowchilla, Clinter, Clovis, Coalinga, Coarsegold, Coleville, Columbia, Copperopolis, Cutler, Deep Springs, Del Rey, Delano (press report), Delhi, Dinuba, Dunlap, Edison, El Dorado, El Nido, El Portal, Escalon, Farmington, Fish Camp, French Camp, Garden Valley, Georgetown, Glencoe, Glennville, Goshen, Grass Valley, Groveland,

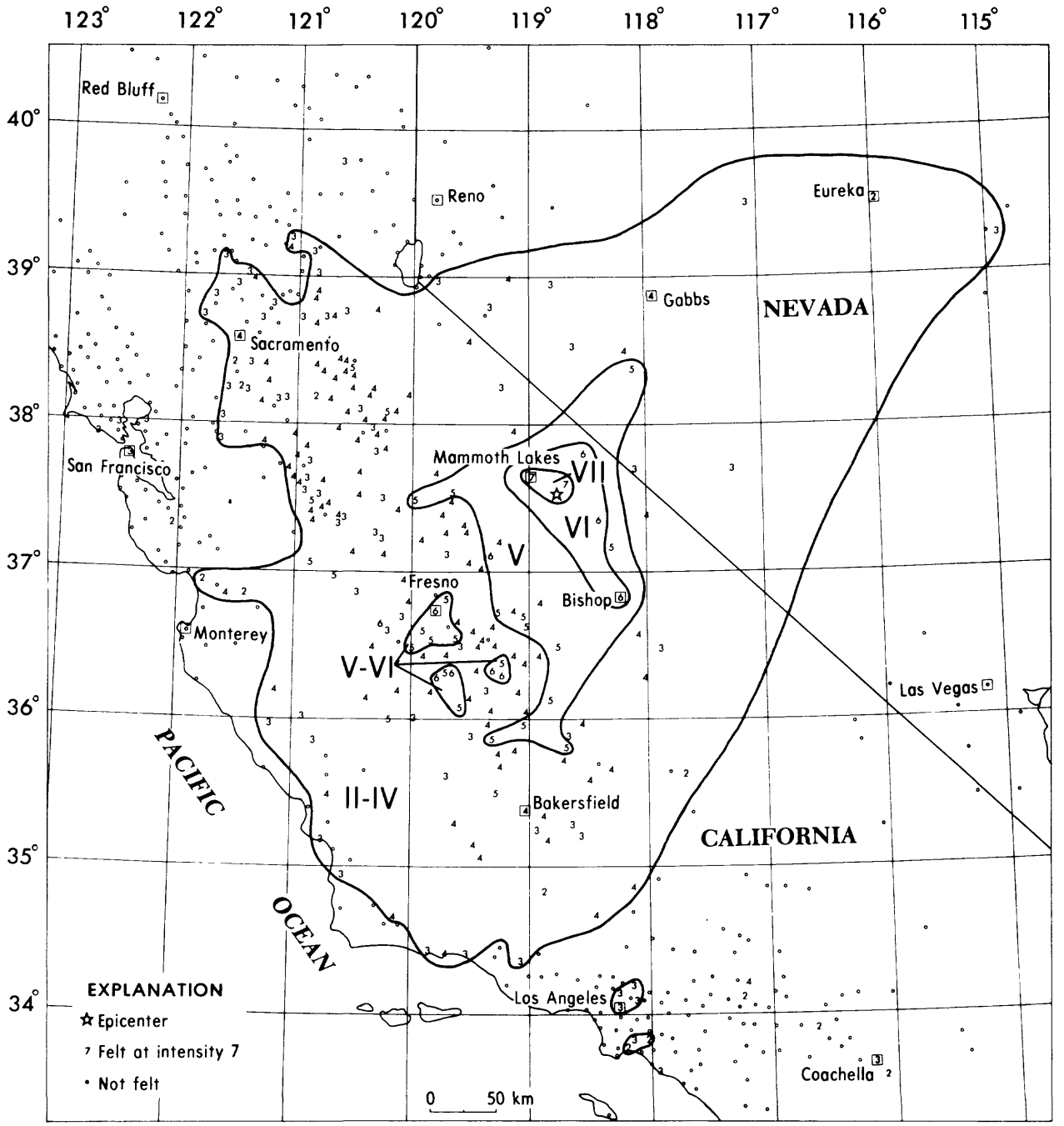

FIGURE 14.--Isoseismal map for the Owens Valley area, California, earthquake of 25 May 1980, 19 44 51.0 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Hathaway Pines, Herald, Hickman, Hilmar, Hume, Huron, Jackson, Johnsondale, King City, Kyburz, La Grange, Lake Hughes, Laton, Lemoncove, Lindsay, London, Lone Pine, Long Barn, Lee Vining, Los Olivos, Madera, Maricopa, McFarland, McKittrick, Modesto, Mokelumne Hill, Mount Aukum, Mountain Ranch, North Fork, Olancha, Orange Cove, Pine Grove, Pioneer, Pixley, Porterville, Prather, Rail Road Flat, Raymond, Reedley, Richgrove, Rimforest, Riverdale, Rosamond, Sacramento, Salida, San Andreas, San Juan Bautista, Sheridan, Snelling, Soulsbyville, South Dos Palos, Stevinson, Stratford, Strawberry, Sutter Creek, Taft, Three Rivers, Tipton, Tollhouse, Twain Harte, Valley Home, Ventura, Volcano, Waterford, Waukena, Weldon, Wilton, Winton, Wishon, Woodbridge, Woodlake.

Nevada--Gabbs, Incline Village, Luning, Yerington.

Intensity III:

California--Alpaugh, Altadena, Amador City, Angels Camp, Atwater, Avila Beach, Bethel Island, Blairsden, Bolinas, Bradley, Bridgeport, Byron, Caliente, California Hot Springs, Carpinteria, Castle Air Force Base, Clements, Coachella, Denair, Diamond Springs, Dos Palos, Douglas Flat, Elk Grove, Empire, Firebaugh, Foresthill, Glendale, Gold Run, Goleta, Guadalupe, Hornitos, Jolon, Keeler, Keene, Kerman, Kettleman City, Keyes, Kingsburg, Lakewood, Lamont, Le Grand, Lockeford, Loomis, Los Angeles, Lost Hills, Moccasin, Nevada City, Newport Beach, Oakdale, O'Neals, Pinole, Planada, Pollock Pines, Rescue, Rio Oso, River Pines, Robbins, Roseville, Ryde, San Ardo, San Francisco, San Gabriel, San Joaquin, San Rafael, Santa Barbara, Santa Paula, Smithflat, Standard, Thornton, Topaz, Tulare, Wasco, Wheatland, Yettem, Yolo, Yuba City.

Nevada--Austin, Babbitt, Dyer, Ely, Goldfield, Minden, Schurz, Smith.

Intensity II:

California--Big Oak Flat, Clarksburg, Cupertino, Cypress, Freedom, Highland, Hollister, Lebec, Long Beach, Los Banos, Mecca, Ridgecrest, Valley Springs, Walnut Grove, White Water.

Nevada--Eureka, Hawthorne.

Felt:

California--Lakeshore.

25 May (B) Owens Valley area
Origin time: 20 35 48.0
Epicenter: 37.61 N., 118.86 W.
Depth: 5 km
Magnitude: 5.2 mb(G), 5.3 MS(G), 5.7 ML(B), 5.9 ML(P)

California--Continued

Felt in the Mammoth Lakes area (B) and at Lakeshore.

Intensity III: Avenal.

26 May (B) Owens Valley area
Origin time: 05 56 26.3
Epicenter: 37.57 N., 118.90 W.
Depth: 7 km
Magnitude: 4.0 mb(G), 4.7 ML(B), 4.6 ML(P)

Felt in the Mammoth Lakes area (B) and at Lakeshore.

26 May (B) Owens Valley area
Origin time: 10 20 31.1
Epicenter: 37.60 N., 118.81 W.
Depth: 8 km
Magnitude: 4.0 mb(G), 4.5 ML(B), 4.1 ML(P)

Felt in the Mammoth Lakes area (B) and at Lakeshore.

26 May (P) Owens Valley area
Origin time: 11 04 06.7
Epicenter: 37.50 N., 118.70 W.
Depth: 5 km
Magnitude: 4.0 ML(P)

Felt at Lakeshore.

26 May (B) Owens Valley area
Origin time: 12 24 25.1
Epicenter: 37.56 N., 118.88 W.
Depth: 7 km
Magnitude: 4.7 mb(G), 5.1 ML(B), 5.6 ML(P)

Felt in the Mammoth Lakes area (B) and at Lakeshore.

Intensity IV: Castle Air Force Base, Iowa Hill, Lemoore Naval Air Station.

26 May (P) Owens Valley area
Origin time: 13 04 20.6
Epicenter: 37.50 N., 118.82 W.
Depth: 2 km
Magnitude: 4.1 ML(P)

Felt at Lakeshore.

26 May (B) Owens Valley area
Origin time: 18 57 55.9
Epicenter: 37.54 N., 118.89 W.
Depth: 8 km
Magnitude: 5.0 mb(G), 5.7 ML(B), 5.5 ML(P)

Felt in the Mammoth Lakes area (B) and at Lakeshore.

27 May (P) Owens Valley area
Origin time: 11 33 49.7
Epicenter: 37.57 N., 118.78 W.
Depth: 4 km
Magnitude: 3.2 ML(P)

Felt at Lakeshore.

27 May (B) Owens Valley area
Origin time: 14 50 56.6
Epicenter: 37.49 N., 118.83 W.
Depth: 16 km
Magnitude: 5.7 mb(G), 6.0 MS(G), 6.2 ML(B), 6.3 ML(P)

Four people in the Mammoth Lakes area were reported injured as a result of this earthquake. The damage was similar to that described for the May 25; 16 33 44.7 UTC event; however, the information is sparse because most of the press coverage and earthquake investigators tended to lump the effects of the two large May 25 events with this one.

In Yosemite National Park landslides and falling boulders were common, so many in fact that, the Chief Ranger closed all hiking trails leading from Yosemite Valley. Also, boulders fell onto Highway 140 leading to Merced. East of Mammoth Lakes the road to Crowley Dam was closed by rockslides and old U.S. Highway 395 was cracked badly enough to require closing (press report).

At Convict Lake a fisherman in a boat reported "The lake tilted from side to side, one side would be real high, covering the bank, and the other would be real low. The water actually moved a foot on each side."

This earthquake was felt over an area of approximately 240,000 sq km of California and Nevada (fig. 15). Many of the aftershocks were felt in the Mammoth Lakes area. See table 1 for a complete list.

Intensity VI:
California--
Benton--partial collapse of an exterior stone wall, trees and bushes shook strongly, small objects broke, felt by all.
Big Creek--chimneys twisted, vehicles rocked slightly, small objects moved, felt by all.
Bishop--large cracks in highways, moving vehicles rocked slightly, light and heavy furniture moved, few windows cracked, felt by all.

California--Continued

Cartago--large cracks in interior plaster walls, felt by several.
Caruthers--plaster cracked in interior walls and some fell, light furniture moved, small objects overturned, a few windows cracked, felt by all.
Crowley Lake--bricks loosened on chimneys, moving vehicles rocked moderately, light furniture moved, hanging pictures swung, felt by all.
East Fresno--a foundation was cracked and an exterior wall partially collapsed, light and heavy furniture moved, some windows broke, felt by many.
Hanford--large cracks in interior walls, felt by many.
Long Barn--a foundation cracked, light and heavy furniture moved, felt by many.
Mammoth Lakes--The press reported many landslides and rockslides in the surrounding mountains and that several water pipes were broken, a few chimneys were cracked, minor structural damage occurred, dishes in stores and homes broke, jars and bottles were knocked off shelves, and it was felt by all.
Shaver Lake--foundation cracked, small landslides, slight damage to concrete dam, few windows cracked, felt by all.
Springville--sidewalks were cracked and a fireplace was damaged (press report).
Visalia--The press reported minor cracking in the walls of the 1973 annex of the Tulare County Public Social Services Building, some broken windows along Mooney Boulevard, some broken plaster statues at the Tulare County Museum. The R-N Market reportedly had items thrown from shelves. Felt by all.

Intensity V: The most common effects reported at this intensity were items fallen off shelves with a few broken, light furniture moved, water splashed onto sides of lakes or swimming pools, moving vehicles rocked slightly, hanging pictures swung out of place, a few windows cracked, felt by many or all. All of these effects did not occur at every location.
California--Big Pine, Burrel, Cantua Creek, Chinese Camp (crack in an old exterior brick wall), Del Rey, Dinuba, Dos Palos, Earlimart, El Portal (small landslides), Farmersville, Fresno, Johnsondale, London, O'Neals (level changed in well water), Pixley (press report), Posey, Raisin, Sultana, Tipton, Toms Place, Tuolumne, Volcano, Wawona (small

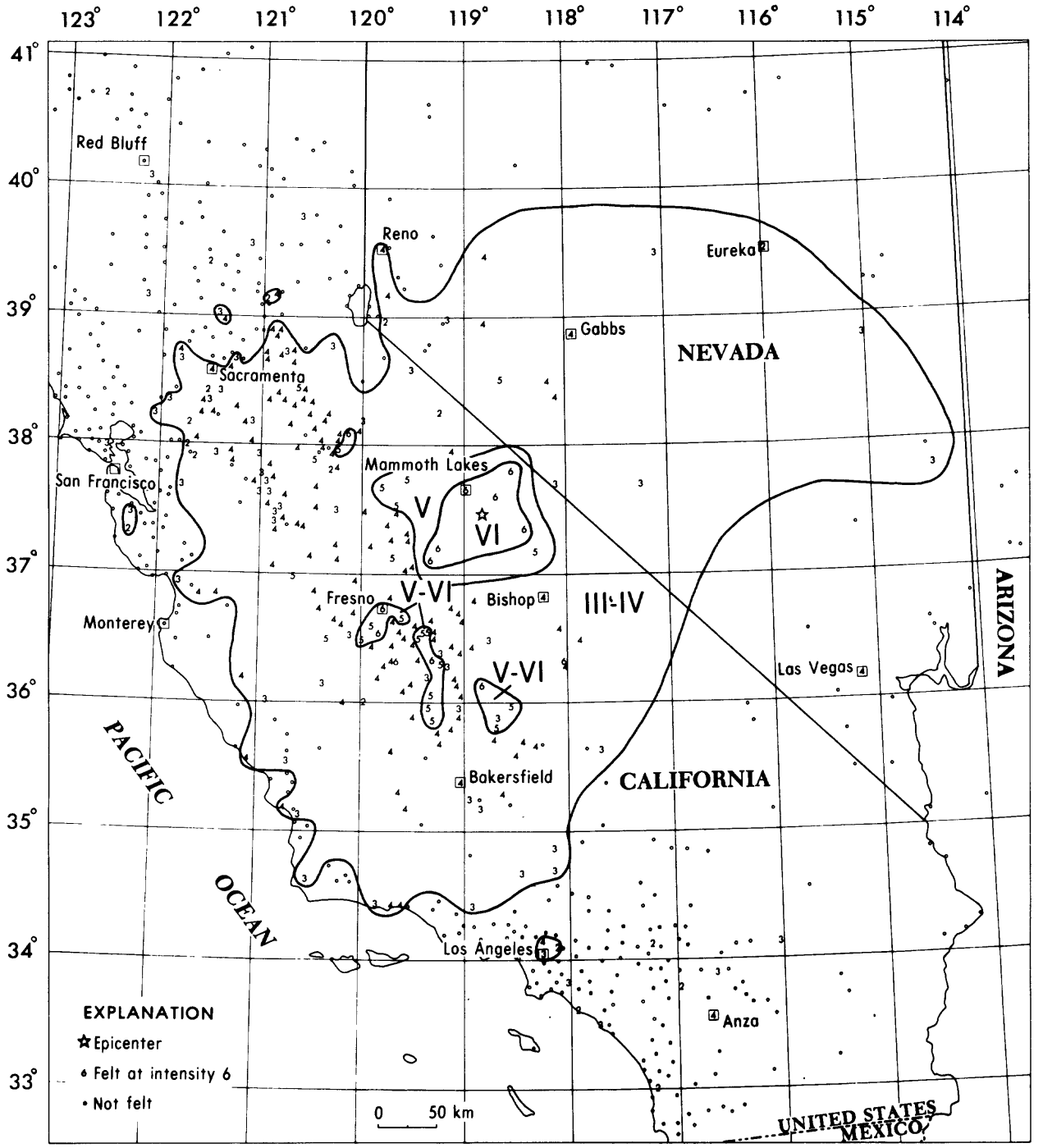

FIGURE 15.--Isoseismal map for the Owens valley area, California, earthquake of 27 May 1980, 14 50 56.6 UTC. Roman numerals represent Modified Mercalli intensities betwen isoseismals; Arabic numerals are used to represent these intensities at specific sites.

landslides), Yosemite National Park (small landslide).
Nevada--Hawthorne.

Intensity IV:
California--Ahwahnee, Alpaugh, Amador City, Anza, Armona, Arnold, Auberry, Avenal, Avila Beach, Badger, Bakersfield, Barton, Bass Lake, Bethel Island, Biola, Bodfish, Caliente, Cambria, Camino, Castle Air Force Base (telegram), Chowchilla, Clovis, Coarsegold, Columbia, Copperopolis, Corcoran, Courtland, Cutler, Delano, Delhi, Diamond Springs, Ducuro, Dunlap, El Nido, Fellows, Firebaugh, Fish Camp, Fowler, French Camp, Fresno Air Terminal, Garden Valley, Georgetown, Glencoe, Glendale, Glennville, Gold Run, Goshen, Greenwood, Groveland, Hathaway Pines, Herald, Hickman, Hollister, Hume, Independence, Ione, Jackson, Keeler, Kerman, Keyes, King City, Kingsburg, La Grange, Laton, Le Grand, Lee Vining, Lemoncove, Lemoore, Linden, Lindsay, Lockeford, Lone Pine, Los Banos, Lost Hills, Madera, Mariposa, McFarland, McKittrick, Mendota, Miramonte, Mi-Wuk Village, Mokelumne Hill, Mountain Ranch, Mt. Aukum, Murphys, North Fork, Oakdale, Olancha, Orange Cove, Orosi, Pine Grove, Pioneer, Porterville, Prather, Rail Road Flat, Rancho Cordova, Raymond, Reedley, Rescue, Richgrove, River Pines, Riverdale, Ryde, Sacramento, Salida, San Andreas, San Joaquin, San Juan Bautista, Selma, Sheridan, Shingle Springs, Sloughhouse, Snelling, Somerset, Sonora (press report), Soulsbyville, South Dos Palos, Stevinson, Stockton, Stratford, Strathmore, Strawberry, Summerland, Sutter Creek, Three Rivers, Tranquillity, Traver, Twain Harte, Valley Home, Ventura, Walnut Grove, Waukena, Weldon, Winton, Wishon, Wofford Heights, Woodlake, Yolo.
Nevada--Babbitt, Carson City (press report), Fallon, Gabbs, Las Vegas (press report), Luning, Mina, Reno (press report), Schurz.

Intensity III:
California--Arroyo Grande, Arvin, Avery, Blairsden, California Hot Springs, Citrus Heights, Clements, Coalinga, Cypress, Denair, Dos Palos, Elk Grove, Elmira, Empire, Escalon, Exeter, Fairfield, Farmington, Fillmore, Freedom, Goleta, Helm, Hilmar, Holt, Hood, Hornitos, Ivanhoe, Kyburz, Laguna Niguel, Lake Hughes, Lamont, Lancaster, Livermoore, Lompoc, Los Angeles, Modesto, Pinecrest, Placerville, Proberta, Redwood City, Ridgecrest, Riverbank, Rosamond, San Ardo, San Rafael, Sequoia

California--Continued

National Park, Smithflat, Strawberry Valley, Templeton, Terra Bella, Topaz, Tulare, Turlock, Twentynine Palms, Waterford, Wheatland, White Water, Williams, Woodland, Yettem.
Nevada--Austin, Dyer, Goldfield, Lund, Panaca, Yerington.

Intensity II:
California--Big Oak Flat, Bridgeport, Byron, Chicago Park, Clarksburg, French Gulch, Highland, Kettleman City, La Honda, Moccasin, Newport Beach, Oakley, Palermo, Rancho Santa Fe, Rio Vista, San Gabriel, San Jacinto.
Nevada--Eureka, Minden.

Felt:
California--Lakeshore, Oakhurst, Ross, Tollhouse.

28 May (P) Owens Valley area
Origin time: 11 54 37.9
Epicenter: 37.47 N., 118.82 W.
Depth: 6 km
Magnitude: 4.2 ML(P), 4.4 ML(B)

Felt at Mammoth Lakes (B) and at Castle Air Force Base (telegram).

29 May (P) Southern California
Origin time: 03 38 47.0
Epicenter: 34.93 N., 120.82 W.
Depth: 5 km
Magnitude: 5.1 mb(G), 4.7 ML(P), 4.9 ML(B)

Intensity V:
Atascadero--few windows cracked, hanging pictures swung, felt by many.
Avila Beach--light furniture and small objects moved, hanging pictures swung, felt by many.
Nipomo--light furniture and small objects moved, building shook strongly, felt by all.
Templeton--small cracks in interior walls, hanging pictures swung, felt by all.

Intensity IV: Arroyo Grande, Bradley, Guadalupe, Oceano, Paso Robles (press report), San Luis Obispo (press report), San Miguel, Santa Maria, Shandon.

Intensity III: Alpaugh, Goleta, King City, Lompoc, Los Alamos, Los Olivos, Morro Bay, San Simeon, Solvang, Stratford.

Intensity II: Lost Hills.

Felt: Santa Margarita (press report).

31 May (B) Owens Valley area
Origin time: 08 05 19.3
Epicenter: 37.55 N., 118.83 W.
Depth: 11 km
Magnitude: 4.1 ML(B), 4.1 ML(P)

Intensity IV: Mariposa.

Felt: Mammoth Lakes area (B).

31 May (B) Owens Valley area
Origin time: 15 16 11.4
Epicenter: 37.60 N., 118.79 W.
Depth: 8 km
Magnitude: 4.1 mb(G), 4.9 ML(B), 4.9 ML(P)
Intensity IV: Mammoth Lakes area (press report), Mariposa.
Intensity III: Castle Air Force Base.

3 June (P) Southern California
Origin time: 16 43 37.8
Epicenter: 34.50 N., 118.52 W.
Depth: 5 km
Magnitude: 3.4 ML(P)
Intensity III: Newhall (press report).
Felt: North Hollywood (P)

5 June (B) Owens Valley area
Origin time: 19 41 01.6
Epicenter: 37.56 N., 118.88 W.
Depth: 8 km
Magnitude: 4.3 ML(B), 3.9 ML(P)

Felt in the Mammoth Lakes area (B) and at Mariposa.

9 June (G) Baja California, Mexico
Origin time: 03 28 18.9
Epicenter: 32.22 N., 114.98 W.
Depth: 5 km
Magnitude: 5.6 mb(G), 6.4 MS(G), 6.1 ML(P)

This earthquake caused 2 deaths, 100 injuries, and major damage in Baja California. The press reported 50 homes were seriously damaged, several breaks occurred in concrete irrigation canals, a railroad bridge at Coahiula collapsed, railroad tracks buckled and a train derailed, ground cracked, and water mains and power lines broke. The worst building damage was at Pescadero, Mexico. This earthquake was felt over an area of approximately 92,000 sq km of southern California and Arizona (fig. 16). No data was available on the intensity and felt area in Mexico.

Intensity V: The most common effects at this intensity were hanging pictures swung, moving vehicles rocked slightly, a few windows cracked, water splashed onto sides of swimming pools, small objects overturned, felt by all. All of these effects did not occur at every location.
Arizona--Gadsden, San Luis (unconfirmed report of broken underground pipes), Somerton, Yuma (knocked goods off grocery store shelves--press report).
California--Bonita, Boulevard, Calexico, Chula Vista, El Centro (knocked goods off grocery store shelves--press report), Glamis (small cracks in dry wall), Hemet, Ocotillo, Seeley, Westmorland, Winterhaven.
Intensity IV:
Arizona--Bouse, Dateland, Martinez Lake (Yuma), Phoenix, Quartzite, Roll, Tacna, Tucson (C), Wellton, Wenden.
California--Agua Caliente Springs (Canebrake Canyon), Aguanga, Alpine, Bard, Bonsall, Brawley, Cabazon, Camp Pendleton, Campo, Cardiff by the Sea, Coronado, Descanso, Dulzura, Earp, El Cajon, Guatay, Havasu Lake, Imperial, Jacumba, Julian, La Jolla, Miramar, National City, Oceanside, Palm Springs, Palo Verde, Palomar Mountain, Parker Dam, Plaster City, Ramona, Ripley, Salton City, San Diego, Santee, Spring Valley, Tecate, Thermal, Valley Center.
Intensity III:
Arizona--Arlington, Buckeye, Ehrenburg, Goodyear, Lake Havasu City, Parker, Waddell.
California--Beaumont, Blythe, Carlsbad, Coachella, Desert Center, Fallbrook, Indio, Jamul, Joshua Tree, Lake Elsinore, Lemon Grove, Los Angeles (press report), Lost Lake, Mount Laguna, Murrieta, Niland, Nuevo, Oceanside, San Juan Capistrano, San Luis Obispo (press report), San Marcos, Vista.
Intensity II:
California--Chiriaco Summit, Maricopa, Moreno, White Water.
Felt:
California--Banning, Century City, Fountain Valley, Hollywood, Huntington Beach, Los Alamitos, Newport, Nyland, Riverside, San Fernando Valley, San Gabriel Valley, Santa Monica, Upland (all from P).

11 June (B) Owens Valley area
Origin time: 04 40 58.5
Epicenter: 37.54 N., 118.89 W.
Depth: 8 km
Magnitude: 3.9 mb(G), 4.7 ML(B), 4.9 ML(P)
Intensity V: Bishop (few windows cracked, felt by many).

18 June (B) Central California
Origin time: 03 48 09.0
Epicenter: 36.90 N., 121.64 W.
Depth: 6 km
Magnitude: 3.7 ML(B)
Felt in parts of the East Bay and San Francisco Peninsula and Monterey and Santa Cruz Counties (press report). Also felt at Hollister (B), Salinas (B), and Watsonville (B).

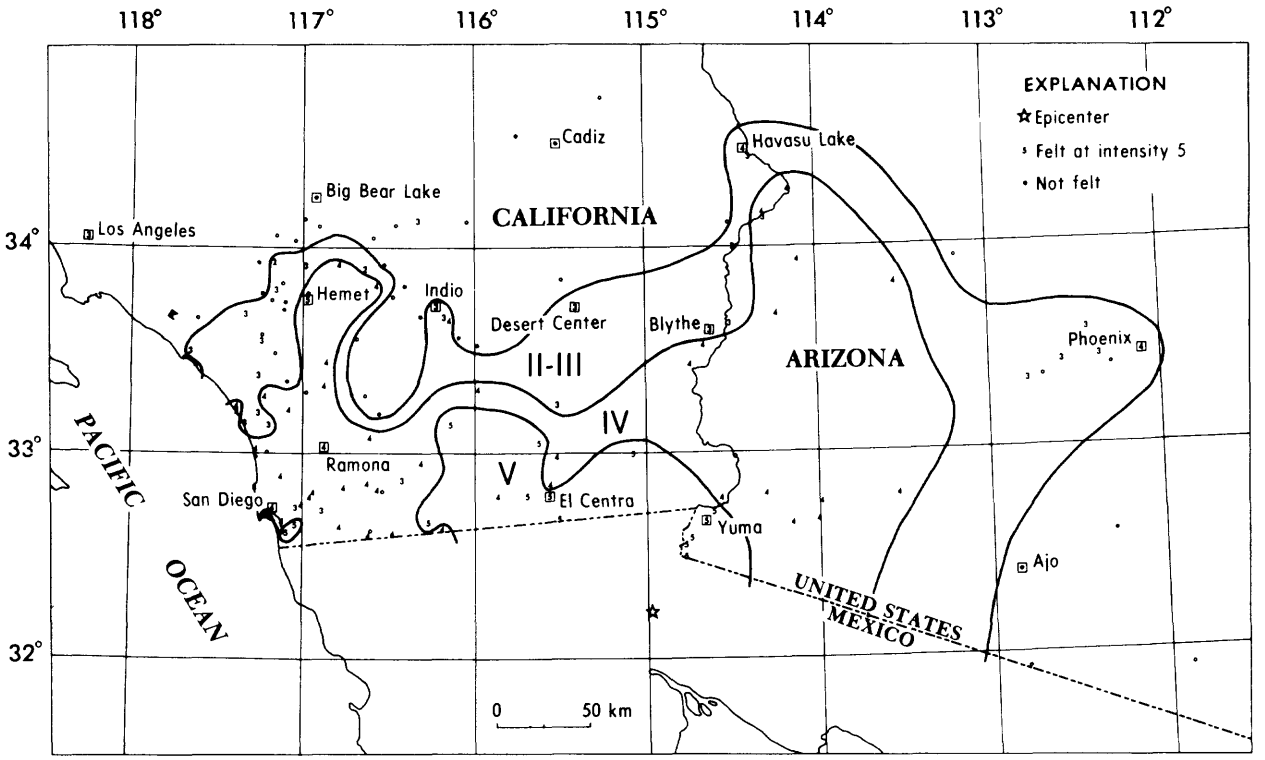

FIGURE 16.--Isoseismal map for the Baja California, Mexico, earthquake of 9 June 1980, 03 28 18.9 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

California--Continued

18 June (B) Central California
Origin time: 04 52 26.6
Epicenter: 36.90 N., 121.64 W.
Depth: 6 km
Magnitude: 4.2 ML(B)

Felt in parts of the East Bay and San Francisco Peninsula and in Monterey and Santa Cruz Counties (press report).

Intensity IV: Aromas, Capitola, French Camp, Merced, Monterey, Redwood City, San Jose (press report), San Juan Bautista, Watsonville.
Intensity III: Belmont, Ben Lomond, Brisbane, Clayton, Firebaugh, Fremont (press report), Hollister, Marina, Mount Herman, Pescadero, Ross, San Martin, Santa Cruz.
Intensity II: Felton.
Felt: Oakland (B), Salinas (B), San Francisco (B).

18 June (B) Central California
Origin time: 05 31 05.2
Epicenter: 36.90 N., 121.65 W.
Depth: 6 km
Magnitude: 3.8 ML(B)

California--Continued

Felt in parts of the East Bay and San Francisco Peninsula and in Monterey and Santa Cruz Counties (press report). Also felt at Hollister (B), Salinas (B), San Jose (B), and Watsonville (B).

18 June (B) Central California
Origin time: 08 35 26.8
Epicenter: 36.90 N., 121.65 W.
Depth: 4 km
Magnitude: 3.5 ML(B)

Felt at Watsonville (B).

23 June (P) Southern California
Origin time: 21 11 40.2
Epicenter: 34.12 N., 117.47 W.
Depth: 5 km
Magnitude: 3.0 ML(P)
Intensity IV: Etiwanda.
Intensity III: San Bernardino (press report).
Felt: Redlands (P), Riverside (P).

26 June (P) Southern California
Origin time: 10 47 02.8
Epicenter: 33.68 N., 116.73 W.

Depth: 6 km
Magnitude: 2.6 ML(P)

Felt at Palm Springs (P).

26 June (P) Southern California
Origin time: 11 19 01.4
Epicenter: 33.80 N., 118.28 W.
Depth: 4 km
Magnitude: 2.6 ML(P)
Intensity III: Torrance (press report).
Felt: Carson (P), Lomita (P).

29 June (B) Owens Valley area
Origin time: 07 46 13.5
Epicenter: 38.00 N., 118.69 W.
Depth: 5 km
Magnitude: 4.2 mb(G), 4.7 ML(P), 5.0 ML(B)

Intensity VI:
California--Mono Hot Springs (large cracks in interior plaster walls, foundation cracked, cracks in exterior stone walls, felt by and awakened all).
Intensity V:
California--Mono Lake (cracks in chimney mortar, cracks in brick or stone walls, felt by many).
Intensity IV:
California--Benton, El Portal, Groveland, Raisin, Toms Place, Volcano, Wawona, Wishon, Yosemite National Park (Curry Village).
Intensity III:
California--Bishop, Delhi, Lakeshore, Mountain Ranch, Piedra, Rail Road Flat, Shaver Lake.
Intensity II:
California--Arnold, Bass Lake, Big Oak Flat, Cartago, Hathaway Pines, Mariposa, Tuolumne Meadows.
Nevada--Silver City.
Felt:
California--Bridgeport (press report).
Nevada--Hawthorne (press report).

30 June (B) Owens Valley area
Origin time: 10 23 01.1
Epicenter: 38.00 N., 118.68 W.
Depth: 3 km
Magnitude: 4.0 ML(B)

Felt in the Mono Lake area.

2 July (P) Southern California
Origin time: 04 53 31.2
Epicenter: 33.82 N., 118.23 W.
Depth: 6 km
Magnitude: 2.4 ML(P)
Intensity III: Long Beach (press report).

California--Continued

5 July (B) Owens Valley area
Origin time: 11 58 59.0
Epicenter: 37.60 N., 118.83 W.
Depth: 9 km
Magnitude: 4.2 mb(G), 4.3 ML(B), 4.4 ML(P)
Intensity IV: Mammoth Lakes (press report).

5 July (B) Owens Valley area
Origin time: 14 19 25.7
Epicenter: 37.40 N., 118.18 W.
Depth: 13 km
Magnitude: 3.6 ML(B), 3.3 ML(P)

Felt at Bishop (B).

6 July (B) Central California
Origin time: 12 04 45.6
Epicenter: 37.98 N., 122.08 W.
Depth: 11 km
Magnitude: 3.0 ML(B)

Felt at Concord and Martinez (B).

7 July (B) Central California
Origin time: 02 35 24.1
Epicenter: 37.99 N., 122.08 W.
Depth: 10 km
Magnitude: 2.5 ML(B)

Felt at Concord and Martinez (B).

7 July (B) Central California
Origin time: 15 39 46.5
Epicenter: 38.02 N., 118.72 W.
Depth: 5 km
Magnitude: 3.8 ML(B), 3.6 ML(P)

Felt in the Mono Lake area (B).

7 July (B) Central California
Origin time: 20 46 44.5
Epicenter: 38.03 N., 118.70 W.
Depth: 10 km
Magnitude: 3.9 ML(B), 3.7 ML(P)

Felt in the Mono Lake area (B).

7 July (B) Central California
Origin time: 21 34 37.2
Epicenter: 38.02 N., 118.71 W.
Depth: 8 km
Magnitude: 3.8 ML(B), 3.8 ML(P)

Felt in the Mono Lake area (B).

8 July (B) Central California
Origin time: 17 13 02.1
Epicenter: 37.05 N., 121.47 W.
Depth: 7 km
Magnitude: 3.0 ML(B)

Felt at Gilroy (B).

10 July (P) Southern California
Origin time: 15 45 31.3
Epicenter: 34.33 N., 117.02 W.
Depth: 6 km
Magnitude: 2.9 ML(P)

Felt at Big Bear (P).

11 July Central California
Origin time: 21 14
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.
Intensity III: Mariposa.

19 July (B) Central California
Origin time: 16 55 19.7
Epicenter: 36.08 N., 120.05 W.
Depth: 8 km
Magnitude: 3.0 ML(B), 3.1 ML(P)
Intensity III: 9.6 km (6 miles) north-northeast of Avenal.

23 July (P) Southern California
Origin time: 07 50 13.4
Epicenter: 34.27 N., 119.62 W.
Depth: 7 km
Magnitude: 3.4 ML(P)
Intensity III: Santa Barbara (press report).

23 July (P) Imperial Valley area
Origin time: 09 55 51.5
Epicenter: 33.07 N., 115.50 W.
Depth: 3 km
Magnitude: 2.5 ML(P)

Felt at Brawley (P).

24 July (B) Central California
Origin time: 13 18 27.4
Epicenter: 38.81 N., 122.79 W.
Depth: 2 km
Magnitude: 2.9 ML(B)

Felt at Cobb (B).

31 July (B) Central California
Origin time: 09 20 45.6
Epicenter: 37.85 N., 121.77 W.
Depth: 11 km
Magnitude: 2.6 ML(B)

Felt at Livermore (B).

1 August (B) Owens Valley area
Origin time: 16 38 55.9
Epicenter: 37.55 N., 118.89 W.
Depth: 8 km
Magnitude: 4.7 mb(G), 5.0 MS(G), 5.4 ML(B), 5.3 ML(P)

This earthquake was felt over an area of approximately 40,000 sq km of California and Nevada (fig. 17). Many aftershocks were felt in the Mammoth Lakes area. See table 1 for a complete list.

Intensity V:
California--Mammoth Lakes (Windows, doors, and dishes rattled; buildings creaked; buildings shook strongly; hanging pictures out of place; a few windows cracked; hanging objects swung moderately; trees and bushes shook moderately, standing and moving vehicles rocked slightly. One jar of mayonnaise was knocked off the shelves at the Safeway store--press report).
Intensity IV:
California--Benton, Big Creek, Big Pine, Bishop, Cartago, Caruthers, Clovis, Coarsegold, Corcoran, Curry Village, Dunlap, El Portal, Fish Camp, Friant, Groveland, Huntington Lake, June Lake, Kings Canyon National Park, Lakeshore, Lee Vining, Lemoore Naval Air Station, Lone Pine, Mariposa, Midpines, Mono Hot Springs, Mountain Ranch, Murphys, Pioneer, Raisin, Reedley, Sequoia National Park, Shaver Lake, Sheep Ranch, Sonora, Soulsbyville, Tollhouse, Toms Place, Tuolumne, Tuolumne Meadows, Volcano, Wawona, Woodville, Yosemite National Park (rock slides occurred on slopes and hiking trails--press report).
Nevada--Reno.
Intensity III:
California--Ahwahnee, Bass Lake, Big Oak Flat, Camp Connell, Cantua Creek, Fresno, Grizzly Flats, Hathaway Pines, Hume, Jamestown, Kernville, Lemoore, Long Barn, North Fork, Oakhurst, Piedra, Pine Grove, Pinecrest, Railroad Flat, Riverdale, Selma, Stanford, Strawberry, Tipton, Wilseyville.
Nevada--Dyer, Luning.
Intensity II:
California--Copperopolis, Helm, Hornitos, Lindsay, Madera, Mi-Wuk Village, Pioneer, Visalia.
Nevada--Fish Lake Valley (near Dyer).
Felt:
California--Convict Lake (press report), O'Neals, Sacramento (press report).

15 August (B) Nothern California
Origin time: 04 25 34.5
Epicenter: 39.48 N., 120.31 W.
Depth: 10 km
Magnitude: 3.3 ML(B)

Felt at Truckee (B).

23 August (B) Central California
Origin time: 15 27 36.2
Epicenter: 38.81 N., 122.78 W.

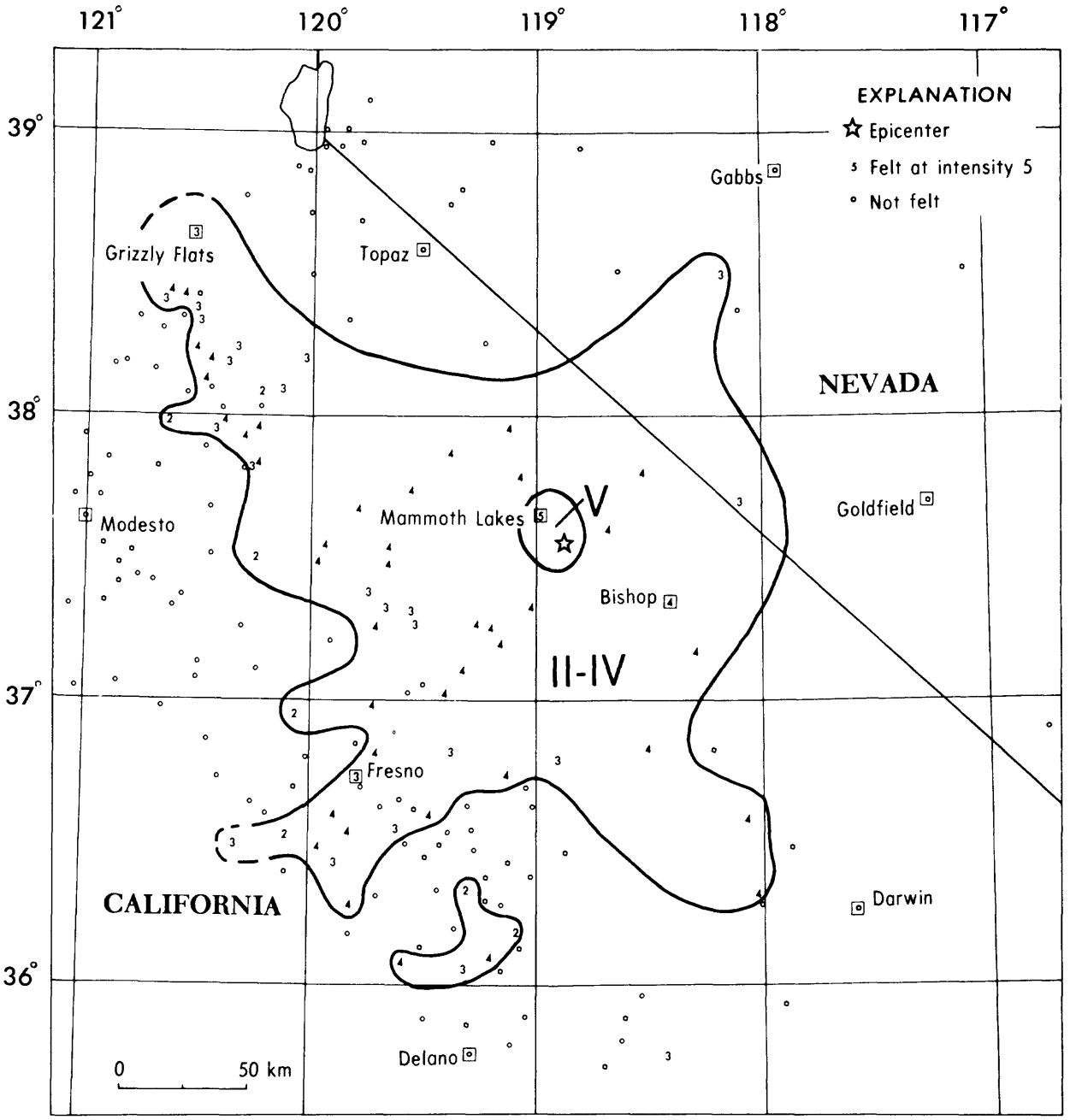

FIGURE 17.--Isoseismal map for the Owens Valley area, California, earthquake of 1 August 1980, 16 38 55.9 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Depth: 3 km
Magnitude: 2.8 ML(B)

Felt at Cobb (B).

24 August (B) Central California
Origin time: 12 41 17.8
Epicenter: 37.57 N., 121.66 W.
Depth: 5 km
Magnitude: 4.0 ML(B)

Felt at Fremont, Livermore, and Pleasanton.

Intensity IV: Livermore.

29 August (B) Central California
Origin time: 17 16 42.1
Epicenter: 38.25 N., 122.17 W.
Depth: 8 km
Magnitude: 2.4 ML(B)

Intensity III: Green Valley area north of Benecia.

31 August (P) Southern California
Origin time: 10 32 46.6
Epicenter: 35.22 N., 118.60 W.
Depth: 3 km
Magnitude: 3.5 ML(P)

Felt at Bakersfield (P).

4 September (B) Western Nevada
Origin time: 13 39 09.4

See Nevada listing.

4 September (B) Western Nevada
Origin time: 21 03 34.1

See Nevada listing.

6 September (B) Western Nevada
Origin time: 05 31 03.5

See Nevada listing.

6 September (B) Western Nevada
Origin time: 07 27 52.3

See Nevada listing.

7 September (B) Western Nevada
Origin time: 01 30 42.8

See Nevada listing.

7 September (B) Western Nevada
Origin time: 04 36 38.2

See Nevada listing.

California--Continued

7 September (B) Western Nevada
Origin time: 06 48 10.6

See Nevada listing.

7 September (B) Western Nevada
Origin time: 06 48 30.6

See Nevada listing.

7 September (B) Western Nevada
Origin time: 16 57 34.4

See Nevada listing.

8 September (B) Western Nevada
Origin time: 04 26 19.8

See Nevada listing.

8 September (B) Central California
Origin time: 06 28 08.4
Epicenter: 35.73 N., 121.34 W.
Depth: 9 km
Magnitude: 3.6 ML(B)

Felt at San Simeon (B).

9 September (P) Southern California
Origin time: 17 26 20.8
Epicenter: 33.58 N., 118.30 W.
Depth: 5 km
Magnitude: 3.9 ML(P)
Intensity IV: North Long Beach (press report), Palos Verdes Peninsula.
Intensity III: Compton, Signal Hill (press report).
Intensity II: Cypress.
Felt: Long Beach (P), Redondo Beach (P).

9 September (P) Southern California
Origin time: 18 07 20.4
Epicenter: 33.82 N., 118.23 W.
Depth: 5 km
Magnitude: 2.4 ML(P)

Felt at Long Beach (P).

13 September (B) Central California
Origin time: 10 50 19.4
Epicenter: 36.66 N., 121.35 W.
Depth: 6 km
Magnitude: 3.3 ML(B)

Felt in the Hollister area (B).

15 September (B) Northern California
Origin time: 13 29 07.4
Epicenter: 40.55 N., 124.40 W.
Depth: 17 km
Magnitude: 3.0 ML(B)

Felt in the Ferndale area (B).

16 September (B) Western Nevada
Origin time: 04 24 41.1

See Nevada listing.

24 September (B) Central California
Origin time: 08 08 38.6
Epicenter: 36.24 N., 120.17 W.
Depth: 8 km
Magnitude: 4.8 mb(G), 4.5 ML(B), 4.3 ML(P)
Intensity V: Avenal (windows, doors, and dishes rattled; hanging objects swung moderately; hairline cracks in plaster walls).
Intensity IV: Coalinga, Lemoore, Mariposa, Tranquillity.
Intensity III: Burrel, Firebaugh, Fresno.
Intensity II: Kerman.
Felt: Hanford (B).

25 September (P) Central California
Origin time: 16 33 29.5
Epicenter: 36.67 N., 118.10 W.
Depth: 6 km
Magnitude: 2.7 ML(P)

Felt at Lake Isabella (P).

26 September (P) Southern California
Origin time: 10 15 40.8
Epicenter: 35.74 N., 120.34 W.
Depth: 7 km
Magnitude: 3.2 ML(P), 2.9 ML(B)

Intensity IV: Avenal.

26 September (P) Southern California
Origin time: 13 18 41.2
Epicenter: 35.27 N., 119.40 W.
Depth: 5 km
Magnitude: 4.2 ML(B), 4.4 ML(P)
Intensity V:
Arvin (windows, doors, and dishes rattled; small objects overturned and fell; few dishes broke; hanging objects swung slightly).
Intensity IV: Avenal, Buttonwillow, Fellows, Stratford, Taft, Wofford Heights.
Intensity III: Bakersfield.
Felt: Derby Acres, Santa Barbara.

2 October (B) Central California
Origin time: 12 47 02.0
Epicenter: 37.98 N., 122.07 W.
Depth: 15 km
Magnitude: 3.1 ML(B)
Intensity IV: Pacheco (press report).
Felt: Benicia, Concord, Martinez, Pittsburg, Walnut Creek (press reports), and Orinda (B).

California--Continued

6 October (P) Southern California
Origin time: 06 40 01.6
Epicenter: 34.35 N., 118.30 W.
Depth: 6 km
Magnitude: 3.2 ML(P)

Felt at Fullerton (P) and in the San Fernando Valley area (press report).

9 October (B) Central California
Origin time: 16 12 21.3
Epicenter: 36.76 N., 121.52 W.
Depth: 7 km
Magnitude: 3.0 ML(B)

Felt near Hollister (B).

10 October (P) Southern California
Origin time: 14 55 59.5
Epicenter: 34.23 N., 118.63 W.
Depth: 2 km
Magnitude: 2.0 ML(P)

Felt at Canoga Park (P) and in west San Fernando Valley (press report).

13 October (B) Northern California
Origin time: 01 16 45.2
Epicenter: 40.43 N., 123.78 W.
Depth: 20 km
Magnitude: 4.3 mb(G), 3.9 ML(B)
Intensity IV: Bridgeville, Carlotta, Eureka, Miranda, Redcrest, Rio Dell, Weott.
Intensity III: Bayside, Blue Lake, Phillipsville, Redway, Salyer, Scotia, Whitehorn.
Felt: Garberville (B), Loleta (press report), Myers Flat.

13 October (B) Central California
Origin time: 02 46 54.1
Epicenter: 36.57 N., 121.09 W.
Depth: 11 km
Magnitude: 4.0 ML(B)
Intensity IV: Seaside.
Intensity III: Aromas, Carmel Valley, Monterey, Tres Pinos.

13 October (G) Central California
Origin time: 05 20 17.3
Epicenter: 37.60 N., 121.99 W.
Depth: 5 km
Magnitude: 2.5 ML(B)
Intensity III: Fremont and Hayward (press report), Union City.

13 October (B) Central California
Origin time: 08 54 39.2
Epicenter: 36.57 N., 121.21 W.
Depth: 7 km
Magnitude: 3.2 ML(B)

Felt in the Bear Valley area (B).

13 October (P) Southern California
Origin time: 13 38 42.3
Epicenter: 34.38 N., 117.67 W.
Depth: 10 km
Magnitude: 2.8 ML(P)

Felt at Wrightwood (P).

21 October (P) Southern California
Origin time: 12 26 14.4
Epicenter: 34.40 N., 118.63 W.
Depth: 4 km
Magnitude: 3.0 ML(P)

Felt at Granada Hills (P).

23 October (B) Owens Valley area
Origin time: 21 40 11.2
Epicenter: 37.49 N., 118.65 W.
Depth: 18 km
Magnitude: 3.7 ML(B), 3.9 ML(P)
Intensity IV: Bishop, Tom's Place.

26 October (P) Imperial Valley
Origin time: 20 56 22.9
Epicenter: 32.62 N., 115.58 W.
Depth: 15 km
Magnitude: 3.8 ML(P)

Felt in the Imperial Valley area (press report) and at El Centro (P).

30 October (B) Owens Valley area
Origin time: 03 45 24.7
Epicenter: 37.53 N., 118.78 W.
Depth: 14 km
Magnitude: 4.3 ML(B), 4.0 ML(P)
Intensity IV: Benton.
Intensity III: Ahwahnee, Badger.
Intensity II: Bishop.
Felt: Mammoth Lakes (B), Tom's Place.

30 October (P) Southern California
Origin time: 13 40 18.2
Epicenter: 33.77 N., 118.17 W.
Depth: 5 km
Magnitude: 2.0 ML(P)

Felt at San Pedro (P).

31 October (P) Imperial Valley
Origin time: 12 55 36.7
Epicenter: 32.67 N., 115.58 W.
Depth: 4 km
Magnitude: 4.2 mb(G), 4.5 ML(P).

Intensity VI: Calexico--hairline cracks in plaster walls and dry wall, light and heavy furniture overturned, few windows cracked, felt by and awakened all.
Intensity V: The most common effects at the places listed below were trees and bushes shook slightly, standing and moving vehicles rocked slightly, few items were thrown from shelves, hanging objects swung slightly, small objects overturned and fell, buildings trembled strongly, felt by and awakened many:
El Centro, Heber, Seeley.
Intensity IV: Brawley, El Cajon, Salton City.
Intensity III: Jacumba, Palomar Mountain, Plaster City, Poway.

California--Continued

2 November (P) Southern California
Origin time: 09 42 04.4
Epicenter: 34.10 N., 117.20 W.
Depth: 6 km
Magnitude: 3.1 ML(P)
Intensity IV: Loma Linda (press report), Redlands.

2 November (B) Central California
Origin time: 23 39 24.6
Epicenter: 37.84 N., 122.24 W.
Depth: 6 km
Magnitude: 3.0 ML(B)

Felt at Berkeley (B), Oakland (B), Piedmont (press report), Richmond (B), and in parts of Alameda and Contra Costa Counties (press report).

5 November (P) Southern California
Origin time: 05 17 32.0
Epicenter: 34.30 N., 118.45 W.
Depth: 14 km
Magnitude: 2.6 ML(P)

Felt at Northridge and San Fernando (P).

8 November (G) Northern California
Origin time: 12 43 10.2
Epicenter: 40.67 N., 124.18 W.
Depth: 24 km
Magnitude: 3.0 ML(B), 2.6 ML(G)

Felt at Fortuna (B).

8 November (B) Northern California
Origin time: 16 03 43.0
Epicenter: 41.07 N., 124.40 W.
Depth: 18 km
Magnitude: 3.4 ML(B), 3.7 ML(G)

Felt at Arcata and Eureka (B).

8 November (B) Northern California
Origin time: 23 52 56.7
Epicenter: 40.37 N., 124.31 W.
Depth: 39 km
Magnitude: 3.3 ML(B), 2.0 ML(B)

Felt in the Petrolia area (B).

9 November (P) Southern California
Origin time: 05 48 21.3
Epicenter: 34.22 N., 116.45 W.
Depth: 5 km
Magnitude: 3.4 ML(P)
Intensity III: Morongo Valley.

11 November (B) California-Nevada border region
Origin time: 10 19 03.0
Epicenter: 38.04 N., 118.59 W.
Depth: 5 km
Magnitude: 4.7 ML(B), 4.5 ML(P)
Intensity III: Bear Valley, Lee Vining.
Felt: Mono Lake (B) and Shaver Lake (P).

11 November (B) California-Nevada border region
Origin time: 10 33 51.3
Epicenter: 38.03 N., 118.56 W.
Depth: 4 km
Magnitude: 4.0 ML(B), 3.8 ML(P)

Felt at Mono Lake (B).

18 November (P) Southern California
Origin time: 13 44 15.8
Epicenter: 34.05 N., 118.80 W.
Depth: 16 km
Magnitude: 2.3 ML(P)

Felt at Westlake Village and Woodland Hills (P).

18 November (B) Central California
Origin time: 16 10 43.1
Epicenter: 37.48 N., 121.83 W.
Depth: 5 km
Magnitude: 2.9 ML(B)

Felt in the San Jose area (B).

19 November (B) Central California
Origin time: 09 34 33.7
Epicenter: 37.76 N., 121.95 W.
Depth: 11 km
Magnitude: 2.9 ML(B)

Felt in Contra Costa and Alameda Counties (press report).

Intensity IV: San Ramon.
Felt: Danville, Dublin, Livermore, and San Francisco (press reports).

20 November (P) Imperial Valley
Origin time: 12 17 49.8
Epicenter: 33.00 N., 115.53 W.
Depth: 11 km
Magnitude: 3.2 ML(P)

Intensity IV: Brawley (press report).

California--Continued

24 November (B) Central California
Origin time: 05 49 31.4
Epicenter: 36.86 N., 121.62 W.
Depth: 4 km
Magnitude: 3.0 ML(B)

Felt at Watsonville (B).

24 November (B) Northern California
Origin time: 19 10 48.2
Epicenter: 39.27 N., 122.25 W.
Depth: 5 km
Magnitude: 3.6 ML(B)

Felt at Willows (B).

25 November (P) Imperial Valley
Origin time: 13 24 56.9
Epicenter: 33.00 N., 115.53 W.
Depth: 10 km
Magnitude: 3.0 ML(P)

Felt at El Centro (P).

28 November (B) Northern California
Origin time: 17 11 39.5
Epicenter: 39.24 N., 120.44 W.
Depth: 10 km
Magnitude: 3.3 ML(B)

This is a foreshock of the earthquake on November 28 at 18 21 12.9. It was felt at the Royal Gorge recreation office (.6 km (1 mile) from the epicenter--press report) and at Truckee (B).

28 November (B) Northern California
Origin time: 18 21 12.9
Epicenter: 39.26 N., 120.47 W.
Depth: 10 km
Magnitude: 4.9 mb(G), 5.1 ML(B)

This earthquake was centered west of Truckee in a lightly populated mountainous area. It was felt over an area of approximately 36,500 sq km from Reno, Nevada to the San Francisco Bay area of California (fig. 18). Some people reported that the quake had a dizzying roll and nauseated them. The noise associated with the earthquake was described as resembling a sonic boom. There were also reports of booming noises echoing off the granite walls of the High Sierra. A reporter at Donner Lake on the crest of the Sierra near Truckee, California, said water in the lake splashed and sloshed for 2 minutes after the quake stopped.

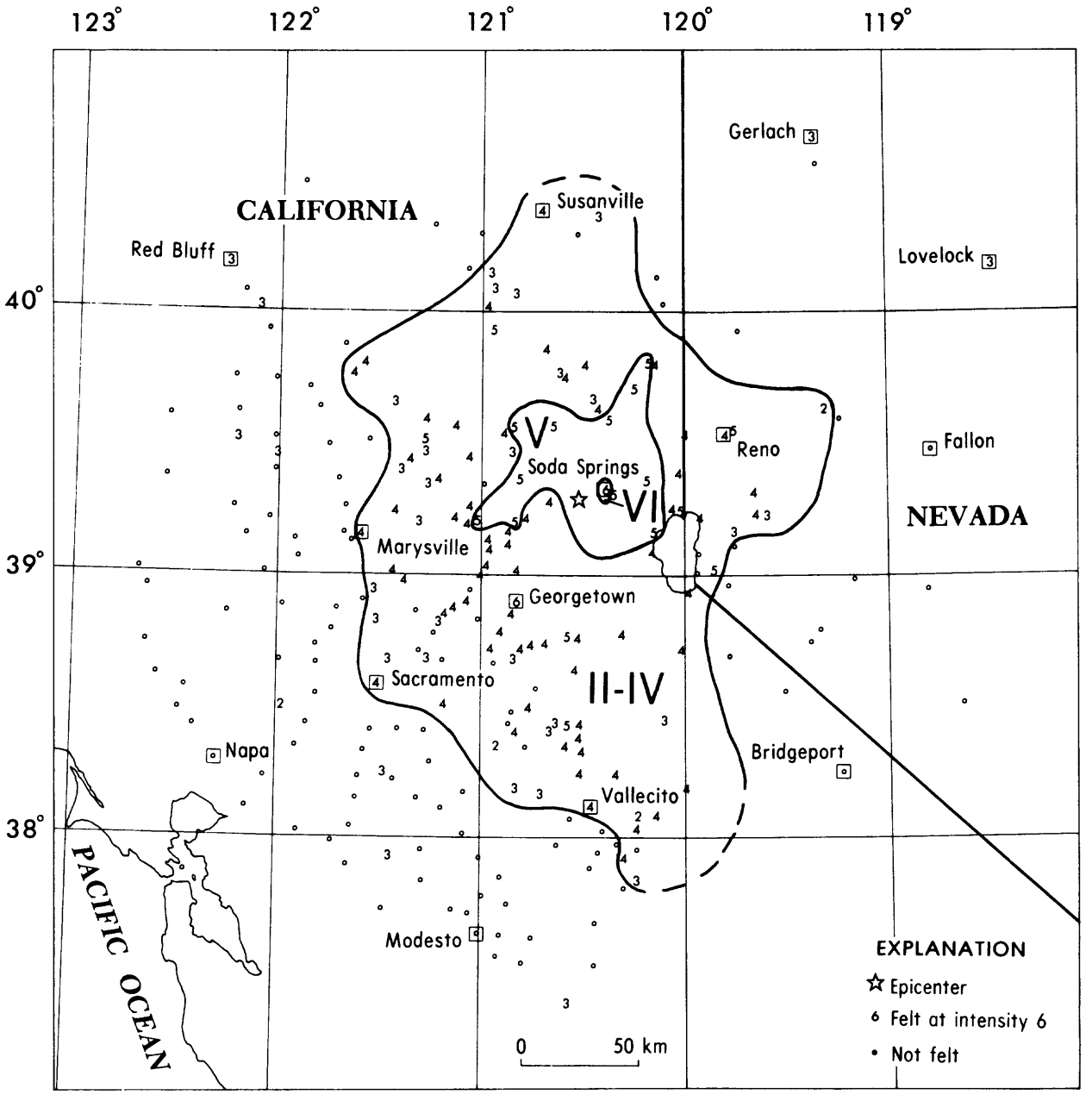

FIGURE 18.--Isoseismal map for the northern California earthquake of 28 November 1980, 18 21 12.9 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Intensity VI:
California--
Georgetown--large cracks in exterior walls, some bricks fell out of walls, large cracks in dry wall, hairline cracks in plaster walls, items thrown from store shelves, glassware and dishes broke, hanging pictures out of place, felt by all.
Soda Springs--items thrown from store shelves, glassware and dishes broke, many small objects overturned and fell, windows broken out, hanging pictures fell, felt by many.

Intensity V: The most common effects at the places listed below were hairline cracks in plaster walls and dry wall, few items thrown from store shelves, few windows cracked, hanging pictures swung and some out of place, hanging objects swung slightly, few dishes broke, small objects overturned and fell, buildings trembled strongly, felt by many:
California--Cedar Ridge (one woman reported a cracked ceiling and a loose chimney pipe--press report), Downieville, Dutch Flat, Forbestown, Loyalton (items fell off a mantle--press report), Norden, Olympic Valley, Pioneer, Pollock Pines, Quincy (press report), Royal Gorge recreation area (some boxes of wax were knocked off shelves), Sierra City, Sierraville, Truckee, Twin Bridges, Vinton, Washington.
Nevada--Crystal Bay, Genoa, Sparks.

Intensity IV:
California--Alta, Arnold, Auburn, Baxter, Blairsden, Browns Valley, Camino, Camptonville, Chicago Park, Chilcoot, Clio, Colfax, Cromberg, Dobbins, Emigrant Gap, Fair oaks, Feather Falls, Fiddletown, Floriston, Foresthill, Garden Valley, Glencoe, Gold Run, Goodyears Bar, Grass Valley, Grizzly Flats, Hathaway Pines, Homewood, Iowa Hill, Keddie, Kirkwood, Kyburz (State Department of Transportation reported a rock slide on Highway 50 near Kyburz), Long Barn, Lotus, Magalia, Marysville, Meadow Vista, Mountain Ranch, Nevada City, Newcastle, Pacific House, Paradise, Penn Valley, Penryn, Pinecrest, Placerville, Portola, Rackerby, Railroad Flat, Rescue, Rough and Ready, Sacramento, Sattley, Sheridan, Sloughhouse, Smithflat, Soulsbyville, South Lake Tahoe, Strawberry Valley, Susanville, Sutter Creek, Tahoe City, Tahoe Vista, Twain Harte, Vallecito, Weimar, West Point, Wheatland, Wilseyville.
Nevada--Incline Village, Reno (occupants of the upper floors of the Harrah 26-story hotel felt the building roll-press report), Silver City, Verdi, Virginia City.

California--Continued

Intensity III:
California--Alleghany, Amador City, Avery, Bangor, Bear River Lake, Bear Valley, Berry Creek, Brownsville, Butte City, Calpine, Castle AFB (telegram), Challenge, Citrus Heights, Crescent Mills, Diamond Springs, El Dorado, Graeagle, Greenville, Groveland, Holt, Kings Beach, Loomis, Los Molinos, Murphys, Oregon House, Pine Grove, Pleasant Grove, Red Bluff, Rio Linda, Rio Oso, San Andreas, Smartville, Standish, Tahoma, Taylorsville, Valley Springs, Volcano, Walnut Grove, Willows.
Nevada--Carson City (chandeliers swayed in the lobby of the Nevada State Capitol), Dayton, Gerlach, Lovelock.

Intensity II:
California--Ione, Mi-Wuk Village, Winters.
Nevada--Wadsworth.

Felt:
California--Chico (press report), San Francisco (B).
Nevada--Stateline.

28 November (B) Northern California
Origin time: 18 42 42.3
Epicenter: 39.27 N., 120.47 W.
Depth: 14 km
Magnitude: 3.0 ML(B)

Felt in the epicentral area (B).

1 December (P) Southern California
Origin time: 07 52 17.8
Epicenter: 34.07 N., 118.95 W.
Depth: 15 km
Magnitude: 2.6 ML(P)

Felt at Thousand Oaks (P).

1 December (G) Northern California
Origin time: 15 39 00.6
Epicenter: 39.37 N., 121.57 W.
Depth: 5 km
Magnitude: 2.8 ML(G)
Intensity IV: Bangor.
Intensity III: Oroville.

2 December (B) Northern California
Origin time: 18 31 07.8
Epicenter: 39.25 N., 120.46 W.
Depth: 10 km
Magnitude: 3.2 ML(B)

Felt in the epicentral area (B).

6 December (B) Northern California
Origin time: 16 19 54.6

Epicenter: 40.42 N., 124.33 W.
Depth: 20 km
Magnitude: 3.4 ML(B)

Felt at Petrolia (B).

9 December (P) Imperial Valley
Origin time: 15 42 14.3
Epicenter: 33.09 N., 115.60 W.
Depth: 5 km
Magnitude: 2.6 ML(P)

Felt at Brawley (P).

12 December (B) Northern California
Origin time: 13 13 20.4
Epicenter: 39.23 N., 122.19 W.
Depth: 5 km
Magnitude: 3.4 ML(B)

Felt in the Clear Lake area and at Collusa and Williams (B).

12 December (B) Northern California
Origin time: 14 24 09.1
Epicenter: 38.95 N., 122.68 W.
Depth: 4 km
Magnitude: 3.2 ML(B)

This is the first in a series of four earthquakes that occurred in the Clearlake area.

Intensity IV: Clearlake Oaks, Clearlake Park, Finley, Glenhaven, Kelseyville, Lucerne, Middletown.
Felt: Lakeport (press report).

12 December (B) Northern California
Origin time: 14 27 17.7
Epicenter: 38.96 N., 122.71 W.
Depth: 5 km
Magnitude: 3.1 ML(B)
Intensity IV: Clearlake Park, Lucerne.
Felt: Lakeport (press report).

12 December (B) Northern California
Origin time: 14 57 08.2
Epicenter: 38.96 N., 122.69 W.
Depth: 4 km
Magnitude: 3.9 ML(B)
Intensity IV: Clearlake Park, Lucerne.
Intensity III: Cobb.
Felt: Kelseyville, Lakeport, and Middletown (press reports).

12 December (B) Northern California
Origin time: 21 17 12.3
Epicenter: 38.97 N., 122.70 W.
Depth: 5 km
Magnitude: 3.2 ML(B)

Felt in the Clear Lake Highlands area (B).

22 December (P) Southern California
Origin time: 19 35 17.6
Epicenter: 32.73 N., 116.60 W.
Depth: 16 km
Magnitude: 3.6 ML(P)
Intensity IV: Alpine, Campo, Dulzura, Guatay, Pine Valley, Potrero, Ramona, Tecate.
Intensity III: Descanso, Mount Laguna, Santee.
Intensity II: Julian, Lakeside.
Felt: El Cajon (press report), Jacumba (press report), San Diego (P).

24 December (B) Central California
Origin time: 12 00 11.3
Epicenter: 36.94 N., 121.44 W.
Depth: 3 km
Magnitude: 3.4 ML(B)

Felt at Hollister (B).

24 December (B) Owens Valley area
Origin time: 13 25 49.3
Epicenter: 37.53 N., 118.91 W.
Depth: 12 km
Magnitude: 4.2 ML(B), 3.6 ML(P)
Intensity V: Mammoth Lakes (hanging objects swung slightly; small objects overturned and fell; hanging pictures out of place; windows, doors, and dishes rattled; felt by many).

24 December (B) Owens Valley area
Origin time: 15 48 33.6
Epicenter: 37.58 N., 118.87 W.
Depth: 16 km
Magnitude: 4.2 mb(G), 4.7 ML(B), 4.5 ML(P)

Intensity V: Mammoth Lakes (hanging objects swung slightly; small objects overturned and fell; hanging pictures out of place; windows, doors, and dishes rattled; felt by many).
Intensity IV: Bishop, Tom's Place.

28 December (B) Western Nevada
Origin time: 22 58 09.8

See Nevada listing.

28 December (B) Western Nevada
Origin time: 23 05 38.8

See Nevada listing.

29 December (B) Northern California
Origin time: 06 05 26.5
Epicenter: 39.27 N., 120.47 W.
Depth: 5 km
Magnitude: 3.0 ML(B)

Felt in the epicentral area (B).

California--Continued

30 December (P) Southern California
Origin time: 08 19 22.1
Epicenter: 34.55 N., 118.15 W.
Depth: 11 km
Magnitude: 2.6 ML(P)

Felt at Lancaster and Palmdale (P).

31 December (B) Central California
Origin time: 12 16 29.5
Epicenter: 37.70 N., 122.12 W.
Depth: 10 km
Magnitude: 3.5 ML(B)

Felt in Alameda, Contra Costa, and San Francisco Counties (press report).

Intensity IV: Brisbane, Daly City, Diablo, Oakland, San Leandro, San Mateo.
Intensity III: Berkeley, Cupertino, San Lorenzo.
Felt: Castro Valley (B), Fremont (B), Hayward (B), San Francisco (B).

California--Off the coast

3 March (B) Northern California
Origin time: 14 17 01.0
Epicenter: 40.45 N., 125.27 W.
Depth: 5 km
Magnitude: 5.0 mb(G), 5.2 MS(G), 5.1 ML(B)
Intensity IV: Honeydew, Loleta, Miranda, Petrolia, Rio Dell, Scotia.
Intensity III: Weott.
Felt: Eureka (B).

18 July Southern California
Origin time: 19 56
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.
Intensity IV: San Clemente Island (telegram).

13 October (B) Northern California
Origin time: 22 59 12.5
Epicenter: 40.72 N., 124.41 W.
Depth: 22 km
Magnitude: 3.2 ML(B)

Felt at Eureka (B).

8 November (G) Northern California
Origin time: 10 27 32.5
Epicenter: 41.12 N., 124.66 W.
Depth: 6 km
Magnitude: 6.2 mb(G), 7.2 MS(G), 6.9 ML(B)

California--Off the coast--Continued

This earthquake was the largest in this area since the 1956 Gorda Basin earthquake of magnitude 7.0 and the largest one to affect the conterminous United States since the Imperial Valley earthquake of October 15, 1979. This event and most of its aftershocks occurred on a large left-lateral, strike-slip fault that strikes about N 50°E from the Mendocino fracture zone (J. Eaton, personal communication). It was felt over an area of approximately 97,000 sq km from northern Oregon to the San Francisco Bay area (fig. 19).

Meehan (1981) reported the Office of Emergency Services estimated the damage at $1.75 million, most of which was from the damage to the Tompkins Hill Road overpass. The damage was not as great as it could have been because this area is very seismically active and many of the buildings were constructed to be earthquake resistant. Another factor is that lumbering and fishing are the major industries and as a result there aren't many tall buildings in the area.

The largest amount of damage occurred when two sections (totalling 300 feet) of the Tompkins Hill Road Overpass on U.S. Highway 101, 3 km (1.9 miles) south of Fields Landing, vibrated off the support pillars and collapsed onto the Northwestern Pacific Railroad tracks below (fig. 20). Engineers inspecting the fallen overpass said that a hinge, meant to absorb shocks caused by earthquakes, had failed because of the sustained twisting motion of the earthquake.

Six people were injured when they drove off the collapsed Tompkins Hill Overpass. In addition, two people were treated for heart attack symptoms and one man was treated at the hospital in Fortuna for cuts on his hand caused "when he jumped out of his window in panic" during the earthquake.

People who were outdoors when the quake struck said they heard a long, rumbling roar and saw flashes in the sky caused by arcing power lines. The motion was described as a rolling sensation, like being on a ship.

Ground surface failures such as numerous small landslides and liquefaction which caused slumping occurred along the Eel River and the Big Lagoon sand spit (Kilbourne and Saucedo, 1981). Cracks in

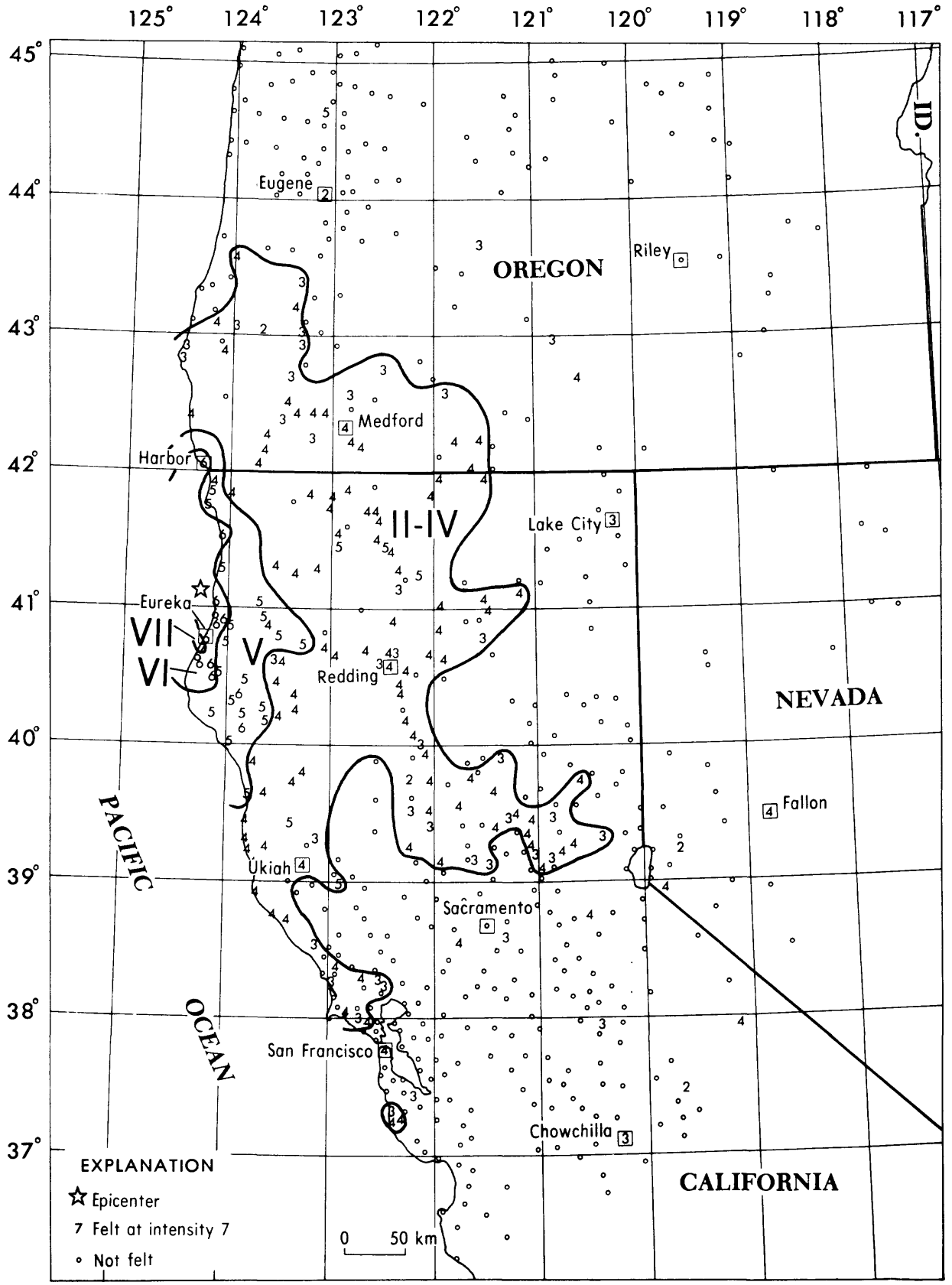

FIGURE 19.--Isoseismal map for the northern California earthquake of 8 November 1980, 10 27 32.5 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

FIGURE 20.--Photograph of damage to the Tompkins Hill Road Overpass on U.S. Highway 101, 1.9 miles south of Fields Landing, California (provided by R. T. Kilbourne, California Division of Mines and Geology).

roads and parking lots also resulted from the shaking. Kilbourne and Saucedo (1981) reported that unusual waves in the Sacramento-San Joaquin Delta region were observed from this earthquake. People sleeping aboard boats in parts of the Delta were awakened by a twisting "seiche" type wave that swept through the region.

Some of the damage information for Humboldt County was taken from Meehan (1981).

Intensity VII:

California--

Fields Landing--Two houses were moved off their .6-m high pier-type foundations. One unreinforced chimney fell, a gas main was reported broken as well as some water and sewer lines, the post office had two broken windows, and telephone service was interrupted. The most damage in this area was to the Tompkins Road Overpass on Highway 101 where two of the southbound spans collapsed onto the railroad tracks below.

California--Off the coast--Continued

Intensity VI:

The most common effects at the places listed below were windows cracked and some broken out, many items thrown from store shelves and damaged, cracked plaster, foundations cracked, chimneys cracked and bricks loosened, underground pipes broke, felt by and awakened all.

California--

Arcata--500-600 bottles of liquor tumbled off shelves in the Trombotta Liquor Warehouse and items fell off shelves in the Safeway Supermarket. Sunset Elementary School had cracked stucco on the east walls and Bloomfield Elementary School had sixteen windows either broken or popped out. Humboldt State University had minor plaster cracks and light fixture lenses that fell to the floor. Greenview Market reported $2,000-$3,000 in damaged merchandise. This type of damage also occurred at other grocery stores. The new Arcata-Eureka airport terminal sustained minor damage with a

crack in a laminated beam and damage to some sheetrock (press report).
Blue Lake.
Eureka--Electric lines whipped violently enough that they touched and shorted. Pacific Gas and Electric Company said electrical service was knocked out to 7,500 customers, but the power was quickly restored. About a dozen plate-glass windows in businesses and some windows in homes were broken. The courthouse also had a few minor cracks in walls, law books were thrown off the top shelves of the two-floor library, and a typewriter was destroyed when it fell off a cabinet. At the Northwest Pacific Railroad yard boxcar doors slammed and locomotives jumped on the tracks. Two buildings built on pilings tilted. The Veterans Memorial Building had mezzanine-level pillars shaken loose. At the Welfare Department Building (929 Koster Street) portions of the suspended ceiling fell down along with a fluorescent light fixture, and paper was thrown out of filing cabinets.
Ferndale--few pictures fell, many dishes broke.
Fortuna.
Klamath--light furniture overturned.
Loleta--College of the Redwoods had extensive damage to the pottery shop and broken windows (press report).
McKinleyville.
Myers Flat.
Redway.
Rio Dell--the face of the concrete abutments of Painter Street overcrossing were cracked.
Samoa--The Crown-Simpson Pulp Mill on the Samoa Peninsula was shut down for about 18 hours due to damage occurring on the 4th floor of the bleach plant, where a 3-m chunk of concrete fell about 9 m and smashed into a "process stock tank." (press report).
Trinidad.
Westhaven.

Oregon--
Brookings--chimneys cracked, sliding glass windows broke (press report).
Harbor--chimneys cracked.

Intensity V:

The most common effects at the places listed below were few windows cracked, small objects overturned and fell, hanging objects swung moderately, glassware and dishes broke, hairline cracks in plaster and drywall, felt by and awakened many.

California--Alderpoint, Bayside, Big Bar, Blocksburg, Bridgeville, Burnt Ranch, Carlotta, Crescent City, Edgewood, Etna, Finley, Fort Dick, Garberville, Honeydew, Hoopa, Hydesville, Kneeland, Korbel, McCloud, Miranda, Orick, Scotia (The Northwest Pacific Railroad trainmaster reported a couple of slides on the Scotia Bluffs), Weott, Westport, Whitehorn, Willits, Willow Creek.
Oregon--Albany (minor plaster cracks in Central Grade School--press report).

Intensity IV:

California--Albion, Alta, Anderson, Annapolis, Bangor, Baxter, Berry Creek, Bieber, Big Bend, Branscomb, Butte City, Camptonville, Challenge, Chicago Park, Clio, Colfax, Comptche, Cottonwood, Covelo, Davis, Dorris, Dos Rios, Douglas City, Elk, Emigrant Gap, Fairfax, Fall River Mills, Forbestown, Forest Glen, Forks of Salmon, Fort Bragg, Freestone, French Gulch, Gasquet, Gazelle, Gerber, Glenburn, Glenn, Greenview, Grenada, Gualala, Hamilton City, Horse Creek, Hyampom, Junction City, Klamath River, Lakehead, Lee Vining, Leggett, Loma Mar, Macdoel, Mad River, Maxwell, Mendocino, Meridian, Montague, Montgomery Creek, Mount Shasta, Nelson, Nevada City, North San Juan, Nubieber, Oak Run, Olema, Orleans, Pacific House, Palo Cedro, Paradise, Penngrove, Pescadero, Phillipsville, Point Arena, Proberta, Red Bluff, Redding, Richvale, Ruth, Salyer, San Francisco, Sawyers Bar, Scott Bar, Seiad Valley, Smith River, Summit City, Tehama, Tulelake, Ukiah, Vina, Weed, Whitmore, Wildwood, Yreka, Zenia.
Nevada--Fallon, Minden.
Oregon--Ashland, Cave Junction, Dairy, Gold Beach, Gold Hill, Grants Pass, Klamath Falls, Lakeside, Medford (employees at the Southern Oregon Bank said the computer bounced around like it was dancing--press report), Merlin, Merrill, Norway, O'Brien, Paisley, Phoenix, Powers, Rogue River (press report), Roseburg (press report), Selma, Talent, Wedderburn.

Intensity III:

California--Alleghany, Beale Air Force Base, Brownsville, Castella, Cazadero, Cedar Ridge, Chowchilla, Dillon Beach, El Verano, Forest Knolls, Gold Run, Hat Creek, Igo, Jamestown, Lake City, Los Molinos, Manchester, Marysville, Palo Alto, Potter Valley, Princeton, Project City, Rancho Cordova, Round Mountain, San Gregorio, Shasta, Soda Springs, The Sea Ranch, Tobin, Vineburg, Whiskeytown, Willows.

Oregon--Applegate, Canyonville (press report), Chiloquin, Colonial Valley (press report), Langlois, La Pine, Myrtle Creek, Myrtle Point, Prospect, Shady Cove, Sixes, Summer Lake, Sutherlin, Wilderville, Wolf Creek.

Intensity II:
California--Fish Camp, Orland.
Nevada--Silver City.
Oregon--Camas Valley, Eugene (press report).

Felt:
California--Burlingame (press report), Chico (press report), Dunsmuir (press report), Fort Jones, Happy Valley (press report), Hayfork (press report), Helena, Olinda (press report), Oroville.
Oregon--Coos Bay (press report), Curry (press report), Del Norte (press report), Glendale (press report), Hugo (press report), Humbug Mountain (press report), Salem (press report), Williams.

8 November (G) Northern California
Origin time: 16 52 27.8
Epicenter: 40.49 N., 125.88 W.
Depth: 15 km
Magnitude: 4.9 ML(B), 4.7 ML(G)

Felt in the coastal area (B).

8 November (G) Northern California
Origin time: 17 14 41.3
Epicenter: 40.56 N., 125.63 W.
Depth: 15 km
Magnitude: 4.5 ML(B), 4.3 ML(G)

Felt in the coastal area (B).

8 November (G) Northern California
Origin time: 18 31 19.5
Epicenter: 40.82 N., 125.25 W.
Depth: 15 km
Magnitude: 4.2 ML(B), 4.3 ML(B)

Felt in the coastal area (B).

8 November (G) Northern California
Origin time: 22 47 53.7
Epicenter: 40.71 N., 125.17 W.
Depth: 15 km
Magnitude: 5.0 ML(B), 4.8 ML(G)

Felt in the Cape Mendocino area (B).

8 November (G) Northern California
Origin time: 23 05 32.0
Epicenter: 41.05 N., 124.82 W.
Depth: 17 km
Magnitude: 4.1 ML(B), 4.5 ML(G)

Felt in the coastal area (B).

California--Off the coast--Continued

8 November (G) Northern California
Origin time: 23 07 09.4
Epicenter: 40.53 N., 125.53 W.
Depth: 15 km
Magnitude: 4.8 ML(B), 4.8 ML(G)

Felt in the coastal area (B).

9 November (G) Northern California
Origin time: 01 58 56.7
Epicenter: 41.22 N., 124.54 W.
Depth: 14 km
Magnitude; 4.3 ML(B), 4.3 mL(G)

Felt at Arcata and Eureka (B).

9 November (B) Northern California
Origin time: 04 31 23.5
Epicenter: 40.87 N., 124.39 W.
Depth: 9 km
Magnitude: 3.0 ML(B)

Felt in the Eureka area (B).

9 November (G) Northern California
Origin time: 06 02 49.6
Epicenter: 40.73 N., 124.50 W.
Depth: 24 km
Magnitude: 3.3 ML(B), 3.3 ML(G)

Felt in the Eureka area (B).

9 November (G) Northern California
Origin time: 06 59 52.4
Epicenter: 40.51 N., 125.44 W.
Depth: 15 km
Magnitude: 4.3 ML(B), 4.3 ML(G)

Felt in the coastal area (B).

9 November (G) Northern California
Origin time: 08 26 53.4
Epicenter: 41.04 N., 124.76 W.
Depth: 13 km
Magnitude: 3.9 ML(B), 3.9 ML(G)

Felt in the coastal area (B).

10 November (G) Northern California
Origin time: 05 06 18.0
Epicenter: 41.12 N., 124.42 W.
Depth: 5 km
Magnitude: 3.8 ML(B), 4.1 ML(G)

Felt at Arcata and Eureka (B).

10 November (G) Northern California
Origin time: 06 24 07.3
Epicenter: 41.11 N., 124.40 W.
Depth: 8 km
Magnitude: 3.8 ML(B), 4.1 ML(G)
Felt at Arcada and Eureka (B).

California--Off the coast--Continued

10 November (G) Northern California
Origin time: 15 41 05.5
Epicenter: 40.35 N., 124.64 W.
Depth: 33 km
Magnitude: 4.1 ML(B), 4.2 ML(G)

Felt in the coastal area (E).

10 November (G) Northern California
Origin time: 23 59 27.4
Epicenter: 40.58 N., 125.65 W.
Depth: 15 km
Magnitude: 4.8 ML(B), 4.7 ML(G)

Felt in the coastal area (B).

16 November (G) Northern California
Origin time: 02 01 08.1
Epicenter: 41.27 N., 124.50 W.
Depth: 9 km
Magnitude: 4.2 ML(B), 4.3 ML(G)

Felt at Arcata and Eureka.

18 November (G) Northern California
Origin time: 21 41 26.3
Epicenter: 40.35 N., 124.69 W.
Depth: 37 km
Magnitude: 3.7 ML(B), 3.8 ML(G)
Intensity III: Rio Dell.

Connecticut

17 January (L) Southeastern New York
Origin time: 10 13 16.1

See New York Listing.

24 October (J) Southern Connecticut
Origin time: 17 27 38.2
Epicenter: 41.32 N., 72.87 W.
Depth: 7 km
Magnitude: 3.1 Mn(G), 2.8 Mn(J), 3.2 Mn(L)
Intensity IV: Ansonia, Chester.
Intensity III: Branford, Cozy Beach (press report), Derby, Hamden (press report), Northford, Orange, Shelton, Stevenson.
Intensity II: Milford.
Felt: East Haven (press report), Fairfield (J), Hartford (J), Madison (J), Meriden (press report), New Haven (J).

25 October (J) Southern Connecticut
Origin time: 00 41 28.3
Epicenter: 41.33 N., 72.88 W.
Depth: 6 km
Magnitude: 3.0 Mn(G), 2.7 Mn(J), 3.1 MN(L)
Intensity IV: Middlebury (press report), Waterbury (press report).

Connecticut--Continued

Intensity III: Naugatuck, North Haven, Seymour.
Felt: Ansonia (press report), Derby, East Haven (press report), northeast of New Haven (J).

Georgia

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

Hawaii

1 January (H) Island of Hawaii
Origin time: 15 07 03.1
Epicenter: 19.33 N., 155.11 W.
Depth: 10 km
Magnitude: 3.4 ML
Intensity III: Hilo, Papaikou.

3 January (H) Island of Hawaii
Origin time: 11 06 16.7
Epicenter: 19.39 N., 155.25 W.
Depth: 3 km
Magnitude: 3.4 ML(H)
Intensity III: Hawaii Volcanoes National Park.

17 January (H) Island of Hawaii
Origin time: 05 03 39.8
Epicenter: 19.38 N., 155.24 W.
Depth: 3 km
Magnitude: 3.1 ML(H)
Intensity III: Hawaii Volcanoes National Park, Volcano.

17 January (H) Island of Hawaii
Origin time: 07 59 56.1
Epicenter: 19.38 N., 155.24 W.
Depth: 4 km
Magnitude: 3.4 ML(H)
Intensity III: Hawaii Volcanoes National Park, Volcano, Volcano Golf Course.

17 January (H) Island of Hawaii
Origin time: 16 23 39.8
Epicenter: 19.40 N., 155.24 W.
Depth: 4 km
Magnitude: 3.1 ML(H)
Intensity III: Hawaii Volcanoes National Park, Volcano.

18 January (H) Island of Hawaii
Origin time: 05 33 42.2
Epicenter: 19.33 N., 155.22 W.
Depth: 10 km

Magnitude: 3.6 ML(H)
Intensity III: Hawaiian Volcano Observatory, Volcano.
Intensity II: Captain Cook, Kainaliu.

20 January (H) Island of Hawaii
Origin time: 01 28 48.6
Epicenter: 19.31 N., 155.54 W.
Depth: 27 km
Magnitude: 4.6 ML(H)
Intensity V: Hawaiian Ocean View Estates, Volcano.
Intensity IV: Ainahou, Glenwood, Hilo, Huihui Ranch, Mountain View, Waimer.
Intensity III: Captain Cook, Hakalau, Kona, Mauna Loa Observatory.

21 January (H) Island of Hawaii
Origin time: 03 52 15.3
Epicenter: 19.35 N., 155.28 W.
Depth: 33 km
Magnitude: 3.1 ML(H)
Intensity III: Kilauea Military Camp.

22 January (H) Island of Hawaii
Origin time: 17 52 04.6
Epicenter: 19.33 N., 155.22 W.
Depth: 8 km
Magnitude: 3.5 ML(H)
Intensity III: Hilo.

24 January (H) Island of Hawaii
Origin time: 21 14 40.5
Epicenter: 19.33 N., 155.20 W.
Depth: 10 km
Magnitude: 3.6 ML(H)
Intensity III: Ahualoa.

29 January (H) Island of Hawaii
Origin time: 05 14 02.2
Epicenter: 19.38 N., 155.24 W.
Depth: 3 km
Magnitude: 3.1 ML(H)
Intensity III: Kilauea Military Camp.

30 January (H) Island of Hawaii
Origin time: 07 14 54.2
Epicenter: 19.35 N., 155.26 W.
Depth: 28 km
Magnitude: 3.6 ML(H)
Intensity III: Volcano.

5 February (H) Island of Hawaii
Origin time: 22 48 09.8
Epicenter: 19.36 N., 155.23 W.
Depth: 29 km
Magnitude: 3.8 ML(H)
Intensity IV: Hilo.

13 February (H) Island of Hawaii
Origin time: 05 00 08.4

Epicenter: 19.38 N., 155.28 W.
Depth: 3 km
Magnitude: 3.2 ML(H)
Intensity III: Hawaii Volcanoes National Park, Volcano.

15 February (H) Island of Hawaii
Origin time: 22 59 25.9
Epicenter: 19.33 N., 155.18 W.
Depth: 8 km
Magnitude: 3.1 ML(H)
Intensity II: Hilo.

18 February (H) Island of Hawaii
Origin time: 02 16 13.7
Epicenter: 19.78 N., 155.38 W.
Depth: 25 km
Magnitude: 3.8 ML(H)
Intensity IV: Ahualoa, Honokaa, Kamuela.
Intensity III: Hilo.
Intensity II: Volcano.

18 February (H) Island of Hawaii
Origin time: 10 13 17.7
Epicenter: 19.47 N., 155.44 W.
Depth: 11 km
Magnitude: 3.5 ML(H)
Intensity IV: Volcano.

18 February (H) Island of Hawaii
Origin time: 16 43 13.5
Epicenter: 20.28 N., 155.78 W.
Depth: 0 km
Magnitude: 3.3 ML(H)
Intensity II: Kohala.

19 February (H) Island of Hawaii
Origin time: 19 18 42.9
Epicenter: 19.39 N., 155.24 W.
Depth: 4 km
Magnitude: 3.1 ML(H)
Intensity III: Hawaii Volcanoes National Park.

25 February (H) Island of Hawaii
Origin time: 02 48 10.6
Epicenter: 20.06 N., 155.95 W.
Depth: 10 km
Magnitude: 3.7 ML(H)
Intensity III: Kamuela, Kohala.

26 February (H) Island of Hawaii
Origin time: 10 30 06.9
Epicenter: 19.33 N., 155.20 W.
Depth: 10 km
Magnitude: 3.6 ML(H)
Intensity III: Volcano.

2 March (H) Island of Hawaii
Origin time: 05 38 28.2
Epicenter: 19.78 N., 156.69 W.

Depth: 16 km
Magnitude: 4.2 ML(H)
Intensity III: Kona.

3 March (H) Island of Hawaii
Origin time: 00 07 06.7
Epicenter: 19.38 N., 155.24 W.
Depth: 1 km
Magnitude: 3.1 ML(H)
Intensity III: Hawaii Volcanoes National Park.

8 March (H) Island of Hawaii
Origin time: 05 47 42.5
Epicenter: 19.33 N., 155.19 W.
Depth: 10 km
Magnitude: 3.2 ML(H)
Intensity III: Hilo.

10 March (H) Island of Hawaii
Origin time: 02 27 20.7
Epicenter: 19.33 N., 155.22 W.
Depth: 9 km
Magnitude: 3.1 ML(H)
Intensity III: Volcano.

12 March (H) Island of Hawaii
Origin time: 12 57 52.7
Epicenter: 19.36 N., 155.23 W.
Depth: 2 km
Magnitude: 3.9 ML(H)
Intensity V: Hawaii Volcanoes National Park, Hawaiian Volcano Observatory.
Intensity IV: Volcano.
Intensity III: Hilo.

21 March (H) Island of Hawaii
Origin time: 17 46 39.8
Epicenter: 19.53 N., 156.03 W.
Depth: 13 km
Magnitude: 3.3 ML(H)
Intensity III: Kealakekua.

21 March (H) Island of Hawaii
Origin time: 22 56 20.2
Epicenter: 19.77 N., 155.53 W.
Depth: 15 km
Magnitude: 3.7 ML(H)
Intensity III: Mauna Kea Observatory.
Intensity II: Kamuela.

22 March (H) Island of Hawaii
Origin time: 11 09 53.5
Epicenter: 19.44 N., 155.39 W.
Depth: 11 km
Magnitude: 3.3 ML(H)
Intensity II: Volcano.

26 March (H) Island of Hawaii
Origin time: 05 16 31.7
Epicenter: 19.98 N., 155.84 W.
Depth: 5 km

Magnitude: 4.0 ML(H)
Intensity IV: Kohala, Waimea.
Intensity III: Honokaa, Papaikou.

28 March (H) Island of Hawaii
Origin time: 09 24 02.6
Epicenter: 19.32 N., 155.28 W.
Depth: 34 km
Magnitude: 3.3 ML(H)
Intensity II: Volcano.

5 May (H) Island of Hawaii
Origin time: 09 07 37.6
Epicenter: 19.23 N., 155.55 W.
Depth: 11 km
Magnitude: 3.9 ML(H)
Intensity IV: Pahala.
Intensity III: Hilo, South Kona.

6 May (H) Island of Hawaii
Origin time: 06 54 43.0
Epicenter: 19.35 N., 155.10 W.
Depth: 9 km
Magnitude: 3.1 ML(H)
Intensity III: Hilo.

6 May (H) Island of Hawaii
Origin time: 14 08 36.8
Epicenter: 19.40 N., 155.43 W.
Depth: 11 km
Magnitude: 3.6 ML(H)
Intensity III: Glenwood.

8 May (H) Island of Hawaii
Origin time: 09 42 33.4
Epicenter: 19.73 N., 155.74 W.
Depth: 12 km
Magnitude: 3.4 ML(H)
Intensity III: Kamuela.

13 May (H) Island of Hawaii
Origin time: 00 40 27.1
Epicenter: 19.32 N., 155.11 W.
Depth: 9 km
Magnitude: 3.3 ML(H)
Intensity IV: Hilo.

13 May (H) Island of Hawaii
Origin time: 00 43 44.6
Epicenter: 19.33 N., 155.11 W.
Depth: 9 km
Magnitude: 3.4 ML(H)
Intensity IV: Hilo.

23 May (H) Island of Hawaii
Origin time: 04 28 39.0
Epicenter: 19.34 N., 155.28 W.
Depth: 33 km
Magnitude: 3.8 ML(H)
Intensity IV: Volcano.
Intensity III: Hilo.
Intensity II: Ahualoa, Hawaiian Ocean View Estates, Honomu.

28 May (H) Island of Hawaii
Origin time: 18 04 50.9
Epicenter: 19.32 N., 155.23 W.
Depth: 10 km
Magnitude: 3.2 ML(H)
Intensity III: Hilo.

9 June (H) Island of Hawaii
Origin time: 10 43 23.3
Epicenter: 19.43 N., 155.40 W.
Depth: 12 km
Magnitude: 3.5 ML(H)
Intensity III: Pahala.
Intensity II: Hawaiian Ocean View Estates, Keaau, Kona.

25 June (H) Island of Hawaii
Origin time: 11 48 44.4
Epicenter: 19.72 N., 155.74 W.
Depth: 16 km
Magnitude: 3.3 ML(H)
Intensity III: Honokaa.
Intensity II: Holualoa.

5 July (H) Off coast of Oahu
Origin time: 05 36 00.7
Epicenter: 20.88 N., 157.79 W.
Depth: 10 km
Magnitude: 3.7 ML(H)

Felt on the island of Oahu.

Intensity III: Kaneohe, Makiki, Pacific Heights, and Waikiki (press reports).

17 July (H) Island of Hawaii
Origin time: 05 03 51.0
Epicenter: 19.95 N., 155.37 W.
Depth: 9 km
Magnitude: 3.0 ML(H)
Intensity II: Waimea.

1 August (H) Island of Hawaii
Origin time: 11 42 15.5
Epicenter: 19.38 N., 155.24 W.
Depth: 6 km
Magnitude: 3.6 ML(H)
Intensity III: Hawaii Volcanoes National Park.

5 August (H) Island of Hawaii
Origin time: 17 45 41.9
Epicenter: 20.04 N., 155.73 W.
Depth: 7 km
Magnitude: 3.1 ML(H)
Intensity III: Kohala.

12 August (H) Island of Hawaii
Origin time: 06 42 33.1
Epicenter: 19.33 N., 155.11 W.
Depth: 10 km

Hawaii--Continued

Magnitude: 4.3 ML(H)
Intensity IV: Glenwood, Hilo, Volcano.
Intensity III: Honaunau, Papaikou.

12 August (H) Island of Hawaii
Origin time: 17 23 44.6
Epicenter: 19.34 N., 155.11 W.
Depth: 9 km
Magnitude: 3.0 ML(H)
Intensity III: Puna area.

12 August (H) Island of Hawaii
Origin time: 21 01 55.9
Epicenter: 19.33 N., 155.18 W.
Depth: 10 km
Intensity III: Hilo.
Intensity II: Papaikou.

14 August (H) Island of Hawaii
Origin time: 07 27 16.7
Epicenter: 19.35 N., 155.42 W.
Depth: 11 km
Magnitude: 4.1 ML(H)
Intensity IV: Glenwood, Hilo, Pahala, Papaikou.
Intensity III: Kealakekua, Volcano.

18 August (H) Island of Hawaii
Origin time: 03 32 48.6
Epicenter: 19.27 N., 155.45 W.
Depth: 11 km
Magnitude: 3.6 ML(H)
Intensity III: Hilo, Volcano.

20 August (H) Island of Hawaii
Origin time: 16 06 25.9
Epicenter: 19.60 N., 156.15 W.
Depth: 25 km
Magnitude: 4.0 ML(H)
Intensity III: Kona.

27 August (H) Island of Hawaii
Origin time: 11 58 53.9
Epicenter: 19.91 N., 155.28 W.
Depth: 39 km
Magnitude: 3.4 ML(H)
Intensity III: Hilo.

28 August (H) Island of Hawaii
Origin time: 01 25 58.7
Epicenter: 19.39 N., 155.24 W.
Depth: 4 km
Magnitude: 3.2 ML(H)

This was one of a swarm of earthquakes that occurred from August 28-29 beneath the Pihimau pit crater on Kilauea.

Intensity III: Hawaii Volcanoes National Park, Hawaiian Volcano Observatory, Volcano.

28 August (H) Island of Hawaii
Origin time: 02 34 01.3
Epicenter: 19.38 N., 155.24 W.
Depth: 1 km
Magnitude: 3.4 ML(H)
Intensity III: Hawaii Volcanoes National Park, Hawaiian Volcano Observatory, Volcano.

28 August (H) Island of Hawaii
Origin time: 06 48 45.2
Epicenter: 19.38 N., 155.26 W.
Depth: 1 km
Magnitude: 3.1 ML(H)
Intensity III: Hawaii Volcanoes Natinal Park, Hawaiian Volcano Observatory.

29 August (H) Island of Hawaii
Origin time: 00 06 57.1
Epicenter: 19.38 N., 155.26 W.
Depth: 1 km
Magnitude: 3.3 ML(H)
Intensity V: Puhimau.
Intensity III: Hawaii Volcanoes National Park, Hawaiian Volcano Observatory, Volcano.

1 September (H) Island of Hawaii
Origin time: 04 16 53.8
Epicenter: 19.34 N., 155.11 W.
Depth: 9 km
Magnitude: 3.6 ML(H)
Intensity III: Hilo.

3 September (H) Island of Hawaii
Origin time: 20 43 06.3
Epicenter: 19.36 N., 155.02 W.
Depth: 8 km
Magnitude: 3.3 ML(H)
Intensity III: Kalapana.

13 September (H) Island of Hawaii
Origin time: 19 04 11.8
Epicenter: 19.33 N., 155.19 W.
Depth: 10 km
Magnitude: 3.2 ML(H)
Intensity III: Volcano.

20 September (H) Island of Hawaii
Origin time: 08 57 11.3
Epicenter: 19.35 N., 155.07 W.
Depth: 9 km
Magnitude: 3.4 ML(H)
Intensity III: Mountain View, Volcano.

5 October (H) Island of Hawaii
Origin time: 08 55 16.6
Epicenter: 19.34 N., 155.12 W.
Depth: 8 km
Magnitude: 3.2 ML(H)
Intensity III: Kurtistown.

Hawaii--Continued

22 October (H) Island of Hawaii
Origin time: 06 38 25.1
Epicenter: 19.38 N., 155.08 W.
Depth: 5 km
Magnitude: 3.4 ML(H)
Intensity III: Hilo.

22 October (H) Island of Hawaii
Origin time: 07 48 19.6
Epicenter: 19.37 N., 155.12 W.
Depth: 1 km
Magnitude: 3.7 ML(H)
Intensity III: Kalapana.

22 October (H) Island of Hawaii
Origin time: 20 16 55.5
Epicenter: 19.47 N., 154.88 W.
Depth: 5 km
Magnitude: 3.5 ML(H)
Intensity IV: Geothermal Well.
Intensity III: Opihikao, Leilani Estates.

30 October (H) Island of Hawaii
Origin time: 20 29 14.0
Epicenter: 19.45 N., 155.21 W.
Depth: 27 km
Magnitude: 3.6 ML(H)
Intensity IV: Hawaiian Volcano Observatory, Volcano.
Intensity III: Ainaloa, Hilo, Kalapana, Kona, Waimea.

3 November (H) Island of Hawaii
Origin time: 02 44 33.8
Epicenter: 19.38 N., 155.24 W.
Depth: 0 km
Magnitude: 3.2 ML(H)
Intensity IV: Pauahi Crater.
Intensity III: Volcano.

4 November (H) Islnd of Hawaii
Origin time: 16 22 32.4
Epicenter: 19.39 N., 155.43 W.
Depth: 11 km
Magnitude: 3.5 ML(H)
Intensity III: Glenwood, Volcano.
Intensity II: Hilo.

6 November (H) Island of Hawaii
Origin time: 06 41 42.6
Epicenter: 19.32 N., 155.23 W.
Depth: 10 km
Magnitude: 3.7 ML(H)
Intensity III: Volcano.

11 November Island of Oahu
Origin time: 10 50 34.0
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.

Felt at Wheeler Air Force Base.

Hawaii--Continued

12 November (H) Island of Oahu
Origin time: 21 38 02.6
Epicenter: 21.47 N., 158.27 W.
Depth: 14 km
Magnitude: 4.0 ML(H)
Intensity IV: Wahiawa and Waianae (press reports), Wheeler Air Force Base.
Intensity III: Haleiwa, Nanakuli.

15 November (H) Island of Hawaii
Origin time: 04 22 24.9
Epicenter: 19.39 N., 155.44 W.
Depth: 9 km
Magnitude: 3.5 ML(H)
Intensity III: Pahala, Volcano.
Intensity II: Hilo.

17 November (H) Island of Hawaii
Origin time: 05 46 38.4
Epicenter: 19.33 N., 155.18 W.
Depth: 10 km
Magnitude: 3.6 ML(H)
Intensity III: Puna.
Intensity II: Hilo, Papaikou, Volcano.

17 November (H) Island of Hawaii
Origin time: 10 47 36.5
Epicenter: 19.30 N., 155.22 W.
Depth: 10 km
Magnitude: 3.8 ML(H)
Intensity III: Hilo, Puna, Volcano.
Intensity II: Kona.

23 November (H) Island of Hawaii
Origin time: 11 31 55.9
Epicenter: 19.36 N., 155.05 W.
Depth: 9 km
Magnitude: 4.2 ML(H)
Intensity IV: Hilo, Puna, Volcano.

23 November (H) Island of Hawaii
Origin time: 11 35 40.0
Epicenter: 19.36 N., 155.05 W.
Depth: 9 km
Magnitude: 3.2 ML(H)
Intensity III: Puna.

1 December (H) Island of Hawaii
Origin time: 18 42 33.5
Epicenter: 19.52 N., 155.92 W.
Depth: 11 km
Magnitude: 3.4 ML(H)
Intensity IV: Kona.

4 December (H) Island of Hawaii
Origin time: 11 16 19.1
Epicenter: 19.39 N., 155.28 W.
Depth: 3 km
Magnitude: 3.1 ML(H)
Intensity III: Hawaii Volcanoes National Park.

Hawaii--Continued

15 December (H) Island of Hawaii
Origin time: 12 14 00.4
Epicenter: 19.33 N., 155.13 W.
Depth: 10 km
Magnitude: 3.1 ML(H)
Intensity III: Hilo, Puna.

15 December (H) Island of Hawaii
Origin time: 15 33 08.3
Epicenter: 19.33 N., 155.20 W.
Depth: 9 km
Magnitude: 3.6 ML(H)
Intensity III: Hilo, Puna.
Intensity II: Papaikou, Volcano.

16 December (H) Island of Hawaii
Origin time: 06 11 36.2
Epicenter: 19.36 N., 155.25 W.
Depth: 10 km
Magnitude: 3.5 ML(H)
Intensity III: Volcano.
Intensity II: Hilo.

21 December (H) Island of Hawaii
Origin time: 17 04 35.4
Epicenter: 19.36 N., 155.08 W.
Depth: 9 km
Magnitude: 3.4 ML(H)
Intensity III: Kalapana.
Intensity II: Hilo.

30 December (H) Island of Hawaii
Origin time: 21 30 55.3
Epicenter: 19.30 N., 155.78 W.
Depth: 10 km
Magnitude: 3.9 ML(H)
Intensity IV: Kona.
Intensity III: Hookena, Keokea.
Intensity II: Hawaiian Volcano Observatory.

Idaho

29 February (U) Southeastern Idaho
Origin time: 19 33 38.5
Epicenter: 42.72 N., 111.73 W.
Depth: 7 km
Magnitude: 3.3 ML(U)
Intensity IV: Bancroft, Soda Springs.
Intensity III: Lava Hot Springs.

18 May (W) Mount St. Helens area Origin time: 15 32 11.4

See Washington listing.

Illinois

13 March (S) Southern Illinois
Origin time: 02 23 13.4

Illinois--Continued

Epicenter: 37.93 N., 88.45 W.
Depth: 19 km
Magnitude: 3.3 Mn(S)
Intensity IV: McLeansboro (K).
Felt: Broughton, Walpole (telephone report).

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

Indiana

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

Kentucky

23 March (S) Central Kentucky
Origin time: 21 38 15.0
Epicenter: 37.63 N., 86.69 W.
Depth: 6 km
Magnitude: 3.3 Mn(S)
Intensity IV: Axtel, Dundee, Glen Dean, Hawesville, McDaniels, Narrows.
Intensity III: Hardinsburg, Philpot, Vanzant, Woodbury.

12 July (G) Western Kentucky
Origin time: 23 59 54.8
Epicenter: 37.26 N., 86.99 W.
Depth: 0 km
Magnitude: 3.1 Mn(G)

Probable explosion.

Intensity III: Horse Branch, South.

27 July (G) Northern Kentucky
Origin time: 18 52 21.8
Epicenter: 38.17 N., 83.91 W.
Depth: 8 km
Magnitude: 5.1 mb(G), 4.7 MS(G), 5.0 Mn(L), 5.2 Mn(T) 5.0 Mn(S)

This shock is the strongest earthquake to be centered in Kentucky and the strongest earthquake to be felt in this region since the southern Illinois earthquake of 1968. It was felt over an area of approximately 600,000 sq km of the central United States and Canada (fig. 21). The press reported one woman was injured in Kent, Kentucky. The worst damage was at Maysville, Kentucky (MM VII) approximately 50 km north

Kentucky--Continued

of the epicenter, where 37 business structures and 269 residences suffered damage of some degree. The preliminary estimate of loss in Maysville was $1,000,000. Most of the significant damage to structures occurred in the older downtown section of the city, which lies adjacent to and extends several blocks back from the Ohio River. This lower section of downtown Maysville extends westward from Limestone Street, through the center of the business district, along West 1st through West 4th Streets (Reagor and others, 1981). The damage was mostly to older brick structures probably built during the middle 1800's. A storm entered the Maysville area after the earthquake and some people associated the thunder with earthquake noise. The storm also contributed to the damage when rain water entered buildings through cracks and holes in roofs, thereby soaking interior finishes.

Ground cracks were reported to have occurred about 12 km from the epicenter at Owingsville and Little Rock, Kentucky (James Zollweg, Tennessee Earthquake Information Center, Memphis, Tenn., oral commun., 1980). At Owingsville, east of the epicenter, the ground cracks were estimated to be 6-10 cm deep and 30 m in length. To the west of the epicenter, on Stoner Road near Little Rock, ground cracks were observed by residents to run toward a cistern. During the earthquake, the ground near the epicenter appeared to have waves, and was described "as if the streets and sidewalks were made out of rubber." Reports of the duration of ground vibration were about 15 sec of strong motions and up to several minutes for sensible vibration. Generally, the noise associated with the shock was described as similar to a low-flying jet, a sonic boom, or an air conditioner or furnace exploding, but the most common description was a blown natural-gas pipeline.

The most common type of damage from this earthquake occurred to chimneys (fig. 22). Except in Maysville, the damage was not a community-wide effect, but was scattered within a community. There were several instances of homes having several chimneys to which the extent of damage varied. The damage to the chimneys also took many forms and exhibited a wide variation in the degree of damage. The chimney damage included cracks of varying lengths and widths, bricks loosened or bricks toppled from the top of chimneys (fig. 23), bricks knocked out between the chimney top and the roofline, and in a few scattered

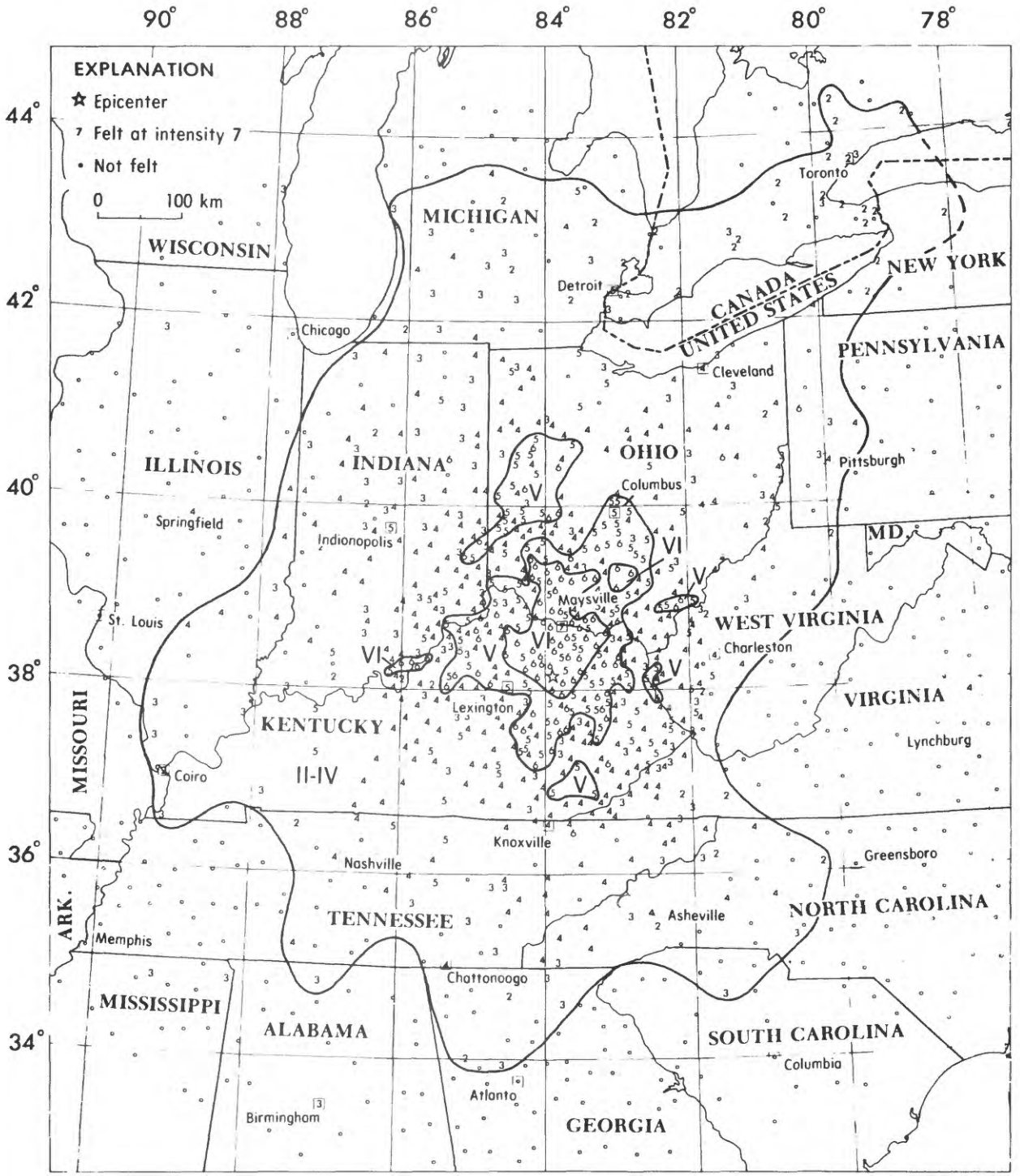

FIGURE 21.--Isoseismal map for the northern Kentucky earthquake of 27 July 1980, 18 52 21.8 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

FIGURE 22.--Photograph of partial chimney collapse in Sherburne, Kentucky (photo provided by M. Hopper).

instances, chimneys were toppled down to near the roofline. There were also reports of bricks that were dislodged inside the chimney and fell onto the hearth. The most extensive damage to chimneys was to older chimneys that were constructed without reinforcement and with mud and lime mortar or a mortar mixture called "brickment." These types of mortar weather and erode quite easily. Although many of these types of chimneys were damaged, there were instances when one chimney would be damaged and another of similar construction was not. On the other hand, there were a few instances of damage occurring to chimneys which had been recently rebuilt and strengthened (fig. 24). A community with scattered chimney damage was assigned an intensity VI.

Much of the data listed below were taken from reports by Hopper and Reagor (1980), Giese-Koch and Reinbold (1980), Anderson and others (1980), and Reagor and others (1981).

Kentucky--Continued

Intensity VII:
United States--
Kentucky--
Maysville--The most common effects reported were concentrated chimney damage, dislodged bricks and bricks fallen from several unbraced parapets, cracks in exterior masonry walls, broken or shattered windows, cracked basement walls, merchandise thrown to the floor, dishes broken, furniture shifted, and hanging pictures fell from walls.
The Cox Building, a brick masonry structure built in 1886, had broken windows and a few cracks in the brick walls at window openings.
The only building reported condemned

FIGURE 23.--Photograph of chimney damage near Sharpsburg, Kentucky (photo provided by M. Hopper).

FIGURE 24.--Photograph of damage to a recently rebuilt chimney in Owingsville, Kentucky (photo provided by M. Hopper).

in Maysville was the Calvary Baptist Church. The entire structure was erected from single-wall cement blocks that were braced across the width of the church by stress rods with turnbuckles. The front wall had cracked on a previous occasion at which time the stress rods were installed. The earthquake reopened the old crack in the front wall to such an extent that the Maysville fire chief condemned the building until repairs could be made.

People were kept out of the First Christian Church because of a wall that had shifted and roof columns that had moved.

The First Presbyterian Church had cracks in interior plaster and a cracked stone beam over the main entrance.

At the Spurlock Station of Eastern Kentucky Power, 3.2 km west of Maysville, a 24.4 m-tall smokestack appeared to sway between 3.6 and 4.5 m during the tremor. The natural built-in sway is 2.4 m (press report).

The Hayswood Hospital on East 4th Street at Market had minor damage to the equipment penthouse at the top of the four-story structure. Cracks developed in the south and west walls. Each of the four 6.1-m columns at the front of the hospital developed horizontal cracks just above the entrance level.

Several windows were broken on the floors above the Kilgus Pharmacy (press report).

A liquor store near the central business district lost its entire stock when bottles fell from shelves.

At the Central Shopping Center on U.S. Highway 62 between Maysville and Washington, Murphys Department Store had slight diagonal cracks along mortar seams on the brick-veneered reinforced concrete-block north-facing wall, and several concrete blocks appeared to be slightly pushed outward.

At the St. Patrick Catholic Church arches cracked and seams of the inside walls were cracked. The ground shook so violently that the church's bell rang. Lead was broken out of stained glass windows at the church, though none of the panes of glass broke. At the St. Patrick Catholic School the framework of the suspended ceiling failed and several ceiling panels fell in the gymnasium. There were also reports of loosened capstones and bricks from outside walls, and cracks in the ceiling plaster.

Kentucky--Continued

Intensity VI:

United States--

In addition to the effects listed below, there were instances of chimney damage in most towns (as described above) but not as concentrated as in Maysville. Other commonly reported damage included cracked basement walls and floors and cracked foundations.

Indiana--

Georgetown.

Hartford City--cracks in exterior brick walls.

Liberty.

Metamora.

New Albany.

Kentucky--

Augusta.

Barterville (glassware broken).

Beattyville.

Berry.

Bethel--tombstones were rotated mostly counterclockwise and some were displaced to the southwest.

Blue Lick.

Buena Vista.

Camargo.

Camp Dix.

Carlisle--a wall was reported cracked in a grocery store at the intersection of Highways 36 and 32;, merchandise in stores was knocked to the floor.

Charters--hairline cracks in concrete block walls of the grocery store.

Concord--one window in a church was cracked diagonally across several panes; a sidewalk was cracked.

Cottageville.

Cowan.

Crystal--some broken windows.

Dover--items fell off shelves, pictures came off walls.

East Bernstadt.

Elizaville.

Elkfork.

Ewing--cracked plaster in walls of homes and the hospital (press report).

Fairview--few items fell off shelves, cracks in concrete-block cisterns.

Flemingsburg--The exterior block wall of the Nutrition Center had cracks at the window and door openings and additional cracking at the window sill. At the Fleming Court House,

built in 1939, a wooden cornice fell from the top of an outside window. The Fleming County Hospital had one broken window, some cracked plaster, and cracks in the inside and outside cement-block brick-veneered wall.

Frankfort--North of Frankfort on U.S. Highway 127 a home was reported to have a broken rear wall where the bricks were loosened and could be removed by hand. Other homes in the subdivision had similar damage.

Fritz--split interior walls and cracked stone fences.

Fultz--large cracks in plaster walls.

Grayson--displaced tombstones.

Harper.

Headquarters--a hairline crack in one house through both bricks and mortar, that extended from the bottom corner of one window to the ground.

Heidelberg.

Hookstown.

Jeff.

Jeffersonville--crack in a brick-veneered wall and hairline cracks along mortar seams in one store.

Judy--several concrete-block cisterns were cracked and one century-old brick house had a meter-long diagonal shear crack in a brick wall.

Little Rock--the concrete-block Davis grocery store and garage had several items fall off shelves.

Louisville--plaster fell from a ceiling, a basement floor cracked, furniture moved, and some windows broke (press report).

Mays Lick--groceries fell from shelves at the Welsh grocery store, pictures were out of place and some fell, furniture moved, and exterior brick walls were cracked.

Means.

Millersburg.

Minerva.

Moorefield--some items were thrown off shelves and brick cisterns were damaged--press report.

Morehead--chimneys and walls damaged, sidewalks broken, patios cracked, items fell off shelves in stores (press report).

Morning Glory--a concrete-block cistern was cracked around the top edge and concrete block steps moved away from a house.

Mount Carmel--groceries were knocked off the shelves at the Food Market.

Mount Olivet--several items fell off shelves at the K-Y grocery store, and the storekeeper's home settled and damaged the gas pipeline.

Kentucky—Continued

Mount Sterling--There were reports that pictures were out of place, items fell off shelves, windows broke, a clock stopped, a wood-framed house with brick veneer had a crack in the brick mortar and some plaster fell, and a plate-glass window broke. Giese-Koch and Reinbold (1980) reported that the Junior High School Building had hairline cracks at all corners of the building and cracks in exterior brick walls. The Chenault Agricultural Building of the high school complex had long cracks in the "terrazzo" floor and minor cracks in the inner cement block walls. One cement-block structure on the Mount Sterling golf course had cracks through all four outside walls, both through blocks and along mortar joints. One pump for the city water supply system was shut down temporarily by the earthquake. The earthquake set off fire alarms at the hospital.

Murphysville--items fell off shelves.

Muses Mills--cracks in concrete patio walls.

North Middletown--an 8-year-old brick building was extensively cracked completely through double brick walls.

Olive Hill.

Olympia.

Orangeburg.

Owenton.

Owingsville--items fell off shelves, pictures turned facing the wall, the 1887 brick Saint Julie Catholic Church had extensive damage to plaster walls, the 1845 two-story brick United Methodist Church had hairline cracks over the arch of one of the front windows and plaster damage over the windows inside the church, cracks in exterior brick walls, and tombstones were displaced and fell.

Paint Lick.

Paris--items fell off shelves, patios were cracked, plaster walls were cracked, and several antique clocks stopped.

Pittsburg--some windows broke.

Pleasant Valley--few items fell off shelves.

Plum--At the grocery and Ashland service station all the groceries came off the west wall, but none came off the east wall; concrete-block cisterns and basements were cracked.

Plumville--a concrete slab porch was cracked and a cave-in at the limestone quarry was reported.

Polksville--at the Village Mart there was a crack in the garage wall from the bottom of a window to the floor straight down through the concrete blocks.
Poplar Plains--cracks in brick walls.
Preston--cracked plaster and dry wall.
Prospect.
Quincy.
Rectorville--a few items knocked off shelves.
Sadieville.
Salt Lick--hairline cracks in concrete-block walls, items fell off shelves.
Sand Hill--wall cracked in one house.
Sanders.
Sandgap.
Sardis.
Shannon--tombstones shifted counter-clockwise (press report).
Sharpsburg--There were reports of basements cracked, plaster chips fell in the post office, some brick and block masonry walls cracked, and tombstones rotated clockwise with many displaced about 1 cm to the south. One home which was more than 150 years old and in poor condition sustained such serious damage from cracked brick walls that it was declared unsafe.
Shelbyville.
Sherburne--At the General Store and Standard Station the front window on the south side was buckled and broken out and all of the groceries lining the east wall were thrown off the shelf. At one home glassware broke and one picture on a table fell, a plastered wall adjacent to a chimney was cracked near the ceiling.
Slade--some broken windows.
South Shore.
Taylorsville.
Tollesboro (press report).
Tyner.
Vanceberg.
Verona.
Versailles.
Waco.
Wallingford--pictures fell off dressers and broke and pictures came off walls and broke.
Warsaw--cracks in exterior brick walls.
Washington--At Riggs Ashland Service Station there were over 1-m long, small cracks running diagonally across the ceiling of the restroom. There were also cracks in the concrete-block walls of the restroom. At the cemetery across from Riggs Service Station tombstones were rotated, most clockwise, and displaced to the northeast up to 4 cm. At Murphy's Department Store several blocks were slightly moved out from the concrete-block side wall. The municipal swimming pool was cracked. Two cases of liquor came off the shelves at the liquor store. At the Kroger Store about $30 worth of things were lost off the shelves; everyone rushed out of the store and one person fainted.
Wedonia.
West Liberty.
Whitesulphur--items fell and a stone house was cracked.
Williamstown.

Ohio--
Aberdeen--books were knocked off shelves; a picture fell from a wall; a wood door frame pulled away from the rest of the building, and industrial cooling units were displaced.
Addison--broken windows.
Bainbridge.
Bellefontaine.
Bentonville--pictures were knocked off walls, items fell from shelves, furniture moved, a loose-stacked rock retaining wall partially collapsed at one home.
Bethel.
Blanchester.
Blue Creek.
Buford--damaged swimming pools.
Chillicothe--broken windows.
Chilo--at the grocery store items fell off shelves, several windows were broken, and there was damage to the tin roof.
Circleville--broken windows.
Cridersville.
Dover--cracks in a patio and driveway (press report).
Dunkinsville (press report).
Fayetteville.
Georgetown.
Goshen.
Higginsport.
Hillsboro--items fell off shelves, one table bounced up and down, and pictures were knocked askew.
Lebanon.
Lees Creek.
Londonderry.
Lynchburg.
Lynx.
Manchester.
Medway--cracked plaster.

Middleport.
Morrow.
New Albany--collapsed brick and concrete wall in basement of Day's Grocery Store--press report.
New Holland.
Piqua.
Portsmouth.
Rainsboro.
Ripley--at Taylor's Village Mart there was some damage to the parapet.
Russellville.
Springfield--broken windows.
Waverly--broken windows.
Wilmington--at one home a gas line was broken and the base of a shed was cracked (press report).
Winchester--broken windows.

Pennsylvania--
New Castle--cracked plaster and cracked exterior brick walls.

Tennessee--
New Tazewell.

West Virginia--
Crum.

Intensity V:

The most common effects for the places listed below were a few windows cracked, small objects and light furniture moved, standing and moving vehicles rocked slightly, buildings shook slightly, glassware broke, small objects fell.

United States--

Indiana--Brookville, Columbia City, Corydon, Floyds Knobs, Holton, Indianapolis (tables bounced across the floor, pictures started swinging, portable walls started moving around--press report), Jasper, Otisco, Vernon, Vevay.

Kentucky--Alexandria, Bagdad, Barbourville, Baxter, Bear Branch, Blaine, Bledsoe, Bradfordsville, Bruin, Burdine, Burkesville, Campbellsburg, Caney, Cannel City, Central City, Clay City, Clayhole, Clearfield, Climax, Clintonville (a cement block cistern was cracked--press report), Cottle, Crittenden, Cynthiana, East Union, Falmouth, Farmers, Fernleaf, Finchville, Foster, Foxport, Frenchburg (concrete porch pulled away about 8 cm from a foundation), Garrison, Germantown, Grange City, Greenup, Hager, Hatton, Hazel Green, Head of Grassy, Helechawa, Helena, Hillsboro, Index, Irvine, Isonville, Jacobs, Kentontown, Leeco, Lenox, Lewisburg, Lexington (ceiling cracked in wood-frame brick-veneer home, items knocked from grocery shelves, pictures fell from wall, sounded like a sonic boom--press report), Logville, Lookout, Lytten, Marthas Mills (press report), McAndrews, McCarr, Melbourne, Milton, Moranburg (at one home a previously cracked glass window was pushed out and an upstairs door was left out of plumb and hard to close--press report), Mount Vernon, Myers, New Castle, Newport, Oddville, Orlando, Owensboro, Parrot, Petersville, Pikeville, Pine Ridge, Pleasureville, Plummers Landing, Poplar Grove, Prestonburg, Reynoldsville (press report), Roark, Robinson Creek, Rousseau, Sandy Hook, Science Hill, Somerset (press report), Stanton, Summersville, Tilton, Turners Station, Union, Vanceburg, Wayland, Webbville, West Van Lear, Westbend, Winchester, Wind Cave, Wyoming.

Michigan--Detroit (shook desks and heavy computer terminals in the Detroit News Newsroom, Tiger Stadium swayed 4-6 in--press report), Saginaw.

Ohio--Ashville, Beaver, Bidwell, Bradysville, Bryan, Cheshire, Cincinnati (a sandstone finial fell from the roof-level of the four-story city hall and broke the granite steps below. The press reported a chimney at St. Pauls Church was damaged and some bricks fell to the street), Clarksburg (press report), Clarksville, Cleves, College Corner, Columbus (.6-m piece of plaster crashed to the floor at the RKO Palace Theatre--press report), Decatur, Eaton, Englewood, Enon, Findlay, Fizzleville (north of Aberdeen), Fremont, Gahanna, Gordon, Greenville, Grove City, Hamden, Hamersville (press report), Kenton, Kingston, Lewisburg, Lima (press report), Lockbourne, Lucasville, Martinsville, McDermott, Mount Orab, Mount Sterling, Mount Vernon, New Bremen, New Carlisle, New Marshfield, New Philadelphia, Newtonsville, North Bend, Orient, Point Pleasant, Racine, Rarden, Reynoldsburg, Rio Grande, Saint Marys, Seven Mile, Sidney (press report), South Bloomingville, South Lebanon, Spring Valley, Springboro, Stout, Sugar Grove, Syracuse, Tarlton, Terrace Park, Toledo (press report), Versailles, Wallingford, Wapakoneta, Washington Court House, Waterford (press report), Wellston (press report), West Alexandria, West Milton, Williamsburg, Williamsport, Worthington (press report), Zanesville.

Tennessee--Grainger County (press report), Lafayette, Olivingston,

Sparta.
West Virginia--Buffalo, Fort Gay, Man, Moundsville, Switzer, Wayne, Williamson.

Intensity IV:
United States--
Alabama--Huntsville (press report), New Market (press report).
Illinois--Danville, Decatur, Lawrenceville, Louisville, Paris, Salem.
Indiana--Angola, Batesville, Bath, Berne, Bloomfield, Bloomington, Borden, Brownstown, Brownsville, Butlerville, Cambridge City, Carmel (press report), Cedar Grove, Clarksburg, Commiskey, Connersville, Cortland, Covington, Crandall, Crawfordsville, Cross Plains, Crothersville, Decatur, Dillsboro, Dupont, East Enterprise, Elizabethtown, Elwood, Fairland (press report), Franklin, Fredericksburg, Gas City, Glenwood, Greensburg, Greenville, Guilford, Hanover, Hartsville, Huntington, Ireland, Jonesville, Knightstown, Kokomo, Laconia, Lafayette, Lawrenceburg, Lexington, Madison, Marion, Martinsville, Marysville, Memphis, Milan, Milroy, Mitchell, Monticello, Mooreland, Moores Hill, Morris, Muncie, Nabb, Napoleon, New Castle, New Middletown, New Point, New Salisbury, New Washington, North Vernon, Oldenburg, Osgood, Paris Crossing, Patriot, Pekin, Peru, Petersburg, Plainfield, Ramsey, Richmond, Rising Sun, Rockville, Rushville, Scipio, Scottsburg, Seymour, Shelbyville, South Bend, Spencer, Sunman, Terre Haute (telegram), Union City, Versailles, Warsaw, Westport, Winamac, Winchester.
Kentucky--Annville, Athol, Auxier, Barnetts Creek, Bays, Beauty, Beaver, Bedford, Beechburg, Belfry, Berea, Bethany, Bighill, Blacks Crossroads, Blairs Mills, Bloomfield, Bonnieville, Booneville, Bowen, Bowling Green, Brandenburg, Brodhead, Bronston, Brooks, Bryantsville, Buckner, Buffalo, Bulan, Burlington, Burnside, Buskirk, Bypro, California, Campton, Canada, Canoe, Carrollton, Carter, Cawood, Cecilia, Chaplin, Cobhill, Colville (press report), Combs, Conway, Corbin, Corinth, Cornettsville, Coxs Creek, Crestwood, Crockett, Cromona, Cumberland, Danville, De Mossville, Denniston, Dreyfus, Drift, Dry Ridge, Dunnville, Eastview, Edna, Egypt, Ekron, Elizabethtown, Elna, Emerson, Eminence, Erlanger, Ermine, Eubank, Evarts, Ezel, Fearisville,

Ferguson, Firebrick, Flat Fork, Flatwoods, Florence, Foraker, Ford, Fort Knox, Fort Thomas (press report), Frakes, Franklin (press report), Freeburn, Garrard, Garrett, Ghent, Gifford, Gillmore, Glasgow, Glencoe, Glendale, Glenview, Goshen, Grahn, Gratz, Gravel Switch, Gray, Gray Hawk, Green Hall, Greensburg, Guerrant, Haddix, Haldeman, Hardy, Hardyville, Harlan, Harold, Harrods Creek, Hazard, Hebron, Hi Hat, Hindman, Hitchins, Hodgenville, Hulen, Hustonville, Insko, Ivel, Jackstown, Jamestown, Jeremiah, Johns Run, Jonesville, Junction City, Keene, Kenton, Kenvir, Kerby Knob, Kings Mountain, Lair, Lancaster, Langley, Lawrenceburg, Lebanon Junction, Lerose, Letcher, Lily, Livingston, Lone, Loretto, Lynn, Maceo, Maggard, Magnolia, Malone, Manchester, Mariba, Martha, Martin, Mason, Mayking (press report), Mazie, McDowell, McKee, McRoberts, Midway, Millstone, Mintonville, Monticello, Moon, Morrill, Mount Eden, Mousie, Nancy, Nazareth, Neon, Nerinx, New Haven, New Hope, New Liberty, Newfoundland, Nicholasville, Oil Springs, Old Landing, Oldtown, Oneida, Ophir, Paintsville, Pathfork, Perryville, Pewee Valley, Phyllis, Pilgrim, Pine Grove (press report), Pine Knot, Pineville, Pinsonfork, Pomeroyton, Poplar Flat, Port Royal, Primrose, Pryse, Quicksand, Raywick, Redbush, Regina, Revelo, Ricetown, Richmond, Rockholds, Rockhouse, Rogers, Rosslyn, Royalton, Rush, Saint Catharine, Saint Francis, Saint Helens, Saldee, Salyersville, Sassafras, Scottsville, Sebastians Branch, Shady Nook, Shawhan, Shelbiana, Shepherdsville, Sidney (press report), Silver Grove, Silverhill, Smithfield, Smiths Creek, Soldier, Sonora, South Portsmouth, Sparta, Stacy Fork, Stamping Ground, Stanford, Stanville, Stephens, Strunk, Sweeden, Talbert, Tateville, Tomahawk, Topmost, Trappist, Trinity, Upper Tygart, Upton, Van Lear, Vancleve, Vicco, Vine Grove, Viper, Virgie, Waddy, Wallins Creek, Walton, Warfield, Washington, Weeksbury, Wellington, Wendover, West Point, Westport, Wheelwright, White Oak, Whitesburg, Whitley City, Wildie, Willard, Willisburg, Wilmore, Winston, Woodbine, Wooton, Worthington, Worthville, Wrigley, Yocum, Zachariah.
Michigan--Allegan, Coldwater (press report), Flint, Hastings, Mount Clemens (telegram), Mount Pleasant, New

Buffalo (press report), Union City.
North Carolina--Asheville, Bryson City, Franklin, Morganton, Murphy, Robbinsville, Sparta, Statesville.
Ohio--Ada, Addyston, Adelphi, Akron, Albany, Alpha, Amelia, Ashland, Batavia, Bellbrook, Belle Center (press report), Belpre, Bethel (press report), Bluffton, Botkins, Bexley (press report), Bourneville, Bowersville, Bremen, Bridgeport, Brookville, Bucyrus, Cambridge (press report), Camden, Camp Dennison, Canal Winchester, Canton, Carey (press report), Cedarville, Cherry Fork, Clayton, Cleveland, Clifton, Coalton, Coldwater, Columbus Grove (press report), Commercial Point, Coolville, Covington, Crestline (press report), Crown City, Dayton (press report), Defiance, Delphos (press report), Derby, Eldorado, Ellsberry, Elyria, Fairborn, Felicity, Frankfort, Franklin, Franklin Furnace, Friendship, Galion, Gallipolis, Glouster, Gratis, Greenwich (press report), Groesbeck (press report), Harrisburg, Harrison (press report), Haverhill, Highland, Hooven, Jackson, Jamestown, Jeffersonville, Kings Mills, Kitts Hill, Langsville, Latham, Laura, Leesburg, Loveland, Ludlow Falls, Mansfield, Marietta, Marion, Mason, Massillon, McArthur, Miamisburg, Miamiville, Middletown, Minford, Minster, Monroe, Montpelier (press report), Moscow, Mount Gilead, Mount Saint Joseph, Napoleon, Nelsonville, Neville, New Concord, New Lebanon, New Lexington, New Paris, New Richmond, New Vienna, Newark, North Hampton, Oak Hill, Oregonia, Ottawa, Otway, Overpeck, Owensville, Oxford (press report), Patriot, Paulding, Pedro, Peebles, Phillipsburg, Piketon, Pleasant Plain, Port William, Ray, Rockbridge, Ross, Rutland, Sabina, Sandusky, Sardinia, Scioto Furnace, Scottown, Seaman, Sedalia, Sherrodsville, Somerville, South Charleston, South Point, South Vienna, South Webster, Steubenville, Summit Station, Tipp City, Trenton, Upper Sandusky, Urbana, Utopia, Van Wert (press report), Vandalia, Verona, Wakefield, Waterloo, Wauseon, Waynesville, West Chester, West Elkton, West Manchester, West Union, Westerville, Wheelersburg, Wilberforce, Willow Wood, Woodsfield (press report), Wooster, Wright-Patterson AFB, Xenia, Yellow Springs, Youngstown, Zaleski.
Pennsylvania--Bellevue (press report), Erie, Kittanning, Pittsburgh.

Kentucky--Continued

Tennessee--Alcoa, Arthur, Blountville, Carthage, Chattanooga, Clairfield, Cookeville, Cumberland Gap, Duff, Elizabethton (press report), Greeneville, Harriman, Jefferson City, Jellico, Johnson City, Jonesboro, Kingsport, Knoxville, La Follette, Lawrenceburg, Lenoir City, Loudon, Maryville, Mountain City, Nashville, Newport, Oneida, Oak Ridge (press report), Portland, Smithville, Sneedville, Sweetwater, Tazewell, Woodbury.
Virginia--Big Rock, Big Stone Gap, Blackwater, Clinchco, Coeburn, Dungannon, East Stone Gap, Ewing, Grundy, Hurley, Jonesville, Kents Stone, Norton, Pennington Gap, Pound, Rose Hill, Saint Charles, Wytheville (press report).
West Virginia--Ashton, Bancroft, Branchland, Bruno, Buckhannon, Charleston, Charlton Heights, Chattaroy, Costa, Dingess, East Lynn, Eleanor (press report), Genoa, Glenwood, Harrisville, Harts, Henderson, Henlawson, Hewett, Huntington, Hurricane, Institute, Lavalette, Lenore, Leon, Lesage, Letart, Logan, Mason, Middlebourne, Naugatuck, Parkersburg, Peach Creek, Point Pleasant, Racine, Ranger, Scott Depot, Sod, Sophia, Southside, Tornado, Varney, Washington, West Hamlin.

Intensity III:
Canada--
Ontario--Allanburg, Amherstburg (press report), Don Mills (press report), East York (press report), Hamilton (press report), London (press report), North York (press report), Scarborough (press report).
United States--
Alabama--Athens, Birmingham.
Georgia--Blairsville, Cleveland, Marietta.
Illinois--Dixon, Jonesboro, Murphysboro, Robinson, Shawneetown.
Indiana--Anderson, Auburn, Bedford, Bluffton, Boston, Canaan, Danville, Delphi, Deputy, Evansville, Fort Wayne, Fowler, Frankfort, Goshen, Greenfield, Hagerstown, La Porte, Laurel, Mount Saint Francis, Paoli, Pendleton, Portland, Salem, Sellersburg, Tell City, Tipton, Wabash, Williamsburg, Zionsville.
Kentucky--Benham, Bethlehem, Betsy Layne, Boston, Burke, Cadiz, Clermont, Columbia, Cutuno, Dorton, Elsie, Fuget, Hellier, Hickman, Hueysville, Independence, Jackhorn, Jackstown, Johnetta, Keaton, La Grange, Lackey, Lawton, London, Mackville, Mary, Middlesboro, Mize, Mouthcard,

Owensboro (press report), Pendleton, Petersburg, Pikeville (press report), Pippa Passes, Raceland, Rineyville, Russell, Salvisa, Sextons Creek, Springfield, Sulphur, Vada, Vincent, Waneta, Wheelersburg, Williamsburg, York (press report).
Michigan--Centreville, Charlotte, Grand Rapids, Jackson, Kalamazoo, Lansing, Marshall, Muskegon, Pontiac, Royal Oak (press report).
Mississippi--Ashland, Iuka.
North Carolina--Banner Elk, Canton, Harrisburg, Hayesville.
Ohio--Amanda, Archbold (press report), Athens, Barnesville, Blacklick, Branch Hill, Brighton (press report), Cardington (press report), Celina, Chesapeake, Cheviot (press report), Coshocton, Donnelsville, Greenfield, Huntington (press report), Ironton, Kent (press report), Maineville, Mantua (press report), Milford (press report), Millersburg, Oak Harbour (press report), Okeana, Pandora (press report), Penfield (press report), Port Clinton (press report), Proctorville, Ravenna (press report), Rochester (press report), Saint Clairsville, South Solon, Stoutsville, Stow (press report), Stryker (press report), Troy, Twin Lakes (press report), Wellington (press report), Wharton (press report), Willowick.
Pennsylvania--Avalon, Bellevue (press report), Butler, Crafton (press report), East Liberty (press report), McKees Rocks (press report), Whitehall (press report).
South Carolina--Union.
Tennessee-Benton, Dayton, Erwin, Kingston, McMinnville, Pikeville, Rockwood, Speedwell.
Virginia--Abingdon, Andover, Bristol (press report), Clintwood, Dryden, Haysi, McClure, Wise (press report).
West Virginia--Accoville, Barboursville, Cottageville, Delbarton, Ethel, Foster, Fraziers Bottom, Kermit, Kimberly, Mallory, Morgantown, New Cumberland, New Haven, Peytona, Pound (press report), Prichard, Ravenswood, Red Jacket, Saint Albans, Sumerco, Wellsburg, West Columbia, Wharncliffe.
Wisconsin--Port Washington.

Intensity II:
Canada--
Ontario--Barrie (press report), Belle River, Belmont, Bethany, Blenheim, Bradford, Brampton (press report), Burford, Burlington (press report), Camlachie, East Catharines (press report), Emeryville, Grimsby (press report), Kitchener (press report), Kleinburg, Niagara Falls (press report), Peel (press report), Saint Catharines (press report), Saint Thomas (press report), Sarnia (press report), Toronto, Waterboro (press report), Waterloo (press report), Welland (press report), Windsor (press report).
United States--
Georgia--Ellijay, Rome.
Illinois--Cairo.
Indiana--Brazil, Crown Point, Edinburg, Elizabeth, Lebanon, Logansport, Michigan City (press report), Santa Claus.
Kentucky--Denton, Greenback (press report), Jenkins, Mount Washington, Pleasure Ridge Park (press report), Shively (press report).
Michigan--Cassopolis, Farmington Hills (press report), Ithaca, Lapeer, Mason, Monroe, Romeo (press report), Royal Oak (press report), Selfridge Air National Guard Base (Detroit), Ypsilanti.
New York--Bemus Point (press report), Chataqua City (press report), Jamestown (press eport), Lakewood (press report), Mayville (press report).
North Carolina--Boone, Fletcher, Winston-Salem.
Ohio--Lisbon, Tallmadge (press report).
Pennsylvania--Oakland (press report).
Tennessee--Clarksville.
Virginia--Bristol, Christiansburg (press report), Lebanon, Marion, Salem (press report).
West Virginia--Chapmanville, Griffithsville, Holden, Jeffrey, Lundale, Matewan, New Martinsville, Ripley, Stollings, Wheeling (press report), Winfield.

30 July (F) Northern Kentucky
Origin time: 17 01 41.2
Epicenter: 38.19 N., 83.92 W.
Depth: 11 km
Magnitude: 1.3 Mn(F)
Intensity II: Sharpsburg (F).

31 July (G) Northern Kentucky
Origin time: 09 26 56.3
Epicenter: 38.20 N., 83.92 W.
Depth: 13 km
Magnitude: 2.5 Mn(G), 2.2 Mn(F)

This is the largest of approximately 30 aftershocks that followed the earthquake on July 27.

Intensity IV: Plum, Sharpsburg (F).
Intensity III: Bethel, Carlisle, Moorefield.

Kentucky--Continued

23 August (G) Northern Kentucky
Origin time: 03 49 02.5
Epicenter: 37.99 N., 84.92 W.
Depth: 5 km
Magnitude: 3.1 Mn(S)
Intensity III: Bethlehem, Cropper, Orville.
Felt: Frankfort (K).

25 August (F) Northern Kentucky
Origin time: 11 41 37.7
Epicenter: 38.20 N., 83.93 W.
Depth: 1 km
Magnitude: 2.5 Mn(G), 2.0 Mn(F)
Intensity IV: Sharpsburg, Sherburne (K).
Felt: Bethel (press report), Judy, North Middltown, Owingsville (press report).

30 December (K) Northeastern Kentucky
Origin time: 03 07 08.1
Epicenter: 38.20 N., 83.91 W.
Depth: 11 km
Magnitude: 1.6 ML(K)
Intensity III: Judy, Moorefield, Sharpsburg.
Felt: Bethel, East Union, Little Rock, Mount Sterling, North Middletown, and Sherburne (press reports).

Maine

9 February (J) Southwestern Maine
Origin time: 13 11 36.0
Epicenter: 43.56 N., 70.76 W.
Depth: 0 km
Magnitude: 2.4 Mn(J)
Intensity II: Alfred and Waterboro (J).

10 April (J) Eastern Maine
Origin time: 15 36 43.8
Epicenter: 44.71 N., 68.36 W.
Depth: 0 km
Magnitude: 3.0 Mn(J)
Intensity III: Ellsworth and Otis (J).

21 April (J) Eastern Maine
Origin time: 13 39 57.5
Epicenter: 44.72 N., 68.36 W.
Depth: 0 km
Magnitude: 2.5 Mn(J)

Felt in the epicentral area (J).

4 May (J) Southern Maine
Origin time: 08 56 13.1
Epicenter: 44.29 N., 69.61 W.
Depth: 2 km
Magnitude: 2.6 Mn(J)

Intensity II: Coopers Mills and Windsor (press report), and Whitefield (J).

Maine--Continued

8 September (J) Eastern Maine
Origin time: 05 59 54.9
Epicenter: 44.68 N., 69.00 W.
Depth: 9 km
Magnitude: 3.2 Mn(J)
Intensity III: Belfast, Brooks, Monroe, Northport, and Swanville (J).

22 November (J) Central Maine
Origin time: 21 28 23.2
Epicenter: 45.22 N., 69.16 W.
depth: 5 km
Magnitude: 2.6 Mn(J)

Intensity II: Dover-Foxcroft area (J).

Massachusetts

23 November (J) Northeastern Massachusetts
Origin time: 00 39 32.4
Epicenter: 42.62 N., 71.39 W.
Depth: 1 km
Magnitude: 2.5 Mn(J)
Intensity V:
Massachusetts--
North Chelmsford--trees and bushes shook slightly, standing and moving vehicles rocked slightly, small objects overturned and fell, hanging objects swung slightly, buildings shook strongly, windows, doors, and dishes rattled, felt by many.
Intensity IV:
Massachusetts--Lowell (press report).
Intensity III:
Massachusetts--Chelmsford, Highlands (press report), Tyngsboro.
Intensity II:
Massachusetts--Billerica.
Felt:
Massachusetts--Amesbury (J), Dracut (press report), Salem (J), Lawrence (J).
New Hampshire--Salem (J).

Michigan

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

20 August (G) Lake Erie, Canada
Origin time: 09 34 52.3
Epicenter: 41.94 N., 83.01 W.
Depth: 5 km
Magnitude: 3.2 Mn(G), 3.2 Mn(S), 3.3 Mn(O)

Michigan--Continued

This earthquake was felt in parts of Michigan and Ohio, United States and Ontario, Canada.

Intensity V:
- Canada--
  - Ontario--Harrow (dishes were broken and children were awakened).

Intensity IV:
- Canada--
  - Ontario--Colchester and Windsor (press report).
- United States--
  - Michigan--Milan, New Boston (press report), Pearl Beach, Rockwood.
  - Ohio--Huron.

Intensity III:
- United States--
  - Michigan--Gross Ile, Salem, Samaria, South Rockwood, Trenton.

Intensity II:
- United States--
  - Michigan--Flat Rock.

Felt:
- United States--
  - Michigan--Detroit (press report).
  - Ohio--Toledo (press report).

Mississippi

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

Missouri

5 July (S) New Madrid area
Origin time: 08 54 41.1
Epicenter: 36.60 N., 89.58 W.
Depth: 10 km
Magnitude: 3.5 Mn(G), 3.2 Mn(T), 3.6 Mn(S)
Intensity IV: Kewanee, Marston, New Madrid.
Felt: Lilbourn (telephone report).

20 August (S) Southeastern Missouri
Origin time: 04 43 04.7
Epicenter: 37.84 N., 90.36 W.
Depth: 8 km
Magnitude: 2.0 Mn(S)

Felt at Desloge (S).

21 August (S) Southeastern Missouri
Origin time: 10 39 44.2
Epicenter: 38.03 N., 90.48 W.

Missouri--Continued

Depth: 10 km
Magnitude: 2.1 Mn(S)

Felt at Bonne Terre (S).

2 December (S) Northwestern Tennessee
Origin time: 08 59 30.0

See Tennessee listing.

Montana

20 February (G) Yellowstone National Park
Origin time: 12 07 52.8

See Wyoming Listing.

22 February (G) Yellowstone National Park
Origin time: 10 18 27.7

See Wyoming Listing.

10 March (G) Western Montana
Origin time: 14 48 56.5
Epicenter: 47.30 N., 113.39 W.
Depth: 5 km
Magnitude: 4.0 mb(G), 4.4 ML(G)
Intensity IV: Seeley Lake.
Intensity III: Greenough, Ovanda.
Intensity II: Missoula (telephone report), Ronan.

10 May (G) Hebgen Lake area
Origin time: 23 41 47.5
Epicenter: 44.76 N., 111.28 W.
Depth: 5 km
Magnitude: 4.2 ML(G), 4.0 ML(D)
Intensity III:
- Montana--West Yellowstone.
- Wyoming--Madison Junction, Mammoth Hot Springs, Old Faithful.

15 July (G) Southern Montana
Origin time: 19 37 27.3
Epicenter: 45.65 N., 111.80 W.
Depth: 5 km
Magnitude: 3.0 ML(G)

Felt in the Harrison-Pony area (telephone report).

20 July (G) Southern Montana
Origin time: 12 57 29.8
Epicenter: 45.65 N., 111.85 W.
Depth: 5 km
Magnitude: 3.0 ML(G)

Felt in the Harrison-Pony area (telephone report).

Montana--Continued

20 July (G) Southern Montana
Origin time: 13 03 39.7
Epicenter: 45.61 N., 111.85 W.
Depth: 5 km
Magnitude: 3.3 ML(G)

Felt in the Harrison-Pony area (telephone report).

Nevada

24 January (B) Central California
Origin time: 19 00 09.7

See California Listing.

28 February (E) Southern Nevada
Origin time: 15 00 00.093
Epicenter: 37.13 N., 116.09 W.
Depth: 0 km
Magnitude: 4.4 mb(G), 4.4 ML(B)

Nevada Test Site explosion "Tarko" at 37°07'35.57" N., 116°05'18.62" W., surface elevation 1307 m, depth of burial 369 m.

8 March (E) Southern Nevada
Origin time: 15 35 00.090
Epicenter: 37.18 N., 116.08 W.
Depth: 0 km
Magnitude: 3.9 mb(G), 4.0 ML(B)

Nevada Test Site explosion "Norbo" at 37°10'47.79" N., 116°04'59.21" W., surface elevation 1376 m, depth of burial 271 m.

3 April (E) Southern Nevada
Origin time: 14 00 00.090
Epicenter: 37.15 N., 116.08 W.
Depth: 0 km
Magnitude: 4.7 mb(G), 4.7 ML(B)

Nevada Test Site explosion "LIPTAUER" at 37°08'59.55" N., 116°04'56.14" W., surface elevation 1335 m, depth of burial 417 m.

8 April (G) Western Nevada
Origin time: 00 13 41.8
Epicenter: 39.50 N., 119.18 W.
Depth: 5 km
Magnitude: 4.7 ML(B)
Intensity V: Fernley--dishes fell to the floor, hanging pictures fell, pendulum clocks stopped, hanging objects swung violently, small objects moved, standing vehicles rocked moderately, felt by many.
Intensity IV: Dayton, Fallon, Reno, Silver Springs.
Intensity III: Carson City, Gabbs, Greenwood, Nevada City, Silver City, Stateline, Wadsworth.
Intensity II: Hawthorne, Yerington.

Nevada--Continued

16 April (E) Southern Nevada
Origin time: 20 00 00.089
Epicenter: 37.10 N., 116.03 W.
Depth: 0 km
Magnitude: 5.3 mb(G), 4.2 MS(G), 5.5 ML(B)

Nevada Test Site explosion "PYRAMID" at 37°06'04.03" N., 116°01'49.91" W., surface elevation 1293 m, depth of burial 579 m.

26 April (E) Southern Nevada
Origin time: 17 00 00.083
Epicenter: 37.25 N., 116.42 W.
Depth: 0 km
Magnitude: 5.4 mb(G), 4.2 MS(G), 5.6 ML(B)

Nevada Test Site explosion "COLWICK" at 37°14'54.34" N., 116°25'20.64" W., surface elevation 1973 m, depth of burial 633 m.

28 April (G) Northern Nevada
Origin time: 13 55 34.0
Epicenter: 41.86 N., 118.91 W.
Depth: 5 km
Magnitude: 4.3 mb(G), 4.1 ML(B)
Intensity IV: Denio.

28 April (G) Northern Nevada
Origin time: 17 07 10.1
Epicenter: 41.85 N., 118.93 W.
Depth: 5 km
Magnitude: 3.8 mb(G)

Felt at Denio (press report).

2 May (E) Southern Nevada
Origin time: 18 46 30.092
Epicenter: 37.06 N., 116.02 W.
Depth: 0 km
Magnitude: 4.4 mb(G), 4.5 ML(B)

Nevada Test Site explosion "CANFIELD" at 37°03'21.64" N., 116°01'08.22" W., surface elevation 1238 m, depth of burial 351 m.

3 May (G) Northern Nevada
Origin time: 00 17 38.1
Epicenter: 41.94 N., 118.84 W.
Depth: 5 km
Magnitude: 4.5 mb(G), 4.3 ML(B)
Intensity IV: Denio.

22 May (E) Southern Nevada
Origin time: 13 00 00.089
Epicenter: 37.00 N., 116.03 W.
Depth: 0 km
Magnitude: 3.8 ML(B)

Nevada Test Site explosion "FLORA" at 37°00'11.03" N., 116°01'53.01" W., surface elevation 1206 m, depth of burial 335 m.

25 May (B) Owens Valley area
Origin time: 16 33 44.2

See California listing.

25 May (B) Owens Valley area
Origin time: 19 44 51.0

See California listing.

27 May (B) Owens Valley area
Origin time: 14 50 56.6

See California listing.

12 June (E) Southern Nevada
Origin time: 17 15 00.086
Epicenter: 37.28 N., 116.45 W.
Depth: 0 km
Magnitude: 5.6 mb(G), 5.5 ML(B)

Nevada Test Site explosion "KASH" at 37°16'53.97" N., 116°27'13.87" W., surface elevation 1938 m, depth of burial 645 m.

24 June (E) Southern Nevada
Origin time: 15 10 00.074
Epicenter: 37.02 N., 116.03 W.
Depth: 0 km
Magnitude: 4.4 mb(G), 4.3 ML(B)

Nevada Test Site explosion "HURON KING" at 37°01'23.85" N., 116°02'02.89" W., surface elevation 1215 m, depth of burial 320 m.

29 June (B) Mono Lake area
Origin time: 07 46 13.5

See California listing.

25 July (E) Southern Nevada
Origin time: 19 05 00.082
Epicenter: 37.26 N., 116.48 W.
Depth: 0 km
Magnitude: 5.5 mb(G), 4.2 MS(G), 5.7 ML(B)

Nevada Test Site explosion "TAFI" at 37°15'22.77" N., 116°28'38.65" W., surface elevation 1886 m, depth of burial 680 m.

31 July (E) Southern Nevada
Origin time: 18 19 00.092
Epicenter: 37.01 N., 116.02 W.
Depth: 0 km
Magnitude: 4.3 mb(G), 3.9 ML(B)

Nevada--Continued

Nevada Test Site explosion "VERDELLO" at 37°00'46.96" N., 116°01'21.89" W., surface elevation 1210 m, depth of burial 366 m.

1 August (B) Owens Valley area
Origin time: 16 38 55.9

See California listing.

4 September (B) Western Nevada
Origin time: 13 39 09.4
Epicenter: 38.08 N., 118.57 W.
Depth: 1 km
Magnitude: 4.0 mb(G), 4.6 ML(B), 4.6 ML(P)

This is the first in a swarm of earthquakes that occurred in this area from September 4 to 8.

Intensity V:
California--Benton (hanging pictures swung, small objects overturned and fell, hanging objects swung slightly, many people awakened).
Intensity IV:
California--Atwater, June Lake, Lee Vining, Toms Place.
Intensity III:
California--Bass Lake, Bishop, Bridgeport, North Fork.
Nevada--Hawthorne.

4 September (B) Western Nevada
Origin time: 21 03 34.1
Epicenter: 38.11 N., 118.56 W.
Depth: 10 km
Magnitude: 4.9 mb(G), 4.9 ML(B), 4.6 ML(P)

Felt in Mono County, California (B).

Intensity III:
California--Castle AFB.
Felt:
California--Mammoth Lakes (P).

6 September (B) Western Nevada
Origin time: 05 31 03.5
Epicenter: 35.10 N., 118.57 W.
Depth: 9 km
Magnitude: 4.0 ML(B)

Felt in the Mono Lake, California area (B).

6 September (B) Western Nevada
Origin time: 07 27 52.3
Epicenter: 38.08 N., 118.57 W.
Depth: 7 km
Magnitude: 4.6 ML(B)

Felt in Mono County, California (B).

7 September (B) Western Nevada
Origin time: 01 30 42.8
Epicenter: 38.08 N., 118.58 W.
Depth: 7 km
Magnitude: 4.4 mb(G), 5.1 ML(B), 4.9 ML(P)

Felt in California at Bodie, Mammoth Lakes, and Yosemite National Park (B).

7 September (B) Western Nevada
Origin time: 04 36 38.2
Epicenter: 38.08 N., 118.60 W.
Depth: 10 km
Magnitude: 4.9 mb(G), 5.0 MS(G), 5.5 ML(B), 5.6 ML(P)

Intensity V:
California--
Bishop--windows, doors, and dishes rattled; hanging pictures swung; small objects overturned; hairline cracks in plaster.
June Lake--poker chips fell off a table and some chairs bounced around (press report).
Intensity IV:
California--Benton, Bridgeport, Fish Camp, Groveland, Hume, Lee Vining, Lone Pine, Raymond, Strawberry, Toms Place, Tuolumne, Wawona, Yosemite National Park.
Nevada--Babbitt, Dyer, Fallon, Hawthorne, Luning, Mina, Schurz, Yerington.
Intensity III:
California--Arnold, Crowley Lake, El Portal, La Grange, Twain Harte, Wilseyville.
Nevada--Gabbs, Silver Springs, Smith.
Intensity II:
California--Camp Connell.
Felt:
California--Bodie (B), Mammoth Lakes (B).

7 September (B) Western Nevada
Origin time: 06 48 10.6
Epicenter: 38.09 N., 118.57 W.
Depth: 5 km
Magnitude: 4.7 ML(B), 4.5 ML(P)

Felt in California at Bodie, Mammoth Lakes, and Yosemite National Park (B).

7 September (B) Western Nevada
Origin time: 06 48 30.6
Epicenter: 38.09 N., 118.57 W.
Depth: 5 km
Magnitude: 4.7 mb(G), 4.4 MS(G), 5.3 ML(B), 5.2 ML(P)

Felt in California at Bodie, Mammoth Lakes, and Yosemite National Park (B).

Nevada--Continued

7 September (B) Western Nevada
Origin time: 16 57 34.4
Epicenter: 38.11 N., 118.59 W.
Depth: 9 km
Magnitude: 3.9 ML(B), 3.7 ML(P)

Felt in Mono County, California (B).

8 September (B) Western Nevada
Origin time: 04 26 19.8
Epicenter: 38.05 N., 118.60 W.
Depth: 9 km
Magnitude: 4.6 ML(B), 4.3 ML(P)

Intensity IV:
California--Bodie (press report).
Felt:
California--Mammoth Lakes and Yosemite National Park (B).

16 September (B) Western Nevada
Origin time: 04 24 41.1
Epicenter: 38.05 N., 118.57 W.
Depth: 7 km
Magnitude: 4.2 mb(G), 4.7 ML(B), 4.4 ML(P)
Intensity IV:
California--Bishop, Lee Vining.
Nevada--Luning, Schurz.
Intensity III:
Nevada--Mina.
Felt:
California--Mammoth Lakes (B).

25 September (E) Southern Nevada
Origin time: 14 45 00.094
Epicenter: 37.06 N., 116.05 W.
Depth: 0 km
Magnitude: 4.6 mb(G), 4.1 ML(B)

Nevada Test Site explosion "BONARDA" at 37°03'22.19" N., 116°02'53.11" W., surface elevation 1237 m, depth of burial 381 m.

25 September (E) Southern Nevada
Origin time: 15 26 30.084
Epicenter: 37.12 N., 116.06 W.
Depth: 0 km
Magnitude: 3.7 ML(G)

Nevada Test Site explosion "RIOLA" at 37°06'57.11" N., 116°03'52.44" W., surface elevation 1281 m, depth of burial 424 m.

24 October (E) Southern Nevada
Origin time: 19 15 00.116
Epicenter: 37.07 N., 116.00 W.
Depth: 0 km
Magnitude: 4.4 mb(G), 4.4 ML(B)

Nevada Test Site explosion "DUTCHESS" at 37°04'28.47" N., 115°59'57.35" W., surface elevation 1292 m, depth of burial 427 m.

Nevada--Continued

31 October (E) Southern Nevada
Origin time: 18 00 00.090
Epicenter: 37.21 N., 116.20 W.
Depth: 0 km
Magnitude: 4.7 mb(G), 4.9 ML(B)

Nevada Test Site explosion "MINERS IRON" 37°12'40.53" N., 116°12'19.36" W., surface elevation 2239 m, depth of burial 390 m.

8 November (G) Northern California
Origin time: 10 27 32.5

See California listing.

14 November (E) Southern Nevada
Origin time: 16 50 00.084
Epicenter: 37.11 N., 116.02 W.
Depth: 0 km
Magnitude: 4.1 mb(G), 4.5 ML(B)

Nevada Test Site explosion "DAUPHIN" at 37°06'41.37" N., 116°01'07.16" W., surface elevation 1333 m, depth of burial 320 m.

28 November (B) Northern California
Origin time: 18 21 12.9

See California listing.

17 December (E) Southern Nevada
Origin time: 15 10 00.086
Epicenter: 32.37 N., 116.31 W.
Depth: 0 km
Magnitude: 5.1 mb(G), 5.0 ML(B)

Nevada Test Site explosion "SERPA" at 37°19'29.21" N., 116°18'42.24" W., surface elevation 2055 m, depth of burial 573 m.

19 December (P) Western Nevada
Origin time: 16 57 45.2
Epicenter: 38.48 N., 118.42 W.
Depth: 5 km
Magnitude: 3.7 ML(P)
Intensity III: Mina, Nevada.

28 December (B) Western Nevada
Origin time: 22 58 09.8
Epicenter: 38.16 N., 118.36 W.
Depth: 5 km
Magnitude: 4.6 mb(G), 5.0 ML(B), 4.6 ML(P)
Intensity IV:
California--Mono City.
Nevada--Luning, Mina.
Intensity III:
California--Bridgeport (press report), Hume, Miramonte.
Nevada--Dyer, Hawthorne.
Felt:
California--Mono Lake (B).

Nevada--Continued

28 December (B) Western Nevada
Origin time: 23 05 38.8
Epicenter: 38.17 N., 118.38 W.
Depth: 5 km
Magnitude: 4.0 ML(B), 3.6 ML(P)

Felt at Mono Lake, California (B).

New Hampshire

23 November (J) Northeastern Massachusetts
Origin time: 00 39 32.4

See Massachusetts listing.

New Jersey

5 March (G) Southeastern Pennsylvania
Origin time: 17 06 54.5

See Pennsylvania Listing.

11 March (G) Southeastern Pennsylvania
Origin time: 06 00 26.0

See Pennsylvania Listing.

New Mexico

22 March (G) Central New Mexico
Origin time: 00 49 12.5
Epicenter: 34.59 N., 105.91 W.
Depth: 5 km
Magnitude: 3.4 ML(G)
Intensity IV: Estancia, Mountainair, Willard.
Intensity III: Cedarvale, Torreon.

11 September (G) Northeastern New Mexico
Origin time: 17 34 37.5
Epicenter: 36.46 N., 105.19 W.
Depth: 5 km
Magnitude: 3.1 ML(G)
Intensity V: Ute Park--foundation was reported cracked, some glasses were broken, and small objects were overturned.
Intensity IV: Cimarron, Red River.
Intensity III: Eagle Nest.
Intensity II: Ocate.

New York

17 January (L) Southeastern New York
Origin time: 10 13 16.1
Epicenter: 41.31 N., 73.93 W.

Depth: 3 km
Magnitude: 2.9 Mn(L), 2.7 Mn(J)

The press reported that this earthquake created turbulence on the Hudson River sending waves crashing against the opposite shoreline.

Intensity V:
New York--Annsville (L).
Intensity IV:
Connecticut--Bethel.
New York--Continental Village (L), Courtland (L), Garrison, Lake Peeksville (L), Peekskill.
Intensity III:
New York--Croton (L), Putnam Valley (L).

6 June (L) Central New York
Origin time: 13 15 52.0
Epicenter: 43.56 N., 75.23 W.
Depth: 1 km
Magnitude: 3.5 Mn(J), 3.5 Mn(G), 3.8 Mn(L)

Figure 25 is an isoseismal map for this earthquake published by Schlesinger-Miller and Barstow (1980).

Intensity V: Forestport (few windows cracked), Hawkinsville (L), Hinckley (few windows cracked).
Intensity IV: Alder Creek, Boonville, Clinton (L), Cold Brook (L), Gravesville (L), Griffiss Air Force Base, Inlet, New York Mills (L), Otter Lake (L), Prospect, Prospectiny (L), Remsen, Rome (L), Russia (L), Steuben (L), Stittville (L), Westernville (L), Woodgate.
Intensity III: Barneville (L), Constableville, Deerfield (L), Dolgeville (L), Frankfort (L), Indian Lake, Lee Center (L), Lyons Falls (L), Mercy (L), Mohawk (L), New Hartford (L), Newcomb, Ohio (L), Old Forge (L), Palatine Bridge, Piseco (L), Poland, Thendara, Trenton (L), Utica (press report), Westernville, Whitelk (L), Whitesboro (L).
Intensity II: Holland Patent.

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

4 September (L) Southeastern New York
Origin time: 04 30 55.8
Epicenter: 41.11 N., 73.78 W.
Depth: 13 km
Magnitude: 3.2 Mn(L), 2.6 Mn(J)
Intensity IV: Armonk (L), Bedford Hills (L), Chappaqua (L), Croton-on-Hudson (L),

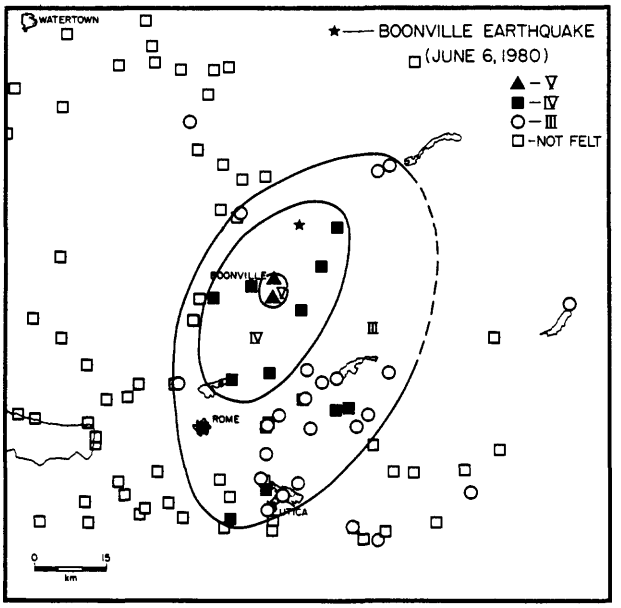

FIGURE 25.--Isoseismal map for the Boonville, New York, earthquake of 6 June 1980, 13 15 52.0 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals. (provided by Schlesinger-Miller and Barstow, Lamont-Doherty Geological Observatory of Columbia University, Palisades, New York).

East Carmel (L), Hawthorne (L), Mount Kisco (L), Mount Pleasant (press report), New City (L), Ossining (L), Pleasantville (press report), South Salem (L), Tarrytown (L), Thornwood (press report).
Intensity III: Briarcliff (L), Katonah (L), Northwest Yonkers (L), Valhalla (L), Verplane (L).

North Carolina

22 April (G) Northern North Carolina
Origin time: 03 14 06.2
Epicenter: 36.50 N., 80.66 W.
Depth: 5 km
Magnitude: 2.5 Mn(V)

Some of the intensities listed below are from a newspaper questionnaire published in the Mt. Airy, North Carolina, newspaper by G. A. Bollinger, Virginia Polytechnic Institute and State University.

Intensity IV: Ararat, Mount Airy, Pilot Mountain, Westfield.

North Carolina--Continued

Intensity III: Dobson, Longhill, Pinnacle.
Intensity II: Toast.

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

Ohio

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

20 August (G) Lake Erie, Canada
Origin time: 09 34 52.3

See Michigan listing.

Oklahoma

5 February (T) Southern Oklahoma
Origin time: 04 32 35.4
Epicenter: 34.05 N., 97.45 W.
Depth: 5 km
Magnitude: 2.3 Mn(T)
Intensity III: Wilson area (T).

1 November (T) Central Oklahoma
Origin time: 05 26 13.8
Epicenter: 35.47 N., 97.84 W.
Depth: 8 km
Magnitude: 2.0 Mn(T)
Intensity III: Yukon (T).

2 November (T) Central Oklahoma
Origin time: 10 00 49.0
Epicenter: 35.43 N., 97.78 W.
Depth: 8 km
Magnitude: 3.0 Mn(T)
Intensity V: Mustang--hanging objects swung slightly, small objects overturned and fell, felt by and awakened a few.
Intensity IV: El Reno (press report), Yukon (press report).
Felt: Banner (telephone report), Bethany (telephone report), Piedmont (telephone report), Surrey Hills area (press report).

5 December (T) Southern Oklahoma
Origin time: 00 07 26.3
Epicenter: 33.91 N., 97.28 W.
Depth: 5 km
Magnitude: 2.4 Mn(T)

Felt in the Wilson area (T).

Oregon

18 May (W) Mount St. Helens area
Origin time: 15 32 11.4

See Washington listing.

7 July (G) Northwestern Oregon
Origin time: 01 17 06.0
Epicenter: 45.22 N., 121.69 W.
Depth: 5 km
Magnitude: 3.3 ML(G)

This was the first in a swarm of earthquakes that occurred near Mount Hood. In the following 24 hours a total of 55 events were recorded, but by July 13 the activity had declined to only one recorded event.

Intensity IV: Government Camp.
Felt: Timberline Lodge (press report).

28 September Northwestern Oregon
Origin time: 20 26
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.

Several people in the eastern part of Lincoln County reported that the earthquake sounded like a sonic boom (press report).

Intensity IV: Eddyville, Logsden, and Toledo (press reports).
Intensity III: Siletz (press report).

8 November (G) Northern California
Origin time: 10 27 32.5

See California--Off the coast listing.

Pennsylvania

5 March (G) Southeastern Pennsylvania
Origin time: 17 06 54.5
Epicenter: 40.19 N., 75.16 W.
Depth: 5 km
Magnitude: 3.5 Mn(L), 3.0 Mn(G), 2.9 Mn(J)

Some of the data listed below are from a questionnaire canvass by Dr. Richard A. Bischke, Temple University, Philadelphia. Figure 26 is an isoseismal map showing the results of Dr. Bischke's canvass. The isoseismals in figure 26 were drawn at Temple University and do not necessarily reflect all the data, as some of the intensities listed below are outside the area covered by figure 26.

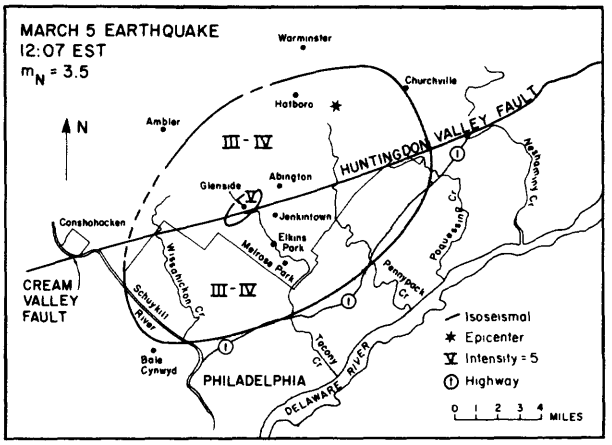

FIGURE 26.--Isoseismal map for the southeastern Pennsylvania earthquake of 5 March 1980, 17 06 54.5 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals (provided by Dr. Richard A. Bischke, Temple University, Philadelphia).

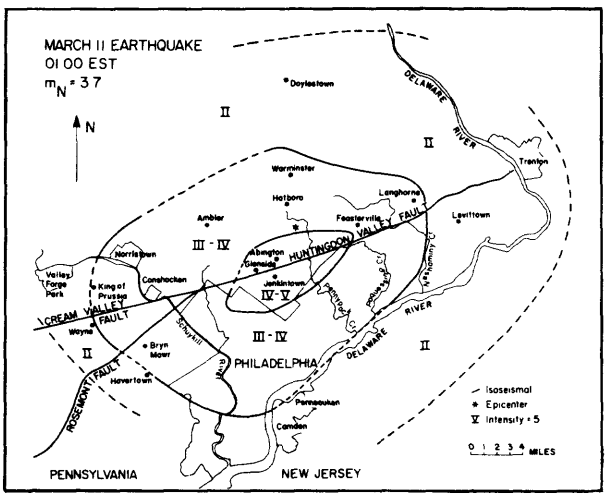

FIGURE 27.--Isoseismal map for the southeastern Pennsylvania earthquake of 11 March 1980, 06 00 26.0 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals (provided by Dr. Richard A. Bischke, Temple University, Philadelphia).

Pennsylvania--Continued

Intensity IV:
New Jersey--Crosswicks.
Pennsylvania--Dresher, Huntingdon Valley, Jenkintown, Wyncote.
Intensity III:
Pennsylvania--Abington (press report), Bala-Cynwyd, Blue Bell, Bryn Athyn, Busleton (press report), Cedars, Cheltenham, Hatboro, Horsham, Upper Moreland (press report), Willow Grove.
Intensity II:
New Jersey--Mount Holly, Trenton.
Pennsylvania--Spring Mount.

11 March (G) Southeastern Pennsylvania
Origin time: 06 00 26.0
Epicenter: 40.16 N., 75.10 W.
Depth: 5 km
Magnitude: 3.7 Mn(L), 3.2 Mn(G), 3.3 Mn(J)

Some of the data listed below are from a questionnaire canvass by Dr. Richard A. Bischke, Temple University, Philadelphia. Figure 27 is an isoseismal map showing the results of Dr. Bischke's canvass. The isoseismals in figure 27 were drawn at Temple University and do not necessarily reflect all the data, as some of the intensities listed below are outside the area covered by figure 27.

Pennsylvania--Continued

Intensity V:
Pennsylvania--
Abington--few plaster cracks, pictures askew.
Ardsley--windows cracked.
Glenside--small objects fell, few plaster cracks.
Huntingdon Valley--small objects fell.
Jenkintown--books fell from shelf.
Intensity IV:
New Jersey--Gibbstown.
Pennsylvania--Busleton, Frankford (press report), Willow Grove.
Intensity III:
Pennsylvania--South Philadelphia (press report).
Felt:
The press reported this earthquake was felt in the Philadelphia area at the following places: Ambler, Cheltenham, Chestnut Hill, Conshohocken, Germantown, Lower Moreland, Melrose Park, Mt. Airey, Newtown Square, Trevose, Upper Moreland, Westminster, West Norriton, West Philadelphia.

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

Puerto Rico

14 February (G) Virgin Islands
Origin time: 17 11 42.1
Epicenter: 18.61 N., 64.68 W.
Depth: 57 km
Magnitude: 4.8 mb(G)

Felt in the Hato Rey and Isla Verde areas of San Juan (press report).

25 February Mona Passage
Origin time: 17 47
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.

Felt at Ponce.

28 February (G) South of Puerto Rico
Origin time: 01 39 06.1
Epicenter: 17.73 N., 66.66 W.
Depth: 10 km
Magnitude: 4.4 mb(G)

Felt strongly at Ponce (press report). Also felt at San Juan.

29 May (G) Northern Purto Rico
Origin time: 14 10 18.2
Epicenter: 18.41 N., 66.25 W.
Depth: Normal.
Magnitude: None computed.
Intensity V: Lares and San Juan (small objects moved, light furniture or small appliances moved).
Intensity IV: Dorado, Caguas, Isla Verde International Airport.
Intensity III: Isabela.

27 September (G) Mona Passage
Origin time: 06 25 36.7
Epicenter: 18.48 N., 68.93 W.
Depth: 159 km
Magnitude: 4.9 mb(G), 5.2 mb(B)

Felt on Puerto Rico and in the Dominican Republic.

Intensity V: The most common effects were a few cracked windows, small objects overturned and fallen and pictures fallen. Guanica, Guaynabo, San Antonio, Villalba.
Intensity IV: Anasco, Isabela, Penuelas, Rincon, Rosario.
Intensity III: Adjuntas, Angeles, Bayamon, Caguas, Fernandez Juncos, Isla Verde International Airport, San Sebastian, Yauco.

South Carolina

22 June (G) Charleston area
Origin time: 20 33 06.2
Epicenter: 33.01 N., 80.16 W.
Depth: 1 km
Magnitude: 2.1 Mn(G)

Intensity II: Lincolnville-Ladson area.

22 June (G) Charleston area
Origin time: 23 35 26.5
Epicenter: 33.01 N., 80.16 W.
Depth: 1 km
Magnitude: 1.6 Mn(G)

Intensity II: Lincolnville-Ladson area (Y).

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

1 September (G) Charleston area
Origin time: 05 44 42.3
Epicenter: 32.97 N., 80.20 W.
Depth: 6 km
Magnitude: 2.7 Mn(G)
Intensity IV: Summerville area.

Tennessee

21 April (G) Eastern Tennessee
Origin time: 20 44 05.7
Epicenter: 35.76 N., 84.13 W.
Depth: 5 km
Magnitude: 2.6 Mn(G)
Intensity III: South Knoxville.

25 June (G) Eastern Tennessee
Origin time: 18 02 01.5
Epicenter: 35.78 N., 84.05 W.
Depth: 5 km
Magnitude: 3.3 Mn(V)
Intensity IV: Louisville, Maryville, Rockford, Tallassee, Townsend.
Intensity III: Alcoa, Farragut, Greenback, Knoxville (telegram), Walland.

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

2 December (S) Northwestern Tennessee
Origin time: 08 59 30.0
Epicenter: 36.21 N., 89.43 W.

Tennessee--Continued

Depth: 11 km
Magnitude: 3.8 Mn(K), 3.8 Mn(S)

This earthquake was felt over an area of approximately 1,700 sq km of northwestern Tennessee and southeastern Missouri (fig. 28). Some of the information listed below was supplied by the Tennessee Earthquake Information Center.

Intensity VI:
Tennessee--
Madie--foundation cracked, small objects broke, felt by and awakened all.
Ridgely--exterior brick walls cracked, small objects fell, hanging pictures fell, felt by and awakened all.

Intensity V:
Missouri--
Caruthersville--unsupported brick garden wall cracked and moved.
Tennessee--
Elbridge--windows cracked in a new one-story brick home.
Hornbeak--trees and bushes shook slightly, few windows cracked, windows, doors, and dishes rattled, felt by and awakened many.
Lane--windows broke in an old two-story building.
Miston--small objects shifted slightly, felt by and awakened all, hanging pictures fell.
Owl Hoot--light furniture shifted, small lamp knocked over, felt by all.
Running Reelfoot Bayou (3 miles southeast of Ridgely)--TV moved away from wall, building trembled and creaked.
Tiptonville--trees and bushes shook slightly, light furniture overturned, small objects overturned and fell, hanging pictures out of place, felt by and awakened several.

Intensity IV:
Missouri--Hayti, Kinfolk Ridge.
Tennessee--Bogota, Broadmoor, Cat Corner, Cottonwood, Gratio, Kenton, Mitchell, Mooring, Newbern, Obion, Samburg, Tennemo, Wynnburg.

Intensity III:
Missouri--Braggadocio, Rives.

Intensity II:
Tennessee--Halls.

Texas

9 June (G) Northwestern Texas
Origin time: 22 37 09.9
Epicenter: 35.51 N., 101.08 W.

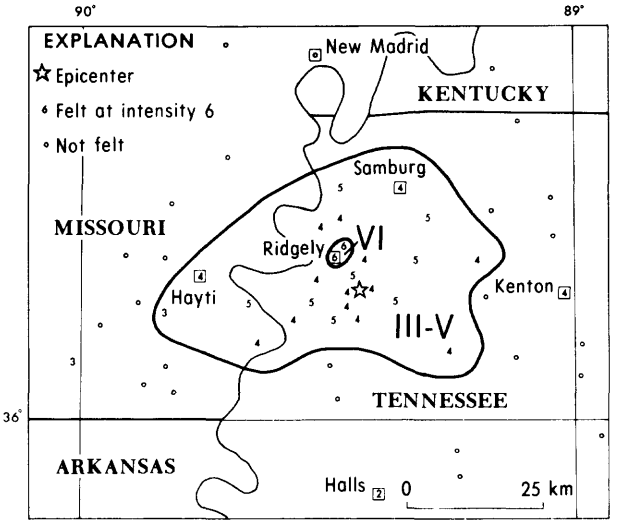

FIGURE 28.--Isoseismal map for the northwestern Tennessee earthquake of 2 December 1980, 08 59 30.0. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Texas--Continued

Depth: 5 km
Magnitude: 3.4 Mn(T)

Felt over parts of Carson, Gary, Hudson, and Potter Counties (press report).

Intensity V: Pampa (minor cracks in walls--press report).
Intensity IV: Lefors, Mobeetic, Skellytown, White Deer.
Intensity III: Amarillo, Dawn, Memphis, Miami, Panhandle, Vega.
Felt: Borger (press report).

Utah

4 April (U) Northwestern Utah
Origin time: 00 45 04.4
Epicenter: 41.34 N., 113.31 W.
Depth: 7 km
Magnitude: 3.0 ML(U)
Intensity IV: Pleasant Grove, St. John, Willard.
Intensity III: Riverside, Salt Lake City.
Felt: Tooele (U).

4 April (U) Northwestern Utah
Origin time: 00 56 09.3
Epicenter: 41.35 N., 113.32 W.

Utah--Continued

Depth: 7 km
Magnitude: 2.7 ML(U)

Felt at Salt Lake City and Tooele (U).

6 April (U) Central Utah
Origin time: 10 45 04.1
Epicenter: 39.95 N., 111.98 W.
Depth: 5 km
Magnitude: 3.8 ML(U)
Intensity IV: Eureka (one report of small cracks in interior walls).
Intensity III: Santaquin.

24 May (U) Central Utah
Origin time: 10 03 36.3
Epicenter: 39.94 N., 111.97 W.
Depth: 5 km
Magnitude: 5.0 mb(G), 4.2 ML(U)

Intensity V:
Goshen--few windows cracked, underground pipes reported broken, building shook slightly, felt by and awakened many.
Santaquin--small objects and light furniture moved, hanging pictures fell, felt by and awakened many.
Intensity IV: Eureka, Levan, Ophir, Payson, Salem (press report), Farmington.
Intensity III: Hinckley.

21 December (U) Southwestern Utah
Origin time: 18 25 10.5
Epicenter: 37.53 N., 113.04 W.
Depth: 7 km
Magnitude: 3.2 ML(U)

Felt at Cedar City and Kanarraville (telephone report).

Virginia

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

5 November (V) Northern Virginia
Origin time: 21 48 14.7
Epicenter: 38.18 N., 79.90 W.
Depth: 4 km
Magnitude: 2.8 Mn(V)

Felt in Bath County (telephone report).

Washington

27 April (W) Puget Sound area
Origin time: 06 00 27.1

Washington--Continued

Epicenter: 47.39 N., 122.56 W.
Depth: 22 km
Magnitude: 3.2 ML(G), 3.7 MD(W)

Felt from the Magnolia area north of Seattle, east to Bellvue, and south to Tacoma (press report).

Intensity IV: Kent, Port Orchard, Renton (press report), Seahurst, Seattle, Vashon.
Intensity III: Burley, Fox Island.
Intensity II: Sauna, Southworth

18 May (W) Mount St. Helens area
Origin time: 15 32 11.4
Epicenter: 46.21 N., 122.19 W.
Depth: 4 km
Magnitude: 4.7 mb(G), 5.2 MS(G), 5.0 ML(G)

This earthquake occurred only seconds before the explosion which began the eruption of Mount St. Helens volcano. This eruption and blast took 396 m (1300 feet) off the top of Mount St. Helens, killed 31 people, left 33 others missing, and caused damage of between $500 million and $2 billion (U.S. Geological Survey, 1980).

The earthquake sequence associated with the volcano began on March 20 with swarms of earthquakes centered near or under Mount St. Helens. Most of the events were too small to be located without a local seismographic network; however, a number of the larger ones were located and are listed in table 1. The seismic activity was continuous until the major eruption on May 18, after which the seismic activity declined. The last earthquake located in this sequence was on May 24.

The USGS Newsletter (1980) described the major eruption as follows:

> "The Big One. Earthquake of 5.2 magnitude occurring at 8:32 (a.m. PST) causes catastrophic slumping of material in the unstable bulge, which in turn releases pressure on underlying steam column leading to the explosion that blows out the north side of the mountain and removes 1300 feet (396 m) from its former elevation. Lateral blast flattens mature trees up to 15 miles (24 km) distant and opens up a wedge shaped crater on the north face of the mountain roughly 1 km wide, 2 km long, and more than 0.5 km deep. Mud and debris released by the failure of the north flank flow down slope to a point about 18 miles (29 km) down the Toutle River Valley. Pyroclastic flows pour out of

the breach in the north face, turning Spirit Lake into a large muddy pond. Debris flow wipes out virtually all bridges on the Toutle, reduces the carrying capacity of the Cowlitz River from 2264 cubic meters (80,000 cubic feet) per second to about 255 cms (9000 cfs), and finally plugs up the ship channel in the Columbia River below Portland. Mud flows to south and southeast reach the head of Swift Reservoir. The vertical columns of ash and steam rises to 18,288 m (60,000 feet) and drops significant quantities of ash over three western states. Particles expected to remain in stratosphere of Northern Hemisphere for at least 2 years. Blast force estimated at 10-50 megatons and volume of ejected material at 1 cubic kilometer."

The closeness in time of the earthquake and the explosion of the volcano made the collection of information on the effects of the earthquake very difficult, as the ground shaking and the effects of the sound waves from the volcanic explosion were virtually indistinguishable. It is known that sound waves can be refracted from the stratosphere and may arrive with considerable energy, rattling windows and causing shaking that can be misinterpreted as an earthquake (Richter, 1958). The questionnaires were evaluated as if the effects were due to ground shaking even though there is this ambiguity. Some of the questionnaires noted that the sound of an explosion was heard without feeling any vibrating effects. These are given an intensity of I on figure 29.

This earthquake and eruption were felt or heard over an area of approximately 349,000 sq km of Idaho, Oregon, and Washington plus an additional area in Canada of unknown dimensions (fig. 29).

Intensity IV:

Oregon--Aloha, Athena, Bay City, Beaver, Blodgett, Cascadia, Cloverdale, Crescent Lake, Elkton, Enterprise, Garibaldi, Gleneden Beach, Hebo, Monument, Newport, Noti, Pacific City, Toledo, Trail, Union, Valsetz, Waldport, Walterville, Yachats, Yoncalla.

Washington--Almira, Amanda Park, Ariel, Arlington, Ashford, Bellingham, Bow, Bremerton, Bridgeport, Brinnon, Carlsborg, Carrols, Cashmere, Chattaroy, Chelan Falls, Chimacum, Clinton, Conconcully, Concrete, Coulee Dam, Creston, Darrington, Deming, Dixie, East Wenatchee, Eastsound, Edison, Edmonds,

Elbe, Electric City, Elk, Everett, Forks, Gifford, Gilchrist, Glenoma, Glenwood, Hamilton, Hooper, Humptulips, Joyce, Keller, Kirkland, La Conner, Lacrosse, Lake Stevens, Langley, Littlerock, Loon Lake, Lopez, Lyman, Lynden, Malott, Maple Falls, Marblemount, Marietta, Medina, Mesa, Moclips, Mohler, Monroe, Morton, Mount Vernon, Mukilteo, Neah Bay, Neilton, Nordland, North Bend, Olga, Okanogan, Orcas, Pacific Beach, Packwood, Point Roberts, Port Angeles, Port Orchard, Port Townsend, Quilcene, Quinault, Richmond Beach, Roche Harbor, Rock Island, Rockport, Seattle, Sedro Woolley, Sequim, Silvana, Silver Lake, Skykomish, Sumas, Tacoma, Taholah, Tahuya, Tonasket, Toppenish, Tumtu, Twisp, Vaughn, Waldron, Wauna, Wilbur, Winthrop, Woodinville, Yakima.

Intensity III:

Idaho--Genesee, Worley.

Oregon--Banks, Blachly, Columbia City, Crescent, Creswell, Culver, Dexter, Dillard, Dorena, Fort Kilamath, Glendale, Greenleaf, Haines, Helix, Junction City, La Pine, Lorane, Mapleton, Neskowin, North Powder, Oceanside, Pilot Rock, Seal Rock, Shaniko, Sheridan, Siletz, Swisshome, Terrebonne, Tillamook, Veneta, Willamina.

Washington--Acme, Auburn, Baring, Belfair, Benge, Bingen, Burien, Clallam Bay, Clearlake, Clearview, Coupeville, Deer Harbor, Deer Park, Ellensburg, Entiat, Ewan, Fairfield, Gold Bar, Grapeview, Grays River, Hatton, Ione, Kahlotus, Kalama, Kingston, La Push, Lilliiwaup, Lummi Island, Mansfield, Marshall, Milton, Newport, Ocean City, Oroville, Orting, Quillayute Airport, Renton, Riverside, Seahurst, Shaw Island, Silverdale, Skyway, Snoqualmie, Snoqualmie Pass, Soap Lake, Spokane, Starbuck, Startup, Stratford, Tokeland, Toledo, Union, Vashon, Waitsburg, Wilson Creek.

Intensity II:

Idaho--Moscow.

Oregon--Astoria, Azalea, Bates, Blue River, Burns, Camp Sherman, Cove, Harrisburg, Marion, Ritter, Scottsburg, Selma, Silverton, Tidewater, Tiller, Ukiah, Umpqua.

Washington--Airway Heights, Appleton, Bucoda, Curlew, Fruitland, George, Kennewick, Malo, Mazama, Mercer Island, Monitor, Nespelem, Rosalia, Southworth, Wauconda, White Salmon.

Heard:

Idaho--Deary, Elk River, Kooskia, Spalding.

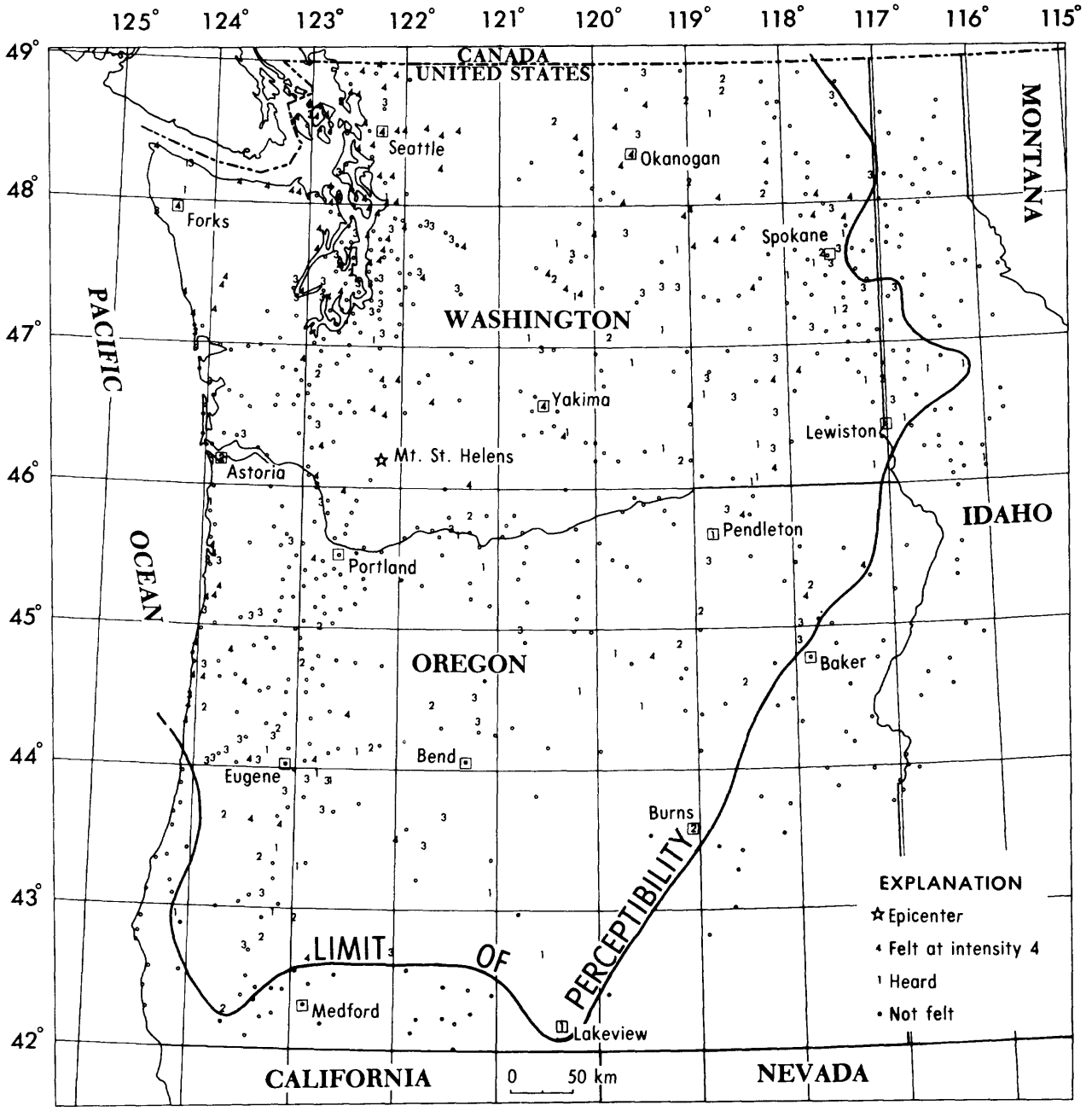

FIGURE 29.--Intensity map for the Mount St. Helens, Washington, earthquake of 18 May 1980, 15 32 11.4 UTC. Arabic numerals are used to represent Modified Mercalli intensities at specific sites.

Oregon--Alvadore, Brownsville, Christmas Valley, Days Creek, Dayville, Dufur, Finn Rock, Gaylord, Glide, Lakeview, Lowell, Mitchell, Mosier, Oakland, Paisley, Pendleton, Pleasant Hill, Spray, Tolovana Park, Warrenton.
Washington--Anatone, Ardenvoir, Beaver, College Place, Connell, Edwall, Graham, Grand Coulee, Hartline, Malaga, Malden, Marlin, Marysville, Mead, Medical Lake, Moses Lake, Nahcotta, Prescott, Pulmann, Republic, Richland, Royal City, Sekiu, Stanwood, Thorp, Walla Walla, Zillah.

28 May (W) Mount St. Helens area
Origin time: 14 15 32.0
Epicenter: 46.34 N., 122.22 W.
Depth: 3 km
Magnitude: 3.8 ML(G)

Felt at Kelso and Longview (press report).

28 May (W) Mount St. Helens area
Origin time: 14 18 30.0
Epicenter: 46.34 N., 122.20 W.
Depth: 8 km
Magnitude: 3.6 ML(G), 4.1 MD(W)

Felt at Kelso and Longview (press report).

8 June (W) Puget Sound area
Origin time: 22 40 10.3
Epicenter: 47.98 N., 123.01 W.
Depth: 48 km
Magnitude: 3.5 ML(G), 4.3 MD(W)

Felt at Victoria, B.C., Canada (press report).

Intensity IV: Chimacum, Mount Vernon.
Intensity III: Friday Harbor, Keyport, La Conner, Oak Harbor, Port Ludlow.
Intensity II: Hadlock, Lopez.

23 June (W) Puget Sound area
Origin time: 16 05 15.7
Epicenter: 47.54 N., 122.26 W.
Depth: 3 km
Magnitude: 3.1 ML(G), 3.7 MD(W)

Intensity V: South Seattle--light and heavy furniture moved, small objects moved, hanging pictures swung, felt by several.
Intensity IV: Dockton, Magnolia, Mercer Island, Renton, Seattle, West Seattle.
Intensity III: East Union, Lakeview, White Center.
Intensity II: Bellevue.
Felt: Tukwila.

23 June (W) Puget Sound area
Origin time: 16 09 54.3

Washington--Continued

Epicenter: 47.54 N., 122.26 W.
Depth: 3 km
Magnitude: 3.0 ML(G), 3.3 MD(W)

The effects of this earthquake could not be separated from the June 23, 16 05 15.9 event; the effects are about the same as those described above with about the same maximum intensity.

15 July Southeastern Washington
Origin time: 19 00
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.

Two earthquakes were felt in the Elk Lake area near Mt. St. Helens shortly after noon on July 15 (press report).

19 September (G) Puget Sound area
Origin time: 22 53 15.7
Epicenter: 47.91 N., 121.87 W.
Depth: 6 km
Magnitude: 3.8 ML(G), 3.8 MD(W)

Intensity V:
Gold Bar--small objects overturned and fell, trees and bushes shook moderately, standing and moving vehicles rocked slightly, many people frightened, felt by all.
Sultan--few small objects overturned and fell, few windows cracked; few dishes broke; trees and bushes shook moderately; several people frightened; felt by all.
Intensity IV: Granite Falls, Monroe, Startup.
Intensity III: Index, Snohomish.
Intensity II: Clearview.
Felt: Bothell and Everett (press report).

21 September (G) Puget Sound area
Origin time: 17 45 12.4
Epicenter: 47.91 N., 121.86 W.
Depth: 5 km
Magnitude: 3.4 ML(G), 3.5 MD(W)

Felt in Bothel and Monroe (W), and in the Sultan area (press report).

30 September (W) Puget Sound area
Origin time: 16 32 13.8
Epicenter: 47.75 N., 122.06 W.
Depth: 14 km
Magnitude: 2.8 ML(G), 2.8 MD(W)

Felt at Duvall (press report) and near Entiat (W).

West Virginia

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

Wisconsin

27 July (G) Northern Kentucky
Origin time: 18 52 21.8

See Kentucky listing.

Wyoming

20 February (G) Yellowstone National Park
Origin time: 12 07 52.8
Epicenter: 44.80 N., 110.92 W.
Depth: 1 km
Magnitude: 3.3 ML(G)

Intensity IV:
Montana--Gardiner.
Wyoming--Mammoth Hot Springs.

22 February (G) Yellowstone National Park
Origin time: 10 18 27.7
Epicenter: 44.81 N., 110.90 W.
Depth: 1 km
Magnitude: 4.5 mb(G), 4.7 ML(G)
Intensity IV:
Montana--Pony, West Yellowstone.
Wyoming--Mammoth Lakes.
Intensity III:
Wyoming--Canyon, Old Faithful.

27 February (G) Yellowstone National Park
Origin time: 06 05 49.5
Epicenter: 44.76 N., 111.04 W.
Depth: 5 km
Magnitude: 3.4 ML(G), 3.3 ML(D)
Intensity IV: Mammoth Hot Springs.
Intensity III: Madison Junction.

21 March Yellowstone National Park
Origin time: 17 50
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.
Intensity IV: Grants Village.

24 March Yellowstone National Park
Origin time: 06 45
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.
Intensity III: Mammoth Hot Springs.

Wyoming--Continued

10 May (G) Hebgen Lake area
Origin time: 23 41 47.5

See Montana listing.

9 August Yellowstone National Park
Origin time: 04 50 38.9
Epicenter: 44.44 N., 110.54 W.
Depth: 2 km
Magnitude: None computed.
Intensity IV: Grant Village-West Thumb Geyser Basin area.

9 August Yellowstone National Park
Origin time: 04 52 04.4
Epicenter: 44.43 N., 110.54 W.
Depth: 3 km
Magnitude: None computed.
Intensity IV: Grant Village-West Thumb Geyser Basin area.

9 August Yellowstone National Park
Origin time: 05 18 28.5
Epicenter: 44.44 N., 110.54 W.
Depth: 2 km
Magnitude: None computed.
Intensity IV: Grant Village-West Thumb Geyser Basin area.

12 September (G) Southeastern Wyoming
Origin time: 22 33 55.4
Epicenter: 41.18 N., 105.12 W.
Depth: 0 km
Magnitude: 3.2 ML(G)

This event was an explosion of 150 tons of dynamite, which was felt 20 miles west-northwest of Cheyenne (telephone report).

18 October (G) Yellowstone National Park
Origin time: 21 45 53.4
Epicenter: 44.65 N., 110.52 W.
Depth: 3 km
Magnitude: 2.7 ML(G)
Intensity III: Canyon Village area.

18 October (G) Yellowstone National Park
Origin time: 21 57 08.7
Epicenter: 44.64 N., 110.52 W.
Depth: 1 km
Magnitude: 2.7 ML(G)
Intensity III: Canyon Village area.

14 November (G) Yellowstone National Park
Origin time: 21 08 10.4
Epicenter: 44.59 N., 111.04 W.
Depth: 11 km
Magnitude: 3.2 ML(G)
Intensity III: West Yellowstone, Montana.

Table 1.--*Summary of U.S. earthquakes for 1980*

[The following symbols are used to indicate authority for arrival or origin times, epicenters, and/or magnitudes: (B) University of California, Berkeley; (D) University of Montana, Missoula; (E) U.S. Department of Energy, Las Vegas, Nevada; (F) Herrmann and others, 1982; (G) U.S. Geological Survey, National Earthquake Information Service, Golden, Colorado, or Network Operations Branch, Menlo Park, California; (H) U.S. Geological Survey, Hawaiian Volcano Observatory; (J) Weston Observatory, Massachusetts; (K) Tennessee Earthquake Information Center, Memphis; (L) Lamont-Doherty Geological Observatory, Palisades, N.Y.; (M) National Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis, Missouri; (T) Oklahoma Geological Survey, Leonard; (U) University of Utah, Salt Lake; (V) Virginia Polytechnic Institute and State University, Blacksburg; (W) University of Washington, Seattle, (Z) Cockerham and others, 1980. N, Normal depth. Leaders (...) indicate information is not available]

Date (1980)	Origin time (UTC)			Lat		Long		Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time			
	hr	min	s						mb	MS	ML or Mn			Date		Hour	
ALABAMA																	
JULY 25	15	30	12.5	33.94	N.	87.44	W.	0	...	...	3.1G	...	G	JULY	25	09	A.M. CST
ALASKA																	
JAN. 1	07	53	29.3	60.20	N.	152.33	W.	93	4.2	...	...	...	G	DEC.	31	09	P.M. AST
JAN. 4	03	47	36.9	61.66	N.	147.44	W.	66	3.7	...	...	FELT	G	JAN.	3	05	P.M. AST
JAN. 4	03	58	9.2	61.65	N.	147.53	W.	33N	...	...	3.0M	...	G	JAN.	3	05	P.M. AST
JAN. 5	23	03	28.8	59.19	N.	150.69	W.	33N	...	...	3.1M	...	G	JAN.	5	01	P.M. AST
JAN. 6	19	51	2.9	51.26	N.	178.96	W.	57	4.5	...	...	...	G	JAN.	6	08	A.M. BST
JAN. 8	08	46	28.5	52.62	N.	169.38	W.	58	4.8	...	...	...	G	JAN.	7	09	P.M. BST
JAN. 8	19	17	52.8	60.04	N.	154.58	W.	157	...	...	...	...	G	JAN.	8	09	A.M. AST
JAN. 9	17	29	40.0	51.20	N.	179.58	W.	33N	4.9	4.0	...	...	G	JAN.	9	06	A.M. BST
JAN. 10	05	54	21.2	58.62	N.	155.15	W.	143	...	...	...	...	G	JAN.	9	07	P.M. AST
JAN. 10	17	18	39.3	61.90	N.	147.60	W.	66	...	...	...	...	G	JAN.	10	07	A.M. AST
JAN. 11	01	38	10.3	61.31	N.	151.43	W.	87	...	...	...	...	G	JAN.	10	03	P.M. AST
JAN. 11	04	39	56.2	63.17	N.	151.13	W.	33N	...	...	3.0M	...	G	JAN.	10	06	P.M. AST
JAN. 11	08	58	40.3	62.56	N.	151.16	W.	33N	...	...	2.7M	...	G	JAN.	10	10	P.M. AST
JAN. 12	05	51	20.1	62.89	N.	151.08	W.	167	...	...	...	...	G	JAN.	11	07	P.M. AST
JAN. 12	08	09	40.2	62.14	N.	150.90	W.	33N	...	...	3.2M	...	G	JAN.	11	10	P.M. AST
JAN. 12	08	53	59.3	52.32	N.	170.11	W.	35	4.6	...	5.0M	...	G	JAN.	11	09	P.M. BST
JAN. 12	21	50	20.0	60.12	N.	141.03	W.	15	...	...	4.0M	...	G	JAN.	12	11	A.M. AST
JAN. 14	02	54	26.8	61.45	N.	149.55	W.	55	...	...	...	...	G	JAN.	13	04	P.M. AST
JAN. 16	01	21	19.0	51.23	N.	179.59	W.	50	4.9	...	...	...	G	JAN.	15	02	P.M. BST
JAN. 16	15	15	19.3	61.46	N.	146.44	W.	71	...	...	...	...	G	JAN.	16	05	A.M. AST
JAN. 16	22	42	40.6	53.03	N.	163.15	W.	36	4.7	...	...	...	G	JAN.	16	11	A.M. BST
JAN. 17	09	51	36.3	60.89	N.	147.03	W.	81	...	...	...	...	G	JAN.	16	11	P.M. AST
JAN. 17	17	46	54.5	58.47	N.	151.03	W.	90	3.6	...	...	...	G	JAN.	17	07	A.M. AST
JAN. 19	07	02	35.0	51.32	N.	178.49	W.	50	5.8	5.7	...	FELT	G	JAN.	18	08	P.M. BST
JAN. 20	03	11	44.7	56.28	N.	152.78	W.	33N	4.5	...	4.3M	...	G	JAN.	19	05	P.M. AST
JAN. 22	06	16	11.6	52.43	N.	169.65	W.	49	4.5	...	4.8M	...	G	JAN.	21	10	P.M. BST
JAN. 24	21	59	10.2	57.61	N.	152.72	W.	33N	...	...	...	...	G	JAN.	24	11	A.M. AST
JAN. 26	14	49	33.1	66.08	N.	168.03	W.	33N	4.5	...	...	...	G	JAN.	26	03	A.M. BST
JAN. 27	04	59	36.6	51.65	N.	173.43	W.	23	4.9	4.0	4.2M	...	G	JAN.	26	05	P.M. BST
FEB. 1	19	49	5.3	59.72	N.	153.12	W.	111	...	...	...	...	G	FEB.	1	09	A.M. AST
FEB. 2	04	29	31.1	59.93	N.	141.55	W.	15	...	...	3.5M	...	G	FEB.	1	06	P.M. AST
FEB. 2	05	08	14.0	57.27	N.	155.41	W.	66	4.3	...	...	...	G	FEB.	1	07	P.M. AST
FEB. 3	20	40	13.3	64.65	N.	149.55	W.	33N	...	...	3.0M	III	G	FEB.	3	10	A.M. AST
FEB. 5	10	04	49.6	62.20	N.	148.12	W.	48	...	...	3.7M	...	G	FEB.	5	12	P.M. AST
FEB. 6	10	43	39.9	51.79	N.	173.19	W.	32	5.2	4.6	...	...	G	FEB.	5	11	P.M. BST
FEB. 7	22	46	52.8	52.42	N.	172.93	W.	44	4.4	...	...	...	G	FEB.	7	11	A.M. BST
FEB. 8	05	51	16.7	64.68	N.	146.87	W.	10	...	...	3.3M	IV	G	FEB.	7	07	P.M. AST
FEB. 9	01	28	59.2	51.03	N.	177.90	E.	33N	4.7	...	...	...	G	FEB.	8	02	P.M. BST
FEB. 9	02	58	5.4	59.15	N.	151.98	W.	86	3.8	...	...	...	G	FEB.	8	04	P.M. AST
FEB. 10	02	32	28.1	61.27	N.	152.33	W.	139	3.5	...	...	...	G	FEB.	9	04	P.M. AST
FEB. 10	08	01	12.3	52.58	N.	172.68	W.	33N	4.3	...	...	...	G	FEB.	9	09	P.M. BST
FEB. 10	16	08	37.7	59.41	N.	151.56	W.	57	3.4	...	...	...	G	FEB.	10	06	A.M. AST
FEB. 12	04	31	6.4	63.65	N.	150.82	W.	69	...	...	...	...	G	FEB.	11	06	P.M. AST
FEB. 12	08	42	29.0	52.29	N.	173.35	W.	75	5.2	...	...	...	G	FEB.	11	09	P.M. BST
FEB. 13	02	18	18.5	54.14	N.	164.07	W.	48	4.4	...	...	...	G	FEB.	12	03	P.M. BST
FEB. 13	15	49	3.0	64.95	N.	147.72	W.	33N	...	...	...	III	G	FEB.	13	05	A.M. AST
FEB. 14	22	02	52.2	60.29	N.	152.29	W.	110	...	...	...	...	G	FEB.	14	12	M. AST
FEB. 15	15	31	48.0	57.67	N.	153.09	W.	98	...	...	...	...	G	FEB.	15	05	A.M. AST
FEB. 15	16	15	25.1	58.20	N.	151.66	W.	99	...	...	...	...	G	FEB.	15	06	A.M. AST
FEB. 17	17	59	29.7	51.34	N.	176.85	E.	21	4.3	...	...	...	G	FEB.	17	06	A.M. BST
FEB. 18	11	15	2.2	51.25	N.	178.31	W.	53	5.0	4.5	...	...	G	FEB.	18	12	P.M. BST
FEB. 18	11	30	14.3	62.80	N.	148.23	W.	96	...	...	...	...	G	FEB.	18	01	A.M. AST
FEB. 20	18	21	27.9	57.17	N.	156.77	W.	97	4.6	...	...	...	G	FEB.	20	08	A.M. AST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
ALASKA--Continued													
FEB. 23	22	54	31.0	61.81 N.	150.81 W.	33N	...	...	3.1M	...	G	FEB. 23	12 M. AST
FEB. 24	00	10	56.6	51.07 N.	178.34 E.	45	4.7	...	4.2M	...	G	FEB. 23	01 P.M. BST
FEB. 29	02	23	4.2	64.28 N.	147.69 W.	33N	...	...	3.5M	...	G	FEB. 28	04 P.M. AST
FEB. 29	19	20	36.0	51.16 N.	177.90 W.	53	4.9	4.2	...	...	G	FEB. 29	08 A.M. BST
MAR. 2	00	28	23.0	59.57 N.	151.36 W.	13	4.4	...	4.3M	IV	G	MAR. 1	02 P.M. AST
MAR. 2	20	34	28.3	59.57 N.	151.35 W.	11	...	...	3.5M	...	G	MAR. 2	10 A.M. AST
MAR. 3	09	46	42.0	60.16 N.	151.25 W.	77	3.5	...	...	...	G	MAR. 2	11 P.M. AST
MAR. 3	15	27	8.8	59.48 N.	152.72 W.	112	...	...	...	...	G	MAR. 3	05 A.M. AST
MAR. 5	19	59	57.6	59.97 N.	141.10 W.	15	3.4	...	...	...	G	MAR. 5	09 A.M. AST
MAR. 6	17	00	5.8	59.76 N.	153.23 W.	127	4.1	...	...	...	G	MAR. 6	07 A.M. AST
MAR. 9	03	28	7.4	51.85 N.	178.40 E.	111	4.8	...	...	...	G	MAR. 8	04 P.M. BST
MAR. 9	18	30	6.1	56.36 N.	153.56 W.	33N	4.5	...	4.6M	...	G	MAR. 9	08 A.M. AST
MAR. 10	11	48	52.2	54.47 N.	162.92 W.	52	4.8	...	...	IV	G	MAR. 10	12 P.M. BST
MAR. 10	12	40	24.0	57.42 N.	153.95 W.	79	4.6	...	...	...	G	MAR. 10	02 A.M. AST
MAR. 11	03	47	2.8	52.19 N.	169.03 W.	20	5.2	4.6	...	...	G	MAR. 10	04 P.M. BST
MAR. 12	10	23	41.7	61.76 N.	149.70 W.	57	...	...	...	...	G	MAR. 12	12 P.M. AST
MAR. 12	23	04	35.4	52.15 N.	168.98 W.	40	5.4	5.2	...	II	G	MAR. 12	12 M. BST
MAR. 13	03	29	35.8	64.97 N.	147.57 W.	21	...	...	3.1M	III	G	MAR. 12	05 P.M. AST
MAR. 14	02	09	30.5	59.78 N.	152.38 W.	85	...	...	...	...	G	MAR. 13	04 P.M. AST
MAR. 14	03	53	32.9	60.01 N.	153.10 W.	138	...	...	...	...	G	MAR. 13	05 P.M. AST
MAR. 14	20	28	6.5	55.02 N.	156.91 W.	33N	4.5	...	...	...	G	MAR. 14	10 A.M. AST
MAR. 15	05	58	13.3	51.53 N.	177.20 W.	41	4.7	4.3	...	...	G	MAR. 14	06 P.M. BST
MAR. 15	17	48	20.2	64.59 N.	152.26 W.	33N	...	...	3.0M	...	G	MAR. 15	07 A.M. AST
MAR. 15	21	45	10.0	52.41 N.	173.02 E.	31	5.0	...	...	...	G	MAR. 15	10 A.M. BST
MAR. 15	22	37	43.4	60.18 N.	140.64 W.	15	...	...	...	...	G	MAR. 15	01 P.M. YST
MAR. 16	07	41	21.5	63.30 N.	151.21 W.	33N	...	...	3.5M	...	G	MAR. 15	09 P.M. AST
MAR. 16	23	34	11.0	62.40 N.	151.32 W.	125	...	...	...	...	G	MAR. 16	01 P.M. AST
MAR. 17	07	37	33.7	59.99 N.	153.14 W.	132	4.9	...	...	III	G	MAR. 16	09 P.M. AST
MAR. 19	19	16	8.9	61.50 N.	146.72 W.	66	3.5	...	...	...	G	MAR. 19	09 A.M. AST
MAR. 21	20	29	36.3	53.81 N.	167.69 W.	93	4.3	...	...	...	G	MAR. 21	09 A.M. BST
MAR. 22	05	44	32.2	58.42 N.	154.88 W.	35	4.1	...	3.4M	...	G	MAR. 21	07 P.M. AST
MAR. 23	21	15	42.3	57.68 N.	155.77 W.	33N	4.0	...	4.4M	...	G	MAR. 23	11 A.M. AST
MAR. 24	02	17	37.5	52.82 N.	167.68 W.	33N	4.9	...	...	...	G	MAR. 23	03 P.M. BST
MAR. 24	03	59	51.3	52.97 N.	167.67 W.	33N	6.2	6.9	6.9M	V	G	MAR. 23	04 P.M. BST
MAR. 24	04	02	19.3	52.60 N.	167.45 W.	33N	6.1	...	...	...	G	MAR. 23	05 P.M. BST
MAR. 24	04	10	16.5	53.68 N.	168.44 W.	33N	4.8	...	...	...	G	MAR. 23	05 P.M. BST
MAR. 24	04	41	59.1	52.89 N.	167.71 W.	33N	5.0	...	...	...	G	MAR. 23	05 P.M. BST
MAR. 24	04	53	20.3	52.53 N.	168.31 W.	33N	4.5	...	...	...	G	MAR. 23	05 P.M. BST
MAR. 24	06	40	9.6	51.96 N.	167.32 W.	33N	4.7	...	...	...	G	MAR. 23	07 P.M. BST
MAR. 24	07	09	14.7	52.82 N.	167.62 W.	33N	4.9	...	...	...	G	MAR. 23	08 P.M. BST
MAR. 24	08	04	48.4	52.63 N.	167.76 W.	33N	4.6	...	...	...	G	MAR. 23	09 P.M. BST
MAR. 24	17	23	57.6	52.82 N.	167.44 W.	33N	4.6	...	...	...	G	MAR. 24	06 A.M. BST
MAR. 25	07	47	45.4	64.35 N.	145.23 W.	33N	...	...	3.0M	...	G	MAR. 24	09 P.M. AST
MAR. 25	10	17	35.5	53.18 N.	167.85 W.	33N	4.9	...	...	...	G	MAR. 24	11 P.M. BST
MAR. 25	21	44	54.2	52.97 N.	167.76 W.	45	4.8	...	...	...	G	MAR. 25	10 A.M. BST
MAR. 26	00	12	0.5	53.66 N.	168.08 W.	33N	4.5	...	...	...	G	MAR. 25	01 P.M. BST
MAR. 27	02	05	49.0	62.19 N.	151.63 W.	108	3.3	...	...	...	G	MAR. 26	04 P.M. AST
MAR. 27	11	00	48.7	52.73 N.	167.65 W.	33N	4.4	...	...	...	G	MAR. 27	12 P.M. BST
MAR. 27	22	20	26.9	52.79 N.	167.75 W.	33N	4.7	...	...	IV	G	MAR. 27	11 A.M. BST
MAR. 28	09	23	40.9	53.00 N.	167.62 W.	30	4.9	4.1	...	III	G	MAR. 27	10 P.M. BST
MAR. 28	21	12	8.7	51.97 N.	171.91 W.	55	4.8	...	...	...	G	MAR. 28	10 A.M. BST
MAR. 29	05	44	0.5	67.49 N.	162.00 W.	33N	...	...	3.3M	...	G	MAR. 28	06 P.M. BST
MAR. 29	13	19	59.2	55.86 N.	155.02 W.	33N	4.2	...	3.9M	...	G	MAR. 29	03 A.M. AST
MAR. 30	11	38	56.3	52.66 N.	166.52 W.	31	4.8	...	4.4M	...	G	MAR. 30	12 P.M. BST
MAR. 31	16	26	8.3	63.62 N.	147.55 W.	105	...	...	...	...	G	MAR. 31	06 A.M. AST
APR. 3	03	46	4.3	63.15 N.	149.57 W.	92	5.0	...	...	IV	G	APR. 2	05 P.M. AST
APR. 3	08	37	29.5	61.60 N.	150.56 W.	58	...	...	...	FELT	G	APR. 2	10 P.M. AST
APR. 4	20	05	31.7	53.70 N.	165.17 W.	33N	4.8	...	...	...	G	APR. 4	09 A.M. BST
APR. 5	01	40	48.0	53.55 N.	163.16 W.	33N	4.7	...	3.9M	...	G	APR. 4	02 P.M. BST
APR. 6	14	47	43.2	61.38 N.	147.82 W.	49	4.9	5.2	5.2M	V	G	APR. 6	04 A.M. AST
APR. 7	03	31	17.9	62.11 N.	149.64 W.	62	...	...	...	...	G	APR. 6	05 P.M. AST
APR. 12	10	22	17.5	59.80 N.	153.39 W.	124	3.8	...	...	...	G	APR. 12	12 P.M. AST
APR. 12	18	31	45.1	60.32 N.	152.38 W.	66	3.5	...	...	...	G	APR. 12	08 A.M. AST
APR. 13	02	08	32.2	55.04 N.	160.31 W.	57	5.4	...	...	IV	G	APR. 12	04 P.M. AST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
ALASKA--Continued													
APR. 14	22	07	36.8	52.98 N.	167.84 W.	46	4.7	4.1	...	IV	G	APR. 14	11 A.M. BST
APR. 15	07	50	19.5	51.87 N.	175.96 W.	69	5.1	...	...	FELT	G	APR. 14	08 P.M. BST
APR. 16	20	10	55.1	54.80 N.	161.23 W.	59	4.6	...	...	...	G	APR. 16	09 A.M. BST
APR. 18	18	49	5.6	50.86 N.	171.75 W.	33N	4.9	...	4.2M	...	G	APR. 18	07 A.M. BST
APR. 20	10	27	31.4	60.84 N.	150.71 W.	37	...	...	3.5M	...	G	APR. 20	12 P.M. AST
APR. 20	19	24	59.2	63.07 N.	151.00 W.	95	...	...	...	...	G	APR. 20	09 A.M. AST
APR. 21	10	53	36.4	64.95 N.	150.38 W.	33N	...	...	...	...	G	APR. 21	12 P.M. AST
APR. 22	13	06	39.4	62.33 N.	149.63 W.	61	4.0	...	...	...	G	APR. 22	03 A.M. AST
APR. 23	16	48	59.4	65.69 N.	151.96 W.	33N	...	...	3.1M	...	G	APR. 23	06 A.M. AST
APR. 24	03	32	22.0	60.72 N.	147.81 W.	117	...	...	...	...	G	APR. 23	05 P.M. AST
APR. 24	03	51	2.1	66.80 N.	156.76 W.	33N	...	...	...	...	G	APR. 23	05 P.M. AST
APR. 24	14	52	49.4	60.27 N.	140.40 W.	33N	3.1	...	...	...	G	APR. 24	05 A.M. YST
APR. 25	01	48	9.7	57.04 N.	150.43 W.	33N	3.9	...	3.1M	...	G	APR. 24	03 P.M. AST
APR. 25	12	25	22.3	59.62 N.	153.05 W.	119	...	...	...	...	G	APR. 25	02 A.M. AST
APR. 27	20	05	39.7	52.47 N.	178.69 E.	33N	4.2	...	4.0M	...	G	APR. 27	09 A.M. BST
APR. 28	03	35	59.2	56.69 N.	156.81 W.	58	4.7	...	...	...	G	APR. 27	05 P.M. AST
APR. 28	17	34	37.6	56.57 N.	156.40 W.	75	3.9	...	...	...	G	APR. 28	07 A.M. AST
APR. 29	13	04	55.6	54.81 N.	159.64 W.	33N	4.1	...	...	...	G	APR. 29	03 A.M. AST
MAY 1	08	22	52.9	61.89 N.	146.94 W.	66	4.3	...	...	IV	G	APR. 30	10 P.M. AST
MAY 1	18	39	2.4	59.65 N.	150.58 W.	44	3.7	...	...	...	G	MAY 1	08 A.M. AST
MAY 2	05	05	34.7	63.22 N.	150.46 W.	140	...	...	...	...	G	MAY 1	07 P.M. AST
MAY 2	22	55	34.9	59.95 N.	152.58 W.	115	...	...	...	...	G	MAY 2	12 M. AST
MAY 3	09	30	8.5	51.23 N.	173.68 E.	33N	5.8	5.3	...	...	G	MAY 2	10 P.M. BST
MAY 4	04	40	6.1	66.83 N.	156.09 W.	33N	...	...	3.5M	...	G	MAY 3	06 P.M. AST
MAY 4	11	40	47.0	52.67 N.	169.77 W.	51	4.4	...	4.8M	...	G	MAY 4	12 P.M. BST
MAY 6	18	18	17.7	63.13 N.	150.65 W.	135	...	...	...	...	G	MAY 6	08 A.M. AST
MAY 7	01	08	11.8	64.01 N.	148.96 W.	33N	...	...	2.7M	...	G	MAY 6	03 P.M. AST
MAY 7	03	06	16.0	62.99 N.	150.80 W.	118	5.0	...	...	II	G	MAY 6	05 P.M. AST
MAY 7	19	14	48.0	55.63 N.	162.40 W.	80	4.8	...	...	...	G	MAY 7	08 A.M. BST
MAY 10	02	57	13.7	60.07 N.	147.15 W.	33N	...	...	3.3M	...	G	MAY 9	04 P.M. AST
MAY 12	09	09	56.1	63.67 N.	147.52 W.	14	...	...	3.1M	...	G	MAY 11	11 P.M. AST
MAY 14	06	40	37.2	68.41 N.	148.90 W.	19	4.4	...	4.4M	III	G	MAY 13	08 P.M. AST
MAY 14	08	38	32.4	61.61 N.	150.02 W.	46	...	...	...	...	G	MAY 13	10 P.M. AST
MAY 14	13	05	36.6	62.03 N.	148.57 W.	32	...	...	2.9M	...	G	MAY 14	03 A.M. AST
MAY 16	04	18	44.5	65.44 N.	148.29 W.	20	...	...	2.8M	...	G	MAY 15	06 P.M. AST
MAY 16	22	40	45.6	62.97 N.	150.73 W.	120	4.0	...	...	...	G	MAY 16	12 M. AST
MAY 18	17	17	29.7	61.84 N.	150.70 W.	36	...	...	3.4M	...	G	MAY 18	07 A.M. AST
MAY 20	15	42	8.0	63.18 N.	150.92 W.	150	...	...	...	...	G	MAY 20	05 A.M. AST
MAY 23	11	10	0.9	61.24 N.	146.82 W.	33N	...	...	3.0M	...	G	MAY 23	01 A.M. AST
MAY 26	10	31	37.1	63.45 N.	151.76 W.	33N	...	...	3.1M	...	G	MAY 26	12 P.M. AST
MAY 29	07	04	39.9	64.91 N.	147.43 W.	33N	...	...	3.6M	III	G	MAY 28	09 P.M. AST
MAY 30	23	28	24.7	61.94 N.	147.82 W.	66	...	...	...	...	G	MAY 30	01 P.M. AST
MAY 31	00	00	10.2	62.00 N.	147.84 W.	42	...	...	...	...	G	MAY 30	02 P.M. AST
MAY 31	03	43	24.5	59.25 N.	153.17 W.	128	...	...	...	...	G	MAY 30	05 P.M. AST
MAY 31	13	20	36.6	59.46 N.	152.73 W.	125	...	...	...	...	G	MAY 31	03 A.M. AST
JUNE 1	16	26	34.5	61.70 N.	150.25 W.	45	...	...	2.6M	...	G	JUNE 1	06 A.M. AST
JUNE 3	10	59	25.2	60.00 N.	152.67 W.	117	3.7	...	...	II	G	JUNE 3	12 P.M. AST
JUNE 4	17	29	54.0	65.85 N.	155.37 W.	29	...	...	3.4M	...	G	JUNE 4	07 A.M. AST
JUNE 4	17	33	26.3	65.78 N.	155.44 W.	5	...	...	3.8M	...	G	JUNE 4	07 A.M. AST
JUNE 8	18	44	42.1	63.30 N.	150.49 W.	133	...	...	...	...	G	JUNE 8	08 A.M. AST
JUNE 9	08	51	47.0	61.51 N.	150.71 W.	73	4.5	...	...	IV	G	JUNE 8	10 P.M. AST
JUNE 10	21	55	43.6	52.64 N.	173.78 W.	186	4.1	...	...	...	G	JUNE 10	10 A.M. BST
JUNE 11	04	38	3.4	59.54 N.	152.31 W.	117	...	...	...	...	G	JUNE 10	06 P.M. AST
JUNE 11	05	44	31.7	60.55 N.	151.80 W.	101	...	...	...	...	G	JUNE 10	07 P.M. AST
JUNE 11	20	56	4.3	63.24 N.	148.25 W.	90	3.8	...	...	...	G	JUNE 11	10 A.M. AST
JUNE 12	00	38	38.5	51.68 N.	177.70 E.	65	4.9	...	...	...	G	JUNE 11	01 P.M. BST
JUNE 12	10	49	23.3	59.82 N.	151.75 W.	97	...	...	...	FELT	G	JUNE 12	12 P.M. AST
JUNE 12	20	53	15.2	64.02 N.	148.89 W.	53	...	...	...	...	G	JUNE 12	10 A.M. AST
JUNE 14	00	03	1.2	52.17 N.	172.84 E.	39	4.9	...	...	...	G	JUNE 13	01 P.M. BST
JUNE 14	09	08	31.4	52.03 N.	173.12 E.	36	4.4	...	...	...	G	JUNE 13	10 P.M. BST
JUNE 14	09	31	31.3	63.77 N.	149.14 W.	124	3.8	...	...	...	G	JUNE 13	11 P.M. AST
JUNE 15	01	06	6.9	59.95 N.	141.10 W.	15	...	...	...	...	G	JUNE 14	03 P.M. AST
JUNE 15	18	16	6.9	62.04 N.	148.91 W.	33N	...	...	2.7M	...	G	JUNE 15	08 A.M. AST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
ALASKA--Continued													
JUNE 15	19	01	53.0	60.04 N.	153.30 W.	120	4.4	...	...	...	G	JUNE 15	09 A.M. AST
JUNE 16	01	18	43.6	51.59 N.	176.02 E.	53	4.7	...	...	...	G	JUNE 15	02 P.M. BST
JUNE 17	09	16	11.6	60.28 N.	153.46 W.	171	4.4	...	...	...	G	JUNE 16	11 P.M. AST
JUNE 17	16	46	19.8	52.14 N.	174.95 E.	59	4.8	...	...	...	G	JUNE 17	05 A.M. BST
JUNE 22	13	56	55.7	53.54 N.	167.52 W.	33N	...	...	3.6M	...	G	JUNE 22	02 A.M. BST
JUNE 22	21	42	30.7	62.80 N.	148.76 W.	99	...	...	...	...	G	JUNE 22	11 A.M. AST
JUNE 23	04	04	33.1	53.54 N.	166.97 W.	33N	4.2	...	4.5M	...	G	JUNE 22	05 P.M. BST
JUNE 25	07	22	19.6	59.62 N.	150.31 W.	33N	...	...	...	III	G	JUNE 24	09 P.M. AST
JUNE 26	04	59	13.0	53.38 N.	167.38 W.	33N	4.0	...	3.8M	...	G	JUNE 25	05 P.M. BST
JUNE 26	08	00	57.9	61.52 N.	146.23 W.	63	...	...	...	...	G	JUNE 25	10 P.M. AST
JUNE 27	09	40	4.4	59.02 N.	152.47 W.	33N	...	...	3.7M	...	G	JUNE 26	11 P.M. AST
JUNE 28	18	51	49.4	62.92 N.	151.10 W.	124	4.3	...	...	FELT	G	JUNE 28	08 A.M. AST
JUNE 28	23	44	53.5	63.42 N.	149.38 W.	33N	...	...	3.1M	...	G	JUNE 28	01 P.M. AST
JUNE 30	10	03	21.9	59.89 N.	153.67 W.	170	...	...	...	...	G	JUNE 30	12 P.M. AST
JUNE 30	18	07	39.0	60.01 N.	141.05 W.	13	5.0	...	5.1M	IV	G	JUNE 30	08 A.M. AST
JUNE 30	18	24	14.4	61.79 N.	149.81 W.	30	...	...	3.0M	...	G	JUNE 30	08 A.M. AST
JUNE 30	18	47	49.1	60.00 N.	141.13 W.	15	...	...	4.5M	...	G	JUNE 30	08 A.M. AST
JUNE 30	18	59	31.7	60.02 N.	141.11 W.	15	4.9	4.8	5.2M	IV	G	JUNE 30	08 A.M. AST
JULY 1	14	04	45.5	52.03 N.	168.20 W.	25	4.2	...	3.9M	...	G	JULY 1	03 A.M. BST
JULY 2	02	42	15.4	59.87 N.	141.16 W.	15	...	...	3.8M	...	G	JULY 1	04 P.M. AST
JULY 4	05	45	14.5	61.90 N.	151.06 W.	80	4.3	...	...	FELT	G	JULY 3	07 P.M. AST
JULY 4	06	07	40.5	53.69 N.	163.72 W.	33N	4.7	...	4.3M	...	G	JULY 3	07 P.M. BST
JULY 5	15	19	22.8	51.47 N.	178.43 W.	51	5.1	4.9	5.7M	...	G	JULY 5	04 A.M. BST
JULY 5	15	50	24.5	61.61 N.	150.11 W.	49	...	...	3.7M	FELT	G	JULY 5	05 A.M. AST
JULY 5	18	31	54.8	62.48 N.	151.29 W.	107	...	...	...	...	G	JULY 5	08 A.M. AST
JULY 6	18	45	30.8	56.56 N.	154.24 W.	26	5.2	4.9	5.4M	FELT	G	JULY 6	08 A.M. AST
JULY 9	16	59	32.9	59.38 N.	144.97 W.	33N	...	...	4.1M	...	G	JULY 9	06 A.M. AST
JULY 10	09	14	3.3	50.89 N.	174.91 E.	33N	4.5	...	...	...	G	JULY 9	10 P.M. BST
JULY 12	22	20	4.9	63.43 N.	147.36 W.	91	...	...	...	...	G	JULY 12	12 M. AST
JULY 13	05	26	19.1	59.95 N.	152.78 W.	123	...	...	...	...	G	JULY 12	07 P.M. AST
JULY 13	15	48	36.1	55.82 N.	153.99 W.	33N	...	...	3.6M	...	G	JULY 13	05 A.M. AST
JULY 13	19	14	37.7	61.90 N.	150.37 W.	5	...	...	3.0M	...	G	JULY 13	09 A.M. AST
JULY 14	03	41	57.4	57.22 N.	153.67 W.	33N	...	...	3.4M	...	G	JULY 13	05 P.M. AST
JULY 15	03	29	35.8	63.63 N.	150.81 W.	33N	...	...	3.6M	...	G	JULY 14	05 P.M. AST
JULY 15	13	27	26.0	61.20 N.	147.53 W.	59	...	...	...	...	G	JULY 15	03 A.M. AST
JULY 15	18	47	49.2	51.57 N.	176.78 W.	55	4.6	...	...	...	G	JULY 15	07 A.M. BST
JULY 17	14	45	52.6	63.17 N.	150.90 W.	149	...	...	...	...	G	JULY 17	04 A.M. AST
JULY 18	20	12	3.6	60.08 N.	141.21 W.	15	4.7	...	4.3M	...	G	JULY 18	10 A.M. AST
JULY 22	00	35	44.0	51.95 N.	174.02 W.	70	4.6	...	...	...	G	JULY 21	01 P.M. BST
JULY 22	22	45	41.7	59.76 N.	152.64 W.	96	...	...	...	...	G	JULY 22	12 M. AST
JULY 23	03	10	0.1	63.42 N.	149.83 W.	117	...	...	...	...	G	JULY 22	05 P.M. AST
JULY 23	23	07	20.7	59.45 N.	152.08 W.	87	...	...	...	...	G	JULY 23	01 P.M. AST
JULY 24	02	34	4.3	53.46 N.	164.54 W.	14	4.7	4.4	...	...	G	JULY 23	03 P.M. BST
JULY 24	17	53	27.8	51.75 N.	176.56 W.	62	4.1	...	...	FELT	G	JULY 24	06 A.M. BST
JULY 24	19	01	55.0	61.51 N.	152.15 W.	133	...	...	...	...	G	JULY 24	09 A.M. AST
JULY 25	03	35	53.8	59.93 N.	141.22 W.	15	...	...	3.7M	...	G	JULY 24	05 P.M. AST
JULY 25	19	16	56.9	59.46 N.	152.75 W.	115	...	...	...	...	G	JULY 25	09 A.M. AST
JULY 26	12	02	8.9	63.09 N.	149.51 W.	123	...	...	...	...	G	JULY 26	02 A.M. AST
JULY 26	13	15	53.4	61.03 N.	147.61 W.	33N	...	...	3.4M	...	G	JULY 26	03 A.M. AST
JULY 27	09	05	35.0	63.72 N.	152.79 W.	21	4.7	3.7	5.0M	IV	G	JULY 26	11 P.M. AST
JULY 27	09	24	0.2	63.73 N.	152.72 W.	33N	...	...	3.5M	...	G	JULY 26	11 P.M. AST
JULY 28	01	15	35.0	59.89 N.	141.10 W.	15	...	...	3.0M	...	G	JULY 27	03 P.M. AST
JULY 28	02	29	24.6	60.11 N.	140.77 W.	28	...	...	3.1M	...	G	JULY 27	05 P.M. YST
JULY 29	02	26	22.0	63.42 N.	153.41 W.	33N	...	...	3.6M	...	G	JULY 28	04 P.M. AST
JULY 29	10	50	2.8	51.15 N.	174.22 E.	33N	4.5	...	...	...	G	JULY 28	11 P.M. BST
JULY 30	04	12	32.3	61.25 N.	150.93 W.	73	3.7	...	...	...	G	JULY 29	06 P.M. AST
JULY 31	04	43	55.2	51.19 N.	178.37 W.	33N	4.7	...	4.1M	...	G	JULY 30	05 P.M. BST
JULY 31	11	59	21.3	59.39 N.	152.31 W.	94	3.7	...	...	...	G	JULY 31	01 A.M. AST
AUG. 1	04	05	38.5	59.91 N.	152.72 W.	118	...	...	...	...	G	JULY 31	06 P.M. AST
AUG. 1	14	39	14.0	60.18 N.	153.15 W.	121	...	...	...	...	G	AUG. 1	04 A.M. AST
AUG. 1	23	07	14.7	59.62 N.	148.94 W.	26	5.4	5.1	5.7M	IV	G	AUG. 1	01 P.M. AST
AUG. 2	07	07	17.3	52.11 N.	169.36 W.	33N	5.3	5.2	4.8M	...	G	AUG. 1	08 P.M. BST
AUG. 2	10	46	15.0	52.23 N.	169.34 W.	33N	4.5	...	...	...	G	AUG. 1	11 P.M. BST
AUG. 2	15	40	29.2	59.90 N.	149.18 W.	33N	...	...	3.1M	...	G	AUG. 2	05 A.M. AST
AUG. 3	07	11	43.0	52.00 N.	169.28 W.	33N	4.8	5.5	5.2M	...	G	AUG. 2	08 P.M. BST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
ALASKA--Continued													
AUG. 3	07	59	52.2	62.20 N.	148.07 W.	76	...	...	...	...	G	AUG. 2	09 P.M. AST
AUG. 4	17	31	0.8	61.09 N.	151.87 W.	96	3.8	...	...	III	G	AUG. 4	07 A.M. AST
AUG. 6	09	16	18.9	60.15 N.	152.65 W.	122	...	...	...	...	G	AUG. 5	11 P.M. AST
AUG. 7	19	16	6.5	63.52 N.	151.29 W.	10	5.2	...	5.4M	IV	G	AUG. 7	09 A.M. AST
AUG. 9	23	24	39.6	58.10 N.	153.64 W.	66	4.2	...	...	...	G	AUG. 9	01 P.M. AST
AUG. 10	07	51	52.7	54.32 N.	161.64 W.	33N	4.9	...	4.4M	...	G	AUG. 9	08 P.M. BST
AUG. 10	09	10	51.3	53.62 N.	163.29 W.	33N	4.9	4.6	4.5M	...	G	AUG. 9	10 P.M. BST
AUG. 10	16	18	54.4	59.49 N.	144.59 W.	33N	...	...	3.0M	...	G	AUG. 10	06 A.M. AST
AUG. 11	20	25	45.0	59.59 N.	152.81 W.	125	...	...	...	...	G	AUG. 11	10 A.M. AST
AUG. 12	14	44	28.5	59.98 N.	152.84 W.	110	5.0	...	...	...	G	AUG. 12	04 A.M. AST
AUG. 12	22	38	44.9	58.25 N.	148.43 W.	33N	...	...	3.3M	...	G	AUG. 12	12 M. AST
AUG. 13	02	17	53.3	53.67 N.	163.24 W.	33N	4.8	4.8	...	...	G	AUG. 12	03 P.M. BST
AUG. 13	03	52	55.8	59.25 N.	151.78 W.	53	4.0	...	...	III	G	AUG. 12	05 P.M. AST
AUG. 16	14	06	5.0	51.80 N.	179.57 W.	85	4.7	...	...	...	G	AUG. 16	03 A.M. BST
AUG. 16	21	33	1.5	53.66 N.	163.58 W.	33N	4.8	...	...	...	G	AUG. 16	10 A.M. BST
AUG. 18	22	50	23.7	63.05 N.	150.51 W.	39	4.5	...	4.0M	III	G	AUG. 18	12 M. AST
AUG. 20	10	14	48.4	60.66 N.	151.62 W.	87	3.7	...	...	...	G	AUG. 20	12 P.M. AST
AUG. 21	06	14	47.7	63.66 N.	158.03 W.	33N	...	...	3.5M	...	G	AUG. 20	08 P.M. AST
AUG. 22	00	43	48.7	61.60 N.	152.35 W.	128	4.3	...	...	...	G	AUG. 21	02 P.M. AST
AUG. 23	00	45	54.8	55.03 N.	160.40 W.	38	5.3	4.4	5.3M	...	G	AUG. 22	02 P.M. AST
AUG. 23	03	51	0.5	60.00 N.	149.58 W.	33N	...	...	3.0M	...	G	AUG. 22	05 P.M. AST
AUG. 23	11	39	39.9	55.67 N.	162.16 W.	33N	...	...	...	...	G	AUG. 23	12 P.M. BST
AUG. 24	00	40	52.2	55.47 N.	159.08 W.	53	4.4	...	4.3M	...	G	AUG. 23	02 P.M. AST
AUG. 24	06	31	34.6	60.14 N.	153.22 W.	139	...	...	...	...	G	AUG. 23	08 P.M. AST
AUG. 24	11	00	37.1	60.42 N.	147.48 W.	66	...	...	...	...	G	AUG. 24	01 A.M. AST
AUG. 25	13	38	24.4	59.95 N.	152.53 W.	33N	4.8	...	3.1M	...	G	AUG. 25	03 A.M. AST
AUG. 25	15	45	18.4	65.30 N.	149.96 W.	37	...	...	3.6M	...	G	AUG. 25	05 A.M. AST
AUG. 25	18	10	37.8	56.70 N.	136.45 W.	22	...	...	...	...	G	AUG. 25	10 A.M. PST
AUG. 26	01	35	3.4	62.76 N.	153.04 W.	33N	...	...	3.9M	...	G	AUG. 25	03 P.M. AST
AUG. 30	00	18	21.1	59.52 N.	152.84 W.	81	4.5	...	...	IV	G	AUG. 29	02 P.M. AST
AUG. 31	16	48	45.2	62.49 N.	151.00 W.	106	...	...	...	...	G	AUG. 31	06 A.M. AST
SEPT. 1	19	46	41.2	59.37 N.	154.81 W.	33N	4.3	...	3.6M	...	G	SEPT. 1	09 A.M. AST
SEPT. 4	10	53	59.6	59.53 N.	143.89 W.	33N	5.0	5.4	5.0M	...	G	SEPT. 4	12 P.M. AST
SEPT. 5	05	46	13.0	60.16 N.	153.21 W.	153	4.0	...	...	...	G	SEPT. 4	07 P.M. AST
SEPT. 5	08	43	27.1	61.04 N.	152.41 W.	117	...	...	...	...	G	SEPT. 4	10 P.M. AST
SEPT. 6	04	34	47.2	51.44 N.	178.54 W.	55	4.6	...	...	...	G	SEPT. 5	05 P.M. BST
SEPT. 6	19	28	45.9	51.37 N.	179.99 W.	56	4.4	...	...	...	G	SEPT. 6	08 A.M. BST
SEPT. 8	03	07	22.1	63.32 N.	151.05 W.	115	...	...	...	...	G	SEPT. 7	05 P.M. AST
SEPT. 9	08	25	10.4	61.01 N.	150.91 W.	33N	3.6	...	3.7M	III	G	SEPT. 8	10 P.M. AST
SEPT. 9	10	08	27.3	63.57 N.	149.94 W.	140	...	...	...	...	G	SEPT. 9	12 P.M. AST
SEPT. 11	21	25	3.0	60.80 N.	145.93 W.	33N	...	...	3.2M	...	G	SEPT. 11	11 A.M. AST
SEPT. 13	07	24	12.2	59.84 N.	152.25 W.	100	4.3	...	...	FELT	G	SEPT. 12	09 P.M. AST
SEPT. 13	09	14	58.4	62.80 N.	142.52 W.	33N	...	...	3.4M	...	G	SEPT. 12	11 P.M. AST
SEPT. 13	21	19	23.5	59.82 N.	143.79 W.	33N	...	...	3.3M	...	G	SEPT. 13	11 A.M. AST
SEPT. 14	05	04	57.0	63.52 N.	150.99 W.	33N	...	...	3.0M	...	G	SEPT. 13	07 P.M. AST
SEPT. 14	07	24	39.5	60.49 N.	141.45 W.	15	...	...	3.4M	...	G	SEPT. 13	09 P.M. AST
SEPT. 14	10	10	14.0	57.66 N.	154.89 W.	33N	...	...	...	...	G	SEPT. 14	12 P.M. AST
SEPT. 14	20	14	32.6	59.30 N.	146.46 W.	31	...	...	3.3M	...	G	SEPT. 14	10 A.M. AST
SEPT. 15	12	34	29.1	61.86 N.	149.97 W.	69	...	...	...	...	G	SEPT. 15	02 A.M. AST
SEPT. 15	17	07	46.7	60.14 N.	152.86 W.	125	...	...	...	...	G	SEPT. 15	07 A.M. AST
SEPT. 17	05	43	26.3	61.61 N.	146.12 W.	25	...	...	...	...	G	SEPT. 16	07 P.M. AST
SEPT. 19	09	49	13.1	51.58 N.	178.22 W.	54	5.0	...	...	...	G	SEPT. 18	10 P.M. BST
SEPT. 19	22	34	50.2	65.60 N.	148.05 W.	16	...	...	3.8M	FELT	G	SEPT. 19	12 M. AST
SEPT. 19	23	12	51.7	63.85 N.	147.31 W.	51	...	...	3.1M	...	G	SEPT. 19	01 P.M. AST
SEPT. 20	06	34	20.8	62.26 N.	152.24 W.	124	...	...	...	...	G	SEPT. 19	08 P.M. AST
SEPT. 21	17	08	55.6	51.91 N.	169.91 W.	12	5.2	4.9	4.7M	...	G	SEPT. 21	06 A.M. BST
SEPT. 21	17	13	32.3	51.86 N.	170.03 W.	14	5.4	4.8	4.9M	...	G	SEPT. 21	06 A.M. BST
SEPT. 21	21	00	17.3	60.09 N.	152.93 W.	130	4.2	...	...	...	G	SEPT. 21	11 A.M. AST
SEPT. 21	23	47	16.0	62.04 N.	151.45 W.	83	4.4	...	...	...	G	SEPT. 21	01 P.M. AST
SEPT. 22	19	44	11.0	62.23 N.	150.91 W.	80	...	...	...	...	G	SEPT. 22	09 A.M. AST
SEPT. 23	06	14	1.9	61.85 N.	151.05 W.	89	...	...	...	...	G	SEPT. 22	08 P.M. AST
SEPT. 23	18	35	21.5	51.34 N.	175.26 W.	69	4.4	...	...	...	G	SEPT. 23	07 A.M. BST
SEPT. 25	06	41	49.9	51.88 N.	169.87 W.	33N	4.4	...	4.0M	...	G	SEPT. 24	07 P.M. BST
SEPT. 25	08	07	44.8	61.41 N.	149.96 W.	52	...	...	2.5M	...	G	SEPT. 24	10 P.M. AST
SEPT. 27	05	36	9.7	65.72 N.	145.45 W.	33N	...	...	3.8M	...	G	SEPT. 26	07 P.M. AST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
ALASKA--Continued													
SEPT. 28	09	10	28.9	60.66 N.	150.69 W.	33N	...	...	3.3M	...	G	SEPT. 27	11 P.M. AST
SEPT. 28	17	54	7.5	63.54 N.	151.32 W.	33N	...	...	3.2M	...	G	SEPT. 28	07 A.M. AST
OCT. 2	11	17	38.4	61.43 N.	150.07 W.	33N	...	...	2.7M	...	G	OCT. 2	01 A.M. AST
OCT. 5	07	22	5.9	58.54 N.	142.52 W.	15	...	...	4.1M	...	G	OCT. 4	09 P.M. AST
OCT. 6	14	57	35.2	66.73 N.	155.06 W.	33N	4.6	4.5	4.7M	III	G	OCT. 6	04 A.M. AST
OCT. 6	15	15	10.4	58.26 N.	150.07 W.	33N	4.5	...	4.6M	...	G	OCT. 6	05 A.M. AST
OCT. 6	17	51	59.2	57.06 N.	152.72 W.	33N	4.7	...	4.0M	...	G	OCT. 6	07 A.M. AST
OCT. 6	19	31	12.3	66.99 N.	155.37 W.	33N	...	...	...	...	G	OCT. 6	09 A.M. AST
OCT. 6	19	42	25.8	66.92 N.	155.29 W.	33N	4.5	...	4.2M	...	G	OCT. 6	09 A.M. AST
OCT. 6	23	33	31.4	59.98 N.	141.27 W.	15	...	...	3.9M	...	G	OCT. 6	01 P.M. AST
OCT. 7	18	22	1.9	62.83 N.	150.10 W.	98	4.0	...	...	...	G	OCT. 7	08 A.M. AST
OCT. 9	07	13	45.8	65.80 N.	155.16 W.	33N	4.2	...	4.5M	...	G	OCT. 8	09 P.M. AST
OCT. 10	00	56	43.2	62.91 N.	150.87 W.	92	...	...	...	...	G	OCT. 9	02 P.M. AST
OCT. 11	12	59	25.5	60.26 N.	152.83 W.	130	...	...	...	...	G	OCT. 11	02 A.M. AST
OCT. 11	13	40	41.8	52.17 N.	171.61 W.	33N	4.5	...	4.6M	...	G	OCT. 11	02 A.M. BST
OCT. 11	15	51	25.5	54.83 N.	151.42 W.	33N	4.7	...	5.2M	...	G	OCT. 11	05 A.M. AST
OCT. 12	00	39	30.7	52.34 N.	168.53 W.	33	...	...	4.3M	...	G	OCT. 11	01 P.M. BST
OCT. 12	11	51	13.5	63.39 N.	152.05 W.	33N	...	...	4.2M	...	G	OCT. 12	01 A.M. AST
OCT. 12	16	30	29.1	63.37 N.	149.08 W.	110	...	...	...	...	G	OCT. 12	06 A.M. AST
OCT. 13	07	38	14.5	60.08 N.	140.91 W.	15	...	...	3.5M	...	G	OCT. 12	10 P.M. YST
OCT. 13	08	15	24.4	63.21 N.	150.59 W.	147	...	...	...	...	G	OCT. 12	10 P.M. AST
OCT. 13	17	12	30.9	63.68 N.	147.58 W.	89	...	...	...	...	G	OCT. 13	07 A.M. AST
OCT. 14	15	53	38.8	54.03 N.	165.99 W.	85	4.5	...	...	IV	G	OCT. 14	04 A.M. BST
OCT. 14	17	36	14.3	66.95 N.	155.37 W.	33N	...	...	3.8M	...	G	OCT. 14	07 A.M. AST
OCT. 15	09	20	12.9	55.67 N.	161.13 W.	24	5.0	...	4.9M	IV	G	OCT. 14	10 P.M. BST
OCT. 15	18	34	58.0	63.24 N.	150.44 W.	136	...	...	...	...	G	OCT. 15	08 A.M. AST
OCT. 16	12	46	20.5	55.30 N.	159.39 W.	10	4.5	...	...	...	G	OCT. 16	02 A.M. AST
OCT. 16	23	46	35.7	58.71 N.	153.43 W.	79	...	...	...	...	G	OCT. 16	01 P.M. AST
OCT. 18	15	39	51.8	62.70 N.	149.33 W.	33N	...	...	3.2M	...	G	OCT. 18	05 A.M. AST
OCT. 19	01	21	22.1	58.66 N.	150.30 W.	110	...	...	...	...	G	OCT. 18	03 P.M. AST
OCT. 19	11	35	53.1	59.94 N.	154.11 W.	178	...	...	...	...	G	OCT. 19	01 A.M. AST
OCT. 20	08	06	18.9	51.56 N.	175.26 W.	53	4.4	...	...	...	G	OCT. 19	09 P.M. BST
OCT. 20	15	50	42.7	52.00 N.	170.02 W.	17	4.8	4.0	...	...	G	OCT. 20	04 A.M. BST
OCT. 20	21	29	17.1	63.09 N.	150.40 W.	117	...	...	...	...	G	OCT. 20	11 A.M. AST
OCT. 21	06	30	14.5	62.93 N.	148.18 W.	91	4.3	...	...	...	G	OCT. 20	08 P.M. AST
OCT. 22	15	33	55.7	59.65 N.	146.64 W.	33N	4.8	4.5	4.4M	...	G	OCT. 22	05 A.M. AST
OCT. 23	01	47	25.4	51.72 N.	175.92 W.	61	4.9	...	...	...	G	OCT. 22	02 P.M. BST
OCT. 23	07	37	22.4	63.04 N.	149.63 W.	100	3.7	...	...	...	G	OCT. 22	09 P.M. AST
OCT. 23	15	34	41.8	62.91 N.	148.84 W.	41	...	...	2.6M	...	G	OCT. 23	05 A.M. AST
OCT. 24	02	30	28.2	59.76 N.	146.52 W.	33N	4.3	...	3.8M	...	G	OCT. 23	04 P.M. AST
OCT. 24	02	51	50.7	61.93 N.	147.87 W.	33N	...	...	2.8M	...	G	OCT. 23	04 P.M. AST
OCT. 24	12	22	0.4	60.04 N.	152.55 W.	110	...	...	...	...	G	OCT. 24	02 A.M. AST
OCT. 25	17	16	41.5	55.59 N.	156.91 W.	33N	4.9	...	4.3M	...	G	OCT. 25	07 A.M. AST
OCT. 26	17	57	11.3	62.03 N.	151.46 W.	102	3.8	...	...	...	G	OCT. 26	07 A.M. AST
OCT. 26	22	33	50.7	52.49 N.	169.53 W.	43	4.8	...	4.8M	...	G	OCT. 26	11 A.M. BST
OCT. 28	13	15	46.5	52.45 N.	176.24 W.	178	4.7	...	...	...	G	OCT. 28	02 A.M. BST
OCT. 30	03	45	26.6	62.51 N.	149.62 W.	80	...	...	...	III	G	OCT. 29	05 P.M. AST
OCT. 30	12	01	31.2	62.95 N.	149.82 W.	121	...	...	...	...	G	OCT. 30	02 A.M. AST
OCT. 30	17	11	22.7	60.07 N.	141.04 W.	15	4.3	...	4.3M	...	G	OCT. 30	07 A.M. AST
OCT. 30	20	53	9.4	57.34 N.	158.08 W.	125	4.7	...	...	...	G	OCT. 30	10 A.M. AST
OCT. 31	01	17	38.2	59.08 N.	136.64 W.	33N	4.0	...	3.7M	...	G	OCT. 30	05 P.M. PST
NOV. 1	03	05	40.6	62.11 N.	148.02 W.	33N	...	...	3.0M	...	G	OCT. 31	05 P.M. AST
NOV. 2	03	20	30.5	61.61 N.	150.92 W.	73	...	...	...	...	G	NOV. 1	05 P.M. AST
NOV. 7	02	37	58.0	60.89 N.	146.80 W.	33N	...	...	1.3M	...	G	NOV. 6	04 P.M. AST
NOV. 7	08	26	26.3	57.78 N.	149.84 W.	33N	...	...	3.3M	...	G	NOV. 6	10 P.M. AST
NOV. 8	21	50	15.8	63.37 N.	145.05 W.	33N	...	...	4.2M	...	G	NOV. 8	11 A.M. AST
NOV. 9	08	44	50.2	52.36 N.	175.18 E.	33N	...	...	4.3M	...	G	NOV. 8	09 P.M. BST
NOV. 9	23	24	9.3	59.93 N.	153.10 W.	129	...	...	...	...	G	NOV. 9	01 P.M. AST
NOV. 12	09	05	19.7	59.64 N.	153.30 W.	145	...	...	...	II	G	NOV. 11	11 P.M. AST
NOV. 12	20	26	28.9	64.06 N.	153.03 W.	33N	...	...	4.5M	...	G	NOV. 12	10 A.M. AST
NOV. 13	09	25	3.4	60.12 N.	153.12 W.	143	...	...	...	...	G	NOV. 12	11 P.M. AST
NOV. 14	09	53	25.1	62.46 N.	150.65 W.	101	...	...	...	...	G	NOV. 13	11 P.M. AST
NOV. 15	09	36	22.6	51.41 N.	177.70 W.	33N	4.4	...	4.0M	...	G	NOV. 14	10 P.M. BST
NOV. 16	13	52	55.7	65.73 N.	154.29 W.	10	...	...	2.9M	...	G	NOV. 16	03 A.M. AST
NOV. 16	18	39	28.0	63.10 N.	151.63 W.	33N	...	...	3.3M	...	G	NOV. 16	08 A.M. AST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
ALASKA--Continued													
NOV. 17	14	46	40.1	63.27 N.	150.64 W.	146	...	...	...	...	G	NOV. 17	04 A.M. AST
NOV. 21	14	56	13.4	51.80 N.	176.14 W.	53	5.6	5.7	...	V	G	NOV. 21	03 A.M. BST
NOV. 22	16	27	27.0	59.33 N.	154.57 W.	137	4.6	...	...	...	G	NOV. 22	06 A.M. AST
NOV. 23	18	52	52.6	60.08 N.	152.83 W.	138	...	...	...	III	G	NOV. 23	08 A.M. AST
NOV. 24	14	33	57.5	60.41 N.	152.45 W.	120	...	...	...	...	G	NOV. 24	04 A.M. AST
NOV. 25	00	05	0.5	60.46 N.	152.26 W.	112	4.3	...	...	...	G	NOV. 24	02 P.M. AST
NOV. 26	08	38	0.4	63.05 N.	150.47 W.	135	...	...	...	...	G	NOV. 25	10 P.M. AST
NOV. 26	08	55	11.8	52.45 N.	170.00 W.	48	4.6	4.0	...	...	G	NOV. 25	09 P.M. BST
NOV. 26	10	50	10.9	56.60 N.	153.34 W.	33N	4.6	...	...	...	G	NOV. 26	12 P.M. AST
NOV. 26	10	55	43.6	55.99 N.	152.46 W.	33N	4.7	...	...	...	G	NOV. 26	12 P.M. AST
NOV. 27	22	54	14.9	59.19 N.	136.43 W.	33N	4.1	...	4.2M	FELT	G	NOV. 27	02 P.M. PST
NOV. 28	02	18	31.8	52.78 N.	162.74 W.	33N	4.9	...	4.3M	...	G	NOV. 27	03 P.M. BST
NOV. 28	06	37	15.3	53.41 N.	163.95 W.	33N	5.0	...	...	...	G	NOV. 27	07 P.M. BST
NOV. 28	17	44	1.2	60.24 N.	152.24 W.	111	4.6	...	...	...	G	NOV. 28	07 A.M. AST
NOV. 29	03	54	40.5	61.89 N.	151.00 W.	80	...	...	...	...	G	NOV. 28	05 P.M. AST
NOV. 29	10	18	54.0	53.21 N.	169.74 W.	99	4.5	...	...	...	G	NOV. 28	11 P.M. BST
NOV. 29	14	31	30.6	51.67 N.	178.08 W.	73	4.5	...	...	...	G	NOV. 29	03 A.M. BST
NOV. 29	18	19	46.4	63.24 N.	150.65 W.	149	...	...	...	...	G	NOV. 29	08 A.M. AST
NOV. 30	17	54	38.9	63.74 N.	147.96 W.	33N	...	...	3.4M	...	G	NOV. 30	07 A.M. AST
NOV. 30	21	31	47.3	59.43 N.	153.27 W.	87	4.9	...	...	V	G	NOV. 30	11 A.M. AST
DEC. 3	13	19	46.7	52.59 N.	170.08 W.	50	4.8	4.6	...	...	G	DEC. 3	02 A.M. BST
DEC. 5	04	05	33.5	63.87 N.	148.84 W.	11	...	...	2.7M	...	G	DEC. 4	06 P.M. AST
DEC. 5	16	59	29.8	62.22 N.	149.49 W.	33N	...	...	3.0M	...	G	DEC. 5	06 A.M. AST
DEC. 6	05	22	17.6	63.11 N.	150.96 W.	127	4.1	...	...	...	G	DEC. 5	07 P.M. AST
DEC. 6	19	32	54.5	52.13 N.	173.07 W.	65	4.7	...	...	...	G	DEC. 6	08 A.M. BST
DEC. 7	03	00	47.1	64.59 N.	146.90 W.	25	...	...	3.0M	...	G	DEC. 6	05 P.M. AST
DEC. 11	08	51	17.5	60.12 N.	153.15 W.	151	...	...	...	...	G	DEC. 10	10 P.M. AST
DEC. 11	22	10	57.4	60.03 N.	152.70 W.	118	...	...	...	III	G	DEC. 11	12 M. AST
DEC. 12	16	00	9.9	60.38 N.	160.99 W.	82	...	...	...	...	G	DEC. 12	06 A.M. AST
DEC. 12	16	49	23.9	64.12 N.	150.25 W.	33N	...	...	3.0M	...	G	DEC. 12	06 A.M. AST
DEC. 12	17	34	49.7	62.86 N.	150.83 W.	110	...	...	...	...	G	DEC. 12	07 A.M. AST
DEC. 12	23	36	49.6	61.31 N.	150.86 W.	61	...	...	...	...	G	DEC. 12	01 P.M. AST
DEC. 13	21	49	24.6	64.78 N.	151.38 W.	33N	...	...	3.6M	...	G	DEC. 13	11 A.M. AST
DEC. 14	03	45	35.8	61.16 N.	147.88 W.	26	...	...	3.1M	...	G	DEC. 13	05 P.M. AST
DEC. 14	06	27	29.8	52.99 N.	171.06 E.	24	5.6	4.8	4.7M	...	G	DEC. 13	07 P.M. BST
DEC. 15	00	35	14.4	61.49 N.	150.72 W.	72	...	...	...	...	G	DEC. 14	02 P.M. AST
DEC. 16	04	28	21.0	66.23 N.	155.32 W.	5	...	...	4.7M	...	G	DEC. 15	06 P.M. AST
DEC. 18	02	44	29.4	63.69 N.	150.74 W.	33N	...	...	3.3M	...	G	DEC. 17	04 P.M. AST
DEC. 18	20	54	13.1	63.56 N.	150.95 W.	37	...	...	3.4M	...	G	DEC. 18	10 A.M. AST
DEC. 20	08	35	8.9	62.08 N.	149.05 W.	70	...	...	...	...	G	DEC. 19	10 P.M. AST
DEC. 20	10	11	40.4	61.86 N.	150.80 W.	53	...	...	3.2M	...	G	DEC. 20	12 P.M. AST
DEC. 21	02	17	59.0	63.22 N.	150.80 W.	126	...	...	...	...	G	DEC. 20	04 P.M. AST
DEC. 22	03	35	24.4	62.30 N.	150.01 W.	33N	...	...	3.3M	...	G	DEC. 21	05 P.M. AST
DEC. 24	12	10	58.4	51.92 N.	170.04 W.	33N	5.0	4.5	...	...	G	DEC. 24	01 A.M. BST
DEC. 24	14	54	59.6	67.47 N.	152.29 W.	33N	...	...	3.7M	...	G	DEC. 24	04 A.M. AST
DEC. 26	07	58	42.2	52.00 N.	170.77 W.	33N	4.7	...	...	...	G	DEC. 25	08 P.M. BST
DEC. 27	17	07	48.9	62.78 N.	150.59 W.	106	3.8	...	...	...	G	DEC. 27	07 A.M. AST
DEC. 27	22	33	46.1	58.48 N.	150.74 W.	33N	4.7	...	3.2M	...	G	DEC. 27	12 M. AST
ARIZONA													
JUNE 1	08	40	27.5	35.39 N.	111.99 W.	5	...	...	3.6G	II	G	JUNE 1	01 A.M. MST
SEPT. 15	22	38	22.2	33.59 N.	111.25 W.	0	...	...	...	V	G	SEPT. 15	03 P.M. MST
CALIFORNIA													
JAN. 1	02	09	25.9	36.23 N.	120.82 W.	6	...	...	3.2B	...	B	DEC. 31	06 P.M. PST
JAN. 1	04	28	41.4	32.90 N.	115.50 W.	5	...	...	3.0P	FELT	P	DEC. 31	08 P.M. PST
JAN. 7	19	56	56.2	37.61 N.	118.92 W.	5	...	...	3.3B	FELT	B	JAN. 7	11 A.M. PST
JAN. 8	19	10	11.5	34.02 N.	117.57 W.	6	...	...	3.3P	IV	P	JAN. 8	11 A.M. PST
JAN. 9	12	17	18.6	40.22 N.	123.76 W.	22	...	...	3.0B	...	B	JAN. 9	04 A.M. PST
JAN. 9	19	53	20.1	38.46 N.	122.64 W.	8	...	...	3.0B	IV	B	JAN. 9	11 A.M. PST
JAN. 10	05	01	59.4	37.44 N.	118.56 W.	5	...	...	3.2B	...	B	JAN. 9	09 P.M. PST
JAN. 12	20	11	5.9	32.97 N.	115.55 W.	5	...	...	4.1P	IV	P	JAN. 12	12 M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
JAN. 13	17	26	36.2	40.33 N.	121.47 W.	12	...	...	3.0B	...	B	JAN. 13	09 A.M. PST
JAN. 13	21	12	34.1	33.12 N.	115.70 W.	5	...	...	3.5P	FELT	P	JAN. 13	01 P.M. PST
JAN. 14	08	54	32.3	39.42 N.	123.20 W.	9	...	...	3.1B	IV	B	JAN. 14	12 P.M. PST
JAN. 14	23	51	54.1	37.61 N.	118.81 W.	11	...	...	4.0B	FELT	B	JAN. 14	03 P.M. PST
JAN. 15	00	00	19.0	37.63 N.	118.87 W.	5	...	...	3.2B	FELT	B	JAN. 14	04 P.M. PST
JAN. 15	13	35	51.6	33.70 N.	116.83 W.	6	...	...	2.8P	FELT	P	JAN. 15	05 A.M. PST
JAN. 15	20	28	22.0	36.18 N.	117.60 W.	8	...	...	3.7P	V	P	JAN. 15	12 M. PST
JAN. 17	01	11	39.5	37.02 N.	121.82 W.	15	...	...	3.6B	FELT	B	JAN. 16	05 P.M. PST
JAN. 17	09	31	21.4	33.83 N.	118.22 W.	5	...	...	2.2P	FELT	P	JAN. 17	01 A.M. PST
JAN. 18	09	09	30.9	33.93 N.	117.73 W.	7	...	...	3.1P	...	P	JAN. 18	01 A.M. PST
JAN. 19	17	05	28.9	38.96 N.	123.53 W.	8	...	...	3.2B	FELT	B	JAN. 19	09 A.M. PST
JAN. 21	06	30	56.4	33.73 N.	117.98 W.	6	...	...	2.1P	FELT	P	JAN. 20	10 P.M. PST
JAN. 22	15	08	47.0	37.63 N.	118.92 W.	5	...	...	3.0P	...	G	JAN. 22	07 A.M. PST
JAN. 24	18	58	42.4	37.83 N.	121.79 W.	7	...	...	2.7B	...	Z	JAN. 24	10 A.M. PST
JAN. 24	19	00	9.7	37.83 N.	121.79 W.	8	5.3	5.9	5.8B	VII	Z	JAN. 24	11 A.M. PST
JAN. 24	19	01	02.2	37.80 N.	121.76 W.	3	...	...	5.1B	FELT	Z	JAN. 24	11 A.M. PST
JAN. 24	19	01	45.2	37.83 N.	121.74 W.	2	...	...	4.0B	FELT	Z	JAN. 24	11 A.M. PST
JAN. 24	19	03	19.2	37.84 N.	121.80 W.	1	...	...	4.8B	FELT	Z	JAN. 24	11 A.M. PST
JAN. 24	19	12	42.1	37.84 N.	121.80 W.	3	...	...	3.1B	FELT	Z	JAN. 24	11 A.M. PST
JAN. 24	19	56	5.2	37.84 N.	121.81 W.	9	...	...	3.5B	FELT	Z	JAN. 24	11 A.M. PST
JAN. 24	19	58	08.9	37.76 N.	121.74 W.	11	...	...	3.0B	FELT	B	JAN. 24	11 A.M. PST
JAN. 24	20	31	07.7	37.83 N.	121.81 W.	10	...	...	3.0B	FELT	B	JAN. 24	12 M. PST
JAN. 24	20	51	12.6	37.84 N.	121.80 W.	7	...	...	3.0B	FELT	B	JAN. 24	12 M. PST
JAN. 25	00	15	08.8	37.85 N.	121.79 W.	6	...	...	3.1B	FELT	B	JAN. 24	04 P.M. PST
JAN. 25	01	48	06.9	37.84 N.	121.78 W.	5	...	...	3.0B	FELT	B	JAN. 24	05 P.M. PST
JAN. 25	04	06	24.9	37.85 N.	121.79 W.	6	...	...	3.0B	FELT	B	JAN. 24	08 P.M. PST
JAN. 25	04	26	34.3	37.84 N.	121.80 W.	5	...	...	3.0B	FELT	B	JAN. 24	08 P.M. PST
JAN. 25	05	12	43.2	37.83 N.	121.78 W.	6	4.2	...	4.4B	FELT	Z	JAN. 24	09 P.M. PST
JAN. 25	05	21	47.7	37.85 N.	121.78 W.	4	...	...	3.4B	FELT	Z	JAN. 24	09 P.M. PST
JAN. 25	05	24	36.6	37.85 N.	121.80 W.	5	4.2	...	4.6B	FELT	Z	JAN. 24	09 P.M. PST
JAN. 25	05	29	45.2	37.85 N.	121.80 W.	3	...	...	3.5B	FELT	Z	JAN. 24	09 P.M. PST
JAN. 25	07	45	59.8	37.84 N.	121.80 W.	3	...	...	3.3B	FELT	Z	JAN. 24	11 P.M. PST
JAN. 25	07	53	39.6	37.84 N.	121.80 W.	5	...	...	3.0B	FELT	B	JAN. 24	11 P.M. PST
JAN. 25	13	39	2.5	37.84 N.	121.79 W.	3	...	...	3.9B	FELT	Z	JAN. 25	05 A.M. PST
JAN. 25	14	03	27.7	37.84 N.	121.79 W.	4	...	...	3.6B	FELT	Z	JAN. 25	06 A.M. PST
JAN. 25	15	41	07.2	37.85 N.	121.79 W.	6	...	...	3.1B	FELT	B	JAN. 25	07 A.M. PST
JAN. 26	23	53	6.0	34.40 N.	117.03 W.	5	...	...	3.1P	...	P	JAN. 26	03 P.M. PST
JAN. 27	00	23	29.2	37.85 N.	121.81 W.	12	...	...	3.0B	FELT	B	JAN. 26	04 P.M. PST
JAN. 27	01	20	26.7	34.05 N.	117.28 W.	14	...	...	2.9P	IV	P	JAN. 26	05 P.M. PST
JAN. 27	02	33	36.2	37.75 N.	121.71 W.	10	5.0	5.0	5.4B	VII	Z	JAN. 26	06 P.M. PST
JAN. 27	07	12	39.4	36.58 N.	121.23 W.	9	...	...	3.0B	...	B	JAN. 26	11 P.M. PST
JAN. 27	10	58	1.5	37.84 N.	121.80 W.	8	...	...	4.1B	FELT	Z	JAN. 27	02 A.M. PST
JAN. 27	22	33	16.9	37.83 N.	121.81 W.	11	...	...	3.3B	FELT	B	JAN. 27	02 P.M. PST
JAN. 29	01	46	4.2	37.79 N.	121.75 W.	9	...	...	3.5B	FELT	Z	JAN. 28	05 P.M. PST
JAN. 30	08	36	24.1	37.65 N.	118.93 W.	14	...	...	3.0B	...	B	JAN. 30	12 P.M. PST
JAN. 30	20	17	45.7	37.65 N.	118.93 W.	5	...	...	3.2B	...	B	JAN. 30	12 M. PST
JAN. 31	10	48	17.2	37.63 N.	118.88 W.	13	...	...	3.2B	...	B	JAN. 31	02 A.M. PST
FEB. 3	20	12	26.0	37.59 N.	118.94 W.	4	...	...	3.2B	...	B	FEB. 3	12 M. PST
FEB. 4	01	22	56.4	37.29 N.	121.66 W.	6	...	...	3.3B	FELT	B	FEB. 3	05 P.M. PST
FEB. 4	06	03	19.8	38.74 N.	122.34 W.	10	...	...	3.0B	IV	B	FEB. 3	10 P.M. PST
FEB. 6	09	36	2.8	37.63 N.	118.78 W.	5	...	...	3.2B	...	B	FEB. 6	01 A.M. PST
FEB. 8	19	53	26.3	34.93 N.	116.80 W.	10	...	...	3.1P	...	P	FEB. 8	11 A.M. PST
FEB. 9	09	17	50.2	33.80 N.	118.08 W.	4	...	...	2.7P	IV	P	FEB. 9	01 A.M. PST
FEB. 13	06	31	13.2	33.28 N.	116.17 W.	7	...	...	3.2P	...	P	FEB. 12	10 P.M. PST
FEB. 13	07	45	50.3	38.95 N.	122.53 W.	6	...	...	3.5B	IV	B	FEB. 12	11 P.M. PST
FEB 14	08	16	32.7	38.88 N.	122.86 W.	5	...	...	3.0B	FELT	B	FEB. 14	12 P.M. PST
FEB. 14	14	30	56.3	37.59 N.	118.91 W.	5	...	...	3.2B	...	B	FEB. 14	06 A.M. PST
FEB. 16	01	45	13.8	34.27 N.	119.60 W.	8	...	...	3.1P	FELT	P	FEB. 15	05 P.M. PST
FEB. 16	15	09	8.2	33.02 N.	115.62 W.	5	...	...	3.9P	FELT	P	FEB. 16	07 A.M. PST
FEB. 16	18	27	25.5	37.51 N.	118.81 W.	8	...	...	3.7B	FELT	B	FEB. 16	10 A.M. PST
FEB. 20	08	53	51.6	34.05 N.	119.00 W.	14	...	...	3.2P	FELT	P	FEB. 20	12 P.M. PST
FEB. 20	10	23	29.9	33.97 N.	117.22 W.	6	...	...	2.5P	FELT	P	FEB. 20	02 A.M. PST
FEB. 21	18	57	29.8	37.66 N.	121.68 W.	6	...	...	3.7B	IV	Z	FEB. 21	10 A.M. PST
FEB. 22	02	30	41.3	37.50 N.	118.69 W.	12	...	...	3.9B	FELT	B	FEB. 21	06 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
FEB. 22	13	39	19.5	33.23 N.	116.28 W.	7	...	...	3.5P	III	P	FEB. 22	05 A.M. PST
FEB. 22	13	39	23.7	33.22 N.	116.22 W.	5	...	...	3.9P	III	P	FEB. 22	05 A.M. PST
FEB. 22	13	45	22.9	33.23 N.	116.23 W.	7	...	...	3.1P	III	P	FEB. 22	05 A.M. PST
FEB. 22	22	26	26.7	37.85 N.	121.79 W.	5	...	...	3.4B	III	B	FEB. 22	02 P.M. PST
FEB. 23	00	57	37.4	37.58 N.	118.79 W.	5	...	...	3.2B	...	B	FEB. 22	04 P.M. PST
FEB. 25	10	47	38.7	33.52 N.	116.55 W.	6	5.1	4.7	5.5P	VI	P	FEB. 25	02 A.M. PST
FEB. 25	10	59	25.3	33.50 N.	116.53 W.	15	...	...	3.4P	...	P	FEB. 25	02 A.M. PST
FEB. 25	11	05	8.8	33.52 N.	116.52 W.	16	...	...	3.3P	FELT	P	FEB. 25	03 A.M. PST
FEB. 25	11	40	49.3	33.52 N.	116.55 W.	10	...	...	3.0P	FELT	P	FEB. 25	03 A.M. PST
FEB. 25	14	00	7.3	33.50 N.	116.53 W.	5	...	...	3.7P	...	P	FEB. 25	06 A.M. PST
FEB. 25	14	51	32.3	33.50 N.	116.53 W.	6	...	...	3.3P	...	P	FEB. 25	06 A.M. PST
FEB. 25	19	02	17.3	33.52 N.	116.52 W.	7	...	...	3.2P	...	P	FEB. 25	11 A.M. PST
FEB. 25	23	43	32.3	36.20 N.	117.58 W.	5	...	...	3.9P	...	P	FEB. 25	03 P.M. PST
FEB. 26	23	42	40.2	32.85 N.	115.55 W.	5	...	...	3.0P	...	P	FEB. 26	03 P.M. PST
FEB. 27	01	28	57.2	32.95 N.	115.57 W.	2	...	...	3.6P	...	P	FEB. 26	05 P.M. PST
FEB. 27	01	41	52.7	32.97 N.	115.57 W.	6	...	...	3.2P	...	P	FEB. 26	05 P.M. PST
FEB. 27	02	38	6.5	32.98 N.	115.57 W.	1	...	...	3.2P	...	P	FEB. 26	06 P.M. PST
FEB. 27	10	54	17.9	40.56 N.	124.00 W.	10	...	...	3.3B	...	B	FEB. 27	02 A.M. PST
FEB. 28	11	39	22.9	40.27 N.	124.05 W.	10	...	...	3.3B	FELT	B	FEB. 28	03 A.M. PST
FEB. 29	23	58	52.8	35.33 N.	120.45 W.	5	...	...	3.3P	...	P	FEB. 29	03 P.M. PST
MAR. 3	08	21	14.0	36.79 N.	121.33 W.	6	...	...	2.7B	FELT	B	MAR. 3	12 P.M. PST
MAR. 6	07	45	25.1	35.57 N.	117.25 W.	1	...	...	3.0P	...	P	MAR. 5	11 P.M. PST
MAR. 6	11	03	44.8	36.67 N.	121.35 W.	7	...	...	3.8B	IV	B	MAR. 6	03 A.M. PST
MAR. 6	11	05	9.2	36.66 N.	121.36 W.	7	...	...	4.0B	FELT	B	MAR. 6	03 A.M. PST
MAR. 6	11	07	37.5	36.66 N.	121.35 W.	5	...	...	3.0B	...	B	MAR. 6	03 A.M. PST
MAR. 10	01	10	42.1	35.61 N.	119.80 W.	5	...	3.1B	3.3P	...	G	MAR. 9	05 P.M. PST
MAR. 10	06	54	22.3	33.88 N.	116.27 W.	7	...	...	3.7P	IV	P	MAR. 9	10 P.M. PST
MAR. 10	21	04	29.7	33.88 N.	116.27 W.	7	...	...	3.3P	...	P	MAR. 10	01 P.M. PST
MAR. 12	08	08	29.2	33.48 N.	116.52 W.	7	...	...	3.0P	...	P	MAR. 12	12 P.M. PST
MAR. 15	07	30	11.1	37.56 N.	118.89 W.	5	...	...	3.3P	...	G	MAR. 14	11 P.M. PST
MAR. 15	15	30	45.6	37.60 N.	118.82 W.	9	...	...	3.8B	FELT	B	MAR. 15	07 A.M. PST
MAR. 16	02	17	16.0	35.67 N.	118.45 W.	5	...	...	2.7P	...	P	MAR. 15	06 P.M. PST
MAR. 17	03	41	17.8	35.65 N.	118.07 W.	6	...	...	3.0P	...	P	MAR. 16	07 P.M. PST
MAR. 19	13	54	24.9	37.58 N.	118.85 W.	6	...	...	3.5B	FELT	B	MAR. 19	05 A.M. PST
MAR. 20	11	04	38.6	37.59 N.	118.89 W.	19	...	...	3.1B	...	B	MAR. 20	03 A.M. PST
MAR. 20	11	05	42.1	37.62 N.	118.90 W.	15	...	...	3.8B	FELT	B	MAR. 20	03 A.M. PST
MAR. 20	11	07	48.1	37.61 N.	118.94 W.	12	...	...	3.1B	...	B	MAR. 20	03 A.M. PST
MAR. 20	14	26	42.5	37.63 N.	118.92 W.	18	...	...	3.2B	...	B	MAR. 20	06 A.M. PST
MAR. 20	16	42	47.7	37.62 N.	118.92 W.	9	...	...	3.7B	FELT	B	MAR. 20	08 A.M. PST
MAR. 20	22	14	33.4	37.62 N.	118.91 W.	8	...	...	3.8B	FELT	B	MAR. 20	02 P.M. PST
MAR. 20	23	54	12.2	37.62 N.	118.91 W.	5	...	...	3.3B	FELT	B	MAR. 20	03 P.M. PST
MAR. 21	02	23	48.0	35.78 N.	119.60 W.	5	...	...	3.2P	...	P	MAR. 20	06 P.M. PST
MAR. 21	03	49	45.2	37.61 N.	118.91 W.	5	...	...	3.1B	...	B	MAR. 20	07 P.M. PST
MAR. 21	09	09	28.1	37.60 N.	118.90 W.	5	...	...	3.2P	...	G	MAR. 21	01 A.M. PST
MAR. 22	14	12	55.2	38.81 N.	119.81 W.	17	...	...	3.6B	FELT	B	MAR. 22	06 A.M. PST
MAR. 25	05	31	43.1	33.95 N.	118.67 W.	8	...	...	2.9P	FELT	P	MAR. 24	09 P.M. PST
MAR. 26	14	41	55.5	37.62 N.	118.91 W.	9	...	...	3.5B	FELT	B	MAR. 26	06 A.M. PST
MAR. 26	16	21	41.1	37.61 N.	118.92 W.	9	...	...	3.1P	...	G	MAR. 26	08 A.M. PST
MAR. 27	02	26	4.1	37.61 N.	118.89 W.	9	...	...	4.3B	IV	B	MAR. 26	06 P.M. PST
MAR. 27	02	29	13.9	37.61 N.	118.90 W.	9	...	...	3.5B	FELT	B	MAR. 26	06 P.M. PST
MAR. 29	06	14	7.6	37.61 N.	118.92 W.	9	...	...	3.5B	FELT	B	MAR. 28	10 P.M. PST
MAR. 29	07	27	46.3	37.63 N.	118.92 W.	5	...	...	3.4B	...	B	MAR. 28	11 P.M. PST
MAR. 29	18	31	19.2	37.67 N.	118.89 W.	5	...	...	3.3B	...	B	MAR. 29	10 A.M. PST
MAR. 30	08	34	9.5	37.62 N.	118.90 W.	5	...	...	3.4B	FELT	B	MAR. 30	12 P.M. PST
APR. 2	08	04	40.7	37.60 N.	118.84 W.	8	...	...	3.0B	FELT	B	APR. 2	12 P.M. PST
APR. 2	18	20	40.6	36.85 N.	115.91 W.	5	...	...	3.2P	...	G	APR. 2	10 A.M. PST
APR. 3	03	00	45.0	37.48 N.	118.67 W.	13	...	...	3.6B	FELT	B	APR. 2	07 P.M. PST
APR. 5	04	10	20.6	41.11 N.	124.01 W.	18	...	...	3.6B	...	B	APR. 4	08 P.M. PST
APR. 5	14	02	13.7	37.55 N.	118.78 W.	13	...	...	3.2B	...	B	APR. 13	06 A.M. PST
APR. 6	22	05	49.1	33.18 N.	115.52 W.	5	...	...	3.3P	FELT	P	APR. 6	02 P.M. PST
APR. 7	02	07	37.4	37.62 N.	118.91 W.	14	...	...	3.0B	...	B	APR. 6	06 P.M. PST
APR. 7	05	17	30.6	37.84 N.	122.23 W.	5	...	...	3.5B	V	B	APR. 6	09 P.M. PST
APR. 7	22	01	35.9	33.20 N.	115.58 W.	5	...	...	3.0P	FELT	P	APR. 7	02 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
APR. 7	22	40	52.1	33.20 N.	115.55 W.	5	...	...	3.1P	FELT	P	APR. 7	02 P.M. PST
APR. 13	03	52	27.5	33.87 N.	118.18 W.	6	...	...	2.2P	II	P	APR. 12	07 P.M. PST
APR. 13	06	15	56.3	36.77 N.	121.52 W.	7	4.5	...	4.7B	V	B	APR. 12	10 P.M. PST
APR. 13	06	20	40.1	36.78 N.	121.56 W.	6	...	...	3.2B	...	B	APR. 12	10 P.M. PST
APR. 13	07	58	10.5	36.77 N.	121.51 W.	7	...	...	3.2B	...	B	APR. 12	11 P.M. PST
APR. 13	23	08	44.3	36.76 N.	121.51 W.	7	...	...	3.2B	...	B	APR. 13	03 P.M. PST
APR. 16	09	58	47.5	37.61 N.	121.69 W.	10	...	...	3.0B	...	B	APR. 16	01 A.M. PST
APR. 16	20	26	14.9	34.35 N.	119.60 W.	8	...	...	3.0P	III	P	APR. 16	12 M. PST
APR. 19	12	45	50.8	36.79 N.	121.56 W.	7	...	...	3.0B	...	B	APR. 19	04 A.M. PST
APR. 21	13	25	5.2	37.63 N.	118.89 W.	13	...	...	3.1B	...	B	APR. 21	13 A.M. PST
APR. 25	12	53	14.5	37.60 N.	118.92 W.	5	...	...	3.0B	...	B	APR. 25	04 A.M. PST
APR. 26	07	36	47.8	37.32 N.	121.68 W.	8	...	...	3.1B	...	B	APR. 25	11 P.M. PST
APR. 28	18	21	25.5	36.79 N.	121.56 W.	7	...	...	3.3B	FELT	B	APR. 28	10 A.M. PST
APR. 29	10	50	25.0	34.08 N.	118.17 W.	5	...	...	2.1P	FELT	P	APR. 29	02 A.M. PST
APR. 29	13	50	23.0	40.51 N.	123.49 W.	10	...	...	4.0B	...	B	APR. 29	05 A.M. PST
APR. 29	14	30	3.6	40.52 N.	123.51 W.	15	...	...	3.3B	...	B	APR. 29	06 A.M. PST
MAY 3	23	01	13.3	37.25 N.	118.58 W.	6	...	...	3.0P	...	P	MAY 3	03 P.M. PST
MAY 4	19	50	39.7	34.08 N.	118.17 W.	4	...	...	2.2P	FELT	P	MAY 4	11 A.M. PST
MAY 7	17	41	26.7	37.61 N.	118.88 W.	12	...	...	3.3B	...	B	MAY 7	09 A.M. PST
MAY 7	22	22	31.4	37.63 N.	118.90 W.	21	...	...	3.3B	...	B	MAY 7	02 P.M. PST
MAY 8	18	00	51.5	37.61 N.	118.90 W.	10	...	...	3.5B	FELT	B	MAY 8	10 A.M. PST
MAY 9	19	56	36.8	37.67 N.	118.95 W.	33	...	...	3.3B	...	B	MAY 9	11 A.M. PST
MAY 11	02	19	23.0	34.38 N.	118.33 W.	8	...	...	3.1P	IV	P	MAY 10	06 P.M. PST
MAY 12	06	07	34.5	37.56 N.	118.88 W.	5	...	...	3.1P	...	G	MAY 11	10 P.M. PST
MAY 14	08	02	31.8	37.60 N.	118.83 W.	13	...	...	4.0B	IV	B	MAY 14	12 P.M. PST
MAY 14	11	18	3.4	37.62 N.	118.85 W.	6	...	...	3.3P	FELT	B	MAY 14	03 A.M. PST
MAY 14	11	41	33.3	37.61 N.	118.84 W.	6	...	...	3.3B	FELT	B	MAY 14	03 A.M. PST
MAY 14	12	03	55.0	37.62 N.	118.84 W.	13	...	...	3.1B	FELT	B	MAY 14	04 A.M. PST
MAY 14	19	48	58.7	37.61 N.	118.90 W.	4	...	...	3.7B	FELT	B	MAY 14	11 A.M. PST
MAY 14	21	08	28.6	37.64 N.	118.89 W.	5	...	...	3.1P	...	G	MAY 14	01 P.M. PST
MAY 15	14	52	31.0	36.62 N.	121.27 W.	9	...	...	3.0B	...	B	MAY 15	06 A.M. PST
MAY 17	00	01	13.5	37.60 N.	118.84 W.	9	...	...	4.3B	FELT	B	MAY 16	04 P.M. PST
MAY 18	12	47	29.6	37.61 N.	118.89 W.	10	...	...	4.0B	FELT	B	MAY 18	04 A.M. PST
MAY 18	12	50	13.5	37.61 N.	118.88 W.	13	...	...	2.9B	...	B	MAY 18	13 A.M. PST
MAY 18	18	40	51.8	37.59 N.	118.84 W.	8	...	...	3.6B	FELT	B	MAY 18	10 A.M. PST
MAY 19	03	03	15.3	35.96 N.	120.55 W.	13	...	...	3.1B	...	B	MAY 18	07 P.M. PST
MAY 19	10	25	17.6	37.63 N.	118.89 W.	12	...	...	3.3B	...	B	MAY 19	02 A.M. PST
MAY 19	12	53	26.2	37.62 N.	118.90 W.	17	...	...	3.3B	...	B	MAY 19	04 A.M. PST
MAY 19	22	19	8.4	37.61 N.	118.89 W.	12	...	...	3.5B	FELT	B	MAY 19	02 P.M. PST
MAY 19	23	16	47.0	37.62 N.	118.89 W.	19	...	...	3.0B	...	B	MAY 19	03 P.M. PST
MAY 20	00	50	33.0	35.05 N.	119.05 W.	10	...	...	3.8P	...	P	MAY 19	04 P.M. PST
MAY 20	01	32	51.1	35.07 N.	119.02 W.	8	...	...	3.1P	...	P	MAY 19	05 P.M. PST
MAY 20	05	22	11.0	37.63 N.	118.89 W.	28	...	...	2.8B	...	B	MAY 19	09 P.M. PST
MAY 20	18	43	0.1	37.58 N.	118.89 W.	5	...	...	3.2P	...	G	MAY 20	10 A.M. PST
MAY 20	23	07	13.5	37.61 N.	118.90 W.	27	...	...	3.1B	...	B	MAY 20	03 P.M. PST
MAY 21	10	27	47.5	37.62 N.	118.83 W.	17	...	...	3.0B	...	B	MAY 21	02 A.M. PST
MAY 21	20	03	38.8	37.59 N.	118.84 W.	5	...	...	3.0P	...	G	MAY 21	12 M. PST
MAY 22	13	03	32.3	37.53 N.	118.83 W.	5	...	...	3.1P	...	P	MAY 22	05 A.M. PST
MAY 25	04	49	34.5	37.62 N.	118.88 W.	10	...	...	3.9P	FELT	B	MAY 24	08 P.M. PST
MAY 25	16	33	44.2	37.59 N.	118.85 W.	8	6.1	6.1	6.1B	VII	B	MAY 25	08 A.M. PST
MAY 25	16	39	40.6	37.57 N.	118.84 W.	6	...	...	4.0B	FELT	B	MAY 25	08 A.M. PST
MAY 25	16	41	56.5	37.55 N.	118.87 W.	16	...	...	4.3B	FELT	B	MAY 25	08 A.M. PST
MAY 25	16	45	26.9	37.53 N.	118.92 W.	22	...	...	4.4B	FELT	B	MAY 25	08 A.M. PST
MAY 25	16	49	26.2	37.62 N.	118.90 W.	1	5.5	...	6.0B	FELT	B	MAY 25	08 A.M. PST
MAY 25	16	52	28.9	37.53 N.	118.90 W.	2	...	...	4.4B	FELT	B	MAY 25	08 A.M. PST
MAY 25	16	52	50.0	37.53 N.	118.90 W.	2	...	...	3.6B	FELT	B	MAY 25	08 A.M. PST
MAY 25	16	54	10.3	37.60 N.	118.89 W.	10	...	...	3.8B	FELT	B	MAY 25	08 A.M. PST
MAY 25	16	56	13.1	37.58 N.	118.92 W.	12	...	...	4.2B	FELT	B	MAY 25	08 A.M. PST
MAY 25	16	59	48.7	37.59 N.	118.87 W.	20	...	...	3.8B	FELT	B	MAY 25	08 A.M. PST
MAY 25	17	03	29.8	37.53 N.	118.87 W.	5	...	...	3.8P	...	P	MAY 25	09 A.M. PST
MAY 25	17	05	40.0	37.45 N.	118.70 W.	5	...	...	3.1P	...	P	MAY 25	09 A.M. PST
MAY 25	17	06	24.4	37.53 N.	118.93 W.	5	...	...	4.6B	FELT	B	MAY 25	09 A.M. PST
MAY 25	17	08	28.3	37.59 N.	118.85 W.	16	4.2	...	4.7B	FELT	B	MAY 25	09 A.M. PST
MAY 25	17	11	04.1	37.60 N.	118.91 W.	2	...	...	3.7B	FELT	B	MAY 25	09 A.M. PST
MAY 25	17	11	25.2	37.57 N.	118.83 W.	34	...	...	4.0B	FELT	B	MAY 25	09 A.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
MAY	25	17	12 40.9	37.54 N.	118.91 W.	10	...	...	3.4B	FELT	B	MAY 25	09 A.M. PST
MAY	25	17	13 48.9	37.57 N.	118.90 W.	3	...	...	3.5B	FELT	B	MAY 25	09 A.M. PST
MAY	25	17	16 03.0	37.61 N.	118.79 W.	15	...	...	3.5B	FELT	B	MAY 25	09 A.M. PST
MAY	25	17	16 51.9	37.58 N.	118.86 W.	9	...	...	3.9B	FELT	B	MAY 25	09 A.M. PST
MAY	25	17	17 29.5	37.61 N.	118.92 W.	10	...	...	3.6B	FELT	B	MAY 25	09 A.M. PST
MAY	25	17	18 21.6	37.56 N.	118.95 W.	1	...	...	3.7B	FELT	B	MAY 25	09 A.M. PST
MAY	25	17	22 08.8	37.55 N.	118.84 W.	10	...	...	3.6B	FELT	B	MAY 25	09 A.M. PST
MAY	25	17	27 10.6	37.55 N.	118.91 W.	10	...	...	3.8B	FELT	B	MAY 25	09 A.M. PST
MAY	25	17	32 59.1	37.62 N.	118.90 W.	6	...	...	3.4P	...	P	MAY 25	09 A.M. PST
MAY	25	17	44 28.2	37.50 N.	118.82 W.	5	...	...	3.4P	...	P	MAY 25	09 A.M. PST
MAY	25	17	45 34.0	37.57 N.	118.90 W.	13	...	...	3.5B	FELT	B	MAY 25	09 A.M. PST
MAY	25	17	46 42.8	37.60 N.	118.91 W.	10	...	...	3.7B	FELT	B	MAY 25	09 A.M. PST
MAY	25	17	48 30.0	37.59 N.	118.89 W.	4	3.9	...	4.6B	FELT	B	MAY 25	09 A.M. PST
MAY	25	17	54 41.8	37.53 N.	118.93 W.	6	...	...	3.6P	...	P	MAY 25	09 A.M. PST
MAY	25	18	05 44.0	37.63 N.	118.85 W.	9	...	...	3.6B	FELT	B	MAY 25	10 A.M. PST
MAY	25	18	11 40.4	37.53 N.	118.82 W.	4	...	...	3.5P	...	P	MAY 25	10 A.M. PST
MAY	25	18	13 57.5	37.56 N.	118.88 W.	8	...	...	3.9B	FELT	B	MAY 25	10 A.M. PST
MAY	25	18	29 23.2	37.68 N.	118.82 W.	7	...	...	3.3P	...	P	MAY 25	10 A.M. PST
MAY	25	18	34 14.4	37.54 N.	118.91 W.	4	4.1	...	4.6B	FELT	B	MAY 25	14 A.M. PST
MAY	25	18	44 59.9	37.57 N.	118.89 W.	5	...	...	3.8B	FELT	B	MAY 25	10 A.M. PST
MAY	25	18	45 0.8	37.58 N.	118.82 W.	4	...	...	3.7P	...	P	MAY 25	10 A.M. PST
MAY	25	18	47 21.4	37.68 N.	118.72 W.	4	...	...	3.2P	...	P	MAY 25	10 A.M. PST
MAY	25	19	03 49.0	33.35 N.	116.38 W.	13	...	...	3.2P	...	P	MAY 25	11 A.M. PST
MAY	25	19	04 33.9	37.54 N.	118.90 W.	5	...	...	4.5B	FELT	B	MAY 25	11 A.M. PST
MAY	25	19	12 6.9	37.52 N.	118.82 W.	5	...	...	3.2P	...	P	MAY 25	11 A.M. PST
MAY	25	19	19 25.9	37.48 N.	118.83 W.	5	...	...	3.2P	...	P	MAY 25	11 A.M. PST
MAY	25	19	31 47.3	37.57 N.	118.87 W.	3	...	...	3.6B	FELT	B	MAY 25	11 A.M. PST
MAY	25	19	35 21.7	37.45 N.	118.95 W.	5	...	...	3.5P	...	P	MAY 25	11 A.M. PST
MAY	25	19	41 23.3	37.56 N.	118.88 W.	10	...	...	4.4P	FELT	B	MAY 25	11 A.M. PST
MAY	25	19	44 51.0	37.54 N.	118.84 W.	13	5.5	5.8	6.1B	VII	B	MAY 25	11 A.M. PST
MAY	25	19	51 52.4	37.57 N.	118.81 W.	14	...	...	4.2B	FELT	B	MAY 25	11 A.M. PST
MAY	25	19	53 27.6	37.47 N.	118.88 W.	5	...	...	3.4P	...	P	MAY 25	11 A.M. PST
MAY	25	19	55 0.8	37.53 N.	118.77 W.	5	...	...	4.0P	FELT	P	MAY 25	11 A.M. PST
MAY	25	19	56 34.6	37.55 N.	118.70 W.	5	...	...	3.3P	FELT	P	MAY 25	11 A.M. PST
MAY	25	20	01 14.0	37.62 N.	118.77 W.	5	...	...	3.1P	...	P	MAY 25	12 M. PST
MAY	25	20	02 57.7	37.50 N.	118.80 W.	5	...	...	3.4P	...	P	MAY 25	12 M. PST
MAY	25	20	10 40.9	37.42 N.	118.80 W.	6	...	...	3.3P	...	P	MAY 25	12 M. PST
MAY	25	20	12 24.0	37.37 N.	118.82 W.	6	...	...	3.7P	FELT	P	MAY 25	12 M. PST
MAY	25	20	23 27.1	37.62 N.	118.82 W.	3	...	...	4.7P	FELT	P	MAY 25	12 M. PST
MAY	25	20	28 45.8	37.60 N.	118.75 W.	4	...	...	3.2P	...	P	MAY 25	12 M. PST
MAY	25	20	34 52.6	37.40 N.	118.70 W.	5	...	...	3.3P	FELT	P	MAY 25	12 M. PST
MAY	25	20	35 48.0	37.61 N.	118.86 W.	5	5.2	5.3	5.7B	FELT	B	MAY 25	06 P.M. PST
MAY	25	20	38 41.6	37.57 N.	118.68 W.	4	...	...	4.9P	FELT	P	MAY 25	12 M. PST
MAY	25	20	40 47	37.63 N.	118.85 W.	5	...	...	3.8B	FELT	B	MAY 25	12 M. PST
MAY	25	20	44 43.1	37.47 N.	118.92 W.	6	...	...	3.7P	FELT	P	MAY 25	12 M. PST
MAY	25	20	47 53.0	37.40 N.	118.87 W.	4	...	...	3.5P	...	P	MAY 25	12 M. PST
MAY	25	20	59 22.6	37.57 N.	118.82 W.	8	4.2	...	5.0B	FELT	B	MAY 25	12 M. PST
MAY	25	21	08 51.6	37.38 N.	118.80 W.	5	...	...	3.0P	...	P	MAY 25	01 P.M. PST
MAY	25	21	14 6.5	37.52 N.	118.83 W.	5	...	...	3.3P	FELT	P	MAY 25	01 P.M. PST
MAY	25	21	17 25.9	37.52 N.	118.97 W.	7	...	...	3.8P	FELT	P	MAY 25	01 P.M. PST
MAY	25	21	20 8.8	37.52 N.	118.82 W.	4	...	...	3.6P	FELT	P	MAY 25	01 P.M. PST
MAY	25	21	20 54.7	37.52 N.	118.82 W.	5	...	...	3.5P	FELT	P	MAY 25	01 P.M. PST
MAY	25	21	25 54.3	37.53 N.	118.75 W.	5	...	...	3.5P	...	P	MAY 25	01 P.M. PST
MAY	25	21	47 16.7	37.45 N.	118.83 W.	4	...	...	3.9P	FELT	P	MAY 25	01 P.M. PST
MAY	25	22	00 1.1	37.52 N.	118.85 W.	6	...	...	3.3P	...	P	MAY 25	02 P.M. PST
MAY	25	22	10 36.4	37.43 N.	118.77 W.	5	...	...	4.2P	FELT	P	MAY 25	02 P.M. PST
MAY	25	22	29 20.6	37.57 N.	118.75 W.	4	...	...	3.6P	FELT	P	MAY 25	02 P.M. PST
MAY	25	22	33 38.2	37.47 N.	118.83 W.	4	...	...	3.9P	FELT	P	MAY 25	02 P.M. PST
MAY	25	22	43 38.3	37.53 N.	118.65 W.	5	...	...	3.1P	FELT	P	MAY 25	02 P.M. PST
MAY	25	22	44 7.9	37.50 N.	118.88 W.	5	...	...	3.9P	...	P	MAY 25	02 P.M. PST
MAY	25	22	46 22.5	37.50 N.	118.83 W.	4	...	...	3.6P	...	P	MAY 25	02 P.M. PST
MAY	25	22	53 6.4	37.53 N.	118.73 W.	4	...	...	3.2P	...	P	MAY 25	02 P.M. PST
MAY	25	23	21 32.7	37.48 N.	118.75 W.	4	...	...	3.1P	...	P	MAY 25	03 P.M. PST
MAY	25	23	49 14.7	37.58 N.	118.95 W.	5	...	...	3.2P	...	P	MAY 25	03 P.M. PST
MAY	25	23	55 46.7	37.55 N.	118.85 W.	5	...	...	3.6P	FELT	P	MAY 25	03 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
MAY	25	23	59 19.7	37.52 N.	118.83 W.	3	...	...	3.8P	FELT	P	MAY 25	03 P.M. PST
MAY	26	00	57 5.1	37.55 N.	118.80 W.	5	4.2	...	4.4P	FELT	P	MAY 25	04 P.M. PST
MAY	26	01	19 2.2	37.57 N.	118.95 W.	7	4.4	...	4.6B	FELT	B	MAY 25	05 P.M. PST
MAY	26	01	20 50.4	37.52 N.	118.88 W.	5	...	...	3.6P	FELT	P	MAY 25	05 P.M. PST
MAY	26	01	29 21.7	37.55 N.	118.75 W.	5	...	...	3.1P	...	P	MAY 25	05 P.M. PST
MAY	26	01	46 14.6	37.60 N.	118.78 W.	3	...	...	3.0P	...	P	MAY 25	05 P.M. PST
MAY	26	01	47 47.7	37.50 N.	118.80 W.	3	...	...	3.0P	...	P	MAY 25	05 P.M. PST
MAY	26	01	49 23.8	37.40 N.	118.92 W.	5	...	...	3.2P	...	P	MAY 25	05 P.M. PST
MAY	26	02	06 33.6	37.53 N.	118.97 W.	5	...	...	3.3P	...	P	MAY 25	06 P.M. PST
MAY	26	02	07 51.6	37.47 N.	118.98 W.	5	...	...	3.2P	...	P	MAY 25	06 P.M. PST
MAY	26	02	09 6.2	37.57 N.	118.77 W.	5	...	...	3.6P	FELT	P	MAY 25	06 P.M. PST
MAY	26	02	10 29.4	37.40 N.	118.90 W.	5	...	...	3.3P	...	P	MAY 25	06 P.M. PST
MAY	26	02	23 49.8	37.38 N.	118.87 W.	5	...	...	3.3P	...	P	MAY 25	06 P.M. PST
MAY	26	02	33 28.8	37.45 N.	118.87 W.	5	...	...	3.0P	...	P	MAY 25	06 P.M. PST
MAY	26	02	36 15.1	37.42 N.	118.77 W.	5	...	...	3.1P	...	P	MAY 25	06 P.M. PST
MAY	26	02	41 23.7	37.57 N.	118.85 W.	4	...	...	3.3P	...	P	MAY 25	06 P.M. PST
MAY	26	02	46 41.0	37.50 N.	118.68 W.	4	...	...	3.0P	...	P	MAY 25	06 P.M. PST
MAY	26	02	54 33.1	37.38 N.	118.83 W.	5	...	...	3.3P	FELT	P	MAY 25	06 P.M. PST
MAY	26	03	00 1.5	37.48 N.	118.80 W.	5	...	...	3.2P	...	P	MAY 25	07 P.M. PST
MAY	26	03	06 31.9	37.37 N.	118.73 W.	4	...	...	3.0P	...	P	MAY 25	07 P.M. PST
MAY	26	03	12 40.6	37.52 N.	118.87 W.	4	...	...	3.4P	...	P	MAY 25	07 P.M. PST
MAY	26	03	16 41.4	37.63 N.	118.77 W.	3	...	...	3.0P	...	P	MAY 25	07 P.M. PST
MAY	26	03	19 4.4	37.53 N.	118.75 W.	5	...	...	3.3P	...	P	MAY 25	07 P.M. PST
MAY	26	03	24 10.6	37.58 N.	118.85 W.	4	...	...	3.1P	FELT	P	MAY 25	07 P.M. PST
MAY	26	03	24 32.8	37.47 N.	118.80 W.	5	...	...	3.8P	...	P	MAY 25	07 P.M. PST
MAY	26	03	31 8.2	37.78 N.	118.62 W.	5	...	...	3.2P	...	P	MAY 25	07 P.M. PST
MAY	26	03	49 8.0	37.63 N.	118.72 W.	1	...	...	4.0P	FELT	P	MAY 25	07 P.M. PST
MAY	26	04	02 35.3	37.48 N.	118.73 W.	5	...	...	3.4P	...	P	MAY 25	08 P.M. PST
MAY	26	04	20 40.0	37.52 N.	118.78 W.	5	...	...	3.5P	...	P	MAY 25	08 P.M. PST
MAY	26	04	24 27.6	37.50 N.	118.87 W.	5	...	...	3.0P	...	P	MAY 25	08 P.M. PST
MAY	26	04	36 54.8	37.65 N.	118.70 W.	3	...	...	4.0P	FELT	P	MAY 25	08 P.M. PST
MAY	26	04	47 17.4	37.50 N.	118.80 W.	5	...	...	3.7P	FELT	P	MAY 25	08 P.M. PST
MAY	26	04	52 6.3	37.45 N.	118.72 W.	3	...	...	3.0P	...	P	MAY 25	08 P.M. PST
MAY	26	05	12 47.7	37.38 N.	118.92 W.	5	...	...	3.3P	FELT	P	MAY 25	09 P.M. PST
MAY	26	05	14 40.5	37.37 N.	118.83 W.	5	...	...	3.0P	...	P	MAY 25	09 P.M. PST
MAY	26	05	26 10.2	37.60 N.	118.77 W.	4	...	...	3.2P	...	P	MAY 25	09 P.M. PST
MAY	26	05	35 52.4	37.43 N.	118.72 W.	5	...	...	3.0P	...	P	MAY 25	09 P.M. PST
MAY	26	05	45 7.8	37.37 N.	118.70 W.	5	...	...	3.5P	FELT	P	MAY 25	09 P.M. PST
MAY	26	05	56 26.3	37.57 N.	118.90 W.	7	4.0	...	4.7B	FELT	B	MAY 25	09 P.M. PST
MAY	26	06	02 33.7	37.35 N.	118.90 W.	5	...	...	3.2P	FELT	P	MAY 25	10 P.M. PST
MAY	26	06	04 1.5	37.42 N.	118.73 W.	5	...	...	3.4P	...	P	MAY 25	10 P.M. PST
MAY	26	06	05 29.3	37.42 N.	118.88 W.	5	...	...	3.2P	...	P	MAY 25	10 P.M. PST
MAY	26	06	21 12.2	37.47 N.	118.82 W.	4	...	...	3.1P	...	P	MAY 25	10 P.M. PST
MAY	26	06	21 58.6	37.48 N.	118.90 W.	5	...	...	3.0P	...	P	MAY 25	10 P.M. PST
MAY	26	06	37 11.8	37.51 N.	118.80 W.	3	...	...	3.1P	...	P	MAY 25	10 P.M. PST
MAY	26	06	43 27.8	37.58 N.	118.78 W.	5	...	...	3.0P	...	P	MAY 25	10 P.M. PST
MAY	26	06	43 48.6	37.45 N.	118.85 W.	4	...	...	4.1P	FELT	P	MAY 25	10 P.M. PST
MAY	26	06	53 35.5	37.42 N.	118.73 W.	4	...	...	3.1P	...	P	MAY 25	10 P.M. PST
MAY	26	07	02 49.2	37.40 N.	118.75 W.	6	...	...	3.5P	FELT	P	MAY 25	11 P.M. PST
MAY	26	07	04 53.7	37.33 N.	118.80 W.	5	...	...	3.2P	...	P	MAY 25	11 P.M. PST
MAY	26	07	14 52.9	37.55 N.	118.93 W.	4	...	...	3.4P	...	P	MAY 25	11 P.M. PST
MAY	26	07	18 38.0	37.67 N.	118.82 W.	3	...	...	3.5P	...	P	MAY 25	11 P.M. PST
MAY	26	07	21 3.2	37.60 N.	118.88 W.	2	...	...	3.3P	...	P	MAY 25	11 P.M. PST
MAY	26	07	30 20.1	40.29 N.	124.25 W.	10	...	...	3.0B	...	B	MAY 25	11 P.M. PST
MAY	26	07	42 3.0	37.62 N.	118.80 W.	4	...	...	3.3P	FELT	P	MAY 25	11 P.M. PST
MAY	26	07	42 50.1	37.47 N.	118.83 W.	5	...	...	3.9P	FELT	P	MAY 25	11 P.M. PST
MAY	26	07	43 43.2	37.38 N.	118.92 W.	5	...	...	3.5P	FELT	P	MAY 25	11 P.M. PST
MAY	26	08	05 12.7	37.38 N.	118.70 W.	5	...	...	3.2P	FELT	P	MAY 26	12 P.M. PST
MAY	26	10	16 50.0	37.57 N.	118.65 W.	4	...	...	3.0P	...	P	MAY 26	02 A.M. PST
MAY	26	10	20 31.1	37.60 N.	118.81 W.	8	4.0	...	4.5B	FELT	B	MAY 26	02 A.M. PST
MAY	26	10	39 31.8	37.50 N.	118.75 W.	4	...	...	3.0P	...	P	MAY 26	02 A.M. PST
MAY	26	10	39 58.5	37.48 N.	118.85 W.	5	...	...	3.7P	FELT	P	MAY 26	02 A.M. PST
MAY	26	10	42 28.0	37.30 N.	118.82 W.	5	...	...	3.0P	...	P	MAY 26	02 A.M. PST
MAY	26	10	44 19.5	37.52 N.	118.83 W.	4	...	...	3.3P	...	P	MAY 26	02 A.M. PST
MAY	26	10	56 55.5	37.58 N.	118.77 W.	5	...	...	3.4P	...	P	MAY 26	02 A.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
MAY 26	11	04	6.7	37.50 N.	118.70 W.	5	...	...	4.0P	FELT	P	MAY 26	03 A.M. PST
MAY 26	11	05	34.9	37.56 N.	118.81 W.	29	...	...	3.5B	FELT	B	MAY 26	03 A.M. PST
MAY 26	11	24	31.1	37.55 N.	118.83 W.	5	...	...	3.1P	...	P	MAY 26	03 A.M. PST
MAY 26	11	47	39.7	37.55 N.	118.83 W.	4	...	...	3.2P	...	P	MAY 26	03 A.M. PST
MAY 26	12	22	34.9	37.42 N.	118.80 W.	4	...	...	3.1P	...	P	MAY 26	04 A.M. PST
MAY 26	12	24	25.1	37.56 N.	118.88 W.	7	4.7	...	5.1B	IV	B	MAY 26	04 A.M. PST
MAY 26	12	50	51.8	37.45 N.	118.87 W.	5	...	...	3.2P	...	P	MAY 26	04 A.M. PST
MAY 26	13	01	48.7	37.42 N.	118.85 W.	5	...	...	3.0P	...	P	MAY 26	05 A.M. PST
MAY 26	13	03	23.3	37.37 N.	118.73 W.	4	...	...	3.0P	...	P	MAY 26	05 A.M. PST
MAY 26	13	04	20.6	37.50 N.	118.82 W.	2	...	...	4.1P	FELT	P	MAY 26	05 A.M. PST
MAY 26	13	29	23.9	37.55 N.	118.87 W.	5	...	...	3.3P	...	P	MAY 26	05 A.M. PST
MAY 26	13	55	30.5	37.53 N.	118.77 W.	3	...	...	3.3P	...	P	MAY 26	05 A.M. PST
MAY 26	13	56	5.0	37.25 N.	118.72 W.	5	...	...	3.0P	...	P	MAY 26	05 A.M. PST
MAY 26	13	57	26.9	37.57 N.	118.73 W.	1	...	...	3.8P	FELT	P	MAY 26	05 A.M. PST
MAY 26	14	04	7.7	37.48 N.	118.83 W.	5	...	...	3.2P	FELT	P	MAY 26	06 A.M. PST
MAY 26	14	31	22.9	37.58 N.	118.87 W.	5	...	...	3.1P	...	P	MAY 26	06 A.M. PST
MAY 26	14	37	32.4	37.48 N.	118.82 W.	1	4.1	...	4.2P	FELT	P	MAY 26	06 A.M. PST
MAY 26	14	48	56.7	37.40 N.	118.78 W.	4	...	...	3.0P	...	P	MAY 26	06 A.M. PST
MAY 26	15	06	24.5	37.62 N.	118.87 W.	3	...	...	3.0P	...	P	MAY 26	07 A.M. PST
MAY 26	15	50	37.4	37.38 N.	118.67 W.	5	...	...	3.6P	FELT	P	MAY 26	07 A.M. PST
MAY 26	15	55	57.2	37.42 N.	118.73 W.	2	...	...	3.0P	...	P	MAY 26	07 A.M. PST
MAY 26	16	04	44.5	37.43 N.	118.78 W.	5	...	...	3.0P	...	P	MAY 26	08 A.M. PST
MAY 26	16	17	19.3	37.45 N.	118.85 W.	5	...	...	3.3P	...	P	MAY 26	08 A.M. PST
MAY 26	16	20	21.6	37.55 N.	118.91 W.	5	4.7	...	4.8B	FELT	B	MAY 26	08 A.M. PST
MAY 26	17	22	14.5	37.52 N.	118.72 W.	3	...	...	3.1P	...	P	MAY 26	09 A.M. PST
MAY 26	17	32	12.6	37.40 N.	118.80 W.	5	...	...	3.0P	...	P	MAY 26	09 A.M. PST
MAY 26	17	38	4.0	37.63 N.	118.77 W.	3	...	...	3.5P	FELT	P	MAY 26	09 A.M. PST
MAY 26	17	40	6.1	37.55 N.	118.83 W.	5	...	...	3.3P	...	P	MAY 26	09 A.M. PST
MAY 26	17	50	27.7	37.50 N.	118.75 W.	4	...	...	3.1P	...	P	MAY 26	09 A.M. PST
MAY 26	18	19	5.3	37.53 N.	118.68 W.	5	...	...	3.0P	...	P	MAY 26	10 A.M. PST
MAY 26	18	55	36.8	37.52 N.	118.89 W.	11	...	...	3.8B	FELT	B	MAY 26	10 A.M. PST
MAY 26	18	57	55.9	37.54 N.	118.89 W.	8	5.0	...	5.7B	FELT	B	MAY 26	10 A.M. PST
MAY 26	19	10	41.4	37.52 N.	118.68 W.	7	...	...	3.3P	FELT	P	MAY 26	11 A.M. PST
MAY 26	19	21	55.5	37.35 N.	118.82 W.	4	...	...	3.1P	FELT	P	MAY 26	11 A.M. PST
MAY 26	19	24	9.4	37.51 N.	118.88 W.	7	...	...	4.7B	FELT	B	MAY 26	11 A.M. PST
MAY 26	19	44	31.0	37.63 N.	118.87 W.	4	...	...	3.5P	FELT	P	MAY 26	11 A.M. PST
MAY 26	19	52	41.8	37.47 N.	118.83 W.	5	...	...	3.3P	FELT	P	MAY 26	11 A.M. PST
MAY 26	20	01	30.8	37.62 N.	118.77 W.	2	...	...	3.4P	FELT	P	MAY 26	12 M. PST
MAY 26	20	03	40.8	37.58 N.	118.88 W.	5	...	...	3.8P	FELT	P	MAY 26	12 M. PST
MAY 26	20	07	41.3	37.35 N.	118.97 W.	5	...	...	3.2P	...	P	MAY 26	12 M. PST
MAY 26	20	12	57.0	37.48 N.	118.75 W.	4	...	...	3.0P	...	P	MAY 26	12 M. PST
MAY 26	21	10	3.3	37.42 N.	118.83 W.	5	...	...	3.0P	...	P	MAY 26	01 P.M. PST
MAY 26	21	19	38.3	37.57 N.	118.68 W.	4	...	...	3.0P	...	P	MAY 26	01 P.M. PST
MAY 26	21	42	10.8	37.57 N.	118.83 W.	4	...	...	3.3P	FELT	P	MAY 26	01 P.M. PST
MAY 26	21	57	42.4	37.57 N.	118.90 W.	3	...	...	3.0P	FELT	P	MAY 26	01 P.M. PST
MAY 26	21	58	10.1	37.65 N.	118.85 W.	4	...	...	3.6P	FELT	P	MAY 26	01 P.M. PST
MAY 26	22	35	42.4	37.57 N.	118.90 W.	2	...	...	3.2P	FELT	P	MAY 26	02 P.M. PST
MAY 26	22	49	59.1	37.38 N.	118.90 W.	4	...	...	3.0P	...	P	MAY 26	02 P.M. PST
MAY 26	23	19	27.4	37.52 N.	118.88 W.	5	...	...	3.3P	FELT	P	MAY 26	03 P.M. PST
MAY 27	00	02	48.4	37.62 N.	118.80 W.	4	...	...	3.0P	...	P	MAY 26	04 P.M. PST
MAY 27	00	24	7.4	37.47 N.	118.82 W.	5	...	...	3.3P	...	P	MAY 26	04 P.M. PST
MAY 27	00	43	17.9	37.58 N.	118.87 W.	5	...	...	3.6P	FELT	P	MAY 26	04 P.M. PST
MAY 27	00	54	3.6	37.32 N.	118.88 W.	5	...	...	3.1P	...	P	MAY 26	04 P.M. PST
MAY 27	01	14	18.5	37.52 N.	118.67 W.	5	...	...	3.2P	...	P	MAY 26	05 P.M. PST
MAY 27	01	19	41.1	37.62 N.	118.90 W.	4	...	...	3.4P	FELT	P	MAY 26	05 P.M. PST
MAY 27	01	44	48.9	37.55 N.	118.70 W.	4	...	...	3.0P	...	P	MAY 26	05 P.M. PST
MAY 27	02	01	17.7	37.55 N.	118.85 W.	3	...	...	3.3P	FELT	P	MAY 26	06 P.M. PST
MAY 27	02	21	24.1	37.65 N.	118.83 W.	5	...	...	3.2P	...	P	MAY 26	06 P.M. PST
MAY 27	02	22	14.9	37.63 N.	118.87 W.	6	...	...	3.3P	...	P	MAY 26	06 P.M. PST
MAY 27	03	43	49.3	37.57 N.	118.87 W.	4	...	...	3.7P	FELT	P	MAY 26	07 P.M. PST
MAY 27	04	07	12.4	37.57 N.	118.80 W.	4	...	...	3.5P	FELT	P	MAY 26	08 P.M. PST
MAY 27	04	22	0.4	37.25 N.	118.60 W.	4	...	...	3.0P	...	P	MAY 26	08 P.M. PST
MAY 27	04	22	1.7	37.50 N.	118.85 W.	4	...	...	3.5P	FELT	P	MAY 26	08 P.M. PST
MAY 27	05	29	11.6	37.48 N.	118.87 W.	5	...	...	3.0P	...	P	MAY 26	09 P.M. PST
MAY 27	05	36	40.0	37.48 N.	118.78 W.	6	...	...	3.1P	...	P	MAY 26	09 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
MAY	27	05	44 58.1	37.60 N.	118.82 W.	5	...	...	3.7P	FELT	P	MAY 26	09 P.M. PST
MAY	27	05	50 13.2	37.38 N.	118.82 W.	5	...	...	3.1P	...	P	MAY 26	09 P.M. PST
MAY	27	06	15 36.9	37.52 N.	118.92 W.	0	...	...	3.5P	FELT	P	MAY 26	10 P.M. PST
MAY	27	06	36 53.2	37.50 N.	118.88 W.	5	...	...	3.8P	FELT	P	MAY 26	10 P.M. PST
MAY	27	06	46 42.5	37.60 N.	118.88 W.	2	...	...	3.6P	FELT	P	MAY 26	10 P.M. PST
MAY	27	07	02 4.5	37.47 N.	118.78 W.	4	...	...	3.4P	FELT	P	MAY 26	11 P.M. PST
MAY	27	07	22 34.9	37.60 N.	118.75 W.	4	...	...	3.2P	...	P	MAY 26	11 P.M. PST
MAY	27	07	30 1.6	37.48 N.	118.87 W.	4	...	...	3.0P	...	P	MAY 26	11 P.M. PST
MAY	27	09	09 31.3	37.60 N.	118.85 W.	2	...	...	4.0P	FELT	P	MAY 27	01 A.M. PST
MAY	27	10	27 33.4	37.38 N.	118.72 W.	4	...	...	3.5P	...	P	MAY 27	02 A.M. PST
MAY	27	10	29 12.9	37.48 N.	118.82 W.	5	...	...	3.2P	FELT	P	MAY 27	02 A.M. PST
MAY	27	10	39 47.2	37.67 N.	118.78 W.	1	...	...	3.0P	...	P	MAY 27	02 A.M. PST
MAY	27	10	46 18.6	37.53 N.	118.73 W.	4	...	...	3.2P	...	P	MAY 27	02 A.M. PST
MAY	27	10	51 15.0	37.45 N.	118.82 W.	5	...	...	3.2P	...	P	MAY 27	02 A.M. PST
MAY	27	11	33 49.7	37.57 N.	118.78 W.	4	...	...	3.2P	FELT	P	MAY 27	03 A.M. PST
MAY	27	13	10 27.8	37.60 N.	118.80 W.	3	...	...	3.2P	FELT	P	MAY 27	05 A.M. PST
MAY	27	13	27 7.3	37.52 N.	118.88 W.	2	3.9	...	3.9P	FELT	P	MAY 27	05 A.M. PST
MAY	27	13	38 53.8	37.46 N.	118.80 W.	4	...	...	3.2P	...	P	MAY 27	05 A.M. PST
MAY	27	14	29 14.2	37.52 N.	118.88 W.	4	...	...	3.3P	...	P	MAY 27	06 A.M. PST
MAY	27	14	50 56.6	37.49 N.	118.83 W.	16	5.7	6.0	6.2B	VI	B	MAY 27	06 A.M. PST
MAY	27	14	58 42.7	37.43 N.	118.88 W.	5	...	...	3.4P	FELT	P	MAY 27	06 A.M. PST
MAY	27	15	01 12.0	37.50 N.	118.82 W.	7	...	...	3.7P	FELT	P	MAY 27	07 A.M. PST
MAY	27	15	04 39.4	37.35 N.	118.72 W.	2	...	...	3.0P	...	P	MAY 27	07 A.M. PST
MAY	27	15	05 38.6	37.60 N.	118.73 W.	4	...	...	3.6P	FELT	P	MAY 27	07 A.M. PST
MAY	27	15	11 19.8	37.43 N.	118.77 W.	4	...	...	3.2P	...	P	MAY 27	07 A.M. PST
MAY	27	15	13 4.5	37.38 N.	118.73 W.	3	...	...	3.0P	...	P	MAY 27	07 A.M. PST
MAY	27	15	13 46.8	37.50 N.	118.82 W.	4	...	...	3.9P	FELT	P	MAY 27	07 A.M. PST
MAY	27	15	17 30.8	37.38 N.	118.75 W.	4	...	...	3.3P	...	P	MAY 27	07 A.M. PST
MAY	27	15	41 46.9	37.48 N.	118.82 W.	1	...	...	4.0P	FELT	P	MAY 27	07 A.M. PST
MAY	27	15	56 3.3	37.58 N.	118.75 W.	5	...	...	3.2P	...	P	MAY 27	07 A.M. PST
MAY	27	16	01 47.9	37.55 N.	118.73 W.	4	...	...	3.2P	...	P	MAY 27	08 A.M. PST
MAY	27	16	09 55.9	37.50 N.	118.68 W.	3	...	...	3.4P	FELT	P	MAY 27	08 A.M. PST
MAY	27	16	10 38.5	37.58 N.	118.87 W.	5	...	...	3.7P	FELT	P	MAY 27	08 A.M. PST
MAY	27	16	35 45.5	37.45 N.	118.83 W.	2	...	...	3.6P	FELT	P	MAY 27	08 A.M. PST
MAY	27	16	45 55.0	37.53 N.	118.82 W.	2	...	...	3.6P	...	P	MAY 27	08 A.M. PST
MAY	27	16	49 13.8	37.43 N.	118.82 W.	5	...	...	3.3P	FELT	P	MAY 27	08 A.M. PST
MAY	27	17	01 18.1	37.40 N.	118.82 W.	5	...	...	3.0P	...	P	MAY 27	09 A.M. PST
MAY	27	17	04 5.5	37.43 N.	118.85 W.	4	...	...	3.0P	...	P	MAY 27	09 A.M. PST
MAY	27	17	09 58.6	37.48 N.	118.82 W.	6	...	...	4.1P	FELT	P	MAY 27	09 A.M. PST
MAY	27	17	20 1.3	37.60 N.	118.85 W.	6	...	...	3.0P	...	P	MAY 27	09 A.M. PST
MAY	27	17	22 45.1	37.50 N.	118.82 W.	2	...	...	3.0P	...	P	MAY 27	09 A.M. PST
MAY	27	17	34 33.8	37.55 N.	118.80 W.	5	...	...	3.3P	...	P	MAY 27	09 A.M. PST
MAY	27	17	43 19.1	37.38 N.	118.67 W.	5	...	...	3.3P	...	P	MAY 27	09 A.M. PST
MAY	27	17	47 41.1	37.43 N.	118.73 W.	5	...	...	3.3P	FELT	P	MAY 27	09 A.M. PST
MAY	27	17	50 55.5	37.40 N.	118.80 W.	4	...	...	3.0P	...	P	MAY 27	09 A.M. PST
MAY	27	17	52 38.0	37.57 N.	118.68 W.	3	...	...	3.1P	...	P	MAY 27	09 A.M. PST
MAY	27	18	36 9.1	37.45 N.	118.85 W.	3	...	...	3.9P	FELT	P	MAY 27	10 A.M. PST
MAY	27	19	01 7.9	37.59 N.	118.79 W.	6	4.3	...	4.8B	FELT	B	MAY 27	10 A.M. PST
MAY	27	19	23 22.1	37.46 N.	118.83 W.	5	...	...	3.0P	...	P	MAY 27	11 A.M. PST
MAY	27	19	23 40.6	37.47 N.	118.73 W.	5	...	...	3.1P	...	P	MAY 27	11 A.M. PST
MAY	27	19	47 22.1	37.67 N.	118.73 W.	5	...	...	3.5P	FELT	P	MAY 27	11 A.M. PST
MAY	27	19	54 2.8	37.58 N.	118.75 W.	4	...	...	3.0P	...	P	MAY 27	11 A.M. PST
MAY	27	19	54 39.0	37.55 N.	118.77 W.	3	...	...	3.2P	...	P	MAY 27	11 A.M. PST
MAY	27	19	59 55.9	37.72 N.	118.72 W.	0	...	...	3.3P	...	P	MAY 27	11 A.M. PST
MAY	27	20	00 47.4	37.65 N.	118.70 W.	4	...	...	3.6P	...	P	MAY 27	12 M. PST
MAY	27	20	26 10.0	37.65 N.	118.82 W.	6	...	...	3.3P	...	P	MAY 27	12 M. PST
MAY	27	21	14 9.3	37.42 N.	118.65 W.	4	...	...	3.0P	...	P	MAY 27	01 P.M. PST
MAY	27	21	31 14.6	37.50 N.	118.88 W.	7	...	...	3.2P	...	P	MAY 27	01 P.M. PST
MAY	27	21	34 54.3	37.50 N.	118.82 W.	5	...	...	4.5P	FELT	P	MAY 27	01 P.M. PST
MAY	27	21	46 13.3	37.55 N.	118.93 W.	5	...	...	3.1P	...	P	MAY 27	01 P.M. PST
MAY	27	22	29 30.3	37.55 N.	118.92 W.	5	...	...	3.0P	...	P	MAY 27	02 P.M. PST
MAY	27	23	14 42.8	37.40 N.	118.53 W.	5	...	...	3.0P	...	P	MAY 27	03 P.M. PST
MAY	27	23	41 3.9	37.57 N.	118.85 W.	5	...	...	4.0P	FELT	P	MAY 27	03 P.M. PST
MAY	27	23	57 43.7	37.55 N.	118.90 W.	3	...	...	3.8P	FELT	P	MAY 27	03 P.M. PST
MAY	28	00	08 19.6	37.45 N.	118.82 W.	7	...	...	3.5P	...	P	MAY 27	04 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
MAY 28	01	12	9.0	37.48 N.	118.83 W.	3	...	...	3.1P	...	P	MAY 27	05 P.M. PST
MAY 28	01	37	27.4	37.52 N.	118.83 W.	5	...	...	3.2P	...	P	MAY 27	05 P.M. PST
MAY 28	01	55	8.7	37.42 N.	118.82 W.	4	...	...	3.2P	...	P	MAY 27	05 P.M. PST
MAY 28	02	01	0.7	37.52 N.	118.83 W.	5	...	...	3.3P	...	P	MAY 27	06 P.M. PST
MAY 28	02	12	14.6	37.57 N.	118.90 W.	3	...	...	3.4P	...	P	MAY 27	06 P.M. PST
MAY 28	02	52	51.0	37.48 N.	118.85 W.	5	...	...	3.2P	...	P	MAY 27	06 P.M. PST
MAY 28	03	26	36.0	37.53 N.	118.83 W.	1	...	...	3.2P	...	P	MAY 27	07 P.M. PST
MAY 28	04	02	58.7	37.60 N.	118.78 W.	3	...	...	3.8P	FELT	P	MAY 27	08 P.M. PST
MAY 28	04	22	11.4	37.55 N.	118.90 W.	2	...	...	3.7P	FELT	P	MAY 27	08 P.M. PST
MAY 28	04	49	53.1	37.55 N.	118.95 W.	5	...	...	3.1P	...	P	MAY 27	08 P.M. PST
MAY 28	04	55	34.7	37.50 N.	118.82 W.	5	...	...	3.0P	...	P	MAY 27	08 P.M. PST
MAY 28	05	05	32.6	37.32 N.	118.72 W.	4	...	...	3.0P	...	P	MAY 27	09 P.M. PST
MAY 28	05	16	23.0	37.57 N.	118.90 W.	4	4.1	...	4.9B	FELT	B	MAY 27	09 P.M. PST
MAY 28	05	48	29.5	37.62 N.	118.87 W.	6	4.0	...	4.6B	FELT	B	MAY 27	09 P.M. PST
MAY 28	06	07	43.6	37.60 N.	118.92 W.	4	...	...	3.6P	FELT	P	MAY 27	10 P.M. PST
MAY 28	06	13	5.9	37.63 N.	118.87 W.	5	...	...	3.5P	...	P	MAY 27	10 P.M. PST
MAY 28	06	34	51.2	37.57 N.	118.97 W.	0	...	...	3.2P	...	P	MAY 27	10 P.M. PST
MAY 28	06	42	45.5	37.62 N.	118.88 W.	4	...	...	3.3P	...	P	MAY 27	10 P.M. PST
MAY 28	06	43	48.1	37.57 N.	119.02 W.	4	...	...	3.0P	...	P	MAY 27	10 P.M. PST
MAY 28	06	49	19.5	37.63 N.	118.87 W.	4	...	...	3.4P	...	P	MAY 27	10 P.M. PST
MAY 28	07	51	45.6	37.62 N.	118.87 W.	5	...	...	3.3P	...	P	MAY 27	11 P.M. PST
MAY 28	08	32	20.7	37.60 N.	118.97 W.	6	...	...	3.2P	...	P	MAY 28	12 P.M. PST
MAY 28	08	44	51.2	37.48 N.	118.80 W.	4	...	...	3.1P	...	P	MAY 28	12 P.M. PST
MAY 28	09	02	38.7	37.62 N.	119.00 W.	7	...	...	3.0P	...	P	MAY 28	01 A.M. PST
MAY 28	09	19	46.5	37.43 N.	118.92 W.	1	...	...	3.0P	...	P	MAY 28	01 A.M. PST
MAY 28	09	20	31.2	37.55 N.	118.80 W.	7	...	...	3.4P	...	P	MAY 28	01 A.M. PST
MAY 28	10	03	36.9	37.58 N.	118.97 W.	5	...	...	3.0P	...	P	MAY 28	02 A.M. PST
MAY 28	10	13	2.7	37.48 N.	118.83 W.	3	...	...	3.7P	FELT	P	MAY 28	02 A.M. PST
MAY 28	11	54	37.9	37.47 N.	118.82 W.	6	...	...	4.2P	FELT	P	MAY 28	03 A.M. PST
MAY 28	13	27	39.2	37.57 N.	118.85 W.	4	...	...	3.4P	...	P	MAY 28	05 A.M. PST
MAY 28	14	06	30.2	37.52 N.	118.78 W.	4	...	...	3.6P	FELT	P	MAY 28	06 A.M. PST
MAY 28	14	18	22.4	37.47 N.	118.85 W.	4	...	...	3.8P	FELT	P	MAY 28	06 A.M. PST
MAY 28	14	47	33.6	37.48 N.	118.60 W.	5	...	...	3.1P	...	P	MAY 28	06 A.M. PST
MAY 28	15	00	8.2	37.57 N.	118.90 W.	4	...	...	3.6P	...	P	MAY 28	07 A.M. PST
MAY 28	15	42	39.8	37.45 N.	118.83 W.	6	...	...	3.4P	...	P	MAY 28	07 A.M. PST
MAY 28	15	45	16.9	37.53 N.	118.92 W.	5	...	...	3.2P	FELT	P	MAY 28	07 A.M. PST
MAY 28	17	28	24.6	37.53 N.	118.90 W.	6	...	...	3.2P	...	P	MAY 28	09 A.M. PST
MAY 28	17	32	22.5	37.50 N.	118.90 W.	3	...	...	3.2P	...	P	MAY 28	09 A.M. PST
MAY 28	18	12	5.6	37.48 N.	118.95 W.	7	...	...	3.0P	...	P	MAY 28	10 A.M. PST
MAY 28	18	35	9.9	37.48 N.	118.82 W.	5	...	...	3.2P	...	P	MAY 28	10 A.M. PST
MAY 28	18	37	19.1	37.55 N.	118.90 W.	5	...	...	3.5P	...	P	MAY 28	10 A.M. PST
MAY 28	19	01	1.3	37.38 N.	118.78 W.	5	...	...	3.0P	...	P	MAY 28	11 A.M. PST
MAY 28	19	26	41.1	37.47 N.	118.87 W.	8	...	...	3.1P	...	P	MAY 28	11 A.M. PST
MAY 28	21	01	59.7	37.50 N.	118.83 W.	6	...	...	3.0P	...	P	MAY 28	01 P.M. PST
MAY 28	21	41	56.2	37.52 N.	118.90 W.	6	...	...	3.0P	...	P	MAY 28	01 P.M. PST
MAY 28	23	07	19.8	37.48 N.	118.92 W.	5	...	...	3.0P	...	P	MAY 28	03 P.M. PST
MAY 28	23	07	25.5	37.53 N.	118.80 W.	4	...	...	3.4P	...	P	MAY 28	03 P.M. PST
MAY 28	23	17	18.8	37.47 N.	118.77 W.	5	...	...	3.2P	...	P	MAY 28	03 P.M. PST
MAY 28	23	50	22.0	37.42 N.	118.82 W.	6	...	...	3.1P	...	P	MAY 28	03 P.M. PST
MAY 29	01	32	22.5	37.58 N.	118.78 W.	4	...	...	3.2P	...	P	MAY 28	05 P.M. PST
MAY 29	03	38	47.0	34.93 N.	120.82 W.	5	5.1	...	4.7P	V	P	MAY 28	07 P.M. PST
MAY 29	04	17	41.5	37.45 N.	118.88 W.	3	...	...	3.3P	...	P	MAY 28	08 P.M. PST
MAY 29	04	18	52.8	37.53 N.	118.83 W.	5	...	...	3.8P	FELT	P	MAY 28	08 P.M. PST
MAY 29	04	33	35.7	37.47 N.	118.85 W.	6	...	...	3.2P	...	P	MAY 28	08 P.M. PST
MAY 29	04	42	30.5	37.60 N.	118.82 W.	5	...	...	3.2P	...	P	MAY 28	08 P.M. PST
MAY 29	04	58	56.6	37.52 N.	118.88 W.	1	...	...	3.5P	FELT	P	MAY 28	08 P.M. PST
MAY 29	05	32	5.2	37.60 N.	118.90 W.	2	...	...	3.0P	...	P	MAY 28	09 P.M. PST
MAY 29	05	55	43.9	37.50 N.	118.88 W.	3	...	...	3.5P	FELT	P	MAY 28	09 P.M. PST
MAY 29	07	32	21.1	37.48 N.	118.82 W.	3	...	...	3.5P	FELT	P	MAY 28	11 P.M. PST
MAY 29	09	47	38.6	37.57 N.	118.88 W.	5	...	...	3.5P	...	P	MAY 29	01 A.M. PST
MAY 29	10	39	38.4	37.58 N.	118.90 W.	5	...	...	3.2P	...	P	MAY 29	02 A.M. PST
MAY 29	11	03	57.2	37.47 N.	118.82 W.	1	...	...	3.0P	...	P	MAY 29	03 A.M. PST
MAY 29	11	59	18.7	37.57 N.	118.87 W.	5	...	...	3.2P	...	P	MAY 29	03 A.M. PST
MAY 29	12	33	44.0	37.62 N.	118.87 W.	5	...	...	3.3P	...	P	MAY 29	04 A.M. PST
MAY 29	13	36	32.2	37.67 N.	118.77 W.	5	...	...	3.3P	...	P	MAY 29	05 A.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
MAY	29	14	00 26.7	37.50 N.	118.87 W.	5	...	...	3.4P	...	P	MAY 29	06 A.M. PST
MAY	29	15	16 6.2	37.57 N.	118.87 W.	5	...	...	3.0P	...	P	MAY 29	07 A.M. PST
MAY	29	15	20 34.4	37.52 N.	118.87 W.	4	...	...	3.0P	...	P	MAY 29	07 A.M. PST
MAY	29	16	01 45.2	37.58 N.	118.90 W.	2	...	...	3.3P	...	P	MAY 29	08 A.M. PST
MAY	29	16	14 9.2	37.60 N.	118.93 W.	5	...	...	3.0P	...	P	MAY 29	08 A.M. PST
MAY	29	16	56 56.8	37.50 N.	118.87 W.	4	...	...	3.5P	FELT	P	MAY 29	08 A.M. PST
MAY	29	17	21 1.3	37.52 N.	118.83 W.	4	...	...	4.0P	FELT	P	MAY 29	09 A.M. PST
MAY	29	17	28 30.1	37.52 N.	118.85 W.	2	...	...	3.2P	...	P	MAY 29	09 A.M. PST
MAY	29	18	24 47.5	37.55 N.	118.70 W.	4	...	...	3.1P	...	P	MAY 29	10 A.M. PST
MAY	29	18	54 0.1	37.30 N.	118.83 W.	6	...	...	3.3P	FELT	P	MAY 29	10 A.M. PST
MAY	29	18	55 12.2	37.48 N.	118.77 W.	3	...	...	3.4P	...	P	MAY 29	10 A.M. PST
MAY	29	18	56 29.3	37.35 N.	118.93 W.	13	...	...	3.1P	...	P	MAY 29	10 A.M. PST
MAY	30	01	19 33.4	37.57 N.	118.82 W.	4	...	...	3.0P	...	P	MAY 29	05 P.M. PST
MAY	30	02	25 55.4	37.57 N.	118.83 W.	0	...	...	3.0P	...	P	MAY 29	06 P.M. PST
MAY	30	02	58 30.1	37.52 N.	118.87 W.	5	...	...	3.0P	...	P	MAY 29	06 P.M. PST
MAY	30	03	04 54.8	37.62 N.	118.88 W.	6	...	...	3.0P	...	P	MAY 29	07 P.M. PST
MAY	30	04	11 47.7	37.52 N.	119.15 W.	2	...	...	3.1P	...	P	MAY 29	08 P.M. PST
MAY	30	05	13 49.0	37.55 N.	118.93 W.	2	...	...	3.1P	...	P	MAY 29	09 P.M. PST
MAY	30	05	29 0.9	37.52 N.	118.82 W.	3	...	...	3.0P	...	P	MAY 29	09 P.M. PST
MAY	30	06	29 28.4	37.62 N.	118.88 W.	4	...	...	3.2P	...	P	MAY 29	10 P.M. PST
MAY	30	06	52 5.0	37.55 N.	118.93 W.	1	...	...	3.0P	...	P	MAY 29	10 P.M. PST
MAY	30	07	08 22.2	37.47 N.	118.83 W.	9	...	...	3.4P	...	P	MAY 29	11 P.M. PST
MAY	30	07	12 39.9	37.52 N.	118.85 W.	2	...	...	3.1P	...	P	MAY 29	11 P.M. PST
MAY	30	10	30 52.8	37.57 N.	118.98 W.	6	...	...	3.1P	...	P	MAY 30	02 A.M. PST
MAY	30	11	14 4.2	37.52 N.	118.85 W.	1	...	...	3.6P	...	P	MAY 30	03 A.M. PST
MAY	30	12	01 52.9	37.52 N.	118.87 W.	4	...	...	3.8P	FELT	P	MAY 30	04 A.M. PST
MAY	30	13	40 52.9	37.57 N.	118.83 W.	7	...	...	3.1P	...	P	MAY 30	05 A.M. PST
MAY	30	13	53 41.0	37.50 N.	118.90 W.	6	...	...	3.2P	...	P	MAY 30	05 A.M. PST
MAY	30	15	05 17.2	37.67 N.	118.83 W.	2	...	...	3.3P	...	P	MAY 30	07 A.M. PST
MAY	30	15	41 57.8	37.56 N.	118.90 W.	5	...	...	4.0B	FELT	B	MAY 30	07 A.M. PST
MAY	30	15	49 2.3	37.53 N.	118.80 W.	2	...	...	3.6P	FELT	P	MAY 30	07 A.M. PST
MAY	30	16	48 47.4	37.46 N.	118.85 W.	10	...	...	3.0P	...	P	MAY 30	08 A.M. PST
MAY	30	19	49 2.4	37.57 N.	118.89 W.	9	...	...	3.7B	FELT	B	MAY 30	11 A.M. PST
MAY	30	20	36 36.7	37.47 N.	118.88 W.	7	...	...	3.1P	...	P	MAY 30	12 M. PST
MAY	30	21	49 37.7	37.37 N.	118.77 W.	5	...	...	3.0P	...	P	MAY 30	01 P.M. PST
MAY	30	22	42 38.3	37.53 N.	118.92 W.	7	...	...	3.1P	...	P	MAY 30	02 P.M. PST
MAY	30	23	02 32.4	37.57 N.	118.83 W.	4	...	...	3.4P	...	P	MAY 30	03 P.M. PST
MAY	31	00	13 26.1	37.58 N.	118.90 W.	1	...	...	3.0P	...	P	MAY 30	04 P.M. PST
MAY	31	00	58 17.3	37.49 N.	118.86 W.	9	4.1	...	4.5B	FELT	B	MAY 30	04 P.M. PST
MAY	31	08	05 19.3	37.55 N.	118.83 W.	1	...	...	4.1B	IV	B	MAY 31	12 P.M. PST
MAY	31	10	11 30.7	37.58 N.	118.82 W.	5	...	...	4.2B	FELT	B	MAY 31	02 A.M. PST
MAY	31	10	14 32.2	37.57 N.	118.87 W.	6	...	...	3.2P	...	P	MAY 31	02 A.M. PST
MAY	31	12	13 39.3	37.60 N.	118.88 W.	5	...	...	3.0P	...	P	MAY 31	04 A.M. PST
MAY	31	13	13 41.0	37.60 N.	118.85 W.	5	...	...	3.3P	...	P	MAY 31	05 A.M. PST
MAY	31	13	43 50.1	37.58 N.	118.72 W.	3	...	...	3.2P	...	P	MAY 31	05 A.M. PST
MAY	31	14	08 35.0	37.47 N.	118.93 W.	2	...	...	3.1P	...	P	MAY 31	06 A.M. PST
MAY	31	14	20 51.5	37.58 N.	118.93 W.	3	...	...	3.1P	FELT	P	MAY 31	06 A.M. PST
MAY	31	15	07 44.8	37.42 N.	118.83 W.	6	...	...	3.2P	...	P	MAY 31	07 A.M. PST
MAY	31	15	16 11.4	37.60 N.	118.79 W.	8	4.1	...	4.9B	IV	B	MAY 31	07 A.M. PST
MAY	31	15	20 19.3	37.60 N.	118.79 W.	7	...	...	4.0B	FELT	B	MAY 31	07 A.M. PST
MAY	31	15	30 52.8	37.60 N.	118.80 W.	6	...	...	3.8B	FELT	B	MAY 31	07 A.M. PST
MAY	31	15	35 20.4	37.45 N.	118.83 W.	5	...	...	3.5P	...	P	MAY 31	07 A.M. PST
MAY	31	18	23 9.9	37.55 N.	118.73 W.	4	...	...	3.0P	...	P	MAY 31	10 A.M. PST
MAY	31	19	06 48.3	37.55 N.	118.78 W.	2	...	...	3.0P	...	P	MAY 31	11 A.M. PST
MAY	31	19	48 58.6	37.62 N.	118.97 W.	5	...	...	3.1P	...	P	MAY 31	11 A.M. PST
MAY	31	19	56 7.5	37.60 N.	118.98 W.	1	...	...	3.2P	...	P	MAY 31	11 A.M. PST
MAY	31	19	57 21.2	37.57 N.	118.97 W.	5	...	...	3.3P	...	P	MAY 31	11 A.M. PST
MAY	31	20	14 42.3	37.57 N.	118.90 W.	5	...	...	3.0P	...	P	MAY 31	12 M. PST
MAY	31	23	15 29.0	37.61 N.	118.84 W.	12	...	...	3.8B	FELT	B	MAY 31	03 P.M. PST
MAY	31	23	38 37.4	37.53 N.	118.90 W.	6	...	...	3.0P	...	P	MAY 31	03 P.M. PST
JUNE	1	00	57 37.6	37.58 N.	118.93 W.	7	...	...	3.4P	...	P	MAY 31	04 P.M. PST
JUNE	1	03	17 44.5	37.52 N.	118.87 W.	4	...	...	3.3P	...	P	MAY 31	07 P.M. PST
JUNE	1	03	34 30.0	37.53 N.	118.92 W.	5	...	...	3.0P	...	P	MAY 31	07 P.M. PST
JUNE	1	05	28 48.8	37.47 N.	118.82 W.	5	...	...	3.0P	...	P	MAY 31	09 P.M. PST
JUNE	1	06	47 36.0	37.47 N.	118.85 W.	8	3.7	...	4.7B	FELT	B	MAY 31	10 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date		Hour
CALIFORNIA--Continued														
JUNE 1	07	00	17.1	37.47 N.	118.88 W.	6	...	...	3.4P	...	P	MAY	31	11 P.M. PST
JUNE 1	07	47	18.2	37.60 N.	118.95 W.	5	...	...	3.3P	...	P	MAY	31	11 P.M. PST
JUNE 1	11	40	29.8	37.50 N.	118.87 W.	6	...	...	3.0P	...	P	JUNE	1	03 A.M. PST
JUNE 1	12	20	59.8	37.59 N.	118.80 W.	7	...	...	3.0B	...	B	JUNE	1	04 A.M. PST
JUNE 1	13	08	25.2	37.58 N.	118.83 W.	6	...	...	3.2P	...	P	JUNE	1	05 A.M. PST
JUNE 1	14	59	5.9	37.61 N.	118.91 W.	8	...	...	3.4B	...	B	JUNE	1	06 A.M. PST
JUNE 1	17	02	55.3	38.80 N.	122.80 W.	2	...	...	3.1B	...	B	JUNE	1	09 A.M. PST
JUNE 1	17	27	24.8	37.57 N.	118.79 W.	8	...	...	3.7B	FELT	B	JUNE	1	09 A.M. PST
JUNE 1	17	50	12.8	37.60 N.	118.94 W.	11	...	...	3.4B	...	B	JUNE	1	09 A.M. PST
JUNE 1	22	30	22.2	37.62 N.	118.90 W.	10	...	...	3.5B	FELT	B	JUNE	1	02 P.M. PST
JUNE 1	23	34	15.7	37.45 N.	118.85 W.	6	...	...	3.4P	...	P	JUNE	1	03 P.M. PST
JUNE 1	23	39	17.4	37.50 N.	118.95 W.	6	...	...	3.0P	...	P	JUNE	1	03 P.M. PST
JUNE 2	01	02	46.7	37.58 N.	118.90 W.	5	...	...	3.0P	...	P	JUNE	1	05 P.M. PST
JUNE 2	02	01	10.2	37.50 N.	119.05 W.	6	...	...	3.0P	...	P	JUNE	1	06 P.M. PST
JUNE 2	02	06	24.7	37.58 N.	118.88 W.	5	...	...	3.0P	...	P	JUNE	1	06 P.M. PST
JUNE 2	06	39	48.2	37.55 N.	118.88 W.	4	...	...	3.6P	...	P	JUNE	1	10 P.M. PST
JUNE 2	09	19	4.0	37.58 N.	118.88 W.	5	...	...	3.0P	...	P	JUNE	2	01 A.M. PST
JUNE 2	10	22	20.4	37.60 N.	118.93 W.	6	...	...	4.1B	FELT	B	JUNE	2	02 A.M. PST
JUNE 2	16	19	4.6	37.60 N.	118.93 W.	4	...	...	3.0P	...	P	JUNE	2	08 A.M. PST
JUNE 2	20	34	13.5	37.56 N.	118.88 W.	7	...	...	4.0B	FELT	B	JUNE	2	12 M. PST
JUNE 2	22	49	24.3	37.58 N.	118.82 W.	5	...	...	3.1P	...	P	JUNE	2	02 P.M. PST
JUNE 3	02	35	45.5	37.52 N.	118.93 W.	1	...	...	3.4P	...	P	JUNE	2	06 P.M. PST
JUNE 3	04	27	52.6	37.43 N.	118.87 W.	7	...	...	3.0P	...	P	JUNE	2	08 P.M. PST
JUNE 3	07	32	2.5	37.60 N.	118.88 W.	6	...	...	3.0P	...	P	JUNE	2	11 P.M. PST
JUNE 3	16	24	08.1	41.15 N.	122.39 W.	5	...	...	3.3B	...	B	JUNE	3	08 A.M. PST
JUNE 3	16	43	37.8	34.50 N.	118.52 W.	5	...	...	3.4P	III	P	JUNE	3	08 A.M. PST
JUNE 3	17	34	11.7	37.56 N.	118.82 W.	14	...	...	3.5B	FELT	B	JUNE	3	09 A.M. PST
JUNE 3	20	59	20.1	37.50 N.	118.87 W.	5	...	...	3.0P	...	P	JUNE	3	12 M. PST
JUNE 4	00	23	9.4	37.67 N.	118.85 W.	5	...	...	3.1P	...	P	JUNE	3	04 P.M. PST
JUNE 4	02	38	22.2	37.60 N.	118.87 W.	3	...	...	3.0P	...	P	JUNE	3	06 P.M. PST
JUNE 4	04	00	6.0	37.54 N.	118.91 W.	15	...	...	3.1B	...	B	JUNE	3	08 P.M. PST
JUNE 4	05	45	5.6	37.45 N.	118.92 W.	5	...	...	3.0P	...	P	JUNE	3	09 P.M. PST
JUNE 4	05	45	24.8	37.55 N.	118.88 W.	5	...	...	3.0P	...	P	JUNE	3	09 P.M. PST
JUNE 4	08	34	20.2	37.48 N.	118.83 W.	1	...	...	3.6P	FELT	P	JUNE	4	12 P.M. PST
JUNE 4	16	59	50.3	37.58 N.	118.82 W.	5	...	...	3.0P	...	P	JUNE	4	08 A.M. PST
JUNE 4	17	09	43.3	37.70 N.	118.85 W.	5	...	...	3.0P	...	P	JUNE	4	09 A.M. PST
JUNE 4	19	09	21.3	37.53 N.	118.89 W.	7	...	...	3.8B	FELT	B	JUNE	4	11 A.M. PST
JUNE 4	21	00	20.4	37.61 N.	118.93 W.	12	...	...	3.1B	...	B	JUNE	4	01 P.M. PST
JUNE 5	03	07	44.2	37.50 N.	118.88 W.	23	...	...	3.1B	...	B	JUNE	4	07 P.M. PST
JUNE 5	08	59	17.8	37.47 N.	118.62 W.	4	...	...	3.2P	...	P	JUNE	5	12 P.M. PST
JUNE 5	10	33	25.0	37.53 N.	118.65 W.	4	...	...	3.0P	...	P	JUNE	5	02 A.M. PST
JUNE 5	19	41	1.6	37.56 N.	118.88 W.	8	...	...	4.3B	FELT	B	JUNE	5	11 A.M. PST
JUNE 5	20	48	31.2	37.55 N.	118.83 W.	5	...	...	3.0P	...	P	JUNE	5	12 M. PST
JUNE 5	23	41	35.7	37.56 N.	118.77 W.	2	...	...	3.1B	...	B	JUNE	5	03 P.M. PST
JUNE 6	09	25	24.9	37.77 N.	118.67 W.	5	...	...	3.0P	...	P	JUNE	6	01 A.M. PST
JUNE 6	09	52	36.9	37.58 N.	118.87 W.	5	...	...	3.0P	...	P	JUNE	6	01 A.M. PST
JUNE 6	13	33	23.9	37.55 N.	118.87 W.	6	...	...	3.1P	...	P	JUNE	6	05 A.M. PST
JUNE 6	14	18	18.1	37.48 N.	118.87 W.	3	...	...	3.0P	...	P	JUNE	6	06 A.M. PST
JUNE 6	15	43	7.7	37.45 N.	118.88 W.	6	...	...	3.1P	...	P	JUNE	6	07 A.M. PST
JUNE 6	16	26	10.7	37.56 N.	118.93 W.	4	...	...	3.5B	FELT	B	JUNE	6	08 A.M. PST
JUNE 6	17	16	15.2	37.46 N.	118.83 W.	16	...	...	3.7B	FELT	B	JUNE	6	09 A.M. PST
JUNE 6	17	41	22.7	37.53 N.	118.90 W.	5	...	...	3.3B	...	B	JUNE	6	09 A.M. PST
JUNE 7	01	31	46.0	37.63 N.	118.90 W.	5	...	...	3.1P	FELT	P	JUNE	6	05 P.M. PST
JUNE 7	01	31	58.4	37.61 N.	118.91 W.	5	...	...	3.8B	...	B	JUNE	6	05 P.M. PST
JUNE 7	03	14	7.6	37.62 N.	118.90 W.	5	...	...	3.0P	...	P	JUNE	6	07 P.M. PST
JUNE 7	03	16	41.5	37.53 N.	118.77 W.	5	...	...	3.1P	...	P	JUNE	6	07 P.M. PST
JUNE 7	06	14	29.3	37.58 N.	118.82 W.	5	...	...	3.0P	...	P	JUNE	6	10 P.M. PST
JUNE 7	07	37	15.1	37.57 N.	118.92 W.	3	...	...	3.2P	...	P	JUNE	6	11 P.M. PST
JUNE 7	07	38	46.2	37.60 N.	118.93 W.	5	...	...	3.4P	...	P	JUNE	6	11 P.M. PST
JUNE 7	10	30	6.5	37.52 N.	118.80 W.	5	...	...	3.4P	...	P	JUNE	7	02 A.M. PST
JUNE 7	18	30	2.9	37.53 N.	118.95 W.	5	...	...	3.4P	...	P	JUNE	7	10 A.M. PST
JUNE 7	18	30	16.6	37.47 N.	118.62 W.	5	...	...	3.3P	...	P	JUNE	7	10 A.M. PST
JUNE 7	22	23	38.0	37.62 N.	118.98 W.	3	...	...	3.0P	...	P	JUNE	7	02 P.M. PST
JUNE 7	22	25	41.0	37.47 N.	118.90 W.	4	...	...	3.1P	FELT	P	JUNE	7	02 P.M. PST
JUNE 7	23	17	52.5	37.63 N.	118.89 W.	5	...	...	4.0B	FELT	B	JUNE	7	03 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
JUNE 8	06	25	27.1	37.54 N.	118.87 W.	9	...	...	3.9B	FELT	B	JUNE 7	10 P.M. PST
JUNE 8	09	26	8.5	37.53 N.	118.83 W.	5	...	...	3.0P	...	P	JUNE 8	01 A.M. PST
JUNE 8	16	40	30.2	37.63 N.	118.90 W.	5	...	...	3.0P	...	P	JUNE 8	08 A.M. PST
JUNE 8	17	55	22.9	37.60 N.	118.83 W.	5	...	...	3.0P	...	P	JUNE 8	09 A.M. PST
JUNE 8	17	56	45.2	37.62 N.	118.98 W.	5	...	...	3.5P	...	P	JUNE 8	09 A.M. PST
JUNE 8	23	22	20.8	37.48 N.	118.84 W.	14	...	...	4.4B	FELT	B	JUNE 8	03 P.M. PST
JUNE 9	08	05	49.5	37.52 N.	118.83 W.	7	...	...	3.2P	...	P	JUNE 9	12 P.M. PST
JUNE 9	15	33	13.0	37.48 N.	118.67 W.	5	...	...	3.0P	...	P	JUNE 9	07 A.M. PST
JUNE 9	20	30	21.5	37.60 N.	118.85 W.	5	...	...	3.0P	...	P	JUNE 9	12 M. PST
JUNE 10	09	28	29.7	37.45 N.	118.75 W.	5	...	...	3.0P	...	P	JUNE 10	01 A.M. PST
JUNE 10	15	21	36.4	37.57 N.	118.82 W.	8	...	...	3.4P	FELT	P	JUNE 10	07 A.M. PST
JUNE 10	17	13	34.2	37.62 N.	118.78 W.	5	...	...	3.2P	...	P	JUNE 10	09 A.M. PST
JUNE 10	18	22	11.2	37.65 N.	118.91 W.	20	...	...	3.2B	...	B	JUNE 10	10 A.M. PST
JUNE 10	22	15	32.2	37.50 N.	118.78 W.	4	...	...	3.4P	...	P	JUNE 10	02 P.M. PST
JUNE 11	03	04	47.8	37.60 N.	118.90 W.	6	...	...	3.4P	...	P	JUNE 10	07 P.M. PST
JUNE 11	04	40	58.5	37.54 N.	118.89 W.	8	3.9	...	4.7B	V	B	JUNE 10	08 P.M. PST
JUNE 11	04	42	25.7	37.47 N.	118.80 W.	5	...	...	3.6P	FELT	P	JUNE 10	08 P.M. PST
JUNE 11	04	47	35.5	37.57 N.	118.90 W.	6	...	...	3.8B	FELT	B	JUNE 10	08 P.M. PST
JUNE 11	05	02	21.7	37.55 N.	118.93 W.	2	...	...	3.0P	...	P	JUNE 10	09 P.M. PST
JUNE 11	13	44	45.5	37.43 N.	118.83 W.	6	...	...	3.0P	...	P	JUNE 11	05 A.M. PST
JUNE 11	17	10	22.7	37.63 N.	118.88 W.	9	...	...	3.6B	FELT	B	JUNE 11	09 A.M. PST
JUNE 11	22	39	31.4	37.51 N.	118.80 W.	17	...	...	3.2B	...	B	JUNE 11	02 P.M. PST
JUNE 12	00	55	55.4	37.54 N.	118.91 W.	13	...	...	3.5B	FELT	B	JUNE 11	04 P.M. PST
JUNE 12	05	29	31.6	37.85 N.	118.65 W.	3	...	...	3.0P	...	P	JUNE 11	09 P.M. PST
JUNE 12	10	22	41.5	37.62 N.	118.92 W.	0	...	...	3.3P	...	P	JUNE 12	02 A.M. PST
JUNE 12	23	17	26.1	37.54 N.	118.88 W.	12	...	...	3.1B	...	B	JUNE 12	03 P.M. PST
JUNE 13	02	36	23.7	37.62 N.	118.98 W.	1	...	3.1B	3.1P	...	P	JUNE 12	06 P.M. PST
JUNE 13	05	08	18.8	37.53 N.	118.42 W.	5	...	...	3.0P	...	P	JUNE 12	09 P.M. PST
JUNE 13	12	13	18.4	37.53 N.	118.73 W.	5	...	...	3.0P	...	P	JUNE 13	04 A.M. PST
JUNE 13	14	56	58.9	37.62 N.	118.91 W.	10	...	...	3.8B	FELT	B	JUNE 13	06 A.M. PST
JUNE 13	21	13	43.6	37.54 N.	118.84 W.	18	...	...	3.2B	...	B	JUNE 13	01 P.M. PST
JUNE 13	21	37	4.9	37.47 N.	118.90 W.	8	...	3.2B	3.1P	...	P	JUNE 13	01 P.M. PST
JUNE 13	23	23	19.9	37.48 N.	118.80 W.	17	...	...	4.1B	FELT	B	JUNE 13	03 P.M. PST
JUNE 14	00	04	34.3	37.54 N.	118.84 W.	10	...	...	3.0B	...	B	JUNE 13	04 P.M. PST
JUNE 14	03	36	33.2	37.55 N.	118.90 W.	7	...	...	3.5P	FELT	P	JUNE 13	07 P.M. PST
JUNE 14	05	47	47.6	37.62 N.	118.88 W.	0	...	...	3.3P	FELT	P	JUNE 13	09 P.M. PST
JUNE 14	07	35	55.5	37.52 N.	118.82 W.	5	...	...	3.7P	...	P	JUNE 13	11 P.M. PST
JUNE 14	11	30	47.8	37.60 N.	118.90 W.	6	...	...	3.2P	...	P	JUNE 14	03 A.M. PST
JUNE 14	12	28	46.3	37.53 N.	118.95 W.	6	...	...	3.0P	...	P	JUNE 14	04 A.M. PST
JUNE 15	12	23	54.7	37.55 N.	118.77 W.	5	...	...	3.4P	...	P	JUNE 15	04 A.M. PST
JUNE 16	08	22	38.4	37.62 N.	118.87 W.	10	...	...	3.5B	FELT	B	JUNE 16	12 P.M. PST
JUNE 16	12	55	40.9	37.50 N.	118.90 W.	5	...	...	3.0P	...	P	JUNE 16	04 A.M. PST
JUNE 16	13	33	50.6	37.42 N.	118.83 W.	4	...	...	3.1P	...	P	JUNE 16	05 A.M. PST
JUNE 16	14	02	19.9	37.57 N.	118.81 W.	9	...	...	3.2B	...	B	JUNE 16	06 A.M. PST
JUNE 16	14	38	7.4	37.56 N.	118.91 W.	14	...	...	3.2B	...	B	JUNE 16	06 A.M. PST
JUNE 16	21	46	30.8	37.56 N.	118.83 W.	26	...	...	3.1B	...	B	JUNE 16	01 P.M. PST
JUNE 16	21	52	59.3	37.53 N.	118.82 W.	5	...	...	3.0P	...	P	JUNE 16	01 P.M. PST
JUNE 17	07	07	20.7	37.52 N.	118.92 W.	6	...	...	3.1P	...	P	JUNE 16	11 P.M. PST
JUNE 17	12	26	39.5	37.51 N.	118.89 W.	9	...	...	3.9B	FELT	B	JUNE 17	04 A.M. PST
JUNE 17	12	27	12.6	37.50 N.	118.88 W.	4	...	...	4.0B	FELT	B	JUNE 17	04 A.M. PST
JUNE 17	23	16	11.4	37.47 N.	118.87 W.	6	...	...	3.0P	...	P	JUNE 17	03 P.M. PST
JUNE 18	03	48	9.0	36.90 N.	121.64 W.	6	...	...	3.7B	FELT	B	JUNE 17	07 P.M. PST
JUNE 18	04	52	26.6	36.90 N.	121.64 W.	6	...	...	4.2B	IV	B	JUNE 17	08 P.M. PST
JUNE 18	05	31	5.2	36.90 N.	121.65 W.	6	...	...	3.8B	FELT	B	JUNE 17	09 P.M. PST
JUNE 18	05	42	56.5	36.91 N.	121.66 W.	5	...	...	3.0B	...	B	JUNE 17	09 P.M. PST
JUNE 18	06	04	58.9	37.38 N.	118.93 W.	5	...	...	3.0P	...	P	JUNE 17	10 P.M. PST
JUNE 18	08	35	26.8	36.90 N.	121.65 W.	4	...	...	3.5B	FELT	B	JUNE 18	12 P.M. PST
JUNE 18	11	58	21.5	37.49 N.	118.90 W.	6	...	...	3.0B	...	B	JUNE 18	03 A.M. PST
JUNE 18	18	55	38.2	37.50 N.	118.85 W.	11	...	...	3.2B	...	B	JUNE 18	10 A.M. PST
JUNE 18	22	21	24.7	37.47 N.	118.88 W.	17	...	...	3.2B	...	B	JUNE 18	02 P.M. PST
JUNE 19	04	45	32.2	37.52 N.	118.88 W.	4	...	...	3.1P	...	P	JUNE 18	08 P.M. PST
JUNE 19	07	18	2.4	37.57 N.	118.92 W.	6	...	...	3.0P	...	P	JUNE 18	11 P.M. PST
JUNE 19	07	19	32.4	37.53 N.	118.97 W.	3	...	...	3.0P	...	P	JUNE 18	11 P.M. PST
JUNE 19	07	22	26.5	37.56 N.	118.93 W.	16	...	...	3.2B	...	B	JUNE 18	11 P.M. PST
JUNE 19	14	04	30.5	37.62 N.	118.87 W.	2	...	...	3.5P	...	P	JUNE 19	06 A.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
JUNE 19	14	06	22.0	37.53 N.	118.90 W.	4	...	...	3.0P	...	P	JUNE 19	06 A.M. PST
JUNE 19	17	21	5.7	37.57 N.	118.88 W.	4	...	...	3.0P	...	P	JUNE 19	09 A.M. PST
JUNE 19	22	26	17.3	37.61 N.	118.93 W.	2	...	...	3.3B	...	B	JUNE 19	02 P.M. PST
JUNE 20	13	44	36.1	37.50 N.	118.83 W.	6	...	...	3.0P	...	P	JUNE 20	05 A.M. PST
JUNE 20	15	25	00.0	37.53 N.	118.86 W.	24	...	...	3.4B	...	B	JUNE 20	07 A.M. PST
JUNE 20	17	24	7.2	37.54 N.	118.91 W.	4	...	...	4.0B	FELT	B	JUNE 20	09 A.M. PST
JUNE 21	00	42	56.5	40.39 N.	124.68 W.	10	...	...	3.8B	...	B	JUNE 20	04 P.M. PST
JUNE 21	18	14	36.4	36.66 N.	121.34 W.	5	...	...	3.0B	...	B	JUNE 21	10 A.M. PST
JUNE 21	22	01	10.5	37.54 N.	118.90 W.	27	...	...	3.3B	...	B	JUNE 21	02 P.M. PST
JUNE 22	06	07	20.3	37.49 N.	118.92 W.	5	...	...	3.2B	...	B	JUNE 21	10 P.M. PST
JUNE 22	09	50	7.7	37.59 N.	118.87 W.	29	...	...	3.0B	...	B	JUNE 22	01 A.M. PST
JUNE 22	17	39	35.8	33.83 N.	116.87 W.	14	...	...	3.1P	...	P	JUNE 22	09 A.M. PST
JUNE 23	06	32	22.3	37.55 N.	118.85 W.	5	...	...	3.8P	...	P	JUNE 22	10 P.M. PST
JUNE 23	05	16	52.7	37.59 N.	118.86 W.	11	...	...	3.5B	FELT	B	JUNE 22	09 P.M. PST
JUNE 23	21	11	40.2	34.12 N.	117.47 W.	5	...	...	3.0P	IV	P	JUNE 23	01 P.M. PST
JUNE 24	21	44	42.6	37.55 N.	118.87 W.	4	...	...	3.0P	...	P	JUNE 24	01 P.M. PST
JUNE 25	05	51	23.6	37.58 N.	118.87 W.	4	...	...	3.1P	...	P	JUNE 24	09 P.M. PST
JUNE 25	22	32	19.4	34.00 N.	116.75 W.	7	...	...	3.0P	...	P	JUNE 25	02 P.M. PST
JUNE 26	03	56	46.6	37.05 N.	121.49 W.	4	...	...	3.2B	...	B	JUNE 25	07 P.M. PST
JUNE 26	04	41	24.0	34.37 N.	117.05 W.	12	...	...	3.0P	...	P	JUNE 25	08 P.M. PST
JUNE 26	10	47	2.8	33.68 N.	116.73 W.	6	...	...	2.6P	FELT	P	JUNE 26	02 A.M. PST
JUNE 26	11	19	1.4	33.80 N.	118.28 W.	4	...	...	2.6P	III	P	JUNE 26	03 A.M. PST
JUNE 27	01	29	29.2	37.58 N.	118.85 W.	10	...	...	3.7B	FELT	B	JUNE 26	16 P.M. PST
JUNE 27	13	21	1.7	37.45 N.	118.85 W.	5	...	...	3.2P	...	P	JUNE 27	05 A.M. PST
JUNE 28	00	57	33.8	37.57 N.	118.85 W.	10	...	...	3.8B	FELT	B	JUNE 27	04 P.M. PST
JUNE 28	00	58	42.8	37.55 N.	118.84 W.	19	...	...	4.2B	FELT	B	JUNE 27	04 P.M. PST
JUNE 28	03	53	1.4	37.58 N.	118.84 W.	11	...	...	3.6B	FELT	B	JUNE 27	07 P.M. PST
JUNE 28	20	32	37.5	37.60 N.	118.90 W.	5	...	...	3.1P	...	P	JUNE 28	12 M. PST
JUNE 29	04	16	12.9	37.53 N.	118.84 W.	8	...	...	3.5B	FELT	B	JUNE 28	08 P.M. PST
JUNE 29	07	44	46.5	38.03 N.	118.71 W.	6	...	...	3.3B	...	B	JUNE 28	11 P.M. PST
JUNE 29	07	46	13.5	38.00 N.	118.69 W.	5	4.2	...	5.0B	VI	B	JUNE 28	11 P.M. PST
JUNE 29	07	57	2.6	38.02 N.	118.72 W.	5	...	...	3.2B	...	B	JUNE 28	11 P.M. PST
JUNE 29	07	59	11.1	37.58 N.	118.88 W.	6	...	...	3.3P	...	P	JUNE 28	11 P.M. PST
JUNE 29	10	55	2.7	38.02 N.	118.70 W.	7	...	...	3.3B	...	B	JUNE 29	02 A.M. PST
JUNE 29	13	49	0.6	38.01 N.	118.71 W.	8	...	...	3.6B	...	B	JUNE 29	05 A.M. PST
JUNE 29	18	04	58.3	38.02 N.	118.70 W.	9	...	...	3.9B	...	B	JUNE 29	10 A.M. PST
JUNE 29	22	13	29.1	38.01 N.	118.71 W.	5	...	...	3.2B	...	B	JUNE 29	02 P.M. PST
JUNE 30	01	49	14.3	37.60 N.	118.92 W.	6	...	...	3.5B	FELT	B	JUNE 29	04 P.M. PST
JUNE 30	02	09	43.7	37.47 N.	118.83 W.	17	...	...	3.6B	FELT	B	JUNE 29	06 P.M. PST
JUNE 30	09	21	20.0	37.62 N.	118.88 W.	11	...	...	3.2B	...	B	JUNE 30	01 A.M. PST
JUNE 30	10	23	1.1	38.00 N.	118.68 W.	3	...	...	4.0B	FELT	B	JUNE 30	02 A.M. PST
JUNE 30	22	29	3.2	33.15 N.	119.02 W.	5	...	...	3.3P	...	P	JUNE 30	02 P.M. PST
JULY 1	06	38	13.7	37.57 N.	118.86 W.	14	...	...	3.6B	FELT	B	JUNE 30	10 P.M. PST
JULY 1	06	43	51.1	37.61 N.	118.90 W.	9	...	...	3.2P	...	P	JUNE 30	10 P.M. PST
JULY 1	10	50	51.1	36.05 N.	118.35 W.	5	...	...	3.2P	...	P	JULY 1	02 A.M. PST
JULY 1	14	25	12.1	37.61 N.	118.94 W.	8	...	...	3.5B	FELT	B	JULY 1	06 A.M. PST
JULY 2	04	13	52.5	37.52 N.	118.85 W.	11	...	...	3.8B	FELT	B	JULY 1	08 P.M. PST
JULY 2	04	53	31.2	33.82 N.	118.23 W.	6	...	...	2.4P	III	P	JULY 1	08 P.M. PST
JULY 2	08	01	13.0	37.48 N.	118.86 W.	11	...	...	3.0P	...	P	JULY 2	12 P.M. PST
JULY 3	02	19	31.5	37.65 N.	118.93 W.	4	...	...	4.0B	FELT	B	JULY 2	06 P.M. PST
JULY 3	02	21	51.5	37.63 N.	118.96 W.	14	...	...	3.5B	FELT	B	JULY 2	06 P.M. PST
JULY 3	02	39	58.2	37.66 N.	118.96 W.	6	...	...	4.2B	FELT	B	JULY 2	06 P.M. PST
JULY 3	03	08	12.6	37.52 N.	118.89 W.	21	...	...	3.4B	FELT	B	JULY 2	07 P.M. PST
JULY 3	06	00	21.8	37.62 N.	118.96 W.	7	...	...	3.6B	FELT	B	JULY 2	10 P.M. PST
JULY 3	07	05	38.1	37.64 N.	118.97 W.	11	...	...	3.4B	FELT	B	JULY 2	11 P.M. PST
JULY 4	15	22	27.6	37.50 N.	118.85 W.	30	...	...	3.2B	...	B	JULY 4	07 A.M. PST
JULY 4	17	20	59.8	37.55 N.	118.82 W.	21	...	...	3.4B	FELT	B	JULY 4	09 A.M. PST
JULY 5	09	13	37.4	36.06 N.	120.68 W.	6	...	...	3.1B	...	B	JULY 5	01 A.M. PST
JULY 5	11	58	59.0	37.60 N.	118.83 W.	9	4.2	...	4.3B	IV	B	JULY 5	03 A.M. PST
JULY 5	12	14	34.5	37.59 N.	118.81 W.	2	...	...	2.9B	...	G	JULY 5	04 A.M. PST
JULY 5	12	14	51.3	37.59 N.	118.85 W.	10	...	...	3.3B	...	B	JULY 5	04 A.M. PST
JULY 5	12	17	6.5	37.60 N.	118.84 W.	10	...	...	2.9B	...	B	JULY 5	04 A.M. PST
JULY 5	12	26	13.2	37.61 N.	118.84 W.	16	...	...	3.1B	...	B	JULY 5	04 A.M. PST
JULY 5	13	43	6.0	37.60 N.	118.84 W.	13	...	...	3.1B	...	B	JULY 5	05 A.M. PST
JULY 5	14	19	25.7	37.40 N.	118.18 W.	13	...	...	3.6B	FELT	B	JULY 5	06 A.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
JULY 5	21	59	31.4	37.57 N.	118.85 W.	8	...	...	3.1P	...	P	JULY 5	01 P.M. PST
JULY 5	22	46	40.1	37.50 N.	118.85 W.	26	...	...	3.4B	FELT	B	JULY 5	02 P.M. PST
JULY 6	05	25	49.9	37.55 N.	118.91 W.	17	...	...	3.2B	...	B	JULY 5	09 P.M. PST
JULY 6	12	04	45.6	37.98 N.	122.08 W.	11	...	...	3.0B	FELT	B	JULY 6	04 A.M. PST
JULY 6	16	40	9.5	37.55 N.	118.93 W.	14	...	...	3.2B	...	G	JULY 6	08 A.M. PST
JULY 6	17	53	12.6	37.59 N.	118.78 W.	11	...	...	3.6B	FELT	B	JULY 6	09 A.M. PST
JULY 7	02	35	24.1	37.99 N.	122.08 W.	10	...	...	2.5B	FELT	B	JULY 6	06 P.M. PST
JULY 7	11	32	14.2	38.02 N.	118.71 W.	6	...	...	3.5B	...	B	JULY 7	03 A.M. PST
JULY 7	15	39	46.5	38.02 N.	118.72 W.	5	...	...	3.8B	FELT	B	JULY 7	07 A.M. PST
JULY 7	16	12	02.1	37.63 N.	118.97 W.	3	...	...	3.0B	...	B	JULY 7	08 A.M. PST
JULY 7	16	12	20.3	37.61 N.	118.97 W.	21	...	...	3.1B	...	B	JULY 7	08 A.M. PST
JULY 7	17	32	18.3	37.64 N.	118.96 W.	14	...	...	3.1B	...	G	JULY 7	09 A.M. PST
JULY 7	20	46	44.5	38.03 N.	118.70 W.	10	...	...	3.9B	FELT	B	JULY 7	12 M. PST
JULY 7	21	34	37.2	38.02 N.	118.71 W.	8	...	...	3.8B	FELT	B	JULY 7	01 P.M. PST
JULY 8	17	13	2.1	37.05 N.	121.45 W.	7	...	...	3.0B	FELT	B	JULY 8	09 A.M. PST
JULY 9	11	17	27.4	37.43 N.	118.83 W.	5	...	...	3.2P	...	P	JULY 9	03 A.M. PST
JULY 9	21	11	25.3	33.05 N.	116.40 W.	8	...	...	3.1P	...	P	JULY 9	01 P.M. PST
JULY 10	06	47	00.1	37.55 N.	118.85 W.	17	...	...	3.2B	...	B	JULY 9	10 P.M. PST
JULY 10	15	45	31.3	34.33 N.	117.02 W.	6	...	...	2.9P	FELT	P	JULY 10	07 A.M. PST
JULY 10	16	46	15.1	37.48 N.	118.89 W.	18	...	...	3.0B	...	B	JULY 10	08 A.M. PST
JULY 11	11	29	34.3	37.56 N.	118.79 W.	12	...	...	3.4B	FELT	B	JULY 11	03 A.M. PST
JULY 13	10	55	35.9	37.49 N.	118.82 W.	21	...	...	3.3B	FELT	B	JULY 13	02 A.M. PST
JULY 15	07	16	11.5	37.51 N.	118.85 W.	15	...	...	3.7B	FELT	B	JULY 14	11 P.M. PST
JULY 15	18	36	4.6	37.62 N.	118.92 W.	14	...	...	3.0B	...	G	JULY 15	10 A.M. PST
JULY 16	09	11	11.0	37.56 N.	118.82 W.	12	...	...	3.2B	...	B	JULY 16	01 A.M. PST
JULY 16	11	25	4.2	37.49 N.	118.88 W.	22	...	...	3.4B	FELT	B	JULY 16	03 A.M. PST
JULY 16	16	18	39.0	37.58 N.	118.94 W.	4	...	...	3.3B	FELT	B	JULY 16	08 A.M. PST
JULY 17	20	19	20.7	37.58 N.	118.83 W.	6	...	...	3.0P	...	P	JULY 17	12 M. PST
JULY 18	05	14	51.0	34.57 N.	120.70 W.	5	...	...	3.2P	...	P	JULY 17	09 P.M. PST
JULY 18	20	14	52.1	37.52 N.	118.91 W.	9	...	...	3.7B	FELT	B	JULY 18	12 M. PST
JULY 19	16	55	19.7	36.08 N.	120.05 W.	8	...	...	3.0B	III	B	JULY 19	08 A.M. PST
JULY 20	11	24	25.1	37.52 N.	118.87 W.	6	...	...	3.2P	...	P	JULY 20	03 A.M. PST
JULY 20	20	27	2.6	37.62 N.	118.87 W.	18	...	...	3.1B	...	B	JULY 20	12 M. PST
JULY 21	21	50	3.0	37.57 N.	118.90 W.	18	...	...	3.3B	...	B	JULY 21	01 P.M. PST
JULY 23	07	50	13.4	34.27 N.	119.62 W.	7	...	...	3.4P	III	P	JULY 22	11 P.M. PST
JULY 23	09	55	51.5	33.07 N.	115.50 W.	3	...	...	2.5P	FELT	P	JULY 23	01 A.M. PST
JULY 24	13	18	27.4	38.81 N.	122.79 W.	2	...	...	2.9B	FELT	B	JULY 24	05 A.M. PST
JULY 24	19	22	10.1	33.27 N.	116.87 W.	7	...	...	3.0P	...	P	JULY 24	11 A.M. PST
JULY 25	06	44	19.2	37.58 N.	118.90 W.	14	...	...	3.8B	FELT	B	JULY 24	10 P.M. PST
JULY 26	03	23	19.3	37.50 N.	118.88 W.	23	...	...	3.4B	FELT	B	JULY 25	07 P.M. PST
JULY 26	17	22	46.8	37.54 N.	118.91 W.	16	...	...	3.6B	FELT	B	JULY 26	09 A.M. PST
JULY 26	18	08	27.9	38.02 N.	118.66 W.	3	...	...	3.4B	...	B	JULY 26	10 A.M. PST
JULY 26	19	17	55.1	35.85 N.	121.21 W.	7	...	...	3.3B	...	B	JULY 26	11 A.M. PST
JULY 26	21	43	1.5	37.62 N.	118.93 W.	11	...	...	3.5B	FELT	B	JULY 26	01 P.M. PST
JULY 27	16	55	30.8	37.47 N.	118.76 W.	18	...	...	3.6B	FELT	B	JULY 27	08 A.M. PST
JULY 28	15	43	08.0	38.00 N.	118.71 W.	5	...	...	3.0B	...	B	JULY 28	07 A.M. PST
JULY 29	01	44	58.9	34.03 N.	116.47 W.	6	...	...	3.0P	...	P	JULY 28	05 P.M. PST
JULY 29	06	48	19.5	33.07 N.	116.02 W.	5	...	...	3.6P	...	P	JULY 28	10 P.M. PST
JULY 29	06	58	40.7	37.58 N.	118.70 W.	4	...	...	3.0P	...	P	JULY 28	10 P.M. PST
JULY 29	19	17	14.1	37.49 N.	118.91 W.	8	...	...	3.9B	FELT	B	JULY 29	11 A.M. PST
JULY 29	20	56	49.1	37.50 N.	118.91 W.	5	...	...	3.6B	FELT	B	JULY 29	12 M. PST
JULY 29	22	01	1.5	37.50 N.	118.93 W.	22	...	...	3.1B	...	B	JULY 29	02 P.M. PST
JULY 29	22	01	57.9	37.49 N.	118.93 W.	26	...	...	3.1B	...	B	JULY 29	02 P.M. PST
JULY 29	23	18	44.6	37.53 N.	118.93 W.	23	...	...	3.1B	...	B	JULY 29	03 P.M. PST
JULY 31	08	20	46.5	37.67 N.	118.72 W.	11	...	...	3.3P	...	P	JULY 31	12 P.M. PST
JULY 31	09	20	45.6	37.85 N.	121.77 W.	11	...	...	2.6B	FELT	B	JULY 31	01 A.M. PST
AUG. 1	16	38	55.9	37.55 N.	118.89 W.	8	4.7	5.0	5.4B	V	B	AUG. 1	08 A.M. PST
AUG. 1	16	42	55.3	37.52 N.	118.91 W.	17	...	...	4.1B	FELT	B	AUG. 1	08 A.M. PST
AUG. 1	16	47	47.8	37.53 N.	118.82 W.	5	...	...	3.0P	...	P	AUG. 1	08 A.M. PST
AUG. 1	16	48	54.6	37.55 N.	118.88 W.	13	4.2	...	4.6B	FELT	B	AUG. 1	08 A.M. PST
AUG. 1	16	52	14.9	37.56 N.	118.95 W.	11	...	...	3.6B	FELT	B	AUG. 1	08 A.M. PST
AUG. 1	16	52	31.7	37.56 N.	118.95 W.	10	...	...	3.9B	FELT	B	AUG. 1	08 A.M. PST
AUG. 1	16	56	51.7	37.59 N.	118.97 W.	8	...	...	3.4B	FELT	B	AUG. 1	08 A.M. PST
AUG. 1	16	59	12.6	37.53 N.	118.88 W.	10	...	...	3.5B	FELT	B	AUG. 1	08 A.M. PST
AUG. 1	17	09	17.2	37.55 N.	118.87 W.	13	...	...	4.1B	FELT	B	AUG. 1	09 A.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
AUG. 1	17	32	54.6	37.53 N.	118.90 W.	14	...	...	3.5B	FELT	B	AUG. 1	09 A.M. PST
AUG. 1	17	47	59.3	37.56 N.	118.87 W.	13	...	...	3.5B	FELT	B	AUG. 1	09 A.M. PST
AUG. 1	17	48	15.2	37.56 N.	118.89 W.	10	...	...	3.8B	FELT	B	AUG. 1	09 A.M. PST
AUG. 1	18	16	34.0	37.57 N.	118.89 W.	13	...	...	3.1B	...	B	AUG. 1	10 A.M. PST
AUG. 1	18	28	44.0	37.57 N.	118.92 W.	8	...	...	3.3B	FELT	B	AUG. 1	10 A.M. PST
AUG. 1	18	52	51.6	37.54 N.	118.90 W.	13	...	...	3.5B	FELT	B	AUG. 1	10 A.M. PST
AUG. 1	19	56	26.3	37.67 N.	118.97 W.	18	...	...	3.3B	FELT	B	AUG. 1	11 A.M. PST
AUG. 1	22	20	7.0	37.54 N.	118.90 W.	6	...	...	3.6B	FELT	B	AUG. 1	02 P.M. PST
AUG. 2	01	15	50.0	37.53 N.	118.91 W.	24	...	...	3.6B	FELT	B	AUG. 1	05 P.M. PST
AUG. 2	17	09	43.0	37.57 N.	118.90 W.	9	...	...	3.9B	FELT	B	AUG. 2	09 A.M. PST
AUG. 2	17	51	45.1	37.57 N.	118.79 W.	16	...	...	3.0B	...	B	AUG. 2	09 A.M. PST
AUG. 3	00	34	32.2	37.53 N.	118.90 W.	13	...	...	3.3B	FELT	B	AUG. 2	04 P.M. PST
AUG. 3	02	58	18.7	37.64 N.	118.96 W.	5	...	...	3.0B	...	G	AUG. 2	06 P.M. PST
AUG. 3	02	58	35.1	37.55 N.	118.85 W.	5	...	...	3.0P	...	P	AUG. 2	06 P.M. PST
AUG. 3	03	35	9.1	37.63 N.	118.96 W.	11	...	...	3.1B	...	B	AUG. 2	07 P.M. PST
AUG. 3	04	49	1.2	37.62 N.	118.97 W.	11	...	...	3.0B	...	B	AUG. 2	08 P.M. PST
AUG. 3	07	32	42.1	37.54 N.	118.86 W.	21	...	...	3.7B	FELT	B	AUG. 2	11 P.M. PST
AUG. 3	10	02	55.7	37.55 N.	118.83 W.	5	...	...	3.1P	...	P	AUG. 3	02 A.M. PST
AUG. 3	14	11	38.5	37.51 N.	118.82 W.	13	...	...	3.1B	...	B	AUG. 3	06 A.M. PST
AUG. 3	17	12	4.5	37.62 N.	118.90 W.	5	...	...	3.3P	...	P	AUG. 3	09 A.M. PST
AUG. 4	12	52	48.3	37.60 N.	118.90 W.	4	...	...	3.4P	...	P	AUG. 4	04 A.M. PST
AUG. 6	10	42	39.1	37.65 N.	118.98 W.	11	...	...	3.0B	...	B	AUG. 6	02 A.M. PST
AUG. 6	10	51	20.2	37.48 N.	118.84 W.	9	...	...	3.5B	FELT	B	AUG. 6	02 A.M. PST
AUG. 6	10	56	14.1	37.50 N.	118.88 W.	10	...	...	3.1B	...	B	AUG. 6	02 A.M. PST
AUG. 7	16	13	36.1	37.49 N.	118.71 W.	10	...	...	3.0B	...	B	AUG. 7	08 A.M. PST
AUG. 7	23	57	3.8	37.62 N.	118.90 W.	10	...	...	3.1B	...	B	AUG. 7	03 P.M. PST
AUG. 8	02	14	38.2	37.55 N.	118.93 W.	5	...	...	3.8B	FELT	B	AUG. 7	06 P.M. PST
AUG. 8	08	16	58.5	37.56 N.	118.95 W.	4	...	...	3.5B	FELT	B	AUG. 8	12 P.M. PST
AUG. 8	08	20	26.2	37.58 N.	118.93 W.	5	...	...	3.0P	...	P	AUG. 8	12 P.M. PST
AUG. 8	08	25	1.3	37.56 N.	118.95 W.	4	...	...	3.5B	FELT	B	AUG. 8	12 P.M. PST
AUG. 8	08	35	25.2	37.55 N.	118.94 W.	7	...	...	3.1B	...	B	AUG. 8	12 P.M. PST
AUG. 8	14	56	29.9	37.58 N.	118.80 W.	11	...	...	3.3B	FELT	B	AUG. 8	06 A.M. PST
AUG. 8	22	14	1.0	37.58 N.	118.80 W.	10	...	...	3.4B	FELT	B	AUG. 8	02 P.M. PST
AUG. 9	23	26	3.4	37.54 N.	118.88 W.	12	...	...	3.7B	FELT	B	AUG. 9	03 P.M. PST
AUG. 10	04	43	4.3	37.54 N.	118.88 W.	11	...	...	3.5B	FELT	B	AUG. 9	08 P.M. PST
AUG. 10	06	48	53.8	37.60 N.	118.85 W.	5	...	...	3.0P	...	P	AUG. 9	10 P.M. PST
AUG. 11	00	35	15.2	35.86 N.	119.93 W.	5	...	...	3.3P	...	G	AUG. 10	04 P.M. PST
AUG. 11	05	55	14.9	37.52 N.	118.87 W.	10	...	...	3.4B	FELT	B	AUG. 10	09 P.M. PST
AUG. 11	09	10	22.1	37.65 N.	118.93 W.	5	...	...	3.0P	...	P	AUG. 11	01 A.M. PST
AUG. 11	13	58	37.8	37.56 N.	118.91 W.	6	...	...	3.4B	FELT	B	AUG. 11	05 A.M. PST
AUG. 14	14	21	48.1	37.62 N.	118.92 W.	10	...	...	3.7B	FELT	B	AUG. 14	06 A.M. PST
AUG. 15	04	23	39.8	35.85 N.	119.90 W.	4	...	...	3.1P	...	P	AUG. 14	08 P.M. PST
AUG. 15	04	25	34.5	39.48 N.	120.31 W.	10	...	...	3.3B	FELT	G	AUG. 14	08 P.M. PST
AUG. 15	05	07	9.8	35.95 N.	120.03 W.	5	...	...	3.0P	...	P	AUG. 14	09 P.M. PST
AUG. 15	13	50	21.5	37.50 N.	118.83 W.	8	...	...	3.5B	FELT	B	AUG. 15	05 A.M. PST
AUG. 16	21	46	33.2	37.45 N.	118.85 W.	12	...	...	3.7B	FELT	B	AUG. 16	01 P.M. PST
AUG. 19	06	45	26.6	37.60 N.	118.86 W.	9	...	...	4.2B	FELT	B	AUG. 18	10 P.M. PST
AUG. 20	05	29	0.5	37.52 N.	118.90 W.	9	...	...	3.8B	FELT	B	AUG. 19	09 P.M. PST
AUG. 21	04	47	59.2	35.32 N.	118.67 W.	5	...	...	3.3P	...	P	AUG. 20	08 P.M. PST
AUG. 21	19	59	46.8	37.26 N.	121.63 W.	8	...	...	3.1B	...	B	AUG. 21	11 A.M. PST
AUG. 23	04	20	22.6	37.57 N.	118.88 W.	6	...	...	3.0P	...	P	AUG. 22	08 P.M. PST
AUG. 23	06	50	42.3	33.27 N.	116.10 W.	5	...	...	3.6P	...	P	AUG. 22	10 P.M. PST
AUG. 23	08	43	36.6	33.48 N.	116.58 W.	12	...	...	3.0P	...	P	AUG. 23	12 P.M. PST
AUG. 23	15	27	36.2	38.81 N.	122.78 W.	3	...	...	2.8B	FELT	B	AUG. 23	07 A.M. PST
AUG. 24	12	41	17.8	37.57 N.	121.66 W.	5	...	...	4.0B	IV	B	AUG. 24	04 A.M. PST
AUG. 24	23	38	50.0	37.61 N.	118.85 W.	15	...	...	3.1B	...	B	AUG. 24	03 P.M. PST
AUG. 25	03	26	24.6	33.15 N.	115.67 W.	9	...	...	3.0P	...	P	AUG. 24	07 P.M. PST
AUG. 25	15	58	37.6	39.95 N.	120.09 W.	2	...	...	3.4B	...	B	AUG. 25	07 A.M. PST
AUG. 26	03	11	27.2	33.37 N.	116.40 W.	5	...	...	3.0P	...	P	AUG. 25	07 P.M. PST
AUG. 29	00	23	5.7	37.52 N.	118.84 W.	10	...	...	3.1B	...	B	AUG. 28	04 P.M. PST
AUG. 29	17	16	40.5	38.27 N.	122.07 W.	5	...	...	2.5B	III	G	AUG. 29	09 A.M. PST
AUG. 30	10	53	28.6	37.58 N.	118.78 W.	11	...	...	3.7B	FELT	B	AUG. 30	02 A.M. PST
AUG. 30	17	49	34.6	37.60 N.	118.82 W.	5	...	...	3.0P	...	P	AUG. 30	09 A.M. PST
AUG. 30	23	38	36.0	33.55 N.	116.67 W.	11	...	...	3.5P	...	P	AUG. 30	03 P.M. PST
AUG. 31	10	32	46.6	35.22 N.	118.60 W.	3	...	...	3.5P	FELT	P	AUG. 31	02 A.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
SEPT. 4	10	59	46.4	37.57 N.	118.78 W.	13	...	...	3.1B	...	B	SEPT. 4	02 A.M. PST
SEPT. 7	13	09	17.0	37.55 N.	118.80 W.	1	...	...	3.0P	...	P	SEPT. 7	05 A.M. PST
SEPT. 8	06	28	8.4	35.73 N.	121.34 W.	9	...	...	3.6B	FELT	B	SEPT. 7	10 P.M. PST
SEPT. 9	16	42	39.6	36.52 N.	121.15 W.	6	...	...	3.0B	...	B	SEPT. 9	08 A.M. PST
SEPT. 9	17	26	20.8	33.58 N.	118.30 W.	5	...	...	3.9P	IV	P	SEPT. 9	09 A.M. PST
SEPT. 9	18	07	20.4	33.82 N.	118.23 W.	5	...	...	2.4P	FELT	P	SEPT. 9	10 A.M. PST
SEPT. 13	10	50	19.4	36.66 N.	121.35 W.	6	...	...	3.3B	FELT	B	SEPT. 13	02 A.M. PST
SEPT. 14	11	50	1.7	37.63 N.	118.95 W.	10	...	...	3.5B	FELT	B	SEPT. 14	03 A.M. PST
SEPT. 15	13	29	07.4	40.55 N.	124.40 W.	17	...	...	3.0B	FELT	B	SEPT. 15	05 A.M. PST
SEPT. 16	05	41	29.9	37.61 N.	118.91 W.	11	...	...	3.0B	...	B	SEPT. 15	09 P.M. PST
SEPT. 17	05	41	4.9	37.63 N.	118.96 W.	18	...	...	3.5B	...	B	SEPT. 16	09 P.M. PST
SEPT. 19	15	11	45.1	41.20 N.	124.15 W.	20	...	...	3.2B	...	B	SEPT. 19	07 A.M. PST
SEPT. 20	10	42	51.3	36.23 N.	120.13 W.	5	...	...	3.0P	...	P	SEPT. 20	02 A.M. PST
SEPT. 20	20	08	30.0	33.50 N.	116.52 W.	11	...	...	3.0P	...	P	SEPT. 20	12 M. PST
SEPT. 21	17	13	27.3	37.57 N.	118.91 W.	21	...	...	3.3B	...	B	SEPT. 21	09 A.M. PST
SEPT. 23	11	13	5.2	36.24 N.	120.16 W.	7	...	...	3.0B	...	B	SEPT. 23	03 A.M. PST
SEPT. 24	08	08	38.6	36.24 N.	120.17 W.	8	4.8	...	4.5B	V	B	SEPT. 24	12 P.M. PST
SEPT. 24	08	13	27.4	36.22 N.	120.13 W.	5	...	...	3.2P	...	P	SEPT. 24	12 P.M. PST
SEPT. 24	08	14	33.1	36.22 N.	120.13 W.	5	...	...	3.0P	...	P	SEPT. 24	12 P.M. PST
SEPT. 25	03	20	32.6	37.55 N.	118.88 W.	13	...	...	3.4B	...	B	SEPT. 24	07 P.M. PST
SEPT. 25	16	33	29.5	36.67 N.	118.10 W.	6	...	...	2.7P	FELT	P	SEPT. 25	08 A.M. PST
SEPT. 26	10	15	41.4	35.78 N.	120.27 W.	6	...	...	3.2P	IV	P	SEPT. 26	02 A.M. PST
SEPT. 26	13	18	41.2	35.27 N.	119.40 W.	5	...	...	4.4P	V	P	SEPT. 26	05 A.M. PST
SEPT. 26	14	21	39.6	37.67 N.	118.90 W.	12	...	...	3.0P	...	P	SEPT. 26	06 A.M. PST
SEPT. 26	16	19	11.5	37.55 N.	118.84 W.	23	...	...	3.5B	FELT	B	SEPT. 26	08 A.M. PST
SEPT. 27	19	16	24.5	37.62 N.	118.92 W.	14	...	...	4.1B	FELT	B	SEPT. 27	11 A.M. PST
SEPT. 27	21	29	0.1	37.63 N.	118.93 W.	16	...	...	3.3B	...	B	SEPT. 27	01 P.M. PST
SEPT. 28	00	42	15.5	37.63 N.	118.92 W.	11	...	...	3.2B	...	B	SEPT. 27	04 P.M. PST
SEPT. 28	10	43	40.8	37.67 N.	118.92 W.	11	...	...	3.0P	...	P	SEPT. 28	02 A.M. PST
SEPT. 28	22	53	21.6	37.62 N.	118.92 W.	12	...	...	3.1B	...	B	SEPT. 28	02 P.M. PST
SEPT. 29	03	21	42.3	37.61 N.	118.93 W.	5	...	...	3.0P	...	G	SEPT. 28	07 P.M. PST
OCT. 2	12	47	2.0	37.98 N.	122.07 W.	15	...	...	3.1B	IV	B	OCT. 2	04 A.M. PST
OCT. 2	23	07	44.6	37.60 N.	118.90 W.	1	...	...	3.0P	...	P	OCT. 2	03 P.M. PST
OCT. 4	16	38	22.2	37.52 N.	118.84 W.	11	...	...	4.3B	FELT	B	OCT. 4	08 A.M. PST
OCT. 4	16	42	17.7	37.51 N.	118.83 W.	10	...	...	3.7B	FELT	B	OCT. 4	08 A.M. PST
OCT. 4	22	46	16.3	37.55 N.	118.83 W.	5	...	...	3.0P	...	P	OCT. 4	02 P.M. PST
OCT. 5	11	38	27.2	37.55 N.	118.88 W.	12	...	...	3.5B	FELT	B	OCT. 5	03 A.M. PST
OCT. 5	20	28	52.7	37.51 N.	118.84 W.	27	...	...	3.2B	...	B	OCT. 5	12 M. PST
OCT. 6	06	40	1.6	34.35 N.	118.30 W.	6	...	...	3.2P	FELT	P	OCT. 5	10 P.M. PST
OCT. 6	15	27	10.6	35.37 N.	118.60 W.	5	...	...	3.2P	...	P	OCT. 6	07 A.M. PST
OCT. 6	15	56	8.4	37.54 N.	118.91 W.	8	...	...	3.2B	...	B	OCT. 6	07 A.M. PST
OCT. 9	16	12	21.3	36.76 N.	121.52 W.	7	...	...	3.0B	FELT	B	OCT. 9	08 A.M. PST
OCT. 9	19	48	56.3	37.48 N.	118.80 W.	5	...	...	3.3P	...	P	OCT. 9	11 A.M. PST
OCT. 10	14	55	59.5	34.23 N.	118.63 W.	2	...	...	2.0P	FELT	P	OCT. 10	06 A.M. PST
OCT. 10	15	55	49.3	37.62 N.	118.94 W.	15	...	...	3.2B	...	B	OCT. 10	07 A.M. PST
OCT. 10	17	54	3.2	37.65 N.	118.91 W.	5	...	...	3.0P	...	G	OCT. 10	09 A.M. PST
OCT. 10	17	57	57.9	37.67 N.	118.97 W.	9	...	...	3.0P	...	P	OCT. 10	09 A.M. PST
OCT. 11	07	51	6.9	37.65 N.	118.98 W.	8	...	...	3.1B	...	B	OCT. 10	11 P.M. PST
OCT. 11	08	08	52.5	37.67 N.	118.97 W.	9	...	...	3.0P	...	P	OCT. 11	12 P.M. PST
OCT. 12	00	35	19.2	37.68 N.	118.98 W.	9	...	...	3.2P	...	P	OCT. 11	04 P.M. PST
OCT. 12	13	55	6.5	37.47 N.	118.86 W.	13	...	...	3.4B	FELT	B	OCT. 12	05 A.M. PST
OCT. 13	01	16	45.2	40.43 N.	123.78 W.	20	4.3	...	3.9B	IV	B	OCT. 12	05 P.M. PST
OCT. 13	02	46	54.1	36.57 N.	121.09 W.	11	...	...	4.0B	IV	B	OCT. 12	06 P.M. PST
OCT. 13	05	16	0.8	37.65 N.	118.85 W.	9	...	...	3.0P	...	P	OCT. 12	09 P.M. PST
OCT. 13	05	20	17.3	37.60 N.	121.99 W.	5	...	...	2.5B	III	B	OCT. 12	09 P.M. PST
OCT. 13	08	54	39.2	36.57 N.	121.21 W.	7	...	...	3.2B	FELT	B	OCT. 13	12 P.M. PST
OCT. 13	13	38	42.3	34.38 N.	117.67 W.	10	...	...	2.8P	FELT	P	OCT. 13	05 A.M. PST
OCT. 13	14	31	44.9	34.38 N.	118.65 W.	16	...	...	3.2P	...	P	OCT. 13	06 A.M. PST
OCT. 14	10	52	39.7	37.45 N.	118.87 W.	10	...	...	3.4B	FELT	B	OCT. 14	02 A.M. PST
OCT. 16	13	55	8.5	40.15 N.	122.70 W.	10	...	...	3.2B	...	B	OCT. 16	05 A.M. PST
OCT. 18	03	54	30.5	34.37 N.	116.70 W.	8	...	...	3.4P	...	P	OCT. 17	07 P.M. PST
OCT. 18	06	41	54.0	33.98 N.	116.85 W.	16	...	...	3.0P	...	P	OCT. 17	10 P.M. PST
OCT. 18	16	49	5.6	37.48 N.	118.87 W.	13	...	...	4.1B	FELT	B	OCT. 18	08 A.M. PST
OCT. 19	22	59	52.4	34.37 N.	116.70 W.	9	...	...	3.1P	...	P	OCT. 19	02 P.M. PST
OCT. 21	03	04	9.0	37.57 N.	118.93 W.	3	...	...	3.5B	FELT	B	OCT. 20	07 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
OCT. 21	11	01	4.5	36.22 N.	120.12 W.	0	...	...	3.4P	...	P	OCT. 21	03 A.M. PST
OCT. 21	12	26	14.4	34.40 N.	118.63 W.	4	...	...	3.0P	FELT	P	OCT. 21	04 A.M. PST
OCT. 23	03	56	18.2	35.77 N.	117.60 W.	6	...	...	3.0P	...	P	OCT. 22	07 P.M. PST
OCT. 23	21	40	11.2	37.49 N.	118.65 W.	18	...	...	3.7B	IV	B	OCT. 23	01 P.M. PST
OCT. 24	09	12	39.7	37.60 N.	118.84 W.	8	...	...	3.1B	...	B	OCT. 24	01 A.M. PST
OCT. 24	23	30	21.9	34.40 N.	116.47 W.	5	...	...	3.2P	...	P	OCT. 24	03 P.M. PST
OCT. 25	05	26	43.6	37.61 N.	118.91 W.	7	...	...	4.4B	FELT	B	OCT. 24	09 P.M. PST
OCT. 25	05	35	22.6	37.61 N.	118.92 W.	6	...	...	3.7B	FELT	B	OCT. 24	09 P.M. PST
OCT. 25	06	02	6.3	37.62 N.	118.91 W.	10	...	...	3.5B	FELT	B	OCT. 24	10 P.M. PST
OCT. 25	20	32	34.9	36.98 N.	122.24 W.	10	...	...	3.5B	FELT	B	OCT. 25	12 M. PST
OCT. 26	20	56	22.9	32.62 N.	115.58 W.	15	...	...	3.8P	FELT	P	OCT. 26	12 M. PST
OCT. 30	03	45	24.7	37.53 N.	118.78 W.	14	...	...	4.3B	IV	B	OCT. 29	07 P.M. PST
OCT. 30	04	36	53.5	36.22 N.	120.13 W.	6	...	...	3.0P	...	P	OCT. 29	08 P.M. PST
OCT. 30	13	40	18.2	33.77 N.	118.17 W.	5	...	...	2.0P	FELT	P	OCT. 30	05 A.M. PST
OCT. 31	12	55	36.7	32.67 N.	115.58 W.	4	4.2	...	4.5P	VI	P	OCT. 31	04 A.M. PST
NOV. 2	09	42	4.4	34.10 N.	117.20 W.	6	...	...	3.1P	IV	P	NOV. 2	01 A.M. PST
NOV. 2	23	39	24.6	37.84 N.	122.24 W.	6	...	...	3.0B	FELT	B	NOV. 2	03 P.M. PST
NOV. 3	05	31	27.5	37.58 N.	118.78 W.	15	...	...	3.2B	...	B	NOV. 2	09 P.M. PST
NOV. 3	09	10	6.8	35.97 N.	117.32 W.	6	...	...	3.0P	...	P	NOV. 3	01 A.M. PST
NOV. 5	05	17	32.0	34.30 N.	118.45 W.	14	...	...	2.6P	FELT	P	NOV. 4	09 P.M. PST
NOV. 7	20	17	38.8	38.81 N.	122.80 W.	1	...	...	2.8B	...	G	NOV. 7	12 M. PST
NOV. 8	12	43	10.2	40.67 N.	124.18 W.	24	...	...	2.6G	FELT	G	NOV. 8	04 A.M. PST
NOV. 8	23	52	56.7	40.37 N.	124.31 W.	39	...	...	2.0G	FELT	G	NOV. 8	03 P.M. PST
NOV. 9	05	48	21.3	34.22 N.	116.45 W.	5	...	...	3.4P	III	P	NOV. 8	09 P.M. PST
NOV. 9	09	56	18.4	37.62 N.	118.88 W.	6	...	...	3.0P	...	P	NOV. 9	01 A.M. PST
NOV. 11	05	30	12.5	37.54 N.	118.87 W.	11	...	...	3.9B	FELT	B	NOV. 10	09 P.M. PST
NOV. 17	20	52	50.1	33.25 N.	115.95 W.	2	...	...	3.2P	...	P	NOV. 17	12 M. PST
NOV. 18	04	36	56.0	33.25 N.	115.95 W.	0	...	...	3.0P	...	P	NOV. 17	08 P.M. PST
NOV. 18	10	59	53.6	37.53 N.	118.80 W.	4	...	...	3.0P	...	P	NOV. 18	02 A.M. PST
NOV. 18	13	44	15.8	34.05 N.	118.80 W.	16	...	...	2.3P	FELT	P	NOV. 18	05 A.M. PST
NOV. 18	16	10	43.1	37.48 N.	121.83 W.	5	...	...	2.9B	FELT	B	NOV. 18	08 A.M. PST
NOV. 18	20	21	41.8	34.22 N.	116.43 W.	3	...	...	3.2P	...	P	NOV. 18	12 M. PST
NOV. 19	09	34	33.7	37.76 N.	121.95 W.	11	...	...	2.9B	IV	B	NOV. 19	01 A.M. PST
NOV. 20	12	17	49.8	33.00 N.	115.53 W.	11	...	...	3.2P	IV	P	NOV. 20	04 A.M. PST
NOV. 21	13	02	4.1	39.79 N.	120.44 W.	3	...	...	3.1B	...	B	NOV. 21	05 A.M. PST
NOV. 21	23	10	42.6	37.53 N.	118.87 W.	13	...	...	3.8B	FELT	B	NOV. 21	03 P.M. PST
NOV. 22	00	21	16.7	37.52 N.	118.88 W.	8	...	...	4.1B	FELT	B	NOV. 21	04 P.M. PST
NOV. 22	11	48	49.7	36.55 N.	121.09 W.	12	...	...	3.0B	...	B	NOV. 22	03 A.M. PST
NOV. 23	05	02	23.6	37.57 N.	118.87 W.	6	...	...	3.0P	...	P	NOV. 22	09 P.M. PST
NOV. 24	05	49	31.4	36.86 N.	121.62 W.	4	...	...	3.0B	FELT	B	NOV. 23	09 P.M. PST
NOV. 24	19	10	48.2	39.27 N.	122.25 W.	5	...	...	3.6B	FELT	B	NOV. 24	11 A.M. PST
NOV. 24	20	35	0.8	37.68 N.	118.98 W.	4	...	...	3.2P	...	P	NOV. 24	12 M. PST
NOV. 25	00	59	49.4	37.63 N.	118.95 W.	9	...	...	3.5B	FELT	B	NOV. 24	04 P.M. PST
NOV. 25	01	04	31.0	37.63 N.	118.97 W.	11	...	...	2.9B	...	B	NOV. 24	05 P.M. PST
NOV. 25	01	27	45.9	37.60 N.	118.92 W.	3	...	...	3.1B	...	B	NOV. 24	05 P.M. PST
NOV. 25	01	30	3.2	37.64 N.	118.95 W.	10	...	...	3.2B	...	B	NOV. 24	05 P.M. PST
NOV. 25	01	32	50.5	37.64 N.	118.95 W.	19	...	...	3.5B	FELT	B	NOV. 24	05 P.M. PST
NOV. 25	02	08	47.3	37.64 N.	118.96 W.	10	...	...	3.4B	...	B	NOV. 24	06 P.M. PST
NOV. 25	13	24	56.9	33.00 N.	115.53 W.	10	...	...	3.0P	FELT	P	NOV. 25	05 A.M. PST
NOV. 25	21	16	14.0	37.50 N.	118.82 W.	18	...	...	3.3B	...	B	NOV. 25	01 P.M. PST
NOV. 28	17	11	39.5	39.24 N.	120.44 W.	10	...	...	3.3B	FELT	B	NOV. 28	09 A.M. PST
NOV. 28	18	21	12.9	39.26 N.	120.47 W.	10	4.9	...	5.1B	VI	B	NOV. 28	10 A.M. PST
NOV. 28	18	42	42.3	39.27 N.	120.47 W.	14	...	...	3.0B	FELT	B	NOV. 28	10 A.M. PST
DEC. 1	07	52	17.8	34.07 N.	118.95 W.	15	...	...	2.6P	FELT	P	NOV. 30	11 P.M. PST
DEC. 1	14	30	41.3	34.13 N.	116.73 W.	11	...	...	3.2P	...	P	DEC. 1	06 A.M. PST
DEC. 1	15	39	0.6	39.37 N.	121.57 W.	5	...	...	2.8G	IV	G	DEC. 1	07 A.M. PST
DEC. 2	12	27	59.8	33.25 N.	115.95 W.	2	...	...	3.2P	...	P	DEC. 2	04 A.M. PST
DEC. 2	18	31	7.8	39.25 N.	120.46 W.	10	...	...	3.2B	FELT	B	DEC. 2	10 A.M. PST
DEC. 5	00	53	12.2	37.62 N.	118.88 W.	15	...	...	3.8B	FELT	B	DEC. 4	04 P.M. PST
DEC. 6	16	19	54.6	40.42 N.	124.33 W.	20	...	...	3.4B	FELT	B	DEC. 6	08 A.M. PST
DEC. 8	16	56	49.6	38.71 N.	119.47 W.	12	...	...	3.8B	...	B	DEC. 8	08 A.M. PST
DEC. 8	17	28	59.1	38.70 N.	119.47 W.	10	...	...	3.5B	...	B	DEC. 8	09 A.M. PST
DEC. 9	15	42	14.3	33.09 N.	115.60 W.	5	...	...	2.6P	FELT	P	DEC. 9	07 A.M. PST
DEC. 12	13	13	20.4	39.23 N.	122.19 W.	5	...	...	3.4B	FELT	B	DEC. 12	05 A.M. PST
DEC. 12	14	24	9.1	38.95 N.	122.68 W.	4	...	...	3.2B	IV	B	DEC. 12	06 A.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
DEC. 12	14	27	17.7	38.96 N.	122.71 W.	5	...	...	3.1B	IV	B	DEC. 12	06 A.M. PST
DEC. 12	14	57	8.2	38.96 N.	122.69 W.	4	...	...	3.9B	IV	B	DEC. 12	06 A.M. PST
DEC. 12	21	17	12.3	38.97 N.	122.70 W.	5	...	...	3.2B	FELT	B	DEC. 12	01 P.M. PST
DEC. 13	04	10	16.3	35.88 N.	118.03 W.	5	...	...	3.1P	...	P	DEC. 12	08 P.M. PST
DEC. 13	06	48	12.8	33.52 N.	116.47 W.	5	...	...	3.0P	...	P	DEC. 12	10 P.M. PST
DEC. 13	14	15	47.2	34.50 N.	116.28 W.	5	...	...	3.4P	...	P	DEC. 13	06 A.M. PST
DEC. 14	09	24	53.0	37.57 N.	118.90 W.	9	...	...	3.6B	FELT	B	DEC. 14	01 A.M. PST
DEC. 14	20	19	15.5	37.60 N.	118.90 W.	12	...	...	3.5B	FELT	B	DEC. 14	12 M. PST
DEC. 15	11	50	37.9	37.61 N.	118.92 W.	14	...	...	3.8B	FELT	B	DEC. 15	03 A.M. PST
DEC. 15	12	10	40.9	37.62 N.	118.90 W.	3	...	...	3.2P	...	P	DEC. 15	04 A.M. PST
DEC. 17	00	40	35.5	40.79 N.	123.49 W.	20	...	...	3.4B	...	B	DEC. 17	12 M. PST
DEC. 18	02	06	06.5	37.88 N.	121.71 W.	5	...	...	3.0B	...	B	DEC. 17	06 P.M. PST
DEC. 22	19	35	17.6	32.73 N.	116.60 W.	16	...	...	3.6P	IV	P	DEC. 22	11 A.M. PST
DEC. 24	03	07	27.9	37.47 N.	118.85 W.	11	...	...	3.2B	...	B	DEC. 23	07 P.M. PST
DEC. 24	12	00	11.3	36.94 N.	121.44 W.	3	...	...	3.4B	FELT	B	DEC. 24	04 A.M. PST
DEC. 24	13	25	49.3	37.53 N.	118.91 W.	12	...	...	4.2B	V	B	DEC. 24	12 A.M. PST
DEC. 24	15	47	32.7	37.57 N.	118.88 W.	9	...	...	3.2B	...	B	DEC. 24	07 A.M. PST
DEC. 24	15	48	33.6	37.58 N.	118.87 W.	16	4.2	...	4.7B	V	B	DEC. 24	07 A.M. PST
DEC. 26	06	22	20.4	37.47 N.	118.87 W.	5	...	...	3.1P	...	G	DEC. 25	10 P.M. PST
DEC. 26	17	25	13.2	37.63 N.	118.88 W.	4	...	...	3.1P	...	P	DEC. 26	09 A.M. PST
DEC. 28	03	40	37.7	37.61 N.	118.87 W.	9	...	...	3.2B	...	B	DEC. 27	07 P.M. PST
DEC. 29	06	05	26.5	39.27 N.	120.47 W.	5	...	...	3.0B	FELT	B	DEC. 28	10 P.M. PST
DEC. 30	08	19	22.1	34.55 N.	118.15 W.	11	...	...	2.6P	FELT	P	DEC. 30	12 P.M. PST
DEC. 30	20	11	26.6	33.75 N.	118.83 W.	3	...	...	3.0P	...	P	DEC. 30	12 M. PST
DEC. 31	00	01	35.2	39.85 N.	123.20 W.	13	...	...	3.0B	...	B	DEC. 30	04 P.M. PST
DEC. 31	12	16	29.5	37.70 N.	122.12 W.	10	...	...	3.5B	IV	B	DEC. 31	04 A.M. PST
DEC. 31	20	22	45.7	37.56 N.	118.89 W.	12	...	...	3.5B	...	B	DEC. 31	12 M. PST
CALIFORNIA--OFF THE COAST													
FEB. 3	12	42	17.0	32.53 N.	118.15 W.	5	...	...	3.1P	...	P	FEB. 3	04 A.M. PST
FEB. 8	10	56	25.3	40.26 N.	126.77 W.	5	3.9	...	4.4B	...	B	FEB. 8	02 A.M. PST
FEB. 14	11	42	14.2	40.60 N.	127.30 W.	5	4.0	...	4.0B	...	B	FEB. 14	03 A.M. PST
MAR. 3	14	17	1.0	40.45 N.	125.27 W.	5	5.0	5.2	5.1B	IV	B	MAR. 3	06 A.M. PST
MAR. 7	01	44	31.1	40.27 N.	126.31 W.	5	...	...	3.8B	...	B	MAR. 6	05 P.M. PST
MAR. 17	09	42	53.4	40.14 N.	125.83 W.	5	...	...	3.7B	...	B	MAR. 17	01 A.M. PST
MAR. 28	22	00	7.1	40.30 N.	124.63 W.	14	...	...	3.4B	...	B	MAR. 28	02 P.M. PST
APR. 2	03	14	00.2	40.43 N.	125.20 W.	5	...	...	3.5B	...	B	APR. 1	07 P.M. PST
APR. 15	12	51	55.5	40.96 N.	125.21 W.	10	...	...	3.7B	...	B	APR. 15	04 A.M. PST
APR. 16	06	27	54.0	40.32 N.	124.61 W.	14	...	...	3.0B	...	B	APR. 15	10 A.M. PST
MAY 29	17	45	42.3	41.86 N.	126.48 W.	5	5.1	4.9	4.4B	...	G	MAY 29	09 A.M. PST
MAY 29	21	17	26.3	41.87 N.	126.80 W.	15	4.5	...	3.6B	...	G	MAY 29	01 P.M. PST
JUNE 9	18	39	24.5	40.46 N.	126.10 W.	5	...	...	4.0B	...	B	JUNE 9	10 A.M. PST
JUNE 17	06	49	33.7	40.26 N.	126.70 W.	15	4.1	...	...	...	G	JUNE 16	10 P.M. PST
JUNE 29	20	06	18.9	40.36 N.	125.19 W.	9	...	...	3.6B	...	B	JUNE 29	12 M. PST
JULY 10	06	13	52.7	40.32 N.	125.71 W.	8	4.5	3.8	4.4B	...	B	JULY 9	10 P.M. PST
AUG. 2	23	15	43.5	41.85 N.	125.85 W.	8	4.0	...	4.0B	...	B	AUG. 2	03 P.M. PST
AUG. 8	09	20	13.0	40.38 N.	124.85 W.	24	...	...	3.7B	...	B	AUG. 8	01 A.M. PST
AUG. 24	16	18	24.0	40.38 N.	124.90 W.	20	...	...	3.3B	...	B	AUG. 24	08 A.M. PST
SEPT. 27	02	51	40.3	41.20 N.	125.00 W.	8	...	...	3.2B	...	B	SEPT. 26	06 P.M. PST
OCT. 13	22	59	12.5	40.72 N.	124.41 W.	22	...	...	3.2B	FELT	B	OCT. 13	02 P.M. PST
OCT. 22	02	29	14.5	41.10 N.	126.14 W.	8	4.2	...	4.1B	...	B	OCT. 21	06 P.M. PST
NOV. 1	22	20	1.9	40.37 N.	124.74 W.	20	...	...	3.7B	...	B	NOV. 1	02 P.M. PST
NOV. 2	01	11	44.0	40.36 N.	124.73 W.	20	...	...	3.2B	...	B	NOV. 1	05 P.M. PST
NOV. 3	00	19	19.3	40.45 N.	126.91 W.	8	...	...	3.8B	...	B	NOV. 2	04 P.M. PST
NOV. 8	10	27	32.5	41.12 N.	124.66 W.	6	6.2	7.2	6.9B	VII	G	NOV. 8	02 A.M. PST
NOV. 8	10	39	15.6	40.43 N.	125.81 W.	15	...	...	4.2G	...	G	NOV. 8	02 A.M. PST
NOV. 8	10	47	33.8	40.41 N.	125.46 W.	15	4.8	...	4.8G	...	G	NOV. 8	02 A.M. PST
NOV. 8	10	51	20.8	40.50 N.	125.51 W.	15	4.7	...	4.9G	...	G	NOV. 8	02 A.M. PST
NOV. 8	11	02	34.4	40.85 N.	125.08 W.	15	...	...	3.4G	...	G	NOV. 8	03 A.M. PST
NOV. 8	11	13	31.8	40.96 N.	125.05 W.	15	4.3	...	4.2G	...	G	NOV. 8	03 A.M. PST
NOV. 8	11	15	54.8	41.08 N.	126.01 W.	20	...	...	4.2B	...	B	NOV. 8	03 A.M. PST
NOV. 8	11	17	19.9	41.08 N.	126.01 W.	20	...	...	4.0B	...	B	NOV. 8	03 A.M. PST
NOV. 8	11	20	40.4	40.39 N.	124.91 W.	21	5.0	...	4.8G	...	G	NOV. 8	03 A.M. PST
NOV. 8	11	25	34.6	40.42 N.	125.81 W.	15	...	...	4.0G	...	G	NOV. 8	03 A.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--OFF THE COAST--Continued													
NOV. 8	11	37	33.7	40.99 N.	124.77 W.	8	...	...	3.2G	...	G	NOV. 8	03 A.M. PST
NOV. 8	11	44	10.1	41.13 N.	124.68 W.	5	...	...	3.4G	...	G	NOV. 8	03 A.M. PST
NOV. 8	11	50	24.7	41.03 N.	124.78 W.	8	...	...	3.4G	...	G	NOV. 8	03 A.M. PST
NOV. 8	11	52	09.7	40.42 N.	125.09 W.	15	...	...	3.3G	...	G	NOV. 8	03 A.M. PST
NOV. 8	12	00	00.7	41.02 N.	124.58 W.	2	...	...	3.1G	...	G	NOV. 8	04 A.M. PST
NOV. 8	12	08	58.7	40.50 N.	125.57 W.	15	...	...	3.1G	...	G	NOV. 8	04 A.M. PST
NOV. 8	12	14	36.2	40.85 N.	124.96 W.	7	...	...	3.0G	...	G	NOV. 8	04 A.M. PST
NOV. 8	12	19	30.0	40.73 N.	125.18 W.	15	...	...	3.7G	...	G	NOV. 8	04 A.M. PST
NOV. 8	12	22	50.7	40.60 N.	125.64 W.	15	...	...	3.5G	...	G	NOV. 8	04 A.M. PST
NOV. 8	12	24	36.6	40.83 N.	125.15 W.	15	...	...	3.5G	...	G	NOV. 8	04 A.M. PST
NOV. 8	12	25	36.2	40.67 N.	125.06 W.	19	...	...	3.9G	...	G	NOV. 8	04 A.M. PST
NOV. 8	12	32	08.6	40.46 N.	125.70 W.	15	...	...	4.3G	...	G	NOV. 8	04 A.M. PST
NOV. 8	12	41	12.5	40.46 N.	125.24 W.	15	...	...	3.0G	...	G	NOV. 8	04 A.M. PST
NOV. 8	12	43	54.3	40.47 N.	125.25 W.	15	...	...	3.7G	...	G	NOV. 8	04 A.M. PST
NOV. 8	12	46	05.3	40.51 N.	124.56 W.	21	...	...	3.2G	...	G	NOV. 8	04 A.M. PST
NOV. 8	12	48	26.6	40.52 N.	125.53 W.	15	...	...	3.0G	...	G	NOV. 8	04 A.M. PST
NOV. 8	13	02	37.2	40.78 N.	125.05 W.	6	...	...	3.1G	...	G	NOV. 8	05 A.M. PST
NOV. 8	13	06	54.0	40.68 N.	124.39 W.	2	...	...	3.4B	...	B	NOV. 8	05 A.M. PST
NOV. 8	13	20	35.5	40.50 N.	125.59 W.	15	...	...	3.5G	...	G	NOV. 8	05 A.M. PST
NOV. 8	13	30	31.2	40.70 N.	124.70 W.	19	...	...	3.3G	...	G	NOV. 8	05 A.M. PST
NOV. 8	13	35	46.2	40.61 N.	125.95 W.	15	...	...	3.1G	...	G	NOV. 8	05 A.M. PST
NOV. 8	13	36	44.1	40.79 N.	125.13 W.	5	...	...	3.9G	...	G	NOV. 8	05 A.M. PST
NOV. 8	13	56	04.1	41.08 N.	124.72 W.	33	...	...	3.6G	...	G	NOV. 8	05 A.M. PST
NOV. 8	14	04	52.2	40.79 N.	125.21 W.	15	...	...	3.5G	...	G	NOV. 8	06 A.M. PST
NOV. 8	14	07	17.7	40.72 N.	125.00 W.	15	...	...	3.7G	...	G	NOV. 8	06 A.M. PST
NOV. 8	15	24	52.1	41.22 N.	124.49 W.	9	...	...	3.1G	...	G	NOV. 8	07 A.M. PST
NOV. 8	15	27	7.2	40.78 N.	124.99 W.	1	...	...	4.0G	...	G	NOV. 8	07 A.M. PST
NOV. 8	16	03	43.0	41.07 N.	124.40 W.	18	...	...	3.7G	FELT	G	NOV. 8	08 A.M. PST
NOV. 8	16	45	40.6	40.55 N.	125.68 W.	8	...	...	3.7B	...	B	NOV. 8	08 A.M. PST
NOV. 8	16	47	51.2	40.52 N.	125.73 W.	15	4.3	3.8	4.5G	...	G	NOV. 8	08 A.M. PST
NOV. 8	16	52	27.8	40.49 N.	125.88 W.	15	4.4	4.3	4.7G	FELT	G	NOV. 8	08 A.M. PST
NOV. 8	16	58	32.1	40.52 N.	125.58 W.	15	...	...	3.1G	...	G	NOV. 8	08 A.M. PST
NOV. 8	16	59	52.5	40.48 N.	125.70 W.	15	...	...	3.5G	...	G	NOV. 8	08 A.M. PST
NOV. 8	17	14	41.3	40.56 N.	125.63 W.	15	4.3	...	4.3G	FELT	G	NOV. 8	09 A.M. PST
NOV. 8	17	33	25.6	40.54 N.	125.70 W.	15	...	...	3.8G	...	G	NOV. 8	09 A.M. PST
NOV. 8	18	27	45.7	40.75 N.	125.30 W.	15	...	...	3.0G	...	G	NOV. 8	10 A.M. PST
NOV. 8	18	31	19.5	40.82 N.	125.25 W.	15	3.7	3.6	4.3G	FELT	G	NOV. 8	10 A.M. PST
NOV. 8	20	16	44.8	40.54 N.	125.59 W.	15	...	...	3.6G	...	G	NOV. 8	12 M. PST
NOV. 8	20	47	47.1	40.50 N.	125.77 W.	15	...	...	4.3G	...	G	NOV. 8	12 M. PST
NOV. 8	21	31	18.7	40.56 N.	125.81 W.	15	...	...	3.2G	...	G	NOV. 8	01 P.M. PST
NOV. 8	22	47	53.7	40.71 N.	125.17 W.	15	4.6	4.2	4.8G	FELT	G	NOV. 8	02 P.M. PST
NOV. 8	23	05	32.0	41.05 N.	124.82 W.	17	4.7	...	4.5G	FELT	G	NOV. 8	03 P.M. PST
NOV. 8	23	07	09.4	40.53 N.	125.53 W.	15	4.6	5.0	4.8G	FELT	G	NOV. 8	03 P.M. PST
NOV. 8	23	21	59.2	40.57 N.	125.81 W.	15	...	...	3.0G	...	G	NOV. 8	03 P.M. PST
NOV. 9	01	58	56.7	41.22 N.	124.54 W.	14	4.1	...	4.3G	FELT	G	NOV. 8	05 P.M. PST
NOV. 9	02	47	49.3	40.65 N.	125.61 W.	15	...	...	3.4G	...	G	NOV. 8	06 P.M. PST
NOV. 9	03	47	48.7	40.54 N.	125.71 W.	15	4.1	4.0	4.0G	...	G	NOV. 8	07 P.M. PST
NOV. 9	03	50	18.4	40.54 N.	125.75 W.	15	...	...	3.7G	...	G	NOV. 8	07 P.M. PST
NOV. 9	04	09	7.5	40.59 N.	125.77 W.	15	5.0	4.3	5.4G	...	G	NOV. 8	08 P.M. PST
NOV. 9	04	31	23.5	40.87 N.	124.39 W.	9	...	...	3.0B	FELT	B	NOV. 8	08 P.M. PST
NOV. 9	04	37	26.2	40.52 N.	125.68 W.	15	...	...	3.5G	...	G	NOV. 8	08 P.M. PST
NOV. 9	05	12	27.1	40.53 N.	125.77 W.	15	...	...	3.7G	...	G	NOV. 8	09 P.M. PST
NOV. 9	05	23	25.5	40.58 N.	125.75 W.	15	...	...	3.0G	...	G	NOV. 8	09 P.M. PST
NOV. 9	05	42	06.6	40.39 N.	125.59 W.	15	...	...	3.3G	...	G	NOV. 8	09 P.M. PST
NOV. 9	06	02	49.6	40.73 N.	124.50 W.	24	...	...	3.3G	FELT	G	NOV. 8	10 P.M. PST
NOV. 9	06	59	40.1	40.69 N.	125.59 W.	15	...	...	3.1G	...	G	NOV. 8	10 P.M. PST
NOV. 9	06	59	52.4	40.51 N.	125.44 W.	15	4.1	3.6	4.3G	FELT	G	NOV. 8	10 P.M. PST
NOV. 9	07	30	03.0	40.67 N.	125.63 W.	15	...	...	3.2G	...	G	NOV. 8	11 P.M. PST
NOV. 9	08	00	10.6	40.50 N.	125.76 W.	15	3.9	3.0	4.1G	...	G	NOV. 9	12 P.M. PST
NOV. 9	08	26	53.4	41.04 N.	124.76 W.	13	...	...	3.9G	FELT	G	NOV. 9	12 P.M. PST
NOV. 9	08	29	31.4	40.50 N.	125.76 W.	15	...	...	3.6G	...	G	NOV. 9	12 P.M. PST
NOV. 9	09	17	00.4	40.83 N.	125.18 W.	15	...	...	3.1G	...	G	NOV. 9	01 A.M. PST
NOV. 9	09	45	01.5	40.67 N.	125.59 W.	15	...	...	3.0G	...	G	NOV. 9	01 A.M. PST
NOV. 9	00	53	26.7	41.06 N.	124.84 W.	10	...	...	3.3G	...	G	NOV. 8	04 P.M. PST
NOV. 9	12	23	06.9	40.50 N.	125.78 W.	15	...	...	3.3G	...	G	NOV. 9	04 A.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--OFF THE COAST--Continued													
NOV. 9	14	57	09.9	41.20 N.	124.58 W.	9	...	...	3.7G	...	G	NOV. 9	06 A.M. PST
NOV. 9	16	54	33.4	40.51 N.	125.33 W.	8	...	...	3.3B	...	B	NOV. 9	08 A.M. PST
NOV. 9	19	39	03.4	41.36 N.	125.08 W.	20	...	...	3.1B	...	B	NOV. 9	11 A.M. PST
NOV. 9	21	41	10.3	40.62 N.	125.61 W.	15	...	...	3.2G	...	G	NOV. 9	01 P.M. PST
NOV. 9	21	51	29.1	40.28 N.	124.47 W.	0	...	...	3.3G	...	G	NOV. 9	01 P.M. PST
NOV. 10	01	22	55.8	40.74 N.	125.24 W.	17	...	...	3.2G	...	G	NOV. 9	05 P.M. PST
NOV. 10	03	24	07.1	41.04 N.	124.79 W.	14	...	...	3.1G	...	G	NOV. 9	07 P.M. PST
NOV. 10	03	29	22.6	41.03 N.	124.92 W.	11	...	...	3.1G	...	G	NOV. 9	07 P.M. PST
NOV. 10	04	35	57.6	41.11 N.	124.45 W.	5	...	...	3.2G	...	G	NOV. 9	08 P.M. PST
NOV. 10	05	06	18.0	41.12 N.	124.42 W.	5	...	...	4.1G	FELT	G	NOV. 9	09 P.M. PST
NOV. 10	05	32	30.7	41.14 N.	124.40 W.	5	...	...	3.1G	...	G	NOV. 9	09 P.M. PST
NOV. 10	06	24	7.3	41.11 N.	124.40 W.	8	...	...	4.1G	FELT	G	NOV. 9	10 P.M. PST
NOV. 10	07	47	30.8	41.11 N.	124.44 W.	4	...	...	3.1G	...	G	NOV. 9	11 P.M. PST
NOV. 10	08	24	52.2	40.61 N.	125.87 W.	15	...	...	3.5G	...	G	NOV. 10	12 P.M. PST
NOV. 10	13	51	53.4	40.84 N.	125.17 W.	15	...	...	3.0G	...	G	NOV. 10	05 A.M. PST
NOV. 10	15	41	5.4	40.33 N.	124.66 W.	22	4.3	...	4.1B	...	G	NOV. 10	07 A.M. PST
NOV. 10	20	42	21.5	41.26 N.	124.49 W.	9	4.6	...	4.1G	...	G	NOV. 10	12 M. PST
NOV. 10	21	44	24.4	41.15 N.	124.61 W.	8	...	...	3.1G	...	G	NOV. 10	01 P.M. PST
NOV. 10	23	50	56.5	41.12 N.	124.46 W.	1	...	...	3.3G	...	G	NOV. 10	03 P.M. PST
NOV. 10	23	59	27.1	40.56 N.	125.67 W.	13	4.8	3.1	4.8B	...	G	NOV. 10	03 P.M. PST
NOV. 11	01	14	41.1	41.11 N.	124.46 W.	1	...	...	3.0G	...	G	NOV. 10	05 P.M. PST
NOV. 11	09	21	26.4	41.09 N.	124.75 W.	14	...	...	3.6G	...	G	NOV. 11	01 A.M. PST
NOV. 11	11	11	29.1	41.06 N.	124.80 W.	12	...	...	3.0G	...	G	NOV. 11	03 A.M. PST
NOV. 11	11	57	57.4	40.95 N.	124.97 W.	22	...	...	3.5G	...	G	NOV. 11	03 A.M. PST
NOV. 12	05	08	56.7	40.35 N.	124.68 W.	35	...	...	3.6G	...	G	NOV. 11	09 P.M. PST
NOV. 12	22	14	52.6	40.44 N.	125.41 W.	15	...	...	3.3G	...	G	NOV. 12	02 P.M. PST
NOV. 13	03	49	26.3	41.11 N.	124.71 W.	16	...	...	3.9G	...	G	NOV. 12	07 P.M. PST
NOV. 13	09	53	45.0	41.13 N.	124.44 W.	3	...	...	3.0G	...	G	NOV. 13	01 A.M. PST
NOV. 13	19	23	48.3	40.81 N.	125.17 W.	15	...	...	3.1G	...	G	NOV. 13	11 A.M. PST
NOV. 14	01	03	06.1	41.12 N.	124.71 W.	16	...	...	3.0G	...	G	NOV. 13	05 P.M. PST
NOV. 14	20	21	51.6	41.19 N.	124.56 W.	9	...	...	3.0G	...	G	NOV. 14	12 M. PST
NOV. 15	07	37	28.9	40.54 N.	125.76 W.	15	...	...	3.7G	...	G	NOV. 14	11 P.M. PST
NOV. 15	19	01	00.9	41.12 N.	124.68 W.	16	...	...	3.1G	...	G	NOV. 15	11 A.M. PST
NOV. 16	02	01	8.1	41.27 N.	124.50 W.	9	4.7	...	4.3G	FELT	G	NOV. 15	06 P.M. PST
NOV. 16	02	58	18.7	41.28 N.	124.47 W.	9	...	...	3.3G	...	G	NOV. 15	06 P.M. PST
NOV. 16	14	09	27.4	41.13 N.	124.44 W.	3	...	...	3.2G	...	G	NOV. 16	06 A.M. PST
NOV. 17	05	59	03.7	40.42 N.	125.08 W.	15	...	...	3.1G	...	G	NOV. 16	09 P.M. PST
NOV. 17	15	06	07.0	40.33 N.	124.71 W.	21	...	...	3.5G	...	G	NOV. 17	07 A.M. PST
NOV. 17	18	40	18.7	40.80 N.	125.14 W.	13	...	...	3.3G	...	G	NOV. 17	10 A.M. PST
NOV. 18	21	41	26.3	40.35 N.	124.69 W.	37	...	...	3.8G	III	G	NOV. 18	01 P.M. PST
NOV. 19	20	27	03.7	41.11 N.	124.70 W.	15	...	...	3.2G	...	G	NOV. 19	12 M. PST
NOV. 20	18	40	14.2	40.34 N.	124.69 W.	33	...	...	3.2G	...	G	NOV. 20	10 A.M. PST
NOV. 26	04	34	13.1	40.57 N.	125.79 W.	15	...	...	3.3G	...	G	NOV. 25	08 P.M. PST
NOV. 26	10	02	45.1	40.59 N.	125.80 W.	15	...	...	3.2G	...	G	NOV. 26	02 A.M. PST
NOV. 26	16	42	50.4	40.56 N.	125.60 W.	15	3.5	...	4.5G	...	G	NOV. 26	08 A.M. PST
NOV. 26	16	42	53.9	40.56 N.	125.65 W.	15	...	...	4.1G	...	G	NOV. 26	08 A.M. PST
NOV. 27	04	28	05.4	40.34 N.	124.70 W.	32	...	...	3.1G	...	G	NOV. 26	08 P.M. PST
NOV. 29	02	37	46.3	40.53 N.	125.68 W.	15	...	...	3.7G	...	G	NOV. 28	06 P.M. PST
DEC. 6	16	59	57.5	41.12 N.	124.76 W.	20	...	...	3.8B	...	B	DEC. 6	08 A.M. PST
DEC. 7	02	56	16.6	40.90 N.	126.03 W.	15	5.0	...	3.7B	...	G	DEC. 6	06 P.M. PST
DEC. 7	02	56	25.4	40.75 N.	125.35 W.	8	...	...	3.7B	...	B	DEC. 6	06 P.M. PST
DEC. 7	15	26	28.4	40.43 N.	125.20 W.	8	...	...	3.6B	...	B	DEC. 7	07 A.M. PST
DEC. 8	08	07	34.6	40.96 N.	124.80 W.	20	...	...	3.8B	...	B	DEC. 8	12 P.M. PST
DEC. 21	16	28	32.5	40.54 N.	125.44 W.	8	...	...	3.2B	...	B	DEC. 21	08 A.M. PST
DEC. 23	22	51	13.9	41.62 N.	127.23 W.	8	...	...	4.2B	...	B	DEC. 23	02 P.M. PST
DEC. 23	22	51	16.6	41.63 N.	126.88 W.	15	4.9	4.5	4.3B	...	G	DEC. 23	02 P.M. PST
DEC. 23	23	10	4.8	41.77 N.	126.92 W.	15	4.9	...	...	...	G	DEC. 23	03 P.M. PST
CONNECTICUT													
OCT. 24	17	27	38.2	41.32 N.	72.87 W.	7	...	...	2.8J	IV	J	OCT. 24	12 M. EST
OCT. 25	00	41	28.3	41.33 N.	72.88 W.	6	...	...	2.7J	IV	J	OCT. 24	07 P.M. EST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
HAWAII													
JAN. 1	15	07	03.1	19.33 N.	155.11 W.	10	...	...	3.4H	III	H	JAN. 1	05 A.M. HST
JAN. 3	11	06	16.7	19.39 N.	155.25 W.	3	...	...	3.4H	III	H	JAN. 3	01 A.M. HST
JAN. 15	23	41	02.7	19.68 N.	156.03 W.	35	...	...	3.8H	...	H	JAN. 15	01 P.M. HST
JAN. 17	05	03	39.8	19.38 N.	155.24 W.	3	...	...	3.1H	III	H	JAN. 16	07 P.M. HST
JAN. 17	07	59	56.1	19.38 N.	155.24 W.	4	...	...	3.4H	III	H	JAN. 16	09 P.M. HST
JAN. 17	16	23	39.8	19.40 N.	155.24 W.	4	...	...	3.1H	III	H	JAN. 17	06 A.M. HST
JAN. 17	22	21	47.5	19.37 N.	155.08 W.	8	...	...	3.3H	...	H	JAN. 17	12 M. HST
JAN. 18	05	33	42.2	19.33 N.	155.22 W.	10	...	...	3.6H	III	H	JAN. 17	07 P.M. HST
JAN. 20	01	28	48.6	19.31 N.	155.54 W.	27	...	...	4.6H	V	H	JAN. 16	03 P.M. HST
JAN. 20	12	58	02.1	19.45 N.	154.86 W.	9	...	...	3.1H	...	H	JAN. 20	02 A.M. HST
JAN. 21	03	52	15.3	19.35 N.	155.28 W.	33	...	...	3.1H	III	H	JAN. 20	05 P.M. HST
JAN. 22	17	52	04.6	19.33 N.	155.22 W.	8	...	...	3.5H	III	H	JAN. 22	07 A.M. HST
JAN. 24	02	37	24.6	19.45 N.	155.50 W.	10	...	...	3.3H	...	H	HAN. 23	04 P.M. HST
JAN. 24	21	14	40.5	19.33 N.	155.20 W.	10	...	...	3.6H	III	H	JAN. 24	11 A.M. HST
JAN. 29	05	14	02.2	19.38 N.	155.24 W.	3	...	...	3.1H	III	H	JAN. 28	07 P.M. HST
JAN. 30	07	14	54.2	19.35 N.	155.26 W.	28	...	...	3.6H	III	H	JAN. 29	09 P.M. HST
FEB. 2	19	31	44.5	19.38 N.	155.24 W.	3	...	...	3.0H	...	H	FEB. 2	09 A.M. HST
FEB. 5	22	48	09.8	19.36 N.	155.23 W.	29	...	...	3.8H	IV	H	FEB. 5	12 M. HST
FEB. 10	23	07	43.9	19.68 N.	156.07 W.	36	...	...	3.1H	...	H	FEB. 10	01 P.M. HST
FEB. 13	05	00	08.4	19.38 N.	155.28 W.	3	...	...	3.2H	III	H	FEB. 12	07 P.M. HST
FEB. 15	22	59	25.9	19.33 N.	155.18 W.	8	...	...	3.1H	II	H	FEB. 15	12 M. HST
FEB. 18	02	16	13.7	19.78 N.	155.38 W.	25	...	...	3.8H	IV	H	FEB. 17	04 P.M. HST
FEB. 18	10	13	17.7	19.47 N.	155.44 W.	11	...	...	3.5H	IV	H	FEB. 18	12 P.M. HST
FEB. 18	16	43	13.5	20.28 N.	155.78 W.	0	...	...	3.3H	II	H	FEB. 18	06 A.M. HST
FEB. 19	19	18	42.9	19.39 N.	155.24 W.	4	...	...	3.1H	III	H	FEB. 19	09 A.M. HST
FEB. 25	02	48	10.6	20.06 N.	155.95 W.	10	...	...	3.7H	III	H	FEB. 24	04 P.M. HST
FEB. 26	10	30	06.9	19.33 N.	155.20 W.	10	...	...	3.6H	III	H	FEB. 26	12 P.M. HST
MAR. 2	05	38	28.2	19.78 N.	156.69 W.	16	...	...	4.2H	III	H	MAR. 1	07 P.M. HST
MAR. 2	15	24	57.2	19.37 N.	155.50 W.	9	...	...	3.0H	...	H	MAR. 2	05 A.M. HST
MAR. 3	00	07	06.7	19.38 N.	155.24 W.	1	...	...	3.1H	III	H	MAR. 2	02 P.M. HST
MAR. 5	10	21	06.9	18.79 N.	156.19 W.	32	...	...	3.1H	...	H	MAR. 5	12 P.M. HST
MAR. 8	05	47	42.5	19.33 N.	155.19 W.	10	...	...	3.2H	III	H	MAR. 7	07 P.M. HST
MAR. 10	02	27	20.7	19.33 N.	155.22 W.	9	...	...	3.1H	III	H	MAR. 9	04 P.M. HST
MAR. 12	12	57	52.7	19.36 N.	155.23 W.	2	4.6	...	4.3H	V	H	MAR. 12	02 A.M. HST
MAR. 15	08	04	08.2	19.35 N.	155.10 W.	8	...	...	3.0H	...	H	MAR. 14	10 P.M. HST
MAR. 15	15	42	09.9	19.43 N.	155.40 W.	12	...	...	3.2H	...	H	MAR. 15	05 A.M. HST
MAR. 21	17	46	39.8	19.53 N.	156.03 W.	13	...	...	3.3H	III	H	MAR. 21	07 A.M. HST
MAR. 21	22	56	20.2	19.77 N.	155.53 W.	15	...	...	3.7H	III	H	MAR. 21	12 M. HST
MAR. 22	11	09	53.5	19.44 N.	155.39 W.	11	...	...	3.3H	II	H	MAR. 22	01 A.M. HST
MAR. 26	05	16	31.7	19.98 N.	155.84 W.	5	...	...	4.0H	IV	H	MAR. 25	07 P.M. HST
MAR. 26	20	56	40.1	19.70 N.	155.17 W.	29	...	...	3.4H	...	H	MAR. 26	10 A.M. HST
MAR. 28	09	24	02.6	19.32 N.	155.28 W.	34	...	...	3.3H	II	H	MAR. 27	11 P.M. HST
MAR. 28	18	32	03.0	19.40 N.	155.47 W.	9	...	...	3.1H	...	H	MAR. 28	08 A.M. HST
APR. 7	10	17	41.6	19.38 N.	155.45 W.	10	...	...	3.4H	...	H	APR. 7	12 P.M. HST
APR. 12	19	40	09.6	19.38 N.	155.50 W.	10	...	...	3.2H	...	H	APR. 12	09 A.M. HST
APR. 17	06	30	44.9	19.36 N.	155.08 W.	9	...	...	3.0H	...	H	APR. 16	08 P.M. HST
APR. 17	08	13	00.9	19.17 N.	155.48 W.	34	...	...	3.4H	...	H	APR. 16	10 P.M. HST
APR. 18	00	14	45.4	19.45 N.	156.05 W.	43	...	...	3.2H	...	H	APR. 17	02 P.M. HST
APR. 18	02	16	45.5	19.45 N.	155.24 W.	33	...	...	3.2H	...	H	APR. 17	04 P.M. HST
APR. 18	02	20	04.4	19.45 N.	155.24 W.	33	...	...	3.0H	...	H	APR. 17	04 P.M. HST
APR. 18	02	22	05.4	19.37 N.	155.31 W.	32	...	...	3.1H	...	H	APR. 17	04 P.M. HST
APR. 30	10	46	23.6	19.42 N.	155.42 W.	11	...	...	3.3H	...	H	APR. 30	12 P.M. HST
MAY 1	02	22	14.0	19.28 N.	155.10 W.	11	...	...	3.4H	...	H	APR. 30	04 P.M. HST
MAY 5	09	07	37.7	19.23 N.	155.55 W.	11	...	...	3.9H	IV	H	MAY 4	11 P.M. HST
MAY 6	06	54	43.0	19.35 N.	155.10 W.	9	...	...	3.1H	III	H	MAY 5	08 P.M. HST
MAY 6	14	08	36.8	19.40 N.	155.43 W.	11	...	...	3.6H	III	H	MAY 6	04 A.M. HST
MAY 8	09	42	33.4	19.73 N.	155.74 W.	12	...	...	3.4H	III	H	MAY 7	11 P.M. HST
MAY 12	16	52	31.4	19.33 N.	155.23 W.	10	...	...	3.4H	...	H	MAY 12	06 A.M. HST
MAY 13	00	40	27.1	19.32 N.	155.11 W.	9	...	...	3.3H	IV	H	MAY 12	02 P.M. HST
MAY 13	00	43	44.6	19.33 N.	155.11 W.	9	...	...	3.4H	IV	H	MAY 12	02 P.M. HST
MAY 13	03	18	48.5	19.46 N.	155.24 W.	33	...	...	3.1H	...	H	MAY 12	05 P.M. HST
MAY 23	04	28	39.0	19.34 N.	155.28 W.	33	...	...	3.8H	IV	H	MAY 22	06 P.M. HST
MAY 28	18	04	50.9	19.32 N.	155.23 W.	10	...	...	3.2H	III	H	MAY 28	08 A.M. HST
JUNE 3	10	26	41.5	19.02 N.	155.67 W.	31	...	...	3.2H	...	H	JUNE 3	12 P.M. HST
JUNE 9	10	01	16.7	19.43 N.	155.39 W.	11	...	...	3.2H	...	H	JUNE 9	12 P.M. HST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
HAWAII--Continued													
JUNE 9	10	43	23.3	19.43 N.	155.40 W.	12	...	...	3.5H	III	H	JUNE 9	12 P.M. HST
JUNE 9	23	04	15.7	19.52 N.	156.28 W.	34	...	...	3.1H	...	H	JUNE 9	01 P.M. HST
JUNE 14	22	34	02.8	19.32 N.	155.19 W.	9	...	...	3.0H	...	H	JUNE 14	12 M. HST
JUNE 24	18	05	24.6	19.38 N.	155.10 W.	1	...	...	3.4H	...	H	JUNE 24	08 A.M. HST
JUNE 24	19	15	17.5	19.37 N.	155.11 W.	1	...	...	3.0H	...	H	JUNE 24	09 A.M. HST
JUNE 25	11	48	44.4	19.72 N.	155.74 W.	16	...	...	3.3H	III	H	JUNE 25	01 A.M. HST
JULY 5	05	36	00.7	20.88 N.	157.79 W.	10	...	...	3.7H	III	H	JULY 4	07 P.M. HST
JULY 9	20	42	13.1	19.38 N.	155.24 W.	3	...	...	3.0H	...	H	JULY 9	10 A.M. HST
JULY 17	05	03	51.0	19.95 N.	155.37 W.	9	...	...	3.0H	II	H	JULY 16	07 P.M. HST
JULY 18	11	26	29.9	19.38 N.	155.08 W.	1	...	...	3.6H	...	H	JULY 18	01 A.M. HST
JULY 18	20	31	10.6	19.52 N.	155.47 W.	4	...	...	3.4H	...	H	JULY 18	10 A.M. HST
JULY 27	21	35	44.0	18.72 N.	156.31 W.	38	...	...	4.2H	...	H	JULY 27	11 A.M. HST
JULY 28	16	18	07.1	19.34 N.	155.50 W.	11	...	...	3.4H	...	H	JULY 28	06 A.M. HST
JULY 30	21	01	20.9	19.18 N.	155.48 W.	34	...	...	3.0H	...	H	JULY 30	11 A.M. HST
AUG. 1	11	42	15.5	19.38 N.	155.24 W.	6	...	...	3.6H	III	H	AUG. 1	01 A.M. HST
AUG. 5	17	45	41.9	20.04 N.	155.73 W.	7	...	...	3.1H	III	H	AUG. 5	07 A.M. HST
AUG. 12	06	42	33.1	19.33 N.	155.11 W.	10	...	...	4.3H	IV	H	AUG. 11	08 P.M. HST
AUG. 12	17	23	44.6	19.34 N.	155.11 W.	9	...	...	3.0H	III	H	AUG. 12	07 A.M. HST
AUG. 12	21	01	55.9	19.33 N.	155.18 W.	10	...	...	3.5H	III	H	AUG. 12	11 A.M. HST
AUG. 13	22	34	58.8	19.38 N.	155.11 W.	2	...	...	3.1H	...	H	AUG. 13	12 M. HST
AUG. 14	07	27	16.7	19.35 N.	155.42 W.	11	...	...	4.1H	IV	H	AUG. 13	09 P.M. HST
AUG. 18	03	32	48.6	19.27 N.	155.45 W.	11	...	...	3.6H	III	H	AUG. 17	05 P.M. HST
AUG. 20	16	06	25.9	19.60 N.	156.15 W.	25	...	...	4.0H	III	H	AUG. 20	06 A.M. HST
AUG. 26	22	38	26.5	19.33 N.	155.19 W.	9	...	...	3.2H	...	H	AUG. 26	12 M. HST
AUG. 27	11	58	53.9	19.91 N.	155.28 W.	39	...	...	3.4H	III	H	AUG. 27	01 A.M. HST
AUG. 28	01	25	58.7	19.39 N.	155.24 W.	4	...	...	3.2H	III	H	AUG. 27	03 P.M. HST
AUG. 28	02	26	55.0	19.39 N.	155.24 W.	3	...	...	3.1H	...	H	AUG. 27	04 P.M. HST
AUG. 28	02	34	01.3	19.38 N.	155.24 W.	1	...	...	3.4H	III	H	AUG. 27	04 P.M. HST
AUG. 28	03	03	50.4	19.35 N.	155.23 W.	28	...	...	3.7H	...	H	AUG. 27	05 P.M. HST
AUG. 28	06	48	45.2	19.38 N.	155.26 W.	1	...	...	3.1H	III	H	AUG. 27	08 P.M. HST
AUG. 29	00	06	57.1	19.38 N.	155.26 W.	1	...	...	3.3H	V	H	AUG. 28	02 P.M. HST
SEPT. 1	04	16	53.8	19.34 N.	155.11 W.	9	...	...	3.6H	III	H	AUG. 31	06 P.M. HST
SEPT. 3	20	43	06.3	19.36 N.	155.02 W.	8	...	...	3.3H	III	H	SEPT. 3	10 A.M. HST
SEPT. 7	16	21	36.3	19.45 N.	155.82 W.	9	...	...	3.4H	...	H	SEPT. 7	06 A.M. HST
SEPT. 10	22	21	43.4	19.27 N.	155.12 W.	45	...	...	3.6H	...	H	SEPT. 10	12 M. HST
SEPT. 12	17	11	11.6	19.33 N.	155.18 W.	9	...	...	3.3H	...	H	SEPT. 12	07 A.M. HST
SEPT. 13	05	59	56.1	19.39 N.	155.43 W.	10	...	...	3.0H	...	H	SEPT. 12	07 P.M. HST
SEPT. 13	19	04	11.8	19.33 N.	155.19 W.	10	...	...	3.2H	III	H	SEPT. 13	09 A.M. HST
SEPT. 18	10	52	54.0	19.86 N.	155.68 W.	15	...	...	3.0H	...	H	SEPT. 18	12 P.M. HST
SEPT. 20	08	57	11.3	19.35 N.	155.07 W.	9	...	...	3.4H	III	H	SEPT. 19	10 P.M. HST
OCT. 5	08	55	16.6	19.34 N.	155.12 W.	8	...	...	3.2H	III	H	OCT. 4	10 P.M. HST
OCT. 9	21	05	55.6	19.38 N.	155.83 W.	13	...	...	3.3H	...	H	OCT. 9	11 A.M. HST
OCT. 10	12	26	10.5	19.35 N.	155.02 W.	7	...	...	3.1H	...	H	OCT. 10	02 A.M. HST
OCT. 15	06	34	29.5	19.34 N.	155.23 W.	10	...	...	3.4H	...	H	OCT. 14	08 P.M. HST
OCT. 18	07	15	37.8	19.28 N.	155.37 W.	8	...	...	3.0H	...	H	OCT. 17	09 P.M. HST
OCT. 22	06	38	25.1	19.38 N.	155.08 W.	4	...	...	3.4H	III	H	OCT. 21	08 P.M. HST
OCT. 22	07	48	19.6	19.37 N.	155.12 W.	1	...	...	3.7H	III	H	OCT. 21	09 P.M. HST
OCT. 22	08	05	42.2	19.37 N.	155.10 W.	1	...	...	3.0H	...	H	OCT. 21	10 P.M. HST
OCT. 22	20	16	55.5	19.47 N.	154.88 W.	5	...	...	3.5H	IV	H	OCT. 22	10 A.M. HST
OCT. 25	23	30	29.2	19.33 N.	155.22 W.	9	...	...	3.0H	...	H	OCT. 25	01 P.M. HST
OCT. 26	11	50	42.0	19.44 N.	155.64 W.	3	...	...	3.3H	...	H	OCT. 26	01 A.M. HST
OCT. 28	10	47	56.4	19.39 N.	155.41 W.	11	...	...	3.1H	...	H	OCT. 28	12 P.M. HST
OCT. 30	20	29	14.0	19.45 N.	155.21 W.	27	...	...	3.6H	IV	H	OCT. 30	10 A.M. HST
OCT. 31	21	39	58.0	19.33 N.	155.22 W.	10	...	...	3.2H	...	H	OCT. 31	11 A.M. HST
NOV. 3	02	44	33.8	19.38 N.	155.24 W.	0	...	...	3.2H	IV	H	NOV. 2	04 P.M. HST
NOV. 4	16	22	32.4	19.39 N.	155.43 W.	11	...	...	3.5H	III	H	NOV. 4	06 A.M. HST
NOV. 6	06	41	42.6	19.32 N.	155.23 W.	10	...	...	3.7H	III	H	NOV. 5	08 P.M. HST
NOV. 10	03	57	28.6	19.43 N.	155.42 W.	10	...	...	3.1H	...	H	NOV. 9	05 P.M. HST
NOV. 12	02	05	22.5	19.38 N.	155.44 W.	9	...	...	3.0H	...	H	NOV. 11	04 P.M. HST
NOV. 12	21	38	2.0	21.19 N.	157.93 W.	10	...	...	4.0H	IV	G	NOV. 12	11 A.M. HST
NOV. 15	04	22	24.9	19.39 N.	155.44 W.	9	...	...	3.5H	III	H	NOV. 14	06 P.M. HST
NOV. 17	05	46	38.4	19.33 N.	155.18 W.	10	...	...	3.6H	III	H	NOV. 16	07 P.M. HST
NOV. 17	10	47	36.5	19.30 N.	155.22 W.	10	...	...	3.8H	III	H	NOV. 17	12 P.M. HST
NOV. 23	11	31	55.9	19.36 N.	155.05 W.	9	...	...	4.2H	IV	H	NOV. 23	01 A.M. HST
NOV. 23	11	35	40.0	19.36 N.	155.05 W.	9	...	...	3.2H	III	H	NOV. 23	01 A.M. HST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
HAWAII--Continued													
NOV. 24	02	46	59.3	19.19 N.	155.61 W.	10	...	...	3.0H	...	H	NOV. 23	04 P.M. HST
DEC. 1	18	42	33.5	19.52 N.	155.92 W.	11	...	...	3.4H	IV	H	NOV. 23	08 A.M. HST
DEC. 4	11	16	19.1	19.39 N.	155.28 W.	3	...	...	3.1H	III	H	DEC. 4	01 A.M. HST
DEC. 10	01	09	20.6	19.33 N.	155.12 W.	10	...	...	3.1H	...	H	DEC. 9	03 P.M. HST
DEC. 12	04	02	10.9	20.06 N.	156.02 W.	10	...	...	3.4H	...	H	DEC. 11	06 P.M. HST
DEC. 14	22	57	46.0	19.33 N.	155.13 W.	9	...	...	3.0H	...	H	DEC. 14	12 M. HST
DEC. 15	12	14	00.4	19.33 N.	155.13 W.	10	...	...	3.1H	III	H	DEC. 15	02 A.M. HST
DEC. 15	15	33	08.3	19.33 N.	155.20 W.	9	...	...	3.6H	III	H	DEC. 15	05 A.M. HST
DEC. 15	19	19	14.4	19.42 N.	155.43 W.	11	...	...	3.1H	...	H	DEC. 15	09 A.M. HST
DEC. 15	20	07	12.0	19.44 N.	155.41 W.	9	...	...	3.1H	...	H	DEC. 15	10 A.M. HST
DEC. 16	06	11	36.2	19.36 N.	155.25 W.	10	...	...	3.5H	III	H	DEC. 15	08 P.M. HST
DEC. 19	07	09	35.8	20.22 N.	156.68 W.	2	...	...	3.5H	...	H	DEC. 18	09 P.M. HST
DEC. 21	17	04	35.4	19.36 N.	155.08 W.	9	...	...	3.4H	III	H	DEC. 21	07 A.M. HST
DEC. 22	04	43	30.9	19.15 N.	155.06 W.	32	...	...	3.0H	...	H	DEC. 21	06 P.M. HST
DEC. 30	21	30	55.3	19.30 N.	155.78 W.	10	...	...	3.9H	IV	H	DEC. 30	11 A.M. HST
IDAHO													
JAN. 5	14	17	13.5	44.72 N.	114.39 W.	5	...	...	3.6G	...	G	JAN. 5	06 A.M. PST
FEB. 21	06	39	40.0	44.40 N.	112.98 W.	5	...	...	3.0D	...	G	FEB. 20	11 P.M. MST
FEB. 29	19	33	38.5	42.72 N.	111.73 W.	7	...	...	3.3U	IV	U	FEB. 29	12 M. MST
MAR. 10	20	28	41.0	42.44 N.	111.28 W.	1	...	...	3.3U	...	U	MAR. 10	01 P.M. MST
NOV. 7	09	15	24.2	44.11 N.	114.32 W.	5	...	...	2.9G	...	G	NOV. 7	02 A.M. PST
NOV. 7	09	19	26.5	44.07 N.	114.41 W.	5	...	...	3.1G	...	G	NOV. 7	02 A.M. PST
NOV. 7	09	20	7.4	44.05 N.	114.46 W.	5	...	...	3.4G	...	G	NOV. 7	02 A.M. PST
ILLINOIS													
MAR. 13	02	23	13.4	37.93 N.	88.45 W.	19	...	...	3.3S	IV	S	MAR. 12	08 P.M. CST
MAR. 29	08	43	40.3	37.21 N.	89.06 W.	5	...	...	2.9S	...	S	MAR. 29	02 A.M. CST
KENTUCKY													
MAR. 23	21	38	15.0	37.63 N.	86.69 W.	6	...	...	3.3S	IV	S	MAR. 23	03 P.M. CST
JULY 12	23	59	54.8	37.26 N.	86.99 W.	0	...	...	3.1G	III	G	JULY 12	05 P.M. CST
JULY 12	23	59	55.4	37.26 N.	86.95 W.	0	...	...	3.1K	...	K	JULY 12	05 P.M. CST
JULY 27	18	52	21.8	38.17 N.	83.91 W.	8	5.1	4.7	5.0S	VII	G	JULY 27	01 P.M. EST
JULY 30	17	01	41.2	38.19 N.	83.92 W.	11	...	...	1.3F	II	F	JULY 30	12 M. EST
JULY 31	09	26	56.3	38.20 N.	83.92 W.	13	...	...	2.5G	IV	G	JULY 31	04 A.M. EST
AUG. 23	03	49	2.5	37.99 N.	84.92 W.	5	...	...	3.1S	III	G	AUG. 22	10 P.M. EST
AUG. 25	11	41	37.7	38.20 N.	83.93 W.	1	...	...	2.0F	IV	F	AUG. 25	06 A.M. EST
NOV. 27	05	26	54.6	38.31 N.	83.33 W.	5	...	...	2.5K	...	K	NOV. 27	12 P.M. EST
DEC. 30	03	07	8.1	38.20 N.	83.91 W.	11	...	...	1.6K	III	K	DEC. 29	10 P.M. EST
MAINE													
JAN. 14	05	57	43.8	43.82 N.	68.09 W.	10	...	...	2.5J	...	J	JAN. 14	12 P.M. EST
FEB. 9	13	11	36.0	43.56 N.	70.76 W.	0	...	...	2.4J	II	J	FEB. 9	08 A.M. PST
APR. 10	15	36	43.8	44.71 N.	68.36 W.	0	...	...	3.0J	III	J	APR. 10	10 A.M. EST
APR. 21	13	39	57.5	44.72 N.	68.36 W.	0	...	...	2.5J	FELT	J	APR. 21	08 A.M. EST
MAY 4	08	56	13.1	44.29 N.	69.61 W.	2	...	...	2.6J	II	J	MAY 4	03 A.M. EST
MAY 10	12	44	48.3	45.23 N.	69.10 W.	0	...	...	2.5J	...	J	MAY 10	07 A.M. EST
JULY 4	11	56	19.0	44.45 N.	69.86 W.	0	...	...	2.5J	...	J	JULY 4	06 A.M. EST
AUG. 31	08	34	56.0	44.41 N.	69.44 W.	0	...	...	2.6J	...	J	AUG. 31	03 A.M. EST
SEPT. 4	06	55	07.9	44.29 N.	69.53 W.	0	...	...	2.1J	...	J	SEPT. 4	01 A.M. EST
SEPT. 8	05	59	54.9	44.68 N.	69.00 W.	9	...	...	3.2J	III	J	SEPT. 8	12 P.M. EST
NOV. 21	04	09	25.8	45.25 N.	70.96 W.	0	...	...	2.6J	...	J	NOV. 20	11 P.M. EST
NOV. 22	21	28	23.2	45.22 N.	69.16 W.	5	...	...	2.6J	II	J	NOV. 22	04 P.M. EST
MASSACHUSETTS													
NOV. 23	00	39	32.4	42.62 N.	71.39 W.	1	...	...	2.5J	V	J	NOV. 22	07 P.M. EST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
MISSISSIPPI													
OCT. 12	11	34	16.1	34.26 N.	89.13 W.	5	...	...	2.6S	...	S	OCT. 12	05 A.M. CST
MISSOURI													
JULY 5	08	54	41.1	36.60 N.	89.58 W.	10	...	...	3.5G	IV	S	JULY 5	02 A.M. CST
AUG. 20	04	43	04.7	37.84 N.	90.36 W.	8	...	...	2.0S	FELT	S	AUG. 19	10 P.M. CST
AUG. 21	10	39	44.2	38.03 N.	90.48 W.	10	...	...	2.1S	FELT	S	AUG. 21	04 A.M. CST
OCT. 31	13	56	34.0	36.52 N.	89.59 W.	9	...	...	2.6S	...	S	OCT. 31	07 A.M. CST
MONTANA													
MAR. 10	14	48	56.5	47.30 N.	113.39 W.	5	4.0	...	4.4G	IV	G	MAR. 10	07 A.M. MST
MAR. 11	04	03	34.1	45.58 N.	111.70 W.	5	...	...	4.0G	...	G	MAR. 10	09 P.M. MST
APR. 14	03	27	33.8	48.79 N.	112.34 W.	5	...	...	3.6D	...	G	APR. 13	08 P.M. MST
APR. 20	22	45	12.7	46.93 N.	112.93 W.	5	...	...	3.8G	...	G	APR. 20	03 P.M. MST
MAY 10	23	41	47.5	44.76 N.	111.28 W.	5	...	...	4.2G	III	G	MAY 10	04 P.M. MST
JULY 15	19	37	27.3	45.65 N.	111.80 W.	5	...	...	3.0G	FELT	G	JULY 15	12 M. MST
JULY 20	12	57	29.8	45.65 N.	111.85 W.	5	...	...	3.0G	FELT	G	JULY 20	05 A.M. MST
JULY 20	13	03	39.7	45.61 N.	111.85 W.	5	...	...	3.3G	FELT	G	JULY 20	06 A.M. MST
AUG. 24	08	32	22.5	47.19 N.	112.92 W.	5	...	...	3.4G	...	G	AUG. 24	01 A.M. MST
NEVADA													
FEB. 28	15	00	0.1	37.13 N.	116.09 W.	0	4.4	...	4.4B	...	E	FEB. 28	07 A.M. PST
MAR. 8	15	35	0.1	37.18 N.	116.08 W.	0	3.9	...	4.0B	...	E	MAR. 8	07 A.M. PST
MAR. 15	04	46	24.1	36.80 N.	115.97 W.	5	...	...	3.2P	...	G	MAR. 14	08 P.M. PST
APR. 3	14	00	0.1	37.15 N.	116.08 W.	0	4.7	...	4.7B	...	E	APR. 3	06 A.M. PST
APR. 8	00	13	41.8	39.50 N.	119.18 W.	5	...	...	4.7B	V	G	APR. 7	04 P.M. PST
APR. 16	20	00	0.1	37.10 N.	116.03 W.	0	5.3	4.2	5.5B	...	E	APR. 16	12 M. PST
APR. 26	17	00	0.1	37.25 N.	116.42 W.	0	5.4	4.2	5.6B	...	E	APR. 26	09 A.M. PST
APR. 28	13	55	34.0	41.86 N.	118.91 W.	5	4.3	...	4.1B	IV	G	APR. 28	05 A.M. PST
APR. 28	17	07	10.1	41.85 N.	118.93 W.	5	3.8	...	...	FELT	G	APR. 28	09 A.M. PST
APR. 30	07	23	57.8	38.62 N.	118.47 W.	5	...	...	3.5B	...	B	APR. 29	11 P.M. PST
MAY 2	18	46	30.1	37.06 N.	116.02 W.	0	4.4	...	4.5B	...	E	MAY 2	10 A.M. PST
MAY 3	00	17	38.1	41.94 N.	118.84 W.	5	4.5	...	4.3B	IV	G	MAY 2	04 P.M. PST
MAY 22	13	00	0.1	37.00 N.	116.03 W.	0	...	...	3.8B	...	E	MAY 22	05 A.M. PST
JUNE 12	17	15	0.1	37.28 N.	116.45 W.	0	5.6	...	5.5B	...	E	JUNE 12	09 A.M. PST
JUNE 24	15	10	0.1	37.02 N.	116.03 W.	0	4.4	...	4.3B	...	E	JUNE 24	07 A.M. PST
JULY 25	19	05	0.1	37.26 N.	116.48 W.	0	5.5	4.2	5.7B	...	E	JULY 25	11 A.M. PST
JULY 31	18	19	0.1	37.01 N.	116.02 W.	0	4.3	...	3.9B	...	E	JULY 31	10 A.M. PST
AUG. 25	15	58	36.5	40.18 N.	119.98 W.	5	...	...	3.9B	...	B	AUG. 25	07 A.M. PST
SEPT. 4	13	39	9.4	38.08 N.	118.57 W.	1	4.0	...	4.6B	V	B	SEPT. 4	05 A.M. PST
SEPT. 4	21	03	34.1	38.11 N.	118.56 W.	10	4.9	...	4.9B	FELT	B	SEPT. 4	01 P.M. PST
SEPT. 4	22	31	39.5	38.07 N.	118.50 W.	5	...	...	3.0P	...	P	SEPT. 4	02 P.M. PST
SEPT. 5	15	52	56.1	38.09 N.	118.58 W.	4	...	...	3.7B	...	B	SEPT. 5	07 A.M. PST
SEPT. 5	15	53	22.0	38.12 N.	116.61 W.	5	...	...	3.5B	...	B	SEPT. 5	07 A.M. PST
SEPT. 6	05	31	3.5	38.10 N.	118.57 W.	9	...	...	4.0B	FELT	B	SEPT. 5	09 P.M. PST
SEPT. 6	07	27	52.3	38.08 N.	118.57 W.	7	4.1	...	4.6B	FELT	B	SEPT. 5	11 P.M. PST
SEPT. 6	07	57	38.4	38.05 N.	118.53 W.	5	...	...	3.0P	...	P	SEPT. 5	11 P.M. PST
SEPT. 7	01	30	42.8	38.08 N.	118.58 W.	7	4.4	...	5.1B	FELT	B	SEPT. 6	05 P.M. PST
SEPT. 7	04	36	38.2	38.08 N.	118.60 W.	10	4.9	5.0	5.5B	V	B	SEPT. 6	08 P.M. PST
SEPT. 7	04	40	4.6	38.09 N.	118.53 W.	5	...	...	4.0B	...	B	SEPT. 6	08 P.M. PST
SEPT. 7	06	00	11.2	38.07 N.	118.53 W.	5	...	...	3.0P	...	G	SEPT. 6	10 P.M. PST
SEPT. 7	06	48	10.6	38.09 N.	118.57 W.	5	...	...	4.7B	FELT	B	SEPT. 6	10 P.M. PST
SEPT. 7	06	48	30.6	38.09 N.	118.57 W.	5	4.7	4.4	5.3B	FELT	B	SEPT. 6	10 P.M. PST
SEPT. 7	10	08	55.0	38.09 N.	118.60 W.	9	...	...	3.7B	...	B	SEPT. 7	02 A.M. PST
SEPT. 7	11	02	2.6	38.12 N.	118.61 W.	6	...	...	3.3B	...	B	SEPT. 7	03 A.M. PST
SEPT. 7	11	58	2.4	38.09 N.	118.61 W.	10	...	...	3.8B	...	B	SEPT. 7	03 A.M. PST
SEPT. 7	16	04	4.5	38.07 N.	118.61 W.	9	...	...	3.7B	...	B	SEPT. 7	08 A.M. PST
SEPT. 7	16	57	34.4	38.11 N.	118.59 W.	9	...	...	3.9B	FELT	B	SEPT. 7	08 A.M. PST
SEPT. 7	18	37	0.9	38.06 N.	118.60 W.	5	...	...	3.6B	...	B	SEPT. 7	10 A.M. PST
SEPT. 7	22	14	29.7	38.11 N.	118.59 W.	5	...	...	3.4B	...	B	SEPT. 7	02 P.M. PST
SEPT. 7	22	23	12.3	38.07 N.	118.53 W.	5	...	...	3.2P	...	P	SEPT. 7	02 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
NEVADA--Continued													
SEPT. 7	23	22	32.4	38.11 N.	118.50 W.	5	...	...	3.0P	...	G	SEPT. 7	03 P.M. PST
SEPT. 8	01	15	48.0	38.12 N.	118.51 W.	5	...	...	3.0P	...	G	SEPT. 7	05 P.M. PST
SEPT. 8	04	26	19.8	38.05 N.	118.60 W.	8	...	...	4.6B	IV	B	SEPT. 7	08 P.M. PST
SEPT. 8	08	19	26.5	38.08 N.	118.59 W.	7	...	...	3.6B	...	B	SEPT. 8	12 P.M. PST
SEPT. 8	11	13	4.3	38.07 N.	118.57 W.	1	...	...	3.0P	...	P	SEPT. 8	03 A.M. PST
SEPT. 8	18	17	12.9	38.08 N.	118.53 W.	3	...	...	3.0P	...	P	SEPT. 8	10 A.M. PST
SEPT. 8	21	58	53.2	38.07 N.	118.52 W.	5	...	...	3.0P	...	P	SEPT. 8	01 P.M. PST
SEPT. 9	12	09	38.6	38.12 N.	118.49 W.	5	...	...	3.0P	...	G	SEPT. 9	04 A.M. PST
SEPT. 10	10	29	8.8	37.93 N.	118.35 W.	3	...	...	3.0P	...	P	SEPT. 10	02 A.M. PST
SEPT. 10	23	49	41.4	38.06 N.	118.59 W.	7	...	...	3.3B	...	B	SEPT. 10	03 P.M. PST
SEPT. 11	04	16	49.5	38.11 N.	118.59 W.	6	...	...	3.7B	...	B	SEPT. 10	08 P.M. PST
SEPT. 11	09	54	26.8	38.07 N.	118.59 W.	7	...	...	3.5B	...	B	SEPT. 11	01 A.M. PST
SEPT. 15	15	08	42.5	38.07 N.	118.60 W.	10	...	...	3.8B	...	B	SEPT. 15	07 A.M. PST
SEPT. 15	16	07	38.5	38.05 N.	118.55 W.	5	...	...	3.0P	...	G	SEPT. 15	08 A.M. PST
SEPT. 16	04	19	44.0	38.05 N.	118.57 W.	2	...	...	3.3P	...	P	SEPT. 15	08 P.M. PST
SEPT. 16	04	24	41.1	38.05 N.	118.57 W.	7	4.2	...	4.7B	IV	B	SEPT. 15	08 P.M. PST
SEPT. 16	06	15	9.3	37.97 N.	118.42 W.	3	...	...	3.0P	...	P	SEPT. 15	10 P.M. PST
SEPT. 17	10	46	42.7	38.08 N.	118.61 W.	8	...	...	3.4B	...	B	SEPT. 17	02 A.M. PST
SEPT. 17	21	37	52.6	38.07 N.	118.61 W.	7	...	...	3.5B	...	B	SEPT. 17	01 P.M. PST
SEPT. 18	06	06	40.3	38.11 N.	118.62 W.	5	...	...	3.5B	...	B	SEPT. 17	10 P.M. PST
SEPT. 18	19	02	28.1	38.09 N.	118.61 W.	4	...	...	3.3B	...	B	SEPT. 18	11 A.M. PST
SEPT. 19	20	05	36.2	38.10 N.	118.58 W.	4	...	...	3.0P	...	P	SEPT. 19	12 M. PST
SEPT. 19	20	56	58.6	38.07 N.	118.59 W.	4	...	...	3.5B	...	B	SEPT. 19	12 M. PST
SEPT. 20	01	35	42.5	38.09 N.	118.62 W.	10	...	...	3.5B	...	B	SEPT. 19	05 P.M. PST
SEPT. 20	21	14	44.8	38.85 N.	118.83 W.	27	...	...	4.1B	...	B	SEPT. 20	01 P.M. PST
SEPT. 21	04	49	46.4	38.87 N.	118.80 W.	5	...	...	3.1P	...	G	SEPT. 20	08 P.M. PST
SEPT. 21	15	15	55.6	38.06 N.	118.60 W.	8	...	...	3.8B	...	B	SEPT. 21	07 A.M. PST
SEPT. 23	10	55	12.6	38.07 N.	118.56 W.	5	...	...	3.0P	...	G	SEPT. 23	02 A.M. PST
SEPT. 25	14	45	0.1	37.06 N.	116.05 W.	0	4.6	...	4.1B	...	E	SEPT. 25	06 A.M. PST
SEPT. 25	15	26	30.1	37.12 N.	116.06 W.	0	...	...	3.7G	...	E	SEPT. 25	07 A.M. PST
OCT. 2	01	48	13.5	37.28 N.	117.02 W.	5	...	...	3.0P	...	G	OCT. 1	05 P.M. PST
OCT. 19	02	54	35.3	38.07 N.	118.57 W.	3	...	...	3.3B	...	B	OCT. 18	06 P.M. PST
OCT. 21	21	31	46.4	38.07 N.	118.54 W.	3	...	...	3.5B	...	B	OCT. 21	01 P.M. PST
OCT. 24	19	15	0.1	37.07 N.	116.00 W.	0	4.4	...	4.4B	...	E	OCT. 24	11 A.M. PST
OCT. 25	00	30	59.0	37.79 N.	116.28 W.	5	...	...	3.8P	...	G	OCT. 24	04 P.M. PST
OCT. 31	18	00	0.1	37.21 N.	116.20 W.	0	4.7	...	4.9B	...	E	OCT. 31	10 A.M. PST
NOV. 7	04	13	55.0	37.95 N.	117.10 W.	5	...	...	3.2P	...	P	NOV. 6	08 P.M. PST
NOV. 11	10	19	3.0	38.04 N.	118.59 W.	5	...	...	4.7B	III	B	NOV. 11	02 A.M. PST
NOV. 11	10	33	51.3	38.03 N.	118.56 W.	4	...	...	4.0B	FELT	B	NOV. 11	02 A.M. PST
NOV. 14	16	50	0.1	37.11 N.	116.02 W.	0	4.1	...	4.5B	...	E	NOV. 14	08 A.M. PST
NOV. 17	22	59	46.1	38.06 N.	118.57 W.	5	...	...	3.8B	...	B	NOV. 17	02 P.M. PST
DEC. 17	15	10	0.1	37.32 N.	116.31 W.	0	5.1	...	5.0B	...	E	DEC. 17	07 A.M. PST
DEC. 19	16	57	45.2	38.48 N.	118.42 W.	5	...	...	3.7P	III	P	DEC. 19	08 A.M. PST
DEC. 28	22	58	9.8	38.16 N.	118.36 W.	5	4.6	...	5.0B	IV	B	DEC. 28	02 P.M. PST
DEC. 28	23	00	39.0	38.16 N.	118.33 W.	5	...	...	4.0B	...	B	DEC. 28	03 P.M. PST
DEC. 28	23	05	38.8	38.17 N.	118.38 W.	5	...	...	3.9B	FELT	B	DEC. 28	03 P.M. PST
DEC. 29	12	24	54.7	38.16 N.	118.42 W.	4	...	...	3.7B	...	B	DEC. 29	04 A.M. PST
NEW HAMPSHIRE													
APR. 7	09	36	00.4	43.13 N.	72.22 W.	0	...	...	2.7J	...	J	APR. 7	04 A.M. EST
NOV. 5	22	40	01.4	43.66 N.	71.36 W.	5	...	...	2.7J	...	J	NOV. 5	05 P.M. EST
NEW JERSEY													
MAR. 25	18	54	35.8	40.98 N.	75.01 W.	5	...	...	2.8L	...	L	MAR. 25	01 P.M. EST
APR. 5	11	49	33.8	39.83 N.	74.05 W.	6	...	...	2.9L	...	L	APR. 5	06 A.M. EST
AUG. 2	17	20	59.7	40.43 N.	74.15 W.	8	...	...	3.1L	...	L	AUG. 2	12 M. EST
AUG. 30	09	19	09.0	39.84 N.	74.86 W.	2	...	...	3.0L	...	L	AUG. 30	04 A.M. EST
NEW MEXICO													
MAR. 22	00	49	12.5	34.59 N.	105.91 W.	5	...	...	3.4G	IV	G	MAR. 21	05 P.M. MST
SEPT. 11	17	34	37.5	36.46 N.	105.19 W.	5	...	...	3.1G	V	G	SEPT. 11	10 A.M. MST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
NEW YORK													
JAN. 17	10	13	16.1	41.31 N.	73.93 W.	3	...	...	2.9L	V	L	JAN. 17	05 A.M. EST
FEB. 4	09	18	45.6	44.76 N.	75.30 W.	0	...	...	2.8L	...	L	FEB. 4	04 A.M. EST
FEB. 29	05	53	56.1	42.58 N.	74.20 W.	12	...	...	3.1L	...	L	FEB. 29	12 P.M. EST
MAY 7	04	32	49.3	41.02 N.	73.87 W.	0	...	...	2.6L	...	L	MAY 6	11 P.M. EST
MAY 20	21	33	23.0	41.35 N.	74.37 W.	2	...	...	2.6L	...	L	MAY 20	04 P.M. EST
MAY 23	08	39	44.0	44.89 N.	74.55 W.	0	...	...	3.4L	...	L	MAY 23	03 A.M. EST
JUNE 6	13	15	52.0	43.56 N.	75.23 W.	1	...	...	3.8L	V	L	JUNE 6	08 A.M. EST
JUNE 12	18	19	26.9	43.63 N.	75.09 W.	7	...	...	2.8L	...	L	JUNE 12	01 P.M. EST
JUNE 12	18	49	26.0	44.37 N.	74.10 W.	16	...	...	2.6L	...	L	JUNE 12	01 P.M. EST
JULY 15	07	21	01.5	44.72 N.	74.90 W.	4	...	...	2.6L	...	L	JULY 15	02 A.M. EST
AUG. 11	14	54	46.2	43.54 N.	75.16 W.	0	...	...	3.3L	...	L	AUG. 11	09 A.M. EST
SEPT. 4	04	30	55.8	41.11 N.	73.78 W.	13	...	...	3.2L	IV	L	SEPT. 3	11 P.M. EST
SEPT. 21	20	54	45.1	43.63 N.	74.02 W.	1	...	...	3.2L	...	L	SEPT. 21	03 P.M. EST
SEPT. 27	00	48	30.5	41.54 N.	73.69 W.	6	...	...	2.5L	...	L	SEPT. 26	07 P.M. EST
SEPT. 28	22	19	05.4	43.77 N.	74.12 W.	1	...	...	3.0L	...	L	SEPT. 28	05 P.M. EST
NORTH CAROLINA													
APR. 22	03	14	6.2	36.50 N.	80.66 W.	5	...	...	2.5V	IV	G	APR. 21	10 P.M. EST
JUNE 10	23	47	32.7	35.45 N.	82.88 W.	5	...	...	3.0V	...	G	JUNE 10	06 P.M. EST
OKLAHOMA													
FEB. 15	04	32	35.4	34.05 N.	97.45 W.	5	...	...	2.3T	III	T	FEB. 4	10 P.M. CST
MAY 30	07	44	02.7	35.51 N.	99.39 W.	5	...	...	2.6T	...	T	MAY 30	01 A.M. CST
JULY 8	01	34	44.0	34.00 N.	97.35 W.	5	...	...	2.5T	...	T	JULY 7	07 P.M. CST
JULY 18	14	29	46.9	35.18 N.	99.70 W.	5	...	...	3.2T	...	T	JULY 18	08 A.M. CST
NOV. 1	05	26	13.8	35.47 N.	97.84 W.	8	...	...	2.0T	III	T	OCT. 31	11 P.M. CST
NOV. 2	10	00	49.0	35.43 N.	97.78 W.	8	...	...	3.0T	V	T	NOV. 2	04 A.M. CST
NOV. 22	19	35	02.8	35.38 N.	95.99 W.	5	...	...	2.5T	...	T	NOV. 22	01 P.M. CST
DEC. 5	00	07	26.3	33.91 N.	97.28 W.	5	...	...	2.4T	FELT	T	DEC. 4	06 P.M. CST
OREGON													
JULY 7	01	17	6.0	45.22 N.	121.69 W.	5	...	...	3.3G	IV	G	JULY 6	05 P.M. PST
AUG. 3	14	43	4.2	42.50 N.	124.56 W.	15	4.5	...	...	...	G	AUG. 3	06 A.M. PST
OREGON--OFF THE COAST													
MAR. 20	15	24	9.2	43.93 N.	128.11 W.	15	4.1	4.0	...	...	G	MAR. 20	07 A.M. PST
MAR. 30	13	49	37.4	43.43 N.	127.12 W.	15	5.2	4.7	...	...	G	MAR. 30	05 A.M. PST
APR. 5	03	42	55.1	43.85 N.	127.93 W.	15	...	...	...	...	G	APR. 4	07 P.M. PST
APR. 9	23	31	51.9	42.29 N.	126.90 W.	15	...	...	...	...	G	APR. 9	03 P.M. PST
APR. 22	16	14	57.4	43.83 N.	127.91 W.	15	4.4	...	...	...	G	APR. 22	08 A.M. PST
JULY 15	14	29	19.9	43.48 N.	127.06 W.	15	4.5	...	...	...	G	JULY 15	06 A.M. PST
AUG. 3	08	24	2.0	42.40 N.	125.71 W.	15	4.5	3.2	...	...	G	AUG. 3	12 P.M. PST
AUG. 3	09	04	23.4	42.35 N.	126.20 W.	15	4.5	...	...	...	G	AUG. 3	01 A.M. PST
AUG. 4	09	40	44.7	42.35 N.	126.94 W.	15	4.4	...	...	...	G	AUG. 4	01 A.M. PST
AUG. 9	05	31	53.3	43.80 N.	127.78 W.	15	4.6	...	...	...	G	AUG. 8	09 P.M. PST
AUG. 15	22	34	3.9	44.41 N.	129.52 W.	15	4.7	3.7	...	...	G	AUG. 15	02 P.M. PST
SEPT. 3	13	12	6.8	43.57 N.	126.65 W.	15	...	...	...	...	G	SEPT. 3	05 A.M. PST
NOV. 17	06	48	32.7	42.24 N.	126.05 W.	15	...	...	3.3G	...	G	NOV. 16	10 P.M. PST
NOV. 18	06	48	15.8	43.51 N.	126.83 W.	15	4.0	...	...	...	G	NOV. 17	10 P.M. PST
NOV. 20	23	20	33.8	42.47 N.	125.83 W.	15	...	...	...	...	G	NOV. 20	03 P.M. PST
DEC. 3	12	12	8.3	43.13 N.	126.25 W.	15	...	...	...	...	G	DEC. 3	04 A.M. PST
DEC. 14	22	17	10.1	43.76 N.	127.70 W.	15	4.2	3.3	...	...	G	DEC. 14	02 P.M. PST
DEC. 20	21	56	28.8	43.80 N.	127.84 W.	15	4.2	...	...	...	G	DEC. 20	01 P.M. PST
DEC. 20	22	20	14.8	43.81 N.	127.73 W.	15	4.1	...	...	...	G	DEC. 20	02 P.M. PST
DEC. 23	22	27	20.6	44.46 N.	129.50 W.	15	4.8	4.6	...	...	G	DEC. 23	02 P.M. PST
DEC. 23	22	56	52.3	44.43 N.	129.58 W.	15	4.7	...	...	...	G	DEC. 23	02 P.M. PST
DEC. 23	23	51	20.5	44.37 N.	129.53 W.	15	4.7	...	...	...	G	DEC. 23	03 P.M. PST
DEC. 24	03	08	19.7	44.44 N.	129.26 W.	15	3.9	...	...	...	G	DEC. 23	07 P.M. PST
DEC. 24	13	29	15.3	42.37 N.	125.73 W.	15	5.2	5.3	5.0B	...	G	DEC. 24	05 A.M. PST
DEC. 24	14	00	55.5	42.39 N.	125.91 W.	15	4.0	...	...	...	G	DEC. 24	06 A.M. PST
DEC. 24	19	40	1.2	42.38 N.	125.70 W.	15	4.3	...	...	...	G	DEC. 24	11 A.M. PST
DEC. 25	15	32	27.9	42.29 N.	125.96 W.	15	4.2	3.8	...	...	G	DEC. 25	07 A.M. PST
DEC. 27	05	23	24.3	42.27 N.	125.84 W.	15	4.3	...	...	...	G	DEC. 26	09 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
PENNSYLVANIA													
MAR. 2	11	54	47.9	40.21 N.	75.08 W.	0	...	...	2.8L	...	L	MAR. 2	06 A.M. EST
MAR. 5	17	06	54.5	40.19 N.	75.16 W.	5	...	...	3.5L	IV	G	MAR. 5	12 M. EST
MAR. 5	17	20	32.4	40.18 N.	75.07 W.	5	...	...	3.1L	...	L	MAR. 5	12 M. EST
MAR. 11	06	00	26.0	40.16 N.	75.10 W.	5	...	...	3.7L	V	G	MAR. 11	01 A.M. EST
MAR. 11	16	16	05.5	40.25 N.	74.99 W.	2	...	...	2.8L	...	L	MAR. 11	11 A.M. EST
MAY 2	15	23	23.5	40.16 N.	74.99 W.	5	...	...	2.8L	...	L	MAY 2	10 A.M. EST
MAY 2	19	02	24.4	40.26 N.	75.03 W.	0	...	...	3.0L	...	L	MAY 2	02 P.M. EST
SOUTH CAROLINA													
JUNE 22	20	33	6.2	33.01 N.	80.16 W.	1	...	...	2.1G	II	G	JUNE 22	03 P.M. EST
JUNE 22	23	35	26.5	33.01 N.	80.16 W.	1	...	...	1.6G	II	G	JUNE 22	06 P.M. EST
SEPT. 1	05	44	42.3	32.97 N.	80.20 W.	6	...	...	2.7G	IV	G	SEPT. 1	12 P.M. EST
TENNESSEE													
APR. 21	20	44	5.7	35.76 N.	84.13 W.	5	...	...	2.6G	III	G	APR. 21	03 P.M. EST
APR. 21	23	20	39.5	35.76 N.	84.12 W.	5	...	...	2.4G	...	G	APR. 21	06 P.M. EST
JUNE 25	18	02	1.5	35.78 N.	84.05 W.	5	...	...	3.3V	IV	G	JUNE 25	01 P.M. EST
DEC. 2	08	59	30.0	36.21 N.	89.43 W.	11	...	...	3.8S	VI	S	DEC. 2	02 A.M. CST
TEXAS													
FEB. 21	20	42	0.9	35.28 N.	101.08 W.	5	...	...	2.9T	...	G	FEB. 21	02 P.M. CST
JUNE 9	22	37	9.9	35.51 N.	101.08 W.	5	...	...	3.4T	V	G	JUNE 9	04 P.M. CST
UTAH													
MAR. 1	15	18	25.6	39.62 N.	110.68 W.	7	...	...	2.8U	...	U	MAR. 1	08 A.M. MST
APR. 4	00	45	4.4	41.34 N.	113.31 W.	7	...	...	3.0U	IV	U	APR. 3	05 P.M. MST
APR. 4	00	56	9.3	41.35 N.	113.32 W.	7	...	...	2.7U	FELT	U	APR. 3	05 P.M. MST
APR. 6	10	45	4.1	39.95 N.	111.98 W.	5	...	...	3.8U	IV	U	APR. 6	03 A.M. MST
MAY 24	10	03	36.3	39.94 N.	111.97 W.	5	5.0	...	4.2U	V	U	MAY 24	03 A.M. MST
AUG. 15	06	25	23.2	41.66 N.	111.66 W.	7	...	...	2.9U	...	U	AUG. 14	11 P.M. MST
DEC. 21	18	25	10.5	37.53 N.	113.04 W.	7	...	...	3.2U	FELT	U	DEC. 21	11 A.M. MST
DEC. 27	04	34	16.2	37.54 N.	113.09 W.	7	...	...	3.0U	...	U	DEC. 26	09 P.M. MST
DEC. 27	06	28	3.6	39.45 N.	111.11 W.	7	...	...	2.5U	...	G	DEC. 26	11 P.M. MST
DEC. 27	18	09	22.3	37.50 N.	113.10 W.	7	...	...	2.8U	...	U	DEC. 27	11 A.M. MST
DEC. 29	07	12	53.1	37.49 N.	113.07 W.	7	...	...	3.1U	...	U	DEC. 29	12 P.M. MST
VERMONT													
DEC. 25	16	58	35.6	44.10 N.	72.09 W.	10	...	...	2.5J	...	J	DEC. 25	11 A.M. EST
VIRGINIA													
NOV. 5	21	48	14.7	38.18 N.	79.90 W.	4	...	...	2.8V	FELT	V	NOV. 5	04 P.M. EST
WASHINGTON													
JAN. 9	12	47	09.9	47.30 N.	122.91 W.	47	...	...	3.3W	...	W	JAN. 9	04 A.M. PST
JAN. 29	00	41	56.0	46.86 N.	121.88 W.	9	...	...	3.0W	...	W	JAN. 28	04 P.M. PST
MAR. 20	23	47	43.3	46.21 N.	122.19 W.	4	...	...	4.1G	...	W	MAR. 20	03 P.M. PST
MAR. 22	22	22	42.2	46.21 N.	122.19 W.	3	4.3	...	3.5G	...	W	MAR. 22	02 P.M. PST
MAR. 23	15	22	42.9	46.22 N.	122.21 W.	1	...	...	3.4G	...	W	MAR. 23	07 A.M. PST
MAR. 24	13	14	42.2	46.20 N.	122.22 W.	2	...	...	3.2G	...	W	MAR. 24	05 A.M. PST
MAR. 24	21	56	49.6	46.21 N.	122.19 W.	3	4.2	...	4.2G	...	W	MAR. 24	01 P.M. PST
MAR. 25	04	07	9.7	46.21 N.	122.19 W.	4	4.2	...	3.4G	...	W	MAR. 24	08 P.M. PST
MAR. 25	07	08	46.2	46.20 N.	122.19 W.	4	4.2	...	3.4G	...	W	MAR. 24	11 P.M. PST
MAR. 25	13	42	14.0	46.20 N.	122.19 W.	4	...	...	3.3G	...	W	MAR. 25	05 A.M. PST
MAR. 25	17	18	47.0	46.21 N.	122.18 W.	1	...	...	3.5G	...	W	MAR. 25	09 A.M. PST
MAR. 25	21	50	51.3	46.21 N.	122.20 W.	3	...	...	3.4G	...	W	MAR. 25	01 P.M. PST
MAR. 25	22	22	14.7	46.20 N.	122.17 W.	3	...	...	3.4G	...	W	MAR. 25	02 P.M. PST
MAR. 25	22	53	1.7	46.20 N.	122.18 W.	4	3.8	...	3.7G	...	W	MAR. 25	02 P.M. PST
MAR. 26	01	06	30.0	46.21 N.	122.19 W.	2	...	...	3.5G	...	W	MAR. 25	05 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
WASHINGTON--Continued													
MAR. 26	02	03	18.4	46.22 N.	122.19 W.	4	4.3	...	3.8G	...	W	MAR. 25	06 P.M. PST
MAR. 26	02	36	0.0	46.20 N.	122.19 W.	4	4.2	...	3.5G	...	W	MAR. 25	06 P.M. PST
MAR. 26	03	36	24.1	46.21 N.	122.18 W.	4	...	...	3.5G	...	W	MAR. 25	07 P.M. PST
MAR. 26	04	10	43.4	46.20 N.	122.20 W.	3	...	...	3.1G	...	W	MAR. 25	08 P.M. PST
MAR. 26	04	14	28.9	46.21 N.	122.19 W.	4	3.8	...	3.7G	...	W	MAR. 25	08 P.M. PST
MAR. 26	05	00	4.4	46.21 N.	122.18 W.	3	4.1	...	3.6G	...	W	MAR. 25	09 P.M. PST
MAR. 26	07	17	21.9	46.21 N.	122.18 W.	4	3.8	...	3.5G	...	W	MAR. 25	11 P.M. PST
MAR. 26	09	10	7.9	46.21 N.	122.18 W.	4	4.1	...	3.5G	...	W	MAR. 26	01 A.M. PST
MAR. 26	09	44	2.7	46.21 N.	122.17 W.	4	4.2	...	3.8G	...	W	MAR. 26	01 A.M. PST
MAR. 26	17	07	10.7	46.19 N.	122.19 W.	7	4.1	...	4.0G	...	W	MAR. 26	09 A.M. PST
MAR. 26	20	37	49.0	46.21 N.	122.19 W.	5	...	...	3.7G	...	W	MAR. 26	12 M. PST
MAR. 27	03	40	5.7	46.22 N.	122.18 W.	5	4.1	...	3.9G	...	W	MAR. 26	07 P.M. PST
MAR. 27	03	48	58.5	46.21 N.	122.19 W.	5	4.2	...	3.9G	...	W	MAR. 26	07 P.M. PST
MAR. 27	04	26	10.1	46.20 N.	122.17 W.	7	4.0	...	3.4G	...	W	MAR. 26	08 P.M. PST
MAR. 27	05	30	43.5	46.21 N.	122.19 W.	4	...	...	3.4G	...	W	MAR. 26	09 P.M. PST
MAR. 27	06	33	24.0	46.20 N.	122.23 W.	1	4.1	...	3.8G	...	W	MAR. 26	10 P.M. PST
MAR. 27	07	39	15.6	46.21 N.	122.18 W.	5	...	...	3.4G	...	W	MAR. 26	11 P.M. PST
MAR. 27	12	32	54.6	46.21 N.	122.19 W.	4	...	...	3.4G	...	W	MAR. 27	04 A.M. PST
MAR. 27	14	55	54.7	46.21 N.	122.19 W.	4	4.2	...	3.9G	...	W	MAR. 27	06 A.M. PST
MAR. 27	15	55	3.8	46.22 N.	122.20 W.	6	4.0	...	3.6G	...	W	MAR. 27	07 A.M. PST
MAR. 27	18	55	44.9	46.21 N.	122.19 W.	5	...	...	3.6G	...	W	MAR. 27	10 A.M. PST
MAR. 27	20	16	43.1	46.21 N.	122.19 W.	5	3.9	...	3.8G	...	W	MAR. 27	12 M. PST
MAR. 27	22	00	5.6	46.22 N.	122.20 W.	4	4.6	...	4.5G	...	W	MAR. 27	02 P.M. PST
MAR. 28	01	51	12.6	46.21 N.	122.18 W.	5	4.1	...	3.7G	...	W	MAR. 27	05 P.M. PST
MAR. 28	03	35	50.9	46.21 N.	122.19 W.	5	...	...	3.1G	...	W	MAR. 27	07 P.M. PST
MAR. 28	08	28	25.7	46.22 N.	122.18 W.	4	4.3	...	4.2G	...	W	MAR. 28	12 P.M. PST
MAR. 28	12	51	19.4	46.22 N.	122.18 W.	5	3.7	...	3.6G	...	W	MAR. 28	04 A.M. PST
MAR. 28	13	59	38.5	46.21 N.	122.19 W.	5	4.0	...	3.7G	...	W	MAR. 28	05 A.M. PST
MAR. 28	15	18	43.4	46.21 N.	122.20 W.	2	...	...	3.6G	...	W	MAR. 28	07 A.M. PST
MAR. 28	22	50	56.7	46.18 N.	122.20 W.	5	3.7	...	3.7G	...	W	MAR. 28	02 P.M. PST
MAR. 28	23	50	28.5	46.22 N.	122.19 W.	4	...	...	3.7G	...	W	MAR. 28	03 P.M. PST
MAR. 29	05	48	47.3	46.21 N.	122.19 W.	5	...	...	3.8G	...	W	MAR. 28	09 P.M. PST
MAR. 29	08	36	56.8	46.21 N.	122.17 W.	5	4.0	...	3.8G	...	W	MAR. 29	12 P.M. PST
MAR. 29	10	34	40.5	46.22 N.	122.18 W.	4	3.7	...	3.5G	...	W	MAR. 29	02 A.M. PST
MAR. 29	11	51	48.2	46.21 N.	122.19 W.	6	4.1	...	4.0G	...	W	MAR. 29	03 A.M. PST
MAR. 29	13	01	50.9	46.20 N.	122.21 W.	1	3.7	...	3.7G	...	W	MAR. 29	05 A.M. PST
MAR. 29	15	05	24.9	46.21 N.	122.18 W.	4	3.7	...	3.8G	...	W	MAR. 29	07 A.M. PST
MAR. 29	15	35	39.4	46.20 N.	122.18 W.	5	4.2	...	4.2G	...	W	MAR. 29	07 A.M. PST
MAR. 29	19	01	1.9	46.22 N.	122.18 W.	4	...	...	3.4G	...	W	MAR. 29	11 A.M. PST
MAR. 29	20	55	52.1	46.21 N.	122.19 W.	4	...	...	4.0G	...	W	MAR. 29	12 M. PST
MAR. 29	23	20	40.7	46.20 N.	122.19 W.	4	4.1	...	3.9G	...	W	MAR. 29	03 P.M. PST
MAR. 30	02	56	19.8	46.22 N.	122.19 W.	3	4.2	...	3.8G	...	W	MAR. 29	06 P.M. PST
MAR. 30	03	53	54.9	46.20 N.	122.20 W.	2	4.1	...	3.9G	...	W	MAR. 29	07 P.M. PST
MAR. 30	07	42	17.3	46.21 N.	122.18 W.	3	4.1	...	3.8G	...	W	MAR. 29	11 P.M. PST
MAR. 30	09	16	53.2	46.21 N.	122.19 W.	5	4.2	...	4.2G	...	W	MAR. 30	01 A.M. PST
MAR. 30	12	39	57.8	46.21 N.	122.17 W.	5	4.1	...	3.7G	...	W	MAR. 30	04 A.M. PST
MAR. 30	13	32	25.4	46.22 N.	122.19 W.	5	4.3	...	4.2G	...	W	MAR. 30	05 A.M. PST
MAR. 30	17	55	10.2	46.22 N.	122.18 W.	5	4.5	...	4.4G	...	W	MAR. 30	09 A.M. PST
MAR. 30	22	47	11.9	46.22 N.	122.19 W.	4	4.4	...	4.2G	...	W	MAR. 30	02 P.M. PST
MAR. 31	02	44	6.3	46.21 N.	122.19 W.	4	4.2	...	4.1G	...	W	MAR. 30	06 P.M. PST
MAR. 31	07	49	42.2	46.22 N.	122.19 W.	4	...	...	4.4G	...	W	MAR. 30	11 P.M. PST
MAR. 31	08	12	52.0	46.22 N.	122.20 W.	4	4.2	...	4.1G	...	W	MAR. 31	12 P.M. PST
MAR. 31	11	34	10.0	46.22 N.	122.19 W.	4	4.6	...	4.4G	...	W	MAR. 31	03 A.M. PST
MAR. 31	14	49	1.3	46.22 N.	122.19 W.	4	4.4	...	4.3G	...	W	MAR. 31	06 A.M. PST
MAR. 31	19	29	11.5	46.21 N.	122.18 W.	4	...	...	3.8G	...	W	MAR. 31	11 A.M. PST
MAR. 31	19	37	10.1	46.20 N.	122.18 W.	3	4.5	...	3.9G	...	W	MAR. 31	11 A.M. PST
APR. 1	04	24	30.5	46.22 N.	122.18 W.	4	5.0	3.7	4.7G	...	W	MAR. 31	08 P.M. PST
APR. 1	08	54	25.4	46.22 N.	122.18 W.	4	4.5	...	4.5G	...	W	APR. 1	12 P.M. PST
APR. 1	12	30	46.7	46.22 N.	122.18 W.	4	4.8	...	4.0G	...	W	APR. 1	04 A.M. PST
APR. 1	23	14	38.6	46.21 N.	122.19 W.	5	4.5	...	4.6G	...	W	APR. 1	03 P.M. PST
APR. 2	09	37	13.1	46.22 N.	122.18 W.	3	4.8	3.7	4.7G	...	W	APR. 2	01 A.M. PST
APR. 2	18	48	20.8	46.21 N.	122.19 W.	4	...	...	4.1G	...	W	APR. 2	10 A.M. PST
APR. 3	02	43	19.8	46.23 N.	122.20 W.	3	4.5	...	4.4G	...	W	APR. 2	06 P.M. PST
APR. 3	09	35	27.2	46.23 N.	122.17 W.	1	4.8	...	4.8G	...	W	APR. 3	01 A.M. PST
APR. 3	15	30	20.2	46.21 N.	122.19 W.	4	...	...	3.7G	...	W	APR. 3	07 A.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
WASHINGTON--Continued													
APR. 3	21	51	58.8	46.23 N.	122.20 W.	3	...	...	3.6G	...	W	APR. 3	01 P.M. PST
APR. 3	23	57	52.3	46.23 N.	122.22 W.	2	5.0	...	4.5G	...	W	APR. 3	03 P.M. PST
APR. 4	09	42	35.5	46.22 N.	122.21 W.	5	4.4	...	3.8G	...	W	APR. 4	01 A.M. PST
APR. 4	09	48	56.3	46.24 N.	122.21 W.	5	...	...	3.6G	...	W	APR. 4	01 A.M. PST
APR. 4	13	45	5.8	46.21 N.	122.18 W.	4	4.5	3.8	4.5G	...	W	APR. 4	05 A.M. PST
APR. 4	21	40	43.5	46.13 N.	122.03 W.	10	...	...	4.4G	...	W	APR. 4	01 P.M. PST
APR. 5	02	09	29.0	46.22 N.	122.18 W.	3	...	...	3.4G	...	W	APR. 4	06 P.M. PST
APR. 5	06	39	3.3	46.21 N.	122.18 W.	5	...	...	3.7G	...	W	APR. 4	10 P.M. PST
APR. 5	08	49	17.3	46.23 N.	122.17 W.	4	4.3	...	3.9G	...	W	APR. 5	12 P.M. PST
APR. 5	10	58	49.5	46.21 N.	122.19 W.	3	4.1	...	3.6G	...	W	APR. 5	02 A.M. PST
APR. 5	13	46	56.0	46.22 N.	122.18 W.	1	4.4	...	3.8G	...	W	APR. 5	05 A.M. PST
APR. 5	16	42	5.7	46.23 N.	122.19 W.	2	4.9	4.5	4.5G	...	W	APR. 5	08 A.M. PST
APR. 5	23	56	53.2	46.19 N.	122.19 W.	8	...	...	3.6G	...	W	APR. 5	03 P.M. PST
APR. 6	06	41	38.6	46.23 N.	122.18 W.	1	...	...	3.1G	...	W	APR. 5	10 P.M. PST
APR. 6	06	58	4.5	46.23 N.	122.19 W.	2	4.7	3.8	4.7G	...	W	APR. 5	10 P.M. PST
APR. 6	11	08	27.6	46.22 N.	122.18 W.	2	...	...	3.2G	...	W	APR. 6	03 A.M. PST
APR. 6	15	00	38.4	46.21 N.	122.18 W.	5	...	...	3.4G	...	W	APR. 6	07 A.M. PST
APR. 6	17	18	49.3	46.30 N.	121.83 W.	1	...	...	3.6G	...	W	APR. 6	09 A.M. PST
APR. 6	20	26	12.4	46.20 N.	122.19 W.	5	...	...	3.6G	...	W	APR. 6	12 M. PST
APR. 6	23	22	56.2	46.22 N.	122.17 W.	3	...	...	3.4G	...	W	APR. 6	03 P.M. PST
APR. 6	23	26	1.1	46.22 N.	122.19 W.	1	4.3	...	3.7G	...	W	APR. 6	03 P.M. PST
APR. 7	01	54	14.4	46.29 N.	122.15 W.	5	...	...	3.5G	...	W	APR. 6	05 P.M. PST
APR. 7	01	57	45.0	46.22 N.	122.19 W.	4	4.0	...	3.5G	...	W	APR. 6	05 P.M. PST
APR. 7	03	52	3.4	46.21 N.	122.18 W.	4	...	...	3.5G	...	W	APR. 6	07 P.M. PST
APR. 7	04	52	53.8	46.19 N.	122.17 W.	5	...	...	3.5G	...	W	APR. 6	08 P.M. PST
APR. 7	06	45	19.2	46.22 N.	122.18 W.	4	4.6	...	4.5G	...	W	APR. 6	10 P.M. PST
APR. 7	10	29	3.6	46.21 N.	122.18 W.	6	...	...	3.2G	...	W	APR. 7	02 A.M. PST
APR. 7	15	05	32.7	46.23 N.	122.21 W.	5	4.9	...	4.7G	...	W	APR. 7	07 A.M. PST
APR. 7	22	50	46.4	46.21 N.	122.18 W.	4	...	...	3.4G	...	W	APR. 7	02 P.M. PST
APR. 8	02	18	47.1	46.22 N.	122.19 W.	5	...	...	3.5G	...	W	APR. 7	06 P.M. PST
APR. 8	04	46	58.3	46.22 N.	122.18 W.	7	...	...	3.8G	...	W	APR. 7	08 P.M. PST
APR. 8	06	07	4.6	46.22 N.	122.19 W.	3	4.7	...	4.5G	...	W	APR. 7	10 P.M. PST
APR. 8	12	29	14.8	46.18 N.	122.16 W.	7	...	...	3.2G	...	W	APR. 8	04 A.M. PST
APR. 8	13	40	56.3	46.22 N.	122.18 W.	3	...	...	3.2G	...	W	APR. 8	05 A.M. PST
APR. 8	13	42	27.1	46.21 N.	122.18 W.	5	...	...	3.5G	...	W	APR. 8	05 A.M. PST
APR. 8	14	37	32.5	46.22 N.	122.18 W.	3	...	...	3.2G	...	W	APR. 8	06 A.M. PST
APR. 8	15	47	29.7	46.22 N.	122.19 W.	2	...	...	3.5G	...	W	APR. 8	07 A.M. PST
APR. 8	19	29	2.8	46.21 N.	122.17 W.	4	4.3	...	4.4G	...	W	APR. 8	11 A.M. PST
APR. 8	22	10	15.4	46.23 N.	122.18 W.	2	...	...	3.4G	...	W	APR. 8	02 P.M. PST
APR. 8	22	13	50.0	46.21 N.	122.19 W.	4	4.4	...	4.2G	...	W	APR. 8	02 P.M. PST
APR. 9	03	25	20.5	46.20 N.	122.18 W.	4	...	...	3.2G	...	W	APR. 8	07 P.M. PST
APR. 9	03	28	51.4	46.21 N.	122.19 W.	4	...	...	3.4G	...	W	APR. 8	07 P.M. PST
APR. 9	07	04	47.4	46.21 N.	122.18 W.	3	...	...	3.3G	...	W	APR. 8	11 P.M. PST
APR. 9	09	01	44.2	46.22 N.	122.18 W.	3	4.2	...	4.2G	...	W	APR. 9	01 A.M. PST
APR. 9	10	13	20.3	46.22 N.	122.15 W.	4	4.9	...	4.5G	...	W	APR. 9	02 A.M. PST
APR. 9	11	55	26.0	46.21 N.	122.17 W.	4	4.1	...	3.4G	...	W	APR. 9	03 A.M. PST
APR. 9	18	19	27.3	46.20 N.	122.20 W.	5	4.8	...	4.5G	...	G	APR. 9	10 A.M. PST
APR. 9	22	29	3.5	46.21 N.	122.18 W.	4	...	...	3.7G	...	W	APR. 9	02 P.M. PST
APR. 10	00	25	47.9	46.22 N.	122.17 W.	4	4.4	...	4.3G	...	W	APR. 9	04 P.M. PST
APR. 10	00	44	15.7	46.23 N.	122.18 W.	4	4.7	...	4.6G	...	W	APR. 9	04 P.M. PST
APR. 10	14	16	15.3	46.22 N.	122.18 W.	2	4.7	3.3	4.5G	...	W	APR. 10	06 A.M. PST
APR. 10	21	08	26.2	46.21 N.	122.18 W.	4	...	...	3.7G	...	W	APR. 10	01 P.M. PST
APR. 11	00	51	48.3	46.21 N.	122.18 W.	4	...	...	3.4G	...	W	APR. 10	04 P.M. PST
APR. 11	03	36	4.3	46.21 N.	122.18 W.	2	...	...	3.2G	...	W	APR. 10	07 P.M. PST
APR. 11	04	45	22.1	46.23 N.	122.17 W.	4	4.7	...	4.4G	...	W	APR. 10	08 P.M. PST
APR. 11	07	42	1.8	46.21 N.	122.19 W.	2	4.3	...	3.6G	...	W	APR. 10	11 P.M. PST
APR. 11	14	52	25.1	46.21 N.	122.18 W.	3	...	...	3.6G	...	W	APR. 11	06 A.M. PST
APR. 11	18	01	10.6	46.21 N.	122.18 W.	1	...	...	3.7G	...	W	APR. 11	10 A.M. PST
APR. 11	21	56	31.2	46.21 N.	122.17 W.	4	...	...	3.5G	...	W	APR. 11	01 P.M. PST
APR. 11	23	52	0.0	46.22 N.	122.16 W.	3	4.4	...	4.8G	...	W	APR. 11	03 P.M. PST
APR. 12	05	16	22.3	46.22 N.	122.18 W.	5	4.3	...	4.2G	...	W	APR. 11	09 P.M. PST
APR. 12	15	08	11.8	46.21 N.	122.18 W.	1	3.8	...	3.6G	...	W	APR. 12	07 A.M. PST
APR. 12	20	45	34.2	46.21 N.	122.18 W.	1	...	...	3.6G	...	W	APR. 12	12 M. PST
APR. 12	21	25	19.7	46.22 N.	122.18 W.	2	...	...	3.4G	...	W	APR. 12	01 P.M. PST
APR. 12	22	29	12.0	46.22 N.	122.18 W.	5	4.2	...	4.3G	...	W	APR. 12	02 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
WASHINGTON--Continued													
APR. 13	01	25	56.1	46.21 N.	122.18 W.	2	4.2	...	3.6G	...	W	APR. 12	05 P.M. PST
APR. 13	03	03	23.0	46.25 N.	122.20 W.	1	...	...	3.5G	...	W	APR. 12	07 P.M. PST
APR. 13	06	13	18.5	46.21 N.	122.19 W.	3	3.8	...	3.6G	...	W	APR. 12	10 P.M. PST
APR. 13	07	39	32.2	46.22 N.	122.18 W.	2	...	...	3.1G	...	W	APR. 12	11 P.M. PST
APR. 13	08	36	18.8	46.22 N.	122.18 W.	1	4.7	...	4.5G	...	W	APR. 13	12 P.M. PST
APR. 13	09	40	46.5	46.22 N.	122.18 W.	2	...	...	3.5G	...	W	APR. 13	01 A.M. PST
APR. 13	12	06	20.7	46.22 N.	122.17 W.	1	...	...	3.5G	...	W	APR. 13	04 A.M. PST
APR. 13	17	35	41.8	46.21 N.	122.19 W.	4	4.2	...	4.1G	...	W	APR. 13	09 A.M. PST
APR. 13	18	58	21.7	46.22 N.	122.17 W.	4	4.0	...	4.3G	...	W	APR. 13	10 A.M. PST
APR. 13	23	57	32.1	46.22 N.	122.18 W.	3	...	...	3.6G	...	W	APR. 13	03 P.M. PST
APR. 14	03	01	2.5	46.21 N.	122.19 W.	4	4.0	...	3.7G	...	W	APR. 13	07 P.M. PST
APR. 14	06	53	38.9	46.22 N.	122.17 W.	3	4.4	...	3.7G	...	W	APR. 13	10 P.M. PST
APR. 14	06	59	22.3	46.22 N.	122.19 W.	4	4.7	...	4.5G	...	W	APR. 13	10 P.M. PST
APR. 14	08	42	11.6	46.21 N.	122.17 W.	3	...	...	3.4G	...	W	APR. 14	12 P.M. PST
APR. 14	12	28	43.6	46.22 N.	122.18 W.	4	4.2	...	3.9G	...	W	APR. 14	04 A.M. PST
APR. 14	13	49	4.1	46.21 N.	122.19 W.	3	4.8	5.3	4.7G	...	W	APR. 14	05 A.M. PST
APR. 14	15	30	30.6	46.23 N.	122.20 W.	1	...	...	3.4G	...	W	APR. 14	07 A.M. PST
APR. 14	22	28	53.3	46.22 N.	122.19 W.	2	...	...	3.4G	...	W	APR. 14	02 P.M. PST
APR. 15	00	37	5.4	46.22 N.	122.16 W.	4	...	...	4.0G	...	W	APR. 14	04 P.M. PST
APR. 15	02	26	18.6	46.23 N.	122.21 W.	1	4.2	...	3.7G	...	W	APR. 14	06 P.M. PST
APR. 15	06	58	22.4	46.22 N.	122.20 W.	6	4.5	...	4.3G	...	W	APR. 14	10 P.M. PST
APR. 15	07	35	25.8	46.22 N.	122.20 W.	4	3.9	...	3.4G	...	W	APR. 14	11 P.M. PST
APR. 15	11	53	53.7	46.20 N.	122.19 W.	4	...	...	3.7G	...	W	APR. 15	03 A.M. PST
APR. 15	13	56	24.7	46.21 N.	122.19 W.	3	...	...	3.4G	...	W	APR. 15	05 A.M. PST
APR. 15	15	27	51.3	46.22 N.	122.19 W.	4	3.7	...	3.3G	...	W	APR. 15	07 A.M. PST
APR. 15	16	12	4.8	46.21 N.	122.18 W.	1	...	...	3.5G	...	W	APR. 15	08 A.M. PST
APR. 15	17	54	54.3	46.22 N.	122.18 W.	3	4.9	3.6	4.7G	...	W	APR. 15	09 A.M. PST
APR. 15	21	55	49.0	46.43 N.	121.93 W.	5	4.1	...	4.0G	...	G	APR. 15	01 P.M. PST
APR. 16	01	54	45.9	46.20 N.	122.20 W.	6	...	...	3.5G	...	W	APR. 15	05 P.M. PST
APR. 16	04	58	57.4	46.22 N.	122.19 W.	4	...	...	3.4G	...	W	APR. 15	08 P.M. PST
APR. 16	06	25	52.5	46.22 N.	122.20 W.	4	4.1	...	3.2G	...	W	APR. 15	10 P.M. PST
APR. 16	11	47	28.6	46.21 N.	122.19 W.	3	3.8	...	3.5G	...	W	APR. 16	03 A.M. PST
APR. 16	14	47	06.4	48.14 N.	122.90 W.	49	...	...	3.8W	...	W	APR. 16	06 A.M. PST
APR. 16	15	22	5.6	46.22 N.	122.18 W.	3	4.9	...	4.9G	...	W	APR. 16	07 A.M. PST
APR. 16	15	40	23.5	46.22 N.	122.17 W.	4	4.8	...	4.5G	...	W	APR. 16	07 A.M. PST
APR. 16	22	46	24.9	46.22 N.	122.18 W.	1	4.3	...	3.5G	...	W	APR. 16	02 P.M. PST
APR. 17	04	26	16.0	46.22 N.	122.19 W.	4	4.1	...	4.3G	...	W	APR. 16	08 P.M. PST
APR. 17	07	06	47.1	46.20 N.	122.17 W.	1	4.0	3.3	3.5G	...	W	APR. 16	11 P.M. PST
APR. 17	08	58	44.8	46.21 N.	122.19 W.	2	...	...	3.3G	...	W	APR. 17	12 P.M. PST
APR. 17	17	43	22.6	46.22 N.	122.18 W.	3	4.7	3.6	4.6G	...	W	APR. 17	09 A.M. PST
APR. 18	00	51	6.0	46.22 N.	122.19 W.	1	3.7	...	3.4G	...	W	APR. 17	04 P.M. PST
APR. 18	00	53	40.5	46.22 N.	122.18 W.	2	4.7	...	4.4G	...	W	APR. 17	04 P.M. PST
APR. 18	02	24	31.3	46.21 N.	122.19 W.	3	4.1	...	3.4G	...	W	APR. 17	06 P.M. PST
APR. 18	08	28	9.2	46.22 N.	122.19 W.	3	4.3	...	3.4G	...	W	APR. 18	12 P.M. PST
APR. 18	09	23	39.1	46.21 N.	122.19 W.	3	3.9	...	3.7G	...	W	APR. 18	01 A.M. PST
APR. 18	10	45	22.4	46.22 N.	122.19 W.	3	4.0	...	3.4G	...	W	APR. 18	02 A.M. PST
APR. 18	12	15	43.9	46.23 N.	122.18 W.	4	...	...	3.4G	...	W	APR. 18	04 A.M. PST
APR. 18	13	08	29.4	46.21 N.	122.18 W.	4	...	...	3.6G	...	W	APR. 18	05 A.M. PST
APR. 18	15	53	13.9	46.21 N.	122.20 W.	4	...	...	3.3G	...	W	APR. 18	07 A.M. PST
APR. 18	19	16	25.4	46.22 N.	122.20 W.	5	...	...	3.5G	...	W	APR. 18	11 A.M. PST
APR. 18	21	16	2.2	46.22 N.	122.19 W.	4	4.8	...	4.7G	...	W	APR. 18	01 P.M. PST
APR. 18	22	27	14.5	46.22 N.	122.18 W.	4	4.5	...	4.1G	...	W	APR. 18	02 P.M. PST
APR. 19	02	37	26.3	46.22 N.	122.18 W.	2	4.1	...	3.6G	...	W	APR. 18	06 P.M. PST
APR. 19	06	03	12.6	46.21 N.	122.19 W.	2	...	...	3.6G	...	W	APR. 18	10 P.M. PST
APR. 19	08	07	18.1	46.22 N.	122.19 W.	3	4.0	...	3.8G	...	W	APR. 19	12 P.M. PST
APR. 19	14	53	14.5	46.23 N.	122.19 W.	1	...	...	3.6G	...	W	APR. 19	06 A.M. PST
APR. 19	17	48	35.7	46.23 N.	122.17 W.	3	4.3	...	3.9G	...	W	APR. 19	09 A.M. PST
APR. 19	19	07	51.2	46.22 N.	122.20 W.	5	3.9	...	3.8G	...	W	APR. 19	11 A.M. PST
APR. 19	19	17	58.3	46.20 N.	122.17 W.	2	...	...	3.5G	...	W	APR. 19	11 A.M. PST
APR. 19	20	41	38.7	46.21 N.	122.18 W.	2	...	...	3.4G	...	W	APR. 19	12 M. PST
APR. 19	22	28	28.2	46.23 N.	122.18 W.	3	4.7	...	4.6G	...	W	APR. 19	02 P.M. PST
APR. 20	00	13	41.2	46.21 N.	122.18 W.	4	4.1	...	3.4G	...	W	APR. 19	04 P.M. PST
APR. 20	04	53	2.6	46.22 N.	122.19 W.	2	4.1	...	3.7G	...	W	APR. 19	08 P.M. PST
APR. 20	05	04	50.3	46.22 N.	122.19 W.	4	4.0	...	3.8G	...	W	APR. 19	09 P.M. PST
APR. 20	08	08	8.7	46.23 N.	122.19 W.	1	3.9	...	3.6G	...	W	APR. 20	12 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
WASHINGTON--Continued													
APR. 20	10	25	25.2	46.22 N.	122.17 W.	2	4.1	...	4.0G	...	W	APR. 20	02 A.M. PST
APR. 20	11	59	31.1	46.21 N.	122.19 W.	3	4.1	...	3.6G	...	W	APR. 20	03 A.M. PST
APR. 20	13	29	24.3	46.21 N.	122.19 W.	3	3.8	...	3.5G	...	W	APR. 20	05 A.M. PST
APR. 20	17	53	34.1	46.21 N.	122.19 W.	3	3.7	...	3.3G	...	W	APR. 20	09 A.M. PST
APR. 20	19	19	33.0	46.22 N.	122.19 W.	5	4.8	3.9	4.8G	...	W	APR. 20	11 A.M. PST
APR. 20	20	12	19.5	46.21 N.	122.19 W.	4	4.2	...	3.5G	...	W	APR. 20	12 M. PST
APR. 20	22	03	48.7	46.22 N.	122.17 W.	3	4.1	...	4.0G	...	W	APR. 20	02 P.M. PST
APR. 21	03	23	33.8	46.22 N.	122.20 W.	3	4.1	...	3.5G	...	W	APR. 20	07 P.M. PST
APR. 21	05	17	52.4	46.22 N.	122.18 W.	2	4.4	...	3.7G	...	W	APR. 20	09 P.M. PST
APR. 21	15	13	55.5	46.11 N.	122.17 W.	10	4.5	...	4.5G	...	W	APR. 21	07 A.M. PST
APR. 21	19	52	8.8	46.22 N.	122.17 W.	4	...	...	4.0G	...	W	APR. 21	11 A.M. PST
APR. 21	20	33	59.5	46.22 N.	122.18 W.	2	...	...	3.5G	...	W	APR. 21	12 M. PST
APR. 22	06	11	55.8	46.22 N.	122.18 W.	5	...	...	3.8G	...	W	APR. 21	10 P.M. PST
APR. 22	10	25	5.6	46.22 N.	122.19 W.	3	4.2	...	3.9G	...	W	APR. 22	02 A.M. PST
APR. 22	19	28	18.8	46.22 N.	122.18 W.	4	4.6	...	4.6G	...	W	APR. 22	11 A.M. PST
APR. 22	22	04	10.9	46.22 N.	122.17 W.	5	4.1	...	...	...	W	APR. 22	02 P.M. PST
APR. 23	03	01	4.9	46.22 N.	122.19 W.	2	...	...	3.4G	...	W	APR. 22	07 P.M. PST
APR. 23	06	04	53.9	46.21 N.	122.18 W.	3	3.9	...	...	...	W	APR. 22	10 P.M. PST
APR. 23	06	44	41.7	46.21 N.	122.18 W.	1	...	...	3.3G	...	W	APR. 22	10 P.M. PST
APR. 23	08	42	42.9	46.21 N.	122.18 W.	2	...	...	3.2G	...	W	APR. 23	12 P.M. PST
APR. 23	12	28	39.3	46.21 N.	122.19 W.	2	...	...	3.3G	...	W	APR. 23	04 A.M. PST
APR. 23	12	30	53.1	46.26 N.	122.01 W.	5	4.5	...	4.7G	...	G	APR. 23	04 A.M. PST
APR. 23	13	08	15.4	46.22 N.	122.20 W.	2	...	...	3.4G	...	W	APR. 23	05 A.M. PST
APR. 23	15	18	1.1	46.22 N.	122.18 W.	4	4.2	...	4.2G	...	W	APR. 23	07 A.M. PST
APR. 23	15	31	2.9	46.20 N.	122.18 W.	4	...	...	3.5G	...	W	APR. 23	07 A.M. PST
APR. 23	23	06	50.5	46.20 N.	122.20 W.	4	...	...	3.4G	...	W	APR. 23	03 P.M. PST
APR. 24	01	41	5.3	46.21 N.	122.20 W.	1	...	...	3.5G	...	W	APR. 23	05 P.M. PST
APR. 24	04	21	41.2	46.21 N.	122.19 W.	3	3.6	...	3.4G	...	W	APR. 23	08 P.M. PST
APR. 24	09	50	9.5	46.22 N.	122.18 W.	4	4.0	...	3.9G	...	W	APR. 24	01 A.M. PST
APR. 24	10	50	42.8	46.22 N.	122.20 W.	3	...	...	3.4G	...	W	APR. 24	02 A.M. PST
APR. 24	13	32	7.7	46.20 N.	122.17 W.	5	...	...	3.5G	...	W	APR. 24	05 A.M. PST
APR. 24	15	31	37.9	46.21 N.	122.19 W.	3	...	...	3.5G	...	W	APR. 24	07 A.M. PST
APR. 24	17	34	10.4	46.22 N.	122.19 W.	4	4.7	3.8	4.8G	...	W	APR. 24	09 A.M. PST
APR. 24	19	00	42.2	46.21 N.	122.19 W.	3	...	...	3.4G	...	W	APR. 24	11 A.M. PST
APR. 24	23	07	53.7	46.22 N.	122.18 W.	4	...	...	3.7G	...	W	APR. 24	03 P.M. PST
APR. 25	00	27	57.7	46.21 N.	122.19 W.	3	...	...	3.6G	...	W	APR. 24	04 P.M. PST
APR. 25	04	55	31.9	46.21 N.	122.19 W.	3	...	...	3.3G	...	W	APR. 24	08 P.M. PST
APR. 25	11	00	21.8	46.21 N.	122.19 W.	3	3.9	...	3.6G	...	W	APR. 25	03 A.M. PST
APR. 25	11	03	43.6	46.22 N.	122.18 W.	3	...	...	3.5G	...	W	APR. 25	03 A.M. PST
APR. 25	23	20	27.9	46.26 N.	122.18 W.	5	5.0	...	...	...	G	APR. 25	03 P.M. PST
APR. 26	12	16	55.8	46.21 N.	122.18 W.	1	...	...	3.5G	...	W	APR. 26	04 A.M. PST
APR. 26	14	26	0.3	46.22 N.	122.18 W.	4	3.9	...	3.6G	...	W	APR. 26	06 A.M. PST
APR. 26	15	53	59.9	46.22 N.	122.18 W.	1	...	...	3.7G	...	W	APR. 26	07 A.M. PST
APR. 27	01	15	41.5	46.21 N.	122.18 W.	4	3.9	...	3.8G	...	W	APR. 26	05 P.M. PST
APR. 27	01	59	56.2	46.21 N.	122.18 W.	2	3.9	...	3.8G	...	W	APR. 26	05 P.M. PST
APR. 27	06	00	27.1	47.39 N.	122.56 W.	22	...	...	3.2G	IV	W	APR. 26	10 P.M. PST
APR. 27	07	15	17.1	46.20 N.	122.18 W.	7	3.8	...	3.5G	...	W	APR. 26	11 P.M. PST
APR. 27	07	26	21.3	46.22 N.	122.18 W.	4	4.5	...	4.6G	...	W	APR. 26	11 P.M. PST
APR. 27	12	34	37.6	46.22 N.	122.19 W.	1	4.0	...	3.6G	...	W	APR. 27	04 A.M. PST
APR. 27	14	48	20.3	46.22 N.	122.18 W.	4	...	...	3.9G	...	W	APR. 27	06 A.M. PST
APR. 27	17	04	39.4	46.21 N.	122.19 W.	2	...	...	3.5G	...	W	APR. 27	09 A.M. PST
APR. 27	20	54	19.8	46.21 N.	122.18 W.	2	4.1	...	3.5G	...	W	APR. 27	12 M. PST
APR. 27	23	40	47.6	46.21 N.	122.18 W.	4	...	...	3.4G	...	W	APR. 27	03 P.M. PST
APR. 28	03	49	33.5	46.22 N.	122.18 W.	4	4.4	...	4.6G	...	W	APR. 27	07 P.M. PST
APR. 28	05	15	54.1	46.22 N.	122.18 W.	2	4.0	...	3.9G	...	W	APR. 27	09 P.M. PST
APR. 28	12	30	54.8	46.21 N.	122.19 W.	1	3.7	...	3.6G	...	W	APR. 28	04 A.M. PST
APR. 28	12	38	41.9	46.22 N.	122.18 W.	2	4.0	...	3.8G	...	W	APR. 28	04 A.M. PST
APR. 28	15	09	7.7	46.21 N.	122.18 W.	3	...	...	3.5G	...	W	APR. 28	07 A.M. PST
APR. 28	17	07	11.9	46.23 N.	122.19 W.	1	...	...	3.3G	...	W	APR. 28	09 A.M. PST
APR. 28	23	52	35.6	46.21 N.	122.18 W.	3	...	...	3.6G	...	W	APR. 28	03 P.M. PST
APR. 29	03	37	36.4	46.22 N.	122.19 W.	4	4.0	...	3.4G	...	W	APR. 28	07 P.M. PST
APR. 29	04	24	30.2	46.22 N.	122.17 W.	2	4.7	3.6	4.6G	...	W	APR. 28	08 P.M. PST
APR. 29	06	20	50.7	46.23 N.	122.21 W.	2	4.2	...	3.6G	...	W	APR. 28	10 P.M. PST
APR. 29	06	22	38.9	46.23 N.	122.19 W.	2	4.7	...	4.5G	...	W	APR. 28	10 P.M. PST
APR. 29	08	59	23.6	46.20 N.	122.23 W.	5	...	...	3.4G	...	W	APR. 29	12 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
WASHINGTON--Continued													
APR. 29	12	41	36.4	46.22 N.	122.19 W.	5	4.3	...	4.1G	...	W	APR. 29	04 A.M. PST
APR. 29	12	46	8.1	46.22 N.	122.19 W.	2	...	...	3.6G	...	W	APR. 29	04 A.M. PST
APR. 29	17	46	6.0	46.22 N.	122.19 W.	2	...	...	3.6G	...	W	APR. 29	09 A.M. PST
APR. 30	00	34	10.6	46.21 N.	122.17 W.	1	4.2	...	3.7G	...	W	APR. 29	04 P.M. PST
APR. 30	05	09	2.7	46.22 N.	122.17 W.	3	4.8	3.8	4.7G	...	W	APR. 29	09 P.M. PST
APR. 30	07	42	9.2	46.22 N.	122.19 W.	4	4.1	...	4.2G	...	W	APR. 29	11 P.M. PST
APR. 30	07	54	59.1	46.22 N.	122.16 W.	2	4.1	...	3.6G	...	W	APR. 29	11 P.M. PST
APR. 30	20	50	38.6	46.21 N.	122.19 W.	3	3.9	...	3.6G	...	W	APR. 30	12 M. PST
MAY 1	04	46	15.6	46.22 N.	122.19 W.	3	4.3	...	4.2G	...	W	APR. 30	08 P.M. PST
MAY 1	04	53	5.4	46.23 N.	122.20 W.	2	4.0	...	3.4G	...	W	APR. 30	08 P.M. PST
MAY 1	06	18	32.3	46.21 N.	122.19 W.	3	4.2	...	3.7G	...	W	APR. 30	10 P.M. PST
MAY 1	10	59	3.4	46.19 N.	122.18 W.	3	3.7	...	3.6G	...	W	MAY 1	02 A.M. PST
MAY 1	12	46	12.3	46.21 N.	122.18 W.	3	...	...	3.2G	...	W	MAY 1	04 A.M. PST
MAY 1	19	27	15.7	46.21 N.	122.18 W.	1	4.3	...	4.3G	...	W	MAY 1	11 A.M. PST
MAY 1	21	31	9.7	46.22 N.	122.16 W.	1	3.7	...	3.7G	...	W	MAY 1	01 P.M. PST
MAY 1	23	01	10.8	46.22 N.	122.18 W.	2	...	...	3.3G	...	W	MAY 1	03 P.M. PST
MAY 2	00	57	9.4	46.23 N.	122.20 W.	1	...	...	3.3G	...	W	MAY 1	04 P.M. PST
MAY 2	05	12	19.0	46.22 N.	122.17 W.	2	4.3	...	4.0G	...	W	MAY 1	09 P.M. PST
MAY 2	08	36	31.6	46.21 N.	122.20 W.	2	4.0	...	3.6G	...	W	MAY 2	12 P.M. PST
MAY 2	09	52	25.4	46.21 N.	122.19 W.	3	...	...	3.4G	...	W	MAY 2	01 A.M. PST
MAY 2	12	52	17.5	46.19 N.	122.15 W.	10	...	...	3.8G	...	W	MAY 2	04 A.M. PST
MAY 2	13	02	29.6	46.23 N.	122.20 W.	1	4.6	3.6	4.5G	...	W	MAY 2	05 A.M. PST
MAY 2	18	59	47.4	46.21 N.	122.19 W.	3	...	...	3.4G	...	W	MAY 2	10 A.M. PST
MAY 3	05	00	46.0	46.21 N.	122.18 W.	10	4.4	4.2	4.5G	...	W	MAY 2	09 P.M. PST
MAY 3	05	05	30.5	46.23 N.	122.19 W.	2	4.5	...	4.1G	...	W	MAY 2	09 P.M. PST
MAY 3	06	47	50.8	46.21 N.	122.19 W.	3	...	...	3.6G	...	W	MAY 2	10 P.M. PST
MAY 3	13	12	13.7	46.43 N.	121.94 W.	1	4.1	...	3.9G	...	G	MAY 3	05 A.M. PST
MAY 3	15	40	57.2	46.22 N.	122.20 W.	2	3.8	...	3.8G	...	W	MAY 3	07 A.M. PST
MAY 3	20	45	38.0	46.21 N.	122.17 W.	1	...	...	3.7G	...	W	MAY 3	12 M. PST
MAY 4	07	47	28.9	46.22 N.	122.19 W.	1	...	...	3.6G	...	W	MAY 3	11 P.M. PST
MAY 4	11	58	27.4	46.23 N.	122.18 W.	2	4.6	4.0	4.6G	...	W	MAY 4	03 A.M. PST
MAY 4	17	34	30.7	46.22 N.	122.19 W.	1	...	...	3.4G	...	W	MAY 4	09 A.M. PST
MAY 4	21	39	22.1	46.21 N.	122.19 W.	2	4.2	...	3.5G	...	W	MAY 4	01 P.M. PST
MAY 5	01	53	30.5	46.22 N.	122.20 W.	1	4.0	...	3.7G	...	W	MAY 4	05 P.M. PST
MAY 5	04	44	32.2	46.21 N.	122.18 W.	2	...	...	3.4G	...	W	MAY 4	08 P.M. PST
MAY 5	05	43	4.1	46.22 N.	122.17 W.	3	4.6	3.7	4.6G	...	W	MAY 4	09 P.M. PST
MAY 5	07	27	30.6	46.21 N.	122.16 W.	1	...	...	3.6G	...	W	MAY 4	11 P.M. PST
MAY 5	09	12	54.4	46.22 N.	122.17 W.	2	4.4	...	4.0G	...	W	MAY 5	01 A.M. PST
MAY 5	09	22	15.9	46.21 N.	122.20 W.	11	3.8	...	3.4G	...	W	MAY 5	01 A.M. PST
MAY 5	10	44	57.8	46.22 N.	122.17 W.	1	...	...	3.3G	...	W	MAY 5	02 A.M. PST
MAY 5	13	19	8.3	46.22 N.	122.19 W.	6	...	...	3.6G	...	W	MAY 5	05 A.M. PST
MAY 5	16	13	51.9	46.21 N.	122.18 W.	1	4.4	...	3.5G	...	W	MAY 5	08 A.M. PST
MAY 6	00	03	31.6	46.22 N.	122.17 W.	4	...	...	4.0G	...	W	MAY 5	04 P.M. PST
MAY 6	08	15	1.8	46.22 N.	122.19 W.	1	4.2	...	3.8G	...	W	MAY 6	12 P.M. PST
MAY 6	08	28	49.2	47.38 N.	122.55 W.	20	...	...	3.0W	...	W	MAY 6	12 P.M. PST
MAY 6	15	30	44.8	46.38 N.	121.90 W.	1	4.0	...	3.7G	...	G	MAY 6	07 A.M. PST
MAY 6	17	04	50.9	46.36 N.	122.08 W.	1	4.7	4.2	4.7G	...	G	MAY 6	09 A.M. PST
MAY 6	19	22	28.4	46.22 N.	122.17 W.	3	4.6	...	4.2G	...	W	MAY 6	11 A.M. PST
MAY 7	03	44	42.8	46.21 N.	122.19 W.	2	3.9	...	3.7G	...	W	MAY 6	07 P.M. PST
MAY 7	08	52	33.1	46.22 N.	122.17 W.	1	4.0	...	3.6G	...	W	MAY 7	12 P.M. PST
MAY 7	11	09	18.0	46.22 N.	122.19 W.	1	4.7	...	4.6G	...	W	MAY 7	03 A.M. PST
MAY 8	01	19	59.0	46.21 N.	122.18 W.	1	4.0	...	3.6G	...	W	MAY 7	05 P.M. PST
MAY 8	07	46	49.1	46.06 N.	121.94 W.	10	3.9	...	3.8G	...	W	MAY 7	11 P.M. PST
MAY 8	07	48	46.1	46.23 N.	122.17 W.	1	5.0	4.0	4.7G	...	W	MAY 7	11 P.M. PST
MAY 8	08	47	55.4	46.22 N.	122.20 W.	1	...	...	3.6G	...	W	MAY 8	12 P.M. PST
MAY 8	09	03	40.0	46.22 N.	122.17 W.	2	4.2	...	4.3G	...	W	MAY 8	01 A.M. PST
MAY 8	10	05	38.4	46.23 N.	122.20 W.	4	4.2	...	3.7G	...	W	MAY 8	02 A.M. PST
MAY 8	15	31	48.9	46.22 N.	122.19 W.	1	...	...	3.6G	...	W	MAY 8	07 A.M. PST
MAY 8	19	27	30.0	46.22 N.	122.18 W.	1	3.8	...	3.6G	...	W	MAY 8	11 A.M. PST
MAY 9	00	55	2.4	46.21 N.	122.19 W.	1	4.2	...	3.5G	...	W	MAY 8	04 P.M. PST
MAY 9	04	31	58.1	46.21 N.	122.18 W.	1	...	...	3.5G	...	W	MAY 8	08 P.M. PST
MAY 9	07	01	1.3	46.22 N.	122.17 W.	2	4.8	...	4.6G	...	W	MAY 8	11 P.M. PST
MAY 9	08	32	30.5	46.22 N.	122.19 W.	1	...	...	3.3G	...	W	MAY 9	12 P.M. PST
MAY 9	14	10	37.3	46.22 N.	122.17 W.	1	3.8	...	3.7G	...	W	MAY 9	06 A.M. PST
MAY 9	18	06	26.5	46.22 N.	122.17 W.	2	4.4	3.7	4.6G	...	W	MAY 9	10 A.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
WASHINGTON--Continued													
MAY 9	21	29	35.8	46.21 N.	122.18 W.	1	...	...	3.6G	...	W	MAY 9	01 P.M. PST
MAY 10	01	14	10.7	46.22 N.	122.18 W.	1	...	...	3.6G	...	W	MAY 9	05 P.M. PST
MAY 10	05	50	4.0	46.22 N.	122.19 W.	1	4.2	...	3.7G	...	W	MAY 9	09 P.M. PST
MAY 10	09	25	56.1	46.22 N.	122.19 W.	4	3.9	...	3.8G	...	W	MAY 10	01 A.M. PST
MAY 10	11	15	54.9	46.22 N.	122.18 W.	1	4.1	...	3.5G	...	W	MAY 10	03 A.M. PST
MAY 10	12	31	51.0	46.35 N.	122.03 W.	10	4.4	...	4.0G	...	G	MAY 10	04 A.M. PST
MAY 10	17	35	20.6	46.22 N.	122.19 W.	3	...	...	4.0G	...	W	MAY 10	09 A.M. PST
MAY 11	01	19	29.5	46.21 N.	122.20 W.	4	...	...	3.7G	...	W	MAY 10	05 P.M. PST
MAY 11	04	00	18.1	46.22 N.	122.17 W.	1	4.7	...	4.5G	...	W	MAY 10	08 P.M. PST
MAY 11	08	09	48.4	46.22 N.	122.18 W.	2	4.0	...	3.6G	...	W	MAY 11	12 P.M. PST
MAY 11	08	15	42.1	46.19 N.	122.20 W.	12	4.0	...	3.5G	...	W	MAY 11	12 P.M. PST
MAY 11	13	29	54.0	46.22 N.	122.18 W.	1	4.2	...	4.1G	...	W	MAY 11	05 A.M. PST
MAY 11	15	00	52.2	46.21 N.	122.17 W.	1	...	...	3.6G	...	W	MAY 11	07 A.M. PST
MAY 11	22	46	24.5	46.21 N.	122.19 W.	2	3.8	...	4.0G	...	W	MAY 11	02 P.M. PST
MAY 12	05	24	36.2	46.21 N.	122.18 W.	2	3.6	...	3.5G	...	W	MAY 11	09 P.M. PST
MAY 12	12	11	25.4	46.21 N.	122.19 W.	1	...	...	3.5G	...	W	MAY 12	04 A.M. PST
MAY 12	16	26	29.7	46.22 N.	122.18 W.	2	4.8	4.4	4.9G	...	W	MAY 12	08 A.M. PST
MAY 12	16	46	50.3	46.22 N.	122.18 W.	2	...	...	3.7G	...	W	MAY 12	08 A.M. PST
MAY 12	17	24	11.9	46.22 N.	122.18 W.	1	...	...	3.6G	...	W	MAY 12	09 A.M. PST
MAY 12	20	33	40.7	46.25 N.	122.31 W.	10	4.4	...	4.6G	...	W	MAY 12	12 M. PST
MAY 13	01	30	53.4	46.31 N.	121.89 W.	5	...	...	4.0G	...	G	MAY 12	05 P.M. PST
MAY 13	08	59	55.6	46.21 N.	122.16 W.	1	4.0	...	3.6G	...	W	MAY 13	12 P.M. PST
MAY 13	11	12	12.9	46.20 N.	122.22 W.	8	4.0	...	3.7G	...	W	MAY 13	03 A.M. PST
MAY 14	02	18	57.8	46.22 N.	122.17 W.	2	4.6	...	4.5G	...	W	MAY 13	06 P.M. PST
MAY 14	05	00	49.3	46.22 N.	122.19 W.	1	4.2	...	3.5G	...	W	MAY 13	09 P.M. PST
MAY 14	09	43	51.8	46.22 N.	122.18 W.	2	4.0	...	3.7G	...	W	MAY 14	01 A.M. PST
MAY 14	14	08	16.4	46.22 N.	122.17 W.	2	...	...	3.9G	...	W	MAY 14	06 A.M. PST
MAY 14	18	48	2.2	46.21 N.	122.18 W.	1	...	...	3.6G	...	W	MAY 14	10 A.M. PST
MAY 15	06	48	24.7	46.21 N.	122.19 W.	2	4.0	...	3.6G	...	W	MAY 14	10 P.M. PST
MAY 15	09	13	0.1	46.22 N.	122.17 W.	1	...	...	3.8G	...	W	MAY 15	01 A.M. PST
MAY 15	11	41	34.6	46.21 N.	122.19 W.	2	4.9	3.6	4.6G	...	W	MAY 15	03 A.M. PST
MAY 15	17	29	16.8	46.21 N.	122.17 W.	1	...	...	3.6G	...	W	MAY 15	09 A.M. PST
MAY 16	03	31	4.7	46.22 N.	122.18 W.	1	4.4	...	3.7G	...	W	MAY 15	07 P.M. PST
MAY 16	07	30	25.9	46.23 N.	122.20 W.	1	...	...	3.4G	...	W	MAY 15	11 P.M. PST
MAY 16	11	15	13.9	46.21 N.	122.17 W.	1	...	...	3.5G	...	W	MAY 16	03 A.M. PST
MAY 16	12	34	54.1	46.22 N.	122.17 W.	2	4.6	3.7	4.7G	...	W	MAY 16	04 A.M. PST
MAY 16	13	27	13.5	46.21 N.	122.18 W.	3	4.3	...	3.9G	...	W	MAY 16	05 A.M. PST
MAY 16	14	22	0.3	46.22 N.	122.18 W.	2	4.2	...	4.0G	...	W	MAY 16	06 A.M. PST
MAY 16	16	17	44.5	46.21 N.	122.19 W.	2	3.9	...	3.8G	...	W	MAY 16	08 A.M. PST
MAY 17	08	05	52.6	46.21 N.	122.19 W.	1	3.6	...	3.6G	...	W	MAY 17	12 P.M. PST
MAY 17	08	31	53.0	46.20 N.	122.20 W.	4	4.2	...	3.9G	...	W	MAY 17	12 P.M. PST
MAY 17	19	27	53.4	46.20 N.	122.17 W.	5	3.8	...	3.6G	...	W	MAY 17	11 A.M. PST
MAY 17	21	42	7.4	46.21 N.	122.17 W.	4	4.2	3.7	3.9G	...	W	MAY 17	01 P.M. PST
MAY 18	01	50	52.1	46.21 N.	122.19 W.	4	3.8	...	3.7G	...	W	MAY 17	05 P.M. PST
MAY 18	06	20	36.1	46.21 N.	122.18 W.	5	3.9	...	3.7G	...	W	MAY 17	10 P.M. PST
MAY 18	14	36	10.6	46.21 N.	122.18 W.	5	4.0	...	3.6G	...	W	MAY 18	06 A.M. PST
MAY 18	15	32	11.4	46.21 N.	122.19 W.	4	4.7	5.2	5.0G	IV	W	MAY 18	07 A.M. PST
MAY 19	00	51	33.2	46.22 N.	122.22 W.	8	...	...	3.2W	...	W	MAY 18	04 P.M. PST
MAY 19	00	53	03.2	46.22 N.	122.22 W.	13	...	...	3.3W	...	W	MAY 18	04 P.M. PST
MAY 19	00	57	59.6	46.22 N.	122.20 W.	14	...	...	3.4W	...	W	MAY 18	04 P.M. PST
MAY 19	01	31	58.7	46.21 N.	122.21 W.	10	...	...	3.4W	...	W	MAY 18	05 P.M. PST
MAY 19	07	18	00.0	46.22 N.	122.20 W.	15	...	...	3.7W	...	W	MAY 18	11 P.M. PST
MAY 19	07	18	50.4	46.20 N.	122.20 W.	19	4.2	...	3.8G	...	W	MAY 18	11 P.M. PST
MAY 19	07	39	32.1	46.21 N.	122.22 W.	10	...	...	3.0W	...	W	MAY 18	11 P.M. PST
MAY 19	14	21	57.1	46.22 N.	122.21 W.	15	...	...	3.7G	...	W	MAY 19	06 A.M. PST
MAY 21	16	02	31.9	46.19 N.	122.20 W.	16	...	...	3.3G	...	W	MAY 21	08 A.M. PST
MAY 21	22	24	54.8	46.18 N.	122.13 W.	0	...	...	3.2W	...	W	MAY 21	02 P.M. PST
MAY 24	23	01	23.8	46.33 N.	122.22 W.	4	...	...	3.8G	...	W	MAY 24	03 P.M. PST
MAY 28	14	15	32.0	46.34 N.	122.22 W.	3	...	...	3.8G	FELT	W	MAY 28	06 A.M. PST
MAY 28	14	18	30.2	46.34 N.	122.22 W.	2	...	...	3.6G	FELT	W	MAY 28	06 A.M. PST
JUNE 8	22	40	10.3	47.98 N.	123.01 W.	48	...	...	3.5G	IV	W	JUNE 8	02 P.M. PST
JUNE 18	11	41	29.7	48.56 N.	119.63 W.	0	...	...	3.0W	...	W	JUNE 18	03 A.M. PST
JUNE 23	16	05	15.7	47.54 N.	122.26 W.	3	...	...	3.1G	V	W	JUNE 23	08 A.M. PST
JUNE 23	16	09	54.3	47.54 N.	122.26 W.	3	...	...	3.0G	FELT	W	JUNE 23	08 A.M. PST
JULY 7	01	17	09.8	45.36 N.	121.78 W.	11	...	...	3.2W	...	W	JULY 6	05 P.M. PST

Table 1.--*Summary of U.S. earthquakes for 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
WASHINGTON--Continued													
JULY 7	01	35	02.9	46.08 N.	122.11 W.	4	...	...	2.8W	...	W	JULY 6	05 P.M. PST
JULY 7	01	36	54.2	46.08 N.	122.10 W.	7	...	...	2.9W	...	W	JULY 6	05 P.M. PST
JULY 7	01	45	34.8	46.08 N.	122.14 W.	0	...	...	3.1W	...	W	JULY 6	05 P.M. PST
JULY 20	02	03	24.8	46.10 N.	122.12 W.	3	...	...	3.2W	...	W	JULY 19	06 P.M. PST
JULY 20	14	22	33.0	46.17 N.	122.12 W.	9	...	...	3.2W	...	W	JULY 20	04 A.M. PST
JULY 20	17	42	09.9	46.09 N.	122.11 W.	3	...	...	2.9W	...	W	JULY 20	09 A.M. PST
AUG. 22	18	19	52.5	48.21 N.	121.69 W.	11	...	...	3.0W	...	W	AUG. 22	10 A.M. PST
SEPT. 6	11	18	33.0	47.53 N.	123.36 W.	46	...	...	2.8W	...	W	SEPT. 6	03 A.M. PST
SEPT. 19	22	53	15.7	47.91 N.	121.87 W.	6	...	...	3.8G	V	G	SEPT. 19	02 P.M. PST
SEPT. 21	17	45	12.4	47.91 N.	121.86 W.	5	...	...	3.4G	FELT	G	SEPT. 21	09 A.M. PST
SEPT. 29	03	53	52.9	47.76 N.	120.24 W.	0	...	...	2.6W	...	W	SEPT. 28	07 P.M. PST
SEPT. 30	16	32	13.8	47.75 N.	122.06 W.	14	...	...	2.8G	FELT	W	SEPT. 30	08 A.M. PST
OCT. 8	10	55	50.4	48.44 N.	123.05 W.	20	...	...	3.0W	...	W	OCT. 8	02 A.M. PST
OCT. 16	20	57	20.1	48.93 N.	121.89 W.	8	...	...	2.4W	...	W	OCT. 16	12 M. PST
OCT. 19	06	23	46.6	46.59 N.	121.86 W.	0	...	...	3.0W	...	W	OCT. 18	10 P.M. PST
NOV. 6	13	37	52.2	47.88 N.	123.14 W.	45	...	...	2.9W	...	W	NOV. 6	05 A.M. PST
NOV. 19	21	35	23.8	46.95 N.	119.48 W.	0	...	...	3.3W	...	W	NOV. 19	01 P.M. PST
WASHINGTON--OFF THE COAST													
DEC. 21	01	55	17.2	47.81 N.	128.74 W.	15	4.8	4.3	...	...	G	DEC. 20	05 P.M. PST
DEC. 21	05	53	44.9	47.62 N.	127.99 W.	15	4.3	...	...	...	G	DEC. 20	09 P.M. PST
DEC. 21	12	13	12.0	47.72 N.	128.59 W.	15	4.6	3.8	...	...	G	DEC. 21	04 A.M. PST
DEC. 21	14	32	15.5	47.71 N.	128.29 W.	15	4.0	...	...	...	G	DEC. 21	06 A.M. PST
DEC. 21	22	46	34.0	47.78 N.	128.74 W.	15	4.6	...	...	...	G	DEC. 21	02 P.M. PST
WYOMING													
FEB. 20	12	07	23.5	44.84 N.	110.89 W.	1	...	...	...	...	G	FEB. 20	05 A.M. MST
FEB. 20	12	07	52.8	44.80 N.	110.92 W.	1	...	...	3.3G	IV	G	FEB. 20	05 A.M. MST
FEB. 22	10	18	27.7	44.81 N.	110.90 W.	1	4.5	...	4.7G	IV	G	FEB. 22	03 A.M. MST
FEB. 27	06	05	49.5	44.76 N.	111.04 W.	5	...	...	3.4G	IV	G	FEB. 26	11 P.M. MST
AUG. 9	04	50	38.9	44.44 N.	110.54 W.	2	...	...	...	IV	G	AUG. 8	09 P.M. MST
AUG. 9	04	52	04.4	44.43 N.	110.54 W.	3	...	...	...	IV	G	AUG. 8	09 P.M. MST
AUG. 9	05	18	28.5	44.44 N.	110.54 W.	2	...	...	...	IV	G	AUG. 8	10 P.M. MST
SEPT. 12	22	33	55.4	41.18 N.	105.12 W.	0	...	...	3.2G	FELT	G	SEPT. 12	03 P.M. MST
OCT. 18	21	45	53.4	44.65 N.	110.52 W.	3	...	...	2.7G	III	G	OCT. 18	02 P.M. MST
OCT. 18	21	57	08.7	44.64 N.	110.52 W.	1	...	...	2.7G	III	G	OCT. 18	02 P.M. MST
NOV. 14	21	08	10.4	44.59 N.	111.04 W.	11	...	...	3.2G	III	G	NOV. 14	02 P.M. MST

Network Operations

ALASKA EARTHQUAKES, 1980

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In 1980, 404 Alaskan earthquakes were reported by the National Earthquake Information Service (NEIS) in their Preliminary Determination of Epicenters Reports and in the follow-up Earthquake Data Reports. An additional 4,000 or so smaller events were located by the University of Alaska's Geophysical Institue (UAGI).

It is instructive to examine how UAGI seismographic nets contribute to the preparation of these reports, as it is a remarkable example of cooperation between agencies.

For a number of years, most of the telemetered data collected by the U.S. Geological Survey (USGS) in Alaska and by the National Oceanic and Atmospheric Administration (NOAA) net have been recorded at NOAA's central recording facility at Palmer. This facility is known as the Alaska Tsunami Warning Center (ATWC). In addition, ATWC also records the signals from some stations operated and maintained by UAGI.

In fact, the system of communication is so interwoven that it is possible, using either ATWC or UAGI as a switchboard, for any agency to record the other's signals. This is often done.

Pertaining to UAGI's contribution, in cooperation with the Palmer Observatory (ATWC), communiques are routed as a matter of course between the two groups, requesting the other's readings for selected events. In the end, readings from UAGI stations that Palmer does not directly record are furnished to NEIS over established communication links between Palmer and Colorado. This arrangement results in maximum cost-effectiveness between all agencies.

The primary changes effected in deployment of UAGI stations during 1980 were the additions of stations to the western net around Seward Peninsula, and in the Bristol Bay area of southwest Alaska (fig. 30). Recording is now being performed at three sites--the primary installation in Fairbanks, and secondary locations at Nome on the Seward Peninsula and at Homer on the Kenai Peninsula. Work on event detection, digital data collection, and a call-in capability for data dump from the secondary sites is in progress. In 1980, about 60 stations were in operation statewide.

Unfortunately, 1980 will probably mark a high-water level for the number of UAGI stations that will be operated in the near future. The present stringent federal and state funding restrictions dictate a downgrading with little hope for immediate recovery.

NORTHERN AND CENTRAL CALIFORNIA EARTHQUAKES, 1980

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The Seismographic Stations operated a network of 19 stations during 1980. Two instruments, a broadband vertical seismograph located at Jamestown (JAS) and low-gain torsion (EW-NS) seismographs located at Berkeley (BRK), are of particular interest. The displacement signal from the vertical-component broadband seismograph at JAS (T = 40 sec) is telemetered to Berkeley and recorded on magnetic tape with a full scale sensitivity of 2 mm. The BRK torsion seismographs are recorded photographically with a magnification of 100 (T = 0.8 sec). As an example of the usefulness of such seismographs, the seismogram for the major Trinity Head earthquake (ML = 7.0) is shown in figure 31 (see also below). The maximum trace amplitude on the NS component corresponds to a ground amplitude of approximately 3.5 cm with a period of 13 seconds. This is the largest ground motion that has been recorded at Berkeley since the low-gain torsion seismographs were installed in January 1968; all other instruments in the Berkeley network (except strong motion accelerometers) went off-scale.

During 1980, about 7,960 occurrences of seismic events were catalogued on summary sheets and 1,150 teleseisms and 1,290 local earthquakes were analyzed. The Bulletin of the Seismographic Stations, Volume 50, No. 1 (Ferguson and others, 1980), contains location and magnitude information for 76 earthquakes ($3.0 \leq ML \leq 5.8$) located in northern and central California and adjoining regions and for 221 earthquakes ($3.5 \leq ML \leq 6.2$) located in the Mammoth Lakes area during the first 6 months of 1980 (see below). The epicentral locations are plotted in figure 32. (The numbers correspond to a list in the Bulletin.)

As part of our seismicity monitoring program (earthquake prediction), the cumulative

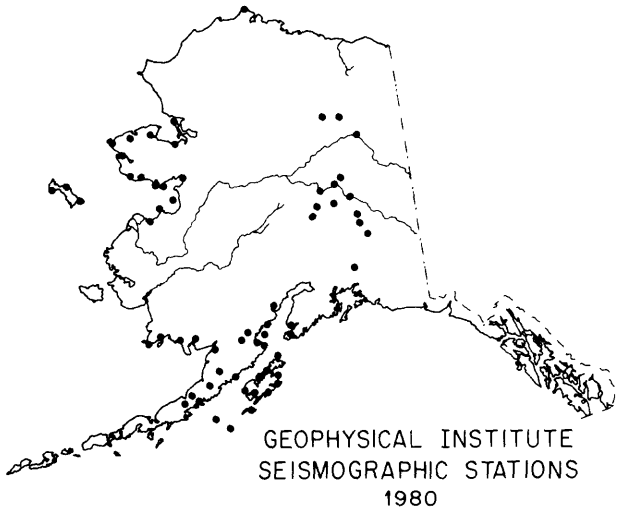

FIGURE 30.--Alaska Geophysical Institute seismographic networks, 1980.

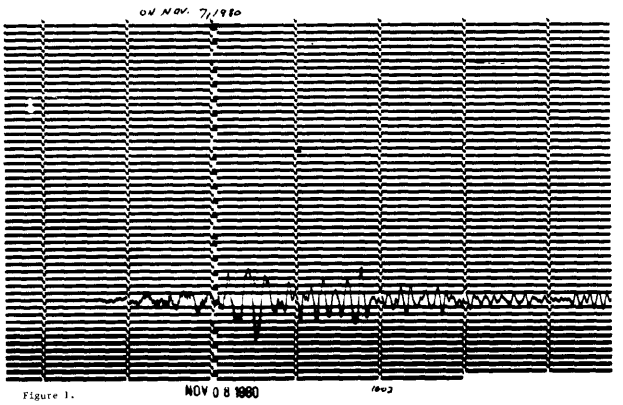

FIGURE 31.--Seismogram for the Trinity Head, California, earthquake of 8 November 1980.

number of earthquakes versus local Richter magnitude (ML) was computed. The data set consists of 895 earthquakes ($3.0 \leq ML \leq 5.9$) listed in the Bulletin in a 280,000 sq km region in northern and central California during the decade of January 1, 1967 to December 31, 1976. The region is bounded on the north and east by the California border, on the southeast by a dotted line in figure 32, on the southwest by a line connecting 35°N-121°W and 39°N-125°W, and on the west by 125°W longitude. The earthquakes were grouped into 20 consecutive 6-month intervals for analysis and the average cumulative number of earthquakes N (total number with a magnitude $\geq$ ML) in a 6-month interval is given by

$$\log N = 4.412 - 0.912\ ML$$

(valid for $3.0 \leq ML \leq 5.9$).

There was no indication that the rate of seismicity for the first 6 months of 1980 was significantly different from the average semiannual rate of seismicity over the past decade. The interesting and unusual Mammoth Lakes sequence, discussed below, is outside of the region used for computing the rate of seismicity.

Three significant earthquake sequences, near Livermore, Mammoth Lakes, and Trinity Head, occurred in the region during 1980. In the first sequence, 61 earthquakes ($2.5 \leq ML \leq 5.8$) occurred along the Greenville fault during the period of January 24-June 30, 1980. The first principal earthquake on January 24 at 1900 UTC (ML = 5.8), caused considerable damage in the Livermore area, injured 50 people (none seriously) and was felt throughout the San Francisco Bay area and much of northern and central California and western Nevada. The mainshock was

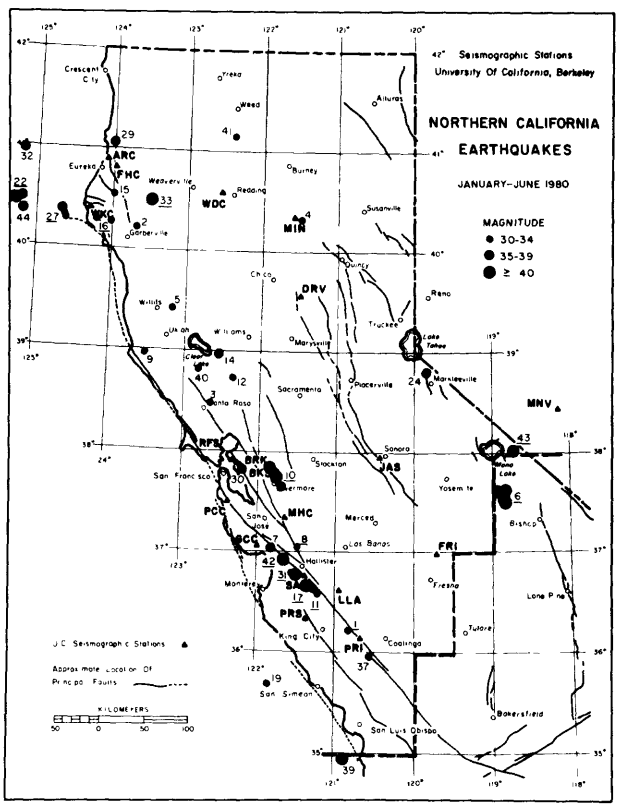

FIGURE 32.--Northern and central California earthquakes during 1980.

preceded by a single foreshock at 1858 UTC on January 24 (ML = 2.7) and was immediately succeeded by three aftershocks (ML = 5.1, 4.0, and 4.8) within 3 minutes. A second principal earthquake occurred on January 27 at 0233 UTC (ML = 5.4) and caused some minor additional damage, particularly to the northwest.

On May 25, 1980, at 1633 UTC, a large earthquake (ML = 6.1) occurred in the vicinity of Mammoth Lakes, California (37.6° N., 118.8° W.). By August 1, 1980, a sequence of approximately 600 earthquakes of magnitude 3.0 or larger had occurred in the region. For comparison, 95 earthquakes are recorded on the average each year in northern and central California and vicinity. The four largest earthquakes in the sequence were assigned local magnitudes of 6.1, 6.0, 6.1, and 6.2. Their corresponding seismic moments, 5.1, 3.7, 3.0, and 5.0 (x10 dyne-cm), respectively, were estimated from broadband displacement seismograms recorded at Jamestown (approximately 150 km west of the epicenters).

A major earthquake occurred on November 8, 1980 at 1027 UTC (ML = 7.0), off the coast of northern California in the vicinity of Trinity Head (41° N. by 125° W.) approximately 450 km northwest of San Francisco. This is the largest earthquake that has occurred in the region in the past 57 years since the ML 7.2 earthquake of January 22, 1923 (40.5° N., 124.5° W.).

SOUTHERN CALIFORNIA EARTHQUAKES, 1980

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During 1980, 4867 local earthquakes were located by the Southern California Seismographic Network, which is jointly operated by the California Institute of Technology and the U.S. Geological Survey. Figure 33 shows the distribution of these events on a map, with the major faults indicated. Caltech maintains an earthquake catalogue complete above magnitude 3.0 in the area enclosed by the box in this figure, although many smaller aftershocks are also located and plotted.

One-hundred-twenty-four of the year's earthquakes were 4.0 and greater in magnitude. The major sequences were as follows:

1. A ML = 5.5 main shock, followed by aftershocks, in the San Jacinto fault zone on February 25. The site of the earthquake was a relatively active spot just southeast of the so-called "Anza Gap" (fig. 34). The epicentral area was remarkably quiet for 65 days prior to the ML 5.5 shock.

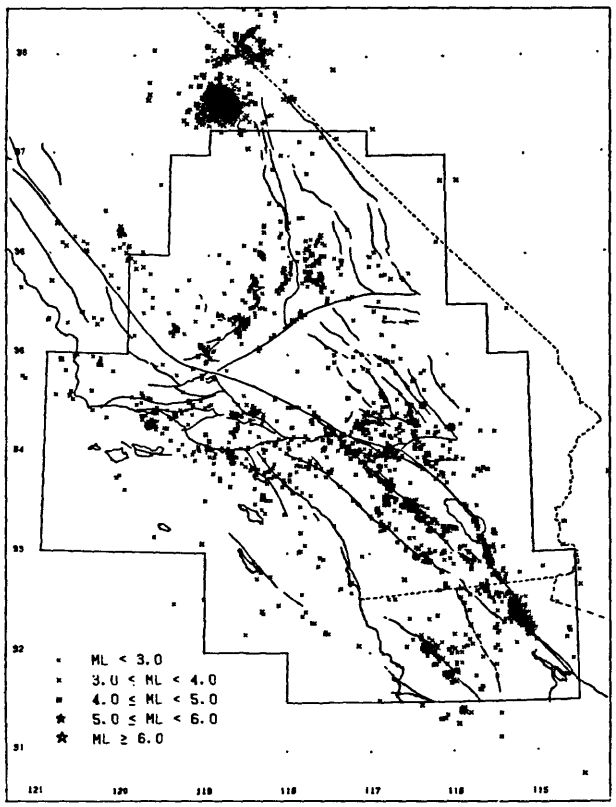

FIGURE 33.--Earthquakes located and cataloged by the Southern California Network during 1980.

2. A very prolific sequence in the Mammoth Lakes area in northern Owens Valley, beginning on May 25 and including 3 events near or above ML = 6.0. This sequence was preceded for a number of months by swarm-like bursts of activity. In the months following, further activity was observed to the northeast, in the Huntoon Valley region.

3. A ML = 6.1 main shock, followed by aftershocks, on June 9 along the Cerro Prieto fault zone in northern Baja California (fig. 35). Damage in the epicentral area and surface faulting were reported.

1980 is considered a very active year by California standards; the average number of events of ML 4.0 and greater in the area covered is roughly 48.

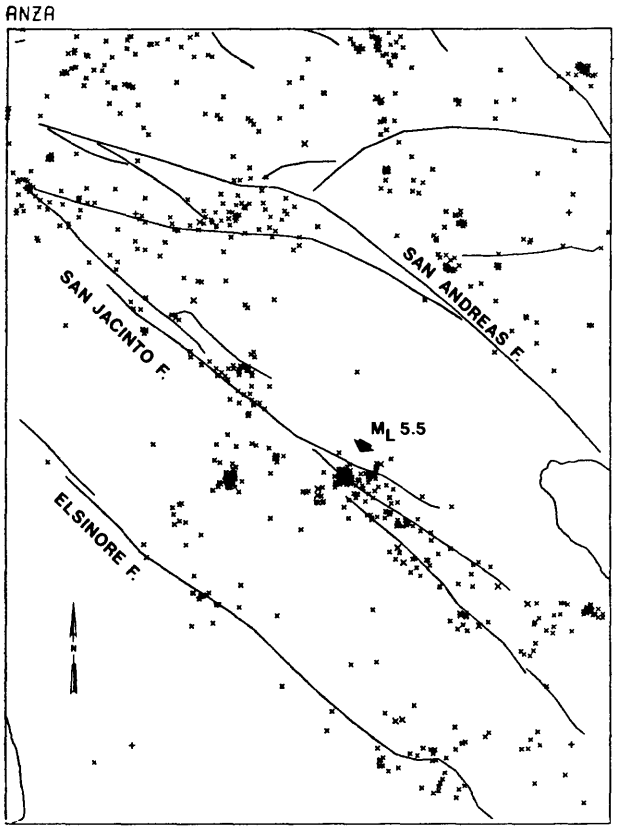

FIGURE 34.--Seismicity in the vicinity of the February 25 shock during 1980. The ML 5.5 main shock is the star located in the cluster of events southeast of the center of the map. The quiescent zone just to the northwest is often referred to as the "Anza Gap."

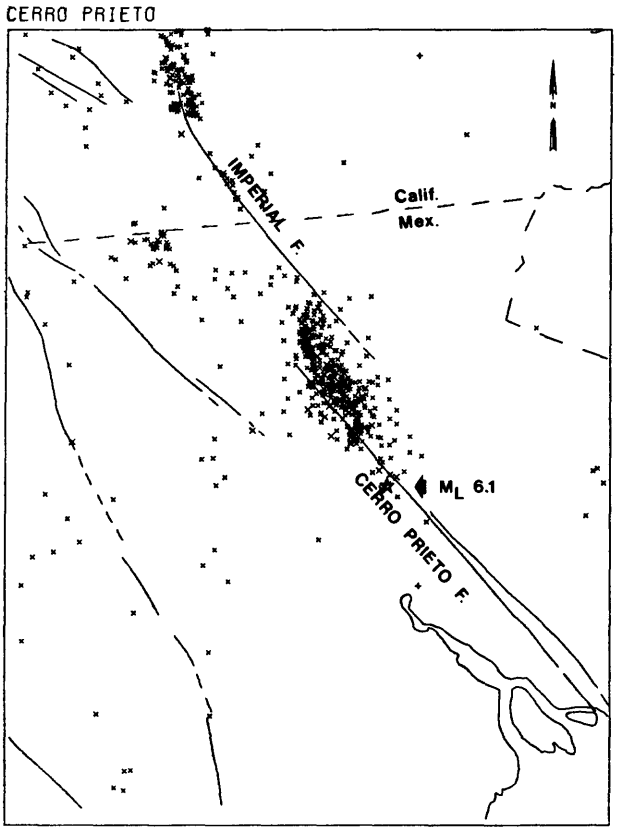

FIGURE 35.--Seismicity in the vicinity of the Imperial and Cerro Prieto faults in 1980.

HAWAII EARTHQUAKES, 1980

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The emphasis in 1980 by the Hawaiian Volcano Observatory (HVO) in both station coverage and detailed data analysis was on the highly active south side of the island of Hawaii. Hundreds of earthquakes too small to locate were counted daily, and the set of located earthquakes in the Kilauea region is nearly complete above magnitude about 2.0. Many smaller events were also located. Substantial effort was made to locate earthquakes elsewhere on the island and within about 150 km of the island. Such coverage cannot be as complete as on the Kilauea Volcano, but all events above magnitude 3.0 to 3.5 were located. Over 3850 earthquakes were located by HVO during 1980.

The Hawaiian Volcano Observatory has installed and maintains an extensive telemetering seismometer network on the island of Hawaii (fig. 36). In December 1980 the seismometer network consisted of 46 stations spread over an area with a diameter of 125 km on the island of Hawaii. Of these 46 stations, 2 are low-gain multicomponent stations (optical), 8 are 3-component, and 36 are vertical only. The coverage is most complete on and around the main center of seismic and volcanic activity, Kilauea Volcano. Other stations in the network are part of a larger net located on other volcanoes of the island of Hawaii. With the exception of the station at Hilo, all seismometer signals from the short-period network are telemetered to the observatory for recording. The telemetered stations are recorded on analog magnetic tape. The earthquakes to be located are digitized from analog tape on an Eclipse computer in a semi-automatic procedure. Seismograms are timed and events located and plotted interactively on computer, resulting in final earthquake locations within two days after the events occur.

In addition, optical seismographs are maintained at Uwekahuna (HVO), Hilo, Maui, and on Oahu (Kipapa station operated by the Pacific

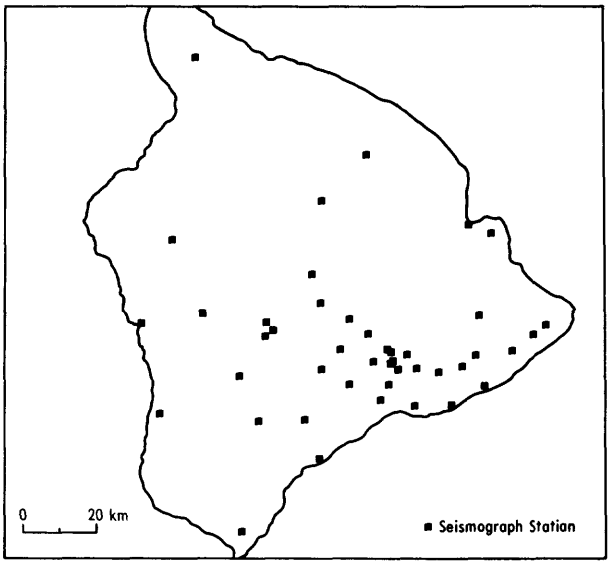

FIGURE 36.--Seismometer network on the island of Hawaii.

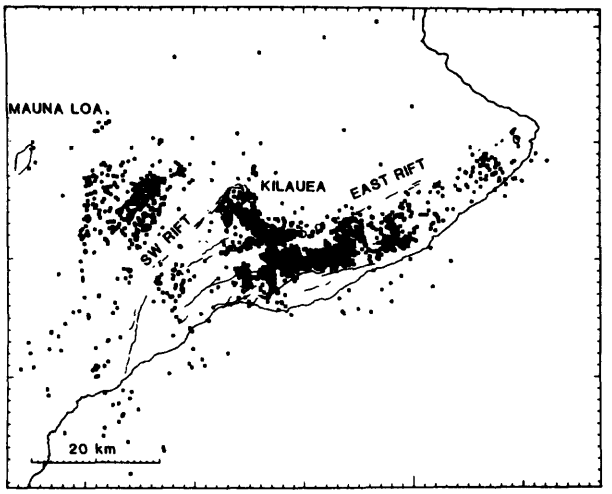

FIGURE 37.--Earthquakes near Kilauea Volcano located during 1980.

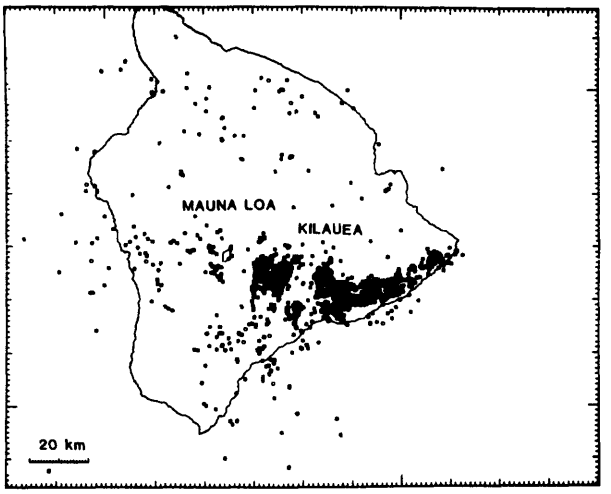

FIGURE 38.--Earthquakes on the island of Hawaii located during 1980.

Tsunami Warning Center). These less sensitive short-period records are used primarily for amplitude measurements for magnitude calculations to supplement readings from the high-gain stations. Long-period Press-Ewing seismographs record in three components in the Hwekahuna vault. The paper (optical) records, the 16mm develocorder microfilm, and the digital seismograms are archived at HVO.

Kilauea Volcano and its adjacent flanks (fig. 37) accounted for most of the earthquakes located during 1980. Kilauea caldera and the radial but curving east rift zone produced mostly shallow (0-5 km depth) earthquakes. These earthquakes are generally associated with magma movement between the storage reservoir below the caldera and the rift zones. The upper 15 km of the east rift saw most of the shallow activity and Kilauea's SW rift was nearly inactive.

The flanks adjacent to Kilauea's rifts were active during 1980 with earthquakes located between about 6 and 12 km depth. The active areas are the south flank of Kilauea seaward of the east rift, and the Kaoiki fault zone between Mauna Loa Volcano and Kilauea's SW rift. These crustal earthquakes result from compressional forces generated by magma intrusions in the rift zones.

Sparse earthquakes were widely scattered around Hawaii island during 1980 (fig. 38). This scattered seismicity to the north, west, and south of Kilauea ranges in depth between about 5 and 55 km depth, and is a result of a variety of tectonic forces not directly related to active volcanism. The few shallow earthquakes scattered near the summit caldera of Mauna Loa were caused mainly by a slow inflation of its magma reservoir. There have been no eruptions in Hawaii since the small outbreak at Pauahi Crater on the upper east rift zone of Kilauea Volcano in November 1979. Mauna Loa Volcano continued in repose with a pattern of slow inflation and few earthquakes, but Kilauea had five significant intrusive events during 1980 (March 2, March 10-12, August 27-28, October 22, and November 2). These intrusive events were characterized by shallow earthquake swarms, volcanic tremor, and rapid deflation of the summit area with simultaneous ground deformation in the earthquake swarm area. They are

interpreted to be intrusions of magma into shallow dikes beneath the rift zone. Magma moving into these new fractures is apparently resupplied from the summit reservoir. Seismicity provides the key information to estimate the length, height, depth to top and propagation rates of the dike.

The occurrence of these five intrusions without eruptions further confirms the major changes in structure and eruption mechanics of Kilauea Volcano caused by the magnitude 7.2 earthquake in November 1975. From 1959 until the major earthquake, Kilauea had 24 eruptions and 12 intrusions without eruptions; since November 1975, Kilauea has had 10 intrusions without eruptions and only 2 eruptions. The major seaward displacement of the southeast flank of Kilauea during that M 7.2 earthquake apparently reduced the accumulated stresses across the east rift zone, making it easier for small dike intrusions to dilate the rift zone.

KANSAS EARTHQUAKES, 1980

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The Kansas Geological Survey seismograph network consisted of ten seismograph stations during 1980. Four of the stations were supported by the Corps of Engineers and six were supported by the Nuclear Regulatory Commission. Equipment, mode of operation, and location of stations have been discussed in earlier reports (Steeples, 1981).

Table 2 lists all epicenters located between 1 January 1980, and 31 December 1980. Figure 39 shows a plot of all epicenters located between August 1, 1977 and May 1, 1981. Figure 40 shows earthquake epicenters plotted with Bouguer gravity contours for northeastern kansas. No new earthquake trends or particularly significant earthquakes occurred during 1980 in Kansas. There is a hint of a trend of seismicity beginning to develop northeastward across Nebraska from northwestern Kansas.

Table 2.--*Kansas earthquakes, 1980*

DATE	ORIGIN	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	QM
800211	545 44.15	39-58.13	97-20.63	5.00	2.1	5	199	55.9	0.34	2.2	6.7	D
800309	545 49.97	38-16.50	96-45.40	11.91	1.7	16	132	42.9	0.51	1.7	3.5	D
800309	922 43.97	38-16.23	96-43.77	5.00	1.6	14	129	41.0	0.43	1.4	2.9	C
800321	9 9 56.41	39-55.07	95-11.96	5.00	1.6	10	282	28.5	0.21	1.9	2.0	C
800326	1011 57.32	39-10.52	99- 8.32	17.83	1.7	14	206	114.7	0.98	6.8	3.0	D
800326	2256 58.31	39-58.85	95- 9.89	7.06	1.9	7	215	34.6	0.05	0.6	0.9	C
800416	713 21.47	39-54.85	97-18.89	5.00	1.6	7	188	56.6	0.15	2.1	4.5	C
800426	1421 48.50	40-43.99	99-43.91	5.00	2.3	12	243	82.5	0.99	12.1	15.2	D
800629	1614 31.32	38-56.56	95-18.49	5.00	1.8	15	185	84.9	0.95	4.1	5.0	D
800630	1 0 22.83	38-52.46	96-52.26	15.37	2.5	8	101	25.8	0.20	1.3	4.5	B
800810	1010 1.37	36-52.00	98-52.00	5.00	2.1	9	146	31.2	0.97	28.1	52.8	D
800813	0550 11.83	41-53.59	97-06.01	9.99	2.1	11	271	117.7	0.63	4.0	3.9	D
800907	022 33.40	39-35.35	97-42.88	8.30	1.5	8	286	9.0	0.37	4.5	3.6	D
801109	1453 5.86	39-15.89	95-57.20	12.89	1.0	8	189	21.2	0.31	7.8	4.4	D
801122	334 9.68	36-32.36	98- 9.41	2.84	2.1	22	100	90.3	1.26	3.8	5.0	D

(Explanation of Table 2)

The microearthquakes are listed in chronological order under the following headings:

DATE: year, month, day

ORIGIN: hour, minute, seconds, hundredths of seconds

LAT N: degrees, minutes, hundredths of minutes north

LONG W: degrees, minutes, hundredths of minutes west

DEPTH: calculated in kilometers or fixed at 5.00 km

MAG: duration magnitude calculated according to equation derived at Oklahoma Geological Observatory

NO: number of P- and S-arrivals used in hypocenter solution

GAP: largest azimuthal separation between stations measured from the epicenter

DMIN: epicentral distance in kilometers to nearest station

RMS: root-mean-square error of the time residuals

[RMS = $(\Sigma_i R_i^2/NO)^{1/2}$] where R_i is the observed seismic-wave travel time less the computed time at the i^{th} station

ERH: standard error of the epicenter in kilometers

[ERH = $(SDX^2 \& SDY^2)^{1/2}$] where SDX and SDY are the standard errors in latitude and longitude, respectively, of the epicenter

ERZ: standard error of depth in kilometers (asterisks are used if greater than 999 km). This is not a good estimate of depth uncertainty in a sparse network.

Q: quality of the event. In a dense network, values are A, B, C, D. Only C and D quality solutions are obtained because of the sparseness of the network. Q is based upon GAP, ERH, ERZ, DMIN, RMS, and NO.

M: crustal model number used in each individual solution. All of the locations use the same model discussed elsewhere in this report.

CENTRAL MISSISSIPPI VALLEY EARTHQUAKES, 1980

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During 1980, 196 earthquakes were located and 242 other nonlocatable earthquakes were detected by a 33-station regional telemetered microearthquake network operated by Saint Louis University under contract for the USGS and NRC. Figure 41 shows 195 earthquakes located within a 4° by 4° region centered on 37.0° N., and 89.5° W. Seismograph stations are denoted by the triangles together with the station code. The magnitudes are indicated by the size of the open symbols. Figure 42 shows the locations and magnitudes of the 177 earthquakes located within a 1.5° by 1.5° region centered at 36.25° N. and 89.75° W. Figures 43 and 44 are similar to figures 41 and 42, but the epicenter symbols are scaled according to focal depth.

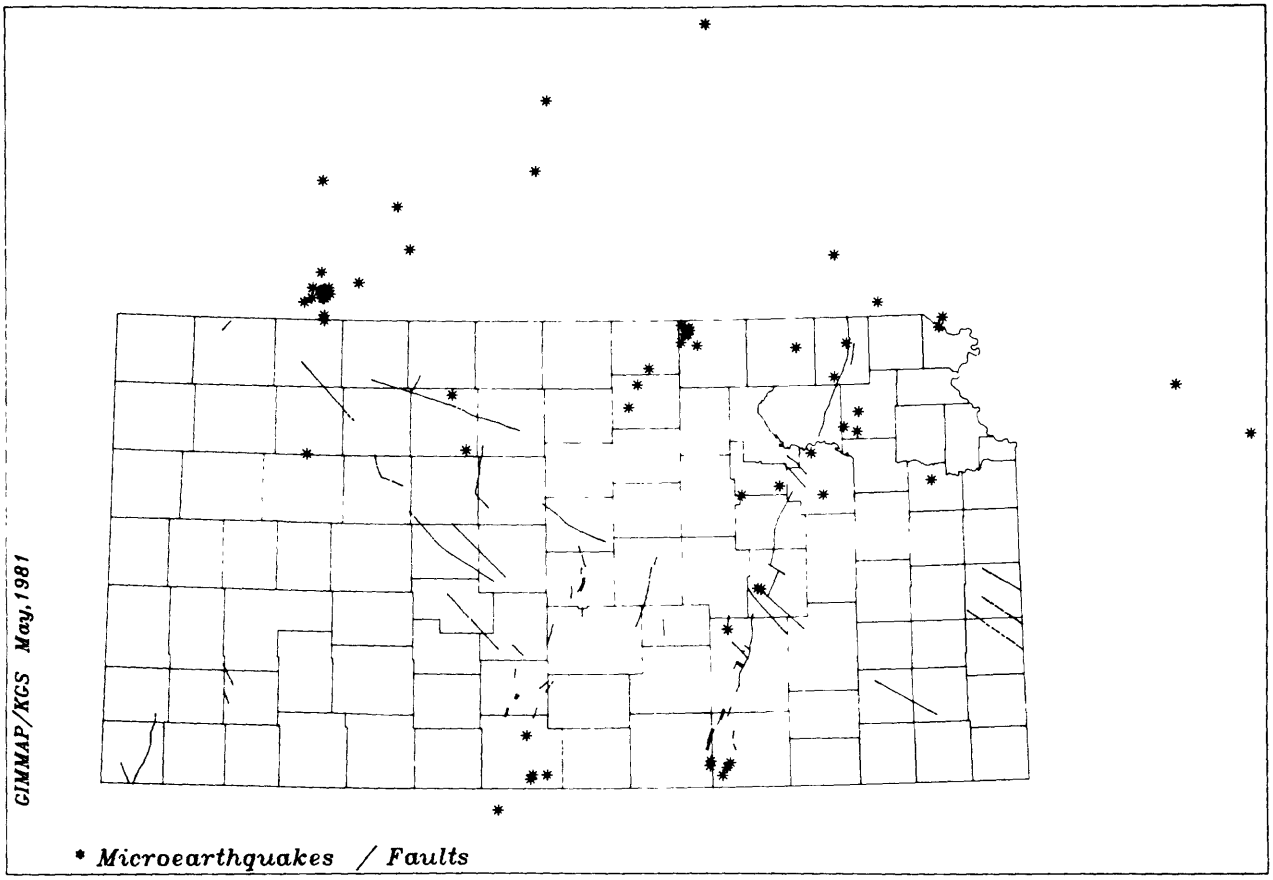

FIGURE 39.--Microearthquake activity in Kansas and adjacent states from August 1977 to May 1981. Locations by computer program HYP071 (Lee and Lahr, 1972).

This year witnessed an expansion of the network by the installation of a cluster of stations about New Madrid, Missouri. The stations installed during the second half of the year were NMMO, DMMO, LDMO, NRMO, and TPMO. The addition of these stations has greatly improved the detection and location capabilities for the earthquakes near 36.5° N., and 89.5° W.

The significant earthquakes during 1980 include the following:

1. March 13, 00 23 UTC, 37.93° N., 88.45° W., felt in McLeansboro, Illinois area as reported by Sheriff's office, mb3HZ = 3.3 (FVM).

2. 5 July, 08 54 UTC, 36.60° N., 89.58° W., felt in the New Madrid area as reported by the Sikeston Daily News, mb3Hz = 3.6 (FVM).

3. August 20, 04 43 UTC, 36.21° N., 90.36° W., felt in Desloge, Missouri, mb3Hz = 2.0 (FVM).

4. August 21, 10 39 UTC, 38.03° N., 90.48° W., felt in Bonne Terre, Missouri. This has two clear aftershocks, mb3Hz = 2.1 (FVM).

5. December 2, 08 59 UTC, 36.21° N., 89.43° W., widely felt in the New Madrid seismic zone, mb3Hz = 3.8 (FVM). This was the largest earthquake in the New Madrid seismic zone since June 11, 1979 which had mb3Hz = 3.9 (FVM).

NEW ENGLAND EARTHQUAKES, 1980

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The New England Seismic Net of Weston Observatory, Boston College, was increased to 36 stations during 1980. The fifth microearthquake

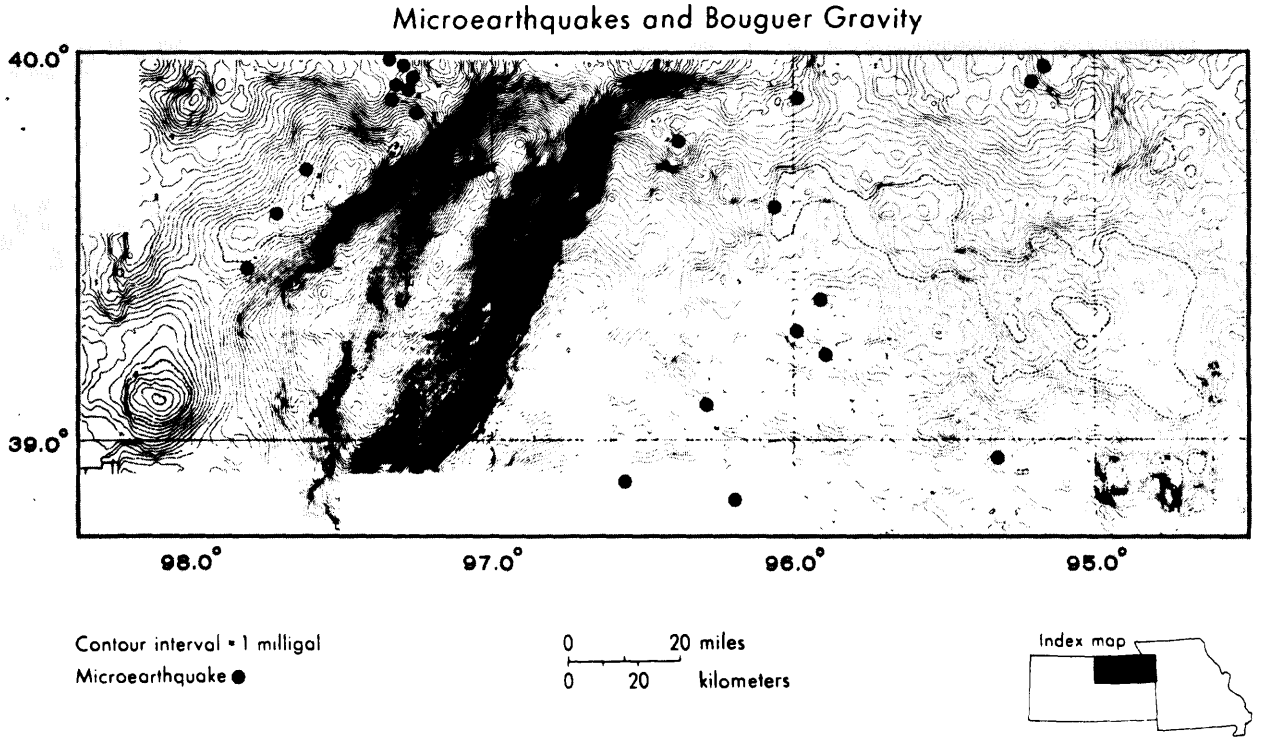

FIGURE 40.--Microearthquake and Bouguer Gravity Map of northeastern Kansas. Note coincidence of microearthquakes and the gravity high between 97° and 98°.

station near Moodus, CT was installed in April and the station at Brookfield, CT was reactivated in December. During the course of the year the program of updating telemetry equipment continued. The new equipment was necessary to improve the signal-to-noise characteristics of the data as well as to improve station reliability.

There were no large events recorded in New England over the course of the year (table 3). However, there were fifty-seven events recorded and, of these, forty-three were reliably located (fig. 45). Significant events which took place include the following:

1. March 11: A 3.4 Mc (coda length magnitude) event was located in the Kelvin seamounts off Massachusetts (not indicated on map, fig. 45).

2. April and May: Three events in the vicinity of Graham Lake, Maine were recorded, two of which were felt. The first event of this series was the largest, 3.2 Mc.

3. June 29: Two events north of Norwich, Connecticut were recorded, though neither was large enough to be felt. These were the second and third from this location this year.

4. August and September: Three events were recorded near China Lake, Maine. They were of approximately the same magnitude, 2.6 to 2.8 Mc.

5. October 24-25: Two events were recorded near New Haven, Connecticut. These were felt over a wide area in southern Connecticut. They were the only events that generated any widespread media interest during the year. They were of magnitude 3.1 Mc and 2.8 Mc, respectively.

6. November 23: This earthquake was felt in the Lowell-Chelmsford area of Massachusetts. It had a shallow focus (1-2 km) and a felt area similar to that of an event in 1938 (Pulli and Guenette, 1981).

7. There were, in all, nine felt events in the six New England states during 1980.

The number of located events in 1980 (43) was greater than that of 1979 (29).

Weston Observatory continued to publish the quarterly bulletin of the Northeastern United States Seismic Network (NEUSSN) (Vudler and Raica, 1980-81). The sources of data for the bulletin are Lamont-Doherty Geological Observatory, Massachusetts Institute of Technology,

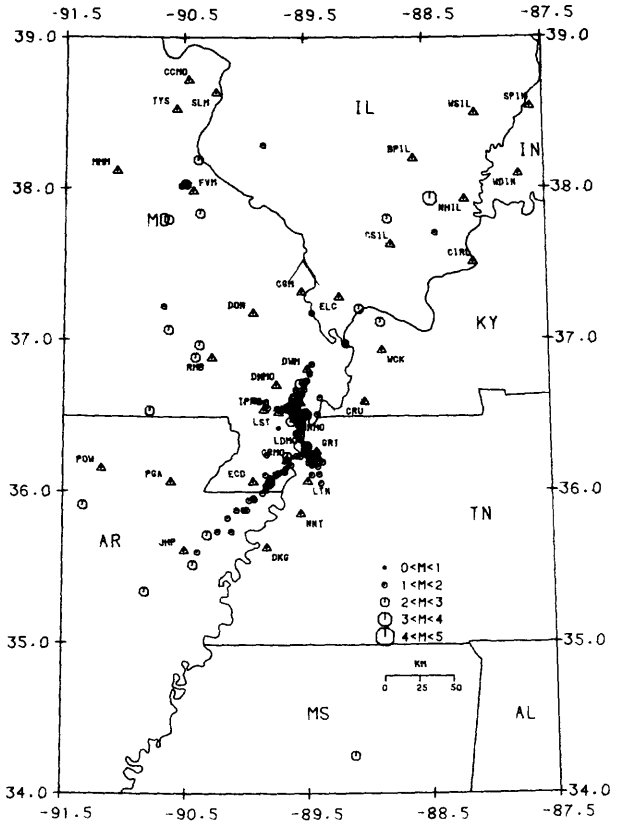

FIGURE 41.--Central Mississippi Valley earthquakes during 1980 within a 4° x 4° region centered at 37.0° N. and 89.5° W.

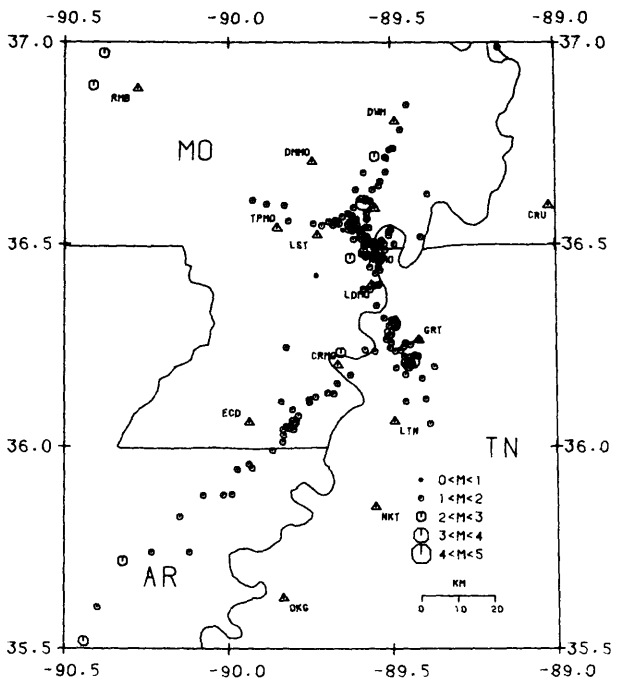

FIGURE 42.--Central Mississippi Valley earthquakes during 1980 within a 1.5° x 1.5° region centered at 36.25° N. and 89.75° W.

Pennsylvania State University, Delaware Geological Survey, Maine Geological Survey and the State University of New York at Stony Brook.

Table 3.--*New England earthquakes, 1980*

Date (1980)	Origin time (UTC)	Location	Lat. (°N.)	Long. (°W.)	Mag. (Mc)
Jan. 14	10 50	ME, Offshore, S of Mt. Desert Is.	43.82	68.09	2.8
Feb. 9	13 11	ME, W of Biddeford	43.56	70.76	2.6
Mar. 11	10 07	MA, Offshore, West Kelvin Seamount	38.16	64.28	3.4
Apr. 7	07 36	NH, W of Highland Lake	43.13	72.22	2.8
Apr. 10	15 36	ME, NE of Graham Lake	44.71	68.36	3.2
Apr. 21	13 39	ME, Northern Graham Lake	44.72	68.36	2.7
May 4	08 56	ME, SE of Augusta	44.29	69.61	2.8
Aug. 25	13 14	MA, Georges Bank	41.40	67.78	3.0
Aug. 31	06 23	ME, E of China Lake	44.39	69.46	2.7
Aug. 31	08 34	ME, E of China Lake	44.41	69.44	2.8
Sep. 4	06 55	ME, SE of China Lake	44.29	69.53	2.6
Sep. 8	05 59	ME, NE of Dixmont	44.68	69.00	3.2
Oct. 24	17 27	CT, NE of New Haven	41.32	72.87	3.1
Oct. 25	00 41	CT, NE of New Haven	41.33	72.88	2.8
Nov. 5	22 40	NH, Northern Lake Winnipesaukee	43.66	71.36	2.7
Nov. 21	04 09	ME, NE of Rump Mountain	45.25	70.96	2.8
Nov. 22	21 28	ME, SW of Milo	45.22	69.16	2.4
Nov. 23	00 39	MA, S of Lowell	42.62	71.39	2.6
Nov. 25	16 58	VT, NW of Newbury	44.10	72.09	2.5

EARTHQUAKES IN NEW YORK STATE AND ADJACENT AREAS, 1980

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Lamont-Doherty Geological Observatory operates a seismic network of 38 short-period stations in the states of New York, New Jersey, and Vermont. The present configuration of this network consists of 38 stations and is shown in figure 46. The signals are telemetered by telephone line and radio to a central recording site at Palisades, New York, and recorded on a common time base. Fourteen channels are recorded on two develocorders and all are recorded on an analog magnetic tape recorder. Ten helicorders

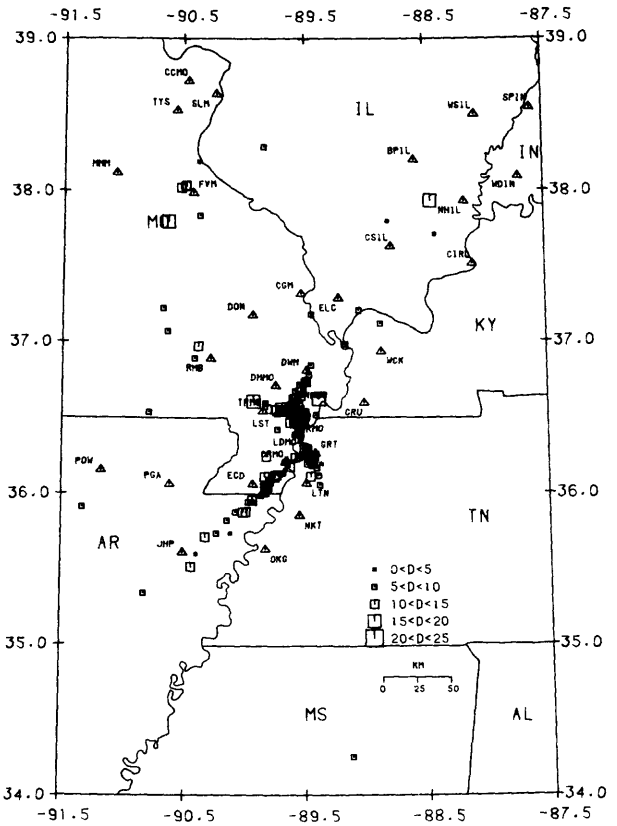

FIGURE 43.--Central Mississippi Valley earthquakes during 1980 within a 4° x 4° region centered at 37.0° N. and 89.5° W. (epicenter symbols are scaled according to focal depth).

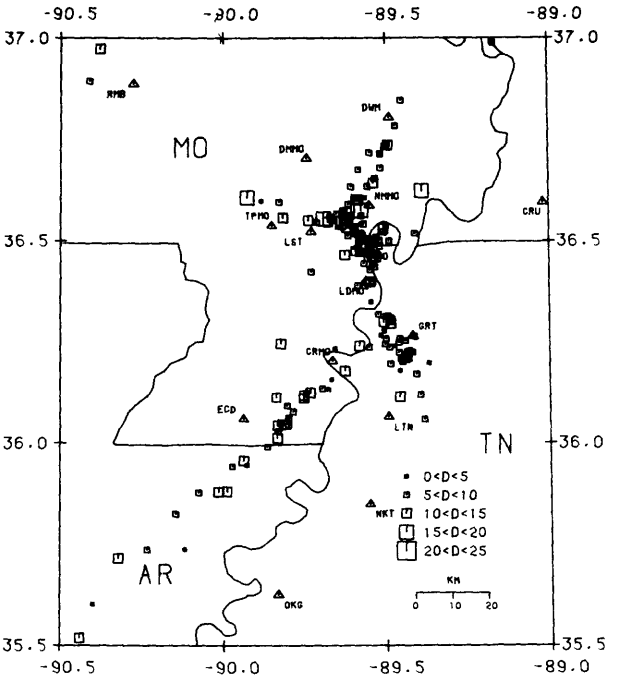

FIGURE 44.--Central Mississippi Valley earthquakes during 1980 withina 1.5° x 1.5° region centered at 36.25° N. and 89.75° W. (epicenter symbols are scaled according to focal depth).

are used to monitor activity in real time, enabling rapid detection of earthquakes. The magnetic tapes are digitized for detailed analysis of particular events, and we expect to convert to digital recording in the near future. In addition to these short-period seismometers, three SMA-1 strong-motion accelerographs are deployed in the field; one in each of the three areas of relatively high activity in the New York State region (as described below).

Figure 47 shows the distribution of earthquakes recorded by the Lamont-Doherty network during 1980. The longer term distribution of seismicity in New York State and adjacent areas can be seen in figure 48, which shows the locations of all earthquakes (mb $\geq$ 2) recorded by the network from its inception in 1970 through 1980. In this figure we chose a magnitude threshold of mb = 2 so as to reduce the bias introduced by non-uniform coverage in space and time. Magnitudes reported here are derived from approximate relationships (Kafka and others, in preparation) between properties of high frequency waves (10 Hz) recorded by the local network and the mbLg scale of Nuttli (1973). Since the mbLg scale was constructed to yield an approximation to mb, we consider the magnitudes reported here to be rough estimates of mb.

The major features of interest in figure 48 are:

1. A NNW trending zone of seismicity extending from northern New York to western Quebec.

2. A northeasterly trending belt of seismic activity extending from New Jersey into Connecticut.

3. Concentrations of seismicity in western New York and western Lake Ontario.

4. Relative absence of activity in the central part of New York State, Vermont, and western Massachusetts.

A comparison of the instrumentally recorded seismicity with the historical earthquake record for this region reveals that these patterns are relatively stationary. Those areas of the New York State region that have had little or no seismicity historically are relatively aseismic today, whereas the historically active areas are also active today.

Fifty-six earthquakes ranging in magnitude from 1 to 5 were recorded during 1980 in New

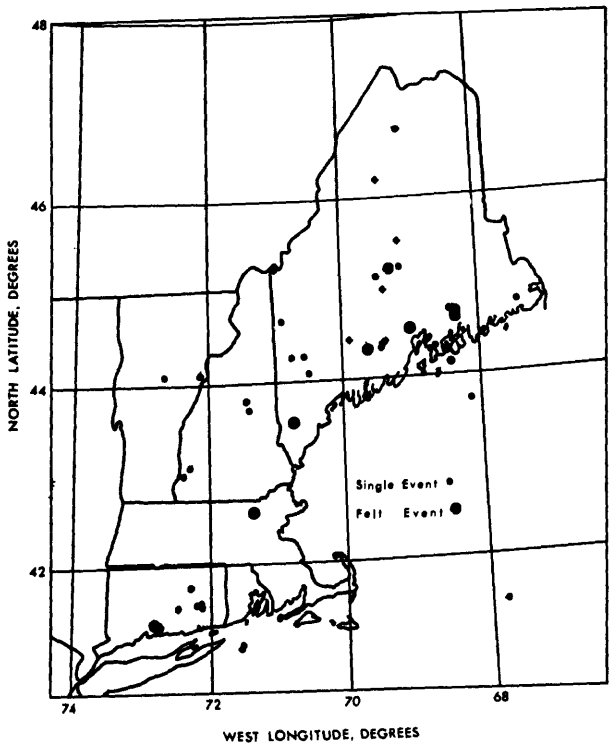

FIGURE 45.--New England earthquake epicenters during 1980.

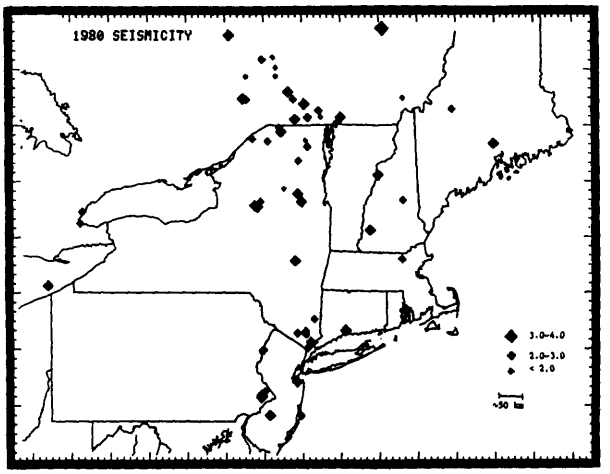

FIGURE 47.--All earthquakes recorded by the Lamont-Doherty network in New York State and adjacent areas during 1980.

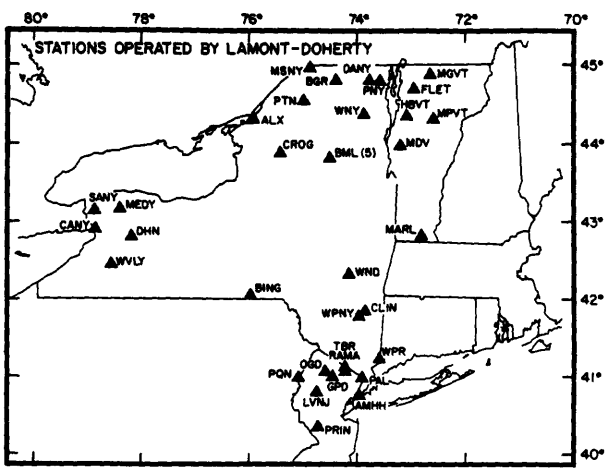

FIGURE 46.--Distribution of short-period seismic stations operated by Lamont-Doherty Geological Observatory in New York State and adjacent areas during 1980.

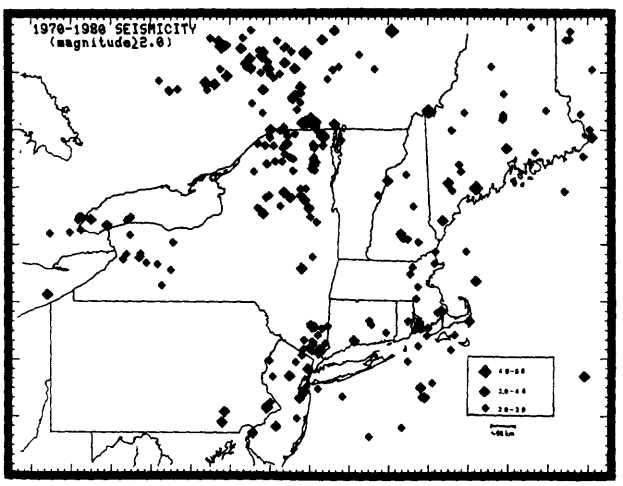

FIGURE 48.--Distribution of earthquakes (mb $\geq$ 2) recorded by the Lamont-Doherty network in New York State and adjacent areas from 1970 through 1980.

York State and the adjacent portions of neighboring states and Canadian provinces. Significant activity has been recorded during this year in northern New York and western Quebec, and also in the New York City region. During 1980 no activity was recorded in western New York although two events were recorded in nearby Canada and one event was recorded in Lake Erie (fig. 47). The most significant earthquakes which occurred this year within the area covered by the network were:

1. On January 17, 1980 an earthquake occurred near Peekskill, New York (10 13 16.13 UTC; 41.31° N., 73.93° W; mb = 2.2). The earthquake was felt over a relatively small area (46 sq km) compared to other events of similar magnitude in this region and the maximum intensity on the Modified Mercalli (MM) scale was V. The depth determined for this event was approximately 3 km, and we consider this depth to be fairly reliable since the earthquake occurred within a dense array of seismic stations operated by Woodward-Clyde Consultants. One station was within a distance of 3 km of the epicenter and five stations were within a 6 km radius of the epicenter. In addition, the high maximum intensity relative to the small felt area is suggestive of a shallow source.

2. On March 2, 1980 an earthquake occurred north of Philadelphia, Pennsylvania (11 54 47.88 UTC; 40.21° N., 75.08° W; mb = 2.5). This event was located near Abington, Pennsylvania, and it was followed by two larger shocks on March 5 (17 06 56.47 UTC; 40.17° N., 75.07° W; mb = 3.2) and March 11 (06 00 26.94 UTC; 40.15°., 75.09° W.; mb = 3.4) that were also located near Abington, Pennsylvania. Whereas only one person reported feeling the March 2 foreshock, many people reported feeling the mainshocks of March 5 and March 11. The maximum reported intensity (MM) for both the March 5 and March 11 earthquakes was V.

3. On June 6, 1980 an earthquake (13 15 51.96 UTC; 43.56° N., 75.23° W.; mb = 3.0) occurred on the southern edge of the Adirondack mountains, near Boonville, New York. The maximum intensity reported for this event was V, and the total felt area was approximately 3,000 sq km.

4. On October 24, 1980 an earthquake occurred near New Haven, Connecticut (17 27 38.45 UTC; 41.33° N., 72.87° W.; mb = 3.1). This event was followed by an aftershock on October 25 (00 41 28.73 UTC; 41.33° N., 72.88° W.; mb = 2.7). Both events were felt by a number of people in the vicinity of New Haven, but no intensity survey was conducted for these earthquakes.

OKLAHOMA EARTHQUAKES, 1980

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A statewide network of 11 seismograph stations is recording seismological data in Oklahoma (fig. 49). The Oklahoma Geophysical Observatory station, TUL, has been recording earthquake data since December 1961. The Observatory, located near Leonard, Oklahoma, in southern Tulsa County, operates seven seismometers, three long-period and four short-period, which are installed in a vault detached from the main building. The seismic responses at TUL are recorded on 14 paper-drum recorders; 16 seismomgrams are recorded on 16-mm film. Seven semipermanent, volunteer-operated seismograph stations and three radio-telemetry stations constitute Oklahoma's regional network. The installation and maintenance of these stations are being supported by the U.S. Nuclear Regulatory Commission. The regional seismograph network supplements the existing seismological capability at the Oklahoma Geophysical Observatory by providing more accurate location and detection of earthquake activity in Oklahoma.

Each of the seven volunteer-operated seismograph stations consists of a Geotech S-13, short-period, vertical seismometer; a Sprengnether MEQ-800-B unit, including amplifier, filters, ink-recording unit, and a clock; and a Kinemetrics time-signal-radio receiver for high-frequency WWV time signals. Each radio-telemetry system consists of one Geotech S-13 seismometer and one Monitron and/or Emheiser Rand telemetry unit. The telemetry unit amplifies the seismometer output and uses this output to frequency-modulate an audiotone. A 500-milliwatt, crystal-controlled transmitter limits the line-of-sight transmission to 80 km. Seismographs from the radio-telemetry stations are recorded at the Oklahoma Geophysical Observatory.

From January 1, 1980, to December 31, 1980, station coverage was relatively uniform. The Carnasaw Mountain Station, CRO, was closed July 23, 1980. A new station was installed near Cedar Creek, CDO, in McCurtain County on August 1, 1980.

In 1980, 49 Oklahoma earthquakes were located (fig. 50) by the Oklahoma Geophysical Observatory staff. Table 4 represents only

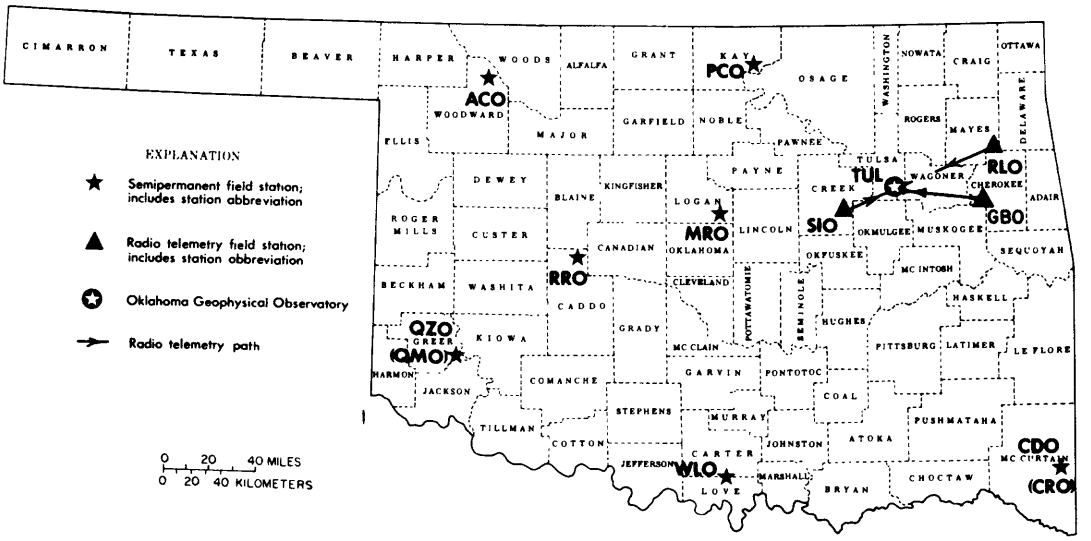

FIGURE 49.--Active seismograph stations in Oklahoma.

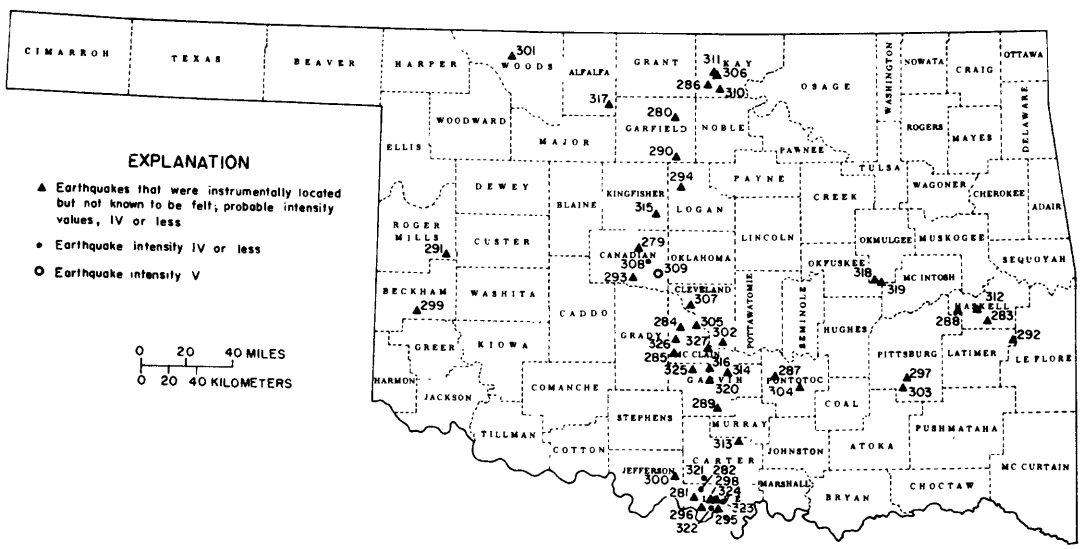

FIGURE 50.--Distribution of Oklahoma earthquakes during 1980. Numbers correspond to event numbers in table 4.

those earthquakes that could be located by using three or more seismograph records. Six earthquakes were reported felt by people living in the vicinity of an earthquake epicenter.

Eleven earthquakes occurred in a 35-kilometer-wide zone that extends between Norman and Maysville, through Cleveland, McClain, and northern Garvin Counties. Only four earthquakes were located in Canadian County in 1980. Of these, one earthquake near Yukon and one earthquake near Mustang were felt. The Mustang event, the largest 1980 earthquake, had an MM V intensity and a magnitude of 3.0 (mbLg). Nine earthquakes occurred in the Love and Carter County region. Of these, four were reported felt.

The 1980 earthquake epicentral data, when combined with previous earthquake data, produced at least four seismic trends worthy of discussion.

One trend is located in north-central Oklahoma (fig. 51). The pre-1977 earthquake data (circles) and the 1977-80 earthquake data (triangles) are shown in figure 51. There appears to be a 40-km wide and 145-km-long earthquake zone that extends northeastward from near El Reno toward Perry (Noble County). Most of the earthquakes within this zone have occurred in the vicinity of the El Reno-Mustang area, which has been the site of numerous earthquakes since 1908. Six of the 1980 earthquakes plot within this zone. Prior to installation of the statewide earthquake-station network, more than one-half of the known Oklahoma earthquakes occurred in the vicinity of El Reno. However, after the El Reno earthquake of 1952, magnitude 5.5 (mb), no earthquakes were reported for this region until 1978.

The correlation of historical and recent earthquake activity to known structural features remains unclear. Some fault features that cut pre-Pennsylvanian rocks, which are compiled from Jordan (1962), Wheeler (1960), and unpublished reports, are shown in figure 51. The El Reno-Perry trend appears to cut diagonally across the Nemaha Uplift structures at about a 30° angle. The southern end of this trend appears to be more active than the middle and northern parts. The recent as well as the historic earthquake data seem to support this observation. A three-seismograph-station array was installed in December of 1980 southeast of El Reno. It is hoped that additional earthquake data, such as focal-depth determinations, will give us a better understanding of this feature.

A second trend is situated between Norman and Pauls Valley. Eleven earthquakes were instrumentally located in this region. This trend closely parallels the McClain County fault zone which is about 40 km wide and 60 km long. Perhaps this very complex fault zone, which contains numerous subparallel faults, is the southernmost extension of the Nemaha Uplift.

In south-central Oklahoma, earthquakes are concentrated in the Wilson area, Carter and Love Counties. Nine earthquakes, of which four were felt, were located in this region in 1980. In the past, this area has also been the site of numerous small earthquakes. A fourth general area of earthquake activity is located along and north of the Ouachita front (Arkoma Basin) in southeastern Oklahoma. Eight earthquakes were instrumentally detected in this region.

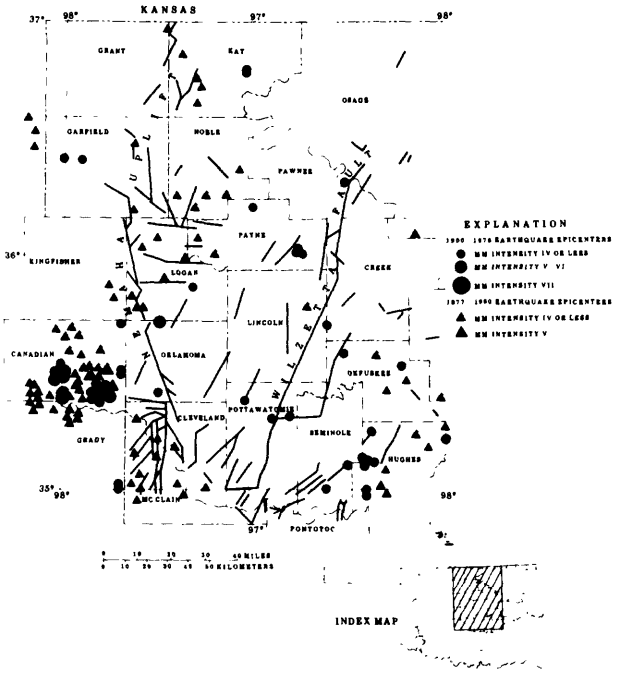

FIGURE 51.--Distribution of faults that cut pre-Pennsylvania strata, and earthquake epicenters for north-central Oklahoma (Wheeler, 1960; Jordan, 1962; unpublished reports).

Table 4.--*Oklahoma earthquake catalog for 1980*

Event number	Date and origin time (UTC)		County	Intensity (MM)	Magnitudes mHz mLg DUR	Latitude (°N)	Longitude (°W)	Depth (km)[1]
279	JAN 5	071131 21	CANADIAN		1 9 1 7 1 7	35 586	97 894	5 0R
280	JAN 12	071256 45	GARFIELD		1 7 1 4	36 453	97 642	5 0R
281	FEB 3	004630 05	LOVE		2 2 1 9 2 0	33 994	97 463	5 0R
282	FEB 5	043235 45	LOVE	3	2 1 2 3 1 9	34 046	97 451	5 0R
283	MAR 9	035710 56	HASKELL		1 2 1 4 1 4	35 100	95 100	5 0R
284	MAR 17	140231 21	MC CLAIN		2 3 2 2 1 9	35 047	97 566	5 0R
285	MAR 19	225057 93	MC CLAIN		2 4 2 4 2 0	34 980	97 644	5 0R
286	MAR 23	074901 56	KAY		1 4 1 4	36 655	97 391	5 0R
287	APR 1	211632 26	PONTOTOC		1 9 1 8 1 8	34 726	96 762	5 0R
288	APR 8	191806 93	HASKELL		2 1 2 1	35 165	95 301	5 0R
289	APR 29	195951 18	GARVIN		2 0 2 4 1 8	34 578	97 285	5 0R
290	MAY 28	040545 65	GARFIELD		1 8	36 168	97 602	5 0R
291	MAY 30	074402 72	ROGER MILLS		3 0 2 6 2 5	35 512	99 390	5 0R
292	JUN 3	214150 31	LATIMER		2 3 2 1 1 7	35 000	94 932	5 0R
293	JUN 6	013127 86	CANADIAN		2 6 2 3 2 2	35 402	97 983	5 0R
294	JUN 6	031812 45	LOGAN		1 5	36 039	97 570	5 0R
295	JUN 8	233334 30	LOVE		2 1 1 9 1 7	33 940	97 323	5 0R
296	JUN 9	055042 20	LOVE		1 8 1 4	33 940	97 417	5 0R
297	JUN 15	125051 95	PITTSBURG		1 2	34 728	95 778	5 0R
298	JUL 8	013444 01	LOVE		2 3 2 5 2 4	34 002	97 354	5 0R
299	JUL 18	142946 88	BECKHAM		3 2 2 8	35 180	99 698	5 0R
300	AUG 5	171332 96	JEFFERSON		2 2	34 096	97 588	5 0R
301	AUG 10	101002 58	WOODS		2 3 2 2	36 843	98 871	5 0R
302	SEP 7	015014 23	CLEVELAND		1 9 2 2	34 953	97 258	5 0R
303	SEP 7	080620 87	PITTSBURG		1 6 1 4 1 8	34 680	95 840	5 0R
304	OCT 4	090220 56	PONTOTOC		2 2 1 8 2 1	34 694	96 612	5 0R
305	OCT 8	083008 97	MC CLAIN		1 9 1 9 2 1	35 084	97 405	5 0R
306	OCT 21	090255 01	KAY		1 7 0 9	36 707	97 318	5 0R
307	OCT 28	090704 99	CLEVELAND		1 7 1 8 1 8	35 225	97 495	5 0R
308	NOV 1	092613 86	CANADIAN	3	1 9 2 0 2 0	35 472	97 836	7 5R
309	NOV 2	100049 03	CANADIAN	5	3 0 3 0 2 8	35 429	97 777	7 5R
310	NOV 7	004633 07	KAY		2 1 1 7 2 0	36 638	97 326	5 0R
311	NOV 7	005011 34	KAY		1 7 1 6 1 7	36 716	97 326	5 0R
312	NOV 13	002339 10	HASKELL		1 5 1 7	35 196	95 235	5 0R
313	NOV 13	235548 18	CARTER		1 8 1 8 1 8	34 367	97 077	5 0R
314	NOV 15	120659 08	GARVIN		1 7 1 8 1 7	34 820	97 187	5 0R
315	NOV 20	095039 73	KINGFISHER		1 6 1 6	35 871	97 733	5 0R
316	NOV 21	102553 61	GARVIN		1 9 1 9 1 9	34 857	97 359	5 0R
317	NOV 22	033410 24	ALFALFA		2 3 1 8 2 1	36 527	98 146	10 1
318	NOV 22	193502 77	OKMULGEE		2 7 2 5 2 7	35 379	95 995	5 0R
319	NOV 22	200430 13	OKMULGEE		1 8 1 4 1 7	35 356	95 987	5 0R
320	NOV 30	234401 99	GARVIN		2 3 1 8 2 2	34 795	97 360	5 0R
321	DEC 4	012316 96	CARTER	FELT	1 9 1 8 1 7	34 096	97 401	5 0R
322	DEC 4	234843 22	LOVE	FELT	2 1 2 1	33 942	97 352	5 0R
323	DEC 5	000726 29	LOVE	FELT	2 6 2 4 2 4	33 909	97 284	5 0R
324	DEC 5	095323 98	LOVE		2 2 2 0 2 0	34 002	97 323	5 0R
325	DEC 17	124945 46	GARVIN		2 4 2 9 2 8	34 955	97 464	5 0R
326	DEC 21	140555 45	MC CLAIN		2 2 2 1 2 2	35 017	97 592	5 0R
327	DEC 30	151752 59	MC CLAIN		1 8 1 7	34 953	97 362	5 0R

[1] The hypocenter is restrained (R) at an arbitrary depth of 5.0 km except where indicated for purposes of computing latitude longitude and origin time

SOUTHEASTERN UNITED STATES EARTHQUAKES, 1980

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There were 15 earthquakes located in the southeastern United States during 1980, that were either felt and/or of $M \geq 3.0$ (table 5). Additionally, 313 microearthquakes of $M < 3.0$ (and not felt) were detected in the region. Of these, 129 were recorded by the Georgia Institute of Technology's Clark Hill Seismic Network and had occurred within a 15 sq km area. Therefore, a total of 328 events ($-0.5 \leq M \leq 5.1$), were detected within the southeastern United States during 1980 (fig. 52).

The largest earthquake of this century (mbLg = 5.1, MM Intensity=VII) in the southeastern United States occurred near Sharpsburg, Kentucky on July 27, 1980. Four teams fielded as many as 28 portable seismographs during the ensuing aftershock monitoring effort. The main shock was followed by more than 60 aftershocks, of which several were felt (table 5). This event is the most extensively studied earthquake of eastern North America.

A data listing of most of the earthquakes in 1980 was presented in Southeastern United States Seismic Network Bulletins No. 6 and 7. A discussion of the "Detection and Location Capability of the Southeastern United States Seismic Network" by Arthur C. Tarr is presented in both issues of the bulletin. Copies of both reports may be obtained by contacting the authors.

The number of seismograph stations operating in the region varied from 83 to 91. Figure 53 shows the station distribution (91) at the end of 1980.

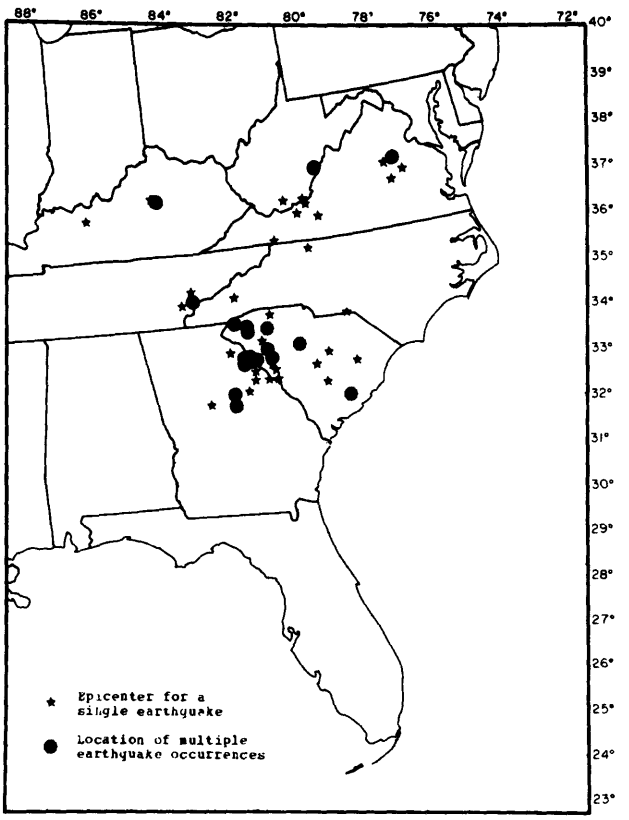

FIGURE 52.--Southeastern United States earthquake epicenters during 1980. Stars represent single events while the solid circles indicate multiple earthquake occurrences.

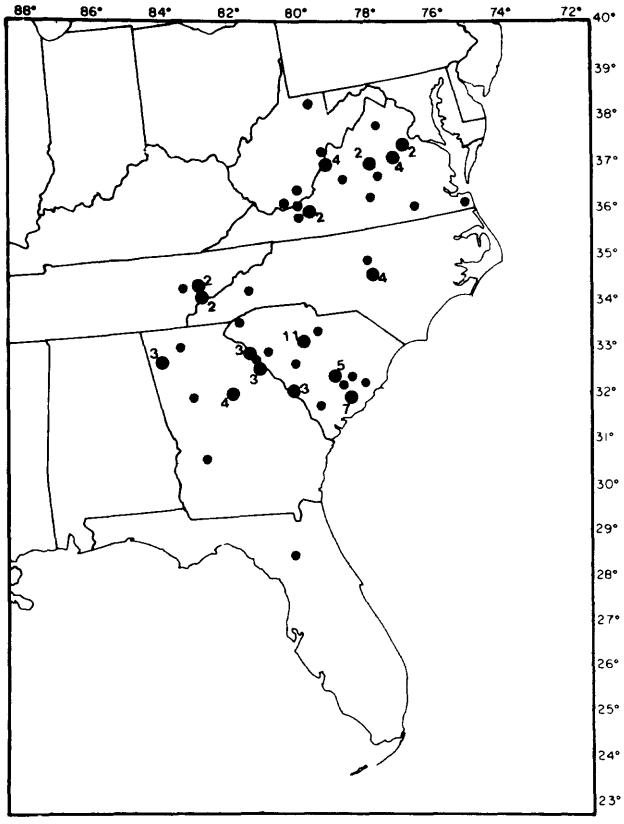

FIGURE 53.--Southeastern United States seismic network stations (solid circles) operating at the close of 1980. Numbers indicate the number of closely-spaced multiple stations at a given location.

Table 5.--*Southeastern United States earthquakes, 1980*

Date (1980)	Origin time (UTC)	Lat. (°N.)	Long. (°W.)	Depth (km)	Mag. (Mn/MD)	State Felt
Jan. 24	04 12 08.3	35.56	84.27	6.5	2.0	TN
Mar. 23	21 38 15.0	37.63	86.69	6.0	3.3	KY
Apr. 24	06 16 56.6	34.35	81.36	3.8	3.0	--
June 10	23 47 32.7	35.45	82.88	5.0F	3.0	NC
June 25	18 02 01.5	35.78	84.05	5.0F	3.3	TN
July 1	23 33 19.8	33.38	80.67	2.0	1.6	SC
July 27	18 52 00.0	38.17	83.91	8.0	5.1	KY
July 29	01 10 22.7	34.35	81.36	1.3	3.2	--
July 30	17 01 41.2	38.19	83.92	11.4	1.3	KY
July 31	09 26 56.3	38.20	83.92	13.0	2.5	KY
Aug. 23	03 49 02.5	38.00	84.92	5.0F	3.1	KY
Aug. 25	11 41 36.9	38.20	83.91	13.0	2.5	KY
Sep. 1	05 44 42.2	32.98	80.19	7.0	2.9	SC
Nov. 5	21 48 14.7	38.18	79.90	3.8	2.8	VA
Dec. 30	03 07 08.0	---	---	---	1.6	KY

UTAH EARTHQUAKES, 1980

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The University of Utah Seismograph Stations records a seismic network consisting of 59 short-period stations, 12 of these operated and maintained by other agencies. The 1980 network configuration is shown in figure 54. Station spacing ranges from 15 to 35 km in northcentral Utah along the Wasatch fault zone to approximately 30 to 100 km in adjacent areas of central and south-western Utah and southeastern Idaho. Seismic data are telemetered via radio, telephone, and/or microwave channels to the University of Utah in Salt Lake City. At the end of 1980, an on-line computer facility became operational providing digital central recording of 58 stations. In addition to vertical components, four stations have horizontal short-period seismometers. Dugway, Utah (DUG) continues to operate as a WWSSN station. Wood-Anderson type instruments operate at DUG and Salt Lake City (SLC).

Figure 55 shows a summary of Utah seismicity for 1980 including 587 located earthquakes. Ten of these were reported felt. The largest earthquake was a magnitude (ML) 4.4 event on May 24, 1980 south of Utah Lake in Goshen Valley (39.9° N., 112.0° W.). Other significant seismicity includes:

1. On-going acitivity along the Idaho-Utah border, including aftershocks of the magnitude 6.0 Pocatello Valley earthquake of March 1975, as well as several nearby swarms.

2. Clustered events east of Logan (41.4° N., 111.5° W.) beneath the Bear River Range with magnitudes up to 3.1.

3. Earthquakes predominantly related to extensive underground coal mining SW, NNW, and ESE of Price, Utah in central Utah.

4. Scattered earthquakes throughout western and south central Utah in a NW-SE trend in the vicinity of the Elsinore, Tushar, and Sevier fault zones.

5. A sequence (ML < 3.3) south of Cedar City near Kanarraville (37.5° N., 113.1° W.) close to the Hurricane fault beginning in December 1980 and continuing into 1981.

Details of Utah seismicity and information in bulletin format is available by contacting the University of Utah Seismograph Stations, 704 W.C. Browning Bldg., Salt Lake City, Utah 84112-1183.

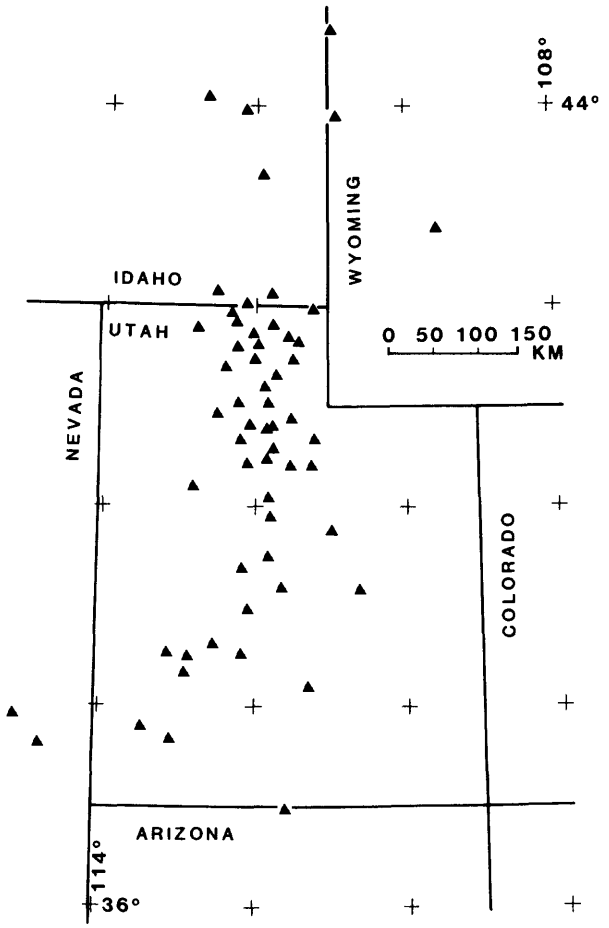

FIGURE 54.--University of Utah seismographic network in 1980.

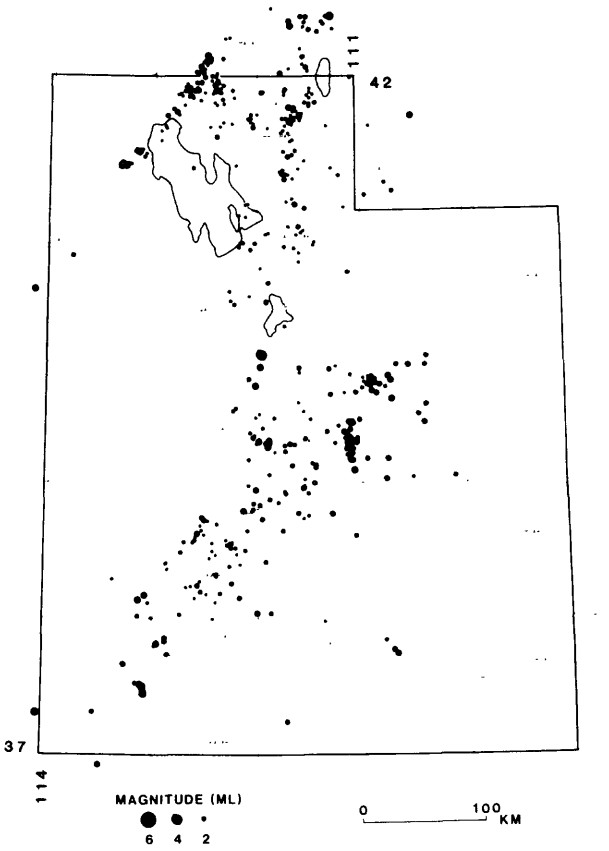

FIGURE 55.--Utah earthquake epicenters during 1980.

WASHINGTON EARTHQUAKES, 1980

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The Geophysics Program of the University of Washington located about 2,500 earthquakes within Washington and northern Oregon during 1980. Approximately 70% of these events were associated with the renewed eruptive activity at Mt. St. Helens in southwestern Washington. Because of the size, duration, and sudden onset of activity related to Mt. St. Helens the data set is incomplete from March 20 to May 31. An intense earthquake swarm that began in late March centered on the northwest flank of the volcano culminated in a major lateral eruption on May 18. Less intense swarms have accompanied all subsequent eruptions. Furthermore, a zone of elevated regional seismicity extending 50 km northwest and 20 km southeast of Mt. St. Helens that developed following the May 18 eruption continued to be unusually active throughout 1980. The preliminary epicenter map (fig. 56) shows felt earthquakes and events greater than M = 2.8 with the following exceptions: none of the Mt. St. Helens and only some larger non-Mt. St. Helens earthquakes were plotted from the interval March 20 to May 18. During that interval over 700 earthquakes generally greater than M = 3.5 were located within a very small volume on the northwest flank of Mt. St. Helens.

The Washington State Seismograph Network consists of several regional networks funded primarily by U.S. Geological Survey and Department of Energy contracts. Major network changes during 1980 included the following:

1. Addition of 11 stations along the Olympic Penninsula (July 1980).

2. Installation of 6 temporary 5-day recorders around Mt. St. Helens in March.

3. Replacement of some 5-day sites with telemetered stations.

4. Additional station installations to improve station distribution and density in the area around Mt. St. Helens.

5. Twenty northern Oregon stations began to be telemetered to the University of Washington in November 1980.

By December 1980 seismic data from about 106 stations was being received at the University of Washington Geophysics program in Seattle.

All seismic data received at the University of Washington prior to 1980 was discriminated, filtered, and the individual channels recorded on analog recorders. See Noson and Crosson (1980) and Malone (1976) for descriptions of past network operations. In early 1980 the University began a transition to an event-triggered on-line digital recording system using a Digital Equipment Corporation PDP11/34 minicomputer supplied by the U.S. Geological Survey. By late March all stations received were recorded on-line by the 11-34. The on-line recording system was closely modeled after the CEDAR system conceived and implemented at Cal Tech by Carl Johnson (1979). The University of Washington code was written by Carl Johnson and Alex Bittenbinder. Although data from the digital system was used for most of the data analysis, a subset of stations continue to be recorded on the analog recorders. The analog records provide continuous coverage of late-arriving phases, the complete coda for magnitude determinations for larger events, and a backup for the digital system. Data from several widely spaced stations record on helicorders to provide a real-time visual monitor of state-wide activity.

Data analysis prior to 1980 involved processing phase data hand-read from visually scanned, multichannel 16mm Develocorder film records. Data from Western Washington and Eastern Washington was processed separately using independent programs to determine hypocenter locations, prepare epicenter maps, and produce data catalogs. A transition to uniform data processing began in 1980 following implementation of the on-line recording system. A DEC PDP11/70 minicomputer supplied by the U.S. Geological Survey was used for the off-line processing of all seismic data recorded by the on-line system. Computer code to demultiplex, display, time and archive trace data as well as location routines, plotting routines and other analytic routines have been either written by the University of Washington staff or adapted by them from other programs for local applications. For a detailed description of current University of Washington seismic processing see Malone and Zollweg (1982).

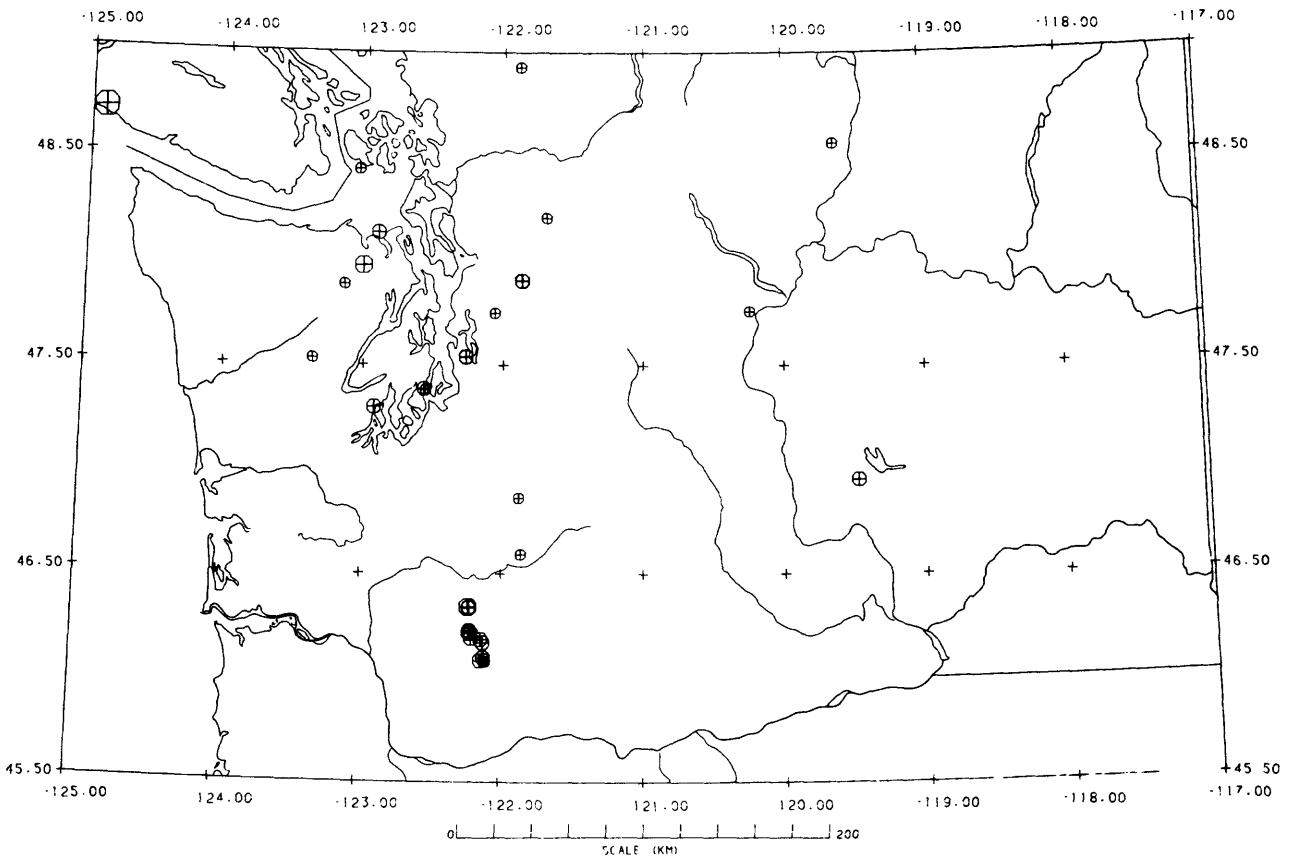

FIGURE 56.--Washington earthquake epicenters during 1980.

Miscellaneous Activities

CRUSTAL MOVEMENT STUDIES

Vertical Control Surveys

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Refraction Error

Determinations of crustal movements by analysis of leveling data have been received skeptically by the North American geodetic community in recent years. The leveling data is frequently suspected of carrying high levels of systematic error, the worst of the systematic errors being refraction. For this reason, the problem of leveling refraction has been restudied.

Stationary and nonstationary refraction tests have been conducted at several locations in the conterminous United States. The stationary tests were conducted outdoors, by sighting on rods placed at various distances (30, 45, and 60 meters) at all times of the day. Temperatures were measured at heights of 0.5, 1.5, and 2.5 meters above ground. The results from Gaithersburg, Maryland, and Tucson, Arizona, showed large accumulations of refraction error. Application of refraction corrections by Garfinkel and Kukkamaki showed excellent remedial results. In most cases 80 percent or more of the refraction error was removed by the corrections.

A new model of temperature stratification developed by Holdahl enabled predictions of the vertical temperature differences, Δt, for input to Kukkamaki's refraction corrections. The predicted Δt values worked about as well as the observed values when applied to the refraction test measurements. The model is based on recorded histories of solar radiation, precipitation, and sky cover at approximately 190 weather stations distributed throughout the conterminous United States. This model will have far-reaching impact on crustal movement studies based on repeat levelings. All historical levelings in the United States will be upgraded by application of the refraction correction prior to being placed in the data base for use in crustal movement investigations.

Recomputation of the Palmdale Uplift

The Palmdale Bulge, an apparent uplift in southern California, is now believed by geodesists to be an artificial feature caused by different amounts of refraction error in the various leveling surveys used in the original analysis by Castle and others (1976). W. E. Strange (1981) used approximate refraction corrections based on the table of values obtained by A. C. Best in England. Strange concluded that the 35 cm bulge reported by Castle could not be constructed from leveling data that are properly corrected for refraction. Holdahl (1982) has since computed vertical motion in southern California (fig. 57) using the new model of temperature stratification to correct for leveling refraction. Holdahl's computation combined refraction-corrected levelings performed between 1959 and 1975 in a network adjustment, and solved for heights at a selected reference time as well as coefficients to describe the regional pattern of elevation change. The computed velocity for any point in the region was in no case greater than twice its computed standard deviation. The adjustment model fits the data reasonably well. The rate of uplift at Palmdale was only 4.9 ± 2.7 mm/yr, which accounts for only 7.4 cm over a 15-year period. Holdahl concluded that no significant movement is taking place. The Palmdale leveling data are particularly subject to refraction error because they spanned the time when procedural and instrumentation changes led to use of shorter sight lengths. Some of the links in the southern California network have height-distance relationships which are optimum for accumulation of refraction error, and solar radiation levels are very high for the region.

Horizontal Control Surveys

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In support of the project to redefine the North American Horizontal Datum, the National Geodetic Survey (NGS) has undertaken the task of modeling historical horizontal crustal deformation for various seismically active regions of the United States. During the adjustment of the

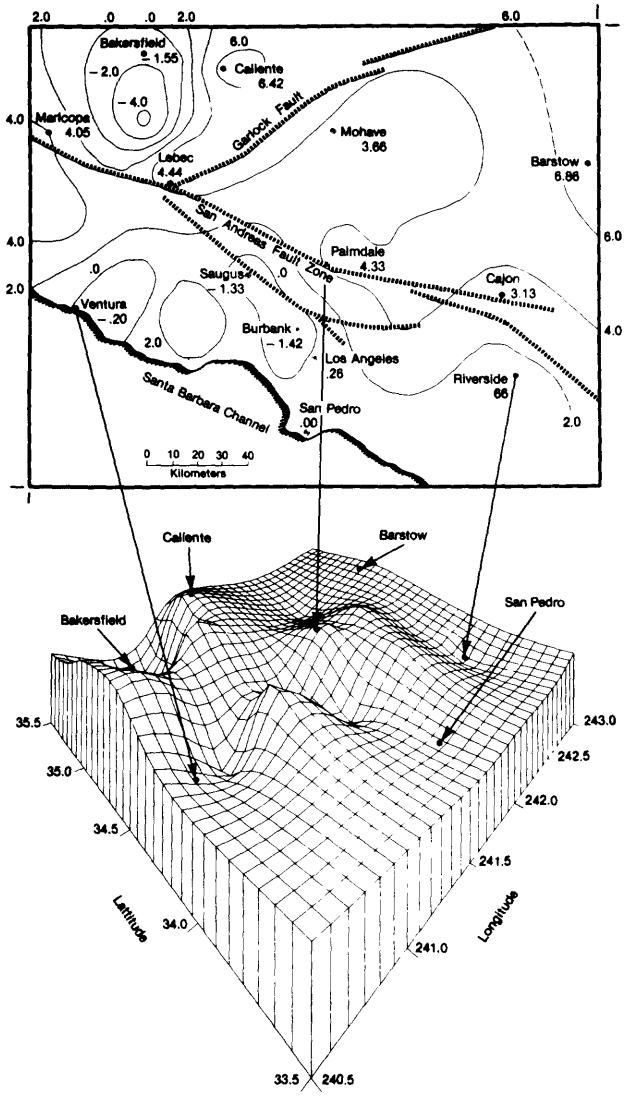

FIGURE 57.--Contour and 3-dimensional plots of the velocity surface for the region surrounding Palmdale, California. Units are in mm/yr.

North American observations, these models will account for the time variability of station coordinates. Secular motion within a region will be modeled as a mosaic of blocks which are allowed to individually translate, rotate, and deform as a linear function of time. Moreover, the deformation within each block will be a linear function of position. Episodic displacements resulting from major earthquakes will be modeled in accordance with the theory of dislocation in an elastic halfspace. The first model has been derived for the southern California region that extends northward from Mexico for approximately 100 km to 33.5° N. latitude. Triangulation data in the region date to the 1910 era; however, most of the data was observed since the late 1930's. Reliable trilateration data of modest quantity exist only for the past decade. The spatial and temporal distribution of azimuth observations is insufficient to detect rotations of less than 0.3 rad/yr. The derived strain pattern reveals that the region spans the Pacific-North American plate boundary with secular strain rate decreasing with distance from the Imperial-San Jacinto fault system. The zone of deformation is at least 200 km wide as (engineering) shear strain rates in excess of 0.1 rad/yr are experienced from the Pacific coast to the Colorado River.

SPACE TECHNOLOGY

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The activities of Federal organizations, including the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA), the U.S. Geological Survey (USGS), the National Science Foundation (NSF), and the Defense Mapping Agency (DMA) involving the application of space techniques to the study of geodynamics have been organized into a coordinated Federal program, managed by an interagency Program Review Board.

The principal space techniques currently available for precise measurements of crustal deformations and motions are independent clock astronomical radio interferometry (VLBI using signals from extragalectic radio sources) and laser ranging to the Moon and artificial satellites, particularly LAGEOS. The VLBI and satellite laser ranging (SLR) methods employ both fixed and mobile stations.

The strategy is to define a Conventional Terrestrial System (CTS) by a set of fixed observatories. The observatories will regularly monitor the orientation of the Earth relative to some "inertial" reference frame, defined by a radio source catalog, or satellite ephemerides. The fixed observatories also will be used to monitor global scale geodynamics phenomena such as the relative motion of the primary plates. Regional and local scale crustal deformation and motions will be monitored by the mobile systems, through periodic visitations to stations of the National Crustal Motion Network (NCMN). (See fig. 58).

Report of Progress

During 1980 and 1981, the coordinated Federal program has progressed through the planning stages into the observing or data collecting stage. The Harvard Radio Astronomy Station

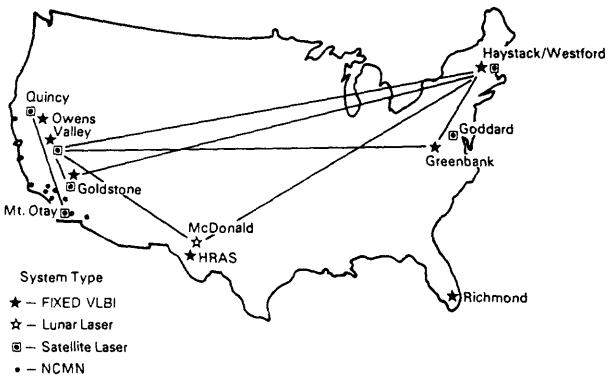

FIGURE 58.--Key measurement locations for space systems in the United States.

(HRAS) and Westford Radio Astronomy Station, the first two stations of the VLBI polar motion and Earth rotation monitoring system being developed by the National Geodetic Survey (NOAA) as POLARIS observatories, began weekly observing sessions in June 1981. Each session yields estimates of the X-components of polar motion with a formal uncertainty of 5 to 10 cm, and of UT1-UTC to a few milleseconds. The third station of the network, the Richmond POLARIS Observatory, is scheduled to become operational in time for the IAU/IUGG sponsored MERIT main campaign in September 1983.

The series of VLBI measurements between Haystack and Owens Valley Radio Observatory, a baseline of nearly 4000 km across the North American continent, was continued using the state-of-the-art MARK III VLBI system. The combined series of MARK I and MARK III measurements, which now span some 8 years, indicate no significant change in the baseline length at the 1 cm/yr level.

A series of VLBI measurements of baselines between the Owens Valley Radio Observatory, Goldstone, and the ARIES mobile system at Pasadena, have been interpreted as possibly displaying episodic motions of the Pasadena station; but more recent study of the statistical significance of that finding indicates that it may be impossible to discriminate reliably between episodic and uniform motion with the present set of measurements.

The NASA Goddard Space Flight Center and the University of Texas are routinely producing polar motion and length-of-day determinations, at 5-day intervals, from the LAGEOS SLR data. The resolution of individual SLR determinations are perhaps an order of magnitude worse than VLBI values. Comparison of the SLR smoothed tracks of the pole, having 10 cm precision, with VLBI and BIH polar motion values, indicates the Bureau International de l'Heure (BIH) values are still contaminated with systematic errors at the few decimeter level.

During 1981, NGS and NASA began developing the National Crustal Motion Network (NCMN) in the southwestern region of the United States, with particular emphasis on California stations. Initial measurements have been made at eight stations by the Jet Propulsion Laboratory of the California Technological Institute, seven in California and one in Arizona, using mobile VLBI equipment; and at three stations in Utah, New Mexico, and California by the University of Texas using mobile laser equipment. The Goddard Space Flight Center has continued to monitor the change in length of a 900 km baseline spanning the San Andreas fault, from Quincy to Mt. Otay. The apparent contemporary rate of motion between the North American and Pacific plates implied by these measurements is 8 + 3 cm/yr (Fischetti, CSTG Bulletin, No. 3, 1981, p. 44).

TSUNAMIS

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During 1980, three tsunamis were reported to the National Oceanic and Atmospheric Administration (NOAA), including one which was recorded on NOAA tide gages.

On February 23, an earthquake (mag. 7.0 MS) in the Kuril Islands (43.5° N., 146.8° E.), caused a tsunami that was reported to be 10 cm at Nemuro, Japan.

The June 29 earthquake (mag. 6.2 MS) near the south coast of Honshu, Japan (34.8° N., 139.2° E.), caused a 9 cm tsunami at Mera.

The July 17, Santa Cruz Islands earthquake (12.5° S., 165.9° E., mag. 7.9 MS) generated a tsunami that was fairly widely recorded. Recorded heights included 27 cm at Kona, and Kahului, Hawaii; 12 cm at Honolulu; 11 cm at Midway, and 10 cm at Hilo.

PRINCIPAL EARTHQUAKES OF THE WORLD

Table 6 lists principal world earthquakes for 1980. The list has been included in this annual series since 1941. It includes earthquakes of magnitude 6.8 or greater; those of smaller magnitude that were locally destructive to life and property; and events of unusual interest.

Table 6.--*Principal earthquakes of the world during 1980*

Date (1980)	Origin time (UTC) hr min sec	Geographic Coordinates Lat. (°) Long. (°)	Depth (km)	USGS Magnitude mb	USGS Magnitude MS	Other Magnitude	Region	Remarks
Jan. 1	16 42 40.0	38.81 N. 27.78 W.	10	6.0	6.7	7.2MS(BRK) 6.9mb(PAS) 6.8MS(PAS)	Azores Islands	At least 56 killed, 400 injured and extensive damage on Terceira Island. Four killed, some injuries, and extensive damage on Sao Jorge.
Jan. 2	20 58 44.2	5.98 N. 126.19 E.	63	6.0		6.9MS(BRK) 6.9mb(PAS) 6.5MS(PAS)	Mindanao, Philippine Islands	Felt on southern Mindanao.
Jan. 24	19 00 09.7	37.83 N. 121.79 W.	8	5.3	5.9	5.5ML(BRK)	Central California	One killed (possible heart attack), 44 injured and moderate damage in the Livermore area.
Feb. 3	11 58 39.8	17.65 S. 171.18 W.	33	6.2	6.4	6.4MS(BRK) 6.8mb(PAS) 6.2MS(PAS)	Tonga Islands region	Felt at Apia, Samoa Islands.
Feb. 23	05 51 03.2	43.53 N. 146.75 E.	44	6.3	7.0	6.9MS(BRK) 7.1mb(PAS) 7.0MS(PAS)	Kuril Islands	Felt at Malokurilskoye, Kurilsk, and Yuzhno-Kurilsk. Also felt on Hokkaido. Tsunami recorded.
Feb. 27	21 17 20.2	6.02 S. 150.19 E.	53	5.8	6.6	6.8MS(BRK) 6.7MS(PAS)	New Britain region	Felt strongly on New Britain.
Feb. 27	21 35 21.3	6.19 S. 150.23 E.	66	5.6		6.8MS(BRK) 6.6MS(PAS)	New Britain region	
Mar. 8	22 12 10.3	22.67 S. 171.36 E.	38	6.1	6.7	7.1MS(BRK) 6.4mb(PAS) 6.7MS(PAS)	Loyalty Islands region	
Mar. 24	03 59 51.3	52.97 N. 167.67 W.	33	6.2	6.9	7.1MS(BRK) 6.8mb(PAS) 6.9MS(PAS)	Fox Islands, Aleutian Islands	Minor damage at Nikolski.
Mar. 26	20 43 37.9	23.87 N. 45.56 W.	10	5.9	6.3	6.8MS(BRK) 5.7mb(PAS) 6.3MS(PAS)	North Atlantic Ridge	
Apr. 13	18 04 31.9	23.47 S. 177.30 W.	79	6.7		6.5mb(BRK) 7.2mb(PAS)	Fiji Islands region	

Table 6.--*Principal earthquakes of the world during 1980*--Continued

Date (1980)	Origin time (UTC) hr min sec	Geographic Coordinates Lat. (°) Long. (°)	Depth (km)	USGS Magnitude mb	USGS Magnitude MS	Other Magnitude	Region	Remarks
May 14	11 26 00.6	6.00 S. 154.51 E.	57	6.1		6.5MS(BRK) 6.9mb(PAS) 6.3MS(PAS)	Solomon Islands	
May 18	20 02 57.5	43.29 N. 20.84 E.	9	5.7	5.8		Yugoslavia	Thirty people injured and extensive damage at Aleksandrovac, Brus, Kursumlija, and Raska.
June 9	03 28 18.9	32.22 N. 114.98 W.	5	5.6	6.4	6.1ML(PAS)	Baja California, Mexico	One killed, 100 injured, and considerable damage southeast of Mexacali.
June 18	10 49 10.0	15.27 S. 173.57 W.	43	5.9	6.5	6.8MS(BRK) 6.6mb(PAS) 6.7MS(PAS)	Tonga Islands	Felt at Apia, Samoa Islands.
June 18	17 14 54.5	9.47 N. 126.66 E.	54	5.8	6.8	7.2MS(BRK) 6.8mb(PAS)	Mindanao, Philippine Islands	Felt at Surigao.
June 25	23 18 20.4	5.23 S. 151.69 E.	49	6.2	6.5	6.5MS(BRK) 6.9mb(PAS) 6.3MS(PAS)	New Britain region	Felt at Rabaul.
July 8	23 19 19.8	12.41 S. 166.38 E.	33	5.9	7.5	7.8MS(BRK) 7.2MS(PAS)	Santa Cruz Islands	Felt in the Banks and Santa Cruz, Islands.
July 9	02 11 52.8	39.27 N. 23.04 E.	14	5.8	6.4		Aegean Sea	One killed, many injured, and extensive damage in Magnisia Province, Greece.
July 9	20 56 53.2	12.69 S. 166.00 E.	33	5.2	6.7	6.9MS(BRK) 6.4MS(PAS)	Santa Cruz Islands region	Felt.
July 16	19 56 46.7	4.46 S. 143.52 E.	84	6.5		6.8MS(BRK) 6.9MS(PAS)	Papua, New Guinea	Felt in Papua and West Irian.
July 17	19 42 23.2	12.52 S. 165.92 E.	33	5.8	7.9	8.0MS(BRK) 7.5MS(PAS)	Santa Cruz, Islands	Felt in the Banks and Torres, Islands. Tsunami recorded.
July 22	05 17 10.1	37.19 N. 50.20 E.	62	5.4			Caspian Sea	One killed, several injured, and damage in the Lahijan-Rasht area, Iran.
July 22	07 06 23.0	20.30 S. 169.61 E.	122	6.1		6.8mb(BRK) 6.7mb(PAS)	Vanuatu Islands	

Table 6.--*Principal earthquakes of the world during 1980*--Continued

Date (1980)	Origin time (UTC) hr min sec	Geographic Coordinates Lat. (°) Long. (°)	Depth (km)	USGS Magnitude mb	USGS Magnitude MS	Other Magnitude	Region	Remarks
July 29	03 11 56.3	13.10 S. 166.34 E.	48	5.9	6.7	7.2MS(BRK) 6.6mb(PAS) 6.7MS(PAS)	Vanuatu Islands	
July 29	14 58 40.8	29.60 N. 81.09 E.	18	6.1	6.5	6.6MS(BRK) 6.6MS(PAS)	Nepal	One-hundred-fifty to two-hundred killed, many injured, and extensive damage in western Nepal. Thirteen killed, 40 injured, and damage in the Pithoragarh area, India.
Aug. 9	05 45 09.5	15.89 N. 88.52 W.	22	6.1	6.4	6.7MS(BRK) 6.3mb(PAS) 6.4MS(PAS)	Guatemala	Two killed, many injured, and damage in Izabal Province, Guatemala. Damage also in northern Honduras.
Aug. 18	15 07 52.6	1.95 S. 80.02 W.	55	5.6		5.6MS(BRK) 6.1mb(PAS)	Ecuador	Eight killed, 100 injured, and extensive damage in the Guayaquil area.
Aug. 21	12 07 20.1	41.32 S. 80.51 E.	10	5.6	6.3	6.8MS(BRK) 6.2MS(PAS)	Mid-Indian Rise	
Aug. 23	21 36 51.6	32.91 N. 75.63 E.	25	5.2	4.9		Kashmir, India	Fifteen killed, 40 injured, and many houses damaged in the Bhaddu area.
Aug. 23	21 50 03.0	32.83 N. 75.63 E.	33	5.2	4.8		Kashmir, India	Casualties and damage in the Bhaddu area.
Sept. 23	19 10 22.7	35.95 N. 139.63 E.	89	5.4			Honshu, Japan	One killed and five injured.
Sept. 24	17 54 24.1	35.45 N. 139.96 E.	73	6.0		5.9mb(BRK)	Honshu, Japan	Two killed, 73 injured, and damage in the Tokyo-Tateyama-Utsunomiya area.
Oct. 10	12 25 23.5	36.19 N. 1.35 E.	10	6.5	7.3	7.7MS(BRK) 7.2mb(PAS) 7.2MS(PAS)	Algeria	At least 5000 killed and 9000 injured. Extensive damage in the El Asnam area.
Oct. 24	03 25 34.4	21.99 S. 170.16 E.	33	5.8	6.7	6.6MS(BRK) 6.7mb(PAS) 6.8MS(PAS)	Loyalty Islands region	Felt.
Oct. 24	14 53 35.1	18.21 N. 98.24 W.	72	6.4		7.0MS(BRK) 6.6mb(BRK) 7.0mb(PAS)	Central Mexico	At least 300 killed, many injured, and about 150,000 homeless. Extensive damage in the Huajuapan de Leon area.

Table 6.--*Principal earthquakes of the world during 1980*--Continued

Date (1980)	Origin time (UTC) hr min sec	Geographic Coordinates Lat. (°) Long. (°)	Depth (km)	USGS Magnitude mb	USGS Magnitude MS	Other Magnitude	Region	Remarks
Oct. 25	11 00 05.1	21.89 S. 169.85 E.	33	5.8	7.2	7.1MS(BRK) 7.0MS(PAS)	Loyalty Islands region	Felt.
Nov. 8	10 27 34.0	41.12 N. 124.25 W.	19	6.2	7.2	7.0ML(BRK)	Near the coast of northern California	Six people injured and moderate damage along the coastal areas.
Nov. 11	10 36 58.2	51.42 S. 28.80 E.	10	6.2	6.7	6.8MS(BRK) 6.5mb(PAS) 6.3MS(PAS)	South of Africa	
Nov. 12	06 58 11.6	13.35 S. 74.54 W.	71	4.9			Peru	Seven killed and many homeless in the Ayacucho area.
Nov. 23	18 34 53.8	40.91 N. 15.37 E.	10	6.0	6.9	7.2MS(BRK) 6.7mb(PAS) 6.9MS(PAS)	Southern Italy	Over 3000 killed, 1900 missing, 7750 injured, 250,000 homeless, and extensive damage.
Nov. 26	17 35 39.1	8.04 N. 72.44 W.	40	5.0	3.8		Colombia	Thirty-six people injured and 30 buildings damaged in the Cucuta area.
Dec. 15	08 12 45.4	17.59 S. 172.30 W.	33	6.1	6.3	6.8mb(PAS) 6.2MS(PAS)	Tonga Islands region	Felt at Apia, Samoa Islands.
Dec. 17	16 21 58.8	49.48 N. 129.50 W.	10	5.9	6.8	6.0mb(PAS)	Vancouver Island region	
Dec. 19	01 16 56.0	34.59 N. 50.65 E.	33	5.6	5.8		Iran	Twenty-six killed in the Qom-Saveh area.
Dec. 22	12 51 21.0	34.50 N. 50.59 E.	41	5.5	5.2		Iran	Three killed and 139 injured in the Qom area.

Abbreviations used in the Other Magnitude column: BRK--University of California, Berkeley; PAS--California Institute of Technology, Pasadena.

Strong-Motion Seismograph Data

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INTRODUCTION

The first engineering seismology program in the United States was administered by the Seismological Field Survey of the Coast and Geodetic Survey (C&GS). This program was begun in 1931 and effectively remained the responsibility of the Seismological Field Survey (SFS) for more than 40 years. During this period the SFS was shifted from one acronymic agency to another, including C&GS, ESSA, NOS, NOAA, ERL, ESL, and finally, in 1973, USGS; soon afterwards the SFS became the Seismic Engineering Branch of the USGS. In spite of these numerous high-level administrative changes, the program has retained a distinct identity and its basic objectives and field-level operations have remained remarkably consonant throughout the years.

The current program of strong-motion instrumentation administered by the USGS is supported by the National Science Foundation (Grant CA-114) in cooperation with both private industry and educational institutions, as well as numerous Federal, State, and local agencies and organizations. The objectives of the program are to record strong ground motions and the response of representative types of engineered structures during potentially damaging earthquakes and to disseminate processed data and information about the records, sites, and structures to external users in earthquake engineering research and design practice and engineering seismology. The dissemination of this information and data is achieved in various ways.

Preliminary earthquake reports and a summary of recent accelerograph records are presented on a regular basis in Seismic Engineering Program Reports, a USGS Circular. These summaries include a brief description of the earthquake and strong-motion recording station, the results of routine scalings of those records that contain peak accelerations greater than 0.05 g, and photographic reproductions of many of the more significant accelerograms. The program reports also contain abstracts of recent reports, notes on strong-motion information sources and the availability of digitized data, and other information pertinent to the USGS and other strong-motion programs.

Strong-motion event and strong-motion data reports are periodically published as USGS Open-file Reports and include the results of digitization and routine analyses of strong-motion accelerograms that contain peak accelerations greater than 0.10 g or are related to a specific event, particular strong-motion station, or geographic group of stations. The minimum acceleration level is based primarily on the current capability of the USGS to process strong-motion records and may vary with both the degree of seismic activity and number of personnel available at any given time. Although maximum acceleration is not directly related to frequency content or duration of strong-motion, the peak acceleration can be readily obtained from an accelerogram and thus the value is commonly used as a general indicator of the potential significance of the record. Detailed information on the availability of digitized data from various sources is published regularly in Seismic Engineering Program Reports.

The Strong-Motion Accelerograph Station List is periodically published as a USGS Open-file Report and includes information on all of the accelerograph stations in the western hemisphere known to the USGS. Because of the ever-changing nature of this information, it is impossible to have a complete list of all of the stations in existence at any one time. Rather, the list is intended to provide that community of persons interested in strong-motion programs with a reasonably complete indication of the current status of the various strong-motion networks. Information presented in this list includes the station name and geographic coordinates, site characteristics, type and size of structure, location of instruments, and the primary sources of data. The current list contains information on approximately 1350 stations located in the United States, Canada, the Caribbean, and throughout Central and South America (Switzer and others, 1981).

A strong-motion information retrieval system (SMIRS) has been developed to provide up-to-date information about strong-motion records and the circumstances in which they were recorded. The system is accessible through a data terminal (30 cps, half duplex). A user's manual is available (Converse, 1978). To retrieve information, dial (415) 329-8600 and place the telephone handset into the terminal. When the carrier light comes on, press the "line-feed" key and wait for the computer to respond (two lines will be printed); type the following:

enter yourname SMIRS

Type the "enter" and "SMIRS" exactly as shown above, but replace yourname with your own name. The word "enter" is five lowercase characters followed by one space; your name is typed as one continuous character string and followed by one space; and "SMIRS" is five uppercase characters. Type the carriage-return key and then the line-feed key; then you will be given instructions.

ACCELEROGRAPH DATA

Table 7 is a summary of the 314 records recovered from USGS strong-motion stations during 1980. This number is contrasted with a yearly average of 216 records for the period 1972 to 1979 inclusive. Additionally, many accelerograms were recovered in 1980 at stations operated by the California Division of Mines and Geology's Office of Strong-Motion Studies (OSMS). Recent state legislation has given responsibility to OSMS for the dissemination of that organization's strong-motion data, which is no longer routinely listed in Seismic Engineering Program Reports.

The earthquakes (table 7) are listed in chronological order and include date, time (UTC), general location, geographic coordinates, and magnitude. Information about the recording station consists of the name and location, owner, and geographic coordinates. Record data include S-wave minus trigger time and the orientation, maximum acceleration, and duration of strong-motion (greater than 0.10 g) for each instrument component. Record data is included only when one or more components recorded at least 0.05 g at ground stations or 0.10 g at upper floors of buildings. The event information has been compiled principally from the Preliminary Determination of Epicenters, published by the Geological Survey.

The following paragraphs summarize the results of the most significant earthquakes from which strong-motion records were obtained in 1980; the abridged reports have been abstracted from Seismic Engineering Program Report, Geological Survey Circular 854-A.

A magnitude 5.5 earthquake near Livermore on January 24 activated USGS accelerograph stations at the Livermore VA Hospital and at the California Department of Water Resources Del Valle Dam (fig. 59). Records from the VA Hospital show peak accelerations of 0.18 g and 0.59 g at the basement and roof (7th) levels, respectively. The maximum acceleration recorded at Del Valle Dam was 0.24 g at both the crest and toe stations; the duration of strong shaking (greater than 0.1 g), however, was more than three times longer at the crest site (fig. 60).

More than 500 aftershocks were recorded on seismographs during the following 30 days (Cockerham and others, 1980), including a magnitude 5.8 event on January 26 (January 27, 0233 UTC) that also triggered the accelerographs at the VA Hospital and at Del Valle Dam. Peak accelerations from this large aftershock, which occurred approximately 10 km southeast of the main shock epicenter, were 0.06 g and 0.24 g at the hospital basement and roof levels, respectively. The accelerographs at Del Valle Dam recorded peak accelerationss of 0.06 g at the toe station and 0.07 g on the crest (fig. 61).

Although the January 26 aftershock has been given a higher local magnitude rating and was located approximately 10 km closer to the VA Hospital and Del Valle Dam stations than the main shock, the recorded peak accelerations for the aftershock are only 0.25-0.33 as high as the main-shock accelerations.

In addition, 21 strong-motion records from each of the two Livermore events were recovered from stations operated by the California Division of Mines and Geology's Office of Strong-Motion Studies (OSMS). Peak horizontal ground accelerations from these stations were generally larger for the January 26 aftershock than for the main shock (McJunkin and Ragsdale, 1980; also, see fig. 59 and table 8).

These apparent inconsistencies in the peak acceleration data suggest that a consideration of magnitude and distance alone may not always be sufficient for predicting peak ground acceleration. This data set, which contains numerous accelerograms from both the January 24 main shock and January 26 aftershock that were recorded at the same sites, was used by Boore and Porcella (1980) to show that peak acceleration levels can have a strong dependence on azimuth and may be interpreted as a result of directivity.

The February 25, magnitude 5.5 earthquake near Anza in southern California triggered 16 accelerographs at USGS strong-motion stations; peak horizontal ground acceleration exceeded 0.05 g at eight stations (see table 7 and fig. 62). Additionally, 25 accelerographs operated by the California Division of Mines and Geology's OSMS were triggered by this event; these stations are within an epicentral distance of 25-105 km and produced a maximum horizontal ground acceleration of 0.18 g at Puerta La Cruz.

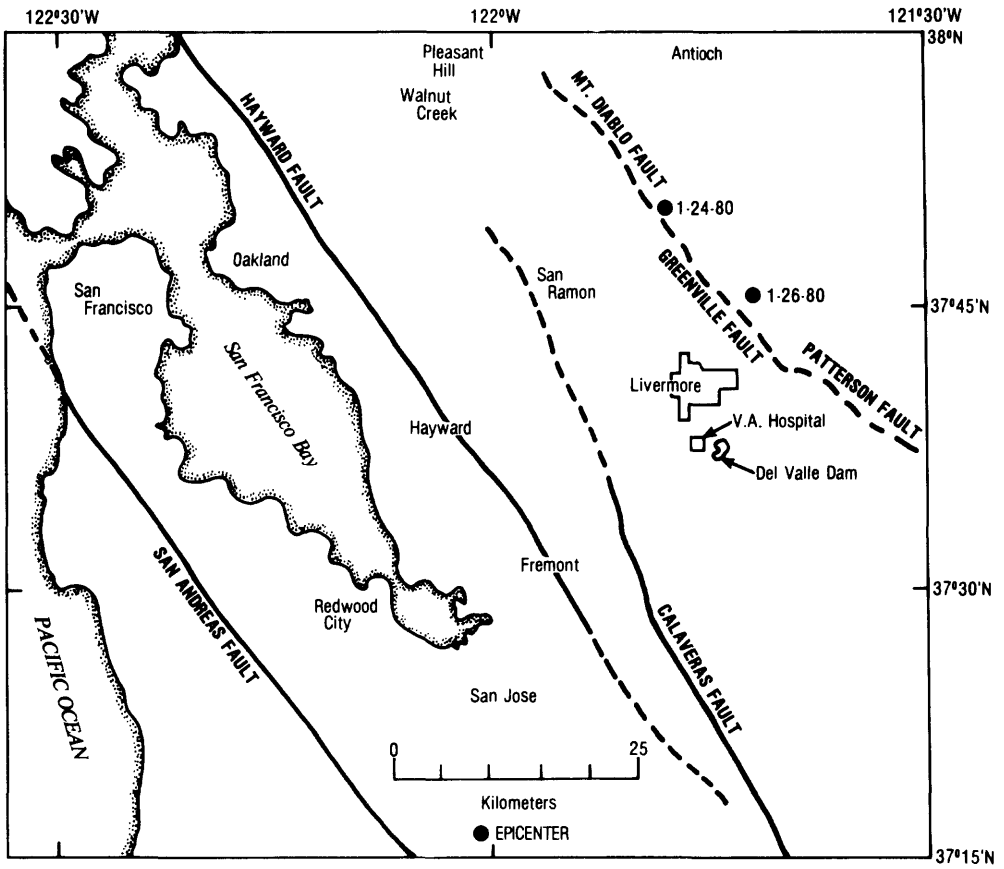

FIGURE 59.--Location map for the Livermore earthquakes of January 24 and 26, 1980; fault locations (from Rogers, 1966) are approximate.

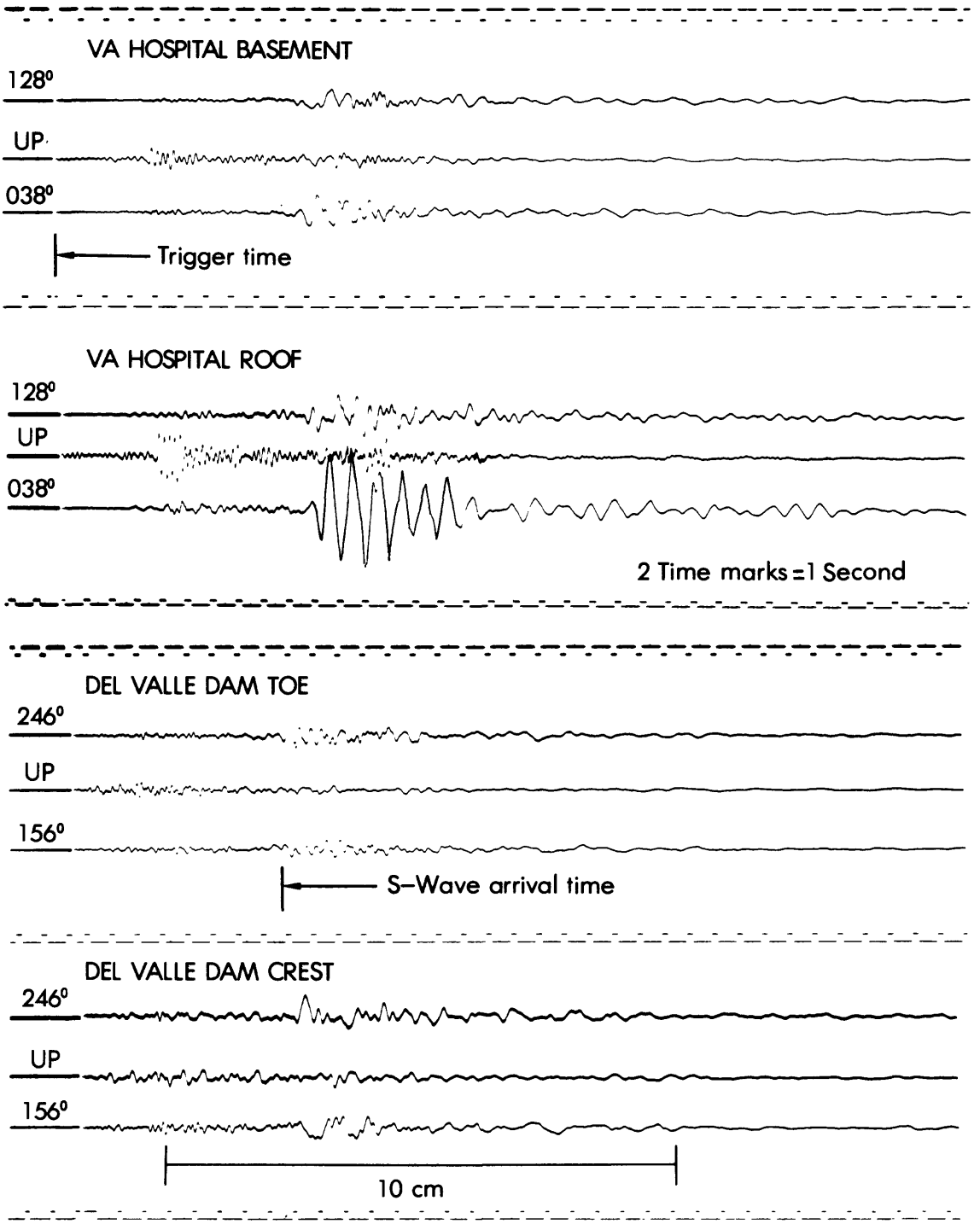

FIGURE 60.--Accelerograms from the January 24, 1980 Livermore, California, earthquake; component label indicates direction of ground acceleration for upward trace deflection on accelerogram. See table 7 for peak acceleration values.

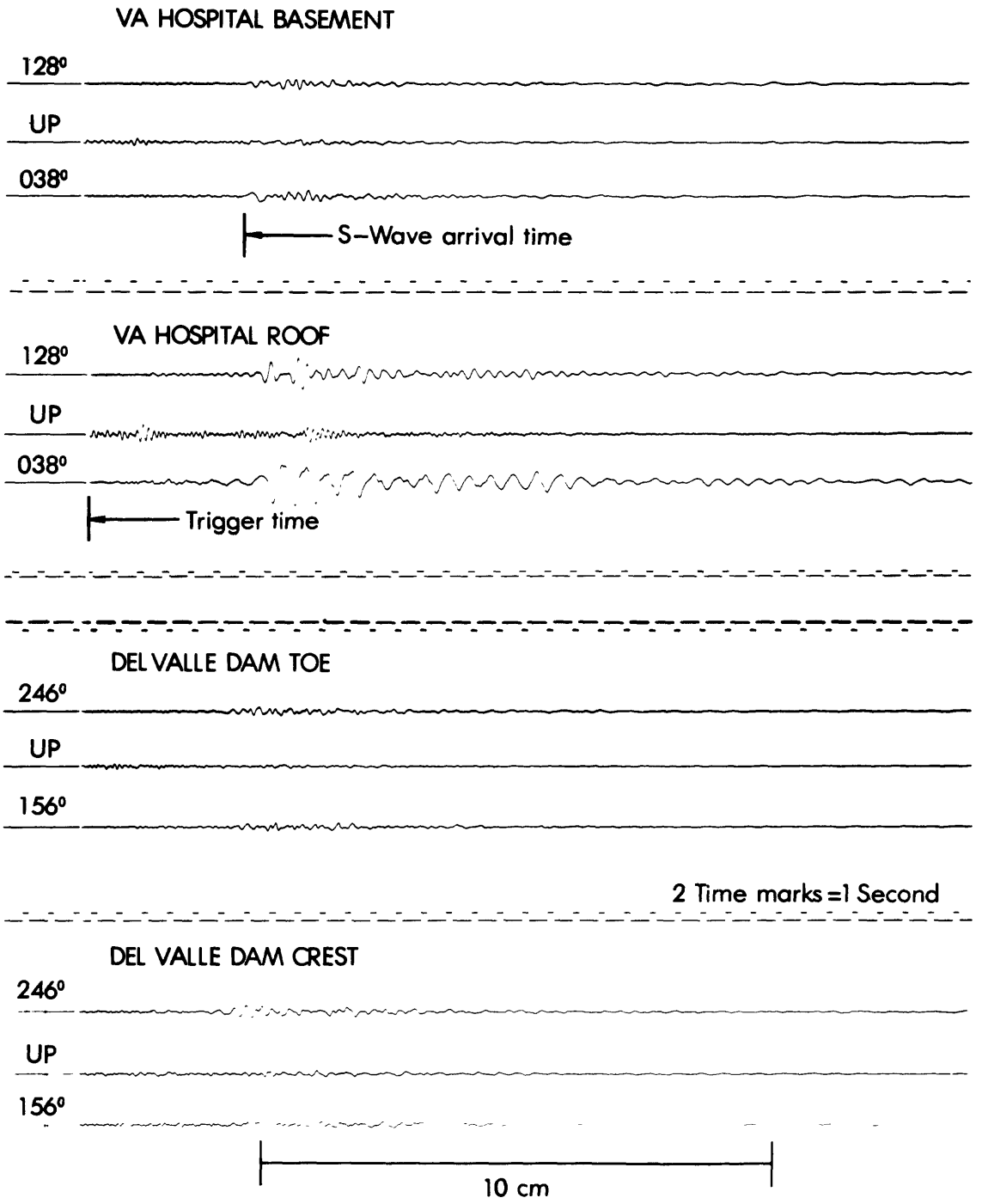

FIGURE 61.--Accelerograms from the January 26, 1980 Livermore aftershock; peak accelerations are listed in table 7.

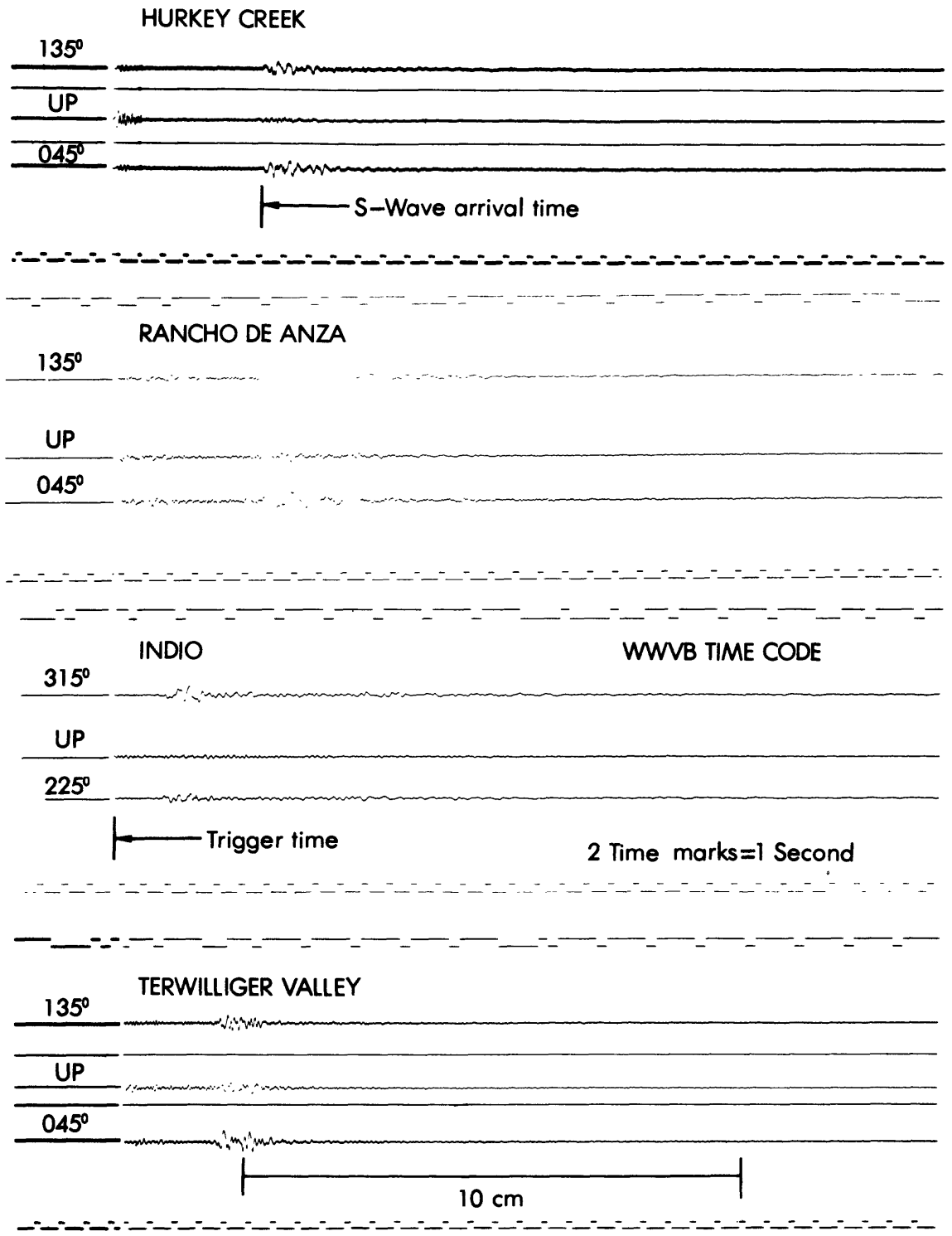

FIGURE 62.—Accelerograms from the February 25, 1980 Anza, California earthquake; peak accelerations are listed in table 7.

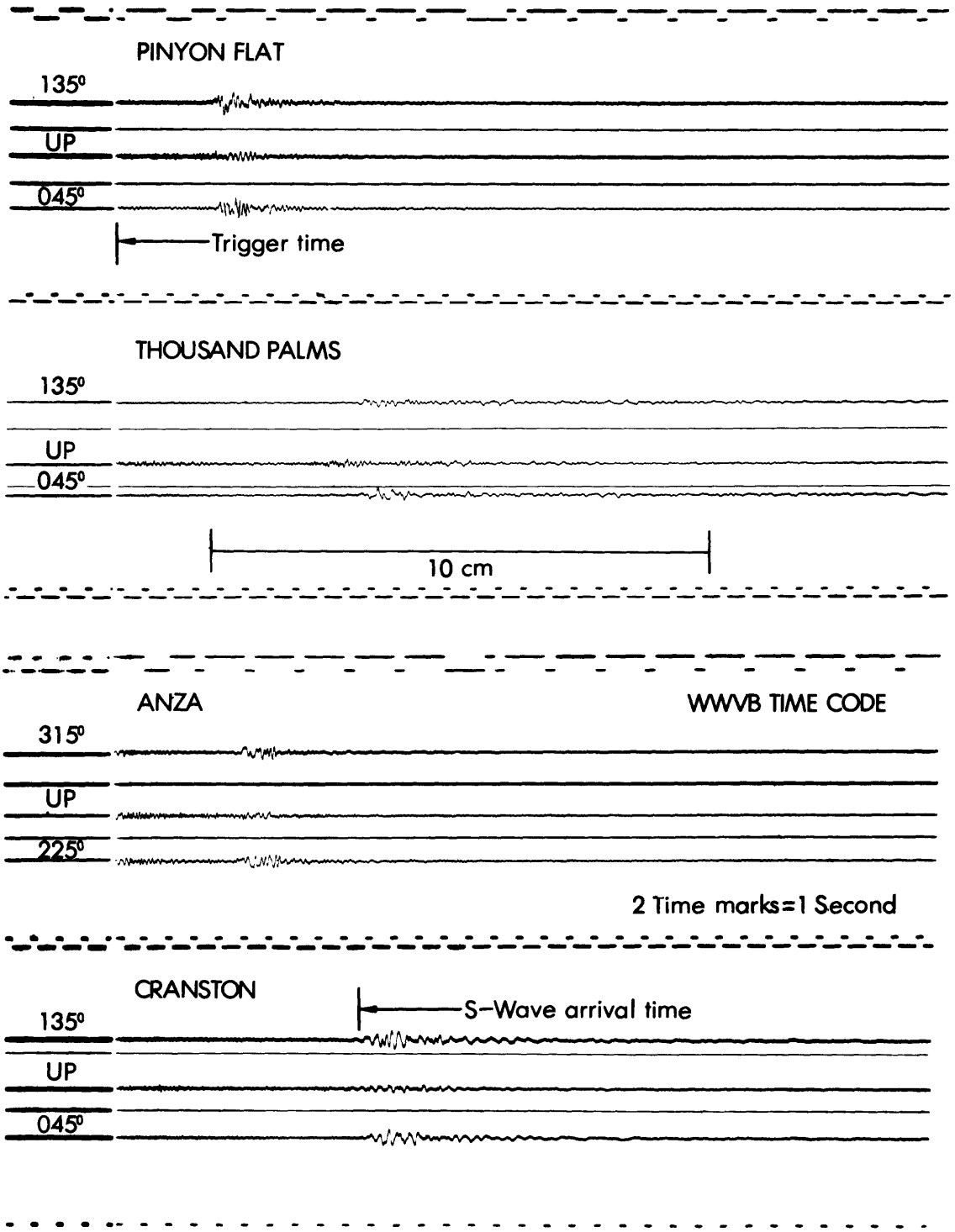

FIGURE 62.—Accelerograms from the Anza, California earthquake -- Continued.

Table 7.--*Summary of U.S. accelerograph records recovered during 1980*

Event	Station name (owner)[1]	Station coord.	S-t[2] (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
7 August 1979- 24 August 1979 Central California Epicenters and magnitudes unknown	APEEL Array Sta. 2E Hayward (USGS)	37.66° N 122.08° W	*	**		
	Note: One additional record** recovered at APEEL station 2E.					
17 October 1979 1607 UTC Jenkinsville, S.C. Epicenter and magnitude unknown	Monticello Dam (USGS)	34.304° N 81.333° W	*			
	Shared abutment (Center crest)				**	
18 October 1979 0807 UTC Jenkinsville, S.C. Epicenter and magnitude unknown	Monticello Dam (USGS)	34.304° N 81.333° W	*			
	Shared abutment (Center crest)				**	
20 October 1979 0625 UTC Central California 36.57N, 121.21W Magnitude 3.4	Bear Valley station 10 Webb Ranch (USGS)	36.53° N 121.14° W	1.4		**	
	Note: One additional record** recovered at station 10 (event unknown).					
	Bear Valley station 4 Bickmore Canyon (USGS)	36.57° N 121.22° W	1.0		**	
4 November 1979 1713 UTC So. California 33.08N, 115.55W Magnitude 3.6	Brawley Municipal Airport (USGS)	32.988° N 115.509° W	.8	315° Up 225°	0.13 .04 .13	1.2 - .8
21 October 1979- 4 January 1980 Central California Epicenters and magnitudes unknown	Bear Valley station 10 Webb Ranch (USGS)	36.53° N 121.14° W	.8	310° Up 220°	.05 .05 .06	- - -
	Note: One additional record** recovered at station 10.					
5 January 1980 2209 UTC Central California Epicenter and magnitude unknown	Bear Valley station 10 Webb Ranch (USGS)	36.53° N 121.14° W	.7		**	
8 January 1980 1935 UTC Central California Epicenter and magnitude unknown	Bear Valley station 10 Webb Ranch (USGS)	36.53° N 121.14° W	1.7		**	

Table 7.--*Summary of U.S. accelerograph records recovered during 1980*--Continued

Event	Station name (owner)[1]	Station coord.	S-t[2] (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
12 January 1980	El Centro array sta. 5	32.86° N	2.6	230°	0.07	-
2011 UTC	James Road	115.47° W		Up	.04	-
So. California	(USGS)			140°	.09	-
32.90N,115.52W						
Magnitude 4.4	Brawley	32.99° N	*		**	
	Municipal Airport	115.51° W				
	(USGS)					
	El Centro array sta. 6	32.84° N	2.7		**	
	Huston Road	115.49° W				
	(USGS)					
13 January 1980	Calipatria	33.13° N	2.8		**	
2113 UTC	Fire Station	115.52° W				
So. California	(USGS)					
33.12N, 115.70W						
Magnitude 3.5						
24 January 1980	Livermore	37.625° N	4.6			
1900 UTC	VA Hospital, Bldg. 62	121.762° W				
Central California	(VA)†					
37.85N, 121.82W						
Magnitude 5.5	Basement			128°	.12	1-peak
				Up	.12	4.2
				038°	.18	1.6
	Roof level			128°	.22	1.7
				Up	.27	4.6
				038°	.59	6.6
	Del Valle Dam	37.617° N	3.8			
	(CDWR)†	121.746° W				
	Toe			246°	.24	.9
				Up	.08	-
				156°	.14	1-peak
	Crest			246°	.24	2.8
				Up	.13	2-peaks
				156°	.13	1.4
27 January 1980	Del Valle Dam	37.617° N	2.7			
0233 UTC	(CDWR)†	121.746° W				
Central California						
37.74N, 121.74W	Toe			246°	0.05	-
Magnitude 5.8				Up	.03	-
				156°	.06	-
	Crest			246°	.07	-
				Up	.04	-
				156°	.05	-
	Livermore	37.625° N	3.0			
	VA Hospital, Bldg. 62	121.762° W				
	(VA)†					
	Basement			128°	.05	-
				Up	.06	-
				038°	.06	-

Table 7.--*Summary of U.S. accelerograph records recovered during 1980*--Continued

Event	Station name (owner)[1]	Station coord.	S-t[2] (s)	Direction[3]	Max acc[4] (g)	Duration[5] (s)
	Roof level			128°	.17	0.7
				Up	.10	.3
				038°	.24	3.4
	Note: Two each aftershock** records were recovered at Livermore VA hospital (basement and roof) and Lawrence Livermore Lab (events between 28 January and 22 February).					
	San Francisco VA Hospital (USGS)†	37.78° N 122.50° W	*			
	Basement				**	
	7th floor				**	
	Alameda Fruitvale Ave. Bridge (ACOE)†	37.77° N 122.23° W	6.1		**	
9 August, 1979-28 January 1980 Central California Epicenters and magnitudes unknown	Hayward City Hall (USGS)	37.68° N 122.08° W	1.0			
	6th floor				**	
	11th floor				**	
	Note: Three each additional records** were recovered at the 6th and 11th floors.					
25 February 1980 1047 UTC So. California 33.52N, 116.55W Magnitude 5.5	Fun Valley Reservoir 361 (USGS)	33.93° N 116.40° W	0.3		**	
	Cabazon Post Office (USGS)	33.92° N 116.78° W	*		**	
	North Palm Springs Post Office (USGS)†	33.92° N 116.54° W	5.8		**	
	Thousand Palms Post Office (USGS)†	33.82° N 116.40° W	4.7	135°	0.05	-
				Up	.05	-
				045°	.07	-
	Anza Fire Station (USGS)	33.75° N 116.67° W	2.5	315°	.07	-
				Up	.05	-
				225°	.07	-
	Indio So. Calif. Gas Co. (USGS)	33.75° N 116.21° W	.9	315°	.09	-
				Up	.03	-
				225°	.05	-
	Pinyon Flat Observ. Underground vault (USGS)	33.61° N 116.46° W	1.8	135°	.13	0.3
				Up	.07	-
				045°	.11	1-peak

Table 7.--*Summary of U.S. accelerograph records recovered during 1980*--Continued

Event	Station name (owner)[1]	Station coord.	S-t[2] (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
	Rancho de Anza Anza-Borrego Park (USGS)	33.35° N 116.40° W	2.8	135° Up 045°	.11 .05 .09	.8 - -
	Coachella Canal Station 1 (USGS)	33.64° N 116.08° W	6.4		**	
	Borrego Air Ranch Borrego Springs (USGS)	33.19° N 116.28° W	5.7		**	
	Terwilliger Valley Snodgrass Residence (USGS)	33.48° N 116.59° W	1.8	135° Up 045°	.09 .06 .12	- - .6
	Morongo Valley F.S. Morongo Valley, Calif. (USGS)	34.05° N 116.58° W	7.3		**	
	Hurkey Creek Park (USGS)	33.67° N 116.68° W	3.1	135° Up 045°	.08 .09 .11	- - 1-peak
	Cherry Valley (USGS)	33.98° N 116.99° W	8.5		**	
	Whitewater Trout Farm (USGS)	33.99° N 116.66° W	6.7		**	
	Cranston Forest Sta. (USGS)	33.74° N 116.84° W	4.7		0.11 .04 .11	1-peak - 1-peak
13 January 1980- 26 February 1980 So. California Epicenter and magnitude unknown	Calipatria Fire Station (USGS)	33.13° N 115.52° W	3.5		**	
23 January 1980- 26 February 1980 So. California Epicenter and magnitude unknown	Brawley Municipal Airport (USGS)	32.99° N 115.51° W	1.9	315° Up 225°	.11 .03 .10	1-peak - 1-peak
27 February 1980 0129 UTC So. California 32.95N, 115.57W Magnitude 3.6	Brawley Municipal Airport (USGS)	32.99° N 115.51° W	2.8		**	
	Calipatria Fire Station (USGS)	33.10° N 115.52° W	*		**	
20 November 1979- 27 February 1980 So. California Epicenters and magnitudes unknown	Lake Mathews Dike toe (MWD)	33.85° N 117.45° W	*		**	
	Diemer Filter Plant (MWD)	33.91° N 117.82° W	.9		**	

Table 7.--*Summary of U.S. accelerograph records recovered during 1980*--Continued

Event	Station name (owner)[1]	Station coord.	S-t[2] (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
	Hoover Dam (CDWR)	36.02° N 114.74° W	*			
	Intake tower				**	
	Gallery				**	
	Note: Four additional records** from events during this time period recovered at gallery station.					
22 February 1980-27 February 1980 Central California Epicenter and magnitude unknown	Livermore VA Hospital (VA)	37.625° N 121.762° W	*			
	Basement				**	
	Roof				**	
	Note: May be related to earthquake of 22 February (2226 UTC).					
17 August 1979-5 March 1980 Central California Epicenters and magnitudes unknown	Bear Valley station 9 Schroll Ranch (USGS)	36.63° N 121.28° W	*		**	
	Note: One additional record** recovered at station 9.					
6 March 1980 1105 UTC Central California 36.67N, 121.37W Magnitude 4.0	Bear Valley station 12 Williams Ranch (USGS)	36.66° N 121.25° W	2.1		**	
	Note: One aftershock** recorded at station 12 on 6 March (1108 UTC).					
	Bear Valley station 9 Schroll Ranch (USGS)	36.63° N 121.28° W	1.2		**	
28 March 1980 2201 UTC Imperial Valley Epicenter and magnitude unknown	Calipatria Fire Station (USGS)	33.13° N 115.52° W	1.6		**	
1 January 1980-3 April 1980 So. California Epicenters and magnitudes unknown	Parachute Test Site Imler Road (USGS)	32.93° N 115.70° W	1.3		**	
	Note: One additional record** recovered at Parachute Test Site.					
	El Centro array sta. 9 Commercial Ave. (USGS)	32.79° N 115.55° W	*		**	
9 October 1979-11 April 1980 So. California Epicenter and magnitude unknown	Escondido Power Station (SDGE)	33.125° N 117.117° W	*	030°	0.04	-
				Up	.04	-
				300°	.14	0.3
	May be related to earthquake of 25 February 1980, 1047 UTC.					

Table 7.--*Summary of U.S. accelerograph records recovered during 1980*--Continued

Event	Station name (owner)[1]	Station coord.	S-t[2] (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
13 April 1980 0616 UTC Central California 36.72N, 121.55W Magnitude 4.9	Hollister City Hall 339 Fifth St. (USGS)†	36.85° N 121.40° W	1.4		**	
	Bear Valley: Sta. 12 Williams Ranch (USGS)	36.658° N 121.249° W	2.4		**	
14 September 1979- 5 May 1980 Central California Epicenter and magnitude unknown	Bear Valley: Sta. 1 Fire Station (USGS)	36.573° N 121.184° W	*		**	
18 September 1979- 9 May 1980 Central California Epicenters and magnitudes unknown	Dos Amigos Pumping Plant (CDWR)	36.92° N 120.83° W	*			
	Level 1				**	
	Level 4				**	
	Note: One each additional records** recovered at levels 1 and 4.					
1 January, 1980- 19 May 1980 Jenkinsville, S.C. Epicenters and magnitudes unknown	Monticello Dam (USGS)	34.304° N 81.333° W	*			
	Shared abutment (Center crest)				**	
25 May 1980- 28 May 1980 Central California Epicenters and magnitudes unknown	New Melones Dam (ACOE)	37.949° N 120.524° W	*			
	Right abutment				**	
	Left abutment				**	
	Slope				**	
	Downstream				**	
	Note: Two each additional records** recovered at the left and right abutments, slope, and downstream stations.					
	Hidden Dam (ACOE)	37.11° N 119.88° W	*			
	Control Tower (upper level)				**	
	Note: Two additional records** recovered at upper level. Instrument at lower level malfunctioned.					
25 May 1980- 4 June 1980 Central California Epicenters and magnitudes unknown	Fresno VA Hospital Basement (VA)	36.77° N 117.78° W	*		**	
	Dos Amigos Pumping plant (CDWR)	36.92° N 117.78° W	*			

Table 7.--*Summary of U.S. accelerograph records recovered during 1980*--Continued

Event	Station name (owner)[1]	Station coord.	S-t[2] (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
	Level 1				**	
	Level 4				**	
	Note: One each additional records** recovered at levels 1 and 4.					
25 May 1980-5 June 1980 Central California Epicenters and magnitudes unknown	Isabella Dam (ACOE)	35.65° N 118.48° W	*			
	Crest				**	
	Toe				**	
	Isabella Dam Lower spillway gallery				**	
	Note: Two each additional records** recovered at crest, toe, and lower spillway gallery.					
	Isabella Aux. Dam (ACOE)	35.64° N 118.47° W	*			
	Crest				**	
	Tower				**	
	Note: Two each additional records** recovered at crest and tower.					
	Lake Success Dam (ACOE)	36.059° N 118.923° W	16.5			
	Downstream			285°	0.05	-
				Up	.02	-
				195°	.06	-
	Right abutment				**	
	Left crest				**	
	Left abutment				**	
	Right crest				**	
	Slope				**	
	Note: Nine each additional records** recovered at downstream, slope, left and right abutments, and left and right crests.					
	Buchanan Dam (ACOE)	37.217° N 119.983° W	*			
	Right abutment				**	
	Lower tower				**	
	Upper tower				**	
	Crest				**	

Table 7.--*Summary of U.S. accelerograph records recovered during 1980*--Continued

Event	Station name (owner)[1]	Station coord.	S-t[2] (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
	Note: Three each additional records** recovered at right abutment and lower tower; two each additional records** recovered at upper tower and crest.					
	Terminus Dam (ACOE)	36.41° N 119.00° W	*			
	Crest			277° Up 187°	.10 .05 .07	1-peak - -
	Right abutment				**	
	Tower				**	
	Downstream			277° Up 187°	0.06 .02 .04	- - -
	Note: Four each additional records** recovered from crest, downstream, and right abutment; two additional records** recovered from tower.					
	Pine Flat Dam (ACOE)	36.83° N 119.33° W	*			
	Tower - 2nd level				**	
	Tower - 5th level			255° Up 165°	.11 .04 .07	1-peak - -
	Downstream				**	
	Note: Three each additional records** recovered from tower (both levels) and downstream stations.					
18 September 1979- 6 June 1980 Central California Epicenters and magnitudes unknown	Pleasant Valley Pumping plant (USGS)	36.31° N 120.25° W	*			
	Switchyard				**	
	Basement				**	
	First floor				**	
	Roof				**	
	Note: Three each additional records** recovered at switchyard, basement, first floor, and roof.					
9 June 1980 0328 UTC No. Mexico 32.22N, 114.99W Magnitude 6.1	Bonds Corner Highways 98 and 115 (USGS)	32.693° N 115.338° W	8.7	230° Up 140°	0.12 .03 .13	1.2 - 1.6
	Calipatria Fire Station (USGS)	33.13° N 115.52° W	*		**	

Table 7.--*Summary of U.S. accelerograph records recovered during 1980*--Continued

Event	Station name (owner)[1]	Station coord.	S-t[2] (s)	Direction[3]	Max acc[4] (g)	Duration[5] (s)
	Calexico Fire Station Fifth and Mary (USGS)	32.669° N 115.492° W	8.9		**	
	El Centro Array 2 Keystone Road (USGS)	32.916° N 115.366° W	*		**	
	El Centro Array 10 Community Hospital (USGS)†	32.780° N 115.567° W	9.2		**	
	El Centro Array 11 McCabe School (USGS)	32.752° N 115.594° W	*		**	
	Holtville Post Office (USGS)†	32.812° N 115.377° W	*		**	
	El Centro Array 9 302 Commercial Ave. (USGS)†	32.794° N 115.549° W	*		**	
	Yuma, Arizona Strand Avenue (USBR/USGS)	32.73° N 114.70° W	*		**	
5 May 1980- 10 June 1980 Central California Epicenter and magnitude unknown	Bear Valley: Sta. 10 Webb Residence (USGS)	36.532° N 121.143° W	1.3		**	
11 June 1980 0734 UTC Central California Epicenter and magnitude unknown	Bear Valley: Sta. 10 Webb Residence (USGS)	36.532° N 121.143° W	1.1	310° Up 220°	0.11 .04 .22	1-peak - 0.15
	Bear Valley: Sta. 11 Wilkinson Ranch (USGS)	36.608° N 121.109° W	1.7		**	
7 March 1980- 23 June 1980 Central California Epicenter and magnitude unknown	Bear Valley: Sta. 9 Schroll Ranch (USGS)	36.622° N 121.276° W	*		**	
14 April 1980- 23 June 1980 Central California Epicenter and magnitude unknown	Hollister City Hall (USGS)	36.85° N 121.40° W	*		**	
19 August 1979- 24 June 1980 Central California Epicenter and magnitude unknown	Gilroy Array Sta. 2 Mission Trails Motel (CDMG)	36.982° N 121.556° W	*	140° Up 050°	0.08 .03 .07	- - -
	Gilroy Array Sta. 3 Sewage Plant (CDMG)	36.991° N 121.536° W	*	140° Up 050°	.03 .02 .06	- - -

Table 7.--*Summary of U.S. accelerograph records recovered during 1980*--Continued

Event	Station name (owner)[1]	Station coord.	S-t[2] (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
20 July 1980 1633 UTC Central California Epicenter and magnitude unknown	Bear Valley: Sta. 10 Webb Residence (USGS)	36.532° N 121.143° W	1.4		**	
27 July 1980 1852 UTC Maysville, Kentucky 38.17N, 83.91W Magnitude 5.2	Laurel River Dam Crest (ACOE)†	36.961° N 84.268° W	*		**	
	Nolin River Dam Center crest (ACOE)†	37.277° N 86.247° W	*		**	
29 July 1980 1545 UTC Central California Epicenter and Magnitude unknown	Bear Valley: Sta. 10 Webb Residence (USGS)	36.532° N 121.143° W	1.5		**	
24 August 1980 1241 UTC Central California 37.57N, 121.67W Magnitude 4.1	Livermore VA Hospital, Bldg. 62 (VA)†	37.625° N 121.762° W	*			
	Basement				**	
	Roof (7)				**	
	Del Valle Dam (CDWR)†	37.617° N 121.746° W	1.5			
	Crest				**	
	Toe				**	
9 September 1980 1642 UTC Central California 36.52N, 121.14W Magnitude 3.0	Bear Valley: Sta. 10 Webb Residence (USGS)	36.532° N 121.143° W	1.0		**	
	Bear Valley: Sta. 6 James Ranch (USGS)	36.504° N 121.101° W	1.4		**	
13 September 1980 1050 UTC Central California 36.65N, 121.36W Magnitude 3.3	Bear Valley: Sta. 12 Williams Ranch (USGS)	36.658° N 121.249° W	1.8		**	
26 September 1980 1319 UTC Central California 35.27N, 119.40W Magnitude 4.4	Buena Vista Pumping plant (CDWR)	36.16° N 119.35° W	2.8		**	
9 October 1979- 28 September 1980 So. Hawaii Epicenters and magnitude unknown	Honokaa, Hawaii Fire Station (USGS)	20.081° N 155.465° W	*	021° Up 291°	0.07 .04 .04	- - -

Note: Two additional records** recovered at Honokaa, Hawaii.

Table 7.--*Summary of U.S. accelerograph records recovered during 1980*--Continued

Event	Station name (owner)[1]	Station coord.	S-t[2] (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
	Ka'u Hospital Pahala, Hawaii (USGS)	19.20° N 155.47° W	*		**	
	Waimea, Hawaii Fire Station (USGS)	20.03° N 155.66° W	*		**	
	Kapa'au, Hawaii Kohala Police Sta. (USGS)	20.23° N 155.80° W	*		**	
13 October 1980 0246 UTC Central California 36.60N, 121.09W Magnitude 4.1	Bear Valley: Sta. 5 Callens Ranch (USGS)	36.673° N 121.195° W	3.1	310° Up 220°	.06 .03 .05	- -
	Bear Valley: Sta. 6 James Ranch (USGS)	36.504° N 121.101° W	2.2		**	
	Bear Valley: Sta. 12 Williams Ranch (USGS)	36.658° N 121.249° W	4.7		**	
	Bear Valley: Sta. 11 Wilkinson Ranch (USGS)	36.608° N 121.109° W	1.4	130° Up 040°	.31 .12 .18	0.50 1-peak .51
	Bear Valley: Sta. 10 Webb Residence (USGS)	36.532° N 121.143° W	2.1		**	
	Bear Valley: Sta. 14 Upper Butts Ranch (USGS)	36.569° N 121.043° W	1.4	310° Up 220	.07 .07 ,07	- - -
31 October 1980 1256 UTC So. California 32.58N, 115.57W Magnitude 4.4	Calexico Fire Station Fifth and Mary (USGS)†	32.669° N 115.492° W	2.7	315° Up 225°	0.06 .04 .05	- - -
	El Centro Array 11 McCabe School (USGS)†	32.752° N 115.594° W	3.2	230° Up 140°	.05 .02 .06	- - -
	El Centro Array 12 907 Brockman Road (USGS)†	32.718° N 115.637° W	2.8	230° Up 140°	.11 .02 .12	1-peak - 1-peak
	El Centro Array 13 Strobel Residence (USGS)	32.709° N 115.683° W	*		**	
	El Centro Differential Array (USGS)†	32.796° N 115.535° W	3.7	360° Up 270°	.04 .02 .06	- - -

Table 7.--*Summary of U.S. accelerograph records recovered during 1980*--Continued

Event	Station name (owner)[1]	Station coord.	S-t[2] (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
8 November 1980 1027 UTC No. California 41.16N, 124.32W Magnitude 7.0	Butler Valley: Sta. 2 (USGS)†	40.79° N 123.88° W	0.3	060° Up 330°	.10 .04 .08	1-peak - -
12 September 1979- 13 November 1980 Central Alaska Epicenter and magnitude unknown	Talkeetna, Alaska FAA/VOR (USGS)	62.30° N 150.10° W	*		**	
	Cantwell, Alaska Highway Station (USGS)	63.388° N 148.878° W	*		**	
22 November 1980 1148 UTC Central California Epicenter and magnitude unknown	Bear Valley: Sta. 14 Upper Butts Ranch (USGS)	36.569° N 121.043° W	*		**	
28 November 1980 1821 UTC No. California 39.31N, 120.43W Magnitude 5.3	Boca Dam (WPRS)†	39.382° N 120.095° W	0.3			
	Crest				**	
	Valve house				**	
	Martis Creek Dam (ACOE)†	39.326° N 120.115° W	*			
	Left crest				**	
	Right crest				**	
	Downstream				**	
	Toe				**	
	Right abutment				**	
5 August 1980- 3 December 1980 Jenkinsville, S.C. Epicenter and magnitude unknown	Monticello Dam (USGS)	34.304° N 81.333° W	*			
	Shared abutment (Center crest)				**	
4 June 1980- 5 December 1980 Central California Epicenters and magnitudes unknown	Lake Success Dam (ACOE)	36.061° N 118.920° W	*			
	Left crest				**	
	Left abutment				**	
	Middam				**	
	Right crest				**	
	Right abutment				**	

Table 7.--*Summary of U.S. accelerograph records recovered during 1980*--Continued

Event	Station name (owner)[1]	Station coord.	S-t[2] (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
	Note: One each additional record** recovered at left crest, middam and right crest.					
6 June 1980- 12 December 1980 Central California Epicenter and magnitude unknown	Pleasant Valley Pumping Plant (USGS)	36.31° N 120.25° W	*			
	Main floor				**	
	Switchyard				**	
	Roof				**	
5 August 1980- 10 December 1980 Central California Epicenter and magnitude unknown	Maricopa Array Station 4 (CDWR)	35.13° N 119.37° W	*		**	
23 August 1979- 9 April 1981 Central California Epicenters and magnitudes unknown	San Francisco Bank of America Bldg. (USGS)	37.79° N 122.40° W	*			
	Basement (3rd)				**	
	Concourse				**	
	22nd floor				**	
	52nd floor				**	
	Note: One each additional records** recovered at basement, concourse, 22nd, and 52nd floor. May be related to Livermore earthquakes of January 24 and 26, 1980.					

[1] Station owner code:
ACOE - U.S. Army Corps of Engineers.
CDMG - California Division of Mines and Geology.
CDWR - California Department of Water Resources.
MWD - Metropolitan Water District.
SDGE - San Diego Gas and Electric Company.
USBR - U.S. Bureau of Reclamation
USGS - U.S. Geological Survey.
WPRS - U.S. Water and Power Research Service.
VA - Veterans Administration.
† - WWVB time code not legible or instrument not equipped with a radio receiver; correlation of accelerogram with event may be questionable.

[2] S-wave arrival minus trigger time (S - t) interval.
* S-t time is questionable or cannot be determined.

[3] Direction of case acceleration for upward trace deflection on accelerogram. Horizontal components are listed as azimuth in degrees clockwise from north. Vertical components are listed as "up" or "down."

[4] Peak acceleration recorded at ground level on one vertical and two orthogonal horizontal components.
** Denotes maximum acceleration is less than 0.05 g at ground level or less than 0.10 g at non ground-level stations.

[5] Duration between first and last peaks of acceleration greater than 0.10 g.

Table 8.--*Strong-motion stations that recorded both the January 24 and January 26 Livermore earthquakes*

Station (owner/code)	January 24 Magnitude 5.5		January 26 Magnitude 5.8	
	Epic. dist.[1] (km)	Horiz. PGA[2] (g)	Epic. dist.[3] (km)	Horiz. PGA (g)
San Ramon (CDMG/187)	17	0.15	21	0.28
San Ramon (CDMG/134)	17	.05	25	.05
Antioch (CDMG/70)	20	.04	30	.11
Walnut Creek (CDMG/364)	24	.03	36	.06
VA Hospital, Bsmt (USGS/1226)	24	.18	16	.06
Del Valle Dam, Toe (USGS/1265)	25	.24	16	.06
Pleasant Hill (CDMG/348)	26	.03	38	.06
Hayward (CDMG/354)	30	.04	38	.06
Hayward (CDMG/219)	30	.08	38	.08
Oakland (CDMG/225)	33	.02	40	.02
Fremont (CDMG/64)	36	.06	32	.11
Oakland (CDMG/359)	37	.02	47	.02

[1] Epicenter located at 37.84° N, 121.80° W.
[2] Peak ground acceleration.
[3] Epicenter located at 37.76° N, 121.70° W.