United States Earthquakes, 1983

U.S. GEOLOGICAL SURVEY BULLETIN 1698

United States Earthquakes, 1983

CARL W. STOVER, Editor

This publication summarizes data for earthquakes that occurred in the 50 states during 1983. Descriptions of individual earthquakes include hypocenters, magnitudes, intensities, and damages. The report also contains results from regional networks and data recorded by strong-motion seismographs.

DEPARTMENT OF THE INTERIOR
DONALD PAUL HODEL, Secretary

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Contributors

Contributors to this publication are listed below according to the information furnished or service performed:

Hypocenters and magnitudes:
John H. Minsch, U.S. Geologocal Survey, Denver, Colo.
Robert Y. Koyanagi, Hawaiian Volcano Observatory, U.S. Geological Survey

Intensities:
Carl W. Stover, U.S. Geological Survey, Denver, Colo.
Robert Y. Koyanagi, Hawaiian Volcano Observatory, U.S. Geological Survey

Network Operations (by institution):
Geophysical Institute, University of Alaska, College.
University of California, Berkeley
California Institute of Technology, Pasadena
Hawaiian Volcano Observatory, U.S. Geological Survey
Lamont-Doherty Geological Observatory, Columbia University, Palisades, NY.
New Mexico Institute of Mining and Technology, Socorro
Oklahoma Geological Survey, Leonard
St. Louis University, Missouri
Tennessee Earthquake Information Center, Memphis State University
University of Nevada-Reno
University of Utah, Salt Lake City
University of Washington, Seattle
Virginia Polytechnic Institute and State University, Blacksburg
U.S. Geological Survey, Menlo Park, Calif.
Weston Observatory, Boston College, Weston, Ma.

Geodesy:
Richard A. Snay, NOAA, NOS, National Geodetic Survey, Rockville, Md.
David B. Zilkoski, NOAA, NOS, National Geodetic Survey, Rockville, Md.

Strong-motion seismograph data:
Ronald L. Porcella, U.S. Geological Survey, Menlo Park, Calif.
Josephine C. Switzer, U.S. Geological Survey, Menlo Park, Calif.

Editorial assistance and manuscript preparations:
Francis W. Baldwin, U.S. Geological Survey, Denver, Colo.
Lindie R. Brewer, U.S. Geological Survey, Denver, Colo.

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United States Earthquakes, 1983

By Carl W. Stover, *Editor*

Introduction

This publication describes all earthquakes that were reported felt in the United States and nearby territories in 1983. Its purpose is to provide a continuous history of U.S. earthquakes to be used in estimating areal seismic risk, for designing earthquake-resistant structures, and answering inquiries from scientists, engineers, and the public.

The U.S. Geological Survey/National Earthquake Information Center (USGS/NEIC) collects intensity information primarily by mailing questionnaires, "Earthquake Report" forms, to postmasters and other public institutions (police departments and/or fire departments) in the earthquake area. Completed questionnaires are returnd to the USGS, where they are evaluated and intensities are assigned. For damaging earthquakes, the questionnaires are supplemented by USGS field investigations. The USGS/NEIC publishes preliminary maximum intensity data for United States earthquakes in the Preliminary Determination of Epicenters, Monthly Listing (PDE) (for example, Irby and others, 1982). The latest and most complete information is published with maps, diagrams, and photographs in United States Earthquakes (now published as a USGS Bulletin), issued annually since 1928. Copies of issues prior to 1982 can be obtained from the Open-File Services Section (OFSS), Western Distribution Branch, U.S. Geological Survey, Box 25425, Federal Center, Denver, CO 80225.

This publication is composed of four major sections: "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, and principal earthquakes of the world (table 10); and "Strong-motion Seismograph Data" (table 11). The intensity and macroseismic data in "Earthquake Descriptions" are compiled from questionnaire canvasses (see previous paragraph), newspaper articles, and reports prepared by other government organizations, State institutions, local organizations, and individuals. Each description includes date, hypocenter, the source of the hypocenter computation, magnitude, maximum intensity (Modified Mercalli), and/or macroseismic effects reported by localities that felt the earthquake.

DISCUSSION OF TABLES

The earthquake parameters in tables 1 and 10 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 those published in the USGS Preliminary Determination of Epicenters, Monthly Listings. These data have been updated and new data added from subsequent publications of universities or State agencies who operate seismic networks. 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/NEIC have a varying degree of accuracy, usually two-tenths of a degree or less. See Preliminary Determination of Epicenters, Monthly Listing, for an explanation of the accuracy of USGS hypocenters. 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. Figures 4-6 show only these earthquakes that had computed magnitudes of 5.0 or larger. Each earthquake epicenter is indicated by a small circle or square.

Figures 7-9 are maps showing the maximum intensity of earthquakes in the conterminous United States, Alaska, and Hawaii. Maximum intensities are represented by Arabic numerals at the epicentral locations. Earthquakes of intensity I-IV are represented by solid circles.

The USGS/NEIC 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 mail canvass of the epicentral area using questionnaire cards. A field survey is usually carried out for damaging events. 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 earthquakes for 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

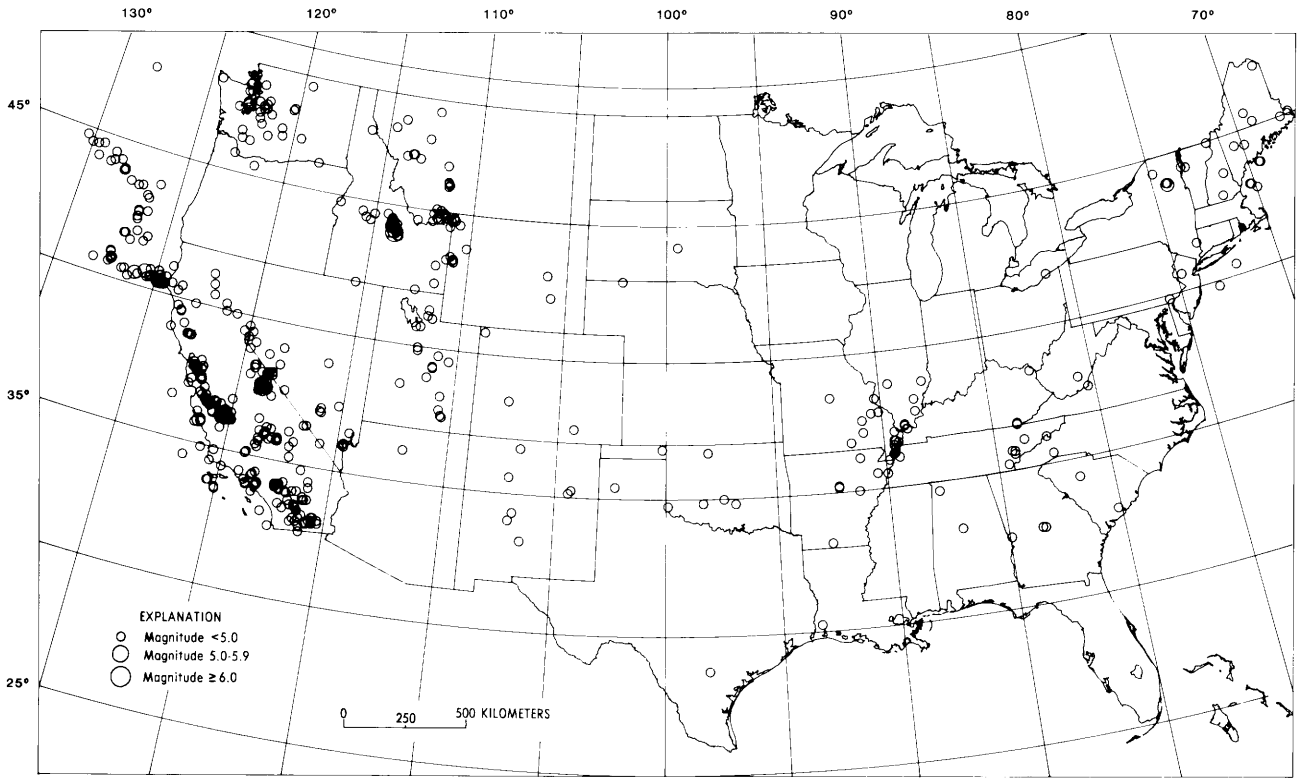

Figure 1. Earthquake epicenters in the conterminous United States for 1983 from table 1.

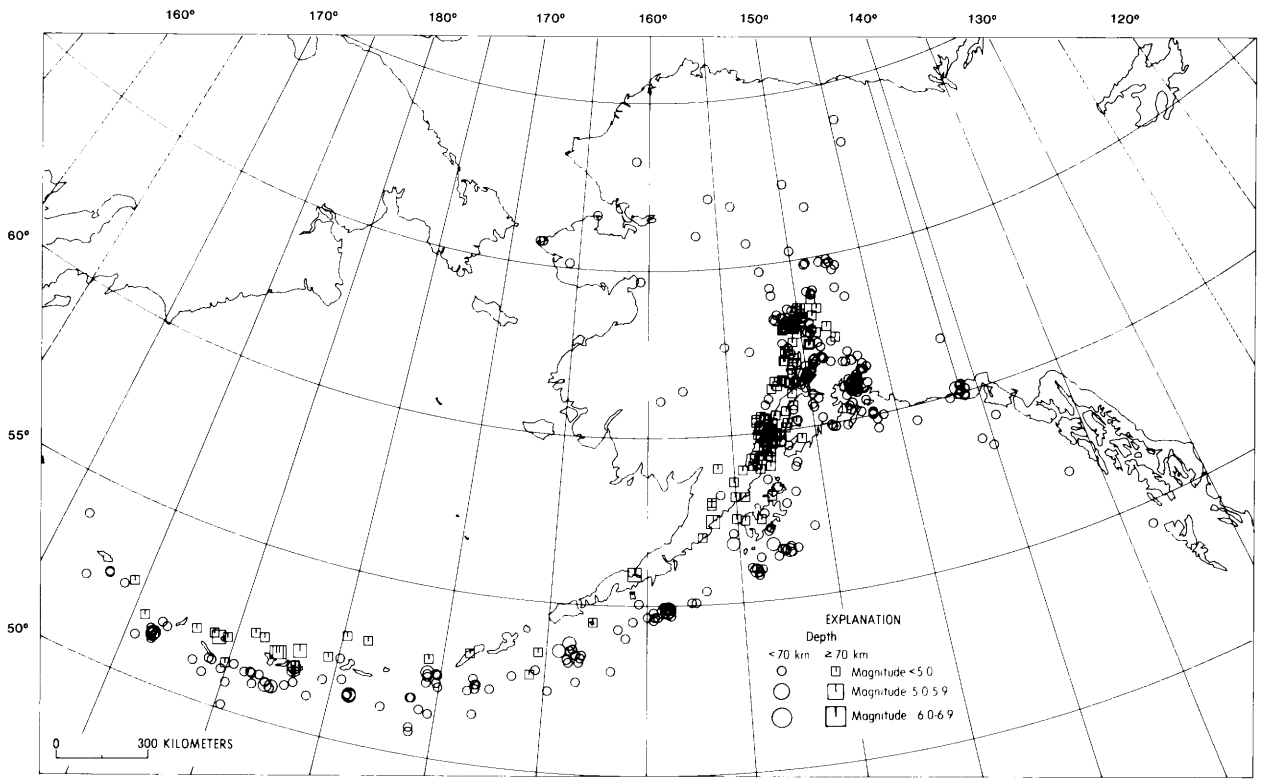

Figure 2. Earthquake epicenters in Alaska for 1983 from table 1.

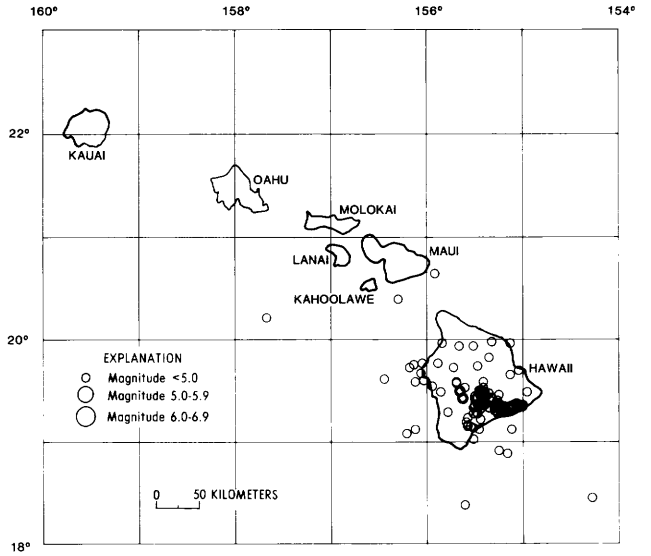

Figure 3. Earthquake epicenters in Hawaii for 1983 from table 1.

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 isoseismals do not account for each intensity observation as they are drawn to show the general patterns at a level of intensity or range of intensities.

MAGNITUDE AND INTENSITY RATINGS

Magnitude, a measure of the "size" of an earthquake, is related to the energy release at the focus of an earthquake. Although the magnitude scale has neither "top" nor "bottom" values, the highest ever calculated was greater than 9 and the lowest was 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 5 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 $20^{\circ} \leq D \leq 160^{\circ}$. 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 $D \geq 5^{\circ}$.

$$ML = \log A - \log A_0, \quad (3)$$

as defined by Richter (1958, p. 340), where A is the maximum trace amplitude in millimeters, written by a Wood-Anderson torsion seismometer, and $\log A_0$ is a standard value as a function of 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. ML magnitudes are listed for events with depths less than 70 km.

$$Mn = 3.75 + 0.90(\log D) + \log (A/T) \quad 0.5^{\circ} \leq D \leq 4^{\circ},$$
$$Mn = 3.30 + 1.66(\log D) + \log(A/T) \quad 4^{\circ} \leq D \leq 30^{\circ} \quad (4)$$

as proposed by Nuttli (1973) for North America east of the Rocky Mountains, 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.

$$M_W = 2/3 \log M_0 - 10.7 \quad (5)$$

as defined by Hanks and Kanamori (1979), where M_0 is the seismic moment in dyne-cm.

In this publication MD designates 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. Duration magnitude scales are normally adjusted to agree with ML or Mn estimates so that resulting magnitudes are compatible. Thus, the MD formulas vary for different geographic regions and seismograph systems.

Intensity, as applied to earthquakes, represents a quantity determined from the effects on people, manmade structures, and the Earth's surface (landslides, ground fissures, etc,). 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 an 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. The word "FELT" in the maximum intensity columns of table 1 indicates that only minimal or sketchy information was available. This does not imply that the earthquake was felt at a low intensity level, but indicates that the available data were not sufficient for assigning a intensity value.

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 will continue to be so until a new scale has been devised and has acceptance in the engineering and seismological communities.

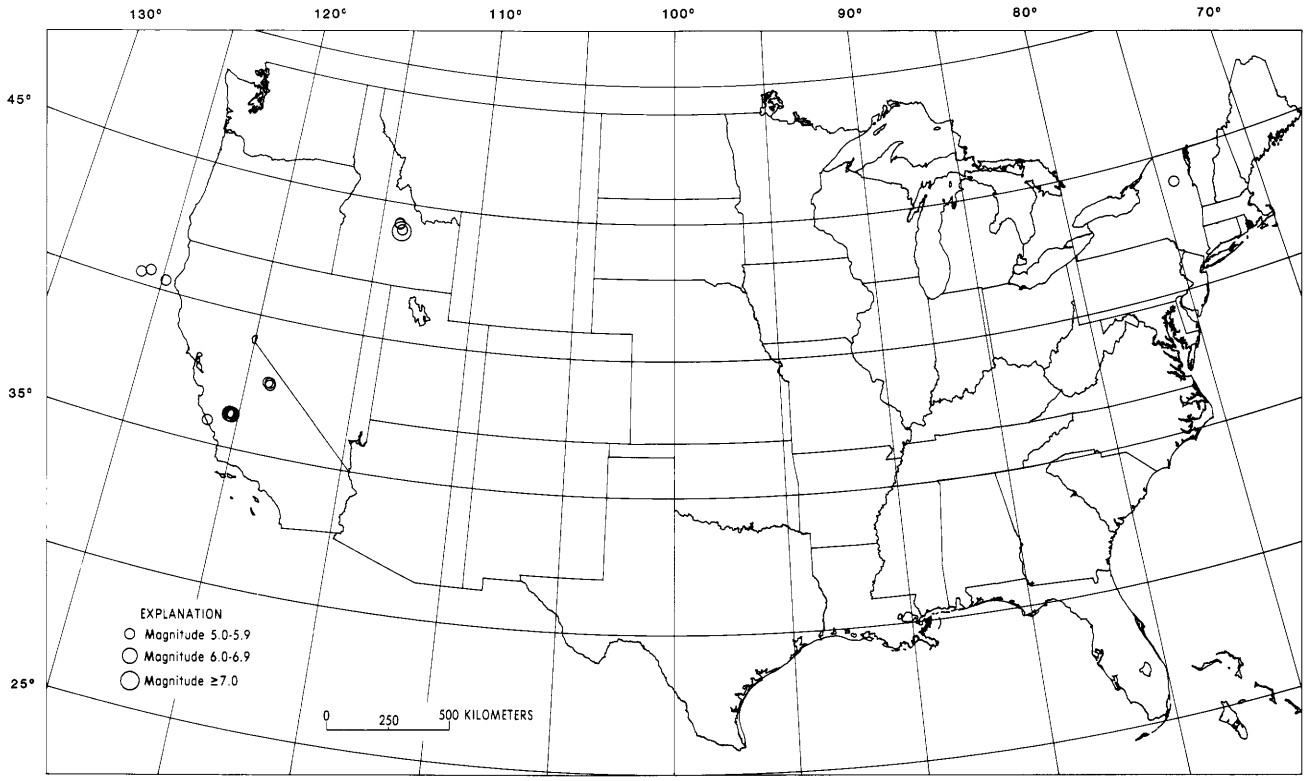

Figure 4. Epicenters in the conterminous United States for earthquakes with magnitudes 5.0 or greater in 1983.

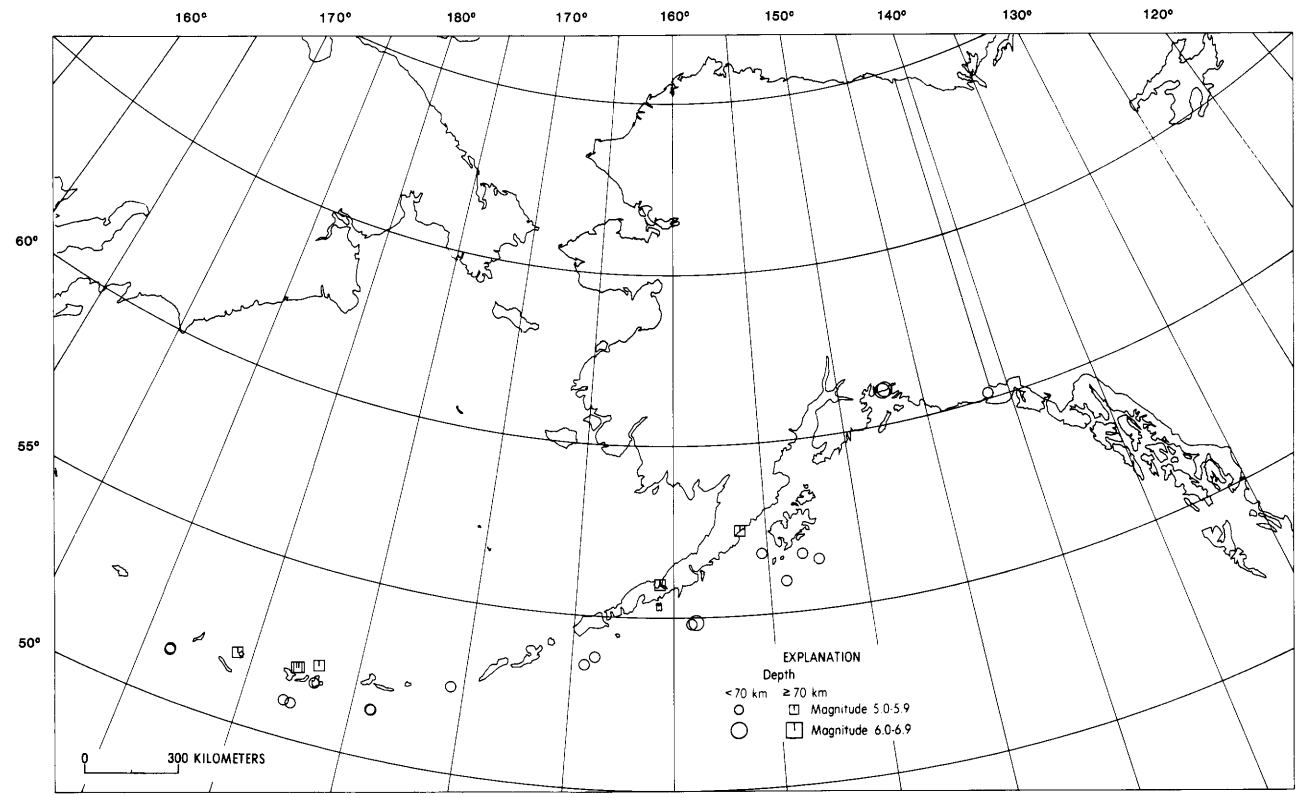

Figure 5. Epicenters in Alaska for earthquakes with magnitudes 5.0 or greater in 1983.

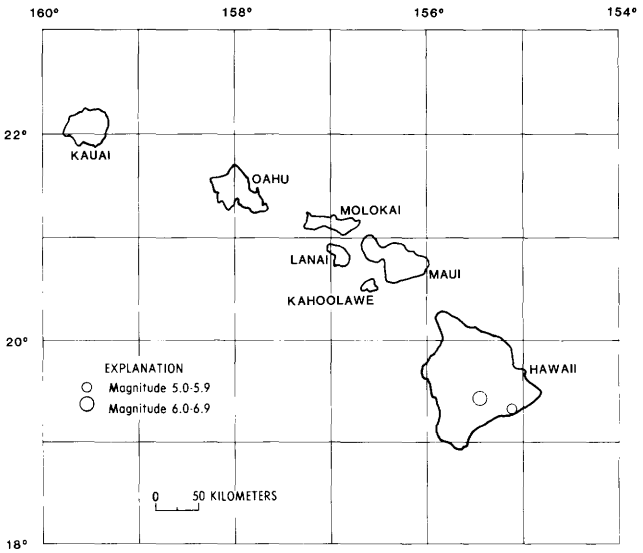

Figure 6. Epicenters in Hawaii for earthquakes with magnitudes 5.0 or greater in 1983.

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 in 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,

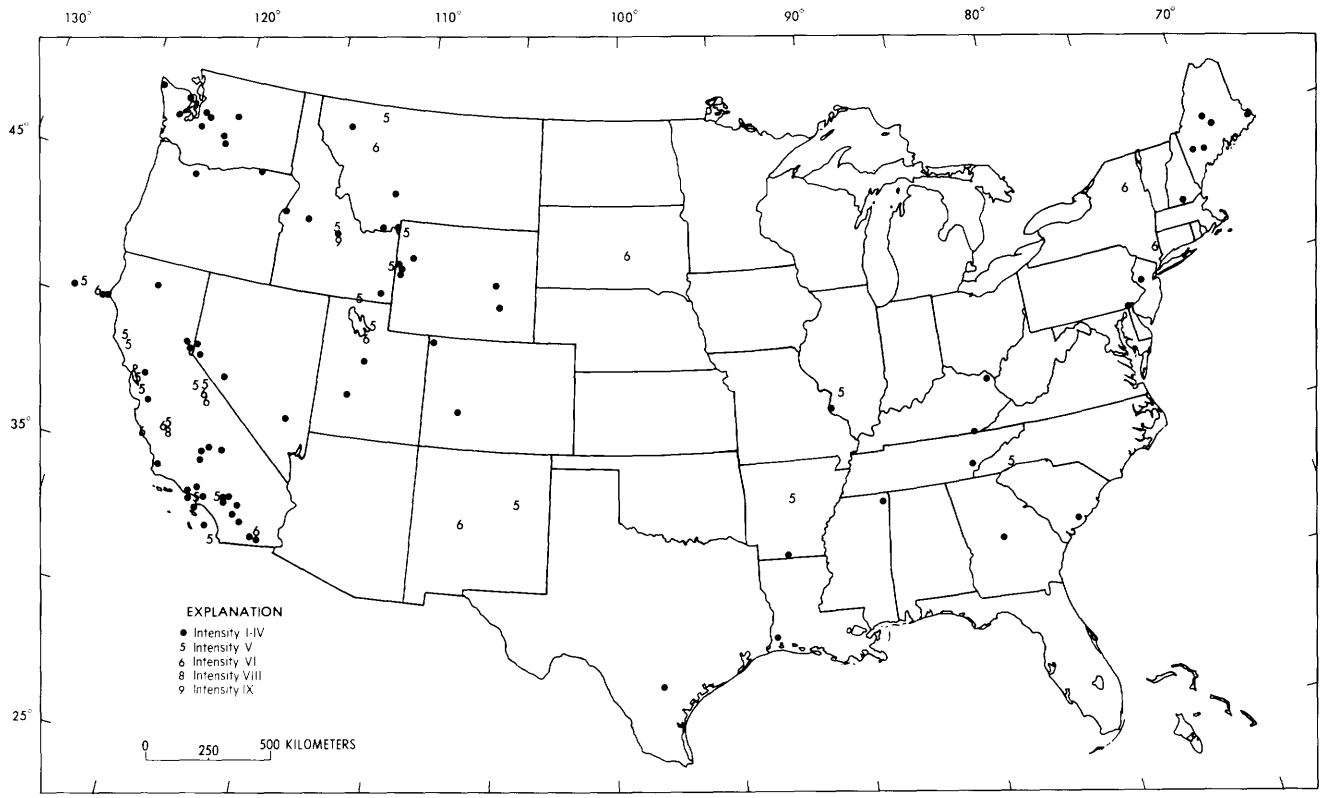

Figure 7. Earthquakes in the conterminous United States that were felt or caused damage in 1983. The intensities denote maximum observed intensity plotted at the epicenter.

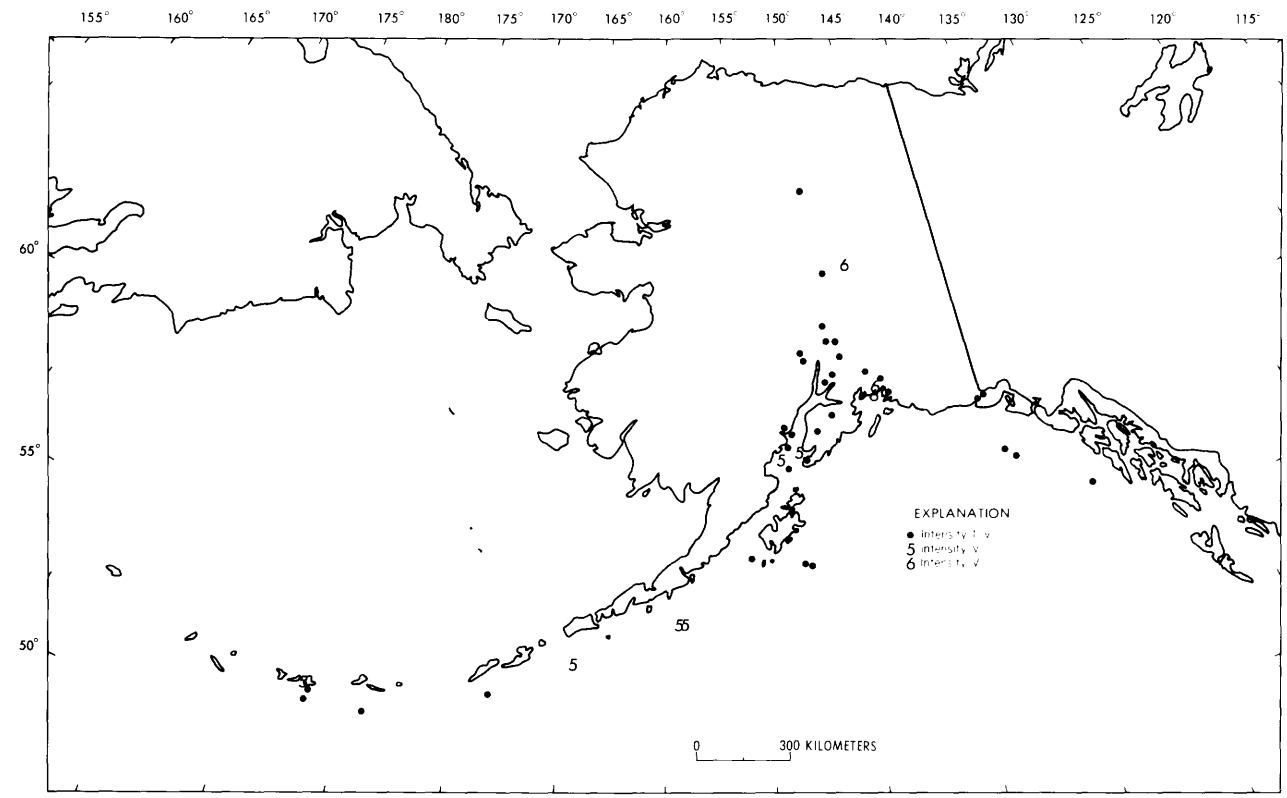

Figure 8. Earthquakes in Alaska that were felt or caused damage in 1983. The intensities denote maximum observed intensity plotted at the epicenter.

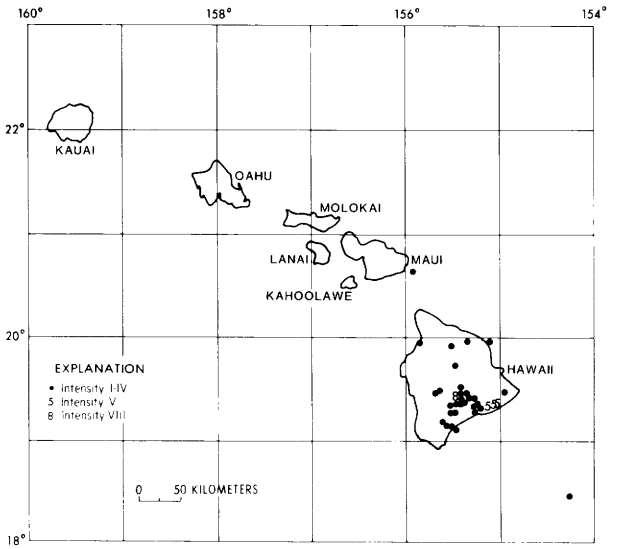

Figure 9. Earthquakes in Hawaii that were felt or caused damage in 1983. The intensities denote maximum observed intensity plotted at the epicenter.

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.

COLLABORATORS

Active cooperation in earthquake investigations in the United States is provided by several seismological collaborators. The following served as collaborators to the USGS during 1983.

Alaska.--Staff of NOAA-Alaska Tsunami Warning Center, Palmer.
California (northern).--Bruce A. Bolt, University of California, Berkeley.
California (southern).--Clarence R. Allen, California Institute of Technology, Pasadena.
Canada--Staff of Earth Physics Branch, Seismological Service of Canada, Ottawa.
Canada--Staff of Pacific Geoscience Centre, Sidney, British Columbia.
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, U.S. Geological Survey, 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.
Missouri, Illinois, Arkansas area.--Otto Nuttli and Robert B. Herrmann, Saint Louis University, Saint Louis.
Montana.--Anthony Qamar, University of Montana, Missoula.
Nevada.--Alan S. Ryall, University of Nevada, Reno.
New England.--John E. Ebel, Boston College, Weston, Mass.
New York.--Lynn R. Sykes, Lamont-Doherty Geological Observatory, Palisades, N.Y.
Ohio.--Edward J. Walter, John Carroll University, Cleveland.
Oklahoma.--James E. Lawson, Jr., Oklahoma Geological Survey, Leonard.
Pennsylvania.--Benjamin F. Howell Jr., and Shelton Alexander, Pennsylvania State University, University Park.
South Carolina.--Pradeep Talwani, University of South Carolina, Columbia, and Joyce Bagwell, Baptist College at Charleston, Charleston.
Tennessee.--Arch C. Johnston, Tennessee Earthquake Information Center, Memphis.
Texas.--G. R. Keller, University of Texas, El Paso.
Texas.--W. D. Pennington, University of Texas, Austin.
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.
Wyoming.--R. A. Hutchinson, National Park Service, Yellowstone National Park.

Earthquake Descriptions

This section lists alphabetically all 1983 earthquakes in the 50 states that were reported felt. The origin time of each earthquake is given in Universal Coordinated Time (UTC). Time is 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 Center, other government agencies, and universities that operate seismic networks.

Roman numerals in the earthquake descriptions refer to the Modified Mercalli Intensity Scale of 1931 (see pg. 5), which gives about equal weight to the disturbance of inanimate objects and to reactions of people. When more than one degree of intensity is reported from a town, the town is assigned the highest intensity reported. All earthquake questionnaires or press reports that contain only minimal information, without enough detail from which to assign an intensity, are listed as "FELT."

[The following codes are used to indicate the source of hypocenters and/or magnitudes: (**BK**) University of California, Berkeley; (**BU**) Montana Bureau of Mines and Geology, Butte; (**EN**) Department of Energy; (**GM**) U.S. Geological Survey, Menlo Park, Calif.; (**GS**) U.S. Geological Survey, Golden, Colorado; (**GT**) Georgia Institute of Technology, Atlanta; (**HV**) Hawaiian Volcano Observatory, U.S. Geological Survey, Hawaii National Park; (**KY**) University of Kentucky, Lexington; (**LA**) Los Alamos National Laboratory, New Mexico; (**LD**) Lamont-Doherty Geological Observatory, Palisades, N.Y.; (**MT**) University of Montana, Missoula; (**PM**) Alaska Tsunami Warning Center, NOAA, Palmer; (**PS**) California Institute of Technology, Pasadena; (**SC**) University of South Carolina, Columbia; (**SL**) St. Louis University, St. Louis, Mo.; (**TC**) Tennessee Earthquake Information Center, Memphis; (**TU**) Oklahoma Geological Survey, Leonard; (**UU**) University of Utah, Salt Lake City; (**VP**) Virginia Polytechnic Institute and State University, Blacksburg; (**WA**) University of Washington, Seattle; (**WO**) Weston Observatory, Weston, Mass. Normal depth = 33 km. Leaders (...) indicate information is not available]

ALASKA

1 January (GM) Southern Alaska
Origin time: 11 18 07.7
Epicenter: 61.295N., 146.975W.
Depth: 38 km
Magnitude: 5.3mb(GS), 4.7ML(PM), 4.0MD(GM)
Intensity IV: Valdez (M).
Intensity III: Anchorage, Cordova, Glennallen, and Palmer (PM).

ALASKA-Continued

10 January (GS) Southern Alaska
Origin time: 12 19 58.0
Epicenter: 63.065, 150.950W.
Depth: 134 km
Magnitude: 4.0mb(GS)
Felt: Tolsona (PM).

14 February (LD) Alaska Peninsula area
Origin time: 03 20 03.7
Epicenter: 54.809N., 159.108W.
Depth: 16 km
Magnitude: 5.9mb(GS), 5.6ML(LD), 6.3MS(GS), 6.5MS(BK)
Intensity V:
Chignik— A few windows cracked; a few small objects fell; a few items were thrown from store shelves; trees and bushes shook moderately; felt by and frightened many.
Sand Point-- A few small objects fell and a few items were thrown from store shelves; trees and bushes shook moderately; felt by many.
Intensity IV: Chignik Lagoon, Chignik Lake, Cold Bay, False Pass, Ivanof Bay, Port Heiden.
Intensity III: King Cove, Perryville.

14 February (LD) Alaska Peninsula area
Origin time: 08 10 02.7
Epicenter: 54.862N., 158.875W.
Depth: 14 km
Magnitude: 6.0mb(GS), 5.6MS(GS), 5.8MS(PS), 6.0ML(LD)
Intensity V: Chignik-- A few items were thrown from store shelves; trees and bushes shook moderately; felt by all and frightened many.
Intensity IV: Chignik Lagoon, Cold Bay, False Pass, Port Heiden.
Intensity III: King Cove, Perryville.
Felt: Sand Point.

23 February (GM) Southern Alaska
Origin time: 07 27 57.6
Epicenter: 60.177N., 153.195W.
Depth: 119 km
Magnitude: 4.5mb(GS), 4.0MD(GM)
Intensity II: Palmer (PM).

10 March (GM) Central Alaska
Origin time: 14 03 38.6
Epicenter: 62.815N., 149.553W.
Depth: 45 km
Magnitude: 4.6mb(GS), 3.5MD(GM)
Intensity III: Ester and Fairbanks (PM).

15 March (GM) Southern Alaska
Origin time: 23 53 22.3
Epicenter: 59.507N., 153.197W.
Depth: 111 km
Magnitude: 4.7mb(GS), 4.4MD(GM)
Intensity V: Ninilchik-- A few dishes broken; a few small objects overturned or fell; trees and bushes shook slightly; felt by many.
Intensity IV: Homer (PM).
Intensity III: Anchor Point, Clam Gulch, Kenai (M), Moose Pass.
Intensity II: Anchorage (PM), Cooper Landing.

17 March (GM) Southeastern Alaska
Origin time: 05 34 42.8
Epicenter: 58.515N., 140.637W.
Depth: 24 km
Magnitude: 4.3mb(GS), 4.2ML(PM)
Intensity IV: Yakutat-- There were many reports of loud noise.

3 April (GS) Andreanof Islands, Aleutian Islands
Origin time: 19 26 24.2
Epicenter: 51.762N., 176.926W.
Depth: 60 km
Magnitude: 5.2mb(GS)
Intensity V: Adak (PM).

6 April (GS) Queen Charlotte Islands region, Canada
Origin time: 09 22 14.0
Epicenter 54.268 N., 133,823 W.
Depth 10 km
Magnitude 5.1mb(GS), 5.1MS(GS)
Intensity IV: Ketchikan (press report).
Felt: Craig, Petersburg, and Wrangell (PM).

7 April (GS) Southern Alaska
Origin time: 21 55 44.1
Epicenter: 62.313N., 148.915W.
Depth: 68 km
Magnitude: 3.0ML(PM)
Intensity III: Palmer (PM).

8 April (GS) Southern Alaska
Origin time: 14 23 58.3
Epicenter: 61.934N., 149.333W.
Depth: Normal
Magnitude: 2.3ML(PM)
Felt: Hatcher Pass (PM).

9 April (GS) Southern Alaska
Origin time: 02 10 25.9
Epicenter: 61.194N., 150.197W.
Depth: 58 km
Magnitude: 3.9ML(PM)
Felt: Anchorage and Palmer (PM).

10 April (GS) Southern Alaska
Origin time: 19 22 41.3
Epicenter: 61.479N., 149.973W.
Depth: 52 km
Magnitude: 3.5mb(GS), 3.8ML(PM)
Felt: Anchorage, Girdwood, and Palmer (PM).

ALASKA-Continued

15 April (GS) Central Alaska
Origin time: 18 30 43.0
Epicenter: 64.853N., 147.531W.
Depth: 10 km
Magnitude: 4.3mb(GS), 4.8ML(PM)
Intensity VI: Fairbanks-- The University of Alaska reported minor damage. Other damage included cracked plaster, and disconnected pipes to the Department of Natural Resources Building.
Intensity V:
Fort Wainwright— Hairline cracks appeared in plaster; a few merchandise items were thrown from store shelves; a few glassware or dishes broke; a few small objects overturned or fell; felt by many.
North Pole— A few small objects overturned or fell; felt by many.
Intensity IV: Ester, Nenana.
Intensity III: Eilson Air Force Base.

19 April (GS) Southern Alaska
Origin time: 04 43 34.6
Epicenter: 61.194N., 147.025W.
Depth: 70 km
Magnitude: 4.0mb(GS)
Intensity III: Valdez (PM).
Intensity II: Palmer (PM).
Intensity I: Anchorage (PM).

19 April (GM) Southern Alaska
Origin time: 19 12 50.0
Epicenter: 63.270N., 149.707W.
Depth: 122 km
Magnitude: 5.1mb(GS), 4.7MD(GM)
Intensity IV: Big Lake (PM), Cantwell, Chickaloon (PM), Denali National Park (PM), Healy, McKinley Park, Palmer (PM), Skwentna, Usibelli, Wasilla (PM).
Intensity III: Anchorage, Copper Center, Spenard, Sutton, Whittier, Willow.

21 April (GS) Southern Alaska
Origin time: 07 13 27.4
Epicenter: 61.262N., 150.449W.
Depth: Normal
Magnitude: 2.9ML(PM)
Felt: Anchorage (PM).

21 April (GM) Southeastern Alaska
Origin time: 12 56 48.8
Epicenter: 58.242N., 140.100W.
Depth: 0 km
Magnitude: 4.6mb(GS), 4.3ML(PM), 3.4MD(GM)
Intensity IV: Yakutat (PM).

22 April (GS) Southern Alaska
Origin time: 03 55 16.9
Epicenter: 61.491N., 150.007W.
Depth: 72 km
Magnitude: 3.9ML(PM)
Felt: at Anchorage, Palmer, and Wasilla (PM).

24 April (GS) Southern Alaska
Origin time: 06 25 11.8
Epicenter: 61.757N., 147.095W.
Depth: 66 km

Magnitude: 3.6ML(PM)
Felt: Sheep Mountain Lodge (PM).

24 April (GS) Southern Alaska
Origin time: 10 07 35.3
Epicenter: 61.320N., 151.947W.
Depth: 109 km
Magnitude: 4.2mb(GS)
Felt: Anchorage (PM).

26 April (GS) Central Alaska
Origin time: 23 10 55.2
Epicenter: 64.811N., 149.083W.
Depth: 10 km
Magnitude: 3.3ML(PM)
Intensity IV: Minto.
Intensity III: Fairbanks.

5 May (GS) Southern Alaska
Origin time: 06 09 03.8
Epicenter: 61.604N., 146.495W.
Depth: 62 km
Magnitude: 3.3ML(PM)
Felt: Valdez (PM).

6 May (GS) Western Alaska
Origin time: 06 38 10.1
Epicenter: 66.608N., 163.891W.
Depth: Normal
Magnitude: 4.3mb(GS), 4.5ML(PM)
Intensity IV: Kotzebue.

7 May (GS) Southeastern Alaska
Origin time: 09 01 47.7
Epicenter: 56.718N., 136.615W.
Depth: Normal
Magnitude: 4.0mb(GS)
Intensity IV: Shelikof (PM).
Intensity II: Sitka (PM).

9 May (GS) Southern Alaska
Origin time: 14 56 27.4
Epicenter: 61.023N., 146.364W.
Depth: 7 km
Magnitude: 3.4ML(PM)
Intensity III: Valdez (PM).

11 May (GS) Southern Alaska
Origin time: 19 24 38.7
Epicenter: 62.600N., 151.328W.
Depth: Normal
Magnitude: 3.1ML(PM)
Intensity II: Anchorage (PM).

15 May (GS) Southern Alaska
Origin time: 05 51 20.8
Epicenter: 61.653N., 149.929W.
Depth: 54 km
Magnitude: 3.6ML(PM)
Intensity II: Palmer (PM).

25 May (GS) Near Islands, Aleutian Islands
Origin time: 10 39 55.2
Epicenter: 52.459N., 174.104E.
Depth: 66 km

ALASKA--Continued

Magnitude: 4.7mb(GS)
Intensity V: Shemya Air Force Base-- A few small objects overturned or fell; hanging pictures swung out of place; felt by many.

9 June (GS) Andreanof Islands, Aleutian Islands
Origin time: 18 46 00.9
Epicenter: 51.414N., 174.111W.
Depth: 21 km
Magnitude: 6.2mb(GS), 5.8MS(GS), 5.8MS(BK)
Intensity III: Adak (PM).

9 June (GM) Southern Alaska
Origin time: 22 15 43.4
Epicenter: 59.260N., 152.843W.
Depth: 83 km
Magnitude: 4.7mb(GS), 3.9MD(GM)
Intensity III: Homer (PM).
Intensity II: Anchorage (PM).

12 June Southern Alaska
Origin time: 16 12
Epicenter: Not located
Depth: None computed
Magnitude None computed
Intensity IV: Homer.

27 June (GM) Southern Alaska
Origin time: 08 12 24.2
Epicenter: 60.225N., 150.937W.
Depth: 65 km
Magnitude: 4.3mb(GS), 3.6MD(GM)
Intensity IV: Homer.

28 June (GM) Southeastern Alaska
Origin time: 03 25 17.6
Epicenter: 60.182N., 141.253W.
Depth: 12 km
Magnitude: 6.0mb(GS), 5.4MS(GS), 5.9ML(PM), 4.3MD(GM)
Intensity IV: Yakutat.
Felt: Cape Yakataga (PM).

30 June (GS) Near Islands, Aleutian Islands
Origin time: 11 51 56.9
Epicenter: 52.559N., 173.245E.
Depth: Normal
Magnitude: 4.9mb(GS), 4.3ML(PM)
Intensity III: Shemya Air Force Base.

12 July (GM) Prince William Sound
Origin time: 15 10 03.7
Epicenter: 61.035N., 147.185W.
Depth: 30 km
Magnitude: 6.1mb(GS), 6.4MS(GS), 6.4ML(PM),6.3MS(BK), 6.2MS(PS), 6.6mb(PS)

This earthquake has an epicenter near the location of the March 27, 1964 event, a great earthquake with magnitude 8.3 (MS). The July 1983 shock was felt from Yakutat on the south to Fairbanks to the north and eastward to Whitehorse in Yukon Territory, Canada (an area of approximately 675,000 km^2, see fig 10).

The Valdez airport terminal building had damage estimated at $1,000,000. The press reported that this earth-

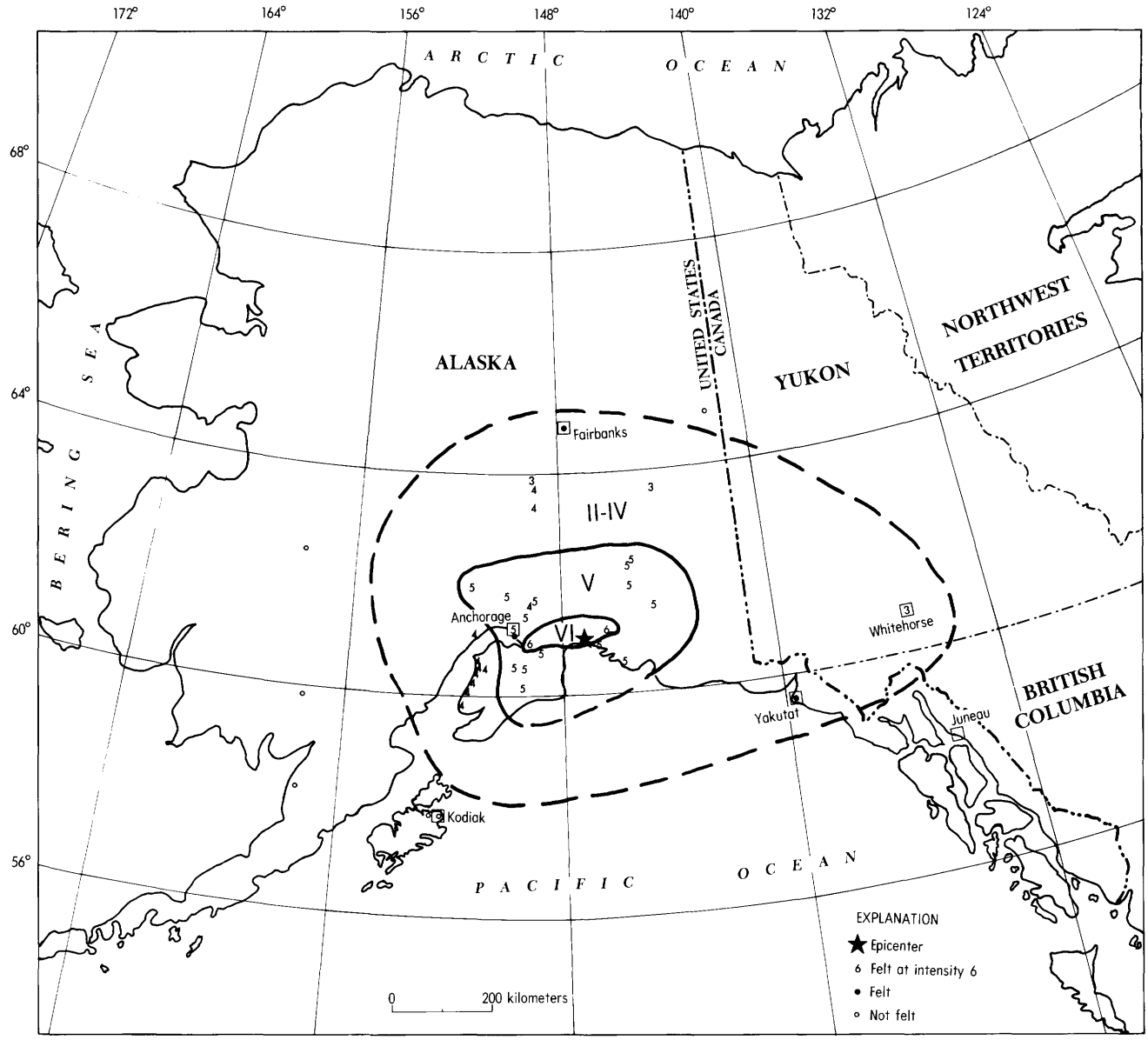

Figure 10. Isoseismal map for the Prince William Sound, Alaska, earthquake of 12 July 1983, 15 10 03.7 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; arabic numerals represent intensities at specific sites.

quake was the probable cause of a break in the Bering Glacier ice dam holding back Berg Lake, about 60 miles east of Cordova. Following the earthquake the level of water in the lake dropped about 210 ft. and the countryside was flooded.

Intensity VI:
United States—Alaska—
Girdwood— Many dishes or glassware broke, many small objects overturned or fell; a few items fell off store shelves; trees and bushes shook moderately; the vibration was described as strong; felt by all and awakened many.
Valdez— The exterior concrete-block walls of the airport terminal building cracked from roof to ground; inside walls also cracked. Many dishes or glassware broke in both businesses and homes. Both grocery stores and liquor stores had merchandise thrown off shelves. In homes pictures were knocked off walls, and furniture overturned. Ceiling tiles fell in the elementary and high school buildings. Sidewalks and streets cracked; both standing and moving vehicles rocked moderately and it was felt by and awakened many.
Intensity V: The most common effects at the places listed below were a few merchandise items thrown off store shelves, a few small objects overturned or fell, trees and bushes shook slightly to moderately, standing vehicles shook slightly. The vibration was described as strong, and felt by many or all. Additional effects are listed after each locality.
United States—Alaska—
Anchorage— Buildings shook strongly.
Chitina.
Chugiak— Hanging pictures fell.
Copper Center— People had difficulty in standing or walking; hairline cracks appeared in interior walls.
Cooper Landing— People had difficulty in standing or walking; water splashed onto sides of ponds.
Cordova— Moving vehicles rocked moderately.
Elmendorf Air Force Base— Moving vehicles rocked slightly.
Fort Richordson— Hairline cracks appeared in interior walls.
Gakona— A few windows cracked.
Glennallen.
Moose Pass— Hairline cracks appeared in interior walls; bricks fell from chimneys.
Seward— A video machine fell off a television; bells hung from the ceiling rang.
Skwentna.
Sutton— A few cracked windows.
Tatitlek— (press report).
Whittier— Hairline cracks in appeared in interior walls.
Willow.
Intensity IV:
United States—Alaska—
Anchor Point, Anchorage International Airport, Cantwell, Clam Gulch, Glacier Park Resort (base of Matanuska Glacier), Kasilof, Kenai, McKinley Park, Ninilchik, Palmer (PM), Soldotna, Sterling (ground cracks on dry and level ground), Tyonek.
Intensity III:
Canada—Yukon Territory—
Whitehorse (PM).
United States—Alaska—
Dot Lake, Healy.

ALASKA--Continued

Felt:
United States—Alaska—
Eagle River (press report), Fairbanks and Yakutat (PM).

12 July (GS) Prince William Sound
Origin time: 15 33 03.2
Epicenter: 60.942N., 147.299W.
Depth: Normal
Magnitude: 3.8ML(PM)
Intensity III: Valdez (PM).
Intensity II: Anchorage (PM).

12 July (GS) Southern Alaska
Origin time: 17 31 24.1
Epicenter: 59.924N., 152.855W.
Depth: 107 km
Magnitude: 4.2mb(GS)
Intensity II: Anchorage (PM).

15 July (GS) Andreanof Islands, Aleutian Islands
Origin time: 03 55 54.0
Epicenter: 52.290N., 176.889W.
Depth: 130 km
Magnitude: 5.0mb(GS)
Felt: Adak Island (PM).

15 July (GM) Southeastern Alaska
Origin time: 07 49 00.1
Epicenter: 60.240N., 140.883W.
Depth: 14 km
Magnitude: 5.1mb(GS), 4.1MS(GS), 4.6ML(PM), 3.7MD(GM)
Intensity III: Yakutat.

15 July (GS) Southeastern Alaska
Origin time: 11 42 57.2
Epicenter: 60.056N., 141.001W.
Depth: 12 km
Magnitude: 3.6ML(PM)
Felt: Yakutat.

21 July (GM) Kodiak Island region
Origin time: 17 35 16.6
Epicenter: 58.077N., 152.940 W.
Depth: 99 km
Magnitude: 4.9mb(GS), 4.6ML(PM), 4.3MD(GM)
Intensity III: Kodiak.
Felt: Afognak Island (PM).

4 August (GS) Southern Alaska
Origin time: 04 07 18.9
Epicenter: 60.870N., 147.349W.
Depth: Normal
Magnitude: 4.4mb(GS), 3.6MS(GS), 4.0ML(PM)
Felt: Palmer and Valdez (PM).

5 August (GS) Northern Alaska
Origin time: 03 10 43.4
Epicenter: 67.107N., 155.478W.
Depth: Normal
Magnitude: 3.2ML(PM)
Felt: Indian Mountain (PM).

5 August (GM) Southern Alaska
Origin time: 21 23 38.7

Epicenter: 61.728N., 147.468W.
Depth: 35 km
Magnitude: 4.2mb(GS), 4.5ML(PM), 3.7MD(GM)
Intensity IV: Copper Center, Sutton.
Felt: Anchorage, Palmer, and Talkeetna (PM).

6 August (GM) Southern Alaska
Origin time: 16 34 00.5
Epicenter: 60.400N., 152.892W.
Depth: 129 km
Magnitude: 5.4mb(GS), 4.7MD(GM)
Intensity IV: Clam Gulch, Homer, Kasilof (one foundation reported cracked), Soldotna.
Intensity III: Anchorage, Cooper Landing, Kenai, Ninilchik, Seldovia (PM), Skwentna, Tyonek.

19 August (GM) Southern Alaska
Origin time: 04 59 32.7
Epicenter: 60.138N., 152.807W.
Depth: 98 km
Magnitude: 4.7mb(GS), 4.2MD(GM)
Intensity III: Anchorage, Homer, and Kenai (PM).
Intensity II: Palmer (PM).

19 August (GS) Southern Alaska
Origin time: 08 07 21.4
Epicenter: 60.641N., 149.955W.
Depth: 25 km
Magnitude: 3.5ML(PM)
Intensity II: Palmer (PM).

19 August (GS) Southern Alaska
Origin time: 19 05 20.6
Epicenter: 62.769N., 148.997W.
Depth: 92 km
Magnitude: 4.4mb(GS)
Intensity II: Palmer (PM).

22 August (GS) Cook Inlet area
Origin time: 10 53 55.2
Epicenter: 60.084N., 152.585W.
Depth: 116 km
Magnitude: None computed
Felt: Homer (PM).

25 August (GS) Southern Alaska
Origin time: 11 59 22.6
Epicenter: 61.655N., 149.723W.
Depth: 42 km
Magnitude: 2.8ML(PM)
Felt: Palmer (PM).

7 September (GM) Prince William Sound
Origin time: 19 22 05.0
Epicenter: 60.978N., 147.320W.
Depth: 30 km
Magnitude: 6.2mb(GS), 6.2MS(GS), 6.2MS(BK), 6.3mb(BK), 6.4mb(PS)

This event is located in the same epicentral area as the March 27, 1964, magnitude 8.3(MS), earthquake.

Intensity VI:
Gakona— Many merchandise items were thrown from store shelves; a few dishes or glassware broke; many small objects overturned or fell; moving vehicles rocked slightly; uncased water wells collapsed; flow was disturbed in water wells; there were small landslides and slumping of road fill.
Valdez— Chimneys and foundations cracked; hairline cracks appeared in interior walls; moving vehicles rocked slightly; a few items were thrown from store shelves; light furniture or small appliances overturned; a few windows cracked; hanging pictures fell; a few dishes or glassware broke; a few small objects overturned or fell; felt by all.
Intensity V: The most common effects at the places listed below were a few small objects overturned or fell, a few items thrown off store shelves, trees and bushes shook slightly to moderately, standing vehicles shook slightly, shaking described as moderate to strong, felt by many or all.
Anchorage— Hanging pictures swung out of place; hairline cracks appeared in drywall partitions along the stairwells of the Resolution Tower building at Fourth Avenue and L Street and the Federal Building at 701 C Street; some ceiling tiles and modular bookcases fell in the Federal Building; a few hairline cracks appeared in the tunnel between the Federal Building and an annex.
Chitina— Buildings shook strongly.
Chugiak.
Cooper Landing— People had difficulty walking; hairline cracks appeared in interior walls; well water muddied.
Copper Center.
Homer— The shaking was strongest on Homer Spit.
Hope— Standing vehicles rocked moderately.
Moose Pass.
Palmer.
Soldotna— A few dishes or glassware broke.
Sterling.
Sutton— Hairline cracks appeared in plaster walls; moving vehicles rocked slightly.
Wasilla— Hanging pictures swung out of place; moving vehicles rocked slightly.
Willow.
Intensity IV: Clam Gulch, Cordova (PM), Glennallen, Gulkana, Kenai, Ninilchik, Seward (PM), Sleetmute, Tyonek, Whittier.
Intensity III: Anchor Point, Dot Lake, Fairbanks (PM).

7 September (GM) Prince William Sound
Origin time: 22 22 10.6
Epicenter: 61.010N., 147.307W.
Depth: 27 km
Magnitude: 5.0mb(GS), 4.6ML(PM), 4.0MD(GM)
Felt: Anchorage, Palmer, Valdez, and Wasilla (PM).

12 September (GS) Prince William Sound.
Origin time: 14 28 19.8
Epicenter: 60.896N., 147.300W.
Depth: Normal
Magnitude: 3.5ML(PM)
Felt: Anchorage, Palmer, and Valdez (PM).

14 September (GM) Prince William Sound
Origin time: 02 35 10.8
Epicenter: 60.960N., 147.267W.
Depth: 30 km

Magnitude: 4.9mb(GS), 4.6ML(PM), 3.7MD(GM)
Felt: Anchorage, Palmer, and Valdez (PM).

14 September (GS) Cook Inlet area
Origin time: 11 25 02.7
Epicenter: 59.969N., 152.868W.
Depth: 185 km
Magnitude: 4.0mb(GS)
Felt: Anchorage and Homer (PM).

16 September (GS) Southern Alaska
Origin time: 22 52 57.2
Epicenter: 60.572N., 149.821W.
Depth: 63 km
Magnitude: 3.5ML(PM)
Felt: Anchorage and Whittier (PM).

21 September (GM) Southern Alaska
Origin time: 22 50 48.2
Epicenter: 60.252N., 152.468W.
Depth: 103 km
Magnitude: 4.8mb(GS), 4.1MD(GM)
Intensity IV: Cooper Landing, Homer, Seward, Skwentna.
Intensity III: Chugiak, Sterling, Sutton, Willow.
Felt: Anchorage, Clam Gulch, and Kenai (PM).

6 October (GM) Southern Alaska
Origin time: 11 10 12.8
Epicenter: 62.355N., 151.193W.
Depth: 97 km
Magnitude: 5.4mb(GS), 4.7MD(GM)
Intensity IV: Anchorage, Chugiak, Eagle River, Talkeetna (press report) Tyonek, Willow.
Intensity III: Fairbanks International Airport.

12 October (GS) Southern Alaska
Origin time: 21 00 54.0
Epicenter: 61.029N., 147.879W.
Depth: 38 km
Magnitude: 3.7mb(GS), 4.3ML(PM)
Intensity III: Anchorage and Chugiak (PM).
Intensity II: Palmer (PM).

13 October (GM) Cook Inlet area
Origin time: 04 30 17.4
Epicenter: 59.630N., 152.077W.
Depth: 63 km
Magnitude: 4.6mb(GS), 3.7MD(GM)
Intensity V: Homer-- Small objects overturned or fell; buildings shook strongly; an observer was almost shaken off his feet; felt by many.
Felt: Seldovia.

14 October (GM) Southern Alaska
Origin time: 17 26 38.9
Epicenter: 61.850., 149.525W.
Depth: 38 km
Magnitude: 4.8mb(GS), 4.3ML(PM), 3.4MD(GM)
Intensity III: Willow.
Intensity II: Anchorage (PM), Elmendorf Air Force Base, Palmer, and Talkeetna (PM).

18 October (GS) Prince William Sound area
Origin time: 12 25 47.3
Epicenter: 61.425N., 146.645W.

ALASKA-Continued

Depth: 51 km
Magnitude: 4.2mb(GS), 4.4ML(PM)
Intensity II: Anchorage and Valdez (PM).

24 October (GS) Fox Islands, Aleutian Islands
Origin time: 13 54 08.8
Epicenter: 52.510N., 168.441W.
Depth: Normal
Magnitude: 4.5ML(PM)
Intensity III: Nikolski (PM).

31 October (GS) Southern Alaska
Origin time: 01 20 11.9
Epicenter: 62.118 N., 150.701 W.
Depth: 94 km
Magnitude: None computed.
Felt: Anchorage and Valdez (PM).

3 November (GS) Northern Alaska
Origin time: 13 07 30.6
Epicenter: 67.302N., 149.714W.
Depth: Normal
Magnitude: 3.2ML(PM)
Intensity III: Wiseman.

4 November (GS) Seward Peninsula
Origin time: 05 41 20.5
Epicenter: 65.739N., 167.785W.
Depth: Normal
Magnitude: 3.7ML(PM)
Intensity III: Tin City Air Force Base (telegram).

4 November (GS) Seward Peninsula
Origin time: 07 55 15.7
Epicenter: 65.725N., 167.941W.
Depth: Normal
Magnitude: 4.2ML(PM)
Intensity IV: Tin City Air Force Base (telegram).

12 November (GS) Central Alaska
Origin time: 07 40 37.5
Epicenter: 64.536N., 147.206W.
Depth: 5 km
Magnitude: 3.7ML(PM)
Felt: Fairbanks, North Pole, and Salcha (PM).

14 November (GS) Central Alaska
Origin time: 18 42 34.7
Epicenter: 64.783N., 147.322W.
Depth: Normal
Magnitude: 2.7ML(PM)
Felt: College Observatory (PM).

17 November (GS) Andreanof Islands, Aleutian Islands
Origin time: 09 36 29.5
Epicenter: 51.649N., 176.805W.
Depth: 59 km
Magnitude: 4.6mb(GS)
Intensity III: Adak (PM).

24 November (GS) Kodiak Island Region
Origin time: 06 50 33.5
Epicenter: 56.386N., 152.189W.
Depth: Normal
Magnitude: 5.0mb(GS), 4.7ML(PM)

Intensity III: Old Harbor and Akhiok (PM).
Intensity II: Karluk (PM).

24 November (GS) Kodiak Island Region
Origin time: 06 56 48.4
Epicenter: 56.429N., 152.498W.
Depth: Normal
Magnitude: 5.1mb(GS), 4.7ML(PM)
Intensity III: Old Harbor and Akhiok (PM).
Intensity II: Karluk (PM).

26 November (GS) Southern Alaska
Origin time: 06 40 41.0
Epicenter: 60.825N., 149.461W.
Depth: Normal
Magnitude: 3.1ML(PM)
Felt: Anchorage (PM).

26 November (GS) Alaska Peninsula
Origin time: 15 51 49.7
Epicenter: 56.768N., 155.344W.
Depth: Normal
Magnitude: 5.3mb(GS), 4.6MS(GS), 5.1ML(PM)
Intensity IV: Larsen Bay.

6 December (GS) Andreanof Islands, Aleutian Islands
Origin time: 20 28 57.4
Epicenter: 51.361N., 176.788W.
Depth: Normal
Magnitude: 3.9mb(GS), 4.9ML(PM)
Intensity III: Adak (PM).

26 December (GS) Near Islands, Aleutian Islands
Origin time: 11 07 39.7
Epicenter: 52.652N., 174.467E.
Depth: 82 km
Magnitude: 4.9mb(GS)
Felt: Shemya Island (PM).

26 December (LD) Alaska Peninsula
Origin time: 19 39 24.4
Epicenter: 55.939N., 160.701W.
Depth: 159 km
Magnitude: 5.0mb(GS)
Felt: Sand Point (PM).

27 December (LD) Unimak Island Region
Origin time: 23 05 52.9
Epicenter: 53.586N., 164.376W.
Depth: 40 km
Magnitude: 5.6mb(GS), 5.3MS(GS), 6.1mb(PS), 5.4MS(PS), 6.0mb(BRK), 5.8ML(LD)
Intensity V: False Pass (PM), King Cove (a few small objects fell, people had difficulty in standing or walking, standing vehicles rocked moderately).
Intensity IV: Akutan, Chignik (PM), Cold Bay, Sand Point (PM).
Intensity III: Chignik Lagoon, Unalaska.

28 December (GS) Andreanof Islands, Aluetian Islands
Origin time: 00 16 34.8
Epicenter: 52.077N., 177.801W.
Depth: 111 km
Magnitude: 5.1mb(GS)
Intensity IV: Adak Island (PM).

ALASKA-Continued

29 December (GS) Kenai Peninsula
Origin time: 20 14 54.2
Epicenter: 59.532N., 151.670W.
Depth: Normal
Magnitude: 3.8ML(PM)
Intensity III: Homer.

ARIZONA

7 January (BK) Mammoth Lakes Area
Origin time: 01 38 10.9

See California listing.

28 January Southern Arizona
Origin time: 15 05
Epicenter: Not located
Depth: None computed
Magnitude: None computed
Intensity III: Casa Grande, Phoenix (press report), Scottsdale (press report).

28 January Southern Arizona
Origin time: 15 14
Epicenter: Not located
Depth: None located
Magnitude: None computed
Intensity III: Phoenix and Scottsdale (press report).

16 February (GS) Hoover Dam area
Origin time: 08 26 05.7
Epicenter: 36.040N., 114.722W.
Depth: 5 km
Magnitude: 3.0ML(GS)
Intensity IV: Temple Bar, Arizona.
Felt: Boulder City, Nevada.

23 February (GS) Hoover Dam area
Origin time: 11 10 20.8
Epicenter: 35.973N., 114.711W.
Depth: 5 km
Magnitude: 3.9ML(GS)
Intensity IV: Henderson, Nevada.
Felt: Boulder City, Nevada (telephone report).

31 August (GS) Northwestern Arizona
Origin time: 08 10 08.7
Epicenter: 36.135N., 112.037W.
Depth: 5 km
Magnitude: 3.3ML(GS)
Felt: Grand Canyon (telephone report).

ARKANSAS

19 January (TC) Central Arkansas
Origin time: 02 30 40.2
Epicenter: 35.186N., 92.212W.
Depth: 5 km
Magnitude: 3.5Mn(GS), 3.5Mn(TU), 3.5MD(TC), 3.9Mn(SL)

This earthquake is one of a series that began on January 12, 1983. Many of these events were felt but not all of them have computed hypocenters. Only hypocenters with a magnitude greater than 2.6 are listed below (see table 6).

Intensity V: Enola—A few small objects overturned and fell; felt by all.
Intensity IV: Mount Vernon, Naylor (TC).
Intensity III: Conway, El Paso.
Intensity II: Little Rock.

17 February (TC) Central Arkansas
Origin time: 19 31 45.3
Epicenter: 35.178N., 92.225W.
Depth: 5 km
Magnitude: 2.8MD(TC)
Felt: Enola-Naylor area (TC).

29 March (TC) Central Arkansas
Origin time: 08 40 45.8
Epicenter: 35.193N., 92.227W.
Depth: 3 km
Magnitude: 2.7Mn(TU), 2.6MD(TC)
Felt: Enola-Naylor area (press report).

30 March (TC) Central Arkansas
Origin time: 04 12 25.4
Epicenter: 35.193N., 92.228W.
Depth: 3 km
Magnitude: 3.1Mn(TU), 3.2MD(TC)
Intensity IV: Naylor (press report).
Felt: Enola (press report).

30 March (TC) Central Arkansas
Origin time: 04 20 54.2
Epicenter: 35.201N., 92.224W.
Depth: 4 km
Magnitude: 2.7Mn(TU), 2.6MD(SL)
Intensity III: Naylor (press report)
Felt: Enola (press report).

12 July (TC) Central Arkansas
Origin time: 08 32 00.0
Epicenter: 35.179N., 92.215W.
Depth: 7 km
Magnitude: 2.5Mn(SL), 2.6MD(TC)
Felt: Enola area (TC).

9 December (GS) Southern Arkansas
Origin time: 20 52 10.5
Epicenter: 33.183N., 92.704W.
Depth: 5 km
Magnitude: 3.0Mn(TU), 3.0MD(TC)
Intensity IV: El Dorado.

10 December (GS) Southern Arkansas
Origin time: 09 24 53.5
Epicenter: 33.183N., 92.704W.
Depth: 5 km
Magnitude: 2.4Mn(TU), 2.2MD(TC)
Intensity II: El Dorado (TC).

4 January (PS) Central California
Origin time: 03 03 05.0
Epicenter: 35.806N., 117.738W.
Depth: 5 km
Magnitude: 4.3mb(GS), 4.0ML(PS), 4.5ML(BK)
Intensity III: China Lake Naval Weapons Center and Ridgecrest (press reports).

4 January (BK) Northern California
Origin time: 21 18 44.6
Epicenter: 41.157N., 122.227W.
Depth: 15 km
Magnitude: 3.2ML(BK)
Felt: southern Siskiyou and northern Shasta Counties and at Castle Crags State Park (press report).
Intensity IV: Dunsmuir, McCloud, and Mount Shasta (press report).

7 January (BK) Mammoth Lakes area
Origin time: 01 31 26.1
Epicenter: 37.633N., 118.937W.
Depth: 12 km
Magnitude: 4.1ML(BK), 4.2ML(PS)
Felt: at Mammoth Lakes (BK).

7 January (BK) Mammoth Lakes area
Origin time: 01 36 46.6
Epicenter: 37.642N., 118.908W.
Depth: 1 km
Magnitude: 4.1mb(GS), 4.3ML(BK), 4.3ML(PS)
Felt: Mammoth Lakes (BK).

7 January (BK) Mammoth Lakes area
Origin time: 01 38 10.9
Epicenter: 37.640N., 118.898W.
Depth: 7 km
Magnitude: 5.1mb(GS), 5.0MS(GS), 5.4ML(BK), 5.6ML(PS)

This earthquake caused a power outage in Mammoth Lakes and at Crowley Lake. It was felt over an area of 76,000 km^2 of California and Nevada (fig. 11).
Intensity VI:
California—
Mammoth Lakes— A few buildings reported damaged and some groceries knocked off shelves.
Intensity V:
California—
Crowley Lake— A few items were thrown off store shelves; felt by all and frightened many.
Lee Vining— A few small objects overturned or fell; felt by all and frightened many.
Wishon— A few dishes or glassware broke; a few small objects overturned or fell; felt by many.
Yosemite National Park— Felt by the postmaster in a moving automobile.
Intensity IV:
California— Armona, Arnold, Auberry, Badger, Bass Lake, Big Creek, Big Pine, Bishop, Burrel, Cantua Creek, Caruthers, Castle Air Force Base, Catheys Valley, Clovis, Crestline, Del Rey, Douglas Flat, El Portal, Firebaugh, Fish Camp, Fresno (Calwa), Friant, Glennville, June Lake, Kingsburg, Kings Canyon National Park, Kyburz, Lone Pine, Madera, Mariposa, Murphys, O'Neals, Pinecrest, Porterville, Prather, Raymond, Reedley, Riverdale, Sequoia National Park, Shaver Lake, Snelling,

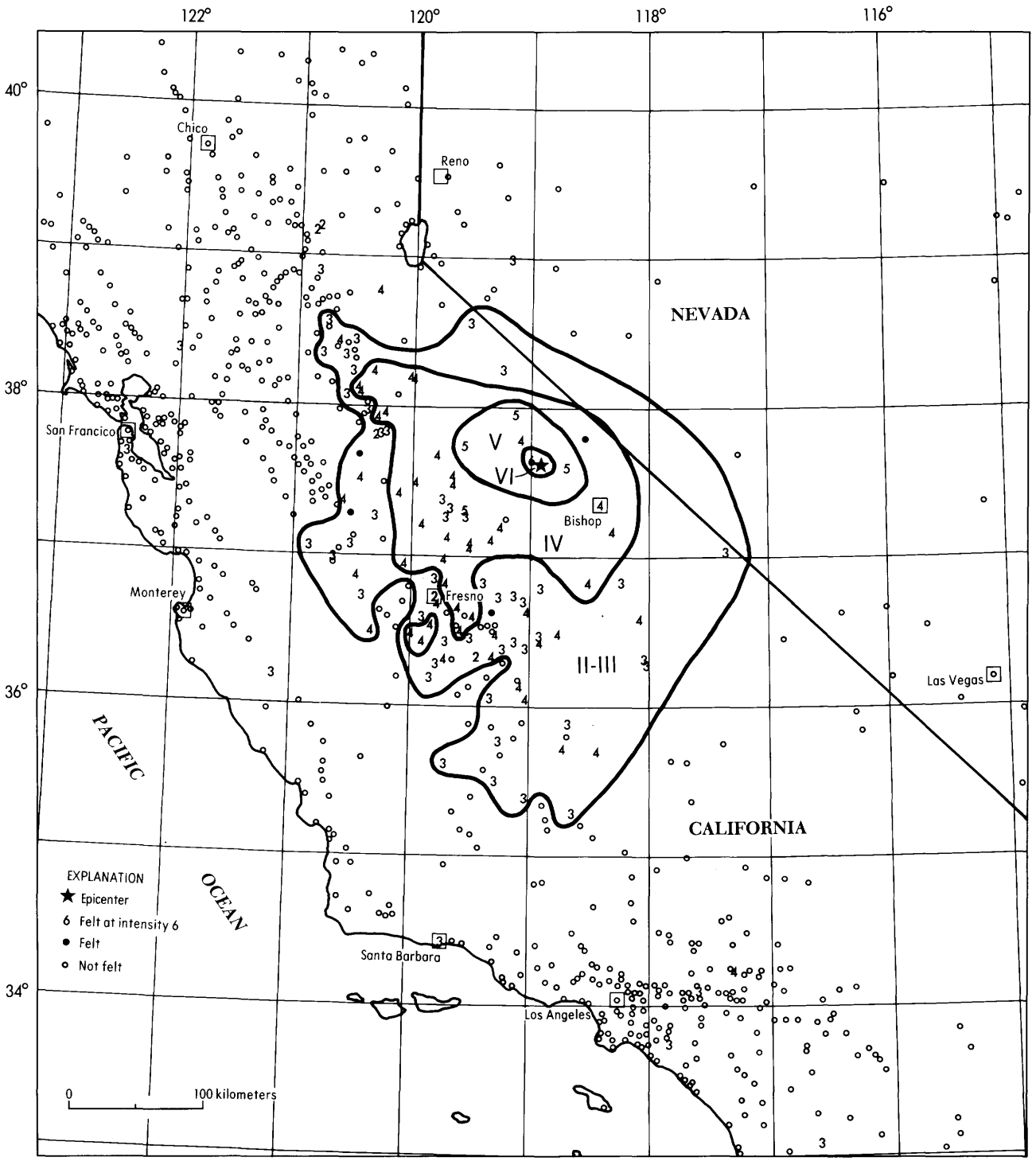

Figure 11. Isoseismal map for the Mammoth Lakes area, California, earthquake of 7 January 1983, 01 38 10.9 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; arabic numerals represent intensities at specific sites.

Soulsbyville, Strathmore, Strawberry, Three Rivers, Toms Place, Tuolumne, Visalia, Volcano, Wawona, Wofford Heights, Yettem.
Intensity III:
Arizona— Wikieup.
California— Ahwahnee, Angels Camp Bakersfield, Big Oak Flat, Bridgeport, Caliente, California Hot Springs, Cartago Coarsegold, Coleville, Cucamonga, Delano, Dos Palos, Dunlap, Georgetown, Glencoe, Groveland, Hume, Independence, Ivanhoe, Jackson, Julian, Kaweah, King City, Laton, Lemoncove, Lemoore Naval Air Station, Los Banos, Lost Hills, Mendota, Miramonte, Mountain Ranch, Mount Aukum, North Fork, Oakhurst, Olancha, Piedra, Pinedale, Planada, Raisin, Red Top, Santa Barbara, Scotty's Castle, Shafter, Sonora, South San Francisco, Squaw Valley, Stratford, Tipton, Traver, Tustin, Vacaville, West Point, Woodlake.
Nevada— Yerington.
Intensity II:
California— Alta, Fresno (Barton), Gold Run, Goshen, Moccasin.
Felt:
California— Benton, Greenview, La Grange, Merced (press report), Orange Cove.

7 January (BK) Mammoth Lakes area
Origin time: 01 45 38.9
Epicenter: 37.642N., 118.940W.
Depth: 4 km
Magnitude: 3.6ML(BK), 4.1ML(PS)
Felt: Mammoth Lakes (BK).

7 January (BK) Mammoth Lakes area
Origin time: 02 13 44.4
Epicenter: 37.647N., 118.967W.
Depth: 13 km
Magnitude: 3.5ML(BK), 3.8ML(PS)
Felt: Mammoth Lakes (BK).

7 January (BK) Mammoth Lakes area
Origin time: 03 24 19.4
Epicenter: 37.635N., 118.988W.
Depth: 7 km
Magnitude: 5.1mb(GS), 5.0MS(GS), 5.3ML(BK), 5.6ML(PS)

This event was felt over an area of approximately 59,000 km^2 of California and Nevada (fig. 12).

Intensity VI:
California—
Mammoth Lakes— At the airport a metal hanger collapsed, damaging a plane. Display cases toppled and shattered in stores (press report); a few items fell from store shelves; felt by all.
Intensity V:
California—
Lee Vining— A few small objects overturned and fell; trees and bushes shaken slightly; felt by many.
Wishon— A few small objects overturned and fell; pictures swung out of place; trees and bushes shook moderately; felt by many.
Yosemite National Park— It was felt moderately by the postmaster while driving his car.
Intensity IV:
California— Angels Camp, Armona, Arnold, Auberry,

CALIFORNIA--Continued

Badger, Benton, Big Creek, Big Oak Flat, Big Pine, Bishop, Burrel, Catheys Valley, Clearlake Park, Clovis, Corcoran, Crowley Lake, Douglas Flat, El Portal, Firebaugh, Fish Camp, Friant, Groveland, Jackson, June Lake, Kerman, Kingsburg, Kings Canyon National Park (Grant Grove), Lakeshore, Lone Pine, Mariposa, Midpines, Miramonte, Pinecrest, Porterville, Prather, Rail Road Flat, Sequoia National Park (Lodgepole), Snelling, Sonora, Strawberry, Toms Place, Tuolumne, Wawona, Wofford Heights.
Intensity III:
California— Ahwahnee, Biola, Bridgeport, Caliente, Calwa, Cantua Creek, Cartago, Castella, Coarsegold, Crestline, Cucamonga, Del Rey, Dunlap, Fresno, Glencoe, Gold Run, Goshen, Hanford, Highland, Hornitos, Hume, Independence, Iowa Hill, Kyburz, La Grange, Lake Isabella, Laton, Lemoncove, Lost Hills, Madera, Mendota, Moreno, Mountain Ranch, Mount Aukum, North Fork, Oakhurst, Olancha, O'Neals, Orange Cove, Piedra, Pine Grove, Pioneer, Planada, Raisin, Red Top, Riverdale, San Bernardino, Santa Ana, Squaw Valley, Stratford, Tipton, Tranquillity, Traver, Tulare, Visalia, West Point, White Pines (Arnold).
Nevada— Dyer, Mina, Yerington.
Intensity II:
California— Barton, Moccasin, Pinedale, Reedley, San Juan Bautista, Santa Barbara, Strathmore, Yettem.
Felt:
California— Mi-Wuk Village, Shaver Lake, Stockton (press report).
Nevada— Reno (press report).

7 January (BK) Mammoth Lakes area
Origin time: 03 30 23.3
Epicenter: 37.643N., 118.965W.
Depth: 5 km
Magnitude: 4.4ML(BK), 4.5ML(PS)
Felt: at Mammoth Lakes (BK).

7 January (BK) Mammoth Lakes area
Origin time: 05 11 03.2
Epicenter: 37.628N., 118.880W.
Depth: 5 km
Magnitude: 3.8ML(BK), 3.7ML(PS)
Felt: Mammoth Lakes (BK).

7 January (BK) Mammoth Lakes area
Origin time: 06 38 25.5
Epicenter: 37.640N., 118.967W.
Depth: 6 km
Magnitude: 3.8ML(BK), 3.9ML(PS)
Felt: Mammoth Lakes (BK).

7 January (BK) Mammoth Lakes area
Origin time: 07 14 25.1
Epicenter: 37.627N., 118.955W.
Depth: 4 km
Magnitude: 3.4ML(BK), 3.6ML(PS)
Felt: Mammoth Lakes (BK).

7 January (BK) Mammoth Lakes area
Origin time: 08 08 11.0
Epicenter: 37.608N., 118.915W.
Depth: 3 km

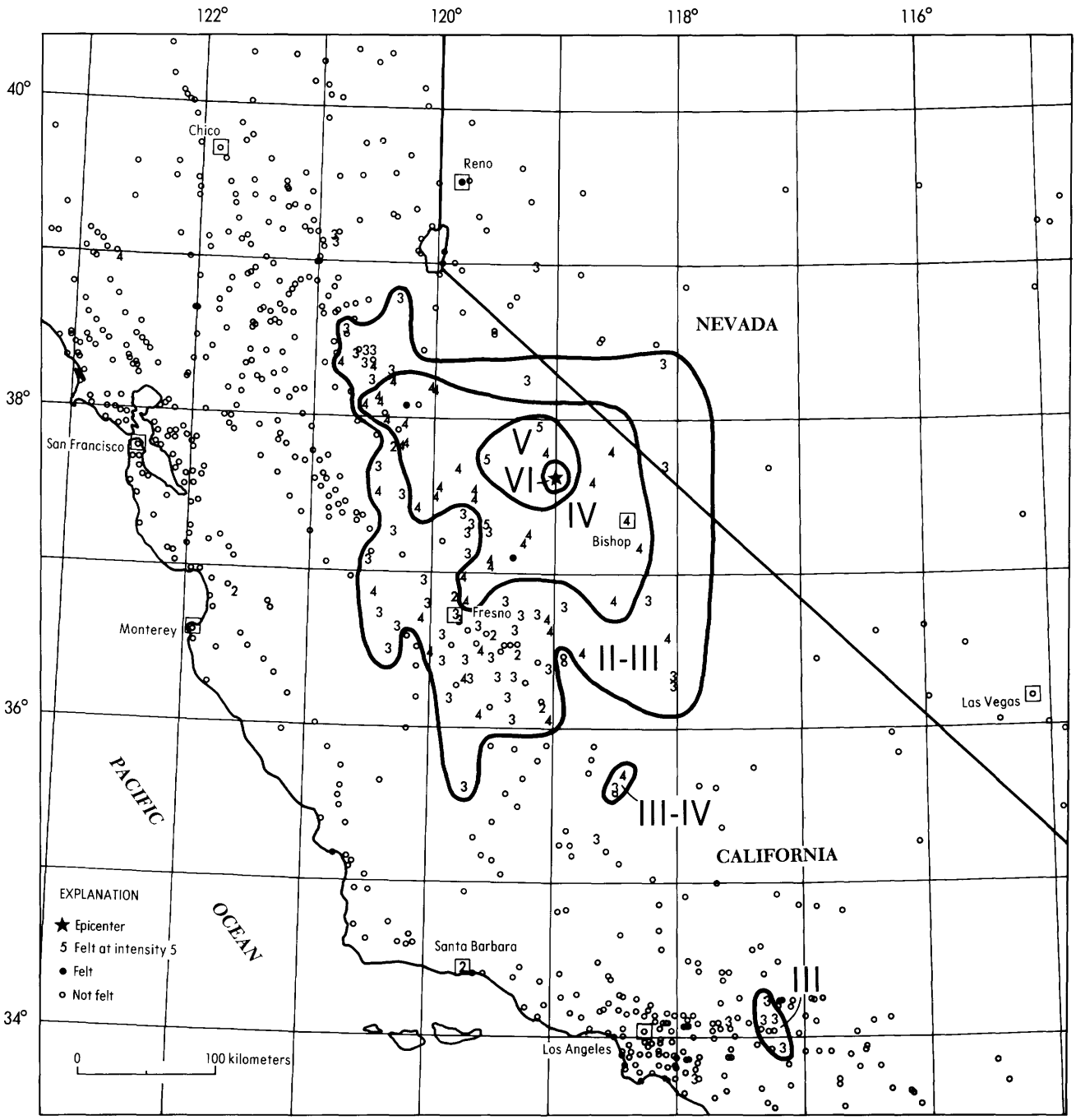

Figure 12. Isoseismal map for the Mammoth Lakes area, California, earthquake of 7 January 1983, 03 24 19.4 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; arabic numerals represent intensities at specific sites.

Magnitude: 3.5ML(BK), 3.8ML(PS)
Felt: Mammoth Lakes (BK).

7 January (BK) Mammoth Lakes area
Origin time: 08 45 53.3
Epicenter: 37.620N., 118.920W.
Depth: 3 km
Magnitude: 3.5ML(BK), 3.6ML(PS)
Felt: Mammoth Lakes (BK).

7 January (BK) Mammoth Lakes area
Origin time: 13 12 48.7
Epicenter: 37.633N., 118.965W.
Depth: 5 km
Magnitude: 3.4ML(BK), 3.5ML(PS)
Felt: Mammoth Lakes (BK).

7 January (PS) Central California
Origin time: 13 43 43.0
Epicenter: 35.741N., 117.741W.
Depth: 5 km
Magnitude: 3.5ML(PS)
Felt: Ridgecrest (PS).

7 January (BK) Mammoth Lakes area
Origin time: 16 33 09.4
Epicenter: 37.632N., 118.933W.
Depth: 3 km
Magnitude: 3.5ML(BK), 3.6ML(PS)
Felt: Mammoth Lakes (BK).

7 January (BK) Mammoth Lakes area
Origin time: 23 09 54.5
Epicenter: 37.625N., 118.880W.
Depth: 7 km
Magnitude: 3.5ML(BK), 3.6ML(PS)
Felt: Mammoth Lakes (BK).

8 January (BK) Mammoth Lakes area
Origin time: 06 17 41.8
Epicenter: 37.623N., 118.858W.
Depth: 9 km
Magnitude: 3.4ML(BK), 3.6ML(PS)
Felt: Mammoth Lakes (BK).

8 January (PS) Southern California
Origin time: 07 19 30.4
Epicenter: 34.133N., 117.454W.
Depth: 8 km
Magnitude: 4.1ML(PS), 4.2ML(BK)
Felt: parts of Los Angeles, Orange, Riverside, and San Bernardino Counties.
Intensity V:
Rialto— A few small objects overturned and fell; pictures swung out of place; it was felt by and frightened many.
San Bruno— A few dishes or glassware broke; a few items thrown from store shelves; a few small objects overturned or fell; felt by many.
Sierra Madre— Hairline cracks appeared in stucco walls; a few windows cracked; a few dishes or glassware broke; a few items were thrown from store shelves; a few small objects overturned or fell; felt by many.
Intensity IV: Colton, Corona, Cucamonga, Etiwanda, Fontana, Guasti, Lytle Creek, Malibu, March Air Force Base, Mount Baldy, Ontario, Pinon Hills, Riverside, San Bernardino, Upland.
Intensity III: Anaheim, Glendale, Sunnymead, Tustin, Yucaipa.
Intensity II: Norwalk, Wrightwood.
Felt: Palm Springs (press report), San Dimas, Victorville (press report).

CALIFORNIA-Continued

9 January (BK) Mammoth Lakes area
Origin time: 11 57 41.3
Epicenter: 37.642N., 118.907W.
Depth: 8 km
Magnitude: 3.4ML(BK), 3.9ML(PS)
Felt: Mammoth Lakes (BK).

10 January (PS) Southern California
Origin time: 04 46 33.3
Epicenter: 33.985N., 118.737W.
Depth: 9 km
Magnitude: 3.0ML(PS)
Intensity III: Malibu and Thousand Oaks (press report).

12 January (PS) Baja California, Mexico
Origin time: 18 30 07.4
Epicenter: 32.066N., 115.783W.
Depth: 6 km
Magnitude: 4.3ML(PS)
Felt: El Cajon and San Diego (PS).

17 January (PS) Central California
Origin time: 01 09 00.8
Epicenter: 35.702N., 118.607W.
Depth: 7 km
Magnitude: 3.6ML(PS), 3.7ML(BK)
Intensity II: Kernville (press report).
Felt: Bakersfield (PS).

18 January (PS) Southern California
Origin time: 14 21 41.9
Epicenter: 34.290N., 118.556W.
Depth: 9 km
Magnitude: 2.5ML(PS)
Felt: San Fernando Valley (press report).

19 January (PS) Southern California
Origin time: 12 05 32.1
Epicenter: 34.137N., 117.460W.
Depth: 7 km
Magnitude: 2.7ML(PS)
Felt: San Bernardino (PS).

24 January (PS) Imperial Valley
Origin time: 03 38 36.5
Epicenter: 32.983N., 115.921W.
Depth: 7 km
Magnitude: 3.4ML(PS)
Intensity III: Imperial.

25 January (BK) Mammoth Lakes area
Origin time: 10 10 41.2
Epicenter: 37.505N., 118.900W.
Depth: 2 km
Magnitude: 4.4mb(GS), 4.8ML(BK), 4.5ML(PS)
Felt: Bishop and Mammoth Lakes (BK).

25 January (PS) Mammoth Lakes area
Origin time: 13 30 22.4
Epicenter: 37.500N., 118.983W.
Depth: 6 km
Magnitude: 3.4ML(PS), 3.4ML(BK)
Felt: Mammoth Lakes (BK).

28 January (PS) Southern California
Origin time: 14 54 08.9
Epicenter: 33.942N., 118.726W.
Depth: 13 km
Magnitude: 3.6ML(PS)
Intensity IV: Venice, West Los Angeles.
Intensity III: Agoura, Malibu, Thousand Oaks.
Intensity II: Somis, Huntington Beach.

29 January (BK) Mammoth Lakes area
Origin time: 15 06 01.5
Epicenter: 37.640N., 118.947W.
Depth: 6 km
Magnitude: 3.4ML(BK), 4.1ML(PS)
Felt: Mammoth Lakes (BK).

29 January (BK) Mammoth Lakes area
Origin time: 15 19 48.1
Epicenter: 37.628N., 118.942W.
Depth: 5 km
Magnitude: 3.2ML(BK), 3.1ML(PS)
Felt: Mammoth Lakes (BK).

31 January (PS) Imperial Valley
Origin time: 10 13 05.2
Epicenter: 33.018N., 115.308W.
Depth: 6 km
Magnitude: 2.3ML(PS)
Felt: Brawley (PS).

31 January (BK) Mammoth Lakes area
Origin time: 10 13 41.1
Epicenter: 37.500N., 118.882W.
Depth: 7 km
Magnitude: 3.9ML(BK), 3.9ML(PS)
Felt: Mammoth Lakes (BK).

31 January (PS) Imperial Valley
Origin time: 10 15 41.1
Epicenter: 33.077N., 115.312W.
Depth: 6 km
Magnitude: 2.5ML(PS)
Felt: Brawley (PS).

31 January (BK) Mammoth Lakes area
Origin time: 10 18 31.1
Epicenter: 37.553N., 118.877W.
Depth: 2 km
Magnitude: 3.4ML(BK), 3.4ML(PS)
Felt: Mammoth Lakes (BK).

31 January (PS) Imperial Valley
Origin time: 10 19 18.0
Epicenter: 33.017N., 115.314W.
Depth: 6 km
Magnitude: 2.7ML(PS)
Felt: Brawley (PS).

CALIFORNIA-Continued

31 January (BK) Mammoth Lakes area
Origin time: 10 22 24.7
Epicenter: 37.503N., 118.893W.
Depth: 4 km
Magnitude: 3.8ML(BK), 3.8ML(PS)
Felt: Mammoth Lakes (BK).

1 February (PS) Central California
Origin time: 22 09 07.9
Epicenter: 35.773N., 117.727W.
Depth: 7 km
Magnitude: 3.4ML(PS)
Felt: Ridgecrest (PS).

4 February (BK) Mammoth Lakes area
Origin time: 07 15 10.3
Epicenter: 37.653N., 118.957W.
Depth: 7 km
Magnitude: 3.9mb(GS), 3.9ML(BK), 4.3ML(PS)
Felt: Mammoth Lakes (BK).

4 February (BK) Mammoth Lakes area
Origin time: 15 02 24.6
Epicenter: 37.643N., 118.950W.
Depth: 6 km
Magnitude: 3.4ML(BK), 3.8ML(PS)
Felt: Mammoth Lakes (BK).

4 February (BK) Central California
Origin time: 16 12 12.9
Epicenter: 37.583N., 121.960W.
Depth: 8 km
Magnitude: 3.0ML(BK)
Intensity III: Fremont, Hayward.
Intensity II: Sunol.

4 February (PS) Southern California
Origin time: 16 19 15.2
Epicenter: 32.913N., 116.501W.
Depth: 6 km
Magnitude: 3.5ML(PS)
Felt: San Diego (PS).

4 February (BK) Mammoth Lakes area
Origin time: 17 02 58.1
Epicenter: 37.643N., 118.948W.
Depth: 3 km
Magnitude: 3.5ML(BK), 3.8ML(PS)
Felt: Mammoth Lakes (BK).

5 February (BK) Central California
Origin time: 12 01 27.0
Epicenter: 36.685N., 120.852W.
Depth: 8 km
Magnitude: 4.2ML(BK)
Felt: Mercy Hot Springs area (BK).

17 February (PS) Southern California
Origin time: 16 11 47.8
Epicenter: 34.135N., 117.442W.
Depth: 8 km
Magnitude: 2.7ML(PS)
Felt: Fontana (PS).

19 February (BK) Mammoth Lakes area
Origin time: 11 08 27.5
Epicenter: 37.528N., 118.875W.
Depth: 9 km
Magnitude: 3.6ML(BK), 3.9ML(PS)
Felt: Mammoth Lakes (BK).

20 February (BK) Mammoth Lakes area
Origin time: 00 50 17.3
Epicenter: 37.622N., 118.943W.
Depth: 6 km
Magnitude: 3.4ML(BK), 3.8ML(PS)
Felt: Mammoth Lakes (BK).

22 February (PS) Southern California
Origin time: 05 37 37.6
Epicenter: 34.135N., 117.458W.
Depth: 5 km
Magnitude: 2.6ML(PS)
Intensity III: Etiwanda.
Felt: Fontana and San Bernardino (PS).

24 February (PS) Southern California
Origin time: 12 14 05.2
Epicenter: 34.086N., 118.872W.
Depth: 6 km
Magnitude: 3.0ML(PS)
Intensity III: Malibu (press report).
Intensity II: Somis.

24 February (BK) Mammoth Lakes area
Origin time: 19 52 00.8
Epicenter: 37.620N., 118.963W.
Depth: 5 km
Magnitude: 3.7ML(BK), 4.1ML(PS)
Intensity III: Mammoth Lakes.

28 February (PS) Southern California
Origin time: 18 11 14.5
Epicenter: 33.961N., 118.341W.
Depth: 6 km
Magnitude: 2.4ML(PS)
Felt: Lakewood (PS).

1 March (PS) Southern California
Origin time: 07 09 23.0
Epicenter: 33.957N., 118.316W.
Depth: 5 km
Magnitude: 2.6ML(PS)
Intensity III: Inglewood (press report).

1 March (PS) Southern California
Origin time: 20 18 35.8
Epicenter: 33.942N., 118.319W.
Depth: 6 km
Magnitude: 3.8ML(PS)
Intensity V: Malibu-- A few cracked windows; a few items were thrown from store shelves; a few dishes broke; a few small objects overturned or fell; felt by many.
Intensity IV: Compton, Culver City, Inglewood, Lawndale, Los Angeles (press report). Lomita, Palos Verdes Peninsula, Redondo Beach, South Gate, Torrance, Wilmington.

CALIFORNIA--Continued

Felt: Cerritos (PS), Downey (PS), Gardena (PS), Hermosa Beach (PS), Long Beach(PS), Santa Barbara (press report), Van Nuys (PS).

15 March (BK) Mammoth Lakes area
Origin time: 03 15 59.9
Epicenter: 37.518N., 118.880W.
Depth: 9 km
Magnitude: 3.8ML(BK), 3.9ML(PS)
Felt: Mammoth Lakes (press report).

16 March (BK) Mammoth Lakes area
Origin time: 15 25 28.3
Epicenter: 37.510N., 118.893W.
Depth: 7 km
Magnitude: 4.0ML(BK), 3.8ML(PS)
Felt: Mammoth Lakes and Bishop (BK).

29 March (PS) Southern California
Origin time: 14 27 15.4
Epicenter: 34.175N., 117.412W.
Depth: 6 km
Magnitude: 3.2ML(PS)
Intensity IV: Fontana.
Intensity III: Mentone.
Felt: Devore, Rialto, and Victorville.

1 April (PS) Southern California
Origin time: 22 56 58.5
Epicenter: 34.934N., 121.000W.
Depth: 6 km
Magnitude: 3.3ML(PS), 3.2ML(BK)
Felt: San Luis Obispo (BK).

7 April (BK) Northern California
Origin time: 07 35 48.0
Epicenter: 39.130N., 123.127W.
Depth: 6 km
Magnitude: 4.1mb(GS), 3.6ML(BK)
Intensity V: Ukiah-- A few small objects overturned or fell; hanging pictures fell; felt by and awakened many.
Intensity IV: Boonville, Finley, Lakeport, Redwood Valley, Talmage, Upper Lake, Willits.
Intensity III: Clearlake Oaks, Lucerne, Philo.
Felt: Hopland (BK), Santa Rosa (BK).

10 April (PS) Southern California
Origin time: 17 19 21.3
Epicenter: 33.727N., 118.450W.
Depth: 6 km
Magnitude: 3.3ML(PS)
Intensity IV: Hawthorne, Lawndale, Palos Verdes Peninsula, Santa Monica (press report), Venice, West Los Angeles.
Intensity III: Burbank (press report), Palms, Westchester.
Felt: Newport Beach (PS).

16 April (PS) Southern California
Origin time: 12 25 27.2
Epicenter: 34.353N., 118.527W.
Depth: 6 km
Magnitude: 3.5ML(PS)
Intensity IV: Agoura, Canoga Park, Chatsworth, Granada Hills, Northridge (a report of a few glassware or dishes broken and a few small objects overturned or fallen),

Resada, San Fernando (press report), Sepulveda.
Intensity III: Industry, Harbor City, Palos Verdes Peninsula, Simi Valley, Thousand Oaks.
Intensity II: Torrance.
Felt: Valencia (press report).

16 April (PS) Southern California
Origin time: 12 26 46.9
Epicenter: 34.351N., 118.534W.
Depth: 6 km
Magnitude: 3.6ML(PS)
Felt: San Fernando and Valencia (press report).

17 April (PS) Central California
Origin time: 11 49 39.7
Epicenter: 35.350N., 118.554W.
Depth: 6 km
Magnitude: 3.4ML(PS)
Intensity III: Caliente.

18 April (PS) Southern California
Origin time: 21 39 07.4
Epicenter: 34.049N., 118.217W.
Depth: 15 km
Magnitude: 2.8ML(PS)
Felt: Slightly in the downtown Los Angeles area, also felt from Pasadena to West Los Angeles (PS).

19 April (BK) Central California
Origin time: 04 27 59.9
Epicenter: 38.827N., 122.802W.
Depth: 4 km
Magnitude: 2.9ML(BK)
Felt: Cobb (BK).

19 April (BK) Central California
Origin time: 19 51 16.6
Epicenter: 38.795N., 122.807W.
Depth: 5 km
Magnitude: 2.8ML(BK)
Felt: Cobb (BK).

21 April (BK) Central California
Origin time: 8 09 59.4
Epicenter: 37.260N., 122.158W.
Depth: 8 km
Magnitude: 3.4ML(BK)
Felt: Santa Clara and Santa Cruz Counties (press report) and at Cupertino and Los Altos (BK).

2 May (BK) Central California
Origin time: 17 57 59.8
Epicenter: 37.065N., 121.477W.
Depth: 6 km
Magnitude: 3.5ML(BK)
Felt: Gilroy, Hollister, and Morgan Hill (BK).

2 May (GM) Central California
Origin time: 23 42 38.1
Epicenter: 36.233N., 120.309W.
Depth: 10 km
Magnitude: 6.2mb(GS), 6.5MS(GS), 6.7ML(BK), 6.1ML(PS), 6.7ML(GM), M_O = 2.3 x 10^{25} dyne-cm (BK).

Ninety-four people were injured by the earthquake (Durkin and others, 1984). The majority of these injuries occurred to people at homes in residential sections of the city of Coalinga. Most injuries were caused by furniture and other objects which were thrown about, falling canned goods, and people being thrown to the floor by the strong shaking. The most serious damage occurred in Coalinga where the eight-block downtown commercial district was virtually destroyed. One building, The Coalinga Inn, which was partially collapsed by the ground shaking, caught fire and burned.

An American Red Cross disaster damage assessment report (Whear, 1983) listed 309 single-family homes and 33 apartments virtually destroyed; major damage to 558 single-family homes, 94 mobile homes, and 39 apartments; and minor damage to 811 single-family homes, 22 mobile homes, and 70 apartments. A preliminary estimate of property damage in Coalinga by the California Office of Emergency Services exceeded $31 million. It was felt from the Los Angeles area north to Susanville and from the Pacific Coast to western Nevada (fig. 13), an area of about 205,00 km^2 (Stover, 1983).

The most heavily damaged section of downtown Coalinga extended from Third to Seventh Streets between Durian and Forest Streets. Shah and others (1984) inspected 139 buildings in this area and reported that 49 had collapsed or were near collapse, 10 were heavily damaged, 28 had moderate damage, and 52 were lightly damaged. Examples of damage in this district are shown in figures 14 through 17. The most severe damage occurred to the old (usually pre-1930) one- and two-story buildings of unreinforced brick masonry wall construction, with floors and roofs of wood (Reitherman and others, 1984). The most common type of damage to these buildings was the collapse of front walls, shifting of second-story walls, or severe cracking of walls. In contrast to the severe damage to old brick buildings, the newer buildings of reinforced concrete-block walls or prefabricated metal had little structural damage. The most common damage to newer buildings were broken windows, fall of ceiling tiles, and minor wall cracks.

The damage in the residential areas was variable from area to area with the most severe damage in the older residential areas to the east and north. Older homes were damaged more severely than those constructed since the adoption of design codes for seismic forces (see fig. 18). Most of the older homes were built on wooden posts or were on masonry type foundations but were not anchored to them. In both instances the houses fell or slid off the foundations and were damaged. Modern homes anchored to a concrete perimeter foundation suffered only superficial damage (Mustart and others, 1983). Many chimneys were cracked, broken at the roofline, or thrown down. Hopper and others (1983) surveyed 388 chimneys and reported 206 of them thrown down and 18 cracked but standing. Virtually all mobile homes suffered some damage and many fell from their supports (Steinbrugge and others, 1984).

Most of the public buildings (the firehouse, post office, city hall, police station, hospital, and schools) in Coalinga suffered only minor damage such as cracked plaster, fallen lights fixtures, and some shattered windows. However, an old storage building at Cheney Kindergarten School and the old maintenance building and storage building at Coalinga High School were severely

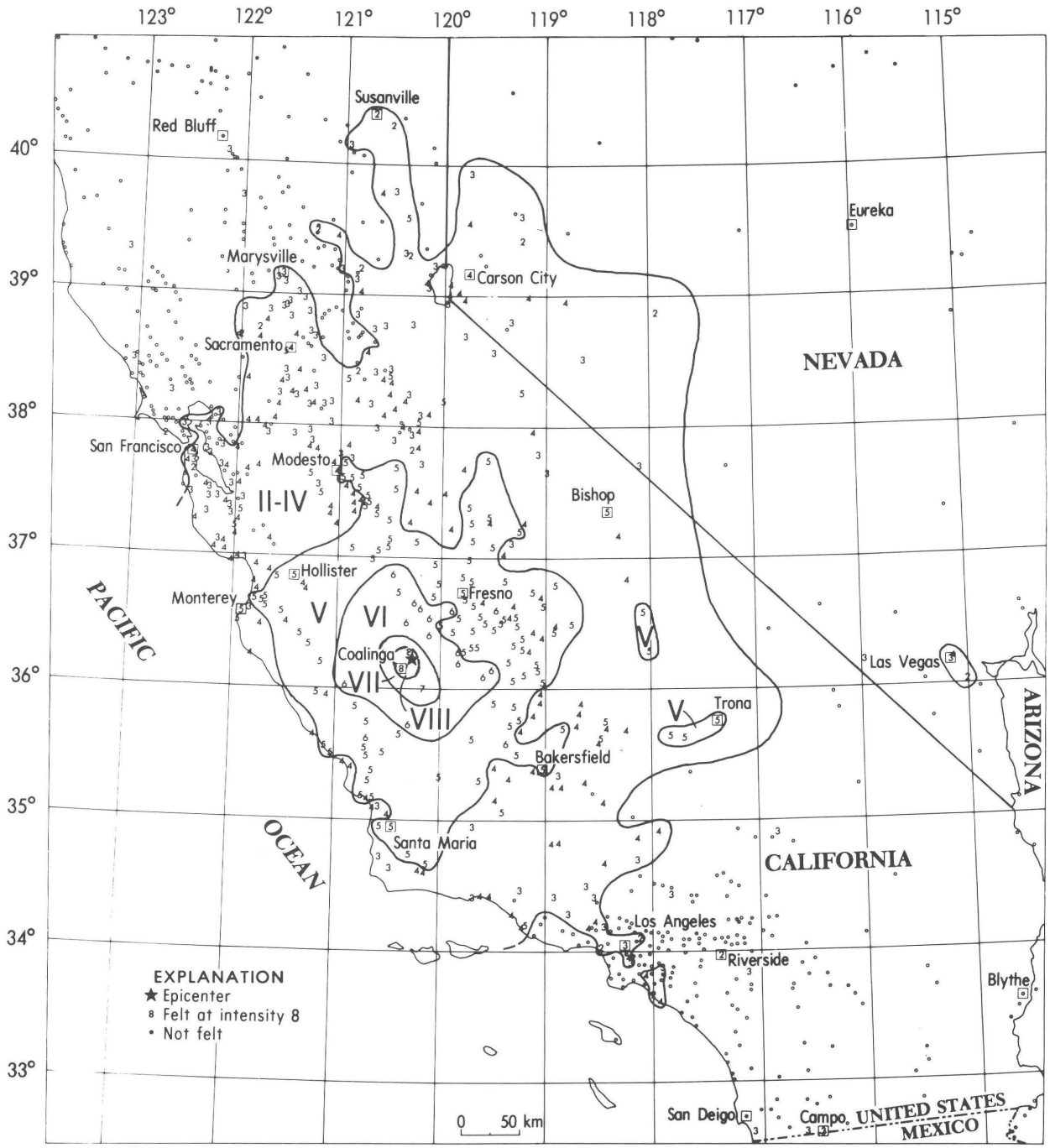

Figure 13. Isoseismal map for the Coalinga, California, earthquake of 2 May 1983, 23 42 38.1 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; arabic numerals represent intensities at specific sites.

Figure 14. Damage to the downtown section of Coalinga, California caused by the 2 May 1983 earthquake (provided by The Fresno Bee).

damaged. Both structures were torn down after the earthquake. Also, the tall brick chimney at the High School was heavily damaged and later demolished (Meehan, 1983).

Public utilities (water, electricity, gas, sewerage) were all damaged to some extent. The water system continued to function despite numerous leaks in the transmission piping. There were only temporary interruptions to electric power, but the gas was shut off for several days because of the hazard from leaks caused by broken or disconnected piping. The sewerage system continued to function despite the partial collapse of a 480-ft section of old concrete sewer pipe west of the downtown area (Isenberg and Escalante, 1984). Telephone service was only temporarily interrupted and functioned after the earthquake.

Sixty bridge sites were surveyed for damage and 16 of the bridges showed signs of movement caused by the earthquake but only 6 suffered minor structural damage (Klein, 1983). The damage consisted of hairline cracks at the top of support columns with some spalling, wingwall and parapet fracturing and displacement, and fill settlement.

Surface facilities and wells in the oilfields surrounding Coalinga were damaged by the earthquakes (Hughes and others, 1983). Most of the subsurface damage was collapsed or parted well casing, and this was to only 14 of 1725 active wells. Surface facilities such as pumping

CALIFORNIA--Continued

units, storage tanks, pipelines, and office and support buildings all were damaged. Pumping units were shaken out of alignment, storage tanks were bulged at top and bottom by sloshing liquid and a few ruptured, some pipe fittings to tanks sheared off causing oil leaks, and pipelines leaked at coupling joints and connections. A Shell Oil Company Administration building (about 7 km north of Coalinga) sustained major structural damage and its two brick chimneys fell (Turkheimer and Glozman, 1984).

A common type of damage to industrial facilities (mostly belonging to the petroleum industry) located outside Coalinga to the north and east, were similiar to those described above for oil tanks and piping connections. Most tanks, especially tall ones, slid off their bases or their supports buckled; storage buildings were cracked. Workers in these areas reported they were unable to stand during the earthquake (Yanev and others, 1984). The Pacific Gas and Electric Substation No. 2, located about 7 miles north of Coalinga, was damaged so badly it was near collapse. Strong motion instruments at the Pleasant Valley Pumping Plant (4.5 miles north of the epicenter) recorded a peak acceleration of 0.54 g horizontal and 0.37 g vertical at the switchyard (Maley and others, 1983).

This earthquake caused an uplift of the Anticline Ridge northeast of Coalinga by 0.5 m, but no surface faulting occurred (Stein, 1983). However, surface faulting did occur on the Nunez Fault, 12 km northwest of Coalinga, on

Figure 15. Damage to a building on Fifth Street in the downtown commercial district of Coalinga, California caused by the 2 May 1983 earthquake (provided by The Fresno Bee).

June 11, 1983, in association with a magnitude 5.2 aftershock; this fault had lengthened to a total of 3.3 km as a result of 3 aftershocks in July (Hart and McJunkin, 1983; Rymer and others, 1983).

Eaton and others (1983) monitored the Coalinga aftershocks from May 2 through July 31 and recorded more than 5,000 events; 894 were of magnitude 2.5 or greater. Most of the larger aftershocks were felt in Coalinga.

Intensity VIII: Much of the data listed below were taken from Bennett and Sherburne (1983) and Scholl and Stratta (1984).

California—

Coalinga— The extensive damages to the commercial district made most of the buildings unsafe and they were rapidly demolished. This demolition precluded a detailed building by building description of the damage. Also, because of the large number of damaged homes in the residential area only a general description of damage to residences is given below.

Commercial District— The most severe damage in this area was to buildings of unreinforced brick walls (fig. 19). Some descriptions of the type of damage are as follows: The failure of a supporting wall caused the roof of a building on Elm Avenue to collapse. A building at the corner of 5th Street and Elm Avenue had a collapsed roof from the fall of an adjacent brick wall. A two-story building on Elm Street was displaced sideways by the collapse of an adjacent building and also collapsed. A building across 5th Street from the two-story building also collapsed. The roof of State Theater on Elm Avenue (fig. 16) collapsed over the stage area, and parapets and corners of the upper walls were displaced, A brick building on 5th Street, one block northwest of Elm Avenue, had a section of the second story exterior wall collapse, cracks in other walls, and cracks in the arched opening at street level. Parapets collapsed from a two-story building at the west corner of 5th Street and Elm Street, an 8-in. thick wall on the northwest side collapsed at the second-floor level, other masonry was displaced outward, and most windows were broken.

CALIFORNIA--Continued

In contrast to the destruction described above, the newer buildings suffered only superficial damage of the type listed below. An example of this difference in damage is the Bank of America, located in the heavily damaged downtown area, which had some ceiling tile fall, filing cases and shelves overturned, a small amount of wall cracking, and one cracked window, but no structural damage. The Guarantee Savings and Loan building at 5th and Cedar Streets had mostly window glass breakage on three sides. Other newer buildings had such damage as broken windows, ceiling panels fallen or hanging, goods thrown off shelves, decorative masonry loosened and some masonry fell, some wall cracking at mortar joints, some cracking of interior walls, some hanging lights fell, trucks were moved about, and metal buildings were flexed but not damaged.

Residential district— Most homes were of wood-frame construction and the older of these homes suffered the

Figure 16. Earthquake damage to the State Theater on Elm Avenue, Coalinga, California caused by the 2 May 1983 earthquake (provided by The Fresno Bee).

most damage. The reason for this was primarily the type foundation on which the homes were built. Older homes were mostly supported by cripple walls or on a perimeter foundation, but were not anchored to it and were usually shaken off and damaged. Newer homes were anchored to concrete foundations and stayed in place. Besides being moved off their foundations, these older homes suffered such damage as collapse of wooden porch roofs and fall of exterior masonry veener. Cracked gypsum-board walls, cracked or fallen chimneys, and some broken windows were common to both older and newer homes.

School Buildings—

Bishop Elementary School— The concrete-block walls cracked near the roof.

Cheney Kindergarten— Slight plaster cracks appeared in classroom ceilings; some ceramic tile fell off restroom walls; some mechanical equipment shifted. There was no structural damage to the school, but an old concrete block storage building sustained considerable damage and was subsequently demolished.

Coalinga District Administration Building— A concrete block cracked near the top of a wall; ceiling panels were displaced; some displacement of a concrete-block wall.

Coalinga High School— In the auditorium decorative plaster on the ceiling fell to the floor and decorative glass in

skylights fell into the stairwells. Some roofing tile were displaced in the classroom building and bottles of chemicals were thrown to the floor in the third floor chemistry lab. The shop building had interior walls cracked, and plaster cracked and fell from exterior walls. The agriculture facility had roof vents shaken off the roof, suspended light fixtures were shaken loose and light tubes and diffusers fell to the floor, and the water heater was moved. Wall piers were cracked in the boys gymnasium. Two old buildings, which were used for maintenance and storage, had walls badly cracked and displaced, roof partially collapsed, and were subsequently demolished. The large brick chimney of the boiler room was heavily damaged and later demolished. Heavy equipment items were moved off their supports in the shop facilities.

Coalinga Junior High School— Windows broke in the library; plaster cracked in the administration offices; in the classroom wings, glass diffusers from overhead light fixtures fell and broke; hot water tanks shifted and broke the piping; a rooftop cooler shifted.

Dawson Elementary School— Minor cracking appeared in interior and exterior plaster walls; a few window panes broke or cracked; a few roof tiles were displaced; ceiling tiles fell; one 5-ft. section of ceiling plaster fell in a classroom; library books and supplies were thrown to the floor.

Sunset Elementary School— Plaster cracked; a few window panes broke; the water heater moved; a few accoustical tiles fell.

West Hills Community College— The Speech Arts Building had large cracks in the ceiling plaster, spalled concrete from support pillars, and a cracked concrete slab. The basketball backstops were partially detached from roof supports in the gymnasium and a pier was diagonally cracked. The swimming pool cracked and piping broke loose at the filters. Bookshelves were displaced in the library and books thrown to the floor. Two plate-glass windows broke in the student center; kitchen equipment had shifted in the cafeteria; items were generally thrown off shelves in classrooms.

Public Buildings—

The two-story Coalinga Firehouse at 7th and Elm Streets had diagonal tension cracks at corners of the garage doors and at the corners of some second-story windows.

The United States Post Office at 6th and Durian Streets had a shattered front window and some hanging lights fell.

Coalinga City Hall at 6th and Elm Streets was not damaged.

Coalinga District Hospital at Washington and Mountain View Streets had hairline cracks in the exterior plaster at the windows, a slight rotation of the top section of the incinerator stack, unachored mechanical equipment shifted, supplies spilled from shelves, ceiling light fixtures fell, broken water pipes, bookcases toppled and drawers of filing cabinets slid from their tracks, and precision electronic equipment suffered extensive damage.

Other buildings—

Keller Chevrolet— Cadillac Agency had corner failure on all walls resulting in vertical cracks in the masonry at each corner of the building. Decorative masonry veneer spalled off the columns at the front of the building.

Laura Lodge Motel— near the downtown area suffered extensive damage to brick veneer on exterior walls.

Figure 17. Damage to a building at 187 South 6th Street, Coalinga, California caused by the 2 May 1983 earthquake (provided by The Fresno Bee).

CALIFORNIA--Continued

Oilfields—
Oil King School— (closed) One multipurpose building, remaining at the intersection of highway 33 and 198, had minor damage to a pier in the west exterior wall and a few displaced ceramic tiles. Other damage consists of a broken window and a few fallen acoustical tiles.
Pacific Gas and Electric Substation No. 2— located on Highway 33/198 near Oilfields, one of two buildings, a concrete block control building, was damaged so badly it was near collapse. The end walls were badly cracked and portions of both the front and back walls collapsed.
Save Mart Shopping Center— on West Polk and Sunset Streets suffered only minor damage consisting of broken glass and fall of large amounts of ceiling panels.
State Market— at Elm and Van Ness Streets also had ceiling panels fall and large amounts of goods thrown off shelves and scattered in every aisle.
Intensity VII:
California—
Avenal— A nursery building was moved about 2 ft. off its foundation breaking sewer connections and toppling bathroom fixtures. A gas main was broken, several people were reported slightly injured; there was much broken glass from shattered windows; many merchandise items were thrown from store shelves; many glassware or dishes broke; light furniture was overturned and heavy furniture was moved; many large cracks in plaster walls; some chimneys fell; felt by all.

CALIFORNIA--Continued

Intensity VI: The most common effects at the places listed below were that a few windows cracked, a few buildings damaged, a few dishes broke, a few small objects overturned or fell, hairline cracks in plaster walls, some merchandise thrown from store shelves, trees and bushes shook moderately, standing and moving vehicles were moderately shaken, pictures swung out of place, the vibration was described as strong, water splashed out of swimming pools or lakes, people had difficulty standing or walking, felt by all.
California—
Cantua Creek— Light and heavy furniture overturned; some windows broken out; hanging pictures fell; highways and streets cracked; a foundation cracked.
Cholame— Buildings shook strongly.
Corcoran— Some windows broke out; underground pipes broke; exterior brick walls cracked.
Firebaugh— Many large cracks appeared in plaster walls.
Five Points— Hanging pictures fell.
Helm— Buildings shook strongly.
Huron— Buildings shook strongly.
Lemoore Naval Air Station— A building shook strongly; light and heavy furniture moved.
Paso Robles— A foundation cracked.
Raisin— Hanging pictures fell; sidewalks cracked.
Reedley— Cracked foundation.
San Ardo— Many small objects overturned or fell.
San Joaquin— Hanging pictures fell; many small objects

Figure 18. Damage to a home at Hawthorne and Fifth Streets in Coalinga, California caused by the 2 May 1983 earthquake (provided by The Fresno Bee).

overturned or fell; light furniture overturned; a foundation cracked; brick fences cracked.

Stratford— Light furniture overturned; one business reported a collapse of an exterior brick wall.

Tranquillity— Chimneys cracked; there were twisted elevated water tanks.

Wasco— Springs and well water muddied.

Waukena— Many small objects overturned or fell; many dishes or glassware broke.

Intensity V: Some of the more common effects reported from the places listed below were the vibration described as moderate to strong, some reported difficulty in standing or walking, most places reported the quake as being felt by many or all, hanging pictures swung out of place, in most places a few small objects overturned or fell, some reported a few broken dishes or glassware, a few merchandise items thrown from store shelves, some hairline cracks in plaster walls, trees and bushes shaken moderately to strongly (as were standing vehicles), moving vehicles slightly rocked (a few had cracked windows).

California—Ahwahnee, Alpaugh, Armina, Atascadero, Atwater, Auberry, Avila Beach, Badger, Bakersfield, Ballico, Big Creek, Biola, Bishop, Bradley, Bridgeport, Burrel (hanging pictures fell), California Valley (light

furniture or small appliances overturned), Calwa, Cambria, Carmel, Cartago, Caruthers, Ceres, China Lake, Chowchilla (cracked chimney reported), Chualar, Clinter (light furniture or small appliances overturned), Clovis, Coarsegold (cracks in exterior cinderblock walls), Cressey, Creston, Delano, Denair, Dinuba, Dos Palos (light furniture or small appliances overturned), Dunlap, Earlimart, El Nido (light furniture or small appliances overturned), Farmersville, Fort Ord, Fowler (hanging pictures fell, cracks in exterior walls), Fresno, Friant (hanging pictures fell, light furniture or small appliances overturned), Greenfield, Guadalupe, Hanford (hanging pictures fell), Harmony, Hollister, Hughson, Hume, Inyokern, Ione, Ivanhoe, Jolon, Kerman (trees and bushes strongly shaken), Kernville, King City (hanging pictures fell), Kingsburg, La Grange, Lake Isabella, Laton (light furniture or small appliances overturned), Lemoore, Lindsay (hanging pictures fell), Livingston, London, Lone Pine, Los Alamos, Los Banos (hanging pictures fell), Los Gatos, Los Olivos, Los Osos, Lost Hills (many items thrown from store shelves), Madera, Maricopa, Marina, McKittrick, Mendota, Merced, Monterey, Oildale, Olancha, O'Neals, Orosi, Oxnard, Patterson, Piedra, Pinecrest, Pinedale, Pismo Beach, Pond, Porterville, Red Top (trees and bushes strongly shaken), Ridgecrest, Riverbank, Riverdale, Salinas, Sanger (hanging pictures fell), San Juan Bautista (trees and bushes strongly shaken), San Luis Obispo (hanging pictures fell), San Miguel, Santa Clara, Santa Margarita, Santa Maria, Santa Rita Park, Selma, Sequoia National Park, Shafter (light furniture or small appliances overturned), Shandon, Sierraville, Snelling, Soledad, South Dos Palos, Spreckles, Strathmore, Templeton, Three Rivers, Tipton, Traver, Trona, Tulare, Twain Harte, Vernalis, Visalia (one report of cracked chimneys), Waterford, West Sacramento, Wilseyville, Wishon, Woodville, Woody, Yettem (one building had a cracked exterior brick wall), Yosemite National Park (trees and bushes strongly shaken).

Intensity IV:

California—Acampo, Altaville, Angels Camp, Antioch, Aromas, Arroyo Grande, Barton, Bass Lake, Belmont, Bethel Island, Big Pine, Big Sur, Blairsden, Bodfish, Broderick, Brookdale, Buellton, Buttonwillow, Caliente, California Hot Springs, Campbell, Camptonville, Canoga Park, Capitola, Carmel Valley, Carpinteria, Castroville, Catheys Valley, Cayucos, Courtland, Crows Landing, Cutler, Daly City, Danville, Davenport, Del Rey, Delhi, Di Giorgio, Ducor, East Fresno, Edwards, El Portal, Elk Grove, Elmira, Elverta, Exeter, Felton, Foresthill, Frazier Park, Freedom, Fremont, Galt, Glencoe, Glennville, Gonzales, Groveland, Grover City, Gustine, Hathaway Pines, Hayward, Hickman, Hilmar, Homewood, Hornitos, Independence, Isleton, Kaweah, Kern City, Keyes, Kingsburg, Knights Landing, Lake Hughes, Lakeshore, Lamont, Lathrop, Lebec, Lee Vining, Lemoncove, Lindsay, Livermore, Lockwood, Long Barn, Los Alamitos, Manteca, Mariposa, McFarland, Modesto, Moffett Field, Morgan Hill, Morro Bay, Moss Landing, Mount Aukum, Mount Hermon, Mountain Ranch, Mountain View, Murphys, Newman, Newport Beach, Nipomo, North Fork, Northridge, Oakley, Oceano, Onyx, Orange Cove, Pacific Grove, Paicines, Pebble Beach, Pescadero, Pittsburg, Planada, Pleasanton, Port Hueneme, Porterville, Posey, Prather, Rail Road Flat, Raymond, Redwood Estates, Richgrove, Ripon, Romie Lane, Rosamond, Sacramento, Salida, San Francisco, Santa Maria, San Simeon, Santa

Figure 19. Damage due to the collapse of an unreinforced brick wall in Coalinga, California caused by the 2 May 1983 earthquake (provided by The Fresno Bee).

CALIFORNIA--Continued

Cruz, Shell Beach, Solvang, Sonora, South Gate, Stevinson, Sultana, Summerland, Taft, Tehachapi, Terra Bella, Tollhouse, Tres Pinos, Tuolumne, Tupman, Turlock, Vallecito, Valley Home, Valley Springs, Ventura, Walnut Grove, Winton, Wofford Heights, Woodlake, Woodland.
Nevada— Carson City, Genoa, Glenbrook, Minden, North Las Vegas, Schurz, Sparks, Yerington, Zephyr Cove.

Intensity III:
California— Alameda, Aptos, Arnold, Avery, Bayside, Ben Lomond, Boulder Creek, Brentwood, Brisbane, Camino, Campo, Carnelian Bay, Castaic, Cedar Ridge, Chinese Camp, Chula Vista, Citrus Heights, Clarksburg, Clements, Coleville, Copperopolis, Coulterville, Cupertino, Dinuba, Dunnigan, East Nicolaus, Edison, Elk Grove, Escalon, Fillmore, French Camp, Fullerton, Garden Valley, Greenville, Halcyon, Half Moon Bay, Hamilton City, Herald, Holt, Hood, Iowa Hill, June Lake, Kyburz, La Honda, Lakeview, Lancaster, Lincoln, Linden, Lockeford, Lompoc, Los Angeles, Lynwood, Mammoth Lakes, Markleeville, Marysville, Mi-Wuk Village, Milpitas, Moraga, New Cuyama, Newark, Nicolaus, Oakdale, Oakland, Ojai, Olivehurst, Palo Alto, Petaluma, Pine Grove, Pinole, Pleasant Grove, Pollock Pines, Port Costa, Portola, Potrero, Potter Valley, Proberta, Redwood City, Rio Oso, River Pines, Robbins, Roseville, Ryde, San Andreas, San Carlos, San Lorenzo, San Rafael, Santa Barbara, Saugus, Seaside, Shaver Lake, Sheridan, Simi Valley, Sloughhouse, Soda Springs, Soulsbyville, South Lake

CALIFORNIA--Continued

Tahoe, Stockton, Sunnyvale, Tahoma, Thornton, Tracy, Valyermo, Van Nuys, Vandenberg Air Force Base, Villa Grande, West Point, Westley, Wheatland, Woodbridge, Yermo, Yuba City.
Nevada— Dyer, Fernley, Gardnerville, Hawthorne, Las Vegas, Pahrump, Smith.
Intensity II:
California— Alta, Amador City, Bolinas, Challenge, Huntington Beach, Janesville, Madison, Moccasin, Norden, Riverside, San Gabriel, Santa Monica, South San Francisco, Susanville, Yolo.
Nevada— Gabbs, Henderson, Silver Springs,
Felt:
California— Arcadia (PS), Chatsworth, Davis, Long Beach, Oakhurst, Pasadena (PS), San Bernardino (PS).

3 May (GM) Central California
Origin time: 00 17 59.0
Epicenter: 36.210N., 120.326W.
Depth: 8 km
Magnitude: 4.8mb(GS), 4.3ML(GM), 4.4ML(BK), 4.4ML(PS)
Felt: Coalinga (BK).

3 May (GM) Central California
Origin time: 00 39 46.0
Epicenter: 36.230N., 120.349W.
Depth: 11 km
Magnitude: 4.5ML(GM), 4.2ML(BK), 4.3ML(PS)
Felt: Coalinga (BK).

3 May (GM) Central California
Origin time: 00 57 44.2
Epicenter: 36.270N., 120.315W.
Depth: 8 km
Magnitude: 5.1mb(GS), 5.1ML(GM), 4.8ML(BK),4.8ML(PS)
Felt: Coalinga (BK).

3 May (GM) Central California
Origin time: 01 41 46.0
Epicenter: 36.142N., 120.219W.
Depth: 7 km
Magnitude: 4.3mb(GS), 4.5ML(GM), 4.2ML(PS) 4.5ML(BK)
Felt: Coalinga (BK).

3 May (GM) Central California
Origin time: 01 58 18.3
Epicenter: 36.782N., 121.512W.
Depth: 9 km
Magnitude: 3.2ML(GM), 3.3ML(PS), 3.8ML(BK)
Felt: Hollister and San Juan Bautista (BK).

3 May (GM) Central California
Origin time: 4 32 32.0
Epicenter: 36.282N., 120.367W.
Depth: 11 km
Magnitude: 4.3mb(GS), 4.4ML(GM), 4.3ML(BK), 4.6ML(PAS)
Felt: at Coalinga (BK).

3 May (GM) Central California
Origin time: 06 04 46.2
Epicenter: 36.270N., 120.395W.
Depth: 10 km
Magnitude: 4.4mb(GS), 4.5ML(GM), 4.3ML(BK),4.4ML(PS)
Felt: Coalinga (BK).

3 May (GM) Central California
Origin time: 08 55 02.0
Epicenter: 36.144N., 120.267W.
Depth: 10 km
Magnitude: 4.4mb(GS), 4.7ML(GM), 4.5ML(BK),4.5ML(PS)
Felt: Coalinga (BK).

3 May (GM) Central California
Origin time: 15 41 41.6
Epicenter: 36.235N., 120.302W.
Depth: 8 km
Magnitude: 4.7mb(GS), 4.8ML(GM), 4.8ML(BK), 4.7ML(PS)
Felt: Coalinga.(BK).

4 May (BK) Central California
Origin time: 7 28 40.4
Epicenter: 36.263N., 120.335W.
Depth: 5 km
Magnitude: 4.7mb(GS), 4.6MS(GS), 4.7ML(BK), 4.5ML(PS)
Felt: at Coalinga (BK).

4 May (GM) Central California
Origin time: 16 11 19.6
Epicenter: 36.281N., 120.349W.
Depth: 12 km
Magnitude: 4.5mb(GS), 4.4ML(GM), 4.3ML(BK), 4.2ML(PS)
Felt: Coalinga (BK).

5 May (GM) Central California
Origin time: 10 20 44.1
Epicenter: 36.285N., 120.368W.
Depth: 11 km
Magnitude: 4.5mb(GS), 4.6ML(GM), 4.6ML(BK), 4.4ML(PS)
Felt: Coalinga (BK).

9 May (GM) Central California
Origin time: 2 49 11.5
Epicenter: 36.246N., 120.299W.
Depth: 12 km
Magnitude: 5.1mb(GS), 4.7MS(GS), 5.3ML(GM), 5.2ML(BK), 5.2ML(PS)

This is one of the stronger aftershocks of the May 2 earthquake. Although it did not cause additional structural damage at Coalinga, two injuries were attributed to the shaking.

Intensity VI: Coalinga.
Intensity V: The most common effects at the places listed below were that a few small objects overturned, a few objects fell, a few dishes or glassware broke, a few items fell off store shelves, plaster walls had hairline cracks, trees and bushes slightly shook, standing vehicles rocked slightly, felt by many.
California— Arvin, Avenal (moving vehicle rocked slightly), Cantua Creek, Five Points, Kerman (a few cracked windows), La Grange, Lemoore Naval Air Station, Pacific Grove (a few cracked windows), Parlier, Selma (a few cracked windows), Shandon, Soledad, Templeton, Woodlake (a few cracked windows), Woodville (hairline cracks in dry wall).
Intensity IV:
California— Ahwahnee, Armona, Atascadero, Atwater, Auberry, Badger, Bass Lake, Big Creek, Biola, Caruthers, Castroville, Catheys Valley, Cholame, Chowchilla, Clovis, Corcoran, Creston, Del Rey, Dunlap, Easton, Farmersville, Firebaugh, Fresno, Friant, Greenfield, Groveland, Helm, Huron, Ivanhoe, Lemoncove, Lindsay, Lockwood, Los Banos, Los Osos, Lost Hills, Madera, McKittrick, O'Neals, Onyx, Orosi, Patterson, Porterville, Prather, Raisin, Reedley, Riverside, Ryde, San Ardo, San Joaquin, San Lucas, Selma, South Dos Palos, Stratford, Sunnyvale, Taft, Tranquillity, Traver, Twain Harte, Visalia, Waukena, Yettem.
Intensity III:
California— Alpaugh, Arroyo Grande, Bakersfield, Bodfish, Calwa, Carmel Valley, California Hot Springs, Delano, Delhi, Dinuba, Dos Palos, Ducor, Earlimart, El Portal, Exeter, Felton, Fresno, Glennville, Gonzales, Goshen, Hanford, Hilmar, Hollister, Independence, Kaweah, King City, Kingsburg, Laton, Lemoore, Livingston, Lone Pine, Mammoth Lakes, Mariposa, McFarland, Mendota, Merced, Monterey, Niland, Oakdale, Olancha, Orange Cove, Pebble Beach, Piedra, Pine Grove, Posey, Raymond, Red Top, Richgrove, Riverdale, San Juan Bautista, San Miguel, San Simeon, Santa Rita Park, Seaside, Sequoia National Park, Shaver Lake, Snelling, Soda Springs, Stevinson, Strathmore, Taft, Temple City, Tipton, Three Rivers, Tulare, Tuolumne, West Point, Winton.

Nevada— Schurz.
Intensity II:
California— Ballico, Harmony, Indio, Jackson, Mi-Wuk Village, Moss Landing, North Fork, Placerville, Planada, Terra Bella.
Felt:
California— Cutler, Jolon, Lake Arrowhead, Nubieber, Tres Pinos, Watsonville.

9 May (GM) Central California
Origin time: 3 26 37.4
Epicenter: 36.240N., 120.299W.
Depth: 12 km
Magnitude: 4.7mb(GS), 4.6ML(GM), 4.4ML(BK),4.9ML(PS)
Felt: Coalinga (BK).

10 May (PS) Imperial Valley
Origin time: 03 28 05.7
Epicenter: 33.158N., 115.616W.
Depth: 2 km
Magnitude: 3.1ML(PS)
Intensity IV: Brawley and Westmorland (press reports).

12 May (GM) Central California
Origin time: 13 41 06.8
Epicenter: 36.167N., 120.268W.
Depth: 11 km
Magnitude: 4.2mb(GS), 4.5ML(GM), 4.4ML(BK), 3.9ML(PS)
Felt: Coalinga (BK).

19 May (BK) Central California
Origin time: 14 46 14.6
Epicenter: 37.328N., 121.767W.
Depth: 6 km
Magnitude: 3.6ML(BK), 3.4MD(GM)
Intensity V:
San Jose (Blossom Hill)-- Floor tiles buckled in the Post Office building; a few glassware broke; a few small objects overturned or fell; felt by many.
San Jose (Valley Fair)-- Hairline cracks appeared in plaster walls.
Intensity IV: Mount Hamilton, Mountain View, Ripon, Sunnyvale.
Intensity III: Fremont, Moffett Field, Monte Sereno, San Jose, San Jose (Cambrian Park), Scotts Valley.
Intensity II: Half Moon Bay, Hollister, Los Gatos, San Jose (Westgate), San Mateo.
Felt: Atwater, Hayward (BK), San Francisco (press report), Santa Cruz (BK).

22 May (GM) Central California
Origin time: 08 39 21.7
Epicenter: 36.150N., 120.201W.
Depth: 10 km
Magnitude: 4.2mb(GS), 4.2ML(GM), 4.0ML(BK), 3.8ML(PS)

Felt: Coalinga (BK).

24 May (GM) Central California
Origin time: 09 02 17.7
Epicenter: 36.254N., 120.333W.
Depth: 9 km
Magnitude: 4.6mb(GS), 4.7ML(GM), 4.6ML(BK), 4.6ML(PS)

Intensity V:
Coalinga— awakened many people.
Fresno (Clinter)— Hairline cracks appeared in plaster walls; moving vehicles rocked slightly; felt by many.
Sanger— A few glassware broke; standing vehicles rocked slightly; a few small objects overturned or fell; a few windows cracked; felt by and awakened many.
Intensity IV: Avenal, Cantua Creek, Corcoran, Creston, Five Points, Huron, King City, Lemoore Naval Air Station, San Ardo.
Intensity III: Alpaugh, Easton, Fresno, Helm, Lockwood, Lost Hills, Templeton.
Intensity II: Santa Rita Park, Tipton.

26 May (PS) Southern California
Origin time: 16 30 20.5
Epicenter: 33.489N., 116.461W.
Depth: 20 km
Magnitude: 3.8ML(PS)
Felt: Palm Springs (PS).

27 May (PS) Southern California
Origin time: 11 25 18.1
Epicenter: 33.647N., 116.747W.
Depth: 18 km
Magnitude: 3.5ML(PS)
Intensity IV: Anza, Cathedral City, Hemet, Idyllwild, Palm Springs (cracked windows), Sun City, Valle Vista.
Intensity III: Palm Desert, Rancho Mirage, White Water.

27 May (GM) Central California
Origin time: 20 40 49.2
Epicenter: 36.242N., 120.376W.
Depth: 13 km
Magnitude: 3.8ML(GM), 3.7ML(BK), 3.7ML(PS)
Felt: Coalinga (BK).

2 June (BK) Central California
Origin time: 00 32 41.4
Epicenter: 37.715N., 121.995W.
Depth: 8 km
Magnitude: 3.0ML(BK), 3.0ML(GS)
Intensity III: San Leandro.
Felt: Castro Valley, Dublin, Hayward, and San Ramon (BK).

4 June (BK) Central California
Origin time: 11 25 11.6
Epicenter: 37.725N., 122.115W.
Depth: 6 km
Magnitude: 3.8ML(BK)
Felt: Contra Costa, San Mateo, and Santa Clara Counties (BK).
Intensity V:
Orinda— Hanging pictures fell; a few small objects overturned or fell; a few glassware broke; a few merchandise items fell from store shelves.
San Leandro— A few small objects overturned; buildings shook strongly; felt by and awakened many.
South San Leandro— Hairline cracks appeared in plaster walls; felt by all and awakened many.
Intensity IV: Alameda, Diablo, Hayward, Millbrae, Moraga, San Lorenzo, San Ramon, Union City.
Intensity III: Fremont, San Mateo.
Felt: Castro Valley (BK).

5 June (BK) Central California
Origin time: 11 22 43.9
Epicenter: 38.015N., 121.872W.
Depth: 13 km
Magnitude: 3.5ML(BK)
Intensity IV: Antioch, Clayton, Concord (one report of a few glassware broken and a few small objects overturned or fell), Diablo, Isleton, Oakley, Pittsburg, Port Costa, West Pittsburg (hairline cracks in plaster walls).
Intensity III: Martinez.

7 June (GM) Central California
Origin time: 05 18 37.8
Epicenter: 36.158N., 120.224W.
Depth: 12 km
Magnitude: 4.2mb(GS), 4.1ML(GM), 4.0ML(BK), 4.2ML(PS)
Felt: Coalinga (BK).

11 June (GM) Central California
Origin time: 03 09 52.2
Epicenter: 36.255N., 120.450W.
Depth: 2 km
Magnitude: 5.3mb(GS), 5.4MS(GS), 5.2ML(GM), 5.1ML(BK), 5.1ML(PS)

Surface faulting was associated with this event. A 3.3-km-long, two-segment fault zone, named the Nunez fault, developed about 12 km northwest of Coalinga (Hart and McJunkin, 1983). The only damage reported occurred to homes in the Los Gatos Canyon area along Los Gatos Creek road, which was offset by the faulting. Rockfalls were common along the road.

Intensity VI: Along Los Gatos Creek road about 12 km northwest of Coalinga-- One home was reported destroyed, but it had been heavily damaged by the May 2 earthquake. Several homes reported minor damage and a few mobile homes were shifted off their supports (press reports).
Intensity V:
Cantua Creek— A few windows cracked; a few glassware broke; a few small objects overturned or fell; a few items fell store shelves; felt by many.
Coalinga— knocked merchandise off store shelves, felt strongly (press report).
Intensity IV: Fresno, Lemoore Naval Air Station, Riverdale, San Lucas, Stratford, Tranquillity.
Intensity III: Armona, Bakersfield, Big Creek, Castroville, Corcoran, Firebaugh, Friant, Hanford, Lemoore, Lindsay, Lost Hills, Mendota, Miramonte, O'Neals, Porterville, Raisin, Red Top, Santa Rita Park, Sequoia National Park (Lodgepole), Shafter.
Intensity II: San Jose (press report), Shaver Lake.

11 June (BK) Central California
Origin time: 22 13 13.5
Epicenter: 38.800N., 122.820W.
Depth: 4 km
Magnitude: 3.4ML(BK)
Intensity V: Cobb-- A few small objects overturned or fell, hanging objects swung violently, trees and bushes shook moderately, standing vehicles rocked moderately, felt by many.
Intensity IV: Calistoga, Middletown.
Intensity III: Geyserville, Lower Lake.

CALIFORNIA-Continued

12 June (GM) Central California
Origin time: 01 31 27.5
Epicenter: 36.126N., 120.295W.
Depth: 14 km
Magnitude: 3.6mb(GS), 4.0ML(GM), 4.0ML(BK), 4.0ML(PS)
Intensity V: Cantua Creek (a few dishes broken, few small objects overturned or fell, a few items fell from store shelves), Coalinga (felt strongly).
Intensity IV: San Lucas.
Intensity III: Armona, Lemoore Naval Air Station, Raisin, Riverdale.
Felt: Paso Robles (press report).

14 June (PS) Southern California
Origin time: 12 39 28.6
Epicenter: 34.083N., 118.843W.
Depth: 3 km
Magnitude: 2.2ML(PS)
Felt: Thousand Oaks (PS).

19 June (PS) Southern California
Origin time: 10 45 44.1
Epicenter: 34.468N., 118.395W.
Depth: 12 km
Magnitude: 3.0ML(PS)
Felt: San Fernando (PS).

20 June (BK) Central California
Origin time: 18 50 12.1
Epicenter: 38.822N., 122.793W.
Depth: 5 km
Magnitude: 3.2ML(BK)
Felt: Clearlake Highlands and Cobb (BK).

24 June (PS) Southern California
Origin time: 01 52 35.9
Epicenter: 34.168N., 117.289W.
Depth: 5 km
Magnitude: 3.0ML(PS)
Felt: San Bernardino (PS).

3 July (BK) Northern California
Origin time: 12 44 42.3
Epicenter: 39.410N., 120.220W.
Depth: 14 km
Magnitude: 3.6ML(BK), 3.7MD(GM)
Intensity III: Pollock Pines and Sierraville (press report).
Felt: Donnieville and Truckee (BK).

3 July (BK) Northern California
Origin time: 15 08 19.3
Epicenter: 39.412N., 120.215W.
Depth: 13 km
Magnitude: 4.1ML(BK), 3.9MD(GM)
Intensity IV: Pollock Pines, Sierraville, and Soda Springs (press report).
Intensity III: Iowa Hill, Loyalton, and Truckee (press report).
Felt: Downieville (BK).

3 July (BK) Mammoth Lakes area
Origin time: 16 50 30.1
Epicenter: 37.557N., 118.872W.
Depth: 9 km

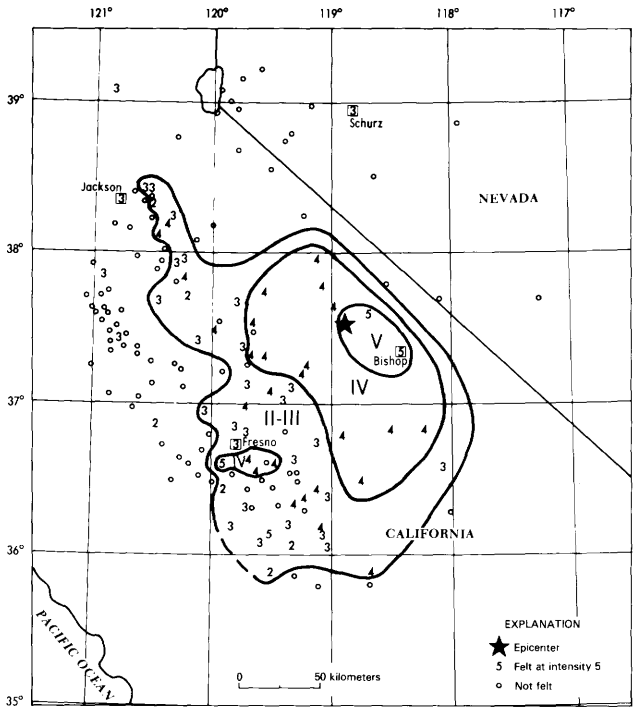

Figure 20. Isoseismal map for the Mammoth Lakes area, California, earthquake of 3 July 1983, 18 40 08.2 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; arabic numerals represent intensities at specific sites.

CALIFORNIA--Continued

Magnitude: 3.6ML(BK), 3.7ML(PS)
Felt: Mammoth Lakes (BK).

3 July (BK) Mammoth Lakes area
Origin time: 18 40 08.2
Epicenter: 37.550N., 118.862W.
Depth: 9 km
Magnitude: 4.8mb(GS), 5.3ML(BK), 5.0ML(PS)

This earthquake was felt over an area of approximately 39,500 km^2 of eastern California (fig. 20).

Intensity V:
California—
Bishop— A few small objects overturned or fell; standing vehicles rocked slightly; felt by many.
Crowley Lake— Some merchandise thrown was off store shelves; a few small objects overturned or fell; trees and bushes shook slightly; minor landslides and rockslides west of town; felt by all.
Raisin— A few windows cracked; a few glassware or dishes broke; a few small objects overturned or fell; plastered walls had hairline cracks; buildings shook strongly; felt by all.
Waukena— A few small objects fell; people had difficulty standing or walking; trees and bushes shook moderately, standing vehicles rocked slightly; felt by many.
Intensity IV:
California— Arnold, Auberry, Bass Lake, Big Creek, California Hot Springs (a few small objects overturned), Fowler, Friant, Groveland (a few small objects fell), Hume, Independence, Ivanhoe, Kings Canyon National Park, Lakeshore, Lee Vining, Lindsay, Mammoth Lakes, Mariposa, Oakhurst, Reedley, Selma, Sequoia National Park, Tom's Place, Vallecito, Visalia, Wawona, Woodlake, Yosemite National Park Headquarters.
Intensity III:
California— Ahwahnee, Armona, Catheys Valley, Clovis, Corcoran, Delhi, Dunlap, El Portal, Fresno, Hathaway Pines, Iowa Hill, Jackson, June Lake, La Grange, Lemoncove, Lone Pine, Madera, O'Neals, Orange Cove, Pinedale, Pioneer, Porterville, Shaver Lake, Soulsbyville, Stratford, Strathmore, Tollhouse, Tulare, Tuolumne, Valley Home, West Point.
Nevada— Schurz.
Intensity II:
California— Alpaugh, Avery, Coulterville, Firebaugh, Rail Road Flat, Riverdale, Tipton, White Pines.
Felt:
California— Mi-Wuk Village, Prather.

3 July (PS) Mammoth Lakes area
Origin time: 18 59 38.0
Epicenter: 37.536N., 118.853W.
Depth: 6 km
Magnitude: 3.3ML(PS), 3.1ML(BK)
Felt: at Mammoth Lakes (BK).

4 July (PS) Southern California
Origin time: 07 03 20.9
Epicenter: 33.445N., 116.410W.
Depth: 11 km
Magnitude: 3.9ML(PS)
Intensity IV: La Quinta.
Intensity III: Idyllwild, North Shore.
Felt: Mecca, Palm Springs (press report).

5 July (BK) Mono Lake area
Origin time: 14 27 26.7
Epicenter: 38.070N., 119.018W.
Depth: 10 km
Magnitude: 4.6mb(GS), 4.8ML(BK), 4.3MD(GM), 4.3ML(PS)

Intensity V:
California— Lee Vining (small landslides, flow disturbed in water wells, trees and bushes shaken slightly, pictures swung out of place, buildings shook strongly, felt by and awakened many).
Intensity IV:
California— Bridgeport, Fish Camp, June Lake, Tom's Place.
Intensity III:
California— Mammoth Lakes, Mono Lake, Strawberry.
Nevada— Hawthorne, Schurz, Smith.
Felt:
California— Lone Pine (press report), Pinecrest.

5 July (GM) Central California
Origin time: 22 10 14.4
Epicenter: 36.340N., 120.330W.
Depth: 5 km
Magnitude: 3.3ML(GM), 3.2ML(BK), 3.2ML(PS)
Felt: Coalinga (BK).

9 July (GM) Central California
Origin time: 07 40 51.3
Epicenter: 36.251N., 120.400W.

Depth: 9 km
Magnitude: 5.3mb(GS), 4.9MS(GS), 5.3ML(BK), 5.0ML(PS), 5.4ML(GM)

Aftershock of the May 2, 1983 earthquake.

Intensity V:
Cantua Creek— A few glassware or dishes broken; a few items were thrown off store shelves; a few small objects overturned or fell; buildings shook strongly; felt by and awakened many.
Coalinga— Houses creaked; standing vehicles rocked moderately; some boulders fell onto Los Gatos Canyon Road northwest of Coalinga; three fires started in the oil fields from sparks caused by power lines touching.
Orosi— A few windows cracked;, a few items fell off store shelves; a few glassware or dishes broke; a few small objects overturned or fell; trees and bushes shook slightly.
Tranquillity— A few small objects overturned or fell; ground shaking was described as moderate; felt by many.
Intensity IV: Ahwahnee, Armona, Auberry, Avenal, Bass Lake, Carmel Valley, Cholame, Dos Palos, Easton, El Portal, Friant, Groveland, Helm, Huron, Ivanhoe, Lakeshore, Porterville, Red Top, Soledad, Sonora, Stratford, Taft.
Intensity III: Castroville, Fresno, Greenfield Laton, Lemoncove, Madera, North Fork, Orange Cove, Paso Robles, Shandon, Tipton.
Intensity II: Bakersfield, California Hot Springs, Firebaugh, Hollister, Moss Landing, Santa Cruz.
Felt: Calwa, Coarsegold, Raisin, Tulare.

9 July (BK) Central California
Origin time: 07 59 52.0
Epicenter: 36.230N., 120.415W.
Depth: 7 km
Magnitude: 3.4ML(BK), 3.5ML(PS)
Felt: Coalinga (BK).

9 July (BK) Central California
Origin time: 10 24 40.4
Epicenter: 36.263N., 120.428W.
Depth: 3 km
Magnitude: 3.4ML(BK), 3.9ML(PS)
Felt: Coalinga (BK).

9 July (BK) Central California
Origin time: 23 51 52.2
Epicenter: 36.275N., 120.445W.
Depth: 2 km
Magnitude: 3.5ML(BK), 3.7ML(PS)
Felt: Coalinga. (BK).

11 July (PS) Imperial Valley area
Origin time: 22 54 17.2
Epicenter: 33.197N., 115.525W.
Depth: 2 km
Magnitude: 3.2ML(PS)
Felt: Imperial and Niland (PS).

12 July (BK) Central California
Origin time: 03 56 40.6
Epicenter: 36.303N., 120.385W.

CALIFORNIA-Continued

Depth: 9 km
Magnitude: 3.6ML(BK), 3.9ML(PS)
Felt: Coalinga (B).

12 July (BK) Mammoth Lakes area
Origin time: 18 39 06.2
Epicenter: 37.540N., 118.867W.
Depth: 9 km
Magnitude: 3.8ML(BK), 4.1ML(PS)
Felt: Mammoth Lakes and Bishop (BK).

13 July (PS) Imperial Valley area
Origin time: 21 16 48.5
Epicenter: 33.208N., 115.530W.
Depth: 12 km
Magnitude: 4.3mb(GS), 4.1ML(PS)
Intensity VI:
Niland— Some windows were broken out; many large cracks in stucco or plaster walls; a few instances of fallen plaster; hanging pictures fell; many items fell off store shelves; a few glassware or dishes broke; many small objects overturned or fell; trees and bushes moderately shook; standing vehicles rocked moderately and moving vehicles rocked slightly; felt by all.
Intensity V:
Calipatria— A few small objects overturned or fell; trees and bushes shook slightly; standing vehicles rocked slightly; felt by many.
Intensity III: Palo Verde.
Intensity II: Heber, Westmorland.
Felt: Brawley (PS).

13 July (PS) Imperial Valley area
Origin time: 22 14 17.6
Epicenter: 33.195N., 115.535W.
Depth: 3 km
Magnitude: 3.1ML(PS)
Felt: at Brawley (PS).

14 July (PS) Southern California
Origin time: 14 59 43.9
Epicenter: 34.103N., 118.269W.
Depth: 12 km
Magnitude: 3.1ML(PS)
Intensity III: Glendale.
Felt: Burbank (press report).

14 July (BK) Central California
Origin time: 15 25 41.5
Epicenter: 36.220N., 120.306W.
Depth: 7 km
Magnitude: 3.5ML(BK), 4.0ML(PS), 3.7ML(GM)
Intensity III: Lemoore.
Felt: Coalinga (BK).

14 July (PS) Imperial Valley area
Origin time: 17 26 15.4
Epicenter: 33.207N., 115.537W.
Depth: 5 km
Magnitude: 3.0ML(PS)
Felt: Brawley (PS).

15 July (BK) Mammoth Lakes area
Origin time: 19 00 06.0
Epicenter: 38.900N., 123.653W.

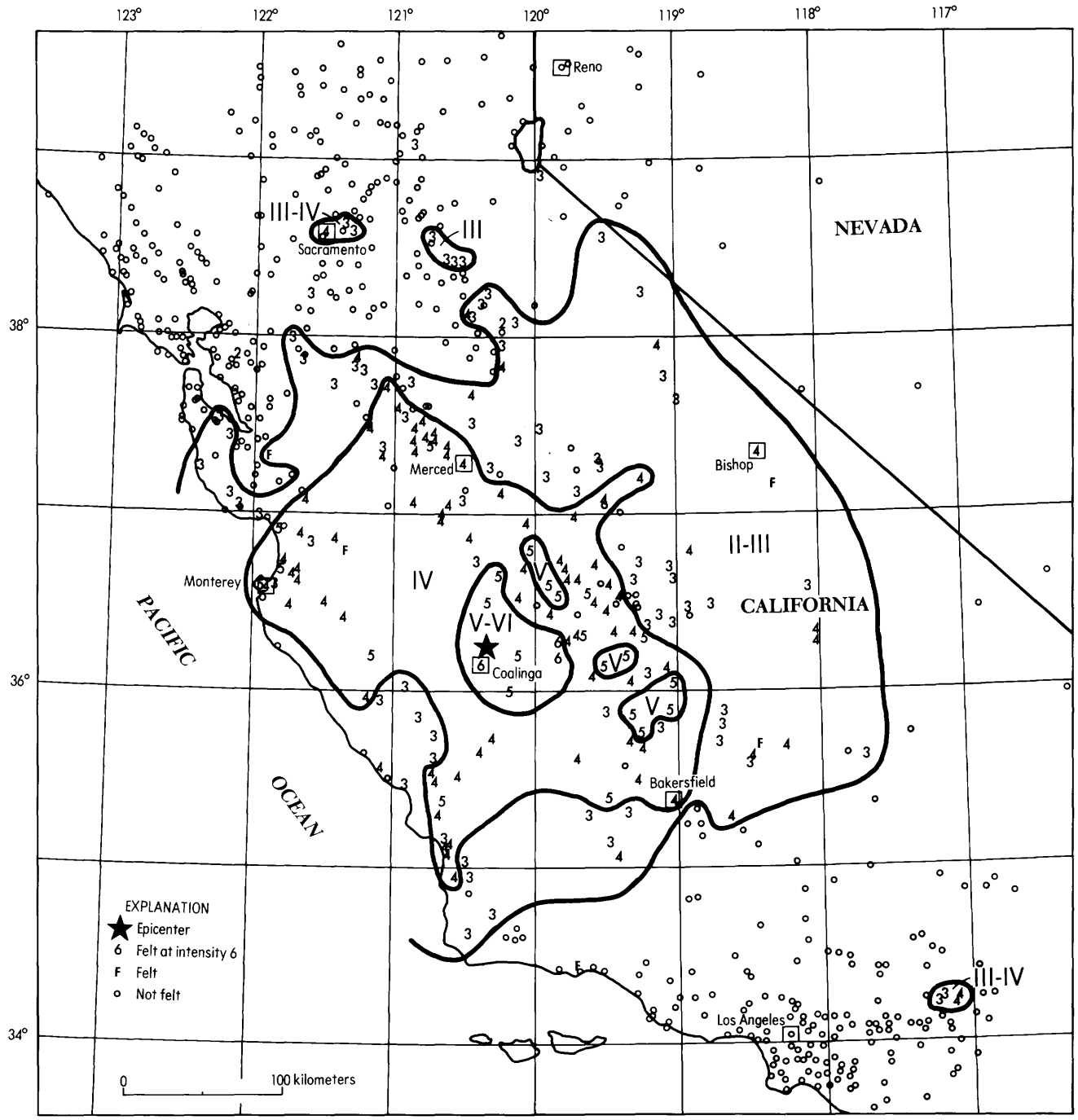

Figure 21. Isoseismal map for the central California earthquake of 22 July 1983, 02 39 54.1 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; arabic numerals represent intensities at specific sites.

Depth: 8 km
Magnitude: 3.6ML(BK)
Felt: Mammoth Lakes (BK).

17 July (GM) Central California
Origin time: 21 58 08.2
Epicenter: 36.282N., 120.329W.
Depth: 12 km
Magnitude: 3.7ML(GM), 3.5ML(BK), 3.7ML(PS)
Felt: Coalinga (BK).

18 July (PS) Southern California
Origin time: 04 36 47.8
Epicenter: 34.252N., 117.058W.
Depth: 5 km
Magnitude: 3.0ML(PS)
Felt: Lake Arrowhead and Big Bear Lake areas.
Intensity IV: Green Valley Lake (press report), Hesperia, Twin Peaks (press report).
Intensity III: Big Bear Lake and Running Springs (press report).

18 July (GM) Central California
Origin time: 19 28 05.4
Epicenter: 36.180N., 120.280W.
Depth: 11 km
Magnitude: 4.2mb(GS), 4.2ML(GM), 3.9ML(BK), 3.9ML(PS)
Intensity III: Coalinga (press report).

22 July (GM) Central California
Origin time: 02 39 54.1
Epicenter: 36.241N., 120.409W.
Depth: 7 km
Magnitude: 6.0mb(GS), 5.7MS(GS), 6.0ML(BK), 5.6ML(PS), 6.0ML(GM)

This earthquake is a very large aftershock of the May 2, 1983, Coalinga event. Two people were injured and minor damage at Coalinga resulted from this aftershock. The aftershock was felt over an area of approximately 108,000 km^2 (fig. 21).

Intensity VI:
Coalinga— Some dishes and glassware broke; many items were thrown from store shelves; a brick foundation cracked; plaster or stucco walls suffered hairline cracks; chimneys cracked; a 50-ft. row of hanging flourescent lights fell in the Thrifty Drug Store; a few windows cracked; hanging pictures fell; buildings shook strongly; small objects fell in homes; minor landslides on Los Gatos Canyon Road northwest of Coalinga; a power line fell starting a grass fire; both phone service and power were temporarily disrupted; felt by many.
Lemoore Naval Air Station— Cracked stucco walls; power was temporarily disrupted; a few small objects overturned or fell; trees and bushes shook moderately or strongly; standing vehicles rocked moderately; felt by most people.
Stratford— Brick fences cracked; plaster and stucco walls had hairline cracks; standing vehicle rocked moderately and moving vehicles rocked slightly; trees and bushes shook slightly; a few items knocked off store shelves; a few glassware or dishes broke; a few small objects overturned or fell; the vibration was described as strong; felt by all.

CALIFORNIA-Continued

Intensity V: The most common effects at the places listed below were a few cracked windows, a few small objects overturned or fell, a few glassware or dishes broke, a few items fell from store shelves, trees and bushes shook slightly, standing and moving vehicles rocked slightly, vibration was described as moderate to strong, felt by many. Additional effects are listed after each locality.
Avenal— Hairline cracks appeared in interior walls; light furniture or appliances overturned.
Biola— Water splashed out of swimming pools.
Buttonwillow— Water splashed out of swimming pools.
Cantua Creek— Water splashed out of swimming pools.
Carmel— Hanging pictures swung out of place.
Caruthers— People had difficulty in standing or walking.
Delano— Hanging pictures swung out of place; water splashed out of swimming pools.
Dulcor— Hanging pictures swung out of place.
Earlimart— Hanging pictures swung out of place.
Farmersville— Water splashed out of swimming pools.
Hanford— Water splashed out of swimming pools.
Huron— Buildings shook strongly; hanging pictures swung out of place; standing vehicles rocked moderately.
King City.
Livingston— Water splashed out of swimming pools.
Marina— People had difficulty in standing or walking; buildings shook strongly.
Pacific Grove.
Porterville— Standing vehicles rocked moderately.
Raisin.
Santa Margarita— Light furniture overturned.
Selma.
Tranquillity— Light furniture overturned; one broken beam in a house.
Tulare— Buildings shook strongly; standing vehicles rocked moderately.
Watsonville— Hanging pictures fell.
Waukena— Buildings shook strongly; trees and bushes shook strongly; standing vehicles rocked moderately.
Intensity IV: Armona, Aromas, Arroyo Grande, Atascadero, Atwater, Auberry, Bakersfield, Ballico, Big Creek, Bishop, Caliente, Cambria, Carmel Valley, Cartago, Castroville, Ceres, Cholame, Chowchilla, Corcoran, Cressey, Creston, Delhi, Denair, Dinuba, Dos Palos, Easton, Firebaugh, Fowler, French Camp, Fresno, Friant, Gonzales, Goshen, Green Valley Lake, Groveland, Grover City, Guadalupe, Helm, Hilmar, Hollister, Hume, Jolon, Kerman, Kingsburg, La Grange, Lake Isabella, Lee Vining, Lemoore, Los Banos, Lost Hills, Madera, Maricopa, McFarland, Merced, Monterey (Fort Ord), Murphys, Newman, Oceano, Olancha, Onyx, Patterson, Pond, Reedley, Riverdale, Running Springs, Sacramento (few small objects overturned or fell), Salida, Salinas, Sanger, San Joaquin, San Luis Obispo, San Martin, Santa Rita Park, Shafter, Shandon, Soledad, South Dos Palos, Spreckles, Stevinson, Strathmore, Templeton, Tipton, Traver, Turlock, Visalia, Winton.
Intensity III: Alpaugh, Arnold, Badger, Bass Lake, Bodfish, Boulder Creek, Bradley, Bridgeport, Byron, California Hot Springs, Catheys Valley, Cayucos, Clovis, Coleville, Crows Landing, Del Ray, Dunlap, East Palo Alto, Foster City, Glennville, Gonzales, Hathaway Pines, Iowa Hill, Ivanhoe, June Lake, Kaweah, Keyes, Lake Arrowhead, Lathrop, Lemoncove, Lindsay, Lockwood, Lompoc, Lone Pine, Long Barn, Los Alamos, Mammoth Lakes, Manteca, Mariposa, Mather Air Force Base, McClellan Air Force

Base, McKittrick, Mendota, Miramonte, Mount Aukum, Mount Hermon, Murphys, Nipomo, North Fork, Oakdale, Oakley, O'Neals, Orange Cove, Paso Robles, Pescadero, Pioneer, Pismo Beach, Planada, Posey, Raymond, Red Top, Richgrove, Ridgecrest, Ripon, Ryde, San Ardo, San Juan Bautista, San Miguel, Santa Maria, Seaside, Sequoia National Park, Skyforest, Snelling, Soquel, South Lake Tahoe, Taft, Tracy, Tulare, Tuolumne, Tupman, Twin Peaks, Vallecito, Volcano, West Point, Woodlake, Woodville.
Intensity II: Lafayette, Mi-Wuk Village, Pulga.
Felt: Big Pine, San Jose (press report), Santa Barbara (press report), Tres Pinos, Turlock, Wofford Heights.

22 July (GM) Central California
Origin time: 02 49 10.0
Epicenter: 36.222N., 120.413.
Depth: 7 km
Magnitude: 4.1ML(GM), 3.9ML(BK), 4.2ML(PS)
Felt: Coalinga (BK).

22 July (BK) Central California
Origin time: 03 23 33.3
Epicenter: 36.360N., 120.373W.
Depth: 6 km
Magnitude: 3.4ML(BK), 3.3ML(PS)
Felt: Coalinga (BK).

22 July (BK) Central California
Origin time: 03 29 02.9
Epicenter: 6.223N., 120.450W.
Depth: 8 km
Magnitude: 3.8ML(BK), 4.1ML(PS)
Felt: Coalinga (BK).

22 July (GM) Central California
Origin time: 03 43 01.4
Epicenter: 36.222N., 120.406W.
Depth: 8 km
Magnitude: 5.3mb(GS), 5.0ML(GM), 5.0ML(BK), 5.0ML(PS)

This event is an aftershock of the May 2, 1983, Coalinga earthquake. It was felt over a large area of central California, but because it followed the 02 39 aftershock by about one hour the intensities for specific places could not be determined. However, the maximum intensity at Coalinga is probably V.

22 July (GM) Central California
Origin time: 04 30 27.2
Epicenter: 36.352N., 120.328W.
Depth: 7 km
Magnitude: 3.6ML(GM), 3.4ML(BK), 3.7ML(PAS)
Felt: Coalinga (BK).

22 July (GM) Central California
Origin time: 07 12 10.9
Epicenter: 36.276N., 120.403W.
Depth: 7 km
Magnitude: 3.3ML(GM), 3.2ML(BK), 3.3ML(PS)
Felt: Coalinga (BK).

25 July (GM) Central California
Origin time: 22 31 39.6
Epicenter: 36.229N., 120.398W.

CALIFORNIA--Continued

Depth: 8 km
Magnitude: 5.6mb(GS), 5.1MS(GS), 5.3ML(GM), 5.1ML(BK), 5.4ML(PS)

This event is an aftershock of the May 2, 1983, Coalinga earthquake. It caused two injuries and minor damage in Coalinga. Rockslides temporarily blocked Los Gatos Canyon Road northwest of Coalinga and small landslides were reported on Highway 198 to King City.

Intensity VI:
Coalinga— The press reported a crack in the exterior wall of the two-story-stone building, housing the police department; an exterior wall of an abandoned building near the City Hall cracked; two water mains cracked; one natural gas line ruptured; water heaters moved and connections broken; a television was knocked over; some were chimneys damaged (including some of those reinforced after the May 2 earthquake); some mobile homes were knocked off their supports and in one case the supports penetrated the floor; a few windows broke; merchandise was thrown off store shelves; some power lines were shaken down causing grass fires; telephone service was knocked out for several hours; interior walls cracked in some homes; people were frightened and ran into the street.
Intensity V:
Avenal— A few windows cracked, standing vehicles rocked slightly; trees and bushes shook slightly; felt by all.
Five Points— A few items were thrown from store shelves; a few glassware or dishes broke, a few small objects overturned or fell; standing vehicles rocked slightly; felt by many.
Raisin— Hairline cracks appeared in wall board; shaking was described as strong; felt by many.
Santa Margarita— A few small objects overturned; standing vehicles rocked slightly; trees and bushes shook slightly; felt by all.
Stratford— A few items were thrown off store shelves; a few small objects overturned or fell; plaster or stucco walls had hairline cracks; felt by many.
Waukena— A few items were knocked off store shelves; a few small objects overturned or fell; trees and bushes moderately shook; moving vehicles shook slightly; felt by many.
Intensity IV: Alpaugh, Atascadero, Burrel, Buttonwillow, California Valley, Cantua Creek, Cholame, Corcoran, Creston, Friant, Harmony, Huron, King City, Lemoore Naval Air Station, London, Madera, Merced, Miramonte, Oceano, Paso Robles, Shafter.
Intensity III: Armona, Aromas, Arroya Grande, Avila Beach, Bass Lake, Bradley, Cayucos, Dinuba, Dos Palos, Ducor, Dunlap, Easton, Fellows, Fresno, Gonzales, Grover City, Hume, Jolon, Kingsburg (press report), Lockwood, Lost Hills, McKittrick, O'Neals, Orange Cove, Porterville, Paicines, Parlier, Raymond, Red Top, Reedley, Salinas, San Ardo, San Miguel, San Simeon, Santa Maria, Santa Rita Park, Selma (press report), Shandon, Spreckles, Squaw Valley, Stevinson, Tipton, Tranquillity, Tulare, Vandenberg Air Force Base, Yettem.
Intensity II: Ballico, Carruthers, Castroville, Helm, Hilmar, Kingsburg, Riverdale, San Juan Bautista, Taft, Woodville.

Felt: Alameda, Fowler, Monterey, and Santa Barbara (press reports).

30 July (BK) Mammoth Lakes area
Origin time: 01 26 16.4
Epicenter: 37.567N., 118.758W.
Depth: 6 km
Magnitude: 4.0ML(BK), 4.3ML(PS)
Felt: Mammoth Lakes and Bishop (BK).

30 July (BK) Mammoth Lakes area
Origin time: 04 16 39.6
Epicenter: 37.570N., 118.757W.
Depth: 6 km
Magnitude: 3.7ML(BK), 4.2ML(PS)
Felt: Mammoth Lakes (BK).

1 August (BK) Owens Valley area
Origin time: 05 36 35.8
Epicenter: 37.292N., 118.360W.
Depth: 15 km
Magnitude: 3.6ML(BK), 3.5ML(PS)
Felt: Bishop (BK).

1 August (PS) Southern California
Origin time: 15 48 28.8
Epicenter: 34.130N., 117.443W.
Depth: 7 km
Magnitude: 3.3ML(PS)
Felt: Western San Bernardino County (press report).

5 August (PS) Southern California
Origin time: 19 58 58.5
Epicenter: 32.617N., 117.300W.
Depth: 0 km
Magnitude: 2.6ML(PS)

U.S. Navy explosion. Felt at San Diego (PS).

7 August (BK) Mammoth Lakes area
Origin time: 21 39 31.8
Epicenter: 37.520N., 118.888W.
Depth: 4 km
Magnitude: 3.3ML(BK), 3.4ML(PS)

Felt: Mammoth Lakes (BK).

8 August (BK) Mammoth Lakes area
Origin time: 16 51 58.0
Epicenter: 37.568N., 118.843W.
Depth: 2 km
Magnitude: 3.7ML(BK), 4.0ML(PS)
Felt: Mammoth Lakes (BK).

9 August (BK) Yosemite National Park area
Origin time: 01 19 03.1
Epicenter: 37.905N., 119.487W.
Depth: 2 km
Magnitude: 4.0ML(BK), 4.0ML(PS)
Intensity V: Tuolumne Meadows-- A few dishes broke; a few small objects overturned or fell; hanging pictures swung out of place; trees and bushes shook slightly; standing and moving vehicles rocked slightly.
Intensity IV: Lee Vining.

CALIFORNIA--Continued

Intensity III: El Portal.
Felt: Yosemite National Park (BK).

12 August (GM) Central California
Origin time: 01 14 41.1
Epicenter: 36.291N., 120.401W.
Depth: 10 km
Magnitude: 3.8ML(BK), 3.9ML(PS), 4.0ML(GM)
Felt: Coalinga (press report).

12 August (GM) Central California
Origin time: 22 02 34.7
Epicenter: 36.183N., 120.136W.
Depth: 9 km
Magnitude: 4.3mb(GS), 4.0ML(BK), 4.3ML(PS),4.1MD(GM)
Felt: Coalinga (BK).

14 August (GM) Central California
Origin time: 12 43 35.7
Epicenter: 36.289N., 120.413W.
Depth: 10 km
Magnitude: 4.1mb(GS), 4.2ML(BK), 4.3ML(GM), 4.2ML(PS)
Felt: Coalinga (BK).

21 August (BK) Central California
Origin time: 14 21 52.1
Epicenter: 36.877N., 121.628W.
Depth: 5 km
Magnitude: 2.7ML(BK)
Felt: near Hollister (BK).

25 August (BK) Northern California
Origin time: 00 26 24.1
Epicenter: 40.437N., 124.133W.
Depth: 18 km
Magnitude: 3.0ML(BK)
Felt: Rio Dell and Scotia (BK).

26 August (GM) Central California
Origin time: 03 21 17.2
Epicenter: 36.300N., 120.473W.
Depth: 12 km
Magnitude: 3.9mb(GS), 4.0ML(BK), 4.0ML(GM), 4.0ML(PS)
Intensity IV: Cantua Creek.
Intensity III: Barton, Raisin.
Felt: Coalinga (BK).

26 August (GM) Central California
Origin time: 19 57 40.6
Epicenter: 36.211N., 120.374W.
Depth: 12 km
Magnitude: 3.8ML(BK), 3.9ML(PS), 3.8ML(GM)
Intensity IV: Cantua Creek.
Felt: Coalinga (BK).

28 August (GM) Central California
Origin time: 12 26 21.7
Epicenter: 35.814N., 121.324W.
Depth: 7 km
Magnitude: 3.8ML(BK), 3.9ML(PS), 3.5MD(GM)
Felt: near King City (BK).

28 August (GM) Central California
Origin time: 13 23 55.4
Epicenter: 35.826N., 121.320W.

Depth: 7 km
Magnitude: 3.5ML(BK), 3.7ML(PS), 3.3MD(GM)
Felt: Near King City (BK).

28 August (PS) Imperial Valley area
Origin time: 21 04 48.9
Epicenter: 32.954N., 115.537W.
Depth: 11 km
Magnitude: 3.0ML(PS)
Felt: Brawley (PS).

29 August (GM) Central California
Origin time: 10 10 30.8
Epicenter: 35.841N., 121.340W.
Depth: 9 km
Magnitude: 5.3mb(GS), 4.3MS(GS), 5.2ML(BK), 4.2MD(GM), 4.8ML(PS)

Because this earthquake occurred at 03:10 a.m. local time it was not generally reported as felt beyond the distance at which people were awakened.

Intensity VI: Near Ragged Point about 20 km northwest of **San Simeon**— cracked chimneys, a few buildings reported damaged.
Intensity V:
Arroyo Grande— A few dishes or glassware broke; a few small objects overturned or fell; hanging pictures swung out of place.
Gorda— A few items were shaken off store shelves (press report).
Harmony— Shaking was described as strong.
Lockwood— A few items were shaken off store shelves; a few small objects overturned or fell; felt by and awakened many.
San Ardo— A few dishes or glassware broke; a few small objects fell; felt by and awakened many.
San Luis Obispo— A few items were shaken off store shelves; a few small objects overturned or fell; felt by and awakened many.
San Simeon— A few items were shaken off store shelves; a few dishes or glassware broke; a few small objects overturned or fell; buildings shook strongly; awakened many.
Intensity IV: Atascadero, Avila Beach, Bradley, California Valley, Carmel, Castroville, Cayucos, Creston, Gonzales, Greenfield, King City, Los Osos, Nipomo, Oceano, Paicines, Paso Robles, Salinas, San Juan Bautista, San Miguel, Santa Margarita, Seaside, Soledad, Tres Pinos, Watsonville.
Intensity III: Cholame, Grove City, Jolon, Moss Landing, Pacific Grove, Shandon.
Intensity II: Hollister.
Felt: Spreckles, San Francisco (BK).

1 September (BK) California-Nevada Border region
Origin time: 17 01 06.3
Epicenter: 38.017N., 118.748W.
Depth: 7 km
Magnitude: 4.0ML(BK), 3.4MD(GM), 4.0ML(PS)
Felt: Mona Lake (BK).

7 September (GM) Central California
Origin time: 23 07 26.2
Epicenter: 36.279N., 120.460W.

CALIFORNIA–Continued

Depth: 12 km
Magnitude: 3.4ML(BK), 3.7ML(PS), 3.8ML(GM)
Felt: Coalinga (BK).

8 September (BK) Central California
Origin time: 19 45 44.8
Epicenter: 37.693N., 121.805W.
Depth: 15 km
Magnitude: 2.9ML(BK)
Felt: Livermore (BK).

9 September (GM) Central California
Origin time: 09 16 13.5
Epicenter: 36.232N., 120.265W.
Depth: 7 km
Magnitude: 5.3mb(GS), 5.4MS(GS), 5.4ML(BK), 5.3ML(GM), 5.3ML(PS)

This event is an aftershock of the May 2, 1983, Coalinga earthquake.

Intensity V: The most common effects at the places listed below were a few small objects overturned or fell, felt by and awakened many. Additional effects are listed after each locality.
Cantua Creek— A few glassware or dishes broke.
Coalinga— Some merchandise was knocked off store shelves and a few dishes were thrown off shelves in homes (press report).
Corcoran— A few glassware or dishes broke.
Five Points— A few glassware or dishes broke; a few merchandise items were thrown off store shelves; there were hairline cracks in interior walls.
Huron— A few merchadise items were thrown off store shelves; there were hairline cracks in interior walls.
Lemoore Naval Air Station— Light furniture or small appliances were moved.
Stratford— A few merchandise were items thrown from store shelves; there were hairline cracks in interior walls.
Tranquillity—
Intensity IV: Armona, Auberry, Avenal, California Valley, Chowchilla, Clovis, Coarsegold, Creston, Cutler, Dunlap, Easton, Fresno, Friant, Hanford, Hume, Kaweah, Kingsburg, Lockwood, Lost Hills, Miramonte, Raymond, Riverdale, Santa Margarita, Traver, Visalia, Waukena.
Intensity III: Badger, Bakersfield, Barton, Big Creek, Cholame, Del Rey, Dinuba, Greenfield, Helm, Squaw Valley.
Intensity II: Ahwahnee, California Hot Springs.
Felt: Calwa, Salinas, Shandon.

9 September (GM) Central California
Origin time: 09 21 31.8
Epicenter: 36.240N., 120.279W.
Depth: 6 km
Magnitude: 4.0ML(BK), 3.9ML(GM)
Felt: Coalinga (press report).

9 September (GM) Central California
Origin time: 21 04 00.2
Epicenter: 36.228N., 120.230W.
Depth: 8 km
Magnitude: 3.7ML(BK), 3.5MD(GM), 3.9ML(PS)
Felt: Coalinga (BK).

9 September (BK) Mammoth Lakes area
Origin time: 23 22 25.9
Epicenter: 37.535N., 118.808W.
Depth: 13 km
Magnitude: 3.4ML(BK),3.2ML(PS)
Felt: Mammoth Lakes (BK).

10 September (GM) Central California
Origin time: 07 19 31.0
Epicenter: 36.261N., 120.467W.
Depth: 2 km
Magnitude: 3.4ML(BK), 3.6ML(PS), 3.3MD(GM)
Felt: Coalinga (BK).

10 September (BK) Mammoth Lakes area
Origin time: 16 02 12.5
Epicenter: 37.438N., 118.642W.
Depth: 13 km
Magnitude: 4.0ML(BK), 3.7ML(PS)
Felt: Mammoth Lakes and Tom's Place (BK).

11 September (GM) Central California
Origin time: 11 48 06.6
Epicenter: 36.242N., 120.383W.
Depth: 10 km
Magnitude: 5.0mb(GS), 4.3ML(BK), 4.8ML(PS),4.5ML(GM)
Felt: parts of Fresno, Kern, Kings, and Tulare Counties.
Intensity IV: Coalinga (press report).

12 September (PS) Southern California
Origin time: 12 08 02.7
Epicenter: 34.048N., 117.256W.
Depth: 15 km
Magnitude: 3.6ML(PS)
Intensity IV: Colton, East Highlands, Loma Linda (hairline crack in plaster wall), Patton, Redlands, Rialto, Riverside, San Bernardino, Sunnymead.
Intensity III: Highland, La Sierra, Perris
Felt: Bryn Mawr, Lakeview, Mentone.

15 September (PS) Southern California
Origin time: 04 39 01.4
Epicenter: 34.117N., 117.433W.
Depth: 6 km
Magnitude: 2.5ML(PS)
Felt: Rialto (PS).

19 September (BK) Lake Tahoe area
Origin time: 01 55 57.3
Epicenter: 39.222N., 120.003W.
Depth: 10 km
Magnitude: 2.9ML(BK), 3.2MD(GM)
Intensity IV:
Nevada— Crystal Bay.
Intensity III:
California— Carnelian Bay.
Nevada— Incline Village.

20 September (PS) Imperial Valley
Origin time: 00 08 51.7
Epicenter: 33.059N., 116.190W.
Depth: 6 km
Magnitude: 3.2ML(PS)
Felt: Imperial Valley (PS).

CALIFORNIA--Continued

20 September (BK) Central California
Origin time: 10 38 39.1
Epicenter: 37.787N., 122.178W.
Depth: 8 km
Magnitude: 2.6ML(BK)
Felt: Berkeley, Oakland, and Piedmont (BK).

24 September (BK) Mammoth Lakes area
Origin time: 13 18 19.2
Epicenter: 37.632N., 119.020W.
Depth: 10 km
Magnitude: 3.2ML(BK), 3.0ML(PS)
Felt: Mammoth Lakes (BK).

27 September (GM) Central California
Origin time: 01 29 59.1
Epicenter: 37.048N., 121.472W.
Depth: 8 km
Magnitude: 3.5ML(BK), 3.1MD(GM)
Intensity III: Gilroy and Morgan Hill (press reports).
Felt: Hollister (BK).

27 September (BK) California-Nevada Border Region
Origin time: 02 56 37.5
Epicenter: 38.278N., 119.363W.
Depth: 3 km
Magnitude: 3.5ML(BK), 3.6ML(PS)
Felt: Bridgeport (BK).

27 September (GS) Central California
Origin time: 14 35 47.9
Epicenter: 37.847N., 122.220W.
Depth: 5 km
Magnitude: 2.6ML(BK)
Felt: Berkeley and Oakland (BK).

30 September (BK) Mammoth Lakes area
Origin time: 16 14 00.9
Epicenter: 37.553N., 118.840W.
Depth: 10 km
Magnitude: 4.8ML(BK), 4.5ML(PS)
Intensity IV: Bishop, June Lake, Mammoth Lakes, Toms Place.

1 October (BK) Northern California
Origin time: 10 15 24.5
Epicenter: 38.795N., 122.840W.
Depth: 4 km
Magnitude: 3.0ML(BK)
Felt: Cobb (BK).

10 October (BK) Central California
Origin time: 16 40 56.4
Epicenter: 37.390N., 121.712W.
Depth: 7 km
Magnitude: 3.1ML(BK)
Felt San Jose (BK).

10 October (BK) Central California
Origin time: 21 12 55.5
Epicenter: 37.812N., 121.737W.
Depth: 9 km
Magnitude: 3.0ML(BK)
Felt: Livermore (BK).

17 October (BK) Northern California
Origin time: 04 45 17.1
Epicenter: 39.365N., 123.248W.
Depth: 5 km
Magnitude: 2.5ML(BK)
Intensity IV: Willits.

19 October (PS) Central California
Origin time: 14 00 37.2
Epicenter: 35.930N., 118.341W.
Depth: 1 km
Magnitude: 4.0ML(PS), 4.2ML(BK)
Felt: Lake Isabella (PS).

19 October (PS) Central California
Origin time: 19 48 23.7
Epicenter: 35.924N., 118.338W.
Depth: 0 km
Magnitude: 3.7ML(PS), 3.8ML(BK)
Felt: Lake Isabella (PS).

21 October (GM) Southern California
Origin time: 11 13 13.8
Epicenter: 34.918N., 120.397W.
Depth: 0 km
Magnitude: 3.1ML(PS), 3.0ML(BK), 3.2ML(GS), 3.4MD(GM)
Intensity III: Santa Maria (press report).

21 October (PS) Central California
Origin time: 22 44 13.3
Epicenter: 35.926N., 118.334W.
Depth: 0 km
Magnitude: 4.4mb(GS), 4.5ML(PS), 4.9ML(BK)
Intensity III: Glennville, Lake Isabella, Woody.
Intensity II: Bakersfield, Ducor.

23 October (GM) Central California
Origin time: 02 35 39.6
Epicenter: 37.328N., 121.688W.
Depth: 7 km
Magnitude: 3.6ML(BK), 3.1MD(GM)
Intensity III: San Jose (press report).
Felt: Milpitas and Santa Clara (BK).

23 October (BK) Northern California
Origin time: 09 37 06.2
Epicenter: 39.573N., 123.378W.
Depth: 0 km
Magnitude: 3.3ML(BK), 3.3MD(GM)
Felt: Willits (BK).

25 October (PS) Central California
Origin time: 11 16 57.1
Epicenter: 35.865N., 118.347W.
Depth: 1 km
Magnitude: 3.8ML(PS), 4.0MD(GM), 4.1ML(BK)
Intensity II: California Hot Springs.

25 October (PS) Central California
Origin time: 13 21 33.3
Epicenter: 35.915N., 118.327W.
Depth: 1 km
Magnitude: 3.5ML(PS), 3.7MD(GM)
Intensity II: California Hot Springs.

CALIFORNIA--Continued

26 October (PS) Southern California
Origin time: 07 30 19.8
Epicenter: 34.070N., 117.478W.
Depth: 3 km
Magnitude: 2.4ML(PS)
Felt: Fontana (PS).

28 October (BK) Northern California
Origin time: 17 19 35.2
Epicenter: 39.585N., 123.388W.
Depth: 2 km
Magnitude: 3.1ML(BK), 3.4MD(GM)
Felt: Willits (BK).

29 October (PS) Southern California
Origin time: 06 38 02.5
Epicenter: 33.997N., 116.607W.
Depth: 12 km
Magnitude: 3.4ML(PS)
Intensity IV: Desert Hot Springs and Palm Springs (press report).
Intensity III: Morongo Valley.

7 November (PS) Central California
Origin time: 12 32 43.9
Epicenter: 35.927N., 118.316W.
Depth: 0 km
Magnitude: 3.7ML(PS), 4.1ML(BK)
Felt: Lake Isabella (PS).

11 November (PS) Imperial Valley area
Origin time: 16 36 31.6
Epicenter: 32.966N., 115.863W.
Depth: 6 km
Magnitude: 3.3ML(PS)
Felt: Imperial Valley (PS).

11 November (PS) Imperial Valley area
Origin time: 17 15 05.2
Epicenter: 32.968N., 115.867W.
Depth: 9 km
Magnitude: 3.8ML(PS)
Felt: Imperial Valley (PS).

12 November (BK) Mammoth Lakes area
Origin time: 01 47 59.2
Epicenter: 37.460N., 118.848W.
Depth: 12 km
Magnitude: 3.7ML(BK), 3.6ML(PS)
Felt: Mammoth Lakes (BK).

15 November (BK) Mammoth Lakes area
Origin time: 03 29 44.6
Epicenter: 37.602N., 118.910W.
Depth: 3 km
Magnitude: 3.5ML(BK), 3.6ML(PS)
Felt: Mammoth Lakes (BK).

15 November (PS) Imperial Valley area
Origin time: 05 04 09.6
Epicenter: 33.045N., 115.563W.
Depth: 6 km
Magnitude: 3.5ML(PS)
Intensity III: Brawley (press report), Calipatria, Seeley, Westmorland.

15 November (PS) Imperial Valley area
Origin time: 11 02 07.2
Epicenter: 33.036N., 115.569W.
Depth: 5 km
Magnitude: 3.3ML(PS)
Intensity IV: Imperial, Westmorland.
Intensity III: Seeley.

15 November (PS) Imperial Valley area
Origin time: 16 53 32.5
Epicenter: 33.036N., 115.571W.
Depth: 5 km
Magnitude: 2.8ML(PS)
Felt: Westmorland (PS).

15 November (PS) Imperial Valley area
Origin time: 21 44 20.8
Epicenter: 33.044N., 115.559W.
Depth: 5 km
Magnitude: 3.1ML(PS)
Felt: Westmorland (PS).

18 November (PS) Southern California
Origin time: 09 55 37.5
Epicenter: 34.001N., 117.209W.
Depth: 15 km
Magnitude: 3.1ML(PS)
Intensity IV: San Bernardino (press report).

19 November (BK) Central California
Origin time: 22 52 51.0
Epicenter: 37.680N., 121.980W.
Depth: 9 km
Magnitude: 3.0ML(BK)
Intensity III: Hayward (press report).
Felt: Castro Valley and Dublin (BK).

20 November (GM) Central California
Origin time: 22 02 36.6
Epicenter: 36.206N., 120.462W.
Depth: 7 km
Magnitude: 3.7ML(BK), 3.7MD(GM), 3.9ML(PS)
Felt: at Coalinga (BK).

23 November (BK) Mammoth Lakes area
Origin time: 06 39 58.4
Epicenter: 37.518N., 118.880W.
Depth: 3 km
Magnitude: 3.8ML(BK), 3.9ML(PS)
Felt: Mammoth Lakes (BK).

11 December (BK) Northern California
Origin time: 21 01 46.3
Epicenter: 39.600N., 123.405W.
Depth: 2 km
Magnitude: 3.4ML(BK), 3.6MD(GM)
Felt: Willits (BK).

13 December (GM) Central California
Origin time: 21 38 37.8
Epicenter: 36.825N., 121.340W.
Depth: 4 km
Magnitude: 3.4ML(BK), 3.3MD(GM)
Felt: Gilroy and Hollister (BK).

CALIFORNIA--Continued

17 December (BK) Central California
Origin time: 00 10 27.5
Epicenter: 37.038N., 121.467W.
Depth: 7 km
Magnitude: 3.2ML(BK)
Felt: Gilroy (BK).

21 December (GM) Central California
Origin time: 18 04 08.4
Epicenter: 36.083N., 120.220W.
Depth: 11 km
Magnitude: 4.3mb(GS), 4.2ML(BK), 4.3ML(PS)
Intensity IV: Avenal-- one report of small objects overturned or fallen.
Intensity III: Huron.
Felt: Coalinga (press report).

25 December (PS) Mammoth Lakes area
Origin time: 20 43 32.7
Epicenter: 37.565N., 118.886W.
Depth: 6 km
Magnitude: 3.8ML(PS),3.5ML(BK)
Felt: Mammoth Lakes (BK).

27 December (PS) Southern California
Origin time: 21 34 37.7
Epicenter: 33.778N., 116.122W.
Depth: 2 km
Magnitude: 3.1ML(PS)
Felt: Indio (PS).

29 December (PS) Southern California
Origin time: 19 46 16.8
Epicenter: 34.170N., 117.355W.
Depth: 8 km
Magnitude: 3.6ML(PS)
Intensity IV: Cedar Glen, Cedarpines Park, Crestline, Fontana, Rialto, San Bernadino.
Intensity III: Lake Arrowhead, Lytle Creek, Norco, Riverside, South part of San Bernardino, Twin Peaks.
Intensity II: Colton, Patton.

29 December (PS) Southern California
Origin time: 19 49 13.8
Epicenter: 34.168N., 117.359W.
Depth: 6 km
Magnitude: 2.9ML(PS)
Felt: San Bernardino (press report).

29 December (PS) Southern California
Origin time: 19 50 02.6
Epicenter: 34.169N., 117.349W.
Depth: 8 km
Magnitude: 2.7ML(PS)
Felt: San Bernardino (press report).

31 December (BK) Mammoth Lakes area
Origin time: 22 39 40.1
Epicenter: 37.542N., 118.900W.
Depth: 6 km
Magnitude: 3.9ML(BK), 4.1ML(PS)
Felt: Mammoth Lakes (BK).

1 February (BK) Northern California
Origin time: 21 21 40.7
Epicenter: 40.307N., 124.810W.
Depth: 10 km
Magnitude: 4.2mb(GS), 4.1ML(BK)
Intensity III: Rio Del.

22 February (PS) Southern California
Origin time: 02 18 30.8
Epicenter: 33.095N., 117.903W.
Depth: 6 km
Magnitude: 4.3mb(GS), 4.3ML(PS)
Intensity IV: Cypress, Dana Point, El Toro, Fountain Valley, Lakeside, La Mesa, Lomita, Palos Verdes Peninsula, Paramount, Perris, Redlands, San Clemente, San Marcos, Upland, Vista.
Intensity III: Alta Loma, Avalon, Beverly Hills (press report), Bonsall, Bueno Park, Bellflower, Cardiff-By-the-Sea, Del Mar, La Jolla (press report), Lake Elsinore, Long Beach Airport, Los Angeles, Mission Viejo, Oceanside, Riverside (press report), San Diego, San Juan Capistrano (press report), Santa Ana, Seal Beach, South Gate, Stanton, Sunnymead, Sunset Beach, Tustin, Westminster, Whittier.
Intensity II: Escondido, Surfside.

20 April (BK) Northern California
Origin time: 17 54 24.4
Epicenter: 40.363N., 124.507W.
Depth: 17 km
Magnitude: 3.8ML(BK)
Intensity IV: Eureka, Ferndale, Kneeland.
Intensity III: Fields Landing, Honeydew, Loleta, Redcrest, Rio Dell, Samoa.
Intensity II: Hydesville.
Felt: Fortuna and Petrolia (BK).

29 May (BK) Northern California
Origin time: 06 55 28.4
Epicenter: 40.425N., 126.090W.
Depth: 5 km
Magnitude: 5.1mb(GS), 5.1MS(GS), 5.4ML(BK)
Intensity III: Eureka (press report), Rio Dell.

29 June (PS) Southern California
Origin time: 08 08 35.7
Epicenter: 32.588N., 117.431W.
Depth: 6 km
Magnitude: 4.4mb(GS), 4.6ML(PS)

This event was felt in Imperial, Riverside, and San Diego Counties of California and in northern Baja California, Mexico.

Intensity V: The most common effects at the places listed below were a few small objects overturned or fell, a few dishes broke, a few windows cracked, a few items fell from store shelves, standing vehicles rocked slightly, felt by and awakened many people. Additional effects are listed after each locality.

El Cajon.
Miramar.
Pala.
Poway— Hairline cracks in drywall.

CALIFORNIA-OFF THE COAST

San Diego— Hanging pictures fell; hairline cracks in plaster walls; people had difficulty in standing or walking.
San Diego (Clairemont)— Hairline cracks in plaster walls.
San Diego (Grantville).
San Diego (Hillcrest).
San Diego (Lindbergh Field)— Slight crack sustained in the east terminal building of the airport (press report).
San Diego (Naval Air Station).
San Diego (Ocean Beach)— Hanging pictures fell, a report of broken underground pipes.
San Diego (Paradise Hills)— A report of cracked sidewalks and brick fences.
San Diego (Palm City)— A report of broken pipes (press report).
San Diego (Point Loma).
San Diego (University City)— Hanging pictures swung out of place; water splashed onto sides of swimming pools.
Intensity IV: Campo, Chula Vista, Coronado, Del Mar, Descanso, El Cajon, Escondido, Jacumba, Jamul, Laguna Niguel, Lake Cuyamaca, Lakeside, La Mesa, Leucadia, National City, Oceanside, Potrero, San Clemente (press report), San Diego (Encanto, Marilou Park), Santa Ana, Santa Ysabel, Spring Valley, Tecate, Tustin, Valley Center, Vista, Warner Springs.
Intensity III: Bonsall, Corona, Costa Mesa, El Centro (press report), Fallbrook, Julian, Long Beach, San Jacinto, San Luis Rey, Surfside.
Felt: Cardiff-by-the-Sea, Pine Valley.

24 August (BK) Northern California
Origin time: 13 36 30.5
Epicenter: 40.377N., 124.832W.
Depth: 18 km
Magnitude: 5.5mb(GS), 5.8MS(GS), 5.5ML(BK),5.4ML(GM)
Intensity VI:
Scotia— Some windows broke out; a few small objects overturned or fell; vibration was described as strong; felt by and awakened many.
Intensity V: The most common effects at the places listed below were small objects overturned or fell, a few glassware or dishes broke, a few items fell off store shelves, trees and bushes shook slightly, vibration was described as moderate to strong, felt by most. Additional effects are listed after each locality.
Alderpoint— Buildings shook strongly; moving vehicles rocked slightly.
Arcata— Hanging pictures swung out of place.
Blocksburg— People reported difficulty in standing or walking; trees and bushes shook slightly.
Bridgeville— Hanging pictures swung out of place; building shook strongly.
Carlotta— Buildings shook strongly; trees and bushes shook slightly.
Elk.
Eureka— A few windows cracked; hanging pictures swung out of place; moving vehicle rocked slightly.
Fields Landing— Trees and bushes shook slightly.
French Gulch— Hanging pictures swung out of place.
Garberville.
Honeydew— People reported difficulty in standing or walking; hanging pictures swung out of place; light furniture or small appliances overturned; standing vehicles rocked moderately.
Mendocino— Hanging pictures swung out of place.
Miranda— Buildings shook strongly.
Myers Flat— Standing vehicles rocked slightly.

CALIFORNIA-OFF THE COAST

Orick— Hanging pictures swung out of place.
Petrolia.
Phillipsville— Trees and bushes shook slightly; standing vehicles rocked slightly.
Redcrest— Hanging pictures fell.
Rio Dell— Buildings shook strongly; hanging pictures swung out of place.
Samoa.
Weott— People reported difficulty in standing or walking.
Zenia— People reported difficulty in standing or walking; buildings shook strongly.
Intensity IV: Albion, Bayside, Blue Lake, Branscomb, Burnt Ranch, Comptche, Covelo, Etna, Kneeland, Blue Lake, Laytonville, Leggett, Little River, Loleta, Mad River, McKinleyville, Navarro, Piercy, Redway, Ruth, Salyer, Westhaven, Westport, Whitethorn, Wildwood.
Intensity III: Fort Bragg, Hayfork, Klamath, Orleans, Point Arena, Redding, Somes Bar, Trinidad, Willits.
Intensity II: Forks of Salmon.
Felt: Alder Point (BK), Hoopa, Mountain Gate, Olinda, and Paradise (press reports).

26 August (BK) Northern California
Origin time: 08 49 26.3
Epicenter: 40.360N., 124.723W.
Depth: 15 km
Magnitude: 4.1mb(GS), 3.9ML(BK), 4.2MD(GM)
Intensity IV: Eureka (a few small objects fell), Garberville, Honeydew, Loleta.
Intensity III: Petrolia, Whitethorn, Wildwood.

11 November (BK) Northern California
Origin time: 12 07 43.8
Epicenter: 40.388N., 124.902W.
Depth: 15 km
Magnitude: 4.9mb(GS), 3.8MS(GS), 4.3ML(BK)
Felt: along the coast of Humboldt County (BK).

20 December (BK) Northern California
Origin time: 10 41 02.2
Epicenter: 40.600N., 125.648W.
Depth: 5 km
Magnitude: 5.6mb(GS), 5.4MS(GS), 5.6ML(BK),5.0MD(GM)
Intensity V:
Carlotta— A few small objects overturned or fell; shaking described as strong; felt by and awakened many.
Honeydew— A few windows cracked; plaster cracks enlarged; shaking was described as strong; felt by and awakened many.
Rio Dell— A few items were knocked off store shelves; a few small objects overturned or fell; felt by and awakened many.
Scotia— Some items were thrown off store shelves with 20 jars broken.
Whitethorn— A few items were shaken from store shelves; a few small objects overturned.
Intensity IV: Bayside, Blocksburg, Bridgeville, Eureka, Garberville, Leggett, Loleta, Mad River, Miranda, Orick, Redway, Salyer, Samoa, Weott (slumping on the river bank), Westport.
Intensity III: Kneeland, Westhaven, Willits, Zenia.
Felt: Arcata, Ferndale, Fortuna, and Perolia (BK).

COLORADO

14 August (GS) Western Colorado
Origin time: 19 08 30.7
Epicenter: 38.359N., 107.402W.
Depth: 5 km
Magnitude: 3.4ML(GS)

Small landslides reported near Maher.

Intensity II: Cimarron.

24 September (GS) Northwestern Colorado
Origin time: 16 57 45.7
Epicenter: 40.789N., 108.837W.
Depth: 5 km
Magnitude: 4.1ML(GS), 3.9ML(UU)
Intensity IV:
Colorado— Northwest of Maybell (at 20010 Highway 318), Rangely.
Intensity II:
Wyoming— Point of Rocks.

CONNECTICUT

26 February (LD) Southeastern New York
Origin time: 19 59 35.4

See New York listing.

7 October (LD) Blue Mountain Lake area
Origin time: 10 18 46.1

See New York listing.

DELAWARE

17 November (GS) Delaware-Pennsylvania Border Region
Origin time: 19 55 06.5
Epicenter: 39.832N., 75.660W.
Depth: 5 km
Magnitude: 2.2Mn(VP), 2.9MD(DE)

A small aftershock was felt at 21:28 EST.

Intensity IV:
Delaware— New Castle, Rockland, Talleyville, Westover Hills, Wilmington (one report of cracked windows and small objects overturning or falling), Wilmington (Wawaset Park), Winterthur.
Intensity III:
Delaware— Claymont, Marshallton.
Pennsylvania— Chadds Ford (press report).
Felt:
Delaware— Wilmington (Brandywine Park).

12 December (GS) Delaware-Pennsylvania Border Region
Origin time: 05 15 09.5
Epicenter: 39.832N., 75.660W.
Depth: 5 km
Magnitude: 2.0Mn(GS), 2.4MD(DE)
Intensity IV: Wilmington (western part of the city— press report).
Felt: Arden and Talleyville areas (press report).

GEORGIA

26 January (GS) Central Georgia
Origin time: 14 07 44.8
Epicenter: 32.728N., 83.375W.
Depth: 5 km
Magnitude: 3.5Mn(GS)
Intensity III: Jeffersonville (press report).
Intensity II: Fort Valley.

6 November (GS) Charleston area
Origin time: 09 02 19.8

See South Carolina listing.

31 December (GS) Western Georgia
Origin time: 06 31 12.1
Epicenter: 32.599N., 84.898W.
Depth: 5 km
Magnitude: 2.6MD(TC)
Intensity IV:
Fortson— A few small objects overturned.
Midland— A few small objects overturned or fell.

31 December (GS) Western Georgia
Origin time: 17 17 27.2
Epicenter: 32.568N., 84.917W.
Depth: 5 km
Magnitude: 2.6MD(TC)
Intensity IV: Fortson— A few small objects overturned.
Intensity II: Midland.

HAWAII

3 January (HV) Island of Hawaii
Origin time: 21 55 04.0
Epicenter: 19.351N., 155.064W.
Depth: 8 km
Magnitude: 3.8ML(HV)
Intensity III: Hilo, Hawaiian Paradise Park.

5 January (HV) Island of Hawaii
Origin time: 14 54 13.0
Epicenter: 19.313N., 155.226W.
Depth: 10 km
Magnitude: 3.4ML(HV)
Intensity III: Hilo, Mountain View.

16 January (HV) Island of Hawaii
Origin time: 17 33 53.6
Epicenter: 19.354N., 155.123W.
Depth: 9 km
Magnitude: 3.9ML(HV)
Intensity IV: Puu Kahaualea
Intensity III: Volcano.

23 January (HV) Island of Hawaii
Origin time: 20 13 39.9
Epicenter: 19.379N., 155.060W.
Depth: 12 km
Magnitude: 3.3ML(HV)
Intensity III: North Glenwood.

23 January (HV) Island of Hawaii
Origin time: 20 46 46.6

HAWAII-Continued

Epicenter: 19.380N., 155.060W.
Depth: 12 km
Magnitude: 3.5ML(HV)
Intensity III: Glenwood, Hilo.

24 January (HV) Island of Hawaii
Origin time: 4 00 24.9
Epicenter: 19.358N., 155.031W.
Depth: 10 km
Magnitude: 4.3ML(HV)
Intensity V: Kurtistown.
Intensity IV: Glenwood, Hilo, Mountain View.
Intensity III: Volcano.

26 January (HV) Island of Hawaii
Origin time: 23 38 34.3
Epicenter: 19.142N., 155.509W.
Depth: 11 km
Magnitude: 3.1ML(HV)
Intensity III: Pahala.

27 January (HV) Island of Hawaii
Origin time: 01 57 58.1
Epicenter: 19.375N., 155.422W.
Depth: 10 km
Magnitude: 3.2ML(HV)
Intensity III: Glenwood.

3 February (HV) Island of Hawaii
Origin time: 05 46 22.7
Epicenter: 19.333N., 155.109W.
Depth: 10 km
Magnitude: 3.3ML(HV)
Intensity III: Hilo.

7 February (HV) Island of Hawaii
Origin time: 04 21 12.6
Epicenter: 19.280N., 155.508W.
Depth: 8 km
Magnitude: 3.1ML(HV)
Intensity III: Pahala.

8 February (HV) Island of Hawaii
Origin time: 02 02 45.5
Epicenter: 19.358N., 155.241W.
Depth: 28 km
Magnitude: 4.6mb(GS), 4.1ML(HV)
Felt: Over most of the island (press report).
Intensity III: Hilo, Puna, Volcano.

20 February (HV) Island of Hawaii
Origin time: 04 05 12.1
Epicenter: 19.332N., 155.122W.
Depth: 9 km
Magnitude: 3.4ML(HV)
Intensity III: Hilo.

5 March (HV) Island of Hawaii
Origin time: 09 27 23.8
Epicenter: 19.360N., 155.052W.
Depth: 8 km
Magnitude: 3.4ML(HV)
Intensity III: Mountain View.

8 March (HV) Island of Hawaii
Origin time: 16 41 03.4
Epicenter: 19.199N., 155.593W.
Depth: 12 km
Magnitude: 4.5ML(HV)
Intensity IV: Hawaiian Ocean View Estates, Pahala.
Intensity III: Ahualoa, Volcano.
Intensity II: Hilo, Kalapana.

13 March (HV) Island of Hawaii
Origin time: 08 43 04.9
Epicenter: 19.982N., 155.333W.
Depth: 14 km
Magnitude: 3.0ML(HV)
Intensity III: Ahualoa.

17 March (HV) Island of Hawaii area
Origin time: 02 10 07.1
Epicenter: 18.453N., 154.279W.
Depth: 40 km
Magnitude: 4.3ML(HV)
Intensity III: Hilo, Pohakuloa.

19 March (HV) Island of Hawaii
Origin time: 04 45 30.0
Epicenter: 19.388N., 155.443W.
Depth: 10 km
Magnitude: 3.5ML(HV)
Intensity III: Glenwood, Volcano Golf Course.

21 March (HV) Island of Hawaii
Origin time: 03 18 39.2
Epicenter: 19.357N., 155.050W.
Depth: 7 km
Magnitude: 4.9mb(GS), 4.8ML(HV)
Intensity V: Kalapana, Pahoa, Volcano (a few items thrown from store shelves).
Intensity IV: Glenwood, Hawaii National Park, Mountain View, Pahala, Papaikou.
Intensity III: Hilo, Ookala, Pohakuloa.
Intensity II: Island of Maui.

21 March (HV) Island of Hawaii
Origin time: 09 02 21.4
Epicenter: 19.365N., 155.419W.
Depth: 11 km
Magnitude: 3.9ML(HV)
Intensity IV: Pahala.
Intensity III: Volcano Golf Course.
Intensity II: Hilo.

7 April (HV) Island of Hawaii
Origin time: 21 00 53.5
Epicenter: 19.281N., 155.477W.
Depth: 9 km
Magnitude: 3.3ML(HV)
Intensity III: Pahala.
Intensity II: Hawaiian Volcano Ovservatory.

12 April (HV) Island of Hawaii
Origin time: 10 49 26.9
Epicenter: 19.494N., 155.667W.
Depth: 7 km
Magnitude: 3.6ML(HV)
Intensity III: Kona.

HAWAII-Continued

16 April (HV) Island of Hawaii
Origin time: 00 51 14.5
Epicenter: 19.335N., 155.198W.
Depth: 9 km
Magnitude: 3.1ML(HV)
Intensity III: Hilo.

28 April (HV) Island of Hawaii
Origin time: 09 34 32.9
Epicenter: 19.330N., 155.126W.
Depth: 8km
Magnitude: 4.0ML(HV)
Intensity IV: Hilo, Puna, Volcano.
Intensity III: Pahala.

9 May (HV) Island of Hawaii
Origin time: 16 52.3
Epicenter: 20.653N., 155.921W.
Depth: 31 km
Magnitude: 3.0ML(HV)
Intensity III: Kona.

13 May (HV) Island of Hawaii
Origin time: 10 30 08.0
Epicenter: 19.171N., 155.583W.
Depth: 9 km
Magnitude: 4.4ML(HV)
Intensity IV: Hawaiian Ocean View Estates.
Intensity III: Hilo, Kona, Naalehu, Pahala.

14 May (HV) Island of Hawaii
Origin time: 14 18 18.2
Epicenter: 19.361N., 155.036W.
Depth: 8 km
Magnitude: 3.3ML(HV)
Intensity III: Hilo.

31 May (HV) Island of Hawaii
Origin time: 13 59 03.4
Epicenter: 19.343N., 155.523W.
Depth: 24 km
Magnitude: 3.4ML(HV)
Intensity III: Pahala.

4 June (HV) Island of Hawaii
Origin time: 08 47 38.3
Epicenter: 19.331N., 155.262W.
Depth: 9 km
Magnitude: 3.3ML(HV)
Intensity III: Pahala.

5 June (HV) Island of Hawaii
Origin time: 09 55 52.2
Epicenter: 19.494N., 154.962W.
Depth: 44 km
Magnitude: 3.5ML(HV)
Intensity II: Waimea.

6 June (HV) Island of Hawaii
Origin time: 04 54 31.0
Epicenter: 19.153N., 155.541W.
Depth: 33 km
Magnitude: 4.1ML(HV)
Intensity IV: Pahala, Volcano.
Intensity III: Hilo, Honomu, Kealakekua.

27 June (HV) Island of Hawaii
Origin time: 02 58 48.7
Epicenter: 19.363N., 155.082W.
Depth: 9 km
Magnitude: 3.7ML(HV)
Intensity III: Hilo.

26 July (HV) Island of Hawaii
Origin time: 20 21 29.7
Epicenter: 19.426N., 155.411W.
Depth: 9 km
Magnitude: 3.6ML(HV)
Intensity III: Hawaiian Volcano Observatory, Hilo.

1 August (HV) Island of Hawaii
Origin time: 02 16 58.0
Epicenter: 19.304N., 155.260W.
Depth: 11 km
Magnitude: 3.5ML(HV)
Intensity III: Hilo.

14 August (HV) Island of Hawaii
Origin time: 03 14 18.7
Epicenter: 19.330N., 155.116W.
Depth: 9 km
Magnitude: 3.6ML(HV)
Intensity III: Hawaii Volcanoes National Park.

16 August (HV) Island of Hawaii
Origin time: 09 35 21.0
Epicenter: 19.317N., 155.218W.
Depth: 10 km
Magnitude: 3.0ML(HV)
Intensity II: Volcano.

16 August (HV) Island of Hawaii
Origin time: 10 10 44.6
Epicenter: 19.962N., 155.840W.
Depth: 7 km
Magnitude: 3.7ML(HV)
Intensity IV: Kawaihae.
Intensity III: Holualoa-Kona, Kamuela, Waikaloa.
Felt: Kohala, Kona, Waimea (press report).

18 August (HV) Island of Hawaii
Origin time: 15 43 59.5
Epicenter: 19.975N., 155.137W.
Depth: 31 km
Magnitude: 4.0ML(HV)
Intensity IV: Hamakua.
Intensity III: Hilo.
Intensity II: Kamuela, Puna, Volcano.

23 August (HV) Island of Hawaii
Origin time: 13 48 35.1
Epicenter: 19.338N., 155.213W.
Depth: 10 km
Magnitude: 3.7ML(HV)
Intensity IV: Volcano.
Intensity III: Hilo.

6 September (HV) Island of Hawaii
Origin time: 08 27 44.7
Epicenter: 19.340N., 155.213W.
Depth: 10 km

HAWAII-Continued

Magnitude: 3.5ML(HV)
Intensity III: Mountain View, Volcano.
Intensity II: Hale Pohaku, Pahala.

7 September (HV) Island of Hawaii
Origin time: 15 09 10.0
Epicenter: 19.341N., 155.298W.
Depth: 39 km
Magnitude: 3.5ML(HV)
Intensity III: Glenwood, Hale Pohaku, Volcano.

9 September (HV) Island of Hawaii
Origin time: 16 30 55.3
Epicenter: 19.332N., 155.122W.
Depth: 9 km
Magnitude: 5.5mb(GS), 5.0MS(GS), 5.4ML(HV)
Intensity V:
Hilo— A few cracked windows; a few merchandise items shaken off store shelves; a few small objects overturned or fell from shelves in homes; felt by most.
Ninole— A few small objects overturned or fell; felt by many.
Pahala— A few dishes or glassware broke; a few small objects overturned or fell; felt by many.
Intensity IV: Bradshaw Army Air Field, Captain Cook, Honokaa, Kealakehua, Kurtistown, Lampahoehoe, Mountain View, Ookala, Papaikou, Volcano.
Intensity III: Hamakua (HV), Hawaiian Ocean View Estates (HV), Kona (HV), Naalehu (HV), Paauhau, South Point, Waimea.
Felt: Kaumana (press report).

14 September (HV) Island of Hawaii
Origin time: 05 39 57.5
Epicenter: 19.354N., 155.052W.
Depth: 9 km
Magnitude: 4.0ML(HV)
Intensity IV: Ainaloa.
Intensity III: Glenwood, Hilo, Mountain View, Volcano.
Intensity II: Kona, Waimea.

14 September (HV) Island of Hawaii
Origin time: 16 43 43.5
Epicenter: 19.504N., 155.655W.
Depth: 8 km
Magnitude: 3.5ML(HV)
Intensity IV: Greenwell Ranch, Waikii.
Intensity III: Ahualoa, Napopo.

14 September (HV) Island of Hawaii
Origin time: 23 00 15.2
Epicenter: 19.357N., 155.051W.
Depth: 8 km
Magnitude: 3.6ML(HV)
Intensity III: Hilo, Kalapana, Volcano.
Intensity II: Ahualoa.

16 September (HV) Island of Hawaii
Origin time: 19 22 12.2
Epicenter: 19.503N., 155.653W.
Depth: 8 km
Magnitude: 4.0ML(HV)
Intensity IV: Mauna Loa Observatory
Intensity III: Captain Cook-Kona.
Intensity II: Hawaiian Volcano Observatory.

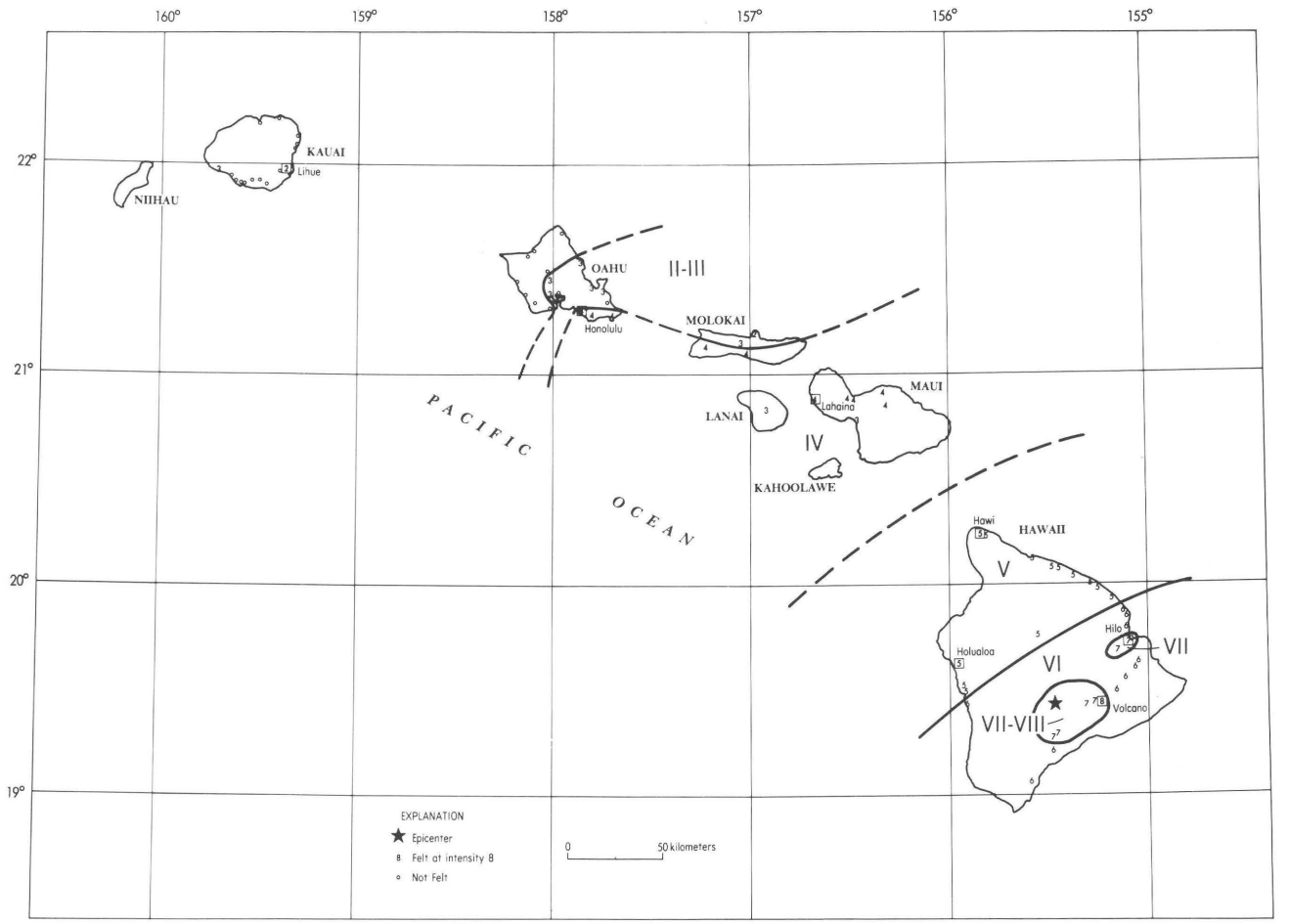

Figure 22. Isoseismal map for the Island of Hawaii earthquake of 16 November 1983, 16 13 00.1 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; arabic numerals are used to represent these intensities at specific sites.

HAWAII--Continued

17 September (HV) Island of Hawaii
Origin time: 01 09 53.2
Epicenter: 19.501N., 155.651W.
Depth: 8 km
Magnitude: 4.2ML(HV)
Intensity IV: Mauna Loa Observatory.
Intensity III: Hawaiian Volacano Observatory, Kona Areas, Pahala.

2 October (HV) Island of Hawaii
Origin time: 11 38 27.6
Epicenter: 19.325N., 155.203W.
Depth: 10 km
Magnitude: 3.4ML(HV)
Intensity III: Volcano.

8 October (HV) Island of Hawaii
Origin time: 03 21 36.3
Epicenter: 19.742N., 155.473W.
Depth: 16 km
Magnitude: 3.9ML(HV)
Intensity IV: Waimea.
Intensity III: Hilo.

HAWAII--Continued

9 October (HV) Island of Hawaii
Origin time: 02 21 34.9
Epicenter: 19.325N., 155.193W.
Depth: 9 km
Magnitude: 3.4ML(HV)
Intensity II: Hilo.

25 October (HV) Island of Hawaii
Origin time: 21 02 35.4
Epicenter: 19.495N., 155.648W.
Depth: 8 km
Magnitude: 4.0ML(HV)
Intensity III: Mauna Loa Observatory.
Intensity II: Hawaiian Volacano Observatory, Hilo, Kamuela, Kona, Ocean View Estates.

31 October (HV) Island of Hawaii
Origin time: 01 49 14.5
Epicenter: 19.451N., 155.454W.
Depth: 10 km
Magnitude: 3.9ML(HV)
Intensity III: Hawaiian Volcano Observatory, Hilo.

Figure 23. Ground failure on Crater Rim Drive around Kilauea crater on the Island of Hawaii (provided by J. D. Griggs).

12 November (HV) Island of Hawaii
Origin time: 08 05 38.3
Epicenter: 19.415N., 155.268W.
Depth: 16 km
Magnitude: 3.6ML(HV)
Intensity II: Pahala.

16 November (HV) Island of Hawaii
Origin time: 16 13 00.1
Epicenter: 9.429N., 155.452W.
Depth: 11 km
Magnitude: 6.4mb(GS), 6.7MS(GS)

This event, named the Kaoiki earthquake, was the most destructive earthquake to occur in Hawaii since the magnitude 7.1 (MS) one near Kalapana on November 29, 1975. The 1983 quake caused six people to suffer minor injuries and resulted in considerable damage on the Island of Hawaii. This shock was also felt on the islands of Kauai, Lanai, Maui, Molokai, and Oahu (fig. 22). The Small Business Administration listed 39 homes with major damage, 317 homes with minor damage, and 35 businesses with varying degrees of damage. Additional damage occurred to roads, bridges, and other government facilities.

Landslides and ground cracking occurred in many areas of the southern part of the island. The most severe ground failures were on Crater Rim Drive around Kilauea crater (fig. 23). At various places the road was constructed near the edge of the crater wall and at one

HAWAII-Continued

place a section of the road fell into the crater. In other areas the road was cracked; the cracks were 4 to 5 ft. wide and 10 to 20 ft. deep. Also, many sections of trails in Hawaiian Volcanoes National Park collapsed into the main caldera of Kilauea Volcano. Landslides fell onto highways along both the east and west coasts of the island. At South Point and Kealekakua Bay parts of the cliffs fell into the ocean (Buchanan-Banks, 1983).

Seismographs at the Hawaiian Volcano Observatory recorded more than 10,000 aftershocks by the end of November. Of these, over 800 had a magnitude of 1.0 or greater. The highest accelerations recorded on strong motion equipment were at the Hawaii Volcano Observatory and at Kau Hospital, Pahala, with peak accelerations of 0.67 g and 0.59 g respectively (Lum and others, 1984).

The intensities listed below were based primarily on damage to man-made structures or other works. None of the intensities are based on landslides, ground cracking, or other ground failures. Most of the houses in the area are of single wall wood construction supported 2 to 4 ft. off the ground by 4 in. by 4 in. posts mounted on 16 in. by 16 in. concrete ft. blocks. The homes of this type built after 1940 had a 6 in. by 6 in. concrete block between the posts and the foot block; most of these post-1940 homes were the ones damaged when they fell off the concrete blocks (Lum and others, 1984). The pre-1940 homes suffered little damage. Some houses with masonry chimneys that were anchored to the house were wracked by

Figure 24. An unanchored chimney in Volcano, Hawaii, that was thrown down by the earthquake on 16 November 1983 (provided by Hawaii Tribune-Herald, Ltd.).

the movement of the chimney; unanchored chimneys fell (see fig. 24).

The damage descriptions for the Island of Hawaii listed below were taken from a report by Buchanan-Banks (1983) and from numerous press reports.

Intensity VIII:
Island of Hawaii—
Volcano—
Many houses and garages were moved off their foundations causing extensive damage. The homes had a wracked appearance and the ceilings and walls were buckled. A woman standing outside on the street said she saw waves in the pavement and that the motion knocked her to the ground. The highways in the vicinity were severly cracked and were temporarily closed. Elevated water tanks were thrown down and water tanks on gravel bases were moved (some as much as 5 cm), and some had their roofs either damaged or knocked off due to the sloshing of the water inside the tanks. Water heaters were moved and connecting pipes broken; three fireplace chimneys collapsed (fig. 24); television sets and bookcases were overturned; heavy furniture shifted; refrigerator and cupboard contents were dumped onto the floor; cabinet drawers opened; dishes were broken; objects were thrown with velocity out of closets and medicine chests.

HAWAII-Continued

Intensity VII:
Island of Hawaii—
Hawaiian Volcano Observatory— There was some cracking and offsets of concrete foundation slabs; dishes and loose objects on shelves fell and broke; file cabinets shifted; books were thrown from shelves and bookcases overturned; computer consoles moved around.
Hilo— Twelve businesses and Hilo Hospital suffered minor structural damage; 14 businesses (fig. 25) and the public library had plate glass windows broken; the concrete marque at the Agasa Furniture and Music Store On Ponahawai Street collapsed (fig. 26); the new Piihonua Bridge was cracked at both ends; a gas main on Mamo Street was broken; the runway at Hilo Airport had hairline cracks; at the Tribune-Herald newspaper building heavy machinery moved across the floor and plaster fell from the ceiling; minor road cracking occurred on Akolea Road, Kaumana Drive, and Nanalele Street; many items in markets fell or were thrown from shelves; windows in homes cracked; retaining walls, driveways, and concrete slabs were cracked; water pipes and water heater connections broke; rock walls and fences collapsed; cesspools

Figure 25. Broken plate-glass store windows in Hilo, Hawaii, following the earthquake on 16 November 1983 (provided by Hawaii Tribune-Herald, Ltd).

HAWAII-Continued

caved-in; chimneys separated from walls; light-weight furniture and lamps overturned; several people experienced difficulty in standing; waves on the ground were observed with estimated amplitudes of 0.3 m and periods of 0.5 seconds.

Kapapala Ranch— The ranch house was moved about 17 cm off its foundation; the hot water tank was separated from the connecting pipes and overturned; rock walls partially collapsed.

Kaumana— Fifteen residences were damaged, a few were knocked off their foundations; masonry steps on a home collapsed; (fig. 27) water pipes broke; a retaining wall collapsed and a transformer knocked off its foundation, at Ainako substation, causing a loss of electricity.

Kilauea Military Camp (4 km west of Volcano)— Chimneys were broken; buildings cracked; many items thrown to the floor from shelves and the highway was damaged at the entrance of the Camp.

Wood Valley— A few wood-frame homes were knocked off their foundations; gas pipes broke; nearly every headstone in the cemetary overturned.

Intensity VI:

Island of Hawaii—

Ainaloa— Two support beams for a deck moved 10 cm off the foundation blocks; book shelves fell; cupboard doors opened and dishes fell out.

Glenwood— Drywall was cracked; a water tank moved about 5 cm; items fell from cupboards; a freezer and a television overturned; books and other loose objects fell from shelves.

Hawaiian Paradise Park— A water tank was destroyed; a few knick-knackes overturned or fell; water splashed out of a 20,000 gallon pool.

Honaunau— A few water pipes broke; filing cabinets moved; bookshelves overturned; loose objects fell from shelves and cupboards causing some breakage; houses shook strongly; rocks fell from walls.

Honomu— Tombstones fell; stone walls cracked; many objects fell off shelves in homes and stores; dishes and bottles broke; light furniture overturned; a few windows cracked.

Keaau— A foundation cracked; a few buildings reported damaged; objects on shelves and in cupboards fell; a few items fell from store shelves; the vibration was described as strong; people had difficulty in standing or walking; felt by all.

Kurtistown— A television, a lamp, and a statue fell off shelves; dishes broke; pictures fell off walls.

Figure 26. The collapse of a concrete marquee, at the Agasa Furniture and Music Store (provided by Hawaii Tribune-Herald, Ltd.).

HAWAII--Continued

Mountain View— One house shifted 2 cm off its foundation piers; a water pipe and connections broke; the water heater was damaged causing leakage; bookcases overturned and books scattered; cupboard doors opened and the contents fell out; dishes and lamps broke; furniture moved; a wall collapsed in some places; people had difficulty in standing or walking; felt by all.

Naalehu— Six homes and the elementary school reported damage; stone fences fell; trees and bushes shook strongly; moving vehicles rocked moderately; many items were thrown off store shelves; table lamps and knick-knacks overturned and dishes broke; a television and microwave oven were displaced and bookshelves overturned; hanging pictures fell; people had difficulty standing or walking; felt by all.

Pahala— Seven businesses reported some damage and that 75% of the merchandise fell from the shelves. In homes, a few water heaters were overturned and some of the connecting pipes broke; appliances and furniture moved; tables, floor lamps, and dishes broke; refrigerator and freezer doors opened and contents fell out; bookcases, books, and shelving fell; pictures and mirrors fell from walls. At Kau Hospital, beds overturned; ceiling panels

HAWAII--Continued

dislodged; wall clocks were knocked loose. It was felt by everyone.

Papaikou— A concrete slab in a carport cracked, with some structural damage to the house. Other effects were cracked interior walls, fallen books and mirrors, broken dishes, a cesspool caved in, a few windows cracked, trees and bushes shook strongly, and people had difficulty in standing or walking, felt by all.

Pepeekeo— Hanging pictures fell; many items were thrown from store shelves; many small objects overturned or fell; many dishes broke; some windows broke; the shaking was described as strong; felt by all.

South Point— One house was moved about 1.5 m off its foundation. Other effects included: a few water pipes broken, refrigerator doors opened and the contents spilled out; bookcases, table lamps, and glassware damaged; rock walls with north-south alignment were damaged; objects fell off shelves; a large sand hill subsided.

Intensity V: The most common effects at the places listed below were some knick-knacks and books knocked off shelves and shaking described as strong. Additional effects are listed after each locality.

Figure 27. Collapsed masonry steps and porch at a home in Kaumana, Hawaii, following the 16 November 1983 earthquake (provided by Hawaii Tribune-Herald, Ltd.).

HAWAII-Continued

Island of Hawaii—
Captain Cook— Trees and bushes shook moderately.
Hawi— Hanging pictures fell.
Holualoa— felt by all.
Honokaa— Hanging pictures fell; rocks fell from road cuts.
Kapaau— felt by all.
Kealakekua— Moving vehicles rocked slightly.
Kukuihaele— A few items were knocked off store shelves.
Laupahoehoe— Ceiling tiles fell in the school library; hanging pictures fell; a few items were knocked off store shelves; cupboard doors opened and items fell out.
Ninole— Pictures fell; felt by all.
Ocean View— Cabinets and drawers opened.
Ookala— felt by all.
Orchidland.
Paauhau— A few items were thrown from store shelves.
Paauilo— A foundation cracked;, a few items were knocked off store shelves.
Intensity IV:
Island of Maui— Haiku, Kahului, Lahaina, Makawao, Wailuku.
Island of Molokai— Kaunakaikai, Mauna Loa.

HAWAII-Continued

Island of Oahu— Hawaii Kai, Honolulu, Kaimuki, Waialae-Kahala.
Intensity III:
Island of Kauai— Kekaha.
Island of Lanai— Lanai City.
Island of Maui— Kihei
Island of Molokai— Kualapuu.
Island of Oahu— Kaaawa, Kailua, Kaneohe, Mililanitown, Waipahu.
Intensity II:
Island of Kauai— Lihue.
Island of Molokai— Kalaupapa.
Island of Oahu— Honolulu (Kapalama).

16 November (HV) Island of Hawaii
Origin time: 23 30 47.5
Epicenter: 19.486N., 155.396W.
Depth: 12 km
Magnitude: 4.8mb(GS), 4.2ML(HV)
Intensity III: Hilo, Pahala, Volcano.

17 November (HV) Island of Hawaii
Origin time: 02 08 28.8

Epicenter: 19.427N., 155.324W.
Depth: 6 km
Magnitude: 3.5ML(HV)
Intensity III: Pahala.

17 November (HV) Island of Hawaii
Origin time: 22 12 47.5
Epicenter: 19.370N., 155.478W.
Depth: 9 km
Magnitude: 3.7ML(HV)
Intensity III: Pahala.

18 November (HV) Island of Hawaii
Origin time: 09 30 39.6
Epicenter: 19.472N., 155.353W.
Depth: 2 km
Magnitude: 3.7ML(HV)
Intensity III: Pahala.

19 November (HV) Island of Hawaii
Origin time: 1 37 51.7
Epicenter: 19.290N., 155.261W.
Depth: 11 km
Magnitude: 4.1MD(HV)
Intensity IV: Hilo, Puna.
Intensity III: Volcano.

22 November (HV) Island of Hawaii
Origin time: 14 39 15.7
Epicenter: 19.314N., 155.223W
Depth: 9 km
Magnitude: 3.1ML(HV)
Intensity II: Volcano.

22 November (HV) Island of Hawaii
Origin time: 15 53 11.3
Epicenter: 19.942N., 155.519W.
Depth: 34 km
Magnitude: 3.2ML(HV)
Intensity II: Hilo, Volcano.

22 November (HV) Island of Hawaii
Origin time: 18 30 08.8
Epicenter: 19.942N., 155.518W.
Depth: 35 km
Magnitude: 3.6ML(HV)
Intensity III: Waimea.
Intensity II: Papaikou.

23 November (HV) Island of Hawaii
Origin time: 06 32 30.0
Epicenter: 19.525N., 155.416W.
Depth: 24 km
Magnitude: 3.6ML(HV)
Intensity III: Volcano.

23 November (HV) Island of Hawaii
Origin time: 12 33 40.6
Epicenter: 19.393N., 155.435W.
Depth: 11 km
Magnitude: 3.8ML(HV)
Intensity III: Glenwood, Hilo, Volcano.
Intensity II: Hawaiian Beaches, Hawaii Volcanoes National Park, Kona, Mountain View, Papaikou, Pohakuloa.

HAWAII-Continued

26 November (HV) Island of Hawaii
Origin time: 04 17 33.0
Epicenter: 19.149N., 155.582W.
Depth: 11 km
Magnitude: 3.7ML(HV)
Intensity III: Naalehu, Pahala.

27 November (HV) Island of Hawaii
Origin time: 03 08 52.5
Epicenter: 19.472N., 155.455W.
Depth: 9 km
Magnitude: 3.0ML(HV)
Intensity II: Hawaiian Volcano Observatory.

27 November (HV) Island of Hawaii
Origin time: 9 27 31.7
Epicenter: 19.358N., 155.050W.
Depth: 9 km
Magnitude: 3.9ML(HV)
Intensity III: Hilo, Kalapana.
Intensity II: Ahualoa, Honokaa.

28 November (HV) Island of Hawaii
Origin time: 01 20 42.0
Epicenter: 19.372N., 155.458W.
Depth: 11 km
Magnitude: 3.5ML(HV)
Intensity II: Hilo.

28 November (HV) Island of Hawaii
Origin time: 05 33 28.1
Epicenter: 19.487N., 155.457W.
Depth: 7 km
Magnitude: 3.7ML(HV)
Intensity III: Pahala.
Intensity II: Hilo.

29 November (HV) Island of Hawaii
Origin time: 20 19 54.6
Epicenter: 19.376N., 155.388W.
Depth: 14 km
Magnitude: 3.7ML(HV)
Intensity III: Hawaiian Volcano Observatory, Volcano.
Intensity II: Hilo, Pahala, Punaluu.

30 November (HV) Island of Hawaii
Origin time: 01 43 11.6
Epicenter: 19.376N., 155.388W.
Depth: 14 km
Magnitude: 3.1ML(HV)
Intensity II: Pahala.

5 December (HV) Island of Hawaii
Origin time: 05 51 41.4
Epicenter: 19.459N., 155.425W.
Depth: 8 km
Magnitude: 3.7ML(HV)
Intensity IV: Pahala.
Intensity III: Papaikou.
Intensity II: Hilo.

15 December (HV) Island of Hawaii
Origin time: 06 56 24.0
Epicenter: 19.367N., 155.502W.
Depth: 10 km

Magnitude: 3.6ML(HV)
Intensity III: Pahala, Volcano.
Intensity II: Hilo, Laupahoehoe, Papaikou.

24 December (HV) Island of Hawaii
Origin time: 06 53 33.1
Epicenter: 19.116N., 155.462W.
Depth: 8 km
Magnitude: 3.0ML(HV)
Intensity II: Pahala.

28 December (HV) Island of Hawaii
Origin time: 00 50 26.5
Epicenter: 19.312N., 155.194W.
Depth: 9 km
Magnitude: 3.4ML(HV)
Intensity III: Volcano.

29 December (HV) Island of Hawaii
Origin time: 12 58 06.9
Epicenter: 19.308N., 155.224W.
Depth: 10 km
Magnitude: 3.7ML(HV)
Intensity IV: Hilo.
Intensity III: Puna.

IDAHO

8 February (UU) Eastern Idaho
Origin time: 10 54 54.9
Epicenter: 43.304N., 111.190W.
Depth: 7 km
Magnitude: 4.4mb(GS), 4.2ML(GS)
Intensity V:
Idaho—
Palisades— Small objects overturned or fell; buildings shook strongly; felt by and awakened all.
Intensity IV:
Idaho— Swan Valley, Victor.
Wyoming— Etna (cracks in road ice), Teton Village.

28 February (GS) Western Idaho
Origin time: 07 24 17.3
Epicenter: 44.383N., 115.447W.
Depth: 5 km
Magnitude: 3.7ML(GS), 4.3ML(MT).
Felt: Stanley.

29 March (GS) Western Idaho
Origin time: 01 36 59.4
Epicenter: 44.790N., 116.881W.
Depth: 5 km
Magnitude: 3.2ML(GS), 3.5ML(BU)
Intensity III: Halfway, Oregon.

9 September (GS) Western Idaho
Origin time: 01 09 36.2
Epicenter: 44.580N., 115.674W.
Depth: 5 km
Magnitude: 3.6ML(GS), 4.0ML(BU)
Intensity II: Garden Valley
Felt: New Meadows.

28 October (GS) Central Idaho
Origin time: 14 06 06.5
Epicenter: 43.974N., 113.916W.
Depth: 14 km
Magnitude: 6.2mb(GS), 7.3MS(GS), 7.2ML(BK), M_o = 2.9 x 10^{26} dyne-cm (BK)

This event, called the Borah Peak earthquake, is the largest earthquake ever recorded in Idaho. It caused the death of two children in Challis and injured one woman in Mackay. The quake was felt over a contiguous area of approximately 855,000 km^2 of Canada and the United States (fig. 28)—670,000 km^2 of this area is within the United States (Stover, 1985). Surface faulting associated with this earthquake occurred in a 34-km-long, northwest-trending zone of fresh scarps and ground breakage on the southwest slope of the Lost River Range (fig. 29). The 34-km-long discontinuous surface faulting had a throw that ranged from 50 cm to 2.7 m and ground breakage over a width of as much as 100 m (Crone and Machette, 1984). The most severe damage occurred at Mackay and Challis, Idaho, where a report by the Governor's office listed a total of 11 businesses and 39 homes sustained major damage and 200 homes suffered minor to moderate damage. The Idaho Bureau of Disaster Services estimated the total earthquake damage at $12.5 million.

Maximum intensity assignments based on geologic effects are common historically (see Coffman and others, 1982). However, many studies differentiate the maximum intensity assigned between vibrational effects on people and structures and the geologic effects such as faulting, landslides, and liquefaction even though Wood and Neumann (1931) combined the two in the Modified Mercalli Intensity Scale. The Borah Peak earthquake is very similar to the 1959 Hebgen Lake, Montana, earthquake where the maximum intensity X was based on faulting even though the vibrational effects on structures were rated at a much lower intensity of VII-VIII (Steinbrugge and Cloud, 1962). In order to maintain continuity of assigned intensities, the maximum intensity of IX is assigned to the area along the 34-km-long zone of fault scarps and surface ruptures (see fig. 28). The highest intensity based on damage to structures is VII (see descriptions below).

Two eyewitness accounts of the shaking effects and faulting were printed in newspapers. The first was by Lawana Knox who was on a hunting trip in the Lost River Mountain Range and described the experience as follows: "At first, I heard a funny roar. I thought it was the wind blowing up the canyon, you know, except it was real still. I saw the sagebrush and the grass wiggling and starting to shake, and I thought 'Earthquake!'. The next thing I knew, it had thrown my gun, a .245 Winchester, out of my hands, and I couldn't get it. It felt like somebody was shaking me by the shoulders, and I had the sensation that it would throw me on my face. I was disoriented. I sat down. The power poles were bending back and forth, lines whipping, and the poles moving too. Then there came this horrible roaring. I looked and the earth just started cracking. Just everywhere I looked, the earth started to open up, just dropping like someone had taken scissors and started cutting. I could see the dust flying and a big crack going right along the mountains. I thought it would

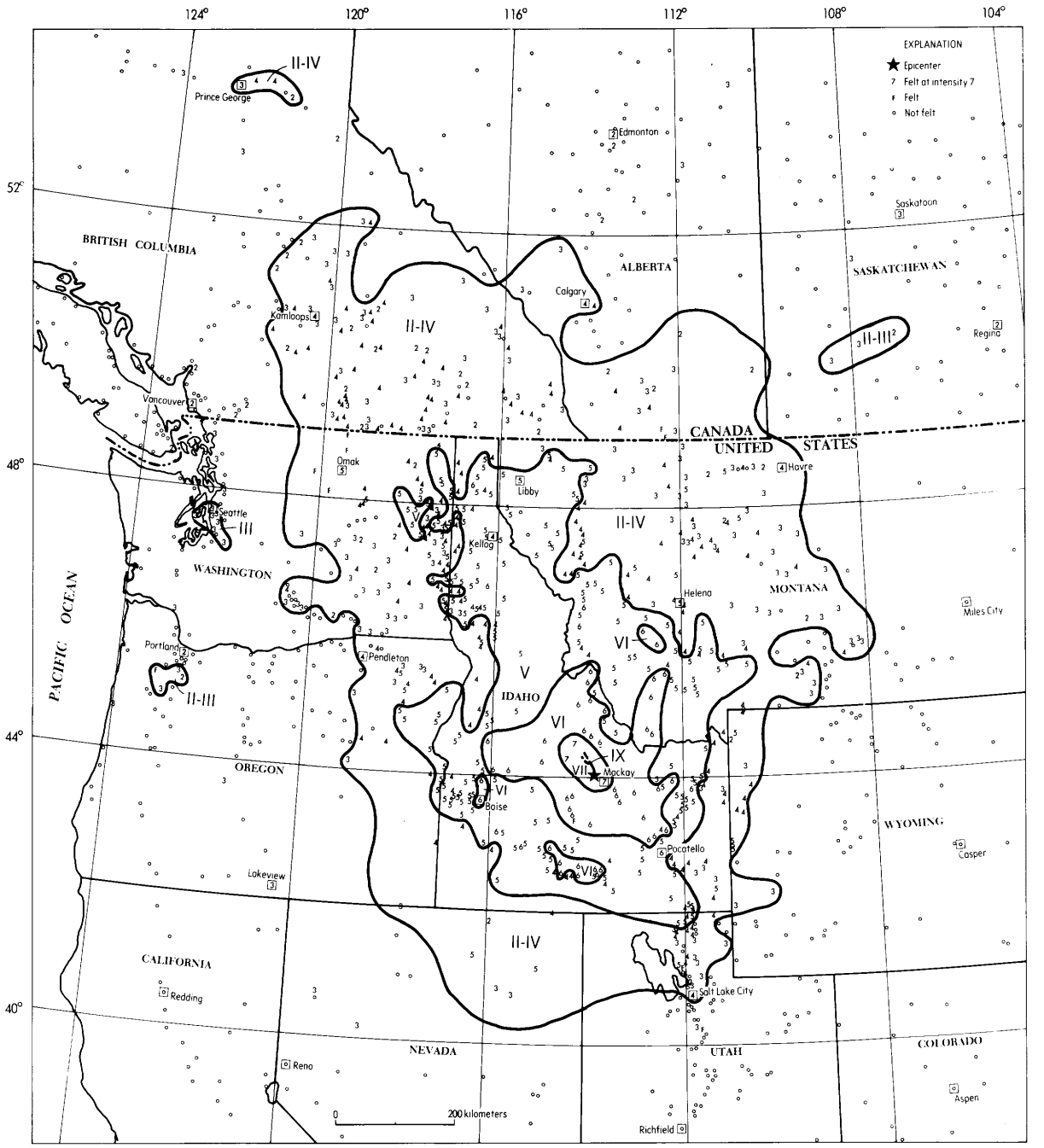

Figure 28. Isoseismal map for the Borah Peak, Idaho, earthquake of 28 October 1983, 14 06 06.5 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; arabic numerals represent intensities at specific sites. Some of the intensities in Canada are from Drysdale and others (1984) (from Stover, 1985). Intensity IX was assigned to the surface rupture extending northwest from the epicenter.

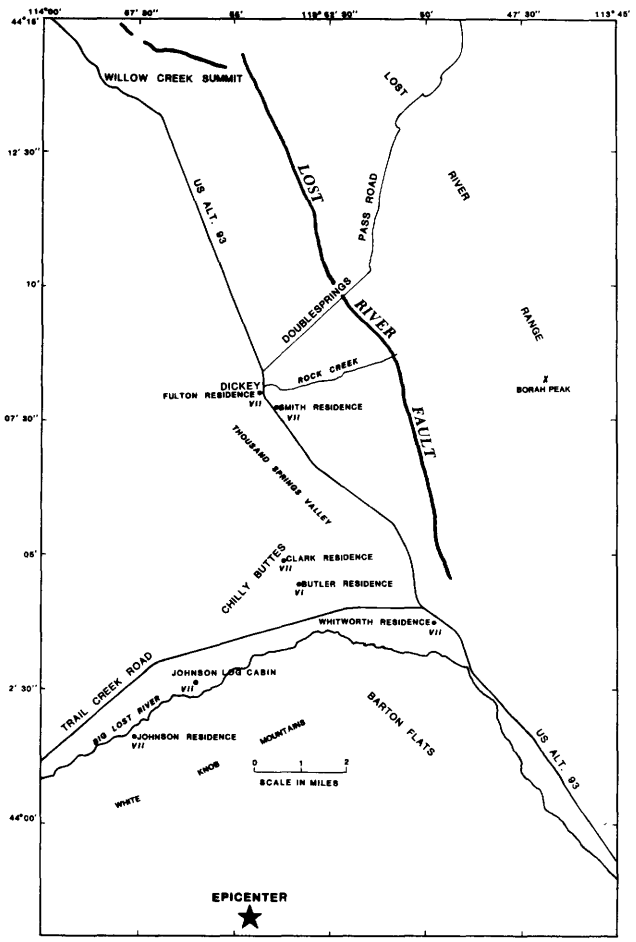

Figure 29. A schematic map showing the locations of topographic features and specific geographic sites in the epicentral region of the Borah Peak, Idaho earthquake. Roman numerals indicate intensities at specific sites.(from Reagor and Baldwin, 1984).

IDAHO--Continued

keep going and I'd just sink. It went along for miles. I could see it going."

The other account was by two unidentified hunters driving a Ford Bronco along Double Springs Pass Road north of Dickey. Their experiences were described as follows: "I (the driver) looked up and saw the road in front (of the vehicle) and it fell. I could see the fault and shock wave. It was crumbling, sinking. It lasted maybe a second. We dropped back down and snapped off an embankment. It felt like we were flying a mechanical bull. I had a death grip on my wheel. We went into violent shaking. The thing that really scared me was the ground opening and closing two to three feet. I was afraid the whole thing would open and swallow us." "I (the passenger) felt like a rag doll and someone was shaking me. I went up to the ceiling (of the truck). I'd fly across the seat and hit the driver."

Geological phenomenon that accompanied the Borah Peak earthquake include the following: numerous landslides and rockfalls, water fountains, and changes in the flow of water from springs. Landslides and rockfalls were common on the steep slopes of the Lost River Mountains. Highways in many areas had to be cleared of

IDAHO--Continued

boulders that had rolled down the slopes. Some homes in Challis, located at the base of large bluffs, were damaged by falling boulders (Reagor and Baldwin, 1984).

The quake caused water fountains in at least two locations: Near Chilly Buttes and at the upper end of Mackay Reservoir (Reagor and Baldwin, 1984). The fountains lasted only a short time leaving many holes of various sizes and depths. The flow of water from springs was also affected. A spring near Mackay Reservoir increased its flow by more than 25 percent, another at Ingram Ranch near Challis became temporarily dry but flow returned in 13 days, and two others near Ketchum, Geyser Hot Springs, and Easley Hot Springs, began flowing at a higher than normal rate. The flooding of the Clayton Silver Mine with more than 100 ft. of water was attributed to this earthquake.

In Mackay, most of the businesses located on Main Street were damaged to some degree; eight of them were condemned as irreparable by building inspectors. Damaged buildings were of masonry construction (brick, concrete block, or stone) (see figs. 30, 31, 32). The type of damage was mostly severe cracking or partial collapse of exterior walls, some cracking of interior walls, and some separation of walls at corners. One person was injured on Main Street by debris from a collapsing wall. About 90 percent of the chimneys in the residential area of Mackay were damaged to some extent; either they collapsed, were twisted, or were so severely cracked they had to be torn down. Large amounts of merchandise were thrown off store shelves and most glass containers were broken. Mackay High School suffered much the same type of damage as the masonry buildings along Main Street (damage descriptions are listed below).

Challis had less damage to buildings than Mackay; however, two children were killed when the upper part of the front of a stone building (built in 1879), collapsed onto them (fig. 33). The Challis High School was the only other building to suffer major damage. Stone facing fell from the top of a wall, a chimney and exterior brick walls were cracked, the stone entrance was separated from the building, and interior walls were cracked. Some chimneys in both the residential and business districts were damaged but not as extensively as in Mackay. Reagor and Baldwin (1984) have published detailed descriptions of damage at other communities in the epicentral area.

The most common damage and effects reported from the communities located within the intensity VI isoseismal were cracked exterior brick or cinderblock walls, cracked foundations, cracked chimneys or bricks fallen from chimneys, many small objects overturned or fell, trees and bushes shook moderately to strongly, and standing automobile or trucks rocked moderately. No damage was reported at any of the 30 Bureau of Reclamation dams within 250 miles of the epicenter.

Many of the damage descriptions listed below were taken from Reagor and Baldwin (1984).

Intensity IX:
Idaho—

Fresh fault scarps and surface ruptures extended northwesterly over a distance of about 34 km, mostly along the surface trace of the Lost River fault (Crone and Machette, 1984). Crone and Machette (1984) reported "The most extensive breakage is along the 8-km-long zone between West Spring and Cedar Creek" (located

Figure 30. Earthquake damage to the south wall of Perks Bar, Main Street, Mackay, Idaho (provided by Idaho Falls, Idaho, Post-Register).

north and south of Doublesprings Pass Road). The violent shaking, combined with differential movement on individual faults along this zone, shattered the ground surface into randomly tilted blocks several meters in width. The ground breakage is as much as 100 m wide and commonly has four to eight en echelon scarps that may be as much as 1-2 m high." The throw on the faulting ranged from less than 50 cm on the southernmost section to the maximum of 2.55-2.70 m just south of Rock Creek at the western base of Borah Peak (Crone and Machette, 1984). Figure 34 shows the fault scarp about 1 mile south of Doublespring Pass Road (Reagor and Baldwin, 1984). The area in the immediate vicinity of the ground breakage was assigned intensity IX. No isoseismal defining intensity VIII is shown on the map (fig. 28) as the faulting occurred in a virtually unpopulated area; thus, there were no reports of damage to structures. However, a zone of intensity VIII shaking probably closely surrounds the area of ground breakage.

Intensity VII:

Idaho—

Challis— Chimneys cracked, broken at the roof line, and a few fallen; dishes, wall ornaments, and knick-knacks commonly fell and broke in many homes; many items were thrown from store shelves; homes were damaged when large boulders rolled down hillsides and crashed into houses; some windows were broken out; streets and sidewalks cracked; some buildings partially collapsed; concrete bridges had slight damage; some underground

IDAHO--Continued

pipes broke; tombstones cracked, rotated or fell. The old Challis High School (built in 1922) had part of the stonework fall from the northeast corner, the smokestack damaged, and large cracks in the stone facade of the school; the entire facade on the front of the school separated from the rest of the building. Inside, plaster fell, ceiling tiles were displaced, and light fixtures hung loose.

Chilly Buttes Area (near the epicenter about 20 miles northwest of Mackay (see fig. 29)—

Butler Residence— Most of the items stored in cabinets were thrown out and onto the floor where some items broke. Medium to heavy furniture overturned and the refrigerator moved away from the wall.

Clark Residence (see fig. 29)— The house shifted slightly on the foundation; a few bricks fell from the chimney; the plaster ceiling cracked; glassware and dishes broke. The owner described the shaking as so strong that his family could not stand long enough to exit the house.

Johnson Residence (see fig. 29)— The owner had to grasp the kitchen sink to remain standing; dishes were shaken off the table; the owner's daughter was unable to open the door to leave the house due to the degree of shaking. However, the damage to the home was slight as only a few dishes broke. At another house located about 100 yds. away the two brick chimneys collapsed through the roof and attic and into the second-floor rooms. A few dishes and glassware broke and in the utility room

Figure 31. Damage to the brick walls of the vacant Custer Hotel in Mackay, Idaho (provided by Idaho Falls, Idaho, Post-Register).

many items on the walls were thrown down. A washing machine overturned.

Whitworth Residence (see fig. 29)— Water pipes broke; large amounts of glassware and antique furniture broke; several pieces of light furniture overturned; several small cracks developed in the walls and ceiling; a heavy upright piano on casters moved; two platform base beds shook apart and the slats broke.

Clayton Area— Rockslides were a common occurrence on the mountain slopes adjacent to the town. New springs were reported in Squaw Canyon north of Clayton. Chimneys cracked, twisted, and fell. Springs and well water had the flow disturbed and water muddied. Power poles swayed; trees and bushes shook moderately; standing and moving vehicles rocked moderately; many small objects overturned or fell; many dishes or glassware broke, many merchandise items thrown from store shelves, hanging picture fell, felt by all. The same effects were reported at a location 13 miles west of Clayton.

Dickey (see fig. 29)—

Fulton Residence— Two brick chimneys broke at the roof line. One fell inside the house and the other fell onto the roof. Many wood and glass antiques broke throughout the house. Cabinet doors flew open and large quantities of glassware and dishes were dumped onto the floor and broke. The refrigerator door was thrown open and the contents dumped onto the floor. Pictures and shelves shook off the walls; light furniture and lamps

IDAHO--Continued

overturned. In the basement many canned goods and jars were thrown from shelves with the glassware items broken. The residents reported they could not stand long enough to exit the house. The displacement of a tractor transmission, which was suspended from a chain hoist, is an example of the violence of the shaking. The transmission was thrown westward up and over the fender of the tractor without touching the fender or breaking the chain.

Smith Residence— One tier of bricks fell from the chimney and the stone veneer near the top of the column between the garage doors was slightly displaced. The resident inside the house was staggered from the shaking but managed to get outside without falling. Inside the home, walls cracked, cabinets emptied, and plates were described as "sailing out of the cabinets like dealt cards." All the shelf items, hanging pictures, and mirrors fell; heavy furniture moved (an upright piano moved across a linoleum floor). Most light furniture overturned, and ceiling light fixtures were shaken down. In both the basement and garage most of the items on shelves were thrown to the floor; glassware broke.

Mackay— A general description of the damage in Mackay has already been given. Detailed descriptions of the damage to individual building and other effects in Mackay and the surrounding area are listed below:

Perks Bar (West Main Street)— The second story of the brick and block wall at the front of the building collapsed into the street (fig. 30).

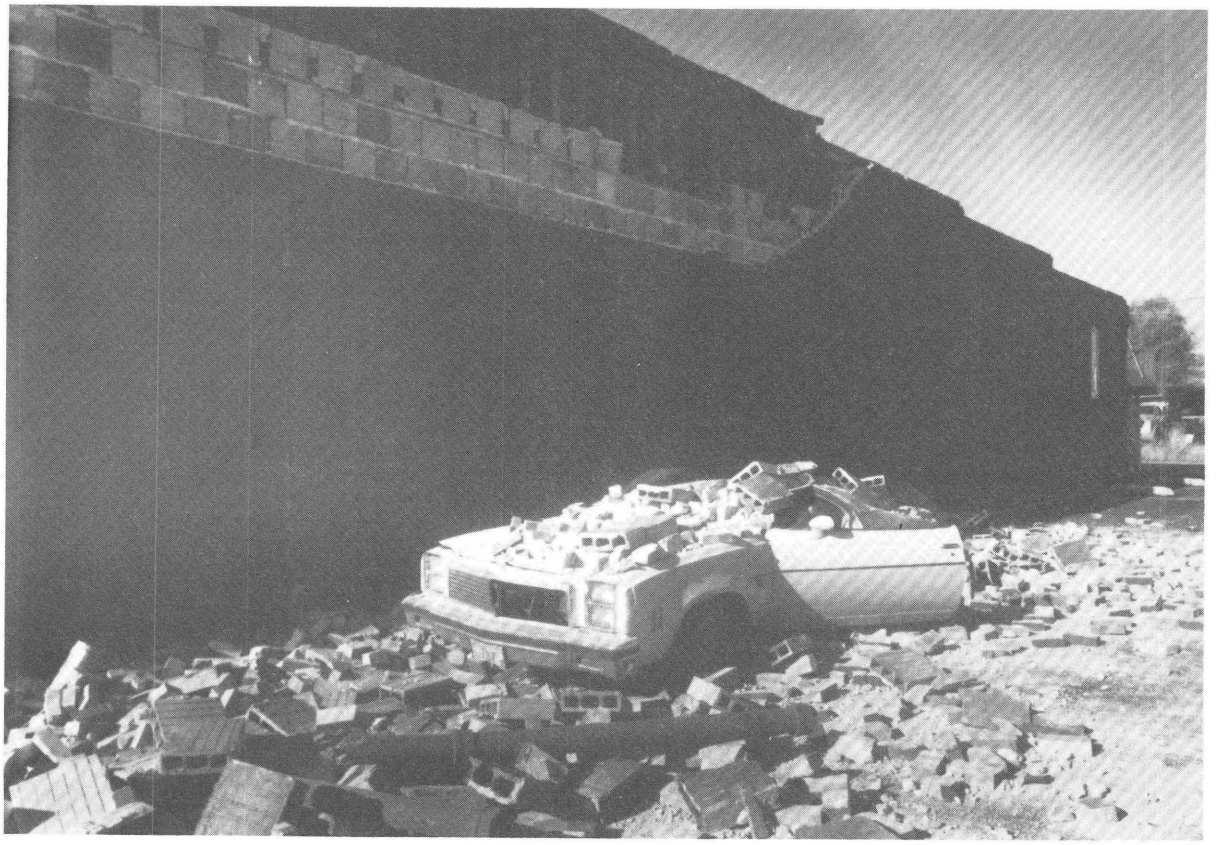

Figure 32. Damage to the east wall of Mackay Drug on Main Street, Mackay, Idaho (provided by Idaho Falls, Idaho, Post-Register).

IDAHO--Continued

City Hall (West Main Street)— Part of the exterior masonry at the front of the building fell, leaving a large hole at the second floor level.

Custer Hotel (West Main Street)— This old (built in 1915) three-story brick building was severely damaged by the partial collapse of front and side walls (fig. 31). One chimney on the hotel partially collapsed due to the wall failure, but the other tall chimney appeared undamaged.

Lundberg Residence (adjoining the Custer Hotel)— Very little damage occurred to this house which was built in 1910. One of the three chimneys rotated counter-clockwise, the other two appeared to have minimal damage. Inside the home only some wall items and dishes fell from shelves. A wood utility building between the house and the hotel was damaged by brick falling from the hotel wall.

Ivie's IGA Grocery (West Main Street)— A metal marquee at the front of the store collapsed onto the sidewalk. The brick front of the building was extensively cracked and bricks fell. Very little damage occurred inside the store, but much of the merchandise was thrown from the shelves into the aisles breaking glass containers.

Mackay Drug (West Main Street)— The outside walls of this two-story brick building partially collapsed (fig. 32). The front and rear walls separated from the side walls and some bricks fell from the front. At the rear of the store, a concrete block chimney split from top to bottom.

Lions Lodge Hall and adjacent storage building (East Main Street)-- The stone front of the lodge bulged outward but

IDAHO--Continued

did not fall. Masonry in the front of the storage building fell and bricks from the front corner at the top of the left wall fell. The left wall also cracked vertically from the top to the ground.

Tri-County Ranch Supply, Inc. (East Main Street)— The upper five tiers of bricks along the front section of the east wall fell. The brick store front cracked and some bricks fell.

Western Store and OK Hardware (East Main Street)— There were minor cracks in the plaster-covered, cement-block store front; large amounts of merchandise shook off shelves.

Mackay High School (2 blocks south of Main Street)--A chimney was cracked and later torn down. Bricks bulged outward on the north and west walls. Inside the gymnasium, near the ceiling, the west wall separated about 4 in. from a concrete pillar. Minor plaster cracks in interior walls occurred throughout the building. In the library, a large number of books shook from shelves; desks and chairs overturned; some adjustable shelves fell; suspended ceilings fell. One 15 by 20 ft. section of brick veneer fell from an exterior auditorium wall.

Mackay Cemetery (located 1/2 mile east of Mackay)-- Only two tombstones were disturbed. One three-stone monument was twisted clockwise and offset about $1\frac{1}{2}$ in. to the northwest. The other, also three sectioned but shorter, had the top stone overturned toward the south.

Prichart Residence (2 miles northwest of Mackay)-- No damage was reported to the house and the brick chimney

Figure 33. The partially collapsed store front where two children, on their way to school, were killed in Challis (provided by B. G. Reagor).

was also undamaged. Only a few items fell inside the house.

Mackay Reservoir— In their description of the ground effects Reagor and Baldwin (1984) included the following firsthand account of the earthquake by Mr. Anderson, who was fishing at the north end of the reservoir: "I was standing on a gravel sand bar when the earthquake struck (a location about 5 miles southeast of the epicenter). Cracks appeared in the bar and began to gurgle water. Then, three or four water spouts with 3 to 4 in. holes opened up and water shot up to 3 ft. in the air. The gravel bar shook like a marshmallow. It was very difficult to stand. Some of the water spouts spewed black water, others spewed clear water."

Intensity VI: Some of the most common effects at the places listed below were cracked chimneys, foundations, and windows; small objects overturned or fell; a few dishes or glassware broke; a few items fell from store shelves; interior walls of plaster or wall board had hairline cracks; trees and bushes shook slightly to moderately; standing vehicles were shook slightly to moderately; moving vehicle shook slightly. The shaking was described as strong and about half of the reports indicated people had difficulty in standing or walking. It

was felt by most. Any additional effects that occurred are listed after each locality.

Idaho—

Arco— Exterior brick walls bulged outward; springs or well water muddied.

Atomic City— There were many large cracks in plaster walls. Waves on the ground were observed and estimated at 1 ft. in height. Many of the cinder block buildings were damaged by cracking, one frame building was reported damaged.

Bellevue— About 5% of the buildings in the area reported some damage.

Blackfoot— Bricks fell from chimneys; a brick wall was bulged outward; some ground cracks in dry and level ground developed; springs or well water muddied; pieces of cement and corner flashing shook from the top of the I.P. Bills building; other buildings had cracked walls.

Boise— In the City Hall a first floor support beam shifted and the building evacuated; plaster fell from new cracks around skylights on the 4th floor of the Capitol building; the walls cracked in the 3rd and 4th floor stairwells of the Employment Building at 317 Main Street= a 1½ in. water pipe broke on the roof of the jail, and a file cabinet overturned on the 10th (top) floor of the Towers State Office building (from press reports). Several people reported seeing a wave move across the ground surface.

Carey— Water flow in the Little Wood River Reservoir increased 45 ft. per second.

Cascade (West Mountain Lodge)— Trees and bushes shook strongly; about 5% of the buildings in the area were damaged; moving vehicles rocked moderately.

Castleford— a few minor cracks appeared in cinderblock buildings.

Cobalt.

Darlington— Exterior brick veneer walls were bulged outward; bricks fell from chimneys; trees and bushes shook strongly; many small objects overturned or fell; hanging pictures fell.

Eden.

Elk River— Bricks fell from chimneys; trees and bushes shook strongly.

Ellis— Hanging pictures fell; bricks fell from chimneys; large cracks developed in the streets; trees and bushes shook strongly; springs or well water muddied.

Garden Valley— Underground pipes broke; trees and bushes shook strongly; the interior walls of a mobile home was damaged.

Gibbonsville.

Glenns Ferry— At the Commercial Hotel a number of bricks dislodged over an upstairs window (press report). Bricks fell from chimneys; concrete patios were cracked.

Gooding— An old stone building at Idaho State Deaf and Blind School cracked; other buildings also cracked.

Hailey— Bricks fell from chimneys.

Hamer— Large cracks developed in exterior stone walls.

Hazelton— Bricks fell from chimneys.

Heyburn— Standing vehicles were rocked strongly; trees and bushes shook strongly; interior walls separated from the ceiling or floor. The cinderblock wall of Harm's Market cracked; the Mini-Cassia Equipment Company reported two cracks in the floor; Harry's Food Center reported structural damage (press reports).

Horseshoe Bend— Large cracks developed in cinderblock walls.

Howe.

Idaho City— A chimney fell at the city hall (press report).

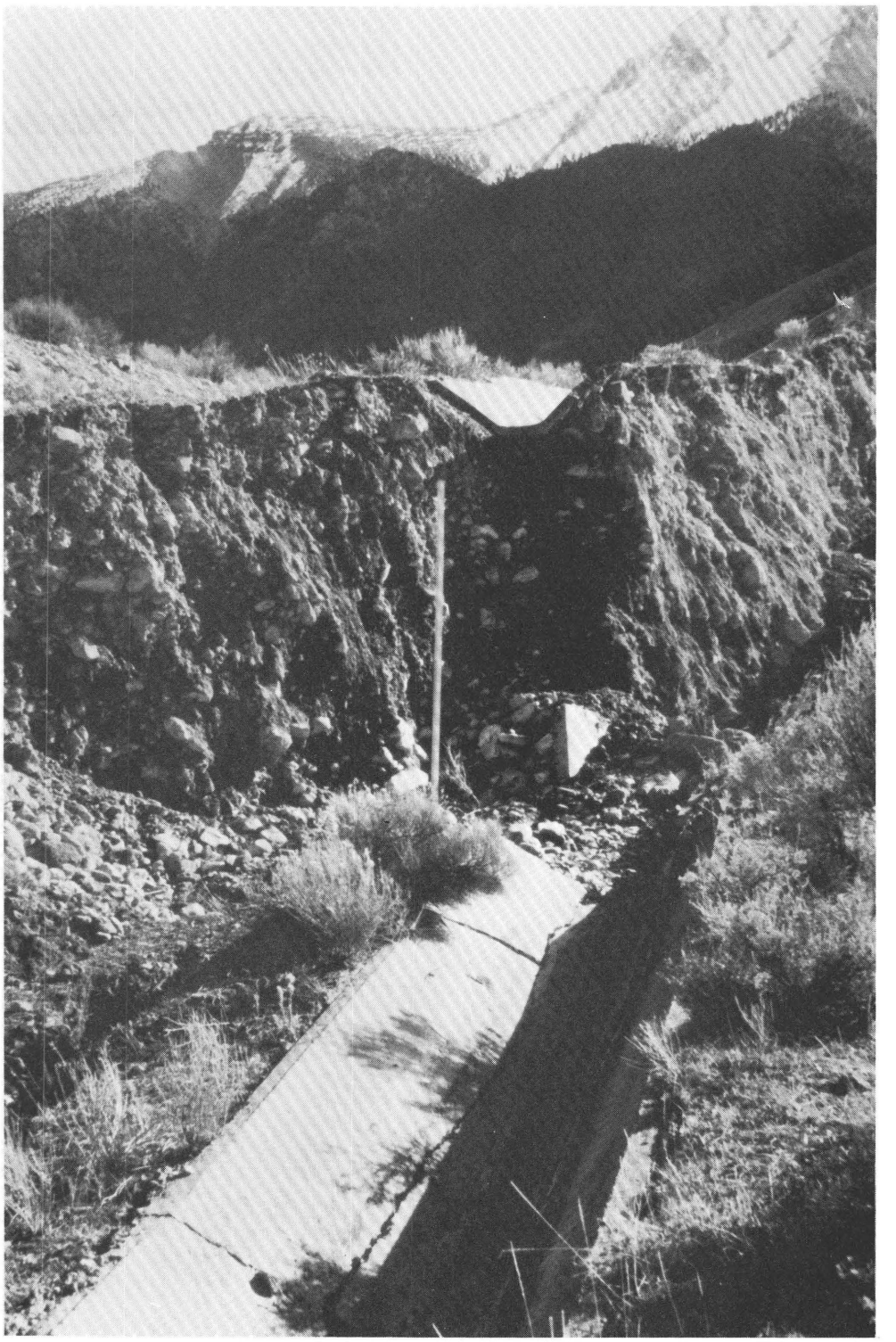

Figure 34. Fault scarp resulting from the Borah Peak, Idaho, earthquake at a location one mile south of Doublesprings Pass Road (provided by B. G. Reagor).

Jerome— Several new cracks appeared in the exterior cinderblock walls of the 1975 addition to the Jerome County Courthouse; there were some hairline cracks in the walls of the high school (press reports).
Ketchum— Large cracks developed in streets; large landslides occured; spring well water was muddied.
Leslie— At the Church of Jesus Christ of Latter Day Saints brick veneer between the windows on the north wall fell. The asphalt road near the church was cracked.
Lowman— Hanging pictures fell; many small objects overturned or fell; many items of merchandise were thrown from store shelves.

May— Trees and bushes shook strongly; many small objects overturned or fell; ground cracks appeared in wet ground; springs or well water muddied. At Double Springs Ranch hanging pictures fell; stone fences fell; large landslides occurred. The press reported the experience of a man working on his truck in May: "I was reaching for the pick-up (truck) and it moved and I landed on the ground."
Mud Lake— Minor damage was reported by the press.
North Fork— Many small objects overturned or fell; many items of merchandise were thrown from store shelves; springs or well water was muddied.
Patterson— The school building had a few minor cracks (press report).
Paul— The gym floor of West Minidoka Junior High School cracked; existing cracks in walls widened; several new hairline cracks appeared in cinderblock walls; a structural cement beam across the top of the gym was cracked. John's Market was also reported damaged (press reports).
Pingree— Springs or well water was muddied.
Pocatello— Bricks fell from chimneys; underground pipes broke.
Rexburg— Moving vehicles rocked moderately.
Rupert— Hanging pictures fell; many small objects overturned or fell; interior walls cracked; there was slight damage to concrete bridges. There were minor cracks in the gym wall of Pershing Elementary School and a cracked foundation. Plaster fell in Mindoka Memorial Hospital (press report).
Salmon— Large cracks appeared in exterior cinderblock walls; the flow was disturbed in springs or wells; people ran into the street.
Sandpoint— Many small objects overturned or fell.
Springfield— Spring or well water was muddied.
Stanley— Hanging pictures fell; large landslides were reported. A two-ft. thick stone wall at a garage cracked (press report).
Sun Valley— Many small objects overturned or fell; hanging pictures fell; light furniture overturned.
Tendoy— Hanging pictures fell; small appliances overturned; small rockslides occurred; springs or well water was muddied.

Montana.
Butte— The plaster was cracked in the Federal Building; light fixtures were broken loose from supports.
Dell— Hanging pictures fell; interior walls split.
Dillon— Plaster walls cracked; bricks fell from chimneys; a chimney on the Beaverhead County Courthouse collapsed.
Glen— Many small objects overturned or fell; many items of merchandise were thrown from store shelves.

IDAHO--Continued

Hamilton— Brick walls at the newspaper office were cracked (press report).
Lima— Large cracks developed in interior plaster walls; there were large cracks in cinderblock walls; small landslides occured; springs or well water had the flow disturbed; the water muddied.
Stevensville— About 5% of the buildings were reported damaged.
Twin Bridges— Bricks fell from chimneys; there were ground cracks on dry and level ground.
Warmsprings.
Intensity V: The most common effects at the places listed below were hairline cracks in interior walls of plaster or dry wall, a few items of merchandise thrown from store shelves, a few dishes or glassware broke, a few small objects overturned or fell, a few windows cracked, hanging pictures swung out of place, shaking was described as moderate to strong, felt by many.
Idaho— Aberdeen, American Falls, Arimo, (springs or well water muddied), Athol, Atlanta, Avery, Banks (hanging pictures fell), Bannock, Basalt, Bliss (small cracks in the old brick high school building), Bonners Ferry, Bovill, Buhl (foundation reported cracked), Burley, Caldwell, Cambridge, Carmen, Cascade, Cataldo, Chester, Clark Fork, Collister, Craters of the Moon National Monument, Culdesac, Cusic, Deary, Declo, Dietrich, Donnelly (hanging picture fell), Dubois, Eagle, Elk City (hanging pictures fell), Emmett, Fairfield (hanging pictures fell), Fernwood, Firth, Fort Hall, Fruitland, Genesee, Grand View, Greenleaf, Hagerman, Hammett, Hayden Lake, Headquarters, Hill City, Homedale, Huston, Idaho Falls, Iona, Island Park, Kendrick, King Hill (press report), Kingston, Kooskia, Kuna, Lake Fork (foundation reported cracked), Leadore (spring flow disturbed), Lemhi (spring or well water muddied), Lewisville, Malad City, Malta, Marsing, McCall, Melba, Menan, Meridian (cracked foundation), Middleton, Monteview, Moore, Mountain Home (a cracked foundation), Mullan, Nampa, Naples, Ola, Oldtown, Orofino, Osburn, Parker, Parma, Payette, Peck, Pinehurst, Placerville (foundation reported cracked), Potlatch, Preston, Princeton, Richfield, Rigby, Ririe, Roberts (hanging pictures fell), Rockland, Sagle, Saint Maries, Samuels, Shoshone, Shoup, Silverton, Skyline, Spirit Lake, Star, Stites (water muddied), Sugar City, Sweet, Terreton, Twin Falls, Ucon, Weippe, Weiser (an interior wall was reported cracked), Wendell, White Bird (springs or well water muddied), Winchester, Yellow Pine.
Montana— Alder, Anaconda, Basin, Bonner, Bozeman, Cameron, Chester, Clinton, Darby (hanging pictures fell), Deer Lodge, Ennis, Florence, Fort Benton, Fortine, Frenchtown (hanging pictures fell), Gallatin Gateway, Hall, Harrison, Helena, Hot Springs (springs or well water muddied), Jackson, Kalispell, Ledger, Libby, Livingston, Lolo (springs or well water muddied), Manhattan, McAllister, Melrose, Milltown, Missoula, Noxon, Olney, Paradise, Philipsburg, Plains, Polaris, Ronan, Saint Ignatius, Saint Regis, Seeley Lake, Sheridan, Somers, Superior, Three Forks, Townsend, Trout Creek, Troy, Victor, Virginia City, West Glacier, Whitehall (cracked foundation), Wisdom (springs or well water muddied), Wise River, Wolf Creek.
Nevada— Wells.
Oregon— Adrian, Baker, Haines, Halfway, Huntington, Imbler, Nyssa, Richland, Union.
Utah— Fielding, Kanesville, Newton, Richmond.

Washington— Clarkston, Clayton, Colfax, Colton, Cusick, Elmer City, Fairfield, Ford, Greenacres, Hunters, Ione, Mead, Medical Lake, Newman Lake, Newport, Omak, Palouse, Reardan, Spokane, Tekoa, Usk, Valley, Wellpinit.
Wyoming— Etna, Freedom, Madison Junction, Thayne.
Intensity IV:
Idaho— Ahsahka, Albion, Ashton, Athol, Bancroft, Bayview, Bruneau, Conda, Coolin, Cottonwood, Council, Craigmont, Driggs, Filer, Franklin, Grangeville, Hansen, Hope, Inkom, Juliaetta, Kamiah, Kellogg, Kimberly, Lava Hot Springs, Lenore, Macks Inn, McCammon, Midvale, Minidoka, Montpelier, Moreland, Moscow, Mountain Home Air Force Base, Moyie Springs, Murphy, New Meadows, New Plymouth, Newdale, Nezperce, Nordman, Notus, Paris, Plummer, Post Falls, Priest River, Rathdrum, Riggins, Shelley, Troy, Victor, Viola, Weston, Worley.
Montana— Alberton, Arlee, Augusta, Belgrade, Belt, Big Arm, Bigfork, Billings, Boulder, Cardwell, Cascade, Charlo, Clancy, Clyde Park, Columbus, Conner, Cut Bank, Dixon, Drummond, Dutton, East Helena, Fairfield, Fort Harrison, Gardiner, Geraldine, Geyser, Great Falls, Helena, Huson, Lakeside, Lewistown, Lincoln, Malmstrom Air Force Base, Ovando, Pablo, Polson, Ravalli, Rudyard, Silver Star, Stockett, Sula, Sun River, Trego, Ulm, Valier, West Yellowstone, Willow Creek.
Nevada— Jackpot.
Oregon— Athena, Cove, Enterprise, Jordan Valley, Joseph, North Powder, Ontario, Prairie City, Summerville, Unity, Vale.
Utah— Bear River City, Garden City, Hill Air Force Base, Hyrum, Layton (press report), Logan (press report), Mendon, North Ogden (press report), Ogden, Salt Lake City (press report), Tremonton, Trenton.
Washington— Addy, Airway Heights, Albion, Asotin, Cheney, Chewelah, Colbert, Davenport, Deer Park, Electric City, Elk, Fairchild Air Force Base, Farmington, Garfield, Grand Coulee, Kettle Falls, Lacrosse, Malden, Marshall, Metaline Falls, Nespelem, Oakesdale, Okanogan, Otis Orchards, Pullman, Rockford, Sprague, Starbuck, Uniontown, Warden, Yakima.
Wyoming— Jackson, Mammoth Hot Springs, Moose, Moran, Wilson.
Intensity III:
Idaho— Burke, Coeur d'Alene, Georgetown, Grace, Lapwai, Lewiston, Smelterville, Soda Springs, Teton, Tetonia.
Montana— Absarokee, Avon, Babb, Ballantine, Big Sandy, Brady, Browning, Choteau, Columbia Falls, Conrad, Coram, Denton, Dupuyer, East Glacier Park, Eureka, Fort Shaw, Gildford, Grassrange, Havre, Highwood, Hobson, Joplin, Judith Gap, Kevin, Lavina, Loma, Martin City, Martinsdale, Moore, Power, Red Lodge, Roberts, Roundup, Sand Coulee, Shelby, Shepherd, Simms, Sunburst, Twodot, Vaughn, White Sulphur Springs, Wilsall, Winifred, Worden.
Nevada— Elko, Gerlach, Lamoille, Lovelock, McDermitt, Tuscarora.
Oregon— Canby, Elgin, La Grande, La Pine (press report), Lakeview, Lostine, Newport, Pendleton, Salem, Seal Rock, Seneca, Ukiah, Wallowa.
Utah— Bountiful, Corinne, Eden, Garland, Huntsville, Morgan, Orem, Paradise, Woodruff.
Washington— Bellevue (press report), Bellingham, Bremerton, Chattaroy, Connell, Enumclaw, Ephrata, Everett, Freeman, Granger, Harrah, Kahlotus, Kelso,

IDAHO--Continued

Kent, Latah, Longview, Moses Lake (press report), Mount Vernon, Nine Mile Falls, Odessa, Othello, Pomeroy, Prescott, Renton, Ritzville, Seattle (press report), Spangle, Springdale, Thornton, Touchet, Valleyford, Veradale, Waitsburg, Walla Walla, Wallula, Washtucna, Wenatchee, Wilson Creek, Zillah.
Wyoming— Cokeville, La Barge, South Entrance Yellowstone National Park.
Intensity II:
Montana— Carter, Fishtail, Galata, Kremlin, Ryegate.
North Dakota— Almont (press report).
Nevada— Mountain City.
Oregon— Molalla, Portland (press report).
Utah— Centerville.
Washington— Benton City, Colville, Harrington, Lind, Marlin.
Wyoming— Lake, Warren Air Force Base (Cheyenne).
Felt:
Idaho— Corral.
Oregon— Athena, Imnaha, McMinnville, and Milton-Freewater (press reports).
Utah— Provo and Roy (press reports).
Washington— Brewester, Oroville, Tonasket, and Twisp (press reports).

28 October (GS) Central Idaho
Origin time: 19 51 25.0
Epicenter: 44.045N., 113.918W.
Depth: 13 km
Magnitude: 5.4mb(GS), 5.1MS(GS), 5.8ML(UU)
Felt: Challis-Mackay area.

29 October (GM) Central Idaho
Origin time: 23 29 11.8
Epicenter: 44.233N., 114.046W.
Depth: 13 km
Magnitude: 5.4mb(GS), 5.0MS(GS), 5.8ML(UU), 5.1**M**(GM)
Felt:
Idaho— Arco, Boise (press report), Challis, Mackay.
Montana— Whitehall.

29 October (GM) Central Idaho
Origin time: 23 39 05.4
Epicenter: 44.257N., 114.064W.
Depth: 12 km
Magnitude: 5.5mb(GS), 5.0MS(GS), 5.4ML(UU), 4.8M(GM)
Felt: Boise (press report), Challis, and Mackay.

2 November (GS) Northwestern Wyoming
Origin time: 20 03 58.8

See Wyoming listing.

6 November (GM) Central Idaho
Origin time: 21 04 48.7
Epicenter: 44.140N., 113.963W.
Depth: 11 km
Magnitude: 4.3mb(GS), 4.6ML(UU), 4.2**M**(GM)
Intensity III: Challis.

9 November (GS) Northwestern Idaho
Origin time: 13 53 12.9

See Wyoming listing.

19 November (UU) Southeastern Idaho
Origin time: 03 50 46.9
Epicenter: 42.055N., 112.499W.
Depth: 5 km
Magnitude: 3.8ML(UU)
Intensity V:
Utah—
Park Valley— Hairline cracks developed in plaster and drywall; a few small objects overturned; people had difficulty in standing or walking; hanging pictures swung out of place; felt by many.
Snowville— A foundation cracked, hairline cracks appeared in plaster walls; felt by many.
Intensity IV:
Idaho— Chubbuck, Stone.
Utah— North Ogden, Portage.
Intensity III:
Idaho— Malad City, Weston.
Utah— Farmington.
Intensity II:
Idaho— Albion, Rupert.

11 December (UU) Southeastern Idaho
Origin time: 07 40 45.7
Epicenter: 42.352N., 111.569W.
Depth: 6 km
Magnitude: 3.6ML(UU)
Intensity III: Boise, Franklin, Hyde Park, Montpelier.
Intensity II: Ovid.
Felt: Paris.

12 December (GS) Central Idaho
Origin time: 04 55 36.5
Epicenter: 44.413N., 114.086W.
Depth: 7 km
Magnitude: 4.5mb(GS), 4.4ML(MT)
Intensity V:
Challis— shaken strongly (press report).
Ellis— A few small objects overturned or fell; light furniture or appliances overturned; felt by many.
Salmon— A few items were shaken off store shelves; a few glassware or dishes broke; a few small objects overturned or fell, felt by many.
Intensity IV: Clayton, May.
Intensity III: Cobalt, Ketchum, Tendoy, Stanley.
Intensity II: Leadore, Lemhi.

13 December (GS) Central Idaho
Origin time: 17 13 38.6
Epicenter: 4.244N., 114.074W.
Depth: 10 km
Magnitude: 3.6ML(GS), 4.3ML(BU)
Felt: Clayton.

15 December (GS) Central Idaho
Origin time: 06 13 34.8
Epicenter: 4.365N., 114.138W.
Depth: 10 km
Magnitude: 4.1ML(GS), 4.5ML(BU)
Intensity IV: Clayton (press report).
Felt: Challis (press report).

17 December (GS) Central Idaho
Origin time: 18 37 20.7
Epicenter: 44.237N., 114.085W.

Depth: 10 km
Magnitude: 3.7ML(GS), 4.3ML(BU)
Felt: Clayton.

20 December (GS) Western Wyoming
Origin time: 22 52 23.7

See Wyoming listing.

21 December (GS) Western Wyoming
Origin time: 00 25 20.7

See Wyoming listing.

21 December (GS) Central Idaho
Origin time: 02 54 17.0
Epicenter: 44.125N., 114.033W.
Depth: 10 km
Magnitude: 3.8ML(GS), 4.2ML(BU)
Intensity III: Clayton.

27 December (GS) Central Idaho
Origin time: 12 21 29.3
Epicenter: 44.255N., 114.074W.
Depth: 9 km
Magnitude: 4.4mb(GS)
Intensity IV: Challis (press report), Clayton, Stanley.
Intensity III: May, Salmon (press report), Tendoy.
Intensity II: Atlanta, Cobalt.

28 December (GS) Central Idaho
Origin time: 08 16 53.6
Epicenter: 44.281N., 114.089W.
Depth: 11 km
Magnitude: 4.0ML(GS), 4.6ML(BU)
Intensity IV: Clayton.
Intensity III: Stanley.

29 December (GS) Central Idaho
Origin time: 16 05 24.4
Epicenter: 44.419N., 114.059W.
Depth: 0 km
Magnitude: 3.8ML(GS), 4.3ML(BU)
Intensity III: Clayton.

ILLINOIS

23 February (SL) Western Kentucky
Origin time: 08 09 14.0

See Kentucky listing.

15 May (SL) Southern Illinois
Origin time: 05 16 21.6
Epicenter: 38.770N., 89.570W.
Depth: 9 km
Magnitude: 3.8mb(GS), 4.3Mn(SL), 4.4Mn(GS), 4.6Mn(TU)

This earthquake was felt over an area of approximately 80,000 km^2 of Illinois, Indiana, Kentucky, and Missouri (fig. 35).

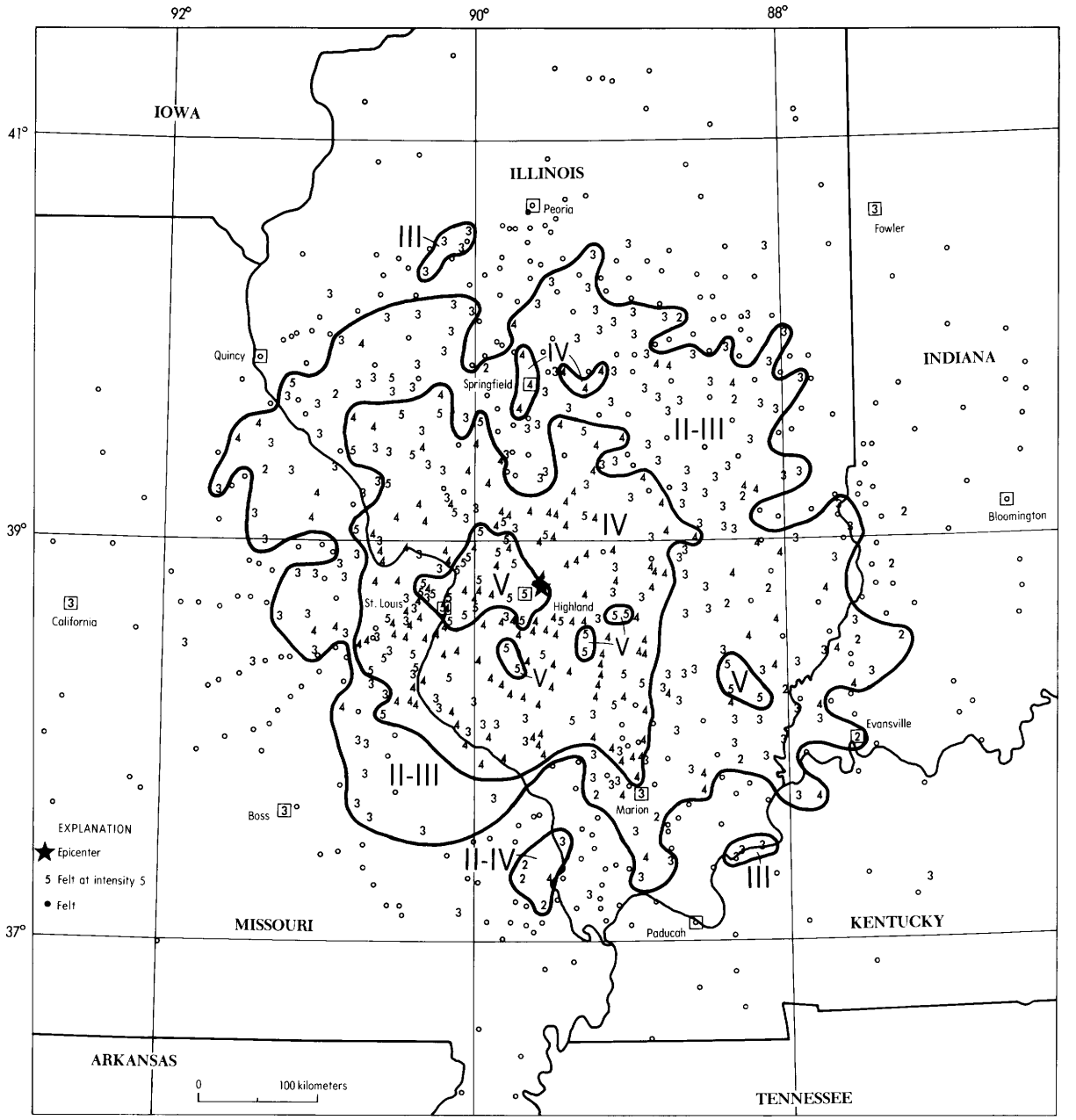

Figure 35. Isoseismal map for the southern Illinois earthquake of 15 May 1983, 05 16 21.6 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; arabic numerals represent intensities at specific sites.

Intensity V: The most common effects at the places listed below were small objects overturned or fell, a few glassware or dishes broke, a few windows cracked, a few items fell from store shelves, plaster or dry wall developed hairline cracks, standing vehicles rocked slightly, trees and bushes shaken slightly, felt by many with the vibration described as moderate.

Illinois— Alhambra (a heavy vibration), Beckemeyer (moving vehicles rocked moderately), Benld, Berkeley (moving vehicles rocked slightly), Bethalto, Bunker Hill (moving vehicles rocked slighty), Carrier, Caseyville (hanging pictures fell), Centreville (moving vehicles rocked slightly), Collinsville, East Alton, East Saint Louis, Edwardsville, Eldred (hanging pictures fell), Fairfield, Fillmore, Granite City (moving vehicles rocked slightly), Hartford (moving vehicles rocked slightly), water splashed out of ponds or swimming pools), Highland, Hoffman, Hoyleton (hanging pictures fell), Mascoutah (a cracked chimney, moving vehicles rocked slightly, water splashed out of ponds or swimming pools), Meredosia, Mill Shoals, Mount Vernon, National City, Nebo, New Athens (two windows broke--(press report), Odin, Okawville, Panama, Pinckneyville (cracked chimney and foundation reported, ground cracks in wet ground), Plainville, Ramsey, Saint Jacob (moving vehicles rocked slightly, water splashed out of ponds or swimming pools), Saint Libory (moving vehicles rocked slightly), Sandoval, Scheller, Staunton, Taylorville, Trenton (water splashed out of ponds or swimming pools), Waterloo (moving vehicles rocked slightly), White Hall, Winchester (cracked chimney and foundation), Woodlawn, Woodson, Worden.

Missouri— Arnold, Ballwin (water splashed out of ponds or swimming pools), Berkeley (moving vehicles rocked), Cedar Hill, De Soto, Florissant, Foley, House Springs (cracked foundation, moving vehicles rocked slightly, water splashed out of ponds or swimming pools), Saint Louis (hanging pictures fell, cracked foundation), Saint Louis (Jennings), Saint Louis (Lambert - Saint Louis International Airport).

Intensity IV:

Illinois— Addieville, Albers, Albion, Altamont, Ashley, Assuption, Aviston, Baldwin, Bartelso, Batchtown, Beecher City, Belle Rive Belleville, Benton, Bingham, Breese, Brussels, Buffalo, Bunker Hill, Cahokia, Campbell Hill, Cantrall, Carlinville, Carlyle, Carrollton, Carterville, Centralia, Cerro Gordo, Chatham, Chester, Coffeen, Columbia, Coulterville, Cutler, Dix, Donnellson, Dorsey, DuBois, DuQuoin, Eagarville, East Carondelet, Ellisgrove, Fairview Heights, Farina, Fieldon, Freeburg, Germantown, Gillespie, Glen Carbon, Godfrey, Golden Eagle, Grafton, Greenup, Greenview, Greenville, Hamel, Harrisburg, Hettick, Hillsboro, Huey, Ina, Ingraham, Irving, Irvington, Jacksonville, Jerseyville, Johnston City, Kane, Kell, Keyesport, Kincaid, Kinmundy, Lakewood, Lawrenceville, Lebanon, Lenzburg, Litchfield, Livingston, Lovejoy, Marissa, Maryville, Mascoutah, Medora, Millstadt, Milton, Mitchell, Modesto, Moro, Mount Auburn, Mount Clare, Mount Erie, Mount Sterling, Mount Vernon, Mulberry Grove, Mulkeytown, Nashville, New Athens, New Baden, Newton, Niantic, Nilwood, Oakdale, Oakley, O'Fallon, Ohlman, Orient, Owaneco, Parkersburg, Percy, Piasa, Pittsfield, Pocahontas, Prairie Du Rocher, Radom, Raleigh, Renault, Richview, Roodhouse, Saint Peter, Sainte Marie, Salem, Sawyerville, Smithboro, Smithton, Sorento, Springerton, Springfield, Summerfield, Taylor Springs, Texico, Tilden, Toledo, Tovey, Troy, Tuscola, Upper Alton, Valmeyer, Vandalia, Venedy, Venice, Vernon, Vienna, Waltonville, Watson, Waverly, West Frankfort, Willisville, Wilsonville, Witt, Wood River, Zeigler.

Indiana— Fort Branch, Owensville, Poseyville.

Kentucky— Waverly.

Missouri— Allenton, Augusta, Brentwood, Cape Girardeau (press report), Carondelet, Center, Creve Coeur, Crystal City, Dellwood, Eolia, Fenton, Ferguson, Festus, Hematite, Herculaneum, Kimmswick, Kirkwood (press report), Manchester, Maplewood, Maryland Heights, Mellville, New London, Overland, Pacific, Richwoods, Saint Charles, Sainte Genevieve, Saint Marys, Saint Peters, Silex, University City, Valley Park, Washington.

Intensity III:

Illinois— Alma, Arenzville, Atlanta, Atwood, Augusta, Barry, Bath, Beason, Belknap, Bellmont, Bement, Bethany, Bloomington, Blue Mound, Bluffs, Bluford, Browning, Bryant, Bulpitt, Cambria, Canton, Carmi, Carterville, Casey, Cave In Rock, Cerro Gordo, Chambersburg, Chandlerville, Chapin, Charleston, Chester, Chestnut, Christopher, Clinton, Colp, Cuba, Dahlgren, Dalton City, Dawson, De Soto, Dieterich, Divernon, Dow, Dowell, East Alton, Edgewood, Edinburg, Effingham, Elizabethtown, Ellery, Emden, Enfield, Evansville, Fairfield, Flat Rock, Flora, Frankfort Heights, Franklin, Fults, Galatia, Geff, Girard, Goreville, Grantsburg, Greenfield, Hamburg, Harristown, Harvel, Herrick, Hillview, Hindsboro, Homer, Hull, Hume, Iola, Ipava, Iuka, Kampsville, Keenes, Kemper, Kenney, Kilbourne, Longview, Louisville, Lovington, Macedonia, Maeystown, Manchester, Marion, Maroa, Martinsville, Mascoutah, Mason, Meppen, Middletown, Montrose, Mount Carmel, Mount Olive, Mount Pulaski, Mount Zion, Neoga, New Haven, Nokomis, Norris City, Oakland, Oblong, Opdyke, Oreana, Pana, Patoka, Pawnee, Paxton, Pearl, Perry, Plainview, Raymond, Red Bud, Rochester, Rockport, Rosamond, Rosiclare, Rushville, Sadorus, Saint Elmo, Saint Francisville, Shattuc, Shelbyville, Shipman, Shobonier, Shumway, Sigel, Sparta, Stanford, Staunton, Steeleville, Stewardson, Strasburg, Tamaroa, Tamms, Taylorville, Timewell, Trilla, Urbana, Virginia, Walsh, Wayne City, Weldon, Westervelt, West York, Wheeler, Willow Hill, Wolf Lake, Wrights, Xenia.

Indiana— Fowler, Francisco, Merom, New Harmony, Wadesville.

Kentucky— Central City, Uniontown.

Missouri— Belleview, Bellflower, Boss, Bowling Green, Cadet, California, Clarksville, Des Peres, Eureka, Flinthill, Frankford, Fredericktown, High Ridge, Hillsboro, House Springs, Irondale, Kinloch, Labadie, Laddonia, Linn, Marthasville, Middletown, Morse Mill, New Haven, Normandy, Old Monroe, Olivette, Otto, Perryville, Pilot Knob, Rosebud, Saint Louis (Laclede), Sulphur Springs, Union, University City, Warrenton, Wentzville, West Alton, Winfield, Wright City, Zalma.

Intensity II:

Illinois— Arcola, Baylis, Carbondale, Clay City, Creal Springs, DeLand, Grayville, Jewett, Olney, Omaha, Pleasant Plains.

Indiana— Decker, Evansville, Freelandville, Hazelton, Linton, Petersburg.

Missouri— Curryville, Gordonville, Jackson, Kelso.

ILLINOIS -Continued

Felt:
Illinois— Pierron, Washington Park.

28 December (SL) Western Illinois
Origin time: 22 30 07.9
Epicenter: 38.310N., 90.270W.
Depth: 3 km
Magnitude: 2.9Mn(SL)
Intensity II: South St. Louis County, Missouri (SL).

INDIANA

15 May (SL) Southern Illinois
Origin time: 05 16 21.6

See Illinois listing.

KENTUCKY

23 February (SL) Western Kentucky
Origin time: 08 09 14.0
Epicenter: 37.070N., 88.860W.
Depth: 22 km
Magnitude: 2.9Mn(SL), 2.4MD(TC)
Intensity II:
Illinois— Temple Hill.
Missouri— Wyatt.

15 May (SL) Southern Illinois
Origin time: 05 26 21.6

See Illinois listing.

17 August (KY) Northeastern Kentucky
Origin time: 14 03 17.1
Epicenter: 38.474N., 82.863W.
Depth: 8 km
Magnitude: 3.5Mn(KY), 3.5Mn(GS), 3.4MD(VP), 3.1Mn(SL)

Intensity IV:
Kentucky— Ashland, Quincy, Rush, South Portsmouth, Warnock (press report).
Ohio— Crown City, Franklin Furnace, New Boston.
West Virginia— Kenova.
Intensity III:
Kentucky— Catlettsburg (KY), Firebrick, Garrison, Grayson, Greenup (press report), Hitchins (KY), Louisa, Maloneton, Naples, Oldtown, Raceland, Russell, Saint Paul, Willard, York.
Ohio— Coal Grove (KY), Ironton, Lucasville, Oak Hill, Portsmouth, Ripley, Rutland, Sciotoville, Scottown, Wheelersburg.
West Virginia— Kenova, Naugatuck, Shoals.
Intensity II:
Kentucky— Flatwoods, Inez, Lloyd, South Shore, Vanceburg.
West Virginia— Fort Gay, Fraziers Bottom, Prichard (press report).
Felt:
Kentucky— Cannonsburg, Kilgore, and Summit (KY).
Ohio— South Webster.
West Virginia— Huntington, Ona.

KENTUCKY-Continued

28 August (TC) Southeastern Kentucky
Origin time: 22 45 07.3
Epicenter: 36.688N., 83.848W.
Depth: 16 km
Magnitude: 3.1Mn(VP), 3.2MD(TC)
Intensity III:
Kentucky— Artemus, Davisburg (KY), Frakes (KY), Middleboro, Pineville (press report), Tinsley (KY).
Tennessee— Cumberland Gap, Speedwell (KY).
Felt:
Kentucky— Calvin, Chenoa, and Meldrum (KY).
Tennessee— Shawnee (KY).

28 August (TC) Southeastern Kentucky
Origin time: 22 56 39.7
Epicenter: 36.652N., 83.843W.
Depth: 17 km
Magnitude: 2.6MD(TC), 2.3MD(VP)
Felt: Middleboro (TC).

LOUISIANA

16 October (GS) Southwestern Louisiana
Origin time: 19 40 50.8
Epicenter: 30.243N., 93.393W.
Depth: 5 km
Magnitude: 3.8Mn(TU), 3.4Mn(SL), 3.5Mn(VP), 3.4MD(TC)
Intensity IV: Westlake (reports of hairline cracks in interior walls and cracks in brick or stone fences).
Intensity III: Hackberry, Hayes, Sulphur.

MAINE

27 May (WO) Central Maine
Origin time: 23 04 35.2
Epicenter: 45.542N., 69.461W.
Depth: 10 km
Magnitude: 3.2Mn(WO), 3.5Mn(EP), 3.5Mn(LD)
Intensity IV:
Maine— Bridgewater, Greenville, Greenville Junction.
Intensity III:
Maine— Coopers Mills, Harrison, Medway, Milo, Monticello, New Sharon, Pembroke.
New Hampshire— North Stratford.
Intensity II:
Maine— Bridgton, East Poland, Turner.
Felt:
Maine— Bowdin, Harfords Point, and Lily Bay (WO).

29 May (WO) Southern Maine
Origin time: 05 45 49.9
Epicenter: 44.489N., 70.400W.
Depth: 2 km
Magnitude: 4.2mb(GS), 3.9Mn(WO), 4.3Mn(OT),3.9Mn(LD)
Intensity IV:
Maine— Bethel, Brunswick, Dresden, Farmington (press report), Guildhall, Hallowell, Jay, Litchfield, Locke Mills, Lovell, Monmouth, Portland (press report), Rangeley, Raymond, Readfield, Rockland (press report), Rumford, Smithfield, Sumner, Weld.
New Hampshire— Milan (a few small objects overturned or fell), West Stewartstown (a few small objects

MAINE -Continued

overturned or fell, a few glass items were broken, and a few windows were reported cracked).
Vermont— Canaan.
Intensity III:
Maine— Auburn (press report), Bass Harbor, Dennnysville, Etna, Lisbon Center, Livermore, Madison, Oakland, Paris, Vanceboro, Waldoboro.
New Hampshire— Berlin.
Felt:
Maine— Augusta, Canton, Dixfield, East Monmouth, East Peru, Fairfield, Farmingdale, Fayette, Frankfort, Fryeburg, Gardiner, Gorham, Harford, Lisbon, Livermore Falls, Norway, Oxford, Peru, Richmond, Saco, South Paris, Wayne, West Paris, West Sumner, and Winthrop (from WO).

12 August (WO) Southeastern Maine
Origin time: 14 08 47.6
Epicenter: 44.974N., 67.682W.
Depth: 12 km
Magnitude: 3.6Mn(WO)
Felt: Hancock, Penobscot, and Washington Counties (WO). Alexander, Baileyville, Bangor, Bar Harbor, Brooks, Brownville Junction, Bucksport, Calais, Chain Lake, Charlotte, Cherrysfield, Columbia, Crawford, Dedham, Dennysville, East Eddington, East Machias, Eastport, Franklin, Glenburn, Gouldsboro, Grove, Hancock, Jacksonville, Jonesboro, Lake Sysladobsis, Machias, Millinocket, North Brooklin, Northeast Harbor, Northfield, Old Town, Pembroke, Perry, Princeton, Robbinston, Roque Bluffs, Round Lake, Steuben, Township 18, Waltham, and Wesley (from WO).

7 October (LD) Blue Mountain Lake area
Origin time: 10 18 46.1

See New York listing.

30 October (WO) Western Maine
Origin time: 17 02 52.9
Epicenter: 44.437N., 69.877W.
Depth: 10 km
Magnitude: 2.9Mn(WO)
Intensity III: Kents Hill, Norridgewock, Oakland, Readfield, Readfield Depot.
Felt: Belgrade, Sydney, and Waterville (press reports).

4 December (WO) Central Maine
Origin time: 10 48 33.6
Epicenter: 45.193N., 69.160W.
Depth: 2 km
Magnitude: 3.3Mn(WO)
Intensity IV: Dexter, Dover-Foxcroft, Guilford, Sebec.
Intensity III: Plymouth, Saint Albans.

8 December (WO) Southeastern Maine
Origin time: 12 23 05.4
Epicenter: 45.079N., 67.223W.
Depth: 9 km
Magnitude: 3.2Mn(WO)
Intensity III: Calais-- one report of glassware knocked off a shelf (press report).
Felt: Milltown and Saint Stephen (press report).

MARYLAND

7 October (LD) Blue Mountain Lake area
Origin time: 10 18 46.1

See New York listing.

MASSACHUSETTS

7 October (LD) Blue Mountain Lake area
Origin time: 10 18 46.1

See New York listing.

MICHIGAN

7 October (LD) Blue Mountain Lake area
Origin time 10 18 46.1

See New York listing.

MINNESOTA

4 March (GS) Central South Dakota
Origin time: 06 32 18.6

See South Dakota listing.

MISSISSIPPI

5 February (TC) Northeastern Mississippi
Origin time: 13 08 19.5
Epicenter: 34.698N., 88.375W.
Depth: 2 km
Magnitude: 2.9Mn(GS), 2.9MD(TC), 3.2Mn(SL)

Felt over an area of about 730 km^2 (TC). This event may have been an explosion.

Intensity IV: Rienzi (TC).
Felt: Northeast of Booneville (TC) and at Altitude (SL).

MISSOURI

23 February (SL) Western Kentucky
Origin time: 08 09 14.0

See Kentucky listing.

23 February (SL) New Madrid Region
Origin time: 08 51 27.0
Epicenter: 36.192N., 89.604W.
Depth: 1 km
Magnitude: 3.7Mn(SL), 3.2MD(TC)
Intensity IV:
Missouri— West of Hayti (TC).
Tennesse— Miston, Ridgely, Ripley.

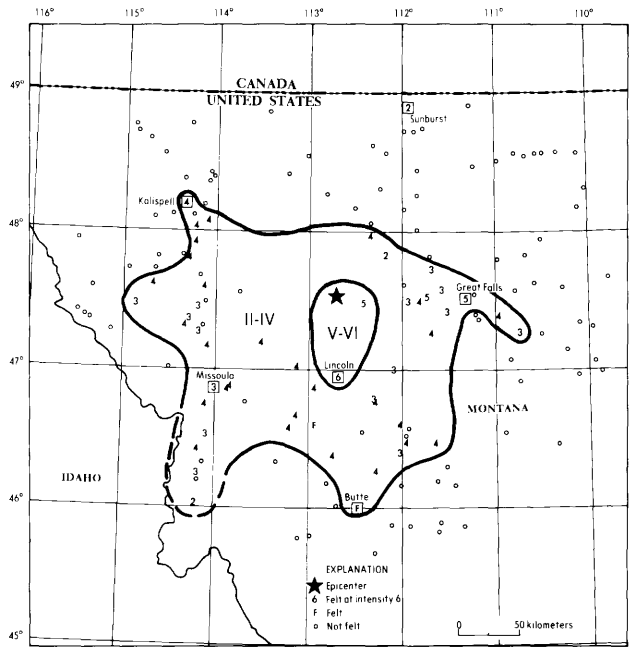

Figure 36. Isoseismal map for the northwestern Montana earthquake of 17 March 1983, 07 25 56.6 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; arabic numerals represent intensities at specific sites.

MISSOURI--Continued

Intensity III:
Missouri— Caruthersville and Kennet (press reports).
Tennessee— Lenox, Tiptonville.
Intensity II:
Missouri— Campbell.
Tennessee— Bogota.
Felt:
Missouri— Braggadocio.

15 May (SL) Southern Illinois
Origin time: 05 16 21.6

See Illinois listing.

MONTANA

6 February (GS) Yellowstone National Park
Origin time: 20 25 16.5

See Wyoming listing.

16 February (GS) Northwestern Montana
Origin time: 06 22 09.3
Epicenter: 48.539N., 112.373W.
Depth: 14 km
Magnitude: 3.5ML(GS), 4.0ML(MT)
Intensity V:
Cut Bank— Objects fell off shelves; water splashed out of an aquarium; people ran outside.
Santa Rita— Hanging pictures fell; felt by and frightened many.
Intensity IV: Ethridge, Sunburst, Valier.
Felt: Conrad-Shelby area (MT).

MONTANA--Continued

16 February (GS) Southwestern Montana
Origin time: 07 14 07.4
Epicenter: 45.927N., 111.497W.
Depth: 5 km
Magnitude: 3.7ML(GS), 3.7ML(MT)
Intensity IV: Galatin Gateway, Harrison, Norris, Pony, Three Forks, Willow Creek.
Intensity III: Belgrade, Manhattan.

17 March (GS) Northwestern Montana
Origin time: 07 25 56.6
Epicenter: 47.526N., 112.702W.
Depth: 5 km
Magnitude: 4.2mb(GS), 3.8ML(MT)

This earthquake was felt over an area of approximately 54,000 km^2 of western Montana (fig. 36).

Intensity VI:
Lincoln— Chimneys and foundations cracked; hairline cracks developed in interior walls; a few windows cracked;, light furniture overturned; buildings shook strongly.
Intensity V:
Augusta— A few items were thrown from store shelves; a few small objects overturned or fell; hanging pictures were out of place; trees and bushes shook moderately; felt by all.
Great Falls— Light and heavy furniture moved; felt by many.
Malmstrom Air Force Base— A few items were thrown from store shelves; a few dishes brook; a few small objects overturned or fell.
Sun River— A few windows cracked;, a few small objects overturned; trees and bushes shook slightly.
Intensity IV: Arlee, Basin, Belt, Big Arm, Bigfork, Bynum, Cascade, Clancy, Deer Lodge, Dixon, Drummond, Fort Shaw, Great Falls, Hall, Helena, Helmville, Hot Springs, Kalispell, Lakeside, Lolo, Marysville, Milltown, Ovando, Pablo, Piltzville, Rollins, Seeley Lake, Victor, Winston.
Intensity III: Canyon Creek, Charlo, Hamilton, Jefferson City, Missoula, Moiese, Plains, Power, Ravalli, Raynesford, Simms, Stevensville, Ulm, Vaughn, Wolf Creek.
Intensity II: Choteau, Darby, Sunburst.
Felt: Butte (press report), Goldcreek.

14 August (GS) Southwestern Montana
Origin time: 00 53 12.7
Epicenter: 44.715N., 111.845W.
Depth: 5 km
Magnitude: 3.8ML(GS), 4.1ML(BU)
Intensity III:
Montana— West Yellowstone.
Wyoming— Old Faithful.
Intensity II:
Montana— Ennis.

13 October (GS) Montana
Origin time: 09 45 26.5
Epicenter: 44.708N., 111.073W.
Depth: 5 km
Magnitude: 3.6ML(BU), 3.5ML(MT)

Link and Giantess Geysers in the Upper Geyser Basin of Yellowstone National Park were activated later in the day. These eruptions may have been in response to this earthquake. Link Geyser erupts rarely but this series lasted for about a week. Virtually all the springs in the Chain Lake group exhibited significant changes in temperature, water level, and turbidity (R. A. Hutchinson, Park Geologist, Yellowstone National Park).

Intensity IV:
Montana— West Yellowstone.
Wyoming— Madison Junction.

28 October (GS) Central Idaho
Origin time: 14 06 06.5

See Idaho listing.

8 November (GS) Flathead Lake area
Origin time: 03 52 48.9
Epicenter: 48.105N., 114.161W.
Depth: 5 km
Magnitude: 2.8ML(GS), 3.1ML(BU)
Intensity IV: Big Fork.

NEBRASKA

4 March (GS) Central South Dakota
Origin time: 06 32 18.6

See South Dakota listing.

NEVADA

7 January (BK) Mammoth Lakes area
Origin time: 01 38 10.9

See California listing.

7 January (BK) Mammoth Lakes area
Origin time: 03 24 19.4

See California listing.

9 January (GS) Northwestern Nevada
Origin time: 14 58 57.0
Epicenter: 39.115N., 119.555W.
Depth: 5 km
Magnitude: 3.8ML(BK)
Intensity IV: Minden.
Felt: Carson City (BK).

11 February (EN) Southern Nevada
Origin time: 16 00 00.096
Epicenter: 37.051N., 116.045W.
Depth: 0 km
Magnitude: 4.2ML(BK)

Nevada Test Site Explosion "COALORA", at 37° 03' 02.14" N., 116° 02' 43.24" W., surface elevation 1235 m, depth of burial 304 m.

16 February (GS) Southern Nevada
Origin time: 08 26 05.7

See Arizona listing.

17 February (EN) Southern Nevada
Origin time: 17 00 00.087
Epicenter: 37.163N., 116.063W.
Depth: 0 km
Magnitude: 4.0mb(GS), 4.0ML(BK)

Nevada Test Site explosion "CHEEDAM" at 37° 09' 46.14"N., 116° 03' 48.05" W., surface elevation 1320 m, depth of burial 343 m.

23 February (GS) Southern Nevada
Origin time: 11 10 20.8

See Arizona listing.

11 March (GS) Southern Nevada
Origin time: 21 05 53.1
Epicenter: 35.994N., 114.809W.
Depth: 5 km
Magnitude: 2.6ML(GS)
Felt: Hoover Dam (telephone report).

26 March (EN) Southern Nevada
Origin time: 20 20 00.088
Epicenter: 37.301N., 116.460W.
Depth: 0 km
Magnitude: 5.1mb(GS), 5.3ML(BK)

Nevada Test Site explosion"CABRA" at 37° 18' 02.47" N., 116° 27' 36.13" W., surface elevation 1934 m, depth of burial 542 m.

14 April (EN) Southern Nevada
Origin time: 19 05 00.119
Epicenter: 37.073N., 116.046W.
Depth: 0 km
Magnitude: 5.7mb(GS), 4.3ML(BK).

Nevada Test Site explosion "TURQUOISE" at 37° 04' 22.21"N., 116° 02' 45.44"W., surface elevation 1246 m, depth of burial 533 m.

22 April (EN) Southern Nevada
Origin time: 13 53 00.085
Epicenter: 37.112N., 116.022W.
Depth: 0 km
Magnitude: 4.0mb(GS), 4.1ML(BK)

Nevada Test Site explosion "ARMADA" at 37° 06' 41.45"N., 116° 01' 20.74 W., surface elevation 1322 m, depth of burial 265 m.

2 May (GM) Central California
Origin time: 23 42 38.1

See California listing.

5 May (EN) Southern Nevada
Origin time: 15 20 00.085
Epicenter: 37.012N., 116.089W.
Depth: 0 km
Magnitude: 4.5mb(GS), 4.3ML(BK)

Nevada Test Site explosion "CROWDIE" at 37° 00' 44.31" N., 116° 05' 21.18" W., surface elevation 1336 m, depth of burial 390 m.

9 May (GM) Central California
Origin time: 02 49 11.5

See California listing.

26 May (EN) Southern Nevada
Origin time: 15 00 00.090
Epicenter 37.103N., 116.006W.
Depth: 0 km
Magnitude: 4.4mb(GS), 4.4ML(BK)

Nevada Test Site explosion "FAHADA" at 37° 06' 10.46" N., 116° 00' 20.52" W., surface elevation 1339 m, depth of burial 384 m.

4 June (GS) Southern Nevada
Origin time: 11 37 40.9
Epicenter: 37.391N., 115.214W.
Depth: 6 km
Magnitude: 3.6ML(GS)
Intensity IV: Alamo.

9 June (EN) Southern Nevada
Origin time: 17 10 00.088
Epicenter: 37.158N., 116.089W.
Depth: 0 km
Magnitude: 4.5mb(GS), 4.6ML(BK)

Nevada Test Site explosion "DANABLU" at 37° 09' 27.42" N., 116° 05' 21.23" W., surface elevation 1253 m, depth of burial 320 m.

3 July (BK) Mammoth Lakes area
Origin time: 18 40 08.2

See California listing.

5 July (BK) Mono Lake area
Origin time: 14 27 26.7

See California listing.

15 July (BK) Western Nevada
Origin time: 22 03 11.2
Epicenter: 38.447N., 118.288W.
Depth: 3 km
Magnitude: 4.4ML(BK), 4.3ML(PS)
Intensity IV: Mina-- Buildings shook strongly; felt by many.
Intensity III: Luning.
Felt: Hawthorne (BK).

21 July (BK) Western Nevada
Origin time: 04 49 16.1
Epicenter: 39.432N., 119.790W.
Depth: 6 km
Magnitude: 3.3ML(BK), 3.1MD(GM), 3.2ML(GS)
Intensity III: Southern areas of Reno.
Felt: Sparks and Washoe City (BK).

3 August (EN) Southern Nevada
Origin time: 13 33 00.100

NEVADA-Continued

Epicenter: 37.119N., 116.089W.
Depth: 0 km
Magnitude: 4.2mb(GS), 4.3ML(BK)

Nevada Test Site explosion "LABAN" at 37° 07' 08.38" N., 116° 05' 20.06' W., surface elevation 1303 m, depth of burial 326 m.

11 August (EN) Southern Nevada
Origin time: 14 00 00.119
Epicenter 36.998N., 116.003W.
Depth: 0 km
Magnitude: 4.4mb(GS), 4.1ML(BK)

Nevada Test Site explosion "SABADO" at 36° 59' 51.66" N., 116° 00' 09.60" W., surface elevation 1066 m, depth of burial 320 m.

1 September (EN) Southern Nevada
Origin time: 14 00 00.083
Epicenter 37.273N., 116.355W.
Depth: 0 km
Magnitude: 5.4mb(GS), 5.4ML(BK).

Nevada Test Site explosion "CHANCELLOR" at 37° 16' 21.94" N., 116° 21' 18.10" W., surface elevation 2040 m, depth of burial 625 m.

19 September (BK) Lake Tahoe area
Origin time: 01 55 57.3

See California listing.

21 September (EN) Southern Nevada
Origin time: 15 00 00.091
Epicenter: 37.210N., 116.209W.
Depth: 0 km
Magnitude: 4.2ML(BK)

Nevada Test Site explosion "TOMME-MIDNIGHT ZEPHYR" tunnel shot at 37° 12' 35.08" N., 116° 12' 33.32" W., surface elevation 2257 m, depth of burial 405 m.

22 September (EN) Southern Nevada
Origin time: 15 00 00.123
Epicenter: 37.106N., 116.049W.
Depth: 0 km
Magnitude: 4.3ML(BK)

Nevada Test Site explosion "TECHADO" at 37° 06' 20.19" N., 116° 02' 57.83 W., surface elevation 1268 m, depth of burial 533 m.

28 October (GS) Central Idaho
Origin time: 14 06 06.5

See Idaho listing.

16 December (EN) Southern Nevada
Origin time: 18 30 00.087
Epicenter: 37.140N., 116.072W.
Depth: 0 km
Magnitude: 5.1mb(GS), 4.9ML(BK)

NEVADA-Continued

Nevada Test Site explosion "ROMANO" at 37° 08' 25.62" N., 116° 04' 19.44" W., surface elevation 1314 m, depth of burial 515 m.

NEW HAMPSHIRE

13 March (WO) Central New Hampshire
Origin time: 13 03 11.6
Epicenter: 43.697N., 71.331W.
Depth: 2 km
Magnitude: 2.9Mn(WO)
Felt: Lake Winnepesaukee area (WO).

24 March (WO) Southern New Hampshire
Origin time: 14 27 20.4
Epicenter: 42.962N., 71.714W.
Depth: 1 km
Magnitude: 2.9Mn(WO)
Intensity IV: Francestown, New Boston.
Intensity III: South Sutton, Weare.
Felt: Goffstown (WO), Manchester (press report), Milford.

27 May (WO) Central Maine
Origin time: 23 04 35.2

See Maine listing.

29 May (WO) Southwestern Maine
Origin time: 05 45 49.9

See Maine listing.

7 October (LD) Blue Mountain Lake area
Origin time: 10 18 46.1

See New York listing.

NEW JERSEY

19 February (LD) Northern New Jersey
Origin time: 05 45 45.1
Epicenter: 40.649N., 74.769W.
Depth: 6 km
Magnitude: 2.7MD(LD)
Intensity IV: Oldwick, Pottersville, Whitehouse Station (unconfirmed reports of hairline cracks in plaster walls).

7 October (LD) Blue Mountain Lake area
Origin time: 10 18 46.1

See New York listing.

NEW MEXICO

2 March (GS) Central New Mexico
Origin time: 23 22 19.4
Epicenter: 34.302N., 106.892W.
Depth: 8 km
Magnitude: 4.1mb(GS), 4.1ML(GS), 4.3Mn(TU)

NEW MEXICO-Continued

Intensity VI: San Acacia-- exterior adobe walls cracked; interior plastered walls cracked; a few items were thrown from store shelves, a few dishes broke; hanging pictures fell; a few small objects overturned or fell; felt by many.
Intensity V:
Bosque— A few windows cracked.
La Joya— Hanging pictures fell; a building shook strongly; felt by all.
Lemitar— A few small objects overturned; felt by all.
Socorro— A few windows cracked; hairline cracks appeared in plaster walls; a few items were thrown from store shelves; a few dishes broke; a few small objects overturned or fell; felt by many.
Intensity III: Duran.
Felt: Belen, and San Antonio (press report).

15 September (GS) Eastern New Mexico
Origin time: 23 25 36.0
Epicenter: 35.142N., 104.388W.
Depth: 5 km
Magnitude: 3.1ML(GS), 3.2Mn(TU)
Intensity V: Newkirk-- Walls in a home cracked;, a cellar had hairline cracks in the walls; felt the strongest about 8 miles northwest of town. Reported felt 17 miles north on State Highway 129.
Intensity IV: Cuervo.

NEW YORK

26 February (LD) Southeastern New York
Origin time: 19 59 35.4
Epicenter: 41.552N., 73.663W.
Depth: 7 km
Magnitude: 2.9Mn(GS), 3.0Mn(LD)
Felt: in southeastern New York and western Connecticut.
Intensity VI:
New York—
Pawling— A church wall cracked; a few buildings were reported damaged and a few windows cracked; a few items were thrown from store shelves; light furniture overturned; a few dishes broke; felt by all and frightened many.
Lagrangeville— Chimneys and a foundation cracked; moving vehicles rocked slightly; felt by and frightened many.
Intensity V:
New York.
Katonah— Some hanging pictures fell.
Mahopac— A few dishes broke; a few items were thrown from store shelves; a few small objects overturned or fell; felt by many.
Holmes— A few small objects overturned; felt by many.
Poughquag— A few small objects overturned; felt by many.
Carmel— A few windows cracked; hairline cracks appeared in dry wall; a few dishes broke; a few small objects overturned or fell; felt by many.
Intensity IV:
Connecticut— New Fairfield, South Kent.
New York— Carmal, Crompond, East Fishkill, Fort Montgomery, Garrison, Hopewell Junction, Lake Peekskill, Mohegan Lake, Pomona, Putnam Valley, Verplanck, Wingdale.

Intensity III:
Connecticut— Bethel, New Preston, Sherman.
New York— Bedford, Buchanan, Cold Spring, Dover Plains, Highland Falls, Jefferson Valley, Milton, Monroe, Montrose, Pound Ridge, Shrub Oak, South Salem, Yorktown Heights.
Intensity II:
New York— Purdy Station.
Felt:
Connecticut— Newtown.
New York— Fishkill, Somers, and Wappinger Falls (press report).

7 October (LD) Blue Mountain Lake area
Origin time: 10 18 46.1
Epicenter: 43.938N., 74.258W.
Depth: 13 km
Magnitude: 5.1mb(GS), 5.1Mn(LD), 5.3Mn(VP), 5.1Mn(SL)

Although this earthquake caused only minor damage, such as cracked walls and chimneys, the contiguous felt area associated with the shock covered approximately 630,000 km^2 of the United States and Canada (fig. 37); about 250,000 km^2 of this area lies within the United States (Stover, 1984). The felt area encompassed all or part of 12 states of the United States and 2 provinces of Canada. The only reported injury was to a 96-year-old resident of New Baltimore, New York, who fell and fractured his shoulder.

The press reported that the Mill C Dam on the Saramac River near Cadyville had moved 3 in. downstream and that there was some minor cracking of a concrete wall.

The maximum intensity assigned here to this earthquake is VI; however, a higher maximum intensity of VII was assigned by Dana Coyle, Lamont-Doherty Geological Observatory (see Earthquakes in New York State and Adjacent Areas, 1983 in Network Operations below) based on cracked masonry walls, broken chimneys, and several landslides. The difference in the assigned intensities is not a result of additional or more complete data, but a different interpretation of the MMI scale.

The intensities for localities in Canada were furnished by R. Wetmiller, Energy, Mines and Resources, Ottawa, Ontario.

Intensity VI: The most common effects at the places listed below were cracked chimneys, a few small objects overturned or fell, a few dishes or glassware broke, felt by many.
United States—
New York—
Blue Mountain Lake— Many items were thrown off shelves; hanging pictures were knocked off the walls in the post office; one old chimney collapsed; about 20 tombstones slid or rotated; some minor cracks in plaster walls (press reports).
Ellisburg—A few items were thrown from store shelves; standing vehicles rocked slightly.
Hadley— Hanging pictures fell.
Indian Lake— Hanging pictures fell; many small objects overturned; bricks fell from chimneys; a cinderblock foundation cracked.
Kirkville— interior walls cracked; a foundation cracked; an exterior cinderblock wall cracked;, moving vehicles rocked slightly.
Lake Clear— A few windows cracked, many small objects overturned; hairline cracks developed in interior walls.
Maryland— A few items were thrown from store shelves; hairline cracks developed in interior walls; a foundation cracked.
Memphis— A few windows cracked; hairline cracks developed in interior walls; moving vehicles rocked slightly; a foundation cracked.
Minerva— Many large cracks developed in interior wall board; a foundation cracked;, many items were thrown from store shelves.
Moriah— A few windows cracked; a few items were thrown from store shelves; hairline cracks developed in interior walls; brick fences cracked; a few buildings reported damaged.
North River— A few items were thrown from store shelves; shaking was described as strong.
Oswegatchie— Hanging pictures fell.
Tupper Lake— Hanging pictures fell; bricks fell from chimneys.
Warners— A few buildings were reported damaged.
Vermont—
Northfield— A few windows cracked;, a few items were thrown from store shelves; hairline cracks developed in interior walls.
Intensity V: The most common effects at the places listed below were a few cracked windows, a few small objects overturned or fell, a few dishes or glassware broke, a few items fell off store shelves, moving and standing vehicles rocked slightly, trees and bushes shook slightly, felt by most people.
Canada—
Ontario—
Amherstview, Lancaster.
United States—
Connecticut— Terryville.
Massachusetts— Amherst, Blandford. Charlemont, Cheshire, East Pepperell (hairline cracks in plaster walls), Erving, Hatfield, Housatonic, Leeds, Lowell, Marshfield, North Chelmsford, North Hatfield, Russell (water splashed onto sides of swimming pools), Shirley (hairline cracks in interior walls), Shutesbury, South Hadley, Southampton, Stockbridge (hairline cracks in interior walls), West Brookfield, Westfield, West Hatfield, Whately, Williamsburg.
Maine— Bryant Pond, Westbrook.
New Hampshire— Bath, Berlin, Chesterfield, Colebrook, Franklin, Groveton, Haverhill, Hinsdale, Marlow, Milan, New Boston, New Ipswich, North Haverhill, North Stratford, Peterborough, Pike, Twin Mountain, Walpole, Washington (hairline cracks in plaster walls, one report of a cracked chimney), Whitefield, Woodsville.
New York— Adams (press report), Adams Center (hairline cracks in plaster walls), Adirondack, Albany, Alder Creek, Altamont, Antwerp, Apalachin, Argyle, Au Sable Forks, Ballston Spa, Beaver Falls, Beaver River, Beekman (cracked plaster), Bellvale, Berlin, Big Indian (cracked chimney), Bloomingdale, Boonville, Brandywine (hairline cracks in interior walls), Brant Lake, Brantingham, Brasher Falls, Bridgewater (hairline cracks in interior walls), Brier Hill, Broadalbin, Brookfield, Brooktondale, Burke, Burlington Flats, Burnt Hills, Cadosia, Calcium, Cambridge, Camden, Canton, Cape Vincent (hairline cracks in interior walls), Caroga Lake, Cassville, Castorland, Cazenovia, Cedarville (press report), Champlain, Chase Mills, Chateaugay, Cherry Valley,

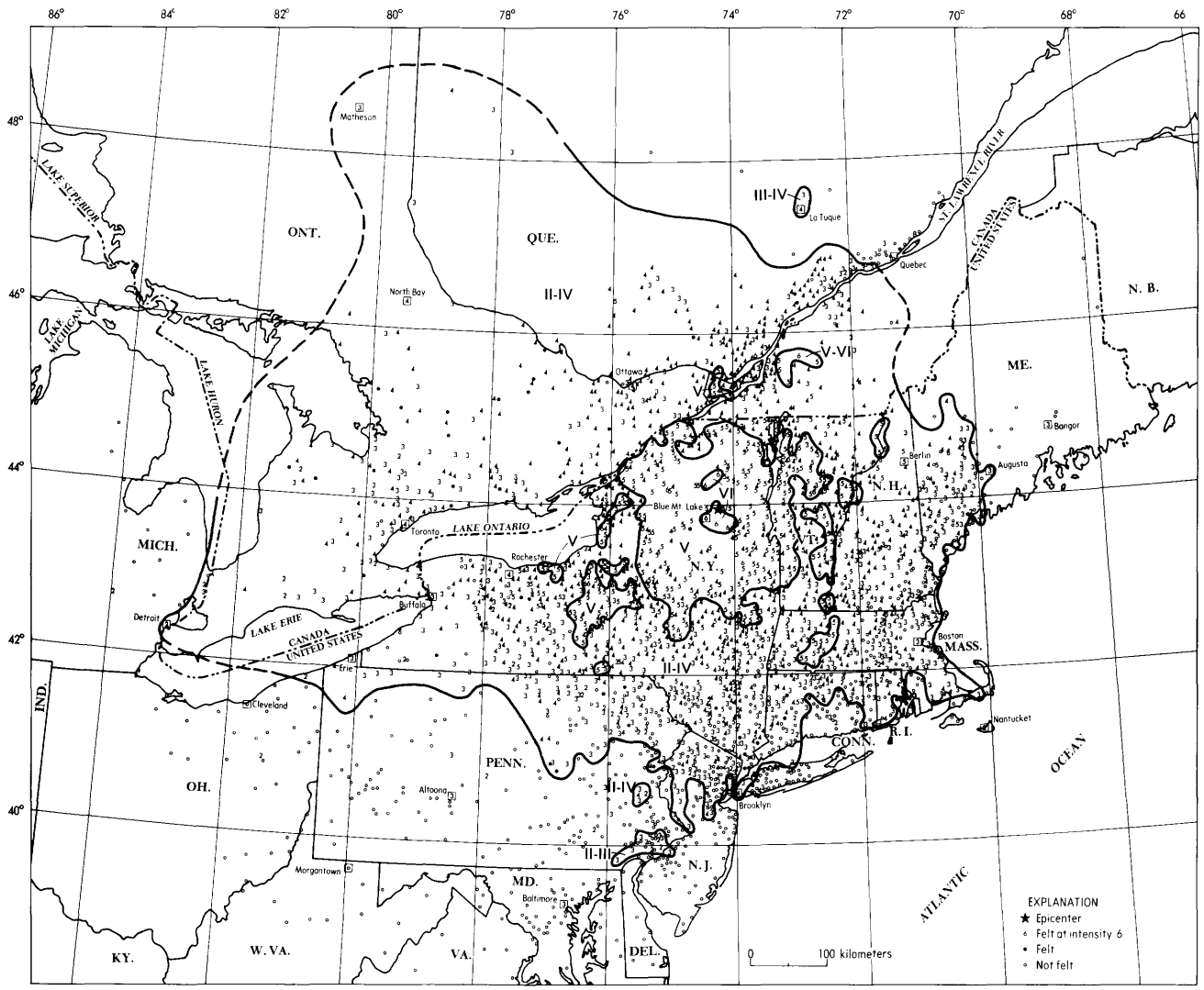

Figure 37. Isoseismal map for the Blue Mountain Lake area, New York, earthquake of 7 October 1983, 10 18 46.1 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; arabic numerals represent intensities at specific sites. All the intensity values listed in the Earthquake Descriptions section are not shown. The intensities in Canada were furnished by R. Wetmiller, Earth Physics Branch, Energy, Mines, and Resources Canada, Ottawa.

Childwold, Chippewa Bay, Claryville, Cleveland, Cleverdale, Clifton Springs, Clinton, Coeymans (hanging pictures fell) , Cold Brook, Colonie, Colton, Comstock, Connelly, Constableville (hairline cracks in interior walls), Constantia, Corinth, Cornwall (cracked foundation), Cortland, Coxsackie, Craryville, Crown Point, Dannemora, Davenport, De Kalb Junction, De Lancey, De Peyster, Deferiet, Delmar, Dexter, Diamond Point, Dolgeville, Duanesburg, Eagle Bay, East Chatham (underground pipe broken), East Greenwich, Edwards, Ellenburg Center, Ellenville, Endicott, Erin, Essex, Evans Mills, Fabius, Felts Mills (hairline cracks in plaster walls), Fine, Fly Creek, Fonda, Forestport, Fort Hunter (hairline cracks in plaster walls), Freeville, Gansevoort, Genoa (hairline cracks in plater walls), Ghent, Gilbertsville (hanging pictures fell), Glasco (hanging pictures fell), Glens Falls, Gloversville, Gorham (hairline cracks in interior walls), Gouverneur, Granville, Great Bend, Greenwich, Greig (cracked foundation), Groton, Hague, Hamden, Hamilton (hairline cracks in interior walls), Hammondsport, Hampton, Hannawa Falls (hairline cracks in plaster walls), Harrietstown, Harrisville, Hartford, Helena, Herkimer, Heuvelton, Hinckley, Hoffmeister, Homer, Hortonville, Hudson, Hudson Falls (cracked foundation), Hunter, Ilion, Inlet, Ithaca, Jamesville (hairline cracks in interior walls), Jay, Johnsburg, Johnstown, Jordanville, Katonah, Keene, Keene Valley, Kingston (hairline cracks in interior walls), Lacona, Lake Luzerne, Lake Placid, Lawrenceville, Lebanon Springs, Lee Center, Lewis, Lisbon, Little Falls, Liverpool, Locke, Long Lake, Loudonville (hairline cracks in interior walls), Lyndonville (cracked chimney), Lyon Mountain (hanging pictures fell), Mallory, Malone, Marcy, Marietta, Marlboro, Martinsburg, Massena (hairline cracks in interior walls), Middle Granville, Milford (hairline cracks in plater walls), Minetto, Mineville (people had difficulty standing or walking), Mohawk (hairline cracks in interior walls), Mooers Forks, Moriah Center, Morrisonville, Mount Vision, Nedrow (hairline cracks in interior walls), Nelliston (hairline cracks in plaster walls), Newcomb (damage reported to an earthen dam), New Russia, Newtonville, New Woodstock, New York Mills, North Bangor, North Branch, North Creek (cracked foundation), North Granville, North Hudson, Northville, Norwood, Odessa, Old Forge, Olmstedville, Onchiota, Oneida, Oran, Oswego, Otego, Otisville, Owasco, Owls Head (hanging pictures fell), Oxbow, Palmyra (hairline cracks in interior walls), Paradox, Pattersonville, Penn Yan, Pennellville (hairline cracks in interior walls), Peru, Peterboro (hairline cracks in interior walls), Phelps, Phoenix, Piercefield, Poland, Poplar Ridge, Port Crane, Port Henry, Port Leyden, Portlandville (hairline cracks in interior walls), Potsdam, Poughquag, Prattsburg, Preble, Pulaski, Raquette Lake (hairline cracks in interior walls), Ravena (hairline cracks in interior walls), Ray Brook, Raymondville, Red Hook, Redford, Redwood, Rensselaer, Richfield Springs, Riparius, Rock City Falls, Rome, Roscoe, Rose, Rotterdam Junction, Roxbury, Russell (hairline cracks in interior walls), Saint Johnsville, Salem, Salisbury Center, Saranac, Saranac Lake, Saratoga Springs, Saugerties (hairline cracks in plater walls), Sauquoit, Schenectady, Schoharie, Schroon Lake, Schuylerville, Seneca Falls, Sennett, Severance (hairline cracks in interior walls), Shandaken, Sherrill, Smithville Flats, Sodus, Sodus Point (cracked chimney, hairline

NEW YORK-Continued

cracks in interior walls), South Colton, South Schroon, Speculator, Springfield Center, Star Lake, Stone Ridge (cracked plaster), Stony Creek, Stottville, Stratford, Syracuse, Tahawus, Three Mile Bay, Ticonderoga, Tivoli (hairline cracks in plaster walls), Tribes Hill, Troy, Truxton, Ulster Park, Upper Jay, Vermontville, Vestal, Wadhams, Walker Valley, Wallkill, Wanakena, Warnerville, Warrensburg, Waterford, Watertown, Watkins Glen, Webster (hairline cracks in interior walls), West Bangor, West Bloomfield, West Davenport, West Eaton, Westford, West Leyden, West Monroe, West Sand Lake, Wevertown, Whitehall, Whitesboro, Willsboro, Wilmington, Wilton, Winthrop, Witherbee, Wolcott (hairline cracks in plaster walls), Woodgate, Woodhull, Woodridge (hairline cracks in interior walls), Woodstock (hairline cracks in interior walls), Worcester, Yorkville.

Pennsylvania— Millrift.

Vermont— Alburg, Ascutney, Bakersfield, Bellows Falls (hairline cracks in interior walls), Bethel, Bolton Valley, Bomoseen (hairline cracks in plaster walls), Bradford, Brandon, Brattleboro, Bristol, Brownsville, Burlington, Cambridge (moving vehicles rocked slightly), Cavendish (hanging pictures fell), Charlotte (hairline cracks in interior walls), Colchester, Danby (moving vehicles rocked slightly), Derby, East Arlington, East Corinth, East Dorset, East Montpelier, East Randolph, East Ryegate, East Wallingford, Ely, Essex, Florence, Forest Dale (hairline cracks in plaster walls), Grafton, Grand Isle, Graniteville, Groton, Guildhall, Hartland, Hinesburg, Hydeville, Johnson, Jonesville, Ludlow, Manchester, Middlebury, Middletown Springs, Milton, Monkton, Montpelier (hairline cracks in interior walls), Moretown, Morrisville, New Haven (hairline cracks in plaster walls), North Ferrisburg, Northfield Falls, North Pomfret, North Springfield, Plainfield, Reading, Richford, Richmond (hanging pictures fell), Rochester (hairline cracks in plaster walls), Roxbury, Rutland (moving vehicles rocked slightly), Saint Albans, Saint Albans Bay, Salisbury (hairline cracks in interior walls), Sharon, Shelburne, South Burlington, South Royalton, Stowe (hairline cracks in interior walls), Taftsville, Troy, Tunbridge, Underhill, Vergennes, Vernon, Waterbury Center (hairline cracks in interior walls), West Burke, West Rutland, White River Junction.

Intensity IV:

Canada—

Ontario— Ajax, Almonte, Alvinston (press report), Apple Hill, Apsley, Athens, Bainsville, Bancroft, Beacon Hill North, Beaverton, Belleville, Blackburn Hamlet, Bourget, Bowmanville, Bracebridge, Bradford, Brinston, Britt, Brockville, Burlington, Camden East, Carrying Place, Chesterville, Collingwood, Commanda, Cornwall, Curve Lake, Dacre, Dalkeith, Deep River, Dobbinton, Dunnville, East York, Eganville (press report), Elgin, Embrum, Emsdale, Erin, Etobicoke, Fitzroy Harbour, Fonthill, Foymount, Gananoque, Gloucester, Godfrey, Gravenhurst, Guelph, Haley Station, Hanover, Harcourt, Hastings, Havelock, Hockley Valley, Inverary, Jarvis Kanata, Kars, Kemptville, Kenmore, King City, Kingston, Lanark (press report), Lancaster, Lindsay, Mallorytown, Manotick, Marshall's Bay, Martintown, Maynooth, Midland, Minden, Monkland, Morrisburg, Munster, Nepean, New Lowell, Noelville, North Bay, North Gower, Norwood, Omemee, Orangeville, Orleans, Ottawa, Owen Sound, Oxford Station, Pakenham, Parham, Parry Sound, Perth, Perth

Road, Petawawa, Petersburg, Picton, Port Hope, Port Perry, Portland, Prescott, Puslinch, Reaboro, Renfrew, Rexdale, Richmond, Ridgeway, River Valley, Rosseau, Round Lake Centre, Russell, Sarnia (press report), Sarsfield, Scarborough, Seeleys Bay, Saint Catharines, Saint Eugene, Stouffville, Stroud, Sundridge, Thornhill, Toledo, Toronto, Tweed, Vanier, Vankleek Hill, Verona, Wainfleet, Warkworth, Warsaw Wellington, Westmeath, Williamstown, Winchester, Wooler, Yarker.

Quebec— Acton Vale, Athelstan, Baie d'Urfe, Batiscan, Beauharnois, Bedford, Bellefeuille, Beloeil, Berthierville, Blandford, Bois des Filion, Bouchette, Brebeuf, Brossard, Buckingham, Calixa Lavallee, Candiac, Cazaville, Chambly, Charlemagne, Chateauguay, Coaticook, Contrecoeur, Cookshire, Coteau du Lac, Coteau Landing, Cowansville, Daveluyville, Delson, Deschambault, Deux Montagnes, Dorion, Drummondville, Fabreville, Ferme Neuve, Fleurimont, Franklin Centre, Gentilly, Gracefield, Grand'Mere, Grenville, Herouxville, Hervey Jonction, Huntingdon, Ile Bizard, Ile des Soeurs, Joliette, Kiamika, Knowlton, L'Epiphanie, La Conception, La Minerve La Perade, La Prairie, La Tuque, Labelle, Lac aux Sables, Lac Bellemare, Lac Remi, Lac Saguay, Lachenaie, Lachine, Lachute, Larochelle, Lasalle, Laurentides, Laval, Laval des Rapides, Le Gardeur, Lemieux, Lemoyne, Les Becquets, Longueuil, Lourdes de Joliette, Luskville, Maniwaki, Manseau, Mascouche, Masson, Mont Laurier, Mont Rolland, Mont Saint Hilaire, Mont Saint Michel, Montreal, Montcerf, Montebello, Montfort, Montreal Nord, Notre Dame de Pontmain, Notre Dame des Anges, Papineauville, Piedmont, Pierrefonds, Plessisville, Pointe aux Trembles, Pointe Calumet, Pointe Claire, Pointe du Lac, Pointe Gatineau, Poltimore, Pont Viau, Portneuf, Prevost, Proulxville, Repentigny, Rigaud, Riviere Beaudette, Rougemont, Roxboro, Sabrevois, Salaberry de Valleyfield, Saut Saint Lin, Shawbridge, Shawinigan, Sherbrooke, Sherrington, Sorel, Saint Adelphe de Champlain, Saint Adolphe d'Howard, Saint Amable, Saint Andre Avellin, Saint Antoine des Laurentides, Saint Basile le Grand, Saint Benoit, Saint Bernard de Lacolle, Saint Boniface de Shawinigan, Saint Bruno de Montarville, Saint Cesaire, Saint Charles de Mandeville, Saint Clet, Saint Colomban, Saint Constant, Saint Cuthbert, Saint Donat de Montcalm, Saint Elie, Saint Esprit, Saint Etienne des Gres, Saint Eustache, Saint Felix de Valois, Saint Gabriel de Brandon, Saint Hubert, Saint Hyacinthe, Saint Hyppolyte de Kilkenny, Saint Jacques, Saint Janvier, Saint Jean, Saint Jerome, Saint Joseph du Lac, Saint Justin, Saint Lambert, Saint Laurent, Saint Lazare de Vaudreuil, Saint Leon, Saint Ligouri, Saint Louis de Champlain, Saint Marc, Saint Mathieu de Lapraire, Saint Maurice, Saint Michel des Saints, Saint Michel de Napierville, Saint Paul d'Abbotsford, Saint Paul d'Industrie, Saint Pierre, Saint Placide, Saint Polycarpe, Saint Prosper, Saint Remi, Saint Samuel de Horton, Saint Sauveur des Monts, Saint Simon de Bagot, Sulpice, Saint Telesphore, Saint Theodore, Saint Timothee, Saint Tite, Saint Ubald, Saint Valerien, Saint Zenon, Sainte Adele, Sainte Agathe des Monts, Sainte Ann de Bellevue, Sainte Anne des Plaines, Sainte Anne du Lac, Sainte Catherine, Sainte Emelie de l'Energie, Sainte Julie de Vercheres, Sainte Julienne, Sainte Lucie de Doncaster, Sainte Marthe, Marthe Sur le Lac, Sainte Melanie, Sainte Sophie, Sainte Thecle, Sainte Therese de Blainville, Stanbridge Station, Terrasse Vaudreuil, Terrebonne, Thurso, Touraine, Val David, Valmont, Verdun, Villers, Waltham Station, Waterloo, Weir, Yamachiche.

United States—

Connecticut— Bethel, Canaan, Chaplin, Colebrook, Cornwall, East Windsor Hill, Ellington, Goshen, Hawleyville, Melrose, Newtown (press report), Pomfret Center, Rogers, Salisbury, South Glastonbury, Suffield, Thomaston (press report), Windsor Locks, Winsted, Woodbury.

Massachusetts— Agawam, Ashfield, Athol, Ayer, Baldwinville, Belchertown, Bondsville, Brimfield, Charlton, Chester, Chicopee, Deerfield, Dover, Dracut (press report), Dunstable, East Princeton, Easton, Gilbertville, Glendale, Granville, Great Barrington, Greenfield, Groton, Hinsdale, Holliston, Holyoke, Hopkinton, Lawrence, Lenox, Lenox Dale, Leominster, Lunenburg, Marshfield Hills, Merrimac, Milford, Millers Falls, Milton, Monroe Bridge, Monson, Montague, Monterey, New Salem, North Adams, North Brookfield, North Uxbridge, Northampton, Orange, Palmer, Pepperell, Rowe, Rowley, South Barre, South Hamilton, South Lee, Southfield, Still River, Sudbury, Sunderland, Templeton, Three Rivers, Wales, Wareham, Warren, Wenham, West Stockbridge, Westford, Wheelwright, Williamstown, Winchendon, Windsor, Woronoco, Worthington.

Maine— Andover, Auburn, Bethel, Biddeford (press report), Buckfield, Cornish, Dixfield, East Sebago, Fryeburg, Hiram, Jay, Kezar Falls, Limington, Lovell, Mexico, Moody, North Waterford, North Waterboro, Raymond, Scarborough, Stratton, Weld, West Newfield, Wilton.

New Hampshire— Alstead, Alton, Alton Bay, Andover, Ashland, Bartlett, Bennington, Bethlehem, Bristol, Canterbury, Center Barnstead, Center Conway, Claremont, Contoocook, Cornish Flat, Danbury, Dover, Drewsville, Dublin, East Andover, East Sullivan, East Swanzey, Elkins, Etna, Farmington, Fitzwilliam, Franconia, Freedom, Georges Mills, Goffstown, Gorham, Goshen, Hanover, Henniker, Hill, Hillsboro, Hudson, Intervale, Jackson, Jaffrey, Kearsarge, Keene, Laconia, Lincoln, Lisbon, Littleton, Lyme, Lyme Center, Manchester, Marlborough, Melvin Village, Milford, Monroe, Moultonboro, Mount Sunapee, Nashua, New Durham, Newton, North Conway, North Salem, North Woodstock, Orange, Orford, Ossipee, Piermont, Pittsburg, Pittsfield, Plainfield, Plymouth, Raymond, Rumney, Salisbury, Silver Lake, South Lyndeboro, Spofford, Stratham, Sunapee, Tamworth, Tilton, Troy, Warner, Warren, West Lebanon, West Ossipee, West Stewartstown, Westmoreland, Winchester, Windham, Wolfeboro.

New Jersey— Andover, Englewood, Hamburg, Jamesburg, Lincoln Park, Oakland, Paterson (press report), Riverdale, Tranquility, Wayne.

New York— Adams Basin, Afton, Akron, Alabama, Albion, Alden, Alexandria Bay, Alfred, Altmar, Alton, Altona, Ames, Amsterdam, Andes, Annandale-on-Hudson, Arkport, Athol, Auburn, Auriesville, Ava, Avoca, Bainbridge, Bakers Mills, Ballston Lake, Bangor, Barnes Corners, Barneveld, Barton, Basom, Beacon (press report), Bedford Hills, Belleville, Bellona, Berne, Bethel, Binghamton (sewer lines reported broken--press report), Black River, Bloomington, Bloomville, Blossvale, Boiceville, Bolton Landing, Bovina Center, Bradford, Brainardsville, Breesport, Brewerton, Bridgeport,

Brockport, Brooklyn, Brookview, Brownville, Brushton, Bullville, Burlingham, Buskirk, Byron, Cadyville, Campbell, Canajoharie, Canaseraga, Canastota, Candor, Carlisle, Carthage, Castile, Castle Creek, Cato, Central Bridge, Central Square, Chadwicks, Chatham, Chaumont, Chazy, Chestertown, Chittenango, Churubusco, Cicero (press report), Cincinnatus, Clark Mills, Clay, Clayton, Clayville, Clemons, Cliff Haven, Clifton Park, Clinton, Clinton Corners, Clintondale (press report), Clockville, Cobleskill, Cochecton, Coeymans Hollow, Cohocton, Cohoes, Cooperstown, Copenhagen, Corbettsville, Cossayuna, Cross River, Dale, Dansville, Deansboro, Deer River, Delanson, Delaware, Delhi (hairline cracks in plaster walls), Denmark, Depauville, Dickinson Center, Downsville, Dundee, Durhamville, Eagle Bridge, Earlville, East Aurora, East Berne, East Branch, East Durham, East Greenbush, East Homer, East Meredith, East Nassau, East Rochester, East Rockaway, East Schodack, East Worcester, Eaton, Eddyville, Edmeston, Elizabethtown, Ellenburg Depot, Elma(few cracked windows), Elmira, Elnora, Esperance, Etna, Fair Haven, Fairfield, Fairport (press report), Fayetteville, Feura Bush, Fishers, Fishers Landing, Fleischmanns, Fort Ann, Fort Edward, Fort Jackson, Fort Johnson, Fort Plain, Frankfort, Franklin, Franklin Springs, Fulton, Fultonham, Fultonville, Gallupville, Geneva (press report), Georgetown, Gilboa, Glen Spey, Glenfield, Glenmont, Godeffroy, Grafton, Grand Gorge, Greece, Greene, Greenfield Center, Greenville, Greenwood, Groveland, Guilderland, Guilderland Center, Guilderland, Hagaman, Hailesboro, Haines Falls, Halcottsville, Hall, Hammond, Hancock, Hannibal, Harpersfield, Harriman, Hartwick, Hastings, Henderson, Henderson Harbor, Hermon, Herrings, High Falls, Highland Mills, Hobart, Hogansburg, Holland Patent, Holmesville, Honeoye, Hoosick, Hoosick Falls, Hopkinton, Hornell, Hubbardsville, Huletts Landing, Hurley, Hyde Park, Irondequoit, Jeffersonville, Jewett, Johnson City, Johnsonville, Jordan, Kattskill Bay, Kauneonga Lake, Keeseville, Kendall, Kernan, Keuka Park, La Fargeville, Lake George, Lake Hill, Lake Huntington, Lake Pleasant, Lansingburg, Latham, Laurens, Lawyersville, Le Roy, Leicester, Leonardsville, Lexington, Linwood, Lisle, Little York, Livingston, Livingston Manor, Livonia, Livonia Center, Lorraine, Lowville, Lyons (press report), Lyons Falls, Madison, Madrid, Maine, Malden On Hudson, Manlius, Mannsville, Maple View, Maplecrest, Marcellus, Marion, Martville, Masonville, Mattydale, Mayfield, McConnellsville, McLean, Meridale, Meridian, Middle Falls, Middle Grove, Middleburg, Middleville, Minoa, Moira, Montezuma, Montour Falls, Mooers, Moravia, Morristown, Morrisville, Morton, Mount Kisco (press report), Mount Tremper (cracked plaster), Mumford, Munnsville, Napanoch, Naples, Natural Bridge, Newark Valley, New Baltimore, New Berlin, New Bremen, Newburgh, New Hartford, New Haven, New Lebanon, New Lebanon Center, New Paltz, Newport, New Scotland, Newton Falls, Nicholville, North Bay, North Chili, North Cohocton, North Lawrence, North Norwich, North Western, Norton Hill, Norwich, Nunda, Oakfield, Oak Hill, Ogdensburg, Oneonta, Oriskany, Oriskany Falls, Orwell, Ouaquaga, Oxford, Painted Post, Parish, Parishville, Paul Smiths, Penfield, Philadelphia, Philmont (press report), Phoenicia, Pierrepont Manor, Pine Hill, Pine Plains, Pine Valley, Piseco, Pittsford, Plainville, Plattsburgh, Plessis,

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Plymouth, Poestenkill, Pond Eddy, Portageville, Port Byron, Porter Corners, Port Gibson, Port Kent, Pottersville, Poughkeepsie, Prattsville, Preston Hollow, Prospect, Pyrites, Queensbury, Redfield, Rensselaer Falls, Rexford, Rhinebeck, Richford, Richland, Richmondville, Richville, Rochester, Rodman, Roessleville, Rooseveltown, Roseboom, Rosendale (press report), Rotterdam, Rouses Point, Rushville, Sackets Harbor, Saint Regis Falls, Salisbury Mills, Sandy Creek, Sangerfield, Sanitaria Springs, Savannah, Schaghticoke, Schodack Landing, Schuyler Falls, Schuyler Lake, Seneca Castle, Sharon Springs, Sherburne, Shortsville, Shushan, Sidney Center, Silver Bay, Slaterville Springs, Sloansville, Smithville, Somers, South Bethlehem, South Butler, South Cairo, South New Berlin, South Otselic, South Rutland, Sparkill, Spencerport, Spencertown, Sprakers, Spring Glen, Spring Valley (press report), Springville, Springwater, Staatsburg, Stanfordville, Stephentown, Sterling, Stillwater, Stittville, Stony Point, Stuyvesant, Stuyvesant Falls, Summitville, Surprise, Swan Lake, Sylvan Beach, Taberg, Thendara, Theresa, Thousand Island, Tillson, Tioga Center, Tully, Turin, Unadilla, Union Hill, Union Springs, Upper Union, Utica, Valatie, Valley Falls, Van Hornesville, Vernon, Vernon Center, Verona Beach, Victor, Victory Mills, Vorheesville, Waddington, Walton, Walworth, Wampsville, Wappingers Falls, Washington Mills, Wassaic, Waterloo, Waterville, Weedsport, Wells, West Chazy, West Coxsackie, Westdale, Westernville, West Exeter, Westfield, West Genesee, West Kill, Westmorland, West Oneonta, West Shokan, West Stockholm, West Winfield, Whallonsburg, Whippleville, White Creek, Whitney Point, Willet, Williamson, Windham, Woodville, Wurtsboro, Wynantskill, Wyoming, York, Youngsville, Yulan.

Pennsylvania— Allentown (press report), Avoca, Beach Lake, Blossburg, Brackney, Canton, Covington, Cowanesque East Stroudsburg, Factoryville, Falls, Forest City, Friendsville, Lackawaxen, Lake City, Lakewood, Little Meadows, Matamoras, Meadville (press report), Montoursville, Nicholson, Sayre, Sciota, Stroudsburg (press report), Troy, Williamsport.

Rhode Island— Hope, Mapleville, North Scituate, Oakland, Providence, Shannock, Warwick, Woonsocket.

Vermont— Adamant, Arlington, Barnet, Barre, Beecher Falls, Belmont, Benson, Bread Loaf, Bridgewater, Bridgewater Corners, Cabot, Calais, Canaan, Castleton, Center Rutland, Chelsea, Chester, Chittenden, Concord, Craftsbury, Craftsbury Common, Cuttingsville, Derby Line, Dorset, East Barre, East Fairfield, East Hardwick, East Middlebury, East Saint Johnsbury, East Thetford, Eden, Essex Junction, Fair Haven, Fairfax, Fairfield, Fairlee, Gaysville, Granville, Greensboro, Greensboro Bend, Hancock, Hardwick, Hartford, Highgate Center, Highgate Springs, Huntington Center, Hyde Park, Irasburg, Island Pond, Jacksonville, Jamaica, Jericho, Jericho Center, Killington, Leicester Junction, Londonderry, Lower Waterford, Lyndon, Lyndon Center, Manchester Center, Marshfield, Middleburg, Montgomery Center, Moscow, Mount Holly, Newbury, Newfane, Newport, Newport Center, North Bennington, North Clarendon, North Hartland, North Montpelier, North Troy, Norwich, Passumpsic, Peacham, Perkinsville, Pittsfield, Post Mills, Poultney, Pownal, Proctor, Proctorsville, Randolph, Randolph Center, Readsboro, Ripton, Saint Johnsbury, Saint Johnsbury Center, Saxtons

River, Shaftsbury, Sheldon, Shoreham, South Barre, South Hero, South Londonderry, South Pomfret, South Ryegate, South Strafford, South Woodstock, Springfield, Starksboro, Stockbridge, Strafford, Stratton Mountain, Thetford, Thetford Center, Underhill Center, Vershire, Waitsfield, Wallingford, Warren, Websterville, Wells, Wells River, West Charleston, West Danville, West Dover, West Fairlee, Westford, Westminster, West Pawlet, West Topsham, Weston, Whiting, Whitingham, Wilder, Williamstown, Williamsville, Williston, Wilmington, Windsor, Winooski, Wolcott, Woodstock, Worcester.

Intensity III:

Canada—

Ontario— Alliston, Ancaster, Apple Hill, Aurora, Aylmer, Barr Haven, Bobcaygeon, Brampton, Brantford, Bridgeport, Buckhorn, Burritts Rapids, Cambridge Galt, Campbellford, Carleton Place, Chaffey's Locks, Cumberland, Demorestville, Don Mills, Downsville, Elgin, Elmvale, Fort Erie, Foxboro, Goderich, Golden Valley, Grimsby, Hamilton, Holland Landing, Huntsville (press report), Isington, Keswick, Kirkfield, Kitchener, Langton, Limoges, Long Sault, Loretto, Lunenburg, Matheson, Mattawa, McDonald's Corners, Meaford, Metcalfe, Millbrook, Milton, Mississauga, Mississippi Station, Mount Albert, Niagara Falls, North York, Oak Ridges, Oakdene Point, Orillia, Oshawa, Peterborough, Port Dover, Prince Albert, Shelburne, Saint Albert, Stayner, Streetsville, Summerstown, Sutton, Tillsonburg, Tobermory, Toledo, Tory Hill, Trent River, Trenton, Unionville, Uxbridge, Walkerton (press report), Wendover, West Hill, Weston, Whitby, Willow Beach, Willowdale, Wyebridge.

Quebec— Amos, Anjou, Asbestos, Aston Junction, Becancour, Boucherville, Brownsburg, Chute Saint Philippe, Donnacona, Granby Guigues, Hull, Jacques Cartier, L'Annonciation, L'Assomption, La Croche, La Macaza, Lac des Ecorces, Lac Remi, Les Eboulements, Melocheville, Mercier, Neuville, Pointe du Lac, Portneuf Station, Precieux Sang, Rawdon, Rock Forest, Shannon, Saint Alban, Saint Alexis de Montcalm, Saint Barthelemy, Saint Basile le Grand, Saint Casimir, Saint Chrysostome, Saint Luc, Saint Narcisse, Saint Paulin, Saint Philippe de Lapraire, Saint Stanislas de Champlain, Saint Suplice, Saint Urbain de Charlevoix, Saint Wenceslas, Sainte Christine, Sainte Genevieve de Bastiscan, Sante Marguerite, Sainte Marie de Blandford, Sainte Martine, Sainte Sophie de Levrard, Sainte Veronique, Stoneham, Tracy, Val d'Or, Varennes, Vincennes, Warwick.

United States—

Connecticut— Abington, Bristol, Brookfield, Canterbury, Cornwall Bridge, East Granby, Enfield, Gaylordsville, Greens Farms, Haddam, Jewett City, Kent, Lakeville, Manchester, Monroe, New Preston, North Canton, Old Mystic, Oneco, Pine Meadow, Poquonock, Riverton, Sherman, Simsbury, Southington, South Kent, South Windham, Stratford, Thompson, Torrington, Washington, Washington Depot, West Cornwall, Windham, Windsorville.

Massachusetts— Adams, Amesbury, Andover, Bernardston, Billerica, Boston, Bourne, Boxford, Bridgewater, Brockton (press report), Brookfield, Buckland, Byfield, Carlisle, Charlton City, Chesterfield, Conway, Dalton, Danvers, Duxbury, East Bridgewater, East Brookfield, East Longmeadow, Easthampton (press report), East Otis, East Walpole, Essex, Fairhaven, Feeding Hills, Foxboro, Grafton, Hardwick, Haydenville,

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Hingham, Hopedale, Hubbardston, Hull, Linwood, Littleton, Ludlow, Marlborough, Middleboro, Millis, Mill River, Millville, Morningdale, New Braintree, Northbridge, North Marshfield, North Reading, Pembroke, Petersham, Plainfield, Plymouth, Salem, Sandwich, Sheffield, South Grafton, South Yarmouth, Southborough, Southwick, Springfield, Stow, Tyngsboro, Tyringham, Upton, Wakefield, Ware, West Boylston, West Bridgewater, West Groton, West Springfield, West Townsend, Whitman, Wilbraham, Winchendon Springs, Worcester.

Maryland— Baltimore, Gibson Island.

Maine— Acton, Augusta, Bailey Island, Bangor (press report), Biddeford Pool, Bridgton, Brunswick, Casco, Center Lovell, Cumberland Center, Danville, Denmark, Dryden, East Poland, East Waterboro, Eliot, Hallowell, Harrison, Hebron, Hollis Center, Lewiston, Livermore, Minot, Monmouth, New Vineyard, Newfield, North Bridgton, North Fryeburg, North Turner, North Windham, Old Orchard Beach, Paris, Poland, Poland Spring, Portland, Sabattus, Sanford, South Berwick, South Paris, Standish, Strong, Topsham, Turner, Wayne, West Baldwin, West Farmington, West Paris.

Michigan— Marine City.

New Hampshire— Antrim, Barnstead, Belmont, Bradford, Canaan, Center Sandwich, Center Strafford, Chocorua, Concord, East Derry, East Hampstead, East Wakefield, Epsom, Errol, Gilmanton Iron Works, Grafton, Greenfield, Guild, Hampstead, Hampton, Hancock, Harrisville, Holderness, Lancaster, Lebanon, Madison, Meriden, Milton, Mirror Lake, Munsonville, New Castle, New London, Newbury, Newport, North Sutton, Pelham, Portsmouth, Rochester, Sanbornton, Sandown, Suncook, Wentworth, West Chesterfield, Wilmot Flat, Wilton.

New Jersey— Augusta, Boonton, Brookside, Carteret, Cherry Hill, Clinton, Cresskill, Demarest, Flemington, Franklin, Garfield, Great Meadows, Hackettstown, Hampton, Ironia, Lafayette, Layton, Little Ferry, Middleville, Morristown, Mount Arlington, New Brunswick, New Providence, Oak Ridge, Ocean Grove, Ogdensburg, Old Tappan, Orange, Penns Grove, Pompton Lakes, Pompton Plains, Ridgefield, Roseland, South Orange, Spotswood, Trenton (press report), Waldwick, Wallpack Center, Wanaque, West Milford, Westwood, Wharton, Whippany.

New York— Addison, Alexander, Alfred Station, Almond, Alpine, Ancramdale, Andover, Angola, Arcade, Ardsley-on-Hudson, Arkville, Armonk, Athens, Attica (press report), Avon, Baldwinsville, Barryville, Batavia, Bath, Beaver Dams, Bergen, Blodgett Mills, Bloomingburg, Bouckville, Briarcliff Manor, Buffalo, Burdett, Butterfield, Callicoon, Callicoon Center, Cameron, Canaan, Canisteo, Cayuga, Cayuta, Cementon, Central Valley, Charlotteville, Chemung, Chenango Bridge, Chester, Clarendon, Clarksville, Claverack, Colliersville, Columbia Center, Columbiaville, Conklin, Coopers Plains, Copake, Crompond, Cropseyville, Croton-on-Hudson, Delphi Falls, Depew, Deposit, Dover Plains, Dryden, East Setauket, East Springfield, East Syracuse, Elbridge, Elka Park, Ellenburg, Fayette, Ferndale, Fineview, Florida, Freeport, Galway, Glen Aubrey, Gowanda, Grahamsville, Grand Island (press report), Great Neck, Greenwood Lake, Guilford, Hamburg (press report), Hamlin, Hartsdale, Haverstraw, Hector, Henrietta, Highland Falls, Hillsdale, Hilton, Himrod, Holley, Holmes, Honeoye Falls,

Huguenot, Hurleyville, Interlaken, Jackson Heights, Jefferson, Jefferson Valley, Johnson, Kanona, Kenoza Lake, Kerhonkson, Kirkwood, Knowlesville, Knox, Lakemont, Lancaster, Leeds, Liberty, Limerick, Lowman, Lycoming, Lysander, Macedon, Manchester, Margaretville, McGraw, Mecklenburg, Medusa, Middletown, Millbrook, Millport, Modena, Monticello, Morris, Mottville, Mount Upton, Mountain Dale, Neversink, Nineveh, Niverville, North Chatham, North Greece, North Hoosick, Obernburg, Old Chatham, Olean (press report), Olivebridge, Ontario Center, Otselic, Owego, Pavilion, Perkinsville, Petersburg, Piffard, Pine City, Plattsburgh Air Force Base, Pompey, Port Ewen, Pulteney, Purchase, Purling, Quail, Red Creek, Rensselaerville, Rhinecliff, Rock Stream, Saint Josephs, Savona, Selkirk, Sidney, Silver Springs, Slingerlands, Smithboro, Smyrna, South Byron, South Kortright, South Lima, Spencer, Stafford (press report), Stanley, Summit, Swain, Tappan, Treadwell, Troupsburg, Tunnel, Valois, Van Etten, Venice Center, Verona, Versailles, Walden, Warsaw, Warwick, Washingtonville, Watervliet, Waverly, Wayland, Wells Bridge, Wellsburg, Wellsville, West Copake, West Edmeston, White Sulphur Springs, Willow, Willseyville, Windsor, Wingdale, Woodbourne.

Pennsylvania— Altoona, Athens, Berwick, Bradford, Burlington, Clearfield, Clifford, Columbia Cross Roads, Corry (press report), Damascus, Danville, Dickson City, Duboistown, Easton (press report), Elkland, Elmhurst, Emmaus, Equinunk, Erie, Fleetville, Gillett, Glen Lyon, Greeley, Hallstead, Hamlin, Harford, Hop Bottom, Jackson, Knoxville, Laceyville, Lake Como, Lake Winola, Lanesboro, Lopez, Lottsville, Mansfield, Mehoopany, Middlebury Center, Milanville, Milford, Monroeton, Mountainhome, Nelson, New Albany, New Hope (press report), Oreland, Origsburg, Pittston, Pleasant Mount, Port Allegany, Preston Park, Prompton, Reading, Roaring Branch, Rowland, Selinsgrove, Shawnee On Delaware, Shohola, Springville, Starrucca, State College (press report), Susquehanna, Tioga, Towanda, Tyler Hill, Ulster, Union City, Valley Forge (press report), Warren Center, Wattsburg, Waymart, Wellsboro, West Chester, West Grove, Whitehall, Wyncote.

Rhode Island— Bradford, Greene, Pawtucket (press report), Slocum.

Vermont— Bennington, Bondville, East Poultney, Franklin, Gilman, Lowell, Marlboro, North Hero, North Pownal, Peru, Riverton, Rupert, Townshend, Wardsboro, Waterville, West Rupert.

Intensity II:

Canada—

Ontario— Chesley, Fergus, Hawkestone, London, Lowbanks, Niagara-on-the-Lake, Saint Thomas, Stonet Creek.

Quebec— Saint Donat de Montcalm, Saint Marc des Carrieres

United States—

Connecticut— Danbury, Derby, Glastonbury, Granby, Greenwich, Hadlyme, Hartford, Naugatuck, New Milford, Orange, Putnam, West Willington.

Massachusetts— Bolton, East Douglas, Hamilton, Lancaster, Manchaug, Manchester, Middlefield, Nantucket, South Deerfield, Westborough.

Maine— Alfred, East Wilton, Lisbon, New Gloucester, South Freeport, Springvale, West Buxton.

Michigan— Detroit, Howell, Saint Clair.

NEW YORK-Continued

New Hampshire— Durham, Francestown, Newton Junction, Rollinsford, Wolfeboro Falls.

New Jersey— Allendale, Flanders, Haskell, Hope, Lodi, Sparta, Succasunna.

New York— Branchport, Brewster, Cairo, Caledonia, Chelsea, Circleville, Cold Spring, Cornwallville, Cragsmoor, Dresden, Durham, East Bethany, Garrison, Geneseo, Glenford, Harpursville, Hemlock, Islip, Jamestown, Jasper, Mattituck, Mount Morris, Quaker Street, Rock Tavern, Skaneateles, Trout Creek.

Ohio— Geneva, North Canton.

Pennsylvania— Canadensis, Dallas, Drexel Hill, Ephrata, Germantown, Kensington, Meshoppen, Moscow, Rome, Sterling, Tunkhannock, Waverly, Wayne, Wysox.

Rhode Island— Chepachet.

Felt:

Canada—

Ontario— Angus (press report), Bethany (press report), Caldenoia (press report), Carnarvon, Cobourg (press report), Codrington, Cormac, Durham (press report), Eb's Bay, Fenwick (press report), Kinmount (press report), Milford Bay, Mountain Grove, Newcastle (press report), New Market (press report), Paisley, Pembroke (press report), Quadeville, Rosseau Road.

Quebec— Charette, Huberdeau, L'Ascension, Les Ecureuils, Oka, Saint Armand Station, Saint Felix de Valois, Saint Liguori, Saint Pierre D'Orleans, Saint Severe, Saint Veronique, Smiths Falls (press report), Utterson (press report).

United States—

Connecticut— Litchfield and Southbury (press reports).

Massachusetts— Granby, Pittsfield, Sharon, and Southbridge (press reports).

Maine— Oxford (press report), Waterford, Yarmouth (press report).

New Hampshire— Danville, New Hampton, Plaistow, South Danville.

New Jersey— Chatham, Hackensack, Newark, and Plainfield (press reports).

New York— Bedford, Canandaigua (press report), Dunkirk (press report), Holcomb, Mount Vernon (press report), New Rochelle (press report), Oppenheim, Peekskill (press report), Pine Bush (press report), Port Jervis (press report), Remsen (press report), Salamanca (press report), Scipio Center, Slate Hill (press report), Suffern (press report), Tarrytown (press report), Watsonville, White Plains (press report).

Pennsylvania— Bellwood, Bethlehem (press report), Bossardville, Lawton, Lewisburg (press report), New Milford, Philadelphia (press report), Scranton, Sunbury (press report).

Vermont— Lunenburg, Quechee.

7 October (LD) New York

Origin time: 10 39 38.5
Epicenter: 43.952N., 74.258W.
Depth: 8 km
Magnitude: 3.5 Mn(GS), 4.1MD(LD)
Felt: Blue Mountain Lake, Balton Landing, and Olmstedville.

11 October (EP) Southeastern Ontario, Canada

Origin time: 04 10 55.0
Epicenter: 45.210N., 75.770W.
Depth: 15 km
Magnitude: 4.2mb(GS), 4.2Mn(EP)

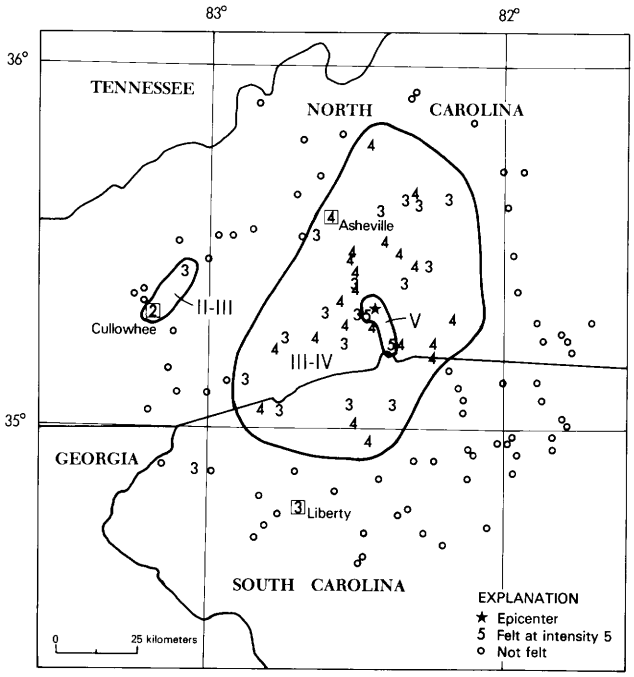

Figure 38. Isoseismal map for the western North Carolina earthquake of 25 March 1983, 02 47 10.9 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; arabic numerals represent intensities at specific sites.

NEW YORK-Continued

Felt: Strongly in the North Gower area south of Ottawa and over a large part of southern Ontario.

Intensity IV: Ogdensburg (press report) and South Colton, New York.
Intensity III: Greece, New York (press report).
Intensity II: Brighton, New York. (press report).

NORTH CAROLINA

25 March (TC) Western North Carolina
Origin time: 02 47 10.9
Epicenter: 35.344N., 82.454W.
Depth: 11 km
Magnitude: 3.2Mn(VP), 3.3MD(TC)

Felt over an area of approximately 5,000 km^2 of North and South Carolina (fig. 38).

Intensity V:
North Carolina—
Dana-- A few small objects overturned; hanging pictures swung; felt by all.
Hendersonville— A few small objects overturned or fell; a few windows cracked; pictures swung out of place; felt by many.
Intensity IV:
North Carolina— Arden, Asheville, Barnardsville, Bat Cave, Brevard (a few small objects overturned), East Flat Rock, Fairview, Flat Rock, Fletcher, Gerton, Horse Shoe (Mills River Community), Lynn, Mill Spring (a few small objects overturned or fell), Montreat, Mountain Home, Penrose, Rosman, Saluda, Skyland, Tryon.
South Carolina— Marietta, Travelers Rest.
Intensity III:
North Carolina— Balfour, Balsam, Balsam Grove, Black Mountain, Cedar Mountain, Chimney Rock, Naples, Old Fort, Pisgah Forest, Ridgecrest, Swannanoa, Tuxedo.
South Carolina— Cleveland, Liberty, Tamassee, Tigerville.
Intensity II:
North Carolina— Cullowhee.

8 July (TC) Eastern Tennessee
Origin time: 19 29 05.9

See Tennessee listing.

NORTH DAKOTA

28 October (GS) Central Idaho
Origin time: 14 06 06.5

See Idaho listing.

OHIO

17 August (KY) Northeastern Kentucky
Origin time: 14 03 17.1

See Kentucky listing.

7 October (LD) Blue Mountain Lake area
Origin time: 10 18 46.1

See New York listing.

OREGON

23 February (WA) Mount Hood area
Origin time: 05 39 45.0
Epicenter: 45.366N., 121.701W.
Depth: 5 km
Magnitude: 2.7MD(WA)
Intensity II: Timberline Lodge (WA).

22 March (WA) Southeastern Washington
Origin time: 12 47 02.6

See Washington listing.

29 March (GS) Western Idaho
Origin time: 01 36 59.4

See Idaho listing.

11 May (WA) Northwestern Oregon
Origin time: 20 20 27.1
Epicenter: 45.651N., 122.828W.
Depth: 0 km
Magnitude: 2.6ML(GS), 2.6MD(WA)

OREGON-Continued

Felt in the West Hills area of Portland. This event may have been an explosion (WA).

28 October (GS) Central Idaho
Origin time: 14 06 06.5

See Idaho listing.

PENNSYLVANIA

7 October (LD) Blue Mountain Lake area
Origin time: 10 18 46.1

See New York listing.

17 November (GS) Delaware-Pennsylvania Border Region
Origin time: 19 55 09.5

See Delaware listing.

RHODE ISLAND

7 October (LD) Blue Mountain Lake area
Origin time: 10 18 46.1

See New York listing.

SOUTH CAROLINA

25 March (TC) Western North Carolina
Origin time: 2 47 10.9

See North Carolina listing.

28 April (TC) Central South Carolina
Origin time: 07 37 10.4
Epicenter: 34.082N., 81.486W.
Depth: 17 km
Magnitude: 2.0MD(TC)
Felt: Keitts and St. Phillips Crossroads (press report)

28 April (TC) Central South Carolina
Origin time: 8 59 59.0
Epicenter: 34.240N., 81.441W.
Depth: 6 km
Magnitude: 2.3MD(TC)
Felt: Keitts and St. Phillips Crossroads (press report).

6 November (SC) Charleston area
Origin time: 09 02 19.8
Epicenter: 32.934N., 80.163W.
Depth: 7 km
Magnitude: 3.1Mn(GS), 3.3MD(SC)
Felt: most strongly in Charleston and Dorchester Counties.
Intensity IV:
South Carolina—
Ladson area (Baptist College of Charleston), Summerville (slight cracks in sidewalks reported).

SOUTH CAROLINA-Continued

Intensity III:
South Carolina— Oakley.
Felt:
Georgia— Augusta.
South Carolina— Columbia (SC).

SOUTH DAKOTA

4 March (GS) Central South Dakota
Origin time: 06 32 18.6
Epicenter: 44.214N., 99.409W.
Depth: 5 km
Magnitude: 4.4mb(GS), 4.4ML(GS), 4.6Mn(TU)

This earthquake was felt over an area of approximately 42,500 km^2 of eastern South Dakota, western Minnesota, and northern Nebraska (fig.39).

Intensity VI:
South Dakota—
Fort Thompson-- a 2-ft-long crack in a ceiling and cracked walls (press report).
Lower Brule-- A reinforced concrete foundation cracked; walls and ceilings cracked (press report); felt by many.
Stephan-- Exterior brick walls cracked; a few items were thrown from store shelves; a few small objects overturned or fell; felt by and frightened many.
Intensity V:
South Dakota—
Gannvalley— A few small objects overturned; pictures swung out of place; felt by and frightened many.
Highmore— A few small objects overturned or fell; felt by several.
Kimball— A few small objects fell.
Orient— A few items thrown from store shelves; a few small objects overturned or fell.
Reliance— A few small objects fell; pictures swung out of place.
Intensity IV:
Nebraska— Kilgore, Spencer, Valentine.
South Dakota— Academy, Alpena, Athol, Bancroft, Bridgewater, Chamberlain, Faulkton, Forestburg, Harrold, Holabird, Huron, Kennebec, Lane, Miller, New Holland, Oacoma, Okreek, Pickstown, Pierre, Plankinton, Presho, Ravinia, Redfield, Ree Heights, Sioux Falls (one report of a few broken dishes), Stratford, Tulare, Turton, Wessington Springs, Wewela, Winner.
Intensity III:
Nebraska— Bristow, Butte, Center, Crookston, Lynch, Niobrara, O'Neill, Wynot.
South Dakota— Aberdeen, Andover, Avon, Bonesteel, Carthage, Chester, Colton, Corsica, Gregory, Hamill, Mansfield, Mitchell, Northville, Platte, Pukwana, Raymond, Saint Lawrence, Springfield, Stickney, Valley Springs, White Lake, Woonsocket, Yale.
Intensity II:
Minnesota— Hendricks.
Nebraska— Verdigre.
South Dakota— Burke, Kadoka, Miranda, Wessington, Wood, Yankton.

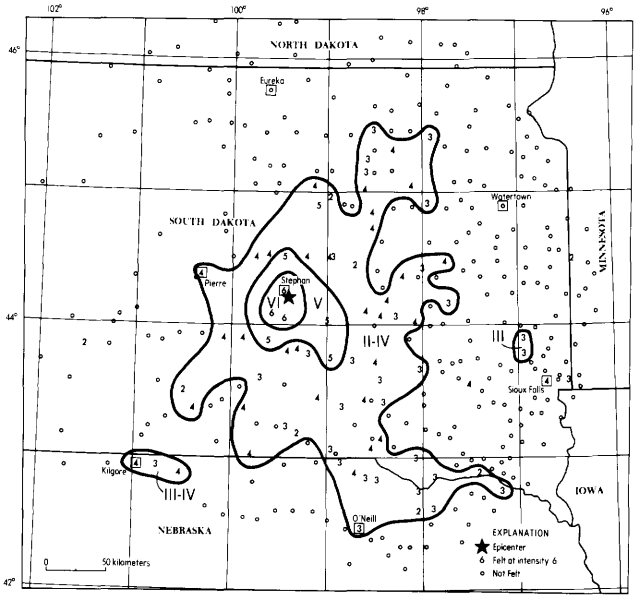

Figure 39. Isoseismal map for the central South Dakota earthquake of 4 March 1983, 06 32 18.6 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; arabic numerals represent intensities at specific sites.

TENNESSEE

23 February (SL) New Madrid Region
Origin time: 08 51 27.0

See Missouri listing.

16 March (TC) Eastern Tennessee
Origin time: 09 13 51.9
Epicenter: 35.218N., 84.548W.
Depth: 12 km
Magnitude: 2.6MD(TC)
Felt: Etowah (TC).

23 June (SL) Western Tennessee
Origin time: 06 40 18.9
Epicenter: 36.360N., 89.510W.
Depth: 11 km
Magnitude: 2.7Mn(SL), 2.4MD(TC)
Intensity IV: Tiptonville (TC).

8 July (TC) Eastern Tennessee
Origin time: 19 29 05.9
Epicenter: 35.547N., 84.153W.
Depth: 9 km
Magnitude: 3.4Mn(TC), 3.2Mn(VP)
Intensity III:
North Carolina— Tapoco.
Tennessee— Alcoa, Greenback, Maryville, Tallassee (muddied well water), Tellico Plains, Vonore.
Intensity II:
Tennessee— Townsend.
Felt:
Tennessee— Englewood.

TENNESSEE-Continued

28 August (TC) Southeastern Kentucky
Origin time: 22 45 07.3

See Kentucky listing.

7 November (SL) New Madrid Region
Origin time: 04 42 31.1
Epicenter: 36.440N., 89.520W.
Depth: 7 km
Magnitude: 2.8Mn(SL), 2.6MD(TC)
Felt: Tiptonville, Tennessee (TC).

TEXAS

23 July (GS) Southern Texas
Origin time: 15 24 38.2
Epicenter: 28.743N., 98.131W.
Depth: 5 km
Magnitude: 3.4ML(TU)

Most of the information listed below was based on an intensity survey by students at the University of Texas at Austin, Department of Geological Sciences. This event was induced by fluid withdrawl and fault strengthening in the Flashing Gas Field (Pennington and others, 1984).

Intensity IV: Warren Petroleum Company Gasoline Plant (located about 2.5 miles northwest of Flashing), at several residences along the county road extending north of Flashing to the intersection with State Highway 791.
Intensity III: Campbellton, Deweesville (southwest of Falls City), Gonzales, Schertz, Tordillo Cattle Company Ranch (16 miles west of Falls City).

UTAH

22 January (UU) Northern Utah
Origin time: 11 44 48.7
Epicenter: 39.949N., 111.946W.
Depth: 2 km
Magnitude: 2.6ML(UU)
Felt: Goshen Valley, Utah (UU).

6 March (UU) Northern Utah
Origin time: 10 53 35.7
Epicenter: 41.140N., 111.672W.
Depth: 9 km
Magnitude: 2.8ML(UU)

The intensities listed below were based on data furnished by Bruce N. Kaliser, Utah Geological and Mineral Survey.

Intensity V:
Mountain Green-- A home 2 miles west of town had cracked interior walls above doorways and in a kitchen corner. Also, there were reports of furniture being moved and people awakened.
Peterson-- A basement window cracked; there were hairline cracks in walls, people were awakened.

Intensity IV: Croydon, Enterprise, Milton, Round Valley, Taggarts.
Intensity III: Henefer.

22 March (UU) Eastern Utah
Origin time: 11 12 35.1
Epicenter: 39.546N., 110.422W.
Depth: 2 km
Magnitude: 3.1MD(UU)

Felt near a local mine. A roadway caved in (UU).

13 April (UU) Eastern Utah
Origin time: 05 51 52.6
Epicenter: 40.734N., 112.176W.
Depth: 6 km
Magnitude: 1.8MD(UU)
Felt: Magna (UU).

3 May (UU) Southeastern Utah
Origin time: 12 43 37.7
Epicenter: 38.305N., 110.633W.
Depth: 2 km
Magnitude: 3.0MD(UU)
Felt: Hanksville (UU)

9 June (UU) Central Utah
Origin time: 16 57 15.0
Epicenter: 39.854N., 111.977W.
Depth: 6 km
Magnitude: 2.9ML(UU)
Intensity III: Mona.

29 August (UU) Northern Utah
Origin time: 12 53 11.5
Epicenter: 41.083N., 11.427W.
Depth: 10 km
Magnitude: 3.0ML(UU)
Felt: Croydon, Ogden, and Taggart (UU).

8 October (UU) Northern Utah
Origin time: 11 57 53.8
Epicenter: 40.748N., 111.993W.
Depth: 6 km
Magnitude: 4.5mb(GS), 4.3ML(UU), 4.5ML(GS)
Intensity VI:
Granger— Bricks fell from a chimney; felt by and awakened many.
West Valley City— Chimneys cracked with one reported fallen; hairline cracks appeared in plaster walls; a few items of merchandise fell from store shelves; a few dishes or glassware broke; a few small objects overturned or fell; felt by and awakened many.
Intensity V: The most common effects at the places listed below were a few cracked windows, a few items of merchandise fell from store shelves, a few small objects fell, felt by and awakened many people. Additional effects are listed after each locality.
Bountiful— A few small objects overturned.
Layton— Hairline cracks appeared in interior walls.
Magna— Standing vehicle rocked slightly.
Midvale.
Salt Lake City (Cottonwood)— A few small objects overturned.
Salt Lake City (Fairground area)— Hairline cracks

UTAH--Continued

appeared in interior walls; a few small objects overturned.
Salt Lake City (Hunter)— Hairline cracks appeared in interior walls.
Sandy— Hairline cracks appeared in interior walls; a few small objects overturned; there were unconfirmed cracks in an exterior brick wall.
Woods Cross.
Intensity IV: Alta, American Fork, Centerville, Holladay, Kearns, Millcreek, Ogden, Pleasant Grove, Porterville (press report), Riverton.
Intensity III: Cedar Valley, Morgan, Ogden, Park City, Roy.

11 October (UU) Northern Utah
Origin time: 11 01 58.2
Epicenter: 40.732N., 111.991W.
Depth: 11 km
Magnitude: 2.5MD(UU)
Intensity IV: West Valley City (press report).

28 October (GS) Central Idaho
Origin time: 14 06 06.5

See Idaho listing.

19 November (UU) Southeastern Idaho
Origin time: 03 50 46.9

See Idaho listing.

9 December (UU) Central Utah
Origin time: 08 58 40.7
Epicenter: 38.577N., 112.565W.
Depth: 0 km
Magnitude: 4.3mb(GS), 3.6ML(UU)
Intensity III: Elsinore, Greenville, Junction.

VERMONT

29 May (WO) Southwestern Maine
Origin time: 05 45 49.9

See Maine listing.

7 October (LD) Blue Mountain Lake area
Origin time: 10 18 46.1

See New York listing.

WASHINGTON

24 January (WA) Western Washington
Origin time: 13 31 52.6
Epicenter: 47.073N., 121.974W.
Depth: 5 km
Magnitude: 3.1ML(GS), 3.0MD(WA)
Intensity IV: Carbonado.

3 March (WA) Western Washington
Origin time: 15 38 00.2

Epicenter: 47.571N., 121.932W.
Depth: 7 km
Magnitude: 2.9MD(WA)
Intensity III: Fall City (press report).

22 March (WA) Southeastern Washington
Origin time: 12 47 02.6
Epicenter: 45.998N., 118.445W.
Depth: 4 km
Magnitude: 3.3ML(GS), 3.9MD(WA)
Intensity IV:
Oregon— Helix, Milton-Freewater (one report of small objects falling).
Washington— College Place, Walla Walla.

25 May (WA) Western Washington
Origin time: 04 20 59.5
Epicenter: 47.768N., 121.657W.
Depth: 12 km
Magnitude: 2.8ML(GS), 3.0MD(WA)
Intensity IV: Gold Bar, Sultan.
Felt: Skykomish (WA).

12 August (WA) Western Washington
Origin time: 01 12 58.4
Epicenter: 47.496N., 121.676W.
Depth: 15 km
Magnitude: 3.1MD(WA)
Intensity III: North Bend (press report).
Felt: On Mount Si by a hiker (press report).

17 August (WA) Northwestern Washington
Origin time: 10 54 27.5
Epicenter: 48.144N., 124.482W.
Depth: 5 km
Magnitude: 3.2ML(GS), 3.7MD(WA)
Intensity IV:
Beaver— A mobile home shook (press report).
Forks— A water heater for a swimming pool shifted and the water in the heater leaked out of the tank; people awakened in a mobile home (press report).
Felt: University District of Seattle (WA).

28 August (WA) Puget Sound area
Origin time: 12 47 47.6
Epicenter: 47.946N., 122.861W.
Depth: 50 km
Magnitude: 4.2mb(GS), 3.9MD(WA)
Intensity IV: Bremerton (Sheridan Park), Hadlock, Oak Harbor, Port Townsend, Seabeck.
Intensity III: Coupeville, Gold Bar, Hamilton, Joyce, La Conner, Olga, Port Ludlow, Sequim Sultan.
Intensity II: Greenbank, Lyman, Quilcene, Vashon.
Felt: University District of Seattle (WA).

14 September (WA) Central Washington
Origin time: 09 03 02.9
Epicenter: 47.718N., 120.261W.
Depth: 1 km
Magnitude: 2.5MD(WA)
Intensity III: Four miles north of Entiat.

14 September (WA) Central Washington
Origin time: 10 51 01.3
Epicenter: 47.713N., 120.271W.

Depth: 0 km
Magnitude: 2.6MD(WA)
Felt: near Entiat (WA).

5 October (WA) Western Washington
Origin time: 03 46 50.1
Epicenter: 47.461N., 121.867W.
Depth: 23 km
Magnitude: 3.0MD(WA)
Felt: North Bend (WA).

28 October (GS) Central Idaho
Origin time: 14 06 06.5

See Idaho listing.

31 October (WA) Western Washington
Origin time: 21 47 58.5
Epicenter: 47.345N., 123.234W.
Depth: 45 km
Magnitude: 4.3MD(WA)
Intensity IV: Belfair, Hoodsport.
Intensity III: Olympia and Shelton (press reports).

14 November (WA) Central Washington
Origin time: 11 19 01.4
Epicenter: 46.665N., 120.591W.
Depth: 6 km
Magnitude: 3.1ML(GS), 3.8MD(WA)
Intensity IV: Cowiche, Selah (a couple of knick-knacks were knocked over), Yakima.

5 December (WA) Central Washington
Origin time: 07 24 19.6
Epicenter: 46.930N., 120.704W.
Depth: 6 km
Magnitude: 3.3ML(GS), 3.8MD(WA)
Intensity III: Ellensburg.
Felt: Vantage (press report).

WEST VIRGINIA

17 August (KY) Northeastern Kentucky
Origin time: 14 03 17.1

See Kentucky listing.

WYOMING

6 February (GS) Yellowstone National Park
Origin time: 20 25 16.5
Epicenter: 44.571N., 110.643W.
Depth: 5 km
Magnitude: 4.7mb(GS), 4.5ML(GS), 4.7ML(MT)

Four hot springs (Calida Pool, Heart Spring, one of the Castle Group, and one in the Chain Lake Group) became turbid in the 2 hours following this earthquake. Bijou Geyser, normally continuously spouting, was mostly inactive following this event. Gention Pool in the Sprinkler Group, located about 10 km north of Old

Faithful, had a drop in water level of approximately 75 cm (R. A. Hutchinson, Park Geologist).

Intensity V:
Wyoming—
Old Faithful— A lamp was overturned; small objects overturned or fell off bookcases and shelves; windows and dishes rattled loudly. The motion was described as, "Like standing on the deck of a boat."
Intensity IV:
Wyoming—
Madison Junction— loud ground noise.
Midway Geyser Basin— felt by cross-country skiers.
Shoshone Creek— felt by cross-country skiers about 13 km south of Old Faithful.
Intensity III:
Montana— Corwin Springs, West Yellowstone.
Wyoming— Canyon Village, Jackson Lake (press report).
Intensity II:
Montana— Gardiner, Targhee Pass Area.
Wyoming— Mammoth Hot Springs, Snake River Ranger Station.

8 February (UU) Eastern Idaho
Origin time: 10 54 54.9

See Idaho listing.

13 February (GS) Southeastern Wyoming
Origin time: 13 44 44.0
Epicenter: 42.232N., 105.729W.
Depth: 5 km
Magnitude: 4.0ML(GS)
Intensity IV: Iron Mountain, McFadden, Medicine Bow, Rock River, Shawnee.
Intensity III: Elk Mountain, Glendo, Laramie, Wheatland (press report).

5 February (GS) Yellowstone National Park
Origin time: 15 10
Epicenter: Not located
Depth: None computed
Magnitude: None computed
Intensity IV: Old Faithful.

26 February Yellowstone National Park
Origin time: 00 55
Epicenter: Not located
Depth: None computed
Magnitude: None computed
Intensity III: Old Faithful.

14 August (GS) Southwestern Montana
Origin time: 00 53 12.7

See Montana listing.

24 September (GS) Northwestern Colorado
Origin time: 16 57 45.7

See Colorado listing.

WYOMING--Continued

13 October (GS) Hebgen Lake area
Origin time: 09 45 26.5

See Montana listing.

28 October (GS) Central Idaho
Orgin time: 14 06 06.5

See Idaho listing.

2 November (GS) Northwestern Wyoming
Origin time: 20 03 58.8
Epicenter: 43.418N., 110.921W.
Depth: 5 km
Magnitude: 3.5ML(GS)
Intensity IV: Swan Valley, Idaho.
Intensity III: Alpine, Wyoming.
Felt: Jackson, Wyoming (telephone report).

9 November (GS) Northwestern Wyoming
Origin time: 13 53 12.9
Epicenter: 43.716N., 110.200W.
Depth: 5 km
Magnitude: 3.6ML(GS)
Intensity III: Swan Valley, Idaho.
Felt: Dubois, Wyoming (telephone report).

15 November (GS) Eastern Wyoming
Origin time: 12 33 12.1
Epicenter: 43.016N., 105.955W.
Depth: 5 km
Magnitude: 3.0ML(GS)
Intensity III: Casper.

20 December (GS) Western Wyoming
Origin time: 22 52 23.7
Epicenter: 43.294N., 110.767W.
Depth: 5 km
Magnitude: 4.5mb(GS)
Intensity IV:
Wyoming— Jackson (felt strongly, hanging pictures swung out of place, trees and bushes shaken moderately), Kelly (hanging pictures swung out of place), Moose (a few cracked windows, hanging pictures swung out place).
Intensity III:
Idaho— Chester.
Wyoming— Etna, Freedom, Moran, Smoot, Teton Village.

21 December (GS) Western Wyoming
Origin time: 00 25 20.7
Epicenter: 43.231N., 110.818W.
Depth: 5 km
Magnitude: 3.0ML(BU)
Intensity III: Swan Valley, Idaho.

22 December (GS) Western Wyoming
Origin time: 18 56 03.9
Epicenter: 43.224N., 110.802W.
Depth: 5 km
Magnitude: 3.4ML(GS)
Intensity IV: Wilson-- A report of small objects overturned and fell.
Intensity III: Etna, Teton Village.

Table 1. *Summary of U. S. earthquakes for 1983*

[The following codes are used to indicate sources for hypocenters, magnitudes, intensities and/or felt data: (**BK**) University of California, Berkeley; (**BU**) Montana Bureau of Mines and Geology, Butte; (**DE**) Delaware Geological Survey, Newark; (**EN**) Department of Energy, Washington, D.C.; (**EP**) Earth Physics Branch, Seismological Service of Canada, Ottawa, Ontario; (**GM**) U.S. Geological Survey, Menlo Park, Calif.; (**GS**) U.S. Geological Survey, Golden, Colo.; (**HV**) Hawaiian Volcano Observatory, U.S. Geological Survey, Hawaii National Park; (**KY**) University of Kentucky, Lexington; (**LD**) Lamont-Doherty Geological Observatory, Palisades, N.Y.; (**MT**) University of Montana, Missoula; (**PM**) Alaska Tsunami Warning Center, NOAA, Palmer; (**PS**) California Institute of Technology, Pasadena; (**SC**) University of South Carolina, Columbia. (**SL**) St. Louis University, St. Louis, Mo.; (**TC**) Tennessee Earthquake Information Center, Memphis; (**TU**) Oklahoma Geological Survey, Leonard; (**UU**) University of Utah, Salt Lake City; (**VP**) Virginia Polytechnic Institute and State University, Blacksburg; (**WA**) University of Washington, Seattle; (**WO**) Weston Observatory, Weston, Mass. Normal depth = 33 km. Leaders (...) indicate information is not available]

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
ALABAMA														
APR. 5	00	41	21.0	33.169N.	86.990W.	0	GT	...	...	2.9MD(GT)	...	APR. 4	18:41	CST
AUG. 28	10	44	03.9	34.662N.	87.770W.	7	TC	...	...	2.6MD(TC)	...	AUG. 28	04:44	CST
ALASKA														
JAN. 1	06	03	20.9	53.280N.	163.930W.	5	LD	4.9	...	4.9ML(PM)	...	DEC. 31	19:03	BST
JAN. 1	10	45	13.6	57.161N.	153.215W.	69	GS	4.3	...	...	...	JAN. 1	00:45	AST
JAN. 1	11	18	07.7	61.295N.	146.975W.	38	GM	5.3	...	4.7ML(PM)	IV	JAN. 1	01:18	AST
JAN. 1	21	10	00.2	61.222N.	146.963W.	81	GS	...	...	...	...	JAN. 1	11:10	AST
JAN. 3	03	59	07.0	62.594N.	150.640W.	100	GS	4.1	...	...	...	JAN. 2	17:59	AST
JAN. 3	22	59	34.1	59.337N.	153.315W.	115	GS	...	...	...	...	JAN. 3	12:59	AST
JAN. 4	20	30	11.6	62.911N.	148.249W.	92	GS	3.9	...	...	...	JAN. 4	10:30	AST
JAN. 8	02	51	44.8	51.471N.	168.252W.	33N	GS	4.4	...	3.3ML(PM)	...	JAN. 7	15:51	BST
JAN. 8	05	19	28.1	57.943N.	156.411W.	131	GS	4.7	...	...	...	JAN. 7	19:19	AST
JAN. 9	12	24	03.4	63.264N.	149.790W.	103	GS	...	...	...	...	JAN. 9	02:24	AST
JAN. 9	22	05	29.8	53.505N.	165.435W.	94	LD	...	...	...	...	JAN. 9	11:05	BST
JAN. 9	23	28	29.0	52.282N.	167.607W.	33N	GS	4.7	...	...	...	JAN. 9	12:28	BST
JAN. 10	12	19	58.0	63.065N.	150.950W.	134	GS	4.0	...	...	FELT	JAN. 10	02:19	AST
JAN. 10	21	52	03.6	53.686N.	163.767W.	2	LD	...	...	3.7ML(LD)	...	JAN. 10	10:52	BST
JAN. 14	04	18	21.7	63.983N.	147.315W.	33N	GS	...	...	...	...	JAN. 13	18:18	AST
JAN. 14	18	20	52.6	55.911N.	154.154W.	33N	GS	5.6	5.8	...	...	JAN. 14	08:20	AST
JAN. 14	18	37	39.7	55.951N.	154.179W.	33N	GS	4.7	...	4.0ML(PM)	...	JAN. 14	08:37	AST
JAN. 14	19	56	03.0	55.929N.	153.863W.	33N	GS	4.4	...	3.8ML(PM)	...	JAN. 14	09:56	AST
JAN. 15	02	39	37.6	55.957N.	154.152W.	33N	GS	4.4	...	4.0ML(PM)	...	JAN. 14	16:39	AST
JAN. 15	05	18	39.4	50.704N.	171.117W.	33N	GS	4.6	...	4.1ML(PM)	...	JAN. 14	18:18	BST
JAN. 15	12	50	51.3	55.952N.	154.181W.	33N	GS	5.1	4.5	4.9ML(PM)	...	JAN. 15	02:50	AST
JAN. 15	13	23	49.9	55.877N.	154.021W.	33N	GS	4.4	...	3.7ML(PM)	...	JAN. 15	03:23	AST
JAN. 15	14	16	45.8	61.433N.	146.485W.	33N	GS	...	...	3.6ML(PM)	...	JAN. 15	04:16	AST
JAN. 15	17	35	25.4	60.589N.	151.134W.	69	GS	...	...	...	...	JAN. 15	07:35	AST
JAN. 15	23	20	34.2	55.898N.	154.180W.	33N	GS	4.4	...	3.9ML(PM)	...	JAN. 15	13:20	AST
JAN. 17	22	00	23.8	62.037N.	147.229W.	33N	GS	...	...	3.0ML(PM)	...	JAN. 17	12:00	AST
JAN. 18	09	32	32.6	58.051N.	156.373W.	139	GS	...	...	...	...	JAN. 17	23:32	AST
JAN. 18	13	50	11.9	51.312N.	179.865E.	74	GS	4.6	...	...	...	JAN. 18	02:50	BST
JAN. 20	09	06	34.2	58.180N.	155.008W.	94	GS	...	...	...	...	JAN. 19	23:06	AST
JAN. 20	14	10	10.8	54.662N.	159.420W.	29	LD	...	...	3.9ML(PM)	...	JAN. 20	04:10	AST
JAN. 20	22	22	27.0	51.255N.	178.800W.	67	GS	4.7	...	...	...	JAN. 20	11:22	BST
JAN. 21	04	36	52.7	56.278N.	152.892W.	33N	GS	4.3	...	4.1ML(PM)	...	JAN. 20	18:36	AST
JAN. 22	13	40	43.4	59.316N.	152.981W.	106	GS	...	...	...	...	JAN. 22	03:40	AST
JAN. 23	03	53	11.1	51.189N.	175.469E.	33N	GS	4.5	...	4.6ML(PM)	...	JAN. 22	16:53	BST
JAN. 23	04	55	32.2	60.483N.	153.133W.	142	GS	...	...	...	...	JAN. 22	18:55	AST
JAN. 23	11	56	40.8	56.024N.	154.417W.	33N	GS	4.7	...	4.0ML(PM)	...	JAN. 23	01:56	AST
JAN. 24	13	02	37.2	51.381N.	176.251E.	33N	GS	5.4	5.7	...	...	JAN. 24	02:02	BST
JAN. 24	15	06	21.5	64.804N.	152.314W.	33N	GS	...	...	3.4ML(PM)	...	JAN. 24	05:06	AST
JAN. 24	15	08	57.7	51.243N.	176.212E.	33N	GS	4.6	...	...	...	JAN. 24	04:08	BST
JAN. 24	16	13	21.5	51.407N.	176.233E.	33N	GS	4.9	...	...	...	JAN. 24	05:13	BST
JAN. 25	11	28	21.2	51.433N.	176.287E.	33N	GS	5.1	4.7	5.1ML(PM)	...	JAN. 25	00:28	BST
JAN. 25	12	04	40.1	51.541N.	176.072E.	33N	GS	4.7	...	...	...	JAN. 25	01:04	BST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
ALASKA--Continued														
JAN. 25	21	22	39.3	51.427N.	176.150E.	33N	GS	4.7	...	4.6ML(PM)	...	JAN. 25	10:22	BST
JAN. 26	09	14	38.0	59.702N.	153.111W.	114	GS	4.4	...	...	...	JAN. 25	23:14	AST
JAN. 28	00	11	42.4	55.781N.	154.007W.	33N	GS	4.4	...	...	...	JAN. 27	14:11	AST
JAN. 28	02	33	11.6	59.878N.	153.262W.	126	GS	...	...	...	...	JAN. 27	16:33	AST
JAN. 28	10	06	24.4	61.820N.	148.397W.	33N	GS	...	...	2.3ML(PM)	...	JAN. 28	00:06	AST
JAN. 29	17	27	43.4	51.814N.	176.513E.	33N	GS	4.5	...	...	...	JAN. 29	06:27	BST
JAN. 29	18	16	46.9	59.716N.	152.914W.	120	GS	...	...	...	...	JAN. 29	08:16	AST
JAN. 29	19	00	35.7	59.848N.	152.382W.	105	GS	...	...	...	...	JAN. 29	09:00	AST
JAN. 30	02	50	05.5	60.370N.	152.969W.	129	GS	...	...	...	...	JAN. 29	16:50	AST
JAN. 30	11	11	42.1	60.960N.	149.806W.	33N	GS	...	...	3.0ML(PM)	...	JAN. 30	01:11	AST
JAN. 30	20	09	03.3	61.994N.	148.857W.	12	GS	...	...	3.9ML(PM)	...	JAN. 30	10:09	AST
JAN. 30	22	08	52.0	61.105N.	159.217W.	33N	GS	4.6	...	4.6ML(PM)	...	JAN. 30	12:08	AST
JAN. 31	19	57	58.6	51.298N.	178.446W.	33N	GS	4.7	...	...	...	JAN. 31	08:57	BST
FEB. 1	22	32	43.2	58.895N.	151.421W.	33N	GS	...	...	3.6ML(PM)	...	FEB. 1	12:32	AST
FEB. 1	23	17	18.0	52.419N.	179.173W.	239	GS	4.1	...	...	...	FEB. 1	12:17	BST
FEB. 2	04	09	34.3	62.059N.	151.219W.	105	GS	...	...	...	...	FEB. 1	18:09	AST
FEB. 7	17	01	55.1	58.336N.	152.581W.	47	GS	...	...	...	...	FEB. 7	07:01	AST
FEB. 8	00	29	37.3	61.491N.	149.947W.	51	GS	...	...	3.6ML(PM)	...	FEB. 7	14:29	AST
FEB. 9	08	08	51.2	65.999N.	156.637W.	33N	GS	...	...	3.4ML(PM)	...	FEB. 8	22:08	AST
FEB. 9	08	43	34.8	68.250N.	161.037W.	33N	GS	...	...	4.0ML(PM)	...	FEB. 8	21:43	BST
FEB. 12	02	06	01.2	61.966N.	150.510W.	64	GS	...	...	...	...	FEB. 11	16:06	AST
FEB. 12	10	23	17.2	62.831N.	150.226W.	110	GS	...	...	...	...	FEB. 12	00:23	AST
FEB. 12	14	51	07.4	63.453N.	151.391W.	33N	GS	...	...	3.2ML(PM)	...	FEB. 12	04:51	AST
FEB. 14	03	07	31.8	51.785N.	174.600W.	55	GS	4.7	...	...	...	FEB. 13	16:07	BST
FEB. 14	03	20	03.7	54.809N.	159.108W.	16	LD	5.9	6.3	5.6ML(LD)	V	FEB. 13	17:20	AST
FEB. 14	03	29	28.7	54.914N.	158.902W.	4	LD	...	...	3.5ML(LD)	...	FEB. 13	17:29	AST
FEB. 14	06	03	35.9	54.712N.	158.734W.	7	LD	...	...	3.5ML(LD)	...	FEB. 13	20:03	AST
FEB. 14	08	10	02.7	54.862N.	158.875W.	14	LD	6.0	5.6	6.0ML(LD)	V	FEB. 13	22:10	AST
FEB. 14	12	29	14.3	61.807N.	150.001W.	19	GS	...	...	...	...	FEB. 14	02:29	AST
FEB. 14	17	48	51.9	54.716N.	158.935W.	12	LD	...	...	3.5ML(LD)	...	FEB. 14	07:48	AST
FEB. 14	23	48	13.1	51.840N.	175.570E.	98	GS	4.6	...	...	...	FEB. 14	12:48	BST
FEB. 15	18	53	52.0	54.861N.	158.818W.	6	LD	4.5	...	3.9ML(LD)	...	FEB. 15	08:53	AST
FEB. 16	00	04	50.9	59.882N.	148.005W.	33N	GS	...	...	3.2ML(PM)	...	FEB. 15	14:04	AST
FEB. 19	11	37	54.5	51.083N.	178.369E.	48	GS	4.9	...	...	...	FEB. 19	00:37	BST
FEB. 21	18	40	27.1	54.288N.	161.455W.	4	LD	5.0	...	3.7ML(LD)	...	FEB. 21	07:40	BST
FEB. 23	07	27	57.6	60.177N.	153.195W.	119	GM	4.5	...	4.0MD(GM)	II	FEB. 22	21:27	AST
FEB. 23	14	45	45.9	57.441N.	154.565W.	92	GS	4.3	...	...	...	FEB. 23	04:45	AST
FEB. 25	05	30	32.4	60.207N.	151.034W.	89	GS	4.3	...	...	...	FEB. 24	19:30	AST
FEB. 26	10	25	01.8	60.483N.	152.214W.	117	GS	...	...	...	...	FEB. 26	00:25	AST
FEB. 27	15	55	31.8	54.892N.	158.977W.	1	LD	4.8	...	4.0ML(LD)	...	FEB. 27	05:55	AST
MAR. 1	22	29	21.6	61.423N.	151.416W.	80	GS	...	...	...	...	MAR. 1	12:29	AST
MAR. 2	00	14	16.9	63.022N.	151.113W.	143	GS	...	...	...	...	MAR. 1	14:14	AST
MAR. 3	07	13	54.8	63.013N.	150.545W.	113	GS	3.7	...	...	...	MAR. 2	21:13	AST
MAR. 3	07	47	25.1	68.894N.	144.633W.	33N	GS	...	...	3.6ML(PM)	...	MAR. 2	21:47	AST
MAR. 3	18	26	04.9	65.145N.	165.626W.	33N	GS	...	...	3.9ML(PM)	...	MAR. 3	07:26	BST
MAR. 5	15	37	30.6	63.047N.	151.050W.	137	GS	...	...	...	...	MAR. 5	05:37	AST
MAR. 7	13	54	29.5	50.984N.	177.807W.	33N	GS	4.8	...	...	...	MAR. 7	02:54	BST
MAR. 8	12	12	42.2	60.071N.	141.034W.	15	GS	...	...	...	...	MAR. 8	02:12	AST
MAR. 8	22	16	13.3	58.260N.	155.869W.	33N	GS	3.9	...	...	...	MAR. 8	12:16	AST
MAR. 10	10	10	04.6	62.468N.	149.491W.	88	GS	...	...	...	...	MAR. 10	00:10	AST
MAR. 10	14	03	38.6	62.815N.	149.553W.	45	GM	4.6	...	3.5MD(GM)	III	MAR. 10	04:03	AST
MAR. 10	16	25	01.1	60.544N.	151.558W.	80	GS	...	...	...	...	MAR. 10	06:25	AST
MAR. 10	16	41	58.6	59.552N.	151.686W.	82	GS	...	...	...	...	MAR. 10	06:41	AST
MAR. 11	18	17	02.5	50.853N.	178.929E.	33N	GS	4.8	...	...	...	MAR. 11	07:17	BST
MAR. 12	07	00	15.1	52.225N.	170.172W.	33N	GS	5.2	4.9	...	...	MAR. 11	20:00	BST
MAR. 12	18	56	36.2	59.957N.	153.413W.	133	GM	4.5	...	4.0MD(GM)	...	MAR. 12	08:56	AST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
ALASKA--Continued														
MAR. 13	01	52	42.6	52.491N.	170.244W.	33N	GS	4.5	...	...	...	MAR. 12	14:52	BST
MAR. 13	12	45	24.9	61.628N.	149.807W.	58	GS	...	...	3.1ML(PM)	...	MAR. 13	02:45	AST
MAR. 13	23	30	14.7	52.006N.	178.058E.	141	GS	4.7	...	...	...	MAR. 13	12:30	BST
MAR. 14	21	14	53.8	52.112N.	170.091W.	33N	GS	4.9	...	...	...	MAR. 14	10:14	BST
MAR. 15	02	22	39.2	52.469N.	170.131W.	33N	GS	4.5	...	...	...	MAR. 14	15:22	BST
MAR. 15	10	11	09.9	56.471N.	151.829W.	33N	GS	4.1	...	...	...	MAR. 15	00:11	AST
MAR. 15	19	18	43.6	63.038N.	151.027W.	134	GS	...	...	...	...	MAR. 15	09:18	AST
MAR. 15	23	53	22.3	59.507N.	153.197W.	111	GM	4.7	...	4.4MD(GM)	V	MAR. 15	13:53	AST
MAR. 17	05	34	42.8	58.515N.	140.637W.	24	GM	4.3	...	4.2ML(PM)	IV	MAR. 16	20:34	YST
MAR. 17	17	11	07.8	60.960N.	152.565W.	33N	GS	...	...	3.2ML(PM)	...	MAR. 17	07:11	AST
MAR. 17	22	09	23.4	64.819N.	148.022W.	28	GS	...	...	3.0ML(PM)	...	MAR. 17	12:09	AST
MAR. 19	11	06	37.2	61.574N.	149.862W.	61	GS	4.0	...	...	...	MAR. 19	01:06	AST
MAR. 20	06	06	48.3	62.989N.	150.398W.	150	GS	...	...	...	...	MAR. 19	20:06	AST
MAR. 22	01	32	31.1	51.272N.	178.434W.	58	GS	4.9	...	...	...	MAR. 21	14:32	BST
MAR. 23	18	56	48.8	63.478N.	148.671W.	103	GS	...	...	...	...	MAR. 23	08:56	AST
MAR. 24	01	31	12.2	63.691N.	146.730W.	33N	GS	...	...	3.0ML(PM)	...	MAR. 23	15:31	AST
MAR. 24	01	42	44.3	63.057N.	150.840W.	157	GS	...	...	...	...	MAR. 23	15:42	AST
APR. 1	05	50	34.6	52.386N.	164.822W.	33N	GS	4.2	...	...	...	MAR. 31	18:50	BST
APR. 3	19	14	05.0	51.976N.	179.259E.	116	GS	5.6	...	...	...	APR. 3	08:14	BST
APR. 3	19	26	24.2	51.762N.	176.926W.	60	GS	5.2	...	...	V	APR. 3	08:26	BST
APR. 4	07	11	23.9	63.232N.	150.708W.	146	GS	...	...	...	...	APR. 3	21:11	AST
APR. 6	01	29	51.2	64.039N.	148.838W.	64	GS	...	...	3.6ML(PM)	...	APR. 5	15:29	AST
APR. 6	01	38	20.3	51.635N.	177.026W.	60	GS	4.5	...	...	...	APR. 5	14:38	BST
APR. 7	21	55	44.1	62.313N.	148.915W.	68	GS	...	...	3.0ML(PM)	III	APR. 7	11:55	AST
APR. 8	14	23	58.3	61.934N.	149.333W.	33N	GS	...	...	2.3ML(PM)	FELT	APR. 8	04:23	AST
APR. 9	02	10	25.9	61.194N.	150.197W.	58	GS	...	...	3.9ML(PM)	FELT	APR. 8	16:10	AST
APR. 10	19	22	41.3	61.479N.	149.973W.	52	GS	3.5	...	3.8ML(PM)	FELT	APR. 10	09:22	AST
APR. 11	09	43	47.6	59.673N.	152.409W.	104	GS	...	...	...	...	APR. 10	23:43	AST
APR. 13	08	13	14.9	59.717N.	153.020W.	117	GS	...	...	...	...	APR. 12	22:13	AST
APR. 15	18	30	32.6	64.734N.	147.517W.	10	GS	...	...	...	...	APR. 15	08:30	AST
APR. 15	18	30	43.0	64.853N.	147.531W.	10	GS	4.3	...	4.8ML(PM)	VI	APR. 15	08:30	AST
APR. 19	04	43	34.6	61.194N.	147.025W.	70	GS	4.0	...	...	III	APR. 18	18:43	AST
APR. 19	19	12	50.0	63.270N.	149.707W.	122	GM	5.1	...	4.7MD(GM)	IV	APR. 19	09:12	AST
APR. 20	10	18	32.9	59.023N.	155.972W.	209	GS	4.5	...	...	...	APR. 20	00:18	AST
APR. 20	23	23	38.3	60.297N.	153.492W.	177	GS	4.2	...	...	...	APR. 20	13:23	AST
APR. 21	07	13	27.4	61.262N.	150.449W.	33N	GS	...	...	2.9ML(PM)	FELT	APR. 20	21:13	AST
APR. 21	12	56	48.8	58.242N.	140.100W.	0	GM	4.6	...	4.3ML(PM)	IV	APR. 21	03:56	YST
APR. 22	03	55	16.9	61.491N.	150.007W.	72	GS	...	...	3.9ML(PM)	FELT	APR. 21	17:55	AST
APR. 23	06	13	50.1	60.398N.	153.385W.	199	GM	4.6	...	4.5MD(GM)	...	APR. 22	20:13	AST
APR. 23	10	54	41.7	52.727N.	163.477W.	33N	GS	4.5	...	...	...	APR. 22	23:54	BST
APR. 23	16	05	56.0	61.608N.	150.908W.	95	GS	...	...	...	...	APR. 23	06:05	AST
APR. 24	00	27	13.1	62.448N.	153.417W.	33N	GS	...	...	3.3ML(PM)	...	APR. 23	14:27	AST
APR. 24	06	25	11.8	61.757N.	147.095W.	66	GS	...	...	3.6ML(PM)	FELT	APR. 23	20:25	AST
APR. 24	10	07	35.3	61.320N.	151.947W.	109	GS	4.2	...	...	FELT	APR. 24	00:07	AST
APR. 24	18	45	33.4	61.969N.	148.851W.	24	GS	...	...	3.0ML(PM)	...	APR. 24	08:45	AST
APR. 25	10	47	36.5	63.444N.	151.399W.	33N	GS	...	...	3.1ML(PM)	...	APR. 25	00:47	AST
APR. 26	11	44	52.8	63.307N.	149.766W.	122	GS	...	...	...	...	APR. 26	01:44	AST
APR. 26	14	46	56.2	61.914N.	150.792W.	81	GS	3.8	...	...	...	APR. 26	04:46	AST
APR. 26	23	10	55.2	64.811N.	149.083W.	10	GS	...	...	3.3ML(PM)	IV	APR. 26	13:10	AST
MAY 1	22	49	03.7	54.569N.	159.706W.	32	LD	4.2	...	3.5ML(LD)	...	MAY 1	12:48	AST
MAY 2	22	25	12.5	59.326N.	153.366W.	112	GS	4.0	...	...	...	MAY 2	12:25	AST
MAY 5	06	09	03.8	61.604N.	146.495W.	62	GS	...	...	3.3ML(PM)	FELT	MAY 4	20:09	AST
MAY 5	14	50	10.6	63.339N.	151.184W.	33N	GS	...	...	3.0ML(PM)	...	MAY 5	04:50	AST
MAY 6	06	38	10.1	66.608N.	163.891W.	33N	GS	4.3	...	4.5ML(PM)	IV	MAY 5	19:38	BST
MAY 6	17	25	55.5	52.048N.	178.993E.	179	GS	4.2	...	...	...	MAY 6	06:25	BST
MAY 7	09	01	47.7	56.718N.	136.615W.	33N	GS	4.0	...	...	IV	MAY 7	01:01	PST
MAY 8	02	46	23.8	63.293N.	149.794W.	114	GS	...	...	...	...	MAY 7	16:46	AST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
ALASKA-Continued														
MAY 9	14	56	27.4	61.023N.	146.364W.	7	GS	...	...	3.4ML(PM)	III	MAY 9	04:56	AST
MAY 10	06	57	54.1	59.077N.	153.604W.	117	GS	4.0	...	...	...	MAY 9	20:57	AST
MAY 10	09	28	10.1	62.263N.	150.826W.	60	GS	...	...	3.0ML(PM)	...	MAY 9	23:28	AST
MAY 11	01	49	32.5	50.135N.	179.726W.	33N	GS	4.4	...	...	...	MAY 10	14:49	BST
MAY 11	19	24	38.7	62.600N.	151.328W.	33N	GS	...	...	3.1ML(PM)	II	MAY 11	09:24	AST
MAY 12	05	54	10.7	54.642N.	159.596W.	29	LD	4.4	...	3.7ML(LD)	...	MAY 11	19:54	AST
MAY 12	21	52	56.9	51.248N.	179.117W.	53	GS	4.9	...	4.4ML(PM)	...	MAY 12	10:52	BST
MAY 15	01	49	39.8	52.166N.	168.641W.	33N	GS	4.3	...	...	...	MAY 14	14:49	BST
MAY 15	05	34	34.7	59.868N.	153.268W.	113	GS	3.9	...	...	...	MAY 14	19:34	AST
MAY 15	05	51	20.8	61.653N.	149.929W.	54	GS	...	...	3.6ML(PM)	II	MAY 14	19:51	AST
MAY 15	16	16	47.0	64.047N.	151.647W.	69	GS	...	...	3.1ML(PM)	...	MAY 15	06:16	AST
MAY 15	22	02	14.1	52.039N.	179.641E.	163	GS	4.4	...	...	...	MAY 15	11:02	BST
MAY 17	18	45	30.6	51.129N.	179.736E.	65	GS	4.5	...	...	...	MAY 17	07:45	BST
MAY 18	15	25	04.0	63.319N.	151.703W.	33N	GS	3.7	...	4.0ML(PM)	...	MAY 18	05:25	AST
MAY 19	04	31	19.9	60.329N.	147.922W.	88	GS	...	...	...	...	MAY 18	18:31	AST
MAY 19	17	48	35.6	51.392N.	174.094W.	31	GS	5.0	...	...	...	MAY 19	06:48	BST
MAY 20	06	09	14.3	53.040N.	173.802W.	204	GS	4.7	...	...	...	MAY 19	19:09	BST
MAY 21	08	13	45.7	63.191N.	150.480W.	148	GS	...	...	...	...	MAY 20	22:13	AST
MAY 22	04	04	13.2	51.269N.	172.550W.	33N	GS	4.0	...	3.6ML(PM)	...	MAY 21	17:04	BST
MAY 22	08	35	58.0	63.324N.	151.028W.	33N	GS	...	...	3.2ML(PM)	...	MAY 21	22:35	AST
MAY 24	02	45	21.2	62.260N.	151.225W.	112	GS	...	...	...	...	MAY 23	16:45	AST
MAY 25	10	39	55.2	52.459N.	174.104E.	66	GS	4.7	...	...	V	MAY 24	23:39	BST
MAY 28	19	35	53.1	59.422N.	152.746W.	108	GS	4.2	...	...	...	MAY 28	09:35	AST
MAY 28	23	05	57.2	59.630N.	152.639W.	127	GS	...	...	...	...	MAY 28	13:05	AST
MAY 30	08	47	52.8	63.203N.	150.859W.	147	GS	3.7	...	...	...	MAY 29	22:47	AST
MAY 30	09	55	31.4	62.435N.	148.184W.	33N	GS	...	...	3.3ML(PM)	...	MAY 29	23:55	AST
MAY 30	15	54	31.1	52.059N.	177.901W.	109	GS	5.0	...	...	...	MAY 30	04:54	BST
JUNE 1	07	10	00.2	51.680N.	171.237W.	31	GS	4.2	...	...	...	MAY 31	20:10	BST
JUNE 1	07	30	33.5	51.672N.	171.289W.	32	GS	4.8	...	...	...	MAY 31	20:30	BST
JUNE 2	16	57	32.3	59.926N.	152.288W.	77	GS	3.7	...	...	...	JUNE 2	06:57	AST
JUNE 3	01	30	04.3	51.179N.	177.170W.	55	GS	4.6	...	...	...	JUNE 2	14:30	BST
JUNE 3	04	10	35.8	64.262N.	151.682W.	10	GS	...	...	3.1ML(PM)	...	JUNE 2	18:10	AST
JUNE 3	13	54	31.3	60.044N.	146.438W.	33N	GS	...	...	3.9ML(PM)	...	JUNE 3	03:54	AST
JUNE 3	21	25	46.5	63.912N.	148.930W.	10	GS	...	...	3.3ML(PM)	...	JUNE 3	11:25	AST
JUNE 4	03	01	45.1	61.408N.	146.534W.	67	GS	...	...	3.9ML(PM)	...	JUNE 3	17:01	AST
JUNE 5	21	48	07.2	60.437N.	147.697W.	19	GM	4.7	...	4.4ML(PM)	...	JUNE 5	11:48	AST
JUNE 9	02	02	00.6	51.281N.	179.226E.	46	GS	4.9	...	...	...	JUNE 8	15:02	BST
JUNE 9	18	46	00.9	51.414N.	174.111W.	21	GS	6.2	5.8	...	III	JUNE 9	07:46	BST
JUNE 9	22	15	43.4	59.260N.	152.843W.	83	GM	4.7	...	3.9MD(GM)	III	JUNE 9	12:15	AST
JUNE 11	13	14	30.4	57.624N.	153.469W.	48	GS	4.1	...	3.5ML(PM)	...	JUNE 11	03:14	AST
JUNE 12	23	16	44.4	62.845N.	149.678W.	92	GS	...	...	...	...	JUNE 12	13:16	AST
JUNE 13	02	58	40.1	62.477N.	148.960W.	41	GS	...	...	3.0ML(PM)	...	JUNE 12	16:58	AST
JUNE 14	06	52	11.0	62.535N.	147.812W.	72	GS	4.0	...	3.9ML(PM)	...	JUNE 13	20:52	AST
JUNE 14	15	50	52.7	52.348N.	174.913W.	51	GS	4.7	...	...	...	JUNE 14	04:50	BST
JUNE 15	08	50	52.1	59.868N.	152.273W.	98	GS	...	...	...	...	JUNE 14	22:50	AST
JUNE 15	19	40	28.1	56.660N.	153.155W.	33N	GS	5.2	4.4	5.2ML(PM)	...	JUNE 15	09:40	AST
JUNE 16	21	19	25.2	60.065N.	151.742W.	85	GM	4.8	...	4.0MD(GM)	...	JUNE 16	11:19	AST
JUNE 17	09	35	09.0	63.279N.	151.615W.	30	GS	3.6	...	4.3ML(PM)	...	JUNE 16	23:35	AST
JUNE 19	06	23	33.2	62.477N.	149.613W.	84	GS	...	...	...	...	JUNE 18	20:23	AST
JUNE 19	10	11	42.0	57.494N.	155.037W.	112	GS	...	...	...	...	JUNE 19	00:11	AST
JUNE 19	10	18	32.7	61.389N.	151.180W.	95	GS	...	...	...	...	JUNE 19	00:18	AST
JUNE 19	15	06	18.1	58.591N.	153.115W.	65	GS	3.7	...	3.5ML(PM)	...	JUNE 19	05:06	AST
JUNE 20	16	46	06.3	64.663N.	146.948W.	33N	GS	...	...	...	...	JUNE 20	06:46	AST
JUNE 22	00	04	17.2	57.081N.	150.805W.	33N	GS	...	...	3.6ML(PM)	...	JUNE 21	14:04	AST
JUNE 22	17	34	51.6	51.073N.	176.060W.	33N	GS	4.0	...	...	...	JUNE 22	06:34	BST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
ALASKA--Continued														
JUNE 22	18	00	25.7	59.029N.	139.471W.	15	GS	4.0	...	...	...	JUNE 22	09:00	YST
JUNE 23	01	45	06.2	51.291N.	178.881W.	58	GS	4.8	...	4.3ML(PM)	...	JUNE 22	14:45	BST
JUNE 24	21	41	34.9	63.194N.	150.212W.	130	GS	...	...	...	...	JUNE 24	11:41	AST
JUNE 25	06	44	16.2	52.842N.	165.780W.	90	GS	4.8	...	4.4ML(PM)	...	JUNE 24	19:44	BST
JUNE 25	09	41	29.5	55.416N.	156.864W.	33N	GS	4.7	...	4.4ML(PM)	...	JUNE 24	23:41	AST
JUNE 26	04	48	31.5	51.357N.	174.211W.	38	GS	4.6	...	4.6ML(PM)	...	JUNE 25	17:48	BST
JUNE 26	04	50	59.0	51.412N.	174.194W.	33N	GS	4.7	...	...	...	JUNE 25	17:50	BST
JUNE 26	20	46	11.9	52.587N.	173.186E.	49	GS	4.8	...	...	...	JUNE 26	09:46	BST
JUNE 27	08	12	24.2	60.225N.	150.937W.	65	GM	4.3	...	3.6MD(GM)	IV	JUNE 26	22:12	AST
JUNE 28	03	25	17.6	60.182N.	141.253W.	12	GM	6.0	5.4	5.9ML(PM)	IV	JUNE 27	17:25	AST
JUNE 28	19	35	53.3	62.870N.	149.229W.	33N	GS	...	...	2.5ML(PM)	...	JUNE 28	09:35	AST
JUNE 29	16	17	38.1	51.266N.	179.081E.	49	GS	4.9	4.5	4.5ML(PM)	...	JUNE 29	05:17	BST
JUNE 29	20	10	59.2	66.838N.	153.913W.	10	GS	...	...	...	...	JUNE 29	10:10	AST
JUNE 30	11	51	56.9	52.559N.	173.245E.	33N	GS	4.9	...	4.3ML(PM)	III	JUNE 30	00:51	BST
JULY 4	15	06	58.2	60.104N.	140.755W.	15	GS	3.6	...	...	...	JULY 4	06:06	YST
JULY 7	05	17	45.9	52.217N.	172.220E.	33N	GS	4.5	...	...	...	JULY 6	18:17	BST
JULY 8	08	18	55.6	61.520N.	150.071W.	41	GS	...	...	2.5ML(PM)	...	JULY 7	22:18	AST
JULY 8	14	50	17.0	65.656N.	152.968W.	33N	GS	...	...	2.5ML(PM)	...	JULY 8	04:50	AST
JULY 9	05	48	04.5	57.079N.	153.351W.	33N	GS	4.5	...	...	...	JULY 8	19:48	AST
JULY 9	07	57	41.0	59.993N.	141.154W.	15	GS	...	...	4.0ML(PM)	...	JULY 8	21:57	AST
JULY 12	15	10	03.7	61.035N.	147.185W.	30	GM	6.1	6.4	6.4ML(PM)	VI	JULY 12	05:10	AST
JULY 12	15	33	03.2	60.942N.	147.299W.	33N	GS	...	...	3.8ML(PM)	III	JULY 12	05:33	AST
JULY 12	15	42	52.7	60.925N.	147.312W.	33N	GS	...	...	3.3ML(PM)	...	JULY 12	05:42	AST
JULY 12	16	20	45.1	60.900N.	147.317W.	33N	GS	...	...	3.0ML(PM)	...	JULY 12	06:20	AST
JULY 12	17	31	24.1	59.924N.	152.855W.	107	GS	4.2	...	...	II	JULY 12	07:31	AST
JULY 12	19	04	14.2	60.968N.	147.330W.	33N	GS	...	...	3.5ML(PM)	...	JULY 12	09:04	AST
JULY 12	20	21	29.0	60.902N.	147.355W.	33N	GS	...	...	3.4ML(PM)	...	JULY 12	10:21	AST
JULY 13	03	50	06.8	60.924N.	147.355W.	33N	GS	...	...	3.8ML(PM)	...	JULY 12	17:50	AST
JULY 13	04	43	04.5	60.941N.	147.197W.	33N	GS	...	...	3.0ML(PM)	...	JULY 12	18:43	AST
JULY 13	07	45	15.1	60.893N.	147.196W.	33N	GS	...	...	3.0ML(PM)	...	JULY 12	21:45	AST
JULY 13	10	27	38.8	62.452N.	151.001W.	33N	GS	...	...	3.1ML(PM)	...	JULY 13	00:27	AST
JULY 13	11	33	48.8	60.965N.	147.174W.	33N	GS	...	...	3.0ML(PM)	...	JULY 13	01:33	AST
JULY 13	18	06	13.0	60.877N.	147.263W.	33N	GS	...	...	3.0ML(PM)	...	JULY 13	08:06	AST
JULY 14	01	02	26.1	64.006N.	149.252W.	24	GS	...	...	3.0ML(PM)	...	JULY 13	15:02	AST
JULY 15	03	55	54.0	52.290N.	176.889W.	130	GS	5.0	...	...	FELT	JULY 14	16:55	BST
JULY 15	07	49	00.1	60.240N.	140.883W.	14	GM	5.1	4.1	4.6ML(PM)	III	JULY 14	22:48	YST
JULY 15	11	42	57.2	60.056N.	141.001W.	12	GS	...	...	3.6ML(PM)	FELT	JULY 15	01:42	AST
JULY 16	15	12	19.1	61.962N.	149.509W.	70	GS	...	...	3.2ML(PM)	...	JULY 16	05:12	AST
JULY 16	21	50	27.4	61.747N.	147.639W.	53	GS	...	...	3.8ML(PM)	...	JULY 16	11:50	AST
JULY 17	13	12	29.5	60.865N.	147.225W.	33N	GS	...	...	3.1ML(PM)	...	JULY 17	03:12	AST
JULY 17	16	53	32.1	60.168N.	153.291W.	167	GS	...	...	...	...	JULY 17	06:53	AST
JULY 18	16	44	29.4	63.034N.	150.670W.	136	GS	...	...	...	...	JULY 18	06:44	AST
JULY 20	09	28	16.5	62.345N.	151.196W.	88	GS	...	...	...	...	JULY 19	23:28	AST
JULY 20	14	13	04.7	60.493N.	147.497W.	33N	GS	...	...	3.0ML(PM)	...	JULY 20	04:13	AST
JULY 20	16	07	37.8	61.465N.	152.129W.	136	GS	4.2	...	...	...	JULY 20	06:07	AST
JULY 20	20	11	30.1	60.903N.	147.274W.	33N	GS	...	...	3.3ML(PM)	...	JULY 20	10:11	AST
JULY 21	17	35	16.6	58.077N.	152.940W.	99	GM	4.9	...	4.6ML(PM)	III	JULY 21	07:35	AST
JULY 22	06	02	04.1	60.985N.	147.061W.	33N	GS	...	...	2.9ML(PM)	...	JULY 21	20:02	AST
JULY 22	06	55	49.5	50.767N.	179.854W.	66	GS	4.3	...	4.2ML(PM)	...	JULY 21	19:55	BST
JULY 22	12	50	16.9	60.858N.	147.020W.	33N	GS	...	...	3.0ML(PM)	...	JULY 22	02:50	AST
JULY 22	21	08	30.9	66.523N.	148.333W.	33N	GS	...	...	3.5ML(PM)	...	JULY 22	11:08	AST
JULY 25	19	45	09.6	61.655N.	150.449W.	48	GS	...	...	2.9ML(PM)	...	JULY 25	09:45	AST
JULY 25	23	34	16.7	61.271N.	152.327W.	136	GS	...	...	...	...	JULY 25	13:34	AST
JULY 26	08	36	59.8	53.082N.	174.790W.	226	GS	4.3	...	...	...	JULY 25	21:36	BST
JULY 26	08	38	35.5	62.353N.	151.025W.	86	GS	...	...	...	...	JULY 25	22:38	AST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
ALASKA--Continued														
JULY 26	12	45	34.7	59.029N.	151.282W.	33N	GS	...	...	3.3ML(PM)	...	JULY 26	02:45	AST
JULY 27	13	55	10.4	62.032N.	149.414W.	48	GS	...	...	3.1ML(PM)	...	JULY 27	03:55	AST
JULY 28	16	51	21.8	60.507N.	146.646W.	33N	GS	...	...	3.0ML(PM)	...	JULY 28	06:51	AST
JULY 29	04	36	15.2	60.242N.	152.779W.	140	GS	4.3	...	...	...	JULY 28	18:36	AST
JULY 30	08	09	52.0	52.374N.	170.596W.	50	GS	5.1	4.2	...	...	JULY 29	21:09	BST
JULY 31	00	05	31.9	61.857N.	146.645W.	56	GS	...	...	3.7ML(PM)	...	JULY 30	14:05	AST
JULY 31	02	24	07.2	57.058N.	155.322W.	53	GS	4.4	4.5	4.4ML(PM)	...	JULY 30	16:24	AST
JULY 31	16	11	03.3	54.352N.	133.594W.	10	GS	4.8	4.1	...	...	JULY 31	08:11	PST
AUG. 1	09	13	03.8	61.166N.	147.382W.	31	GS	...	...	2.9ML(PM)	...	JULY 31	23:13	AST
AUG. 2	11	31	20.7	60.093N.	153.291W.	143	GS	...	...	...	...	AUG. 2	01:31	AST
AUG. 4	04	07	18.9	60.870N.	147.349W.	33N	GS	4.4	3.6	4.0ML(PM)	FELT	AUG. 3	18:07	AST
AUG. 4	17	16	54.2	60.861N.	147.304W.	33N	GS	...	...	3.1ML(PM)	...	AUG. 4	07:16	AST
AUG. 4	23	38	34.6	61.404N.	157.875W.	33N	GS	...	...	4.0ML(PM)	...	AUG. 4	13:38	AST
AUG. 4	23	45	23.2	58.135N.	154.449W.	102	GS	...	...	...	...	AUG. 4	13:45	AST
AUG. 5	03	10	43.4	67.107N.	155.478W.	33N	GS	...	...	3.2ML(PM)	FELT	AUG. 4	17:10	AST
AUG. 5	21	23	38.7	61.728N.	147.468W.	35	GM	4.2	...	4.5ML(PM)	IV	AUG. 5	11:23	AST
AUG. 6	16	34	00.5	60.400N.	152.892W.	129	GM	5.4	...	4.7MD(GM)	IV	AUG. 6	06:33	AST
AUG. 7	14	13	43.9	63.496N.	150.414W.	33N	GS	...	...	3.5ML(PM)	...	AUG. 7	04:13	AST
AUG. 7	15	17	00.1	59.680N.	152.050W.	100	GS	4.3	...	...	...	AUG. 7	05:17	AST
AUG. 8	04	37	37.8	54.806N.	159.669W.	11	LD	4.7	...	4.6ML(PM)	...	AUG. 7	18:37	AST
AUG. 9	07	16	19.5	59.719N.	150.872W.	76	GS	...	...	...	...	AUG. 8	21:16	AST
AUG. 9	13	35	03.3	61.151N.	147.049W.	96	GS	...	...	...	...	AUG. 9	03:35	AST
AUG. 9	15	58	23.0	60.162N.	147.100W.	39	GM	5.0	...	4.4ML(PM)	...	AUG. 9	05:58	AST
AUG. 10	00	55	58.1	56.495N.	152.693W.	33N	GS	5.1	4.1	4.8ML(PM)	...	AUG. 9	14:55	AST
AUG. 11	11	19	04.1	68.172N.	144.494W.	33N	GS	...	...	3.8ML(PM)	...	AUG. 11	01:19	AST
AUG. 12	15	53	47.4	60.068N.	153.334W.	164	GS	...	...	...	...	AUG. 12	05:53	AST
AUG. 13	17	11	42.2	59.557N.	143.983W.	33N	GS	...	...	3.4ML(PM)	...	AUG. 13	07:11	AST
AUG. 14	03	50	47.4	65.270N.	149.976W.	20	GS	...	...	3.1ML(PM)	...	AUG. 13	17:50	AST
AUG. 18	08	37	02.0	62.627N.	155.083W.	33N	GS	...	...	3.0ML(PM)	...	AUG. 17	22:37	AST
AUG. 19	04	59	32.7	60.138N.	152.807W.	98	GM	4.7	...	4.2MD(GM)	III	AUG. 18	18:59	AST
AUG. 19	08	07	21.4	60.641N.	149.955W.	25	GS	...	...	3.5ML(PM)	II	AUG. 18	22:07	AST
AUG. 19	19	05	20.6	62.769N.	148.997W.	92	GS	4.4	...	...	II	AUG. 19	09:05	AST
AUG. 19	20	50	57.4	54.036N.	161.090W.	11	LD	4.4	...	3.6ML(LD)	...	AUG. 19	10:50	AST
AUG. 21	00	22	07.4	59.746N.	152.716W.	110	GS	...	...	...	...	AUG. 20	14:22	AST
AUG. 21	20	47	43.1	60.208N.	151.616W.	88	GS	...	...	...	...	AUG. 21	10:47	AST
AUG. 22	08	13	30.2	51.736N.	176.734E.	33N	GS	4.8	...	4.5ML(PM)	...	AUG. 21	21:13	BST
AUG. 22	10	53	55.2	60.084N.	152.585W.	116	GS	...	...	...	FELT	AUG. 22	00:53	AST
AUG. 23	02	01	47.2	62.427N.	149.594W.	89	GS	...	...	...	...	AUG. 22	16:01	AST
AUG. 25	11	59	22.6	61.655N.	149.723W.	42	GS	...	...	2.8ML(PM)	FELT	AUG. 25	01:59	AST
AUG. 26	22	22	24.5	60.904N.	147.205W.	33N	GS	...	...	3.3ML(PM)	...	AUG. 26	12:22	AST
AUG. 28	12	05	10.1	53.509N.	163.312W.	20	LD	4.9	...	3.9ML(LD)	...	AUG. 28	01:05	BST
AUG. 28	21	47	12.0	62.774N.	149.344W.	33N	GS	...	...	3.2ML(PM)	...	AUG. 28	11:47	AST
AUG. 29	06	36	36.5	59.846N.	153.267W.	133	GS	...	...	...	...	AUG. 28	20:36	AST
AUG. 31	22	20	07.4	53.505N.	163.605W.	33N	GS	5.1	4.2	...	...	AUG. 31	11:20	BST
SEPT. 2	04	09	39.8	52.340N.	175.491W.	115	GS	4.7	...	...	...	SEPT. 1	17:09	BST
SEPT. 3	20	42	03.8	59.634N.	153.017W.	113	GS	...	...	...	...	SEPT. 3	10:42	AST
SEPT. 4	00	49	26.8	59.942N.	145.818W.	18	GS	...	...	3.3ML(PM)	...	SEPT. 3	14:49	AST
SEPT. 6	03	34	45.8	60.208N.	149.465W.	67	GS	...	...	3.3ML(PM)	...	SEPT. 5	17:34	AST
SEPT. 6	03	56	07.8	52.460N.	170.641W.	62	GS	4.8	...	...	...	SEPT. 5	16:56	BST
SEPT. 6	04	01	52.1	53.827N.	163.886W.	1	LD	5.1	...	5.0ML(LD)	...	SEPT. 5	17:01	BST
SEPT. 7	19	22	05.0	60.978N.	147.320W.	30	GM	6.2	6.2	...	VI	SEPT. 7	09:22	AST
SEPT. 7	21	36	20.6	60.895N.	147.368W.	33N	GS	...	...	3.7ML(PM)	...	SEPT. 7	11:36	AST
SEPT. 7	22	22	10.6	61.010N.	147.307W.	27	GM	5.0	...	4.6ML(PM)	FELT	SEPT. 7	12:22	AST
SEPT. 8	00	39	28.3	60.829N.	147.344W.	33N	GS	...	...	3.4ML(PM)	...	SEPT. 7	14:39	AST
SEPT. 8	02	23	24.3	60.838N.	147.439W.	33N	GS	...	...	3.6ML(PM)	...	SEPT. 7	16:23	AST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
ALASKA--Continued														
SEPT. 8	02	51	22.2	60.906N.	147.325W.	33N	GS	...	...	...	...	SEPT. 7	16:51	AST
SEPT. 8	03	21	23.6	60.860N.	147.188W.	33N	GS	...	...	3.0ML(PM)	...	SEPT. 7	17:21	AST
SEPT. 8	08	23	21.9	60.928N.	147.163W.	33N	GS	...	...	3.9ML(PM)	...	SEPT. 7	22:23	AST
SEPT. 8	09	45	46.2	60.765N.	147.758W.	33N	GS	...	...	3.2ML(PM)	...	SEPT. 7	23:45	AST
SEPT. 8	15	50	05.7	60.860N.	147.313W.	33N	GS	...	...	3.3ML(PM)	...	SEPT. 8	05:50	AST
SEPT. 9	00	30	16.1	60.094N.	146.430W.	33N	GS	...	...	3.3ML(PM)	...	SEPT. 8	14:30	AST
SEPT. 9	02	37	20.8	60.082N.	146.448W.	33N	GS	...	...	3.3ML(PM)	...	SEPT. 8	16:37	AST
SEPT. 9	05	13	42.4	60.865N.	147.350W.	33N	GS	...	...	3.2ML(PM)	...	SEPT. 8	19:13	AST
SEPT. 9	09	14	32.1	60.855N.	147.411W.	33N	GS	...	...	3.4ML(PM)	...	SEPT. 8	23:14	AST
SEPT. 10	09	12	38.2	60.914N.	147.390W.	33N	GS	4.2	...	3.9ML(PM)	...	SEPT. 9	23:12	AST
SEPT. 10	14	07	11.5	59.258N.	153.744W.	134	GS	...	...	...	...	SEPT. 10	04:07	AST
SEPT. 10	18	20	30.2	52.355N.	168.293W.	33N	GS	4.3	...	...	...	SEPT. 10	07:20	BST
SEPT. 11	00	52	36.6	61.757N.	141.333W.	15	GS	...	...	3.2ML(PM)	...	SEPT. 10	14:52	AST
SEPT. 11	13	50	59.7	52.187N.	170.685W.	33N	GS	5.0	4.7	4.8ML(PM)	...	SEPT. 11	02:50	BST
SEPT. 11	14	17	18.2	60.756N.	147.154W.	33N	GS	...	...	3.2ML(PM)	...	SEPT. 11	04:17	AST
SEPT. 11	22	58	30.5	60.855N.	147.329W.	33N	GS	...	...	3.3ML(PM)	...	SEPT. 11	12:58	AST
SEPT. 12	03	18	29.4	61.207N.	147.526W.	33N	GS	...	...	3.0ML(PM)	...	SEPT. 11	17:18	AST
SEPT. 12	07	20	28.7	53.283N.	163.386W.	4	LD	...	...	3.5ML(LD)	...	SEPT. 11	20:20	BST
SEPT. 12	11	46	10.2	60.890N.	147.267W.	33N	GS	...	...	3.2ML(PM)	...	SEPT. 12	01:46	AST
SEPT. 12	14	28	19.8	60.896N.	147.300W.	33N	GS	...	...	3.5ML(PM)	FELT	SEPT. 12	04:28	AST
SEPT. 13	02	25	25.5	60.844N.	147.146W.	33N	GS	...	...	3.0ML(PM)	...	SEPT. 12	16:25	AST
SEPT. 13	09	24	25.0	60.909N.	147.227W.	33N	GS	...	...	3.3ML(PM)	...	SEPT. 12	23:24	AST
SEPT. 13	10	49	03.7	60.906N.	147.327W.	33N	GS	...	...	3.5ML(PM)	...	SEPT. 13	00:49	AST
SEPT. 13	23	33	36.9	59.934N.	140.852W.	15	GS	3.9	...	4.4ML(PM)	...	SEPT. 13	14:33	YST
SEPT. 14	00	31	57.3	54.640N.	159.946W.	34	LD	4.7	...	4.3ML(PM)	...	SEPT. 13	14:31	AST
SEPT. 14	00	39	38.6	59.890N.	140.847W.	15	GS	3.7	...	4.3ML(PM)	...	SEPT. 13	15:39	YST
SEPT. 14	02	35	10.8	60.960N.	147.267W.	30	GM	4.9	...	4.6ML(PM)	FELT	SEPT. 13	16:35	AST
SEPT. 14	11	25	02.7	59.969N.	152.868W.	185	GS	4.0	...	...	FELT	SEPT. 14	01:25	AST
SEPT. 14	22	32	35.8	63.153N.	150.504W.	124	GS	...	...	...	...	SEPT. 14	12:32	AST
SEPT. 15	21	27	21.7	60.297N.	147.682W.	33N	GS	...	...	3.3ML(PM)	...	SEPT. 15	11:27	AST
SEPT. 16	02	59	09.8	61.487N.	146.257W.	33N	GS	...	...	4.1ML(PM)	...	SEPT. 15	16:59	AST
SEPT. 16	03	22	50.9	61.092N.	147.482W.	0	GS	...	...	...	...	SEPT. 15	17:22	AST
SEPT. 16	22	52	57.2	60.572N.	149.821W.	63	GS	...	...	3.5ML(PM)	FELT	SEPT. 16	12:52	AST
SEPT. 17	00	37	19.5	63.506N.	150.068W.	134	GS	...	...	...	...	SEPT. 16	14:37	AST
SEPT. 17	05	36	19.7	62.006N.	149.020W.	18	GS	...	...	3.0ML(PM)	...	SEPT. 16	19:36	AST
SEPT. 17	23	46	25.0	58.161N.	151.570W.	33N	GS	...	...	3.3ML(PM)	...	SEPT. 17	13:46	AST
SEPT. 18	15	45	22.5	60.874N.	147.351W.	33N	GS	...	...	3.6ML(PM)	...	SEPT. 18	05:45	AST
SEPT. 19	05	40	13.1	63.153N.	150.573W.	161	GS	...	...	...	...	SEPT. 18	19:40	AST
SEPT. 19	14	27	43.8	63.141N.	150.903W.	146	GS	...	...	...	...	SEPT. 19	04:27	AST
SEPT. 21	19	28	30.2	59.339N.	153.769W.	33N	GS	...	...	3.7ML(PM)	...	SEPT. 21	09:28	AST
SEPT. 21	22	50	48.2	60.252N.	152.468W.	103	GM	4.8	...	4.1MD(GM)	IV	SEPT. 21	12:50	AST
SEPT. 22	04	33	53.9	60.045N.	152.598W.	118	GS	...	...	...	...	SEPT. 21	18:33	AST
SEPT. 22	16	21	45.3	56.304N.	153.843W.	33N	GS	5.0	...	4.9ML(PM)	...	SEPT. 22	06:21	AST
SEPT. 23	06	25	14.9	59.857N.	152.025W.	33N	GS	...	...	3.3ML(PM)	...	SEPT. 22	20:25	AST
SEPT. 23	15	15	58.0	52.968N.	165.477W.	11	LD	...	...	3.5ML(LD)	...	SEPT. 23	04:15	BST
SEPT. 24	16	30	05.0	53.639N.	163.847W.	33N	GS	4.9	...	...	...	SEPT. 24	05:30	BST
SEPT. 24	22	53	41.3	63.169N.	149.863W.	105	GS	...	...	...	...	SEPT. 24	12:53	AST
SEPT. 25	09	55	16.5	52.384N.	178.678W.	197	GS	4.7	...	...	...	SEPT. 24	22:55	BST
SEPT. 26	23	52	52.9	57.445N.	156.395W.	85	GS	5.4	...	...	...	SEPT. 26	13:52	AST
SEPT. 28	13	40	05.9	51.370N.	179.684W.	33N	GS	4.6	...	4.3ML(PM)	...	SEPT. 28	02:40	BST
SEPT. 28	14	07	19.8	50.797N.	171.089W.	33N	GS	5.1	...	4.7ML(PM)	...	SEPT. 28	03:07	BST
SEPT. 30	06	38	55.8	60.974N.	147.230W.	33N	GS	...	...	3.0ML(PM)	...	SEPT. 29	20:38	AST
SEPT. 30	21	05	03.8	56.973N.	156.995W.	112	GS	...	...	...	...	SEPT. 30	11:05	AST
OCT. 5	04	21	51.7	57.431N.	153.652W.	88	GS	...	...	...	...	OCT. 4	18:21	AST
OCT. 5	09	55	30.7	64.700N.	160.558W.	33N	GS	...	...	3.9ML(PM)	...	OCT. 4	23:55	AST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
ALASKA-Continued														
OCT. 6	02	35	17.1	63.001N.	151.182W.	137	GS	...	...	...	...	OCT. 5	16:35	AST
OCT. 6	11	10	12.8	62.355N.	151.193W.	97	GM	5.4	...	4.7MD(GM)	IV	OCT. 6	01:10	AST
OCT. 7	04	31	47.4	59.063N.	153.911W.	111	GS	...	...	...	...	OCT. 6	18:31	AST
OCT. 9	03	32	10.8	60.832N.	147.334W.	16	GS	...	...	3.1ML(PM)	...	OCT. 8	17:32	AST
OCT. 10	09	28	25.6	60.869N.	147.325W.	33N	GS	...	...	3.2ML(PM)	...	OCT. 9	23:28	AST
OCT. 10	10	24	06.1	60.252N.	141.017W.	8	GM	4.9	...	3.3MD(GM)	...	OCT. 10	01:24	YST
OCT. 10	16	51	51.6	51.063N.	178.073W.	50	GS	5.0	...	...	...	OCT. 10	05:51	BST
OCT. 10	19	15	32.4	51.127N.	178.075W.	50	GS	4.7	...	...	...	OCT. 10	08:15	BST
OCT. 12	21	00	54.0	61.029N.	147.879W.	38	GS	3.7	...	4.3ML(PM)	III	OCT. 12	11:00	AST
OCT. 13	04	30	17.4	59.630N.	152.077W.	63	GM	4.6	...	3.7MD(GM)	V	OCT. 12	18:30	AST
OCT. 13	11	22	44.1	60.695N.	151.127W.	76	GS	...	...	...	...	OCT. 13	01:22	AST
OCT. 14	17	26	38.9	61.850N.	149.525W.	38	GM	4.8	...	4.3ML(PM)	III	OCT. 14	07:26	AST
OCT. 18	12	25	47.3	61.425N.	146.645W.	51	GS	4.2	...	4.4ML(PM)	II	OCT. 18	02:25	AST
OCT. 20	10	04	11.2	61.478N.	151.598W.	105	GS	...	...	...	...	OCT. 20	00:04	AST
OCT. 20	12	12	47.5	50.971N.	178.653W.	57	GS	4.6	...	4.4ML(PM)	...	OCT. 20	01:12	BST
OCT. 21	01	37	44.3	60.820N.	152.776W.	33N	GS	...	...	3.0ML(PM)	...	OCT. 20	15:37	AST
OCT. 22	01	11	44.7	60.919N.	147.409W.	23	GS	...	...	3.8ML(PM)	...	OCT. 21	15:11	AST
OCT. 22	04	54	52.2	55.075N.	160.439W.	55	LD	...	...	3.8ML(LD)	...	OCT. 21	18:54	AST
OCT. 23	17	09	16.5	63.394N.	149.856W.	121	GS	...	...	...	...	OCT. 23	07:09	AST
OCT. 24	11	32	54.0	58.609N.	155.026W.	151	GS	...	...	...	...	OCT. 24	01:32	AST
OCT. 24	13	54	08.8	52.510N.	168.441W.	33N	GS	...	...	4.5ML(PM)	III	OCT. 24	02:54	BST
OCT. 27	18	06	19.2	63.167N.	150.607W.	137	GS	...	...	...	...	OCT. 27	08:06	AST
OCT. 28	01	13	59.9	63.954N.	148.917W.	7	GS	...	...	3.0ML(PM)	...	OCT. 27	15:13	AST
OCT. 28	04	09	36.0	51.416N.	176.377E.	33N	GS	...	...	4.3ML(PM)	...	OCT. 27	17:09	BST
OCT. 29	15	26	58.8	61.058N.	151.110W.	84	GS	...	...	...	...	OCT. 29	05:26	AST
OCT. 31	01	20	11.9	62.118N.	150.701W.	94	GS	...	...	...	FELT	OCT. 30	16:20	YST
NOV. 2	15	33	22.4	64.848N.	149.032W.	10	GS	...	...	3.0ML(PM)	...	NOV. 2	06:33	YST
NOV. 3	00	36	20.9	52.730N.	166.587W.	33N	GS	4.5	...	4.4ML(PM)	...	NOV. 2	15:36	AST
NOV. 3	01	20	47.2	62.042N.	151.370W.	111	GS	...	...	...	...	NOV. 2	16:20	YST
NOV. 3	13	05	38.2	60.911N.	147.245W.	33N	GS	...	...	...	...	NOV. 3	04:05	YST
NOV. 3	13	07	30.6	67.302N.	149.714W.	33N	GS	...	...	3.2ML(PM)	III	NOV. 3	04:07	YST
NOV. 4	05	41	20.5	65.739N.	167.785W.	33N	GS	...	...	3.7ML(PM)	III	NOV. 3	20:41	YST
NOV. 4	07	55	15.7	65.725N.	167.941W.	33N	GS	...	...	4.2ML(PM)	IV	NOV. 3	22:55	YST
NOV. 4	19	01	36.7	52.253N.	168.289W.	33N	GS	5.3	4.6	4.8ML(PM)	...	NOV. 4	10:01	AST
NOV. 4	19	18	05.4	52.357N.	168.270W.	33N	GS	4.8	...	...	...	NOV. 4	10:18	AST
NOV. 6	06	54	51.2	59.940N.	141.730W.	11	GM	4.6	...	4.0ML(PM)	...	NOV. 5	21:54	YST
NOV. 7	22	06	19.3	53.046N.	161.773W.	8	LD	...	...	3.9ML(LD)	...	NOV. 7	13:06	YST
NOV. 8	21	05	43.4	61.328N.	150.833W.	33N	GS	...	...	...	...	NOV. 8	12:05	YST
NOV. 9	10	52	13.8	63.035N.	150.510W.	111	GS	...	...	...	...	NOV. 9	01:52	YST
NOV. 9	16	02	32.2	54.542N.	160.725W.	4	LD	4.9	...	4.6ML(PM)	...	NOV. 9	07:02	YST
NOV. 10	04	31	15.5	63.311N.	149.758W.	130	GS	4.3	...	...	...	NOV. 9	19:31	YST
NOV. 10	20	11	08.1	51.278N.	170.354W.	33N	GS	...	...	...	...	NOV. 10	10:11	AST
NOV. 11	22	47	53.7	52.491N.	170.639W.	59	GS	5.1	...	...	...	NOV. 11	12:47	AST
NOV. 12	05	59	46.7	51.377N.	170.773W.	33N	GS	4.3	...	4.1ML(PM)	...	NOV. 11	19:59	AST
NOV. 12	07	39	11.0	64.521N.	147.266W.	5	GS	...	...	...	...	NOV. 11	22:39	YST
NOV. 12	07	40	37.5	64.536N.	147.206W.	5	GS	...	...	3.7ML(PM)	FELT	NOV. 11	22:40	YST
NOV. 12	07	43	23.8	59.842N.	146.250W.	33N	GS	...	...	3.0ML(PM)	...	NOV. 11	22:43	YST
NOV. 13	02	05	59.4	60.884N.	147.465W.	33N	GS	...	...	3.2ML(PM)	...	NOV. 12	17:05	YST
NOV. 14	18	42	34.7	64.783N.	147.322W.	33N	GS	...	...	2.7ML(PM)	FELT	NOV. 14	09:42	YST
NOV. 17	09	36	29.5	51.649N.	176.805W.	59	GS	4.6	...	...	III	NOV. 16	23:36	AST
NOV. 17	11	27	11.3	53.411N.	163.352W.	2	LD	5.0	4.0	4.2ML(LD)	...	NOV. 17	02:27	YST
NOV. 17	23	29	44.3	59.949N.	149.009W.	33N	GS	4.0	...	3.7ML(PM)	...	NOV. 17	14:29	YST
NOV. 18	03	56	19.8	53.261N.	168.711W.	104	GS	4.4	...	...	...	NOV. 17	17:56	AST
NOV. 18	18	06	03.6	59.906N.	148.914W.	56	GS	4.0	...	3.8ML(PM)	...	NOV. 18	09:06	YST
NOV. 19	08	07	26.9	63.551N.	149.824W.	116	GS	...	...	...	...	NOV. 18	23:07	YST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
ALASKA-Continued														
NOV. 20	08	29	36.8	55.080N.	157.665W.	31	LD	5.1	4.0	4.8ML(PM)	...	NOV. 19	23:29	YST
NOV. 20	08	35	42.1	55.057N.	157.439W.	23	LD	...	...	4.1ML(LD)	...	NOV. 19	23:35	YST
NOV. 23	00	02	26.9	51.631N.	175.511W.	62	GS	4.8	...	...	...	NOV. 22	14:02	AST
NOV. 23	19	46	10.9	58.917N.	153.430W.	82	GM	4.6	...	3.5MD(GM)	...	NOV. 23	10:46	YST
NOV. 24	06	50	33.5	56.386N.	152.189W.	33N	GS	5.0	...	4.7ML(PM)	III	NOV. 23	21:50	YST
NOV. 24	06	51	44.9	56.442N.	152.339W.	33N	GS	5.3	...	...	...	NOV. 23	21:51	YST
NOV. 24	06	56	48.4	56.429N.	152.498W.	33N	GS	5.1	...	4.7ML(PM)	III	NOV. 23	21:56	YST
NOV. 24	07	02	32.8	56.462N.	152.539W.	33N	GS	5.0	...	4.2ML(PM)	...	NOV. 23	22:02	YST
NOV. 24	07	04	47.6	56.541N.	152.260W.	33N	GS	5.0	...	4.4ML(PM)	...	NOV. 23	22:04	YST
NOV. 24	13	23	03.9	63.590N.	150.676W.	33N	GS	...	...	3.2ML(PM)	...	NOV. 24	04:23	YST
NOV. 25	00	04	36.9	61.381N.	150.717W.	80	GS	...	...	...	...	NOV. 24	15:04	YST
NOV. 25	00	10	46.4	61.423N.	150.792W.	69	GS	...	...	3.2ML(PM)	...	NOV. 24	15:10	YST
NOV. 25	00	26	54.8	54.971N.	159.113W.	33	LD	...	...	3.8ML(LD)	...	NOV. 24	15:26	YST
NOV. 25	14	48	46.4	63.310N.	149.124W.	103	GS	...	...	...	...	NOV. 25	05:48	YST
NOV. 26	01	11	34.9	57.806N.	152.161W.	33N	GS	4.2	...	3.4ML(PM)	...	NOV. 25	16:11	YST
NOV. 26	06	40	41.0	60.825N.	149.461W.	33N	GS	...	...	3.1ML(PM)	FELT	NOV. 25	21:40	YST
NOV. 26	15	51	49.7	56.768N.	155.344W.	33N	GS	5.3	4.6	5.1ML(PM)	IV	NOV. 26	06:51	YST
NOV. 30	10	20	27.6	63.166N.	150.582W.	130	GS	...	...	...	...	NOV. 30	01:20	YST
NOV. 30	19	20	49.9	51.041N.	177.739W.	33N	GS	5.1	...	...	...	NOV. 30	09:20	AST
DEC. 1	05	40	52.9	59.897N.	148.783W.	33N	GS	...	...	3.3ML(PM)	...	NOV. 30	20:40	YST
DEC. 5	12	41	23.6	53.870N.	171.092E.	33N	GS	5.2	4.6	...	...	DEC. 5	02:41	AST
DEC. 5	21	06	06.6	54.501N.	162.783W.	79	LD	...	...	3.7ML(LD)	...	DEC. 5	12:06	YST
DEC. 6	20	28	57.4	51.361N.	176.788W.	33N	GS	3.9	...	4.9ML(PM)	III	DEC. 6	10:28	AST
DEC. 7	07	23	17.3	53.348N.	163.975W.	7	LD	...	...	3.5ML(LD)	...	DEC. 6	22:23	YST
DEC. 10	00	20	18.1	50.544N.	130.024W.	10	GS	4.2	...	...	...	DEC. 9	15:20	YST
DEC. 10	14	25	25.7	58.985N.	152.892W.	84	GS	...	...	...	...	DEC. 10	05:25	YST
DEC. 13	20	48	47.8	51.785N.	177.094W.	79	GS	4.7	...	...	...	DEC. 13	10:48	AST
DEC. 17	18	30	36.3	59.602N.	146.271W.	33N	GS	...	...	3.4ML(PM)	...	DEC. 17	09:30	YST
DEC. 20	17	20	36.1	52.911N.	170.708W.	100	GS	4.4	...	...	...	DEC. 20	07:20	AST
DEC. 23	02	15	54.0	58.926N.	154.505W.	146	GS	...	...	...	...	DEC. 22	17:15	YST
DEC. 23	11	08	54.4	63.780N.	149.044W.	121	GS	...	...	...	...	DEC. 23	02:08	YST
DEC. 24	07	33	40.5	61.755N.	150.930W.	60	GM	4.5	...	3.6MD(GM)	...	DEC. 23	22:33	YST
DEC. 25	17	27	45.4	61.386N.	150.726W.	59	GS	...	...	3.8ML(PM)	...	DEC. 25	08:27	YST
DEC. 26	11	07	39.7	52.652N.	174.467E.	82	GS	4.9	...	...	FELT	DEC. 26	01:07	AST
DEC. 26	19	39	24.4	55.939N.	160.701W.	159	LD	5.0	...	...	FELT	DEC. 26	10:39	YST
DEC. 27	23	05	52.9	53.586N.	164.376W.	40	LD	5.6	5.3	5.8ML(LD)	V	DEC. 27	14:05	YST
DEC. 28	00	16	34.8	52.077N.	177.801W.	111	GS	5.1	...	...	IV	DEC. 27	14:16	AST
DEC. 29	20	14	54.2	59.532N.	151.670W.	33N	GS	...	...	3.8ML(PM)	III	DEC. 29	11:14	YST
DEC. 31	01	22	12.1	63.582N.	150.012W.	151	GS	...	...	...	...	DEC. 30	16:22	YST
DEC. 31	03	09	21.2	63.083N.	149.385W.	33N	GS	...	...	3.0ML(PM)	...	DEC. 30	18:09	YST
ARIZONA														
FEB. 16	08	26	05.7	36.040N.	114.722W.	5	GS	...	...	3.0ML(GS)	IV	FEB. 16	00:26	PST
FEB. 23	11	10	20.8	35.973N.	114.711W.	5	GS	...	...	3.9ML(GS)	IV	FEB. 23	03:10	PST
AUG. 31	08	10	08.7	36.135N.	112.037W.	5	GS	...	...	3.3ML(GS)	FELT	AUG. 31	01:10	MST
ARKANSAS														
JAN. 19	02	30	40.2	35.186N.	92.212W.	5	TC	...	...	3.5Mn(GS)	V	JAN. 18	20:30	CST
FEB. 4	09	58	13.9	35.203N.	92.233W.	1	TC	...	...	2.8MD(TC)	...	FEB. 4	03:58	CST
FEB. 17	19	31	45.3	35.178N.	92.225W.	5	TC	...	...	2.8MD(TC)	FELT	FEB. 17	13:31	CST
MAR. 18	14	56	11.5	36.020N.	89.860W.	11	SL	...	...	2.9Mn(SL)	...	MAR. 18	08:56	CST
MAR. 29	08	40	45.8	35.193N.	92.227W.	3	TC	...	...	2.7Mn(TU)	FELT	MAR. 29	02:40	CST
MAR. 30	04	12	25.4	35.193N.	92.228W.	3	TC	...	...	3.1Mn(TU)	IV	MAR. 29	22:12	CST
MAR. 30	04	20	54.2	35.201N.	92.224W.	4	TC	...	...	2.7Mn(TU)	III	MAR. 29	22:20	CST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
ARKANSAS--Continued														
JUNE 5	13	04	18.6	35.001N.	91.319W.	14	TC	...	...	2.5MD(TC)	...	JUNE 5	07:04	CST
JULY 12	08	32	00.0	35.179N.	92.215W.	7	TC	...	...	2.5Mn(SL)	FELT	JULY 12	02:32	CST
JULY 31	14	07	00.1	35.198N.	92.221W.	5	TC	...	...	2.5Mn(SL)	...	JULY 31	08:07	CST
SEPT. 26	04	58	17.3	35.601N.	90.412W.	2	TC	...	...	2.6MD(TC)	...	SEPT. 24	10:58	CST
OCT. 4	05	11	58.1	36.165N.	91.175W.	12	TC	...	...	2.7MD(TC)	...	OCT. 3	23:11	CST
DEC. 9	20	52	10.5	33.183N.	92.704W.	5	GS	...	...	3.0Mn(TU)	IV	DEC. 9	14:52	CST
DEC. 10	09	24	53.5	33.183N.	92.704W.	5	GS	...	...	2.4Mn(TU)	II	DEC. 10	03:24	CST
CALIFORNIA														
JAN. 2	06	20	02.2	36.097N.	118.091W.	6	PS	...	...	3.0ML(PS)	...	JAN. 1	22:20	PST
JAN. 2	16	32	22.2	36.437N.	116.637W.	6	PS	...	...	3.2ML(PS)	...	JAN. 2	08:32	PST
JAN. 2	22	09	58.2	33.761N.	115.940W.	7	PS	...	...	3.2ML(PS)	...	JAN. 2	14:09	PST
JAN. 3	17	39	45.0	36.484N.	116.548W.	6	PS	...	...	3.0ML(PS)	...	JAN. 3	09:39	PST
JAN. 4	03	03	05.0	35.806N.	117.738W.	5	PS	4.3	...	4.0ML(PS)	III	JAN. 3	19:03	PST
JAN. 4	18	58	25.7	33.765N.	115.936W.	4	PS	...	...	3.2ML(PS)	...	JAN. 4	10:58	PST
JAN. 4	21	18	44.6	41.157N.	122.227W.	15	BK	...	...	3.2ML(BK)	IV	JAN. 4	13:18	PST
JAN. 5	09	17	16.1	37.586N.	117.807W.	6	PS	...	...	3.3ML(PS)	...	JAN. 5	01:17	PST
JAN. 5	11	59	04.5	35.736N.	117.743W.	5	PS	...	...	3.1ML(PS)	...	JAN. 5	03:59	PST
JAN. 5	16	06	34.8	35.733N.	117.747W.	8	PS	...	...	3.0ML(PS)	...	JAN. 5	08:06	PST
JAN. 6	05	57	31.6	36.683N.	121.360W.	5	BK	...	...	3.4ML(BK)	...	JAN. 5	21:57	PST
JAN. 6	20	30	51.5	35.815N.	117.734W.	5	PS	...	...	3.0ML(PS)	...	JAN. 6	12:30	PST
JAN. 7	00	49	56.6	37.644N.	118.931W.	3	PS	...	...	3.1ML(PS)	...	JAN. 6	16:49	PST
JAN. 7	01	18	51.3	37.635N.	118.929W.	8	PS	...	...	3.2ML(PS)	...	JAN. 6	17:18	PST
JAN. 7	01	31	26.1	37.633N.	118.937W.	12	BK	...	...	4.1ML(BK)	FELT	JAN. 6	17:31	PST
JAN. 7	01	33	47.5	37.667N.	118.833W.	6	PS	...	...	3.1ML(PS)	...	JAN. 6	17:32	PST
JAN. 7	01	34	22.7	37.667N.	118.833W.	6	PS	...	...	3.3ML(PS)	...	JAN. 6	17:34	PST
JAN. 7	01	35	00.4	37.650N.	118.935W.	3	BK	...	...	3.5ML(BK)	...	JAN. 6	17:35	PST
JAN. 7	01	36	46.6	37.642N.	118.908W.	1	BK	4.1	...	4.3ML(BK)	FELT	JAN. 6	17:36	PST
JAN. 7	01	38	10.9	37.640N.	118.898W.	7	BK	5.1	5.0	5.4ML(BK)	VI	JAN. 6	17:38	PST
JAN. 7	01	44	49.2	37.573N.	118.880W.	6	PS	...	...	3.1ML(PS)	...	JAN. 6	17:44	PST
JAN. 7	01	45	38.9	37.642N.	118.940W.	4	BK	...	...	3.6ML(BK)	FELT	JAN. 6	17:45	PST
JAN. 7	01	48	23.3	37.481N.	118.939W.	4	PS	...	...	3.5ML(PS)	...	JAN. 6	17:48	PST
JAN. 7	01	54	32.4	37.466N.	118.909W.	5	PS	...	...	3.1ML(PS)	...	JAN. 6	17:54	PST
JAN. 7	01	57	44.0	37.592N.	118.855W.	5	PS	...	...	3.6ML(PS)	...	JAN. 6	17:57	PST
JAN. 7	02	00	33.1	37.484N.	118.981W.	5	PS	...	...	3.7ML(PS)	...	JAN. 6	18:00	PST
JAN. 7	02	02	37.2	37.595N.	118.829W.	3	PS	...	...	3.5ML(PS)	...	JAN. 6	18:02	PST
JAN. 7	02	10	00.5	37.583N.	118.917W.	5	PS	...	...	3.0ML(PS)	...	JAN. 6	18:10	PST
JAN. 7	02	13	44.4	37.647N.	118.967W.	13	BK	...	...	3.5ML(BK)	FELT	JAN. 6	18:13	PST
JAN. 7	02	16	04.8	37.408N.	119.074W.	5	PS	...	...	3.4ML(PS)	...	JAN. 6	18:16	PST
JAN. 7	02	17	52.9	37.510N.	118.914W.	5	PS	...	...	3.1ML(PS)	...	JAN. 6	18:17	PST
JAN. 7	02	20	12.0	37.527N.	118.980W.	3	PS	...	...	3.0ML(PS)	...	JAN. 6	18:20	PST
JAN. 7	02	20	46.2	37.738N.	118.686W.	3	PS	...	...	3.6ML(PS)	...	JAN. 6	18:20	PST
JAN. 7	02	28	21.0	37.480N.	119.021W.	5	PS	...	...	3.0ML(PS)	...	JAN. 6	18:28	PST
JAN. 7	02	37	46.5	37.419N.	118.969W.	5	PS	...	...	3.0ML(PS)	...	JAN. 6	18:37	PST
JAN. 7	02	45	46.6	37.507N.	118.863W.	3	PS	...	...	3.5ML(PS)	...	JAN. 6	18:45	PST
JAN. 7	02	51	17.3	37.482N.	118.969W.	3	PS	...	...	3.4ML(PS)	...	JAN. 6	18:51	PST
JAN. 7	02	53	24.8	37.484N.	119.008W.	3	PS	...	...	3.0ML(PS)	...	JAN. 6	18:53	PST
JAN. 7	02	54	48.6	37.500N.	118.867W.	6	PS	...	...	3.3ML(PS)	...	JAN. 6	18:54	PST
JAN. 7	03	22	59.0	37.564N.	118.952W.	5	PS	...	...	3.3ML(PS)	...	JAN. 6	19:22	PST
JAN. 7	03	24	19.4	37.635N.	118.988W.	7	BK	5.1	5.0	5.3ML(BK)	VI	JAN. 6	19:24	PST
JAN. 7	03	27	30.6	37.667N.	119.000W.	5	PS	...	...	3.8ML(PS)	...	JAN. 6	19:27	PST
JAN. 7	03	30	23.3	37.643N.	118.965W.	5	BK	...	...	4.4ML(BK)	FELT	JAN. 6	19:30	PST
JAN. 7	03	43	09.7	37.479N.	118.994W.	4	PS	...	...	3.5ML(PS)	...	JAN. 6	19:43	PST
JAN. 7	03	54	58.3	37.613N.	118.886W.	5	PS	...	...	3.2ML(PS)	...	JAN. 6	19:54	PST
JAN. 7	03	56	48.9	37.519N.	118.906W.	5	PS	...	...	3.3ML(PS)	...	JAN. 6	19:55	PST
JAN. 7	04	47	24.7	37.508N.	118.972W.	5	PS	...	...	3.5ML(PS)	...	JAN. 6	20:47	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
CALIFORNIA--Continued														
JAN. 7	04	49	52.4	37.644N.	118.950W.	5	PS	...	...	3.7ML(PS)	...	JAN. 6	20:49	PST
JAN. 7	04	54	56.1	37.511N.	118.961W.	5	PS	...	...	3.3ML(PS)	...	JAN. 6	20:54	PST
JAN. 7	05	11	03.2	37.628N.	118.880W.	5	BK	...	...	3.8ML(BK)	FELT	JAN. 6	21:11	PST
JAN. 7	05	16	30.6	37.505N.	118.978W.	5	PS	...	...	3.3ML(PS)	...	JAN. 6	21:16	PST
JAN. 7	05	20	44.3	37.495N.	118.961W.	5	PS	...	...	3.1ML(PS)	...	JAN. 6	21:20	PST
JAN. 7	06	14	38.2	37.648N.	118.885W.	6	PS	...	...	3.2ML(PS)	...	JAN. 6	22:14	PST
JAN. 7	06	38	25.5	37.640N.	118.967W.	6	BK	...	...	3.8ML(BK)	FELT	JAN. 6	22:38	PST
JAN. 7	07	14	25.1	37.627N.	118.955W.	4	BK	...	...	3.4ML(BK)	FELT	JAN. 6	23:14	PST
JAN. 7	07	15	40.4	37.645N.	118.960W.	6	PS	...	...	3.4ML(PS)	...	JAN. 6	23:15	PST
JAN. 7	08	08	11.0	37.608N.	118.915W.	3	BK	...	...	3.5ML(BK)	FELT	JAN. 7	00:08	PST
JAN. 7	08	45	53.3	37.620N.	118.920W.	3	BK	...	...	3.5ML(BK)	FELT	JAN. 7	00:45	PST
JAN. 7	11	12	37.4	37.637N.	118.906W.	6	PS	...	...	3.5ML(PS)	...	JAN. 7	03:12	PST
JAN. 7	13	12	48.7	37.633N.	118.965W.	5	BK	...	...	3.4ML(BK)	FELT	JAN. 7	05:12	PST
JAN. 7	13	43	43.0	35.741N.	117.741W.	5	PS	...	...	3.5ML(PS)	FELT	JAN. 7	05:43	PST
JAN. 7	14	03	22.3	35.816N.	117.725W.	3	PS	...	...	3.0ML(PS)	...	JAN. 7	06:03	PST
JAN. 7	16	33	09.4	37.632N.	118.933W.	3	BK	...	...	3.5ML(BK)	FELT	JAN. 7	08:33	PST
JAN. 7	18	05	05.2	37.659N.	118.974W.	6	PS	...	...	3.1ML(PS)	...	JAN. 7	10:05	PST
JAN. 7	23	09	54.5	37.625N.	118.880W.	7	BK	...	...	3.5ML(BK)	FELT	JAN. 7	15:09	PST
JAN. 7	23	12	32.2	37.650N.	118.889W.	6	PS	...	...	3.2ML(PS)	...	JAN. 7	15:12	PST
JAN. 8	05	47	05.0	37.680N.	118.960W.	6	PS	...	...	3.0ML(PS)	...	JAN. 7	21:47	PST
JAN. 8	06	17	41.8	37.623N.	118.858W.	9	BK	...	...	3.4ML(BK)	FELT	JAN. 7	22:17	PST
JAN. 8	06	37	39.9	37.673N.	118.972W.	6	PS	...	...	3.3ML(PS)	...	JAN. 7	22:37	PST
JAN. 8	06	41	31.4	37.665N.	118.966W.	6	PS	...	...	3.0ML(PS)	...	JAN. 7	22:41	PST
JAN. 8	07	19	30.4	34.133N.	117.454W.	8	PS	...	...	4.1ML(PS)	V	JAN. 7	23:19	PST
JAN. 8	07	30	58.7	35.741N.	117.742W.	5	PS	...	...	3.0ML(PS)	...	JAN. 7	23:30	PST
JAN. 8	10	16	30.0	37.643N.	118.912W.	6	PS	...	...	3.5ML(PS)	...	JAN. 8	02:16	PST
JAN. 8	10	31	59.2	37.653N.	118.933W.	6	PS	...	...	3.2ML(PS)	...	JAN. 8	02:31	PST
JAN. 8	12	28	31.4	37.677N.	118.894W.	6	PS	...	...	3.2ML(PS)	...	JAN. 8	04:28	PST
JAN. 8	16	28	03.9	37.679N.	118.959W.	6	PS	...	...	3.5ML(PS)	...	JAN. 8	08:28	PST
JAN. 8	17	02	09.4	37.673N.	118.873W.	6	PS	...	...	3.0ML(PS)	...	JAN. 8	09:02	PST
JAN. 9	11	04	35.0	37.629N.	118.916W.	6	PS	...	...	3.2ML(PS)	...	JAN. 9	03:04	PST
JAN. 9	11	57	41.3	37.642N.	118.907W.	8	BK	...	...	3.4ML(BK)	FELT	JAN. 9	03:57	PST
JAN. 9	13	38	30.5	37.626N.	118.983W.	6	PS	...	...	3.2ML(PS)	...	JAN. 9	05:38	PST
JAN. 10	04	46	33.3	33.985N.	118.737W.	9	PS	...	...	3.0ML(PS)	III	JAN. 9	20:46	PST
JAN. 10	06	03	37.3	37.640N.	118.915W.	6	PS	...	...	3.3ML(PS)	...	JAN. 9	22:03	PST
JAN. 11	05	46	29.6	37.625N.	118.879W.	6	PS	...	...	3.3ML(PS)	...	JAN. 10	21:46	PST
JAN. 11	05	47	41.2	37.622N.	118.885W.	6	PS	...	...	3.7ML(PS)	...	JAN. 10	21:47	PST
JAN. 11	05	48	30.0	37.463N.	118.891W.	6	PS	...	...	3.0ML(PS)	...	JAN. 10	21:48	PST
JAN. 13	07	12	46.6	36.353N.	120.283W.	6	PS	...	...	3.1ML(PS)	...	JAN. 12	23:12	PST
JAN. 15	23	37	09.4	33.356N.	116.275W.	10	PS	...	...	3.3ML(PS)	...	JAN. 15	15:37	PST
JAN. 16	02	41	58.5	35.945N.	118.614W.	6	PS	...	...	3.0ML(PS)	...	JAN. 15	18:41	PST
JAN. 16	20	07	39.5	34.416N.	116.009W.	6	PS	...	...	3.0ML(PS)	...	JAN. 16	12:07	PST
JAN. 17	01	09	00.8	35.702N.	118.607W.	7	PS	...	...	3.6ML(PS)	II	JAN. 16	17:09	PST
JAN. 17	01	22	29.4	37.652N.	118.963W.	6	PS	...	...	3.7ML(PS)	...	JAN. 16	17:22	PST
JAN. 18	14	21	41.9	34.290N.	118.556W.	9	PS	...	...	2.5ML(PS)	FELT	JAN. 18	06:21	PST
JAN. 19	12	05	32.1	34.137N.	117.460W.	7	PS	...	...	2.7ML(PS)	FELT	JAN. 19	04:05	PST
JAN. 22	02	47	48.3	35.704N.	118.614W.	8	PS	...	...	3.0ML(PS)	...	JAN. 21	18:47	PST
JAN. 22	18	06	06.5	37.636N.	118.968W.	6	PS	...	...	3.3ML(PS)	...	JAN. 22	10:06	PST
JAN. 22	19	13	20.4	33.348N.	116.943W.	5	PS	...	...	3.1ML(PS)	...	JAN. 22	11:13	PST
JAN. 24	03	38	36.5	32.983N.	115.921W.	7	PS	...	...	3.4ML(PS)	III	JAN. 23	19:38	PST
JAN. 25	10	10	41.2	37.505N.	118.900W.	2	BK	4.4	...	4.8ML(BK)	FELT	JAN. 25	02:10	PST
JAN. 25	13	30	22.4	37.500N.	118.983W.	6	PS	...	...	3.4ML(PS)	FELT	JAN. 25	05:30	PST
JAN. 26	23	15	05.7	33.027N.	116.424W.	6	PS	...	...	3.0ML(PS)	...	JAN. 26	15:15	PST
JAN. 27	03	09	31.0	37.527N.	118.910W.	6	PS	...	...	3.0ML(PS)	...	JAN. 26	19:09	PST
JAN. 27	11	28	04.6	37.511N.	118.896W.	6	PS	...	...	3.0ML(PS)	...	JAN. 27	03:28	PST
JAN. 28	14	54	08.9	33.942N.	118.726W.	13	PS	...	...	3.6ML(PS)	IV	JAN. 28	06:54	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypocenter source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
CALIFORNIA--Continued														
JAN. 29	15	04	38.9	37.645N.	118.944W.	6	PS	...	...	3.2ML(PS)	...	JAN. 29	07:04	PST
JAN. 29	15	06	01.5	37.640N.	118.947W.	6	BK	...	...	3.4ML(BK)	FELT	JAN. 29	07:06	PST
JAN. 29	15	19	48.1	37.628N.	118.942W.	5	BK	...	...	3.2ML(BK)	FELT	JAN. 29	07:19	PST
JAN. 29	16	26	34.9	37.700N.	118.953W.	6	PS	...	...	3.3ML(PS)	...	JAN. 29	08:26	PST
JAN. 31	10	13	05.2	33.018N.	115.308W.	6	PS	...	...	2.3ML(PS)	FELT	JAN. 31	02:13	PST
JAN. 31	10	13	41.1	37.500N.	118.882W.	7	BK	...	...	3.9ML(BK)	FELT	JAN. 31	02:13	PST
JAN. 31	10	15	41.1	33.077N.	115.312W.	6	PS	...	...	2.5ML(PS)	FELT	JAN. 31	02:15	PST
JAN. 31	10	18	31.1	37.553N.	118.877W.	2	BK	...	...	3.4ML(BK)	FELT	JAN. 31	02:18	PST
JAN. 31	10	19	18.0	33.017N.	115.314W.	6	PS	...	...	2.7ML(PS)	FELT	JAN. 31	02:19	PST
JAN. 31	10	22	24.7	37.503N.	118.893W.	4	BK	...	...	3.8ML(BK)	FELT	JAN. 31	02:22	PST
JAN. 31	16	36	02.9	37.388N.	118.844W.	6	PS	...	...	3.3ML(PS)	...	JAN. 31	08:36	PST
FEB. 1	22	09	07.9	35.773N.	117.727W.	7	PS	...	...	3.4ML(PS)	FELT	FEB. 1	14:09	PST
FEB. 4	07	15	10.3	37.653N.	118.957W.	7	BK	3.9	...	3.9ML(BK)	FELT	FEB. 3	23:15	PST
FEB. 4	10	56	56.5	37.626N.	118.968W.	6	PS	...	...	3.0ML(PS)	...	FEB. 4	02:56	PST
FEB. 4	12	57	31.3	37.522N.	118.903W.	6	PS	...	...	3.0ML(PS)	...	FEB. 4	04:57	PST
FEB. 4	15	02	24.6	37.643N.	118.950W.	6	BK	...	...	3.4ML(BK)	FELT	FEB. 4	07:02	PST
FEB. 4	16	12	12.9	37.583N.	121.960W.	8	BK	...	...	3.0ML(BK)	III	FEB. 4	08:12	PST
FEB. 4	16	19	15.2	32.913N.	116.501W.	6	PS	...	...	3.5ML(PS)	FELT	FEB. 4	08:19	PST
FEB. 4	17	02	58.1	37.643N.	118.948W.	3	BK	...	...	3.5ML(BK)	FELT	FEB. 4	09:02	PST
FEB. 5	12	01	27.0	36.685N.	120.852W.	8	BK	...	...	4.2ML(BK)	FELT	FEB. 5	04:01	PST
FEB. 7	10	47	49.5	37.097N.	122.263W.	10	BK	...	...	2.8ML(BK)	...	FEB. 7	02:47	PST
FEB. 11	12	56	56.5	37.512N.	118.856W.	6	PS	...	...	3.0ML(PS)	...	FEB. 11	04:56	PST
FEB. 17	16	11	47.8	34.135N.	117.442W.	8	PS	...	...	2.7ML(PS)	FELT	FEB. 17	08:11	PST
FEB. 18	05	34	36.9	37.595N.	118.608W.	6	PS	...	...	3.6ML(PS)	...	FEB. 17	21:34	PST
FEB. 18	07	31	45.4	32.830N.	116.103W.	11	PS	...	...	3.4ML(PS)	...	FEB. 18	23:31	PST
FEB. 19	09	19	12.0	37.638N.	118.978W.	6	PS	...	...	3.7ML(PS)	...	FEB. 19	01:19	PST
FEB. 19	11	08	27.5	37.528N.	118.875W.	9	BK	...	...	3.6ML(BK)	FELT	FEB. 19	03:08	PST
FEB. 20	00	50	17.3	37.622N.	118.943W.	6	BK	...	...	3.4ML(BK)	FELT	FEB. 19	16:50	PST
FEB. 22	05	37	37.6	34.135N.	117.458W.	5	PS	...	...	2.6ML(PS)	III	FEB. 21	21:37	PST
FEB. 22	12	40	06.0	37.620N.	118.964W.	6	PS	...	...	3.0ML(PS)	...	FEB. 22	04:40	PST
FEB. 24	12	14	05.2	34.086N.	118.872W.	6	PS	...	...	3.0ML(PS)	III	FEB. 24	04:14	PST
FEB. 24	18	12	32.1	38.060N.	118.725W.	12	BK	...	...	3.4ML(BK)	...	FEB. 24	10:12	PST
FEB. 24	19	52	00.8	37.620N.	118.963W.	5	BK	...	...	3.7ML(BK)	III	FEB. 24	11:52	PST
FEB. 25	00	56	15.6	37.480N.	118.783W.	6	PS	...	...	3.4ML(PS)	...	FEB. 24	16:56	PST
FEB. 28	16	31	32.7	36.124N.	120.314W.	6	PS	...	...	3.3ML(PS)	...	FEB. 28	08:31	PST
FEB. 28	18	11	14.5	33.961N.	118.341W.	6	PS	...	...	2.4ML(PS)	FELT	FEB. 28	10:11	PST
MAR. 1	01	49	16.5	35.816N.	117.736W.	6	PS	...	...	3.2ML(PS)	...	FEB. 28	17:49	PST
MAR. 1	07	09	23.0	33.957N.	118.316W.	5	PS	...	...	2.6ML(PS)	III	FEB. 28	23:09	PST
MAR. 1	20	18	35.8	33.942N.	118.319W.	6	PS	...	...	3.8ML(PS)	V	MAR. 1	12:18	PST
MAR. 2	14	23	55.3	35.786N.	117.726W.	7	PS	...	...	3.1ML(PS)	...	MAR. 2	06:23	PST
MAR. 4	05	51	20.3	35.789N.	117.713W.	7	PS	...	...	3.1ML(PS)	...	MAR. 3	21:51	PST
MAR. 11	05	26	29.8	35.765N.	117.710W.	5	PS	...	...	3.2ML(PS)	...	MAR. 10	21:26	PST
MAR. 12	17	04	46.1	35.772N.	117.712W.	5	PS	...	...	3.2ML(PS)	...	MAR. 12	09:04	PST
MAR. 12	17	15	00.3	38.820N.	122.795W.	2	BK	...	...	3.0ML(BK)	...	MAR. 12	09:15	PST
MAR. 15	03	15	59.9	37.518N.	118.880W.	9	BK	...	...	3.8ML(BK)	FELT	MAR. 14	19:16	PST
MAR. 16	00	42	04.9	35.594N.	117.162W.	6	PS	...	...	3.1ML(PS)	...	MAR. 15	16:42	PST
MAR. 16	15	25	28.3	37.510N.	118.893W.	7	BK	...	...	4.0ML(BK)	FELT	MAR. 16	07:25	PST
MAR. 23	16	48	23.9	38.823N.	119.802W.	10	BK	...	...	3.0ML(BK)	...	MAR. 23	08:48	PST
MAR. 23	19	11	55.7	37.550N.	118.859W.	6	PS	...	...	3.2ML(PS)	...	MAR. 23	11:11	PST
MAR. 28	02	43	53.5	35.127N.	119.017W.	6	PS	...	...	3.2ML(PS)	...	MAR. 27	18:44	PST
MAR. 29	14	27	15.4	34.175N.	117.412W.	6	PS	...	...	3.2ML(PS)	IV	MAR. 29	06:27	PST
APR. 1	22	56	58.5	34.934N.	121.000W.	6	PS	...	...	3.3ML(PS)	FELT	APR. 1	14:56	PST
APR. 3	03	55	33.1	39.965N.	122.823W.	11	BK	...	...	3.1ML(BK)	...	APR. 2	19:55	PST
APR. 3	05	21	14.6	37.607N.	118.949W.	6	PS	...	...	3.4ML(PS)	...	APR. 2	21:21	PST
APR. 7	07	35	48.0	39.130N.	123.127W.	6	BK	4.1	...	3.6ML(BK)	V	APR. 6	23:35	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
CALIFORNIA--Continued														
APR. 7	07	44	17.9	37.565N.	118.900W.	6	PS	...	...	3.0ML(PS)	...	APR. 6	23:44	PST
APR. 10	17	19	21.3	33.727N.	118.450W.	6	PS	...	...	3.4ML(PS)	IV	APR. 10	09:19	PST
APR. 16	12	25	27.2	34.353N.	118.527W.	6	PS	...	...	3.5ML(PS)	IV	APR. 16	04:25	PST
APR. 16	12	26	46.9	34.351N.	118.534W.	6	PS	...	...	3.6ML(PS)	FELT	APR. 16	04:26	PST
APR. 16	22	35	25.3	34.029N.	116.426W.	6	PS	...	...	3.2ML(PS)	...	APR. 16	14:35	PST
APR. 17	11	49	39.7	35.350N.	118.554W.	6	PS	...	...	3.4ML(PS)	III	APR. 17	03:49	PST
APR. 18	21	39	07.4	34.049N.	118.217W.	15	PS	...	...	2.8ML(PS)	FELT	APR. 18	13:39	PST
APR. 19	04	27	59.9	38.827N.	122.802W.	4	BK	...	...	2.9ML(BK)	FELT	APR. 18	20:27	PST
APR. 19	19	51	16.6	38.795N.	122.807W.	5	BK	...	...	2.8ML(BK)	FELT	APR. 19	11:51	PST
APR. 21	08	09	59.4	37.260N.	122.158W.	8	BK	...	...	3.4ML(BK)	FELT	APR. 21	00:09	PST
APR. 21	11	37	39.5	36.174N.	120.020W.	6	PS	...	...	3.3ML(PS)	...	APR. 21	03:37	PST
APR. 22	09	12	36.7	36.228N.	120.837W.	3	GM	...	...	3.3ML(PS)	...	APR. 22	01:12	PST
APR. 22	20	55	43.6	40.423N.	121.978W.	13	BK	...	...	3.6ML(BK)	...	APR. 22	12:55	PST
APR. 24	19	18	39.1	37.563N.	118.960W.	6	PS	...	...	3.3ML(PS)	...	APR. 24	11:18	PST
MAY 1	03	45	26.2	33.225N.	116.068W.	8	PS	...	...	3.4ML(PS)	...	APR. 30	19:45	PST
MAY 2	17	57	59.8	37.065N.	121.477W.	6	BK	...	...	3.5ML(BK)	FELT	MAY 2	09:57	PST
MAY 2	23	42	38.1	36.233N.	120.309W.	10	GM	6.2	6.5	6.7ML(BK)	VIII	MAY 2	15:42	PST
MAY 2	23	45	43.8	36.250N.	120.250W.	6	PS	...	...	4.5ML(PS)	...	MAY 2	15:45	PST
MAY 2	23	46	06.0	36.225N.	120.295W.	8	BK	5.5	...	5.6ML(BK)	...	MAY 2	15:46	PST
MAY 2	23	47	28.0	36.211N.	120.318W.	10	GM	...	...	5.6ML(GM)	...	MAY 2	15:47	PST
MAY 2	23	52	17.9	36.269N.	120.296W.	3	PS	...	...	3.9ML(PS)	...	MAY 2	15:52	PST
MAY 2	23	54	48.3	36.250N.	120.250W.	6	PS	...	...	4.1ML(PS)	...	MAY 2	15:54	PST
MAY 2	23	55	29.1	36.154N.	120.232W.	9	GM	...	...	4.2ML(GM)	...	MAY 2	15:55	PST
MAY 2	23	56	35.8	36.165N.	120.278W.	12	PS	...	...	3.7ML(PS)	...	MAY 2	15:56	PST
MAY 2	23	56	52.0	36.250N.	120.250W.	6	PS	...	...	3.8ML(PS)	...	MAY 2	15:56	PST
MAY 2	23	57	26	36.135N.	120.168W.	5	BK	...	...	3.3ML(BK)	...	MAY 2	15:57	PST
MAY 2	23	59	04.4	36.250N.	120.250W.	6	PS	...	...	3.7ML(PS)	...	MAY 2	15:59	PST
MAY 3	00	00	22.4	36.195N.	120.303W.	10	BK	...	...	3.5ML(BK)	...	MAY 2	16:00	PST
MAY 3	00	01	25	36.195N.	120.303W.	10	BK	...	...	3.3ML(BK)	...	MAY 2	16:01	PST
MAY 3	00	04	41.6	36.222N.	120.344W.	13	PS	...	...	3.8ML(PS)	...	MAY 2	16:04	PST
MAY 3	00	08	07.1	36.177N.	120.312W.	9	GM	...	...	3.0ML(GM)	...	MAY 2	16:08	PST
MAY 3	00	08	41	36.197N.	120.348W.	7	BK	...	...	3.0ML(BK)	...	MAY 2	16:08	PST
MAY 3	00	09	22.5	36.168N.	120.272W.	7	GM	...	...	4.3ML(GM)	...	MAY 2	16:09	PST
MAY 3	00	09	30.7	36.257N.	120.889W.	16	GM	...	...	3.2ML(GM)	...	MAY 2	16:09	PST
MAY 3	00	12	20.3	36.239N.	120.353W.	2	PS	...	...	3.5ML(PS)	...	MAY 2	16:12	PST
MAY 3	00	13	18.8	36.173N.	120.361W.	13	GM	...	...	3.1ML(GM)	...	MAY 2	16:13	PST
MAY 3	00	14	48.2	36.234N.	120.369W.	12	GM	...	...	3.7ML(GM)	...	MAY 2	16:14	PST
MAY 3	00	15	36.2	36.104N.	120.191W.	5	GM	...	...	4.4ML(GM)	...	MAY 2	16:15	PST
MAY 3	00	15	57	36.103N.	120.182W.	6	BK	...	...	4.0ML(BK)	...	MAY 2	16:15	PST
MAY 3	00	16	29.0	36.250N.	120.250W.	6	PS	...	...	3.8ML(PS)	...	MAY 2	16:16	PST
MAY 3	00	16	48.7	36.250N.	120.250W.	6	PS	...	...	3.9ML(PS)	...	MAY 2	16:16	PST
MAY 3	00	17	59.0	36.210N.	120.326W.	8	GM	4.8	...	4.3ML(GM)	FELT	MAY 2	16:17	PST
MAY 3	00	18	51.6	36.250N.	120.250W.	6	PS	...	...	3.9ML(PS)	...	MAY 2	16:18	PST
MAY 3	00	22	12.7	36.266N.	120.360W.	8	GM	...	...	3.6ML(GM)	...	MAY 2	16:22	PST
MAY 3	00	25	49.8	36.192N.	120.559W.	12	GM	...	...	3.1MD(GM)	...	MAY 2	16:25	PST
MAY 3	00	27	40.7	36.222N.	120.474W.	7	PS	...	...	3.3ML(PS)	...	MAY 2	16:27	PST
MAY 3	00	28	16.3	36.270N.	120.365W.	4	GM	...	...	3.0MD(GM)	...	MAY 2	16:28	PST
MAY 3	00	29	05.7	36.165N.	120.335W.	10	PS	...	...	3.3ML(PS)	...	MAY 2	16:29	PST
MAY 3	00	30	41.8	36.309N.	120.338W.	7	GM	...	...	3.1MD(GM)	...	MAY 2	16:30	PST
MAY 3	00	36	56.1	36.240N.	120.334W.	11	GM	...	...	3.1MD(GM)	...	MAY 2	16:36	PST
MAY 3	00	37	08.9	36.250N.	120.250W.	6	PS	...	...	3.2ML(PS)	...	MAY 2	16:37	PST
MAY 3	00	38	08.7	36.200N.	120.274W.	14	PS	...	...	3.1ML(PS)	...	MAY 2	16:38	PST
MAY 3	00	39	46.0	36.230N.	120.349W.	11	GM	...	...	4.5ML(GM)	FELT	MAY 2	16:39	PST
MAY 3	00	45	24.8	36.187N.	120.322W.	8	PS	...	...	3.4ML(PS)	...	MAY 2	16:45	PST
MAY 3	00	47	31.2	36.210N.	120.269W.	4	GM	...	...	3.9ML(GM)	...	MAY 2	16:47	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
CALIFORNIA--Continued														
MAY	3	00	50 33.3	36.221N.	120.339W.	11	GM	...	...	4.1ML(GM)	...	MAY	2	16:50 PST
MAY	3	00	53 06.7	36.127N.	120.296W.	9	PS	...	...	3.5ML(PS)	...	MAY	2	16:53 PST
MAY	3	00	57 44.2	36.270N.	120.315W.	8	GM	5.1	...	5.1ML(GM)	FELT	MAY	2	16:57 PST
MAY	3	01	03 07.9	36.287N.	120.339W.	7	GM	...	...	3.1MD(GM)	...	MAY	2	17:03 PST
MAY	3	01	03 38.4	36.216N.	120.276W.	0	GM	...	...	3.0MD(GM)	...	MAY	2	17:03 PST
MAY	3	01	04 23.9	36.217N.	120.257W.	9	GM	...	...	3.2MD(GM)	...	MAY	2	17:04 PST
MAY	3	01	06 57.0	36.195N.	120.322W.	11	GM	...	...	3.2MD(GM)	...	MAY	2	17:06 PST
MAY	3	01	11 05.7	36.218N.	120.242W.	14	GM	...	...	3.2MD(GM)	...	MAY	2	17:11 PST
MAY	3	01	12 03.9	36.113N.	120.275W.	5	GM	...	...	3.1MD(GM)	...	MAY	2	17:12 PST
MAY	3	01	16 40.3	36.242N.	120.263W.	8	GM	...	...	3.4ML(GM)	...	MAY	2	17:16 PST
MAY	3	01	18 57.4	36.188N.	120.259W.	4	GM	...	...	3.2MD(GM)	...	MAY	2	17:18 PST
MAY	3	01	23 04.5	36.172N.	120.266W.	7	GM	...	...	3.2ML(GM)	...	MAY	2	17:23 PST
MAY	3	01	26 12.8	36.250N.	120.250W.	6	PS	...	...	3.3ML(PS)	...	MAY	2	17:26 PST
MAY	3	01	31 46.9	36.285N.	120.357W.	6	GM	...	...	3.1MD(GM)	...	MAY	2	17:31 PST
MAY	3	01	33 04.9	36.260N.	120.290W.	0	GM	...	...	3.6MD(GM)	...	MAY	2	17:33 PST
MAY	3	01	33 53.9	36.186N.	120.301W.	5	GM	...	...	3.1ML(GM)	...	MAY	2	17:33 PST
MAY	3	01	34 00.4	36.157N.	120.163W.	7	GM	...	...	3.1ML(GM)	...	MAY	2	17:34 PST
MAY	3	01	34 44.6	36.250N.	120.250W.	6	PS	...	...	3.5ML(PS)	...	MAY	2	17:34 PST
MAY	3	01	36 19.2	36.235N.	120.317W.	0	GM	...	...	3.8ML(GM)	...	MAY	2	17:36 PST
MAY	3	01	38 56.3	36.289N.	120.466W.	8	GM	...	...	3.2MD(GM)	...	MAY	2	17:38 PST
MAY	3	01	41 46.0	36.142N.	120.219W.	7	GM	4.3	...	4.5ML(GM)	FELT	MAY	2	17:41 PST
MAY	3	01	43 15.2	36.250N.	120.250W.	6	PS	...	...	3.9ML(PS)	...	MAY	2	17:43 PST
MAY	3	01	54 17.1	36.214N.	120.236W.	13	PS	...	...	3.0ML(PS)	...	MAY	2	17:54 PST
MAY	3	01	55 46.4	36.230N.	120.299W.	7	GM	...	...	4.0ML(GM)	...	MAY	2	17:55 PST
MAY	3	01	58 08.3	36.189N.	120.298W.	1	GM	...	...	3.5MD(GM)	...	MAY	2	17:58 PST
MAY	3	01	58 18.3	36.782N.	121.512W.	9	GM	...	...	3.2ML(GM)	FELT	MAY	2	17:58 PST
MAY	3	02	03 05.7	36.260N.	120.364W.	2	GM	...	...	3.2ML(GM)	...	MAY	2	18:03 PST
MAY	3	02	11 49.8	36.242N.	120.442W.	5	GM	...	...	3.1MD(GM)	...	MAY	2	18:11 PST
MAY	3	02	15 14.9	36.238N.	120.285W.	9	GM	...	...	4.1ML(GM)	...	MAY	2	18:15 PST
MAY	3	02	17 40.5	36.286N.	120.266W.	6	GM	...	...	3.8ML(GM)	...	MAY	2	18:17 PST
MAY	3	02	18 54.3	36.235N.	120.303W.	12	GM	...	...	3.2MD(GM)	...	MAY	2	18:18 PST
MAY	3	02	22 02.3	36.295N.	120.266W.	11	GM	...	...	3.0MD(GM)	...	MAY	2	18:22 PST
MAY	3	02	24 08.1	36.189N.	120.357W.	6	PS	...	...	3.1ML(PS)	...	MAY	2	18:24 PST
MAY	3	02	26 08.8	36.272N.	120.374W.	10	GM	...	...	3.2ML(GM)	...	MAY	2	18:26 PST
MAY	3	02	36 24.4	36.210N.	120.245W.	11	GM	...	...	3.2MD(GM)	...	MAY	2	18:36 PST
MAY	3	02	36 40.1	36.212N.	120.242W.	2	GM	...	...	3.0MD(GM)	...	MAY	2	18:36 PST
MAY	3	02	38 19.4	36.205N.	120.258W.	11	GM	...	...	3.0MD(GM)	...	MAY	2	18:38 PST
MAY	3	02	42 58.9	36.151N.	120.304W.	3	GM	...	...	3.1MD(GM)	...	MAY	2	18:42 PST
MAY	3	02	44 26.4	36.281N.	120.364W.	3	GM	...	...	3.4MD(GM)	...	MAY	2	18:44 PST
MAY	3	02	52 25.7	36.283N.	120.331W.	5	GM	...	...	3.2MD(GM)	...	MAY	2	18:52 PST
MAY	3	02	58 19.5	36.182N.	120.291W.	6	GM	...	...	3.0MD(GM)	...	MAY	2	18:58 PST
MAY	3	03	00 33.4	36.170N.	120.275W.	12	GM	...	...	3.7MD(GM)	...	MAY	2	19:00 PST
MAY	3	03	03 03.9	36.177N.	120.294W.	0	GM	...	...	3.2ML(GM)	...	MAY	2	19:03 PST
MAY	3	03	06 11.3	36.332N.	120.561W.	8	GM	...	...	3.0MD(GM)	...	MAY	2	19:06 PST
MAY	3	03	22 02.0	36.235N.	120.349W.	12	GM	...	...	4.0ML(GM)	...	MAY	2	19:22 PST
MAY	3	03	28 40.7	36.290N.	120.311W.	4	GM	...	...	3.5ML(GM)	...	MAY	2	19:28 PST
MAY	3	03	36 53.1	36.173N.	120.294W.	8	GM	...	...	3.3MD(GM)	...	MAY	2	19:36 PST
MAY	3	03	38 52.3	36.243N.	120.308W.	12	GM	...	...	3.0MD(GM)	...	MAY	2	19:38 PST
MAY	3	03	40 35.0	36.211N.	120.223W.	9	GM	...	...	3.8ML(GM)	...	MAY	2	19:40 PST
MAY	3	03	50 40.6	36.159N.	120.305W.	9	PS	...	...	3.0ML(PS)	...	MAY	2	19:50 PST
MAY	3	03	59 04.8	36.266N.	120.315W.	9	GM	...	...	3.0MD(GM)	...	MAY	2	19:59 PST
MAY	3	04	02 23.5	36.201N.	120.295W.	1	GM	...	...	3.1MD(GM)	...	MAY	2	20:02 PST
MAY	3	04	02 46.7	36.292N.	120.275W.	5	GM	...	...	3.0MD(GM)	...	MAY	2	20:02 PST
MAY	3	04	16 10.5	36.212N.	120.329W.	10	PS	...	...	3.1ML(PS)	...	MAY	2	20:16 PST
MAY	3	04	28 24.4	36.136N.	120.226W.	9	PS	...	...	3.0ML(PS)	...	MAY	3	20:28 PST
MAY	3	04	31 11.6	36.301N.	120.405W.	11	GM	...	...	3.8ML(GM)	...	MAY	2	20:31 PST
MAY	3	04	32 32.0	36.282N.	120.367W.	11	GM	4.3	...	4.4ML(GM)	FELT	MAY	2	20:32 PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC)			Latitude	Longitude	Depth	Hypo-	Magnitude			Maximum	Local time		
	hr	min	sec	(°)	(°)	(km)	center source	mb	MS	ML, Mn MD, Mw	intensity	Date	Hour	Time zone
CALIFORNIA--Continued														
MAY 3	04	33	36.5	36.311N.	120.378W.	10	GM	...	...	3.5MD(GM)	...	MAY 2	20:33	PST
MAY 3	04	35	02.3	36.250N.	120.250W.	6	PS	...	...	3.4ML(PS)	...	MAY 2	20:35	PST
MAY 3	04	43	29.2	36.260N.	120.356W.	11	GM	...	...	3.2MD(GM)	...	MAY 2	20:43	PST
MAY 3	04	55	17.6	36.225N.	120.265W.	10	GM	...	...	3.3ML(GM)	...	MAY 2	20:55	PST
MAY 3	04	58	12.9	36.231N.	120.261W.	10	GM	...	...	3.5ML(GM)	...	MAY 2	20:58	PST
MAY 3	05	01	52.0	36.211N.	120.293W.	12	GM	...	...	3.5ML(GM)	...	MAY 2	21:01	PST
MAY 3	05	02	00.2	36.180N.	120.267W.	9	GM	...	...	3.3MD(GM)	...	MAY 2	21:02	PST
MAY 3	05	33	49.8	36.236N.	120.245W.	10	GM	...	...	3.6ML(GM)	...	MAY 2	21:33	PST
MAY 3	05	42	15.4	36.257N.	120.355W.	11	GM	...	...	3.2MD(GM)	...	MAY 2	21:42	PST
MAY 3	05	46	27.8	36.239N.	120.268W.	9	GM	...	...	3.1MD(GM)	...	MAY 2	21:46	PST
MAY 3	05	54	24.2	36.282N.	120.402W.	12	GM	...	...	3.2MD(GM)	...	MAY 2	21:54	PST
MAY 3	05	58	29.1	36.230N.	120.263W.	10	GM	...	...	3.5ML(GM)	...	MAY 2	21:58	PST
MAY 3	06	04	46.2	36.270N.	120.395W.	10	GM	4.4	...	4.5ML(GM)	FELT	MAY 2	22:04	PST
MAY 3	06	12	50.3	36.255N.	120.370W.	8	GM	...	...	3.8ML(GM)	...	MAY 2	22:12	PST
MAY 3	06	21	47.8	36.254N.	120.331W.	8	GM	...	...	3.2MD(GM)	...	MAY 2	22:21	PST
MAY 3	06	28	37.8	36.397N.	120.039W.	0	GM	...	...	3.2MD(GM)	...	MAY 2	22:28	PST
MAY 3	06	35	03.2	36.216N.	120.287W.	13	GM	4.2	...	4.2ML(GM)	...	MAY 2	22:35	PST
MAY 3	06	36	28.0	36.102N.	119.958W.	5	PS	...	...	3.8ML(PS)	...	MAY 2	22:36	PST
MAY 3	06	39	59.7	36.174N.	120.287W.	9	PS	...	...	3.1ML(PS)	...	MAY 2	22:39	PST
MAY 3	06	59	08.8	36.256N.	120.333W.	10	GM	...	...	3.1MD(GM)	...	MAY 2	22:59	PST
MAY 3	07	28	19.2	36.347N.	120.332W.	1	GM	...	...	3.5MD(GM)	...	MAY 2	23:28	PST
MAY 3	07	28	34.6	36.135N.	120.211W.	6	GM	...	...	3.6ML(GM)	...	MAY 2	23:28	PST
MAY 3	07	33	56.1	36.216N.	120.242W.	10	GM	...	...	3.2MD(GM)	...	MAY 2	23:33	PST
MAY 3	07	35	25.1	36.152N.	120.206W.	9	GM	...	...	3.9ML(GM)	...	MAY 2	23:35	PST
MAY 3	07	39	19.6	36.168N.	120.279W.	8	PS	...	...	3.1ML(PS)	...	MAY 2	23:39	PST
MAY 3	07	57	12.7	36.125N.	120.236W.	7	GM	...	...	3.1MD(GM)	...	MAY 2	23:57	PST
MAY 3	07	59	18.8	36.271N.	120.347W.	7	GM	...	...	3.4ML(GM)	...	MAY 2	23:59	PST
MAY 3	07	59	31.9	36.250N.	120.250W.	6	PS	...	...	3.4ML(PS)	...	MAY 2	23:59	PST
MAY 3	08	14	39.2	36.252N.	120.362W.	12	GM	...	...	3.0MD(GM)	...	MAY 3	00:14	PST
MAY 3	08	26	35.2	36.065N.	120.241W.	6	GM	...	...	3.0MD(GM)	...	MAY 3	00:26	PST
MAY 3	08	42	35.5	36.262N.	120.281W.	7	GM	...	...	3.1MD(GM)	...	MAY 3	00:42	PST
MAY 3	08	55	02.0	36.144N.	120.267W.	10	GM	4.4	...	4.7ML(GM)	FELT	MAY 3	00:55	PST
MAY 3	08	57	29.2	36.228N.	120.300W.	9	PS	...	...	3.4ML(PS)	...	MAY 3	00:57	PST
MAY 3	09	24	16.9	36.206N.	120.302W.	9	GM	...	...	3.2MD(GM)	...	MAY 3	01:24	PST
MAY 3	09	39	45.7	36.269N.	120.271W.	10	GM	4.2	...	4.1ML(GM)	...	MAY 3	01:39	PST
MAY 3	00	50	34.3	36.240N.	120.280W.	4	BK	...	...	4.0ML(BK)	...	MAY 2	16:50	PST
MAY 3	10	25	48.6	36.214N.	120.261W.	21	GM	...	...	3.1MD(GM)	...	MAY 3	02:25	PST
MAY 3	10	35	20.2	36.187N.	120.265W.	6	GM	...	...	3.8ML(GM)	...	MAY 3	02:35	PST
MAY 3	10	36	52.4	36.250N.	120.250W.	6	PS	...	...	3.1ML(PS)	...	MAY 3	02:36	PST
MAY 3	10	41	29.3	36.177N.	120.273W.	9	GM	...	...	3.3MD(GM)	...	MAY 3	02:41	PST
MAY 3	11	20	22.0	36.210N.	120.272W.	9	GM	...	...	3.2MD(GM)	...	MAY 3	03:20	PST
MAY 3	11	35	49.8	36.204N.	120.265W.	9	GM	...	...	3.1MD(GM)	...	MAY 3	03:35	PST
MAY 3	11	56	01.6	36.236N.	120.308W.	11	GM	...	...	3.1MD(GM)	...	MAY 3	03:56	PST
MAY 3	12	57	05.2	36.132N.	120.210W.	11	GM	...	...	3.9ML(GM)	...	MAY 3	04:57	PST
MAY 3	13	09	14.6	36.180N.	120.260W.	12	GM	...	...	4.0ML(GM)	...	MAY 3	05:09	PST
MAY 3	13	20	16.5	36.205N.	120.256W.	5	GM	...	...	3.1MD(GM)	...	MAY 3	05:20	PST
MAY 3	13	20	28.2	36.278N.	120.346W.	0	GM	...	...	3.1MD(GM)	...	MAY 3	05:20	PST
MAY 3	13	22	18.2	36.207N.	120.321W.	12	PS	...	...	3.1ML(PS)	...	MAY 3	05:22	PST
MAY 3	13	47	28.9	36.282N.	120.379W.	11	GM	...	...	3.4ML(GM)	...	MAY 3	05:47	PST
MAY 3	13	48	52.4	36.239N.	120.266W.	10	GM	...	...	3.5ML(GM)	...	MAY 3	05:48	PST
MAY 3	14	13	41.1	36.226N.	120.296W.	8	GM	...	...	3.0MD(GM)	...	MAY 3	06:13	PST
MAY 3	14	14	54.5	36.057N.	120.445W.	14	GM	...	...	3.5ML(GM)	...	MAY 3	06:14	PST
MAY 3	14	20	22.4	36.304N.	120.381W.	10	GM	...	...	3.5ML(GM)	...	MAY 3	06:20	PST
MAY 3	14	26	54.2	36.280N.	120.314W.	1	GM	...	...	3.9ML(GM)	...	MAY 3	06:26	PST
MAY 3	14	29	55.6	36.194N.	120.019W.	5	PS	...	...	3.4ML(PS)	...	MAY 3	06:29	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
CALIFORNIA--Continued														
MAY	3	14	37 41.9	36.206N.	120.326W.	7	GM	...	...	3.2MD(GM)	...	MAY	3	06:37 PST
MAY	3	14	50 46.9	36.180N.	120.289W.	11	GM	...	...	4.0ML(GM)	...	MAY	3	06:50 PST
MAY	3	15	04 02.5	36.241N.	120.288W.	9	GM	...	...	3.6ML(GM)	...	MAY	3	07:04 PST
MAY	3	15	10 35.7	36.287N.	120.338W.	8	GM	4.0	...	3.9ML(GM)	...	MAY	3	07:10 PST
MAY	3	15	27 54.6	36.276N.	120.338W.	7	GM	...	...	3.2MD(GM)	...	MAY	3	07:27 PST
MAY	3	15	41 41.6	36.235N.	120.302W.	8	GM	4.7	...	4.8ML(GM)	FELT	MAY	3	07:41 PST
MAY	3	16	02 08.8	36.214N.	120.301W.	6	GM	...	...	3.0MD(GM)	...	MAY	3	08:02 PST
MAY	3	16	11 18.3	36.239N.	120.306W.	7	GM	...	...	3.1ML(GM)	...	MAY	3	08:11 PST
MAY	3	16	17 02.6	36.160N.	120.255W.	10	GM	...	...	3.9ML(GM)	...	MAY	3	08:17 PST
MAY	3	16	22 37.6	36.227N.	120.271W.	7	GM	...	...	3.4ML(GM)	...	MAY	3	08:22 PST
MAY	3	16	55 13.1	36.184N.	120.309W.	9	GM	...	...	3.2MD(GM)	...	MAY	3	08:55 PST
MAY	3	17	01 29.5	36.223N.	120.291W.	9	GM	...	...	3.6ML(GM)	...	MAY	3	09:01 PST
MAY	3	17	09 36.6	36.191N.	120.304W.	10	GM	...	...	3.2MD(GM)	...	MAY	3	09:09 PST
MAY	3	17	35 58.3	36.182N.	120.254W.	10	GM	...	...	3.3MD(GM)	...	MAY	3	09:35 PST
MAY	3	17	44 38.3	36.266N.	120.316W.	7	GM	...	...	3.2MD(GM)	...	MAY	3	09:44 PST
MAY	3	18	41 53.9	36.117N.	120.210W.	6	GM	...	...	3.3ML(GM)	...	MAY	3	10:41 PST
MAY	3	18	50 18.9	36.179N.	120.304W.	10	GM	...	...	3.2ML(GM)	...	MAY	3	10:50 PST
MAY	3	20	56 52.6	36.149N.	120.224W.	11	GM	...	...	3.3MD(GM)	...	MAY	3	12:56 PST
MAY	3	21	36 57.9	36.161N.	120.277W.	11	GM	...	...	3.7ML(GM)	...	MAY	3	13:36 PST
MAY	3	22	29 44.6	36.204N.	120.340W.	8	GM	...	...	3.8ML(GM)	...	MAY	3	14:29 PST
MAY	3	23	45 47.1	36.143N.	120.206W.	9	GM	...	...	3.5MD(GM)	...	MAY	3	15:45 PST
MAY	3	23	46 04.3	36.151N.	120.336W.	14	GM	...	...	4.0ML(GM)	...	MAY	3	15:46 PST
MAY	3	23	57 12.6	36.326N.	120.356W.	3	GM	...	...	3.2MD(GM)	...	MAY	3	15:57 PST
MAY	4	00	10 11.2	36.228N.	120.238W.	6	PS	...	...	3.1ML(PS)	...	MAY	3	16:10 PST
MAY	4	00	36 50.8	36.151N.	120.179W.	6	PS	...	...	3.6ML(PS)	...	MAY	3	16:36 PST
MAY	4	01	27 20.9	36.231N.	120.102W.	6	GM	...	...	3.0MD(GM)	...	MAY	3	17:27 PST
MAY	4	01	27 31.5	36.146N.	120.261W.	4	GM	...	...	3.0MD(GM)	...	MAY	3	17:27 PST
MAY	4	02	46 09.5	36.206N.	120.264W.	7	GM	...	...	3.0MD(GM)	...	MAY	3	18:46 PST
MAY	4	04	24 20.7	36.250N.	120.295W.	5	GM	...	...	3.1MD(GM)	...	MAY	3	20:24 PST
MAY	4	05	41 42.0	36.234N.	120.290W.	11	GM	...	...	3.0MD(GM)	...	MAY	3	21:41 PST
MAY	4	07	28 40.4	36.263N.	120.335W.	5	BK	4.7	4.6	4.7ML(BK)	FELT	MAY	3	23:28 PST
MAY	4	07	35 04.4	36.155N.	120.237W.	8	PS	...	...	3.2ML(PS)	...	MAY	3	23:35 PST
MAY	4	07	39 07.9	36.296N.	120.302W.	6	GM	...	...	3.2MD(GM)	...	MAY	3	23:39 PST
MAY	4	08	25 46.4	36.219N.	120.269W.	9	GM	...	...	3.0MD(GM)	...	MAY	4	00:25 PST
MAY	4	08	48 28.0	36.210N.	120.292W.	6	GM	...	...	3.5MD(GM)	...	MAY	4	00:48 PST
MAY	4	08	48 53.1	36.225N.	120.278W.	13	GM	...	...	3.5ML(GM)	...	MAY	4	00:48 PST
MAY	4	08	59 01.8	36.114N.	120.203W.	7	GM	...	...	3.2MD(GM)	...	MAY	4	00:59 PST
MAY	4	10	02 44.3	36.153N.	120.257W.	8	GM	...	...	3.0MD(GM)	...	MAY	4	02:02 PST
MAY	4	12	00 26.9	36.207N.	120.303W.	9	GM	...	...	3.0MD(GM)	...	MAY	4	04:00 PST
MAY	4	12	26 09.4	36.209N.	120.298W.	9	GM	...	...	3.2MD(GM)	...	MAY	4	04:26 PST
MAY	4	13	25 07.0	36.274N.	120.329W.	11	GM	...	...	3.0MD(GM)	...	MAY	4	05:25 PST
MAY	4	13	29 15.9	36.109N.	120.220W.	10	GM	...	...	3.4ML(GM)	...	MAY	4	05:29 PST
MAY	4	15	57 13.5	36.226N.	120.300W.	7	GM	...	...	3.0MD(GM)	...	MAY	4	07:57 PST
MAY	4	15	59 14.0	36.244N.	120.291W.	7	GM	...	...	3.8ML(GM)	...	MAY	4	07:59 PST
MAY	4	16	11 19.6	36.281N.	120.349W.	12	GM	4.5	...	4.4ML(GM)	FELT	MAY	4	08:11 PST
MAY	4	16	17 47.3	36.164N.	120.167W.	6	PS	...	...	3.2ML(PS)	...	MAY	4	08:17 PST
MAY	4	18	36 35.8	36.175N.	120.280W.	10	GM	...	...	3.2MD(GM)	...	MAY	4	10:36 PST
MAY	4	19	45 02.9	36.120N.	120.269W.	7	GM	...	...	3.4ML(GM)	...	MAY	4	11:45 PST
MAY	4	21	19 57.2	36.244N.	120.429W.	4	GM	...	...	3.1MD(GM)	...	MAY	4	13:19 PST
MAY	4	22	03 43.0	36.208N.	120.262W.	8	GM	...	...	3.2MD(GM)	...	MAY	4	14:03 PST
MAY	5	00	13 06.4	36.233N.	120.266W.	8	GM	...	...	3.1MD(GM)	...	MAY	4	16:13 PST
MAY	5	00	27 50.8	36.229N.	120.269W.	9	GM	...	...	3.5ML(GM)	...	MAY	4	16:27 PST
MAY	5	00	32 11.6	36.231N.	120.264W.	9	GM	...	...	3.4MD(GM)	...	MAY	4	16:32 PST
MAY	5	00	32 23.0	36.250N.	120.250W.	6	PS	...	...	3.3ML(PS)	...	MAY	4	16:32 PST
MAY	5	01	56 42.4	36.220N.	120.286W.	8	GM	...	...	3.4ML(GM)	...	MAY	4	17:56 PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC)			Latitude	Longitude	Depth	Hypo-	Magnitude			Maximum	Local time		
	hr	min	sec	(°)	(°)	(km)	center source	mb	MS	ML, Mn MD, Mw	intensity	Date	Hour	Time zone
CALIFORNIA--Continued														
MAY 5	03	31	08.6	36.185N.	120.288W.	11	GM	...	...	3.0ML(GM)	...	MAY 4	19:31	PST
MAY 5	04	37	48.6	36.134N.	120.203W.	11	GM	...	...	4.0ML(GM)	...	MAY 4	20:37	PST
MAY 5	05	54	32.2	36.240N.	120.268W.	8	GM	...	...	3.0MD(GM)	...	MAY 4	21:54	PST
MAY 5	06	43	32.3	36.068N.	120.123W.	24	GM	...	...	3.2MD(GM)	...	MAY 4	22:43	PST
MAY 5	08	06	26.7	36.150N.	120.223W.	9	GM	...	...	3.7ML(GM)	...	MAY 5	00:06	PST
MAY 5	09	39	33.6	36.125N.	120.305W.	12	GM	...	...	3.1MD(GM)	...	MAY 5	01:39	PST
MAY 5	10	20	44.1	36.285N.	120.368W.	11	GM	4.5	...	4.6ML(GM)	FELT	MAY 5	02:20	PST
MAY 5	11	33	40.7	36.258N.	120.364W.	10	GM	...	...	3.7ML(GM)	...	MAY 5	03:33	PST
MAY 5	11	50	50.0	36.181N.	120.285W.	11	GM	...	...	3.5ML(GM)	...	MAY 5	03:50	PST
MAY 5	12	42	15.7	36.256N.	120.399W.	12	GM	...	...	3.9ML(GM)	...	MAY 5	04:42	PST
MAY 5	14	40	08.3	36.217N.	120.272W.	6	GM	...	...	3.3MD(GM)	...	MAY 5	06:40	PST
MAY 5	15	50	09.6	36.153N.	120.227W.	6	GM	...	...	3.3MD(GM)	...	MAY 5	07:50	PST
MAY 5	22	46	12.4	36.301N.	120.419W.	10	GM	...	...	3.4ML(GM)	...	MAY 5	14:46	PST
MAY 6	04	31	25.3	36.334N.	120.327W.	4	GM	...	...	3.1MD(GM)	...	MAY 5	20:31	PST
MAY 6	04	57	09.4	36.201N.	120.290W.	11	GM	...	...	3.4ML(GM)	...	MAY 5	20:57	PST
MAY 6	09	43	39.0	36.194N.	120.338W.	13	GM	...	...	3.7ML(GM)	...	MAY 6	01:43	PST
MAY 6	11	51	44.4	36.274N.	120.373W.	11	GM	...	...	3.3ML(GM)	...	MAY 6	03:51	PST
MAY 6	18	31	10.6	36.271N.	120.316W.	4	GM	...	...	3.2MD(GM)	...	MAY 6	10:31	PST
MAY 6	21	42	50.4	36.286N.	120.361W.	6	GM	...	...	3.0MD(GM)	...	MAY 6	13:42	PST
MAY 6	23	28	43.7	36.144N.	120.212W.	6	GM	...	...	3.3MD(GM)	...	MAY 6	15:28	PST
MAY 7	00	17	15.9	36.268N.	120.322W.	9	GM	...	...	3.9ML(GM)	...	MAY 6	16:17	PST
MAY 7	05	15	02.4	36.162N.	120.269W.	9	GM	...	...	3.2MD(GM)	...	MAY 6	21:15	PST
MAY 7	05	43	57.3	36.235N.	120.277W.	9	GM	...	...	3.5ML(GM)	...	MAY 6	21:43	PST
MAY 7	07	32	33.2	36.277N.	120.344W.	12	GM	...	...	3.0MD(GM)	...	MAY 6	23:32	PST
MAY 7	12	42	30.4	36.302N.	120.408W.	11	GM	...	...	3.6ML(GM)	...	MAY 7	04:42	PST
MAY 8	00	05	01.8	33.960N.	116.994W.	15	PS	...	...	3.4ML(PS)	...	MAY 7	16:05	PST
MAY 8	01	20	14.7	36.212N.	120.302W.	8	GM	...	...	3.5ML(GM)	...	MAY 7	17:20	PST
MAY 8	01	23	04.1	36.224N.	120.289W.	12	GM	...	...	3.0MD(GM)	...	MAY 7	17:23	PST
MAY 8	01	47	25.9	36.206N.	120.278W.	8	GM	...	...	3.0ML(GM)	...	MAY 7	17:47	PST
MAY 8	03	45	33.9	36.257N.	120.436W.	2	GM	...	...	3.4ML(GM)	...	MAY 7	19:45	PST
MAY 8	07	38	11.6	36.263N.	120.278W.	5	GM	...	...	3.3ML(GM)	...	MAY 7	23:38	PST
MAY 8	10	06	32.1	33.058N.	115.711W.	6	PS	...	...	3.0ML(PS)	...	MAY 8	02:06	PST
MAY 8	10	37	21.1	36.218N.	120.354W.	12	GM	...	...	3.3ML(GM)	...	MAY 8	02:37	PST
MAY 8	15	23	32.9	36.192N.	120.333W.	7	GM	...	...	3.3ML(GM)	...	MAY 8	07:23	PST
MAY 8	15	42	13.1	36.234N.	120.296W.	6	GM	...	...	3.3MD(GM)	...	MAY 8	07:42	PST
MAY 8	15	42	31.0	36.191N.	120.346W.	3	GM	...	...	3.1MD(GM)	...	MAY 8	07:42	PST
MAY 8	19	18	24.2	36.293N.	120.471W.	12	GM	...	...	3.7ML(GM)	...	MAY 8	11:18	PST
MAY 8	20	25	40.0	36.212N.	120.302W.	8	GM	...	...	3.6ML(GM)	...	MAY 8	12:25	PST
MAY 9	02	49	11.5	36.246N.	120.299W.	12	GM	5.1	4.7	5.3ML(GM)	VI	MAY 8	18:49	PST
MAY 9	03	12	45.4	36.223N.	120.300W.	12	GM	...	...	3.3ML(GM)	...	MAY 8	19:12	PST
MAY 9	03	19	11.2	36.238N.	120.298W.	12	GM	...	...	3.6ML(GM)	...	MAY 8	19:19	PST
MAY 9	03	26	37.4	36.240N.	120.299W.	12	GM	4.7	...	4.6ML(GM)	FELT	MAY 8	19:26	PST
MAY 9	03	30	40.9	36.239N.	120.298W.	12	GM	...	...	3.2MD(GM)	...	MAY 8	19:30	PST
MAY 9	11	18	23.1	36.172N.	120.313W.	9	GM	...	...	3.0ML(GM)	...	MAY 9	03:18	PST
MAY 9	13	24	33.7	36.201N.	120.273W.	9	GM	...	...	3.3ML(GM)	...	MAY 9	05:24	PST
MAY 9	18	15	44.2	36.174N.	120.309W.	9	GM	...	...	3.0ML(GM)	...	MAY 9	10:15	PST
MAY 9	20	14	35.7	36.206N.	120.296W.	7	GM	...	...	3.0ML(GM)	...	MAY 9	12:14	PST
MAY 10	03	28	05.7	33.158N.	115.616W.	2	PS	...	...	3.1ML(PS)	IV	MAY 9	19:28	PST
MAY 10	09	40	01.4	35.818N.	117.748W.	6	PS	...	...	3.1ML(PS)	...	MAY 10	01:40	PST
MAY 10	10	12	16.8	33.157N.	115.623W.	4	PS	...	...	3.0ML(PS)	...	MAY 10	02:12	PST
MAY 10	13	26	29.4	36.330N.	120.316W.	5	GM	...	...	3.9ML(GM)	...	MAY 10	05:26	PST
MAY 10	13	45	47.8	36.322N.	120.324W.	3	GM	...	...	3.0MD(GM)	...	MAY 10	05:45	PST
MAY 10	15	04	42.2	36.173N.	120.235W.	9	GM	...	...	3.2MD(GM)	...	MAY 10	07:04	PST
MAY 10	15	22	45.5	36.325N.	120.313W.	4	GM	...	...	3.4ML(GM)	...	MAY 10	07:22	PST
MAY 10	17	20	41.7	37.477N.	118.866W.	6	PS	...	...	3.5ML(PS)	...	MAY 10	09:20	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr min sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	Magnitude MS	Magnitude ML, Mn MD, Mw	Maximum intensity	Local time Date	Local time Hour	Local time Time zone
CALIFORNIA--Continued												
MAY 10	17 31 06.4	36.395N.	118.681W.	6	PS	...	...	3.4ML(PS)	...	MAY 10	09:31	PST
MAY 10	19 00 28.9	36.321N.	120.311W.	4	GM	...	...	3.2MD(GM)	...	MAY 10	11:00	PST
MAY 10	19 38 44.4	36.250N.	120.250W.	6	PS	...	...	3.1ML(PS)	...	MAY 10	11:38	PST
MAY 11	08 14 47.2	36.155N.	120.253W.	12	GM	...	...	3.5MD(GM)	...	MAY 11	00:14	PST
MAY 11	20 49 25.2	36.271W.	120.353W.	9	GM	...	...	3.5ML(GM)	...	MAY 11	12:49	PST
MAY 11	23 35 52.7	36.182N.	120.351W.	6	GM	...	...	3.1ML(GM)	...	MAY 11	15:35	PST
MAY 12	06 42 07.9	36.262N.	120.336W.	8	GM	...	...	3.0MD(GM)	...	MAY 11	22:42	PST
MAY 12	13 41 06.8	36.167N.	120.268W.	11	GM	4.2	...	4.5ML(GM)	FELT	MAY 12	05:41	PST
MAY 12	19 56 06.9	36.327N.	120.286W.	7	GM	...	...	3.0MD(GM)	...	MAY 12	11:56	PST
MAY 13	14 22 15.9	36.121N.	120.209W.	11	GM	...	...	3.3ML(GM)	...	MAY 13	06:22	PST
MAY 13	14 40 03.6	36.143N.	120.240W.	10	GM	...	...	3.3MD(GM)	...	MAY 13	06:40	PST
MAY 13	15 01 13.1	36.103N.	120.207W.	1	PS	...	...	3.5ML(PS)	...	MAY 13	07:01	PST
MAY 13	18 59 06.0	36.201N.	120.314W.	8	GM	...	...	3.0ML(GM)	...	MAY 13	10:59	PST
MAY 14	05 02 03.1	36.275N.	120.308W.	11	GM	...	...	3.9ML(GM)	...	MAY 13	21:02	PST
MAY 14	17 15 35.7	36.174N.	120.281W.	9	GM	...	...	3.5ML(GM)	...	MAY 14	09:15	PST
MAY 15	12 47 27.4	34.516N.	120.482W.	6	PS	...	...	3.8ML(PS)	...	MAY 15	04:47	PST
MAY 15	23 12 43.7	36.168N.	120.315W.	2	PS	...	...	3.3ML(PS)	...	MAY 15	15:12	PST
MAY 16	01 31 37.6	36.141N.	120.250W.	12	GM	...	...	3.6ML(GM)	...	MAY 15	17:31	PST
MAY 16	12 17 43.0	36.119N.	120.209W.	10	GM	...	...	3.1ML(GM)	...	MAY 16	04:17	PST
MAY 16	14 21 48.4	36.159N.	120.275W.	9	GM	...	...	3.9ML(GM)	...	MAY 16	06:21	PST
MAY 16	18 27 00.0	36.178N.	120.247W.	8	GM	...	...	3.1MD(GM)	...	MAY 16	10:26	PST
MAY 16	18 40 15.8	36.166N.	120.303W.	7	GM	...	...	3.1ML(GM)	...	MAY 16	10:40	PST
MAY 16	19 09 37.6	36.181N.	120.292W.	10	GM	...	...	3.2MD(GM)	...	MAY 16	11:09	PST
MAY 17	07 42 11.1	36.249N.	120.373W.	10	GM	...	...	3.1ML(GM)	...	MAY 16	23:42	PST
MAY 17	22 22 13.2	36.231N.	120.360W.	8	GM	...	...	3.5ML(GM)	...	MAY 17	14:22	PST
MAY 18	02 46 50.5	36.210N.	120.258W.	4	BK	...	...	3.5ML(BK)	...	MAY 17	18:46	PST
MAY 18	20 39 32.4	36.257N.	120.351W.	7	GM	...	...	3.3MD(GM)	...	MAY 18	12:39	PST
MAY 19	07 23 39.4	36.284N.	120.396W.	8	GM	...	...	3.1MD(GM)	...	MAY 16	23:23	PST
MAY 19	11 05 27.2	33.525N.	116.673W.	18	PS	...	...	3.0ML(PS)	...	MAY 19	03:05	PST
MAY 19	11 05 30.1	36.230N.	120.271W.	13	GM	...	...	4.2ML(GM)	...	MAY 19	03:05	PST
MAY 19	14 46 14.6	37.328N.	121.767W.	6	BK	...	...	3.6ML(BK)	V	MAY 19	06:46	PST
MAY 19	23 26 06.5	36.257N.	120.435W.	2	GM	...	...	3.5ML(GM)	...	MAY 19	15:26	PST
MAY 20	11 01 41.4	36.221N.	120.292W.	7	GM	...	...	3.4MD(GM)	...	MAY 20	03:01	PST
MAY 20	12 22 34.0	36.186N.	120.243W.	11	GM	...	...	3.2ML(GM)	...	MAY 20	04:22	PST
MAY 21	10 05 41.0	36.172N.	120.255W.	10	GM	...	...	3.2ML(GM)	...	MAY 21	02:05	PST
MAY 21	11 02 32.8	36.124N.	117.233W.	6	PS	...	...	3.1ML(PS)	...	MAY 21	03:02	PST
MAY 21	20 00 23.4	36.168N.	120.308W.	7	GM	...	...	3.0ML(GM)	...	MAY 21	12:00	PST
MAY 22	06 49 52.2	35.694N.	118.087W.	5	PS	...	...	3.2ML(PS)	...	MAY 21	22:49	PST
MAY 22	08 39 21.7	36.150N.	120.201W.	10	GM	4.2	...	4.2ML(GM)	FELT	MAY 22	00:39	PST
MAY 23	13 27 10.5	36.207N.	120.292W.	9	GM	...	...	3.0MD(GM)	...	MAY 23	05:27	PST
MAY 24	07 03 32.5	33.787N.	116.047W.	5	PS	...	...	3.1ML(PS)	...	MAY 23	23:03	PST
MAY 24	09 02 17.7	36.254N.	120.333W.	9	GM	4.6	...	4.7ML(GM)	V	MAY 24	01:02	PST
MAY 24	09 03 56.6	36.264N.	120.316W.	8	GM	...	...	3.6ML(PS)	...	MAY 24	01:03	PST
MAY 24	11 47 21.8	36.232N.	120.261W.	7	GM	...	...	3.3MD(GM)	...	MAY 24	03:47	PST
MAY 24	11 47 41.4	36.236N.	120.263W.	8	GM	...	...	3.2MD(GM)	...	MAY 24	03:47	PST
MAY 24	12 26 07.7	36.191N.	120.299W.	11	GM	...	...	3.2ML(GM)	...	MAY 24	04:26	PST
MAY 25	16 45 14.6	36.159N.	120.227W.	10	GM	...	...	3.2MD(GM)	...	MAY 25	08:45	PST
MAY 25	20 09 24.1	36.121N.	118.300W.	6	PS	...	...	3.1ML(PS)	...	MAY 25	12:09	PST
MAY 26	08 54 55.1	36.236N.	120.277W.	8	GM	...	...	3.2ML(GM)	...	MAY 26	00:54	PST
MAY 26	16 30 20.5	33.489N.	116.461W.	20	PS	...	...	3.8ML(PS)	FELT	MAY 26	08:30	PST
MAY 27	11 25 18.1	33.647N.	116.747W.	18	PS	...	...	3.5ML(PS)	IV	MAY 27	03:25	PST
MAY 27	20 40 49.2	36.242N.	120.376W.	13	GM	...	...	3.8ML(GM)	FELT	MAY 27	12:40	PST
MAY 27	20 51 04.8	36.248N.	120.361W.	14	PS	...	...	3.2ML(PS)	...	MAY 27	12:51	PST
MAY 29	01 24 03.4	36.241N.	120.374W.	13	GM	...	...	3.5ML(GM)	...	MAY 28	17:24	PST
MAY 29	01 47 26.6	36.383N.	120.294W.	5	GM	...	...	3.1MD(GM)	...	MAY 28	17:47	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
CALIFORNIA--Continued														
MAY 29	01	49	00.1	36.389N.	120.246W.	0	GM	...	...	3.2ML(GM)	...	MAY 28	17:49	PST
MAY 30	01	31	16.9	36.181N.	120.245W.	9	GM	...	...	3.0MD(GM)	...	MAY 29	17:31	PST
MAY 30	03	21	52.4	36.250N.	120.377W.	12	GM	...	...	3.3MD(GM)	...	MAY 29	19:21	PST
MAY 31	02	31	44.3	36.106N.	120.261W.	9	GM	...	...	3.3MD(GM)	...	MAY 30	18:31	PST
MAY 31	04	00	42.5	36.086N.	120.168W.	1	PS	...	...	3.0ML(PS)	...	MAY 30	20:00	PST
MAY 31	04	41	01.4	36.120N.	120.259W.	7	GM	...	...	3.4MD(GM)	...	MAY 30	20:41	PST
JUNE 1	05	06	39.8	36.154N.	120.331W.	12	GM	...	...	3.0MD(GM)	...	MAY 31	21:06	PST
JUNE 1	06	28	22.2	39.965N.	121.310W.	13	BK	...	...	3.2ML(BK)	...	MAY 31	22:28	PST
JUNE 2	00	32	41.4	37.715N.	121.995W.	8	BK	...	...	3.0ML(BK)	III	JUNE 1	16:32	PST
JUNE 4	11	25	11.6	37.725N.	122.115W.	6	BK	...	...	3.8ML(BK)	V	JUNE 4	03:25	PST
JUNE 5	11	22	43.9	38.015N.	121.872W.	13	BK	...	...	3.5ML(BK)	IV	JUNE 5	03:22	PST
JUNE 6	16	06	49.0	36.182N.	120.211W.	10	GM	...	...	3.3MD(GM)	...	JUNE 6	08:06	PST
JUNE 7	05	18	37.8	36.158N.	120.224W.	12	GM	4.2	...	4.1ML(GM)	FELT	JUNE 6	21:18	PST
JUNE 7	18	27	15.0	36.213N.	120.289W.	13	GM	...	...	3.1MD(GM)	...	JUNE 7	10:27	PST
JUNE 9	15	03	00.4	35.756N.	116.995W.	6	PS	...	...	3.1ML(PS)	...	JUNE 9	07:03	PST
JUNE 10	00	34	01.6	35.481N.	118.655W.	5	PS	...	...	3.1ML(PS)	...	JUNE 9	16:34	PST
JUNE 11	03	09	52.2	36.255N.	120.450W.	2	GM	5.3	5.4	5.2ML(GM)	VI	JUNE 10	19:09	PST
JUNE 11	05	25	18.1	36.226N.	120.453W.	5	GM	...	...	3.0MD(GM)	...	JUNE 10	21:25	PST
JUNE 11	05	48	31.0	36.252N.	120.441W.	2	GM	...	...	3.0MD(GM)	...	JUNE 10	21:48	PST
JUNE 11	14	27	05.5	36.242N.	120.445W.	4	GM	...	...	3.2ML(GM)	...	JUNE 11	06:27	PST
JUNE 11	22	13	13.5	38.800N.	122.820W.	4	BK	...	...	3.4ML(BK)	V	JUNE 11	14:13	PST
JUNE 11	23	02	19.8	36.258N.	120.439W.	4	GM	...	...	3.4ML(GM)	...	JUNE 11	15:02	PST
JUNE 12	01	31	27.5	36.126N.	120.295W.	14	GM	3.6	...	4.0ML(GM)	V	JUNE 11	17:31	PST
JUNE 12	06	58	53.0	36.184N.	120.332W.	9	GM	...	...	3.0MD(GM)	...	JUNE 11	22:58	PST
JUNE 13	17	39	24.5	34.212N.	115.923W.	11	PS	...	...	3.0ML(PS)	...	JUNE 13	09:39	PST
JUNE 14	12	39	28.6	34.083N.	118.843W.	3	PS	...	...	2.2ML(PS)	FELT	JUNE 14	04:39	PST
JUNE 14	14	10	26.2	36.289N.	120.427W.	12	GM	...	...	3.1MD(GM)	...	JUNE 14	06:10	PST
JUNE 15	00	44	15.8	36.251N.	120.395W.	10	GM	...	...	3.1MD(GM)	...	JUNE 14	16:44	PST
JUNE 15	09	02	11.5	35.750N.	120.369W.	12	PS	...	...	3.2ML(PS)	...	JUNE 15	01:02	PST
JUNE 16	17	37	23.6	36.242N.	120.359W.	11	GM	...	...	3.5ML(GM)	...	JUNE 16	09:37	PST
JUNE 18	01	37	01.2	36.201N.	120.420W.	0	PS	...	...	3.0ML(PS)	...	JUNE 17	17:37	PST
JUNE 19	10	45	44.1	34.468N.	118.395W.	12	PS	...	...	3.0ML(PS)	FELT	JUNE 19	02:45	PST
JUNE 19	13	28	20.2	36.164N.	120.265W.	9	GM	...	...	3.2MD(GM)	...	JUNE 19	05:28	PST
JUNE 20	03	39	56.3	36.142N.	120.266W.	2	PS	...	...	3.0ML(PS)	...	JUNE 19	19:39	PST
JUNE 20	10	33	44.1	36.222N.	120.229W.	5	GM	...	...	3.1MD(GM)	...	JUNE 20	02:33	PST
JUNE 20	18	50	12.1	38.822N.	122.793W.	5	BK	...	...	3.2ML(BK)	FELT	JUNE 20	10:50	PST
JUNE 20	23	13	08.4	36.665N.	121.283W.	8	BK	...	...	3.5ML(BK)	...	JUNE 20	15:13	PST
JUNE 21	16	12	40.3	36.880N.	120.068W.	5	BK	...	...	2.9ML(BK)	...	JUNE 21	08:12	PST
JUNE 24	01	52	35.9	34.168N.	117.289W.	5	PS	...	...	3.0ML(PS)	FELT	JUNE 23	17:52	PST
JUNE 24	10	47	35.4	36.557N.	121.227W.	2	BK	...	...	3.1ML(BK)	...	JUNE 24	02:47	PST
JUNE 29	06	41	07.8	36.159N.	120.191W.	13	GM	...	...	3.5ML(GM)	...	JUNE 28	22:41	PST
JUNE 30	23	06	54.1	36.249N.	120.370W.	10	GM	...	...	3.1MD(GM)	...	JUNE 30	15:06	PST
JULY 1	07	36	05.5	36.246N.	120.261W.	1	PS	...	...	3.2ML(PS)	...	JUNE 30	23:36	PST
JULY 2	13	12	44.9	36.340N.	120.333W.	1	GM	...	...	3.2MD(GM)	...	JULY 2	05:12	PST
JULY 3	10	19	59.6	32.939N.	116.261W.	6	PS	...	...	3.2ML(PS)	...	JULY 3	02:19	PST
JULY 3	12	44	42.3	39.410N.	120.220W.	14	BK	...	...	3.6ML(BK)	III	JULY 3	04:44	PST
JULY 3	15	08	19.3	39.412N.	120.215W.	13	BK	...	...	4.1ML(BK)	IV	JULY 3	07:08	PST
JULY 3	16	50	30.1	37.557N.	118.872W.	9	BK	...	...	3.6ML(BK)	FELT	JULY 3	08:50	PST
JULY 3	18	40	08.2	37.550N.	118.862W.	9	BK	4.8	...	5.3ML(BK)	V	JULY 3	10:40	PST
JULY 3	18	59	38.0	37.536N.	118.853W.	6	PS	...	...	3.3ML(PS)	FELT	JULY 3	10:59	PST
JULY 4	07	03	20.9	33.445N.	116.410W.	11	PS	...	...	3.9ML(PS)	IV	JULY 3	23:03	PST
JULY 4	21	19	25.1	36.333N.	120.339W.	1	GM	...	...	3.2MD(GM)	...	JULY 4	13:19	PST
JULY 5	14	27	26.7	38.070N.	119.018W.	10	BK	4.6	...	4.8ML(BK)	V	JULY 5	06:27	PST
JULY 5	22	10	14.4	36.340N.	120.330W.	5	GM	...	...	3.3ML(GM)	FELT	JULY 5	14:10	PST
JULY 6	17	09	18.9	36.262N.	120.318W.	9	GM	...	...	3.1MD(GM)	...	JULY 6	09:09	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr min sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	Magnitude MS	Magnitude ML, Mn MD, Mw	Maximum intensity	Local time Date	Local time Hour	Local time Time zone
CALIFORNIA--Continued												
JULY 6	21 37 28.9	37.564N.	118.818W.	6	PS	...	...	3.3ML(PS)	...	JULY 6	13:37	PST
JULY 7	00 16 00.0	36.258N.	120.444W.	3	GM	...	...	3.0MD(GM)	...	JULY 6	16:15	PST
JULY 7	00 30 33.7	36.221N.	120.279W.	12	GM	...	...	3.6ML(GM)	...	JULY 6	16:30	PST
JULY 8	01 40 27.0	36.221N.	120.320W.	3	PS	...	...	3.3ML(PS)	...	JULY 7	17:40	PST
JULY 9	07 40 51.3	36.251N.	120.400W.	9	GM	5.3	4.9	5.3ML(BK)	V	JULY 8	23:40	PST
JULY 9	07 59 52.0	36.230N.	120.415W.	7	BK	...	...	3.4ML(BK)	FELT	JULY 8	23:59	PST
JULY 9	10 24 40.4	36.263N.	120.428W.	3	BK	...	...	3.4ML(BK)	FELT	JULY 9	02:24	PST
JULY 9	12 25 43.7	36.220N.	120.365W.	6	PS	...	...	3.1ML(PS)	...	JULY 9	04:25	PST
JULY 9	23 15 27.1	36.298N.	120.363W.	10	PS	...	...	3.2ML(PS)	...	JULY 9	15:15	PST
JULY 9	23 51 52.2	36.275N.	120.445W.	2	BK	...	...	3.5ML(BK)	FELT	JULY 9	15:51	PST
JULY 9	23 59 34.5	36.298N.	120.283W.	0	PS	...	...	3.1ML(PS)	...	JULY 9	15:59	PST
JULY 10	08 11 34.3	40.248N.	121.357W.	3	BK	...	...	3.1ML(BK)	...	JULY 10	00:11	PST
JULY 11	22 54 17.2	33.197N.	115.525W.	2	PS	...	...	3.2ML(PS)	FELT	JULY 11	14:55	PST
JULY 12	03 56 40.6	36.303N.	120.385W.	9	BK	...	...	3.6ML(BK)	FELT	JULY 11	19:56	PST
JULY 12	18 39 06.2	37.540N.	118.867W.	9	BK	...	...	3.8ML(BK)	FELT	JULY 12	10:39	PST
JULY 13	12 58 00.6	36.298N.	120.379W.	9	PS	...	...	3.5ML(PS)	...	JULY 13	04:57	PST
JULY 13	21 16 48.5	33.208N.	115.530W.	12	PS	4.3	...	4.1ML(PS)	VI	JULY 13	13:16	PST
JULY 13	22 14 17.6	33.195N.	115.535W.	3	PS	...	...	3.1ML(PS)	FELT	JULY 13	14:14	PST
JULY 13	23 12 10.8	37.616N.	118.841W.	5	PS	...	...	3.0ML(PS)	...	JULY 13	15:12	PST
JULY 14	14 59 43.9	34.103N.	118.269W.	12	PS	...	...	3.1ML(PS)	III	JULY 14	06:59	PST
JULY 14	15 25 41.5	36.220N.	120.306W.	7	BK	...	...	3.5ML(BK)	III	JULY 14	07:25	PST
JULY 14	17 26 15.4	33.207N.	115.537W.	5	PS	...	...	3.0ML(PS)	FELT	JULY 14	09:26	PST
JULY 15	19 00 06.0	38.900N.	123.653W.	8	BK	...	...	3.6ML(BK)	FELT	JULY 15	11:00	PST
JULY 17	21 58 08.2	36.282N.	120.329W.	12	GM	...	...	3.7ML(GM)	FELT	JULY 17	13:58	PST
JULY 18	04 36 47.8	34.252N.	117.058W.	5	PS	...	...	3.0ML(PS)	IV	JULY 17	20:36	PST
JULY 18	18 41 06.1	36.175N.	120.279W.	10	GM	...	...	3.1MD(GM)	...	JULY 18	10:41	PST
JULY 18	19 28 05.4	36.180N.	120.280W.	11	GM	4.2	...	4.2ML(GM)	III	JULY 18	11:28	PST
JULY 21	01 23 33.5	36.153N.	121.548W.	7	BK	...	...	3.9ML(BK)	...	JULY 20	17:23	PST
JULY 22	02 39 54.1	36.241N.	120.409W.	7	GM	6.0	5.7	6.0ML(BK)	VI	JULY 21	18:39	PST
JULY 22	02 49 10.0	36.222N.	120.413W.	7	GM	...	...	4.1ML(GM)	FELT	JULY 21	18:49	PST
JULY 22	02 51 49.2	36.250N.	120.300W.	6	PS	...	...	3.7ML(PS)	...	JULY 21	18:50	PST
JULY 22	03 03 41.6	36.226N.	120.405W.	8	GM	...	...	3.2ML(GM)	...	JULY 21	19:03	PST
JULY 22	03 08 12.8	36.336N.	120.349W.	4	GM	...	...	3.3MD(GM)	...	JULY 21	19:08	PST
JULY 22	03 11 47.6	36.332N.	120.333W.	2	GM	...	...	3.3ML(GM)	...	JULY 21	19:11	PST
JULY 22	03 15 05.8	36.260N.	120.387W.	6	BK	...	...	3.3ML(BK)	...	JULY 21	19:15	PST
JULY 22	03 23 33.3	36.360N.	120.373W.	6	BK	...	...	3.4ML(BK)	FELT	JULY 21	19:23	PST
JULY 22	03 29 02.9	36.223N.	120.450W.	8	BK	...	...	3.8ML(BK)	FELT	JULY 21	19:29	PST
JULY 22	03 43 01.4	36.222N.	120.406W.	8	GM	5.3	...	5.0ML(GM)	V	JULY 21	19:43	PST
JULY 22	04 27 40.8	36.360N.	120.361W.	7	GM	...	...	3.2MD(GM)	...	JULY 21	20:27	PST
JULY 22	04 30 27.2	36.352N.	120.328W.	7	GM	...	...	3.6ML(GM)	FELT	JULY 21	20:30	PST
JULY 22	05 09 25.6	36.251N.	120.445w.	3	PS	...	...	3.1ML(PS)	...	JULY 21	21:09	PST
JULY 22	06 39 53.2	36.265N.	120.405W.	2	PS	...	...	3.1ML(PS)	...	JULY 21	22:39	PST
JULY 22	07 04 41.7	36.265N.	120.420W.	3	PS	...	...	3.0ML(PS)	...	JULY 21	23:04	PST
JULY 22	07 12 10.9	36.276N.	120.403W.	7	GM	...	...	3.3ML(GM)	FELT	JULY 21	23:12	PST
JULY 22	07 35 58.4	36.207N.	120.408W.	0	PS	...	...	3.1ML(PS)	...	JULY 21	23:35	PST
JULY 22	08 17 03.8	36.276N.	120.329W.	12	PS	...	...	3.1ML(PS)	...	JULY 22	00:17	PST
JULY 22	08 17 59.3	36.315N.	120.280W.	6	GM	...	...	3.2ML(PS)	...	JULY 22	00:17	PST
JULY 22	10 38 19.1	36.228N.	120.410W.	9	GM	...	...	3.2ML(PS)	...	JULY 22	02:38	PST
JULY 22	21 52 32.7	36.264N.	120.399W.	8	GM	...	...	3.3ML(GM)	...	JULY 22	13:52	PST
JULY 24	17 05 45.2	39.925N.	120.727W.	7	BK	...	...	3.2ML(BK)	...	JULY 24	09:05	PST
JULY 25	22 31 39.6	36.229N.	120.398W.	8	GM	5.6	5.1	5.3ML(GM)	VI	JULY 25	14:31	PST
JULY 26	01 20 30.2	36.216N.	120.441W.	4	GM	...	...	2.9MD(GM)	...	JULY 25	17:20	PST
JULY 26	05 12 54.2	37.572N.	118.914W.	6	PS	...	...	3.4ML(PS)	...	JULY 25	21:12	PST
JULY 29	10 13 52.4	36.231N.	120.446W.	5	GM	...	...	3.2ML(PS)	...	JULY 29	02:13	PST
JULY 30	01 26 16.4	37.567N.	118.758W.	6	BK	...	...	4.0ML(BK)	FELT	JULY 29	17:26	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
CALIFORNIA--Continued														
JULY 30	02	19	35.2	37.591N.	118.813W.	6	PS	...	...	3.9ML(PS)	...	JULY 29	18:19	PST
JULY 30	04	16	39.6	37.570N.	118.757W.	6	BK	...	...	3.7ML(BK)	FELT	JULY 29	20:16	PST
JULY 31	16	43	52.5	36.231N.	120.265W.	9	GM	...	...	3.5ML(GM)	...	JULY 31	08:43	PST
JULY 31	17	24	10.1	36.157N.	120.232W.	11	GM	...	...	3.5ML(GM)	...	JULY 31	09:24	PST
JULY 31	17	54	20.3	36.231N.	120.260W.	10	GM	...	...	3.4ML(GM)	...	JULY 31	09:54	PST
JULY 31	22	51	06.2	35.352N.	118.568W.	6	PS	...	...	3.3ML(PS)	...	JULY 31	14:51	PST
AUG. 1	05	36	35.8	37.292N.	118.360W.	15	BK	...	...	3.6ML(BK)	FELT	JULY 31	21:36	PST
AUG. 1	15	48	28.8	34.130N.	117.443W.	7	PS	...	...	3.3ML(PS)	FELT	AUG. 1	07:48	PST
AUG. 2	01	54	52.6	36.213N.	120.428W.	4	BK	...	...	3.0ML(BK)	...	AUG. 1	17:54	PST
AUG. 2	22	21	16.6	33.550N.	116.456W.	11	PS	...	...	3.2ML(PS)	...	AUG. 2	14:21	PST
AUG. 3	05	34	27.8	37.510N.	118.855W.	6	PS	...	...	3.0ML(PS)	...	AUG. 2	21:34	PST
AUG. 5	10	06	01.0	36.235N.	120.442W.	5	GM	...	...	3.0ML(BK)	...	AUG. 5	02:06	PST
AUG. 5	19	58	58.5	32.617N.	117.300W.	0	PS	...	...	2.6ML(PS)	FELT	AUG. 5	11:58	PST
AUG. 6	18	30	56.6	36.159N.	120.249W.	10	GM	...	...	3.2ML(PS)	...	AUG. 6	10:30	PST
AUG. 7	21	39	31.8	37.520N.	118.888W.	4	BK	...	...	3.3ML(BK)	FELT	AUG. 7	13:39	PST
AUG. 8	13	13	09.5	36.582N.	121.060W.	10	BK	4.1	...	4.0ML(BK)	...	AUG. 8	05:13	PST
AUG. 8	16	48	43.5	37.579N.	118.867W.	6	PS	...	...	3.0ML(PS)	...	AUG. 8	08:48	PST
AUG. 8	16	51	58.0	37.568N.	118.843W.	2	BK	...	...	3.7ML(BK)	FELT	AUG. 8	08:51	PST
AUG. 9	01	19	03.1	37.905N.	119.487W.	2	BK	...	...	4.0ML(BK)	V	AUG. 8	17:19	PST
AUG. 9	23	11	48.2	37.483N.	118.647W.	1	PS	...	...	3.2ML(PS)	...	AUG. 9	15:11	PST
AUG. 10	00	33	30.3	36.561N.	121.068W.	10	GM	...	...	3.2ML(BK)	...	AUG. 9	16:33	PST
AUG. 10	14	11	26.0	36.131N.	120.207W.	6	GM	...	...	3.1MD(GM)	...	AUG. 10	06:11	PST
AUG. 11	18	35	25.8	33.888N.	116.891W.	13	PS	...	...	3.0ML(PS)	...	AUG. 11	10:35	PST
AUG. 12	01	14	41.1	36.291N.	120.401W.	10	GM	...	...	3.8ML(BK)	FELT	AUG. 11	17:14	PST
AUG. 12	11	04	31.8	36.291N.	120.404W.	8	GM	...	...	3.0ML(BK)	...	AUG. 12	03:04	PST
AUG. 12	18	22	36.5	34.349N.	119.137W.	2	PS	...	...	3.0ML(PS)	...	AUG. 12	10:22	PST
AUG. 12	22	02	34.7	36.183N.	120.136W.	9	GM	4.3	...	4.0ML(BK)	FELT	AUG. 12	14:02	PST
AUG. 13	04	06	33.5	36.289N.	120.402W.	9	GM	...	...	3.3MD(GM)	...	AUG. 12	20:06	PST
AUG. 14	12	43	35.7	36.289N.	120.413W.	10	GM	4.1	...	4.2ML(BK)	FELT	AUG. 14	04:43	PST
AUG. 18	19	57	27.5	38.021N.	118.748W.	9	BK	...	...	3.5ML(BK)	...	AUG. 18	11:57	PST
AUG. 19	03	22	44.8	36.647N.	121.320W.	9	BK	...	...	2.9ML(BK)	...	AUG. 18	19:22	PST
AUG. 19	11	56	50.9	37.490N.	118.835W.	6	PS	...	...	3.9ML(PS)	...	AUG. 19	03:56	PST
AUG. 20	17	54	14.9	33.490N.	117.175W.	17	PS	...	...	3.0ML(PS)	...	AUG. 20	09:54	PST
AUG. 20	23	32	07.6	38.807N.	122.788W.	6	BK	...	...	3.0ML(BK)	...	AUG. 20	15:32	PST
AUG. 21	14	21	52.1	36.877N.	121.628W.	5	BK	...	...	2.7ML(BK)	FELT	AUG. 21	06:21	PST
AUG. 22	21	47	33.4	37.574N.	118.923W.	6	PS	...	...	3.2ML(PS)	...	AUG. 22	13:47	PST
AUG. 23	20	40	22.1	38.808N.	122.785W.	3	BK	...	...	3.1ML(BK)	...	AUG. 23	12:40	PST
AUG. 25	00	26	24.1	40.437N.	124.133W.	18	BK	...	...	3.0ML(BK)	FELT	AUG. 24	16:26	PST
AUG. 25	23	18	41.9	36.214N.	120.276W.	10	GM	...	...	3.1MD(GM)	...	AUG. 25	15:18	PST
AUG. 26	03	21	17.2	36.300N.	120.473W.	12	GM	3.9	...	4.0ML(BK)	IV	AUG. 25	19:21	PST
AUG. 26	03	41	30.9	36.262N.	120.477W.	3	PS	...	...	3.2ML(PS)	...	AUG. 25	19:41	PST
AUG. 26	19	57	40.6	36.211N.	120.374W.	12	GM	...	...	3.8ML(BK)	IV	AUG. 26	11:57	PST
AUG. 28	12	26	21.7	35.814N.	121.324W.	7	GM	...	...	3.8ML(BK)	FELT	AUG. 28	04:26	PST
AUG. 28	13	23	55.4	35.826N.	121.320W.	7	GM	...	...	3.5ML(BK)	FELT	AUG. 28	05:23	PST
AUG. 28	21	04	48.9	32.954N.	115.537W.	11	PS	...	...	3.0ML(PS)	FELT	AUG. 28	13:04	PST
AUG. 29	10	06	32.3	37.545N.	118.826W.	6	PS	...	...	3.1ML(PS)	...	AUG. 29	02:06	PST
AUG. 29	10	10	30.8	35.841N.	121.340W.	9	GM	5.3	4.3	5.2ML(BK)	VI	AUG. 29	02:10	PST
AUG. 29	11	40	23.4	35.863N.	121.307W.	7	BK	...	...	3.0ML(BK)	...	AUG. 29	03:40	PST
AUG. 29	11	52	01.9	35.862N.	121.302W.	7	BK	...	...	3.0ML(BK)	...	AUG. 29	03:52	PST
AUG. 29	20	14	15.5	35.859N.	121.333W.	6	GM	...	...	3.2ML(BK)	...	AUG. 29	12:14	PST
SEPT. 1	00	18	14.0	35.868N.	121.318W.	7	BK	...	...	3.0ML(BK)	...	AUG. 31	16:18	PST
SEPT. 1	05	38	46.0	37.515N.	118.811W.	6	PS	...	...	3.4ML(PS)	...	AUG. 31	21:38	PST
SEPT. 1	17	01	06.3	38.017N.	118.748W.	7	BK	...	...	4.0ML(BK)	FELT	SEPT. 1	09:01	PST
SEPT. 1	23	04	07.8	36.292N.	120.381W.	10	GM	...	...	3.1MD(GM)	...	SEPT. 1	15:04	PST
SEPT. 4	22	40	28.1	36.184N.	120.304W.	9	GM	...	...	3.1MD(GM)	...	SEPT. 4	14:40	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
CALIFORNIA--Continued														
SEPT. 7	23	07	26.2	36.279N.	120.460W.	12	GM	...	...	3.4ML(BK)	FELT	SEPT. 7	15:07	PST
SEPT. 8	19	45	44.8	37.693N.	121.805W.	15	BK	...	...	2.9ML(BK)	FELT	SEPT. 8	11:45	PST
SEPT. 9	09	16	13.5	36.232N.	120.265W.	7	GM	5.3	5.4	5.4ML(BK)	V	SEPT. 9	01:16	PST
SEPT. 9	09	21	31.8	36.240N.	120.279W.	6	GM	...	...	4.0ML(BK)	FELT	SEPT. 9	01:21	PST
SEPT. 9	09	41	31.8	36.241N.	120.289W.	5	GM	...	...	3.2ML(PS)	...	SEPT. 9	01:41	PST
SEPT. 9	10	26	02.2	36.224N.	120.253W.	8	GM	...	...	3.1MD(GM)	...	SEPT. 9	02:26	PST
SEPT. 9	21	04	00.2	36.228N.	120.230W.	8	GM	...	...	3.7ML(BK)	FELT	SEPT. 9	13:04	PST
SEPT. 9	23	19	19.4	37.280N.	121.662W.	10	BK	...	...	3.0ML(BK)	...	SEPT. 9	15:19	PST
SEPT. 9	23	22	25.9	37.535N.	118.808W.	13	BK	...	...	3.4ML(BK)	FELT	SEPT. 9	15:22	PST
SEPT. 10	07	19	31.0	36.261N.	120.467W.	2	GM	...	...	3.4ML(BK)	FELT	SEPT. 9	23:19	PST
SEPT. 10	16	02	12.5	37.438N.	118.642W.	13	BK	...	...	4.0ML(BK)	FELT	SEPT. 10	08:02	PST
SEPT. 10	17	30	33.0	36.213N.	120.452W.	4	GM	...	...	3.3ML(PS)	...	SEPT. 10	09:30	PST
SEPT. 11	03	57	18.8	40.250N.	123.762W.	19	BK	...	...	2.8ML(BK)	...	SEPT. 10	19:57	PST
SEPT. 11	11	48	06.6	36.242N.	120.383W.	10	GM	5.0	...	4.3ML(BK)	IV	SEPT. 11	03:48	PST
SEPT. 12	12	08	02.7	34.048N.	117.256W.	15	PS	...	...	3.6ML(PS)	IV	SEPT. 12	04:08	PST
SEPT. 12	21	33	35.1	35.230N.	117.036W.	6	PS	...	...	3.2ML(PS)	...	SEPT. 12	13:33	PST
SEPT. 13	06	53	17.4	36.211N.	120.430W.	0	PS	...	...	3.3ML(PS)	...	SEPT. 12	22:53	PST
SEPT. 15	04	39	01.4	34.117N.	117.433W.	6	PS	...	...	2.5ML(PS)	FELT	SEPT. 14	20:39	PST
SEPT. 16	14	23	47.9	37.519N.	118.847W.	6	PS	...	...	3.1ML(PS)	...	SEPT. 16	06:23	PST
SEPT. 17	17	35	28.7	36.208N.	120.310W.	10	GM	...	...	3.6ML(PS)	...	SEPT. 17	09:35	PST
SEPT. 18	14	11	44.3	36.202N.	120.419W.	0	PS	...	...	3.3ML(PS)	...	SEPT. 18	06:11	PST
SEPT. 18	14	34	32.0	36.278N.	120.342W.	9	GM	...	...	3.7ML(PS)	...	SEPT. 18	06:34	PST
SEPT. 19	01	55	57.3	39.222N.	120.003W.	10	BK	...	...	2.9ML(BK)	IV	SEPT. 18	17:55	PST
SEPT. 20	00	08	51.7	33.059N.	116.190W.	6	PS	...	...	3.2ML(PS)	FELT	SEPT. 19	16:08	PST
SEPT. 20	10	38	39.1	37.787N.	122.178W.	8	BK	...	...	2.6ML(BK)	FELT	SEPT. 20	02:38	PST
SEPT. 21	23	54	00.5	38.176N.	119.401W.	6	PS	...	...	3.2ML(PS)	...	SEPT. 21	15:54	PST
SEPT. 23	01	35	26.9	35.562N.	118.552W.	2	PS	...	...	3.1ML(PS)	...	SEPT. 22	17:35	PST
SEPT. 23	09	08	18.6	38.257N.	119.390W.	12	BK	...	...	3.0ML(BK)	...	SEPT. 23	01:08	PST
SEPT. 24	11	25	03.0	37.478N.	118.835W.	6	PS	...	...	3.0ML(PS)	...	SEPT. 24	03:25	PST
SEPT. 24	13	18	19.2	37.632N.	119.020W.	10	BK	...	...	3.2ML(BK)	FELT	SEPT. 24	05:18	PST
SEPT. 25	11	38	34.6	37.456N.	118.818W.	6	PS	...	...	3.3ML(PS)	...	SEPT. 25	03:38	PST
SEPT. 25	11	57	32.1	37.462N.	118.823W.	6	PS	...	...	2.9ML(PS)	...	SEPT. 25	03:57	PST
SEPT. 27	01	29	59.1	37.048N.	121.472W.	8	GM	...	...	3.5ML(BK)	III	SEPT. 26	17:29	PST
SEPT. 27	02	56	37.5	38.278N.	119.363W.	3	BK	...	...	3.5ML(BK)	FELT	SEPT. 26	18:56	PST
SEPT. 27	03	39	56.3	36.323N.	120.382W.	10	PS	...	...	3.5ML(PS)	...	SEPT. 26	19:39	PST
SEPT. 27	12	29	58.1	38.792N.	122.663W.	5	GS	...	...	...	...	SEPT. 27	04:29	PST
SEPT. 27	14	35	47.9	37.847N.	122.220W.	5	GS	...	...	2.6ML(BK)	FELT	SEPT. 27	06:35	PST
SEPT. 27	20	20	59.4	36.224N.	120.450W.	4	GM	...	...	3.4ML(PS)	...	SEPT. 27	12:20	PST
SEPT. 28	22	22	21.3	37.471N.	118.638W.	6	BK	...	...	3.2ML(BK)	...	SEPT. 28	14:22	PST
SEPT. 29	09	56	16.9	36.662N.	120.770W.	2	BK	...	...	2.9ML(BK)	...	SEPT. 29	01:56	PST
SEPT. 30	12	24	22.2	32.938N.	115.819W.	7	PS	...	...	3.2ML(PS)	...	SEPT. 30	04:24	PST
SEPT. 30	16	14	00.9	37.553N.	118.840W.	10	BK	...	...	4.8ML(BK)	IV	SEPT. 30	08:14	PST
OCT. 1	10	15	24.5	38.795N.	122.840W.	4	BK	...	...	3.0ML(BK)	FELT	OCT. 1	02:15	PST
OCT. 2	02	25	13.6	36.599N.	120.532W.	6	PS	...	...	3.5ML(PS)	...	OCT. 1	18:25	PST
OCT. 4	04	55	59.2	36.791N.	121.541W.	6	GM	...	...	3.2ML(BK)	...	OCT. 3	20:55	PST
OCT. 4	09	32	51.7	37.568N.	118.930W.	6	PS	...	...	3.1ML(PS)	...	OCT. 4	01:32	PST
OCT. 7	00	38	58.9	36.447N.	120.307W.	6	PS	...	...	3.2ML(PS)	...	OCT. 6	16:38	PST
OCT. 7	10	40	24.7	33.977N.	116.969W.	15	PS	...	...	3.1ML(PS)	...	OCT. 7	02:40	PST
OCT. 7	18	05	35.4	36.220N.	120.310W.	2	GM	...	...	3.2ML(BK)	...	OCT. 7	10:05	PST
OCT. 9	23	28	56.9	36.304N.	120.260W.	3	PS	...	...	3.1ML(PS)	...	OCT. 9	15:28	PST
OCT. 10	08	12	47.6	36.310N.	120.382W.	9	PS	...	...	3.0ML(PS)	...	OCT. 10	00:12	PST
OCT. 10	16	40	56.4	37.390N.	121.712W.	7	BK	...	...	3.1ML(BK)	FELT	OCT. 10	08:40	PST
OCT. 10	21	12	55.5	37.812N.	121.737W.	9	BK	...	...	3.0ML(BK)	FELT	OCT. 10	13:12	PST
OCT. 11	15	48	28.9	36.146N.	120.223W.	3	PS	...	...	3.3ML(PS)	...	OCT. 11	07:48	PST
OCT. 14	19	52	53.7	36.180N.	120.357W.	4	PS	...	...	3.4ML(PS)	...	OCT. 14	11:52	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
CALIFORNIA--Continued														
OCT. 16	05	07	19.3	36.300N.	120.278W.	15	PS	...	...	3.1ML(PS)	...	OCT. 15	21:07	PST
OCT 16	11	52	26.9	36.224N.	120.377W.	3	PS	...	...	3.3ML(PS)	...	OCT. 16	03:52	PST
OCT. 16	20	39	17.9	39.610N.	120.038W.	12	BK	...	...	3.1ML(BK)	...	OCT. 16	12:39	PST
OCT. 17	04	43	28.3	37.517N.	118.928W.	6	PS	...	...	3.0ML(PS)	...	OCT. 16	20:43	PST
OCT. 17	17	05	04.4	37.496N.	118.849W.	6	PS	...	...	3.2ML(PS)	...	OCT. 17	09:05	PST
OCT. 19	14	00	37.2	35.930N.	118.341W.	1	PS	...	...	4.0ML(PS)	FELT	OCT. 19	06:00	PST
OCT. 19	14	05	19.2	35.926N.	118.343W.	1	PS	...	...	3.4ML(PS)	...	OCT. 19	06:05	PST
OCT. 19	19	48	23.7	35.924N.	118.338W.	0	PS	...	...	3.7ML(PS)	FELT	OCT. 19	11:48	PST
OCT. 21	11	13	13.8	34.918N.	120.397W.	0	GM	...	...	3.1ML(PS)	III	OCT. 21	03:13	PST
OCT. 21	22	44	13.3	35.926N.	118.334W.	0	PS	4.4	...	4.5ML(PS)	III	OCT. 21	14:44	PST
OCT. 21	22	56	00.2	35.903N.	118.320W.	0	PS	...	...	3.3ML(PS)	...	OCT. 21	14:56	PST
OCT. 23	02	35	39.6	37.328N.	121.688W.	7	GM	...	...	3.6ML(BK)	III	OCT. 22	18:35	PST
OCT. 23	09	37	06.2	39.573N.	123.378W.	0	BK	...	...	3.3ML(BK)	FELT	OCT. 23	01:37	PST
OCT. 23	15	16	53.5	36.234N.	120.216W.	0	PS	...	...	3.2ML(PS)	...	OCT. 23	07:16	PST
OCT. 23	23	35	43.9	35.071N.	119.030W.	15	PS	...	...	3.1ML(PS)	...	OCT. 23	15:35	PST
OCT. 24	23	36	50.0	35.906N.	118.328W.	1	PS	4.1	...	3.9ML(PS)	...	OCT. 24	15:36	PST
OCT. 25	05	09	11.1	35.912N.	118.331W.	1	PS	...	...	3.5ML(PS)	...	OCT. 24	21:09	PST
OCT. 25	05	28	57.1	35.910N.	118.333W.	1	PS	...	...	3.2ML(PS)	...	OCT. 24	21:28	PST
OCT. 25	06	55	02.0	35.910N.	118.333W.	4	PS	...	...	3.7ML(PS)	...	OCT. 24	22:55	PST
OCT. 25	09	09	05.1	35.918N.	118.331W.	2	PS	...	...	3.1ML(PS)	...	OCT. 25	01:09	PST
OCT. 25	11	16	57.1	35.865N.	118.347W.	1	PS	...	...	3.8ML(PS)	II	OCT. 25	03:16	PST
OCT. 25	13	21	33.3	35.915N.	118.327W.	1	PS	...	...	3.5ML(PS)	II	OCT. 25	05:21	PST
OCT. 26	07	30	19.8	34.070N.	117.478W.	3	PS	...	...	2.4ML(PS)	FELT	OCT. 25	23:30	PST
OCT. 26	17	05	44.4	35.905N.	118.327W.	6	PS	...	...	3.1ML(PS)	...	OCT. 26	09:05	PST
OCT. 26	23	02	41.7	36.241N.	120.385W.	10	PS	...	...	3.8ML(PS)	...	OCT. 26	15:02	PST
OCT. 28	17	19	35.2	39.585N.	123.388W.	2	BK	...	...	3.1ML(BK)	FELT	OCT. 28	09:19	PST
OCT. 28	21	28	08.9	33.059N.	116.191W.	5	PS	...	...	3.0ML(PS)	...	OCT. 28	13:28	PST
OCT. 29	06	38	02.5	33.997N.	116.607W.	12	PS	...	...	3.4ML(PS)	IV	OCT. 28	22:37	PST
OCT. 30	05	50	03.4	37.484N.	118.814W.	6	PS	...	...	3.0ML(PS)	...	OCT. 29	21:50	PST
OCT. 30	08	13	10.7	36.280N.	120.396W.	11	GM	...	...	3.3ML(PS)	...	OCT. 30	00:13	PST
OCT. 30	20	02	59.2	35.912N.	118.336W.	1	PS	...	...	3.6ML(PS)	...	OCT. 30	12:02	PST
OCT. 31	12	15	11.6	36.180N.	120.324W.	2	PS	...	...	3.2ML(PS)	...	OCT. 31	04:15	PST
NOV. 3	02	40	57.2	37.496N.	118.696W.	6	PS	...	...	3.0ML(PS)	...	NOV. 2	18:40	PST
NOV. 4	11	30	32.9	36.289N.	120.280W.	10	PS	...	...	3.5ML(PS)	...	NOV. 4	03:30	PST
NOV. 4	13	57	52.1	36.318N.	120.274W.	15	PS	...	...	3.0ML(PS)	...	NOV. 4	05:57	PST
NOV. 4	19	09	18.5	37.464N.	118.891W.	6	PS	...	...	3.0ML(PS)	...	NOV. 4	11:09	PST
NOV. 6	01	34	31.3	35.918N.	118.316W.	1	PS	...	...	3.1ML(PS)	...	NOV. 5	17:34	PST
NOV. 6	02	01	29.5	35.918N.	118.316W.	1	PS	...	...	3.0ML(PS)	...	NOV. 5	18:01	PST
NOV. 6	02	06	59.6	40.317N.	124.580W.	19	BK	...	...	3.2ML(BK)	...	NOV. 5	18:06	PST
NOV. 6	02	08	15.5	35.921N.	118.314W.	0	PS	...	...	3.1ML(PS)	...	NOV. 5	18:08	PST
NOV. 7	12	32	43.9	35.927N.	118.316W.	0	PS	...	...	3.7ML(PS)	FELT	NOV. 7	04:32	PST
NOV. 10	15	18	22.7	35.929N.	118.311W.	0	PS	...	...	3.0ML(PS)	...	NOV. 10	07:18	PST
NOV. 11	16	36	31.6	32.966N.	115.863W.	6	PS	...	...	3.3ML(PS)	FELT	NOV. 11	08:36	PST
NOV. 11	17	15	05.2	32.968N.	115.867W.	9	PS	...	...	3.8ML(PS)	FELT	NOV. 11	09:15	PST
NOV. 12	01	47	59.2	37.460N.	118.842W.	12	BK	...	...	3.7ML(BK)	FELT	NOV. 11	17:47	PST
NOV. 13	22	05	59.9	37.495N.	118.657W.	6	PS	...	...	3.0ML(PS)	...	NOV. 13	14:05	PST
NOV. 14	12	57	22.9	35.920N.	118.311W.	0	PS	...	...	3.3ML(PS)	...	NOV. 14	04:57	PST
NOV. 15	03	29	44.6	37.602N.	118.910W.	3	BK	...	...	3.5ML(BK)	FELT	NOV. 14	19:29	PST
NOV. 15	03	36	07.5	37.640N.	118.925W.	6	PS	...	...	3.2ML(PS)	...	NOV. 14	19:36	PST
NOV. 15	04	50	34.6	33.032N.	115.569W.	5	PS	...	...	3.0ML(PS)	...	NOV. 14	20:50	PST
NOV. 15	05	04	09.6	33.045N.	115.563W.	6	PS	...	...	3.5ML(PS)	III	NOV. 14	21:04	PST
NOV. 15	11	02	07.2	33.036N.	115.569W.	5	PS	...	...	3.3ML(PS)	IV	NOV. 15	03:02	PST
NOV. 15	11	57	09.9	36.484N.	121.082W.	14	PS	...	...	3.2ML(PS)	...	NOV. 15	03:57	PST
NOV. 15	16	53	32.5	33.036N.	115.571W.	5	PS	...	...	2.8ML(PS)	FELT	NOV. 15	08:53	PST
NOV. 15	21	44	20.8	33.044N.	115.559W.	5	PS	...	...	3.1ML(PS)	FELT	NOV. 15	13:44	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
CALIFORNIA-Continued														
NOV. 16	00	40	35.9	39.722N.	123.573W.	2	BK	...	...	3.0ML(BK)	...	NOV. 15	16:40	PST
NOV. 18	09	55	37.5	34.001N.	117.209W.	15	PS	...	...	3.1ML(PS)	IV	NOV. 18	01:55	PST
NOV. 19	02	21	25.7	36.117N.	120.247W.	3	PS	...	...	3.0ML(PS)	...	NOV. 18	18:21	PST
NOV. 19	22	52	51.0	37.680N.	121.980W.	9	BK	...	...	3.0ML(BK)	III	NOV. 19	14:52	PST
NOV. 20	22	02	36.6	36.206N.	120.462W.	7	GM	...	...	3.7ML(BK)	FELT	NOV. 20	14:02	PST
NOV. 23	06	39	58.4	37.518N.	118.880W.	3	BK	...	...	3.8ML(BK)	FELT	NOV. 22	22:39	PST
NOV. 26	01	03	10.4	40.790N.	122.133W.	26	BK	...	...	3.4ML(BK)	...	NOV. 25	17:03	PST
NOV. 30	21	49	19.0	36.287N.	120.444W.	3	PS	...	...	3.1ML(PS)	...	NOV. 30	13:49	PST
DEC. 1	10	56	09.7	36.101N.	120.178W.	18	PS	...	...	3.0ML(PS)	...	DEC. 1	02:56	PST
DEC. 5	05	24	22.3	38.096N.	118.688W.	5	GS	...	...	3.1ML(BK)	...	DEC. 4	21:24	PST
DEC. 5	14	07	24.5	38.047N.	118.790W.	6	PS	...	...	3.7ML(PS)	...	DEC. 5	06:07	PST
DEC. 5	18	41	18.4	35.929N.	118.337W.	0	PS	...	...	3.1ML(PS)	...	DEC. 5	10:41	PST
DEC. 6	01	20	22.9	34.824N.	116.402W.	2	PS	...	...	3.2ML(PS)	...	DEC. 5	17:20	PST
DEC. 6	03	43	52.5	38.122N.	118.767W.	5	GS	...	...	3.1ML(BK)	...	DEC. 5	19:43	PST
DEC. 6	09	10	48.7	33.061N.	116.189W.	10	PS	...	...	3.2ML(PS)	...	DEC. 6	01:10	PST
DEC. 6	23	22	09.6	33.060N.	116.185W.	6	PS	...	...	3.1ML(PS)	...	DEC. 6	15:22	PST
DEC. 7	15	19	03.3	33.060N.	116.188W.	6	PS	...	...	3.1ML(PS)	...	DEC. 7	07:19	PST
DEC. 7	22	15	56.4	38.033N.	118.740W.	8	BK	...	...	3.7ML(BK)	...	DEC. 7	14:15	PST
DEC. 9	18	09	28.9	36.172N.	120.297W.	9	GM	...	...	3.2ML(BK)	...	DEC. 9	10:09	PST
DEC. 9	19	13	03.3	35.882N.	115.797W.	6	PS	...	...	3.2ML(PS)	...	DEC. 9	11:13	PST
DEC. 11	18	14	37.7	40.450N.	123.673W.	10	BK	...	...	3.2ML(BK)	...	DEC. 11	10:14	PST
DEC. 11	21	01	46.3	39.600N.	123.405W.	2	BK	...	...	3.4ML(BK)	FELT	DEC. 11	13:01	PST
DEC. 13	01	40	23.4	33.890N.	116.145W.	3	PS	...	...	3.4ML(PS)	...	DEC. 12	17:40	PST
DEC. 13	21	38	37.8	36.825N.	121.340W.	4	GM	...	...	3.4ML(BK)	FELT	DEC. 13	13:38	PST
DEC. 16	02	08	25.8	36.265N.	120.418W.	3	PS	...	...	3.4ML(PS)	...	DEC. 15	18:08	PST
DEC. 17	00	10	27.5	37.038N.	121.467W.	7	BK	...	...	3.2ML(BK)	FELT	DEC. 16	16:10	PST
DEC. 18	17	56	48.9	35.772N.	118.013W.	4	PS	...	...	3.3ML(PS)	...	DEC. 18	09:56	PST
DEC. 18	20	51	39.2	32.616N.	116.081W.	10	PS	...	...	3.2ML(PS)	...	DEC. 18	12:51	PST
DEC. 20	01	03	32.3	36.277N.	120.437W.	5	GM	...	...	3.5ML(BK)	...	DEC. 19	17:03	PST
DEC. 20	01	15	04.1	32.942N.	116.291W.	2	PS	...	...	3.5ML(PS)	...	DEC. 19	17:15	PST
DEC. 20	19	37	34.8	38.776N.	122.671W.	5	GS	...	...	3.0ML(BK)	...	DEC. 20	11:37	PST
DEC. 21	11	53	42.6	36.167N.	120.159W.	15	PS	...	...	3.0ML(PS)	...	DEC. 21	03:53	PST
DEC. 21	18	04	08.4	36.083N.	120.220W.	11	GM	4.3	...	4.2ML(BK)	IV	DEC. 21	10:04	PST
DEC. 23	02	03	07.4	36.088N.	120.235W.	2	PS	...	...	3.5ML(PS)	...	DEC. 22	18:03	PST
DEC. 23	15	45	31.2	38.766N.	118.866W.	6	PS	...	...	3.0ML(PS)	...	DEC. 23	07:45	PST
DEC. 25	20	43	32.7	37.565N.	118.886W.	6	PS	...	...	3.8ML(PS)	FELT	DEC. 25	12:43	PST
DEC. 26	06	36	35.2	36.189N.	120.351W.	3	PS	...	...	3.2ML(PS)	...	DEC. 25	22:36	PST
DEC. 26	22	10	08.8	37.624N.	118.962W.	6	PS	...	...	3.4ML(PS)	...	DEC. 26	14:10	PST
DEC. 27	21	34	37.7	33.778N.	116.122W.	2	PS	...	...	3.1ML(PS)	FELT	DEC. 27	13:34	PST
DEC. 28	08	20	24.1	37.480N.	118.827W.	6	PS	...	...	3.2ML(PS)	...	DEC. 28	00:20	PST
DEC. 29	07	23	29.8	35.903N.	118.317W.	1	PS	...	...	3.3ML(PS)	...	DEC. 28	23:23	PST
DEC. 29	19	46	16.8	34.170N.	117.355W.	8	PS	...	...	3.6ML(PS)	IV	DEC. 29	11:46	PST
DEC. 29	19	49	13.8	34.168N.	117.359W.	6	PS	...	...	2.9ML(PS)	FELT	DEC. 29	11:49	PST
DEC. 29	19	50	02.6	34.169N.	117.349W.	8	PS	...	...	2.7ML(PS)	FELT	DEC. 29	11:50	PST
DEC. 31	02	09	11.4	33.062N.	116.192W.	6	PS	...	...	3.0ML(PS)	...	DEC. 30	18:09	PST
DEC. 31	22	39	40.1	37.542N.	118.900W.	6	BK	...	...	3.9ML(BK)	FELT	DEC. 31	14:39	PST
CALIFORNIA-OFF THE COAST														
JAN. 2	18	51	40.0	41.047N.	124.333W.	23	BK	...	...	3.8ML(BK)	...	JAN. 2	10:51	PST
JAN. 12	16	56	51.2	33.560N.	120.043W.	6	PS	...	...	3.5ML(PS)	...	JAN. 12	08:56	PST
JAN. 12	17	19	01.3	33.568N.	120.039W.	6	PS	...	...	3.9ML(PS)	...	JAN. 12	09:19	PST
JAN. 20	09	10	42.4	40.318N.	124.608W.	22	BK	...	...	3.2ML(BK)	...	JAN. 20	01:10	PST
FEB. 1	21	21	40.7	40.307N.	124.810W.	10	BK	4.2	...	4.1ML(BK)	III	FEB. 1	13:21	PST
FEB. 22	02	18	30.8	33.095N.	117.903W.	6	PS	4.3	...	4.3ML(PS)	IV	FEB. 21	18:18	PST
MAR. 4	16	50	25.1	40.245N.	126.340W.	5	BK	...	...	3.6ML(BK)	...	MAR. 4	08:50	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
CALIFORNIA--OFF THE COAST														
MAR. 11	02	19	42.7	40.407N.	124.712W.	21	BK	...	...	3.7ML(BK)	...	MAR. 10	18:19	PST
MAR. 20	11	47	54.8	40.567N.	127.457W.	5	BK	4.2	...	3.8ML(BK)	...	MAR. 20	03:47	PST
MAR. 31	06	45	06.9	33.809N.	120.377W.	6	PS	...	...	3.1ML(PS)	...	MAR. 30	22:45	PST
APR. 8	16	20	11.0	35.744N.	121.544W.	7	GM	...	...	3.1MD(GM)	...	APR. 8	08:20	PST
APR. 13	18	35	57.1	40.429N.	125.906W.	10	GS	...	...	3.3ML(BK)	...	APR. 13	10:35	PST
APR. 20	17	54	24.4	40.363N.	124.507W.	17	BK	...	...	3.8ML(BK)	IV	APR. 20	09:54	PST
APR. 20	21	44	27.4	40.370N.	124.688W.	15	BK	...	...	3.5ML(BK)	...	APR. 20	13:44	PST
APR. 23	22	52	26.1	40.422N.	124.735W.	19	BK	...	...	4.0ML(BK)	...	APR. 23	14:52	PST
MAY 11	06	48	04.7	40.368N.	124.723W.	21	BK	...	...	3.4ML(BK)	...	MAY 10	22:48	MST
MAY 15	12	47	25.0	34.468N.	121.685W.	9	PS	...	...	3.9ML(PS)	...	MAY 15	04:47	PST
MAY 16	02	26	41.9	40.983N.	127.458W.	5	BK	4.6	3.8	4.0ML(BK)	...	MAY 15	18:26	PST
MAY 16	02	35	30.4	40.927N.	127.440W.	5	BK	4.4	3.6	4.0ML(BK)	...	MAY 15	18:35	PST
MAY 18	00	49	34.6	40.770N.	127.373W.	5	BK	5.0	4.8	4.4ML(BK)	...	MAY 17	16:49	PST
MAY 18	01	10	24.3	40.892N.	127.458W.	5	BK	4.6	4.1	3.8ML(BK)	...	MAY 17	17:10	PST
MAY 25	20	46	21.9	41.828N.	125.955W.	5	BK	4.5	3.6	4.4ML(BK)	...	MAY 25	12:46	PST
MAY 26	11	54	53.8	40.438N.	126.757W.	5	BK	4.1	...	3.5ML(BK)	...	MAY 26	03:54	PST
MAY 27	16	19	15.3	40.292N.	124.645W.	15	BK	...	...	3.3ML(BK)	...	MAY 27	08:19	PST
MAY 29	06	55	28.4	40.425N.	126.090W.	5	BK	5.1	5.1	5.4ML(BK)	III	MAY 28	22:55	PST
JUNE 16	19	50	05.8	40.297N.	124.637W.	19	BK	...	...	3.2ML(BK)	...	JUNE 16	11:50	PST
JUNE 19	08	01	36.9	40.592N.	124.857W.	18	BK	...	...	3.1ML(BK)	...	JUNE 19	00:01	PST
JUNE 19	22	08	00.4	40.298N.	124.677W.	18	BK	...	...	3.2ML(BK)	...	JUNE 19	14:08	PST
JUNE 28	13	12	33.8	33.797N.	120.446W.	6	PS	...	...	3.5ML(PS)	...	JUNE 28	05:12	PST
JUNE 29	08	08	35.7	32.588N.	117.431W.	6	PS	4.4	...	4.6ML(PS)	V	JUNE 29	00:08	PST
JULY 28	18	31	01.5	40.478N.	126.602W.	5	BK	...	...	3.7ML(BK)	...	JULY 28	10:31	PST
AUG. 6	14	27	46.4	40.546N.	128.195W.	10	GS	...	...	3.7ML(BK)	...	AUG. 6	06:27	PST
AUG. 12	08	30	36.6	40.513N.	124.792W.	17	BK	...	...	3.1ML(BK)	...	AUG. 12	00:30	PST
AUG. 24	13	36	30.5	40.377N.	124.832W.	18	BK	5.5	5.8	5.5ML(BK)	VI	AUG. 24	05:36	PST
AUG. 24	13	52	58.2	40.388N.	125.020W.	5	BK	...	...	3.6ML(BK)	...	AUG. 24	05:52	PST
AUG. 24	15	04	05.6	40.360N.	124.815W.	19	BK	...	...	3.2ML(BK)	...	AUG. 24	07:04	PST
AUG. 24	16	53	06.9	40.318N.	124.715W.	17	BK	...	...	3.0ML(BK)	...	AUG. 24	08:53	PST
AUG. 26	08	49	26.3	40.360N.	124.723W.	15	BK	4.1	...	3.9ML(BK)	IV	AUG. 26	00:49	PST
AUG. 29	03	38	49.2	40.267N.	124.662W.	16	BK	...	...	3.5ML(BK)	...	AUG. 28	19:38	PST
SEPT. 20	10	44	55.3	41.925N.	126.497W.	10	GS	4.0	...	...	...	SEPT. 20	02:44	PST
SEPT. 20	12	06	02.9	40.442N.	125.350W.	5	BK	...	...	3.5ML(BK)	...	SEPT. 20	04:06	PST
SEPT. 23	02	15	33.3	40.427N.	125.457W.	3	BK	...	...	3.6ML(BK)	...	SEPT. 22	18:15	PST
SEPT. 29	11	58	01.4	40.752N.	124.933W.	10	BK	...	...	3.5ML(BK)	...	SEPT. 29	03:58	PST
OCT. 3	20	53	28.1	41.625N.	126.097W.	5	BK	4.1	...	4.1ML(BK)	...	OCT. 3	12:53	PST
OCT. 10	12	42	41.5	40.728N.	127.302W.	2	BK	3.5	...	3.8ML(BK)	...	OCT. 10	04:42	PST
OCT. 10	13	55	21.8	40.485N.	125.255W.	4	BK	...	...	3.7ML(BK)	...	OCT. 10	05:55	PST
OCT. 19	04	28	45.2	36.555N.	122.860W.	10	BK	...	...	3.2ML(BK)	...	OCT. 18	20:28	PST
NOV. 8	12	31	42.5	40.628N.	127.360W.	5	BK	4.1	...	4.1ML(BK)	...	NOV. 8	04:31	PST
NOV. 8	16	44	53.5	41.723N.	127.059W.	10	GS	4.2	...	3.7MD(GM)	...	NOV. 8	08:44	PST
NOV. 8	17	33	39.7	41.555N.	126.737W.	5	BK	4.5	4.8	3.9ML(BK)	...	NOV. 8	09:33	PST
NOV. 8	17	36	46.5	41.755N.	127.095W.	10	GS	4.4	...	4.0ML(BK)	...	NOV. 8	09:36	PST
NOV. 11	12	07	43.8	40.388N.	124.902W.	15	BK	4.9	3.8	4.3ML(BK)	FELT	NOV. 11	04:07	PST
NOV. 19	17	44	41.3	40.302N.	124.548W.	17	BK	...	...	3.7ML(BK)	...	NOV. 19	09:44	PST
NOV. 20	16	09	13.4	40.588N.	124.802W.	19	BK	...	...	3.3ML(BK)	...	NOV. 20	08:09	PST
DEC. 15	19	29	07.0	34.389N.	119.972W.	3	PS	...	...	3.0ML(PS)	...	DEC. 15	10:29	PST
DEC. 20	10	41	02.2	40.600N.	125.648W.	5	BK	5.6	5.4	5.6ML(BK)	V	DEC. 20	02:41	PST
DEC. 21	19	15	29.1	40.713N.	125.373W.	5	BK	...	...	3.5ML(BK)	...	DEC. 21	11:15	PST
DEC. 27	10	35	35.2	40.580N.	124.535W.	23	BK	...	...	3.3ML(BK)	...	DEC. 27	02:35	PST
COLORADO														
AUG. 14	19	08	30.7	38.359N.	107.402W.	5	GS	...	...	3.4ML(GS)	II	AUG. 14	12:08	MST
AUG. 17	15	03	27.6	37.469N.	104.314W.	5	GS	...	...	3.4ML(GS)	...	AUG. 17	08:03	MST
SEPT. 24	16	57	45.7	40.789N.	108.837W.	5	GS	...	...	4.1ML(GS)	IV	SEPT. 24	09:57	MST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
DELAWARE														
NOV. 17	19	55	06.5	39.832N.	75.660W.	5	GS	...	...	2.2Mn(VP)	IV	NOV. 17	14:55	EST
DEC. 12	05	15	09.5	39.832N.	75.660W.	5	GS	...	...	2.0Mn(GS)	IV	DEC. 12	00:15	EST
GEORGIA														
JAN. 17	02	06	06.9	32.745N.	83.524W.	0	GT	...	...	2.8MD(GT)	...	JAN. 16	21:06	EST
JAN. 26	14	07	44.8	32.728N.	83.375W.	5	GS	...	...	3.5Mn(GS)	III	JAN. 26	09:07	EST
DEC. 31	06	31	12.1	32.599N.	84.898W.	5	GS	...	...	2.6MD(TC)	IV	DEC. 31	01:31	EST
DEC. 31	17	17	27.2	32.568N.	84.917W.	5	GS	...	...	2.6MD(TC)	IV	DEC. 31	12:17	EST
HAWAII														
JAN. 3	03	00	10.7	19.345N.	154.997W.	9	HV	...	...	3.3ML(HV)	...	JAN. 2	17:00	HST
JAN. 3	05	39	52.5	19.130N.	155.122W.	10	HV	...	...	3.3ML(HV)	...	JAN. 2	19:39	HST
JAN. 3	21	55	04.0	19.350N.	155.064W.	8	HV	...	...	3.8ML(HV)	III	JAN. 3	11:55	HST
JAN. 5	14	54	13.0	19.313N.	155.226W.	10	HV	...	...	3.4ML(HV)	III	JAN. 5	04:54	HST
JAN. 9	00	50	15.2	19.370N.	155.260W.	34	HV	...	...	3.1ML(HV)	...	JAN. 8	14:50	HST
JAN. 13	18	52	35.0	19.284N.	155.259W.	11	HV	...	...	3.0ML(HV)	...	JAN. 13	08:52	HST
JAN. 15	10	29	35.8	19.621N.	156.443W.	14	HV	...	...	3.2ML(HV)	...	JAN. 15	00:29	HST
JAN. 16	17	33	53.6	19.354N.	155.123W.	9	HV	...	...	3.9ML(HV)	IV	JAN. 16	07:33	HST
JAN. 23	20	13	39.9	19.379N.	155.060W.	12	HV	...	...	3.3ML(HV)	III	JAN. 23	10:13	HST
JAN. 23	20	46	46.6	19.380N.	155.060W.	12	HV	...	...	3.5ML(HV)	III	JAN. 23	10:46	HST
JAN. 24	04	00	24.9	19.358N.	155.031W.	10	HV	...	...	4.3ML(HV)	V	JAN. 23	18:00	HST
JAN. 25	09	08	28.2	19.230N.	155.455W.	10	HV	...	...	3.3ML(HV)	...	JAN. 24	23:08	HST
JAN. 26	23	38	34.3	19.142N.	155.509W.	11	HV	...	...	3.1ML(HV)	III	JAN. 26	13:38	HST
JAN. 27	01	57	58.1	19.375N.	155.422W.	10	HV	...	...	3.2ML(HV)	III	JAN. 26	15:57	HST
FEB. 3	05	46	22.7	19.333N.	155.109W.	10	HV	...	...	3.3ML(HV)	III	FEB. 2	19:46	HST
FEB. 7	04	21	12.6	19.280N.	155.508W.	8	HV	...	...	3.1ML(HV)	III	FEB. 6	18:21	HST
FEB. 8	02	02	45.5	19.358N.	155.241W.	28	HV	4.6	...	4.1ML(HV)	III	FEB. 7	16:02	HST
FEB. 15	09	11	54.0	19.336N.	155.109W.	9	HV	...	...	3.4ML(HV)	...	FEB. 14	23:11	HST
FEB. 20	04	05	12.1	19.332N.	155.122W.	9	HV	...	...	3.4ML(HV)	III	FEB. 19	18:05	HST
FEB. 25	04	49	46.1	19.421N.	155.635W.	2	HV	...	...	3.7ML(HV)	...	FEB. 24	18:49	HST
MAR. 2	13	38	48.6	19.425N.	155.629W.	2	HV	...	...	3.1ML(HV)	...	FEB. 2	03:38	HST
MAR. 5	09	27	23.8	19.360N.	155.052W.	8	HV	...	...	3.4ML(HV)	III	MAR. 4	23:27	HST
MAR. 6	02	10	02.4	19.759N.	156.134W.	40	HV	...	...	3.5ML(HV)	...	MAR. 5	16:10	HST
MAR. 8	16	41	03.4	19.199N.	155.593W.	12	HV	...	...	4.5ML(HV)	IV	MAR. 8	06:41	HST
MAR. 13	08	43	04.9	19.982N.	155.333W.	14	HV	...	...	3.0ML(HV)	III	MAR. 12	22:43	HST
MAR. 15	16	52	29.5	19.587N.	155.411W.	35	HV	...	...	3.1ML(HV)	...	MAR. 15	06:52	HST
MAR. 17	02	10	07.1	18.453N.	154.279W.	39	HV	...	...	4.3ML(HV)	III	MAR. 16	16:10	HST
MAR. 18	04	35	42.7	19.335N.	155.197W.	10	HV	...	...	3.1ML(HV)	...	MAR. 17	18:35	HST
MAR. 19	04	45	30.0	19.388N.	155.443W.	10	HV	...	...	3.5ML(HV)	III	MAR. 18	18:45	HST
MAR. 21	03	18	39.2	19.357N.	155.050W.	7	HV	4.9	...	4.8ML(HV)	V	MAR. 20	17:18	HST
MAR. 21	09	02	21.4	19.365N.	155.419W.	11	HV	...	...	3.9ML(HV)	IV	MAR. 20	23:02	HST
MAR. 21	10	37	28.9	19.367N.	155.424W.	11	HV	...	...	3.4ML(HV)	...	MAR. 21	00:37	HST
MAR. 22	07	36	23.0	19.354N.	155.463W.	11	HV	...	...	3.3ML(HV)	...	MAR. 21	21:36	HST
MAR. 24	12	59	33.2	19.427N.	155.471W.	11	HV	...	...	3.0ML(HV)	...	MAR. 24	02:59	HST
MAR. 29	13	54	39.9	19.336N.	155.347W.	32	HV	...	...	3.2ML(HV)	...	MAR. 29	03:54	HST
APR 7	21	00	53.5	19.281N.	155.477W.	9	HV	...	...	3.3ML(HV)	III	APR . 7	11:00	HST
APR 12	10	49	26.9	19.494N.	155.667W.	7	HV	...	...	3.6ML(HV)	III	APR. 12	00:49	HST
APR. 16	00	51	14.5	19.335N.	155.198W.	9	HV	...	...	3.1ML(HV)	III	APR. 15	14:51	HST
APR. 23	06	43	41.9	19.333N.	155.137W.	9	HV	...	...	3.0ML(HV)	...	APR. 22	20:43	HST
APR. 27	19	34	04.0	20.395N.	156.300W.	26	HV	...	...	3.3ML(HV)	...	APR. 27	09:34	HST
APR. 28	09	34	32.9	19.330N.	155.126W.	8	HV	...	...	4.0ML(HV)	IV	APR. 27	23:34	HST
APR. 28	23	15	30.4	19.595N.	156.028W.	40	HV	...	...	3.0ML(HV)	...	APR. 28	13:15	HST
MAY 3	03	19	37.9	19.928N.	155.667W.	23	HV	...	...	3.0ML(HV)	...	MAY 2	17:19	HST
MAY 7	18	47	10.4	19.301N.	155.488W.	9	HV	...	...	3.0ML(HV)	...	MAY 7	08:47	HST
MAY 9	16	16	52.3	20.653N.	155.921W.	31	HV	...	...	3.0ML(HV)	III	MAY 9	06:16	HST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
HAWAII--Continued														
MAY 11	00	57	12.0	19.697N.	155.036W.	0	HV	...	...	3.1ML(HV)	...	MAY 10	14:57	HST
MAY 13	10	30	08.0	19.171N.	155.583W.	9	HV	...	...	4.4ML(HV)	IV	MAY 13	00:30	HST
MAY 14	14	18	18.2	19.361N.	155.036W.	8	HV	...	...	3.3ML(HV)	III	MAY 14	04:18	HST
MAY 18	15	49	13.3	19.731N.	155.730W.	41	HV	...	...	3.2ML(HV)	...	MAY 18	05:49	HST
MAY 19	21	46	37.3	19.566N.	155.694W.	2	HV	...	...	3.3ML(HV)	...	MAY 19	11:46	HST
MAY 21	12	43	04.8	19.591N.	155.699W.	0	HV	...	...	3.1ML(HV)	...	MAY 21	02:43	HST
MAY 24	17	49	17.8	19.325N.	155.145W.	10	HV	...	...	3.1ML(HV)	...	MAY 24	07:49	HST
MAY 26	09	09	37.0	19.343N.	155.041W.	7	HV	...	...	3.1ML(HV)	...	MAY 25	23:09	HST
MAY 27	12	45	37.0	19.820N.	155.355W.	17	HV	...	...	3.0ML(HV)	...	MAY 27	02:45	HST
MAY 28	10	12	33.7	19.767N.	156.047W.	40	HV	...	...	3.0ML(HV)	...	MAY 28	00:12	HST
MAY 31	13	59	03.4	19.343N.	155.523W.	24	HV	...	...	3.4ML(HV)	III	MAY 31	03:59	HST
JUNE 4	08	47	38.3	19.331N.	155.262W.	9	HV	...	...	3.3ML(HV)	III	JUNE 3	10:47	HST
JUNE 5	09	55	52.2	19.494N.	154.962W.	44	HV	...	...	3.5ML(HV)	II	JUNE 4	11:55	HST
JUNE 6	04	54	31.0	19.153N.	155.541W.	33	HV	...	...	4.1ML(HV)	IV	JUNE 5	18:54	HST
JUNE 7	13	46	37.8	19.427N.	155.631W.	3	HV	...	...	3.0ML(HV)	...	JUNE 7	03:46	HST
JUNE 22	03	55	15.7	19.242N.	155.568W.	9	HV	...	...	3.8ML(HV)	...	JUNE 21	17:55	HST
JUNE 22	22	51	13.5	19.489N.	155.863W.	11	HV	...	...	3.3ML(HV)	...	JUNE 22	12:51	HST
JUNE 25	00	57	35.5	19.336N.	155.198W.	6	HV	...	...	3.0ML(HV)	...	JUNE 24	14:57	HST
JUNE 27	02	58	48.7	19.363N.	155.082W.	9	HV	...	...	3.7ML(HV)	III	JUNE 26	16:58	HST
JUNE 29	14	03	52.8	19.534N.	155.611W.	11	HV	...	...	3.1ML(HV)	...	JUNE 29	04:03	HST
JUNE 30	10	10	56.8	19.019N.	155.511W.	38	HV	...	...	3.4ML(HV)	...	JUNE 30	00:10	HST
JULY 1	06	11	18.6	19.385N.	155.455W.	10	HV	...	...	3.4ML(HV)	...	JUNE 30	20:11	HST
JULY 1	21	00	16.6	19.314N.	155.278W.	33	HV	...	...	3.1ML(HV)	...	JULY 1	11:00	HST
JULY 2	19	59	00.5	19.429N.	155.624W.	0	HV	...	...	3.1ML(HV)	...	JULY 2	09:59	HST
JULY 7	12	05	17.3	18.385N.	155.606W.	36	HV	...	...	3.7ML(HV)	...	JULY 7	02:05	HST
JULY 7	19	18	44.0	19.537N.	155.944W.	9	HV	...	...	3.1ML(HV)	...	JULY 7	09:18	HST
JULY 15	20	08	51.6	19.346N.	155.198W.	8	HV	...	...	3.0ML(HV)	...	JULY 15	10:08	HST
JULY 16	10	40	29.1	19.357N.	155.023W.	7	HV	...	...	3.1ML(HV)	...	JULY 16	00:40	HST
JULY 19	06	35	34.0	20.206N.	157.670W.	29	HV	...	...	3.1ML(HV)	...	JULY 18	20:35	HST
JULY 26	20	21	29.7	19.426N.	155.411W.	9	HV	...	...	3.6ML(HV)	III	JULY 26	10:21	HST
JULY 30	12	01	06.8	19.366N.	155.109W.	8	HV	...	...	3.0ML(HV)	...	JULY 30	02:01	HST
JULY 30	17	49	56.1	19.423N.	155.413W.	10	HV	...	...	3.3ML(HV)	...	JULY 30	07:49	HST
JULY 30	19	50	43.7	19.362N.	155.254W.	9	HV	...	...	3.0ML(HV)	...	JULY 30	09:50	HST
JULY 31	15	39	16.3	19.328N.	155.124W.	9	HV	...	...	3.8ML(HV)	...	JULY 31	05:39	HST
AUG. 1	02	16	58.0	19.304N.	155.260W.	11	HV	...	...	3.5ML(HV)	III	JULY 31	16:16	HST
AUG. 8	21	39	51.4	19.334N.	155.201W.	9	HV	...	...	3.1ML(HV)	...	AUG. 8	11:39	HST
AUG. 14	03	14	18.7	19.330N.	155.116W.	9	HV	...	...	3.6ML(HV)	III	AUG. 13	17:14	HST
AUG. 16	09	35	21.0	19.317N.	155.218W.	10	HV	...	...	3.0ML(HV)	II	AUG. 15	23:35	HST
AUG. 16	10	10	44.6	19.962N.	155.840W.	7	HV	...	...	3.7ML(HV)	IV	AUG. 16	00:10	HST
AUG. 18	15	43	59.5	19.975N.	155.137W.	31	HV	...	...	4.0ML(HV)	IV	AUG. 18	05:43	HST
AUG. 20	08	52	50.9	19.433N.	155.617W.	3	HV	...	...	3.1ML(HV)	...	AUG. 19	22:52	HST
AUG. 23	13	48	35.1	19.338N.	155.213W.	10	HV	...	...	3.7ML(HV)	IV	AUG. 23	03:48	HST
AUG. 26	16	23	52.1	19.422N.	155.624W.	1	HV	...	...	3.4ML(HV)	...	AUG. 26	06:23	HST
AUG. 28	17	34	00.6	19.310N.	155.300W.	33	HV	...	...	3.1ML(HV)	...	AUG. 28	07:34	HST
AUG. 31	11	45	35.8	18.913N.	155.245W.	12	HV	...	...	3.1ML(HV)	...	AUG. 31	01:45	HST
SEPT. 3	11	40	33.3	19.656N.	155.125W.	42	HV	...	...	3.2ML(HV)	...	SEPT. 3	01:40	HST
SEPT. 6	08	27	44.7	19.340N.	155.213W.	10	HV	...	...	3.5ML(HV)	III	SEPT. 5	22:27	HST
SEPT. 6	13	56	41.0	19.506N.	155.654W.	8	HV	...	...	3.3ML(HV)	...	SEPT. 6	03:56	HST
SEPT. 7	15	09	10.0	19.341N.	155.298W.	4	HV	...	...	3.5ML(HV)	III	SEPT. 7	05:09	HST
SEPT. 9	16	30	55.3	19.332N.	155.122W.	9	HV	5.5	5.0	5.4ML(HV)	V	SEPT. 9	06:30	HST
SEPT. 10	03	44	04.9	19.508N.	155.660W.	7	HV	...	...	3.1ML(HV)	...	SEPT. 9	17:44	HST
SEPT. 13	04	59	37.2	19.503N.	155.664W.	8	HV	...	...	3.3ML(HV)	...	SEPT. 12	18:59	HST
SEPT. 14	05	39	57.5	19.354N.	155.052W.	9	HV	...	...	4.0ML(HV)	IV	SEPT. 13	19:39	HST
SEPT. 14	16	43	43.5	19.504N.	155.655W.	8	HV	...	...	3.5ML(HV)	IV	SEPT. 14	06:43	HST
SEPT. 14	18	55	58.4	19.511N.	155.654W.	8	HV	...	...	3.0ML(HV)	...	SEPT. 14	08:55	HST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
HAWAII–Continued														
SEPT. 14	23	00	15.2	19.357N.	155.051W.	8	HV	...	...	3.6ML(HV)	III	SEPT. 14	13:00	HST
SEPT. 14	23	37	17.1	19.508N.	155.658W.	8	HV	...	...	3.7ML(HV)	...	SEPT. 14	13:37	HST
SEPT. 16	19	22	12.2	19.503N.	155.653W.	8	HV	...	...	4.0ML(HV)	IV	SEPT. 16	09:22	HST
SEPT. 17	01	09	53.2	19.501N.	155.651W.	8	HV	...	...	4.2ML(HV)	IV	SEPT. 16	15:09	HST
SEPT. 18	09	28	29.1	19.368N.	155.001W.	6	HV	...	...	3.5ML(HV)	...	SEPT. 17	23:28	HST
SEPT. 21	18	34	49.3	19.320N.	155.441W.	11	HV	...	...	3.1ML(HV)	...	SEPT. 21	08:34	HST
SEPT. 23	17	21	05.2	19.730N.	156.177W.	39	HV	...	...	3.0ML(HV)	...	SEPT. 23	07:21	HST
SEPT. 26	12	02	22.5	19.298N.	155.777W.	11	HV	...	...	3.0ML(HV)	...	SEPT. 26	02:02	HST
SEPT. 28	05	44	32.8	19.330N.	155.138W.	9	HV	...	...	3.2ML(HV)	...	SEPT. 27	19:44	HST
OCT. 2	11	38	27.6	19.325N.	155.203W.	10	HV	...	...	3.4ML(HV)	III	OCT. 2	01:38	HST
OCT. 5	05	45	53.5	19.369N.	155.432W.	11	HV	...	...	3.1ML(HV)	...	OCT. 4	19:45	HST
OCT. 6	04	53	30.5	19.509N.	155.658W.	7	HV	...	...	3.2ML(HV)	...	OCT. 5	18:53	HST
OCT. 8	03	21	36.3	19.742N.	155.473W.	16	HV	...	...	3.9ML(HV)	IV	OCT. 7	17:21	HST
OCT. 9	02	21	34.9	19.325N.	155.193W.	9	HV	...	...	3.4ML(HV)	II	OCT. 8	16:21	HST
OCT. 22	09	42	15.3	19.670N.	156.065W.	34	HV	...	...	3.3ML(HV)	...	OCT. 21	23:42	HST
OCT. 25	05	05	26.2	18.875N.	155.169W.	44	HV	...	...	3.4ML(HV)	...	OCT. 24	19:05	HST
OCT. 25	21	02	35.4	19.495N.	155.648W.	4	HV	...	...	4.0ML(HV)	III	OCT. 25	11:02	HST
OCT. 28	04	03	35.3	19.328N.	155.130W.	9	HV	...	...	3.4ML(HV)	...	OCT. 27	18:03	HST
OCT. 28	04	53	13.8	19.328N.	155.129W.	9	HV	...	...	3.2ML(HV)	...	OCT. 27	18:53	HST
OCT. 30	05	26	09.1	19.348N.	155.047W.	9	HV	...	...	3.2ML(HV)	...	OCT. 29	19:26	HST
OCT. 31	01	49	14.5	19.451N.	155.454W.	10	HV	...	...	3.9ML(HV)	III	OCT. 30	15:49	HST
NOV. 11	17	55	43.7	19.432N.	155.624W.	3	HV	...	...	3.3ML(HV)	...	NOV. 11	07:55	HST
NOV. 12	08	05	38.3	19.415N.	155.268W.	16	HV	...	...	3.6ML(HV)	II	NOV. 11	22:05	HST
NOV. 14	17	16	49.4	19.437N.	155.619W.	2	HV	...	...	3.5ML(HV)	...	NOV. 14	07:16	HST
NOV. 16	16	13	00.1	19.429N.	155.452W.	11	HV	6.4	6.7	...	VIII	NOV. 16	07:13	HST
NOV. 16	23	30	47.5	19.486N.	155.396W.	12	HV	4.8	...	4.2ML(HV)	III	NOV. 16	14:30	HST
NOV. 17	00	23	43.4	19.394N.	155.435W.	11	HV	...	...	3.3ML(HV)	...	NOV. 16	14:23	HST
NOV. 17	00	57	42.9	19.453N.	155.392W.	9	HV	...	...	3.1ML(HV)	...	NOV. 16	14:57	HST
NOV. 17	02	08	28.8	19.427N.	155.324W.	6	HV	...	...	3.5ML(HV)	III	NOV. 16	16:08	HST
NOV. 17	02	18	42.0	19.467N.	155.453W.	8	HV	...	...	3.0ML(HV)	...	NOV. 16	16:18	HST
NOV. 17	03	33	00.2	19.366N.	155.474W.	11	HV	...	...	3.4ML(HV)	...	NOV. 16	17:33	HST
NOV. 17	07	17	23.4	19.501N.	155.453W.	3	HV	...	...	3.0ML(HV)	...	NOV. 16	21:17	HST
NOV. 17	08	12	46.0	19.300N.	155.264W.	10	HV	...	...	3.1ML(HV)	...	NOV. 17	22:12	HST
NOV. 17	22	12	47.5	19.370N.	155.478W.	9	HV	...	...	3.7ML(HV)	III	NOV. 17	12:12	HST
NOV. 18	09	30	39.6	19.472N.	155.353W.	2	HV	...	...	3.7ML(HV)	III	NOV. 17	23:30	HST
NOV. 19	11	37	51.7	19.290N.	155.261W.	11	HV	...	...	4.1MD(HV)	IV	NOV. 19	02:37	HST
NOV. 19	16	32	37.1	19.486N.	155.433W.	9	HV	...	...	3.0ML(HV)	...	NOV. 19	06:32	HST
NOV. 19	19	18	34.6	19.418N.	155.500W.	10	HV	...	...	3.2ML(HV)	...	NOV. 19	09:18	HST
NOV. 19	19	35	25.0	19.454N.	155.495W.	11	HV	...	...	3.0ML(HV)	...	NOV. 19	09:35	HST
NOV. 19	21	30	32.2	19.418N.	155.357W.	12	HV	...	...	3.0ML(HV)	...	NOV. 19	11:30	HST
NOV. 20	13	56	43.3	19.373N.	155.473W.	7	HV	...	...	3.2ML(HV)	...	NOV. 20	03:56	HST
NOV. 22	14	39	15.7	19.314N.	155.223W	9	HV	...	...	3.1ML(HV)	II	NOV. 22	04:39	HST
NOV. 22	15	53	11.3	19.942N.	155.519W.	34	HV	...	...	3.2ML(HV)	II	NOV. 22	05:53	HST
NOV. 22	18	30	08.8	19.942N.	155.518W.	35	HV	...	...	3.6ML(HV)	III	NOV. 22	08:30	HST
NOV. 23	06	32	30.0	19.525N.	155.416W.	24	HV	...	...	3.6ML(HV)	III	NOV. 22	20:32	HST
NOV. 23	10	38	45.9	10.465N.	155.448W.	9	HV	...	...	3.1ML(HV)	...	NOV. 23	00:38	HST
NOV. 23	12	33	40.6	19.393N.	155.435W.	11	HV	...	...	3.8ML(HV)	III	NOV. 23	02:33	HST
NOV. 26	04	17	33.0	19.149N.	155.582W.	11	HV	...	...	3.7ML(HV)	III	NOV. 25	19:17	HST
NOV. 27	03	08	52.5	19.472N.	155.455W.	9	HV	...	...	3.0ML(HV)	II	NOV. 26	17:08	HST
NOV. 27	19	27	31.7	19.358N.	155.050W.	9	HV	...	...	3.9ML(HV)	III	NOV. 27	10:27	HST
NOV. 27	23	01	12.8	19.361N.	155.403W.	14	HV	...	...	3.2ML(HV)	...	NOV. 27	13:01	HST
NOV. 28	01	20	42.0	19.372N.	155.458W.	11	HV	...	...	3.5ML(HV)	II	NOV. 27	15:20	HST
NOV. 28	01	39	18.5	19.372N.	155.458W.	10	HV	...	...	3.1ML(HV)	...	NOV. 27	15:39	HST
NOV. 28	05	33	28.1	19.487N.	155.457W.	7	HV	...	...	3.7ML(HV)	III	NOV. 27	19:33	HST
NOV. 28	07	29	29.8	19.357N.	155.505W.	10	HV	...	...	3.3ML(HV)	...	NOV. 27	21:39	HST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
HAWAII-Continued														
NOV. 29	20	19	54.6	19.376N.	155.388W.	14	HV	...	...	3.7ML(HV)	III	NOV. 29	10:19	HST
NOV. 30	01	43	11.6	19.376N.	155.388W.	14	HV	...	...	3.1ML(HV)	II	NOV. 29	15:43	HST
DEC. 4	17	39	20.0	19.480N.	155.463W.	7	HV	...	...	3.2ML(HV)	...	DEC. 4	07:39	HST
DEC. 4	21	43	32.7	19.352N.	155.052W.	8	HV	...	...	3.5ML(HV)	...	DEC. 4	11:43	HST
DEC. 5	01	29	15.6	19.591N.	156.120W.	14	HV	...	...	3.0ML(HV)	...	DEC. 4	15:29	HST
DEC. 5	05	51	41.4	19.459N.	155.425W.	8	HV	...	...	3.7ML(HV)	IV	DEC. 4	19:51	HST
DEC. 6	11	20	12.9	19.484N.	155.437W.	8	HV	...	...	3.0ML(HV)	...	DEC. 6	01:20	HST
DEC. 6	17	41	15.0	19.461N.	155.253W.	32	HV	...	...	3.3ML(HV)	...	DEC. 6	07:41	HST
DEC. 9	07	05	59.8	19.091N.	156.206W.	33	HV	...	...	3.0ML(HV)	...	DEC. 8	21:05	HST
DEC. 10	07	14	40.2	19.327N.	155.258W.	9	HV	...	...	3.0ML(HV)	...	DEC. 9	21:14	HST
DEC. 11	11	47	10.4	19.506N.	155.456W.	4	HV	...	...	3.1ML(HV)	...	DEC. 11	01:47	HST
DEC. 15	06	56	24.0	19.367N.	155.502W.	10	HV	...	...	3.6ML(HV)	III	DEC. 14	21:56	HST
DEC. 19	07	11	56.2	19.485N.	155.443W.	8	HV	...	...	3.2ML(HV)	...	DEC. 18	21:11	HST
DEC. 19	09	41	31.7	19.358N.	155.501W.	10	HV	...	...	3.3ML(HV)	...	DEC. 18	23:41	HST
DEC. 20	13	54	59.4	19.128N.	156.119W.	33	HV	...	...	3.2ML(HV)	...	DEC. 20	03:54	HST
DEC. 21	12	34	49.4	19.378N.	155.079W.	8	HV	...	...	3.0ML(HV)	...	DEC. 21	02:34	HST
DEC. 22	01	06	18.4	19.351N.	155.502W.	3	HV	...	...	3.2ML(HV)	...	DEC. 21	15:06	HST
DEC. 22	01	32	52.2	19.349N.	155.500W.	3	HV	...	...	3.3ML(HV)	...	DEC. 21	15:32	HST
DEC. 22	19	29	48.8	19.346N.	155.259W.	34	HV	...	...	3.3ML(HV)	...	DEC. 22	10:29	HST
DEC. 24	06	53	33.1	19.116N.	155.462W.	8	HV	...	...	3.0ML(HV)	II	DEC. 23	20:53	HST
DEC. 25	16	39	40.5	19.771N.	155.893W.	30	HV	...	...	3.1ML(HV)	...	DEC. 25	06:39	HST
DEC. 28	00	50	26.5	19.312N.	155.194W.	9	HV	...	...	3.4ML(HV)	III	DEC. 27	14:50	HST
DEC. 29	12	58	06.9	19.308N.	155.224W.	10	HV	...	...	3.7ML(HV)	IV	DEC. 29	02:58	HST
DEC. 29	19	58	50.8	19.502N.	155.455W.	6	HV	...	...	3.5ML(HV)	...	DEC. 29	09:58	HST
DEC. 29	21	50	11.8	19.423N.	155.627W.	1	HV	...	...	3.3ML(HV)	...	DEC. 29	12:50	HST
IDAHO														
FEB. 8	10	54	54.9	43.304N.	111.190W.	7	UU	4.4	...	4.2ML(GS)	V	FEB. 8	03:54	MST
FEB. 25	05	28	05.5	43.001N.	111.601W.	5	GS	...	...	3.2ML(GS)	...	FEB. 24	22:28	MST
FEB. 28	07	24	17.3	44.383N.	115.447W.	5	GS	...	...	3.7ML(GS)	FELT	FEB. 27	23:24	PST
MAR. 1	02	00	42.7	44.349N.	115.244W.	5	GS	...	...	3.7ML(GS)	...	FEB. 28	18:00	PST
MAR. 1	14	09	21.7	44.551N.	115.089W.	5	GS	...	...	3.3ML(GS)	...	MAR. 1	06:09	PST
MAR. 29	01	36	59.4	44.790N.	116.881W.	5	GS	...	...	3.2ML(GS)	III	MAR. 28	17:36	PST
APR. 14	23	24	26.1	43.961N.	114.133W.	2	MT	...	...	3.0ML(MT)	...	APR. 14	16:24	MST
JUNE 24	00	26	25.1	47.507N.	115.976W.	10	MT	...	...	3.1ML(BU)	...	JUNE 23	17:26	MST
SEPT. 9	01	09	36.2	44.580N.	115.674W.	5	GS	...	...	3.6ML(GS)	II	SEPT. 8	17:09	PST
OCT. 12	07	37	11.9	44.643N.	114.397W.	5	GS	...	...	3.6ML(GS)	...	OCT. 11	23:37	PST
OCT. 28	14	06	06.5	43.974N.	113.916W.	14	GS	6.2	7.3	7.2ML(BK)	IX	OCT. 28	07:06	MST
OCT. 28	15	14	07.7	44.127N.	113.968W.	10	UU	4.3	...	4.6ML(UU)	...	OCT. 28	08:14	MST
OCT. 28	15	27	04.9	44.272N.	114.125W.	10	GS	...	...	3.7ML(UU)	...	OCT. 28	08:27	MST
OCT. 28	15	54	31.7	44.206N.	114.058W.	10	UU	...	...	4.0ML(UU)	...	OCT. 28	08:54	MST
OCT. 28	17	20	24.3	44.176N.	114.091W.	10	UU	...	...	4.0ML(UU)	...	OCT. 28	10:20	MST
OCT. 28	18	31	52.5	44.198N.	114.078W.	10	UU	...	...	4.1ML(UU)	...	OCT. 28	11:31	MST
OCT. 28	18	42	56.0	44.004N.	114.004W.	10	GS	...	...	3.9ML(UU)	...	OCT. 28	11:42	MST
OCT. 28	19	30	45.0	44.313N.	114.121W.	10	GS	...	...	3.6ML(GS)	...	OCT. 28	12:30	MST
OCT. 28	19	51	25.0	44.045N.	113.918W.	13	GS	5.4	5.1	5.8ML(UU)	FELT	OCT. 28	12:51	MST
OCT. 28	20	19	03.2	44.175N.	114.001W.	10	GS	...	...	3.7ML(UU)	...	OCT. 28	13:19	MST
OCT. 29	02	37	03.7	44.255N.	114.055W.	10	UU	...	...	4.0ML(UU)	...	OCT. 28	19:37	MST
OCT. 29	03	11	46.7	44.339N.	114.001W.	10	GS	...	...	3.6ML(GS)	...	OCT. 28	20:11	MST
OCT. 29	04	02	58.9	44.280N.	114.061W.	10	GS	...	...	3.5ML(GS)	...	OCT. 28	21:02	MST
OCT. 29	08	15	17.9	44.253N.	114.027W.	10	GS	...	...	3.9ML(UU)	...	OCT. 29	01:15	MST
OCT. 29	11	47	03.2	44.231N.	113.883W.	10	GS	...	...	3.6ML(GS)	...	OCT. 29	04:47	MST
OCT. 29	16	24	14.5	44.063N.	113.906W.	10	GM	...	...	2.9M (GM)	...	OCT. 29	09:24	MST
OCT. 29	17	37	40.7	44.042N.	113.869W.	8	GM	...	...	3.3M (GM)	...	OCT. 29	10:37	MST
OCT. 29	19	23	24.3	44.045N.	113.906W.	9	GM	...	...	3.1M (GM)	...	OCT. 29	12:23	MST
OCT. 29	19	48	12.8	43.985N.	113.937W.	10	GS	...	...	3.6ML(GS)	...	OCT. 29	12:48	MST
OCT. 29	21	13	59.5	44.105N.	113.943W.	9	GM	...	...	3.3M (GM)	...	OCT. 29	14:13	MST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr min sec	Latitude (°)	Longitude (°)	Depth (km)	Hypocenter source	Magnitude mb	Magnitude MS	Magnitude ML, Mn MD, Mw	Maximum intensity	Local time Date	Local time Hour	Local time Zone
IDAHO--Continued												
OCT. 29	23 29 11.8	44.233N.	114.046W.	13	GM	5.4	5.0	5.8ML(UU)	FELT	OCT. 29	16:29	MST
OCT. 29	23 39 05.4	44.257N.	114.064W.	12	GM	5.5	5.0	5.4ML(UU)	FELT	OCT. 29	16:39	MST
OCT. 29	23 49 43.6	44.173N.	114.186W.	10	GS	...	...	3.8ML(GS)	...	OCT. 29	16:49	MST
OCT. 30	01 07 41.3	44.312N.	114.068W.	10	GS	...	...	3.7ML(GS)	...	OCT. 29	18:07	MST
OCT. 30	01 16 39.4	44.056N.	113.891W.	9	GM	...	...	3.3M (GM)	...	OCT. 29	18:16	MST
OCT. 30	01 24 51.3	44.089N.	113.977W.	13	GM	4.3	...	4.8ML(UU)	...	OCT. 29	18:24	MST
OCT. 30	01 59 02.0	44.200N.	114.056W.	16	GM	4.2	...	4.7ML(UU)	...	OCT. 29	18:59	MST
OCT. 30	02 54 39.7	44.215N.	114.115W.	6	GM	...	...	4.0ML(UU)	...	OCT. 29	19:54	MST
OCT. 30	03 45 19.3	44.333N.	113.829W.	2	GM	...	...	3.9ML(GS)	...	OCT. 29	20:45	MST
OCT. 30	07 14 00.7	44.304N.	114.120W.	10	GS	...	...	3.9ML(GS)	...	OCT. 30	00:14	MST
OCT. 30	09 41 33.1	44.297N.	114.112W.	10	GS	...	...	3.7ML(GS)	...	OCT. 30	02:41	MST
OCT. 30	12 25 52.6	44.108N.	113.916W.	9	GM	...	...	3.1M (GM)	...	OCT. 30	05:25	MST
OCT. 30	12 54 00.0	44.307N.	114.084W.	10	GS	...	...	3.6ML(GS)	...	OCT. 30	05:54	MST
OCT. 30	17 49 19.9	44.157N.	113.862W.	7	GM	...	...	3.8ML(GS)	...	OCT. 30	10:49	MST
OCT. 30	19 23 42.4	44.377N.	113.994W.	10	GS	...	...	3.6ML(GS)	...	OCT. 30	12:23	MST
OCT. 30	23 02 34.5	44.026N.	113.807W.	8	GM	...	...	3.1M (GM)	...	OCT. 30	16:02	MST
OCT. 30	23 56 26.0	44.255N.	114.081W.	6	GM	...	...	3.5ML(GS)	...	OCT. 30	16:56	MST
OCT. 31	10 33 26.3	44.184N.	113.945W.	8	GM	...	...	3.0M (GM)	...	OCT. 31	03:33	MST
OCT. 31	16 08 33.3	44.258N.	113.990W.	10	GS	...	...	3.6ML(GS)	...	OCT. 31	09:08	MST
NOV. 1	01 05 28.2	44.232N.	114.053W.	8	GM	...	...	3.1M (GM)	...	OCT. 31	18:05	MST
NOV. 1	05 02 46.6	44.052N.	113.889W.	11	GM	...	...	2.8M (GM)	...	OCT. 31	22:02	MST
NOV. 1	10 30 33.6	44.134N.	113.950W.	10	GM	...	...	3.0M (GM)	...	NOV. 1	03:30	MST
NOV. 1	13 50 25.0	44.152N.	113.986W.	12	GM	...	...	3.7ML(UU)	...	NOV. 1	06:50	MST
NOV. 2	12 41 12.9	44.246N.	114.158W.	10	GS	...	...	3.7ML(GS)	...	NOV. 2	05:41	MST
NOV. 2	22 24 04.6	44.232N.	114.057W.	9	GM	...	...	3.1M (GM)	...	NOV. 2	15:24	MST
NOV. 2	23 42 01.9	44.265N.	114.082W.	6	GM	...	...	3.4M (GM)	...	NOV. 2	16:42	MST
NOV. 2	23 43 55.1	44.260N.	114.081W.	6	GM	...	...	4.2ML(UU)	...	NOV. 2	16:43	MST
NOV. 3	00 18 48.4	44.259N.	114.036W.	9	GM	...	...	3.3M (GM)	...	NOV. 2	17:18	MST
NOV. 3	01 22 15.7	44.262N.	114.065W.	8	GM	...	...	3.2M (GM)	...	NOV. 2	18:22	MST
NOV. 3	01 50 20.3	44.249N.	114.080W.	7	GM	4.3	...	3.8ML(UU)	...	NOV. 2	18:50	MST
NOV. 3	02 24 13.6	44.377N.	114.165W.	10	GS	...	...	3.4ML(GS)	...	NOV. 2	19:24	MST
NOV. 3	02 59 19.2	44.228N.	114.031W.	10	GM	...	...	3.9ML(UU)	...	NOV. 2	19:59	MST
NOV. 3	04 15 16.4	44.253N.	114.141W.	8	GM	...	...	3.6ML(GS)	...	NOV. 2	21:15	MST
NOV. 3	04 47 35.6	44.394N.	114.074W.	10	GS	...	...	3.5ML(GS)	...	NOV. 2	21:47	MST
NOV. 3	14 14 17.8	44.308N.	114.142W.	10	GS	...	...	3.6ML(GS)	...	NOV. 3	07:14	MST
NOV. 3	15 47 30.1	44.303N.	114.052W.	10	GS	...	...	3.6ML(GS)	...	NOV. 3	08:47	MST
NOV. 3	17 00 14.0	43.885N.	113.679W.	8	GM	...	...	2.7M (GM)	...	NOV. 3	10:00	MST
NOV. 3	22 09 24.5	44.101N.	113.951W.	11	GM	...	...	2.8M (GM)	...	NOV. 3	15:09	MST
NOV. 4	00 02 25.5	44.177N.	114.013W.	11	GM	...	...	2.6M (GM)	...	NOV. 3	17:02	MST
NOV. 4	05 00 14.8	44.139N.	113.938W.	9	GM	...	...	3.5ML(GS)	...	NOV. 3	22:00	MST
NOV. 4	07 08 19.2	44.207N.	114.024W.	9	GM	...	...	3.5ML(GS)	...	NOV. 4	00:08	MST
NOV. 4	09 04 12.9	44.139N.	113.912W.	7	GM	...	...	3.1M (GM)	...	NOV. 4	02:04	MST
NOV. 4	13 43 01.1	44.200N.	114.029W.	9	GM	...	...	2.9M (GM)	...	NOV. 4	06:43	MST
NOV. 4	23 29 49.3	44.257N.	114.096W.	8	GM	...	...	3.2M (GM)	...	NOV. 4	16:29	MST
NOV. 4	23 36 45.4	44.237N.	114.072W.	8	GM	...	...	2.7M (GM)	...	NOV. 4	16:36	MST
NOV. 5	01 51 49.1	44.131N.	113.951W.	12	GM	...	...	3.0M (GM)	...	NOV. 4	18:51	MST
NOV. 5	03 53 34.3	44.153N.	113.895W.	6	GM	...	...	2.8M (GM)	...	NOV. 4	20:53	MST
NOV. 5	04 22 09.0	44.141N.	113.970W.	10	GM	...	...	2.9M (GM)	...	NOV. 4	21:22	MST
NOV. 5	05 37 39.8	44.227N.	114.067W.	10	GM	...	...	3.6ML(GS)	...	NOV. 4	22:37	MST
NOV. 5	08 13 39.4	44.206N.	114.023W.	8	GM	...	...	2.9M (GM)	...	NOV. 4	01:13	MST
NOV. 5	17 36 25.3	44.181N.	114.023W.	12	GM	...	...	3.5ML(GS)	...	NOV. 5	10:36	MST
NOV. 5	17 43 54.7	44.144N.	113.987W.	14	GM	...	...	3.1M (GM)	...	NOV. 5	10:43	MST
NOV. 5	20 29 30.1	44.197N.	114.030W.	10	GM	...	...	3.2M (GM)	...	NOV. 5	13:29	MST
NOV. 5	22 56 42.7	44.222N.	114.039W.	12	GM	...	...	3.3M (GM)	...	NOV. 5	15:56	MST
NOV. 6	03 26 09.4	44.262N.	114.085W.	7	GM	...	...	2.9M (GM)	...	NOV. 5	20:26	MST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
IDAHO--Continued														
NOV. 6	06	44	15.9	44.171N.	113.972W.	11	GM	...	...	3.0M (GM)	...	NOV. 5	23:44	MST
NOV. 6	21	04	48.7	44.140N.	113.963W.	11	GM	4.3	...	4.6ML(UU)	III	NOV. 6	14:04	MST
NOV. 6	21	11	55.0	44.139N.	113.977W.	11	GM	...	...	3.8ML(UU)	...	NOV. 6	14:11	MST
NOV. 6	21	19	56.4	44.146N.	113.974W.	10	GM	...	...	3.0M (GM)	...	NOV. 6	14:19	MST
NOV. 6	21	20	40.2	44.142N.	113.975W.	10	GM	...	...	3.1M (GM)	...	NOV. 6	14:20	MST
NOV. 6	23	11	38.6	44.227N.	114.044W.	7	GM	...	...	3.1M (GM)	...	NOV. 6	16:11	MST
NOV. 7	09	33	31.2	44.170N.	113.968W.	9	GM	...	...	3.2M (GM)	...	NOV. 7	02:33	MST
NOV. 7	17	33	06.1	44.257N.	114.046W.	10	GM	...	...	3.1M (GM)	...	NOV. 7	10:33	MST
NOV. 8	06	43	02.5	44.168N.	113.958W.	9	GM	...	...	3.0M (GM)	...	NOV. 7	23:43	MST
NOV. 8	23	32	43.0	44.236N.	114.060W.	7	GS	...	...	3.5ML(GS)	...	NOV. 8	16:32	MST
NOV. 9	09	25	04.3	44.480N.	114.140W.	10	GS	...	...	3.4ML(GS)	...	NOV. 9	02:25	MST
NOV. 9	23	00	43.3	43.897N.	113.755W.	11	GS	...	...	3.4ML(GS)	...	NOV. 9	16:00	MST
NOV. 19	03	50	46.9	42.055N.	112.499W.	5	UU	...	...	3.8ML(UU)	V	NOV. 18	20:50	MST
NOV. 21	19	11	35.7	44.027N.	113.952W.	10	GS	...	...	3.6ML(GS)	...	NOV. 21	12:11	MST
DEC. 1	07	52	58.5	44.285N.	114.133W.	10	GS	...	...	3.5ML(GS)	...	DEC. 1	00:52	MST
DEC. 3	03	10	16.0	44.480N.	114.103W.	10	GS	...	...	3.3ML(GS)	...	DEC. 2	20:10	MST
DEC. 5	02	13	27.1	44.302N.	113.816W.	10	GS	...	...	3.5ML(GS)	...	DEC. 4	19:13	MST
DEC. 5	11	51	02.4	44.362N.	114.120W.	10	GS	...	...	3.2ML(GS)	...	DEC. 5	04:51	MST
DEC. 8	04	24	50.0	44.179N.	113.907W.	10	GS	...	...	3.4ML(GS)	...	DEC. 7	21:24	MST
DEC. 10	01	35	01.0	44.256N.	114.156W.	10	GS	...	...	3.8ML(GS)	...	DEC. 9	18:35	MST
DEC. 11	07	40	45.7	42.352N.	111.569W.	6	UU	...	...	3.6ML(UU)	III	DEC. 11	00:40	MST
DEC. 11	19	58	18.2	44.286N.	114.160W.	10	GS	...	...	4.0ML(GS)	...	DEC. 11	12:58	MST
DEC. 12	04	55	36.5	44.413N.	114.086W.	7	GS	4.5	...	4.4ML(MT)	V	DEC. 11	21:55	MST
DEC. 12	05	11	27.8	44.423N.	114.114W.	10	GS	...	...	3.2ML(GS)	...	DEC. 11	22:11	MST
DEC. 13	14	55	26.9	44.226N.	114.177W.	10	GS	...	...	3.2ML(GS)	...	DEC. 13	07:55	MST
DEC. 13	17	13	38.6	44.244N.	114.074W.	10	GS	...	...	3.6ML(GS)	FELT	DEC. 13	10:13	MST
DEC. 15	06	13	34.8	44.365N.	114.138W.	10	GS	...	...	4.1ML(GS)	IV	DEC. 14	23:13	MST
DEC. 17	18	37	20.7	44.237N.	114.085W.	10	GS	...	...	3.7ML(GS)	FELT	DEC. 17	11:37	MST
DEC. 19	11	31	34.4	44.305N.	114.008W.	10	GS	...	...	3.5ML(GS)	...	DEC. 19	04:31	MST
DEC. 19	17	27	55.9	44.397N.	114.179W.	10	GS	...	...	3.6ML(GS)	...	DEC. 19	10:27	MST
DEC. 20	03	40	42.4	44.215N.	114.059W.	10	GS	...	...	3.1ML(GS)	...	DEC. 19	20:40	MST
DEC. 20	17	36	22.0	44.487N.	111.146W.	10	MT	...	...	3.0ML(BU)	...	DEC. 20	10:36	MST
DEC. 21	02	54	17.0	44.125N.	114.033W.	10	GS	...	...	3.8ML(GS)	III	DEC. 20	19:54	MST
DEC. 21	06	33	54.9	44.365N.	113.984W.	10	GS	...	...	3.3ML(GS)	...	DEC. 20	23:33	MST
DEC. 25	09	49	01.5	44.143N.	113.924W.	10	GS	...	...	3.6ML(GS)	...	DEC. 25	02:49	MST
DEC. 25	12	23	56.3	44.342N.	114.093W.	10	GS	...	...	3.4ML(GS)	...	DEC. 25	05:23	MST
DEC. 27	12	21	29.3	44.255N.	114.074W.	9	GS	4.4	...	...	IV	DEC. 27	05:21	MST
DEC. 27	20	19	17.7	44.223N.	114.081W.	10	GS	...	...	3.6ML(GS)	...	DEC. 27	13:19	MST
DEC. 28	08	16	53.6	44.281N.	114.089W.	11	GS	...	...	4.0ML(GS)	IV	DEC. 28	01:16	MST
DEC. 29	03	44	39.8	44.289N.	114.047W.	10	GS	...	...	3.3ML(GS)	...	DEC. 28	20:44	MST
DEC. 29	16	05	24.4	44.419N.	114.059W.	10	GS	...	...	3.8ML(GS)	III	DEC. 29	09:05	MST
DEC. 31	12	10	13.2	44.264N.	114.113W.	10	GS	...	...	3.6ML(GS)	...	DEC. 31	05:10	MST
ILLINOIS														
MAY 15	05	16	21.6	38.770N.	89.570W.	9	SL	3.8	...	4.3Mn(SL)	V	MAY 14	23:16	CST
MAY 16	23	33	29.6	38.750N.	87.960W.	20	SL	...	...	2.6Mn(SL)	...	MAY 16	17:33	CST
JUNE 3	22	39	00.6	38.140N.	88.410W.	22	SL	...	...	2.7Mn(SL)	...	JUNE 3	16:39	CST
DEC. 20	11	54	52.0	37.670N.	88.400W.	3	SL	...	...	2.8Mn(SL)	...	DEC. 20	05:54	CST
DEC. 28	22	30	07.9	38.310N.	90.270W.	3	SL	...	...	2.9Mn(SL)	II	DEC. 28	16:30	CST
KENTUCKY														
FEB. 22	13	09	18.2	38.048N.	82.767W.	11	TC	...	...	2.6MD(TC)	...	FEB. 22	08:09	EST
FEB. 23	08	09	14.0	37.070N.	88.860W.	22	SL	...	...	2.9Mn(SL)	FELT	FEB. 23	02:09	CST
MAY 8	01	05	15.0	36.610N.	89.370W.	7	SL	...	...	2.5Mn(SL)	...	MAY 7	19:05	CST
AUG. 17	14	03	17.1	38.474N.	82.863W.	8	KY	...	...	3.5Mn(KY)	IV	AUG. 17	09:03	EST
AUG. 28	22	45	07.3	36.688N.	83.848W.	16	TC	...	...	3.1Mn(VP)	III	AUG. 28	17:45	EST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypocenter source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
KENTUCKY-Continued														
AUG. 28	22	56	39.7	36.652N.	83.843W.	17	TC	...	...	2.6MD(TC)	FELT	AUG. 28	17:56	EST
NOV. 22	10	37	06.3	37.230N.	89.000W.	3	SL	...	...	2.5Mn(SL)	...	NOV. 22	04:37	CST
DEC. 31	11	59	56.1	37.210N.	89.010W.	2	SL	...	...	2.6Mn(SL)	...	DEC. 31	05:59	CST
LOUISIANA														
OCT. 16	19	40	50.8	30.243N.	93.393W.	5	GS	...	...	3.8Mn(TU)	IV	OCT. 16	13:40	CST
MAINE														
APR. 12	20	13	05.2	43.688N.	69.401W.	19	WO	...	...	2.7Mn(WO)	...	APR. 12	15:13	EST
APR. 17	01	33	40.7	47.063N.	68.122W.	0	WO	...	...	2.7MD(WO)	...	APR. 16	20:33	EST
MAY 27	23	04	35.2	45.542N.	69.461W.	10	WO	...	...	3.2Mn(WO)	IV	MAY 27	18:03	EST
MAY 29	05	45	49.9	44.489N.	70.400W.	2	WO	4.2	...	3.9Mn(WO)	IV	MAY 29	00:45	EST
JUNE 29	02	06	14.1	43.732N.	69.457W.	16	WO	...	...	2.8MD(WO)	...	JUNE 28	21:06	EST
AUG. 6	05	24	57.5	43.039N.	70.134W.	7	WO	...	...	2.7Mn(WO)	...	AUG. 6	00:24	EST
AUG. 10	23	52	32.9	43.046N.	70.222W.	7	WO	...	...	2.6Mn(WO)	...	AUG. 10	18:52	EST
AUG. 12	14	08	47.6	44.974N.	67.682W.	12	WO	...	...	3.6Mn(WO)	FELT	AUG. 12	09:08	EST
OCT. 14	17	23	59.0	42.869N.	69.933W.	9	WO	...	...	2.5Mn(WO)	...	OCT. 14	12:23	EST
OCT. 30	17	02	52.9	44.437N.	69.877W.	10	WO	...	...	2.9Mn(WO)	III	OCT. 30	12:02	EST
DEC. 4	10	48	33.6	45.193N.	69.160W.	2	WO	...	...	3.3Mn(WO)	IV	DEC. 4	05:48	EST
DEC. 8	12	23	05.4	45.079N.	67.223W.	9	WO	...	...	3.2Mn(WO)	III	DEC. 8	07:23	EST
MISSISSIPPI														
FEB. 5	13	08	19.5	34.698N.	88.375W.	2	TC	...	...	2.9Mn(GS)	IV	FEB. 5	07:08	CST
MISSOURI														
JAN. 29	11	37	18.0	36.700N.	89.540W.	5	SL	...	...	2.5Mn(SL)	...	JAN. 29	05:37	CST
FEB. 12	19	20	20.7	36.760N.	91.520W.	12	SL	...	...	2.7Mn(SL)	...	FEB. 12	13:20	CST
FEB. 22	15	03	16.5	37.800N.	90.160W.	18	SL	...	...	2.5Mn(SL)	...	FEB. 22	09:03	CST
FEB. 23	08	51	27.0	36.192N.	89.604W.	1	SL	...	...	3.7Mn(SL)	IV	FEB. 23	02:51	CST
MAY 16	14	03	03.8	38.480N.	92.360W.	5	SL	...	...	3.0Mn(SL)	...	MAY 16	08:03	CST
JUNE 23	06	40	18.9	36.360N.	89.510W.	11	SL	...	...	2.7Mn(SL)	...	JUNE 23	00:40	CST
JUNE 26	09	08	22.6	37.020N.	89.520W.	14	SL	...	...	2.7Mn(SL)	...	JUNE 26	03:08	CST
JULY 8	09	41	40.2	37.100N.	90.940W.	10	SL	...	...	3.0Mn(SL)	...	JULY 8	03:41	CST
JULY 10	02	54	25.4	37.110N.	90.930W.	6	SL	...	...	3.0Mn(SL)	...	JULY 9	08:54	CST
AUG. 12	19	12	50.8	37.540N.	90.930W.	11	SL	...	...	2.8Mn(SL)	...	AUG. 12	13:12	CST
OCT. 21	23	38	31.0	36.690N.	89.500W.	12	SL	...	...	2.5Mn(SL)	...	OCT. 21	17:38	CST
NOV. 3	17	22	40.5	37.790N.	90.490W.	19	SL	...	...	2.6Mn(SL)	...	NOV. 3	11:22	CST
NOV. 17	14	32	34.6	36.560N.	89.590W.	5	SL	...	...	2.6Mn(SL)	...	NOV. 17	08:32	CST
MONTANA														
FEB. 16	06	22	09.3	48.539N.	112.373W.	14	GS	...	...	3.5ML(GS)	V	FEB. 15	23:22	MST
FEB. 16	07	14	07.4	45.927N.	111.497W.	5	GS	...	...	3.7ML(GS)	IV	FEB. 16	00:14	MST
MAR. 17	07	25	56.6	47.526N.	112.702W.	5	GS	4.2	...	3.8ML(MT)	VI	MAR. 17	00:25	MST
APR. 22	14	45	32.6	44.768N.	111.389W.	9	MT	...	...	3.5ML(MT)	...	APR. 22	07:45	MST
MAY 22	16	23	19.1	44.856N.	111.512W.	15	MT	...	...	3.2ML(BU)	...	MAY 22	09:23	MST
MAY 22	16	26	41.6	44.882N.	111.530W.	10	MT	...	...	3.1ML(BU)	...	MAY 22	09:26	MST
MAY 25	14	14	52.3	46.821N.	113.145W.	11	MT	...	...	3.2ML(BU)	...	MAY 25	07:14	MST
JUNE 29	23	35	11.1	44.928N.	111.518W.	1	MT	...	...	2.7ML(BU)	...	JUNE 29	16:35	MST
JULY 10	10	54	40.2	45.030N.	111.725W.	17	MT	...	...	3.4ML(BU)	...	JULY 10	03:54	MST
JULY 16	09	14	57.4	47.803N.	114.695W.	17	MT	...	...	3.0ML(BU)	...	JULY 16	02:14	MST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
MONTANA--Continued														
JULY 25	19	02	48.5	46.855N.	113.868W.	15	MT	...	...	3.3ML(BU)	...	JULY 25	12:02	MST
AUG. 10	11	09	50.0	44.598N.	112.877W.	6	MT	...	...	3.0ML(BU)	...	AUG. 10	03:09	MST
AUG. 11	03	58	45.8	44.747N.	111.258W.	13	MT	...	...	3.2ML(BU)	...	AUG. 10	20:58	MST
AUG. 13	04	41	05.1	44.704N.	111.817W.	5	GS	...	...	3.8ML(GS)	...	AUG. 12	21:41	MST
AUG. 14	00	53	12.7	44.715N.	111.845W.	5	GS	...	...	3.8ML(GS)	III	AUG. 13	17:53	MST
AUG. 19	03	48	43.0	46.018N.	111.479W.	2	MT	...	...	3.1ML(BU)	...	AUG. 18	20:48	MST
AUG. 25	19	49	35.0	44.869N.	111.491W.	14	MT	...	...	3.1ML(BU)	...	AUG. 25	12:49	MST
AUG. 25	19	50	21.1	44.888N.	111.468W.	2	MT	...	...	3.6ML(BU)	...	AUG. 25	12:50	MST
SEPT. 4	21	50	49.0	45.077N.	111.938W.	9	MT	...	...	3.0ML(BU)	...	SEPT. 4	14:50	MST
OCT. 1	03	17	46.8	44.925N.	111.783W.	9	MT	...	...	3.2ML(BU)	...	SEPT. 30	20:17	MST
OCT. 13	09	45	26.5	44.708N.	111.073W.	5	GS	...	...	3.6ML(BU)	IV	OCT. 13	02:45	MST
OCT. 20	10	28	17.2	44.593N.	112.104W.	12	MT	...	...	2.6ML(BU)	...	OCT. 20	03:28	MST
NOV. 8	03	52	48.9	48.105N.	114.161W.	5	GS	...	...	2.8ML(GS)	IV	NOV. 7	20:52	MST
NOV. 10	06	25	16.7	44.702N.	111.770W.	18	MT	...	...	3.1ML(BU)	...	NOV. 9	23:25	MST
NOV. 23	09	17	03.3	44.878N.	112.023W.	1	MT	...	...	3.0ML(BU)	...	NOV. 23	02:17	MST
DEC. 3	14	15	26.1	46.011N.	111.401W.	11	MT	...	...	2.8ML(BU)	...	DEC. 3	07:15	MST
DEC. 10	14	48	01.2	46.087N.	111.490W.	1	MT	...	...	2.7ML(BU)	...	DEC. 10	07:48	MST
DEC. 10	14	58	58.5	46.075N.	111.491W.	3	MT	...	...	2.5ML(BU)	...	DEC. 10	07:58	MST
DEC. 20	14	37	04.2	46.939N.	113.505W.	5	GS	...	...	3.3ML(BU)	...	DEC. 20	07:37	MST
DEC. 21	20	25	22.2	46.939N.	113.542W.	5	GS	...	...	3.0ML(GS)	...	DEC. 21	13:25	MST
DEC. 29	23	53	01.1	46.695N.	111.576W.	9	MT	...	...	3.8ML(BU)	...	DEC. 29	16:53	MST
NEBRASKA														
MAY 6	06	14	46.9	42.955N.	102.198W.	5	GS	...	...	3.3ML(GS)	...	MAY 6	00:14	CST
NEVADA														
JAN. 1	01	32	35.9	38.147N.	118.549W.	6	PS	...	...	3.1ML(PS)	...	DEC. 31	17:32	PST
JAN. 9	14	58	57.0	39.115N.	119.555W.	5	GS	...	...	3.8ML(BK)	IV	JAN. 9	06:58	PST
FEB. 11	16	00	00.1	37.051N.	116.045W.	0	EN	...	...	4.2ML(BK)	...	FEB. 11	08:00	PST
FEB. 17	17	00	00.1	37.163N.	116.063W.	0	EN	4.0	...	4.0ML(BK)	...	FEB. 17	09:00	PST
FEB. 24	18	12	05.3	41.980N.	115.449W.	5	GS	...	...	3.4ML(GS)	...	FEB. 24	10:12	PST
MAR. 11	21	05	53.1	35.994N.	114.809W.	5	GS	...	...	2.6ML(GS)	FELT	MAR. 11	13:05	PST
MAR. 26	20	20	00.1	37.301N.	116.460W.	0	EN	5.1	...	5.3ML(BK)	...	MAR. 26	12:20	PST
APR. 14	19	05	00.1	37.073N.	116.046W.	0	EN	5.7	...	4.3ML(BK)	...	APR. 14	11:05	PST
APR. 22	13	53	00.1	37.112N.	116.022W.	0	EN	4.0	...	4.1ML(BK)	...	APR. 22	05:53	PST
MAY 5	15	20	00.1	37.012N.	116.089W.	0	EN	4.5	...	4.3ML(BK)	...	MAY 5	07:20	PST
MAY 26	15	00	00.1	37.103N.	116.006W.	0	EN	4.4	...	4.4ML(BK)	...	MAY 26	07:00	PST
MAY 29	18	16	38.6	38.030N.	118.499W.	6	PS	...	...	3.1ML(PS)	...	MAY 29	10:16	PST
JUNE 4	11	37	40.9	37.391N.	115.214W.	6	GS	...	...	3.6ML(GS)	IV	JUNE 4	03:37	PST
JUNE 9	17	10	00.1	37.158N.	116.089W.	0	EN	4.5	...	4.6ML(BK)	...	JUNE 9	09:10	PST
JULY 15	22	03	11.2	38.447N.	118.288W.	3	BK	...	...	4.4ML(BK)	IV	JULY 15	14:03	PST
JULY 21	04	49	16.1	39.432N.	119.790W.	6	BK	...	...	3.3ML(BK)	III	JULY 20	20:49	PST
JULY 21	23	40	52.6	39.070N.	118.182W.	5	GS	...	...	3.3ML(GS)	...	JULY 21	15:40	PST
AUG. 3	13	33	00.1	37.119N.	116.089W.	0	EN	4.2	...	4.3ML(BK)	...	AUG. 3	05:33	PST
AUG. 11	14	00	00.1	36.998N.	116.003W.	0	EN	4.4	...	4.1ML(BK)	...	AUG. 11	06:00	PST
AUG. 27	13	59	59.9	37.192N.	115.992W.	5	GS	4.1	...	4.2ML(BK)	...	AUG. 27	05:59	PST
SEPT. 1	14	00	00.1	37.273N.	116.355W.	0	EN	5.4	...	5.4ML(BK)	...	SEPT. 1	06:00	PST
SEPT. 13	19	03	21.5	38.867N.	116.017W.	5	GS	...	...	4.2ML(GS)	...	SEPT. 13	11:03	PST
SEPT. 21	15	00	00.1	37.210N.	116.209W.	0	EN	...	...	4.2ML(BK)	...	SEPT. 21	07:00	PST
SEPT. 21	16	24	59.7	37.113N.	116.043W.	3	GS	...	...	4.2ML(BK)	...	SEPT. 21	08:24	PST
SEPT. 22	15	00	00.1	37.106N.	116.049W.	0	EN	...	...	4.3ML(BK)	...	SEPT. 22	07:00	PST
NOV. 3	18	26	23.5	36.483N.	114.560W.	5	GS	...	...	3.3ML(GS)	...	NOV. 3	10:26	PST
DEC. 9	15	59	59.2	37.021N.	115.975W.	2	GS	...	...	4.0ML(BK)	...	DEC. 9	07:59	PST
DEC. 16	18	30	00.1	37.140N.	116.072W.	0	EN	5.1	...	4.9ML(BK)	...	DEC. 16	10:30	PST
DEC. 23	15	45	31.2	38.766N.	118.866W.	6	PS	...	...	3.6ML(PS)	...	DEC. 23	07:45	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypocenter source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
NEW HAMPSHIRE														
MAR. 13	13	03	11.6	43.697N.	71.331W.	2	WO	...	...	2.9Mn(WO)	FELT	MAR. 13	08:03	EST
MAR. 24	14	27	20.4	42.962N.	71.714W.	1	WO	...	...	2.9Mn(WO)	IV	MAR. 24	09:27	EST
NEW JERSEY														
FEB. 19	05	45	45.1	40.649N.	74.769W.	6	LD	...	...	2.7MD(LD)	IV	FEB. 19	00:45	EST
NEW MEXICO														
MAR. 2	23	22	19.4	34.302N.	106.892W.	8	GM	4.1	...	4.1ML(GS)	VI	MAR. 2	16:22	MST
APR. 30	07	34	20.1	33.316N.	106.438W.	7	GS	...	...	3.5ML(GS)	...	APR. 30	00:34	MST
JULY 12	16	37	08.2	35.576N.	107.110W.	5	LA	...	...	2.5MD(LA)	...	JULY 12	09:37	MST
AUG. 7	04	48	01.9	36.653N.	106.699W.	5	LA	...	...	2.7MD(LA)	...	AUG. 6	21:48	MST
SEPT. 15	23	25	36.0	35.142N.	104.388W.	5	GS	...	...	3.1ML(GS)	V	SEPT. 15	16:25	MST
SEPT. 20	03	55	20.1	34.040N.	107.022W.	5	LA	...	...	3.0MD(LA)	...	SEPT. 19	20:55	MST
SEPT. 29	07	44	08.4	35.245N.	104.296W.	5	GS	...	...	2.7MD(GS)	...	SEPT. 29	00:44	MST
NEW YORK														
FEB. 21	21	13	30.8	39.787N.	73.205W.	0	WO	...	...	2.6Mn(WO)	...	FEB. 21	16:13	EST
FEB. 26	19	59	35.4	41.552N.	73.663W.	7	LD	...	...	2.9Mn(GS)	VI	FEB. 26	14:59	EST
MAY 9	12	36	22.2	44.434N.	74.842W.	4	LD	...	...	2.6MD(LD)	...	MAY 9	07:36	EST
SEPT. 8	19	35	10.1	40.433N.	72.123W.	26	LD	...	...	2.9MD(LD)	...	SEPT. 8	13:35	EST
OCT. 7	10	18	46.1	43.938N.	74.258W.	13	LD	5.1	...	5.1ML(LD)	VI	OCT. 7	05:18	EST
OCT. 7	10	39	38.5	43.952N.	74.258W.	8	LD	...	...	3.5Mn(GS)	FELT	OCT. 7	05:39	EST
OCT. 7	10	59	03.8	43.952N.	74.258W.	8	LD	...	...	2.9Mn(GS)	...	OCT. 7	05:59	EST
OCT. 8	08	58	37.6	43.962N.	74.261W.	7	LD	...	...	2.8MD(LD)	...	OCT. 8	03:58	EST
OCT. 11	05	48	29.0	43.955N.	74.257W.	8	LD	...	...	2.9MD(LD)	...	OCT. 11	00:48	EST
OCT. 12	02	17	06.3	43.956N.	74.258W.	8	LD	...	...	2.8Mn(GS)	...	OCT. 11	21:17	EST
OCT. 30	12	14	10.9	43.931N.	74.238W.	12	LD	...	...	3.0MD(LD)	...	OCT. 30	07:14	EST
NOV. 12	15	13	00.0	43.957N.	74.271W.	6	LD	...	...	2.5MD(LD)	...	NOV. 12	10:13	EST
NOV. 15	20	51	06.8	43.960N.	74.264W.	7	LD	...	...	2.5MD(LD)	...	NOV. 15	15:51	EST
NOV. 23	02	22	03.0	43.952N.	74.260W.	7	LD	...	...	2.8MD(LD)	...	NOV. 22	21:22	EST
NOV. 23	23	34	17.3	43.952N.	74.261W.	7	LD	...	...	2.6MD(LD)	...	NOV. 23	18:34	EST
DEC. 10	02	58	55.3	44.392N.	73.342W.	5	LD	...	...	2.8MD(LD)	...	DEC. 9	21:58	EST
NORTH CAROLINA														
MAR. 25	02	47	10.9	35.344N.	82.454W.	11	TC	...	...	3.2Mn(VP)	V	MAR. 24	21:47	EST
NOV. 29	19	30	28.1	36.027N.	82.653W.	7	TC	...	...	2.7MD(TC)	...	NOV. 29	14:30	EST
OHIO														
JAN. 22	07	46	57.9	41.854N.	81.191W.	5	GS	...	...	2.7Mn(GS)	...	JAN. 22	02:46	EST
OKLAHOMA														
JAN. 10	17	06	43.7	36.704N.	98.107W.	4	TU	...	...	2.5Mn(TU)	...	JAN. 10	11:06	CST
MAR. 11	16	50	45.3	36.791N.	100.196W.	5	GS	...	...	2.7Mn(TU)	...	MAR. 11	10:50	CST
MAY 15	04	00	23.6	34.827N.	98.360W.	5	TU	...	...	2.7Mn(TU)	...	MAY 14	22:00	CST
MAY 16	21	08	21.1	34.718N.	99.883W.	5	TU	...	...	2.8Mn(TU)	...	MAY 16	15:08	CST
JUNE 21	18	32	59.9	34.959N.	97.405W.	5	TU	...	...	2.9Mn(TU)	...	JUNE 21	12:32	CST
OCT. 23	19	34	46.9	34.817N.	96.888W.	5	TU	...	...	2.9Mn(TU)	...	OCT. 23	13:34	CST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
OREGON														
FEB. 23	05	39	45.0	45.366N.	121.701W.	5	WA	...	...	2.7MD(WA)	II	FEB. 22	21:39	PST
MAY 11	20	20	27.1	45.651N.	122.828W.	0	WA	...	...	2.6ML(GS)	FELT	MAY 11	12:20	PST
OREGON--OFF THE COAST														
JAN. 23	23	15	54.1	43.536N.	127.112W.	10	GS	4.4	...	...	...	JAN. 23	15:15	PST
FEB. 1	06	16	08.7	43.208N.	126.420W.	10	GS	4.9	4.8	...	...	JAN. 31	22:16	PST
MAR. 21	23	41	14.7	42.346N.	126.651W.	10	GS	...	...	...	...	MAR. 21	15:41	PST
APR. 7	10	50	54.2	43.801N.	126.070W.	10	GS	...	...	...	...	APR. 7	02:50	PST
APR. 10	21	14	18.3	42.440N.	126.744W.	10	GS	4.1	...	...	...	APR. 10	13:14	PST
MAY 7	12	29	39.8	43.916N.	127.991W.	10	GS	4.4	3.2	...	...	MAY 7	04:29	PST
MAY 19	16	07	44.4	44.148N.	128.635W.	10	GS	4.5	...	...	...	MAY 19	08:07	PST
JUNE 8	01	40	31.3	44.143N.	129.472W.	10	GS	4.3	...	...	...	JUNE 7	17:40	PST
JUNE 30	10	30	37.0	44.071N.	128.844W.	10	GS	4.0	3.6	...	...	JUNE 30	02:30	PST
JULY 9	12	33	15.0	44.443N.	128.696W.	10	GS	4.4	...	...	...	JULY 9	04:33	PST
JULY 28	15	50	46.0	44.617N.	129.389W.	10	GS	4.5	...	...	...	JULY 28	07:50	PST
AUG. 15	02	46	10.4	43.906N.	128.067W.	10	GS	4.5	4.2	...	...	AUG. 14	18:46	PST
AUG. 16	09	30	09.3	43.966N.	128.029W.	10	GS	4.3	3.5	...	...	AUG. 16	01:30	PST
OCT. 17	12	25	15.7	43.286N.	126.537W.	10	GS	4.3	...	...	...	OCT. 17	04:25	PST
NOV. 11	10	08	03.0	43.593N.	126.894W.	10	GS	4.5	3.7	...	...	NOV. 11	02:08	PST
NOV. 25	22	25	56.3	42.687N.	126.288W.	10	GS	4.5	...	...	...	NOV. 25	14:25	PST
NOV. 26	14	34	11.8	42.653N.	126.755W.	10	GS	4.3	...	...	...	NOV. 26	06:34	PST
NOV. 27	14	17	40.3	42.638N.	126.699W.	10	GS	4.3	...	...	...	NOV. 27	06:17	PST
DEC. 3	01	37	13.2	43.641N.	127.547W.	10	GS	5.1	4.9	...	...	DEC. 2	17:37	PST
DEC. 5	20	14	26.0	44.262N.	128.262W.	10	GS	4.5	...	...	...	DEC. 5	12:14	PST
DEC. 31	03	56	44.6	44.521N.	130.028W.	10	GS	4.1	...	...	...	DEC. 30	19:56	PST
DEC. 31	03	57	43.2	44.715N.	130.358W.	10	GS	4.2	...	...	...	DEC. 30	19:57	PST
DEC. 31	03	58	41.8	44.572N.	129.719W.	10	GS	4.3	...	...	...	DEC. 30	19:58	PST
SOUTH CAROLINA														
JAN. 31	23	41	01.4	34.302N.	82.394W.	8	GS	...	...	2.8MD(GS)	...	JAN. 31	18:41	EST
APR. 28	7	37	10.4	34.082N.	81.486W.	17	TC	...	...	2.0MD(TC)	FELT	APR. 28	2:37	EST
APR. 28	8	59	59.0	34.240N.	81.441W.	6	TC	...	...	2.3MD(TC)	FELT	APR. 28	3:59	EST
MAY 7	05	00	59.8	34.332N.	81.535W.	1	SC	...	...	2.5MD(SC)	...	MAY 7	00:00	EST
MAY 8	03	36	23.0	34.333N.	81.542W.	0	SC	...	...	2.5MD(SC)	...	MAY 7	22:36	EST
NOV. 6	09	02	19.8	32.934N.	80.163W.	7	SC	...	...	3.1Mn(GS)	IV	NOV. 6	04:02	EST
SOUTH DAKOTA														
MAR. 4	06	32	18.6	44.214N.	99.409W.	5	GS	4.4	...	4.4ML(GS)	VI	MAR. 4	00:32	CST
TENNESSEE														
JAN. 3	15	16	46.6	36.290N.	89.530W.	5	SL	...	...	2.9Mn(SL)	...	JAN. 3	09:16	CST
JAN. 27	22	09	35.1	36.059N.	83.631W.	13	TC	...	...	3.1MD(TC)	...	JAN. 27	17:09	EST
FEB. 7	20	48	38.9	36.100N.	89.380W.	8	SL	...	...	2.7Mn(SL)	...	FEB. 7	14:48	CST
MAR. 16	09	13	51.9	35.218N.	84.548W.	12	TC	...	...	2.6MD(TC)	FELT	MAR. 16	04:13	EST
MAY 26	12	30	02.2	35.666N.	84.264W.	3	TC	...	...	2.5MD(TC)	...	MAY 26	07:30	EST
JUNE 23	06	40	18.9	36.360N.	89.510W.	11	SL	...	...	2.7Mn(SL)	IV	JUNE 23	00:40	CST
JULY 8	19	29	05.9	35.547N.	84.153W.	9	TC	...	...	3.4Mn(TC)	III	JULY 8	14:29	EST
JULY 15	19	32	56.1	35.548N.	84.164W.	7	TC	...	...	2.6MD(TC)	...	JULY 15	14:32	EST
OCT. 17	07	45	20.0	35.670N.	84.162W.	19	TC	...	...	2.6MD(TC)	...	OCT. 17	02:45	EST
NOV. 7	04	42	31.1	36.440N.	89.520W.	7	SL	...	...	2.8Mn(SL)	FELT	NOV. 6	22:42	CST
DEC. 22	23	31	56.0	35.540N.	89.960W.	13	SL	...	...	2.7Mn(SL)	...	DEC. 22	17:31	CST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC) hr	min	sec	Latitude (°)	Longitude (°)	Depth (km)	Hypo-center source	Magnitude mb	MS	ML, Mn MD, Mw	Maximum intensity	Local time Date	Hour	Time zone
TEXAS														
APR. 3	04	55	21.2	35.448N.	102.321W.	5	GS	...	...	3.4Mn(TU)	...	APR. 2	22:55	CST
JULY 23	15	24	38.2	28.743N.	98.131W.	5	GS	...	...	3.4ML(TU)	IV	JULY 23	09:24	CST
OCT. 17	07	45	20.0	35.670N.	84.162W.	19	TC	...	...	2.6MD(TC)	...	OCT. 17	02:45	EST
UTAH														
JAN. 22	11	44	48.7	39.949N.	111.946W.	2	UU	...	...	2.6ML(UU)	FELT	JAN. 22	04:44	MST
JAN. 27	23	37	11.8	37.778N.	110.674W.	7	UU	...	...	3.3MD(UU)	...	JAN. 27	16:37	MST
FEB. 5	08	34	25.2	39.316N.	111.132W.	7	UU	...	...	2.5MD(UU)	...	FEB. 5	01:34	MST
FEB. 9	21	04	39.5	39.290N.	111.154W.	1	UU	...	...	2.6MD(UU)	...	FEB. 9	14:04	MST
FEB. 12	12	57	40.5	39.311N.	111.162W.	1	UU	...	...	2.7MD(UU)	...	FEB. 12	05:57	MST
FEB. 20	01	20	01.2	39.708N.	110.950W.	0	UU	...	...	2.5MD(UU)	...	FEB. 19	18:20	MST
MAR. 6	10	53	35.7	41.140N.	111.672W.	9	UU	...	...	2.8ML(UU)	V	MAR. 6	03:53	MST
MAR. 22	11	12	35.1	39.546N.	110.422W.	2	UU	...	...	3.1MD(UU)	FELT	MAR. 22	04:12	MST
APR. 13	05	51	52.6	40.734N.	112.176W.	6	UU	...	...	1.8MD(UU)	FELT	APR. 12	22:51	MST
APR. 30	19	20	16.4	41.377N.	111.677W.	1	UU	...	...	2.5MD(UU)	...	APR. 30	12:20	MST
MAY 3	12	43	37.7	38.305N.	110.633W.	2	UU	...	...	3.0MD(UU)	FELT	MAY 3	05:43	MST
JUNE 9	16	57	15.0	39.854N.	111.977W.	6	UU	...	...	2.9ML(UU)	III	JUNE 9	09:57	MST
JUNE 16	18	45	43.3	38.936N.	111.391W.	0	UU	...	...	2.4MD(UU)	...	JUNE 16	11:45	MST
JUNE 28	23	31	29.7	39.329N.	111.133W.	1	UU	...	...	2.6MD(UU)	...	JUNE 28	16:31	MST
AUG. 4	17	50	59.4	37.525N.	110.452W.	0	UU	...	...	2.7MD(UU)	...	AUG. 4	10:51	MST
AUG. 29	12	53	11.5	41.083N.	111.427W.	10	UU	...	...	3.0ML(UU)	FELT	AUG. 29	05:53	MST
OCT. 8	11	57	53.8	40.748N.	111.993W.	6	UU	4.5	...	4.3ML(UU)	VI	OCT. 8	04:57	MST
OCT. 11	11	01	58.2	40.732N.	111.991W.	11	UU	...	...	2.5MD(UU)	IV	OCT. 11	04:01	MST
DEC. 9	08	58	40.7	38.577N.	112.565W.	0	UU	4.3	...	3.6ML(UU)	III	DEC. 9	01:58	MST
DEC. 15	02	00	49.4	37.575N.	110.510W.	3	UU	...	...	2.8MD(UU)	...	DEC. 14	19:00	MST
VERMONT														
APR. 3	21	32	39.6	44.964N.	71.718W.	1	WO	...	...	2.5Mn(WO)	...	APR. 3	16:32	EST
DEC. 25	07	46	05.0	44.378N.	73.138W.	5	WO	...	...	2.5Mn(WO)	...	DEC. 25	02:46	EST
WASHINGTON														
JAN. 24	13	31	52.6	47.073N.	121.974W.	5	WA	...	...	3.1ML(GS)	IV	JAN. 24	05:31	PST
FEB. 2	07	07	48.0	46.200N.	122.191W.	0	WA	...	...	2.8MD(WA)	...	FEB. 1	23:07	PST
MAR. 3	15	38	00.6	47.571N.	121.932W.	7	WA	...	...	2.9MD(WA)	III	MAR. 3	07:38	PST
MAR. 13	00	46	59.1	46.236N.	122.626W.	14	WA	...	...	2.9MD(WA)	...	MAR. 12	16:46	PST
MAR. 15	22	44	57.3	46.505N.	122.736W.	23	WA	...	...	2.7MD(WA)	...	MAR. 15	14:44	PST
MAR. 22	12	47	02.6	45.998N.	118.445W.	4	WA	...	...	3.3ML(GS)	IV	MAR. 22	04:47	PST
APR. 3	03	43	43.6	47.614N.	121.786W.	13	WA	...	...	2.7MD(WA)	...	APR. 2	19:43	PST
APR. 7	00	15	11.5	48.211N.	122.907W.	39	WA	...	...	2.7MD(WA)	...	APR. 6	16:15	PST
APR. 24	13	20	37.3	46.527N.	121.406W.	4	WA	...	...	2.7MD(WA)	...	APR. 24	05:20	PST
APR. 25	15	48	20.3	48.639N.	119.584W.	0	WA	...	...	3.0MD(WA)	...	APR. 25	07:48	PST
APR. 27	14	52	01.8	47.548N.	122.818W.	19	WA	...	...	2.7MD(WA)	...	APR. 27	06:52	PST
MAY 2	11	52	46.8	47.978N.	122.691W.	15	WA	...	...	2.7MD(WA)	...	MAY 2	03:52	PST
MAY 4	08	02	10.8	48.306N.	122.127W.	9	WA	...	...	2.9MD(WA)	...	MAY 4	00:02	PST
MAY 21	01	11	15.0	47.286N.	121.434W.	10	WA	...	...	2.8MD(WA)	...	MAY 20	17:11	PST
MAY 25	04	20	59.5	47.768N.	121.657W.	12	WA	...	...	2.8ML(GS)	IV	MAY 24	20:20	PST
JUNE 2	01	21	38.1	47.677N.	122.183W.	23	WA	...	...	3.1MD(WA)	...	JUNE 1	17:21	PST
JUNE 10	18	20	07.9	47.663N.	120.279W.	4	WA	...	...	2.7MD(WA)	...	JUNE 10	10:20	PST
AUG. 12	01	12	58.4	47.496N.	121.676W.	15	WA	...	...	3.1MD(WA)	III	AUG. 11	17:12	PST
AUG. 17	10	54	27.5	48.144N.	124.482W.	5	WA	...	...	3.2ML(GS)	IV	AUG. 17	02:54	PST
AUG. 19	15	14	52.9	48.276N.	122.825W.	7	WA	...	...	2.7MD(WA)	...	AUG. 19	07:14	PST
AUG. 28	12	47	47.6	47.946N.	122.861W.	50	WA	4.2	...	3.9MD(WA)	IV	AUG. 28	04:47	PST
SEPT. 14	09	03	02.9	47.718N.	120.261W.	1	WA	...	...	2.5MD(WA)	III	SEPT. 14	01:03	PST
SEPT. 14	10	51	01.3	47.713N.	120.271W.	0	WA	...	...	2.6MD(WA)	FELT	SEPT. 14	02:51	PST

Table 1. *Summary of U. S. earthquakes for 1983*--Continued

Date	Origin time (UTC)			Latitude	Longitude	Depth	Hypo-center	Magnitude			Maximum intensity	Local time		
	hr	min	sec	(°)	(°)	(km)	source	mb	MS	ML, Mn MD, Mw		Date	Hour	Time zone
WASHINGTON--Continued														
SEPT. 29	06	36	47.3	47.335N.	122.687W.	25	WA	...	...	2.7MD(WA)	...	SEPT. 28	22:36	PST
OCT. 5	03	46	50.1	47.461N.	121.867W.	23	WA	...	...	3.0MD(WA)	FELT	OCT. 4	19:46	PST
OCT. 20	09	44	58.3	46.717N.	119.577W.	0	WA	...	...	3.4MD(WA)	...	OCT. 20	01:44	PST
OCT. 31	21	47	58.5	47.345N.	123.234W.	45	WA	...	...	4.3MD(WA)	IV	OCT. 31	13:47	PST
NOV. 14	11	19	01.4	46.665N.	120.591W.	6	WA	...	...	3.1ML(GS)	IV	NOV. 14	03:19	PST
NOV. 15	09	52	11.3	46.878N.	121.794W.	0	WA	...	...	2.9MD(WA)	...	NOV. 15	01:52	PST
DEC. 5	07	24	19.6	46.930N.	120.704W.	6	WA	...	...	3.3ML(GS)	III	DEC. 4	23:24	PST
DEC. 16	11	35	19.6	47.325N.	122.018W.	10	WA	...	...	3.0MD(WA)	...	DEC. 16	03:35	PST
DEC. 29	10	46	05.3	46.269N.	122.634W.	16	WA	...	...	3.0MD(WA)	...	DEC. 29	02:46	PST
WASHINGTON--OFF THE COAST														
DEC. 10	05	44	00.7	47.834N.	128.055W.	10	GS	4.3	...	...	...	DEC. 9	21:44	PST
WEST VIRGINIA														
MAY 26	01	04	44.8	37.506N.	80.316W.	9	VP	...	...	2.6Mn(VP)	...	MAY 25	20:04	EST
JULY 20	04	41	40.5	37.904N.	80.687W.	7	TC	...	...	2.5MD(TC)	...	JULY 19	23:41	EST
WYOMING														
JAN. 30	13	57	11.7	44.736N.	110.899W.	18	MT	...	...	3.1ML(MT)	...	JAN. 30	06:57	MST
FEB. 6	20	25	16.5	44.571N.	110.643W.	5	GS	4.7	...	4.5ML(GS)	V	FEB. 6	13:25	MST
FEB. 13	13	44	44.0	42.232N.	105.729W.	5	GS	...	...	4.0ML(GS)	IV	FEB. 13	06:44	MST
APR. 8	07	10	27.0	44.774N.	110.962W.	14	MT	...	...	3.3ML(MT)	...	APR. 8	00:10	MST
APR. 19	04	06	00.0	44.824N.	110.994W.	12	MT	...	...	3.5ML(MT)	...	APR. 18	21:06	MST
NOV. 2	20	03	58.8	43.418N.	110.921W.	5	GS	...	...	3.5ML(GS)	IV	NOV. 2	13:03	MST
NOV. 9	13	53	12.9	43.716N.	110.200W.	5	GS	...	...	3.6ML(GS)	III	NOV. 9	06:53	MST
NOV. 15	12	33	12.1	43.016N.	105.955W.	5	GS	...	...	3.0ML(GS)	III	NOV. 15	05:33	MST
DEC. 20	22	52	10.2	43.300N.	110.776W.	5	GS	...	...	...	...	DEC. 20	15:52	MST
DEC. 20	22	52	23.7	43.294N.	110.767W.	5	GS	4.5	...	...	IV	DEC. 20	15:52	MST
DEC. 20	23	21	52.3	43.268N.	110.826W.	5	GS	...	...	3.5ML(GS)	...	DEC. 20	16:21	MST
DEC. 21	00	25	20.7	43.231N.	110.818W.	5	GS	...	...	3.0ML(BU)	III	DEC. 20	17:25	MST
DEC. 22	18	56	03.9	43.224N.	110.802W.	5	GS	...	...	3.4ML(GS)	IV	DEC. 22	11:56	MST

NETWORK OPERATIONS

Alaska Earthquakes, 1983

Larry Gedney
Geophysical Institute,
University of Alaska
Fairbanks, AK 99701

During 1983, the Geophysical Institute located over 3,000 Alaska earthquakes which occurred within the areas covered by the existing seismographic networks. Of these, 389 were of magnitude (ML) 3.0 or greater (fig. 40), and 91 were of magnitude 3.5 or greater (fig. 41).

Seismological investigations during 1983 depended on a network configuration comprising two subsets of stations. The northernmost of these consisted of 18 stations ranging from Barrow (BRV) in the north to Anvil Mountain (AVN) at Nome in the west. However, most installations lay within a radius of 400 km from Fairbanks (FB2), where the signals were recorded.

The other subset was made up of 21 stations which were operated around Cook Inlet in south-central Alaska (fig. 42). Stations for this group included remote installations on Kodiak Island and the Alaska Peninsula. Signals were telemetered to Homer (HOM) on the Kenai Peninsula, where recording was done.

This configuration of stations does not permit the accurate location of earthquakes in the highly active areas of the Aleutians or the southeast panhandle of Alaska. Data for the latter area are largely provided by network operations of the USGS at Menlo Park, while the NOAA Alaska Tsunami Warning Center at Palmer bears the primary responsibility for fast locations in the Aleutians.

Geophysical Institute capabilities are therefore largely concentrated on the more heavily populated area of central and south-central Alaska. During 1983, the more significant earthquakes to have occurred within these areas were the following:

Date UTC	Time	Lat N	Long W	H(km)	Mag(ML)	Remarks
Northern sub-net						
15 Apr 83	1830	64.75	147.53	7	5.0	Slight damage at Fairbanks.
Southern sub-net						
06 Aug 83	1633	60.42	152.94	149	5.4	Felt throughout Kenai Peninsula.
26 Sep 83	2352	57.54	156.00	87	5.4	Alaska Peninsula.
Combined nets						
12 Jul 83	1510	61.04	147.19	25	6.4	Damage at Valdez.
07 Sep 83	1922	60.94	147.26	18	6.2	Slight damage at Valdez.
06 Oct 83	1110	62.46	151.21	94	5.4	Felt throughout Matanuska Valley.

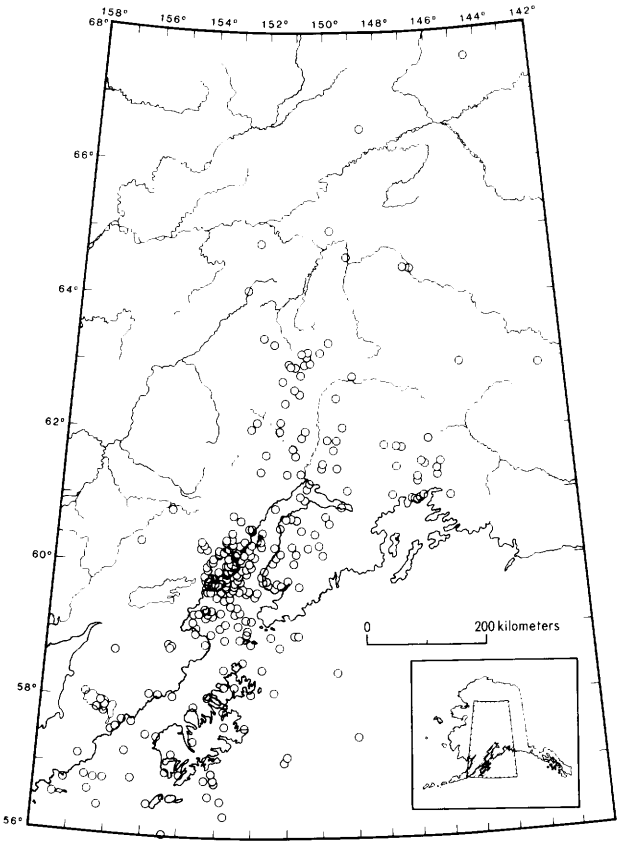

Figure 40. Alaska earthquakes of magnitude 3.0 or greater located by the University of Alaska seismic network in 1983. Open circles represent earthquake epicenters.

The Geophysical Institute, in cooperation with the Alaska State Division of Geological and Geophysical Surveys, is currently publishing a quarterly bulletin to list the parameters of all earthquakes located with the present networks.

Earthquake Monitoring in the Shumagin Seismic Gap and Eastern Aleutians, Alaska, 1983

J. J. Taber, M. A. Luchman and S. Rosen
Lamont-Doherty Geological Observatory of
Columbia University
Palisades, NY 10964

Since 1973, Lamont-Doherty Geological Observatory (L-DGO) has operated a short-period high-gain seismic network in the Shumagin Islands region of the eastern Aleutians. The Shumagin network consists of 14 stations

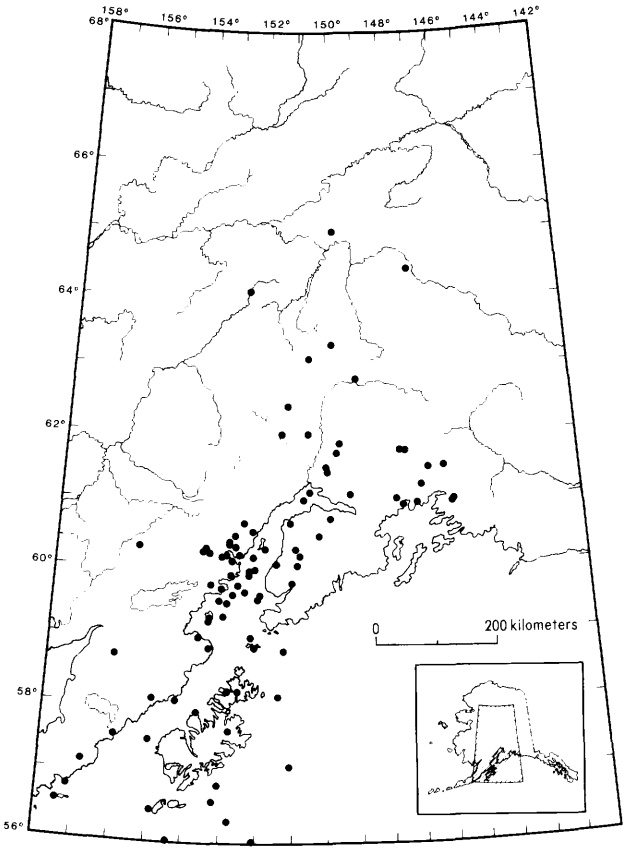

Figure 41. Alaska earthquakes of magnitude 3.5 or greater located by the University of Alaska seismic network in 1983. Solid circles represent earthquake epicenters.

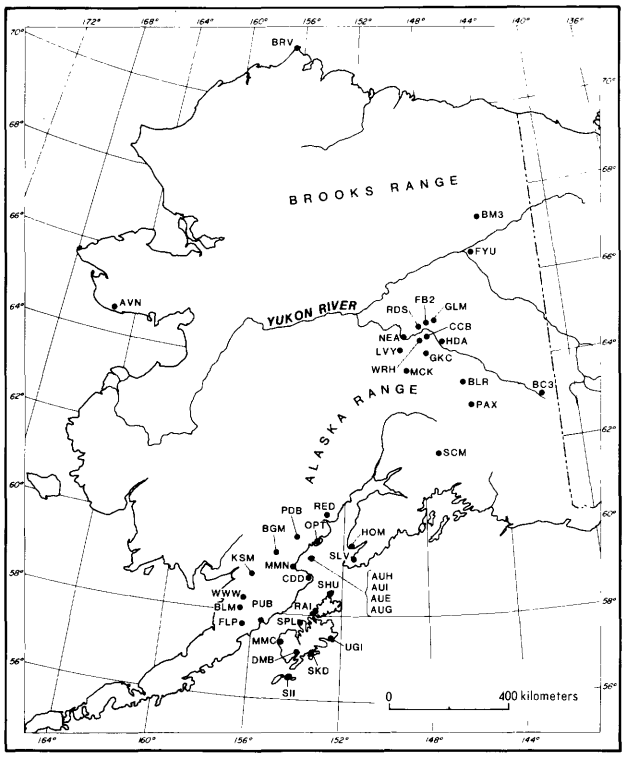

Figure 42. Telemetered seismographic network operated by the University of Alaska during 1983. Solid circles represent geographic locations of the stations; the three letter code represents each station name abbreviation.

plus four stations in the Pavlov volcano subarray (fig. 43). The stations consist of single short-period vertical seismometers, except for five short-period three-component stations, one intermediate-period three-component station, and one three-component force balance accelerometer. The analog signals from the high gain remote stations are transmitted via radio links to a central recording site in Sand Point. The seismic signals are digitized at 100 samples per second and are event detected using 12 of the 32 recorded channels. The event detector parameters can be adjusted from L-DGO via modem. An analog tape recorder with a separate event detection algorithm works in parallel with the digital system and acts as the backup system.

Within the region of the Shumagin network there are also 12 strong-motion accelerographs (Kinemetrics SMA-1, 1g) 10 of which are colocated with seismic stations. These 10 SMA's are connected to the telemetry system so that a trigger signal is sent to the central recording site allowing us to know the exact time at which an SMA began recording a given earthquake.

The most significant activity in the Shumagin region in 1983 was an earthquake sequence that included two moderate (M_S = 6.3 and 5.6) thrust events and at least 50 smaller events with magnitudes up to 4.0 M_L. The cluster is visible in figure 44 near 55° N., 159° W. The main events occurred on February 14 and were separated by 5 hours. The events were located on the shallowly dipping subduction zone interface between the Pacific and North American plates. They lie about 1/3 of the distance between the downdip end of this main thrust zone and the offshore trench. These were the largest events to occur within the Shumagin gap since 1979 and both were felt in Sand Point and nearby villages. The events occurred on the eastern edge of the seismic gap and the rupture direction was updip and away from the gap. This may explain why the shocks did not initiate the expected great earthquake in the region. The only other felt event in 1983 had a local magnitude of 5.8 and occurred on December 27 at 2305. It was located about 140 km west of the network, near the probable western boundary of the Shumagin seismic gap.

Otherwise, seismicity within the region was similar to previous years. There were 565 events located by the network, as shown in map view in figure 44 and in cross section in figure 45. There is relatively little activity along the shallow part of the main thrust zone, but there is a cluster of events at the lower end of this locked zone. Below 40 km there is a clear double Benioff zone, with most of the events occurring in the upper plane. The apparent bend in the slab at about 130 km is due mainly to mislocations arising from the relatively high velocity of the descending slab.

The upper crustal seismicity is also concentrated above the lower edge of the main thrust zone. This forms a band of seismicity parallel to the mainland and about 100 km offshore. There is very little shallow seismicity on the mainland itself. Further west, in the area of the magnitude 5.8 event, the rate of seismicity increases and

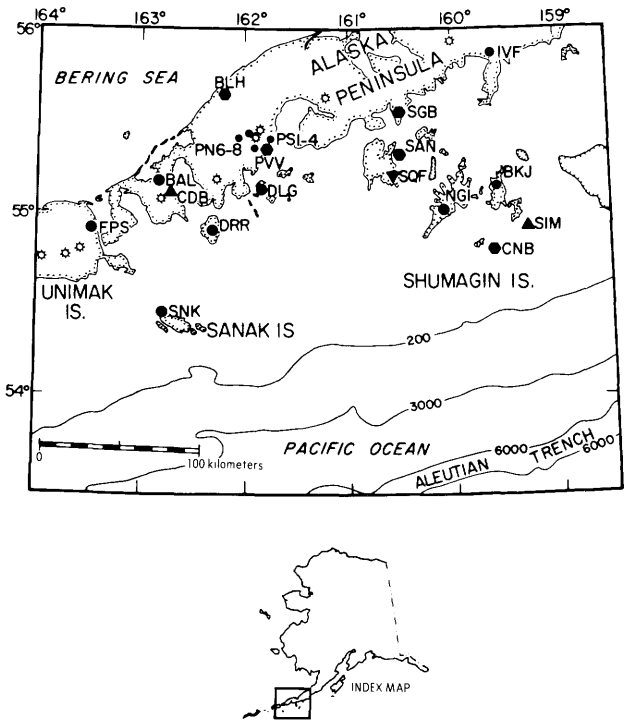

Figure 43. The Shumagin seismic network, in 1983. Solid circles are short-period vertical seismic stations. The hexagons are short-period three-component stations. The inverted triangle (SQF) indicates a low-gain site with a three-component force balance accelerometer. Strong motion accelerographs (SMA-1) are located at the seismic stations SNK, DRR, DLG, SGB, SAN, NGI, BKJ, IVF, and CNB and at upward pointing triangles. Instrumentation at SAN also includes a digitally recording PDR-1 strong motion recorder with FBA sensors.

the events are spread over a larger portion of the distance between the volcanic arc and the offshore trench.

Explanation of table 2

DATE	Year, month, and day of the event.
ORIGIN	Origin time in hours, minutes and seconds.
LAT	North latitude, in degrees and minutes.
LON	West longitude in degrees and minutes.
DEPTH	Depth in km.
XMAG	Average amplitude or local magnitude.
NWR	Number if readings (P and S), with weights greater than 0.1.
GAP	The largest azimuthal gap between azimuthally adjacent stations.
DMIN	Distance to the nearest station reporting an arrival with weight greater than 0.1.
RMS	The root-mean-square travel time residual, computed after residual weighting.
ERH	The horizontal error in km, defined as the greatest length of the horizontal projections of the three standard errors.
ERZ	The vertical error in km, defined as the greatest length of the vertical projections of the three standard errors.

A * after ERZ means that one of the parameters was held fixed in the final solution (usually depth).

Table 2. *Magnitude 3.5 or larger earthquakes located by the Shumagin network in 1983*

DATE	ORIGIN	LAT	LON	DEPTH	XMAG	NWR	GAP	DMIN	RMS	ERH	ERZ
830101	0603 20.93	53 16.80	163 55.81	004.55	4.1	11	326	271	0.14	01.17	31.61*
830109	2205 29.82	53 30.31	165 26.11	094.19	3.5	26	330	205	0.19	01.90	03.75
830110	2152 03.59	53 41.17	163 46.01	001.89	3.7	27	303	109	0.35	03.16	03.29
830120	1410 10.76	54 39.72	159 25.21	029.00	3.9	25	296	021	0.51	02.72	02.84
830214	0320 03.71	54 48.52	159.06.46	016.11	5.6	25	308	031	0.44	02.24	01.20
830214	0329 28.72	54 54.87	158 54.11	004.29	3.5	22	311	045	0.28	01.03	01.19
830214	0603 35.88	54 42.71	158 44.06	007.15	3.5	21	314	056	0.32	02.03	02.43
830214	0810 02.72	54 51.75	158 52.48	014.02	6.0	24	313	046	0.34	01.94	00.97
830214	1748 51.92	54 42.99	158 56.08	012.11	3.5	20	310	043	0.33	01.69	01.04
830215	1853 51.99	54 51.67	158 49.09	006.12	3.9	25	282	049	0.37	02.04	01.04
830221	1840 27.10	54 17.28	161 27.31	003.52	3.7	28	221	088	0.33	01.05	02.04
830227	1555 31.82	54 53.50	158 58.63	001.37	4.0	25	277	109	0.35	02.85	01.52
830501	2249 03.70	54 34.16	159 42.35	031.61	3.5	13	288	029	0.33	02.46	02.77
830512	0554 10.67	54 38.50	159 35.78	028.88	3.7	12	300	020	0.39	03.83	02.40
830625	0644 16.18	52 50.65	165 46.78	090.14	4.1	24	331	268	0.72	06.91	31.61*
830808	0437 37.81	54 48.35	159 40.17	011.36	4.3	25	188	005	0.45	01.37	01.52
830819	2050 57.37	54 02.14	161 05.39	011.29	3.6	30	246	120	0.48	03.19	07.57
830828	1205 10.09	53 30.55	163 18.71	019.93	3.9	21	299	113	0.43	08.94	17.01
830906	0401 52.15	53 49.64	163 53.17	001.45	5.0	23	304	102	0.34	05.71	02.84
830912	0720 28.74	53 16.97	163 23.19	003.91	3.5	26	304	138	0.48	11.48	14.62
830914	0031 57.28	54 38.43	159 56.77	033.93	3.7	32	217	030	0.40	01.70	02.91
830923	1515 57.96	52 58.07	165 28.63	010.52	3.5	22	329	244	0.52	05.51	31.61*
830924	1630 03.58	53 15.66	163 38.91	016.29	3.9	31	307	147	0.46	07.17	12.44
831022	0454 52.23	55 04.50	160 26.34	054.69	3.8	31	129	018	0.37	01.26	02.08
831107	2206 19.29	53 02.77	161 46.36	008.23	3.9	31	298	172	0.50	10.38	12.94
831109	1602 32.17	54 32.51	160 43.49	003.72	4.0	31	200	069	0.42	01.47	03.59

Southern Alaska Seismicity, 1983

C. D. Stephens, R. A. Page, K. A. Fogleman,
and J. C. Lahr, U. S. Geological Survey
345 Middlefield Road, Mail Stop 977
Menlo Park, CA 94025

Two of the most significant earthquakes in southern Alaska in recent years occurred beneath Columbia Bay north of Prince William Sound on July 12 and September 7, 1983 (fig. 46 and table 3). These shocks, with magnitudes of 6.1 m_b (6.4 M_S) and 6.2 m_b (6.2 M_S), are the largest events to occur in the Prince William Sound region since the 1964 Alaska earthquake (9.2 M_W, 8.4 M_S), and the largest events to occur within the USGS regional seismograph network since the 1979 St. Elias earthquake (7.1 M_S) north of Icy Bay. Both of the Columbia Bay shocks were felt throughout south-central Alaska, and a peak horizontal acceleration of 0.32 g at Valdez produced by the July shock is the strongest ground acceleration recorded for an Alaskan earthquake (Maley and Ellis, 1984). Both mainshocks were located at a depth of 30 km by the regional network using travel-time corrections calibrated by well-located aftershocks recorded by temporary seismographs deployed in the epicentral area following the mainshocks (Page and others, 1985). The July shock occurred about 45 km west of Valdez, 145 km east of Anchorage, and about 25 km east of the epicenter of the 1964 earthquake. Aftershocks of the July shock (fig. 47) define a steeply northwest-dipping planar zone about 27 km long ranging in depth from 22 to 32 km. The September shock occurred about 10 km southwest of the July shock at the southwest end of the July aftershock zone. Aftershocks from the later event define a cluster 6 to 9 km in diameter ranging in depth from 26 to 35 km which does not significantly overlap the July aftershock zone. Preliminary focal mechanisms for the two mainshocks determined from regional and teleseismic P-wave polarities are nearly identical and indicate predominantly

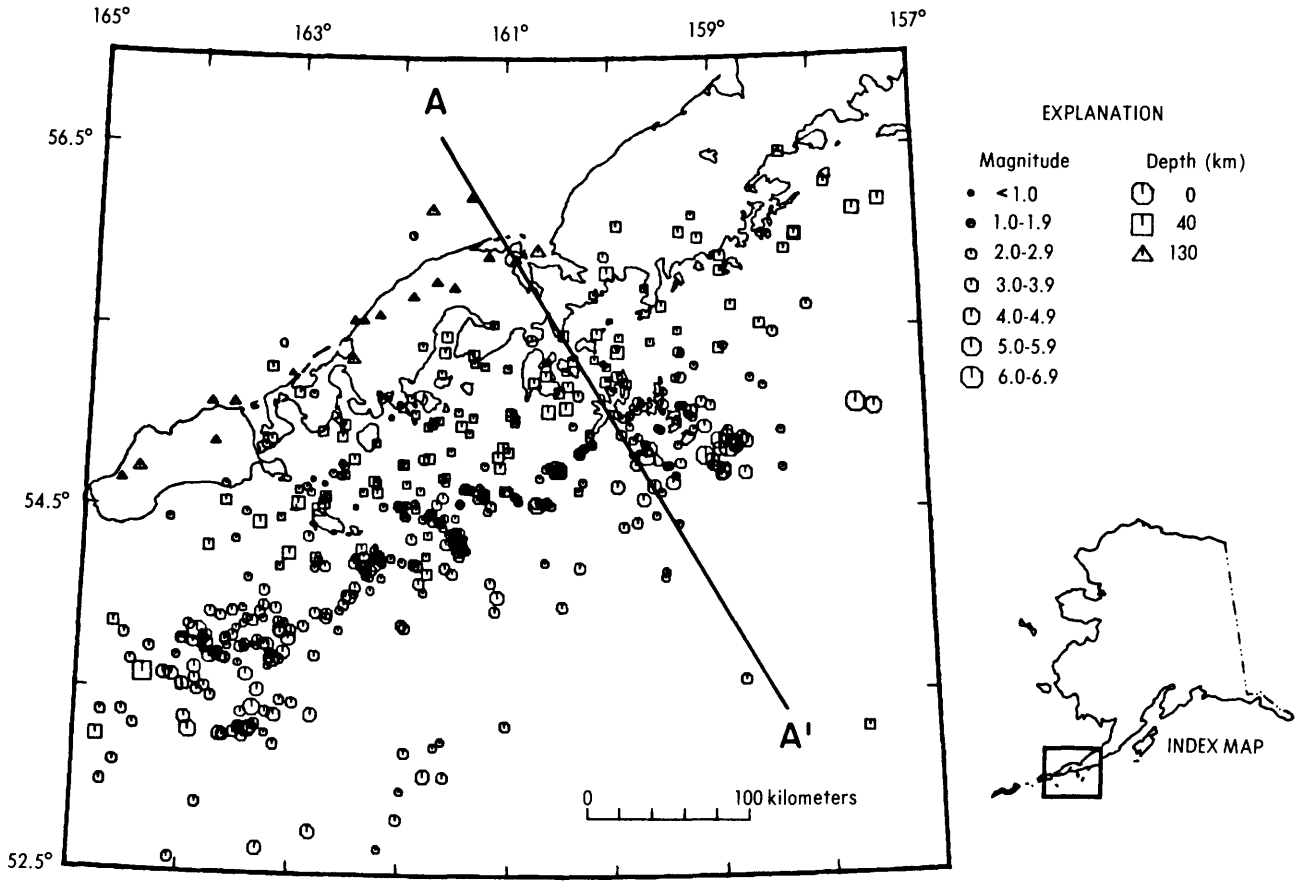

Figure 44. Hypocenters located by the Shumagin network in 1983. Events less than 40 km deep are plotted as octagons, those between 40 and 130 km as squares, and those greater than 130 km as triangles.

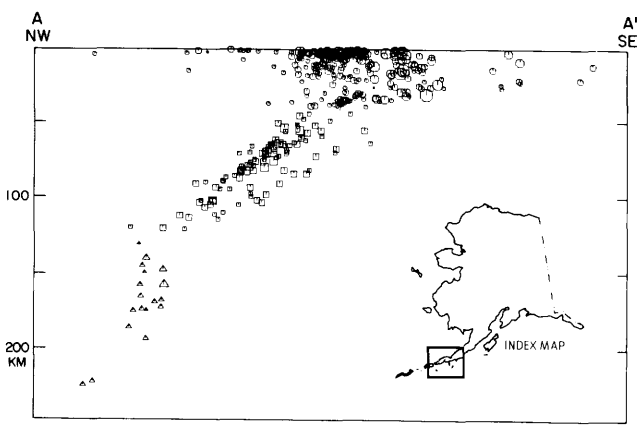

Figure 45. Cross section along A-A' in figure 44. Events that required fixed depths are excluded.

normal faulting with a subhorizontal least compressive stress axis dipping gently to the northwest. In each case, one of the nodal planes closely corresponds to the steeply dipping fault plane defined by the aftershock distribution. The depth to the subducted Pacific plate beneath the Prince William Sound region is difficult to ascertain because of the sparce distribution of seismicity and generally poor depth control; but on the basis of the distribution of Benioff-Wadati zone seismicity in adjacent regions, the Columbia Bay events are surmised to have occurred within the upper part of the subducted plate (Page and others, 1985).

On January 1, a magnitude 5.4 m_b (4.8 M_S) shock occurred at a depth of 38 km near the southern end of a southwest-northeast-trending zone of seismicity about 40 km north of the Columbia Bay aftershock zone. In October, a magnitude 4.2 m_b shock occurred at a 43 km depth near the northern end of the zone. Activity within this zone has persisted since at least 1971 when the network was established. Preliminary focal mechanisms for the two recent events determined from P-wave polarities at regional stations indicate normal faulting on northeast-striking planes similar to the mechanisms found for the Columbia Bay shocks, suggesting that these events also may have occurred within the subducted Pacific plate. However, the northern zone of seismicity is offset from and rotated counter clockwise with respect to the Columbia Bay aftershock zone, suggesting that the seismicity in these two zones probably occurs on different structures.

On June 28, a 6.0 m_b shock occurred at 15 km depth north of Icy Bay and within the aftershock zone of the St. Elias earthquake. A focal mechanism for the June event determined from regional P-wave first motions is compatible with predominantly low-angle thrusting on a northward-dipping plane, consistent with the teleseismic solution published by NEIC, and similar to the low-angle

Table 3. *Earthquakes in southern Alaska with magnitude 4.5 mb or larger, or MM intensity IV or higher*

	ORIGIN TIME (UT)		LAT N	LONG W	DEPTH		MAG		INT	REGION
1983	HR MN	SEC	DEG MIN	DEG MIN	KM	Mb	MS	MD	MM	
JAN 1	11 18	7.7	61 17.7	146 58.5	37.8	5.3	-	4.8	IV	NORTH OF PRINCE WILLIAM SOUND
FEB 23	7 27	57.6	60 18.6	153 11.7	118.7	4.6	-	4.8	III	COOK INLET BENIOFF ZONE
MAR 18	14 3	36.6	62 48.9	149 33.2	45.2	4.6	-	3.6	F	N. COOK INLET BENIOFF ZONE
12	18 56	36.2	59 57.4	153 24.8	133.4	4.6	-	4.0	-	S. COOK INLET BENIOFF ZONE
16	23 53	22.3	59 38.4	153 11.8	118.7	4.7	-	4.4	V	S. COOK INLET BENIOFF ZONE
17	5 34	42.8	58 38.8	148 38.2	24.3	4.3	-	3.8	IV	CONTINENTAL MARGIN, S. OF YAKUTAT BAY
30	18 6	16.5	61 24.6	142 23.8	0.2	5.4	4.8	4.1	F	DUKE RIVER FAULT - YUKON TERR.
APR 19	19 12	58.8	63 16.2	149 42.4	121.6	5.1	-	4.7	V	N. COOK INLET BENIOFF ZONE
21	12 56	48.8	58 14.5	140 6.8	8.2	4.6	-	3.4	IV	CONTINENTAL MARGIN, S. OF YAKUTAT BAY
23	6 13	58.1	60 23.5	153 23.1	199.8	4.6	-	4.6	-	COOK INLET BENIOFF ZONE
JUN 5	21 48	7.2	60 26.2	147 41.8	19.1	4.7	-	3.6	-	WESTERN PRINCE WILLIAM SOUND
9	22 15	43.4	59 15.6	152 58.6	83.2	4.7	-	3.9	III	S. COOK INLET BENIOFF ZONE
16	21 19	25.2	60 3.9	151 44.5	85.3	4.8	-	4.0	-	COOK INLET BENIOFF ZONE
27	8 12	24.2	60 13.5	150 56.2	65.2	4.3	-	3.6	IV	COOK INLET BENIOFF ZONE
28	3 26	17.6	60 18.9	141 15.2	11.9	6.8	8.4	4.3	IV	ST. ELIAS AFTERSHOCK ZONE
JUL 12	15 18	3.7	61 2.1	147 11.1	29.8	6.1	6.4	-	VI	COLUMBIA BAY
15	7 49	8.1	60 14.4	140 52.9	13.7	5.1	4.1	3.7	III	ST. ELIAS AFTERSHOCK ZONE
21	17 35	18.6	58 4.6	152 56.4	99.4	4.9	-	4.3	III	KODIAK ISLAND
AUG 5	21 23	38.7	61 43.7	147 28.1	35.1	4.2	-	3.7	IV	NORTH OF PRINCE WILLIAM SOUND
6	16 34	8.5	60 24.8	152 53.6	128.7	5.4	-	4.7	IV	COOK INLET BENIOFF ZONE
9	15 58	23.8	59 9.7	147 6.8	39.8	5.8	-	3.8	-	MONTAGUE ISLAND
19	4 59	32.7	60 8.3	152 48.4	97.8	4.7	-	4.2	III	COOK INLET BENIOFF ZONE
SEP 7	19 22	5.8	60 54.7	147 19.2	30.2	4.2	6.2	-	VI	COLUMBIA BAY
7	22 32	18.6	61 8.6	147 18.4	27.2	5.8	-	4.8	F	COLUMBIA BAY
14	2 35	18.8	60 57.6	147 15.8	30.2	4.9	-	3.7	F	COLUMBIA BAY
21	23 58	48.2	60 15.1	152 38.1	103.8	4.8	-	4.1	F	COOK INLET BENIOFF ZONE
OCT 6	11 18	12.8	62 21.3	151 11.6	97.3	5.4	-	4.7	V	N. COOK INLET BENIOFF ZONE
18	18 24	6.1	60 15.1	141 1.8	8.2	4.9	-	3.3	-	ST. ELIAS AFTERSHOCK ZONE
13	4 38	17.4	59 37.8	152 4.6	63.2	4.6	-	3.7	V	COOK INLET BENIOFF ZONE
14	17 26	38.9	61 51.8	149 31.6	37.6	4.8	-	3.4	III	N. COOK INLET
NOV 6	6 54	51.2	59 56.4	141 43.8	18.7	4.6	-	3.1	F	ST. ELIAS AFTERSHOCK ZONE
23	19 46	18.9	58 55.8	153 25.8	81.9	4.6	-	3.5	F	S. COOK INLET BENIOFF ZONE
DEC 24	7 33	48.5	61 46.3	150 55.8	48.2	4.5	-	3.6	F	N. COOK INLET BENIOFF ZONE

thrusting inferred for the St. Elias mainshock (Hasegawa and others, 1980). The June event occurred at the southwest edge of a zone characterized by a relatively high rate of continuous aftershock activity since the St. Elias mainshock. This event and other shocks of magnitude 5.0 and larger that have occurred nearby within the zone generally have not triggered strong secondary aftershock activity; only 43 shocks of coda-duration magnitude 1.0 and larger occurred within three days and 10 km of the June 1983 shock. Similarly, a magnitude 5.1 m_b shock in July 1983 occurred within the zone of high activity about 20 km east of the June event and did not trigger a strong secondary aftershock sequence. In contrast, a magnitude 5.0 m_b shock that occurred in May 1982 and was located within the St. Elias aftershock zone about 20 km south of the June 1983 event had 324 aftershocks of magnitude 1.0 and larger within three days and 10 km (Stephens and others, 1984b).

A magnitude 5.4 m_b (4.8 M_s) shock occurred on March 30 and was located at crustal depth near the western end of the Duke River fault system in Canada. This event had a pronounced aftershock sequence, but the distribution of the aftershocks is not well constrained due to a lack of nearby seismographs to record the events.

Aside from aftershocks associated with some of the larger events, the distribution of microearthquakes located by the USGS regional network for 1983 is similar to that observed over the past several years (fig. 48). West of Prince William Sound the distribution is dominated by earthquakes that occur within the Aleutian Benioff-Wadati zone of the subducted Pacific plate which dips northwestward at a low angle beneath the Kenai Peninsula and more steeply beneath the volcanic arc west of

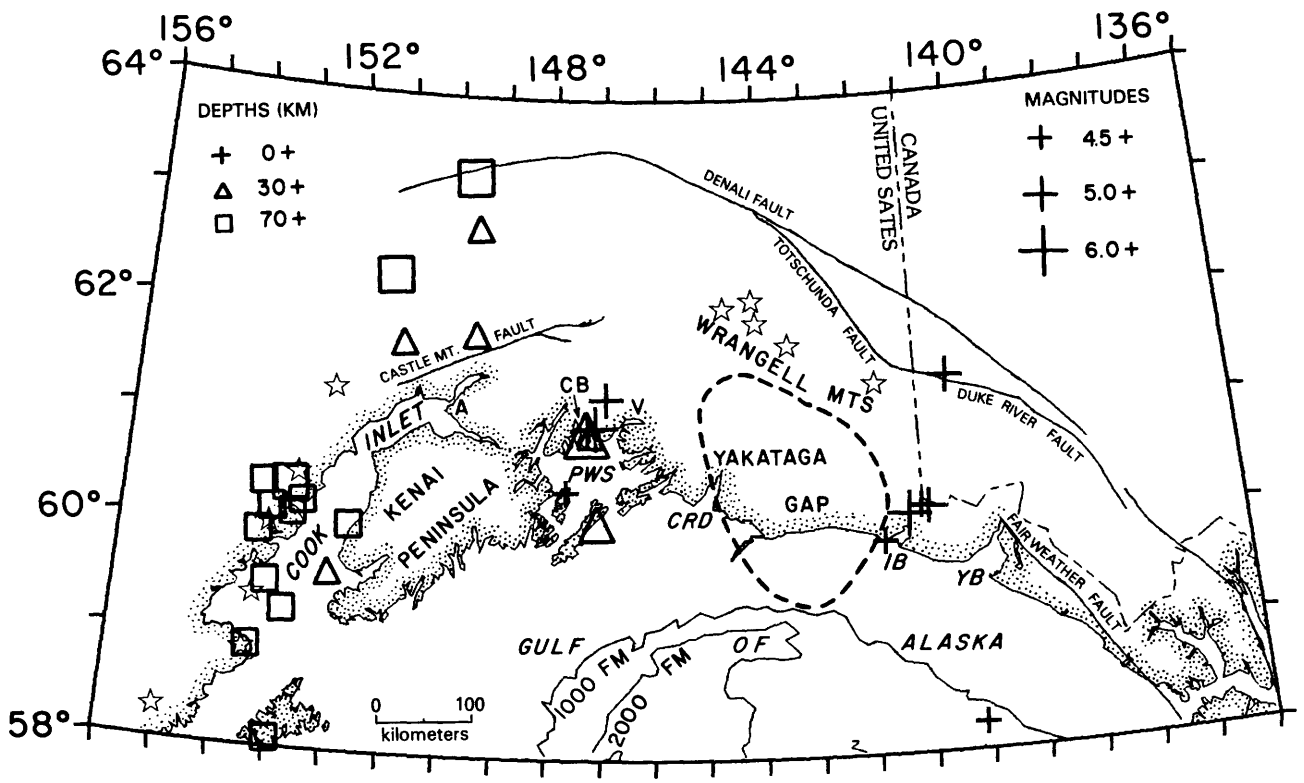

Figure 46. Hypocenters of magnitude 4.5 m_b and larger earthquakes determined by the USGS regional seismograph network in southern Alaska for 1983. A - Anchorage, CB - Columbia Bay, CRD - Copper River Delta, IB - Icy Bay, PWS - Prince William Sound, V - Valdez, YB - Yakutat Bay. Stars indicate volcanoes.

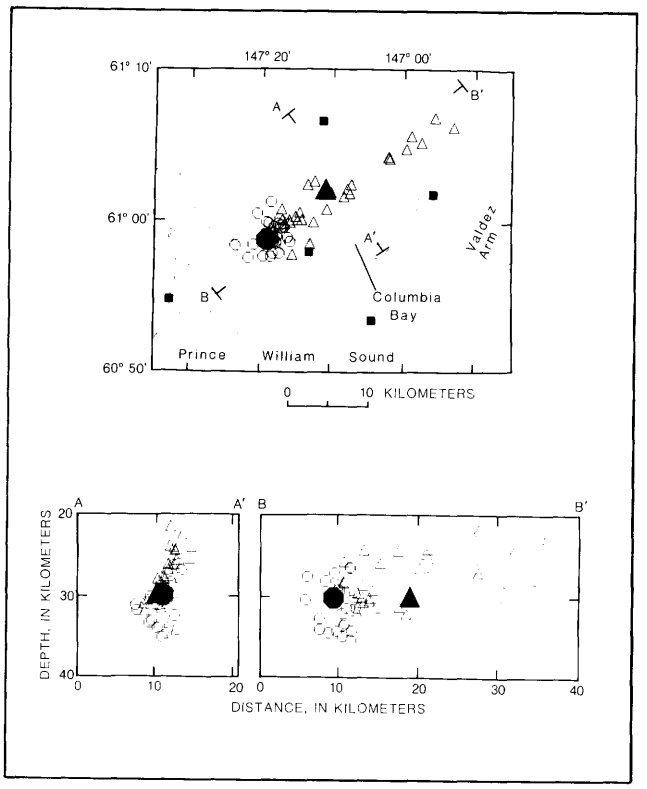

Figure 47. (Top) Epicenters of Columbia Bay main shocks (large solid symbols) and well-located aftershocks. All aftershocks were recorded by local temporary seismographs (solid squares) as well as more distant reional stations. Triangles shocks from July 16-24; octagons, shocks from September 12-14. Aftershock magnitudes, determined from duration of signal codas at regional stations, range from 1.6 to 3.8. Westernmost seismograph operated in September only, others in both July and September. AA' and BB' indicate line of cross-sections shown in lower part of figure. (Bottom) Vertical cross sections of Columbia Bay main shocks and well-located aftershocks. Data and symbols as in map view. Left section is view looking to northeast along strike of aftershock zone. Right section is view looking to northwest in dip direction of aftershock zone. Figure modified from Page and others (1985).

Cook Inlet. The rate of seismicity in the overthrust plate is relatively low; concentrations of small (magnitude less than 1.0) shallow earthquakes along the Cook Inlet section of the volcanic arc are due at least in part to an emphasis placed on locating smaller events in this area. East of Prince William Sound the seismicity is concentrated at depths shallower than about 35 km, although a few deeper shocks occur within the northeast-dipping Wrangell Benioff-Wadati zone south of the Wrangell volcanoes (Stephens and others, 1984a). Salient features in the distribution of hypocenters include continuing aftershock activity from the St. Elias earthquake, concentrations of events beneath the Copper River Delta and beneath Waxell Ridge near the center of the Yakataga seismic gap, and diffuse clusters of events along the northern section of the Fairweather fault, offshore south of Yakutat Bay, and along the Denali fault system north of the St. Elias rupture zone.

Northern and Central California Earthquakes, 1983

Robert A. Uhrhammer
Seismographic Station,
475 Earth Sciences Building
University of California, Berkeley
Berkeley, CA 94720

In 1983, the University of California Seismograph Stations at Berkeley operated a telemetered network of 19 stations using a wide range of seismographic instrumentation. Fifteen of the stations house short-period vertical-component instruments, five stations house Wood-Anderson torsion seismographs, and six stations house long-period or broad-band seismographs. The station located at Berkeley (BKS, fig. 49) operates 14 instruments including world wide standard (WWSSN) instrumentation and a three-component ultralong-period seismograph. Two of the stations, Jamestown (JAS) and BKS telemeter high resolution (16-bit, 96db) digital signals to the central campus for recording and analysis. Complete information on the instrumental parameters and calibration curves is given by Abrahamson and others (1985).

During the year, approximately 5500 occurrences of seismic events were cataloged on summary sheets and 1010 teleseisms and 680 local earthquakes were analyzed. The Bulletin of the Seismographic Stations (Abrahamson and others, 1985) contains location and magnitude data, shown in figure 49, for 371 earthquakes located in northern and central California ($2.5 \leq M_L \leq 6.7$) and adjoining regions ($M_L \geq 4.0$). Fifteen of the earthquakes were of magnitude 5.0 or larger: three off the coast of northern California (M_L 5.4, 5.5, and 5.6); three in the Mammoth Lakes area (M_L 5.4, 5.3, and 5.3); one about 45 km southwest of King City (M_L 5.2); and eight in the Coalinga area (M_L 6.7, 5.6, 5.2, 5.1, 5.3, 6.0, 5.1, and 5.4).

The earthquakes occurring in the vicinity of Mammoth Lakes during the year are a continuation of the May 1980 Mammoth Lakes earthquake sequence. The occurrence of 91 earthquakes ($M_L \geq 3.0$) during the year is consistent with expected number of earthquakes (81 ± 13) if the sequence occurrence rate is continuing to follow an Omori relation with $n(t) = At^{-p}$ events per hour where $A = 39.6 \pm 6.0$ and $p = 0.82 \pm 0.034$ (Uhrhammer and Ferguson, 1980). If the sequence continues to decay at the present rate, it will take (170 ± 105) years to decay to the background rate of two earthquakes per year ($M_L \geq 3.0$) observed prior to 1978.

The most significant earthquake which occurred in California during the year was the destructive (M_L 6.7, M_o 2.3×10^{25} dyne-cm, MM VIII) earthquake which occurred at 2342 UTC on May 2, near Coalinga in the Central Coast Ranges east of the San Andreas fault (36° 13.5' N., 120° 17.7' W.) (Uhrhammer and others, 1983). The historical seismicity record (1852 to present) for the region indicates that this earthquake is not unexpected in either size or general location. From May 2 to December 31, the sequence consisted of 191 earthquakes with $M_L \geq 3.0$. The b-value is 0.69 ± 0.057 and the sequence follows Omori's relation with $p = 0.75 \pm 0.21$. If the rate of decay of the sequence continues to follow the current trend, it will take 51 ± 21 years to decay to the background rate observed during the past two decades.

Two mild earthquakes that occurred during the year are also of interest, a M_L 3.6 earthquake in the Point

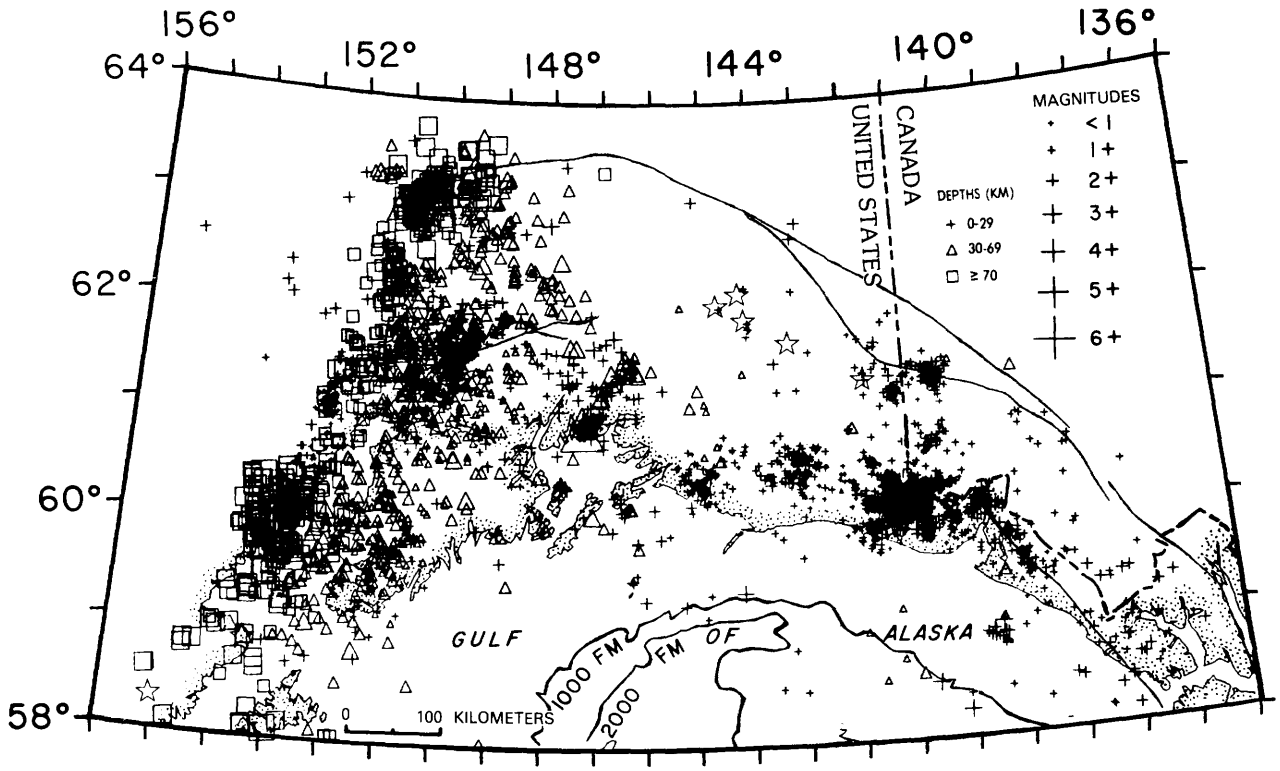

Figure 48. Hypocenters of 4642 earthquakes located by the USGS regional seismograph network in southern Alaska for 1983. The magnitude threshold for completeness varies across the network. West of longitude 145°W. all shallow (0-40 km depth) events of coda-duration magnitude 2.0 and larger are routinely located, but the threshold for completeness increases with depth and is about magnitude 3.0 at 150 km depth. Concentrations of shallow events beneath the southern Kenai Peninsula, near Anchorage, and along the volcanic arc west of Cook Inlet are a result of emphasis placed on locating events smaller than magnitude 2.0 in these areas. East of Prince William Sound the relative rate of activity is much lower and earthquakes as small as magnitude 1.0 are routinely located. The phase data used to locate the earthquakes includes P- and S-times from stations operated by the Alaska Tsunami Warning Center, the University of Alaska, and the Department of Energy, Mines and Resources, Canada. Stars indicate volcanoes.

Arena area (July 15, 1900 UTC, 38°54' N., 123°39' W.) and a M_L 3.2 earthquake along the continental slope 90 km west of the coastline (October 19, 0428 UTC, 36°33'; N., 122°52' W.). The earthquake in the Point Arena area occurred on or near a segment of the San Andreas fault which ruptured in 1906 and which has exhibited a low rate of seismicity since the occurrence of the great (M_S 8.3) 1906 San Francisco earthquake (Bolt and others, 1968). Five other earthquakes ($M_L \geq 3.0$) have been observed along a 100 km segment of the coast, centered on Point Arena, during the past 35 years. The occurrence of the earthquake along the continental slope west of Monterey is noteworthy. Only one other earthquake ($M_L \geq 3.0$) has been observed along the continental shelf in the past 35 years, since the installation of high-gain seismographs in the central coast region (Uhrhammer, 1977). This well located earthquake (distinct S phases were observed at four stations along the coast) demonstrates the existence of seismic activity right up to the southwestern edge of the continental shelf along the continental slope.

Southern California Earthquakes, 1983

L. K. Hutton and C. R. Allen
Seismological Laboratory
California Institute of Technology
Pasadena, CA 91125
and C. E. Johnson
U. S. Geological Survey, at Seismogical Laboratory
California Institute of Technology
Pasadena, CA 91125

The Southern California Network cataloged 11,297 earthquakes in 1983 (fig. 50), 643 of which were of M_L 3.0 and greater. Sixty-eight events were M_L 4.0 and larger. Of these, 37 were members of the Coalinga sequence, 19 occurred on the California-Nevada border near Mammoth Lakes, and four were south of the United States/Mexican border. The following other M_L 4.0 and greater earthquakes occurred in southern California proper:

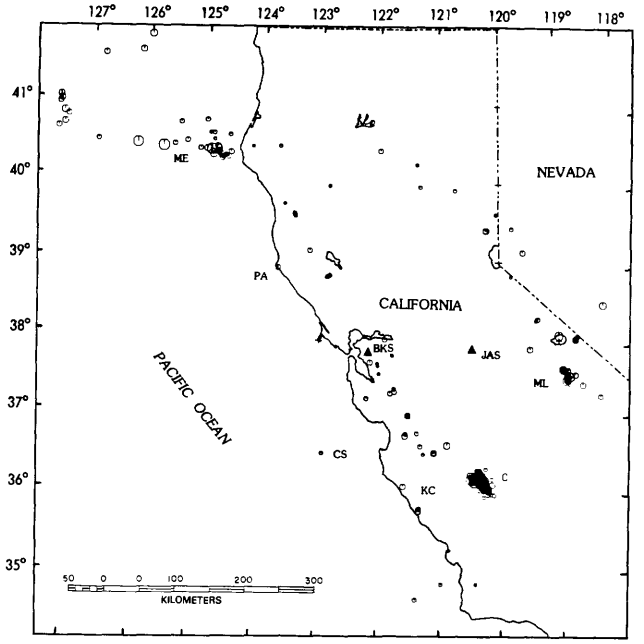

Figure 49. Northern and central California seismicity, 1983. Three-hundred and seventy one earthquakes ($2.5 \leq ML \leq 6.7$) are plotted. The solid triangles designate stations at Berkeley (BKS) and Jamestown (JAS); the other symbols are: C - Coalinga; CS - continental slope; KC - King City; ME - Mendocino Escarpment; ML - Mammoth Lakes; and PA - Point Arena.

Date	Mag.	Area
Jan. 4	4.0	China Lake
Jan. 8	4.1	San Bernardino
Jan. 12	4.2	Offshore
Feb. 22	4.3	Offshore
Jun. 29	4.6	San Diego
Jul. 13	4.0	Imperial Valley
Oct. 19	4.0	Kern Valley
Oct. 21	4.5	Kern River

The largest event recorded was the M_L 6.3 earthquake of May 2, which caused major damage in the town of Coalinga. The second largest, July 22 M_L 5.8 was a Coalinga aftershock. All magnitude 5.0 or greater events were either at Coalinga or at Mammoth Lakes.

During July of 1983, the network began processing its data with a new software system known as CUSP, for Caltech/USGS Seismic Processor. This system allows the hypocenters, phases, and seismograms to be written into a relational data base. We intend eventually to translate all of our older data into this data base as well.

Beginning in September, we began the practice of "finalizing" all phase information within a few months after the fact. Amplitude readings from our photographically recorded Wood-Anderson instruments are entered into the data base, enabling us to compute M_L for most events of about M_L 2.8 and greater. Magnitudes for the smaller events are computed using a coda algorithm (Johnson, 1979) which is calibrated against those events with proper M_L. Helicorder phase and amplitude readings are also entered for teleseisms, and reporting to the National Earthquake Information Center is then semiautomatic.

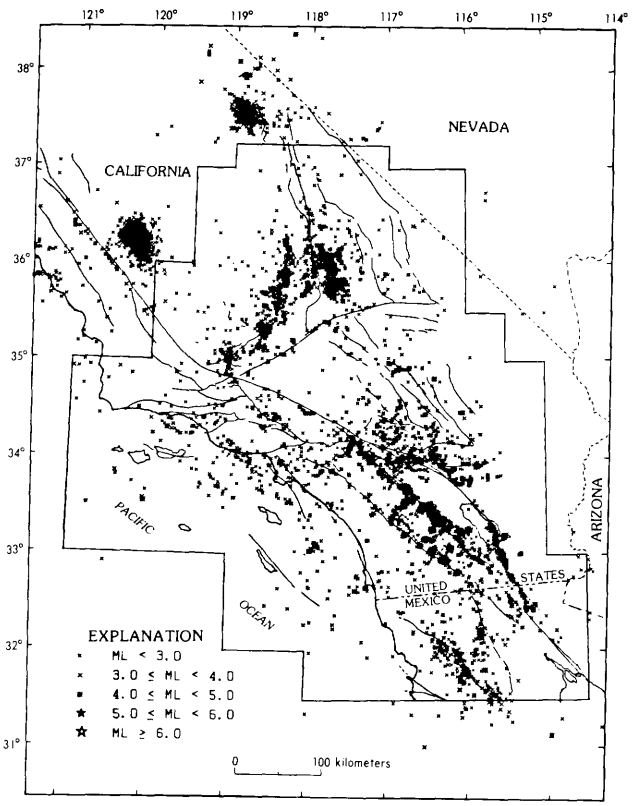

Figure 50. Earthquakes located by the southern California network in 1983.

The network group has recently printed a catalog of southern California earthquakes of M_L 3.0 and greater for 1975 through 1983 (Hutton and others, 1985). This publication is available through the California Institute of Technology Bookstore.

Hawaii Earthquakes, 1983

Robert Y. Koyanagi
U.S. Geological Survey
Hawaiian Volcano Observatory
Hawaii National Park, HI 96718

In 1983 the seismometer network maintained by the Hawaiian Volcano Observatory consisted of 51 stations: two were low-gain, multi-component stations, nine were three-component, and 40 were vertical only. With the exception of two self-contained stations, all seismometer signals from the short-period network on the island of Hawaii were telemetered to the observatory for recording. In addition to the seismic network on the island of Hawaii, optical seismographs were maintained on the island of Maui and Oahu (Oahu station operated by the Pacific Tsunami Warning Center).

Earthquake statistics for Hawaii in 1983 included 4320 events at magnitude 1.5 or greater, 270 events at magnitude 3.0 or greater, and 15 events at magnitude 4.0 or greater. Figures 51, 52, and 53 are plots of shallow, crustal, and deep earthquakes beneath the Island of Hawaii. Figure 54 shows the distribution of earthquakes of magnitude 3.5 or greater in the Hawaiian Islands.

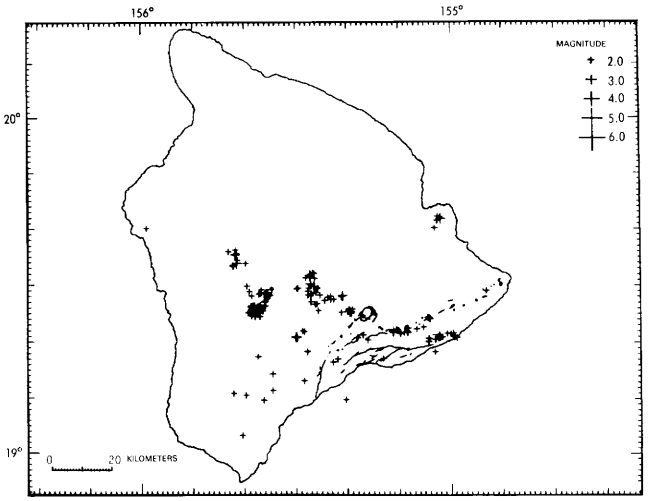

Figure 51. Shallow earthquakes (0 to 5 km depth) with magnitudes 2.0 or greater beneath the Island of Hawaii in 1983.

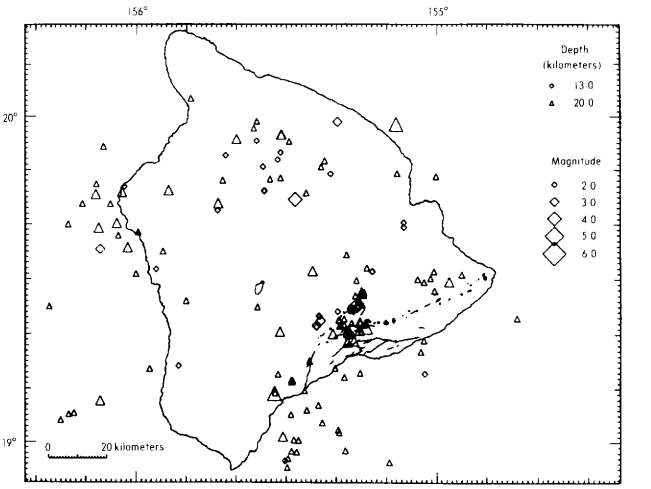

Figure 53. Deep earthquakes (13 to 60 km depth) with magnitudes of 2.0 or greater beneath the Island of Hawaii in 1983.

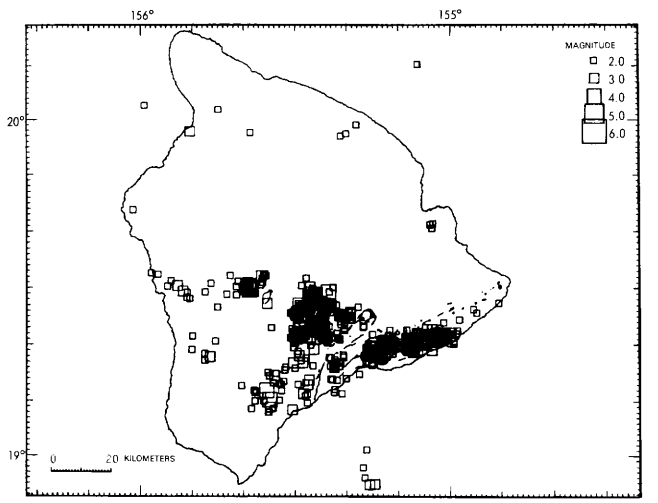

Figure 52. Crustal earthquakes (5 to 13 km depth) with magnitudes of 2.0 or greater beneath the Island of Hawaii in 1983.

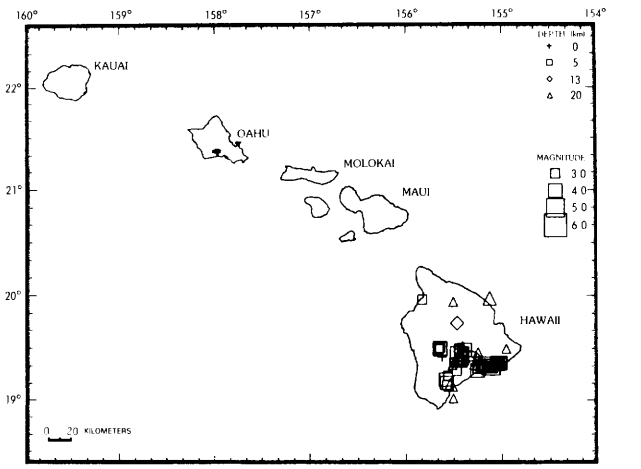

Figure 54. Earthquakes of magnitude 3.5 or greater located in Hawaii during 1983.

The most significant event was the damaging, Kaoiki earthquake on November 16, 1983, at 6:30 (HST). This magnitude 6.6 earthquake occurred at 12 km depth in the Kaoiki seismic zone beneath the southeast flank of Mauna Loa. The epicenter was slightly south of the mid-point of a line drawn between the summit calderas of Kilauea and Mauna Loa volcanoes. The summit area of Kilauea was subjected to intensity VIII to IX shaking, which did considerable damage but fortunately caused only a few minor injuries. Sectors of the Crater Rim Road near Waldron Ledge fell into the caldera, and heavy damage was caused to roads where they cross or, closely parallel, the outer caldera walls Of Kilauea. Considerable structural damage also occurred in Hilo. The total damage was in excess of 7 million dollars.

Microearthquake activity, otherwise, related to the state of unrest beneath the active volcanoes Kilauea and Mauna Loa.

The flank eruption of Kilauea volcano on January 3 was preceded by a 24-hour swarm of microearthquakes. Nearly 700 microearthquakes of 0.5 to 4.2 in magnitude outlined the downrift-fracturing that accommodated the movement of magma to set the stage for the eruption on the volcano's middle east rift. Mauna Loa volcano began to show signs of increasing unrest with a swarm of micro-earthquakes beneath its summit region in early March, 1983. Subsequent minor swarms in June and July were followed by a major swarm in September that peaked with several hundred detected microearthquakes per day.

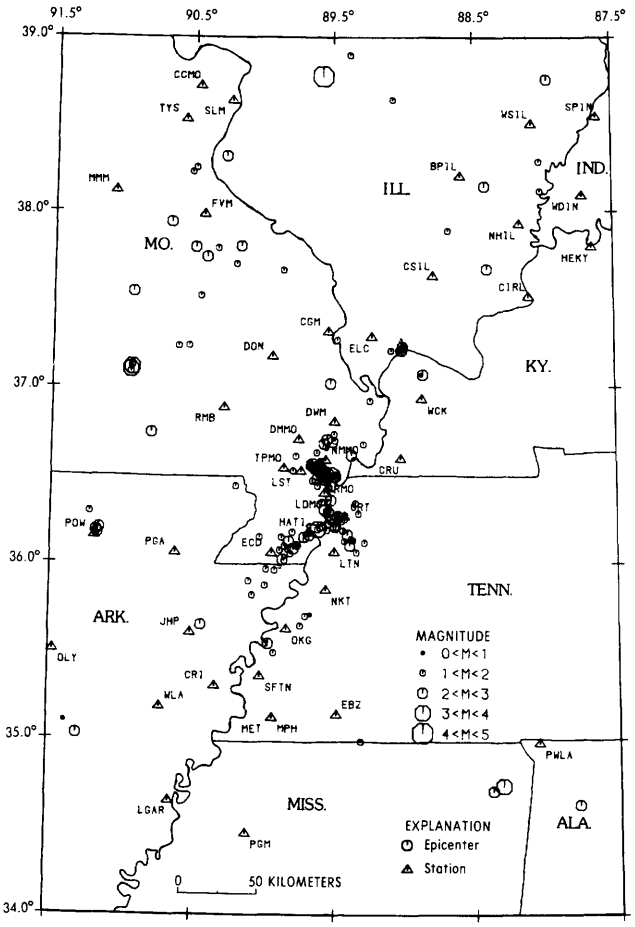

Figure 55. Central Mississippi Valley earthquakes during 1983 within a 4° x 5° region centered at 36.5°N., 89.5°W.

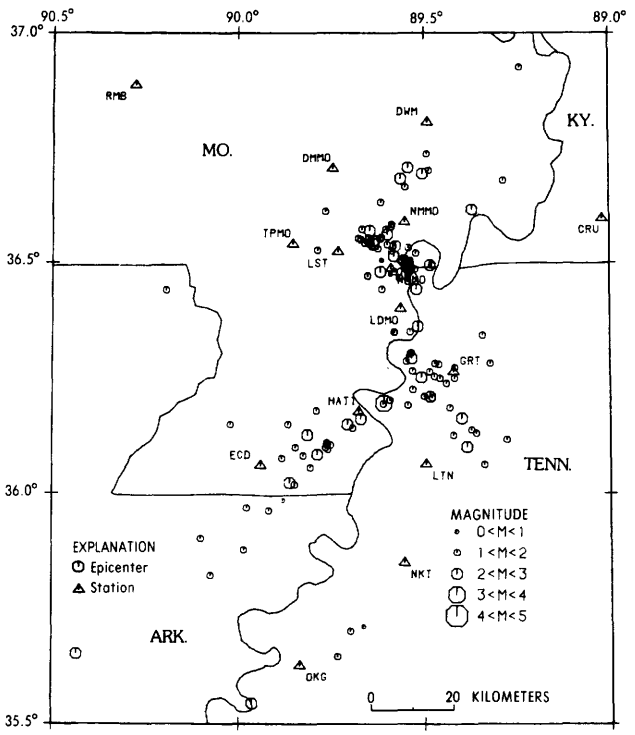

Figure 56. Central Mississippi Valley earthquakes during 1983 within a 1.5° x 1.5° region centered at 36.25°N., 89.75°W.

Central Mississippi Valley Earthquakes, 1983

W. Stauder, R. Herrmann, J. Chulick, J. Mascarenas, P. Leu, T. Shin, V. John, and L. Himes
Department of Earth and Atmospheric Sciences
Saint Louis University,
P.O. Box 8099 Laclede Station
Saint Louis, MO 63156

In 1983, 204 earthquakes were located and 132 other nonlocatable earthquakes were detected by the 36 station regional telemetered microearthquake network operated by Saint Louis University for the U.S. Geological Survey and the Nuclear Regulatory Commission. Figure 55 shows 191 earthquakes located within a 4° x 5° region centered on 36.5° N. and 89.5° W. Seismograph stations are denoted by triangles and are labeled by the station code. The magnitudes are indicated by the size of the open symbols. Figure 56 shows the locations and magnitudes of 132 earthquakes located within 1.5° x 1.5° region centered at 36.25° N. and 89.75° W. Figures 57 and 58 are similar to figures 55 and 56, but the epicenter symbols (squares) are scaled to focal depth.

One hundred and eighty-six teleseisms were recorded by the PDP 11/34 microcomputer in 1983. Assuming a plane wavefront propagating across the network and using the traveltime curves to determine the back azimuth and slowness, assuming a focal depth of 15 km, and using spherical geometry, epicentral coordinates were determined. Arrival time information for teleseismic P and PKP phases has been published in the quarterly Central Mississippi Valley Earthquake Bulletin.

The significant earthquakes occurring in 1983 include the following:

1. February 5, 1983, 1308 UTC, 34.74° N., 88.31° W.: felt in Altitude and Boonville, Mississippi. m_{bLg}=3.2 (SLM), m_{bLg}=3.1 (HEKY), m_{bLg}=2.7 (BLO).

2. February 23, 1983, 0809 UTC, 37.07° N., 88.86° W.: felt at Temple Hill, Illinois and Wyatt, Missouri. m_{b10Hz}=2.9 (SLM), m_{bLg}=2.2 (HEKY), m_{bLg}=2.6 (BLO).

3. February 23, 1983, 0851 UTC, 36.19° N, 89.60° W.: felt at Ripley (IV), Lenox (III), Miston (III), and Tiptonville (III), Tennesse. Also felt at Bogota, Tennesse, and Caruthersville, Hayti, and Kennett, Missouri. m_{b10Hz}=3.6 (SLM), m_{bLg}=3.7 (HEKY), m_{bLg}=3.1 (BLO).

4. May, 15, 1983, 0516 UTC, 38.77° N., 89.57° W.: slight damage at East Saint Louis (VI). Granite City (VI), and Mascoutah (VI), Illinois. Felt (V) throughout much of southern Illinois, and in the Saint Louis Missouri area. Also felt in southern

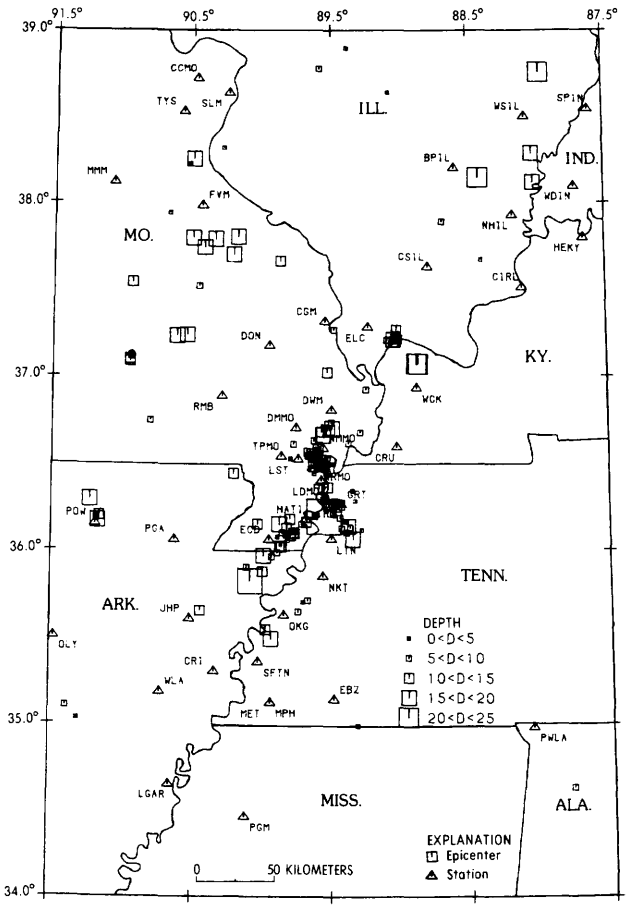

Figure 57. Central Mississippi Valley earthquakes during 1983 in the same region as figure 55, scaled by focal depth.

Indiana and northeastern Arkansas. m_{bLg}=4.3 (SLM), 4.4 (NEIS), 4.5 (TUL), 4.5 (OTT).

5. November 16, 1983, 37.21° N., 89.01° W.: an earthquake swarm began on this day near Ohio River Lock and Dam No. 53 and continued until March 1984. There were nine events located in this area in 1983.

Earthquakes in the Southern Mississippi Valley and the Southern Appalachians, 1983

By Sue Nava, A. C. Johnston, and Ann Metzger
Tennessee Earthquake Information Center
Memphis State University
Memphis, TN 38152

Instrumentation

The Tennessee Earthquake Information Center (TEIC) operates two seismic networks: Memphis Area Regional Seismic Network (MARSN) and the Southern Appalachian Regional Seismic Network (SARSN). MARSN consists of nine stations, located in the states of Tennessee, Arkansas, Alabama, and Mississippi (fig. 59). SARSN consists of 16 stations located in the states of Tennessee, North Carolina, Georgia, and Virginia (fig. 60).

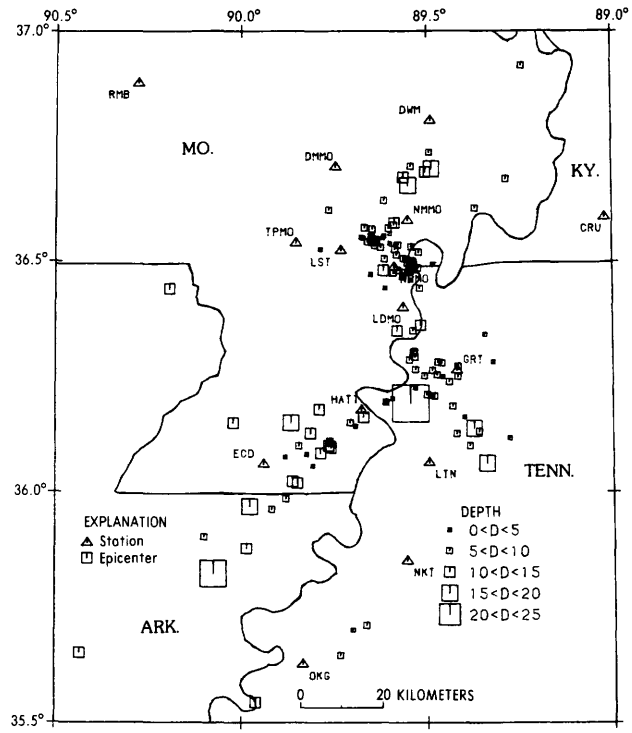

Figure 58. Central Mississippi Valley earthquakes during 1983 in the same region as figure 56, scaled by focal depth.

MARSN is designed to monitor seismic activity in the southern portion of the New Madrid seismic zone and the lower Mississippi Embayment. Instrumentation consists of four Geotech S-13 seismometers (OLY, PWLA, EBZ, STAR) and three Kinemetrics Ranger seismometers (WLA, LGAR, PGM); all are vertical short-period (1.0 sec) seismometers. SFTN is a three-component Mark Products L-15, 8 hz borehole seismometer located at the 486-foot level of an abandoned water test well. MPH, located at TEIC, is a three-component Sprengnether long-period seismograph. Two cooperative seismograph stations sponsored by TEIC are located and recorded at University of Tennessee in Martin and at Volunteer State Community College in Gallatin, Tennessee.

SARSN is designed to monitor the seismic activity of the Southern Appalachians. All SARSN stations have Geotech S-13 vertical short-period seismometers. Data for both networks are telemetered via radio to central receiving sites, then brought to TEIC over leased telephone lines. All short period data are recorded in analog form on 16 mm Develocorder film or pen and ink paper records. Digital recording will commence in 1985-86.

Seismic Activity

All events recorded by a sufficient number of MARSN and SARSN stations were located using HYPO71 (Lee and Lahr, 1975) during 1983. The MARSN network located 18 events in 1983. These events are presented in table 4 and figure 61. Not included in this total are 90 New Madrid events for which better coverage was available from St. Louis University. Figure 62 and table 5 present the locations of 60 Southern Appalachian events located by SARSN in 1983. The epicentral uncertainty

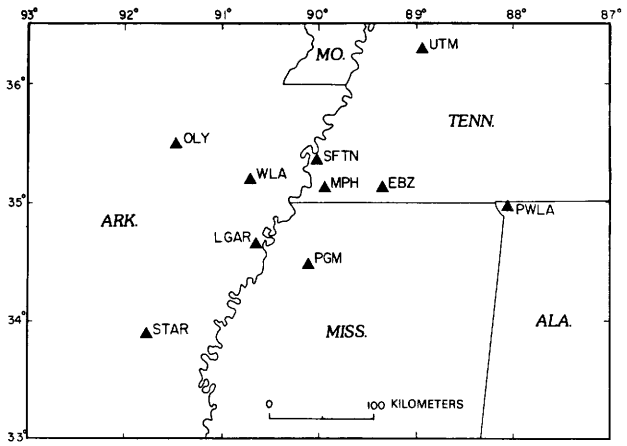

Figure 59. Memphis Area Regional Seismic Network (MARSN), 1983.

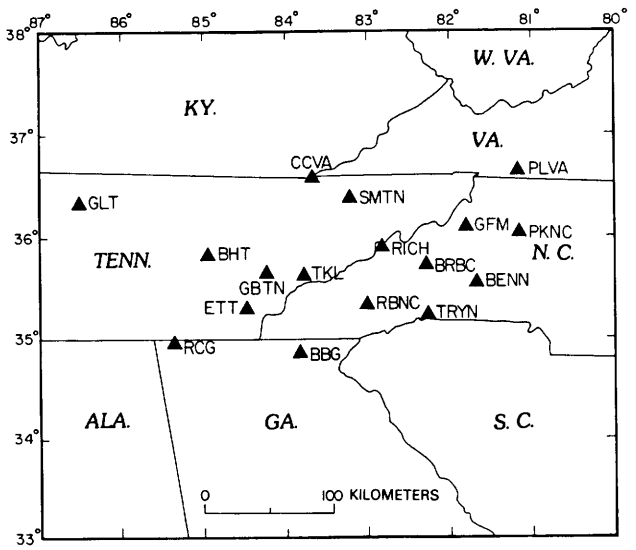

Figure 60. Southern Appalachian Regional Seismic Network (SARSN), 1983.

for these earthquakes is 1-2 km if the location is within the limits of the network and 6-12 km for outlying events.

At present only duration magnitudes are determined by TEIC; amplitude magnitudes await full system calibration of the networks. More detailed information is published in the TEIC Quarterly Seismological Bulletin along with special reports on significant events. Subscriptions are available upon request from TEIC.

Arkansas Swarm

The Arkansas earthquake swarm which began on January 12, 1982, continued sporadically throughout 1983. Over 45,000 events were recorded during this period, by a temporary network of seismographs deployed in the area. The epicenters generally cluster in an area roughly 8 km x 8 km, located west of the town of Enola, Arkansas. This confined source region is depicted by the star in figure 61. Table 6 contains hypocenter

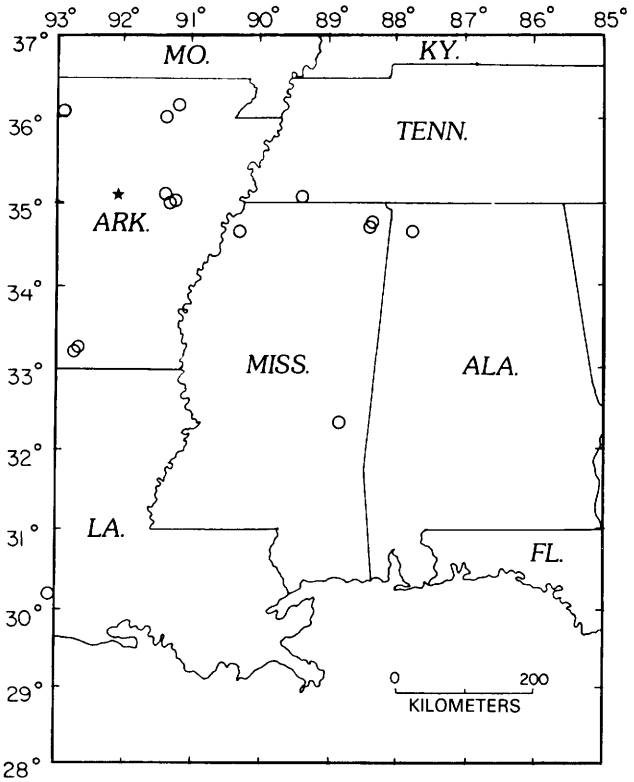

Figure 61. Central United States earthquakes, 1983 (from table 4). The star denotes the location of the central Arkansas earthquake swarm (from table 6).

Table 4. *Hypocentral locations for Central United States, 1983*

DATE	ORIGIN TIME	LAT. N	LONG W	DEPTH	MAG	FELT AREA/MMI INTENSITY
01-17	10:18:42.6	36.478	91.582	5.25	1.9	
01-29	16: 5:31.5	34.680	88.368	5.0R	2.4	
02-05	13: 8:19.4	34.694	88.373	1.4	2.9	Rienzi & Booneville, MS/ II-IV
02-05	23:25: 7.3	35.108	91.380	8.7	1.6	
02-09	9:41:58.0	36.349	93.165	5.0R	1.9	
04-25	12:43:22.7	34.668	90.305	2.0	1.6	
05-30	7:14: 4.6	32.329	88.839	0.4	2.4	
06-05	13: 4:18.6	35.002	91.319	14.3	2.5	
06-05	13:11:26.0	35.038	91.252	2.4	0.8	
08-03	11:31:55.0	36.098	92.950	5.0R	2.2	
08-27	1:25:50.8	35.066	89.369	2.4	1.8	
08-28	10:44: 3.9	34.661	87.771	6.9	2.6	
10-04	5:11:58.1	36.165	91.175	12.0	2.7	
10-04	7:21:26.0	36.170	91.168	15.5	1.9	
10-12	13:43:12.5	36.046	91.384	10.8	2.1	
10-16	19:40:51.6	30.074	93.221	5.0	3.4	Lake Charles, LA/ III
12-09	20:52:10.7	33.209	92.739	1.9	3.0	El Dorado, AR/ V
12-10	9:24:55.3	33.264	92.686	9.1	2.2	El Dorado, AR/ II

parameters for 8 magnitude 2.6 or greater events which occurred during 1983. The peak swarm activity occurred in late January, 1982, but bursts of activity recur periodically. Twenty-four events were felt by local residents during 1983. The temporary array recorded events as small as duration magnitude -3.5. Special reports were issued semiannually during 1982 and 1983 updating the swarms activity and are available upon request from TEIC.

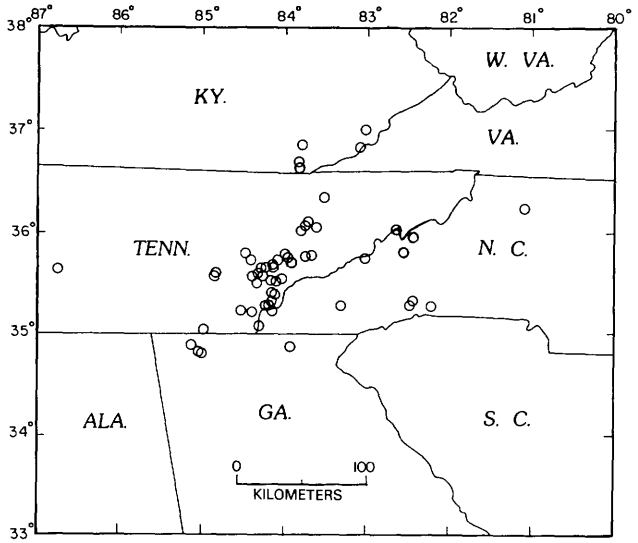

Figure 62. Southern Appalachian earthquakes, 1983 (from table 5).

Table 5. *Hypocentral locations for Southern Appalachian earthquakes, 1983*

DATE	ORIGIN TIME	LAT N	LONG W	DEPTH	MAG	FELT AREA/MMI INTENSITY
01-18	05:09:12.3	35.589	84.287	8.2	2.3	
01-26	11:30:55.4	35.416	84.135	*12.9	0.9	
01-27	22:09:35.1	36.059	83.631	12.8	3.1	
01-29	18:08:30.4	36.125	83.737	*15.9	2.1	
01-10	06:19:00.1	37.007	83.026	15.5	2.2	
02-11	01:15:37.5	35.038	85.006	13.0	0.7	
03-04	14:03:27.7	35.599	84.354	*12.9	2.3	
03-11	22:29:40.0	35.210	84.422	*16.7	1.7	
03-13	03:53:12.6	35.507	84.352	* 9.5	1.3	
03-13	14:21:44.3	35.802	84.013	*11.7	1.1	
03-16	09:13:52.1	35.228	84.551	*11.7	2.6	
03-19	01:57:57.4	35.285	83.326	2.5	1.6	
03-25	02:47:11.1	35.333	82.460	*11.5	3.3	Hendersonville, NC/ VI
04-05	03:17:59.3	35.542	84.166	*12.9	2.1	
04-16	07:26:43.6	35.420	84.188	*10.6	1.5	
05-16	06:50:23.5	35.549	84.064	*16.4	1.9	
05-25	10:46:05.9	35.741	84.441	*17.8	1.6	
05-26	12:30:02.2	35.666	84.264	* 3.3	2.5	
05-22	05:53:24.3	35.596	84.864	*19.8	0.9	
06-26	17:34:02.2	35.288	84.251	*13.9	0.5	
07-02	06:46:28.1	35.696	84.195	*13.1	1.8	
07-08	19:29:05.9	35.548	84.153	* 9.7	3.4	Vonore, TN/ II-III
07-09	03:28:46.8	35.545	84.143	* 9.5	1.0	
07-09	09:57:47.7	35.537	84.135	5.3	1.3	
07-11	12:54:36.1	35.636	86.789	*29.3	2.4	
07-15	19:32:56.1	35.547	84.164	* 6.8	2.6	
07-28	18:07:29.9	34.886	83.947	* 6.3	2.1	
07-30	06:31:53.2	36.653	81.637	9.1	2.2	
08-03	13:40:47.2	36.065	83.787	* 9.5	1.5	
08-05	07:22:36.9	35.783	83.762	*22.5	2.0	
08-12	05:49:13.6	35.623	84.336	*12.9	2.1	
08-28	22:45:07.4	36.681	83.844	16.0	3.2	Middlesboro, KY / IV
08-28	22:56:39.7	36.652	83.843	16.8	2.6	
09-13	01:35:34.7	35.972	82.433	8.1	1.7	
09-13	11:06:00.3	35.073	84.338	8.3	0.2	
09-16	09:47:48.9	34.811	85.021	21.2	1.5	
10-03	02:51:34.8	34.810	85.056	6.2	1.2	
10-05	03:50:25.9	35.732	84.104	*21.2	1.7	
10-08	04:26:12.2	35.331	84.190	10.5	1.5	
10-08	06:21:34.7	35.216	84.186	12.5	1.9	
10-08	17:09:33.3	35.720	83.930	*23.2	1.6	
10-13	10:56:16.8	34.879	85.156	*17.4	2.0	
10-16	22:02:48.4	35.838	84.507	* 7.2	2.4	
10-17	07:45:20.0	35.670	84.162	*19.4	2.6	
10-25	16:35:56.5	35.661	84.286	* 6.9	2.1	
11-05	06:30:33.8	36.836	83.095	6.7	1.8	
11-06	00:12:58.5	36.868	83.821	12.1	2.2	
11-08	20:18:44.3	36.044	83.826	5.7	1.5	
11-11	06:19:11.0	36.350	83.526	6.4	1.6	
11-14	16:34:25.1	35.759	83.969	10.1	0.9	
11-20	04:04:27.0	35.409	84.133	*16.7	0.6	
11-23	18:13:37.8	35.269	82.229	*11.2	1.7	
11-24	19:40:33.1	35.759	83.036	6.8	0.7	
11-24	21:37:51.1	34.987	84.450	21.5	1.2	
11-27	08:17:03.8	36.277	81.110	4.4	1.9	
11-29	19:30:28.1	36.027	82.653	* 7.1	2.7	
12-05	10:35:10.5	35.299	82.492	* 7.4	2.1	
12-06	04:46:49.4	35.793	83.682	*12.2	1.1	
12-21	09:01:32.6	35.574	84.420	*19.1	1.5	
12-30	02:05:23.2	35.212	84.421	* 4.4	1.5	

* Reliable Depth

Table 6. *Arkansas swarm hypocenters for 1983 earthquakes with magnitude of 2.6 or greater*

DATE	ORIGIN TIME	LAT. N	LONG. W	DEPTH	MAG
01-19	02:30:40.2	35.1858	92.2123	5.0	3.7
02-04	09:58:13.9	35.2028	92.2335	1.2	2.8
02-17	19:31:45.3	35.1785	92.2252	5.3	2.8
03-29	08:40:45.8	35.1928	92.2273	3.0	2.6
03-30	04:12:25.4	35.1927	92.2282	2.5	3.2
03-30	04:20:54.2	35.2013	92.2243	3.9	2.6
07-12	08:32:00.0	35.1793	92.2152	6.9	2.6
07-31	14:07:00.1	35.198	92.221	5.1	2.9

Nevada and Eastern California Earthquakes, 1983

Ute R. Vetter
Seismological Laboratory,
University of Nevada
Reno, NV 89557-0018

In 1983 the University of Nevada Reno Seismological Laboratory collected data from a network of 70 short-period seismic stations; about 50 of these stations were operated the entire year. Five of the stations recorded three components of ground motion, while the others had only vertical-component instruments. A map of all stations from which we received signals at any time in 1983 is seen in figure 63. The data were telemetered to the laboratory over radio and telephone links and recorded on analog tape; key stations were also monitored on Helicorders. In the playback-process several subnetworks were used whereby small events were only played out for 2-3 nearby subnetworks.

Figure 64 shows a map with the 1711 events which were located for the 1983 period using the HYPO71 algorithm of Lee and Lahr (1975); 25 of which were reported felt. As in the previous 3 years, the most significant activity occurred in the Mammoth Lakes area, where 1300 events were located (fig. 65). Especially active was the time period from January through about the middle of February, where a major earthquake swarm occurred: 360 events were located during this time period (fig. 66). Several authors have suggested that this swarm was the result of shallow intrusion of new magma, citing an episode of harmonic tremor within a longer period of spasmodic tremor. Interest in Mammoth Lakes seismicity has been renewed because this seismicity may be associated with a potential volcanic hazard near the populous Mammoth Lakes resort area.

The seismicity in 1983 was not particularly strong in terms of energy release; only 20 earthquakes with local magnitude greater than 4.0 occurred. The three largest earthquakes had magnitudes of 5.0 and 5.4.

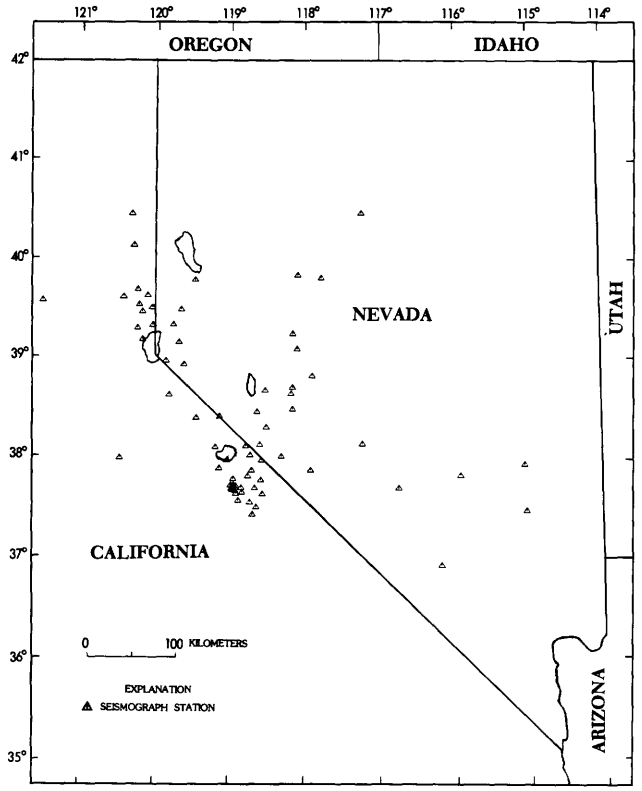

Figure 63. University of Nevada-Reno seismograph network for 1983.

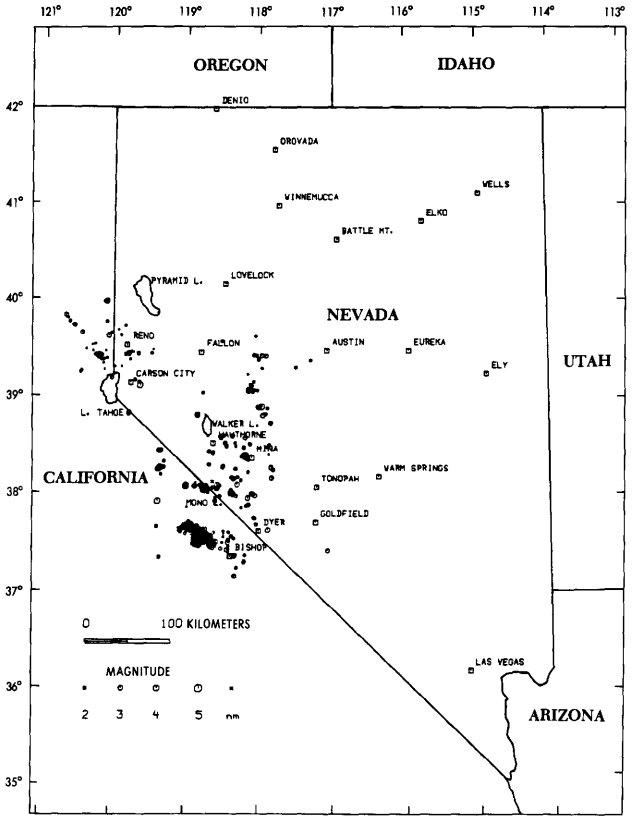

Figure 64. Earthquakes located by the University of Nevada-Reno seismic network during 1983.

New England Earthquakes, 1983

James P. McCaffrey, S.J.
Department of Geology and Geophysics
Boston College, Weston Observatory
381 Concord Road
Weston, MA 02193

During 1983 Weston Observatory operated 30 stations spanning the entire New England region. The data from the network was transmitted via telephone lines to Weston Observatory where it was recorded in both analog and digital form. The digital recording system, in development during 1982, included the data from all 30 stations by year's end. In the digital system the stations in the network were paired so that storage of data took place when the short term average amplitudes at two stations exceeded the long term average amplitude by some preset threshold. The sampling rate established for all stations was 100 samples/sec.

The events that evoked more than esoteric interest were:

1. The coda-duration magnitude Mc = 4.4 earthquake at Dixfield, Maine, on Sunday, May 29, at about 1:45 a.m. (EDT). It was centered 6 km southeast of Dixfield and awoke people throughout the western part of Maine. This was the second event felt in this part of Maine within a 3 day period. The earlier earthquake was located at Baker Mountain on May 27, at about 7:04 p.m. (EDT). Its coda-duration magnitude was 3.7. The maximum intensity reported for the Dixfield earthquake was less than Modified Mercalli intensity VI, (Ebel and McCaffrey, 1984).

2. The 3.7 Mc earthquake SW of Crawford Lake, Maine, on Friday, August 12, at about 10:08 a.m. (EDT). This was felt over a large part of northeastern Maine. A large number of felt reports were received but no damage reports were made.

3. The earthquake at Blue Mountain Lake, New York, on Friday October 7, at about 6:18 a.m. (EDT). It was felt throughout all of New England.

A total of 56 earthquakes were recorded in the New England states during the year. Four were located in Connecticut, six in Massachusetts, 30 in Maine, 11 in New Hampshire, one in Rhode Island, and four in Vermont. Those events whose magnitudes were 2.5 or greater are shown in figure 67.

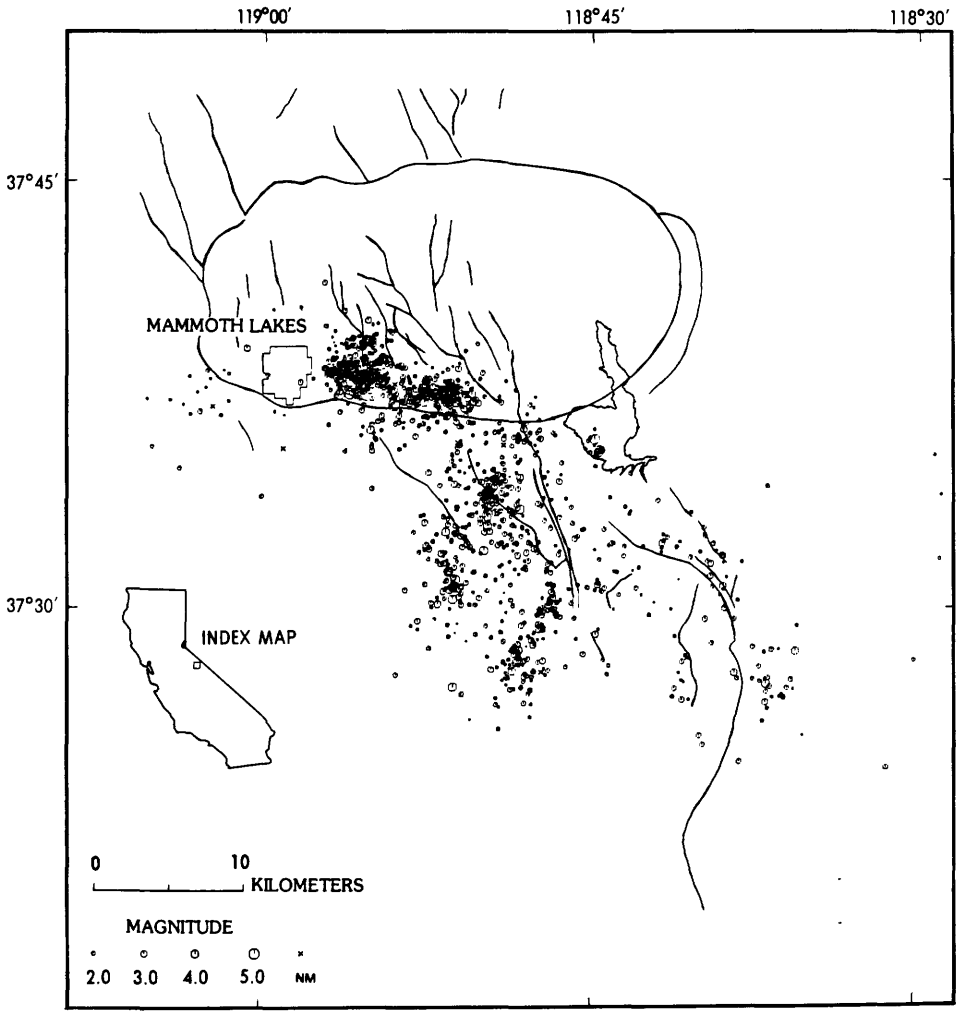

Figure 65. Seismicity of the Mammoth Lakes, California area during 1983. The encircled area represents the boundary of the Long Valley Caldera. Other lines indicate faults.

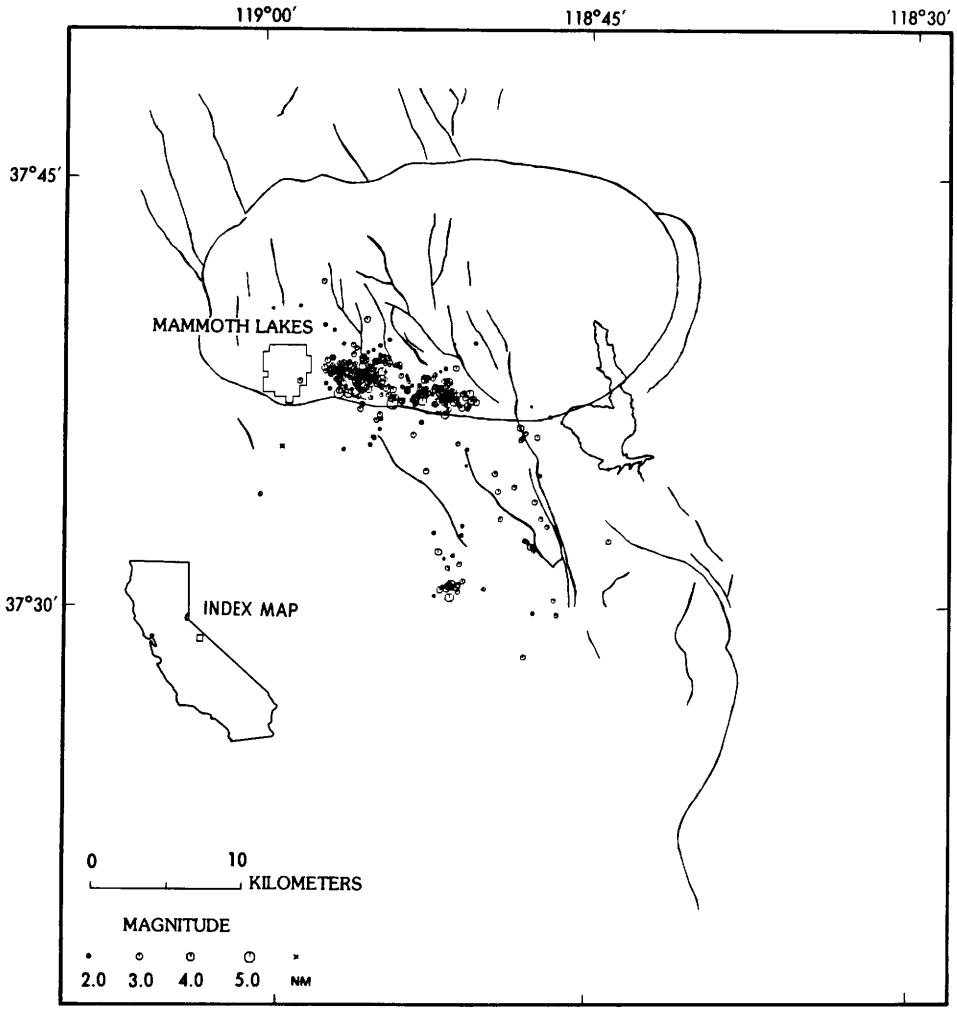

Figure 66. Seismicity of the Mammoth Lakes, California area for January through February 10, 1983. The encircled area represents the boundary of the Long Valley Caldera. Other lines indicate faults.

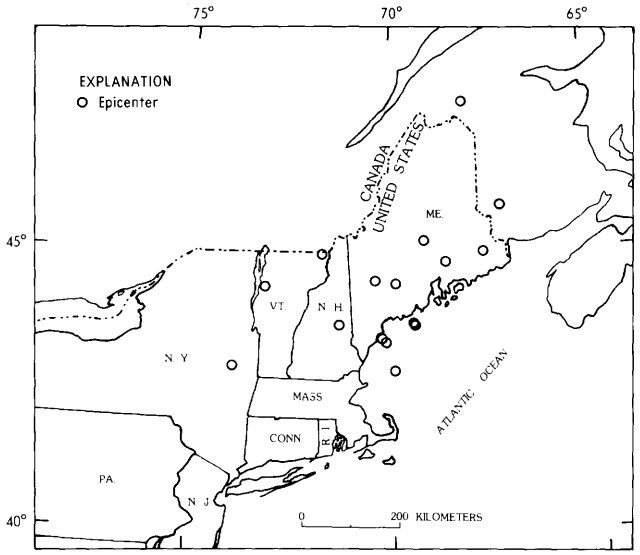

Figure 67. New England earthquakes in 1983 with magnitudes 2.5 or greater.

Table 7. *Earthquakes in New York and New Jersey greater than magnitude 2.0 (MD)*

YR	MO	DA	HR	MN	SEC	Lat°N	Lon°W	Depth	Mag	Place
83	1	14	22	22	20.52	38:45.30	72:53.80	10.09	2.2	Rye NY
83	1	21	21	21	26.05	40:57.28	73:40.92	.20	2.2	Offshore
83	1	24	21	15	00.05	43:57.96	73:21.45	11.46	2.4	Port Henry NY
83	2	11	17	14	08.82	44:05.01	73:32.22	5.40	2.2	Mineville NY
83	2	19	5	45	45.12	40:38.91	74:46.14	6.09	2.7	Oldwick NJ
83	2	21	21	13	24.47	39:24.00	72:55.79	4.78	2.2	Offshore
83	2	26	19	59	35.38	41:33.12	73:39.77	6.66	3.0	Pawling NY
83	3	19	5	42	04.54	39:01.20	72:52.61	9.82	2.2	Offshore
83	4	14	20	37	13.63	42:43.41	77:37.27	10.00	2.2	Conesus NY
83	5	9	12	36	22.24	44:26.02	74:50.51	4.00	2.6	Canopus Lake NY
83	9	8	19	35	10.14	40:26.00	72:07.36	26.07	2.9	Offshore
83	10	7	10	18	46.26	43:56.52	74:15.18	10.12	5.1	Goodnow NY
83	10	7	10	35	45.30	43:57.74	74:14.63	5.95	2.2	Goodnow NY
83	10	7	10	39	38.59	43:57.31	74:14.75	4.12	4.1	Goodnow NY
83	10	7	10	59	03.75	43:56.09	74:14.88	9.91	3.2	Goodnow NY
83	10	8	1	19	33.85	43:55.51	74:14.46	6.84	2.3	Goodnow NY
83	10	8	8	58	37.58	43:57.71	74:15.65	7.14	2.8	Goodnow NY
83	10	9	10	34	35.64	43:56.95	74:15.54	7.28	2.2	Goodnow NY
83	10	10	17	51	40.80	43:57.16	74:15.42	7.64	2.2	Goodnow NY
83	10	11	0	26	34.90	43:57.38	74:15.68	7.36	2.2	Goodnow NY
83	10	11	5	46	29.01	43:57.31	74:15.40	7.54	2.9	Goodnow NY
83	10	12	2	17	06.32	43:57.35	74:15.47	7.74	3.1	Goodnow NY
83	10	16	6	39	45.28	43:57.37	74:15.37	7.48	2.4	Goodnow NY
83	10	23	22	33	53.76	43:58.69	74:15.72	5.58	2.1	Goodnow NY
83	10	30	12	14	10.91	43:55.88	74:14.26	12.02	3.0	Goodnow NY
83	10	30	16	53	27.48	44: 5.42	73:31.58	5.02	2.1	Mineville NY
83	11	12	15	13	00.01	43:57.44	74:16.24	5.87	2.5	Goodnow NY
83	11	14	1	48	19.49	44:52.52	73:35.61	15.10	2.3	Altona NY
83	11	15	20	51	06.83	43:57.60	74:15.83	7.43	2.5	Goodnow NY
83	11	23	2	22	03.02	43:57.13	74:15.61	6.89	2.8	Goodnow NY
83	11	23	3	42	30.54	43:57.22	74:15.61	7.01	2.4	Goodnow NY
83	11	23	23	34	17.31	43:57.15	74:15.67	7.31	2.6	Goodnow NY
83	12	2	11	57	23.29	44:52.19	74:37.15	13.94	2.2	Moira NY
83	12	10	2	58	55.32	44:23.52	73:20.53	4.98	2.8	Willsboro NY
83	12	25	7	46	03.62	44:22.34	73:20.89	4.19	2.3	Willsboro NY

Seismicity of New Mexico, 1983

Allan Sanford
Geoscience Department and Geophysical
Research Center
New Mexico Institute of Mining and Technology
Socorro, New Mexico 87801
and Lawrence Jaksha
U.S. Geological Survey
Socorro, NM 87801
and Dan Cash
Geophysics Group, ESS-3
Los Alamos National Laboratory,
Los Alamos, NM 87545

The distribution of earthquakes in the state of New Mexico during 1983 is shown in figure 68. Plotted on this map are epicenters for shocks whose duration magnitudes were 1.5 or greater. Data are from networks of seismic stations operated by Los Alamos National Laboratory (LANL) and New Mexico Institute of Mining and Technology (NMIMT) in collaboration with the United States Geological Survey (USGS). The LANL network is centered on the Rio Grande rift in north central New Mexico; the principal NMIMT/USGS network is centered on the rift near the middle of the state. Stations SPD and WTX (fig. 68) are located near the centers of these two networks. An additional small network of stations in southeastern New Mexico, which includes station CL4 (fig. 68), is operated by the NMIMT/USGS group.

Although the recording stations are concentrated in the central region of the state, the geographical distribution of earthquake activity in figure 68 is believed to be nearly free of station location bias. Earthquakes with magnitudes of 1.5 in the farthest regions of the state are well within the detection capabilities of all stations in the two principal networks. However, because the azimuthal distribution of stations narrows as distance from the networks increases, the accuracy of earthquake locations diminishes progressively towards the boundaries of the state.

The distribution of earthquake activity in 1983 was similar to what has been observed since instrumental studies began in New Mexico (Sanford, 1965; Sanford and Cash, 1969; Toppozada and Sandford, 1972; Sanford, and others, 1981). Earthquakes were most numerous within or near the Rio Grande rift, a major extensional structure running north-south through the center of the state (approximate boundaries shown by dashed lines in figure 68). Also, as in the past, significant earthquake activity occurred in the Great Plains of eastern New Mexico and the Colorado Plateau in the northwestern quadrant of the state; both physiographic provinces which have no surface evidence for recent crustal movement. A somewhat unusual aspect of seismic activity in 1983 was the absence of any earthquakes from the southwest quadrant of the state which lies within the Southern Basin and Range province.

The strongest earthquake during the year occurred 26 km N. 12° E. of station WTX at 23:22 UTC. on March 2. The shock which measured 4.1 on duration and Richter local magnitude scales, occurred during a 19 day swarm which commenced on February 25. The earthquake was felt over approximately 7000 km^2 and had a maximum intensity of V-VI on the Modified Mercalli Intensity Scale.

The LANL seismograph network is positioned to obtain detailed information on seismic activity where a

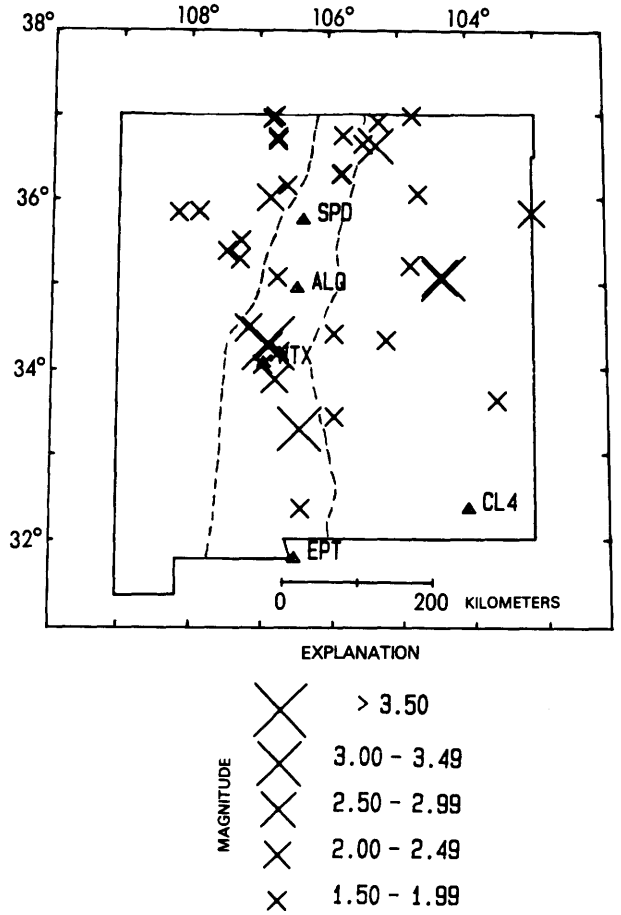

Figure 68. Seismicity of New Mexico during 1983. The dashed lines indicate the approximate boundaries of the Rio Grande rift. The triangles indicate the locations of seismograph stations.

prominent northeast-trending volcanic lineament crosses the Rio Grande rift. The NMIMT/USGS network is positioned to monitor earthquakes in an area where a thin layer of magma exists at midcrustal level beneath the Rio Grande rift. Discussions of seismic activity in these two areas during 1983 appear immediately below.

Socorro, New Mexico Area Earthquakes, 1983

Allan Sanford, Jon Ake, Stephen Jarpe
Geoscience Department and Geophysical Research Center
New Mexico Institute of Mining and Technology
Socorro, NM 87801 and
Lawrence Jaksha, U.S. Geological Survey
Socorro, NM 87801

In early 1982, the U.S. Geological Survey (USGS) and New Mexico Institute of Mining and Technology (NMIMT) began joint operation of a network of seismograph stations centered on the Rio Grande rift in central

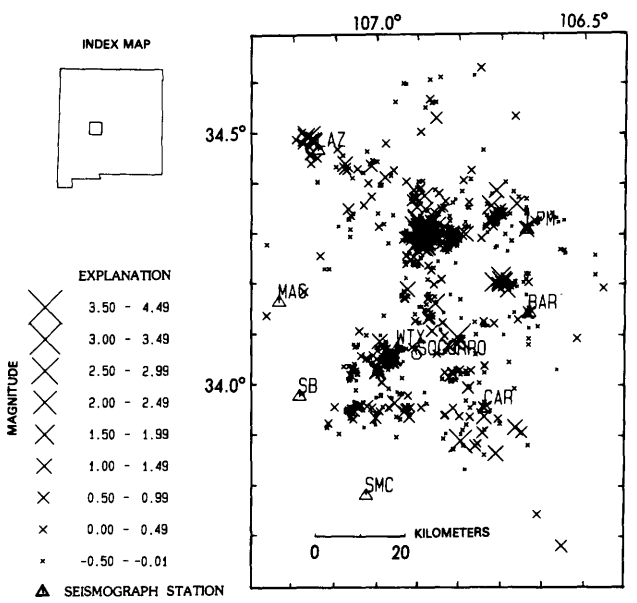

Figure 69. Earthquakes located by the NMINT/USGS network at Socorro, New Mexico, from September 1, 1982 to July 10, 1984.

New Mexico. By September 1, 1982, signals from six local stations were being telemetered into a central observatory located on the NMIMT campus in Socorro. The stations shown in figure 69 were those in operation throughout 1983 with the exception of MAG. The latter station began recording on September 17, 1983, and replaced a permanent station located 13 km to the north. The ninth station (MLM) in the network during 1983 is off the map at 34.814° N. and 107.145° W.

The epicenters plotted in figure 69 are for the period September 1, 1982 through July 10, 1984. Sixty-three percent of the 808 epicenters shown are for earthquakes that occurred in 1983. The epicenters were calculated using the algorithm HYPO 71 Revised (Lee and Lahr, 1975) with a half-space velocity of 5.85 km/s and a Poisson's ratio of 0.25 (Ward and others, 1981) station corrections ranging from, -0.33 to 0.28 seconds were used to account for differences in near surface geology and elevation within the network (Ward, 1980; and Ake, 1984). The HYPO 71 estimates of quality for the solutions in figure 69 range from A to D with 25 percent B or better.

Magnitudes of the earthquakes were calculated from durations of recorded signals using an empirical equation based on northern New Mexico earthquakes (Newton and others, 1976). The same equation was found to be applicable to earthquakes in the Socorro area in the magnitude range to be applicable to earthquakes in the Socorro area in the magnitude range 1.0 to 4.0 (Ake and others, 1983).

The dense concentration of epicenters in figure 69 near 34.3° N. and 106.9° W. is primarily the result of a single major swarm that occurred in a 19 day interval from February 25 to March 16, 1983 (Jarpe, 1984). Included within this swarm at 23:22 UTC on March 2, was a magnitude 4.1 shock which was felt over approximately 7000 km^2 of central New Mexico. A few hours after this quake, temporary stations were deployed in the epicentral region. Data from these stations and the nine permanent network stations gave well constrained hypocenters for 28 earthquakes. The spatial distribution of

these hypocenters, the nodal planes obtained from an analysis of the first motions for the main shock and the strike of Pliocene and younger faults in the area all suggest that the swarm earthquakes were confined to a tabular crustal volume that strikes north, dips 50° east, and extends from a depth of 4.7 to 7.6 km.

Whereas the first motions for the magnitude 4.1 earthquake indicate normal faulting, the first motions for about half of the 28 well-recorded earthquakes are nearly all compressions with a distribution over the focal sphere which cannot be explained by the standard double-couple-without-moment (DCWM) model of faulting. A mechanism which can explain the distribution of first motions for these shocks is simultaneous shear along, and opening of, existing normal faults. The strength of the linear vector dipole (LVD) which represents the opening can be varied relative to the DCWM in such a manner as to explain the absence or near absence of dilatational first motions. Minakami (1964) invoked this mechanism (with opposite polarity for the LVD) to explain first motion distribution for some earthquakes following the 1962 eruption of a volcano in Japan. In order to explain dilatational first motions in all directions as well as clear S phases, Minikami proposed simultaneous collapse and shear along faults. Collapse was believed to arise from the ejection of magma. In the case of the Socorro quakes, a possible explanation for the opening of faults is injection of magma. The swarm was located at the center of a region of surface uplift defined by level-line data (Reilinger and Oliver, 1976; Reilinger and others, 1980) and above an extensive (>1,700 km^2) layer of magma at a depth of 19 km (Sanford and others, 1973; Sanford and others, 1977; Rinehart and others, 1979).

The tight cluster of epicenters centered 7 km west of Socorro in figure 69 is for earthquakes in two swarms during 1983 (Ake, 1984). The first swarm occurred from May 10 to May 14 and contained 446 shocks with local magnitudes greater than -0.8. The second occurred from July 14 to July 21 and contained 296 earthquakes with $M_L \geq -0.8$. No significant difference in earthquake locations existed between the two swarms. Average focal depth for both was 8.8 km and all hypocenters were confined to a small, about 4 km^3, volume of the crust.

Digital recordings at 100 sps were obtained for about 100 shocks in the July swarm using an event recorder located about 2.2 km from the epicenters. Wave forms were found to be very similar, except for amplitude, up to magnitude 1.2. This duplication was especially pronounced for the P-phase. The duration of the first half-cycle of the P phase was also found to be essentially constant (0.036 ± 0.003 secs) for earthquakes with magnitudes between -1.0 and 1.2. These observations imply that waveforms of the smaller earthquakes are the path and instrument response to very short "delta-like" pulses produced at the sources.

Seismic Activity in North-Central New Mexico, 1983

D. J. Cash and J. J. Wolff
Geophysics Group, ESS-3
Los Alamos National Laboratory
Los Alamos, NM 87545

The Los Alamos Seismograph Network has been operating since 1973. Up to 24 stations have been in service at any given time. In 1983 the network was operating at a reduced level, usually with ten or fewer

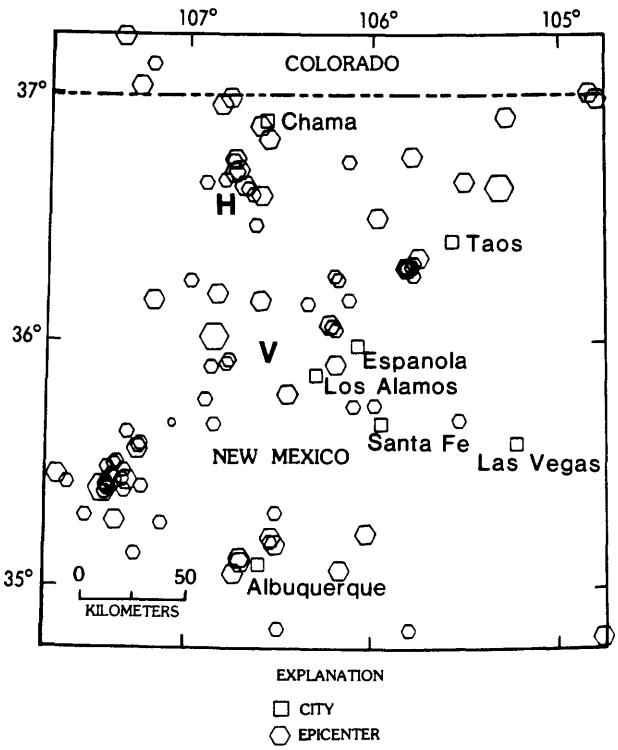

Figure 70. Seismicity of north-central New Mexico during 1983 for the area 34.75-37.25°N., 104.75-107.75°W. **H** indicates the location of Heron and El Vado reservoir. **V** indicates the Jemez Mountains calderas.

stations. Supplementary data were frequently obtained from the U.S. Geological Survey's Albuquerque Seismological Laboratory and New Mexico Tech.

The recorded seismicity for 1983 was reported in four quarterly issues of the Earthquake Catalog for Northern New Mexico (Cash and others, 1983a, 1983b, 1984a, 1984b). A summary of the seismicity for north-central New Mexico in 1983, taken from the catalogs, is presented here in figure 70., This 75,000 km^2 area was chosen because of the belief that at least 90% of the events of magnitude ML > = 1.0 are detected in that area and reasonably well located. Magnitudes are calculated by the formula:

$$ML = 2.79 \log T(sec) - 3.63,$$

where T is the event duration measured from the first P-wave arrival to the time when the signal disappears into the noise (Newton and others, 1976). The formula was determined by fitting about ten of the larger northern New Mexico events with the ML value calculated from WWSSN station, ALQ.

Epicenters are determined using HYPOINVERSE (Klein, 1978) with a 6.15 km/sec half-space velocity model. Depths, usually 0.05-5 km, are calculated only for events within ten km of a station. A careful attempt has been made to eliminate mining blasts and other man-made events from the epicenter map. Searches of state mining records and discussions with the mining company personnel all indicate that but a few non-natural events have been eliminated. In fact, it is very possible that some microquakes have been discarded because they occurred near known mining sites.

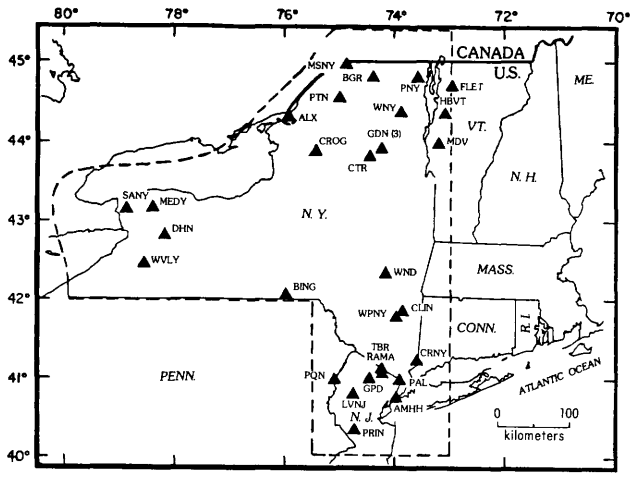

Figure 71. Seismograph stations operated by the Lamont-Doherty Geological Observatory. Within the area outlined by the dashed line, the network catalog is complete for magnitude 2.0 or greater.

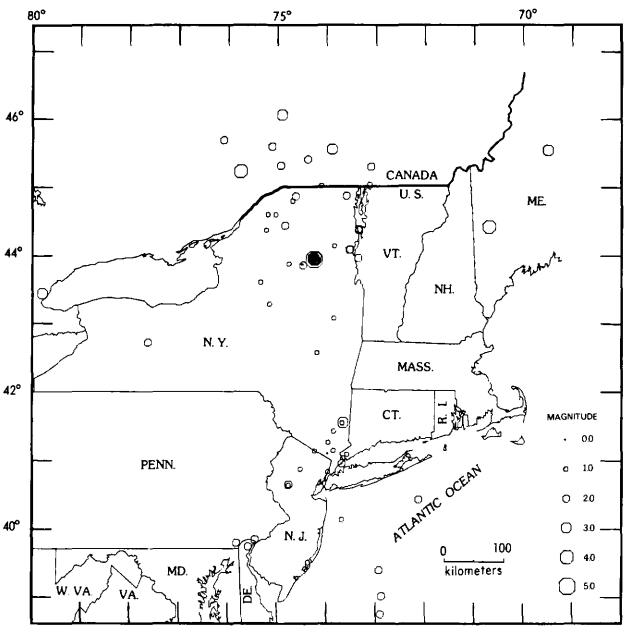

Figure 72. Epicenters located by the New York - New Jersey seismic network in 1983.

In 1983, 160 events were cataloged for northern New Mexico. Most were in the north-central part of the state (fig. 70) near the Rio Grande Rift, the Jemez and Mt. Taylor volcanics, and older, Laramide structures. The pattern of seismicity is essentially the same as for the rest of the ten years of seismicity monitoring by Los Alamos (Cash and Wolff, 1984). The salient features of seismic activity are as follows:

1. The Jemez Mountains calderas (V in fig. 70) are essentially aseismic, probably because of high temperatures at even shallow crustal depths.

2. The Nacimiento uplift on the west side of the Jemez Mountains (35.5-36.2° N., 107.0° W.) continues to be moderately active. This uplift structure appears to be a high angle reverse fault overthrust to the west in Laramide time and probably reactivated by contemporary extensional tectonics.

3. The Gallina-Archuleta arch, north of the Nacimiento, was less active than usual in 1983 except for the cluster at about 36.7° N., 106.75° W. This cluster lies on the Heron and El Vado reservoirs (H in fig. 70). This was the site of considerable activity in 1982, particularly during the second quarter. It might be a case of reservoir-induced seismicity.

4. The area of the Mt. Taylor volcanic field, near 35.5° N., 107.3 °W., continues to be moderately active.

The largest event in the area of figure 70 during 1983 was ML = 2.4, near Mt. Taylor. Two others had magnitudes ML > = 2.0, one in the Nacimiento uplift and one northeast of Taos.

Earthquakes in New York State and Adjacent Areas, 1983

Dana Coyle
Lamont-Doherty Geological Observatory
of Columbia University
Palisades, NY 10964

Lamont-Doherty Geological Observatory (L-DGO) operates a network of 27 single component short period seismic stations and four three-component stations within New York, New Jersey, and Vermont (fig. 71). In October 1983, several stations in the Adirondack region were relocated to form a small network near Goodnow, New York. During 1983, 197 earthquakes were located in New York and the surrounding area (fig. 72). Earthquakes above magnitude 2.0 Mc are listed in table 7. Significant earthquakes during 1983 include the following:

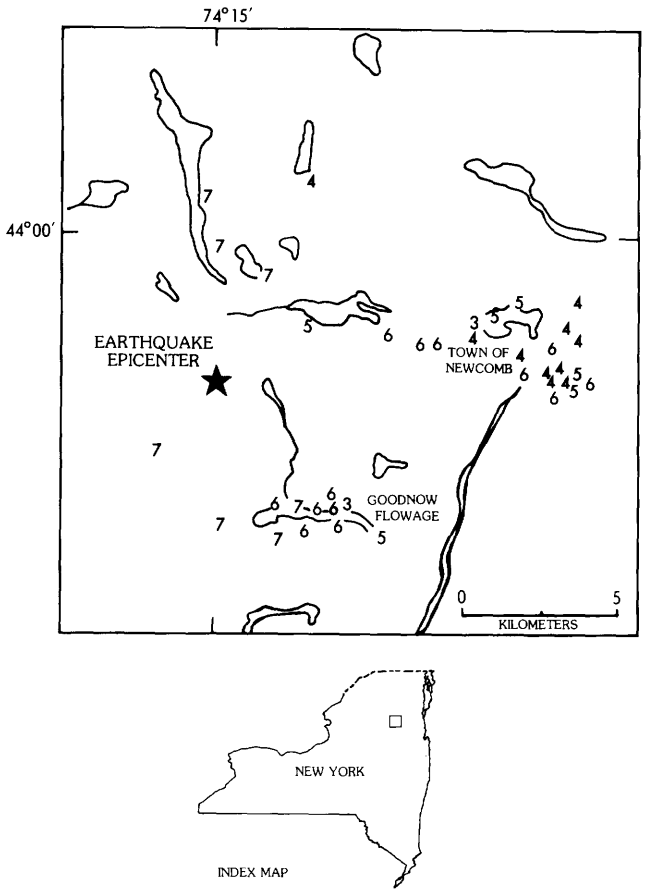

Figure 73. Epicentral intensity map of the Goodnow, New York, earthquake of 7 October 1983, 10:18 UTC. Arabic numerals are used to represent MMI intensities at specific sites.

1. January 24, 21:15 UTC, Port Henry, New York magnitude 2.4 Mc; February 11, 17:14 UTC, Mineville, New York magnitude 2.2 Mc and October 30, 16:53 UTC, Mineville, New York magnitude 2.1 Mc. These events indicate the continued activity in the Southern Lake Champlain region, no earthquakes prior to 1981 had been located there by the L-DGO network. Since that time a total of 13 events, magnitude 1.5 Mc or greater have been located.

2. February 6, 09:52 UTC, Oldwick, New Jersey magnitude 1.5 Mc. This event was the only foreshock to the Oldwick main shock of February 19, 05:45 UTC, magnitude 1.5 Mc.

3. February 26, 19:59 UTC, Pawling, New York (near Lake Whaley) magnitude 3.0 Mc maximum intensity IV. This event was followed by two aftershocks February 26, 20:16 UTC, magnitude 1.2 Mc and March 3, 20:16 UTC, magnitude 1.5 Mc.

4. April 14, 20:37 UTC, Conesus, New York magnitude 2.2 Mc. This event marked the first earthquake over magnitude 2.0 Mc in western New York since 1981.

5. October 7, 10:18 UTC, Goodnow, New York, magnitude 5.1 mbLg maximum intensity VII. No foreshocks were associated with this event. Several portable MEQ 800 seismometers were deployed and 96 aftershocks were recorded between October 8th and November 27th.

A total of 154 aftershocks were recorded during the first 85 days following the main shock, nineteen with magnitudes greater than 2.0 Mc. The Modified Mercalli intensity VII reports were confined to a narrow zone along the Catlin Lake lineament. This orientation is parallel to the fault plane defined by the largest cluster of aftershocks and is consistent with the steep, west-dipping nodal plane of the fault plane solution for the main shock. The elongate grouping of intensity VII's may be a radiation pattern effect or it could, in part, reflect soil conditions along the valley (fig. 73).

The Goodnow event was located north and east of Blue Mountain Lake, an area of known seismicity. It is possible that seismicity after the Blue Mountain Lake swarms of 1971-1973 and before the Goodnow event was on the same fault system active during the well located sequences of 1971, 1973, and 1983 (fig. 74).

Oklahoma Earthquakes, 1983

James E. Lawson, Jr.
Oklahoma Geophysical Observatory
Leonard, OK 74043
and Kenneth V. Luza
Oklahoma Geological Survey,
University of Oklahoma
Norman, OK 73019

A statewide network of 11 seismograph stations is recording seismological data in Oklahoma (fig. 75). The Oklahoma Geophysical Observatory (OGO) 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 (see Lawson and Luza, 1984 for instrumentation).

All Oklahoma earthquakes recorded on seismograms from three or more stations are located. In 1983, 47 Oklahoma earthquakes were located (fig. 76, table 8). None of these earthquakes was reported felt.

Magnitude values range from a low of 0.9 (mbLg) in Creek and Tulsa Counties to a high of 2.9 (mbLg) in Beaver and Pontotoc Counties (table 8). Six earthquakes occurred in a 30-km-wide zone that extends 50 km southward from Norman (Cleveland County) through McClain, Grady and northern Garvin Counties. The greatest concentration of earthquakes, 18, occurred in eastern Creek County, southwestern Tulsa County, and northern Okmulgee County (fig. 76) The first known earthquake occurred in Harmon County on May 16.

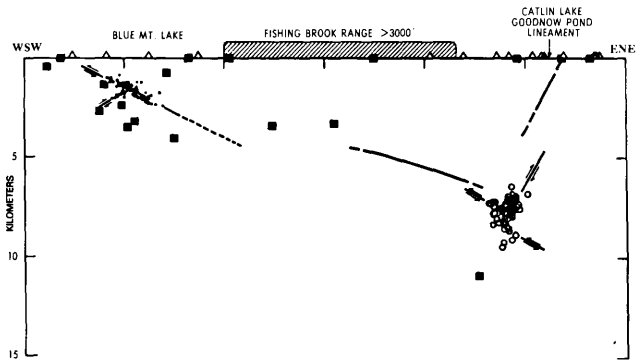

Figure 74. Cross section through the Goodnow and Blue Mountain Lake area, New York (no vertical exaggeration). Hypocenters for the 1971-1973 Blue Mountain Lake swarms are from Yang and Aggarwal (1981). Solid squares indicate 1971-1973 hypocenters, open circles indicate 1983 hypocenters.

Southeastern United States Earthquakes, 1983

Martin C. Chapman, Matthew S. Sibol
and G. A. Bollinger
Seismological Observatory, Virginia Polytechnic Institute and State University
Blacksburg, VA 24061

There were 100 earthquakes detected instrumentally and located in the southeastern United States during 1983 (fig. 77). Eight of these earthquakes were either felt and/or had calculated magnitudes greater than 3.0 (table 9). The largest shock that occurred in the region during the year was a magnitude 3.5 event in central Georgia. The area experiencing the largest number of earthquakes was southeastern Tennessee. A total of 127 seismograph stations were operational in the region at the end of 1983 (fig. 78).

A data listing for earthquakes during 1983 is contained in Southern United States Seismic Network (SEUSSN) Bulletins No. 12A and 13 available from the authors. Bulletin 12A is described in some detail in the Bulletin of the Seismological Society of America, volume 75, 1985, p. 629-633.

Utah Earthquakes, 1983

James C. Pechmann, William D. Richins, and
Walter J. Arabasz, Seismograph Stations
Department of Geology and Geophysics
University of Utah
Salt Lake City, UT 84112-1183

The University of Utah Seismograph Stations records a regional seismic network that in December 1983 consisted of 76 stations (fig. 79). Twenty-eight of these stations are operated and maintained by other agencies. The 16 stations in and around Yellowstone Park in northwestern Wyoming were added during 1983 with funding and assistance from the U.S. Geological Survey and the National Park Service. Station spacing is about 15 to 35 km in north-central Utah and southern Idaho. The spacing is approximately 30 to 100 km in central and southwestern Utah and southeastern, Idaho. All stations except Salt Lake City (SLC) are equipped with short-period vertical seismometers. Two stations (DUG and HVU) recorded three-component short-period data during 1983. Seismic data are telemetered via radio, telephone, and/or microwave channels to the University of Utah campus in Salt Lake City. An online PDP-11/34 computer facility provides event detection and digital central recording of the network. Dugway, Utah (DUG), operates as a WWSSN station. Wood-Anderson-type seismographs operate at Dugway and Salt Lake City.

Epicenters for 622 earthquakes located in the Utah region during 1983 are shown in figure 80. Of these, nine had local magnitudes (M_L) of 3.0 or greater and 12 were reported felt ($1.8 \leq m_L \leq 4.3$). The largest event had a local magnitude of 4.3 and occurred approximately 10 km west of downtown Salt Lake City on October 8, 1983. This earthquake was widely felt throughout the Salt Lake Valley as well as to the south in northern Utah County and to the north in the Ogden area. A well-constrained focal mechanism for this event indicates normal faulting on a north-northwest-striking fault that dips either 68°-80° east or 10°-22° west. Other significant features of Utah seismicity during 1983 (as shown in fig. 80) include, from north to south:

1. A magnitude 3.6 felt earthquake near Montpelier, Idaho, (approximately 42.4° N., 111.6° W.) on December 11.

2. Ongoing, densely clustered activity along the Idaho-Utah border (approximately 42.0° N., 112.5° W.), including late aftershocks of the magnitude 6.0 Pocatello Valley earthquake of March 1975, as well as several nearby swarms within Hansel Valley. The largest earthquake in this area during 1983 occurred on November 19 with a magnitude of 3.8.

3. Clustered earthquakes 5 to 25 km east and south of Logan, Utah beneath the Bear River Range with magnitudes less than 2.0, and approximately 25 km east of Ogden, Utah, with magnitudes of 3.0 and less. This seismicity is part of an active north-south zone in northern Utah.

4. A magnitude 3.9 earthquake in a remote area near Dinosaur National Monument (approximately 40.8° N., 109.8° W.) on September 24, 1983 that was felt in northwestern Colorado and southwestern Wyoming.

5. Earthquakes southwest, north, and east of Price in central Utah predominantly related to extensive underground coal mining.

6. Ongoing small magnitude activity 50 to 100 km north of Richfield near the southern portion of the Wasatch fault.

7. A magnitude 3.6 felt earthquake near Cove Fort southwest of Richfield on December 9, 1983.

8. Scattered small earthquakes throughout south-central and southwestern Utah in a broad NE-SW trending belt encompassing the Elsinore, Tushar, Sevier, and Hurricane fault zones between Richfield and Cedar City.

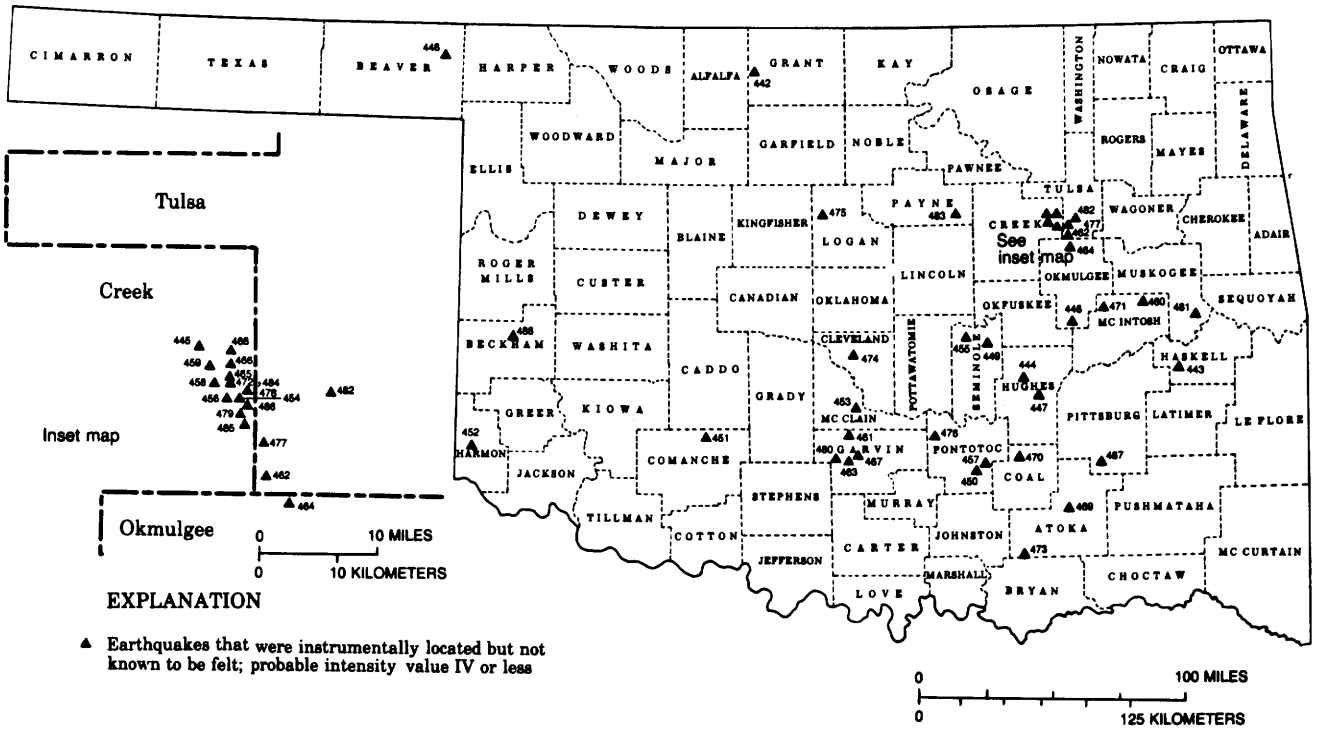

Figure 75. Active seismograph stations in Oklahoma during 1983 (from Lawson and Luza, 1984).

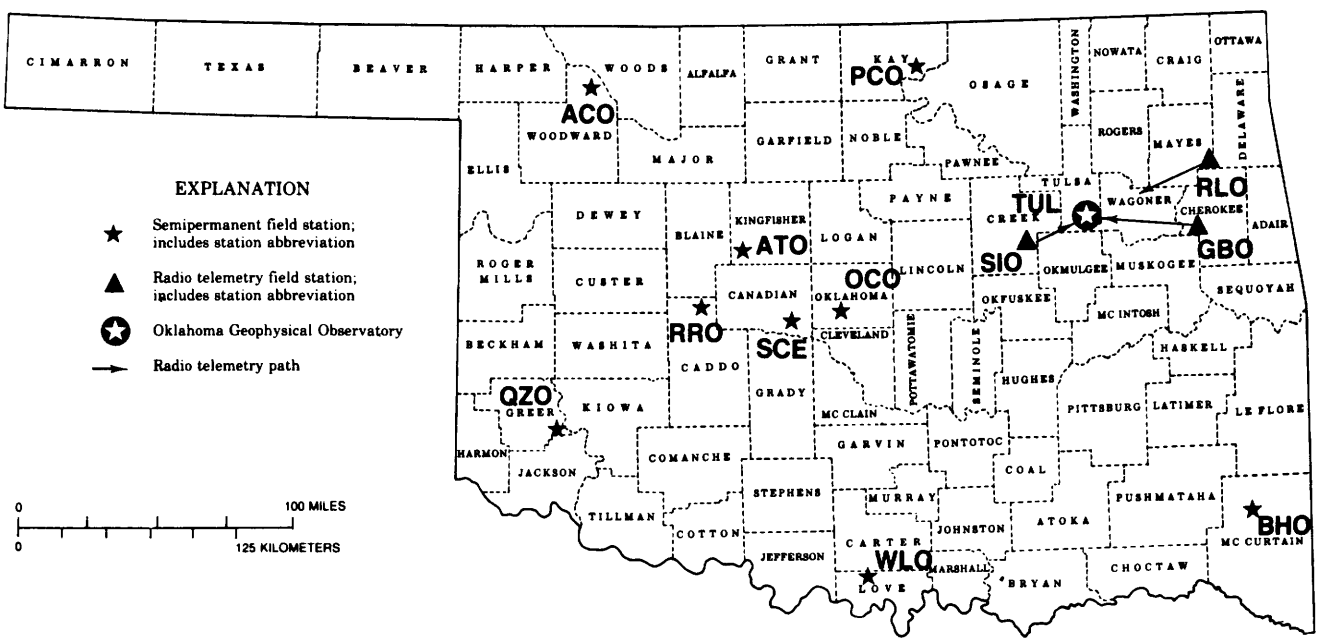

Figure 76. Distribution of Oklahoma earthquakes for 1983. Numbers correspond to event numbers in table 8 (from Lawson and Luza, 1984).

Table 8. *Oklahoma earthquake catalog for 1983*

Event Number	Date and Origin Time (UTC)		County	Magnitudes 3Hz	bLg	DUR	Latitude (°N.)	Longitude (°W.)	Depth (km) [1]
442	JAN 10	170643 75	GRANT	2.7	2.5	2.4	36 704	98.107	3 9
443	JAN 21	000504 58	HASKELL	1.8		2.0	35 165	95 282	5 0R
444	FEB 1	071938 08	HUGHES	1.7		1.3	35 082	96 272	5 0R
445	FEB 17	195100 43	CREEK	1.7		1 9	35 862	96 067	5 0R
446	FEB 19	005932 94	OKMULGEE	1.7	1.3	1 7	35 399	95 975	5 0R
447	MAR 10	080604 14	HUGHES	2.6	2.3	2.6	35 035	96 202	12 5R
448	MAR 11	1e5048 26	BEAVER	2.9	2.8	2.8	36 827	100 115	5 0R
449	MAR 13	101720 85	SEMINOLE			1 9	35 309	96 557	5 0R
450	MAR 28	093224 86	PONTOTOC	2.1		1 9	34 635	9e 561	5 0R
451	MAY 15	040023 58	COMANCHE	2.8	2.7	2.6	34 827	98 360	5 0R
452	MAY 1e	210821 08	HARMON	2.8	2.8	2.5	34 718	99 883	5 0R
453	JUN 21	183259 87	MC CLAIN	2.6	2.9	2.5	34 959	97 405	5 0R
454	JUN 22	052952 24	CREEK	1 6		1 8	35 932	9e 037	5 0R
455	JUN 22	05354e 13	SEMINOLE	1.8	1.3		35 321	9e 623	5 0R
456	JUN 22	091047 07	CREEK	1 3		1 3	35 932	9e 043	5 0R
457	JUL 5	200225 84	PONTOTOC	2 4	2 4	2 3	34 e67	9e 519	5 0R
458	JUL 8	065021 36	CREEK	1 6		2 0	35 946	9e 054	5 0R
459	JUL 24	215958 71	CREEK	1 0		1 6	35 950	9e 054	5 0R
460	JUL 26	101056 69	MC INTOSH	1 6		1 9	35 489	95 518	5 0R
461	JUL 27	055743 45	GARVIN	2 1	1 9	2 2	34 855	97 425	5 0R
462	AUG 3	043124 2	TULSA	1 2		1 4	35 883	9e 011	5 0R
463	AUG 8	040711 19	GARVIN	2 0		1 9	34 731	97 416	5 0R
464	AUG 10	010040 34	OKMULGEE	1 5		2 0	35 848	95 980	5 0R
465	AUG 10	190837 95	CREEK	1 4		1 5	35 948	9e 043	5 0R
466	AUG 12	070027 81	CREEK	1 6		2 1	35 950	9e 041	5 3
467	AUG 18	063816 68	GARVIN	1 7	1 7	1 8	34 741	97 404	5 0R
468	AUG 19	135205 91	CREEK	1 6		1 7	35 957	9e 043	5 0R
469	AUG 20	054e01 39	ATOKA	2 1	1 9	2 3	34 435	95 984	5 0R
470	AUG 20	112843 42	COAL			1 5	34 728	9e 319	5 0R
471	AUG 24	101003 43	MC INTOSH			1 4	35 493	95 787	5 0R
472	AUG 30	003202 58	CREEK	1 7		2 0	35 946	9e 043	5 0R
473	SEP 28	001e15 35	ATOKA	1 5		1 9	34 1ee	9e 305	5 0R
474	SEP 28	012601 33	CLEVELAND	1 9		2 2	35 250	97 367	5 0R
475	OCT e	070925 29	LOGAN	1 7	1 4	2 2	35 985	97 537	5 0R
476	OCT 23	193446 93	PONTOTOC	2 9	2 9	2 7	34 817	9e 888	5 0R
477	NOV 13	052752 82	TULSA	1 3		2 0	35 918	9e 027	5 0R
478	NOV 20	080324 e6	CREEK	1 0		1 3	35 936	9e 031	5 0R
479	NOV 21	055320 14	CREEK	1 1		1 5	35 926	9e 035	5 0R
480	NOV 23	143617 57	GARVIN	2 1	2 1	2 1	34 731	97 485	5 0R
481	NOV 27	163342 84	MUSKOGEE			1 7	35 431	95 200	5 0R
482	NOV 29	034918 14	TULSA	0 9		1 1	35 942	95 925	5 0R
483	DEC 4	053e00 18	PAYNE		1 5		35 961	9e 746	5 0R
484	DEC 11	050122 25	CREEK	0 9		1 3	35 946	9e 043	5 0R
485	DEC 11	071344 57	CREEK	1 3		1 8	35 920	9e 033	5 0R
486	DEC 11	073425 13	CREEK	1 5		2 1	35 930	9e 031	5 0R
487	DEC 19	142453 32	PITTSBURG	2 0	1 7	1 9	34 682	95 774	5 0R
488	DEC 29	104e44 26	BECKHAM	2 3	2 2	2 4	35 284	99 e20	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

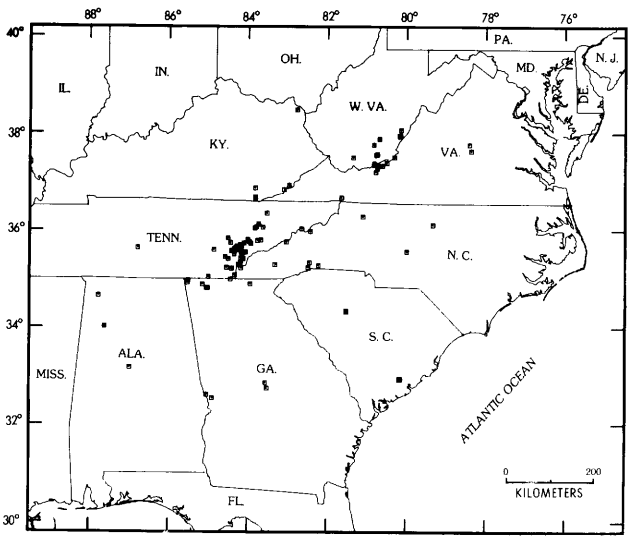

Figure 77. Southeastern United States earthquakes during 1983.

9. a rare felt earthquake near Hanksville (approximately 38.3° N., 110.6° W.) on May 3, 1983 with magnitude 3.0.

Details of Utah seismicity and information in bulletin format are available by contacting the University of Utah Seismograph Stations, 704 W. C. Browning Building, Salt Lake City, Utah 84112-1183.

Table 9. *Southeastern United States earthquakes in 1983 with magnitudes greater than 3.0 or reported felt*

Date (1983)	Origin Time (UTC)	Lat. (°N.)	Long. (°W.)	Depth (Km)	Mag. (MbLg/Md)	I_o (MM)	State Felt
26 Jan.	14:07:44.7	32.85	83.56	0.0F	3.5	F	GA
27 Jan.	22:09:35.1	36.06	83.63	12.8	3.1		TN
25 Mar.	02:47:11.1	35.33	82.46	11.5	3.3	V	NC
08 July	19:29:05.9	35.55	84.15	9.7	3.4	III	TN
17 Aug.	14:03:15.7	38.48	82.78	18.6	3.4	V	KY
28 Aug.	22:45:07.4	36.68	83.82	18.1	3.0	IV	KY
28 Aug.	22:56:38.5	36.66	83.82	0.1	2.3	F	KY

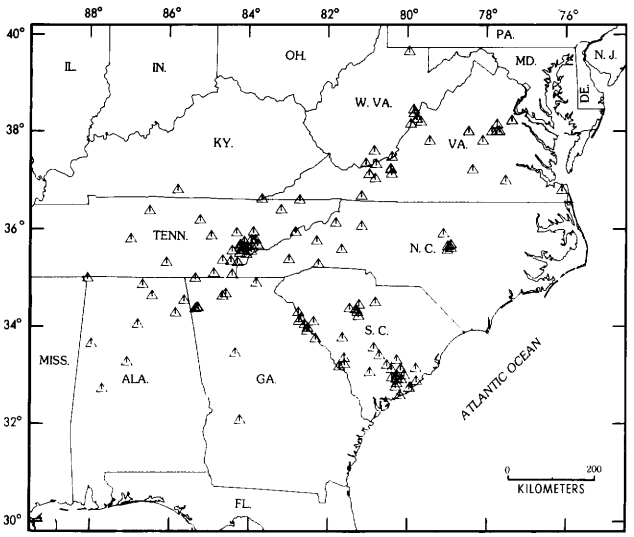

Figure 78. Southeastern United States seismic network stations operating at the close of 1983. Triangles represents station locations.

Washington Earthquakes, 1983

R. S. Ludwin, S. D. Malone, and R. S. Crosson
University of Washington
Seattle, WA 98195

The University of Washington monitored up to 107 seismic stations in Washington and northern Oregon during 1983. Our network configuration was described and depicted in a previous report (Noson and others, 1984). Minor changes in station coverage and equipment quality were made in 1983, including installation of four new stations: one on the Olympic Peninsula (OSP), one near Mount Saint Helens (TDL), one northwest of Mount Rainier (RVC), and one at Black Rock Valley (BRV) about 45 kilometers east of Yakima. Several stations in the high mountains of north central Oregon, which we had operated during the previous two years, were discontinued due to the difficulty and cost of maintaining them. Coverage of earthquakes in northern Washington was impaired by the removal (in 1982) of two stations in the Skagit Valley as a result of loss of support for data

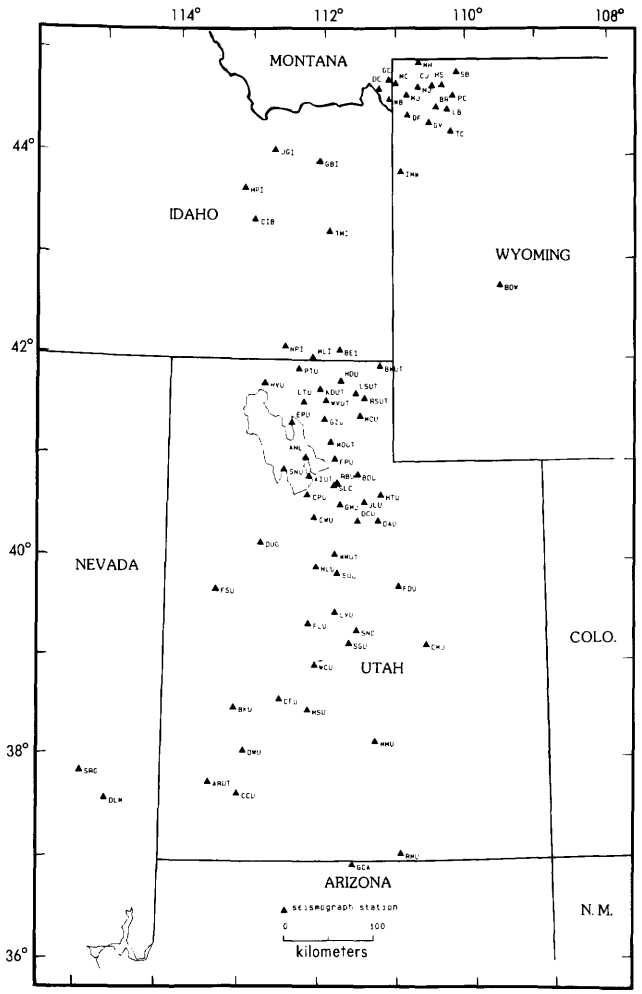

Figure 79. University of Utah seismograph station network, 1983.

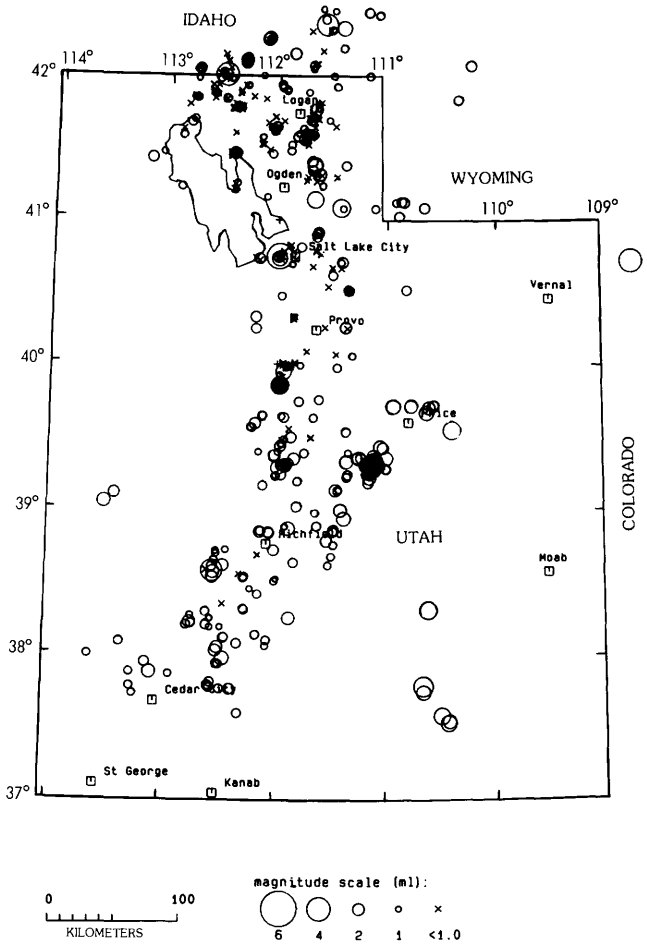

Figure 80. Utah and adjacent areas earthquakes during 1983. Squares indicate the location of cities.

transmission. Data acquisition and processing procedures are similar to those of the previous three years and are described in Malone and Zollweg (1982).

During 1983, 1359 earthquakes were located within Washington and northern Oregon in the area shown in figure 81. Figure 81 shows a subset of earthquakes with coda-length magnitudes (Mc) greater than or equal to 2.7. Of the total number of events located in 1983, 47% were located in the vicinity of Mount Saint Helens, reflecting both greater station density and a higher level of activity at small magnitudes there. Of the earthquakes located in 1983, 30% occurred west of the Cascade Range outside of the Mount Saint Helens area, 12% occurred within the Cascade Range and the remaining 10% were located east of the Cascade Range. Earthquakes with felt reports are indicated in figure 81 by solid symbols.

The largest earthquake in the Pacific Northwest during 1983 was a M_c = 4.3 event in the South Puget Sound region near Shelton, Washington; felt with no damage at Shelton and Olympia on October 31. This event had a depth of 45 km and a preliminary fault-plane solution indicates normal faulting striking northeast with a small strike-slip component. Another noteworthy Puget Sound earthquake of M_c = 3.9 occurred near Port Townsend on the Olympic Peninsula on August 28. The event depth of this event was 50 km, and it was felt as far away as Seattle. A preliminary fault-plane solution indicates mainly strike-slip motion, either right-lateral on a plane striking about N. 40° E. and dipping about 70° or left-lateral on a plane striking N.60°W. and dipping about 80° . No aftershocks were detected for either of the two earthquakes.

In the northwest Olympic Peninsula an event of magnitude 3.7 near the town of Forks occurred on August 17. This earthquake was generally felt in the Forks area and along the Calawah River. Although azimuthal control was not good because of the epicenter's proximity to the coast, reasonable solutions place the earthquake at shallow depth and well to the south of the Calawah Fault Zone.

Five smaller earthquakes in western Washington were also felt. An Mc = 3.0 event was felt in the Carbonado-Wilkeson vicinity on January 24. An M_c = 2.9 quake was felt at Fall City on March 3, an event of M_c = 3.0 occurred on May 25 northeast of Seattle along the Cascade front, and was felt at the towns of Sultan and Skykomish. Two events of M_c = 3.1 and M_c = 3.0 on August 12 and October 5, respectively, were felt at North Bend.

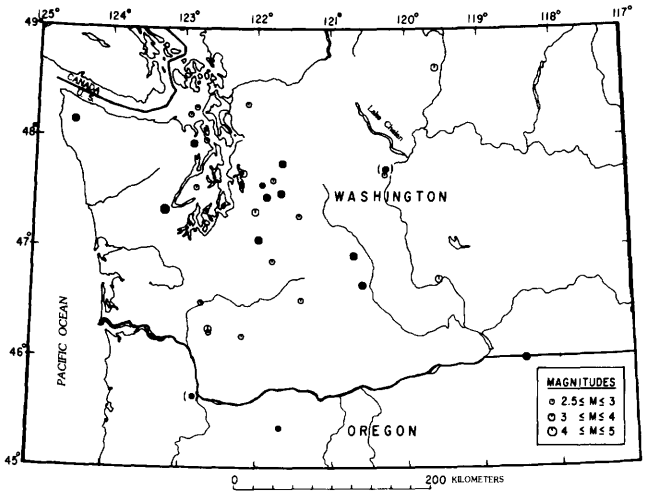

Figure 81. Washington and northern Oregon earthquakes during 1983 with magnitudes 2.7 or larger. Solid symbols indicate earthquakes that were felt.

In northern Oregon two felt earthquakes occurred. One was located near Mount Hood, and occurred on February 23, with M_c = 2.7. Earthquakes larger than magnitude 3.0, not of volcanic origin, occurred at Mount Hood in 1972, 1974, and 1978. The other felt event was located in northern Oregon near Portland on May 11, 1983. This M_c = 2.6 event was strongly felt in Portland but no damage was reported. It appears to be a blast based on seismogram characteristics and predominance of compressive first motions; however, attempts to track down the source of this suspected blast have been unsuccessful.

In eastern Washington, a sequence of earthquakes just north of Yakima began on November 14, with an event of M_c = 3.8, followed by a short aftershock sequence of 9 events. The main shock was lightly felt throughout the greater Yakima area. A preliminary fault plane solution for the main shock shows a high angle east-west striking reverse mechanism, and the aftershocks appear to have first motion distributions consistent with this mechanism. An unusual strike-slip mechanism was determined for a single felt earthquake of M_c = 3.8 near Ellensburg on December 5. Previous events in the Ellensburg-Cle Elum area have typically shown reverse rather than strike-slip mechanisms.

An interesting earthquake of magnitude 3.6 occurred in southeastern Washington near Walla Walla, on March 22. It was felt in Walla Walla, Washington; and Helix and Milton-Freewater, Oregon, (NEIC) although no damage was reported. No aftershocks were detected immediately following the earthquake; however, an M_c = 2.6 occurred in the same area on April 13. These earthquakes occurred in the same area as the 1936 magnitude 5.8 Milton-Freewater earthquake. The last felt event in this area was in 1979. The 1979 and 1983 earthquakes are similar in their lack of associated foreshock or aftershock activity. A preliminary focal mechanism for the 1983 event indicates a strike-slip event with fault planes striking N. 26° W. and N. 65° E. with a maximum compressive stress direction of N. 63° W.

In the region south of Lake Chelan, two relatively small earthquakes of magnitudes 2.5 and 2.6 were felt on September 14 with no reports of damage. Their locations coincide and appear as a single symbol in figure 81. Forty-seven earthquakes of M_c equal to or greater than 1.0 were located in this area during 1983, a rate of activity which is typical of this area over the past 10 years.

MISCELLANEOUS ACTIVITIES

Crustal Movement Studies

Richard A. Snay
NOAA, National Ocean Services
National Geodetic Survey,
Charting and Geodetic Services
Rockville, MD 20852

In 1983 precise leveling surveys were performed following the magnitude 6.5 earthquake near Coalinga, California, and the magnitude 7.3 earthquake near Borah Peak, Idaho. Survey data were compared with pre-earthquake leveling data to gauge coseismic elevation changes. For the Coalinga event the derived vertical deformation is compatible with 1.8 $\pm$ 0.5 meters of reverse slip on a steeply dipping rupture surface (Stein, 1983). Coseismic elevation changes for the Borah Peak event suggest 2.1 + 0.1 meters of normal slip on a planar rupture surface (Stein and Barrientos, 1985).

Also in 1983 a precise leveling survey was conducted near the epicentral area of the 1959 Hebgen Lake, Montana, earthquake (M_S 7.5). Previous leveling surveys in this area were performed in 1923, 1960, 1967, and 1975. Reilinger (1985) reported that the pattern for the 1960-83 postseismic vertical deformation along the leveling route is similar, but larger in magnitude, to deformation during the 1923-60 pre/co-seismic interval. For both intervals the leveling reveals doming in the epicentral area with a maximum uplift of 35 cm for the 1960-83 interval as compared to 15 cm for the 1923-60 interval. According to Reilinger, the doming region appears to be bordered to the south by a zone of relative subsidence which has a wavelength comparable to that of the uplift (about 100 km) and about half the magnitude. The peripheral subsidence occurs during both the pre/co-seismic and postseismic intervals and is approximately coincident with the Snake River downwarp. The new leveling survey also provides evidence that resurgence at nearby Yellowstone Caldera continued during the period from 1975 to 1983.

A seven-line network in western Texas was re-observed with electro-optical distance measuring equipment in 1982 as a check for horizontal stability in the vicinity of MacDonald Observatory, a radio astronomy facility. The network was first measured in 1977. Network lines range in length between 32 and 93 km and are configured in a radial pattern. Relative line length changes were computed to estimate the shearing components of the regional deformation. If the deformation is assumed to be spatially homogeneous for the area spanned by the network, then the estimated magnitude of maximum shear strain rate equals 0.1 $\pm$ 0.1 microradians per year for the 1977-1982 interval. The estimated direction of maximum line-length extension is N. 15° W. This direction, however, is statistically indistinguishable from any other directional value.

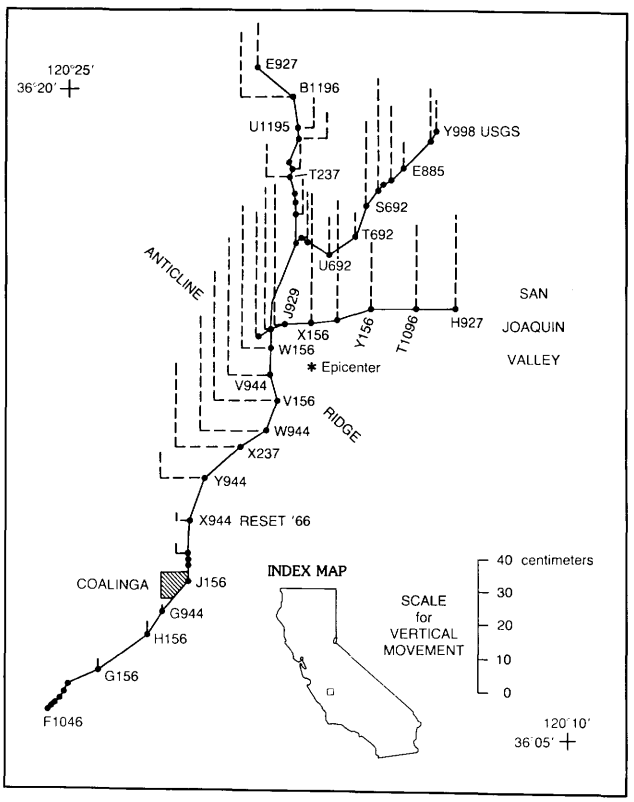

Figure 82. Coseismic elevation changes due to the Coalinga, California earthquake of 2 May 1983. Dashed lines represent the amount of vertical movement.

Vertical Control Survey of the Coalinga, California Region

David V. Zilkoski
NOAA, National Ocean Service
National Geodetic Survey
Charting and Geodetic Services
Rockville, MD 20852

On May 2, 1983, Coalinga, California, was shaken by an earthquake of magnitude 6.5. The earthquake, located west of the San Joaquin Valley beneath Anticline Ridge, was one of the largest to occur in that area in the past 100 years.

Several epochs of geodetic leveling at Coalinga and vicinity were used to estimate the changes in elevations caused by the earthquake. In 1960, 1966, 1969, 1972, and

1983 (after the earthquake), a network was leveled in the area where the earthquake struck. Normally, elevation differences obtained from geodetic leveling surveys observed both before and after an earthquake can be used to estimate the vertical crustal motion caused by the earthquake. However, in this instance, subsidence due to water- and oil-withdrawal in the area complicated the analysis. Therefore, the 1972 elevations must be corrected for subsidence before computing the elevation changes caused by the earthquake. The final results of the study will vary depending on the method and data used to estimate the man-made subsidence.

The leveling network begins in the mountains (bench mark F 1064) about 10 km southwest of the City of Coalinga, preoceeds in a northeasterly direction passing through Coalinga, over Anticline Ridge, and ends approximately 24 km north of Coalinga (fig. 82). The pre-earthquake levelings were single-run to second-order specifications. The 1983 leveling was double-run using first-order, class II specifications.

To estimate the rates of movement in the area, a minimum-constraint least squares adjustment was performed for each epoch. Bench mark F 1046, a bedrock mark, was assumed to be stable and was chosen as the "datum" (fixed) point for all the adjustments in order to facilitate the movement computations. The resulting adjusted elevations were used to determine the rates of movement from 1960 to 1966, 1966 to 1969, 1969 to 1972, and 1966 to 1972. The subsidence rates varied considerably from bench mark to bench mark and slowed in the later time intervals.

Ross Stein of the U.S. Geological Survey performed an analysis using elevation changes to estimate the fault attitude, geometry, and slip. Stein modeled the earthquake elevation changes with dislocations embedded in an elastic half-space. He used the 1966 to 1972 rate, deep-well compactification monitors, and fluid pumping records to account for the man-made crustal motion. Because of the regional variation in subsidence rates, as well as the temporal rate changes, the latest rate, 1969 to 1972, was used in the NGS study to compute the 1983 coseismic elevation changes (fig. 82).

Principal Earthquakes of the World

Table 10 lists the principal earthquakes of the world 1983. The table includes all earthquakes of magnitude 6.8 or greater; those of smaller magnitude that were locally destructive to life and property; and events of unusual interest. The primary source for table 10 is the NEIC Preliminary Determination of Epicenters, Monthly Listing.

Table 10. *Principal earthquakes of the world during 1983*

Date (1983)	Origin time (UTC) hr min sec	Geographic Coordinates Lat.(°)	Long.(°)	Depth (km)	USGS Magnitude mb	M_S	Other Magnitudes	Region	Remarks
Jan. 17	12 41 29.7	38.026 N.	20.228 E.	14	6.1	7.0	7.2Ms(BK) 7.1Ms(PS)	Greece	Minor damage in Greece. Felt in Albania, Italy, and southern Yugoslavia.
Jan. 24	08 17 39.6	16.147 N.	95.232 W.	57	6.3	6.7	7.0Ms(BK) 6.5Ms(PS)	Oaxaca, Mexico	Damage in the Juchitan area and in Mexico City.
Feb. 13	01 40 10.9	39.945 N.	75.135 E.	16	5.6	6.2		Southern Xinjiang, China	Several people injured and moderate damage in the Wuqia area.
Feb. 26	20 07 49.9	38.841 N.	70.727 E.	49	5.3	5.2		Tadzhik, SSR	Extensive damage in the Garm area.
Mar. 15	17 27 26.3	34.775 N.	137.573 E.	43	5.3	4.8		Central Honshu, Japan	One killed, two injured, and slight damage in the Nagoya area.
Mar. 18	09 05 50.0	4.8835 N.	153.581 E.	89	6.5	7.6	7.9Ms(BK)	New Ireland	Landslides and ground cracks occurred, trees were uprooted, and steam was ejected from fumeroles in the Feni Islands. Damage along the southeast coast of New Ireland. Slight damage and landslides in the Rabaul, New Britain area. Twenty-five cm Tsunami at Rabaul. Minor tsunami on the Feni Islands and the coast of New Ireland.
Mar. 23	23 51 06.5	38.294 N.	20.262 E.	19	5.8	6.2	6.0ML(AT)	Greece	Seven injured and 160 homes damaged in the Vonitsa area.
Mar. 25	11 57 49.3	35.953 N.	52.264 E.	33	5.2	4.9		Iran	Thirty killed, 61 injured, many homes damaged, and landslides in the Damavand-Amol area.
Mar. 31	13 12 52.6	2.461 N.	76.686 W.	22	5.5	4.9		Colombia	At least 250 killed, many injured, and extensive damage in the Popayan area.
Apr. 3	01 50 01.1	8.717 N.	83.123 W.	37	6.5	7.3	7.2Ms(BK)	Costa Rica	Five people died from heart attacks, one killed by a collapsing house, several injured. Felt in Panama.
Apr. 4	02 51 34.3	5.723 N.	94.722 E.	79	6.6		6.8mb(PS)	Northern, Sumatera	Casualties and damage in the Banda Aceh area.
Apr. 5	06 50 33.4	40.025 N.	75.260 E.	33	5.5	5.6		Xinjiang, China	Casualties and damage reported.

May 2	23 42 38.1	36.233 N.	120.309 W.	10	6.2	6.5	6.7ML(BK) 6.3ML(PS) 6.7ML(GM)	Central California	Ninety-four injured and $31 million damage in the Coalinga area.
May 10	18 27 31.8	4.805 S.	152.509 E.	72	6.0	6.5	6.9Ms(BK) 6.8Ms(PS)	New Britain region	Felt at Rabaul.
May 26	02 59 59.6	40.462 N.	139.102 E.	24	6.8	7.7	7.7Ms(BK) 7.7Ms(PS) 7.8Ms(LD)	Off the west coast of Northern Honshu, Japan	One hundred deaths due to a tsunami, some injured, and extensive damage mostly on the Oga Peninsula. The tsunami caused 3 deaths in South Korea. Tsunami heights ranged from 14m on Honshu, 2-6m on Hokkaido, 8m along the coast of USSR, and 4m along the coast of South Korea.
June 21	06 25 27.3	41.346 N.	139.099 E.	10	6.7	6.9	6.5Ms(BK) 6.9Ms(PS)	Off the southwest coast of Hokkaido, Japan	Some damage in northern Honshu. Felt in southern Hokkaido and northern Honshu. Tsunami recorded.
July 3	17 14 23.1	9.652 N.	83.688 W.	33	5.9	6.2	6.7Ms(BK) 6.1Ms(PS)	Costa Rica	Two killed, about 60 injured, and considerable damage to buildings. Landslides.
July 5	12 01 27.3	40.324 N.	27.222 E.	10	5.7	6.1	5.9ML(AT)	Turkey	Five killed, 25 injured, and damage in the Biga area. One injured at Erdek. Felt in eastern Greece.
July 11	12 56 28.3	60.889 S.	53.020 W.	10	6.1	6.9	7.0Ms(BK) 6.7Ms(PS)	South Shetland Islands	
July 22	02 41 00.8	36.948 N.	49.180 E.	41	5.6	5.0		Western Iran	Three killed, 41 injured, and 75 homes destroyed in the Zanjan area.
Aug. 2	09 01 05.5	49.150 N.	6.698 E.	0			3.5ML(GR)	France	One killed and one injured in a mine collapse.
Aug. 6	15 43 51.2	40.142 N.	24.766 E.	2	6.2	7.0	7.3Ms(BK)	Agean Sea	Slight damage on Limnos Island and in the Mount Athos area. Felt in Greece, Bulgaria, and Turkey.
Aug. 8	03 47 57.1	35.498 N.	139.069 E.	25	5.9	5.3		Honshu, Japan	One killed, 28 injured, landslides, and houses damaged in south central Honshu.
Aug. 17	10 55 54.1	55.867 N.	161.287 E.	63	6.6		7.0mb(PS) 6.5Ms(BK)	Kamchatka, USSR	

Aug. 17	12 17 56.0	18.231 N.	120.860 E.	29	6.2	6.5		Luzon, Philippine Islands	Sixteen killed, 47 injured, and extensive damage in the Laoag area of northern Luzon. Sandblows, liquefaction, and landslides occurred in the area.
Oct. 4	18 52 13.3	26.535 S.	70.563 W.	15	6.4	7.3	7.4Ms(BK) 7.4Ms(LD)	Northern Chile	Five killed, 24 injured, and extensive damage in the Copiapo-Chanaral area. Local tsunami recorded.
Oct. 22	04 21 35.0	69.665 S.	25.451 W.	24	6.5	6.8	6.7Ms(BK)	South Sandwich Islands Region	
Oct. 28	14 06 06.5	43.974 N.	113.916 W.	14	6.2	7.3	7.2ML(BK)	Idaho	Two killed and one injured. Considerable damage at Challis and Mackay. Damage was estimated at $12.5 million. It caused approximately 34 km of surface faulting. It was felt in seven states and three provinces of Canada.
Oct. 30	04 12 27.1	40.330 N.	42.187 E.	12	6.1	6.9	6.9Ms(BK)	Turkey	At least 1342 killed, many injured, and more then 25,000 homeless. Fifty villages destroyed in Erzurum and Kara Provinces.
Nov. 6	21 09 45.2	35.206 N.	115.213 E.	19	5.7	5.3		Eastern China	Thirty-four killed, about 2220 injured and about 3300 homes destroyed in Shandong Province.
Nov. 8	00 49 32.1	50.696 N.	5.346 E.	10	5.0		4.9ML(DO)	Belgium	One killed, one died from a heart attack, 30 injured and hundreds of buildings damaged in the Liege area. Felt in the Netherlands, Luxembourg, and West Germany.
Nov. 9	16 29 51.6	44.689 N.	10.317 E.	37	5.1	5.0	5.2ML(RM)	Northern Italy	About 100 injured and damage in the Parma area.
Nov. 24	05 30 34.2	7.481 S.	128.168 E.	179	6.4		7.1mb(BK)	Banda Sea	Felt in Indonesia and Australia.
Nov. 30	17 46 00.6	6.852 S.	72.110 E.	10	6.6	7.6	7.7Ms(BK)	Chagos Region	Some damage to buildings and piers on Diego Garcia. Tsunami recorded.
Dec. 2	03 09 05.6	14.066 N.	91.924 W.	67	5.9		7.1Ms(BK) 6.7Ms(PS) 6.7Ms(LD)	Guatemala	Felt in Guatemala, Mexico, and El Salvador.
Dec. 21	12 05 06.3	28.190 S.	63.172 W.	602	6.2		6.9mb(BK)	Northern Argentina	Felt in Argentina, Brazil, Chile, and Paraguay.
Dec. 22	04 11 29.2	11.866 N.	13.529 W.	11	6.4	6.2	6.2Ms(BK) 6.1Ms(PS)	Western Guinea	At least 443 killed, 200 missing, 150 injured and extensive damage in the Gaoual-Koumbia area. Also felt in Gambai, Senegal, and Sierra Leone.

Dec. 30	23 52 39.9	36.372 N.	70.738 E.	215	6.6	7.2mb(BK)	Eastern Afghanistan	Twelve killed, 483 injured, and extensive damage in the Kabul-Samagan, Afghanistan area. Fourteen killed, hundreds injured, and moderate damage in Peshawar, Pakistan. Some damage in Tajikstan, USSR.

[Abbreviations used in the Other Magnitudes column: (AT) National Observatory of Athens, Greece; (BK) University of California, Berkeley; (DO) Dourbes seismograph station, Belgium; (GM) U.S. Geological Survey, Menlo Park, California; (GR) Graefenberg Observatory, West Germany; (LD) Lamont-Doherty Geological Observatory, Palisades, N.Y.; (PS) California Institute of Technology, Pasadena; (RM) Rome seismograph station, Italy]

STRONG-MOTION SEISMOGRAPH DATA

Ronald L. Porcella and Josephine C. Switzer Seismic Engineering Branch U.S. Geological Survey Menlo Park, CA 94025

Introduction

The first engineering seismology program in the United States was administered by the Seismological Field Survey of the Coast at Geodetic Survey (C&GS). This Program was begun in 1931 and effectively remained 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 constant throughout the years.

The current program of strong-motion instrumentation is administered by the USGS 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 users in earthquake engineering research and design practice. 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 Strong Motion 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 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 Motion Program Reports.

The Strong-Motion Accelerograph Station List is periodically published as a USGS Open-file Report and includes information on all known accelerograph stations in the western hemisphere. 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).

Descriptions of strong-motion accelerograph records and the circumstances in which they were recorded are available to anyone involved in earthquake engineering through the computer based Strong-Motion Information Retrieval System (SMIRS). The system provides ready access to information about strong-motion records and the level of processing and analysis that has been performed on them. Information about earthquakes that generated recorded motion and about the sites at which the motion was recorded is also provided. The information has been arranged into three major data sets: the record descriptions, the earthquake descriptions, and the recording site descriptions. Supplementary data sets include instructions and information about the data base, information about the recording instruments, identification of the recording instruments, and identification of organizations that own strong-motion instruments, that have additional information about the recording sites, or that archive the original or processed records.

Users may access SMIRS via link. Once accessed, SMIRS becomes a user friendly, interactive system. A general introduction to SMIRS and various "help files" are available on the system. The user may also request a copy of the printed User's Manual (Converse, 1978).

Accelerograph Data

Table 11 contains a summary of the 508 strong-motion records recovered from the USGS National Network during 1983; this network has produced a yearly average of 217 records for the period 1972 to 1982 inclusive.

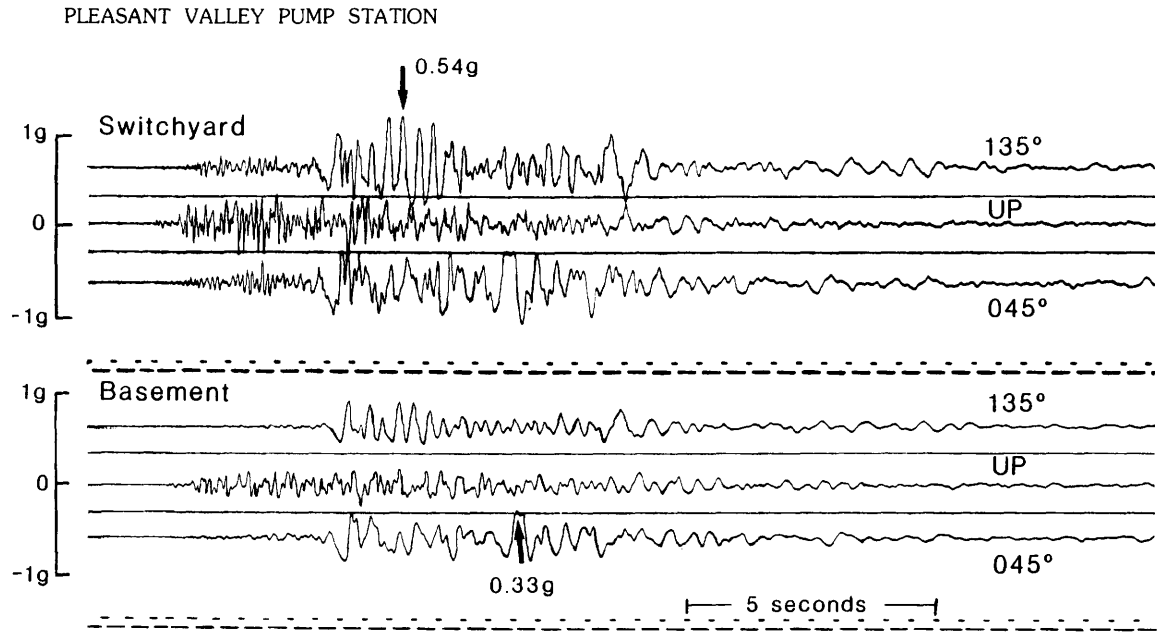

Figure 83. Strong motion record of the Coalinga, California earthquake of 2 May 1983, 23 42 38.1 UTC at a distance of 11 km from the epicenter.

Approximately 340 of the 1983 records are related to the May 2, magnitude 6.5 (M_L), Coalinga, California, earthquake and its aftershocks. They were recorded at 37 strong-motion stations (see table 11). Main-shock records from the Pleasant Valley Pump Plant station at an epicentral distance of 11 km contain a peak horizontal acceleration of 0.54 g and strong duration (acceleration greater than 0.1 g) of more than 14 seconds (fig. 83). Six aftershocks of magnitude 5.0 (ML) or greater also were recorded during the period May 2 through September 9, 1983, and are described in Maley and others (1983).

A magnitude 6.4 (M_L) earthquake shook the Big sland of Hawaii on November 16, 1983, and produced strong-motion records at 15 USGS stations. Maximum horizontal accelerations ranged from 0.04 g at the Kailua-Kona station to 0.87 g at the Volcano Observatory in Hawaii National Park. Peak recorded accelerations were 0.10 g or greater at 13 stations and 0.50 g or greater at 4 stations (table 11).

Additional USGS accelerograph stations triggered during 1983 were located in Alaska, Arkansas, California, Idaho, Nevada, and Washington state.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983***

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
31 August 1982 0311:07.8 UTC Central California 36.648N, 121.325W Magnitude 4.0	Bear Valley Station 14 Upper Buts Ranch (USGS)	36.569°N 121.043°W	18.4 *		**	
	Bear Valley Station 11 Wilkinson Ranch (USGS)	36.608°N 121.109°W	12.3 *		**	
22 October 1982 0059 UTC Central California Epicenter and magnitude unknown	Bear Valley Station 11 Wilkinson Ranch (USGS)	36.608°N 121,109°W	3.8 *		**	
24 October 1982 2018 UTC Central California Epicenter and magnitude unknown	Bear Valley Station 11 Wilkinson Ranch (USGS)	36.608°N 121.109°W	26.5 *		**	
6 January 1983 0557:31.9 UTC Central California 36.718N, 121.343W Magnitude 3.4	Bear Valley Station 12 Williams Ranch (USGS)	36.658°N 121.249°W	34.7 2.8		**	
7 January 1983 0138:11.0 UTC Eastern California 37.628N, 118.915W Magnitude 5.4	Long Valley Dam Lake Crowley (USGS)†	37.588°N 118.705°W	* 2.5			
	Left abutment			275°	0.06	-
				Up	.06	-
				185°	.09	-
4 August 1982-16 January 1983 Eastern California Epicenters and magnitudes unknown	Long Valley Fire Station (USGS)	37.570°N 118.752°W	* *		**	
	Note: Two additional records** recovered at Long Valley fire station.					
	Long Valley Dam Lake Crowley (USGS)	37.588°N 118.705°W	* 2.3			
	Left abutment			275°	.08	-
				Up	.06	-
				185°	.11	1-peak
10 July 1982-26 January 1983 Arkansas Epicenters and magnitudes unknown	Enola, Arkansas (USGS/TEIC)	35.185°N 92.232°W	* 0.7		**	
	Note: One additonal record** recovered at Enola.					

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max acc[4] (g)	Duration[5] (s)
3 May 1982-	Mauna Loa, Hawaii	19.539°N	*		**	
2 February 1983	Weather Observatory	155.580°W	*			
Hawaii	(USGS)					
Epicenters and						
magnitudes unknown	Mauna Kea, Hawaii	19.752°N	*	050°	.05	-
	State Park	155.530°W	*	Up	.08	-
	(USGS)			320°	.09	-
	Note: One additional record** recovered at Mauna Kea State Park.					
	Honokaa, Hawaii	20.080°N	*	020°	.12	0.7
	Fire Station	155.465°W	*	Up	.07	-
	(USGS)			290°	.27	2-peaks
	Note: Four additonal records** recovered at Honokaa Fire Station.					
	Kapa'au, Hawaii	20.230°N	*		**	
	Kohala Police Station	155.801°W	*			
	(USGS)					
	Waimea, Hawaii	20.03° N	*	155°	0.20	1.7
	Fire Station	155.66° W	*	Up	.19	1.2
	(USGS)			065°	.24	0.8
	Note Two additional records** recovered at Waimea Fire Station.					
	Pahala, Hawaii	19.20° N	*	188°	.06	-
	Kau Hospital	155.47° W	1.7	Up	.03	-
	(USGS)			098°	.04	-
	Hawaii National Park	19.329°N	*		**	
	Wahaula Maint. Cntr.	155.031°W	1.5			
	(USGS)					
4 March 1983	Big Bend Dam, SD	44.043°N	*			
0632:18.6 UTC	(ACOE)†	99.444°W	2.3			
South Dakota						
44.214N, 99.409W	Crest			183°	.08	-
Magnitude 4.4				Up	.11	1-peak
				093°	.04	-
	Downstream			277°	.06	-
				Up	.11	1-peak
				187°	.10	1-peak
	Spillway				**	
12 August 1982-	Bear Valley Station 1	36.573°N	*		**	
2 May 1983	Fire Station	121.184°W	*			
Central California	(USGS)					
Epicenters and						
magnitudes unknown	Note: Three additional records** recovered at Bear Valley Station 1.					

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max acc[4] (g)	Duration[5] (s)
2 May 1983 2342:37.7 UTC Central California 36.219N, 120.317W Magnitude 6.5	Pleasant Valley Pump Plant (USBR)†	36.308°N 120.249°W	* 3.1			
	Switchyard			135° Up 045°	.54 .38 .46	14.1 10.2 11.6
	Basement			135° Up 045°	.28 .22 .31	5.8 8.3 6.7
	Bear Valley Station 1 Fire Station (USGS)†	36.573°N 121.184°W	* *		**	
	Bear Valley Station 2 Stone Canyon West (USGS)	36.636°N 121.234°W	11.5 *		**	
	Bear Valley Station 6 James Ranch (USGS)	36.504°N 121.101°W	56.3 7.7		**	
	Bear Valley Station 12 Williams Ranch (USGS)	36.658°N 121.249°W	59.8 12.7	310° Up 220°	0.08 .03 .08	- - -
	Bear Valley Station 10 Webb Residence (USGS)	36.532°N 121.143°W	01.0 6.4	310° Up 220°	.04 .02 .06	- - -
	Bear Valley Station 11 Wilkinson Ranch (USGS)	36.608°N 121.109°W	59.2 *		**	
	Bear Valley Station 14 Upper Butts Ranch (USGS)	36.569°N 121.043°W	* 2.8		**	
	Fresno VA Hospital (VA)†	36.77° N 119.78° W	* *		**	
	Dos Amigos Pumping Plant (CDWR)†	36.92° N 120.83° W	* *			
	Level 1				**	
	Level 4				**	
	Buchanan Dam (ACOE)	37.22° N 119.98° W	03.9 7.4			
	Left crest				**	
	Right abutment				**	
	Tower level 9				**	

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Right crest				**	
	Tower level 1				**	
	New Melones Dam (USBR)†	37.949°N 120.524°W	* *			
	Slope				**	
	Downstream				**	
	Right abutment				**	
	Center crest				**	
	Left abutment				**	
	Left crest				**	
	Pine Flat Dam (ACOE)	36.83° N 119.33° W	* 11.9			
	Gallery level 5			255° Up 165°	0.07 .02 .05	- - -
	Gallery level 2				**	
	Toe				**	
	Hidden Dam (ACOE)	37.112°N 119.883°W	09.6 *			
	Left crest				**	
	Downstream				**	
	Right crest				**	
	Upper level (control tower)				**	
	Terminus Dam (ACOE)	36.420°N 119.000°W	50.8 *			
	Slope				**	
	Main crest				**	
	Auxiliary dam crest			320° Up 230°	.05 .04 .07	- - -
	Note: One aftershock record** recovered at the auxiliary crest.					
	Lake Success Dam (ACOE)†	36.061°N 118.920°W	* 12.0			
	Left crest			285° Up 195°	.04 .03 .03	- - -

See footnotes at end of table.

Table 11. *Summary of U. S. accelerograph records recovered during 1983*--Continued

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Downstream			285°	.04	-
				Up	.01	-
				195°	.09	-
	Left abutment				**	
	Slope				**	
	Right crest				**	
	Right abutment				**	
	Note: Two each additional records** recovered at left crest, left abutment, downstream, right crest, right abutment, and slope.					
Note: Records from May 2 (main shock), May 9 (0249 UTC), and July 22 (0239 UTC) that have been digitized and processed include the following: May 2: Pleasant Valley Pump Plant (basement, switchyard) in USGS Open File Report 84-626. May 9: Anticline Ridge (freefield and pad), Burnett Construction, Oil City, Oil Fields Fire Station, Palmer Avenue, Skunk Hollow and Pleasant Valley Pump Plant (switchyard, basement, first floor, roof) in USGS Open File Report 84-626. July 22: Anticline Ridge (pad), Oil City, Oil Fields (freefield and pad), Palmer Avenue, Pleasant Valley Pump Plant (first floor, basement, freefield, roof, switchyard), Skunk Hollow, and Transmitter Hill in USGS Open File Report 85-250). Additional aftershock records are currently being processed.						
2 May 1983 2343 UTC Central California Epicenter and magnitude unknown	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	- (3.8)			
	Basement				**	
2 May 1983 2344 UTC Central California Epicenter and magnitude unknown	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	- (3.1)			
	Basement				**	
2 May 1983 2345:23 UTC Central California Epicenter and magnitude unknown	Pleasant Valley Pump Plant (USBR)†	36.308°N 120.249°W	- 2.7			
	Basement				**	
2 May 1983 2345:50 UTC Central California Epicenter and magnitude unknown	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	- (3.7)			
	Basement				**	

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
2 May 1983	Pleasant Valley	36.308°N	-			
2346:06.0 UTC	Pump Plant	120.249°W	(3.7)			
Central California	(USBR)					
36.230N, 120.290W						
Magnitude 5.7	Basement			135°	0.05	-
				Up	.09	-
				045°	.06	-
2 May 1983	Pleasant Valley	36.308°N	-			
2347:13 UTC	Pump Plant	120.249°W	(2.8)			
Central California	(USBR)					
Epicenter and						
magnitude unknown	Basement				**	
2 May 1983	Pleasant Valley	36.308°N	-			
2348 UTC	Pump Plant	120.249°W	(3.0)			
Central California	(USBR)					
Epicenter and						
magnitude unknown	Basement				**	
4 May 1983	Coalinga	36.275°N	41.9	360°	.05	-
0728:40.3 UTC	Skunk Hollow	120.306°W	*	Up	.10	1-peak
Central California	(USGS)			270°	.04	-
36.270N, 120.331W						
Magnitude 4.8	Pleasant Valley	36.308°N	42.9			
	Pump Plant	120.249°W	2.9			
	(USBR)					
	Basement			135°	.05	-
				Up	.05	-
				045°	.17	1-peak
	1st floor			135°	.04	-
				Up	.04	-
				045°	.16	1-peak
	Roof			135°	.08	-
				Up	.07	-
				045°	.44	2.3
	Switchyard			135°	.07	-
				Up	.08	-
				045°	.26	1-peak
4 May 1983	Pleasant Valley	36.308°N	10.4			
0739:07.7 UTC	Pump Plant	120.249°W	3.0			
Central California	(USBR)					
36.282N, 120.306W						
Magnitude 3.5	Basement				**	
	1st floor				**	
	Roof				**	
	Switchyard			135°	0.03	-
				Up	.03	-
				045°	.07	-
	Coalinga	36.275°N	09.9		**	
	Skunk Hollow	120.306°W	1.3			
	(USGS)					

See footnotes at end of table.

Table 11. *Summary of U. S. accelerograph records recovered during 1983*–Continued

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
4 May 1983 1611:19.4 UTC Central California 36.263N,120.363W Magnitude 4.3	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	23.7 3.0			
	Basement				**	
	1st floor				**	
	Roof				**	
	Switchyard			135°	.04	-
				Up	.05	-
				045°	.10	1-peak
	Coalinga Skunk Hollow (USGS)	36.275°N 120.306°W	22.8 1.9		**	
5 May 1983 1020:43.9 UTC Central California 36.264N, 120.385W Magnitude 4.5	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	48.5 3.0			
	Basement			135°	.02	-
				Up	.02	-
				045°	.06	-
	1st floor			135°	.02	-
				Up	.02	-
				045°	.06	-
	Roof			135°	.06	-
				Up	.03	-
				045°	.16	1-peak
	Switchyard			135°	.05	-
				Up	.03	-
				045°	.11	1-peak
5 May 1983 1133:40.4 UTC Central California 36.241N, 120.368W Magnitude 3.6	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	44.7 3.1			
	Basement				**	
	1st floor				**	
	Roof				**	
	Switchyard				**	
5 May 1983 1242:15.4 UTC Central California 36.240N, 120.401W Magnitude 3.7	Coalinga Burnett Const. Co. (USGS)	36.138°N 120.357°W	20.0 2.8		**	
20 May 1982-6 May 1983 Central California Epicenters and magnitudes unknown	Hollister Damler Residence (UCB)	36.82° N 121.41° W	* 4.1		**	
	Note: Two additonal records** recovered at Damler residence.					

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
24 September 1982- 6 May 1983 Central California Epicenter and magnitude unknown	Bear Valley Station 5 Callens Ranch (USGS)	36.673°N 121.195°W	* 1.5		**	
3 May 1983- 6 May 1983 Central California Epicenters and magnitudes unknown	Coalinga Palmer Avenue (USGS)	36.209°N 120.292°W	* 1.0	360° Up 270°	0.07 .03 .05	- - -
			* 2.2	360° Up 270°	.13 .03 .10	1-peak - 1-peak
			* 1.5	360° Up 270°	.05 .03 .06	- - -
			* 2.4	360° Up 270°	.25 .04 .07	0.4 - -
			* 2.4	360° Up 270°	.07 .02 .03	- - -
			* 2.5	360° Up 270°	0.07 .02 .02	- - -
	Note: Two additional records** recovered at Palmer Avenue.					
6 May 1983 1151:44.1 UTC Central California 36.258N, 120.380W Magnitude 3.3	Coalinga Anticline Ridge (USGS)	36.233°N 120.333°W	47.3 1.9			
	Freefield				**	
7 May 1983 0017:15.1 UTC Central California 36.279N, 120.312W Magnitude 3.8	Coalinga Anticline Ridge (USGS)	36.233°N 120.333°W	18.6 1.8			
	Freefield			360° Up 270°	.05 .02 .08	- - -
	Pad			360° Up 270°	.07 .02 .08	- - -
	Coalinga Oil Fields Fire Sta. (USGS)	36.247°N 120.314°W	18.5 1.6			
	Freefield			360° Up 270°	.10 .02 .07	1-peak - -
	Coalinga Palmer Avenue (USGS)	36.209°N 120.292°W	20.0 0.9	360° Up 270°	.04 .04 .06	- - -

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
7 May 1983	Coalinga	36.233°N	00.0			
0543:57.0 UTC	Anticline Ridge	120.333°W	1.9			
Central California	(USGS)					
36.223N, 120.288W						
Magnitude 3.5	Freefield				**	
	Pad				**	
	Coalinga	36.209°N	00.6	360°	.02	-
	Palmer Avenue	120.292°W	0.8	Up	.02	-
	(USGS)†			270°	.06	-
8 May 1983	Coalinga	36.209°N	*	360°	0.03	-
Time unknown	Palmer Avenue	120.292°W	1.6	Up	.05	-
Central California	(USGS)†			270°	.03	-
Epicenter and magnitude unknown						
4 May 1983-	Coalinga	36.275°N	*		**	
9 May 1983	Skunk Hollow	120.306°W	1.9			
Central California	(USGS)					
Epicenter and						
magnitude unknown	Coalinga	36.229°N	*		**	
	Oil City	120.360°W	*			
	(USGS)					
6 May 1983-	Pleasant Valley	36.308°N	*			
9 May 1983	Pump Plant	120.249°W	2.7			
Central California	(USBR)					
Epicenter and						
magnitude unknown	Switchyard			135°	.05	-
				Up	.02	-
				045°	.03	-
9 May 1983	Coalinga	36.233°N	14.6			
0249:11.2 UTC	Anticline Ridge	120.333°W	2.1			
Central California	(USGS)					
36.229N, 120.312W						
Magnitude 5.1	Freefield			360°	.56	1.4
				Up	.30	0.4
				270°	.56	1.4
	Pad			360°	.48	0.8
				Up	.37	0.4
				270°	.47	1.3
	Coalinga	36.138°N	*	360°	.09	-
	Burnett Const. Co.	120.357°W	1.9	Up	.07	-
	(USGS)†			270°	.08	-
	Coalinga	36.229°N	*	360°	.30	0.9
	Oil City	120.360°W	2.1	Up	.10	3.0
	(USGS)†			270°	.24	0.5
	Coalinga	36.247°N	14.7			
	Oil Fields Fire Sta.	120.314°W	1.9			
	(USGS)					
	Freefield			360°	.18	0.7
				Up	.16	0.3
				270°	.25	0.4

See footnotes at end of table.

Table 11. *Summary of U. S. accelerograph records recovered during 1983*--Continued

Event	Station name (owner)[7]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Coalinga Palmer Avenue (USGS)	36.209°N 120.292°W	14.6 2.1	360° Up 270°	0.26 .10 .22	0.8 0.9 0.7
	Coalinga Skunk Hollow (USGS)†	36.275°N 120.306°W	* 2.1	360° Up 270°	.12 .12 .15	1-peak 1-peak 1-peak
	Pleasant Valley Pump Plant (USBR)†	36.308°N 120.249°W	* 2.9			
	Basement			135° Up 045°	.14 .04 .05	1-peak - -
	1st floor			135° Up 045°	.13 .05 .06	1-peak - -
	Roof			135° Up 045°	.23 .06 .24	0.5 - 1.9
	Switchyard			135° Up 045°	.22 .11 .10	1-peak 1-peak 1-peak
	Terminus Dam (ACOE)	36.420°N 119.000°W	44.2 *			
	Auxiliary Center crest				**	
9 May 1983 0326:36.6 UTC Central California 36.210N, 120.318W Magnitude 4.4	Coalinga Anticline Ridge (USGS)	36.233°N 120.333°W	40.9 1.9			
	Freefield			360° Up 270°	.05 .02 .08	- - -
	Pad			360° Up 270°	.05 .02 .10	- - 1-peak
	Coalinga Burnett Const. Co. (USGS)	36.138°N 120.357°W	42.0 2.4		**	
	Coalinga Oil City (USGS)	36.229°N 120.360°W	41.2 1.9	360° Up 270°	0.06 .02 .07	- - -
	Coalinga Oil Fields Fire Sta. (USGS)	36.247°N 120.314°W	40.7 1.9			
	Freefield			360° Up 270°	.07 .04 .06	- - -

See footnotes at end of table.

Table 11. *Summary of U. S. accelerograph records recovered during 1983*--Continued

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Coalinga Palmer Avenue (USGS)	36.209°N 120.292°W	40.5 2.1	360° Up 270°	.06 .06 .07	- - -
	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	41.5 3.0			
	Roof				**	
9 May 1983 0330:40.6 UTC Central California 36.222N, 120.308W Magnitude 3.3	Coalinga Oil City (USGS)	36.229°N 120.360°W	47.1 *		**	
9 May 1983 0332-2241 UTC Central California Epicenter and magnitude unknown	Coalinga Oil City (USGS)†	36.229°N 120.360°W	* *		**	
10 May 1983 0328:05.7 UTC So. California 33.150N, 115.617W Magnitude 3.2	Salton Sea Wildlife Refuge (USGS)	33.18° N 115.62° W	07.9 0.8		**	
10 May 1983 1326:29.5 UTC Central California 36.311N, 120.322W Magnitude 3.7	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	34.7 *			
	Roof				**	
10 May 1983 2331 UTC So. California Epicenter and magnitude unknown	Salton Sea Wildlife Refuge (USGS)	33.18° N 115.62° W	07.6 1.6		**	
11 May 1983 2049:25.1 UTC Central California 36.232N, 120.255W Magnitude 3.3	Coalinga Anticline Ridge (USGS)	36.233°N 120.333°W	28.4 0.5			
	Freefield			360° Up 270°	0.08 .02 .13	- - 0.2
	Pad			360° Up 270°	.08 .02 .13	- - 0.2
	Coalinga Oil Fields Fire Sta. (USGS)	36.247°N 120.314°W	26.9 1.7			
	Freefield			360° Up 270°	.09 .01 .04	- - -

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
9 May 1983(0250)-	Coalinga	36.275°N	*		**	
12 May 1983	Skunk Hollow	120.306°W	2.1			
Central California	(USGS)					
Epicenters and						
magnitudes unknown	Note: Four additional records** recovered at Skunk Hollow.					
	Pleasant Valley	36.308°N	*			
	Pump Plant	120.249°W	3.0			
	(USBR)					
	Switchyard			135°	.02	-
				Up	.02	-
				045°	.07	-
	Note: Two additional records** were recovered at the switchyard at Pleasant Valley Pump Plant.					
5 May 1983(2245)-	Coalinga	36.229°N	*	360°	.06	-
12 May 1983(1945)	Oil City	120.360°W	*	Up	.02	-
Central California	(USGS)			270°	.03	-
Epicenters and						
magnitudes unknown	Note: One additional record** recovered at Oil City.					
11 May 1983(2200)-	Pleasant Valley	36.308°N	*			
12 May 1983(2025)	Pump Plant	120.249°W	2.0			
Central California	(USBR)					
Epicenter and						
magnitude unknown	Switchyard				**	
12 May 1983	Coalinga	36.138°N	10.4	360°	0.05	-
1341:08.1 UTC	Burnett Const. Co.	120.357°W	2.4	Up	.03	-
Central California	(USGS)			270°	.04	-
36.155N, 120.257W						
Magnitude 4.4	Coalinga	36.209°N	10.0	360°	.14	1-peak
	Palmer Avenue	120.292°W	2.1	Up	.13	0.1
	(USGS)			270°	.10	1-peak
	Coalinga	36.247°N	12.3			
	Oil Fields Fire Sta.	120.314°W	0.8			
	(USGS)					
	Freefield				**	
14 May 1983	Coalinga	36.229°N	07.7		**	
0502:02.9 UTC	Oil City	120.360°W	0.8			
Central California	(USGS)					
36.254N, 120.321W						
Magnitude 3.7	Coalinga	36.209°N	07.7	360°	.07	-
	Palmer Avenue	120.292°W	1.0	Up	.06	-
	(USGS)			270°	.10	1-peak
	Coalinga	36.233°N	07.0			
	Anticline Ridge	120.333°W	1.2			
	(USGS)					
	Pad			360°	.08	-
				Up	.07	-
				270°	.07	-
	Freefield			360°	.06	-
				Up	.05	-
				270°	.11	1-peak

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Coalinga Oil Fields Fire Sta. (USGS)	36.247°N 120.314°W	07.3 0.7			
	Freefield			360°	.08	-
				Up	.02	-
				270°	.07	-
	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	06.6 2.7			
	Basement				**	
	1st floor			135°	.05	-
				Up	.05	-
				045°	.05	-
	Roof			135°	0.05	-
				Up	.02	-
				045°	.13	1-peak
	Switchyard			135°	.05	-
				Up	.05	-
				045°	.11	1-peak
10 May 1983 1426-1741 UTC Central California Epicenter and magnitude unknown	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	* *			
	Roof				**	
12 May 1983- 18 May 1983 Central California Epicenter and magnitude unknown	Coalinga Burnett Const. Co. (USGS)	36.138°N 120.357°W	* 2.6		**	
18 May 1983 0246:50.0 UTC Central California 36.228N, 120.241W Magnitude 3.6	Coalinga Palmer Avenue (USGS)	36.209°N 120.292°W	05.2 1.7		**	
18 May 1983 2039:32.0 UTC Central California 36.242N, 120.370W Magnitude 3.4	Coalinga Anticline Ridge (USGS)	36.233°N 120.333°W	34.6 1.7			
	Freefield				**	
	Pad				**	
	Coalinga Oil Fields Fire Sta. (USGS)	36.247°N 120.314°W	34.6 1.6			
	Freefield				**	
	Coalinga Palmer Avenue (USGS)	36.209°N 120.292°W	35.0 2.1		**	

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*—Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
14 May 1983(1402)-	Coalinga	36.229°N	*	360°	0.08	-
19 May 1983(1631)	Oil City	120.360°W	1.6	Up	.05	-
Central California	(USGS)			270°	.05	-
Epicenter and						
magnitude unknown	Coalinga	36.275°N	*		**	
	Skunk Hollow	120.306°W	2.1			
	(USGS)					
	Note: Records may be related to event of 18 May 1983, 2039 UTC.					
24 May 1983	Coalinga	36.233°N	20.5			
0902:17.3 UTC	Anticline Ridge	120.333°W	1.5			
Central California	(USGS)					
36.238N, 120.326W						
Magnitude 4.6	Freefield			360°	.44	1.3
				Up	.34	0.9
				270°	.74	1.4
	Pad			360°	.30	1.5
				Up	.35	0.4
				270°	.66	1.6
	Coalinga	36.229°N	20.5	360°	.22	0.5
	Oil City	120.360°W	1.4	Up	.10	1-peak
	(USGS)			270°	.14	1.0
	Coalinga	36.247°N	20.4			
	Oil Fields Fire Sta.	120.314°W	1.5			
	(USGS)					
	Pad			360°	.49	0.8
				Up	.10	0.2
				270°	.32	0.6
	Freefield			360°	.50	0.9
				Up	.12	0.1
				270°	.35	0.6
	Coalinga	36.138°N	21.8	360°	.05	-
	Burnett Const. Co.	120.357°W	2.7	Up	.05	-
	(USGS)			270°	.07	-
	Coalinga	36.209°N	20.9	360°	.14	0.3
	Palmer Avenue	120.292°W	1.7	Up	.07	-
	(USGS)			270°	.08	-
	Coalinga	36.275°N	*	360°	.06	-
	Skunk Hollow	120.306°W	1.4	Up	.08	-
	(USGS)†			270°	.10	1-peak
	Pleasant Valley	36.308°N	21.4			
	Pump Plant	120.249°W	2.8			
	(USBR)					
	Basement			135°	0.05	-
				Up	.04	-
				045°	.06	-
	1st floor			135°	.04	-
				Up	.04	-
				045°	.07	-

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****--Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Roof			135°	.08	-
				Up	.04	-
				045°	.22	0.8
	Switchyard			135°	.07	-
				Up	.09	-
				045°	.11	1-peak
	Freefield			360°	.04	-
				Up	.05	-
				270°	.09	-
24 May 1983 0904 UTC Central California Epicenter and magnitude unknown	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	00.5 2.6			
	Switchyard				**	
	Freefield				**	
24 May 1983- 25 May 1983 Central California Epicenter and magnitude unknown	Coalinga Oil City (USGS)	36.229°N 120.360°W	* 1.9		**	
25 May 1983 0851 UTC Central California Epicenter and magnitude unknown	Bear Valley Station 10 Webb Residence (USGS)	36.532°N 121.143°W	53.4 1.1		**	
27 May 1983 1125:18.3 UTC Southern California 33.650N, 116.733W Magnitude 3.7	Hurkey Creek Park (USGS)	33.67° N 116.68° W	03.8 1.8	135° Up 045°	.05 .01 .04	- - -
30 May 1983 0321:52.2 UTC Central California 36.233N, 120.384W Magnitude 3.3	Coalinga Oil Fields Fire Sta. (USGS)	36.247°N 120.314°W	55.4 *			
	Freefield				**	
	Pad				**	
11 June 1983 0309:52.1 UTC Central California 36.244N, 120.459W Magnitude 5.0	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	01.0 *			
	Freefield				**	
	Switchyard			135° Up 045°	0.04 .02 .05	- - -
	Basement				**	
	1st floor				**	

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Roof			135°	.04	-
				Up	.03	-
				045°	.14	0.7
	Coalinga Anticline Ridge (USGS)	36.233°N 120.333°W	57.8 3.5			
	Freefield			360°	.06	-
				Up	.02	-
				270°	.06	-
	Pad				**	
	Coalinga Transmitter Hill (USGS)†	36.249°N 120.343°W	* 2.8	360° Up 270°	.06 .04 .06	- - -
	Coalinga Oil Fields Fire Sta. (USGS)	36.247°N 120.314°W	00.9 *			
	Freefield				**	
	Pad				**	
	Coalinga Oil City (USGS)	36.229°N 120.360°W	55.8 1.9	360° Up 270°	.09 .09 .09	- - -
	Coalinga Burnett Const. Co. (USGS)	36.138°N 120.357°W	01.3 2.0	360° Up 270°	0.20 .07 .14	0.2 - 0.1
12 June 1983 0131:27.1 UTC Central California 36.114N, 120.303W Magnitude 4.0	Coalinga Palmer Avenue (USGS)	36.209°N 120.292°W	31.6 2.9	360° Up 270°	.05 .04 .06	- - -
	Coalinga Oil Fields Fire Sta. (USGS)	36.247°N 120.314°W	32.2 3.1			
	Freefield			360° Up 270°	.06 .02 .03	- - -
	Pad			360° Up 270°	.07 .01 .02	- - -
	Coalinga Burnett Const. Co. (USGS)†	36.138°N 120.357°W	* 2.4	360° Up 270°	.07 .02 .08	- - -
25 May 1983- 13 June 1983 Central California Epicenters and magnitudes unknown	Coalinga Skunk Hollow (USGS)	36.275°N 120.306°W	* 2.2		**	
	Note: One additional record** recovered at Skunk Hollow.					

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max acc[4] (g)	Duration[5] (s)
12 September 1982- 22 June 1983 Cent. Washington Epicenter and magnitude unknown	Mud Mountain Dam, WA (ACOE)	47.14° N 121.93° W	* *			
	Toe				**	
24 June 1983 1047:35.5 UTC Central California 36.553N, 121.230W Magnitude 3.2	Bear Valley Station 1 Fire Station (USGS)	36.573°N 121.184°W	36.4 0.6		**	
24 June 1982- 26 June 1983 Alaska Epicenter and magnitude unknown	Bradley Lake, AK (USGS)	59.76° N 150.89° W	* *	360° Up 270°	.10 .03 .05	1-peak - -
28 June 1983 0325:17.0 UTC Alaska 60.219N, 141.287W Magnitude 5.9	Guyot Hills, AK (USGS)	60.146°N 141.472°W	27.2 2.5	360° Up 270°	0.12 .06 .10	1-peak - 0.1
10 December 1982- 28 June 1983 Nevada Epicenters and magnitudes unknown	Hoover Dam Nevada (USBR)	36.02° N 114.74° W	* *			
	Gallery			135° Up 045°	.02 .03 .14	- - 1-peak
	Right abutment				**	
	Upper intake tower			315° Up 225°	.06 .04 .06	- - -
				315° Up 225°	.07 .03 .11	- - 1.peak
	Note: Two additional record** recovered at Gallery.					
29 June 1983 0808:36.4 UTC So. California 32.633N, 117.383W Magnitude 4.6	Mission Power Station San Diego (SDGE)†	32.788°N 117.138°W	* *		**	
3 July 1983 1840:08.2 UTC Central California 37.535N, 118.858W Magnitude 5.2	Long Valley Dam Lake Crowley (USGS)†	37.588°N 118.705°W	* 2.4			
	Left abutment			275° Up 185°	.08 .05 .07	- - -
	Long Valley Fire Station (USGS)	37.570°N 118.752°W	12.3 *	037° Up 307°	.05 .02 .04	- - -

See footnotes at end of table.

Table 11. *Summary of U. S. accelerograph records recovered during 1983*–Continued

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Terminus Dam (ACOE)	36.420°N 119.000°W	51.5 *			
	Auxiliary Center crest				**	
9 July 1983 0740:50.9 UTC Central California 36.237N, 120.409W Magnitude 5.2	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W				
	Basement		56.1 3.0		**	
	1st floor		56.2 3.0		**	
	Roof		56.1 3.1	135° Up 045°	0.03 .04 .10	- - 1.0
	Switchyard		57.2 3.4	135° Up 045°	.03 .03 .06	- - -
	Freefield		* 3.8		**	
	Coalinga Anticline Ridge (USGS)†	36.233°N 120.333°W	* 1.7			
	Freefield			360° Up 270°	.28 .12 .39	2.2 0.5 2.5
	Pad			360° Up 270°	.24 .11 .42	2.4 1.7 2.6
	Coalinga Burnett Const. Co. (USGS)	36.138°N 120.357°W	55.3 2.1	360° Up 270°	.14 .08 .10	2-peaks - 1-peak
	Coalinga Oil City (USGS)	36.229°N 120.360°W	53.8 1.5	360° Up 270°	.37 .21 .38	2.4 2.1 2.5
	Coalinga Oil Fields Fire Sta. (USGS)	36.247°N 120.314°W	54.1 2.0			
	Freefield			360° Up 270°	.09 .07 .09	- - -
	Pad			360° Up 270°	.09 .07 .09	- - -

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Coalinga Palmer Avenue (USGS)	36.209°N 120.292°W	54.5 2.2	360° Up 270°	0.20 .07 .12	2-peaks - 0.2
	Coalinga Skunk Hollow (USGS)†	36.275°N 120.306°W	* 2.1	360° Up 270°	.14 .15 .17	2-peaks 1.8 1-peak
	Coalinga Transmitter Hill (USGS)	36.249°N 120.343°W	54.1 1.6	360° Up 270°	.19 .12 .20	2.2 1-peak 2.5
9 July 1983 2351:52.4 UTC Central California 36.312N, 120.393W Magnitude 3.4	Coalinga Oil City (USGS)	36.229°N 120.360°W	55.2 *	360° Up 270°	.06 .02 .06	- - -
12 July 1983 1510:03.4 UTC Alaska 61.031N, 147.286W Magnitude 6.4	Valdez City Hall (USGS)†	61.137°N 146.362°W	* 6.0	360° Up 270°	.12 .07 .13	1.5 - 1.2
	Valdez High School (USGS)†	61.143°N 146.355°W	* 4.1	180° Up 090°	.32 .10 .17	1.3 1-peak 1.0
	Mt. Hamilton (USGS)†	60.337°N 144.261°W	* *		**	
	Anchorage Alaska Hospital (USGS)†	61.21° N 149.82° W	* 14.4			
	First floor				**	
	Fourth floor				**	
	Seventh floor			225° Up 135°	.07 .03 .08	- - -
	Anchorage Federal Building (USGS)†	61.216°N 149.883°W	* 18.0			
	Basement				**	
	Anchorage USGS Building (USGS)†	61.223°N 149.892°W	* *			
	Basement				**	
	Anchorage Westward Hotel (USGS)†	61.220°N 149.892°W	* 18.8			
	Basement				**	
	22nd level (roof)			135° Up 045°	0.05 .06 .07	- - -

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
13 July 1983 2116:48.2 UTC Southern California 33.200N, 115.533W Magnitude 4.0	Salton Sea Wildlife Refuge (USGS)	33.18° N 115.62° W	50.5 1.6		**	
14 July 1983 1525:42.8 UTC Central California 36.213N, 120.293W Magnitude 3.3	Coalinga Palmer Avenue (USGS)	36.209°N 120.292°W	43.9 1.6	360° Up 270°	.06 .04 .07	- - -
17 July 1983 2158:08.0 UTC Central California 36.261N, 120.336W Magnitude 3.2	Coalinga Oil City (USGS)	36.229°N 120.360°W	13.7 *		**	
18 July 1983 1928:05.2 UTC Central California 36.166N, 120.292W Magnitude 3.7	Coalinga Burnett Const. Co. (USGS)	36.138°N 120.357°W	08.9 2.3	360° Up 270°	.09 .02 .07	- - -
22 July 1983 0239:53.7 UTC Central California 36.228N, 120.416W Magnitude 5.9	Pleasant Valley Pump Plant (USBR)†	36.308°N 120.249°W	* 3.6			
	Basement			135° Up 045°	.13 .08 .43	1-peak - 0.3
	First floor			135° Up 045°	.12 .08 .47	1-peak - 0.5
	Roof			135° Up 045°	0.25 .20 1.10	0.9 1.3 6.0
	Switchyard			135° Up 045°	.38 .29 .58	0.9 0.5 0.6
	Freefield			360° Up 270°	.41 .12 .21	0.9 2-peaks 1-peak
	Coalinga Anticline Ridge (USGS)†	36.233°N 120.333°W	* 1.6			
	Pad			360° Up 270°	.49 .80 1.17	4.1 2.2 4.1
	Coalinga Burnett Const. Co. (USGS)†	36.138°N 120.357°W	* 2.4	360° Up 270°	.34 .27 .26	5.0 2.6 6.6

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Coalinga Oil City (USGS)†	36.229°N 120.360°W	* 1.4	360° Up 270°	.40 .37 .85	4.3 4.1 4.6
	Coalinga Oil Fields Fire Sta. (USGS)	36.247°N 120.314°W	57.6 2.1			
	Freefield			360° Up 270°	.20 .13 .22	1.7 1.6 2.1
	Pad			360° Up 270°	.22 .17 .21	1.7 2.5 2.1
	Coalinga Palmer Avenue (USGS)	36.209°N 120.292°W	57.6 2.7	360° Up 270°	.30 .22 .28	2.2 3.9 2.1
	Coalinga Skunk Hollow (USGS)†	36.275°N 120.306°W	* 3.1	360° Up 270°	.23 .24 .39	1.5 1.7 1.7
	Coalinga Transmitter Hill (USGS)†	36.249°N 120.343°W	* 1.7	360° Up 270°	0.96 .50 .75	4.4 2.6 4.1
22 July 1983 0249:09.6 UTC Central California 36.211N, 120.422W Magnitude 3.8	Coalinga Palmer Avenue (USGS)	36.209°N 120.292°W	13.3 2.5		**	
22 July 1983 0329:02.6 UTC Central California 36.233N, 120.432W Magnitude 3.5	Coalinga Oil City (USGS)	36.229°N 120.360°W	03.8 1.7	360° Up 270°	.05 .04 .10	- - 1-peak
22 July 1983 0240 - 0342 UTC Central California Epicenter and magnitude unknown	Coalinga Anticline Ridge (USGS)†	36.233°N 120.333°W	* *			
	Pad				**	
	Coalinga Burnett Const. Co. (USGS)†	36.138°N 120.357°W	* 0.7	360° Up 270°	.09 .03 .07	- - -
	Note: One additional record** recovered at Burnett Construction Co.					
	Coalinga Transmitter Hill (USGS)†	36.249°N 120.343°W	* *		**	
	Coalinga Oil City (USGS)†	36.229°N 120.360°W	* *	360° Up 270°	.09 .05 .10	- - 1-peak
	Note: One additional record** recovered at Oil City.					

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max acc[4] (g)	Duration[5] (s)
22 July 1983 0343:00.6 UTC Central California 36.210N, 120.413W Magnitude 5.0	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	06.3 3.3			
	Basement				**	
	First floor				**	
	Roof			135° Up 045°	.04 .03 .11	- - 0.5
	Switchyard				**	
	Freefield				**	
	Coalinga Anticline Ridge (USGS)†	36.233°N 120.333°W	* 1.9			
	Pad			360° Up 270°	0.34 .22 .51	1.6 1-peak 1.6
	Coalinga Burnett Const. Co. (USGS)	36.138°N 120.357°W	04.6 2.1	360° Up 270°	.17 .04 .11	2-peaks - 0.3
	Coalinga Oil City (USGS)	36.229°N 120.360°W	03.6 1.6	360° Up 270°	.25 .12 .30	1.2 1-peak 0.7
	Note: One additional record** recovered at Oil City between July 22, 0343 and July 25, 2152 UTC.					
	Coalinga Oil Fields Fire Sta. (USGS)	36.247°N 120.314°W	04.1 2.2			
	Freefield			360° Up 270°	.13 .04 .14	1-peak - 1-peak
	Pad			360° Up 270°	.13 .04 .16	1-peak - 0.3
	Coalinga Palmer Avenue (USGS)	36.209°N 120.292°W	04.2 2.3	360° Up 270°	.30 .08 .33	0.6 - 0.4
	Coalinga Skunk Hollow (USGS)†	36.275°N 120.306°W	* 2.5	360° Up 270°	.09 .04 .15	- - 0.2
	Note: One additional record** recovered at Skunk Hollow.					
	Coalinga Transmitter Hill (USGS)	36.249°N 120.343°W	03.9 1.8	360° Up 270°	.30 .08 .25	1.2 - 0.9

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****--Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Lake Success Dam (ACOE)	36.061°N 118.920°W	39.1 *			
	Right crest				**	
	Right abutment				**	
	Slope				**	
	Downstream				**	
	Left crest				**	
	Left abutment				**	
	Note: Three each additional records** recovered at left crest, left abutment, slope, downstream, right crest, and right abutment between 3 May and 22 July 1983.					
25 July 1983 2231:39.2 UTC Central California 36.215N, 120.406W Magnitude 5.4	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	44.4 3.6			
	Basement				**	
	First floor				**	
	Roof			135°	0.03	-
				Up	.03	-
				045°	.15	4.6
	Switchyard				**	
	Freefield				**	
	Coalinga Anticline Ridge (USGS)	36.233°N 120.333°W	42.0 1.9			
	Freefield			360°	.59	2.4
				Up	.30	0.8
				270°	.55	2.6
	Pad			360°	.43	3.1
				Up	.29	0.9
				270°	.56	2.4
	Coalinga Burnett Const. Co. (USGS)	36.138°N 120.357°W	43.0 2.4	360°	.39	1.0
				Up	.26	1.6
				270°	.66	1.0
	Coalinga Oil City (USGS)	36.229°N 120.360°W	42.1 1.5	360°	0.24	1.3
				Up	.22	2.1
				270°	.37	2.1
	Coalinga Oil Fields Fire Sta. (USGS)	36.247°N 120.314°W	42.5 2.1			

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****--Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max acc[4] (g)	Duration[5] (s)
(Cont.)	Freefield			360°	.10	1-peak
				Up	.06	-
				270°	.15	0.2
	Pad			360°	.12	2-peaks
				Up	.06	-
				270°	.18	0.2
	Coalinga	36.209°N	42.7	360°	.15	0.5
	Palmer Avenue	120.292°W	2.4	Up	.17	1.9
	(USGS)			270°	.18	0.6
	Coalinga	36.275°N	*	360°	.06	-
	Skunk Hollow	120.306°W	2.4	Up	.09	-
	(USGS)†			270°	.14	0.3
	Coalinga	36.249°N	*	360°	.39	1.5
	Transmitter Hill	120.343°W	1.9	Up	.12	1-peak
	(USGS)†			270°	.28	1.4
26 August 1982-	Icy Bay	59.968°N	*	180°	.20	1.0
27 July 1983	Gulf Timber Co.	141.643°W	6.1	Up	.02	-
Alaska	(USGS)			090°	.20	2-peaks
Epicenter and magnitude unknown						
30 July 1983	Long Valley Dam	37.588°N	*			
0126:16.7 UTC	Lake Crowley	118.705°W	*			
Eastern California	(USGS)†					
37.582N, 118.772W						
Magnitude 3.9	Left abutment				**	
	Long Valley	37.570°N	17.9		**	
	Fire Station	118.752°W	0.3			
	(USGS)					
30 July 1983	Long Valley Dam	37.588°N	*			
0416:39.7 UTC	Lake Crowley	118.705°W	*			
Eastern California	(USGS)†					
37.575N, 118.768W						
Magnitude 3.6	Left abutment				**	
31 July 1983	Coalinga	36.229°N	54.7		**	
1643:52.2 UTC	Oil City	120.360°W	*			
Central California	(USGS)					
36.215N, 110.272W						
Magnitude 3.4						
8 August 1983	Bear Valley Station 11	36.608°N	11.9	130°	0.06	-
1313:09.5 UTC	Wilkinson Ranch	121.109°W	1.7	Up	.03	-
Central California	(USGS)			040°	.06	-
36.575N, 121.065W						
Magnitude 4.0	Bear Valley Station 6	36.504°N	12.5	310°	.06	-
	James Ranch	121.101°W	2.5	Up	.04	-
	(USGS)			220°	.06	-
	Bear Valley Station 7	36.483°N	12.9	310°	.04	-
	Pinnacles Nat'l Mon.	121.180°W	2.2	Up	.02	-
	(USGS)			220°	.06	-

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Bear Valley Station 14	36.569°N	11.0	310°	.32	0.7
	Upper Butts Ranch	121.043°W	1.5	Up	.16	1.1
	(USGS)			220°	.18	0.8
	Note: Two additional records** between 8 August and 7 December recovered at Upper Butts Ranch.					
	Bear Valley Station 10	36.532°N	12.5	310°	.07	-
	Webb Residence	121.143°W	2.1	Up	.04	-
	(USGS)			220°	.06	-
14 August 1983	Coalinga	36.233°N	40.8			
1243:36.5 UTC	Anticline Ridge	120.333°W	*			
Central California	(USGS)					
36.297N, 120.387W						
Magnitude 4.2	Freefield				**	
	Pad				**	
	North				**	
	Coalinga	36.229°N	38.7	360°	.09	-
	Oil City	120.360°W	1.9	Up	.03	-
	(USGS)			270°	.09	-
	Coalinga	36.249°N	41.8		**	
	Transmitter Hill	120.343°W	*			
	(USGS)					
	Coalinga	36.275°N	*		**	
	Skunk Hollow	120.306°W	1.4			
	(USGS)†					
	Pleasant Valley	36.308°N	40.0			
	Pump Plant	120.249°W	3.4			
	(USBR)					
	Basement				**	
	First floor				**	
	Roof				**	
	Switchyard				**	
	Slope				**	
	Freefield				**	
6 August 1982-	Cordova Airport	60.48° N	*		**	
16 August 1983	Flight Center	145.40° W	*			
Alaska	(USGS)					
Epicenters and magnitudes unknown	Note: One additional record** recovered at Cordova Airport.					
28 May 1983-	Eel River Valley Array	40.563°N	*		**	
24 August 1983	Centerville Beach	124.348°W	6.2			
No. California	(USGS)					
Epicenter and magnitude unknown						

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
24 August 1983 1336:30.9 UTC No. California 40.305N, 124.767W Magnitude 5.5	Eel River Valley Array Centerville Beach (USGS)†	40.563°N 124.348°W	* 6.8	360° Up 270°	0.18 .06 .14	2-peaks - 2-peaks
	Eel River Valley Array Fortuna Fire Station (USGS)†	40.599°N 124.154°W	* 9.6	360° Up 270°	.09 .02 .08	- - -
	Eel River Valley Array Bunker Hill FAA (USGS)†	40.498°N 124.294°W	* 6.2	360° Up 270°	.05 .02 .04	- - -
26 August 1983 1957:41.9 UTC Central California 36.195N, 120.358W Magnitude 3.8	Coalinga Oil City (USGS)	36.229°N 120.360°W	43.7 2.0		**	
29 August 1983 1010:31.0 UTC Central California 35.830N, 121.353W Magnitude 5.2	Bear Valley Station 10 Webb Residence (USGS)	36.532°N 121.143°W	46.5 8.4		**	
13 June 1983- 3 September 1983 Alaska Epicenter and magnitude unknown	Whittier RR Dock Building (USGS)†	60.778°N 148.692°W	* 9.7	360° Up 270°	0.05 .05 .06	- - -
7 September 1983 1922:05.1 UTC So. Alaska 60.976N, 147.500W Magnitude 6.2	Anchorage Alaska Hospital (USGS)†	61.21° N 149.82° W	* 14.6			
	1st floor				**	
	4th floor				**	
	7th floor			225° Up 135°	.07 .03 .09	- - -
	Anchorage Federal Building (USGS)†	61.216°N 149.883°W	* *			
	Basement				**	
	Anchorage Gould Hall, APU (USGS)†	61.189°N 149.801°W	* *		**	
	Anchorage USGS Building (USGS)†	61.223°N 149.892°W	* *			
	Basement				**	
	Anchorage Westward Hotel (USGS)†	61.220°N 149.892°W	* *			

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Basement				**	
	22nd level (roof)			135°	.06	-
				Up	.06	-
				045°	.07	-
	Whittier RR Dock Building (USGS)†	60.778°N 148.692°W	* 8.7	360°	.08	-
				Up	.07	-
				270°	.08	-
	Note: Two additional records** recovered at Whittier RR dock building.					
	Valdez Valdez Dock Company (USGS)†	61.13° N 146.36° W	* *	030°	0.04	-
				Up	.05	-
				300°	.09	-
	Valdez Valdez City Hall (USGS)†	61.137°N 146.362°W	* 4.7	360°	.06	-
				Up	.04	-
				270°	.05	-
	Valdez Valdez High School (USGS)†	61.143°N 146.355°W	* 6.1	180°	.08	-
				Up	.06	-
				090°	.06	-
5 May 1983- 9 September 1983 Central California Epicenter and magnitude unknown	Bear Valley Station 12 Williams Ranch (USGS)	36.658°N 121.249°W	* 2.0	310°	.07	-
				Up	.02	-
				220°	.04	-
9 September 1983 Time unknown Central California Epicenter and magnitude unknown	Bear Valley Station 12 Williams Ranch (USGS)	36.658°N 121.249°W	16.2 *		**	
9 September 1983 0916:14.9 UTC Central California 36.230N, 120.262W Magnitude 5.3	Pleasant Valley Pump Plant (USBR/USGS)	36.308°N 120.249°W	17.6 2.9			
	1st floor				**	
	Roof			135°	.06	-
				Up	.06	-
				045°	.11	0.9
	Switchyard			135°	.07	-
				Up	.08	-
				045°	.08	-
	Freefield			315°	.06	-
				Up	.05	-
				225°	.04	-
	Slope			315°	.05	-
				Up	.07	-
				225°	.07	-

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****--Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Coalinga Burnett Const. Co. (USGS)	36.138°N 120.357°W	18.5 3.6		**	
	Coalinga Anticline Ridge (USGS)	36.233°N 120.333°W	16.8 1.8			
	Freefield			360° Up 270°	0.23 .05 .18	1.7 - 2.4
	Pad			360° Up 270°	.20 .09 .18	1.4 - 1.5
	North			360° Up 270°	.29 .06 .17	1.8 - 2.0
	South			360° Up 270°	.08 .04 .06	- - -
	Coalinga Skunk Hollow (USGS)†	36.275°N 120.306°W	* 2.3	360° Up 270°	.09 .05 .10	- - 1-peak
	Coalinga Oil Fields Fire Sta. (USGS)†	36.247°N 120.314°W	* 1.5			
	Freefield			360° Up 270°	.14 .09 .09	1.6 - -
	Pad			360° Up 270°	.17 .07 .12	1.5 - 2-peaks
	Coalinga Oil City (USGS)	36.229°N 120.360°W	18.0 1.2	360° Up 270°	.07 .04 .09	- - -
	Coalinga Transmitter Hill (USGS)†	36.249°N 120.343°W	* 1.5		**	
9 September 1983 0921:33.3 UTC Central California 36.235N, 120.277W Magnitude 3.5	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	40.0 *			
	Switchyard				**	
11 September 1983 1148:08.0 UTC Central California 36.230N, 120.388W Magnitude 4.3	Pleasant Valley Pump Plant (USBR)	36.308°N 120.249°W	09.6 2.9			
	Switchyard				**	
	Slope				**	

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Freefield				**	
	Coalinga Anticline Ridge (USGS)	36.233°N 120.333°W	10.7 0.7			
	Freefield			360°	0.10	1-peak
				Up	.03	-
				270°	.08	-
	Pad			360°	.09	-
				Up	.04	-
				270°	.10	1-peak
	North			360°	.06	-
				Up	.03	-
				270°	.06	-
	South				**	
	Coalinga Burnett Const. Co. (USGS)	36.138°N 120.357°W	10.5 2.3	360° Up 270°	.25 .09 .31	0.3 - 0.3
	Coalinga Oil Fields Fire Sta. (USGS)	36.247°N 120.314°W	11.0 *			
	Freefield				**	
	Pad				**	
	Coalinga Oil City (USGS)	36.229°N 120.360°W	09.4 1.6	360° Up 270°	.09 .03 .09	- - -
	Coalinga Skunk Hollow (USGS)†	36.275°N 120.306°W	* 2.1	360° Up 270°	.05 .03 .07	- - -
	Coalinga Transmitter Hill (USGS)†	36.249°N 120.343°W	* *	360° Up 270°	.05 .02 .06	- - -
14 September 1983 1556 UTC Central California Epicenter and magnitude unknown	Bear Valley Station 12 Williams Ranch (USGS)	36.658°N 121.249°W	10.9 *		**	
27 July 1983-16 September 1983 Central California Epicenters and magnitudes unknown	Coalinga Palmer Avenue (USGS)	36.209°N 120.292°W	* 1.5	360° Up 270°	0.33 .13 .21	2.1 1.1 1.5
	Note: 3 additional records** recovered at Palmer Avenue.					
18 September 1983 1434:32.5 UTC Central California 36.300N, 120.283W Magnitude 3.7	Coalinga Oil City (USGS)	36.229°N 120.360°W	37.1 *		**	

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
14 September 1982- 21 September 1983 Alaska Epicenters and magnitudes unknown	Fairbanks Observatory, UA (USGS)	64.86° N 147.83° W	* *		**	
	Fairbanks Duckering Hall, UA (USGS)	64.85° N 147.82° W	* *		**	
	Talkeetna FAA-VOR (USGS)	62.30° N 150.10° W	* *		**	
	Note: Three additional records** recovered at Talkeetna, FAA-VOR.					
21 September 1983 2335 UTC Central California Epicenter and magnitude unknown	Bear Valley Station 10 Webb Residence (USGS)	36.532°N 121.143°W	58.0 *		**	
4 October 1983 0455:59.2 UTC Central California 36.808N, 121.532W Magnitude 3.4	San Justo Damsite (USBR)	36.827°N 121.445°W	04.5 *			
	Right abutment (dike)				**	
8 September 1983- 10 October 1983 Southern Alaska Epicenters and magnitudes unknown	Whittier RR Dock Building (USGS)	60.778°N 148.692°W	* *		**	
	Note: One additional record** recovered at Whittier RR dock building.					
28 October 1983 1406:06.6 UTC Eastern Idaho 44.058N, 113.857W Magnitude 6.2	Boise, Idaho VA Hospital (VA)†	43.62° N 116.19° W	* 18.3		**	
	Ririe Dam, Idaho (USBR)†	43.59° N 111.75° W	* *			
	Upper tower				**	
	Lower tower				**	
	Crest				**	
	Abutment				**	
	Downstream				**	
29 October 1983 0637:59.9 UTC Southern California 33.967N, 116.573W Magnitude 3.6	Whitewater Canyon Trout Farm (USGS)	33.99° N 116.66° W	07.1 *		**	
29 October 1983 2329:11.5 UTC Western Idaho 44.231N, 114.105W Magnitude 5.8	Dickey, Idaho Smith Ranch (USGS)	44.134°N 113.901°W	17.4 1.4	236° Up 146°	0.06 .04 .08	- - -

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
29 October 1983 2339:05.5 UTC Western Idaho 44.281N, 114.115W Magnitude 5.4	Dickey, Idaho Smith Ranch (USGS)	44.134°N 113.901°W	12.8 *		**	
30 October 1983 0124:51.2 UTC Eastern Idaho 44.083N, 113.970W Magnitude 4.8	Dickey, Idaho Smith Ranch (USGS)	44.134°N 113.901°W	54.4 1.8	236° Up 146°	.05 .05 .08	- - -
30 October 1983 0534 UTC Central California Epicenter and magnitude unknown	Bear Valley Station 10 Webb Residence (USGS)	36.532°N 121.143°W	17.9 *		**	
30 October 1983 1225 UTC Eastern Idaho Epicenter and Magnitude unknown	Dickey, Idaho Smith Ranch (USGS)	44.134°N 113.901°W	54.5 1.1		**	
30 October 1983 1749:20.3 UTC Eastern Idaho 44.16N, 113.95W Magnitude 3.8	Dickey, Idaho Smith Ranch (USGS)	44.134°N 113.901°W	22.1 *		**	
5 November 1983 0353 UTC Eastern Idaho Epicenter and magnitude unknown	Dickey, Idaho Smith Ranch (USGS)	44.134°N 113.901°W	36.1 *		**	
6 November 1983 2104:48.8 UTC Eastern Idaho 44.145N, 113.966W Magnitude 4.6	Dickey, Idaho Smith Ranch (USGS)	44.134°N 113.901°W	52.5 1.0		**	
	Dickey, Idaho Whitworth Ranch (USGS)	44.062°N 113.831°W	53.5 *		**	
12 November 1983 2032 UTC Eastern Idaho Epicenter and magnitude unknown	Dickey, Idaho Hatch Ranch (USGS)	44.338°N 114.051°W	38.2 *		**	
27 January 1983- 16 November 1983 Hawaii Epicenters and magnitudes unknown	Hawaii Nat'l Park, HI Wahaula Maint. Center (USGS)	19.329°N 155.031°W	* 1.5 * 2.0	145° Up 055° 145° Up 055°	0.12 .08 .07 .06 .03 .03	1-peak - - - - -

Note: Three additional records** recovered at Wahaula Maintenance Center.

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*--Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
(Cont.)	Mauna Loa Observ., HI (USGS)	19.539°N 155.580°W	* *		**	
	Note: Two additional records** recovered at Mauna Loa Observatory.					
	Hilo, Hawaii U.S. Fish & Wildlife (USGS)	19.731°N 155.100°W	* *	360° Up 270°	.12 .03 .06	0.6 - -
	Honokaa, Hawaii Fire Station (USGS)	20.080°N 155.465°W	* *		**	
	Note: One additional record** recovered at Honokaa Fire Station.					
	Mauna Kea, HI State Park (USGS)	19.752°N 155.530°W	* *		**	
	Note: One additional record** recovered at Mauna Kea State Park.					
	Pahala, HI Kau Hospital (USGS)	19.20° N 155.47° W	* *		**	
	Waiohinu, HI Ka'u Baseyard (USGS)	19.070°N 155.615°W	* *		**	
	Note: One additional record** recovered at Ka'u baseyard.					
	Waimea, HI Fire Station (USGS)	20.03° N 155.66° W	* *		**	
16 November 1983 1613:00.0 UTC Southern Hawaii 19.430N, 155.454W Magnitude 6.4	Hawaii Nat'l Park, HI Wahaula Maint. Center (USGS)†	19.329°N 155.031°W	* 5.1	145° Up 055°	0.12 .05 .07	1-peak - -
	Hawaii Nat'l Park, HI Volcano Observatory (USGS)†	19.423°N 155.291°W	* 2.4	360° Up 270°	.87 .21 .39	8.5 6.6 8.2
	Hilo, HI Sewage Plant (USGS)†	19.734°N 155.050°W	* 4.3	333° Up 243°	.10 .02 .07	1-peak - -
	Hilo, HI University of Hawaii (USGS)†	19.707°N 155.083°W	* 3.3	085° Up 355°	.07 .04 .11	- - 1-peak
	Kailua-Kona, HI Fire Station (USGS)†	19.649°N 155.996°W	* 5.0	312° Up 222°	.04 .01 .03	- - -
	Kealakekua, HI Kona Hospital (USGS)†	19.523°N 155.879°W	* 5.7	346° Up 256°	.10 .07 .10	1-peak - 1-peak

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner) [1]	Station coord.	TT [2], S-t (s)	Direction [3]	Max accl [4] (g)	Duration [5] (s)
(Cont.)	Mauna Kea, HI	19.752°N	*	050°	.17	5.4
	State Park	155.530°W	3.9	Up	.21	3.5
	(USGS)†			320°	.26	7.1
	Kapa'au, HI	20.230°N	*	102°	.07	-
	Kohala Police Station	155.801°W	1.5	Up	.05	-
	(USGS)†			012°	.09	-
	Pahoa, HI	19.498°N	*	087°	0.18	0.4
	Fire Station	154.951°W	7.0	Up	.07	-
	(USGS)†			357°	.11	2-peaks
	Waimea, HI	20.03° N	*	155°	.13	2.1
	Fire Station	155.66° W	8.4	Up	.07	-
	(USGS)†			065°	.08	-
	Hilo, HI	19.731°N	*	360°	.40	6.3
	U.S. Fish & Wildlife	155.100°W	5.0	Up	.15	1.3
	(USGS)†			270°	.50	10.5
	Honokaa, HI	20.080°N	*	021°	.25	4.5
	Fire Station	155.465°W	8.5	Up	.10	0.9
	(USGS)†			291°	.37	4.4
	Mauna Loa, HI	19.539°N	*	030°	.34	8.8
	Observatory	155.580°W	2.0	Up	.46	6.5
	(USGS)†			300°	.58	8.4
	Pahala, HI	19.20° N	*	188°	.59	8.5
	Kau Hospital	155.47° W	3.3	Up	.16	5.8
	(USGS)†			098°	.31	7.7
	Waiohinu, HI	19.070°N	*	065°	.19	3.8
	Ka'u Baseyard	155.615°W	4.7	Up	.09	-
	(USGS)†			335°	.17	3.6
20 November 1983 2202:36.4 UTC Central California 36.227N, 120.423W Magnitude 3.6	Coalinga Oil City (USGS)	36.229°N 120.360°W	40.1 *		**	
26 November 1983 1932 UTC Central California Epicenter and magnitude unknown	Bear Valley Station 10 Webb Residence (USGS)	36.532°N 121.143°W	05.3 1.4		**	
21 June 1983- 5 December 1983 Central California Epicenter and magnitude unknown	Isabella Dam Auxiliary Dam (ACOE)	35.642°N 118.470°W	* *			
	Right abutment				**	
	Right crest				**	
	Lower tower				**	

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****–Continued**

Event	Station name (owner)[1]	Station coord.	TT[2], S-t (s)	Direction[3]	Max accl[4] (g)	Duration[5] (s)
16 November 1983- 11 December 1983 Southern Hawaii Epicenters and magnitudes unknown	Hawaii Nat'l Park, HI Wahaula Maint. Center (USGS)	19.329°N 155.031°W	* 1.6		**	
	Hawaii Nat'l Park, HI Volcano Observatory (USGS)	19.423°N 155.291°W	* *		**	
	Note: One additional record** recovered at the Volcano Observatory.					
	Honokaa, HI Fire Station (USGS)	20.080°N 155.465°W	* 3.3		**	
	Note: One additional record** recovered at Honokaa Fire Station.					
	Mauna Kea, HI State Park (USGS)	19.752°N 155.530°W	* *		**	
	Mauna Loa, HI Observatory (USGS)	19.539°N 155.580°W	* *	030° Up 300°	0.09 .03 .08	- - -
	Waimea, HI Fire Station (USGS)	20.03° N 155.66° W	* *		**	
	Note: One additional record** recovered at Waimea Fire Station.					
12 December 1983 0455:36.4 UTC Western Idaho 44.128N, 114.102W Magnitude 4.5	Dickey, Idaho Hatch Ranch (USGS)	44.338°N 114.051°W	39.2 1.4	360° Up 270°	.09 .04 .11	- - 1-peak
3 July 1983- 13 December 1983 Central California Epicenter and magnitude unknown	Terminus Dam (ACOE) Main Dam (Right crest)	36.420°N 119.000°W	* *		 **	
15 December 1983 0613:34.8 UTC Western Idaho 44.365N, 114.138W Magnitude 4.1	Dickey, Idaho Hatch Ranch (USGS)	44.338°N 114.051°W	38.4 1.2		**	
25 December 1983 0949:01.5 UTC Eastern Idaho 44.143N, 113.924W Magnitude 3.6	Dickey, Idaho Smith Ranch (USGS)	44.134°N 113.903°W	03.7 1.2		**	

See footnotes at end of table.

Table 11. ***Summary of U. S. accelerograph records recovered during 1983*****--Continued**

[1] Station owner code:
ACOE - U.S. Army Corps of Engineers.
CDWR - California Department of Water Resources.
SDGE - San Diego Gas and Electric Company.
UCB - University of California, Berkeley.
USBR - U.S. Bureau of Reclamation.
USGS - U.S. Geological Survey.
TEIC - Tennessee Earthquake Information Center.
VA - Veterans Administration.
† - WWVB time code not legible or instrument not equipped with a radio receiver; a correlation of accelerogram with event may be questionable.

[2] TT - Trigger time of accelerograph (in seconds, after minute (or following minute) listed in event column).
S-t - S-wave arrival minus trigger time (S - t) interval (S-P times given in parentheses).
* TT or 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 unless otherwise noted.
** 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.

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ERRATA

United States Earthquakes, 1982
U.S. Geological Survey Bulletin 1655
"Earthquake Descriptions"

1. The event description on page 11 for the 7 January earthquake under the heading "Arizona" should be changed to the following:

7 January (G) Northern Arizona
Origin time: 16 21 45.4
Epicenter: 36.95 N., 112.88 W.
Depth: 10 km
Magnitude: 2.9 ML(G)

Felt at Colorado City (U)

2. The hypocenter source "D" for Montana earthquakes on page 91 is the University of Montana, Missoula.

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