

DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

United States Earthquakes, 1976

By

Jerry L. Coffman

and

Carl W. Stover

Open-File report 84-976

Prepared in cooperation with National Oceanic and Atmospheric Administration.

This report has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Contributors

Contributors to this publication are listed below according to the type of data supplied or service performed.

Hypocenters and magnitudes:

John S. Derr, U.S. Geological Survey
W. LeRoy Irby, U.S. Geological Survey
R. Kangas, U.S. Geological Survey
Waverly J. Person, U.S. Geological Survey
Bruce W. Presgrave, U.S. Geological Survey
Hawaiian Volcano Observatory, U.S. Geological Survey

Intensities:

Jerry L. Coffman, NOAA, EDIS
Ruth B. Simon, U.S. Geological Survey

Geodesy:

B.K. Meade, NOAA, NOS, National Geodetic Survey
John G. Gergen, NOAA, NOS, National Geodetic Survey

Tsunamis:

Mark G. Spaeth, NOAA, National Weather Service

Strong-motion seismograph data:

Ronald L. Porcella, U.S. Geological Survey

Well-water levels:

Kenneth L. Rennick, U.S. Geological Survey

Computer programs, editorial assistance, and manuscript review:

Beverly Armstrong, NOAA, EDIS
Sharon R. Johnson, NOAA, EDIS
Leslie D. Morris, NOAA, EDIS
Carl A. von Hake, NOAA, EDIS
Carol Weathers, NOAA, EDIS

Contents

	Page
Contributors	iii
Introduction	1
Discussion of Tables	1
Epicenter Maps	1
Earthquake Information Services	1
Magnitude and Intensity Ratings	3
Modified Mercalli Intensity Scale	5
Acknowledgments	6
Earthquake Descriptions	7
Alaska	7
Arizona	10
Arkansas	12
California	15
Connecticut	29
Georgia	29
Hawaii	29
Idaho	41
Indiana	41
Kentucky	41
Maine	43
Massachusetts	43
Michigan	43
Missouri	43
Montana	44
Nevada	44
New Jersey	45
New Mexico	46
Oklahoma	47
Oregon	48
Puerto Rico	49
Rhode Island	49
Tennessee	49
Texas	50
Utah	50
Virginia	50
Virgin Islands	51
Washington	52
West Virginia	55
Wyoming	56
Miscellaneous Activities	71
Horizontal Control Surveys for Crustal Movement Studies	71
Vertical Movement Studies	71
Tsunamis	71
Principal Earthquakes of the World	71
Fluctuations in Well-Water Levels	72
Strong-Motion Seismograph Data	83
Introduction	83
Accelerograph Data	83
Intensities Observed in States Beyond Epicentral Region	93
References	94

LIST OF TABLES

Table	Page
1 Summary of earthquakes felt in U.S. for 1976	58
2 Principal earthquakes of the world during 1976	73
3 Earthquake fluctuations in well-water levels during 1976	76
4 Earthquakes in 1976 believed to have caused fluctuations in well-water levels	80
5 Summary of U.S. accelerograph records recovered during 1976	85
6 Summary of non-U.S. accelerograph records recovered during 1976	91

LIST OF ILLUSTRATIONS

Figure	Page
1 Earthquake epicenters in the U.S. in 1976	2
2 Earthquakes plotted by Modified Mercalli Intensity in 1976	4
3 Area affected by western Arizona earthquake of February 4	11
4 Area affected by northeastern Arkansas earthquake of March 25	13
5 Area affected by southern California earthquake of January 1	16
6 Area affected by southern California earthquake of April 8	18
7 Area affected by southern California earthquake of August 11	22
8 Area affected by southern California earthquake of October 17	24
9 Area affected by southern California earthquake of November 4	25
10 Area affected by southern California earthquake of November 22	27
11 Area affected by northern California earthquake of November 26	28
12 Area affected by Hawaii earthquake of April 2	32
13 Area affected by eastern Kentucky earthquake of January 19	42
14 Area affected by southern Quebec, Canada, earthquake of October 23	43
15 Area affected by northwestern New Mexico earthquake of January 5	46
16 Area affected by northern Oregon earthquake of April 13	48
17 Area affected by Virginia-North Carolina border earthquake of September 13	51
18 Area affected by Vancouver Island earthquake of May 16	53
19 Area affected by northwestern Washington earthquake of September 2	54
20 Area affected by northwestern Washington earthquake of September 8	55

United States Earthquakes, 1976

Jerry L. Coffman, NOAA, Environmental Data and Information Service
Carl W. Stover, U.S. Geological Survey

Introduction

This publication describes all earthquakes that occurred in the United States and nearby territories in 1976. It has been produced jointly by the NOAA Environmental Data and Information Service (EDIS) and the U.S. Geological Survey (USGS). Its purpose is to provide a continuous history of U.S. earthquakes for studying seismic risk, evaluating nuclear powerplant sites, designing earthquake-resistant structures, and answering inquiries from the scientific and general public.

The publication is composed of three major chapters: Earthquake Descriptions (which includes a chronological list of earthquakes by state in 1976 (table 1) and a summary of macroseismic data reported for each earthquake); Miscellaneous Activities (which contains information on crustal movement studies, tsunamis, principal earthquakes of the world (table 2), and fluctuations in well-water levels (tables 3 and 4)); and Strong-Motion Seismograph Data (table 5). The intensity and macroseismic data in "Earthquake Descriptions" are compiled from questionnaire canvasses (see next paragraph), newspaper articles, and reports prepared by other government organizations, state institutions, local organizations, and individuals. Each description includes date, origin time, hypocenter and hypocenter source of the earthquake, magnitude, maximum intensity (Modified Mercalli), and macroseismic effects reported in the area.

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

DISCUSSION OF TABLES

The earthquake values in tables 1, 2, 4, and 5 include date, origin time, hypocenter (epicenter and focal depth), and magnitude (table 1 also contains the Modified Mercalli (MM) intensity). The origin time and date are listed in Universal Coordinated Time (UTC). The epicenters were taken from those published in the USGS Preliminary Determination of Epicenters Monthly Listing or Earthquakes in the United States. The accuracy of the epicenters in table 1 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 USGS have a varying degree of accuracy, usually

two-tenths of a degree or less, depending on their continental or oceanic location. The oceanic hypocenters are less accurate than those on the continent, even though both are listed to two decimals. Depths are listed to the nearest whole kilometer, but may not be known to this accuracy.

Magnitude values listed in the tables were furnished by cooperating institutions or determined by USGS. The computational sources are labeled according to the assigned letter codes shown in footnotes to the tables. The absence of a letter code in the magnitude column of table 1 indicates that the epicenter source listed in the "source" column is also the magnitude source. If a letter code does not appear in the "source" column, the earthquake is noninstrumental.

EPICENTER MAPS

Figure 1 is a computer plot of all earthquake epicenters listed in table 1. Each earthquake is indicated by a small dot.

Figure 2 is a computer plot of 1976 earthquakes by Modified Mercalli intensity. Maximum intensities are represented by Arabic numerals at the location that each occurred. Earthquakes of int. I-IV are represented by dots.

The selection of intensity or isoseismal maps (figs. 3-20) is governed largely by the size of the area affected. This means that sharp, localized shocks of intensity VI (which occur mostly in California) may not be represented by these maps, whereas other earthquakes of intensity V and VI (which occur largely in the Eastern and Central States) often will be illustrated because of the larger felt areas. Numerals on these computer-plotted maps represent the maximum MM intensities at each town. Isoseismal contours are a generalization of intensity data and are extrapolated to regions that have no observations. The contours do not include each intensity observation.

EARTHQUAKE INFORMATION SERVICES

The National Geophysical and Solar-Terrestrial Data Center (NGSDC), one of the five major facilities of NOAA's Environmental Data and Information Service, is responsible for data activities in seismology. Its services include preparing local and regional seismic histories for engineers, actuaries, and other scientists and answering direct inquiries from the public on all

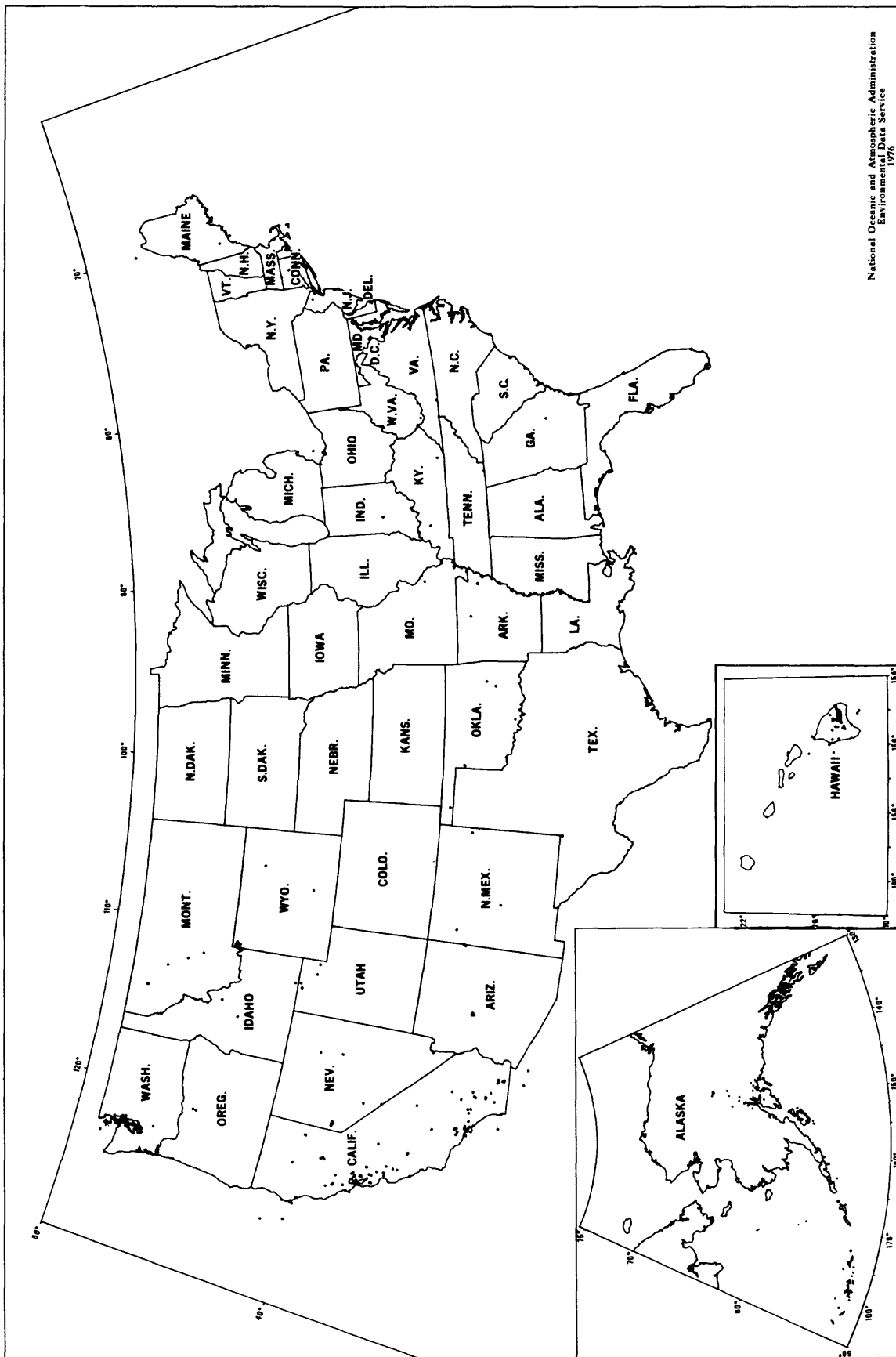


Figure 1.--Earthquake epicenters in the U.S. in 1976

aspects of historical earthquakes. Additional services and products include publishing annual earthquake summaries and revised historical earthquake reports; and making available copies of seismograms, accelerograms, displacement meter records, digitized strong-motion seismograms, and epicenter lists in several formats. Many of these products and services are based on seismic records or other data that have originated with USGS recording networks or with USGS data-reduction facilities. Information concerning services and products of NGSDC may be obtained from the National Geophysical and Solar-Terrestrial Data Center, NOAA/EDIS, Boulder, Colo. 80303.

During 1976, USGS announced 6,320 epicenter locations in the twice-weekly Preliminary Determination of Epicenters (PDE) list. Epicenters are published when sufficient information has accumulated to insure a reasonable degree of accuracy. The results are preliminary and do not always agree with later epicenters determined from additional seismic readings or from new data with critical azimuths and distances. For special studies, an inquiry should be made to the USGS (Denver Federal Center, Branch of Global Seismology, Stop 967, Box 25046, Denver, Colo. 80225) for possible recomputation of epicenters of interest.

USGS coordinates the collection of all types of earthquake information, with the special objective of correlating instrumentally determined earthquake locations with noninstrumental locations indicated by intensity data. This correlation is achieved through intensive regional investigations of earthquakes by local organizations and USGS. Primary data are gathered by a canvass of the epicentral area using questionnaire cards. When returned and analyzed, this information is used to map the seismic areas of the country in order to promote public safety through a better understanding of earthquake phenomena.

MAGNITUDE AND INTENSITY RATINGS

Magnitude, a measure of the "size" of an earthquake, is roughly related to the energy release at the focus of an earthquake. Although the magnitude scale has neither "top" nor "bottom" values, the highest ever recorded was magnitude 8.9 and the lowest about -3. On this logarithmic scale, a magnitude 6 shallow-focus earthquake represents elastic-wave energy approximately 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 USGS are based on the following formulae:

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

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 horizontal surface-wave ground amplitude in micrometers; T is the period in seconds, and $18 < T < 22$; and D is the distance in geocentric degrees (station to epicenter), and $20^\circ < D < 160^\circ$. No depth correction is made for depth less 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 $0.1 < T < 3.0$, 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 $D > 5^\circ$.

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

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 < 600 km. ML values are also calculated from other seismometers by conversion of recorded ground motion to the expected response of the torsion seismometer.

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

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

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

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

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

Although the Modified Mercalli Intensity Scale is in many instances inadequate for present-day requirements, the scale has been the

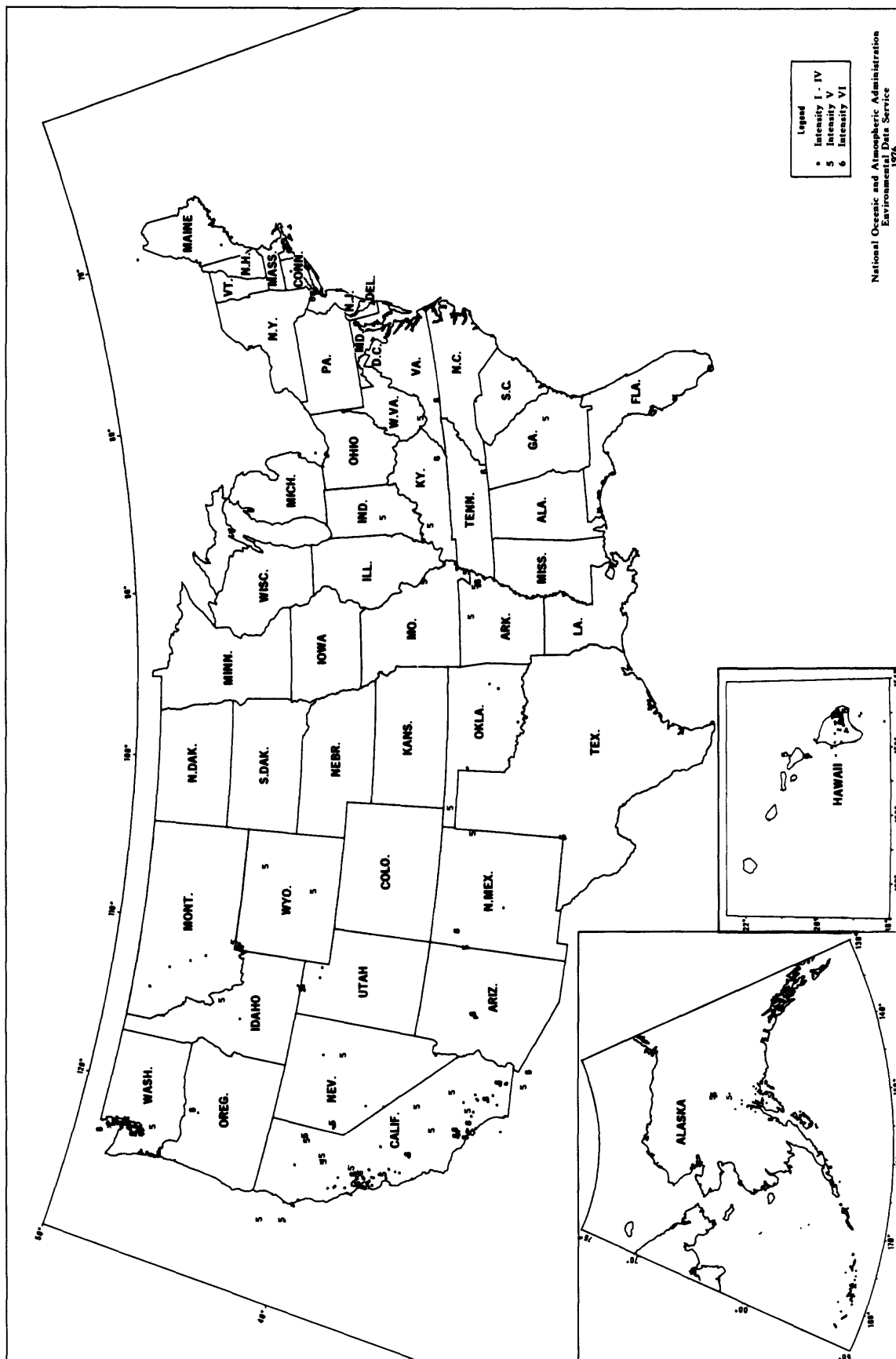


Figure 2.--Earthquakes plotted by Modified Mercalli Intensity in 1976

guide used by NOAA and USGS and will continue to be so used until a new scale has been devised and has acceptance in the engineering and seismological communities. Questions concerning the interpretation of historical earthquake intensities should be referred to USGS.

MODIFIED MERCALLI INTENSITY SCALE

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. Ratling 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 knickknacks, 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 roofline (sometimes damaging roofs). Fall of cornices from towers and high buildings. Dislodged bricks and stones. Overturned heavy furniture, with damage from breaking. Damage considerable to concrete irrigation ditches.

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

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

frames; serious to reservoirs; underground pipes sometimes broken.

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

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

Acknowledgments

Active cooperation in earthquake investigations in the United States is provided by several seismology collaborators. The following served as collaborators to NOAA and USGS during 1976.

Alabama.--L.J. Eisele, Spring Hill College, Mobile.

Alaska.--Staff of NOAA-Palmer Observatory, Palmer, and J.B. Townshend, College Observatory, College.

Arizona.--Richard T. Moore, University of Arizona, Tucson.

California (at large).--Nina Scott, San Francisco.

California (northern).--Bruce A. Bolt, University of California, Berkeley.

California (southern).--Clarence R. Allen, California Institute of Technology, Pasadena.

Colorado.--Maurice W. Major, Colorado School of Mines, Golden.

Connecticut.--Edward F. Chiburis, University of Connecticut, Groton.

Delaware.--Robert R. Jordan, University of Delaware, Newark.

Florida and Georgia.--Leland T. Long, Georgia Institute of Technology, Atlanta.

Hawaii.--Robert Koyanagi, USGS, Hawaiian Volcano Observatory, Hawaii National Park.

Idaho.--Melvin W. Jackson, Morrison-Knudsen Co., Inc., Industrial Engineering Group, Boise.

Indiana.--Robert F. Blakely, Department of Natural Resources, Geological Survey, Bloomington.

Iowa.--J.P. Kopp, Loras College, Dubuque.

Kansas.--Robert J. Harris, Kansas State University, Manhattan.

Kentucky.--G. Randy Keller, University of Kentucky, Lexington.

Michigan.--James T. Wilson, University of Michigan, Ann Arbor.

Minnesota.--Harold Mooney, University of Minnesota, Minneapolis.

Mississippi, Louisiana area.--Fred Followill, University of Mississippi, University.

Missouri, Illinois, Arkansas area.--William J. Stauder and Otto Nuttli, Saint Louis University, Saint Louis.

Montana.--Stephen W. Nile, Gallatin Gateway.

Nevada.--Douglas Van Wormer, University of Nevada, Reno.

New England.--Francis J. Donohoe, S.J., Daniel J. Linehan, S.J., and James W. Skehan, S.J., Weston College, Weston, Mass.

New Mexico.--Allan R. Sanford, New Mexico Institute of Mining and Technology, Socorro.

New York.--Lynn R. Sykes, Lamont-Doherty Geological Observatory, Palisades.

North Carolina.--David M. Stewart, University of North Carolina, Chapel Hill.

Ohio.--Edward J. Walter, John Carroll University, Cleveland.

Oklahoma.--James E. Lawson, Jr., University of Oklahoma, Leonard.

Oregon.--Richard W. Couch, Oregon State University, Corvallis.

Pennsylvania.--Benjamin F. Howell, Jr., Pennsylvania State University, University Park.

South Carolina.--Pradeep Talwani, University of South Carolina, Columbia.

Tennessee.--Berlen C. Moneymaker, Knoxville.

Texas.--James Dorman, University of Texas, Galveston.

Utah.--Kenneth Cook, University of Utah, Salt Lake City.

Virginia.--G.A. Bollinger, Virginia Polytechnic Institute and State University, Blacksburg.

Washington.--Norman Rasmussen and Robert S. Crosson, University of Washington, Seattle.

West Virginia.--R.W. Laird, University of West Virginia, Morgantown.

Wisconsin.--David E. Willis, University of Wisconsin, Milwaukee.

Earthquake Descriptions

This section lists all earthquakes alphabetically by state. The origin time of earthquake occurrences is given in Universal Coordinated Time (UTC), which is expressed continuously from midnight to midnight, or 0 to 24 hours. The following symbols are used to indicate authority for arrival or origin times, epicenters, magnitudes, and (or) intensity data.

A--University of West Virginia, Morgantown.
 B--University of California at Berkeley.
 C--University of Connecticut, Groton.
 D--University of Montana, Missoula.
 E--California Dept. of Water Resources, Sacramento.
 F--USGS Open-File Report 77-181 (Fuis and others, 1977).
 G--U.S. Geological Survey (USGS), National Earthquake Information Service, Golden, Colo.
 H--U.S. Geological Survey, Hawaiian Volcano Observatory, Hawaii National Park.
 I--Dept. of Natural Resources, Bloomington, Ind.
 J--Weston Observatory, Weston, Mass.
 K--NOAA, Adak Observatory, Alaska.
 L--Lamont-Doherty Geological Observatory, Palisades, N.Y.
 M--NOAA, Alaska Tsunami Warning Center, Palmer.
 N--Georgia Institute of Technology, Atlanta.
 O--Seismological Service of Canada, Ottawa.
 P--California Institute of Technology, Pasadena.
 R--University of Nevada, Reno.
 S--St. Louis University, St. Louis, Mo.
 T--University of Oklahoma, Leonard.
 U--University of Utah, Salt Lake City.
 V--Virginia Polytechnic Institute and State University, Blacksburg.
 W--University of Washington, Seattle.
 Y--University of Kentucky, Lexington.
 Z--Oregon State University Tech. Report GTR 760915 (Couch and Farooqui, 1976).

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

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

----- Alaska -----

7 January (G) Southern Alaska

Origin time: 17 18 46.7
 Epicenter: 61.86 N., 150.67 W.
 Depth: 44 km
 Magnitude: None computed.
Intensity III: Palmer (press report).

13 January (G) Andreanof Islands, Aleutian Islands

Origin time: 23 48 22.6
 Epicenter: 51.79 N., 174.70 W.
 Depth: 33 km
 Magnitude: 3.9 mb
Intensity II: Adak.

15 January (G) Southern Alaska

Origin time: 02 17 20.4
 Epicenter: 61.74 N., 149.77 W.
 Depth: 30 km
 Magnitude: None computed.
Intensity II: Willow.

15 January (G) Central Alaska

Origin time: 13 12 31.2
 Epicenter: 62.26 N., 150.46 W.
 Depth: 33 km
 Magnitude: 3.3 ML(M)
Intensity IV: Talkeetna.

17 January (G) Southern Alaska

Origin time: 09 09 51.4
 Epicenter: 61.44 N., 148.38 W.
 Depth: 28 km
 Magnitude: 2.6 ML(M)
Intensity II: Palmer (M).

22 January (G) Southern Alaska

Origin time: 07 59 20.0
 Epicenter: 61.57 N., 149.96 W.
 Depth: 59 km
 Magnitude: None computed.
Intensity II: Nancy Lake (M).

23 January (G) Fox Islands, Aleutian Islands

Origin time: 13 03 04.7
 Epicenter: 53.52 N., 166.49 W.
 Depth: 104 km
 Magnitude: 3.7 mb
Intensity IV: Unalaska, Dutch Harbor (M).

5 February (G) Kenai Peninsula, Alaska

Origin time: 09 36 36.5
 Epicenter: 59.99 N., 149.35 W.
 Depth: 35 km
 Magnitude: 5.2 mb, 3.9 MS, 4.8 ML(M)
Intensity V: Seward (M).
Intensity IV: Moose Pass area (M).
Intensity III: Anchorage, Whittier (M).
Intensity II: Palmer (M).

Alaska--Continued

18 February (G) Andreanof Islands, Aleutian Islands

Origin time: 08 00 58.6
Epicenter: 51.57 N., 178.68 W.
Depth: 39 km
Magnitude: 4.9 mb, 4.3 MS
Intensity IV: Adak (K).

19 February (G) Andreanof Islands, Aleutian Islands

Origin time: 10 28 33.5
Epicenter: 52.50 N., 179.52 W.
Depth: 212 km
Magnitude: 4.9 mb
Intensity II: Adak (K).

22 February (G) Andreanof Islands, Aleutian Islands

Origin time: 07 21 25.8
Epicenter: 51.73 N., 176.87 W.
Depth: 58 km
Magnitude: 5.0 mb
Intensity IV: Adak (K).

28 February (G) Andreanof Islands, Aleutian Islands

Origin time: 09 43 58.0
Epicenter: 51.56 N., 178.54 W.
Depth: 32 km
Magnitude: 4.8 mb
Intensity II: Adak (K).

8 March (G) Andreanof Islands, Aleutian Islands

Origin time: 02 28 47.7
Epicenter: 51.34 N., 178.04 W.
Depth: 54 km
Magnitude: 4.7 mb, 4.1 MS
Intensity III: Adak (K).

13 March (G) Central Alaska

Origin time: 14 33 42.5
Epicenter: 63.50 N., 148.67 W.
Depth: 22 km
Magnitude: 3.9 mb, 4.2 ML(M)
Intensity V: Cantwell, Summit area.
Intensity III: Broad Pass, Suntrana.

13 March (G) Central Alaska

Origin time: 15 18 57.8
Epicenter: 63.51 N., 148.70 W.
Depth: 45 km
Magnitude: 3.3 ML(M)
Intensity III: Cantwell.

21 March (G) Kenai Peninsula

Origin time: 17 20 27.9
Epicenter: 60.87 N., 149.69 W.
Depth: 59 km
Magnitude: None computed.
Intensity III: Alyeska, Anchorage, Palmer (M).

25 March (G) Kodiak Island region

Origin time: 07 49 33.6
Epicenter: 57.01 N., 153.71 W.
Depth: 28 km
Magnitude: 5.0 mb

Alaska--Continued

Intensity III: Sitkinak Island (Trinity Island group), Old Harbor area.

26 March (G) Central Alaska

Origin time: 14 40 14.2
Epicenter: 63.60 N., 147.65 W.
Depth: 33 km
Magnitude: 4.1 mb, 4.2 ML(M)
Intensity IV: Fairbanks.

11 April Central Alaska

Origin time: 07 36
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.
Intensity IV: College.

14 April (G) Central Alaska

Origin time: 04 16 16.3
Epicenter: 62.15 N., 150.26 W.
Depth: 33 km
Magnitude: 3.1 ML(M)
Intensity IV: Talkeetna.

17 April (G) Central Alaska

Origin time: 06 08 44.5
Epicenter: 64.90 N., 148.31 W.
Depth: 33 km
Magnitude: 4.0 ML(M)
Intensity V: Fairbanks.
Intensity II: North Pole.

25 April (G) Central Alaska

Origin time: 10 12 09.4
Epicenter: 64.79 N., 147.67 W.
Depth: 34 km
Magnitude: 3.3 ML(M)
Intensity V: Fairbanks.

27 April (G) Central Alaska

Origin time: 11 26 57.5
Epicenter: 64.81 N., 147.49 W.
Depth: 33 km
Magnitude: 3.8 ML(M)
Intensity IV: Fairbanks.

27 April (G) Central Alaska

Origin time: 11 34 20.0
Epicenter: 64.73 N., 147.58 W.
Depth: 29 km
Magnitude: 3.0 ML(M)
Intensity V: Fairbanks (aftershock felt 5 minutes later).

8 May (G) Southern Alaska

Origin time: 11 25 36.3
Epicenter: 61.62 N., 151.52 W.
Depth: 16 km
Magnitude: 4.4 mb, 4.4 ML(M)
Intensity IV: Kenai.
Intensity II: Talkeetna.

9 May (G) Southern Alaska

Origin time: 00 09 50.7
Epicenter: 59.86 N., 153.07 W.
Depth: 38 km
Magnitude: 4.7 mb, 3.9 ML(M)
Intensity IV: Homer, Iliamna.

Alaska--Continued

- 11 May (G) Southern Alaska
Origin time: 16 46 15.8
Epicenter: 61.49 N., 146.97 W.
Depth: 67 km
Magnitude: 4.2 mb
Intensity III: Valdez.
- 26 May (G) Kodiak Island Region
Origin time: 17 38 22.2
Epicenter: 57.97 N., 153.30 W.
Depth: 33 km
Magnitude: 4.5 mb
Intensity III: Kodiak Island.
- 1 June (G) Central Alaska
Origin time: 16 30 55.5
Epicenter: 64.70 N., 147.80 W.
Depth: 9 km
Magnitude: 2.9 ML(M)
Intensity II: Epicentral region.
- 10 June (G) Andreanof Islands, Aleutian Islands
Origin time: 08 57 59.6
Epicenter: 51.52 N., 176.54 W.
Depth: 58 km
Magnitude: 4.5 mb
Intensity II: Adak.
- 14 June (G) Andreanof Islands, Aleutian Islands
Origin time: 12 39 39.0
Epicenter: 51.47 N., 176.85 W.
Depth: 50 km
Magnitude: 4.1 mb
Intensity III: Adak.
- 24 June (G) Central Alaska
Origin time: 13 36 59.2
Epicenter: 61.97 N., 150.90 W.
Depth: 73 km
Magnitude: 4.8 mb
Intensity III: Talkeetna.
- 5 July (G) Andreanof Islands, Aleutian Islands
Origin time: 18 25 17.7
Epicenter: 51.30 N., 179.14 W.
Depth: 61 km
Magnitude: 4.6 mb
Intensity II: Adak.
- 5 July (G) Andreanof Islands, Aleutian Islands
Origin time: 18 28 28.0
Epicenter: 51.33 N., 179.16 W.
Depth: 54 km
Magnitude: 5.2 mb
Intensity II: Adak.
- 15 July (G) Central Alaska
Origin time: 08 09 47.4
Epicenter: 62.70 N., 149.83 W.
Depth: 24 km
Magnitude: 4.2 mb, 4.6 ML(M)
Intensity IV: Talkeetna.
- 22 July (G) Andreanof Islands, Aleutian Islands
Origin time: 14 30 17.7
Epicenter: 51.49 N., 177.86 W.
Depth: 58 km

Alaska--Continued

- Magnitude: 4.9 mb
Intensity II: Adak.
- 30 July (G) Southern Alaska
Origin time: 13 54 32.2
Epicenter: 61.33 N., 147.45 W.
Depth: 40 km
Magnitude: 3.9 mb, 4.0 ML(M)
Intensity II: Valdez.
- 11 August (G) Andreanof Islands, Aleutian Islands
Origin time: 20 43 45.5
Epicenter: 51.70 N., 175.42 W.
Depth: 33 km
Magnitude: 4.6 mb
Intensity III: Adak.
- 16 August (G) Andreanof Islands, Aleutian Islands
Origin time: 05 11 38.9
Epicenter: 51.50 N., 178.38 W.
Depth: 65 km
Magnitude: 5.1 mb
Intensity II: Adak.
- 16 August (G) Andreanof Islands, Aleutian Islands
Origin time: 10 11 33.3
Epicenter: 51.49 N., 178.05 W.
Depth: 55 km
Magnitude: 4.8 mb, 3.9 MS
Intensity II: Adak.
- 22 August (G) Southern Alaska
Origin time: 02 01 47.4
Epicenter: 60.22 N., 153.30 W.
Depth: 144 km
Magnitude: 5.5 mb
- An observer near the epicenter noted:
Campers at the west end of Kontrashibuna Lake, at about 60.15 N., 153.90 W., heard a loud noise to the southeast, looked immediately in that direction, but saw nothing. Experienced mountaineers in the group agreed later that it sounded like a rock avalanche, and that if it had been a rockfall they would have seen it. Less than a minute later they saw a 5-8 cm swell on the lake reach the shore where they were camped, even though it was a windless day. Waves 5 to 8 cm in height continued to break on the shore from many directions for several minutes before beginning to subside. The water was murky for at least one-half hour afterward. None of the campers felt any indication of earth movement.
- Intensity VI: Kenai (small ground cracks--unconfirmed), Ninilchik (small objects fell, not broken).
Intensity V: Anchorage (small objects moved, many people frightened), Anchor Point (water sloshed), Clam Gulch, Homer (water sloshed), Kasilof (surface of water disturbed, small objects moved), Nondalton (observer drifting in small boat on Snowshoe Bay felt vibration), Port Graham

Alaska--Continued

(small objects moved), Port Lions, Seward
(small objects moved), Soldotna, Sterling
(observer picking berries felt shaking
"longer than 2 minutes", water sloshed),
Wasilla (small objects moved).
Intensity IV: Aniak, Chugiak, Nyac, Old
Harbor, Ouzinkie, Seldovia, Talkeetna.
Intensity III: Mill Bay, Kodiak, Palmer.

- 25 August (G) Kenai Peninsula
Origin time: 11 04 18.9
Epicenter: 60.61 N., 150.17 W.
Depth: 47 km
Magnitude: None computed.
Intensity III: Anchorage, northern Kenai
Peninsula.
- 28 August (G) Andreanof Islands, Aleutian Islands
Origin time: 02 30 09.2
Epicenter: 52.60 N., 175.34 W.
Depth: 145 km
Magnitude: 5.1 mb
Intensity III: Adak.
- 5 September (G) Andreanof Islands, Aleutian
Islands
Origin time: 10 33 49.0
Epicenter: 51.40 N., 178.77 W.
Depth: 68 km
Magnitude: 4.4 mb
Intensity II: Adak.
- 15 September (G) Southern Alaska
Origin time: 16 44 29.6
Epicenter: 61.08 N., 150.62 W.
Depth: 74 km
Magnitude: None computed.
Intensity II: Anchorage.
- 21 September (G) Kodiak Island region
Origin time: 03 01 04.6
Epicenter: 57.84 N., 152.12 W.
Depth: 33 km
Magnitude: 4.9 mb, 4.6 ML(M)
Intensity III: Kodiak.
- 22 September (G) Andreanof Islands, Aleutian
Islands
Origin time: 02 30 25.7
Epicenter: 51.72 N., 175.95 W.
Depth: 43 km
Magnitude: 4.8 mb, 5.1 MS
Intensity IV: Adak.
- 27 September (G) Southern Alaska
Origin time: 05 59 45.7
Epicenter: 60.46 N., 145.17 W.
Depth: 41 km
Magnitude: 4.0 mb, 3.3 ML(M)
Intensity III: Cordova.
- 18 October (G) Central Alaska
Origin time: 00 36 31.6
Epicenter: 63.29 N., 150.74 W.
Depth: 126 km
Magnitude: 4.9 mb
Intensity IV: Cantwell, Colorado.
Intensity II: Anchorage, Palmer.

Alaska--Continued

- 24 October (G) Central Alaska
Origin time: 17 19 53.7
Epicenter: 62.65 N., 149.14 W.
Depth: 75 km
Magnitude: 4.9 mb
Intensity III: South-central Alaska (press
report).
- 11 November (G) Southern Alaska
Origin time: 18 18 30.5
Epicenter: 61.31 N., 149.79 W.
Depth: 33 km
Magnitude: 3.2 ML(M)
Intensity II: Reported felt; a specific town
was not given.
- 30 November (G) Southern Alaska
Origin time: 06 22 35.3
Epicenter: 59.92 N., 153.36 W.
Depth: 127 km
Magnitude: 4.7 mb
Intensity IV: Kenai-Anchor Point area.
Intensity III: Anchorage, Homer.
- 15 December (G) Southern Alaska
Origin time: 09 51 32.3
Epicenter: 61.35 N., 150.25 W.
Depth: 51 km
Magnitude: 3.7 mb
Intensity III: Anchorage, Peters Creek.
- 15 December (G) Central Alaska
Origin time: 13 35 53.8
Epicenter: 64.83 N., 147.87 W.
Depth: 31 km
Magnitude: 3.0 ML(M)
Intensity IV: Fairbanks.

Arizona

- 4 February (G) Western Arizona
Origin time: 00 04 58.1
Epicenter: 34.66 N., 112.50 W.
Depth: 12 km
Magnitude: 4.9 mb, 5.1 ML, 5.2 ML(P)

USGS personnel conducted a field survey fol-
lowing this earthquake. USGS also can-
vassed an area around the epicenter and
mailed 362 questionnaires.

The earthquake was felt over an area of about
25,000 sq km, from Yuma to Tucson and as
far north as Flagstaff (see fig. 3). It
apparently was strongest in the vicinity of
Prescott. Minor damage occurred in Chino
Valley, Cottonwood, Miller Valley (suburb
of Prescott), and Paulden. Many fallen
rocks and boulders were observed south of
Prescott on Highway 89, a winding, moun-
tainous road in Prescott National Forest.
These are believed to have resulted from an
intense rainstorm on February 4-5, not from

the earthquake. Telephone service was interrupted for a short time, such that calls could be made but not received. After-shocks awakened many at 10 p.m., February 3 and at 2 a.m. and 6 a.m., February 4 (local time).

Between February 4 and February 9, 12 after-shocks were reported by the Arizona State University Seismograph Station.

Most of the housing in the sparsely settled epicentral area that was surveyed by USGS consisted of mobile-trailer homes, some of which were placed on concrete platforms and called "modular homes." Many were on cinderblocks and "skirted" with sheet-metal or some other material. There were few brick chimneys in the area.

Intensity VI:

Chino Valley--At the Buckaroo shopping center and liquor store, bottles were thrown from shelves along the north wall. Estimated loss from breakage was about \$100. Bottles along the shelves on the west wall rattled but did not fall. This one-story building of recent frame construction on flat ground had ceiling beams from east to west. One beam was loosened slightly and the plaster separated from the ceiling. The beams were not structural members of the building, but ornamental. The proprietor of the Shell gas station in this town said cracks in the cinderblock partition in his garage probably were due to the earthquake. The building was in such poor condition, however, that it would

be difficult to ascertain that any damage was due to the shock. He reportedly saw waves on the ground and nearly fell over. He also told the USGS team he had lived in California for 30 years before coming to Arizona.

The Forest Ranger said there was a report of muddied water in a well in the area. This was unconfirmed.

Cottonwood--Slight damage. Trees and bushes shook.

Miller Valley--In this northern suburb of Prescott, the recently constructed (1975) addition to the Safeway supermarket had small cracks in the west wall, beginning at the ceiling and extending downward about 1 m where they disappeared behind shelves. These cracks were located at the juncture of the old and new sections of the store. The mortar joining the cinderblocks was cracked in a way that might have indicated settling. The assistant manager was sure the cracks were not present before the earthquake. The liquor department just adjacent to the cracked wall is in the new section along the west wall. The bottles rattled and clinked together, but none was thrown from the shelf.

Paulden--Trees and bushes shook in this small community, about 12 km north of Chino Valley. The barmaid at the only bar in town said she heard of a mirror falling from the wall at one residence. A lamp hanging in the bar swung considerably during the earthquake.

The retired deputy-sheriff reported that the most significant thing he noticed was the sound of a large explosion coming from

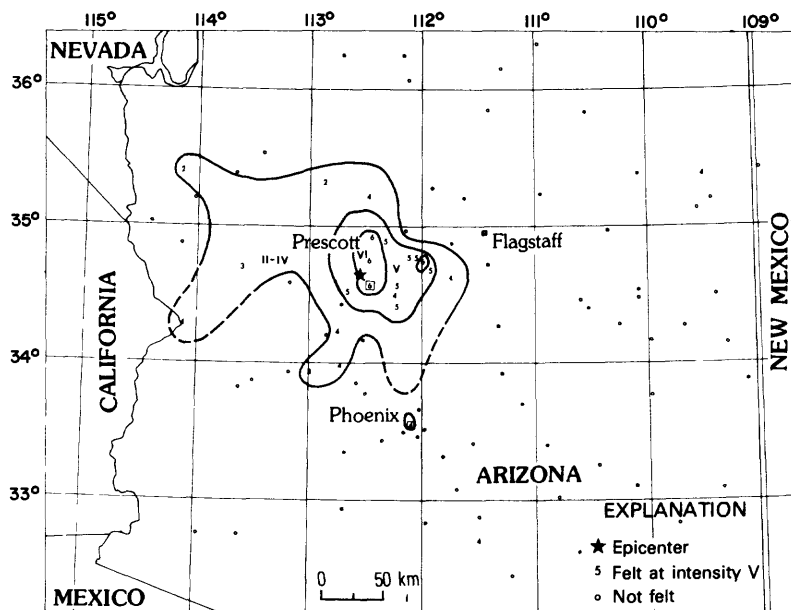


Figure 3.--Area affected by western Arizona earthquake of February 4

Arizona--Continued

a northeasterly direction, at or near Dillard's Verde River Ranch. One resident reported that the waste-line to his son's trailer-home had been broken off by the earthquake. He also stated that it had been loose for some time and that when the shock occurred, the waste-line became disconnected.

Intensity V: Cornville, Dewey, Jerome, Mayer, Peeples Valley (field report), Rio Verde Ranch (southeast of Paulden), Skull Valley. Interviews in Skull Valley and Peeples Valley, and in small wayside stops, gas stations, and cafes revealed that almost everybody felt the main shock and the aftershocks. Most of those who noticed the swing of hanging objects stated that the direction was from north to south. The places mentioned here are all south and west of Prescott.

Intensity IV:

Arizona--Ash Fork, Humboldt, Phoenix, Piacho, Rimrock, Wickenburg, Wide Ruin, Yarnell.

California--Parker Dam.

Intensity III: Bouse, Wikieup.

Intensity II: Chloride, Seligman.

9 February (G) Western Arizona

Origin time: 03 07 22.0
Epicenter: 34.61 N., 112.53 W.
Depth: 10 km
Magnitude: 4.6 mb, 3.3 ML
Intensity II: Chino Valley area.

23 February (G) Western Arizona

Origin time: 14 09 54.4
Epicenter: 34.68 N., 112.43 W.
Depth: 10 km
Magnitude: 3.5 ML
Intensity VI: Chino Valley (plaster cracked).
Intensity V: Humboldt, Prescott, Skull Valley.
Intensity IV: Dewey, Paulden.

19 April (G) Northeastern Arizona

Origin time: 23 35 45.5
Epicenter: 35.39 N., 109.10 W.
Depth: 5 km
Magnitude: 3.5 ML

This might have been an explosion in the Four Corners area.

Intensity V: St. Michaels.

Intensity IV: Window Rock.

4 May (G) Western Arizona

Origin time: 10 06 34.8
Epicenter: 34.70 N., 112.54 W.
Depth: 10 km
Magnitude: 3.0 ML
Intensity II: Prescott.

Arizona--Continued

7 December (P) Baja California

Origin time: 12 59 56.3
Epicenter: 31.98 N., 114.78 W.
Depth: 8 km
Magnitude: 5.5 mb(G), 5.7 MS(G), 5.2 ML
Intensity VI:

Arizona--San Luis (furniture moved; damage slight), Wellton (broken windows--press report), Yuma (broken windows--telephone report; broken waterline at Del Oro Mobile Estates--press report).
California--El Centro (plaster cracked; furniture moved).

Intensity V:

Arizona--Gadsden, Martinez Lake, Roll, Somerton.
California--Bard (small objects moved), Borrego Springs, Boulevard, Campo, Jacumba, Mount Laguna, Ocotillo, Winterhaven.

Intensity IV:

California--Brawley, Glamis, Julian, La Mesa, Santa Ysabel.

Intensity III:

California--San Diego (press report).

Arkansas

16 January (G) Northern Arkansas

Origin time: 19 42 57.0
Epicenter: 35.92 N., 92.12 W.
Depth: 14 km
Magnitude: 3.2 ML(S)
Intensity V: Blanchard Springs Cavern (felt by all in cave; underground rocks fell), Onia (felt strongly 7 km north of; trees and bushes were noticeably disturbed).
Intensity IV: Bull Shoals, Cotter, Fifty-six, Mountain View, Norfolk.
Intensity III: Mountain Home (telephone report).
Intensity II: (Press reports) Calico Rock, Salesville, Sycamore Springs.

25 March (S) Northeastern Arkansas

Origin time: 00 41 20.5
Epicenter: 35.59 N., 90.48 W.
Depth: 15 km
Magnitude: 4.9 mb(G), 5.0 ML

USGS canvassed an area around the epicenter within a radius of 500 km and mailed 1,809 questionnaires. Figure 4 shows the results of this canvass. The quake was felt over an area of approximately 280,000 sq km, including Alabama, Arkansas, Illinois, Indiana, Kentucky, Mississippi, Missouri, and Tennessee. Slight damage occurred in several towns in Arkansas, Mississippi, Missouri, and Tennessee. This earthquake triggered seven accelerographs located at four stations--Arkabutla Dam, Miss.; Wappapelo Dam, Mo.; Tiptonville, Tenn.; and New Madrid, Mo. The maximum recorded acceleration was 0.04 g (R.L. Porcella,



Figure 4.--Area affected by northeastern Arkansas earthquake of March 25

personal commun., 1977). An aftershock was felt in several towns at about 01:00 UTC.

Intensity VI:

Arkansas--Bay (furniture moved, small objects broke), Biggers, Blytheville, Brookland, Bunker (plaster and dry wall cracked), Cash, Datto, Decatur (unconfirmed reports of minor property damage; ceiling tiles fell and some roof damage--press report), Delaplaine, Dolph, Egypt, Hardy, Harrisburg (plaster cracked), Jonesboro (power blackout, telephone lines down; ceilings, walls and floors shook violently at state police headquarters, which is 7.6 m underground--press report), Knobel (plaster cracked), Lake City, Lepanto (dry wall cracked), Luxora, Marked Tree (plaster cracked), McDougal, Minturn, Okean, Paragould (windows broken; \$700 damage estimated--press report), Peach Orchard (dry wall cracked), Portia, Sedgwick, Smithville, Tomato, Trumann (dry wall cracked; ceiling tiles fell), Twist, Walnut Ridge (windows blown out in downtown businesses--press report).

Kentucky--Fancy Farm.

Mississippi--Abbeville, Arkabulta, Falkner (plaster cracked), Michigan City, Tupelo (knocked down ceiling panels in one home; cracked masonry--press report).

Missouri--Arab, Arbyrd, Brandsville, Hunter (cracked house foundation; crack enlarged in concrete steps), Libbourn (plaster cracked), Puxico.

Tennessee--Brunswick (plaster cracked), Drummonds, Dyersburg, Ellendale, Macon (plaster cracked), Memphis (minor damage at nine Memphis Fire Department stations; books shaken from shelves in 11-story library tower at Memphis State University--press report), Tipton (plaster cracked slightly), Union City (damage to telephone circuits--press report).

Intensity V:

Alabama--Albertville, Bankston, Cherokee, Coker, Florence (furniture moved--press report), Lawrence County (some downed powerlines--press report), Lexington, Muscle Shoals (press report), Waterloo.

Arkansas--Alexander, Augusta, Balch, Bassett, Batesville (powerlines down--press report), Beech Grove, Bexar, Biscoe, Black Oak, Black Rock, Boswell, Brickeys, Brinkley, Burdette, Caldwell, Camp, Cave City, Chatfield, Cherry Valley, Clarendon, Concord, Cord, Corning, Cotter, Coy, Crawfordville, Cushman, Dardanelle, Dell, Devalls Bluff, Diaz, Dyess, Earle, Edmondson, Ethel, Etowah, Fisher, Forrest City, Franklin, Gepp, Gillett, Gilmore, Glencoe, Goodwin,

Greenway, Gregory, Griffithville, Grubbs, Helena, Henderson, Heth, Higden, Higginson, Howell, Hoxie, Hughes, Humphrey, Hunter, Imboden, Jacksonport, Jefferson, Joiner, Jordan, Keiser, Kensett, Keo, La Grange, Leachville, Light, Locust Grove, Lynn, Mammoth Spring, Manila, Marcella, Marianna, Marmaduke, Marvell, Maynard, Mcrae, Mellwood, Moro, Moscow, Mount Pleasant, Mountain Home, Mountain View, Newark, Newport, Nimmons, Norfork, Oil Trough, Osceola, Oxford, Palestine, Pineville, Pleasant Grove, Pocahontas, Powhatan, Proctor, Ravenden, Ravenden Springs, Reydell, Reyno, Roe, Rosie, Round Pond, Saffell, Saint Charles, Saint Francis, Shoffner, Smithville, Stonewall, Strawberry, Sweet Home, Swifton, Tilly, Tucker, Tuckerman, Turner, Tyronza, Vannsdale, Violet Hill, Wabbaseka, Walcott, Waldenburg, Weiner, Weldon, West Helena, West Memphis, West Ridge, Wheatley, Wideman, Widener, Williford, Wilson.

Illinois--Cisne, Edwardsville.

Kentucky--Canton, Clinton, Farmington, Fulton, Grand Rivers, Lovelaceville, Wingo.

Mississippi--Alligator, Ashland, Askew, Batesville (powerlines down--press report), Belen, Blue Mountain, Blue Springs, Carthage, Cleveland, Coahoma, Coffeerville, Coldwater, Como, Crenshaw, Darling, Derma, Duck Hill, Dumas, Duncan, Dundee, Ecu, Elliott, Etta, Friars Point, Glendora, Gore Springs, Hernando (powerlines down--press report), Hickory Flat, Holly Springs (all residents alarmed--press report), Lake Cormorant, Lamar, Le Flore, Marks, Mattson, Mineral Wells, Minter City, Moorhead, Nesbit, Olive Branch, Oxford, Pittsboro, Pleasant Grove, Potts Camp, Red Banks, Rienzi, Robinsonville, Rome, Rosedale, Sarah, Sardis, Scobey, Sherman, Taylor, Thaxton, Tie Plant, Tiplersville, Toccopola, Tula, Tunica, Victoria, Walls, Waterford, Water Valley, Webb.

Missouri--Alton, Bakersfield, Blodgett, Bloomfield, Bradleyville, Bragg City, Braggadocio, Briar, Broseley, Brownwood, Canalou, Cardwell, Charleston, Clarkton, Conran, Cooter, Couch, Deering, Dexter, Doniphan, Dudley, Ellington, Fairdealing, Fisk, Fremont, Gibson, Gideon, Gipsy, Gbler, Grayridge, Greenville, Hardenville, Harviell, Hayti, Hendrickson, Hiram, Holcomb, Holland, Hornersville, Kennett, Kewanee, Kinder, Malden (telephone service disrupted--press report), Mill Spring, Montier, Mountain Grove, Mountain View, Myrtle, Neelyville, Oxly, Pascola, Patterson, Peace Valley, Perkins, Piedmont, Pomona, Qulin, Risco, Rives, Senath, Sikeston, Sturdivant, Tallapoosa,

Teresita, Thayer, Vanduser, Wardell, Washington, West Plains (press report), Winona, Zalma.

Tennessee--Alamo, Atwood, Beech Bluff, Bells, Bolivar, Braden, Brighton, Brownsville, Burlison, Cedar Grove, Clifton, College Grove, Collierville, Covington, Crockett Mills, Denmark, Denver, Dukedom, Dyer, Elora, Finley, Fort Pillow, Friendship, Fruitland, Fruitvale, Gadsden, Gallaway, Gattes, Grand Junction, Greenfield, Guys, Halls, Henderson, Hickory Valley, Hickory Withe, Hornbeak, Hornsby, Idlewild, Jackson, La Grange, Laconia, Lavinia, Leach, Lexington, Lyles, Luray, Maury City, Medina, Milledgeville, Millington, Munford, Newbern, North Memphis (press report), Oakfield, Obion, Pinson, Ramer, Ridgely, Ripley, Rives, Rutherford, Samburg, Saulsbury, Selmer, Silerton, Somerville, Trenton, Trimble, Troy, Williston, Yorkville.

Intensity IV:

Alabama--Adger, Brent, Burnwell, Cloverdale, Echola, Ethelsville, Ford City (press report), Gainesville, Hamilton (press report), Killen, New Market, Northport (press report), Ragland, Samantha, Sheffield (press report), Tanner, Tuscaloosa (severe shaking on top floors of hospital--press report), Woodlawn (lamps shook, glasses rattled--press report).

Arkansas--Beebe, Birdeye, Blackwell, Bradford, Byron, Calico Rock, Choctaw, Clinton, Cotton Plant, Crocketts Bluff, Crumrod, Damascus, Dennard, Drasco, Edgemont, Elaine, Elizabeth, England, Fargo, Floral, Forty Four, Gamaliel, Gilbert, Gould, Grand Glaize, Guion, Hamilton, Haynes, Hazen, Heber Springs, Holly Grove, Humnake, Jacksonville, Lacrosse, Leslie, Lexa, Little Rock (press report), Lonoke, Mabelvale, Madison, Mammoth Spring (press report), Mayflower, Moko, Monroe, Newburg, Pangburn, Patterson, Pleasant Plains, Pollard, Poughkeepsie, Prim, Redfield, Romance, Roseland, Russell, Sage, Saint James, Salem, Scotland, Sherrill, Sidney, Steprock, Stuttgart, Success, Sulphur Rock, Tichnor, Tumbling Shoals, Tupelo, Viola, Wabash, Ward, Wilburn, Wynne, Zion.

Illinois--Akin, Belleville (press report), Cairo (press report), Centralia, Coulterville, Donnellson, Fairmont City, Hillsboro, Madison County (press report), Valmeyer, Washington Park (press report).

Kentucky--Arlington, Bardwell, Barlow, Boaz, Cadiz, Carrsville, Cunningham, Eddyville, Hamlin, Hickman, Hickory, Jackson Purchase (press report), Kevil, Kirksey, Lynn Grove, Lynnvile, Paducah, South Fulton (press report), Wickliffe.

Mississippi--Byhalia, Cascilla, Clarksdale,

Arkansas--Continued

Arkansas--Continued

Courtland, Crowder, Enid, Grenada, Horn Lake (powerlines down--press report), Independence, Indianola (momentary power failure--press report), Lafayette Springs, Lambert, Merigold, Mount Pleasant, Myrtle, New Albany (powerlines down, telephone service interrupted--press report), Oakland, Paris, Randolph, Rena Lara, Ripley, Savage, Schlater, Senatobia, Shelby, Sherard, Sidon, Slate Spring, Sunflower, Swiftown, Tillatoba, Tippo, Tutwiler, Vance, Vicksburg (press report).

Missouri--Advance, Anniston, Ava, Bell City, Bellflower, Bertrand, Birch Tree, Bonnots Mill, Brighton, Cape Girardeau (press report), Caruthersville (press report), Caulfield, Chamois, Chesterfield, Conway, Des Arc, Dittmer, Eminence, Essex, Gatewood, Grandin, Hocomo, Howards Ridge, Jackson (press report), La Due (press report), Lanton, Lodi, Matthews, McGee, Moody, Morehouse, Naylor, New Haven, Oran, Painton, Parma, Poplar Bluff, Portland, Richmond Heights (press report), Shook, St. Charles County (press report), Tecumseh, Udall, University City (press report), Wappapello, Williamsville, Wolf Island.
Tennessee--Atoka, Buchanan, Bumpus Mills, Camden (press report), Chattanooga (press report), Columbia (press report), Como, Cordova, Cottage Grove, Cunningham, Daisy, Dover, Dresden, Eads, Eaton, Elbridge, Enville, Finger, Flintville, Frayser (press report), Humboldt, Huron, Indian Mound, Jacks Creek, Kenton, Lafayette, Linden, Lobelville, Martin, McEwen, McNairy, Milan, Moscow, Oakland, Palmersville, Puryear, Raleigh Springs (people left the cinema--press report), Sharon, Springcreek, Stanton, Tigrett, Toone, Trezevant, Union City, Whiteville.

Intensity III:

Alabama--Belle Mina, Birmingham (press report), Limestone (press report), Rogersville.
Arkansas--Cozahome, Des Arc, Evening Shade, Fifty Six, Huff, Midway, Oneida, Wolf Bayou.
Illinois--Buckner, Chester (press report), DuQuoin (press report), Murphysboro (press report).
Kentucky--Deepwood (press report), Hopkinsville (press report), Mayfield, Murray (high-rise dormitories at Murray College were evacuated--press report), Oakton.
Mississippi--Banner, Big Creek, Calhoun City, Lula, Lyon.
Missouri--Bendavis, Leslie, Poynor, Saint Louis.
Tennessee--Bath Springs, Bradford, Charlotte, Medon.

Intensity II:

Alabama--Arab, Cardiff, Tuscumbia (press report).

Arkansas--Barton, Bass, Brockwell, De Witt, El Paso, Greenbrier, Leslie, Ulm.
Illinois--Belle Rive, Cutler, Godfrey, Michael.
Indiana--Evansville.
Kentucky--Bandana, Benton, Kuttawa, Ledbetter.
Mississippi--Carrollton, Farrell, Jonestown, Pope, Rich, Sledge, Sumner.
Missouri--Barnett, Whiteman AFB.
Oklahoma--Tulsa (press report).
Tennessee--Cades, Cunningham, Gibson, Gleason, Henry County (hundreds of calls--press report), Nashville (press report), New Johnsonville (press report), Paris (press report).

25 March (S) Northeastern Arkansas

Origin time: 01 00 11.9
Epicenter: 35.61 N., 90.48 W.
Depth: 15 km
Magnitude: 4.5 ML
Intensity II: Felt in several towns.

25 September (S) Northeastern Arkansas

Origin time: 14 06 56.0
Epicenter: 35.61 N., 90.45 W.
Depth: 5 km
Magnitude: 3.6 mBlg
Intensity V:

Arkansas--Lepanto, Payneway (small objects and furniture moved), Trumann, Tyroneza (small objects moved).
Tennessee--Macon, Memphis.

Intensity IV:

Arkansas--Marked Tree, Riverdale.
Missouri--Deering.

Intensity II:

Arkansas--Hunter, Swifton.

California

1 January (P) Southern California

Origin time: 17 20 12.9
Epicenter: 33.97 N., 117.88 W.
Depth: 6 km
Magnitude: 4.2 ML, 4.6 mb(G)

This earthquake was felt in Los Angeles, Orange, Riverside, and San Bernardino Counties. It disturbed millions of residents but caused no injuries and did no serious damage (press report). Minor damage was reported at Brea, Cudahy, La Habra, Maywood and Yorba Linda. Some telephone service was interrupted (press report). The USGS (Porcella, 1977) reported 11 strong-motion records were obtained from locations within a 14-km radius of the epicenter. The maximum recorded acceleration of 0.28 g occurred in Whittier, about 13.8 km west of the epicenter.

USGS canvassed an area around the epicenter within a radius of 60 km and mailed 158

questionnaires. Figure 5 shows the results of this survey.

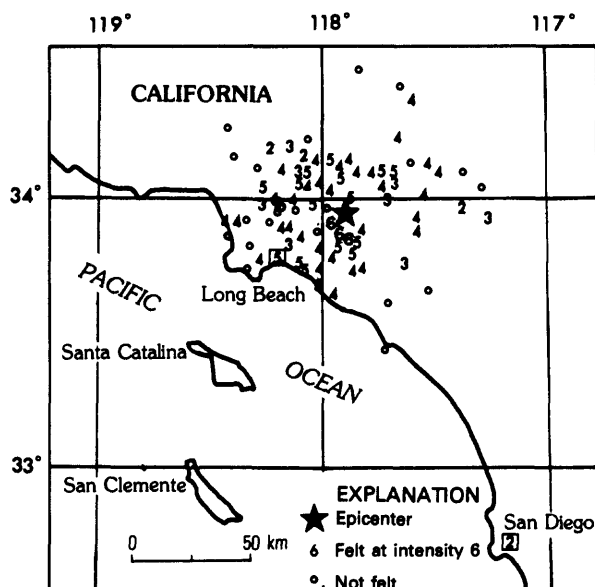


Figure 5.--Area affected by southern California earthquake of January 1

Intensity VI: Brea (cracked fireplace; broke windowpane--press report), Cudahy (slight damage), La Habra (broke water pipe at High School, causing minor water damage; broke glass at the Pic 'N' Save and at an apartment complex on La Habra Blvd.; knocked phone service out--press report), Maywood (cracked windows), Yorba Linda (cracked walls and ceilings, toppled lamps--press report).

Intensity V: Anaheim, Artesia, Atwood, Azusa, Buena Park, Claremont, Compton, Duarte, Fullerton, Huntington Beach, La Mirada, Long Beach, Los Angeles, Monrovia, Monterey Park, Orange, Pomona, Rosemead, Seal Beach, Sunset Beach, Upland (press report), Walnut, West Covina, Whittier.

Intensity IV: Arcadia, Baldwin Park, Bassett, Bellflower, Cerritos, Corona, Costa Mesa, Cypress, El Monte, El Segundo, Etiwanda, Fontana, Garden Grove, Glendale, Glendora, Hacienda Heights, Inglewood, La Puente, Laverne, Midway City, Mira Loma, Montclair, Montebello, Mt. Baldy, Newport Beach, Norco (press report), Paramount, Phelan, Placentia, San Dimas, Santa Ana, South Gate, South Pasadena, Stanton, Tustin, Westminster, Wilmington.

Intensity III: Altadena, Chino, Covina, Huntington Park, Lakewood, Montrose, Ontario, Silverado, Sunnymead, Temple City.

Intensity II: Bell Gardens, Downey, Lomita, Riverside, San Diego, Sierra Madre.

10 January (G) California-Mexico border area

Origin time: 12 58 15.9

Epicenter: 32.05 N., 115.54 W.

Depth: 33 km

Magnitude: 4.6 mb

Intensity V:

California--El Centro (bottles broke at Food Palace Market--press), Calexico.

Intensity IV:

Arizona--Gadsden.

Intensity II:

California--San Diego (aftershock at 5 p.m.).

14 January (P) Southern California

Origin time: 20 26 24.5

Epicenter: 33.09 N., 116.65 W.

Depth: 13 km

Magnitude: 3.4 ML

Intensity III: San Diego (P).

14 January (B) Central California

Origin time: 21 43 59.3

Epicenter: 36.11 N., 120.16 W.

Depth: 5 km

Magnitude: 5.1 mb(G), 4.9 ML

USGS canvassed an area around the epicenter within a radius of 200 km and mailed 290 questionnaires.

Intensity VI: Avenal (Plaster cracked.

Light fixture fell from ceiling at elementary school--press report.).

Intensity V: Mount Hamilton.

Intensity IV: Cholame, Coalinga, Creston, Dos Palos, Five Points, Friant, Huron, Kettleman City, King City, Lemoore, Lost Hills, Piedra, Riverdale, Stratford, Templeton, Westhaven, Yosemite National Park.

Intensity III: Caruthers, Delano, Parkville (press report).

Intensity II: Laton.

14 January (B) Central California

Origin time: 23 40 17.6

Epicenter: 36.14 N., 120.21 W.

Depth: 2 km

Magnitude: 3.4 ML

Intensity II: San Joaquin Valley (press report). Aftershock of earthquake on 14 January, 21 43 59.3 UTC.

15 January (B) Central California

Origin time: 00 09 37.4

Epicenter: 36.15 N., 120.25 W.

Depth: 7 km

Magnitude: 3.5 ML

Intensity II: San Joaquin Valley (press report). Aftershock of earthquake on 14 January, 21 43 59.3 UTC.

15 January (P) Brea, Calif.

Origin time: 03 12

Epicenter: None computed.

Depth: None computed.

Magnitude: None computed.

Intensity II: Anaheim, Brea, Fullerton, La Habra, Placentia (press report).

California--Continued

- 18 January (B) Northern California
Origin time: 01 00 24.7
Epicenter: 40.64 N., 124.35 W.
Depth: 23 km
Magnitude: 4.0 mb(G), 3.7 ML
Intensity IV: Ferndale.
- 18 January (B) Northern California
Origin time: 07 38 25.2
Epicenter: 39.06 N., 122.96 W.
Depth: 7 km
Magnitude: 2.6 ML
Intensity III: Lakeport vicinity.
- 1 February (B) Northern California
Origin time: 02 57 39.7
Epicenter: 37.93 N., 122.31 W.
Depth: 4 km
Magnitude: 2.6 ML
Intensity II: El Cerrito, Pablo, Pinole, Richmond (press report).
- 3 February (P) Southern California
Origin time: 03 40
Epicenter: None computed.
Depth: None computed.
Magnitude: None computed.
Intensity II: Hollywood, downtown Los Angeles.
- 19 February (P) Southern California
Origin time: 22 09 55.1
Epicenter: 34.39 N., 118.35 W.
Depth: 9 km
Magnitude: 3.1 ML
Intensity III: Soledad, Sylmar (aftershock at 22:12) (P).
- 24 February (B) Northern California
Origin time: 15 13 10.5
Epicenter: 40.29 N., 124.37 W.
Depth: 6 km
Magnitude: 3.5 mb(G), 3.5 ML
Intensity IV: Fortuna, Kneeland.
- 1 March (B) Central California
Origin time: 17 06 40.3
Epicenter: 37.73 N., 121.96 W.
Depth: 7 km
Magnitude: 2.8 ML
Intensity II: Dublin.
- 4 March (B) Central California
Origin time: 15 08 09.7
Epicenter: 38.79 N., 122.75 W.
Depth: 2 km
Magnitude: 3.1 ML
Intensity II: Cobb.
- 6 March (B) Central California
Origin time: 13 51 08.1
Epicenter: 38.83 N., 122.83 W.
Depth: 4 km
Magnitude: 2.9 ML
Intensity II: Cobb.

California--Continued

- 8 March (B) Central California
Origin time: 20 23 27.3
Epicenter: 37.39 N., 120.10 W.
Depth: 2 km
Magnitude: 2.5 ML
Intensity IV: Mariposa.
- 9 March (B) Central California
Origin time: 19 45 00.3
Epicenter: 37.33 N., 122.18 W.
Depth: 7 km
Magnitude: 2.6 ML
Intensity II: Palo Alto.
- 14 March (P) Southern California
Origin time: 09 32
Epicenter: None computed.
Depth: None computed.
Magnitude: None computed.
Intensity II: Glendale, Tujunga.
- 17 March (B) Central California
Origin time: 04 01 52.7
Epicenter: 36.83 N., 121.13 W.
Depth: 8 km
Magnitude: 4.2 mb(G), 4.3 ML
Intensity IV: Gilroy (15 km northeast of).
- 29 March (P) Southern California
Origin time: 16 37
Epicenter: None computed.
Depth: None computed.
Magnitude: None computed.
Intensity II: Brawley (press report).
- 8 April (P) Southern California
Origin time: 15 21 38.1
Epicenter: 34.35 N., 118.67 W.
Depth: 15 km
Magnitude: 4.7 mb(G), 3.9 MS(G),
4.8 ML(B), 4.6 ML
- USGS canvassed an area around the epicenter within a radius of 250 km and mailed 842 questionnaires. The earthquake was felt from Bakersfield to San Diego (see fig. 6).
- Intensity VI: Granada Hills (plaster cracked), Inglewood (slight damage), Palmdale, Sylmar.
- Intensity V: Agoura, Arcadia, Calabasas, Chatsworth, Compton, Culver City, Encino, Frazier Park, Julian, Llano, Los Angeles, Manhattan Beach, Newbury Park, Pacoima, Palos Verdes Peninsula, Panorama City, Piru, Reseda, San Fernando, Santa Paula, Saugus, Sierra Madre, Simi Valley, South Pasadena, Surfside, Sunset Beach, Tarzana.
- Intensity IV: Altadena, Bakersfield, Burbank, Camarillo, Canoga Park, Carpinteria, Fillmore, Hawthorne, Hermosa Beach, Lake Arrowhead, Lake Hughes, Lebec, Lomita, Long Beach, Lynwood, Malibu, Maricopa, Midway City, Mojave, Montebello, Moorpark, North Hollywood, Northridge,

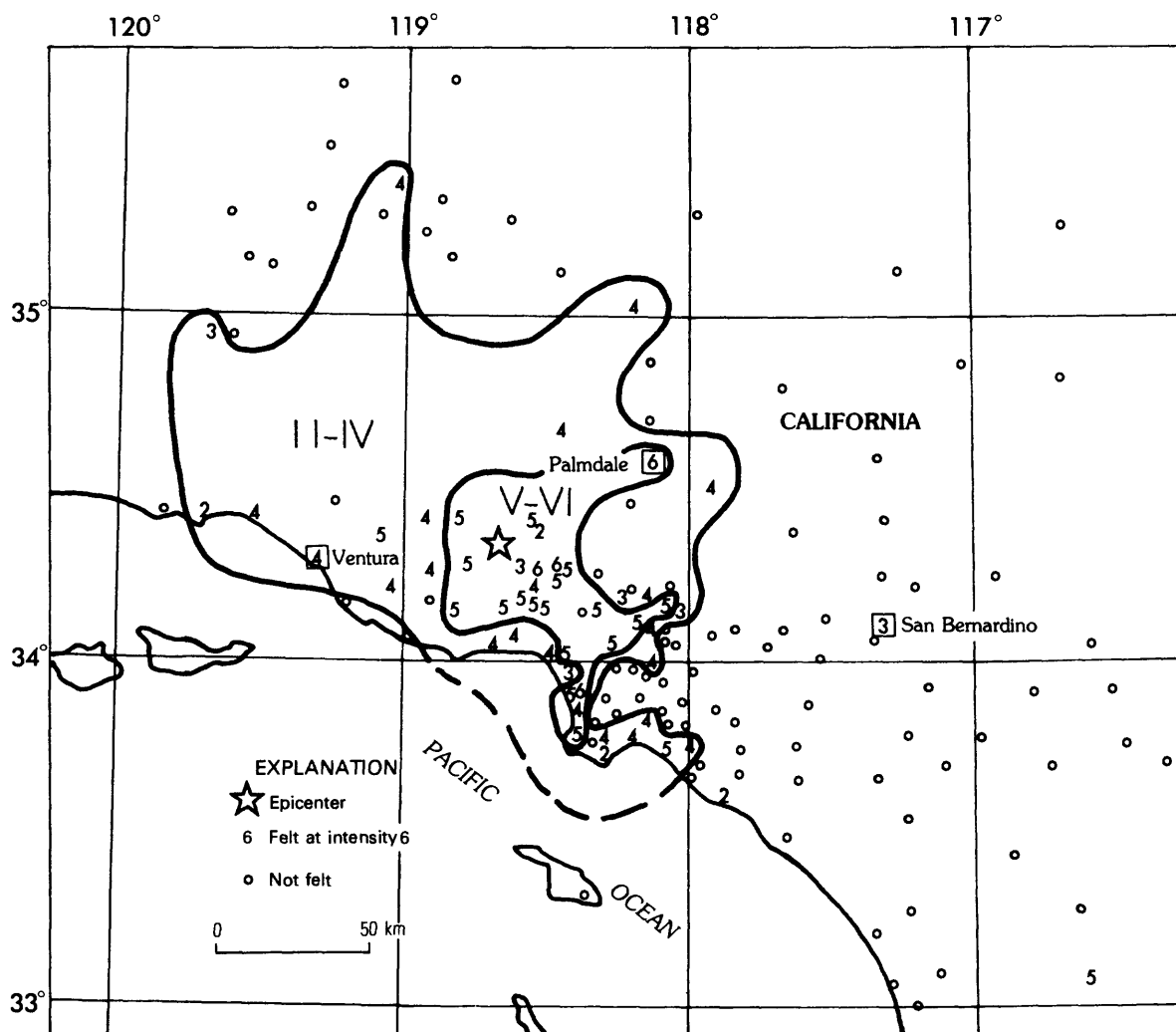


Figure 6.--Area affected by southern California earthquake of April 8

Pacific Palisades, Pearblossom, San Diego, San Gabriel, Santa Monica, Seal Beach, Sepulveda, Sun Valley Thousand Oaks, Topanga, Valermo, Ventura.

Intensity III: Juniper Hills, Lakewood, Monrovia, Montrose, New Cuyama, Oxnard, San Bernardino, Venice, Woodland Hills.

Intensity II: Balboa Beach area (press report), Hollywood (press report), Newhall (press report), San Pedro, Santa Barbara (press report).

14 April (P) Southern California

Origin time: 06 56 03.9
Epicenter: 32.87 N., 115.48 W.
Depth: 14 km
Magnitude: 4.2 mb(G), 3.8 ML
Intensity III: El Centro.
Intensity II: Brawley.

The press reported that a swarm of 100 small earthquakes occurred in Imperial Valley following this earthquake.

14 April (P) Southern California

Origin time: 07 59 27.8
Epicenter: 32.88 N., 115.55 W.
Depth: 8 km
Magnitude: 3.6 ML
Intensity III: El Centro.
Intensity II: Brawley.

14 April (P) Southern California

Origin time: 10 31 00.8
Epicenter: 32.88 N., 115.48 W.
Depth: 8 km
Magnitude: 4.0 mb(G), 3.9 ML
Intensity III: El Centro.
Intensity II: Brawley.

California--Continued

14 April (P) Southern California

Origin time: 10 47 53.6
Epicenter: 32.93 N., 115.55 W.
Depth: 8 km
Magnitude: 3.7 ML
Intensity III: El Centro.
Intensity II: Brawley.

14 April (P) Southern California

Origin time: 13 23 59.4
Epicenter: 33.12 N., 115.50 W.
Depth: 19 km
Magnitude: 3.3 ML
Intensity III: El Centro.
Intensity II: Brawley.

15 April (P) Southern California

Origin time: 04 59 32.8
Epicenter: 34.37 N., 118.67 W.
Depth: 15 km
Magnitude: 3.1 ML
Intensity II: Woodland Hills.

16 April Near Avenal, Calif.

Origin time: 09 20
Epicenter: None computed.
Depth: None computed.
Magnitude: None computed.
Intensity IV: Near Avenal (Kings County).

16 April (B) Northern California

Origin time: 17 11 50.6
Epicenter: 39.56 N, 121.61 W
Depth: 5 km
Magnitude: 3.0 ML(E), 2.7 ML
Intensity II: Oroville area (press report).

25 April (P) Southern California

Origin time: 17 51 08.4
Epicenter: 33.74 N., 118.02 W.
Depth: 11 km
Magnitude: 3.0 ML
Intensity III: Huntington Harbor, Long Beach,
Seal Beach, parts of Orange County (press
report).
Intensity II: Buena Park, Cypress (press report).

26 April (P) Southern California

Origin time: 06 46 36.5
Epicenter: 33.13 N., 115.67 W.
Depth: 2 km
Magnitude: 3.8 ML
Intensity III: Brawley.

3 May (B) Northern California

Origin time: 05 42 38.9
Epicenter: 38.14 N., 121.95 W.
Depth: 26 km
Magnitude: 3.4 ML
Intensity VI: Fairfield (plaster cracked).
Intensity V: Birds Landing, Clayton,
Crockett, Orinda, Pittsburg, Port Costa,
Suisun City, Vallejo, Yountville.
Intensity IV: Elmira, Rio Vista, Walnut
Creek.
Intensity III: Martinez.
Intensity II: Concord, San Francisco,
Vacaville.

California--Continued

4 May (P) Southern California

Origin time: 13 09
Epicenter: None computed.
Depth: None computed.
Magnitude: None computed.
Intensity II: Newhall.

10 May (P) Southern California

Origin time: 10 24 24.0
Epicenter: 34.46 N., 116.88 W.
Depth: 8 km
Magnitude: 3.8 mb(G), 3.6 ML
Intensity IV: Victor Valley.
Intensity III: Lucerne Valley, Victorville.

12 May (P) Southern California

Origin time: 01 54 39.0
Epicenter: 34.36 N., 118.67 W.
Depth: 14 km
Magnitude: 3.2 ML
Intensity III: Canoga Park, Newhall.

12 May (P) Southern California

Origin time: 03 32 06.7
Epicenter: 34.36 N., 118.66 W.
Depth: 15 km
Magnitude: 3.1 ML
Intensity III: Canoga Park, Newhall, Simi
Valley.

20 May (B) Central California

Origin time: 04 32 38.6
Epicenter: 36.89 N., 121.49 W.
Depth: 2 km
Magnitude: 3.0 ML
Intensity V: Hollister.
Intensity IV: Tres Pinos.
Intensity II: Mount Hermon.

27 May (B) Northern California

Origin time: 17 01 07.4
Epicenter: 38.39 N., 122.68 W.
Depth: 2 km
Magnitude: 3.4 ML
Intensity IV: Santa Rosa (10 km southeast).
Intensity III: Cotati (press report),
Petaluma, Rohnert Park (press report).

3 June (P) Southern California

Origin time: 08 26
Epicenter: None computed.
Depth: None computed.
Magnitude: None computed.
Intensity II: Acton, Glendale.

14 June (B) Northern California

Origin time: 23 30 26.5
Epicenter: 39.47 N., 121.54 W.
Depth: 7 km
Magnitude: 3.9 mb(G), 3.8 ML

Intensity V: Biggs, Brownsville, Dobbins,
Gold Run, Meadow Vista, Nelson, Palermo,
Rackerby, Richardson Springs, Sheridan,
Storrie, Wendel.

California--Continued

Intensity IV: Alta, Browns Valley, Challenge, Clipper Mills, College City, Durham, Forbestown, Gridley, Magalia, Milford, Nevada City, North San Juan, Oroville, Penn Valley, Pulga, Richvale, Smartville, Strawberry Valley (sudden loss of water flow from spring--unconfirmed), Taylorsville, Wheatland.

Intensity III: Twain.

Intensity II: Dutch Flat, Forest Ranch, Herlong.

17 June (P) Southern California

Origin time: 11 04
Epicenter: None computed.
Depth: None computed.
Magnitude: None computed.
Intensity II: Bodfish.

20 June (B) Northern California

Origin time: 10 15 24.8
Epicenter: 40.43 N., 120.57 W.
Depth: 5 km
Magnitude: 4.4 mb(G), 4.5 ML

This epicenter is located near Susanville, Lassen County, in the vicinity of the Antelope Mountain-Litchfield faults. Several aftershocks were recorded (B).

Intensity V: Objects were knocked from walls and many awakened in the following communities (press report): Chilcoat, Eagle Lake, Janesville, Susanville, Washington, Wendel (2-1/2 km east of), Westwood, Willow Creek.

Intensity IV: Milford, Taylorsville.

24 June (B) Northern California

Origin time: 15 44 45.4
Epicenter: 40.39 N., 120.59 W.
Depth: 5 km
Magnitude: 4.7 mb(G), 4.2 ML
Intensity V: Litchfield, Standish (foreshock felt at 10:15 which might pertain to the June 20 event in the same area), Susanville, Wendel.
Intensity IV: Janesville, Keddle.

27 June (P) Southern California

Origin time: 22 11 36.7
Epicenter: 34.05 N., 118.30 W.
Depth: 8 km
Magnitude: 2.9 ML

Intensity III: Beverly Hills, Culver City, Glendale, Griffith Park, Hollywood, Los Angeles (airport and downtown), Pasadena, Santa Monica, Venice, Wilshire-Crenshaw area (all press reports).

29 June (P) Southern California

Origin time: 06 44 54.6
Epicenter: 33.96 N., 116.58 W.
Depth: 8 km
Magnitude: 3.0 ML
Intensity II: Palm Springs.

California--Continued

3 July (B) Northern California

Origin time: 19 45 20.4
Epicenter: 40.39 N., 120.58 W.
Depth: 5 km
Magnitude: 4.4 mb(G), 3.8 ML
Intensity V: Litchfield (small objects moved).
Intensity IV: Strawberry Valley.
Intensity II: Janesville, Susanville.

6 July (G) Northern California

Origin time: 03 55 16.2
Epicenter: 39.40 N., 121.60 W.
Depth: 5 km
Magnitude: 4.5 mb, 4.1 ML(B)
Intensity V: Camptonville (small objects moved), Dobbins, Fair Oaks, Forbestown (small objects moved), Oroville (small objects moved), Marysville (small objects moved), Rio Oso (small objects moved).
Intensity IV: Bangor, Browns Valley, Chico, Colfax, Grass Valley, Gridley, Loomis, Meadow Vista, Nevada City, Rackerby, Sheridan, Smartville, Weimar, Wheatland.
Intensity III: Strawberry Valley, Sutter, Trowbridge.
Intensity II: Meridian, Richvale, Sacramento (press report), Twain, Yuba City (press report).

7 July (B) Central California

Origin time: 07 50 45.4
Epicenter: 37.44 N., 121.77 W.
Depth: 10 km
Magnitude: 3.5 ML
Intensity IV: Mt. Hamilton, San Jose, Sunnyvale, Willow Glen (press report).
Intensity III: Campbell (press report), Fremont (press report), Santa Clara (press report).

8 July (B) Northern California

Origin time: 16 14 10.5
Epicenter: 40.10 N., 124.00 W.
Depth: 2 km
Magnitude: 2.9 ML
Intensity IV: Petrolia.

13 July (B) Northern California

Origin time: 13 34 53.7
Epicenter: 38.09 N., 121.87 W.
Depth: 10 km
Magnitude: 3.7 ML

Felt throughout sections of Contra Costa, Sacramento, and Solano Counties (press report).

Intensity V: Pittsburg (small objects moved).
Intensity IV: Birds Landing, Diablo, Rio Vista.
Intensity III: Antioch, Collinsville (press report).
Intensity II: Bethel Island (press report), Byron, Concord, Fairfield (press report), Hood, Martinez, Ryde, Walnut Creek.

California--Continued

18 July (B) Central California
Origin time: 11 49 28.4
Epicenter: 37.28 N., 122.17 W.
Depth: 10 km
Magnitude: 2.6 ML
Intensity V: Los Altos Hills (stained glass windows cracked--press report).

23 July (P) Southern California
Origin time: 20 53 55.9
Epicenter: 33.87 N., 118.13 W.
Depth: 11 km
Magnitude: 3.1 ML
Intensity IV: Lakewood (shook desk lamps--press report).
Intensity III: (Press reports) Bellflower, Compton, North Long Beach.

26 July (B) Northern California
Origin time: 13 50 05.0
Epicenter: 36.37 N., 121.17 W.
Depth: 6 km
Magnitude: 2.3 ML
Intensity IV: Pinnacles National Monument (east side, headquarters area).

26 July (B) Northern California
Origin time: 14 00 01.7
Epicenter: 36.55 N., 121.17 W.
Depth: 6 km
Magnitude: 2.0 ML
Intensity IV: Pinnacles National Monument (east side, headquarters area).

1 August (P) Southern California
Origin time: 17 18 48.1
Epicenter: 34.90 N., 116.58 W.
Depth: 12 km
Magnitude: 4.5 ML
Intensity V: Daggett, Newberry Springs.
Intensity IV: Landers, Yermo.
Intensity II: Baker.

9 August (P) Southern California
Origin time: 10 54 30.0
Epicenter: 34.33 N., 118.52 W.
Depth: 8 km
Magnitude: 2.8 ML
Intensity II: Northridge.

11 August (P) Southern California
Origin time: 15 24 55.5
Epicenter: 33.48 N., 116.52 W.
Depth: 15 km
Magnitude: 4.3 ML

USGS canvassed an area around the epicenter within a radius of 200 km and mailed 642 questionnaires. The earthquake was felt in San Bernardino, San Diego, Orange, and Imperial Counties, over an area of about 15,500 sq km (fig. 7).

Intensity VI: Borrego Springs (ground cracked in "fault wash" in east part of Anza-Borrego State Park; also some mudslides reported by acting manager of

California--Continued

State Park), Indio (slight damage; one resident became nauseous--press report), Palm Desert (cement curb raised 5 cm, causing buckling).

Intensity V: Angelus Oaks (postmaster sitting in car in parking lot reported, "The trees and surrounding area...made a strange sound as if the wind were blowing. The animals and birds were very still, and the building creaked somewhat. My vehicle bounced...for about 30-40 seconds and then began to slow down as the suspension stopped the vibrations."), Anza, Big Bear City (small objects moved), Cathedral City, Hemet, Idyllwild, Laguna Niguel (report from observer on fifth floor of six-story Federal Building stated that 13 of 18 people felt the shock. Duration was estimated to be 2-3 seconds, with two shocks 8-10 seconds apart. Hanging planters and pictures swung from east to west. Some people frightened; some became dizzy), Mecca, North Palm Springs, Potrero, Ranchita (small objects displaced), San Diego, San Jacinto, San Luis Rey Downs, Temecula, Thousand Palms, Warner Springs.
Intensity IV: Alpine (goats reacted before the earthquake), Cabazon, Coachella, Escondido, Julian, La Quinta, Mead Valley, Moreno, Morongo Valley, Mountain Center, Muscoy, North Shore, Pala, Palm Springs, Rancho Mirage, Salton City, Thermal, White Water, Winchester, Yucca Valley.

Intensity III: Cuyamaca (felt at caretaker's home, on State Highway 79 at south end of Cuyamaca Dam), Murrieta, Riverside, Santa Ysabel.

Intensity II: Bonsall, Homeland, North Park.

12 August (B) Central California
Origin time: 08 51 11.3
Epicenter: 37.17 N., 121.53 W.
Depth: 7 km
Magnitude: 3.2 ML
Intensity IV: Pinnacles National Monument (windows rattled at headquarters building; light fixtures squeaked but did not swing), Storrie.

15 August (B) Central California
Origin time: 12 29 05.6
Epicenter: 37.79 N., 121.96 W.
Depth: 7 km
Magnitude: 3.3 ML

The press reported that seven earthquakes occurred within 2 1/2 hours after this shock near Danville in Contra Costa County.

Intensity V: Castro Valley (small objects moved), Danville, Diablo (3 tremors felt from 3 to 5 a.m.), San Lorenzo. (Many were awakened and frightened in these communities.)

Intensity IV: Walnut Creek (several aftershocks felt between 3:10-5:30 a.m.; radio station reported windows shattered in

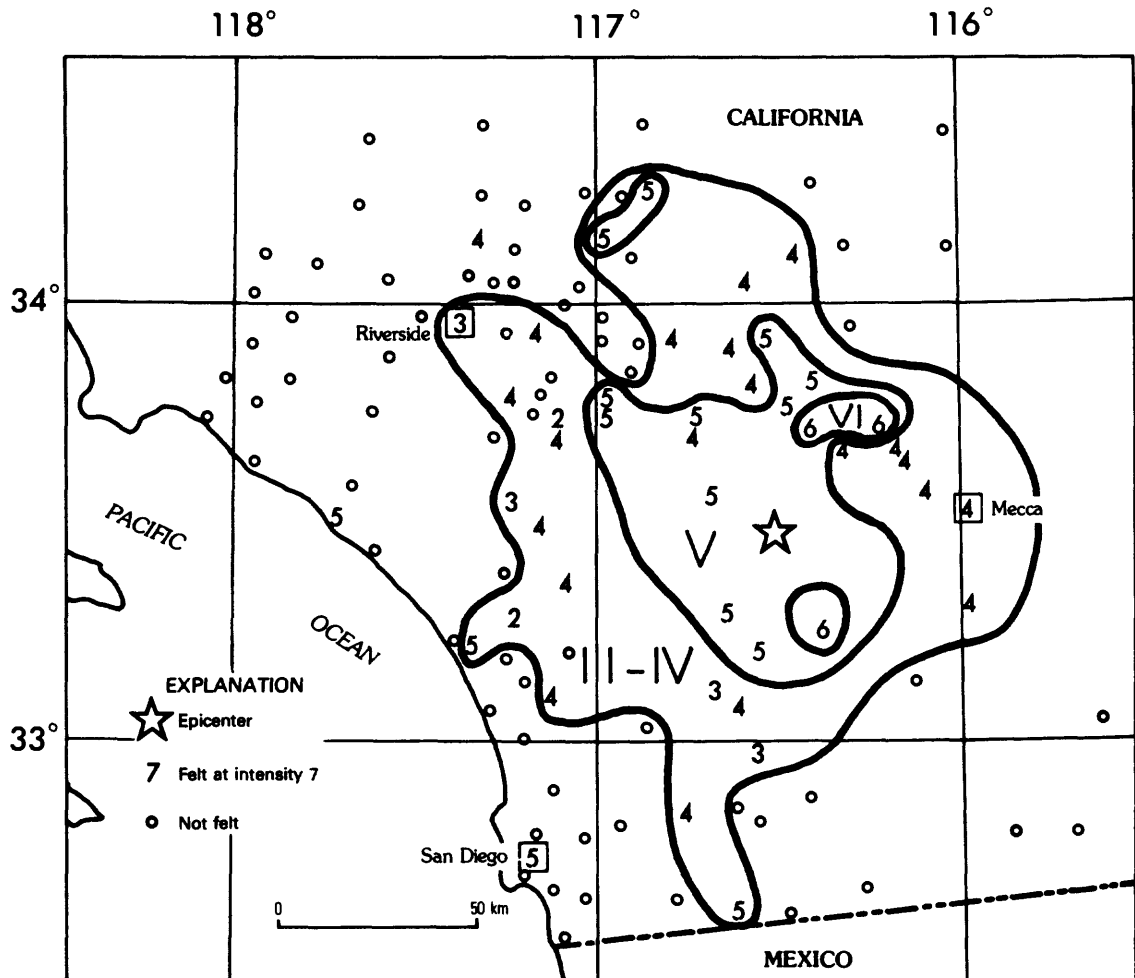


Figure 7.--Area affected by southern California earthquake of August 11

one house--unconfirmed).

Intensity II: Dimond.

16 August (F) California-Nevada Border Region

Origin time: 16 37 21.4

Epicenter: 36.19 N., 117.66 W.

Depth: 8 km

Magnitude: 3.7 ML(B), 3.7 ML(P)

Intensity V: Darwin.

20 August (B) Central California

Origin time: 22 05 52.9

Epicenter: 37.79 N., 121.97 W.

Depth: 7 km

Magnitude: 4.0 ML

This was the largest earthquake of two swarms that occurred Aug. 15-16 and 20-22. They centered in the same general area as the swarm in June 1970. The epicenter is located about 24 km southeast of Berkeley, in the area of Danville, in the vicinity of the Calaveras fault system. It was

reported felt throughout the San Francisco Bay area. Plaster reportedly was cracked in some Danville homes (B).

Intensity VI: Danville (plaster reported cracked in homes) (B).

Intensity IV: Alameda, Dublin (press report).

Intensity III: Berkeley (press report), El Cerrito, Walnut Creek.

Intensity II: Daly City, Dimond, Hayward, Martinez, Oakland, Pittsburg, Pleasanton, San Francisco, San Ramon, Sunol. (All press reports except Dimond and Oakland.)

20 August (B) Central California

Origin time: 22 08 01.1

Epicenter: 37.76 N., 121.91 W.

Depth: 2 km

Magnitude: 3.9 ML

Felt throughout the San Francisco Bay area. The August 20 earthquake (at 22:05 UTC) was

California--Continued

canvassed. Only one respondent mentioned that the same effects were felt for both shocks.

Intensity IV: Danville, Dublin (press report).

22 August (P) Southern California

Origin time: 08 09 59.7
Epicenter: 34.03 N., 117.47 W.
Depth: 3 km
Magnitude: 3.0 ML
Intensity IV: Etiwanda.

Intensity III: (Press reports) Fontana, San Bernardino.

1 September (B) Northern California

Origin time: 22 42 48.8
Epicenter: 40.64 N., 122.21 W.
Depth: 5 km
Magnitude: 3.5 ML
Intensity IV: Central Valley, French Gulch, Lakehead, Palo Cedro, Project City, Red Bluff (press report), Redding.
Intensity III: Millville.
Intensity II: Anderson.

5 September (B) Central California

Origin time: 03 15 09.3
Epicenter: 37.60 N., 121.43 W.
Depth: 9 km
Magnitude: 3.5 ML
Intensity IV: Tracy (floors and walls shook).

12 September (B) Northern California

Origin time: 17 34 33.0
Epicenter: 37.90 N., 122.22 W.
Depth: 6 km
Magnitude: 2.5 ML
Intensity II: Martinez.

15 September (B) Northern California

Origin time: 01 35 31.8
Epicenter: 38.00 N., 122.00 W.
Depth: 15 km
Magnitude: 3.4 ML
Intensity II: Concord, Orinda, Walnut Creek (B).

16 September (B) Central California

Origin time: 12 37 12.0
Epicenter: 37.34 N., 121.77 W.
Depth: 2 km
Magnitude: 2.5 ML
Intensity II: San Jose.

24 September (P) Southern California

Origin time: 14 02 17.6
Epicenter: 34.07 N., 118.15 W.
Depth: 8 km
Magnitude: 2.2 ML
Intensity II: Downtown Los Angeles area.

California--Continued

6 October (B) Central California

Origin time: 20 54 19.9
Epicenter: 37.63 N., 121.42 W.
Depth: 2 km
Magnitude: 3.0 ML
Intensity II: Stockton, Tracy.

9 October (P) Southern California

Origin time: 02 09 28.1
Epicenter: 33.33 N., 116.23 W.
Depth: 16 km
Magnitude: 3.9 ML
Intensity III: Cuyamaca (north San Diego County).

15 October (B) Northern California

Origin time: 01 35 31.8
Epicenter: 38.01 N., 122.05 W.
Depth: 19 km
Magnitude: 3.4 ML
Intensity III: Concord, Orinda, Walnut Creek.

15 October (P) Southern California

Origin time: 04 01 00.5
Epicenter: 33.90 N., 116.62 W.
Depth: 8 km
Magnitude: 2.9 ML
Intensity II: Palm Springs.

17 October (P) Southern California

Origin time: 05 38 11.9
Epicenter: 34.45 N., 118.37 W.
Depth: 15 km
Magnitude: 4.3 mb(G), 3.9 ML, 4.1 ML(B)

This earthquake affected residents over an 8,000-sq-km area of southern California (fig. 8).

Intensity VI: Newhall (broken water main--press report), Northridge (cracked plaster), Tarzana (cracked plaster and masonry), Van Nuys (small objects moved; slight damage).

Intensity V: Altadena, Arcadia, Burbank, Glendale, Granada Hills, Hermosa Beach, La Canada, Lebec, North Hollywood (small objects moved), Pasadena, San Fernando, San Gabriel, Saugus, Sherman Oaks (small objects shifted), West Adams (small objects shifted).

Intensity IV: Canoga Park, Hughes Lake, La Mirada, Lancaster, Los Angeles, Montrose, Panorama City, Redondo Beach, Rosamond, Sepulveda, Simi Valley, Studio City, Sun Valley, Sunset Beach, Tujunga, York.

Intensity III: El Monte, Sierra Madre, Sunland, Temple City.

Intensity II: Gardena, Keene, Pacoima, Reseda, Valyermo.

20 October (G) California-Nevada border region

Origin time: 23 14 56.3
Epicenter: 37.64 N., 118.02 W.
Depth: 5 km
Magnitude: 3.3 ML(B)
Intensity III: Bishop.

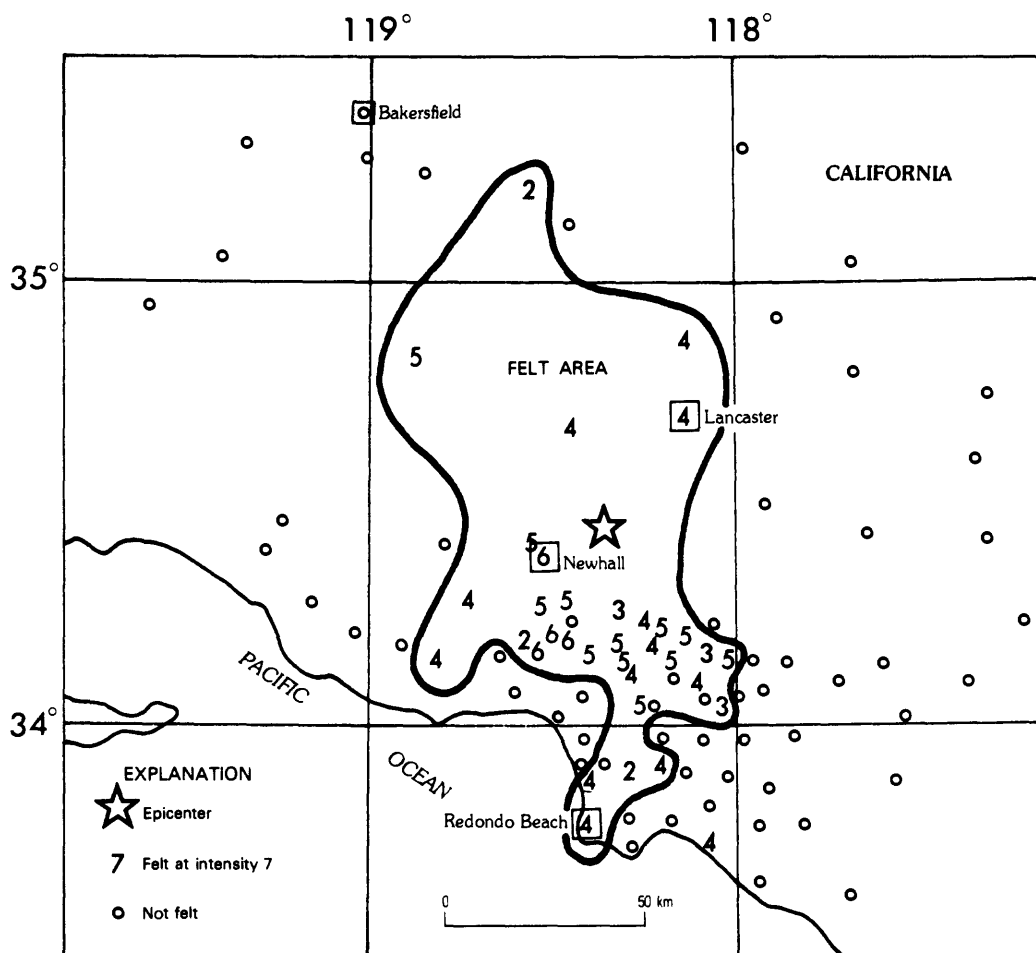


Figure 8.--Area affected by southern California earthquake of October 17

22 October (P) Southern California

Origin time: 23 19 13.6

Epicenter: 33.48 N., 116.58 W.

Depth: 15 km

Magnitude: 4.5 mb(G), 3.6 ML

Intensity II: Palm Springs (press report).

Depth: 15 km

Magnitude: 3.4 ML

Intensity IV: Fortuna, Rio Dell, Scotia.
(Buildings creaked in all three towns.)

23 October (B) Central California

Origin time: 19 24 33.2

Epicenter: 36.89 N., 121.49 W.

Depth: 11 km

Magnitude: 3.5 ML

Intensity II: Gilroy, Hollister.

2 November (P) Southern California

Origin time: 02 46 05.9

Epicenter: 34.10 N., 117.30 W.

Depth: 6 km

Magnitude: 3.3 ML

USGS evaluated a questionnaire canvass of University of Redlands students; the results are listed below.

24 October (B) Central California

Origin time: 02 19 52.7

Epicenter: 36.84 N., 121.63 W.

Depth: 2 km

Magnitude: 3.5 ML

Intensity II: Gilroy, Hollister.Intensity V: Loma Linda (frightened many in Loma Linda Hospital), Redlands (frightened students in dormitory of University of Redlands), San Bernardino (picture fell from wall in southernmost part of city).

26 October (B) Northern California

Origin time: 23 23 44.8

Epicenter: 40.30 N., 124.27 W.

Intensity IV: Highland, Rialto, Yucaipa.Intensity II: Norton Air Force Base
(telephone report).

California--Continued

4 November (P) Southern California
Origin time: 04 33 45.9
Epicenter: 34.05 N., 116.38 W.
Depth: 8 km
Magnitude: 3.2 ML
Intensity IV: Morongo Valley.

4 November (F) Southern California
Origin time: 05 48 20.9
Epicenter: 33.12 N., 115.60 W.
Depth: 5 km
Magnitude: 4.2 ML(P)
Intensity II: Imperial Valley.

4 November (F) Southern California
Origin time: 06 35 03.5
Epicenter: 33.12 N., 115.59 W.
Depth: 5 km
Magnitude: 4.1 ML(P)
Intensity II: Imperial Valley.

4 November (F) Southern California
Origin time: 07 56 06.8
Epicenter: 33.12 N., 115.61 W.
Depth: 1 km
Magnitude: 3.9 ML(P)
Intensity II: Imperial Valley.

California--Continued

4 November (F) Southern California
Origin time: 10 41 37.5
Epicenter: 33.12 N., 115.59 W.
Depth: 4 km
Magnitude: 4.6 mb(G), 5.3 MS(G),
4.9 ML(P), 5.5 ML(B)

Thirty earthquakes of magnitude 2 to 4 occurred between 8:00 p.m. and 11:30 p.m. PST (press report). One hundred earthquakes were recorded at California Institute of Technology in a 24-hour period (press report). The earthquake triggered burglar alarms in several Imperial Valley communities (press report). The main shock was felt over an area of about 25,000 sq km (fig. 9) of the southern California-western Arizona region. Slight damage occurred at Brawley, El Centro, and Westmorland. No intensity data are available from Mexico.

Intensity VI:

California--Brawley (plaster and dry wall cracked; bottles and jars falling from market shelves caused about \$200 damage--press report), El Centro (fences displaced slightly, furniture

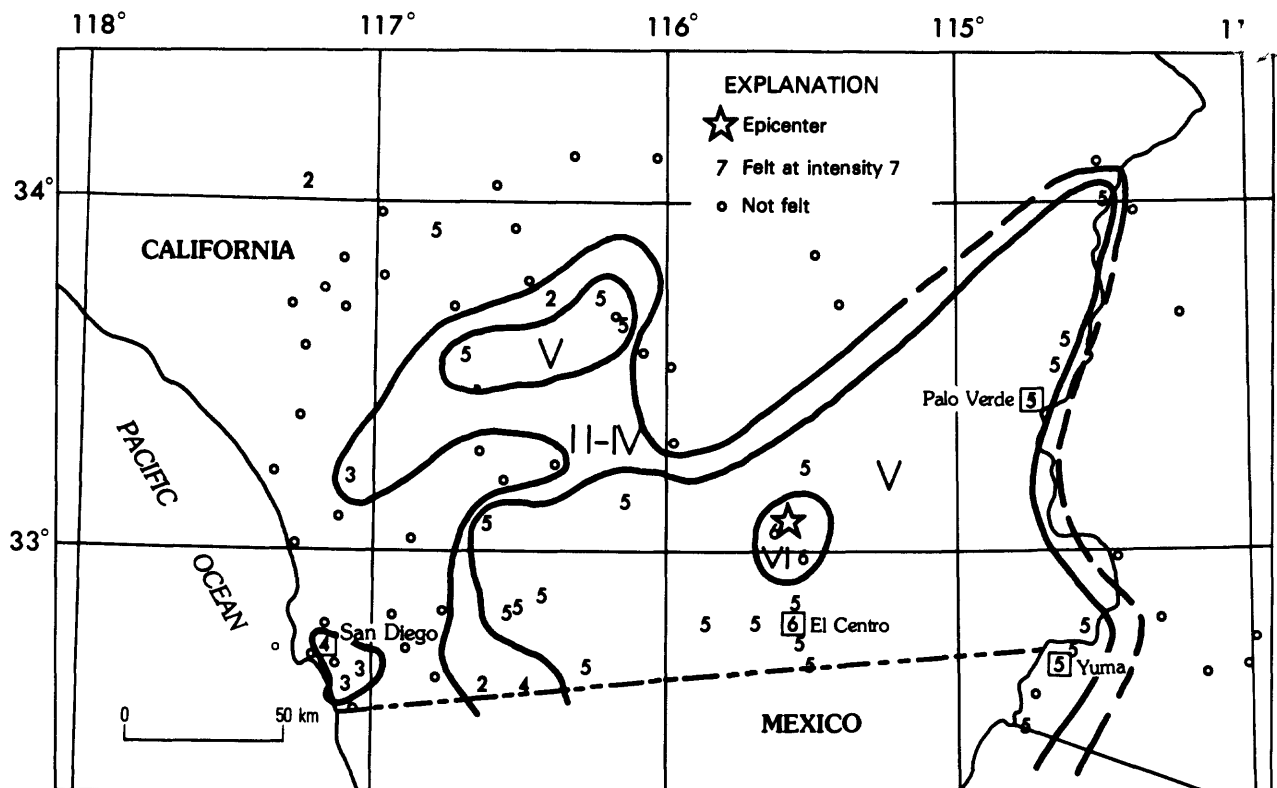


Figure 9.--Area affected by southern California earthquake of November 4

California--Continued

moved, plaster and ceiling tiles cracked), Westmorland (large appliances displaced, ground cracked, plaster cracked, electric service interrupted in area).

Intensity V:

Arizona--San Luis (furniture moved), Yuma (press report).

California--Anza, Bard, Blythe, Boulevard (5 km west of, at Live Oak Springs), Cabazon, Calexico, Chiriaco Summit (small objects moved), Guatay, Heber, Imperial, Julian, Lost Lake (50 km north of Blythe), Mount Laguna, Niland, Ocotillo (furniture moved), Palo Verde, Pine Valley, Plaster City, Ripley (3 km north of), Seeley, Thermal, Winterhaven (5 km northeast of).

Intensity IV:

California--Campo, Cuyamaca, Indio, San Diego.

Intensity III:

California--Bonita (press report), Chula Vista (press report), Palm Desert, Valley Center.

Intensity II:

California--Bryn Mawr, Potrero, Rancho Mirage, San Bernardino.

4 November (F) Southern California

Origin time: 11 39 08.3
Epicenter: 33.10 N., 115.62 W.
Depth: 1 km
Magnitude: 4.1 ML(P)
Intensity II: Imperial Valley.

4 November (F) Southern California

Origin time: 11 49 40.4
Epicenter: 33.11 N., 115.62 W.
Depth: 2 km
Magnitude: 3.8 mb(G), 4.1 ML(P)
Intensity II: Imperial Valley.

4 November (F) Southern California

Origin time: 13 31 27.7
Epicenter: 33.10 N., 115.62 W.
Depth: 4 km
Magnitude: 4.2 ML(P)
Intensity II: Imperial Valley.

4 November (F) Southern California

Origin time: 14 12 50.2
Epicenter: 33.12 N., 115.60 W.
Depth: 5 km
Magnitude: 4.2 mb(G), 4.4 ML(P)
Intensity II: Imperial Valley.

5 November (B) Central California

Origin time: 19 43 11.0
Epicenter: 35.80 N., 121.30 W.
Depth: 2 km
Magnitude: 3.5 ML
Intensity II: San Simeon.

11 November Northern California

Origin time: 02 32
Epicenter: Not located.

California--Continued

Depth: None computed.
Magnitude: None computed.
Intensity V: Willets (small objects and furniture moved).

15 November (P) Southern California

Origin time: 12 08 04.0
Epicenter: 33.93 N., 118.25 W.
Depth: 8 km
Magnitude: 2.9 ML
Intensity III: Culver City, Gardena, Inglewood.

22 November (P) Southern California

Origin time: 17 55 10.8
Epicenter: 33.95 N., 118.62 W.
Depth: 2 km
Magnitude: 3.8 ML

This earthquake was felt over an area of approximately 4,000 sq km (fig. 10) along the coast of California west of Los Angeles.

Intensity VI: Long Beach (slight damage; trees and bushes shook), Los Angeles (plaster cracked), North Hollywood (plaster cracked, windows broken, furniture moved).

Intensity V: El Segundo, Fillmore, Hawthorne, Hermosa Beach, Inglewood, Lynwood, Playa del Rey (small objects moved), Redondo Beach, Santa Monica, Sepulveda (small objects moved), Sherman Oaks (small objects moved), Topanga, Torrance (small objects moved), Venice, West Los Angeles, Woodland Hills.

Intensity IV: Burbank, Canoga Park, Chatsworth, Culver City, Downey, Encino, Gardena (press report), Granada Hills, Huntington Park, Lakewood, Mission Hills, Montebello (press report), Mount Baldy, Northridge, Norwalk, Pacific Palisades, Rosemead, Simi Valley, Somis, South Gate, Sylmar (press report), Thousand Oaks, Van Nuys, Westwood, Wilmington.

Intensity III: La Palma (press report), Pasadena, Piru.

Intensity II: Malibu.

22 November (P) Southern California

Origin time: 19 32 36.8
Epicenter: 33.97 N., 118.58 W.
Depth: 8 km
Magnitude: 2.9 ML
Intensity II: Los Angeles, Santa Monica.

27 November (F) Southern California

Origin time: 15 23 43.1
Epicenter: 33.50 N., 116.49 W.
Depth: 5 km
Magnitude: 3.3 ML(P)
Intensity II: Palm Springs.

30 November (P) Southern California

Origin time: 23 55 18.8
Epicenter: 34.08 N., 118.28 W.

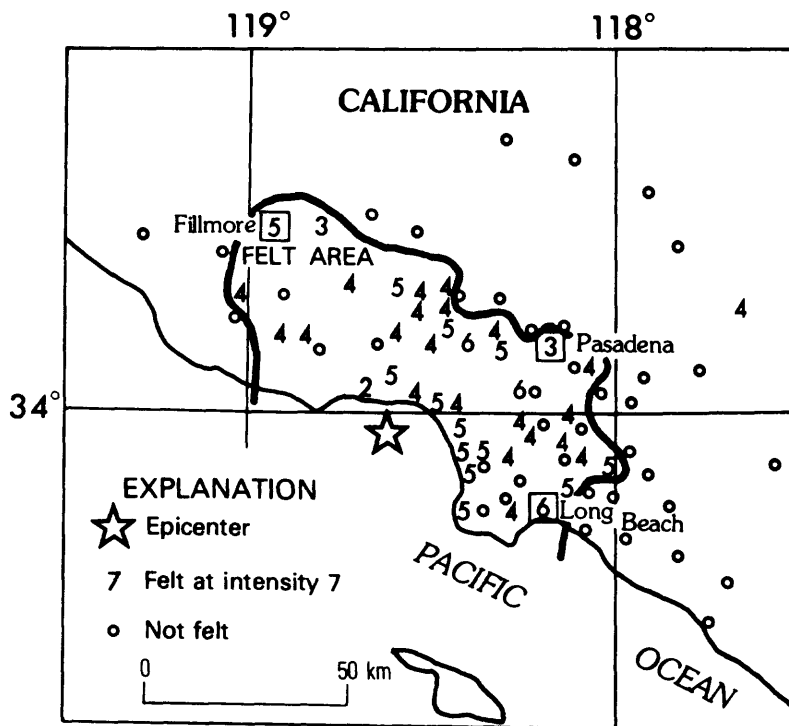


Figure 10.--Area affected by southern California earthquake of November 22

Depth: 8 km
 Magnitude: 2.5 ML
Intensity III: Hollywood, Los Angeles downtown area.

5 December (P) Central California
 Origin time: 04 41 08.9
 Epicenter: 35.39 N., 118.68 W.
 Depth: 1 km
 Magnitude: 3.8 ML
Intensity V: Keene.
Intensity II: Walkers Basin (near Caliente).

7 December (P) Baja California
 Origin time: 12 59 56.3
 Epicenter: 31.98 N., 114.78 W.
 Depth: 8 km
 Magnitude: 5.5 mb(G), 5.7 MS(G), 5.2 ML

See Arizona listing for intensity data.

8 December (P) Southern California
 Origin time: 02 13 44.1
 Epicenter: 34.47 N., 118.42 W.
 Depth: 12 km
 Magnitude: 3.3 ML
Intensity II: San Fernando.

9 December (P) Southern California
 Origin time: 17 11 36.3
 Epicenter: 33.98 N., 117.25 W.
 Depth: 11 km
 Magnitude: 2.9 ML

Intensity II: Riverside County (press report), San Bernardino County (press report).

17 December (B) Northern California
 Origin time: 21 36 28.4
 Epicenter: 38.77 N., 122.27 W.
 Depth: 2 km
 Magnitude: 3.3 ML
Intensity II: Geyserville.

California--Off the coast

20 January (G) Northern California
 Origin time: 13 59 37.2
 Epicenter: 40.38 N., 125.34 W.
 Depth: 33 km
 Magnitude: 4.8 mb, 4.7 ML(B)
Intensity IV: Eureka, Ferndale, Petrolia (press report).

22 May (G) Northern California
 Origin time: 00 51 41.4
 Epicenter: 40.40 N., 125.35 W.
 Depth: 33 km
 Magnitude: 3.9 mb, 3.4 ML(B)
Intensity V: Fortuna.
Intensity IV: Miranda, Salmon Creek.

13 September (B) Northern California

Origin time: 16 08 10.2
 Epicenter: 40.20 N., 124.39 W.
 Depth: 1 km
 Magnitude: 4.8 mb(G), 4.0 ML
Intensity IV: Ferndale, Petrolia, Scotia.
Intensity III: Rio Dell.

18 October (P) Southern California

Origin time: 17 26 52.6
 Epicenter: 32.72 N., 117.92 W.
 Depth: 15 km
 Magnitude: 4.6 mb(G), 4.2 ML
 Felt in western San Diego and Orange
 Counties.
Intensity III: Newport Beach, San Diego.

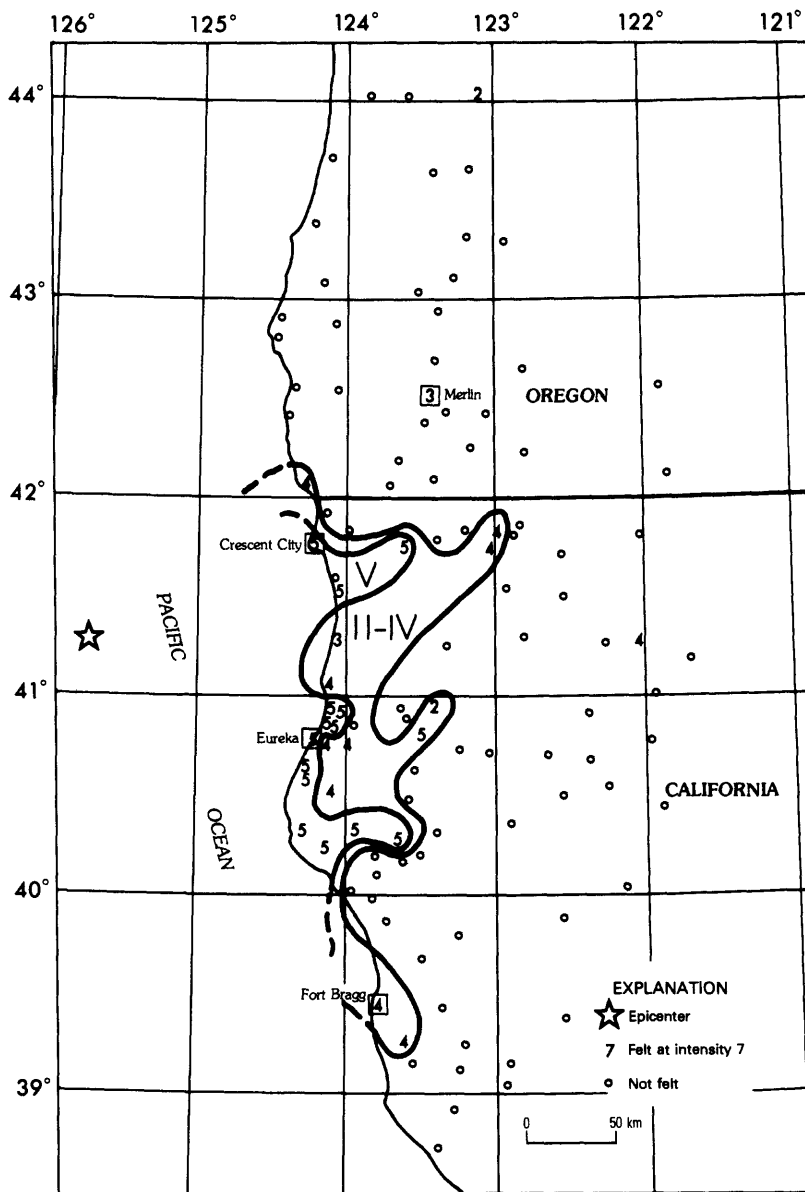


Figure 11.--Area affected by northern California earthquake of November 26

 California--Off the Coast--Continued

26 November (G) Northern California

Origin time: 11 19 25.2
 Epicenter: 41.29 N., 125.71 W.
 Depth: 15 km
 Magnitude: 6.0 mb, 6.8 MS, 6.2 ML(B)

This earthquake was felt over an area of about 6,500 sq km (fig. 11, on p. 28) along the coast north and south of Eureka.

Intensity V:

California--Arcata (small objects moved), Bayside, Blocksburg, Blue Lake, Burnt Ranch, Cedar Ridge, Crescent City (press report), Eureka, Ferndale, Honeydew, Humboldt (press report), Klamath, Loleta, McKinleyville (press report), Petrolia, Samoa, Weott.

Intensity IV:

California--Carlotta (3 km east of), Comptche, Fort Bragg, Horse Creek, Kneeland, Mount Shasta, Rio Dell (observer said all effects exaggerated in the press and on radio), Scott Bar, Trinidad.

Oregon--Brookings.

Intensity III:

California--Hydesville, Orick.
 Oregon--Merlin.

Intensity II:

California--Denny.
 Oregon--Eugene (telephone report).
 Washington--Long View (telephone report).

 Connecticut

24 April (C) Central Connecticut

Origin time: 10 22 22.1
 Epicenter: 41.68 N., 72.49 W.
 Depth: 0 km
 Magnitude: 2.2 mbLg

A smaller foreshock was reported on April 6, an aftershock on April 30 (press report).

Intensity IV: Haddam, Shailerville (awakened a few people--press report).

 Georgia

27 December (G) Southeastern Georgia

Origin time: 06 57 13.9
 Epicenter: 32.22 N., 82.46 W.
 Depth: 5 km
 Magnitude: 3.7 mbLg(V)

The intensities listed below are from a USGS questionnaire canvass and a report by Lance et al. (1977). Three small aftershocks that occurred on December 28, 1976, 22 17 UTC; January 5, 1977, 02 30

 Georgia--Continued

UTS; and January 5, 1977, 02 32 UTC were reported by Lance et al. (1977).

Intensity V: Baxley, Hazelhurst, Reidsville, Uvalda (pictures tilted).
Intensity IV: Cedar Crossing (oral commun.), Fitzgerald, Jekyll Island ("wind blowing fiercely, loud thunderclap, followed one-half minute later by loud noise as if heavy boots were dropped above"), Lyons.

 Hawaii

1 January (H) Island of Hawaii

Origin time: 18 54 23.0
 Epicenter: 18.85 N., 155.08 W.
 Depth: 26 km
 Magnitude: 4.5 ML
Intensity III: Kalapana (H).
Intensity II: Kona (H), Naalehu (H).

2 January (H) Island of Hawaii

Origin time: 01 36 47.2
 Epicenter: 19.36 N., 155.25 W.
 Depth: 9 km
 Magnitude: 3.5 ML
Intensity III: Volcano (H).

7 January (H) Island of Hawaii

Origin time: 11 44 33.2
 Epicenter: 19.45 N., 154.88 W.
 Depth: 9 km
 Magnitude: 3.8 ML
Intensity III: Pahoa (H).

12 January (H) Island of Hawaii

Origin time: 00 05 40.1
 Epicenter: 19.51 N., 155.27 W.
 Depth: 24 km
 Magnitude: 4.2 ML, 4.5 mb(G), 4.2 MS(G)
Intensity IV: Felt Islandwide (houses shaken on the eastern side of the Island of Hawaii--press report), Hilo (H), Puna (H).
Intensity III: Kau (H).
Intensity II: Kamuela (H), Kona (H).

12 January (H) Island of Hawaii

Origin time: 13 48 32.9
 Epicenter: 19.37 N., 155.12 W.
 Depth: 9 km
 Magnitude: 3.0 ML
Intensity III: Nanawale (H).

14 January (H) Island of Hawaii

Origin time: 22 09 51.9
 Epicenter: 19.38 N., 155.11 W.
 Depth: 7 km
 Magnitude: 2.3 ML
Intensity II: Volcano (H).

Hawaii--Continued

- 15 January (H) Island of Hawaii
 Origin time: 22 41 45.2
 Epicenter: 19.41 N., 155.29 W.
 Depth: 14 km
 Magnitude: 4.4 ML
Intensity V: Hilo (H).
Intensity IV: Other parts of Hawaii Island (H).
Intensity II: Oahu Island (H).
- 15 January (H) Island of Hawaii
 Origin time: 22 59 26.0
 Epicenter: 19.41 N., 155.29 W.
 Depth: 16 km
 Magnitude: 4.8 mb(G), 4.5 ML
Intensity V: Hilo (H).
Intensity IV: Other parts of Hawaii Island (H).
Intensity III: Felt Islandwide (press report).
Intensity II: Oahu Island (H).
- 17 January (H) Island of Hawaii
 Origin time: 05 29 13.8
 Epicenter: 19.38 N., 155.11 W.
 Depth: 8 km
 Magnitude: 3.7 ML
Intensity IV: Hilo (H).
Intensity III: Puna (H), Volcano (H).
- 17 January (H) Island of Hawaii
 Origin time: 06 00 03.9
 Epicenter: 19.35 N., 155.00 W.
 Depth: 4 km
 Magnitude: 3.2 ML
Intensity III: Hilo (H), Kalapana (H).
Intensity II: Parts of Puna (H), Volcano (H).
- 18 January (H) Island of Hawaii
 Origin time: 14 49 28.3
 Epicenter: 19.36 N., 155.25 W.
 Depth: 10 km
 Magnitude: 3.6 ML
Intensity III: Hilo (H), Volcano (H).
Intensity II: Puna (H).
- 19 January (H) Island of Hawaii
 Origin time: 00 13 37.8
 Epicenter: 19.36 N., 155.13 W.
 Depth: 8 km
 Magnitude: 3.6 ML
Intensity II: Hawaii National Park (H).
- 19 January (H) Island of Hawaii
 Origin time: 09 57 46.4
 Epicenter: 19.38 N., 155.10 W.
 Depth: 8 km
 Magnitude: 3.5 ML
Intensity II: Hawaii National Park (H), Volcano (H).
- 21 January (H) Island of Hawaii
 Origin time: 21 41 21.2
 Epicenter: 19.37 N., 155.12 W.
 Depth: 9 km
 Magnitude: 4.1 ML

Hawaii--Continued

- Intensity III: Hilo (H).
Intensity II: Honomu (H), Kalapana (H), Papaikou (H), Volcano (H).
- 23 January (H) Island of Hawaii
 Origin time: 12 47 40.0
 Epicenter: 19.36 N., 155.09 W.
 Depth: 9 km
 Magnitude: 3.7 ML
Intensity III: Hilo (H), Puna (H).
Intensity II: Kahuku (H), Volcano (H).
- 27 January (H) Island of Hawaii
 Origin time: 15 35 51.3
 Epicenter: 19.35 N., 155.10 W.
 Depth: 9 km
 Magnitude: 3.6 ML
Intensity III: Hilo (H).
Intensity II: Glenwood (H), Keaau (H), Kurtistown (H), Volcano (H).
- 27 January (H) Island of Hawaii
 Origin time: 21 34 04.5
 Epicenter: 19.34 N., 155.09 W.
 Depth: 7 km
 Magnitude: 2.9 ML
Intensity II: Hawaii National Park (H).
- 28 January (H) Island of Hawaii
 Origin time: 08 26 28.1
 Epicenter: 19.34 N., 155.11 W.
 Depth: 9 km
 Magnitude: 4.0 ML
Intensity IV: Hilo (H).
Intensity III: Puna areas (H), Volcano (H).
- 29 January (H) Island of Hawaii
 Origin time: 20 19 56.4
 Epicenter: 19.38 N., 155.00 W.
 Depth: 8 km
 Magnitude: 4.7 ML, 4.5 mb(G)
Intensity IV: Hilo (H), Puna areas (H).
 Minor household breakage at unknown location (press report).
Intensity III: Kau (H), Volcano (H).
Intensity II: Kona (H), northern parts of the Island.
- 1 February (H) Island of Hawaii
 Origin time: 06 07 26.9
 Epicenter: 19.37 N., 155.08 W.
 Depth: 8 km
 Magnitude: 3.3 ML
Intensity III: Hilo (H).
Intensity II: Glenwood (H).
- 4 February (H) Island of Hawaii
 Origin time: 02 42 13.4
 Epicenter: 19.38 N., 155.10 W.
 Depth: 8 km
 Magnitude: 3.4 ML
Intensity III: Glenwood (H).
Intensity II: Volcano (H).
- 4 February (H) Island of Hawaii
 Origin time: 06 50 58.3
 Epicenter: 19.36 N., 155.25 W.

Hawaii--Continued

Depth: 10 km
 Magnitude: 3.5 ML
Intensity III: Hilo (H), Volcano (H).
Intensity II: Glenwood (H), Keaau (H),
 Kurtistown (H), Mountainview (H).

8 February (H) Island of Hawaii
 Origin time: 08 48 12.2
 Epicenter: 19.33 N., 155.13 W.
 Depth: 8 km
 Magnitude: 3.2 ML
Intensity III: Volcano (H).

12 February (H) Island of Hawaii
 Origin time: 16 18 26.2
 Epicenter: 19.36 N., 155.06 W.
 Depth: 8 km
 Magnitude: 3.2 ML
Intensity II: Hilo (H).

13 February (H) Island of Hawaii
 Origin time: 10 49 51.8
 Epicenter: 19.52 N., 155.96 W.
 Depth: 10 km
 Magnitude: 3.6 ML
Intensity III: Captain Cook (H), Holualoa
 (H), Kealahou (H).

13 February (H) Island of Hawaii
 Origin time: 17 12 29.1
 Epicenter: 19.37 N., 155.84 W.
 Depth: 7 km
 Magnitude: 2.9 ML
Intensity II: Hilo (H).

19 February (H) Island of Hawaii
 Origin time: 04 40 52.5
 Epicenter: 19.43 N., 155.28 W.
 Depth: 1 km
 Magnitude: 2.8 ML
Intensity III: Hawaii National Park (H).
Intensity II: Hilo (H), Volcano (H).

21 February (G) Island of Hawaii
 Origin time: 05 51 13.8
 Epicenter: 20.21 N., 156.27 W.
 Depth: 33 km
 Magnitude: 4.9 mb, 4.0 MS, 5.1 ML (H)
Intensity VI: Kawaihae (wall damage
 amounting to \$50 in one house on Hawaii
 Island; minor damage to items that fell
 from shelves--press report).
Intensity V: Hana (on Maui Island--press
 report), Hoolehua, Kahului, Kamuela,
 Kapaau, Kealahou, Paauhau.
Intensity IV: Captain Cook, Holualoa,
 Honokaa, Honolulu, Honouliuli, Kohala (H),
 Kualapuu, Lanai City, Makawao, Maunaloa,
 Paia, Papaikou, Volcano, Wheeler AFB.
Intensity III: Kaaawa, southern parts of
 Hawaii Island (H).
Intensity II: Kaneohe, Oahu. Felt
 Islandwide: Maui (H), Oahu (H).

24 February (H) Island of Hawaii
 Origin time: 15 15 19.1
 Epicenter: 19.37 N., 155.11 W.

Hawaii--Continued

Depth: 9 km
 Magnitude: 4.2 ML
Intensity III: Mountainview (H), Volcano
 (H).

25 February (H) Island of Hawaii
 Origin time: 23 48 20.3
 Epicenter: 19.37 N., 155.11 W.
 Depth: 9 km
 Magnitude: 3.9 ML
Intensity III: Hilo (H).
Intensity II: Pahoa (H), Volcano (H).

3 March (H) Island of Hawaii
 Origin time: 16 52 01.2
 Epicenter: 19.40 N., 155.26 W.
 Depth: 5 km
 Magnitude: 2.5 ML
Intensity II: Hawaii National Park (H),
 Volcano (H).

3 March (H) Island of Hawaii
 Origin time: 23 06 10.3
 Epicenter: 19.43 N., 155.28 W.
 Depth: 1 km
 Magnitude: 2.2 ML
Intensity II: Hawaii National Park (H),
 Volcano (H).

5 March (H) Island of Hawaii
 Origin time: 13 16 52.4
 Epicenter: 19.61 N., 155.13 W.
 Depth: 11 km
 Magnitude: 2.6 ML
Intensity II: Glenwood (H), Hilo (H).

6 March (H) Island of Hawaii
 Origin time: 22 23 04.6
 Epicenter: 19.36 N., 155.03 W.
 Depth: 7 km
 Magnitude: 3.5 ML
Intensity III: Waiholu Visitors Center (H).

8 March (H) Island of Hawaii
 Origin time: 02 25 34.6
 Epicenter: 19.36 N., 155.12 W.
 Depth: 8 km
 Magnitude: 3.7 ML
Intensity III: Volcano (H).

16 March (H) Island of Hawaii
 Origin time: 16 48 16.9
 Epicenter: 19.37 N., 155.12 W.
 Depth: 8 km
 Magnitude: 2.8 ML
Intensity II: Volcano (H).

19 March (H) Island of Hawaii
 Origin time: 13 04 01.3
 Epicenter: 19.41 N., 155.26 W.
 Depth: 4 km
 Magnitude: 2.7 ML
Intensity III: Hawaii National Park (H).
Intensity II: Volcano (H).

Hawaii--Continued

- 19 March (H) Island of Hawaii
Origin time: 23 24 30.3
Epicenter: 19.36 N., 155.06 W.
Depth: 8 km
Magnitude: 3.9 ML
Intensity III: Hilo (H).
Intensity II: Volcano (H).
- 20 March (H) Island of Hawaii
Origin time: 23 13 19.8
Epicenter: 19.33 N., 155.11 W.
Depth: 9 km
Magnitude: 3.1 ML
Intensity II: Hilo (H).
- 21 March (H) Island of Hawaii
Origin time: 23 58 00.2
Epicenter: 19.35 N., 155.19 W.
Depth: 7 km
Magnitude: 2.6 ML
Intensity II: Volcano (H).
- 22 March (H) Island of Hawaii
Origin time: 17 27 41.6
Epicenter: 19.29 N., 155.36 W.
Depth: 9 km
Magnitude: 2.4 ML
Intensity II: Waikaeuka (H).
- 23 March (H) Island of Hawaii
Origin time: 06 48 26.9
Epicenter: 19.37 N., 155.09 W.
Depth: 8 km
Magnitude: 3.3 ML
Intensity III: Hilo (H).
- 23 March (H) Island of Hawaii
Origin time: 07 19 56.6
Epicenter: 19.34 N., 155.11 W.
Depth: 9 km
Magnitude: 3.1 ML
Intensity II: Hilo (H).
- 24 March (H) Island of Hawaii
Origin time: 00 38 11.1
Epicenter: 19.33 N., 155.19 W.
Depth: 8 km
Magnitude: 2.8
Intensity II: Volcano (H).
- 24 March (H) Island of Hawaii
Origin time: 01 06 03.1
Epicenter: 19.32 N., 155.31 W.
Depth: 9 km
Magnitude: 3.7 ML
Intensity III: Kona (H).
Intensity II: Hawaii National Park (H),
Hilo (H).
- 29 March (H) Island of Hawaii
Origin time: 15 09 51.9
Epicenter: 19.37 N., 155.25 W.
Depth: 10 km
Magnitude: 3.7 ML
Intensity III: Hilo (H).
Intensity II: Hawaii National Park (H),
Keaau (H), Volcano (H).

Hawaii--Continued

- 29 March (H) Island of Hawaii
Origin time: 18 31 29.8
Epicenter: 19.40 N., 155.26 W.
Depth: 14 km
Magnitude: 3.0 ML
Intensity II: Volcano (H).
- 31 March (H) Island of Hawaii
Origin time: 00 52 10.2
Epicenter: 19.34 N., 155.12 W.
Depth: 9 km
Magnitude: 3.4 ML
Intensity III: Hilo (H).
- 2 April (H) Island of Hawaii
Origin time: 18 14 06.4
Epicenter: 19.35 N., 155.11 W.
Depth: 9 km
Magnitude: 4.5 mb(G), 4.6 ML

Figure 12 shows the intensity distribution on Hawaii Island.

Intensity V: Holualoa, Honomu,
Mountainview, Ookaia, Papaaloa, Wheeler
AFB.
Intensity IV: Captain Cook, Hawaii National
Park, Hilo, Keaau, Kurtistown, Pahoa,
Papaikou, Puna district (H), Volcano.
Intensity III: Kau district (H).
Intensity II: Hakalau, Kamuela (H), Kona
district (H).

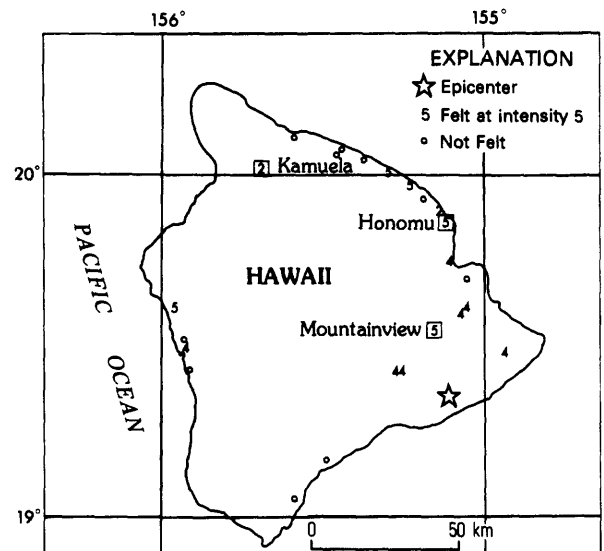


Figure 12.--Area affected by Hawaii earthquake of April 2

- 2 April (H) Island of Hawaii
Origin time: 19 14 11.9
Epicenter: 19.62 N., 155.99 W.
Depth: 10 km
Magnitude: 3.4 ML
Intensity III: Captain Cook (H), Kealahou (H).

Hawaii--Continued

- 2 April (H) Island of Hawaii
 Origin time: 19 55 03.3
 Epicenter: 19.34 N., 155.22 W.
 Depth: 8 km
 Magnitude: 3.6 ML
Intensity III: Hilo (H).
Intensity II: Volcano (H).
- 3 April (H) Island of Hawaii
 Origin time: 11 43 42.2
 Epicenter: 19.40 N., 155.28 W.
 Depth: 4 km
 Magnitude: 3.0 ML
Intensity III: Hawaii National Park (H).
Intensity II: Volcano (H).
- 11 April (H) Island of Hawaii
 Origin time: 15 48 21.4
 Epicenter: 19.41 N., 155.21 W.
 Depth: 2 km
 Magnitude: 2.3 ML
Intensity III: Hawaii National Park (H).
Intensity II: Volcano (H).
- 12 April (H) Island of Hawaii
 Origin time: 01 35 49.2
 Epicenter: 19.35 N., 155.06 W.
 Depth: 6 km
 Magnitude: 3.4 ML
Intensity II: Mountainview (H), Volcano (H).
- 15 April (H) Island of Hawaii
 Origin time: 08 01 36.0
 Epicenter: 19.46 N., 154.89 W.
 Depth: 9 km
 Magnitude: 3.3 ML
Intensity III: Pahoa (H).
Intensity II: Kapoho (H).
- 20 April (H) Island of Hawaii
 Origin time: 17 11 03.0
 Epicenter: 19.36 N., 155.25 W.
 Depth: 9 km
 Magnitude: 3.5 ML
Intensity II: Hilo (H).
- 22 April (H) Island of Hawaii
 Origin time: 04 13 34.5
 Epicenter: 18.80 N., 155.00 W.
 Depth: 49 km
 Magnitude: 4.6 ML
Intensity III: Hainakea, Hilo (H), Papaikou (H), Puna and South Kona areas (press report).
Intensity II: Glenwood (H), Oceanview Estate (H), Volcano (H).
- 22 April (H) Island of Hawaii
 Origin time: 15 54 04.8
 Epicenter: 19.53 N., 155.31 W.
 Depth: 12 km
 Magnitude: 3.4 ML
Intensity II: Glenwood (H), Volcano (H).
- 23 April (H) Island of Hawaii
 Origin time: 22 29 53.7
 Epicenter: 19.37 N., 155.09 W.

Hawaii--Continued

- Depth: 9 km
 Magnitude: 4.2 ML
Intensity III: Hilo (H), Kalapana (H).
Intensity II: Hawaiian Volcano Observatory (H), Kaaau (H), Mountainview (H).
- 27 April (H) Island of Hawaii
 Origin time: 07 44 41.6
 Epicenter: 19.39 N., 155.28 W.
 Depth: 6 km
 Magnitude: 3.2 ML
Intensity III: Hawaii National Park (H).
Intensity II: Volcano (H).
- 27 April (H) Island of Hawaii
 Origin time: 23 40 12.1
 Epicenter: 19.41 N., 155.26 W.
 Depth: 2 km
 Magnitude: 2.6 ML
Intensity II: Hawaii National Park (H).
- 6 May (H) Island of Hawaii
 Origin time: 04 32 20.3
 Epicenter: 19.40 N., 155.27 W.
 Depth: 2 km
 Magnitude: 2.2 ML
Intensity II: Hawaii National Park (H).
- 9 May (H) Island of Hawaii
 Origin time: 16 14 43.3
 Epicenter: 19.36 N., 155.13 W.
 Depth: 10 km
 Magnitude: 3.4 ML
Intensity II: Glenwood (H), Volcano (H).
- 12 May (H) Island of Hawaii
 Origin time: 15 55 11.4
 Epicenter: 19.34 N., 155.19 W.
 Depth: 10 km
 Magnitude: 3.7 ML
Intensity III: Hilo.
Intensity II: Captain Cook (H), Glenwood (H), Papaikou (H), Volcano (H).
- 16 May (H) Island of Hawaii
 Origin time: 07 39 58.5
 Epicenter: 19.43 N., 155.28 W.
 Depth: 5 km
 Magnitude: 2.7 ML
Intensity III: Hawaii National Park (H).
Intensity II: Volcano (H).
- 17 May (H) Island of Hawaii
 Origin time: 11 45 06.0
 Epicenter: 19.33 N., 155.27 W.
 Depth: 10 km
 Magnitude: 3.6 ML
Intensity III: Hilo (H).
- 18 May (H) Island of Hawaii
 Origin time: 06 54 49.1
 Epicenter: 19.33 N., 155.14 W.
 Depth: 9 km
 Magnitude: 3.0 ML
Intensity II: Volcano (H).

Hawaii--Continued

- 18 May (H) Island of Hawaii
 Origin time: 16 16 41.2
 Epicenter: 19.33 N., 155.13 W.
 Depth: 9 km
 Magnitude: 3.5 ML
Intensity III: Hilo (H).
Intensity II: Mountainview (H), Volcano (H).
- 20 May (H) Island of Hawaii
 Origin time: 03 12 05.4
 Epicenter: 19.33 N., 155.13 W.
 Depth: 9 km
 Magnitude: 3.8 ML
Intensity III: Volcano (H).
Intensity II: Kahuku Ranch (H).
- 22 May (H) Island of Hawaii
 Origin time: 05 53 09.7
 Epicenter: 19.35 N., 155.10 W.
 Depth: 9 km
 Magnitude: 3.2 ML
Intensity II: Hilo (H).
- 23 May (H) Island of Hawaii
 Origin time: 04 52 08.3
 Epicenter: 19.36 N., 155.25 W.
 Depth: 11 km
 Magnitude: 3.7 ML
Intensity III: Hilo (H).
Intensity II: Volcano (H).
- 24 May (H) Island of Hawaii
 Origin time: 03 31 20.1
 Epicenter: 19.34 N., 155.12 W.
 Depth: 9 km
 Magnitude: 4.0 ML
Intensity III: Hilo (H).
Intensity II: Captain Cook (H), Volcano (H).
- 24 May (H) Island of Maui
 Origin time: 09 24 08.2
 Epicenter: 20.80 N., 156.24 W.
 Depth: 0 km
 Magnitude: 4.1 ML
Intensity V: Wailuku, Maui.
Intensity IV: Kualapuu, Molokai; Lanai City, Lanai; Makawao, Maui.
Intensity III: Honolulu, Oahu; Kohala, Hawaii (press report); Kula, Maui (press report); Lahaina, Maui (press report); Pukalani, Maui (press report).
Intensity II: Kona, Hawaii (H).
- 24 May (H) Island of Hawaii
 Origin time: 09 24 20.5
 Epicenter: 20.06 N., 155.80 W.
 Depth: 6 km
 Magnitude: 3.6 ML
Intensity III: Maui (H).
- 31 May (H) Island of Hawaii
 Origin time: 16 27 23.3
 Epicenter: 20.12 N., 155.76 W.
 Depth: 29 km
 Magnitude: 3.5 ML

Hawaii--Continued

- Intensity III: Honokaa (H), Kohala (H), Waimea (H).
Intensity II: Hilo (H).
- 31 May (H) Island of Hawaii
 Origin time: 18 32 18.8
 Epicenter: 19.52 N., 156.24 W.
 Depth: 17 km
 Magnitude: 4.5 ML
Intensity IV: Kona.
Intensity III: Honokaa (H), Kamuela (H), Kohala (H).
Intensity II: Pepeekeo (H).
- 31 May (H) Island of Hawaii
 Origin time: 18 32 24.9
 Epicenter: 19.55 N., 155.59 W.
 Depth: 2 km
 Magnitude: 3.7 ML
Intensity III: Honokaa (H), Kamuela (H), Kohala (H).
Intensity II: Pepeekeo (H).
- 1 June (H) Island of Hawaii
 Origin time: 20 02 22.0
 Epicenter: 19.36 N., 155.20 W.
 Depth: 1 km
 Magnitude: 2.7 ML
Intensity II: Hilo (H).
- 5 June (H) Island of Hawaii
 Origin time: 08 50 51.2
 Epicenter: 19.36 N., 155.12 W.
 Depth: 9 km
 Magnitude: 4.1 ML
Intensity III: Hilo (H), Kalapana (H), Volcano (H).
Intensity II: Glenwood (H), Keaau (H), Papaikou (H).
- 9 June (H) Island of Hawaii
 Origin time: 21 03 42.6
 Epicenter: 19.22 N., 155.46 W.
 Depth: 10 km
 Magnitude: 2.7 ML
Intensity II: Pahala.
- 15 June (H) Island of Hawaii
 Origin time: 00 17 15.2
 Epicenter: 19.41 N., 155.26 W.
 Depth: 4 km
 Magnitude: 3.2 ML
Intensity II: Hawaiian Volcano Observatory (H).
- 15 June (H) Island of Hawaii
 Origin time: 15 00 32.4
 Epicenter: 19.46 N., 155.48 W.
 Depth: 10 km
 Magnitude: 3.4 ML
Intensity II: Volcano (H).
- 16 June (H) Island of Hawaii
 Origin time: 19 17 15.8
 Epicenter: 19.36 N., 155.08 W.
 Depth: 8 km
 Magnitude: 3.4 ML
Intensity II: Hilo (H), Papaikou (H).

Hawaii--Continued

- 18 June (H) Island of Hawaii
Origin time: 22 01 11.6
Epicenter: 19.38 N., 155.10 W.
Depth: 8 km
Magnitude: 3.4 ML
Intensity II: Hilo (H).
- 20 June (H) Island of Hawaii
Origin time: 10 25 11.3
Epicenter: 19.39 N., 155.25 W.
Depth: 5 km
Magnitude: 3.1 ML
Intensity III: Hawaii National Park (H).
Intensity II: Volcano (H).
- 20 June (H) Island of Hawaii
Origin time: 13 06 23.7
Epicenter: 19.19 N., 155.55 W.
Depth: 10 km
Magnitude: 3.1 ML
Intensity III: Pahala (H).
Intensity II: Captain Cook (H).
- 22 June (H) Island of Hawaii
Origin time: 00 27 49.5
Epicenter: 19.37 N., 155.22 W.
Depth: 9 km
Magnitude: 2.6 ML
Intensity II: Volcano (H).
- 22 June (H) Island of Hawaii
Origin time: 04 16 27.2
Epicenter: 19.37 N., 155.22 W.
Depth: 6 km
Magnitude: 3.1 ML
Intensity III: Volcano (H).
- 22 June (H) Island of Hawaii
Origin time: 06 00 34.7
Epicenter: 19.37 N., 155.22 W.
Depth: 6 km
Magnitude: 3.3 ML
Intensity III: Volcano (H).
- 22 June (H) Island of Hawaii
Origin time: 07 27 28.9
Epicenter: 19.39 N., 155.25 W.
Depth: 2 km
Magnitude: 3.0 ML
Intensity II: Volcano (H).
- 22 June (H) Island of Hawaii
Origin time: 13 04 39.6
Epicenter: 19.38 N., 155.24 W.
Depth: 3 km
Magnitude: 3.2 ML
Intensity III: Volcano (H).
- 25 June (H) Island of Hawaii
Origin time: 05 47 53.7
Epicenter: 19.34 N., 155.20 W.
Depth: 9 km
Magnitude: 3.6 ML
Intensity III: Hilo (H).
Intensity II: Volcano (H).

Hawaii--Continued

- 25 June (H) Island of Hawaii
Origin time: 11 29 52.5
Epicenter: 19.39 N., 155.28 W.
Depth: 4 km
Magnitude: 2.5 ML
Intensity II: Volcano (H).
- 2 July (H) Island of Hawaii
Origin time: 15 57 37.8
Epicenter: 19.26 N., 155.53 W.
Depth: 9 km
Magnitude: 2.6 ML
Intensity II: Pahala.
- 8 July (H) Island of Hawaii
Origin time: 03 49 06.6
Epicenter: 19.40 N., 155.26 W.
Depth: 5 km
Magnitude: 2.5 ML
Intensity II: Hawaii National Park.
- 8 July (H) Island of Hawaii
Origin time: 07 39 17.0
Epicenter: 19.39 N., 155.26 W.
Depth: 7 km
Magnitude: 2.7 ML
Intensity III: Hawaii National Park.
Intensity II: Volcano.
- 12 July (H) Island of Hawaii
Origin time: 09 26 10.7
Epicenter: 19.35 N., 155.22 W.
Depth: 10 km
Magnitude: 3.2 ML
Intensity II: Volcano.
- 12 July (H) Island of Hawaii
Origin time: 22 45 35.2
Epicenter: 19.38 N., 155.25 W.
Depth: 5 km
Magnitude: 3.0 ML
Intensity II: Hawaiian Volcano Observatory.
- 14 July (H) Island of Hawaii
Origin time: 12 05 02.3
Epicenter: 19.39 N., 155.24 W.
Depth: 6 km
Magnitude: 3.3 ML
Intensity III: Hawaii National Park.
Intensity II: Volcano.
- 15 July (H) Island of Hawaii
Origin time: 00 14 38.1
Epicenter: 19.37 N., 155.21 W.
Depth: 6 km
Magnitude: 3.2 ML
Intensity II: Volcano.
- 15 July (H) Island of Hawaii
Origin time: 18 54 39.8
Epicenter: 19.36 N., 155.13 W.
Depth: 8 km
Magnitude: 3.3 ML
Intensity II: Hilo.

Hawaii--Continued

- 16 July (H) Island of Hawaii
 Origin time: 11 11 28.6
 Epicenter: 19.19 N., 155.55 W.
 Depth: 10 km
 Magnitude: 3.2 ML
Intensity II: Pahala.
- 22 July (H) Island of Hawaii
 Origin time: 12 40 53.0
 Epicenter: 19.38 N., 155.08 W.
 Depth: 9 km
 Magnitude: 3.7 ML
Intensity III: Hilo.
Intensity II: Mountain View, Papaikou.
- 23 July (H) Island of Hawaii
 Origin time: 07 49 45.4
 Epicenter: 19.39 N., 155.25 W.
 Depth: 5 km
 Magnitude: 3.3 ML
Intensity III: Hawaii National Park.
Intensity II: Volcano.
- 24 July (H) Island of Hawaii
 Origin time: 05 38 17.0
 Epicenter: 19.34 N., 155.14 W.
 Depth: 9 km
 Magnitude: 3.7 ML
Intensity II: Kurtistown, Naniwale, Volcano.
- 25 July (H) Island of Hawaii
 Origin time: 06 53 44.1
 Epicenter: 19.38 N., 155.12 W.
 Depth: 9 km
 Magnitude: 2.9 ML
Intensity II: Glenwood.
- 27 July (H) Island of Hawaii
 Origin time: 17 14 26.8
 Epicenter: 19.37 N., 155.09 W.
 Depth: 9 km
 Magnitude: 4.0 ML
Intensity III: Hilo.
Intensity II: Glenwood, Kurtistown, Mountain View, Papaikou, Volcano.
- 28 July (H) Island of Hawaii
 Origin time: 06 37 12.7
 Epicenter: 19.39 N., 155.24 W.
 Depth: 5 km
 Magnitude: 3.6 ML
Intensity III: Hawaii National Park, Hawaiian Volcano Observatory.
Intensity II: Volcano.
- 30 July (H) Island of Hawaii
 Origin time: 08 46 35.2
 Epicenter: 19.37 N., 155.25 W.
 Depth: 6 km
 Magnitude: 3.0 ML
Intensity II: Hawaii National Park, Volcano.
- 30 July (H) Island of Hawaii
 Origin time: 15 09 43.6
 Epicenter: 19.34 N., 155.11 W.
 Depth: 8 km

Hawaii--Continued

- Magnitude: 3.8 ML
Intensity III: Hilo.
Intensity II: Keaau, Mountain View.
- 30 July (H) Island of Hawaii
 Origin time: 18 02 34.9
 Epicenter: 19.34 N., 155.12 W.
 Depth: 9 km
 Magnitude: 2.7 ML
Intensity II: Hilo.
- 31 July (H) Island of Hawaii
 Origin time: 09 19 13.9
 Epicenter: 19.34 N., 155.20 W.
 Depth: 9 km
 Magnitude: 3.0 ML
Intensity II: Volcano.
- 1 August (H) Island of Hawaii
 Origin time: 02 51 36.0
 Epicenter: 19.41 N., 155.27 W.
 Depth: 5 km
 Magnitude: 3.3 ML
Intensity III: Hawaii National Park.
Intensity II: Volcano.
- 2 August (H) Island of Hawaii
 Origin time: 01 01 17.4
 Epicenter: 19.37 N., 155.09 W.
 Depth: 9 km
 Magnitude: 3.4 ML
Intensity III: Hilo.
- 2 August (H) Island of Hawaii
 Origin time: 02 39 18.0
 Epicenter: 19.39 N., 155.25 W.
 Depth: 6 km
 Magnitude: 3.6 ML
Intensity III: Hawaii National Park.
- 2 August (H) Island of Hawaii
 Origin time: 16 37 01.3
 Epicenter: 19.36 N., 155.25 W.
 Depth: 10 km
 Magnitude: 3.2 ML
Intensity II: Hilo.
- 9 August (H) Island of Hawaii
 Origin time: 23 09 33.5
 Epicenter: 19.39 N., 155.24 W.
 Depth: 5 km
 Magnitude: 3.4 ML
Intensity III: Hawaii National Park.
Intensity II: Hawaiian Volcano Observatory.
- 11 August (H) Island of Hawaii
 Origin time: 05 03 47.5
 Epicenter: 19.32 N., 155.22 W.
 Depth: 10 km
 Magnitude: 3.5 ML
Intensity II: Hilo, Kurtistown, Volcano.
- 12 August (H) Island of Hawaii
 Origin time: 02 30 11.0
 Epicenter: 19.34 N., 155.19 W.
 Depth: 9 km
 Magnitude: 2.7 ML
Intensity II: Hawaii National Park.

Hawaii--Continued

- 15 August (H) Island of Hawaii
Origin time: 03 01 00.3
Epicenter: 19.36 N., 155.14 W.
Depth: 9 km
Magnitude: 3.2 ML
Intensity II: Volcano.
- 18 August (H) Island of Hawaii
Origin time: 03 25 34.5
Epicenter: 19.41 N., 155.26 W.
Depth: 2 km
Magnitude: 2.3 ML
Intensity II: Volcano.
- 23 August (H) Island of Hawaii
Origin time: 02 26 55.8
Epicenter: 19.38 N., 155.24 W.
Depth: 5 km
Magnitude: 2.2 ML
Intensity II: Hawaii National Park.
- 26 August (H) Island of Hawaii
Origin time: 13 19 43.5
Epicenter: 19.36 N., 155.25 W.
Depth: 10 km
Magnitude: 3.6 ML
Intensity III: Volcano.
Intensity II: Hilo, Mountain View, Papaikou.
- 31 August (H) Island of Hawaii
Origin time: 20 41 08.3
Epicenter: 19.39 N., 155.49 W.
Depth: 10 km
Magnitude: 4.0 ML
Intensity III: Hawaiian Volcano Observatory
Intensity II: Kona.
- 2 September (H) Island of Hawaii
Origin time: 20 20 26.7
Epicenter: 19.35 N., 155.05 W.
Depth: 8 km
Magnitude: 3.5 ML
Intensity III: Hilo.
Intensity II: Kalapana.
- 4 September (H) Island of Hawaii
Origin time: 08 03 41.4
Epicenter: 19.48 N., 154.86 W.
Depth: 9 km
Magnitude: 3.5 ML
Intensity III: Paho.
- 4 September (H) Island of Hawaii
Origin time: 23 10 54.1
Epicenter: 19.33 N., 155.27 W.
Depth: 10 km
Magnitude: 3.9 ML
Intensity III: Hawaiian Volcano Observatory,
Volcano.
Intensity II: Hilo, Honaunau, Keaau, Paho.
- 6 September (H) Island of Hawaii
Origin time: 15 34 15.2
Epicenter: 19.44 N., 154.91 W.
Depth: 9 km
Magnitude: 3.5 ML
Intensity III: Glenwood.
Intensity II: Hawaii National Park.

Hawaii--Continued

- 8 September (H) Island of Hawaii
Origin time: 08 01 16.2
Epicenter: 19.37 N., 155.08 W.
Depth: 8 km
Magnitude: 3.5 ML
Intensity III: Hilo, Kurtistown.
Intensity II: Hawaii National Park.
- 8 September (H) Island of Hawaii
Origin time: 14 01 55.4
Epicenter: 19.31 N., 155.35 W.
Depth: 9 km
Magnitude: 3.2 ML
Intensity II: Glenwood, Hilo.
- 10 September (H) Island of Hawaii
Origin time: 06 46 22.2
Epicenter: 19.39 N., 155.07 W.
Depth: 8 km
Magnitude: 2.5 ML
Intensity II: Mountain View.
- 11 September (H) Island of Hawaii
Origin time: 15 04 30.4
Epicenter: 19.37 N., 155.07 W.
Depth: 8 km
Magnitude: 3.6 ML
Intensity III: Hilo.
Intensity II: Keaau.
- 12 September (H) Island of Hawaii
Origin time: 23 21 43.3
Epicenter: 19.43 N., 154.97 W.
Depth: 5 km
Magnitude: 2.8 ML
Intensity II: Paho.
- 21 September (H) Island of Hawaii
Origin time: 19 35 49.7
Epicenter: 19.35 N., 155.11 W.
Depth: 9 km
Magnitude: 3.2 ML
Intensity II: Hilo.
- 28 September (H) Island of Hawaii
Origin time: 19 14 53.3
Epicenter: 19.33 N., 155.22 W.
Depth: 10 km
Magnitude: 3.7 ML
Intensity III: Hawaiian Volcano Observatory,
Hilo.
Intensity II: Honaunau, Honokaa, Kapapala
Ranch, Mountain View, Naniwale, Papaikou,
Pepeekeo.
- 29 September (H) Island of Hawaii
Origin time: 22 58 03.9
Epicenter: 19.34 N., 155.09 W.
Depth: 9 km
Magnitude: 3.3 ML
Intensity III: Hilo.
- 4 October (H) Island of Hawaii
Origin time: 15 18 52.5
Epicenter: 19.35 N., 155.11 W.
Depth: 9 km
Magnitude: 3.0 ML
Intensity II: Hilo (H).

Hawaii--Continued

- 5 October (H) Island of Hawaii
 Origin time: 15 58 50.5
 Epicenter: 19.34 N., 155.11 W.
 Depth: 9 km
 Magnitude: 3.8 ML
Intensity III: Hawaiian Beaches (H), Hilo (H).
Intensity II: Mountain View (H), Papaikou (H), Volcano (H).
- 5 October (H) Island of Hawaii
 Origin time: 19 55 39.6
 Epicenter: 19.37 N., 155.08 W.
 Depth: 8 km
 Magnitude: 3.5 ML
Intensity III: Hilo (H), Kalapana (H).
Intensity II: Volcano (H).
- 9 October (H) Island of Hawaii
 Origin time: 02 29 29.9
 Epicenter: 19.55 N., 155.85 W.
 Depth: 25 km
 Magnitude: 3.3 ML
Intensity II: Kona district (H).
- 15 October (H) Island of Hawaii
 Origin time: 09 17 06.9
 Epicenter: 19.38 N., 155.09 W.
 Depth: 9 km
 Magnitude: 2.7 ML
Intensity II: Hamakua district (H), Hilo (H).
- 21 October (H) Island of Hawaii
 Origin time: 12 25 26.0
 Epicenter: 19.45 N., 154.87 W.
 Depth: 9 km
 Magnitude: 2.9 ML
Intensity II: Pahoa (H).
- 22 October (H) Island of Hawaii
 Origin time: 22 43 23.6
 Epicenter: 19.32 N., 155.20 W.
 Depth: 11 km
 Magnitude: 3.4 ML
Intensity II: Hilo (H).
- 23 October (H) Island of Hawaii
 Origin time: 00 11 25.8
 Epicenter: 19.35 N., 155.06 W.
 Depth: 9 km
 Magnitude: 3.5 ML
Intensity II: Hilo (H), Kalapana (H).
- 24 October (H) Island of Hawaii
 Origin time: 18 18 54.0
 Epicenter: 19.37 N., 155.00 W.
 Depth: 7 km
 Magnitude: 2.5 ML
Intensity II: Wahaula Visitors Center (H).
- 3 November (H) Island of Hawaii
 Origin time: 04 15 46.3
 Epicenter: 19.32 N., 155.22 W.
 Depth: 10 km
 Magnitude: 3.7 ML
Intensity III: Mountain View (H).
Intensity II: Hilo (H), Volcano (H).

Hawaii--Continued

- 5 November (H) Island of Hawaii
 Origin time: 00 44 55.8
 Epicenter: 19.41 N., 155.27 W.
 Depth: 3 km
 Magnitude: 2.3 ML
Intensity III: Hawaii Volcanoes National Park (H).
Intensity II: Volcano (H).
- 5 November (H) Island of Hawaii
 Origin time: 12 58 29.6
 Epicenter: 19.36 N., 155.14 W.
 Depth: 9 km
 Magnitude: 2.7 ML
Intensity II: Volcano (H).
- 10 November (H) Island of Hawaii
 Origin time: 01 33 03.3
 Epicenter: 19.34 N., 155.07 W.
 Depth: 9 km
 Magnitude: 3.8 ML
Intensity III: Hilo (H).
Intensity II: Hale Pohaku (H), Pepeekeo (H), Wood Valley (H).
- 11 November (H) Island of Hawaii
 Origin time: 04 15 16.5
 Epicenter: 19.35 N., 155.19 W.
 Depth: 10 km
 Magnitude: 3.1 ML
Intensity II: Mountain View (H).
- 13 November (H) Island of Hawaii
 Origin time: 02 54 46.4
 Epicenter: 19.35 N., 155.04 W.
 Depth: 8 km
 Magnitude: 3.5 ML
Intensity II: Volcano (H).
- 13 November (H) Island of Hawaii
 Origin time: 21 14 03.3
 Epicenter: 19.37 N., 155.09 W.
 Depth: 9 km
 Magnitude: 3.7 ML
Intensity III: Hilo (H).
- 14 November (H) Island of Hawaii
 Origin time: 14 19 23.0
 Epicenter: 19.43 N., 155.28 W.
 Depth: 16 km
 Magnitude: 3.0 ML
Intensity II: Volcano (H).
- 16 November (H) Island of Hawaii
 Origin time: 12 23 35.4
 Epicenter: 19.38 N., 155.08 W.
 Depth: 9 km
 Magnitude: 3.6 ML
Intensity III: Hilo.
Intensity II: Hawaiian Beaches (H), Paauhau (H).
- 17 November (H) Island of Hawaii
 Origin time: 05 44 33.9
 Epicenter: 19.43 N., 155.28 W.
 Depth: 1 km
 Magnitude: 2.3 ML
Intensity II: Hawaii Volcanoes National Park (H), Volcano (H).

Hawaii--Continued

- 17 November (H) Island of Hawaii
 Origin time: 15 51 48.5
 Epicenter: 19.54 N., 155.24 W.
 Depth: 25 km
 Magnitude: 3.7 ML
Intensity III: Hilo (H).
Intensity II: Hawaii Volcanoes National Park (H), Hawaiian Volcano Observatory (H), Kaaau (H), Papaikou (H), Volcano (H), Wood Valley (H).
- 17 November (H) Island of Hawaii
 Origin time: 22 13 08.6
 Epicenter: 19.38 N., 155.28 W.
 Depth: 3 km
 Magnitude: 2.1 ML
Intensity II: Hawaii Volcanoes National Park (H), Volcano (H).
- 18 November (H) Island of Hawaii
 Origin time: 14 33 18.1
 Epicenter: 19.35 N., 155.22 W.
 Depth: 9 km
 Magnitude: 2.3 ML
Intensity II: Hawaii Volcanoes National Park (H).
- 19 November (H) Island of Hawaii
 Origin time: 08 24 43.7
 Epicenter: 19.40 N., 155.28 W.
 Depth: 4 km
 Magnitude: 3.0 ML
Intensity III: Hawaii Volcanoes National Park (H).
Intensity II: Hawaiian Volcano Observatory (H), Volcano (H).
- 22 November (H) Island of Hawaii
 Origin time: 06 35 13.5
 Epicenter: 19.37 N., 155.11 W.
 Depth: 8 km
 Magnitude: 2.5 ML
Intensity II: Puna district (H).
- 23 November (H) Island of Hawaii
 Origin time: 01 40 49.9
 Epicenter: 19.39 N., 155.28 W.
 Depth: 3 km
 Magnitude: 2.4 ML
Intensity II: Hawaii Volcanoes National Park (H), Volcano (H).
- 25 November (H) Island of Hawaii
 Origin time: 16 37 27.4
 Epicenter: 19.39 N., 155.29 W.
 Depth: 4 km
 Magnitude: 2.3 ML
Intensity II: Hawaii Volcanoes National Park (H), Volcano (H).
- 25 November (H) Island of Hawaii
 Origin time: 21 05 40.3
 Epicenter: 19.40 N., 155.28 W.
 Depth: 2 km
 Magnitude: 2.5 ML
Intensity II: Hawaii Volcanoes National Park (H).

Hawaii--Continued

- 26 November (H) Island of Hawaii
 Origin time: 13 49 14.8
 Epicenter: 19.40 N., 155.27 W.
 Depth: 2 km
 Magnitude: 2.1 ML
Intensity II: Hawaii Volcanoes National Park (H).
- 26 November (H) Island of Hawaii
 Origin time: 20 15 58.5
 Epicenter: 19.40 N., 155.27 W.
 Depth: 5 km
 Magnitude: 3.1 ML
Intensity III: Hawaiian Volcano Observatory (H).
Intensity II: Volcano (H).
- 1 December (H) Island of Hawaii
 Origin time: 03 46 09.9
 Epicenter: 19.33 N., 155.19 W.
 Depth: 10 km
 Magnitude: 3.3 ML
Intensity III: Volcano (H).
- 1 December (H) Island of Hawaii
 Origin time: 04 18 45.2
 Epicenter: 19.32 N., 155.19 W.
 Depth: 10 km
 Magnitude: 3.0 ML
Intensity II: Volcano (H).
- 1 December (H) Island of Hawaii
 Origin time: 05 37 30.1
 Epicenter: 19.33 N., 155.27 W.
 Depth: 10 km
 Magnitude: 2.5 ML
Intensity II: Volcano (H).
- 4 December (H) Island of Hawaii
 Origin time: 13 50 50.8
 Epicenter: 19.34 N., 155.14 W.
 Depth: 9 km
 Magnitude: 3.0 ML
Intensity III: Hilo (H).
Intensity II: Kamuela (H), Volcano (H).
- 6 December (H) Island of Hawaii
 Origin time: 03 11 59.1
 Epicenter: 19.39 N., 155.11 W.
 Depth: 8 km
 Magnitude: 1.9 ML
Intensity II: Hilo (H).
- 6 December (H) Island of Hawaii
 Origin time: 16 26 58.0
 Epicenter: 19.36 N., 155.13 W.
 Depth: 10 km
 Magnitude: 3.8 ML
Intensity III: Hawaiian Beaches (H), Hilo (H).
Intensity II: Mountain View (H), Volcano (H).
- 8 December (H) Island of Hawaii
 Origin time: 09 40 22.2
 Epicenter: 19.40 N., 155.28 W.

Hawaii--Continued

Depth: 3 km
 Magnitude: 2.8 ML
Intensity II: Hawaii Volcanoes National
 Park (H), Volcano (H).

9 December (H) Island of Hawaii

Origin time: 00 15 42.5
 Epicenter: 19.34 N., 155.18 W.
 Depth: 9 km
 Magnitude: 2.9 ML
Intensity II: Hilo (H).

9 December (H) Island of Hawaii

Origin time: 04 50 26.3
 Epicenter: 19.43 N., 155.28 W.
 Depth: 1 km
 Magnitude: 2.0 ML
Intensity II: Hawaii Volcanoes National
 Park (H), Volcano (H).

10 December (H) Island of Hawaii

Origin time: 01 28 49.9
 Epicenter: 19.40 N., 155.29 W.
 Depth: 3 km
 Magnitude: 3.0 ML
Intensity III: Keanakakoi (H).
Intensity II: Hawaiian Volcano Observatory
 (H), Volcano (H).

12 December (H) Island of Hawaii

Origin time: 09 39 36.6
 Epicenter: 19.22 N., 155.47 W.
 Depth: 9 km
 Magnitude: 2.8 ML
Intensity II: Kau district (H).

14 December (H) Island of Hawaii

Origin time: 03 26 42.0
 Epicenter: 19.34 N., 155.13 W.
 Depth: 10 km
 Magnitude: 3.4 ML
Intensity II: Puna district (H), Volcano
 (H).

17 December (H) Island of Hawaii

Origin time: 13 39 14.5
 Epicenter: 19.43 N., 155.28 W.
 Depth: 1 km
 Magnitude: 2.9 ML
Intensity II: Hawaii Volcanoes National
 Park (H), Volcano (H).

18 December (H) Island of Hawaii

Origin time: 14 01 00.5
 Epicenter: 19.34 N., 155.12 W.
 Depth: 9 km
 Magnitude: 4.8 ML, 5.0 mb(G)
Intensity V: Hakalao, Hilo (small objects
 fell) (H), Honokaa, Honomu (small objects
 moved), Keaau, Kurtistown, Lahaina (small
 objects moved), Laupahoehoe, Mountain
 View, Ookala, Paauhau, Pahala, Volcano
 (small objects moved).
Intensity IV: Puna district (H).
Intensity III: Kau district (H).
Intensity II: Kamuela (H), Kohala (H),
 Kona district (H).

Hawaii--Continued

22 December (H) Island of Hawaii

Origin time: 19 03 32.4
 Epicenter: 19.40 N., 155.27 W.
 Depth: 3 km
 Magnitude: 2.2 ML
Intensity II: Hawaii Volcanoes National
 Park (H), Volcano (H).

25 December (H) Island of Hawaii

Origin time: 17 01 15.4
 Epicenter: 19.64 N., 156.01 W.
 Depth: 9 km
 Magnitude: 3.3 ML
Intensity III: Kailua (H), Kona district
 (H).
Intensity II: Holualoa (H).

27 December (H) Island of Hawaii

Origin time: 14 15 20.6
 Epicenter: 19.39 N., 155.25 W.
 Depth: 5 km
 Magnitude: 3.3 ML
Intensity III: Hawaii Volcanoes National
 Park (H).
Intensity II: Mountain View (H).

27 December (H) Island of Hawaii

Origin time: 16 24 27.3
 Epicenter: 19.32 N., 155.27 W.
 Depth: 10 km
 Magnitude: 3.1 ML
Intensity III: Hawaii Volcanoes National
 Park (H).

27 December (H) Island of Hawaii

Origin time: 19 19 27.0
 Epicenter: 19.40 N., 155.25 W.
 Depth: 3 km
 Magnitude: 2.5 ML
Intensity II: Hawaii Volcanoes National
 Park (H).

29 December (H) Island of Hawaii

Origin time: 01 17 36.6
 Epicenter: 19.40 N., 155.28 W.
 Depth: 3 km
 Magnitude: 2.8 ML
Intensity II: Hawaii Volcanoes National
 Park (H).

29 December (H) Island of Hawaii

Origin time: 05 37 04.8
 Epicenter: 19.32 N., 155.20 W.
 Depth: 10 km
 Magnitude: 3.2 ML
Intensity III: Hawaiian Volcano Observatory
 (H).
Intensity II: Volcano (H).

29 December (H) Island of Hawaii

Origin time: 13 45 37.4
 Epicenter: 19.39 N., 155.29 W.
 Depth: 2 km
 Magnitude: 2.4 ML
Intensity II: Hawaii Volcanoes National
 Park (H).

Hawaii--Continued

30 December (H) Island of Hawaii
 Origin time: 02 44 25.6
 Epicenter: 19.33 N., 155.19 W.
 Depth: 9 km
 Magnitude: 2.9 ML
Intensity II: Hawaii Volcanoes National
 Park (H).

30 December (H) Island of Hawaii
 Origin time: 05 26 26.9
 Epicenter: 19.39 N., 155.24 W.
 Depth: 5 km
 Magnitude: 3.0 ML
Intensity III: Hawaii Volcanoes National
 Park (H).

30 December (H) Island of Hawaii
 Origin time: 10 47 36.9
 Epicenter: 18.16 N., 155.25 W.
 Depth: 7 km
 Magnitude: 3.9 ML
Intensity II: Kau district (H).

30 December (H) Island of Hawaii
 Origin time: 14 19 51.5
 Epicenter: 19.33 N., 155.27 W.
 Depth: 10 km
 Magnitude: 3.0 ML
Intensity II: Volcano (H).

Idaho

14 June (U) Eastern Idaho
 Origin time: 09 37 57.8
 Epicenter: 42.12 N., 112.48 W.
 Depth: 7 km
 Magnitude: 3.6 ML
Intensity IV: Malad City, St. John.

26 July (G) Western Idaho
 Origin time: 10 45 28.2
 Epicenter: 45.02 N., 114.18 W.
 Depth: 10 km
 Magnitude: 4.3 mb, 4.4 ML
Intensity V: Cobalt, North Fork, Tendoy.
Intensity IV: Carmen, Ellis, Salmon, Shoup,
 Williams Lake (press report).

1 November (G) Western Idaho
 Origin time: 22 22 51.1
 Epicenter: 44.26 N., 114.97 W.
 Depth: 5 km
 Magnitude: 3.7 ML(A), 3.9 ML(D)
Intensity IV: Stanley.
Intensity III: Salmon, Stanley (5 km south
 of, at U.S. Forest Station).

Indiana

8 April (G) Central Indiana
 Origin time: 07 38 53.0
 Epicenter: 39.35 N., 86.68 W.

Indiana--Continued

Depth: 20 km
 Magnitude: 3.0 mBlg
Intensity V: Stinesville.
Intensity IV: Bloomington, Ellettsville
 (telephone report), Solsberry, Spencer,
 Stanford.

13 June (I) Indianapolis, Ind.
 Origin time: 18 55 18.5, 18 58 28.5
 Epicenter: None computed.
 Depth: None computed.
 Magnitude: None computed.
Intensity II: Indianapolis (felt by a
 building engineer touring a building site).

Kentucky

19 January (G) Eastern Kentucky
 Origin time: 06 20 39.5
 Epicenter: 36.88 N., 83.83 W.
 Depth: 5 km
 Magnitude: 4.0 mb, 3.8 ML(S).

This earthquake was felt in parts of
 southeastern Kentucky, northeastern
 Tennessee, northwestern North Carolina,
 southwestern West Virginia, and western
 Virginia.

USGS canvassed an area around the epicenter
 within a radius of 200 km and mailed
 1,528 questionnaires. Figure 13 shows
 the results of this canvass and of the
 reevaluated questionnaires obtained from
 G. R. Keller, University of Kentucky,
 Lexington (Y), who made an onsite survey.

Intensity VI:

Kentucky--Minor damage reported in Knox
 and Bell Counties (press report).
 Artemus (windows broken), Barbourville
 (plaster cracked at Union College;
 objects were knocked from shelves and
 walls. Furniture moved. Loud earth
 noises--Y), Bimble (fence fell on
 railroad tracks--telephone report),
 Flat Lick (window cracked; objects
 overturned. Loud noises--Y), Green
 Road (concrete sidewalk cracked),
 Himyar, Hinkle (plaster and dry wall
 cracked), Jenson, Julip, Kettle Island
 (plaster cracked), Lexington (at
 Eastover Mine rocks fell on tracks,
 material from ceiling fell--press
 report), Pineville (walls cracked),
 Trospen, Walker (cracks in brick school
 building), Woodbine (plaster cracked).

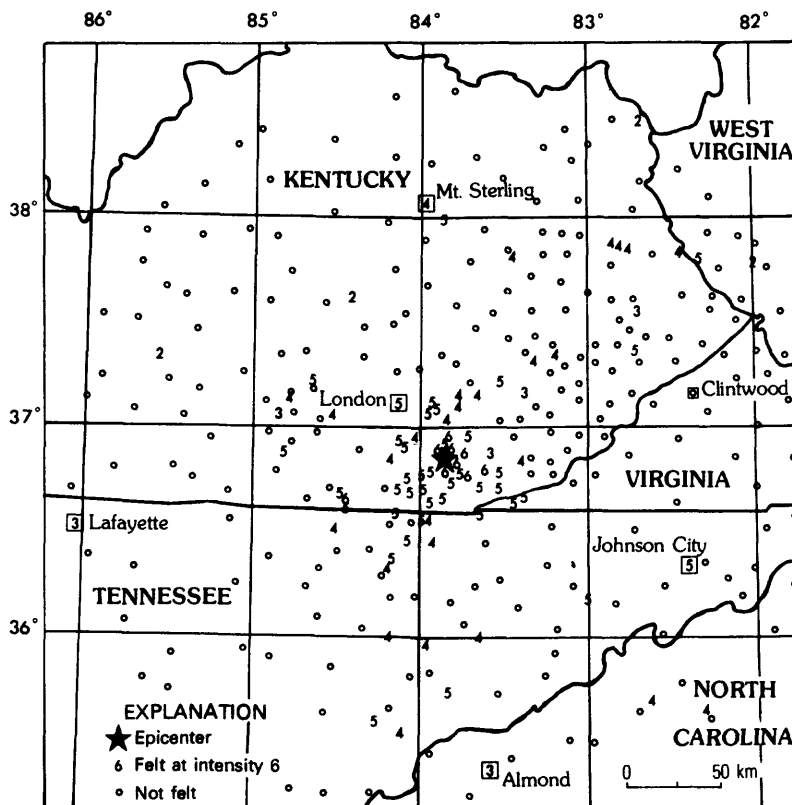


Figure 13 --Area affected by eastern Kentucky earthquake of January 19

Intensity V:

Kentucky--Bryants Store, Bypro, Callaway, Calvin, Cannon, Corbin, Crane Nest, Cubage, Emlyn, Four Mile, Frakes, Gausdale, Girdler, Gray, Hulen, Ingram, Jeffersonville, Lida, London, Marydell, Nevisdale, Pine Knot, Pulaski, Revelo, Salt Gum, Sasser, Scalf, Siler, Sizeroock, Somerset (press report), Steubenville, Strunk, Tinsley, West Liberty, Williamsburg (press report).

North Carolina--Tuckasegee.

Tennessee--Andersonville (press report), Duff, Eagan, Jellico, Johnson City (press report), La Follette (dishes were knocked from cabinets; tires fell on floor in auto store--press report), Midway, Shawanee, Tri-County Airport (press report), Vonore, Walland.

Virginia--Ewing, Rose Hill.

West Virginia--Naugatuck.

Intensity IV:

Kentucky--Arjay, Baileys Switch, Beauty, Bush, Buskirk, Dice, Garrard, Hazel Green (press report), Hector, Keavy, Kona, Loyall, Manchester, Mount Sterling, Napfor, Pointer, River, Ruth, Sitka, Tedders, Tuttle, Walden, Wendover, Wittensville.

North Carolina--Alexander, Montreat.

Tennessee--Clairfield, Gatlinburg, Jacksboro, Knoxville, Kodak, Maryville, Oneida, Speedwell, Tallassee.

West Virginia--Gary (V).

Intensity III:

Kentucky--Chenoa, Dana, Faubush, Field, Harlan (Y), Hyden (Y), Middlesboro (press report).

North Carolina--Almond.

Tennessee--Lafayette.

Intensity II:

Kentucky--Ashland (Y), Cumberland (press report), Molus (press report), Paint Lick, Summersville.

North Carolina--Arden.

West Virginia--Switzer.

15 April (G) Western Kentucky

Origin time: 07 03 34.9

Epicenter: 37.41 N., 87.31 W.

Depth: 15 km

Magnitude: 3.3 mblg(V)

Intensity V: Allegre, Calhoun, Crofton, Curdsville, Manitou.

Intensity IV: Elkton, Fairview, Steff.

Intensity III: Hopkinsville (telephone report), Island (telephone report), Livermore (telephone report), Rochester.

Intensity II: Waverly.

----- Maine -----

15 April (J) Southwestern Maine

Origin time: 10 36 04.8
Epicenter: 44.24 N., 70.14 W.
Depth: 0 km
Magnitude: 2.4 mblg
Intensity III: Auburn, Green.
Intensity II: Turner.

23 October (O) Southern Quebec, Canada

Origin time: 20 58 18.0
Epicenter: 47.82 N., 69.79 W.
Depth: 18 km
Magnitude: 3.8 mb(G), 4.2 mblg,
4.1 mblg(L), 3.8 mblg(J)

This earthquake was felt over a large area of southern Quebec, Canada, as shown by figure 14 (furnished by R. Wetmiller, Earth Physics Branch, Energy, Mines, and Resources, Ottawa, Canada). All the intensity values shown in figure 14 were evaluated by the office of R. Wetmiller.

Intensity IV:

Maine--Fort Kent, Frenchville.
New Brunswick--(press report).

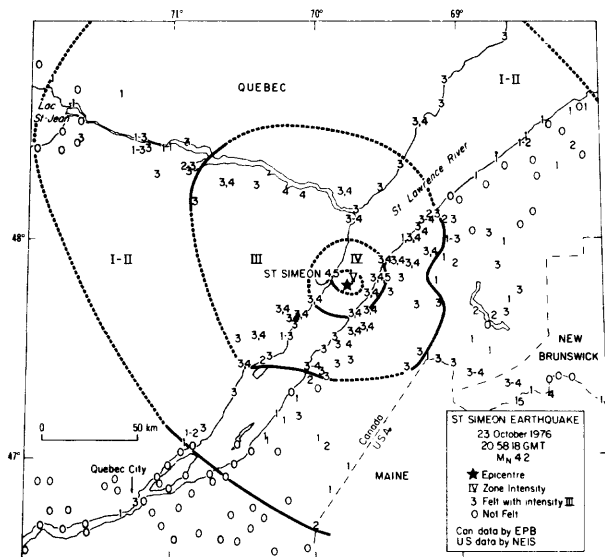


Figure 14.--Area affected by southern Quebec, Canada, earthquake of October 23

----- Massachusetts -----

14 March (C) Cape Cod, Mass.

Origin time: 23 12 24.6
Epicenter: 41.66 N., 69.97 W.
Depth: 0 km
Magnitude: 3.0 ML(L)

----- Massachusetts--Continued -----

Intensity V: Harwich, North Chatham, West Dennis, West Harwich.

Intensity IV: Brewster, Chatham (press report), Dennis, Dennis Port, Harwich Port, Sandwich (press report), South Chatham, South Dennis, South Orleans, Yarmouth.

Intensity III: West Yarmouth.

Intensity II: East Dennis, Sagamore Beach.

10 May (C) Southeastern Massachusetts

Origin time: 01 34 20.5
Epicenter: 41.54 N., 71.01 W.
Depth: 0 km
Magnitude: 2.7 mblg

Intensity V:

Massachusetts--Mattapoisett, South Dartmouth, Westport.

Intensity IV:

Massachusetts--Fairhaven, North Dartmouth, Westport Point.

Rhode Island--Providence.

Intensity III:

Massachusetts--Dartmouth, New Bedford.

Rhode Island--Little Compton.

Intensity II:

Massachusetts--Fall River.

----- Michigan -----

2 February (O) Southern Ontario, Canada

Origin time: 21 14 02.0
Epicenter: 41.96 N., 82.67 W.
Depth: 10 km
Magnitude: 3.4 ML

Intensity IV (from press reports):

Michigan--Flat Rock, Rockwood, Trenton.

Intensity III (from press reports):

Michigan--New Boston, Gibraltar, Grosse Ile.

Ontario, Canada--Colchester, Leamington.

----- Missouri -----

23 January (S) New Madrid, Mo.

Origin time: 00 56 39.6
Epicenter: 36.55 N., 89.60 W.
Depth: 9 km
Magnitude: 2.0 ML
Intensity IV: Marston.

22 May (S) New Madrid Region

Origin time: 07 40 46.0
Epicenter: 36.04 N., 89.84 W.
Depth: 10 km
Magnitude: 3.2 mblg
Intensity V:
Missouri--Cooter, Steele.
Tennessee--Ellendale.

Missouri--Continued

13 December (S) Eastern Missouri
Origin time: 08 35 54.9
Epicenter: 37.80 N., 90.24 W.
Depth: 5 km
Magnitude: 3.5 mbLg
Intensity V:
Missouri--Clearwater, Farmington (8 km
north of), Flat River, Frankclay,
Ironton, Perryville.
Intensity IV:
Missouri--Arcadia, Belleview, Iron
Mountain.
Illinois--Renault, Welge.

Montana

21 January (G) Northwestern Montana
Origin time: 13 43 29.6
Epicenter: 48.22 N., 114.10 W.
Depth: 5 km
Magnitude: 3.1 ML
Intensity IV: Creston, Hungry Horse, Somers.
Intensity III: Flathead Lake region (press
report).

13 February (G) Western Montana
Origin time: 06 13 43.1
Epicenter: 46.75 N., 112.13 W.
Depth: 1 km
Magnitude: 3.8 ML
Intensity IV: Clancy, East Helena,
Marysville.
Intensity II: Helena.

5 April (G) Western Montana
Origin time: 02 40 07.4
Epicenter: 46.13 N., 111.68 W.
Depth: 5 km
Magnitude: 3.6 ML(D)
Intensity IV: Trident.

24 April (G) Western Montana
Origin time: 08 49 12.0
Epicenter: 48.26 N., 114.09 W.
Depth: 5 km
Magnitude: 2.9 ML
Intensity II: Kalispell area (tel. report).

28 July (G) Western Montana
Origin time: 05 06 16.9
Epicenter: 47.55 N., 112.73 W.
Depth: 5 km
Magnitude: 3.5 ML(D), 3.5 ML
Intensity IV: Augusta.

27 November (G) Hebgen Lake region
Origin time: 00 24 46.1
Epicenter: 44.64 N., 111.14 W.
Depth: 9 km
Magnitude: 3.3 ML(A), 3.7 ML(D)
Intensity IV:
Wyoming--Canyon Village, Madison
Junction.

Montana--Continued

8 December (G) Hebgen Lake region
Origin time: 22 10 42.3
Epicenter: 44.75 N., 111.05 W.
Depth: 5 km
Magnitude: 3.5 ML
Intensity III: Gardiner, West Yellowstone

20 December (G) Hebgen Lake region
Origin time: 17 07 10.5
Epicenter: 44.50 N., 111.07 W.
Depth: 9 km
Magnitude: 3.3 ML(A)

The intensity data below were furnished by
R. A. Hutchinson, National Park Service
geologist, Yellowstone National Park, Wyo.

Intensity III:
Wyoming--Canyon Village, Madison
Junction, Mammoth Hot Springs.
Intensity II:
Montana--Gardiner, West Yellowstone.
Wyoming--Old Faithful.

Nevada

8 February (G) Northwestern Nevada
Origin time: 06 09 26.5
Epicenter: 39.47 N., 119.76 W.
Depth: 5 km
Magnitude: 3.4 ML (B)
Intensity IV: Virginia City.
Intensity III: Reno.
Intensity II: Pleasant Valley, Steamboat
(telephone report).

10 June (G) Central Nevada
Origin time: 10 39 35.9
Epicenter: 39.63 N., 115.85 W.
Depth: 2 km
Magnitude: None computed.
Intensity V: Eureka.

24 June (G) Western Nevada
Origin time: 00 24 45.1
Epicenter: 39.45 N., 119.53 W.
Depth: 2 km
Magnitude: 3.5 ML(B)
Intensity V: Reno.
Intensity IV: Silver City, Stateline.

29 June (G) Western Nevada
Origin time: 13 10 48.8
Epicenter: 39.45 N., 119.54 W.
Depth: 6 km
Magnitude: 3.5 ML(B)
Intensity V:
Nevada--Reno.
Intensity IV:
California--Frazier Park, Calif. (observer
reported event at 18:20 UTC; probably is
a different earthquake).

Nevada--Continued

2 August (G) California-Nevada border region

Origin time: 08 14 07.4
Epicenter: 38.38 N., 118.19 W.
Depth: 8 km
Magnitude: 4.8 mb, 4.3 ML(B)
Intensity IV: Luning, Mina.
Intensity II: Hawthorne.

14 August (G) Western Nevada

Origin time: 07 50 44.9
Epicenter: 39.48 N., 119.62 W.
Depth: 7 km
Magnitude: 2.2 ML
Intensity II: Steamboat (R).

14 August (G) Western Nevada

Origin time: 07 58 32.4
Epicenter: 39.45 N., 119.54 W.
Depth: 4 km
Magnitude: 3.1 ML(B)
Intensity II: Steamboat (R).

14 August (G) Western Nevada

Origin time: 08 08 03.1
Epicenter: 39.43 N., 119.64 W.
Depth: 6 km
Magnitude: 2.2 ML
Intensity II: Steamboat (R).

4 October (G) Southern Nevada

Origin time: 14 48 39.0
Epicenter: 36.03 N., 114.74 W.
Depth: 5 km
Magnitude: 3.0 ML
Intensity III: Hoover Dam.

19 October (G) Southern Nevada

Origin time: 01 59 10.6
Epicenter: 35.98 N., 114.82 W.
Depth: 5 km
Magnitude: None computed.
Intensity III: Boulder City (press report).

17 November (G) Northern Nevada

Origin time: 08 23 35.0
Epicenter: 40.54 N., 115.99 W.
Depth: 15 km
Magnitude: 3.9 ML(B)
Intensity IV: Elko, Tuscarora.

New Jersey

11 March (L) Northeastern New Jersey

Origin time: 21 07 20.4
Epicenter: 40.96 N., 74.37 W.
Depth: 4 km
Magnitude: 2.4 mBLg

Residents in Morris and Passaic Counties, along with those in a few towns in Bergen County in northern New Jersey, felt this earthquake. Slight damage occurred at Pompton Lakes, Kinnelon, and Ridgefield.

New Jersey--Continued

The Lamont-Doherty Geological Observatory (LDGO, Columbia University, Palisades, N.Y.) placed an earthquake questionnaire form in several community newspapers in the area. The completed forms received by LDGO were forwarded to USGS and reevaluated. There was one report of cracked and fallen plaster (VI); there were five reports stating that small objects moved, chinaware fell, and pictures were knocked askew; some were frightened, especially children and animals (V).

The results of the combined canvass are as follows:

Intensity VI: Pompton Lakes (reports of ceiling cracks extending from fireplace to center of room, with small pieces of plaster found on rug; pictures dislodged--confirmed by LDGO personnel), Kinnelon (cracked plaster and windows--press report), Ridgefield (ceiling cracked).

Intensity V: Belleville, Bogota, Butler, Cliffside Park, Cresskill, East Rutherford, Englewood Cliffs, Fairview, Fort Lee, Garfield, Hackensack, Lyndhurst, Moonache, New Milford, North Bergen, Nuttley, Palisades Park, Ridgefield Park, River Edge, Rutherford, Smoke Rise, Wallington, West Milford (Shady Lake and High Crest subdivisions of West Milford).

Intensity IV: Alpine, Bloomingdale, Demerest, Dumont, Edgewater, Englewood, Hasbrouch Heights, Leonia, Little Ferry, Lodi, Maywood, Montville, Newfoundland, North Arlington, Paramus, Rochelle Park, Secaucus, Teaneck, Tenafly, Totowa Boro, Union City, Weehawken, West New York, Wood Ridge.

Intensity III: Bergenfield, Elmwood Park, Glen Ridge, Guttenberg, Haworth, Jersey City, Kearny, Lake Edenwold, Midvale, Riverdale, South Orange, Upper Montclair, Upper Saddle River, Wayne, Westwood.

Intensity II: Ringwood.

13 April (L) Northeastern New Jersey

Origin time: 15 39 13.2
Epicenter: 40.84 N., 74.05 W.
Depth: 2 km
Magnitude: 3.1 mBLg

This canvass was conducted by Lamont-Doherty Geological Observatory (Columbia University, Palisades, N.Y.) by means of a questionnaire in local northern New Jersey papers. Results of the canvass, consisting of letters and questionnaires, were reevaluated by the USGS.

The press reported that 200,000 people live in the 50 sq-km area affected by this earthquake.

New Jersey--Continued

Intensity VI: Ridgefield (plaster fell).

Intensity V: All of the following communities reported that small objects shifted and many people were frightened: Belleville, Bogota, Cliffside Park, Cresskill, East Rutherford, Englewood, Englewood Cliffs, Fairview, Fort Lee, Garfield, Hackensack, Leonia, Lindhurst, Moonachie, New Milford, North Bergen, Nutley, Palisades Park, Ridgefield Park, River Edge, Rutherford, Teaneck (press report), Wallington.

Intensity IV: Alpine, Clifton (press report), Demarest, Dumont, Edgewater, Hasbrouck Heights, Little Ferry, Lodi, Maywood, North Arlington, Paramus, Rochelle Park, Secaucus, Tenafly, Union City, Weehawken, West New York, Wood-Ridge.

Intensity III: Bergenfield, Elmwood Park, Glen Ridge, Guttenberg, Haworth, Jersey City, Kearny, South Orange, Upper Montclair, Upper Saddle River, Westwood.

New Mexico

5 January (G) Northwestern New Mexico

Origin time: 06 23 32.9
Epicenter: 35.84 N., 108.34 W.
Depth: 25 km
Magnitude: 5.0 mb, 4.6 ML

USGS canvassed an area around the epicenter within a radius of 300 km and mailed 359 questionnaires. The damage that occurred was generally minor, consisting mostly of cracks in plaster and dry wall in several Colorado and New Mexico towns and at Leupp, Ariz. Figure 15 shows the results of this canvass, combined with information from Dr. Allan R. Sanford, New Mexico Institute of Mining Technology, and the results of a USGS field survey. The earthquake was felt over an area of approximately 115,000 sq km of Arizona, Colorado, New Mexico, and Utah.

Intensity VI:

Arizona--Leupp (cracked plaster).

Colorado--Cahone (cracked plaster and dry

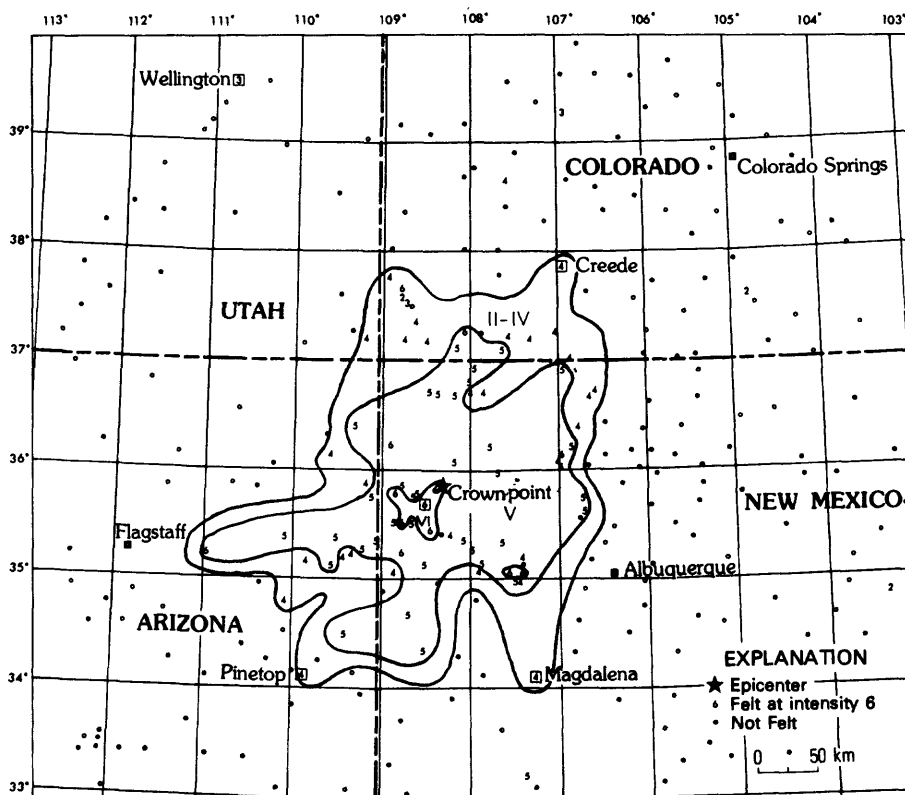


Figure 15.--Area affected by northwestern New Mexico earthquake of January 5

New Mexico--Continued

wall, chimney cracked), Hesperus (new cracks in new concrete platform--telephone report).
New Mexico--Crownpoint (cracked plaster, dry wall, and windows), Cuba (cracked plaster), Cubero, Farmington (cracked plaster), Fort Wingate (cracked plaster and dry wall), Gallup (minor damage--press report), Laguna, Mexican Springs (cracked plaster and ceiling tiles), Regina, Standing Rock (cracked plaster), Thoreau (cracked plaster and dry wall), Toadlena (cracked plaster), Vanderwagen (cracked plaster, moved furniture).

Intensity V:

Arizona--Fort Defiance, Indian Wells, Houck, Lukachukai, Lupton, Navajo, St. Johns, Wide Ruins.

Colorado--Ignacio, Marvel.

New Mexico--Aztec, Bluewater, Brimhall, Casa Blanca, Church Rock, Cuchillo, Fence Lake (bottles fell from shelf), Galina, Gamarco, Grants (press report), Jemez Springs, Kirtland, Lake Valley School (50 km NNE of Crownpoint), Lumberton, Mentmore, Nageezi, Navajo Dam, Ponderosa, Prewitt, Pueblo Pintado School, Quemado, Ramah, Rehoboth, San Mateo, Tohatchi, Waterflow.

Intensity IV:

Arizona--Chambers, Chinle, Petrified Forest National Park, Pinetop, Sanders, Sawmill, Woodruff.

Colorado--Bayfield, Chimney Rock, Chromo, Cortez, Creede, Dove Creek, Durango, Maher, Mesa Verde, Pagosa Springs, Rico, Towaoc.

New Mexico--Blanco, Bloomfield, Continental Divide, Dulce, La Jara, La Puente, Llaves, Los Ojos, Magdalena, New Laguna, Nulan, Rutherton, San Rafael, Seboyeta, Silver City, Zuni.

Utah--Aneth.

Intensity III:

Colorado--Woody Creek, Yellow Jacket.

New Mexico--Milan.

Utah--Wellington.

Intensity II:

Colorado--Pleasant View, Walsenburg.

New Mexico--Grady.

14 January (G) Central New Mexico

Origin time: 07 01 32.0
Epicenter: 34.17 N., 106.81 W.
Depth: None computed.
Magnitude: None computed.
Intensity II: Lemitar, about 10 km east of Socorro.

20 May (G) Northwestern New Mexico

Origin time: 19 43 21.9
Epicenter: 35.47 N., 109.04 W.
Depth: 5 km
Magnitude: 2.5 ML
Intensity IV: Window Rock area.

New Mexico--Continued

24 June (G) Eastern New Mexico

Origin time: 15 27 32.0
Epicenter: 35.62 N., 103.28 W.
Depth: 5 km
Magnitude: 3.5 ML
Intensity V: Amistad. Postmaster at Tucumcari, 200 km north of epicenter, reported everyone was frightened in Irene and Rosebud.
Intensity IV: Nara Visa.
Intensity III: Capulin.

Oklahoma

16 March (T) Eastern Oklahoma

Origin time: 07 39 54.5
Epicenter: 35.30 N., 95.50 W.
Depth: None computed.
Magnitude: 2.3 ML

Intensity data were provided by J. Lawson, Earth Sciences Laboratory, University of Oklahoma, Leonard.

Intensity III: Eufaula, Stidham, Vivian.

Intensity II: Hannah (8 km northwest of), Lenna.

30 March (G) Northwestern Oklahoma

Origin time: 09 27 01.0
Epicenter: 36.61 N., 102.08 W.
Depth: 5 km
Magnitude: 2.7 ML(T)
Intensity V: Boise City, Keyes.
Intensity IV: Griggs (press report). An earlier and smaller shock occurred at 07 05 (T).

16 April (G) Western Oklahoma

Origin time: 18 59 44.2
Epicenter: 36.11 N., 99.88 W.
Depth: 5 km
Magnitude: 3.4 mbLg(T)
Intensity IV:

Oklahoma--Durham.

Texas--Higgins.

Intensity III:

Oklahoma--Arnett.

17 April (T) Southern Oklahoma

Origin time: 02 48
Epicenter: 34.1 N., 97.4 W.
Depth: None computed.
Magnitude: 2.4 mbLg
Intensity II: Wilson.

19 April (G) Western Oklahoma

Origin time: 04 42 42.2
Epicenter: 36.13 N., 99.84 W.
Depth: 5 km
Magnitude: 3.5 mbLg(T)
Intensity IV:
Oklahoma--Arnett, Cheyenne, Custer, Durham.
Texas--Higgins.
Intensity II:
Oklahoma--Reydon.

Oklahoma--Continued

20 September (T) Southern Oklahoma
 Origin time: 09 40
 Epicenter: Not located.
 Depth: None computed.
 Magnitude: 2.2 ML
 Intensity II: Wilson.

19 December (T) Southeastern Oklahoma
 Origin time: 08 26 36.7
 Epicenter: 34.92 N., 95.73 W.
 Depth: 5 km
 Magnitude: 2.9 mbLg
 Intensity II: McAlester (telephone report).

Oregon--Continued

USGS canvassed an area around the epicenter within a radius of 250 km and mailed 355 questionnaires. The earthquake was felt over an area of approximately 35,000 sq km, as shown in figure 16. Slight damage was reported at Dufur and Wamic. A field investigation was made by Couch and Farooqui (1976), Oregon State University. The intensity data from this report are designated by (Z) in the listings below.

Intensity VI:

Oregon--Dufur (slight damage), Wamic (plaster and dry wall cracked).

Oregon

13 April (G) Northern Oregon
 Origin time: 00 47 17.1
 Epicenter: 45.22 N., 120.77 W.
 Depth: 15 km
 Magnitude: 4.5 mb, 3.3 MS, 4.8 ML

Intensity V:

Oregon--Antelope, Ashwood, Fossil, Gales Creek, Hood River (Z), Kahneeta (Z), Maupin, Parkdale, Post, Prineville, Rhododendron, South Junction Depot (Z), Spray, The Dalles (cracked windows--press report), Tygh Valley, Warm Springs. Washington--Cook.

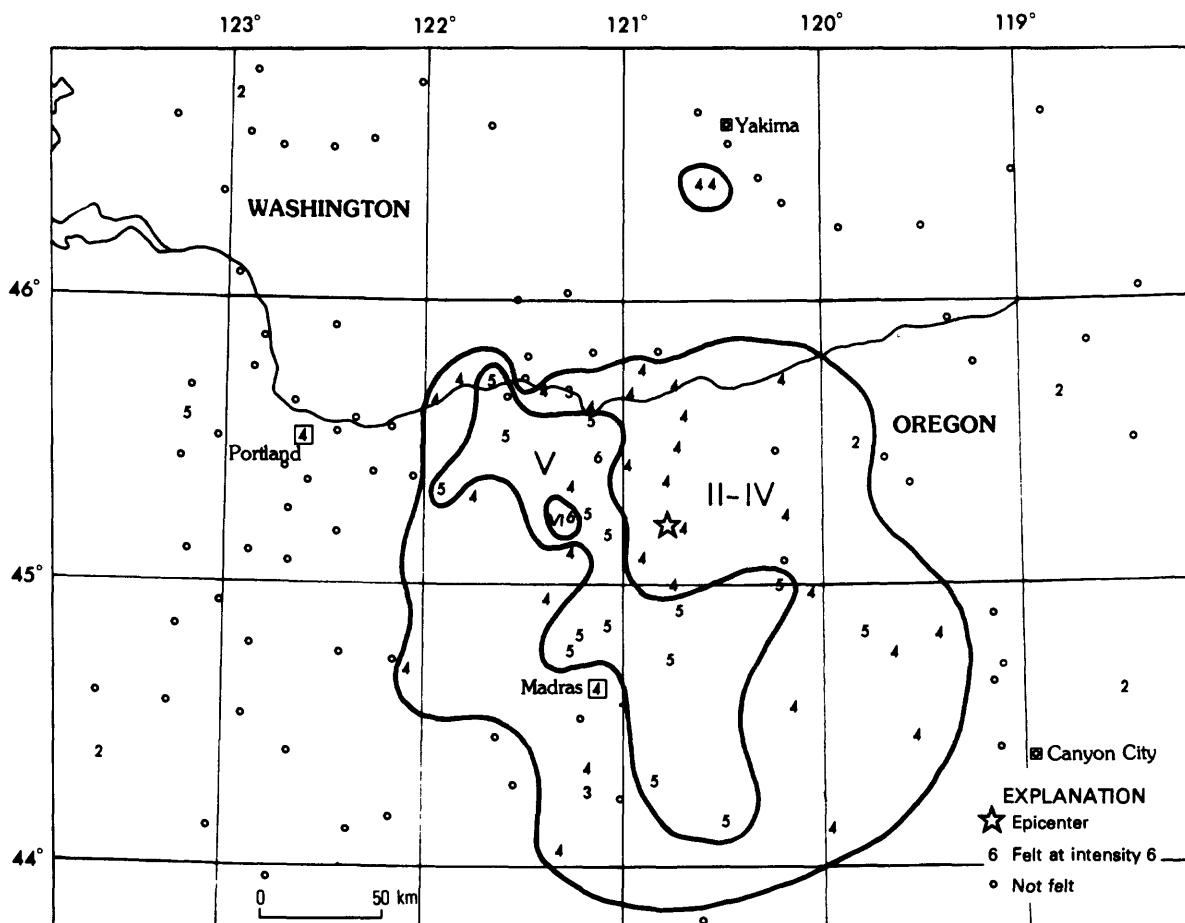


Figure 16.--Area affected by northern Oregon earthquake of April 13

Oregon--Continued

Intensity IV:

Oregon--Arlington, Bakeoven Road--22 km northwest of Shaniko (Z), Bend, Condon, Dayville, Friend, Grass Valley, Idanha, Kent, Kimberly, Kinzua, Madras, Mitchell, Monument, Moro, Mosier, Oak Springs Fish Hatchery (Z), Paulina, Pinegrove (Z), Portland (press report), Rufus, Shaniko, Simnasho (Z), Terrebonne, Timberline Lodge, Wapunitia (Z), Wasco.
Washington--Brownstown, Carson, Centerville, Dallesport, Harrah, North Bonneville, Wishram.

Intensity III:

Oregon--Bonneville, Corvallis (Z), Redmond (Z), Rowena (Z), Tygh Ridge (Z).

Intensity II:

Oregon--Alsea, Bates, Ione, Pendleton.
Washington--Centralia.

17 April (G) Northern Oregon

Origin time: 02 11 44.4
Epicenter: 45.08 N., 120.80 W.
Depth: 2 km
Magnitude: 4.2 ML

Intensity II: Wasco County, Oreg.

This is an aftershock of the earthquake of April 13 at 00 47 17.1 UTC.

Puerto Rico

29 March (G) Puerto Rico region

Origin time: 06 15 41.6
Epicenter: 18.35 N., 65.12 W.
Depth: 110 km
Magnitude: 4.7 mb

Intensity III: San Juan (Isla Verde International Airport).

Intensity II: Vieques, P.R., and on all three U.S. Virgin Islands.

13 June (G) Mona Passage

Origin time: 19 06 27.4
Epicenter: 19.44 N., 67.92 W.
Depth: 51 km
Magnitude: 5.4 mb
Intensity II: San Juan.

Rhode Island

11 March (C) Southeastern Rhode Island

Origin time: 08 29 32.2
Epicenter: 41.56 N., 71.21 W.
Depth: 0 km
Magnitude: 3.5 mbLg

The earthquake was generally felt in towns along the eastern Rhode Island-eastern Massachusetts border region, from Oakland, R.I., south to Newport, and from Somerset, Mass., south to New Bedford and Westport Point. Some isolated felt reports include Leicester (near

Rhode Island--Continued

Worcester), Wakefield (north of Boston), Edgartown, and Dennis Port, Mass.; and Rogers, Conn. (where plaster reportedly was cracked).

Intensity VI:

Connecticut--Rogers (plaster cracked).

Intensity V:

Massachusetts--Dartmouth, Fairhaven, Fall River (press report), Marshfield Hills, New Bedford, Somerset (press report), Swansea, Westport (knocked snow from roof--press report), Westport Point.

Rhode Island--Bristol, Coventry, Exeter, Hope Valley, Jamestown, Little Compton, Newport (lamp fell from table), North Kingstown (press report), North Scituate, Providence (press report), Tiverton, Warren, Warwick.

Intensity IV:

Massachusetts--Dennis Port, Edgartown, Elmwood, Leicester, Osterville, Plymouth, Wakefield.

Rhode Island--East Greenwich (press report), Middletown (press report), Oakland, Richmond.

Intensity III:

Massachusetts--Brewster (press report), Chatham (press report), Harwich (press report), Hyannis, Sandwich (press report).

Intensity II:

Massachusetts--Dennis (press report), West Falmouth, Yarmouth (press report).

Tennessee

4 February (G) Tennessee-Georgia border

Origin time: 19 53 52.9
Epicenter: 35.00 N., 84.75 W.
Depth: 5 km
Magnitude: 3.0 mbLg(V)

The epicenter of this earthquake is located east of Chattanooga, Tenn., near Conasauga, in the Lake Ocoee Dam area. The shock was felt at a few towns in that region.

Intensity VI:

Tennessee--Conasauga (cracked masonry; cracks in 4-year-old cement-block building north of city; cracks in chimney of house 2 km from Ball Play Creek, along Highway 411 (N)).

Intensity V:

Georgia--Baxley, Cisco, Lyons, Reidsville, Uvalda (N).

Intensity IV:

Tennessee--Copperhill, Ducktown.

Tennessee--Continued

Intensity III:

Tennessee--Chattanooga (telephone report).

Intensity II:

Georgia--Dalton, Hiwassee.

Texas

19 January (G) Southwestern Texas

Origin time: 04 03 30.5
Epicenter: 31.90 N., 103.08 W.
Depth: 1 km
Magnitude: 3.3 ML
Intensity IV: Kermit.

22 January (G) Southwestern Texas

Origin time: 07 21 57.0
Epicenter: 31.90 N., 103.07 W.
Depth: 1 km
Magnitude: 2.8 ML
Intensity III: Kermit (press report).

25 January (G) Southwestern Texas

Origin time: 04 48 27.9
Epicenter: 31.90 N., 103.08 W.
Depth: 2 km
Magnitude: 4.1 ML
Intensity V:
Texas--Kermit.
Intensity IV:
New Mexico--Jal.
Texas--Notrees.
Intensity III:
New Mexico--Lea County (press reports).
Texas--Ector and Winkler Counties.

Utah

11 February (U) Northern Utah

Origin time: 03 28 14.7
Epicenter: 41.27 N., 111.84 W.
Depth: 13 km
Magnitude: 2.7 ML
Intensity III: Ogden (U).

27 February (G) Northern Utah

Origin time: 07 18 16.4
Epicenter: 41.24 N., 111.27 W.
Depth: 5 km
Magnitude: 2.4 ML(U)
Intensity II: Hill AFB, Ogden,
Pleasant View, Roy (all from press reports).

15 June (U) Northern Utah

Origin time: 02 08 10.4
Epicenter: 41.89 N., 112.44 W.
Depth: 1 km
Magnitude: 3.1 ML
Intensity III: Blue Creek Valley (press report).

Utah--Continued

5 November (U) Northern Utah

Origin time: 01 15 06.9
Epicenter: 41.82 N., 112.69 W.
Depth: 7 km
Magnitude: 3.4 ML
Intensity II: Snowville.

5 November (U) Northern Utah

Origin time: 02 48 55.4
Epicenter: 41.81 N., 112.70 W.
Depth: 7 km
Magnitude: 4.1 ML
Intensity V: Utah--Howell (small objects moved), Lewiston, Riverside.
Intensity IV: Utah--Hyrum, Snowville.
Idaho--Holbrook, Stone.
Intensity III: Utah--Portage.
Intensity II: Utah--Plymouth.

5 November (U) Northern Utah

Origin time: 10 58 03.5
Epicenter: 41.82 N., 112.69 W.
Depth: 7 km
Magnitude: 3.2 ML
Intensity II: Snowville.

Virginia

13 September (G) Virginia-North Carolina border

Origin time: 18 54 37.1
Epicenter: 36.60 N., 80.81 W.
Depth: 5 km
Magnitude: 3.3 mbLg(V)

USGS canvassed an area around the epicenter within a radius of 150 km and mailed 356 questionnaires. In addition, data were provided by G. A. Bollinger, Virginia Polytechnic Institute and State University, at Blacksburg, and by Law Engineering Testing Company, Marietta, Georgia. These data were evaluated by the USGS, and the combined results are listed below. The earthquake was felt over an area of approximately 17,500 sq km (fig. 17).

Intensity VI:

North Carolina--Mount Airy (bricks fell from chimney; pictures fell off piano; pictures dislodged from wall), Toast (cracked masonry and plaster; guards on fluorescent light fixtures and metal sorting cases in post office rattled violently; loud noises resembling explosions).

Intensity V:

North Carolina--Advance, Dobson (small objects shifted), East Bend, Ennice, Glade Valley, Pilot Mountain, Piney Creek, Rural Hall, Siloam, Sparta (pictures tilted on wall), State Road, Thurmond, White Plains.

Virginia--Cana, Fancy Gap (small objects overturned), Fries, Galax, Lambsburg.

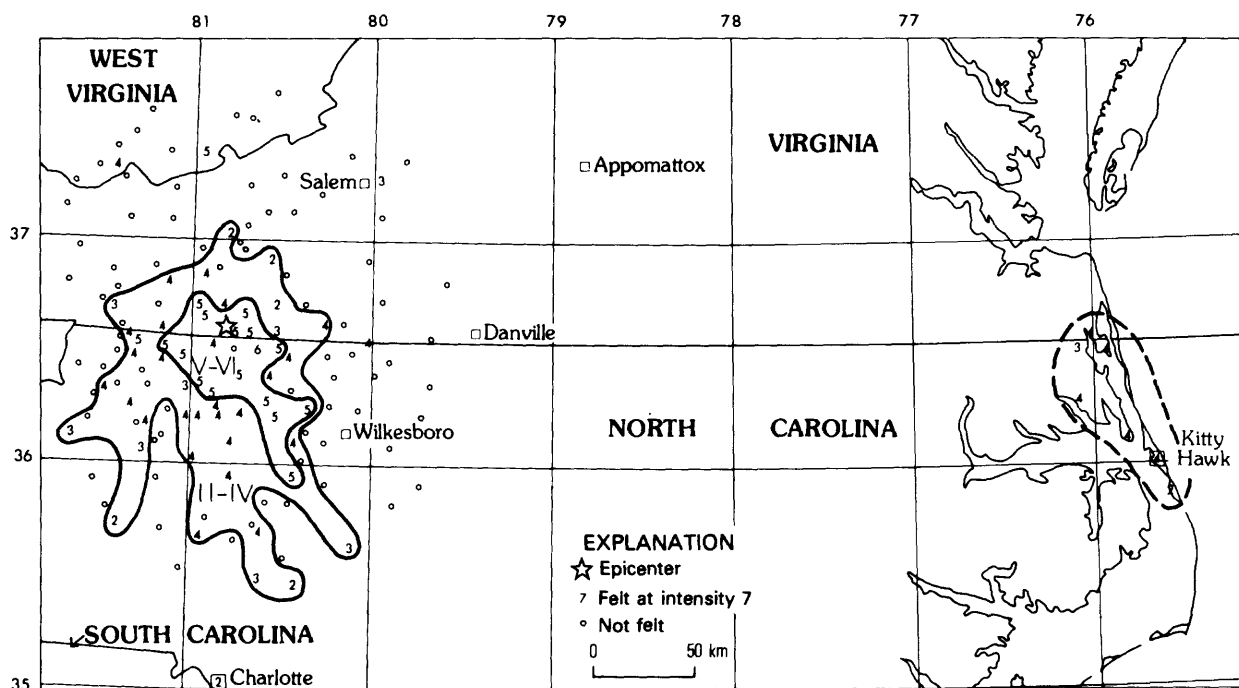


Figure 17.--Area affected by Virginia-North Carolina border earthquake of September 13

Intensity IV:

North Carolina--Ararat, Barium Springs, Belle Island (two shocks felt several seconds apart at Currituck Sound), Boonville, Concord (north-south motion reported), Elkin (loud sound like an explosion rattled windows and doors; water in bathtub rippled), Grandy (three shocks felt), Hamptonville, Harmony, Hillsville, Jonesville, Kitty Hawk (6.3 km north on Currituck Sound; two tremors noted, each lasting several seconds and separated by several seconds, described as relatively high-frequency vibration that did not vary in intensity from beginning to end, but began and ceased abruptly), Knotts Island (rattling of windows and doors, lasting about 10 seconds), Landis, Lewisville, Lowgap, Maple (Currituck County; three shocks felt in about 5 minutes, two close together), Millers Creek, Pilot Mountain, Powells Point (on Albemarle Sound), Roaring River, Ronda, Salisbury (southern Rowan County), Scottville, Sparta, Statesville, Union Grove, Westfield, Whitehead, Wilbar, Woodleaf.
 Virginia--Austinville, Claudville, Cripple Creek, Hillsville, Independence, Mouth of Wilson, Stuart, Woodlawn.
 West Virginia--Anawalt.

Intensity III:

North Carolina--Blowing Rock, Boomer, Denton, Kannapolis, Moyock (lasted longer than 10 seconds), Needmore, Traphill.
 Virginia--Ararat, Fancy Gap, Roanoke, Trout Dale.

Intensity II:

North Carolina--Charlotte, Longview, Manteo (two shocks felt), Mt. Pleasant.
 South Carolina--Columbia (felt on upper floors of an eight-story building--telephone report), Greenville (telephone report).
 Virginia--Indian Valley, Laurel Fork, Marion.

Virgin Islands

15 October (G) Virgin Islands

Origin time: 19 50 42.0
 Epicenter: 18.92 N., 64.47 W.
 Depth: 45 km
 Magnitude: 5.0 mb, 5.4 mb (L).

Intensity V:

Puerto Rico--San Juan (Isla Verde International Airport).

Intensity IV:

Virgin Islands--Cruz Bay.
 Cuba--Guantanamo Bay.
 Puerto Rico--Fajardo.

----- Washington -----

5 January (W) Puget Sound, Wash.

Origin time: 13 25 43.8
 Epicenter: 47.46 N., 122.60 W.
 Depth: 42 km
 Magnitude: 2.7 ML(G), 3.3
Intensity IV: Burley, Olympia, Port Orchard.
Intensity III: Bremerton (press report), Eatonville, La Grande, Preston.
Intensity II: Steilacoom, Tacoma (press report).

27 January (W) Northwestern Washington

Origin time: 03 09 31.3
 Epicenter: 47.88 N., 122.17 W.
 Depth: 19 km
 Magnitude: 2.1 ML(G), 2.9
Intensity IV: Snohomish.
Intensity III: Everett.

31 January (W) Northwestern Washington

Origin time: 12 27 14.0
 Epicenter: 48.35 N., 122.32 W.
 Depth: 18 km
 Magnitude: 2.4 ML(G), 3.6
Intensity IV: Camano Island, Silvana, Stanwood.
Intensity II: Mount Vernon.

16 May (W) Vancouver Island region

Origin time: 08 35 14.8
 Epicenter: 48.80 N., 123.36 W.
 Magnitude: 5.1 mb (G)
 Depth: 62 km

USGS canvassed an area around the epicenter within a radius of 250 km and mailed 296 questionnaires. The earthquake was felt over an area of approximately 77,000 sq km of Washington and British Columbia, as shown in figure 18. Minor damage occurred at Deming, Wash., and Lake Cowichan and Victoria, B.C. The Canadian data were supplied by Gary Rogers, Victoria Geophysical Observatory, British Columbia, and reevaluated by the USGS.

Intensity VI:

British Columbia--Abbotsford, Duncan, Essondale, Gold River, Ladysmith, Lake Cowichan (waterline broken), Langley, Mill Bay, Mount Lehman, Nanaimo, Richmond, Steveston, Surrey, Victoria (one chimney damaged, one brick fell), West Vancouver, White Rock.

Washington--Deming (plaster and dry wall cracked), Maple Falls.

Intensity V:

British Columbia--Agassiz, Aldergrove, Bamfield, Boston Bar, Bradner, Brentwood Bay, Burnaby, Chemainus, Chilliwack, Cobble Hill, Coquitlam, Cowichan, Crofton, Delta, Dewdney, Fulford Harbor, Gabriola, Galiano, Gambier, Ganges, Garden Bay, Half Moon

----- Washington--Continued -----

Bay, Harrison Hot Springs, Harrison Mills, Honeymoon Bay, Hopkins Landing, Huntington, Lindell Beach, Madeira Park, Maple Ridge, Matsqui, Mayne, Mesachie Lake, Mission City, Nanoose Bay, New Westminster, North Surrey, North Vancouver, Parksville, Port Alberni, Port Coquitlam, Port Mellon, Port Renfrew, Port Washington, Roberts Creek, Rosedale, Saanichton, Saturna, Sechelt, Shawnigan Lake, Sidney, Sooke, South Wellington, Squamish, Thetis Island, Vancouver (power outage), Vedder Crossing, Whonock, Woodfibre.

Washington--Acme, Alderwood Manor, Anacortes, Arlington, Bellingham, Blakely Island, Blanchard, Bothell, Bow, Burlington, Carlsborg, Chimacum, Clallam Bay, Clinton, Concrete, Custer, Darrington, Eastsound, Edison, Enumclaw, Everett, Everson, Ferndale, Freeland, Friday Harbor, Gardiner, Glacier, Gold Bar, Hamilton, Index, Joyce, Lake Stevens, Lopez, Lyman, Lynden, Marblemount, Marietta, Monroe, Mount Vernon, Nooksack, Nordland, Oak Harbor, Olga, Orcas, Point Roberts, Preston, Quilcene, Roche Harbor, Rockport, Sedro Woolley, Sekiu, Shaw Island, Silvana, Skykomish, Snoqualmie, Stoughton, Sumas, Wickersham.

Intensity IV:

British Columbia--Blubber Bay, Bowen Island, Britannia Beach, Cassidy, Cultus Lake, Fort Langley, Gibsons, Hope, Hornby Island, Icco, James Island, Mount Currie, North Burnaby, Pender Island, Pitt Meadows, Port Moody, Powell River, Qualicum Beach, Royston, Stewardson Inlet, Union Bay, Westholme, Yarrow, Youbou.

Washington--Aberdeen, Birch Bay (press report), Blaine (press report), Bremerton, Carnation, Coupeville, Deer Harbor, Fall City, Grayland, Greenbank, Hansville, Holden Village, Indianola, La Conner, Langley, Mount Vernon, Mukilteo, Olympia (press report), Port Angeles, Ravensdale, Rollingbay, San Juan Island (press report), Seabeck, Seattle, Stanwood, Waldron.

Intensity III:

British Columbia--Cumberland, Gillies Bay, Mansons Landing.
 Washington--Duvall (8 km northeast of), Mercer Island.

Intensity II:

British Columbia--Barnet.
 Washington--Dockton, Snohomish.

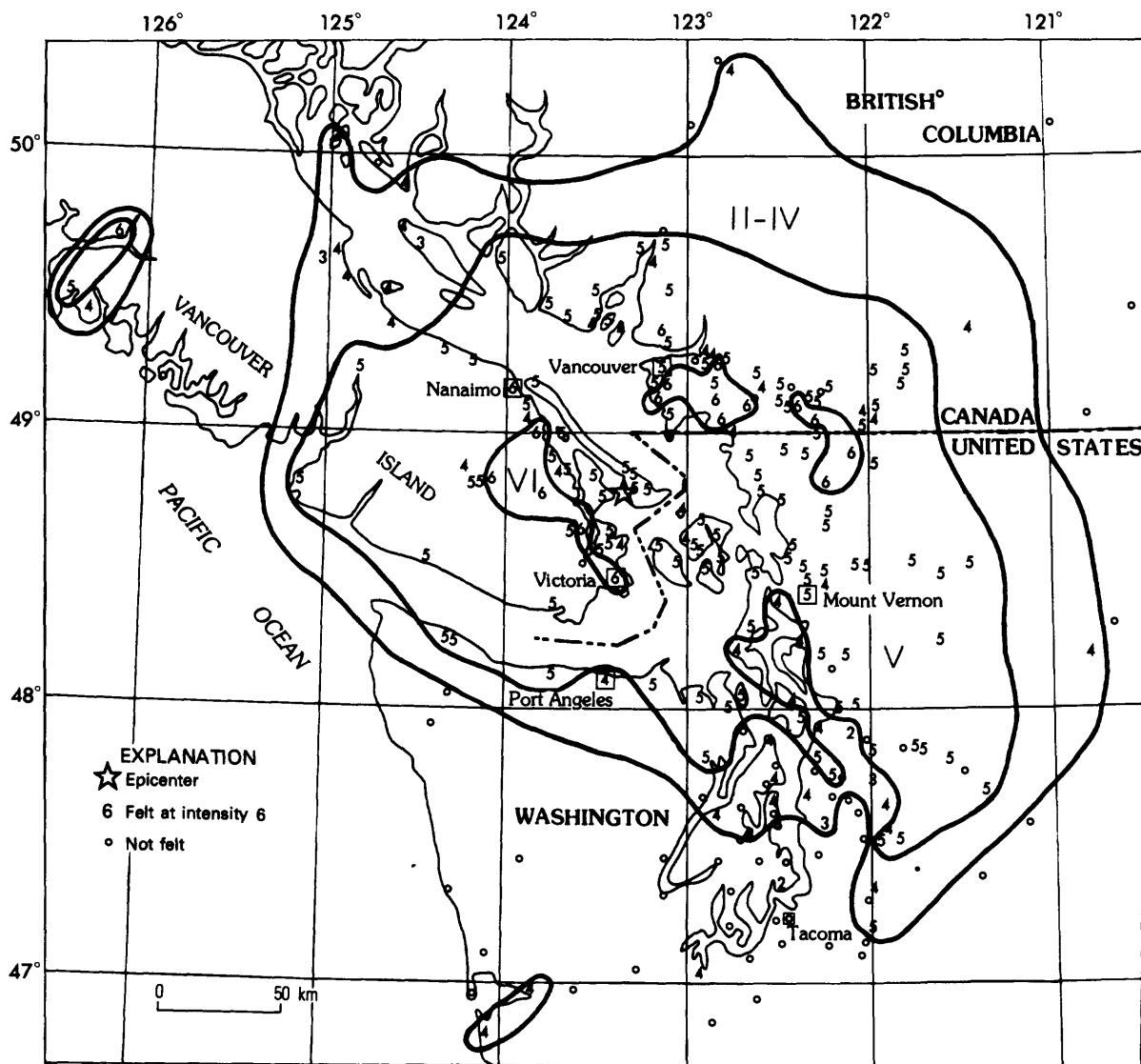


Figure 18.--Area affected by Vancouver Island earthquake of May 16

2 September (W) Northwestern Washington

Origin time: 13 36 11.0
 Epicenter: 48.21 N., 122.76 W.
 Depth: 24 km
 Magnitude: 4.3 mb(G), 4.0 ML(G)

This earthquake was widely felt in the Washington Counties of Clallam, Island, Jefferson, King, Kitsap, San Juan, Skagit, Snohomish, and Whatcom, as well as in Vancouver and Victoria in British Columbia (press report). USGS canvassed an area around the epicenter within a radius of 125 km and mailed 244 questionnaires. This earthquake was felt throughout the Puget Sound area (fig. 19).

Intensity V: Bremerton, Carlsborg, Coupeville, Eastsound, Everett, Gardiner, Greenbank, Hadlock (small objects and furniture moved), Joyce, La Connor (small objects moved), Lopez (small objects moved), Lummi Island, Lynnwood, Oak Harbor (water sloshed; small objects shifted), Olga, Orcas, Port Angeles, Port Townsend (small objects moved), Quilcene, Seattle, Shaw Island (small objects moved), Starwood, Waldron, Whidbey Island (small objects shifted).

Intensity IV: Anacortes, Blakely Island, Bothell, Brinnon, Chimacum, Clearlake, Ferndale, Freeland, Friday Harbor, Lyman, Magnolia, Port Ludlow, Sequim, Skykomish.

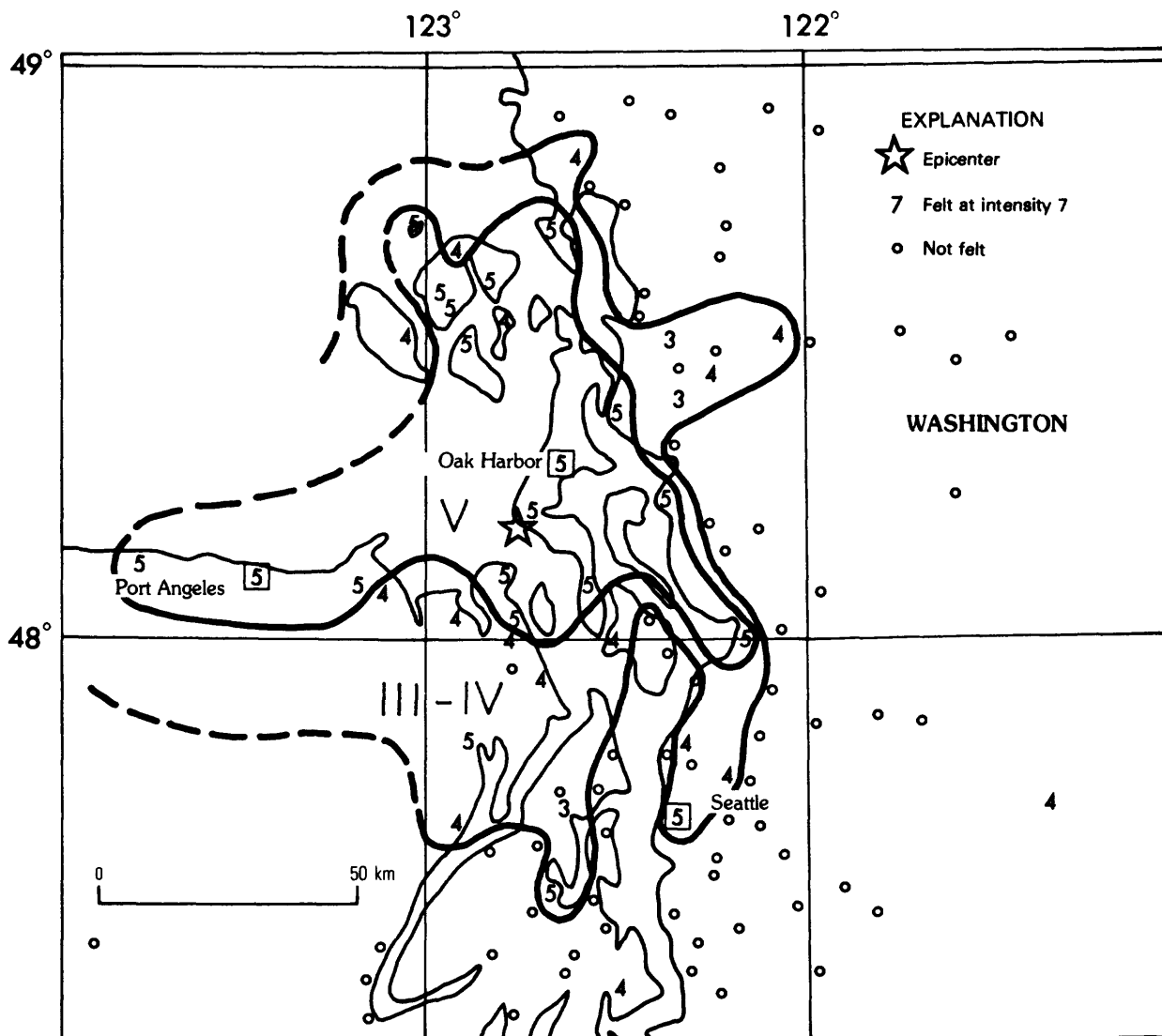


Figure 19.--Area affected by northwestern Washington earthquake of September 2

Intensity III: Bow, Keyport, Mt. Vernon
(press report).

Intensity II: Capitol Hill.

8 September (W) Northwestern Washington

Origin time: 08 21 01.6

Epicenter: 47.38 N., 123.08 W.

Depth: 48 km

Magnitude: 4.6 mb(G), 3.9 MS(G), 4.8 ML(G)

USGS canvassed an area around the epicenter within a radius of 150 km and mailed 336 questionnaires. The earthquake was felt throughout the Puget Sound area (fig. 20).

Intensity VI: Tacoma (broken glassware, other slight damage, many awakened and frightened--press report).

Intensity V: Allyn (small objects moved), Aloha, Anderson Island, Auburn, Belfair, Burley, Carnation, Dockton, East Olympia, Fox Island, Grapeview, Lilliwaup, Longbranch (small objects moved), Lopez (furniture moved), Lyman, Manchester, Matlock (small objects moved), McMillin, Mercer Island (press report), Milton, Mineral, Nordland (small objects moved), Oakville, Olga, Olympia, Pacific, Puyallup, Redondo, Renton, Rochester (small objects

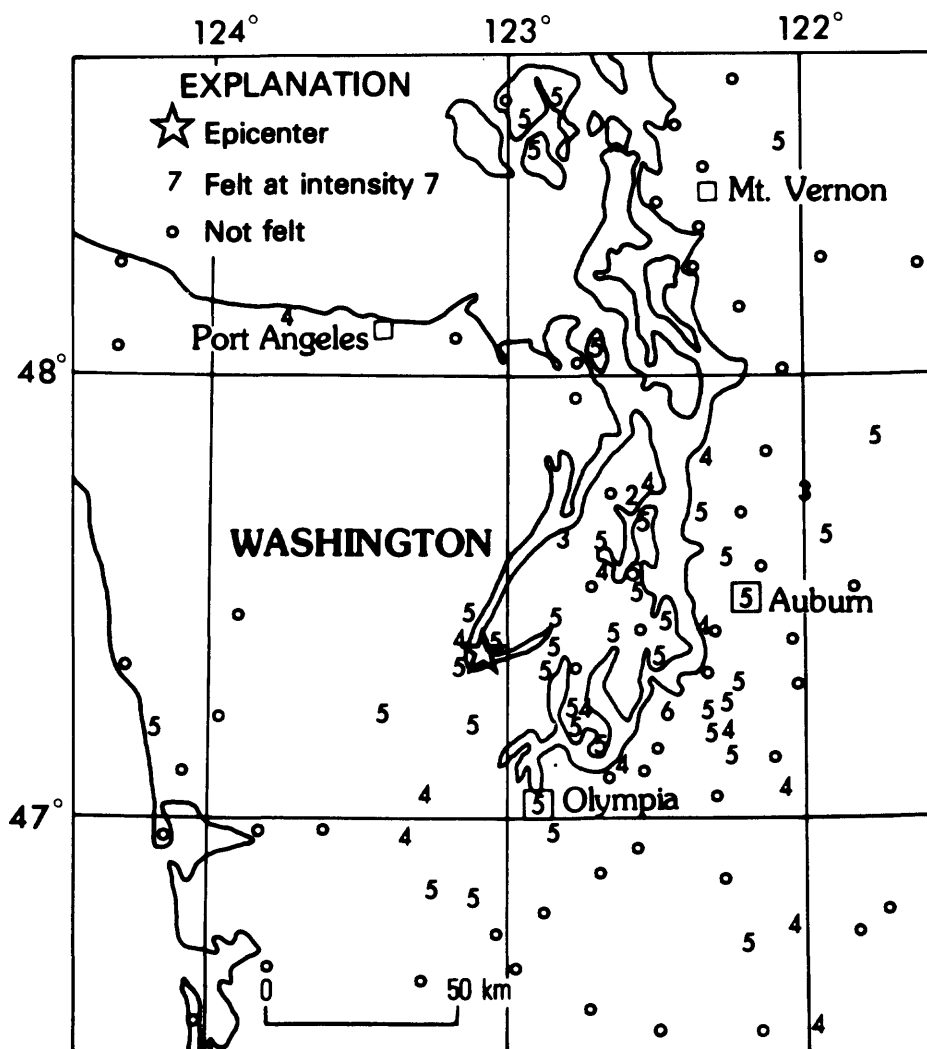


Figure 20.--Area affected by northwestern Washington earthquake of September 8

shifted), Rollingbay, Seattle, Shaw Island, Shelton, South Colby (small objects shifted), Startup, Tahuya, Tracyton, Union, Vashon, Victor (press report), West Seattle (press report).

Intensity IV: Ashford, Bremerton, Carbonado, Fort Lewis, Hoodsport, Indianola, Joyce, Lakebay, Lynnwood, Malone, McCleary, Normandy Park (press report), Randle, Seattle-Tacoma Airport (control-tower personnel estimated tower swayed 3 m), Sumner.

Intensity III: Duvall, Seabeck.

Intensity II: Auburn, Suquamish.

14 October (W) Southwestern Washington

Origin time: 21 39 17.7
Epicenter: 46.66 N., 122.34 W.
Depth: 30 km
Magnitude: 3.1 ML(G)

Intensity V: Elbe (furniture moved), Glenoma, La Grande, Mineral (furniture moved).

Intensity IV: Ashford, Morton, Randle, Silver Creek.

Intensity III: Salkum.

Intensity II: Eatonville, McKenna, Mossyrock.

West Virginia

6 May (A) Northern West Virginia

Origin time: 18 46 08.1
Epicenter: None computed.
Depth: None computed.
Magnitude: None computed.

Intensity IV: Morgantown (U.S. Bureau of Mines station; glasses rattled, floor moved).

 West Virginia--Continued

19 June (G) Southern West Virginia

Origin time: 05 54 13.9
 Epicenter: 37.36 N., 81.62 W.
 Depth: 5 km
 Magnitude: 4.7 mb, 3.0 mbLg(V)
Intensity V: Berwind, Wilcoe.
Intensity IV: Welch, Wilcoe.
Intensity III: Coalwood, Gary.

 Wyoming

27 January (G) Southern Wyoming

Origin time: 10 54 38.7
 Epicenter: 41.95 N., 107.22 W.
 Depth: 5 km
 Magnitude: 2.3 ML
Intensity V: Rawlins (knocked lamp
 off table, pictures off wall--press
 report).

7 June Yellowstone National Park

Origin time: 04 48
 Epicenter: Not located.
 Depth: None computed.
 Magnitude: None computed.
Intensity V: Madison Junction, Old
 Faithful.

7 June Yellowstone National Park

Origin time: 12 07
 Epicenter: Not located.
 Depth: None computed.
 Magnitude: None computed.
Intensity V: Canyon Village, Madison
 Junction, Old Faithful. (Residents
 were awakened and frightened; most
 were living in old wood cabins or
 trailers.)

3 September (G) Northeastern Wyoming

Origin time: 04 18 16.2
 Epicenter: 44.04 N., 106.15 W.
 Depth: 10 km
 Magnitude: 4.8 mb, 4.2 ML
Intensity V: Kaycee (small objects and
 light furniture moved; building creaked,
 several frightened).

19 October (G) Yellowstone National Park

Origin time: 06 18 35.3
 Epicenter: 44.74 N., 110.81 W.
 Depth: 4 km
 Magnitude: 5.3 mb, 4.0 ML

This earthquake was felt over an area of
 approximately 3,000 sq km in the
 Yellowstone National Park. Both tremors
 (the second occurred at 07 24 34.6) were
 described as a strong, quick jolt or
 rocking action lasting a few seconds. The
 only direction sensed was at Canyon where
 the winterkeeper reported tremors coming
 from the west (R. A. Hutchinson, National
 Park Service, written commun., 1976).

 Wyoming--Continued

Intensity IV:

Montana--West Yellowstone.
 Wyoming--Canyon Village, Madison Junction,
 Mammoth, Old Faithful.

Intensity III:

Montana--Corwin Springs.

19 October (G) Yellowstone National Park

Origin time: 07 24 34.6
 Epicenter: 44.80 N., 110.70 W.
 Depth: 5 km
 Magnitude: 5.3 mb, 4.1 ML
Intensity IV:

Montana--West Yellowstone.
 Wyoming--Canyon Village, Madison Junction,
 Mammoth, Old Faithful.

17 November (G) Yellowstone National Park

Origin time: 14 34 33.4
 Epicenter: 44.75 N., 110.86 W.
 Depth: 5 km
 Magnitude: 3.0 ML(A), 3.7 ML(D)
Intensity IV: Canyon Village.
Intensity III: Madison Junction.

17 November (G) Yellowstone National Park

Origin time: 14 57 38.6
 Epicenter: 44.74 N., 110.83 W.
 Depth: 5 km
 Magnitude: 3.0 ML(A)
Intensity III: Madison Junction.

27 November (G) Yellowstone National Park

Origin time: 01 09 35.2
 Epicenter: 44.66 N., 110.82 W.
 Depth: 5 km
 Magnitude: 3.5 ML(A)
Intensity III: Madison Junction.

27 November (G) Yellowstone National Park

Origin time: 19 18 57.9
 Epicenter: 44.85 N., 110.97 W.
 Depth: 5 km
 Magnitude: 3.6 ML(A)
Intensity II: Canyon Village, Madison
 Junction.

8 December (G) Yellowstone National Park

Origin time: 14 40 59.1
 Epicenter: 44.76 N., 110.79 W.
 Depth: 5 km
 Magnitude: 5.5 mb, 4.6 ML
Intensity V:
 Montana--Corwin Springs (small objects
 moved).

Intensity IV:

Montana--Gardiner, West Yellowstone.

Intensity III:

Wyoming--Canyon Village, Madison
 Junction, Mammoth Hot Springs, Old
 Faithful.

9 December (G) Yellowstone National Park

Origin time: 22 36 23.7
 Epicenter: 44.77 N., 110.80 W.
 Depth: 5 km
 Magnitude: 4.5 mb, 5.1 ML, 4.7 ML(D)

Wyoming--Continued

Intensity V:

Montana--Corwin Springs (small objects moved), West Yellowstone.

Wyoming--Canyon Village (small objects fell, Gibbon River turbid).

Intensity IV:

Montana--Harrison.

Wyoming--Madison Junction, Mammoth.

Intensity III:

Montana--Gallatin Gateway (telephone report), Virginia City.

Wyoming--Old Faithful.

16 December (G) Yellowstone National Park

Origin time: 00 28 21.4

Epicenter: 44.64 N., 111.05 W.

Depth: 5 km

Magnitude: 3.0 ML(A)

Intensity IV: Madison Junction.

19 December (G) Yellowstone National Park

Origin time: 17 10 15.6

Epicenter: 44.77 N., 110.80 W.

Depth: 5 km

Magnitude: 4.9 mb, 4.5 ML

The intensity data below were furnished by
R. A. Hutchinson, National Park Service
geologist, Yellowstone National Park, Wyo.

Intensity VI:

Montana--Gardiner (very minor damage).

Wyoming--Continued

Wyoming--Mammoth Hot Springs (very minor damage).

(Both areas reported cracked windows; Christmas decorations and household items were knocked to the floor.)

Intensity IV:

Wyoming--Canyon Village, Devil's Slide area of Yellowstone Valley (south of Corwin Springs, Mont.), Madison Junction, Old Faithful.

Intensity III:

Montana--West Yellowstone.

20 December (G) Yellowstone National Park

Origin time: 01 34 16.7

Epicenter: 44.84 N., 110.83 W.

Depth: 5 km

Magnitude: 4.4 mb, 4.3 ML

The intensity data below were furnished by
R. A. Hutchinson, National Park Service
geologist, Yellowstone National Park, Wyo.

Intensity IV:

Montana--Gardiner.

Wyoming--Canyon Village, Madison Junction, Mammoth Hot Springs, Mary Mountain Patrol Cabin.

Intensity III:

Montana--Corwin Springs, West Yellowstone.
Wyoming--Devil's Slide area of Yellowstone Valley (south of Corwin Springs, Mont.), Old Faithful.

TABLE 1. SUMMARY OF EARTHQUAKES FELT IN U.S.: FOR 1976

DATE	ORIGIN TIME			COORDINATES		SOURCE	REGION	MAXIMUM INTENSITY	DEPTH	MAGNITUDE
	UT	H	M S	LAT. DEG.	LONG. DEG.					
							ALASKA			
JAN 7	17 18	46.7		61.86	150.67	G	SOUTHERN ALASKA	III	44 KM	NONE COMPUTED.
JAN 13	23 48	22.6		51.79	174.70	G	ANDREANOF ISLANDS	II	33 KM	3.9 MB
JAN 15	02 17	20.4		61.74	149.77	G	SOUTHERN ALASKA	II	30 KM	NONE COMPUTED.
JAN 15	13 12	31.2		62.26	150.46	G	CENTRAL ALASKA	IV	33 KM	3.3 ML(M)
JAN 17	09 09	51.4		61.44	148.38	G	SOUTHERN ALASKA	II	28 KM	2.6 ML(M)
JAN 22	07 59	20.0		61.57	149.96	G	SOUTHERN ALASKA	II	59 KM	NONE COMPUTED.
JAN 23	13 03	04.7		53.52	166.49	G	FOX ISLANDS	IV	104 KM	3.7 MB
FEB 5	09 36	36.5		59.99	149.35	G	KENAI PENINSULA	V	35 KM	5.2 MB, 3.9 MS, 4.8 ML
FEB 18	08 00	58.6		51.57	178.68	G	ANDREANOF ISLANDS	IV	39 KM	4.9 MB, 4.3 MS
FEB 19	10 28	33.5		52.50	179.52	G	ANDREANOF ISLANDS	II	212 KM	4.9 MB
FEB 22	07 21	25.8		51.73	176.87	G	ANDREANOF ISLANDS	IV	58 KM	5.0 MB
FEB 28	09 43	50.0		51.56	178.54	G	ANDREANOF ISLANDS	II	32 KM	4.8 MB
MAR 8	02 28	47.7		51.34	178.04	G	ANDREANOF ISLANDS	III	54 KM	4.7 MB, 4.1 MS
MAR 13	14 33	42.5		63.50	148.67	G	CENTRAL ALASKA	V	22 KM	3.9 MB, 4.2 ML(M)
MAR 13	15 18	57.8		63.51	148.70	G	CENTRAL ALASKA	III	45 KM	3.3 ML(M)
MAR 21	17 20	27.9		60.87	149.69	G	KENAI PENINSULA	III	59 KM	NONE COMPUTED.
MAR 25	07 49	33.6		57.01	153.71	G	KODIAK ISLAND REGION	III	28 KM	5.0 MB
MAR 26	14 40	14.2		63.60	147.65	G	CENTRAL ALASKA	IV	33 KM	4.1 MB, 4.2 ML(M)
APR 11	07 36						CENTRAL ALASKA	IV		NONE COMPUTED.
APR 14	04 16	16.3		62.15	150.26	G	CENTRAL ALASKA	IV	33 KM	3.1 ML(M)
APR 17	06 08	44.5		64.90	148.31	G	CENTRAL ALASKA	V	33 KM	4.0 ML(M)
APR 25	10 12	09.4		64.79	147.67	G	CENTRAL ALASKA	V	34 KM	3.3 ML(M)
APR 27	11 26	57.5		64.81	147.49	G	CENTRAL ALASKA	IV	33 KM	3.8 ML(M)
APR 27	11 34	20.0		64.73	147.58	G	CENTRAL ALASKA	V	29 KM	3.0 ML(M)
MAY 8	11 25	36.3		61.62	151.52	G	SOUTHERN ALASKA	IV	16 KM	4.4 MB, 4.4 ML(M)
MAY 9	00 09	50.7		59.86	153.07	G	SOUTHERN ALASKA	IV	38 KM	4.7 MB, 3.9 ML(M)
MAY 11	16 46	15.8		61.49	146.97	G	SOUTHERN ALASKA	III	67 KM	4.2 MB
MAY 26	17 38	22.2		57.97	153.30	G	KODIAK ISLAND REGION	III	33 KM	4.5 MB
JUN 1	16 30	55.5		64.70	147.80	G	CENTRAL ALASKA	II	09 KM	2.9 ML(M)
JUN 10	08 57	59.6		51.52	176.54	G	ANDREANOF ISLANDS	II	58 KM	4.5 MB
JUN 14	12 39	39.0		51.47	176.85	G	ANDREANOF ISLANDS	III	50 KM	4.1 MB
JUN 24	13 36	59.2		61.97	150.90	G	CENTRAL ALASKA	III	73 KM	4.8 MB
JUL 5	18 25	17.7		51.30	179.14	G	ANDREANOF ISLANDS	II	61 KM	4.6 MB
JUL 5	18 28	28.0		51.33	179.16	G	ANDREANOF ISLANDS	II	54 KM	5.2 MB
JUL 15	08 09	47.4		62.70	149.83	G	CENTRAL ALASKA	IV	24 KM	4.2 MB, 4.6 ML(M)
JUL 22	14 30	17.7		51.49	177.86	G	ANDREANOF ISLANDS	II	58 KM	4.9 MB
JUL 30	13 54	32.2		61.33	147.45	G	SOUTHERN ALASKA	II	40 KM	3.9 MB, 4.0 ML(M)
AUG 11	20 43	45.5		51.70	175.42	G	ANDREANOF ISLANDS	III	33 KM	4.6 MB
AUG 16	05 11	38.9		51.50	178.38	G	ANDREANOF ISLANDS	II	65 KM	5.1 MB
AUG 16	10 11	33.3		51.49	178.05	G	ANDREANOF ISLANDS	II	55 KM	4.8 MB, 3.9 MS
AUG 22	02 01	47.4		60.22	153.30	G	SOUTHERN ALASKA	VI	144 KM	5.5 MB
AUG 25	11 04	18.9		60.61	150.17	G	KENAI PENINSULA	III	47 KM	NONE COMPUTED.
AUG 28	02 30	09.2		52.60	175.34	G	ANDREANOF ISLANDS	III	145 KM	5.1 MB
SEP 5	10 33	49.0		51.40	178.77	G	ANDREANOF ISLANDS	II	68 KM	4.4 MB
SEP 15	16 44	29.6		61.08	150.62	G	SOUTHERN ALASKA	II	74 KM	NONE COMPUTED.
SEP 21	03 01	04.6		57.84	152.12	G	KODIAK ISLAND REGION	III	33 KM	4.9 MB, 4.6 ML(M)

SEE FOOTNOTES AT END OF TABLE

TABLE 1. SUMMARY OF EARTHQUAKES FELT IN U.S. FOR 1976 - CONTINUED

DATE	ORIGIN TIME			GEOGRAPHIC		SOURCE	REGION	MAXIMUM		DEPTH	MAGNITUDE
				COORDINATES				INTENSITY			
	UT	H	M	S	LAT. DEG.	LONG. DEG.					
ALASKA (CONTINUED)											
SEP 22	02 30	25.7			51.72	175.95	G	ANDREANOF ISLANDS	IV	43 KM	4.8 MB, 5.1 MS
SEP 27	05 59	45.7			60.46	145.17	G	SOUTHERN ALASKA	III	41 KM	4.8 MB, 3.3 ML(M)
OCT 18	00 36	31.6			63.29	150.74	G	CENTRAL ALASKA	IV	126 KM	4.9 MB
OCT 24	17 19	53.7			62.65	149.14	G	CENTRAL ALASKA	III	75 KM	4.9 MB
NOV 11	18 18	30.5			61.31	149.79	G	SOUTHERN ALASKA	II	33 KM	3.2 ML(M)
NOV 30	06 22	35.3			59.92	153.36	G	SOUTHERN ALASKA	IV	127 KM	4.7 MB
DEC 15	09 51	32.3			61.35	150.25	G	SOUTHERN ALASKA	III	51 KM	3.7 MB
DEC 15	13 35	53.8			64.83	147.87	G	CENTRAL ALASKA	IV	31 KM	3.0 ML(M)
ARIZONA											
FEB 4	00 04	58.1			34.66	112.50	G	WESTERN ARIZONA	VI	12 KM	4.9 MB, 5.1 ML, 5.2 ML
FEB 9	03 07	22.8			34.61	112.53	G	WESTERN ARIZONA	II	10 KM	4.6 MB, 3.3 ML
FEB 23	14 09	54.4			34.68	112.43	G	WESTERN ARIZONA	VI	10 KM	3.5 ML
APR 19	23 35	45.5			35.39	109.10	G	NORTHEASTERN ARIZONA	V	05 KM	3.5 ML
MAY 4	10 06	34.8			34.70	112.54	G	WESTERN ARIZONA	II	10 KM	3.0 ML
DEC 7	12 59	56.3			31.98	114.78	P	BAJA CALIFORNIA	VI	08 KM	5.5 MB(G), 5.7 MS(G)
ARKANSAS											
JAN 16	19 42	57.0			35.92	092.12	G	NORTHERN ARKANSAS	V	14 KM	3.2 ML(S)
MAR 25	00 41	20.5			35.59	090.48	S	NORTHEASTERN ARKANSAS	VI	15 KM	4.9 MB(G), 5.0 ML
MAR 25	01 00	11.9			35.61	090.48	S	NORTHEASTERN ARKANSAS	II	15 KM	4.5 ML
SEP 25	14 06	56.0			35.61	090.45	S	NORTHEASTERN ARKANSAS	V	05 KM	3.6 MBLG
CALIFORNIA											
JAN 1	17 20	12.9			33.97	117.88	P	SOUTHERN CALIFORNIA	VI	06 KM	4.2 ML, 4.6 MB(G)
JAN 10	12 58	15.9			32.05	115.54	G	CALIFORNIA-MEXICO BORDER AREA	V	33 KM	4.6 MB
JAN 14	20 26	24.5			33.09	116.65	P	SOUTHERN CALIFORNIA	III	13 KM	3.4 ML
JAN 14	21 43	59.3			36.11	120.16	B	CENTRAL CALIFORNIA	VI	05 KM	5.1 MB(G), 4.9 ML
JAN 14	23 40	17.6			36.14	120.21	B	CENTRAL CALIFORNIA	II	02 KM	3.4 ML
JAN 15	00 09	37.4			36.15	120.25	B	CENTRAL CALIFORNIA	II	07 KM	3.5 ML
JAN 15	03 12						P	BREA, CALIF.	II		NONE COMPUTED
JAN 18	01 00	24.7			40.64	124.35	B	NORTHERN CALIFORNIA	IV	23 KM	4.0 MB(G), 3.7 ML
JAN 18	07 38	25.2			39.06	122.96	B	NORTHERN CALIFORNIA	III	07 KM	2.6 ML
JAN 20	13 59	37.2			40.38	125.34	G	NORTHERN CALIFORNIA	IV	33 KM	4.8 MB, 4.7 ML(B)
FEB 1	02 57	39.7			37.93	122.31	B	NORTHERN CALIFORNIA	II	04 KM	2.6 ML
FEB 3	03 40						P	SOUTHERN CALIFORNIA	II		NONE COMPUTED
FEB 19	22 09	55.1			34.39	118.35	P	SOUTHERN CALIFORNIA	III	09 KM	3.1 ML
FEB 24	15 13	10.5			40.29	124.37	B	NORTHERN CALIFORNIA	IV	06 KM	3.5 MB(G), 3.5 ML
MAR 1	17 06	40.3			37.73	121.96	B	CENTRAL CALIFORNIA	II	07 KM	2.8 ML
MAR 4	15 08	09.7			38.79	122.75	B	CENTRAL CALIFORNIA	II	02 KM	3.1 ML
MAR 6	13 51	08.1			38.83	122.83	B	CENTRAL CALIFORNIA	II	04 KM	2.9 ML
MAR 8	20 23	27.3			37.39	120.10	B	CENTRAL CALIFORNIA	IV	02 KM	2.5 ML

SEE FOOTNOTES AT END OF TABLE

TABLE 1. SUMMARY OF EARTHQUAKES FELT IN U.S. FOR 1976 - CONTINUED

DATE	GEOGRAPHIC			SOURCE	REGION	MAXIMUM		DEPTH	MAGNITUDE
	ORIGIN TIME	COORDINATES				INTENSITY			
	UT H M S	LAT. DEG.	LONG. DEG.						
MAR 9	19 45 00.3	37.33	122.18	B	CENTRAL CALIFORNIA	II		07 KM	2.6 ML
MAR 14	09 32			P	SOUTHERN CALIFORNIA	II			NONE COMPUTED
MAR 17	04 01 52.7	36.03	121.13	B	CENTRAL CALIFORNIA	IV		08 KM	4.2 MB(G), 4.3 ML
MAR 29	16 37			P	SOUTHERN CALIFORNIA	II			NONE COMPUTED
APR 8	15 21 38.1	34.35	118.67	P	SOUTHERN CALIFORNIA	VI		15 KM	4.7 MB(G), 3.9 MS(G)
APR 14	06 56 03.9	32.07	115.48	P	SOUTHERN CALIFORNIA	III		14 KM	4.2 MB(G), 3.8 ML
APR 14	07 59 27.8	32.88	115.55	P	SOUTHERN CALIFORNIA	III		08 KM	3.6 ML
APR 14	10 31 00.8	32.88	115.48	P	SOUTHERN CALIFORNIA	III		08 KM	4.0 MB(G), 3.9 ML
APR 14	10 47 53.6	32.93	115.55	P	SOUTHERN CALIFORNIA	III		08 KM	3.7 ML
APR 14	13 23 59.4	33.12	115.50	P	SOUTHERN CALIFORNIA	III		19 KM	3.3 ML
APR 15	04 59 32.8	34.37	118.67	P	SOUTHERN CALIFORNIA	II		15 KM	3.1 ML
APR 16	09 20				NEAR AVEVAL, CALIF.	IV			NONE COMPUTED
APR 16	17 11 50.6	39.56	121.61	B	NORTHERN CALIFORNIA	II		05 KM	3.8 ML(E), 2.7 ML
APR 25	17 51 08.4	33.74	118.02	P	SOUTHERN CALIFORNIA	III		11 KM	3.0 ML
APR 26	06 46 36.5	33.13	115.67	P	SOUTHERN CALIFORNIA	III		02 KM	3.8 ML
MAY 3	05 42 38.9	38.14	121.95	B	NORTHERN CALIFORNIA	VI		26 KM	3.4 ML
MAY 4	13 09			P	SOUTHERN CALIFORNIA	II			NONE COMPUTED
MAY 10	10 24 24.0	34.46	116.88	P	SOUTHERN CALIFORNIA	IV		08 KM	3.8 MB(G), 3.6 ML
MAY 12	01 54 39.0	34.36	118.67	P	SOUTHERN CALIFORNIA	III		14 KM	3.2 ML
MAY 12	03 32 06.7	34.36	118.66	P	SOUTHERN CALIFORNIA	III		15 KM	3.1 ML
MAY 20	04 32 38.6	36.89	121.49	B	CENTRAL CALIFORNIA	V		02 KM	3.0 ML
MAY 22	00 51 41.4	40.40	125.35	G	NORTHERN CALIFORNIA	V		33 KM	3.9 MB, 3.4 ML(B)
MAY 27	17 01 07.4	38.39	122.68	B	NORTHERN CALIFORNIA	IV		02 KM	3.4 ML
JUN 3	08 26			P	SOUTHERN CALIFORNIA	II			NONE COMPUTED
JUN 14	23 30 26.5	39.47	121.54	B	NORTHERN CALIFORNIA	V		07 KM	3.9 MB(G), 3.8 ML
JUN 17	11 04			P	SOUTHERN CALIFORNIA	II			NONE COMPUTED
JUN 20	10 15 24.8	40.43	120.57	B	NORTHERN CALIFORNIA	V		05 KM	4.4 MB(G), 4.5 ML
JUN 24	15 44 45.4	40.39	120.59	B	NORTHERN CALIFORNIA	V		05 KM	4.7 MB(G), 4.2 ML
JUN 27	22 11 36.7	34.05	118.30	P	SOUTHERN CALIFORNIA	III		08 KM	2.9 ML
JUN 29	06 44 54.6	33.96	116.58	P	SOUTHERN CALIFORNIA	II		08 KM	3.0 ML
JUL 3	19 45 20.4	40.39	120.58	B	NORTHERN CALIFORNIA	V		05 KM	4.4 MB(G), 3.8 ML
JUL 6	03 55 16.2	39.40	121.60	G	NORTHERN CALIFORNIA	V		05 KM	4.5 MB, 4.1 ML(B)
JUL 7	07 50 45.4	37.44	121.77	B	CENTRAL CALIFORNIA	IV		18 KM	3.5 ML
JUL 8	16 14 10.5	40.10	124.00	B	NORTHERN CALIFORNIA	IV		02 KM	2.9 ML
JUL 13	13 34 53.7	38.09	121.87	B	NORTHERN CALIFORNIA	V		10 KM	3.7 ML
JUL 18	11 49 28.4	37.28	122.17	B	CENTRAL CALIFORNIA	V		10 KM	2.6 ML
JUL 23	20 53 55.9	33.87	118.13	P	SOUTHERN CALIFORNIA	IV		11 KM	3.1 ML
JUL 26	13 50 05.0	36.37	121.17	B	NORTHERN CALIFORNIA	IV		06 KM	2.3 ML
JUL 26	14 00 01.7	36.55	121.17	B	NORTHERN CALIFORNIA	IV		06 KM	2.0 ML
AUG 1	17 18 48.1	34.90	116.56	P	SOUTHERN CALIFORNIA	V		12 KM	4.5 ML
AUG 9	10 54 30.0	34.33	118.52	P	SOUTHERN CALIFORNIA	II		08 KM	2.8 ML
AUG 11	15 24 55.5	33.48	116.51	P	SOUTHERN CALIFORNIA	VI		15 KM	4.3 ML
AUG 12	08 51 11.3	37.17	121.53	B	CENTRAL CALIFORNIA	IV		07 KM	3.2 ML
AUG 15	12 29 05.6	37.79	121.96	B	CENTRAL CALIFORNIA	V		07 KM	3.3 ML
AUG 16	16 37 21.4	36.19	117.66	F	CALIFORNIA-NEVADA BORDER REGION	V		08 KM	3.7 ML(B), 3.7 ML(P)

SEE FOOTNOTES AT END OF TABLE

TABLE 1. SUMMARY OF EARTHQUAKES FELT IN U.S. FOR 1976 - CONTINUED

DATE	GEOGRAPHIC			SOURCE	REGION	MAXIMUM INTENSITY	DEPTH	MAGNITUDE
	ORIGIN TIME	LAT. DEG.	LONG. DEG.					
	UT H M S							
AUG 20	22 05 52.9	37.79	121.97	B	CENTRAL CALIFORNIA	VI	07 KM	4.0 ML
AUG 20	22 08 01.1	37.76	121.91	B	CENTRAL CALIFORNIA	IV	02 KM	3.9 ML
AUG 22	08 09 59.7	34.03	117.47	P	SOUTHERN CALIFORNIA	IV	03 KM	3.0 ML
SEP 1	22 42 48.8	40.64	122.21	B	NORTHERN CALIFORNIA	IV	05 KM	3.5 ML
SEP 5	03 15 09.3	37.60	121.43	B	CENTRAL CALIFORNIA	IV	09 KM	3.5 ML
SEP 12	17 34 33.0	37.90	122.22	B	NORTHERN CALIFORNIA	II	06 KM	2.5 ML
SEP 13	16 08 10.2	40.20	124.39	B	NORTHERN CALIFORNIA	IV	01 KM	4.8 MB(G), 4.0 ML
SEP 15	01 35 31.8	38.00	122.00	B	NORTHERN CALIFORNIA	II	15 KM	3.4 ML
SEP 16	12 37 12.0	37.34	121.77	B	CENTRAL CALIFORNIA	II	02 KM	2.5 ML
SEP 24	14 02 17.6	34.07	118.15	P	SOUTHERN CALIFORNIA	II	08 KM	2.2 ML
OCT 6	20 54 19.9	37.63	121.42	B	CENTRAL CALIFORNIA	II	02 KM	3.0 ML
OCT 9	02 09 28.1	33.33	116.23	P	SOUTHERN CALIFORNIA	III	16 KM	3.9 ML
OCT 15	01 35 31.8	38.01	122.05	B	NORTHERN CALIFORNIA	III	19 KM	3.4 ML
OCT 15	04 01 00.5	33.90	116.62	P	SOUTHERN CALIFORNIA	II	08 KM	2.9 ML
OCT 17	05 38 11.9	34.45	118.37	P	SOUTHERN CALIFORNIA	VI	15 KM	4.3 MB(G), 3.9 ML
OCT 18	17 26 52.6	32.72	117.92	P	SOUTHERN CALIFORNIA	III	15 KM	4.6 MB(G), 4.2 ML
OCT 20	23 14 56.3	37.64	118.02	G	SOUTHERN CALIFORNIA	III	05 KM	3.3 ML(B)
OCT 22	23 19 13.6	33.48	116.58	P	CALIFORNIA-NEVADA BORDER REG.	II	15 KM	4.5 MB(G), 3.6 ML
OCT 23	19 24 33.2	36.89	121.49	B	CENTRAL CALIFORNIA	II	11 KM	3.5 ML
OCT 24	02 19 52.7	36.84	121.63	B	CENTRAL CALIFORNIA	II	02 KM	3.5 ML
OCT 26	23 23 44.8	40.30	124.27	B	NORTHERN CALIFORNIA	IV	15 KM	3.4 ML
NOV 2	02 46 05.9	34.10	117.30	P	SOUTHERN CALIFORNIA	V	06 KM	3.3 ML
NOV 4	04 33 45.9	34.05	116.36	P	SOUTHERN CALIFORNIA	IV	08 KM	3.2 ML
NOV 4	05 48 20.9	33.12	115.60	F	SOUTHERN CALIFORNIA	II	05 KM	4.2 ML(P)
NOV 4	06 35 03.5	33.12	115.59	F	SOUTHERN CALIFORNIA	II	05 KM	4.1 ML(P)
NOV 4	07 56 06.8	33.12	115.61	F	SOUTHERN CALIFORNIA	II	01 KM	3.9 ML(P)
NOV 4	10 41 37.5	33.12	115.59	F	SOUTHERN CALIFORNIA	VI	04 KM	4.6 MB(G), 5.3 MS(G)
NOV 4	11 39 08.3	33.10	115.62	F	SOUTHERN CALIFORNIA	II	01 KM	4.1 ML(P)
NOV 4	11 49 40.4	33.11	115.62	F	SOUTHERN CALIFORNIA	II	02 KM	3.8 MB(G), 4.1 ML(P)
NOV 4	13 31 27.7	33.10	115.62	F	SOUTHERN CALIFORNIA	II	04 KM	4.2 ML(P)
NOV 4	14 12 50.2	33.12	115.60	F	SOUTHERN CALIFORNIA	II	05 KM	4.2 MB(G), 4.4 ML(P)
NOV 5	19 43 11.0	35.80	121.30	B	CENTRAL CALIFORNIA	II	02 KM	3.5 ML
NOV 11	02 32				NORTHERN CALIFORNIA	V		NONE COMPUTED.
NOV 15	12 08 04.0	33.93	118.25	P	SOUTHERN CALIFORNIA	III	08 KM	2.9 ML
NOV 22	17 55 10.8	33.95	118.62	P	SOUTHERN CALIFORNIA	VI	02 KM	3.8 ML
NOV 22	19 32 36.8	33.97	118.58	P	SOUTHERN CALIFORNIA	II	08 KM	2.9 ML
NOV 26	11 19 25.2	41.29	125.71	G	NORTHERN CALIFORNIA	V	15 KM	6.0 ML, 6.8 MS, 6.2 ML
NOV 27	15 23 43.1	33.50	116.49	F	SOUTHERN CALIFORNIA	II	05 KM	3.3 MB(P)
NOV 30	23 55 18.8	34.08	118.28	P	SOUTHERN CALIFORNIA	III	08 KM	2.5 ML
DEC 5	04 41 08.9	35.39	118.68	P	CENTRAL CALIFORNIA	V	01 KM	3.8 ML
DEC 8	02 13 44.1	34.47	118.42	P	SOUTHERN CALIFORNIA	II	12 KM	3.3 ML
DEC 9	17 11 36.3	33.98	117.25	P	SOUTHERN CALIFORNIA	II	11 KM	2.9 ML
DEC 17	21 36 28.4	38.77	122.27	B	NORTHERN CALIFORNIA	II	02 KM	3.3 ML

TABLE 1. SUMMARY OF EARTHQUAKES FELT IN U.S. FOR 1976 - CONTINUED

DATE	ORIGIN TIME			COORDINATES		SOURCE	REGION	MAXIMUM INTENSITY	DEPTH	MAGNITUDE
	UT H M S	LAT. DEG.	LONG. DEG.							
APR 24	10 22 22.1	41.68	072.49	C	CENTRAL CONNECTICUT	IV	00 KM	2.2 MBLG		
DEC 27	06 57 13.9	32.22	082.46	G	SOUTHEASTERN GEORGIA	V	05 KM	3.7 MBLG(V)		
					GEORGIA					
					HAWAII					
JAN 1	18 54 23.0	18.85	155.08	H	ISLAND OF HAWAII	III	26 KM	4.5 ML		
JAN 2	01 36 47.2	19.36	155.25	H	ISLAND OF HAWAII	III	09 KM	3.5 ML		
JAN 7	11 44 33.2	19.45	154.88	H	ISLAND OF HAWAII	III	09 KM	3.8 ML		
JAN 12	00 05 40.1	19.51	155.27	H	ISLAND OF HAWAII	IV	24 KM	4.2 ML, 4.5 MB(G)		
JAN 12	13 48 32.9	19.37	155.12	H	ISLAND OF HAWAII	III	09 KM	3.0 ML		
JAN 14	22 09 51.9	19.38	155.11	H	ISLAND OF HAWAII	II	07 KM	2.3 ML		
JAN 15	22 41 45.2	19.41	155.29	H	ISLAND OF HAWAII	V	14 KM	4.4 ML		
JAN 15	22 59 26.0	19.41	155.29	H	ISLAND OF HAWAII	V	16 KM	4.8 MB(G), 4.5 ML		
JAN 17	05 29 13.8	19.38	155.11	H	ISLAND OF HAWAII	IV	08 KM	3.7 ML		
JAN 17	06 00 03.9	19.35	155.00	H	ISLAND OF HAWAII	III	04 KM	3.2 ML		
JAN 18	14 49 28.3	19.36	155.25	H	ISLAND OF HAWAII	III	10 KM	3.6 ML		
JAN 19	00 13 37.8	19.36	155.13	H	ISLAND OF HAWAII	II	08 KM	3.6 ML		
JAN 19	09 57 46.4	19.38	155.10	H	ISLAND OF HAWAII	II	08 KM	3.5 ML		
JAN 21	21 41 21.2	19.37	155.12	H	ISLAND OF HAWAII	III	09 KM	4.1 ML		
JAN 23	12 47 40.0	19.36	155.09	H	ISLAND OF HAWAII	III	09 KM	3.7 ML		
JAN 27	15 35 51.3	19.35	155.10	H	ISLAND OF HAWAII	III	09 KM	3.6 ML		
JAN 27	21 34 04.5	19.34	155.09	H	ISLAND OF HAWAII	II	07 KM	2.9 ML		
JAN 28	08 26 28.1	19.34	155.11	H	ISLAND OF HAWAII	IV	09 KM	4.0 ML		
JAN 29	20 19 56.4	19.38	155.00	H	ISLAND OF HAWAII	IV	08 KM	4.7 ML, 4.5 MB(G)		
FEB 1	06 07 26.9	19.37	155.08	H	ISLAND OF HAWAII	III	08 KM	3.3 ML		
FEB 4	02 42 13.4	19.38	155.10	H	ISLAND OF HAWAII	III	08 KM	3.4 ML		
FEB 4	06 50 58.3	19.36	155.25	H	ISLAND OF HAWAII	III	10 KM	3.5 ML		
FEB 8	08 48 12.2	19.33	155.13	H	ISLAND OF HAWAII	III	08 KM	3.2 ML		
FEB 12	16 18 26.2	19.36	155.06	M	ISLAND OF HAWAII	II	08 KM	3.2 ML		
FEB 13	10 49 51.8	19.52	155.96	M	ISLAND OF HAWAII	III	10 KM	3.6 ML		
FEB 13	17 12 29.1	19.37	155.84	M	ISLAND OF HAWAII	II	07 KM	2.9 ML		
FEB 19	04 40 52.5	19.43	155.28	H	ISLAND OF HAWAII	III	01 KM	2.8 ML		
FEB 21	05 51 13.8	20.21	156.27	G	ISLAND OF HAWAII	VI	33 KM	4.9 MB, 4.0 MS		
FEB 24	15 15 19.1	19.37	155.11	H	ISLAND OF HAWAII	III	09 KM	4.2 ML		
FEB 25	23 48 20.3	19.37	155.11	H	ISLAND OF HAWAII	III	09 KM	3.9 ML		
MAR 3	16 52 01.2	19.40	155.26	H	ISLAND OF HAWAII	II	05 KM	2.5 ML		
MAR 3	23 06 10.3	19.43	155.28	H	ISLAND OF HAWAII	II	01 KM	2.2 ML		
MAR 5	13 16 52.4	19.61	155.13	H	ISLAND OF HAWAII	II	11 KM	2.6 ML		
MAR 6	22 23 04.6	19.36	155.03	H	ISLAND OF HAWAII	III	07 KM	3.5 ML		
MAR 8	02 25 34.6	19.36	155.12	H	ISLAND OF HAWAII	III	08 KM	3.7 ML		
MAR 16	16 48 16.9	19.37	155.12	H	ISLAND OF HAWAII	II	08 KM	2.8 ML		
MAR 19	13 04 01.3	19.41	155.26	H	ISLAND OF HAWAII	III	04 KM	2.7 ML		

SEE FOOTNOTES AT END OF TABLE

TABLE 1. SUMMARY OF EARTHQUAKES FELT IN U.S. FOR 1976 - CONTINUED

DATE	ORIGIN TIME			COORDINATES		SOURCE	REGION	GEOGRAPHIC		MAXIMUM INTENSITY	DEPTH	MAGNITUDE
	H	M	S	LAT. DEG.	LONG. DEG.							
MAR 19	23	24	30.3	19.36	155.06	H	ISLAND OF HAWAII			III	08 KM	3.9 ML
MAR 20	23	13	19.8	19.33	155.11	H	ISLAND OF HAWAII			II	07 KM	3.1 ML
MAR 21	23	58	00.2	19.35	155.19	H	ISLAND OF HAWAII			II	09 KM	2.6 ML
MAR 22	17	27	41.6	19.29	155.36	H	ISLAND OF HAWAII			II	09 KM	2.4 ML
MAR 23	06	48	26.9	19.37	155.09	H	ISLAND OF HAWAII			III	08 KM	3.3 ML
MAR 23	07	19	56.6	19.34	155.11	H	ISLAND OF HAWAII			III	09 KM	3.1 ML
MAR 24	08	38	11.1	19.33	155.19	H	ISLAND OF HAWAII			II	08 KM	2.8 ML
MAR 24	01	06	03.1	19.32	155.31	H	ISLAND OF HAWAII			III	09 KM	3.7 ML
MAR 29	15	09	51.9	19.37	155.25	H	ISLAND OF HAWAII			III	10 KM	3.7 ML
MAR 29	18	31	29.8	19.40	155.26	H	ISLAND OF HAWAII			II	14 KM	3.0 ML
MAR 31	00	52	18.2	19.34	155.12	H	ISLAND OF HAWAII			III	09 KM	3.4 ML
APR 2	18	14	06.4	19.35	155.11	H	ISLAND OF HAWAII			V	09 KM	4.5 MBIG), 4.6 ML
APR 2	19	14	11.9	19.62	155.99	H	ISLAND OF HAWAII			III	10 KM	3.4 ML
APR 2	19	55	03.3	19.34	155.22	H	ISLAND OF HAWAII			III	08 KM	3.6 ML
APR 3	11	43	42.2	19.40	155.28	H	ISLAND OF HAWAII			III	04 KM	3.0 ML
APR 11	15	48	21.4	19.41	155.21	H	ISLAND OF HAWAII			II	02 KM	2.3 ML
APR 12	01	35	49.2	19.35	155.06	H	ISLAND OF HAWAII			II	06 KM	3.4 ML
APR 15	08	01	36.0	19.46	154.89	H	ISLAND OF HAWAII			III	09 KM	3.3 ML
APR 20	17	11	03.0	19.36	155.25	H	ISLAND OF HAWAII			II	49 KM	3.5 ML
APR 22	04	13	34.5	18.60	155.00	H	ISLAND OF HAWAII			III	09 KM	4.6 ML
APR 22	15	54	04.8	19.53	155.31	H	ISLAND OF HAWAII			II	12 KM	3.4 ML
APR 23	22	29	53.7	19.37	155.09	H	ISLAND OF HAWAII			III	09 KM	4.2 ML
APR 27	07	44	41.6	19.39	155.28	H	ISLAND OF HAWAII			III	06 KM	3.2 ML
APR 27	23	40	12.1	19.41	155.26	H	ISLAND OF HAWAII			II	02 KM	2.6 ML
MAY 6	04	32	20.3	19.40	155.27	H	ISLAND OF HAWAII			II	02 KM	2.2 ML
MAY 9	16	14	43.3	19.36	155.13	H	ISLAND OF HAWAII			II	10 KM	3.4 ML
MAY 12	15	55	11.4	19.34	155.19	H	ISLAND OF HAWAII			III	10 KM	3.7 ML
MAY 16	07	39	58.5	19.43	155.28	H	ISLAND OF HAWAII			III	05 KM	2.7 ML
MAY 17	11	45	06.0	19.33	155.27	H	ISLAND OF HAWAII			III	10 KM	3.6 ML
MAY 18	06	54	49.1	19.33	155.14	H	ISLAND OF HAWAII			II	09 KM	3.0 ML
MAY 18	16	16	41.2	19.33	155.13	H	ISLAND OF HAWAII			III	09 KM	3.5 ML
MAY 20	03	12	05.4	19.33	155.13	H	ISLAND OF HAWAII			III	09 KM	3.8 ML
MAY 22	05	53	09.7	19.35	155.10	H	ISLAND OF HAWAII			II	09 KM	3.2 ML
MAY 23	04	52	08.3	19.36	155.25	H	ISLAND OF HAWAII			III	11 KM	3.7 ML
MAY 24	03	31	20.1	19.34	155.12	H	ISLAND OF HAWAII			III	09 KM	4.0 ML
MAY 24	09	24	08.2	20.60	156.24	H	ISLAND OF MAUI			V	00 KM	4.1 ML
MAY 24	09	24	20.5	20.06	156.80	H	ISLAND OF HAWAII			III	06 KM	3.6 ML
MAY 31	16	27	23.3	20.12	155.76	H	ISLAND OF HAWAII			III	29 KM	3.5 ML
MAY 31	18	32	18.8	19.52	156.24	H	ISLAND OF HAWAII			IV	17 KM	4.5 ML
MAY 31	18	32	24.9	19.55	155.59	H	ISLAND OF HAWAII			III	02 KM	3.7 ML
JUN 1	20	02	22.0	19.36	155.20	H	ISLAND OF HAWAII			II	01 KM	2.7 ML
JUN 5	08	50	51.2	19.36	155.12	H	ISLAND OF HAWAII			III	09 KM	4.1 ML
JUN 9	21	03	42.6	19.22	155.46	H	ISLAND OF HAWAII			II	10 KM	2.7 ML
JUN 15	00	17	15.2	19.41	155.26	H	ISLAND OF HAWAII			II	04 KM	3.2 ML
JUN 15	15	00	32.4	19.46	155.48	H	ISLAND OF HAWAII			II	10 KM	3.4 ML

SEE FOOTNOTES AT END OF TABLE

TABLE 1. SUMMARY OF EARTHQUAKES FELT IN U.S. FOR 1976 - CONTINUED

DATE	ORIGIN TIME		GEOGRAPHIC		SOURCE	REGION	MAXIMUM INTENSITY	DEPTH	MAGNITUDE
			LAT. DEG.	LONG. DEG.					
		UT H M S							
JUN 16	19 17	15.8	19.36	155.08	H	ISLAND OF HAWAII	II	08 KM	3.4 ML
JUN 18	22 01	11.6	19.38	155.10	H	ISLAND OF HAWAII	II	08 KM	3.4 ML
JUN 20	10 25	11.3	19.39	155.25	H	ISLAND OF HAWAII	III	05 KM	3.1 ML
JUN 20	13 06	23.7	19.19	155.55	H	ISLAND OF HAWAII	III	10 KM	3.1 ML
JUN 22	00 27	49.5	19.37	155.22	H	ISLAND OF HAWAII	II	09 KM	2.6 ML
JUN 22	04 16	27.2	19.37	155.22	H	ISLAND OF HAWAII	III	06 KM	3.1 ML
JUN 22	06 00	34.7	19.37	155.22	H	ISLAND OF HAWAII	III	06 KM	3.3 ML
JUN 22	07 27	28.9	19.39	155.25	H	ISLAND OF HAWAII	II	02 KM	3.0 ML
JUN 22	13 04	39.6	19.38	155.24	H	ISLAND OF HAWAII	III	03 KM	3.2 ML
JUN 25	05 47	53.7	19.34	155.20	H	ISLAND OF HAWAII	III	09 KM	3.6 ML
JUN 25	11 29	52.5	19.39	155.28	H	ISLAND OF HAWAII	II	04 KM	2.5 ML
JUL 2	15 57	37.8	19.26	155.53	H	ISLAND OF HAWAII	II	09 KM	2.6 ML
JUL 8	03 49	06.6	19.40	155.26	H	ISLAND OF HAWAII	II	05 KM	2.5 ML
JUL 8	07 39	17.0	19.39	155.26	H	ISLAND OF HAWAII	III	07 KM	2.7 ML
JUL 12	09 26	18.7	19.35	155.22	H	ISLAND OF HAWAII	II	10 KM	3.2 ML
JUL 12	22 45	35.2	19.38	155.25	H	ISLAND OF HAWAII	II	05 KM	3.0 ML
JUL 14	12 05	82.3	19.39	155.24	H	ISLAND OF HAWAII	III	06 KM	3.3 ML
JUL 15	00 14	38.1	19.37	155.21	H	ISLAND OF HAWAII	II	06 KM	3.2 ML
JUL 15	18 54	39.8	19.36	155.13	H	ISLAND OF HAWAII	II	08 KM	3.3 ML
JUL 16	11 11	28.6	19.19	155.55	H	ISLAND OF HAWAII	II	10 KM	3.2 ML
JUL 22	12 40	53.8	19.38	155.08	H	ISLAND OF HAWAII	III	09 KM	3.7 ML
JUL 23	07 49	45.4	19.39	155.25	H	ISLAND OF HAWAII	III	05 KM	3.3 ML
JUL 24	05 38	17.0	19.34	155.14	H	ISLAND OF HAWAII	II	09 KM	3.7 ML
JUL 25	06 53	44.1	19.38	155.12	H	ISLAND OF HAWAII	II	09 KM	2.9 ML
JUL 27	17 14	26.8	19.37	155.89	H	ISLAND OF HAWAII	III	09 KM	4.0 ML
JUL 28	06 37	12.7	19.39	155.24	H	ISLAND OF HAWAII	III	05 KM	3.6 ML
JUL 30	08 46	35.2	19.37	155.25	H	ISLAND OF HAWAII	II	06 KM	3.8 ML
JUL 30	15 09	43.6	19.34	155.11	H	ISLAND OF HAWAII	III	08 KM	3.8 ML
JUL 30	18 02	34.9	19.34	155.12	H	ISLAND OF HAWAII	II	09 KM	2.7 ML
JUL 31	09 19	13.9	19.34	155.20	H	ISLAND OF HAWAII	II	09 KM	3.0 ML
AUG 1	02 51	36.0	19.41	155.27	H	ISLAND OF HAWAII	III	05 KM	3.3 ML
AUG 2	01 01	17.4	19.37	155.09	H	ISLAND OF HAWAII	III	09 KM	3.4 ML
AUG 2	02 39	18.0	19.39	155.25	H	ISLAND OF HAWAII	III	06 KM	3.6 ML
AUG 2	16 37	81.3	19.36	155.25	H	ISLAND OF HAWAII	II	10 KM	3.2 ML
AUG 9	23 09	33.5	19.39	155.24	H	ISLAND OF HAWAII	III	05 KM	3.4 ML
AUG 11	05 03	47.5	19.32	155.22	H	ISLAND OF HAWAII	II	10 KM	3.5 ML
AUG 12	02 30	11.0	19.34	155.19	H	ISLAND OF HAWAII	II	09 KM	2.7 ML
AUG 15	03 01	00.3	19.36	155.14	H	ISLAND OF HAWAII	II	09 KM	3.2 ML
AUG 18	03 25	34.5	19.41	155.26	H	ISLAND OF HAWAII	II	02 KM	2.3 ML
AUG 23	02 26	55.8	19.38	155.24	H	ISLAND OF HAWAII	II	05 KM	2.2 ML
AUG 26	13 19	43.5	19.36	155.25	H	ISLAND OF HAWAII	III	10 KM	3.6 ML
AUG 31	20 41	08.3	19.39	155.49	H	ISLAND OF HAWAII	III	10 KM	4.0 ML
SEP 2	20 20	26.7	19.35	155.05	H	ISLAND OF HAWAII	III	08 KM	3.5 ML
SEP 4	08 03	41.4	19.48	154.86	H	ISLAND OF HAWAII	III	09 KM	3.5 ML
SEP 4	23 10	54.1	19.33	155.27	H	ISLAND OF HAWAII	III	10 KM	3.9 ML

SEE FOOTNOTES AT END OF TABLE

TABLE 1. SUMMARY OF EARTHQUAKES FELT IN U.S. FOR 1976 - CONTINUED

DATE	ORIGIN TIME			COORDINATES		SOURCE	REGION	GEOGRAPHIC		MAXIMUM INTENSITY	DEPTH	MAGNITUDE
								LAT. DEG.	LONG. DEG.			
	H	M	S									
SEP 6	15	34	15.2	19.44	154.91	H	ISLAND OF HAWAII			III	09 KM	3.5 ML
SEP 8	08	01	16.2	19.37	155.08	H	ISLAND OF HAWAII			III	08 KM	3.5 ML
SEP 8	14	01	55.4	19.31	155.35	H	ISLAND OF HAWAII			II	09 KM	3.2 ML
SEP 10	06	46	22.2	19.39	155.07	H	ISLAND OF HAWAII			III	08 KM	2.5 ML
SEP 11	15	04	30.4	19.37	155.07	H	ISLAND OF HAWAII			III	08 KM	3.6 ML
SEP 12	23	21	43.3	19.43	154.97	H	ISLAND OF HAWAII			II	05 KM	2.8 ML
SEP 21	19	35	49.7	19.35	155.11	H	ISLAND OF HAWAII			II	10 KM	3.2 ML
SEP 20	19	14	53.3	19.33	155.22	H	ISLAND OF HAWAII			III	09 KM	3.7 ML
SEP 29	22	58	03.9	19.34	155.09	H	ISLAND OF HAWAII			III	09 KM	3.3 ML
OCT 4	15	10	52.5	19.35	155.11	H	ISLAND OF HAWAII			II	09 KM	3.0 ML
OCT 5	15	58	58.5	19.34	155.11	H	ISLAND OF HAWAII			III	09 KM	3.8 ML
OCT 5	19	55	39.6	19.37	155.08	H	ISLAND OF HAWAII			III	08 KM	3.5 ML
OCT 9	02	29	29.9	19.55	155.85	H	ISLAND OF HAWAII			II	25 KM	3.3 ML
OCT 15	09	17	06.9	19.38	155.09	H	ISLAND OF HAWAII			II	09 KM	2.7 ML
OCT 21	12	25	26.0	19.45	154.07	H	ISLAND OF HAWAII			II	09 KM	2.9 ML
OCT 22	22	43	23.6	19.32	155.20	H	ISLAND OF HAWAII			II	11 KM	3.4 ML
OCT 23	00	11	25.8	19.35	155.06	H	ISLAND OF HAWAII			II	09 KM	3.5 ML
OCT 24	18	18	54.0	19.37	155.00	H	ISLAND OF HAWAII			II	07 KM	2.5 ML
NOV 3	04	15	46.3	19.32	155.22	H	ISLAND OF HAWAII			III	18 KM	3.7 ML
NOV 5	00	44	55.8	19.41	155.27	H	ISLAND OF HAWAII			III	03 KM	2.3 ML
NOV 5	12	58	29.6	19.36	155.14	H	ISLAND OF HAWAII			II	09 KM	2.7 ML
NOV 10	01	33	03.3	19.34	155.07	H	ISLAND OF HAWAII			III	09 KM	3.8 ML
NOV 11	04	15	16.5	19.35	155.19	H	ISLAND OF HAWAII			II	10 KM	3.1 ML
NOV 13	02	54	46.4	19.35	155.04	H	ISLAND OF HAWAII			II	08 KM	3.5 ML
NOV 13	21	14	03.3	19.37	155.09	H	ISLAND OF HAWAII			III	09 KM	3.7 ML
NOV 14	14	19	23.0	19.43	155.28	H	ISLAND OF HAWAII			II	16 KM	3.0 ML
NOV 16	12	23	35.4	19.38	155.08	H	ISLAND OF HAWAII			III	09 KM	3.6 ML
NOV 17	05	44	33.9	19.43	155.28	H	ISLAND OF HAWAII			II	01 KM	2.3 ML
NOV 17	15	51	48.5	19.54	155.24	H	ISLAND OF HAWAII			III	25 KM	3.7 ML
NOV 17	22	13	08.6	19.38	155.28	H	ISLAND OF HAWAII			II	03 KM	2.1 ML
NOV 18	14	33	18.1	19.35	155.22	H	ISLAND OF HAWAII			II	09 KM	2.3 ML
NOV 19	08	24	43.7	19.40	155.28	H	ISLAND OF HAWAII			III	04 KM	3.0 ML
NOV 22	06	35	13.5	19.37	155.11	H	ISLAND OF HAWAII			II	08 KM	2.5 ML
NOV 23	01	40	49.9	19.39	155.28	H	ISLAND OF HAWAII			II	03 KM	2.4 ML
NOV 25	16	37	27.4	19.39	155.29	H	ISLAND OF HAWAII			II	04 KM	2.3 ML
NOV 25	21	05	40.3	19.40	155.28	H	ISLAND OF HAWAII			II	02 KM	2.5 ML
NOV 26	13	49	14.8	19.40	155.27	H	ISLAND OF HAWAII			II	02 KM	2.1 ML
NOV 26	20	15	58.5	19.40	155.27	H	ISLAND OF HAWAII			III	05 KM	3.1 ML
DEC 1	03	46	09.9	19.33	155.19	H	ISLAND OF HAWAII			III	10 KM	3.3 ML
DEC 1	04	10	45.2	19.32	155.19	H	ISLAND OF HAWAII			II	10 KM	3.0 ML
DEC 1	05	37	38.1	19.33	155.27	H	ISLAND OF HAWAII			II	10 KM	2.5 ML
DEC 4	13	50	58.8	19.34	155.14	H	ISLAND OF HAWAII			III	09 KM	3.0 ML
DEC 6	03	11	59.1	19.39	155.11	H	ISLAND OF HAWAII			III	08 KM	1.9 ML
DEC 6	16	26	58.0	19.36	155.13	H	ISLAND OF HAWAII			III	10 KM	3.8 ML
DEC 8	09	40	22.2	19.40	155.20	H	ISLAND OF HAWAII			II	03 KM	2.8 ML

HAWAII
(CONTINUED)

SEE FOOTNOTES AT END OF TABLE

TABLE 1. SUMMARY OF EARTHQUAKES FELT IN U.S. FOR 1976 - CONTINUED

DATE	ORIGIN TIME			GEOGRAPHIC COORDINATES		SOURCE	REGION	MAXIMUM INTENSITY	DEPTH	MAGNITUDE
	UT H M S	LAT. DEG.	LONG. DEG.							
HAWAII (CONTINUED)										
DEC 9	00 15 42.5	19.34	155.18	H	ISLAND OF HAWAII	II	09 KM	2.9 ML		
DEC 9	04 50 26.3	19.43	155.28	H	ISLAND OF HAWAII	II	01 KM	2.0 ML		
DEC 10	01 28 49.9	19.40	155.29	H	ISLAND OF HAWAII	III	03 KM	3.0 ML		
DEC 12	09 39 36.6	19.22	155.47	H	ISLAND OF HAWAII	II	09 KM	2.8 ML		
DEC 14	03 26 42.0	19.34	155.13	H	ISLAND OF HAWAII	II	10 KM	3.4 ML		
DEC 17	13 39 14.5	19.43	155.20	H	ISLAND OF HAWAII	II	01 KM	2.9 ML		
DEC 18	14 01 08.5	19.34	155.12	H	ISLAND OF HAWAII	V	09 KM	4.8 ML, 5.0 MB(G)		
DEC 22	19 03 32.4	19.40	155.27	H	ISLAND OF HAWAII	II	03 KM	2.2 ML		
DEC 25	17 01 15.4	19.64	156.01	H	ISLAND OF HAWAII	III	09 KM	3.3 ML		
DEC 27	14 15 28.6	19.39	155.25	H	ISLAND OF HAWAII	III	05 KM	3.3 ML		
DEC 27	16 24 27.3	19.32	155.27	H	ISLAND OF HAWAII	III	10 KM	3.1 ML		
DEC 27	19 19 27.0	19.40	155.25	H	ISLAND OF HAWAII	II	03 KM	2.5 ML		
DEC 29	01 17 36.6	19.40	155.28	H	ISLAND OF HAWAII	II	03 KM	2.8 ML		
DEC 29	05 37 04.8	19.32	155.20	H	ISLAND OF HAWAII	III	10 KM	3.2 ML		
DEC 29	13 45 37.4	19.39	155.29	H	ISLAND OF HAWAII	II	02 KM	2.4 ML		
DEC 30	02 44 25.6	19.33	155.19	H	ISLAND OF HAWAII	II	09 KM	2.9 ML		
DEC 30	05 26 26.9	19.39	155.24	H	ISLAND OF HAWAII	III	05 KM	3.0 ML		
DEC 30	10 47 36.9	18.16	155.25	H	ISLAND OF HAWAII	II	07 KM	3.9 ML		
DEC 30	14 19 51.5	19.33	155.27	H	ISLAND OF HAWAII	II	10 KM	3.0 ML		
IDAHO										
JUN 14	09 37 57.0	42.12	112.48	U	EASTERN IDAHO	IV	07 KM	3.6 ML		
JUL 26	10 45 28.2	45.02	114.18	G	WESTERN IDAHO	V	10 KM	4.3 MB, 4.4 ML		
NOV 1	22 22 51.1	44.26	114.97	G	WESTERN IDAHO	IV	05 KM	3.7 ML(A), 3.9 ML(D)		
INDIANA										
APR 8	07 38 53.0	39.35	88.68	G	CENTRAL INDIANA	V	20 KM	3.0 MBLG		
JUN 13	18 55 18.5			I	INDIANAPOLIS, IND.	II		NONE COMPUTED		
JUN 13	18 58 28.5			I	INDIANAPOLIS, IND.	II		NONE COMPUTED		
KENTUCKY										
JAN 19	06 28 39.5	36.88	83.02	G	EASTERN KENTUCKY	VI	05 KM	4.0 MB, 3.8 ML(S)		
APR 15	07 03 34.9	37.41	87.31	G	WESTERN KENTUCKY	V	15 KM	3.3 MBLG(V)		
MAINE										
APR 15	18 36 04.8	44.24	70.14	J	SOUTHWESTERN MAINE	III	00 KM	2.4 MBLG		
OCT 23	20 58 18.0	47.82	69.79	O	SOUTHERN QUEBEC, CANADA	IV	18 KM	3.8 MB(G), 4.2 MBLG		
MASSACHUSETTS										
MAR 14	23 12 24.6	41.66	69.97	C	CAPE COD, MASS.	V	00 KM	3.0 ML(L)		

SEE FOOTNOTES AT END OF TABLE

TABLE 1. SUMMARY OF EARTHQUAKES FELT IN U.S. FOR 1976 - CONTINUED

DATE	ORIGIN TIME			GEOGRAPHIC COORDINATES		SOURCE	REGION	MAXIMUM INTENSITY	DEPTH	MAGNITUDE
	UT			LAT. DEG.	LONG. DEG.					
	H	M	S							
MAY 10	01 34	20.5		41.54	071.01	C	SOUTHEASTERN MASSACHUSETTS	V	00 KM	2.7 MBLG
MICHIGAN										
FEB 2	21 14	02.0		41.96	082.67	O	SOUTHWESTERN ONTARIO, CANADA	IV	10 KM	3.4 ML
MISSOURI										
JAN 23	00 56	39.6		36.55	089.60	S	NEW MADRID, MO.	IV	09 KM	2.0 ML
MAY 22	07 40	46.0		36.04	089.84	S	NEW MADRID REGION	V	10 KM	3.2 MBLG
DEC 13	08 35	54.9		37.88	098.24	S	EASTERN MISSOURI	V	05 KM	3.5 ML
MONTANA										
JAN 21	13 43	29.6		48.22	114.10	G	NORTHWESTERN MONTANA	IV	05 KM	3.1 ML
FEB 13	06 13	43.1		46.75	112.13	G	WESTERN MONTANA	IV	01 KM	3.8 ML
APR 5	02 40	07.4		46.13	111.68	G	WESTERN MONTANA	IV	05 KM	3.6 ML(D)
APR 24	08 49	12.0		48.26	114.09	G	WESTERN MONTANA	II	05 KM	2.9 ML
JUL 28	05 06	16.9		47.55	112.73	G	WESTERN MONTANA	IV	05 KM	3.5 ML(D), 3.5 ML
NOV 27	08 24	46.1		44.64	111.14	G	HEBGEN LAKE REGION	IV	09 KM	3.3 ML(A), 3.7 ML(D)
DEC 8	22 10	42.3		44.75	111.05	G	HEBGEN LAKE REGION	III	05 KM	3.5 ML
DEC 20	17 07	10.5		44.50	111.07	G	HEBGEN LAKE REGION, MONT.	III	09 KM	3.3 ML(A)
NEVADA										
FEB 8	06 09	26.5		39.47	119.76	G	NORTHWESTERN NEVADA	IV	05 KM	3.4 ML(B)
JUN 10	10 39	35.9		39.63	115.85	G	CENTRAL NEVADA	V	02 KM	NONE COMPUTED.
JUN 24	00 24	45.1		39.45	119.53	G	WESTERN NEVADA	V	02 KM	3.5 ML(B)
JUN 29	13 10	48.8		39.45	119.54	G	WESTERN NEVADA	V	06 KM	3.5 ML(B)
AUG 2	08 14	07.4		38.38	118.19	G	CALIFORNIA-NEVADA BORDER REGION	IV	08 KM	4.8 MB, 4.3 ML(B)
AUG 14	07 50	44.9		39.48	119.62	G	WESTERN NEVADA	II	07 KM	2.2 ML
AUG 14	07 58	32.4		39.45	119.54	G	WESTERN NEVADA	II	04 KM	3.1 ML(B)
AUG 14	08 08	03.1		39.43	119.64	G	WESTERN NEVADA	II	06 KM	2.2 ML
OCT 4	14 48	39.0		36.03	114.74	G	SOUTHERN NEVADA	III	05 KM	3.0 ML
OCT 19	01 59	10.6		35.98	114.82	G	SOUTHERN NEVADA	III	05 KM	NONE COMPUTED.
NOV 17	08 23	35.0		40.54	115.99	G	NORTHERN NEVADA	IV	15 KM	3.9 ML(B)
NEW JERSEY										
MAR 11	21 07	20.4		40.96	074.37	L	NORTHEASTERN NEW JERSEY	VI	04 KM	2.4 MBLG
APR 13	15 39	13.2		40.84	074.05	L	NORTHEASTERN NEW JERSEY	VI	02 KM	3.1 MBLG
NEW MEXICO										
JAN 5	06 23	32.9		35.84	108.34	G	NORTHWESTERN NEW MEXICO	VI	25 KM	5.0 MB, 4.6 ML

SEE FOOTNOTES AT END OF TABLE

TABLE 1. SUMMARY OF EARTHQUAKES FELT IN U.S. FOR 1976 - CONTINUED

DATE	ORIGIN TIME			COORDINATES		SOURCE	REGION	MAXIMUM		MAGNITUDE
	UT H M S	LAT. DEG.	LONG. DEG.	INTENSITY	DEPTH					
JAN 14	07 01 32.0	34.17	106.81	G	CENTRAL NEW MEXICO	NEW MEXICO (CONTINUED)	II		NONE COMPUTED.	
MAY 20	19 43 21.9	35.47	109.04	G	NORTHWESTERN MEXICO		IV	05 KM	2.5 ML	
JUN 24	15 27 32.0	35.62	103.28	G	EASTERN NEW MEXICO		V	05 KM	3.5 ML	
MAR 16	07 39 54.5	35.30	095.50	T	EASTERN OKLAHOMA	OKLAHOMA	III		2.3 ML	
MAR 30	09 27 01.0	36.61	102.08	G	NORTHWESTERN OKLAHOMA		V	05 KM	2.7 ML(T)	
APR 16	18 59 44.2	36.11	099.88	G	WESTERN OKLAHOMA		IV	05 KM	3.4 MBLG(T)	
APR 17	02 48	34.1	097.4	T	SOUTHERN OKLAHOMA		II		2.4 MBLG	
APR 19	04 42 42.2	36.13	099.84	G	WESTERN OKLAHOMA		IV	05 KM	3.5 MBLG(T)	
SEP 20	09 40			T	SOUTHERN OKLAHOMA		II		2.2 ML	
DEC 19	08 26 36.7	34.92	095.73	T	SOUTHEASTERN OKLAHOMA		05 KM	2.9 MBLG		
APR 13	00 47 17.1	45.22	120.77	G	NORTHERN OREGON	OREGON	VI	15 KM	4.5 MB, 3.3 MS, 4.8 ML	
APR 17	02 11 44.4	45.08	120.80	G	NORTHERN OREGON		II	02 KM	4.2 ML	
MAR 29	06 15 41.6	18.35	065.12	G	PUERTO RICO REGION	PUERTO RICO	III	110 KM	4.7 MB	
JUN 13	19 06 27.4	19.44	067.92	G	MONA PASSAGE		II	51 KM	5.4 MB	
MAR 11	08 29 32.2	41.56	071.21	C	SOUTHEASTERN RHODE ISLAND	RHODE ISLAND	VI	00 KM	3.5 MBLG	
FEB 4	19 53 52.9	35.00	084.75	G	TENNESSEE-GEORGIA BORDER		VI	05 KM	3.0 MBLG(V)	
JAN 19	04 03 30.5	31.90	103.08	G	SOUTHWESTERN TEXAS	TEXAS	IV	01 KM	3.3 ML	
JAN 22	07 21 57.0	31.90	103.07	G	SOUTHWESTERN TEXAS		III	01 KM	2.8 ML	
JAN 25	04 48 27.9	31.90	103.08	G	SOUTHWESTERN TEXAS		V	02 KM	4.1 ML	
FEB 11	03 28 14.7	41.27	111.84	U	NORTHERN UTAH	UTAH	III	13 KM	2.7 ML	
FEB 27	07 18 16.4	41.24	111.27	G	NORTHERN UTAH		II	05 KM	2.4 ML(U)	
JUN 15	02 08 10.4	41.89	112.44	U	NORTHERN UTAH		III	01 KM	3.1 ML	
NOV 5	01 15 06.9	41.82	112.69	U	NORTHERN UTAH		II	07 KM	3.4 ML	
NOV 5	02 48 55.4	41.81	112.70	U	NORTHERN UTAH		V	07 KM	4.1 ML	

SEE FOOTNOTES AT END OF TABLE

TABLE 1. SUMMARY OF EARTHQUAKES FELT IN U.S. FOR 1976 - CONTINUED

DATE	ORIGIN TIME			GEOGRAPHIC COORDINATES		SOURCE	REGION	MAXIMUM INTENSITY	DEPTH	MAGNITUDE
	UT H M S	LAT. DEG.	LONG. DEG.							
UTAH (CONTINUED)										
NOV 5	10 50 03.5	41.02	112.69	U			NORTHERN UTAH	II	07 KM	3.2 ML
							VIRGINIA			
SEP 13	10 54 37.1	36.60	080.01	G			VIRGINIA-NORTH CAROLINA REGION	VI	05 KM	3.3 MBLG(V)
							VIRGIN ISLANDS			
OCT 15	19 50 42.0	18.92	064.47	G			VIRGIN ISLANDS	V	45 KM	5.0 MB, 5.4 MB(L)
							WASHINGTON			
JAN 5	13 25 43.8	47.46	122.60	M			PUGET SOUND, WASH.	IV	42 KM	2.7 ML(G), 3.3 ML(W)
JAN 27	03 09 31.3	47.08	122.17	M			NORTHWESTERN WASHINGTON	IV	19 KM	2.1 ML(G), 2.9 ML(W)
JAN 31	12 27 14.0	48.35	122.32	M			NORTHWESTERN WASHINGTON	IV	18 KM	2.4 ML(G), 3.6 ML(W)
MAY 16	08 35 14.8	46.80	123.36	M			VANCOUVER ISLAND REGION	VI	62 KM	5.1 MB (G)
SEP 2	13 36 11.0	48.21	122.76	M			NORTHWESTERN WASHINGTON	V	24 KM	4.3 MB(G), 4.0 ML(G)
SEP 8	08 21 01.6	47.38	123.08	M			NORTHWESTERN WASHINGTON	VI	48 KM	4.6 MB(G), 3.9 MS(G)
OCT 14	21 39 17.7	46.66	122.34	M			SOUTHWESTERN WASHINGTON	V	38 KM	3.1 ML(G)
WEST VIRGINIA										
MAY 6	10 46 00.1	37.36	081.62	X			NORTHERN WEST VIRGINIA	IV		NONE COMPUTED
JUN 19	05 54 13.9			G			SOUTHERN WEST VIRGINIA	V	05 KM	4.7 MB, 3.0 MBLG(V)
WYOMING										
JAN 27	10 54 38.7	41.95	107.22	G			SOUTHERN WYOMING	V	05 KM	2.3 ML
JUN 7	04 48 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07						YELLOWSTONE NATIONAL PARK	V		NONE COMPUTED.
JUN 7	12 07 12.07									

SEE FOOTNOTES AT END OF TABLE

TABLE 1. SUMMARY OF EARTHQUAKES FELT IN U.S. FOR 1976 - CONTINUED

Abbreviations used in source and magnitude columns:

- (A) U.S. Energy Research and Development Administration
- (B) University of California, Berkeley
- (C) University of Connecticut, Groton
- (D) University of Montana, Missoula
- (E) California Dept. of Water Resources, Sacramento
- (F) USGS Open-File Report 77-181 (Fuis and others, 1977)
- (G) U.S. Geological Survey, National Earthquake Information Service, Golden, Colo.
- (H) U.S. Geological Survey, Hawaiian Volcano Observatory, Hawaii National Park
- (I) Dept. of Natural Resources, Bloomington, Ind.
- (J) Weston Observatory, Weston, Mass.
- (L) Lamont-Doherty Geological Observatory, Palisades, N.Y.
- (M) NOAA, Alaska Tsunami Warning Center, Palmer
- (O) Seismological Service of Canada, Ottawa
- (P) California Institute of Technology, Pasadena
- (S) St. Louis University, St. Louis, Mo.
- (T) University of Oklahoma, Leonard
- (U) University of Utah, Salt Lake City
- (V) Virginia Polytechnic Institute and State University, Blacksburg
- (W) University of Washington, Seattle
- (X) University of West Virginia, Morgantown.

NOTE: Dates and origin times are listed in Universal Coordinated Time (UTC), giving the hour, minute, and second. Epicenters are shown in decimal degrees. Only earthquakes with intensity data are listed.

See page 3 for a description of magnitudes used in this table.

Miscellaneous Activities

HORIZONTAL CONTROL SURVEYS FOR CRUSTAL MOVEMENT STUDIES¹

Results of the 1975 trilateration survey at the expanded RANCH - TEJON site, which spans the Garlock fault zone, indicate that left-lateral movement continues and that the accumulated annual rate is about 5 to 8 mm. The 1975 leveling survey shows that accumulated uplift at the RANCH net ranged between 4.1 mm and 22.9 mm relative to the TEJON net during the interval 1971-75. Since 1971, vertical movement has accumulated to 22.9 mm at TUNNEL 3 PT 3 and to 17.3 mm at RANCH F.

Leveling results show that: MEADE B subsided about 0.6 m between 1972 and 1975 and shifted horizontally about 4 cm since 1969; MEADE A subsided 35 mm and shifted horizontally 17.2 mm from 1969 to 1975; and RON RM 3 subsided 11.6 mm. The other monuments at the MEADE site have remained stable.

The fifth and sixth surveys were made in 1973 and 1975-76 at Site 18 - UNION, along the South San Francisco Bay section of the aqueduct which straddles the Hayward fault 11 km southeast of Hayward. Overall observed changes indicate that right-lateral movement continues at an annual rate of 6 to 7 mm. Significant vertical movement was not apparent.

The fourth and fifth resurveys at Site 19 - VERAS, along the South San Francisco Bay section of the aqueduct which straddles the Calaveras fault, indicate a continuation of right-lateral movement at an annual rate of 2 to 3 mm and a small relative subsidence of approximately 1 mm annually on the southwest side of the fault.

VERTICAL MOVEMENT STUDIES

Because of the concern about the crustal uplift in the Palmdale area of southern California, the National Geodetic Survey has attempted to obtain the best estimates possible of its character, magnitude, and areal extent. Velocities of elevation change for 1906-62 and 1959-76 were determined from southern California leveling data. The study area extends from San Pedro north to latitude 35.5°, and between longitudes 117° and 119.5°.

The velocity surface for the 1906-62 period shows negligible subsidence of 1 mm/yr at Palmdale, increasing to 9 mm/yr at Bakersfield. The 11 mm/yr maximum uplift velocity determined

for the 1959-76 period is approximately twice the corresponding standard deviation. This means the uplift should be regarded as a real phenomenon. (See Holdahl, 1977, for additional information.)

TSUNAMIS²

Four tsunamis were reported to the National Oceanic and Atmospheric Administration during 1976, including one that was recorded on National Ocean Survey tide gages.

An earthquake on January 14 (mag. 8.0 MS) in the Kermadec Islands (28.4°S, 177.7°W) caused a minor tsunami that was recorded as far away as Hawaii. The Australian Domestic Service reported a 90-cm wave in the southern Fiji Islands. Recorded wave heights include 6 cm at Honolulu; 29 cm at Kahului; 14 cm at Apia; and 15 cm at Suva.

An earthquake on January 21 (mag. 7.0 MS) in the Kuril Islands (44.9°N, 149.1°E) caused a minor local tsunami. The USSR reported tsunami heights of 13 cm at Burevestnik, 12 cm at Malokuril'skoye, and 3 to 4 cm at Yuzhno-Kuril'sk.

The destructive Guatemala earthquake (mag. 7.5 MS) of February 4 (15.3°N, 89.1°W) caused a tsunami that was recorded on the Puerto Cortes tide gage with a maximum amplitude of 45 cm.

On August 16, an earthquake (mag. 7.9 MS) and tsunami killed 5,000 to 8,000 people. The earthquake, located in Mindanao, Philippine Islands (6.3°N, 124.0°E), caused a major tsunami in Moro Gulf. The tsunami reached 400 to 475 cm above sea level at Pagadian City, Alicia, Bongo Island, Resa Bay, Lebak, and the east coasts of Basilan and Jolo Islands. The wave was recorded on the Davao tide gage with a maximum amplitude of 35 cm.

PRINCIPAL EARTHQUAKES OF THE WORLD

Table 2 lists principal world earthquakes for 1976. The list has been included in this annual series since 1941. It includes earthquakes of magnitude 6.8 or greater; those of smaller magnitude that were locally destructive to life and property; and events of unusual interest.

Nineteen earthquakes of magnitude 6.8 and above occurred in 1976. The most destructive occurred in northeastern China on July 27, and killed over 655,000 people. This is the second largest death toll from an earthquake in recorded history. The largest toll--830,000 fatalities--resulted from a 1556 earthquake in China.

¹Prepared by John G. Gergen, NOAA, National Ocean Survey, National Geodetic Survey, Rockville, Md.

²Prepared by Mark G. Spaeth, NOAA, National Weather Service, Silver Spring, Md.

FLUCTUATIONS IN WELL-WATER LEVELS³

In 1943, the Coast and Geodetic Survey (now the National Ocean Survey) first published the section on well-water fluctuations in its annual United States Earthquakes series. Data for the years 1944-49 appeared in the 1949 issue. From 1950 to the present, the material has been published annually in this series.

³Prepared by Kenneth L. Rennick, U.S. Geological Survey, Denver, Colo.

Table 3 lists well-water fluctuations caused principally by earthquakes. It includes county and (or) well number, date and time at recorder, depth to water before disturbance, and water-level fluctuations. Table 4 lists earthquakes believed to have caused fluctuations in well-water levels in 1976. It contains date, time, and hypocenter of the earthquake; the states recording fluctuations; and earthquake magnitude.

Complete information on earthquakes possibly associated with the fluctuations tabulated in table 3 may be obtained from the Preliminary Determination of Epicenters Monthly Listing, published by the USGS.

TABLE 2 - PRINCIPAL EARTHQUAKES OF THE WORLD DURING 1976

(SOURCE. PRELIMINARY DETERMINATION OF EPICENTERS MONTHLY LISTING, PUBLISHED BY U.S. GEOLOGICAL SURVEY.)

DATE	ORIGIN TIME			GEOGRAPHIC COORDINATES		REGION	REMARKS	DEPTH	USGS			OTHER
	H	M	S	LAT DEG.	LONG DEG.				MAGNITUDE	MB	MS	MAGNITUDE
JAN 14	15	56	34.9	29.2S	177.9W	KERMADEC ISLANDS	DAMAGE ON RAOUL	069		6.3		7.7PAS
JAN 14	16	47	33.5	28.4S	177.7W	KERMADEC ISLANDS REGION	TSUNAMI REPORTED	033		6.5	8.0	8.0PAS
JAN 21	10	05	24.1	44.9N	149.1E	KURIL ISLANDS	FELT. TSUNAMI REPORTED	041		6.3	7.0	6.4PAS
FEB 04	09	01	43.4	15.3N	089.1W	GUATEMALA	AT LEAST 23,000 KILLED. EXTENSIVE DAMAGE	005		6.2	7.5	7.5PAS
FEB 19	13	59	59.8	19.9N	076.9W	CUBA REGION	1 KILLED, 8 INJURED IN CAMARON AREA	020		5.3	5.9	
MAR 13	16	30	41.5	14.8N	091.1W	GUATEMALA	4 REPORTED KILLED, CONSIDERABLE DAMAGE	005		5.4	5.1	
MAR 19	13	03	38.4	36.6N	067.8E	HINDU KUSH REGION	49 KILLED, HEAVY DAMAGE	033		5.6	5.5	
MAR 25	11	55	39.4	41.1N	043.0E	TURKEY-USSR BORDER REGION	1 KILLED, 6 INJURED. SEVERAL VILLAGES FLATTENED IN KARS REGION	018		4.8		
APR 02	16	58	07.6	39.8N	043.6E	TURKEY	4 KILLED, 2 INJURED	046		4.6		
APR 08	02	40	27.0	40.3N	063.8E	UZBEK SSR	DAMAGE IN GAZLI-BUKHARA AREA	033		6.5	7.0	7.1PAS
APR 09	07	08	47.0	00.8N	079.8W	NEAR COAST OF ECUADOR	8 KILLED, 46 INJURED	009		6.1	6.7	6.3PAS
APR 29	22	18	09.1	40.9N	042.9E	TURKEY	4 KILLED, MANY HOUSES COLLAPSED	044		5.0	5.5	
MAY 06	20	00	11.6	46.4N	013.3E	NORTHEASTERN ITALY	1000 REPORTED KILLED, 3700 INJURED. EXTENSIVE DAMAGE	009		6.0	6.5	
MAY 15	21	55	58.5	11.6S	074.5W	PERU	5 REPORTED KILLED, 30 INJURED BY LANDSLIDES	033		6.0	6.6	6.5PAS
MAY 17	02	58	40.6	40.4N	063.5E	UZBEK SSR	6 KILLED, 10,000 HOMELESS IN GAZLI AREA	010		6.3	7.0	7.1PAS
AUG 17	04	19	27.3	07.2N	122.9E	MINDANAO, PHILIPPINE ISLANDS	DAMAGE AND INJURIES	022		6.2	6.8	
AUG 19	01	12	36.7	37.7N	028.9E	TURKEY	4 KILLED, 50 INJURED. 1800 HOMES DESTROYED	003		5.0	4.9	5.0PRU

SEE FOOTNOTES AT END OF TABLE

TABLE 2 - PRINCIPAL EARTHQUAKES OF THE WORLD DURING 1976 - CONTINUED

DATE	GEOGRAPHIC			REGION	REMARKS	DEPTH KM	USGS			OTHER
	ORIGIN TIME	COORDINATES					MAGNITUDE	MS	ML	
	UT H M S	LAT DEG.	LONG DEG.							
MAY 29	12 23 18.7	24.6N	099.0E	YUNNAN PROVINCE, CHINA	CASUALTIES AND EXTENSIVE DAMAGE	008	6.1	6.9		6.9BRK
MAY 29	14 00 18.5	24.5N	098.7E	BURMA-CHINA BORDER REGION	CASUALTIES AND EXTENSIVE DAMAGE	010	6.0	7.0		6.9PAS
JUN 20	20 53 13.4	03.4N	096.3E	NORTHERN SUMATRA	FELT	033	6.3	7.0		7.0PAS
JUN 25	19 18 56.9	04.6S	140.1E	WEST NEW GUINEA	422 REPORTED KILLED, 5000-9000 MISSING IN LANDSLIDES. 6 VILLAGES REPORTED DESTROYED	033	6.1	7.1		7.1PAS
JUL 09	09 34 42.7	38.3N	040.5E	TURKEY	1 KILLED, 2 INJURED	033	4.2			
JUL 11	20 41 47.5	07.4N	078.1W	PANAMA	7 INJURED, DAMAGE	003	6.2	7.0		7.0PAS
JUL 14	07 13 24.0	08.2S	114.9E	BALI ISLAND REGION	563 REPORTED KILLED, 2300 INJURED	040	6.2	6.5		6.3BRK
JUL 27	19 42 54.6	39.6N	118.0E	NORTHEASTERN CHINA	655,237 REPORTED KILLED, AROUND 800,000 INJURED. DEATH TOLL PROBABLY THE SECOND GREATEST FROM AN EARTHQUAKE IN RECORDED HISTORY. EXTENSIVE DAMAGE OVER A WIDE AREA	023	6.3	7.9		7.6PAS
JUL 28	10 45 35.2	39.7N	118.4E	NORTHEASTERN CHINA	ADDITIONAL CASUALTIES AND DAMAGE	026	6.3	7.4		7.1PAS
AUG 02	10 55 25.7	20.6S	169.3E	NEW HEBRIDES ISLANDS	FELT	052	6.1	6.9		7.0PAS
AUG 16	14 06 45.9	32.8N	104.2E	SZECHMAN PROVINCE, CHINA	PROBABLE CASUALTIES AND DAMAGE	016	6.1	6.9		
AUG 16	16 11 07.3	06.3N	124.0E	MINDANAO, PHILIPPINE ISLANDS	5000-8000 REPORTED KILLED. TSUNAMI, EXTENSIVE DAMAGE	033	6.4	7.9		7.9BRK
SEP 11	16 31 21.0	46.3N	013.2E	NORTHEASTERN ITALY	AT LEAST 5 KILLED, CONSIDERABLE DAMAGE	016	5.2	5.5		
SEP 15	03 15 19.9	46.3N	013.2E	do.	11 REPORTED KILLED, CONSIDERABLE DAMAGE	010	5.7	6.0		6.3CLL

SEE FOOTNOTES AT END OF TABLE

TABLE 2 - PRINCIPAL EARTHQUAKES OF THE WORLD DURING 1976 - CONTINUED

DATE	ORIGIN TIME			GEOGRAPHIC COORDINATES		REGION	REMARKS	DEPTH KM	USGS			OTHER MAGNITUDE
	UT H M S	LAT DEG.	LONG DEG.						MB	MS	ML	
OCT 06	09 12 38.9	00.7S	078.8W	ECUADOR			9 KILLED, MANY HOMELESS	033	5.7			
OCT 29	02 51 07.6	04.5S	139.9E	WEST NEW GUINEA			133 REPORTED KILLED	033	6.1	7.1		7.2PAS
NOV 07	04 00 51.6	33.8N	059.2E	IRAN			17 KILLED, 32 INJURED. HEAVY DAMAGE	013	5.6	6.2		
NOV 07	17 09 06.1	08.5N	126.4E	MINDANAO, PHILIPPINE ISLANDS			DAMAGE REPORTED	060	6.0	6.8		6.9PAS
NOV 24	12 22 18.8	39.1N	044.0E	N.W. IRAN-USSR BORDER REGION			ESTIMATED 5000 DEATHS, EXTENSIVE DAMAGE IN TURKEY AND IRAN	036	6.1	7.3		7.3PAS
NOV 30	00 40 57.8	20.5S	068.9W	CHILE-BOLIVIA BORDER REGION			1 KILLED, 13 INJURED. CONSIDERABLE DAMAGE TO HOMES	082	6.5			
DEC 08	08 38 25.7	28.0S	026.7E	REPUBLIC OF SOUTH AFRICA			4 KILLED, 36 INJURED. CONSIDERABLE DAMAGE	033	5.2			

Abbreviations used in magnitude column: BRK -- University of California, Berkeley; CLL -- Collmborg, German Democratic Republic;
PAS -- California Institute of Technology, Pasadena; PRU -- Pruhonice, Czechoslovakia.
NOTE: See page 3 for a description of magnitudes used in this table.

TABLE 3 - EARTHQUAKE FLUCTUATIONS IN WELL-WATER LEVELS DURING 1976

COUNTY AND/OR WELL NUMBER	DATE/TIME AT RECORDER U.T.	DEPTH TO WATER BEFORE DISTURBANCE (M)	WATER-LEVEL FLUCTUATIONS		
			FROM PREQUAKE UPWARD (CM)	LEVEL DOWNWARD (CM)	DOUBLE AMPLITUDE (CM)
ALASKA					
AK 2049	JUL 27,	14.26	2.44	1.22	3.66
AK 2049	JUL 28,	14.23	0.61	1.22	1.83
GEORGIA					
DECATUR 9F520	FEB 04,	13.41	9.14	9.14	18.29
LONG 33M4	FEB 04,	13.17	4.27	3.35	7.62
WAYNE 30K4	FEB 04,	6.44	2.74	2.74	5.49
DOUGHERTY 13L3	FEB 04,	10.80	9.45	10.97	20.42
DOUGHERTY 0019	FEB 04,	18.40	6.10	5.18	11.28
DOUGHERTY 13L3	JUL 11,	9.63	1.52	1.83	3.35
CHARLTON 27E2	JUL 27,	20.06	0.61	1.52	2.13
DOUGHERTY 13L3	JUL 27,	9.63	1.52	1.83	3.35
DOUGHERTY 0019	JUL 27,	19.05	2.13	1.22	3.35
LONG 33M4	JUL 27,	13.80	1.52	0.91	2.44
MCINTOSH 35M13	JUL 27,	4.45	0.91	1.22	2.13
WAYNE 31L1	JUL 27,	6.65	0.61	0.30	0.91
DOUGHERTY 13L3	JUL 28,	9.65	0.91	0.91	1.83
DOUGHERTY 0019	JUL 28,	19.07	0.30	0.61	0.91
WAYNE 30K4	AUG 16,	7.39	0.61	0.61	1.22
DOUGHERTY 13L3	AUG 16,	9.97	1.22	1.52	2.74
CHARLTON 27E2	AUG 16,	20.35	0.91	1.22	2.13
LONG 33M4	AUG 16,	14.09	0.61	0.61	1.22
WAYNE 31L1	AUG 16,	6.88	0.91	0.91	1.83
MCINTOSH 35M13	AUG 16,	4.45	0.61	0.91	1.52
IDAHO					
BUTTE 4N-30E-7A081	JAN 14,	96.65	1.22	1.83	3.05
BUTTE 4N-30E-7A081	JAN 14,	96.65	2.74	3.05	5.79
BUTTE 3N-29E-14A081	JAN 14,	137.67	0.91	0.61	1.52
BUTTE 3N-29E-14A081	FEB 04,	137.52	1.22	2.74	3.96
BUTTE 4N-30E-7A081	FEB 04,	96.55	3.35	4.27	7.62
BLAINE 1S-19E-3CC82	FEB 04,	5.00	0.61	0.30	0.91
CASSIA 13S-21E-1888C1	FEB 04,	171.49	0.91	2.44	3.35
BUTTE 4N-30E-7A081	FEB 09,	96.55	0.61	0.61	1.22
BUTTE 3N-29E-14A081	FEB 09,	137.53	0.91	0.61	1.52
CASSIA 13S-21E-1888C1	MAY 02,	170.99	2.74	4.88	7.62
BUTTE 4N-30E-7A081	JUN 07,	96.64	2.44	3.05	5.49

TABLE 3 - EARTHQUAKE FLUCTUATIONS IN WELL-WATER LEVELS DURING 1976 - CONTINUED

COUNTY AND/OR WELL NUMBER	DATE/TIME AT RECORDER U.T.	DEPTH TO WATER BEFORE DISTURBANCE (M)	WATER-LEVEL FLUCTUATIONS			
			FROM UPWARD (CM)	PREQUAKE LEVEL DOWNWARD (CM)	DOUBLE AMPLITUDE (CM)	
IDAHO						
(CONTINUED)						
BUTTE 3N-28E-14AD81	JUN 07,	1515	1.22	2.44	3.66	
BUTTE 4N-30E-7AD81	JUL 11,	2130	0.91	0.61	1.52	
BUTTE 4N-30E-7AD81	JUL 27,	2045	2.74	2.13	4.88	
BUTTE 4N-30E-7AD81	JUL 28,	1130	0.91	1.22	2.13	
BUTTE 4N-30E-7AD81	AUG 16,	1715	2.13	1.83	3.96	
CASSIA 13S-21E-1888C1	NOV 26,	1100	1.52	0.30	1.83	
JEFFERSON 3N-34E-98DA1	NOV 26,	1120	0.61	0.61	1.22	
BLAINE 1S-19E-3CC82	NOV 26,	1130	1.52	1.83	3.35	
BUTTE 2N-28E-35ADD1	NOV 26,	1130	0.61	1.22	1.83	
BUTTE 3N-29E-14AD81	NOV 26,	1145	5.18	5.79	10.97	
JEFFERSON 5N-32E-36ADD1	NOV 26,	1200	0.30	2.44	2.74	
BUTTE 3N-29E-14AD81	DEC 20,	2030	1.83	0.61	2.44	
INDIANA						
MA 32	JAN 03, 1815-1820	2.96	0.61	0.30	0.91	
MA 32	JAN 13, 1250-1305	2.99	0.91	0.30	1.22	
SH 2	JAN 14, 0950-1005	5.80	0.00	0.61	0.61	
MA 32	JAN 14, 1640-1820	3.00	3.35	1.22	4.57	
MA 32	JAN 21, 1050-1110	2.98	0.30	0.30	0.61	
MA 32	FEB 04, 1010-1040	2.98	6.71	5.49	12.19	
PU 6	FEB 04, 1040-1050	3.26	2.13	1.22	3.35	
MA 32	MAR 29, 0440-0450	2.96	0.61	0.30	0.91	
MA 32	MAY 15, 2230-2240	3.23	0.00	0.61	0.61	
MA 32	MAY 17, 0420-0430	3.31	0.30	0.30	0.61	
MA 32	JUL 11, 1750-1810	3.46	1.22	1.83	3.05	
MA 32	JUL 11, 1940-2040	3.44	0.91	3.96	4.88	
MA 32	JUL 27, 1930-2015	3.55	3.66	2.44	6.10	
MA 32	AUG 16, 1610-1640	3.50	1.22	2.13	3.35	
SH 2	AUG 16, 1630-1650	6.06	0.61	0.00	0.61	
MA 32	NOV 18, 0215-0230	3.17	0.61	0.61	1.22	
NEVADA						
S17/50-36DC1	JAN 03,	1930	7.32	8.23	15.54	
S17/50-36DC1	JAN 08,	1630	0.91	0.00	0.91	
S17/50-36DC1	JAN 10,	0930	0.30	0.91	1.22	
S17/50-36DC1	JAN 14,	1630	3.05	5.79	8.84	
S17/50-36DC1	FEB 01,	1115	0.91	0.30	1.22	

TABLE 3 - EARTHQUAKE FLUCTUATIONS IN WELL-WATER LEVELS DURING 1976 - CONTINUED

COUNTY AND/OR WELL NUMBER	DATE/TIME AT RECORDER U.T.	DEPTH TO WATER BEFORE DISTURBANCE (H)	WATER-LEVEL FLUCTUATIONS		
			UPWARD (CH)	FROM PREQUAKE LEVEL DOWNWARD (CH)	DOUBLE AMPLITUDE (CH)
NEVADA					
(CONTINUED)					
S17/50-360C1	FEB 12,	1630	4.88	9.75	14.63
S17/50-360C1	FEB 14,	1345	2.74	2.74	5.49
S17/50-360C1	FEB 23,	1550	0.61	0.61	1.22
S17/50-360C1	FEB 25,	2315	0.30	0.61	0.91
S17/50-360C1	MAR 09,	1415	3.66	4.57	8.23
S17/50-360C1	MAR 29,	0545	0.91	1.22	2.13
S17/50-360C1	JUN 06,	0300	0.91	0.61	1.52
S17/50-360C1	JUN 07,	1500	2.74	3.35	6.10
S17/50-360C1	JUL 11,	1630	0.30	1.52	1.83
S17/50-360C1	JUL 11,	2045	2.44	0.61	3.05
S17/50-360C1	JUL 27,	2015	4.88	3.96	8.84
S17/50-360C1	JUL 28,	1120	1.52	1.52	3.05
S17/50-360C1	AUG 05,	1800	0.91	0.00	0.91
S17/50-360C1	AUG 16,	1620	3.96	3.35	7.32
S17/50-360C1	AUG 26,	1400	3.35	3.66	7.01
S17/50-360C1	SEP 26,	2145	0.61	0.00	0.61
S17/50-360C1	OCT 11,	2350	1.22	0.91	2.13
S17/50-360C1	OCT 29,	0315	0.61	0.61	1.22
S17/50-360C1	NOV 04,	1045	0.91	0.30	1.22
S17/50-360C1	DEC 07,	1315	1.22	0.91	2.13
S17/50-360C1	DEC 08,	1450	0.30	0.00	0.30
S17/50-360C1	DEC 09,	1000	1.22	0.91	2.13
S17/50-360C1	DEC 11,	2315	0.30	0.30	0.61
S17/50-360C1	DEC 20,	2030	2.13	3.05	5.18
S17/50-360C1	DEC 23,	0930	1.83	1.22	3.05
S17/50-360C1	DEC 28,	1755	2.74	2.74	5.49
WISCONSIN					
LF-57	JAN 03,	1850	0.61	0.30	0.91
M1-120	JAN 03,	1935	0.00	0.244	0.244
LF-57	JAN 13,	1330	0.61	0.61	1.22
LF-57	JAN 14,	1605	5.49	2.44	7.92
M1-120	JAN 14,	1705	2.682	1.829	4.511
M1-120	JAN 21,	1050	0.640	0.244	0.884
LF-57	JAN 21,	1100	0.61	1.22	1.83
LF-57	FEB 04,	0900	7.32	7.01	14.33
M1-120	FEB 04,	0915	3.109	3.871	6.980
DN-143	FEB 04,	0930	0.30	0.30	0.61
M1-120	FEB 23,	1500	0.335	0.427	0.762

TABLE 3 - EARTHQUAKE FLUCTUATIONS IN WELL-WATER LEVELS DURING 1976 - CONTINUED

COUNTY AND/OR WELL NUMBER	DATE/TIME AT RECORDER U.T.	DEPTH TO WATER BEFORE DISTURBANCE (M)	WATER-LEVEL FLUCTUATIONS			
			FROM PREQUAKE UPWARD (CM)	LEVEL DOWNWARD (CM)	DOUBLE AMPLITUDE (CM)	
WISCONSIN						
(CONTINUED)						
M1-120	MAR 14,	1130	0.000	0.305	0.305	
LF-57	MAR 14,	1245	0.305	1.219	1.524	
M1-120	APR 09,	0730	0.061	0.061	0.488	
M1-120	MAY 17,	0230	0.061	0.061	0.122	
LF-57	MAY 29,	1430	0.61	0.00	0.61	
LF-57	JUN 07,	1430	0.61	1.52	2.13	
M1-120	JUN 07,	1430	0.152	0.549	0.701	
LF-57	JUN 20,	2145	0.61	0.00	0.61	
M1-120	JUN 20,	2150	0.030	0.091	0.122	
M1-120	JUN 25,	1955	0.305	0.000	0.305	
LF-57	JUN 25,	2000	0.30	0.30	0.61	
DR-265	JUL 11,	1555	0.00	1.83	1.83	
LF-57	JUL 11,	1715	1.52	2.44	3.96	
M1-120	JUL 11,	1715	1.433	1.737	3.170	
DR-265	JUL 11,	1945	2.74	3.96	6.71	
LF-57	JUL 11,	2100	4.88	4.57	9.45	
M1-120	JUL 11,	2100	3.231	2.469	5.700	
M1-120	JUL 27,	2010	2.896	2.347	5.243	
DR-265	JUL 27,	2030	10.67	9.75	20.42	
LF-57	JUL 27,	2030	7.62	7.62	15.24	
LF-57	JUL 28,	1130	3.05	2.74	5.79	
DR-265	JUL 28,	1150	0.30	4.08	5.18	
M1-120	JUL 28,	1150	0.701	0.823	1.524	
M1-120	AUG 16,	1550	1.554	1.494	3.048	
LF-57	AUG 16,	1650	2.74	2.13	4.88	
M1-120	NOV 24,	1305	0.518	0.152	0.671	
M1-120	NOV 26,	1130	1.554	0.945	2.499	
M1-120	NOV 30,	0100	0.427	1.097	1.524	
M1-120	DEC 20,	2045	1.036	1.250	2.286	
LF-57	DEC 20,	2350	1.83	3.35	5.18	

TABLE 4 - EARTHQUAKES IN 1976 BELIEVED TO HAVE CAUSED FLUCTUATIONS IN WELL-WATER LEVELS

DATE	ORIGIN TIME		GEOGRAPHIC COORDINATES		REGION	STATES RECORDING FLUCTUATIONS	DEPTH	USGS			OTHER
	UT H M S	LAT DEG.	LONG DEG.	KM				MB	MS	ML	
JAN 03	19 15	00.2	37.2N	116.3W	SOUTHERN NEVADA	INDIANA, NEVADA, WISCONSIN.	000	6.2	5.5		6.3BRK
JAN 08	16 14	19.9	37.3N	116.3W	SOUTHERN NEVADA	NEVADA.	005	4.5			4.3BRK
JAN 10	08 58	45.2	43.5N	127.4W	OFF COAST OF OREGON	NEVADA.	033	5.4			
JAN 13	13 29	19.5	66.1N	016.5W	ICELAND REGION	INDIANA, WISCONSIN.	033	6.0	6.4		6.4PAS
JAN 14	08 28	07.4	29.2S	177.2W	KERMADEC ISLANDS	INDIANA.	064	5.3			
JAN 14	15 56	34.9	29.2S	177.8W	KERMADEC ISLANDS	IDAHO, WISCONSIN.	069	6.3			7.7PAS
JAN 14	16 47	33.5	28.4S	177.6W	KERMADEC ISLANDS REGION	IDAHO, INDIANA, NEVADA.	033	6.5	8.0		8.0PAS
JAN 21	10 05	24.1	44.9N	149.1E	KURIL ISLANDS	INDIANA, WISCONSIN.	041	6.3	7.0		6.4PAS
FEB 01	11 14	57.3	17.1N	100.1W	GUERRERO, MEXICO	NEVADA.	052	5.7	5.6		5.6PAS
FEB 04	09 01	43.4	15.3N	089.1W	GUATEMALA	GEORGIA, IDAHO, INDIANA, WISCONSIN.	005	6.2	7.5		7.5PAS
FEB 04	09 30	29.4	14.9N	098.5W	GUATEMALA	IDAHO, INDIANA, NEVADA, WISCONSIN.	005	5.4			
FEB 09	21 29	57.1	21.5N	106.6W	OFF COAST OF CENTRAL MEXICO	IDAHO.	048	5.5	5.4		
FEB 12	17 37	29.0	37.2N	116.4W	SOUTHERN NEVADA	NEVADA.	000	4.8			4.3BRK
FEB 23	15 14	16.0	51.4N	138.4W	QUEEN CHARLOTTE ISLANDS REGION	NEVADA, WISCONSIN.	016	5.6	6.0		5.6PAS
MAR 09	14 00	00.1	37.3N	116.3W	SOUTHERN NEVADA	NEVADA.	000	6.0	4.8		5.9BRK
MAR 14	12 30	00.2	37.3N	116.4W	SOUTHERN NEVADA	WISCONSIN.	000	6.3	5.3		6.2BRK
MAR 29	05 39	35.5	03.9N	085.8W	OFF COAST OF CENTRAL AMERICA	NEVADA, INDIANA.	033	5.9	6.5		6.5PAS
APR 09	07 08	47.0	00.7N	079.8W	NEAR COAST OF ECUADOR	WISCONSIN.	009	6.1	6.7		6.3PAS
MAY 02	08 23	83.9	34.3N	117.0W	SOUTHERN CALIFORNIA	IDAHO.	006	3.0			3.0PAS
MAY 15	21 55	58.5	11.6S	074.4W	PERU	INDIANA.	033	6.0	6.6		6.5PAS
MAY 17	02 58	40.6	40.3N	063.4E	UZBEK SSR	INDIANA, WISCONSIN.	010	6.3	7.0		7.1PAS

SEE FOOTNOTES AT END OF TABLE

TABLE 4 - EARTHQUAKES IN 1976 BELIEVED TO HAVE CAUSED FLUCTUATIONS IN WELL-WATER LEVELS - CONTINUED

DATE	ORIGIN TIME			GEOGRAPHIC COORDINATES		REGION	STATES RECORDING FLUCTUATIONS	USGS			OTHER
	UT H M S	LAT DEG.	LONG DEG.	LAT DEG.	LONG DEG.			DEPTH KM	MAGNITUDE MB	MAGNITUDE MS	MAGNITUDE HL
MAY 29	14 00 10.5	24.5N	098.7E	BURMA-CHINA BORDER REGION			WISCONSIN.	010	6.0	7.0	6.9PAS
JUN 06	02 35 31.6	49.1N	127.7W	VANCOUVER ISLAND REGION			NEVADA.	033	4.5		
JUN 07	14 26 39.1	17.4N	100.6W	GUERRERO, MEXICO			IDAHO, NEVADA, WISCONSIN.	045	6.1	6.4	6.7PAS
JUN 20	20 53 13.4	03.3N	096.3E	NORTHERN SUMATRA			WISCONSIN.	033	6.3	7.0	7.0PAS
JUN 25	19 18 56.9	04.6S	140.0E	WEST NEW GUINEA			WISCONSIN.	033	6.1	7.1	7.1PAS
JUL 11	16 54 31.8	07.3N	078.4W	PANAMA			GEORGIA, IDAHO, INDIANA, NEVADA, WISCONSIN.	022	6.3	6.7	6.6PAS
JUL 11	20 41 47.5	07.4N	078.1W	PANAMA			INDIANA, NEVADA, WISCONSIN.	003	6.2	7.0	7.0PAS
JUL 27	19 42 54.6	39.5N	117.9E	NORTHEASTERN CHINA			ARKANSAS, GEORGIA, IDAHO, INDIANA, NEVADA, WISCONSIN.	023	6.3	7.9	7.6PAS
JUL 28	10 45 35.2	39.6N	118.4E	NORTHEASTERN CHINA			ARKANSAS, GEORGIA, IDAHO, NEVADA, WISCONSIN.	026	6.3	7.4	7.1PAS
AUG 05	17 36 37.9	45.6N	112.4W	MONTANA			NEVADA.	005			2.9ERD
AUG 16	16 11 07.3	06.2N	124.0E	MINDANAO, PHILIPPINE ISLANDS			GEORGIA, IDAHO, INDIANA, NEVADA, WISCONSIN.	033	6.4	7.9	7.9BRK
AUG 26	14 30 00.2	37.1N	116.0W	SOUTHERN NEVADA			NEVADA.	000	5.3	4.2	5.1BRK
SEP 26	22 44 37.2	39.3N	110.1W	NEVADA			NEVADA.	005		3.0	
OCT 12	00 40 52.9	10.4S	161.2E	SOLOMON ISLANDS			NEVADA.	106	6.0		6.4PAS
OCT 29	02 51 07.6	04.5S	139.9E	WEST NEW GUINEA			NEVADA.	033	6.1	7.1	7.2PAS
NOV 04	10 41 37.5	33.1N	115.5W	SOUTHERN CALIFORNIA			NEVADA.	004	4.6	5.3	4.9PAS
NOV 18	03 24 00.2	08.8S	156.9E	SOLOMON ISLANDS			INDIANA.	033	6.1	6.5	6.6PAS
NOV 24	12 22 10.0	39.1N	044.0E	N.W. IRAN-USSR BORDER REGION			WISCONSIN.	036	6.1	7.3	7.3PAS

SEE FOOTNOTES AT END OF TABLE

TABLE 4 - EARTHQUAKES IN 1976 BELIEVED TO HAVE CAUSED FLUCTUATIONS IN WELL-WATER LEVELS - CONTINUED

DATE	ORIGIN TIME			GEOGRAPHIC COORDINATES		REGION	STATES RECORDING FLUCTUATIONS	DEPTH KM	USCS			OTHER MAGNITUDE
	UT H M S	LAT DEG.	LONG DEG.						M B	M S	M L	
NOV 26	11 19 25.2	41.2N	125.7W	OFF COAST OF NORTHERN CALIFORNIA		IDAHO, WISCONSIN.		015	6.0	6.0		6.2BRK
DEC 07	12 59 56.3	31.9N	114.7W	M. ARIZ. - MEXICO BORDER REGION		NEVADA.		008	5.5	5.7		5.2PAS
DEC 08	14 49 30.1	37.0N	116.0W	SOUTHERN NEVADA		NEVADA.		000	4.9			4.5BRK
DEC 09	09 50 59.5	44.5N	129.9W	OFF COAST OF OREGON		NEVADA.		018	5.3	5.5		
DEC 11	23 08 27.7	25.8N	110.2W	GULF OF CALIFORNIA		NEVADA.		033	5.2	5.0		
DEC 20	20 33 07.8	48.8N	129.2W	VANCOUVER ISLAND REGION		IDAHO, NEVADA, WISCONSIN.		010	5.9	6.7		6.6PAS
DEC 23	09 38 56.4	41.7N	125.9W	OFF COAST OF NORTHERN CALIFORNIA		NEVADA.		015	5.5	5.5		5.3BRK
DEC 28	18 00 00.1	37.1N	116.0W	SOUTHERN NEVADA		NEVADA.		000	5.5			5.5BRK

Abbreviations used in magnitude column: BRK -- University of California, Berkeley; ERD -- U.S. Energy Research and Development Administration; PAS -- California Institute of Technology, Pasadena.

NOTE: See page 3 for a description of magnitudes used in this table.

Strong-Motion Seismograph Data¹

INTRODUCTION

The U.S. Geological Survey Seismic Engineering Branch (formerly the National Oceanic and Atmospheric Administration Seismological Field Survey) has administered engineering seismology programs in the United States and Latin America since 1932. The current strong-motion instrumentation program is supported by the National Science Foundation (Grant CA-114) in cooperation with both private industry and educational institutions, as well as numerous Federal, state, and local agencies. The program objectives are to: (1) record strong ground motions and the response of representative types of structures during potentially damaging earthquakes, and (2) disseminate processed data and information about records, sites, and structures to users in earthquake engineering research and design practice. These data are disseminated in various ways.

USGS publishes preliminary earthquake reports and a summary of recent accelerograph records in the quarterly Seismic Engineering Program Report². These summaries include a brief description of the earthquakes and strong-motion recording stations, results of routine scalings of records that contain peak accelerations greater than 0.05 g, and photographic reproductions of some of the significant accelerograms. They also contain abstracts of recent technical reports, notes on strong-motion information sources, remarks about the availability of digitized data, and other information pertinent to the U.S. strong-motion program.

USGS periodically publishes Strong-Motion Data Reports in the Open-File Report series. These include the results of digitization and routine analyses of strong-motion accelerograms that contain peak accelerations greater than 0.10 g. This minimum acceleration level is based primarily on the current capability of USGS to process strong-motion records; it may vary with both the degree of seismic activity and the number of personnel available at any given time. Although maximum acceleration is not directly related to frequency or duration of strong motion, the peak acceleration can be readily obtained from an accelerogram. Thus that value is used as an indicator of the potential significance of the record. A list of the records to be contained in future data reports, including estimates of their

publication dates and detailed information on the availability of digitized data, is published regularly in the Seismic Engineering Program Report.

The Strong-Motion Accelerograph Station List, periodically published as a USGS Open-File Report, includes information on all accelerograph stations known to USGS in the Western Hemisphere. Because this information is always changing, it is impossible to have a complete list of all existing stations at any one time. Rather, the list provides 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 in this station list includes the station name and (or) address and geographic coordinates, site characteristics, type and size of structure, location of instrument(s), and primary data sources. The current list contains information on approximately 1,200 stations located in 38 states, Canada, the Caribbean, and throughout Central and South America.

ACCELEROGRAPH DATA

Ninety accelerograph records were recovered from the National Strong-Motion Network from January through December 1976. The yearly average from 1972 through 1975 was 218 records.

Table 5 lists accelerograph records that were recovered, although not necessarily recorded, during 1976. The earthquakes are listed in chronological order and include date, time (UTC), general location, geographic coordinates, and magnitude. Information about the recording station includes the name and location, owner, and geographic coordinates. Record data include S-wave minus trigger time (S-t), and the orientation, maximum acceleration, and duration of strong motion (greater than 0.10 g) for each instrument component. Record data are included only if one or more components recorded at least 0.05 g at ground stations or 0.10 g at upper floors of buildings. Table 6, a summary of non-U.S. accelerograph records obtained in 1976, contains the same type of information and data as table 5. The event information has been compiled principally from the Preliminary Determination of Epicenters Monthly Listing, published by USGS.

The following paragraphs summarize the results of the most significant earthquakes from which strong-motion records were obtained in 1976.

¹Prepared by Ronald L. Porcella, Seismic Engineering Branch, U.S. Geological Survey, 345 Middlefield Road, Mail Stop 78, Menlo Park, California 94025.

²Copies of these reports are available from address given in footnote 1.

SOUTHERN CALIFORNIA - JANUARY 1

This magnitude 4.2 earthquake occurred in the Puente Hills of eastern Los Angeles County, approximately 4 km north of the Whittier fault zone at a depth of about 6 km. Eleven strong-motion records were recovered within a 14-km radius of the epicenter; nine of these display peak accelerations greater than 0.10 g.

Strong-motion instruments in Whittier, approximately 13.8 km from the epicenter, recorded maximum accelerations of 0.19 g at the 10th-floor level, 0.28 g at the 5th-floor level, and 0.17 g at the basement level (Etheridge and Nielson, 1976). See table 5 for information on additional records.

GUATEMALA - FEBRUARY 4

A destructive earthquake of magnitude 7.5 caused great damage and loss of life in Guatemala on February 4. Two seismoscope records were recovered from the university station in Guatemala City; a maximum relative displacement of 5.3 cm was recorded at the ground-floor level. More than 20 accelerograms were recorded during the next 4 months at aftershock stations established in Guatemala City, Zacapa, Puerto Santo Tomas, and Chichicastenango (Knudson, 1976). Maximum acceleration was 0.20 g (table 6).

NORTHEAST ARKANSAS - MARCH 25

A magnitude 5.0 earthquake in northeastern Arkansas on March 25 was followed by a magnitude 4.5 aftershock 19 minutes later. Focal depth of both events was approximately 15 km. The main

shock, which was reported felt over a seven-state region, triggered seven accelerographs located at four stations. Four strong-motion records were recovered at Arkabutla Dam, Miss., two at Wappapello Dam, Mo., one at Tiptonville, Tenn., and one at New Madrid, Mo. The maximum recorded acceleration was 0.04 g (Risavich and Porcella, 1976). The toe station at Arkabutla Dam produced the only record of the second event.

IMPERIAL VALLEY, CALIFORNIA - NOVEMBER 4

A swarm of more than 400 earthquakes occurred near Calipatria in the Imperial Valley between November 3 and 8; seven events of magnitude 4.0 or greater occurred on November 4 between 0548 and 1413 UTC. The epicenters for all of the shocks in this series have been located at 33.12°N, 115.60°W. Eighteen strong-motion records were recovered from seven accelerograph stations located within 32 km of the epicenter. A maximum acceleration of 0.11 g was recorded by an accelerograph located at Brawley airport at an epicentral distance of 12 km. Five of the seven accelerographs that operated during this swarm are equipped with WWVB radio receivers and vertical triggers. Consequently, 14 accelerograms were recovered with identifiable events; 12 of these records display S-wave minus trigger or S- minus P-wave time intervals of 2.6 to 3.1 seconds. While these records are not significant in terms of strong ground motion, they do provide considerable seismological data useful in magnitude and epicenter determinations, wave-propagation, and source-mechanism studies for the Imperial Valley region (Porcella and Nielson, 1976).

TABLE 5. SUMMARY OF U.S. ACCELEROGRAPH RECORDS RECOVERED DURING 1976

EVENT	STATION, (OWNER) ¹	STATION COORD.	S-T TIME ² (SEC)	COMP	MAX ACCL ³ (G)	DURATION ⁴ (SEC)
30 November 1975- 22 March 1976 Kilauea, Hawaii Epicenters and magnitudes unknown	Kilauea, Hawaii Namakani Paio (USGS)	19.43 N. 155.30 W	-	S30W Down S60E	0.05 0.03 0.05	- - -
	Kilauea, Hawaii Namakani Paio (USGS)	19.43 N 155.30 W	-	S30W Down S60E	0.06 0.03 0.05	- - -
	Kilauea, Hawaii Namakani Paio (USGS)	19.43 N 155.30 W	-	S30W Down S60E	0.04 0.04 0.06	- - -
10 December 1975 0958 UTC Imperial Valley 32.95N, 115.50W Magnitude 3.8	El Centro station 5 2801 James Road (CIT)	32.85 N 115.46 W	3.3		**	
	El Centro station 6 551 Huston Road (CDMG)	32.84 N 115.49 W	3.4		**	
1 January 1976 1720 UTC So. California 33.97N, 117.88W Magnitude 4.2	Brea Dam Fullerton, Calif. (USAE)	33.89 N 117.93 W				
	Crest station		2.1	N50W Down S40W	0.09 0.06 0.13	- - 0.2
	Downstream station		1.8	N50W Down S40W	0.10 0.06 0.06	1-peak - -
	Left abutment station			-instrument was inoperative-		
	Carbon Canyon Dam Brea, Calif. (USAE)	33.92 N 117.84 W				
	Crest station		1.7	N50W Down S40W	0.08 0.05 0.12	- - 0.5
	Right abutment station		1.7	N50W Down S40W	0.10 0.04 0.14	1-peak - 0.3
	Left abutment station		1.7	N50W Down S40W	0.13 0.06 0.14	1-peak - 0.2

See footnotes at end of table

TABLE 5. SUMMARY OF U.S. ACCELEROGRAPH RECORDS RECOVERED DURING 1976 - CONTINUED

EVENT	STATION, (OWNER) ¹	STATION COORD.	S-T TIME ² (SEC)	COMP	MAX ACCL ³ (G)	DURATION ⁴ (SEC)
1 January (cont.)	Diemer Filter Plant Yorba Linda, Calif. (MWD)	33.91 N 117.82 W				
	Administration bldg.		1.6	S79E Down N11E	0.02 0.03 0.02	- - -
	Reservoir		1.7	N79E Down N11W	0.03 0.03 0.07	- - -
	Orange Co. Reservoir Brea, Calif. (MWD)	33.94 N 117.88 W				
	Abutment station		1.5	N84W Down S06W	0.18 0.06 0.08	0.1 - -
	Whittier, Calif. 7215 Bright Avenue (CWH)	33.97 N 118.04 W				
	Basement level		2.5	North Down West	0.06 0.07 0.17	- - 0.2
	5th-floor level		2.5	North Down West	0.07 0.10 0.28	- 0.1 0.6
	10th-floor level		2.5	North Down West	0.04 0.12 0.19	- 0.3 0.7
4 February 1976 0004 UTC Western Arizona 34.66N, 112.50W Magnitude 5.2	Prescott, Ariz. VA Hospital (VA)	34.55 N 112.45 W	-		**	
5 February 1976 0936 UTC Alaska 59.99N, 149.35W Magnitude 4.8	Seward, Alaska Wesleyan Hospital (USGS)	60.11 N 149.44 W	-		**	

See footnotes at end of table

TABLE 5. SUMMARY OF U.S. ACCELEROGRAPH RECORDS RECOVERED DURING 1976 - CONTINUED

EVENT	STATION ¹ (OWNER) ¹	STATION COORD.	S-T TIME ² (SEC)	COMP	MAX ACCL ³ (G)	DURATION ⁴ (SEC)
22 February 1976 0721 UTC Aleutian Is. 51.73N, 176.87W Magnitude 5.0	Adak, Alaska Seismic vault (USGS)	51.88 N 176.58 W	-	North Down West	0.03 0.01 0.05	- - -
25 March 1976 0041 UTC NE Arkansas 35.59N, 90.48W Magnitude 5.0	Arkabutla Dam Arkabutla, Miss. (USAE)	34.76 N 90.12 W				
	Left crest station		-		**	
	Left toe station		-		**	
	Right abutment station		-		**	
	Wappapello Dam Poplar Bluff, Mo. (USAE)	36.93 N 90.27 W				
	Right crest station		-		**	
	Right toe station		-		**	
	New Madrid, Mo. Noranda plant (USGS)	36.51 N 89.57 W	-		**	
	Tiptonville, Tenn. Reelfoot Lake (USGS)	36.37 N 89.41 W	-		**	
25 March 1976 0100 UTC NE Arkansas 35.61N, 90.48W Magnitude 4.5	Arkabutla Dam Arkabutla, Miss. (USAE)	34.76 N 90.12 W				
	Left toe station				**	
8 April 1976 1521 UTC So. California 34.35N, 118.67W Magnitude 4.7	Santa Felicia Dam Piru, Calif. (UWCD)	34.46 N 118.75 W				
	Crest station		-	S78W Down S12E	0.05 0.03 0.05	- - -
	Right abutment station		-	S78W Down S12E	0.04 0.03 0.05	- - -

See footnotes at end of table

TABLE 5. SUMMARY OF U.S. ACCELEROGRAPH RECORDS RECOVERED DURING 1976 - CONTINUED

EVENT	STATION (OWNER) ¹	STATION COORD.	S-T TIME ² (SEC)	COMP	MAX ACCL ³ (G)	DURATION ⁴ (SEC)
14 April 1976 0656 UTC Imperial Valley 32.87N, 115.48W Magnitude 3.8	El Centro station 5 2801 James Road (USGS)	32.85 N 115.46 W	2.20		**	
14 April 1976 0656 UTC Imperial Valley 32.88N, 115.53W Magnitude unknown	El Centro station 5 2801 James Road (USGS)	32.85 N 115.46 W	2.50*		**	
14 April 1976 1031 UTC Imperial Valley 32.88N, 115.48W Magnitude 3.9	El Centro station 5 2801 James Road (USGS)	32.85 N 115.46 W	2.25	N50E Down N40W	0.07 - 0.06	- - -
	El Centro station 6 551 Huston Road (CDMG)	32.84 N 115.49 W	2.20	N50E Down N40W	0.14 0.05 0.09	(1-peak) - -
26 April 1976 0646 UTC Imperial Valley 33.13N, 115.67W Magnitude 3.8	Calipatria Fire station (CIT)	33.13 N 115.52 W	2.65	S45E Down N45E	0.07 0.03 0.05	- - -
	Salton Sea Wildlife refuge (CIT)	33.18 N 115.62 W	2.05	S45E Down N45E	0.07 0.05 0.08	- - -
4 June 1976- 9 September 1976 Livermore, Calif. Epicenter and magnitude unknown	Livermore, Calif. VA Hospital (VA)	37.62 N 121.76 W	-		**	
11 August 1976 1524 UTC So. California 33.48N, 116.52W Magnitude 4.3	Puerta La Cruz Ground level (CDMG)	33.32 N 116.68 W	-		**	
	Sage fire station Ground level (CDMG)	33.58 N 116.93 W	-		**	
8 September 1976 0821 UTC Seattle, Wash. 47.38N, 123.08W Magnitude 4.8	Tacoma, Wash. City/County bldg. (USGS)	47.25 N 122.45 W	-		**	

See footnotes at end of table

TABLE 5. SUMMARY OF U.S. ACCELEROGRAPH RECORDS RECOVERED DURING 1976 - CONTINUED

EVENT	STATION (OWNER) ¹	STATION COORD.	S-T TIME ² (SEC)	COMP	MAX ACCL ³ (g)	DURATION ⁴ (SEC)
13 September 1976 1608 UTC Cape Mendocino 40.20N, 124.39W Magnitude 4.0	Ferndale, Calif. City Hall (USGS)	40.58 N 124.26 W	-		**	
17 October 1976 0538 UTC So. California 34.45N, 118.37W Magnitude 4.1 ML(B)	Newhall Fire Station (CDMG) Lake Hughes Station 4 (CIT)	34.39 N 118.53 W 34.66 N 118.46 W	- - -		** **	
4 November 1976 0548 UTC Imperial Valley 33.12N, 115.60W Magnitude 4.2 ML(P)	Calipatria Fire station (CIT)	33.13 N 115.52 W	2.60	S45E Down N45E	0.04 0.02 0.06	- - -
4 November 1976 0548 UTC Imperial Valley 33.12N, 115.60W Magnitude unknown	Calipatria Fire station (CIT)	33.13 N 115.52 W	2.80*	S45E Down N45E	0.05 0.03 0.07	- - -
4 November 1976 0621 UTC Imperial Valley 33.08N, 115.60W Magnitude unknown	Calipatria Fire station (CIT)	33.13 N 115.52 W	2.65	S45E Down N45E	0.04 0.02 0.05	- - -
	Note: Five additional shocks of the November 4 earthquake swarm were recorded at Calipatria before the instrument ran out of film. Maximum acceleration less than 0.05 g.					
4 November 1976 1041 UTC Imperial Valley 33.12N, 115.59W Magnitude 4.9	Brawley Airport Transformer bldg. (CIT) Niland Fire station (CDMG) Superstition Mtn. Camera site (CIT) Imperial Valley Parachute test facility (CIT)	32.99 N 115.51 W 33.24 N 115.51 W 32.96 N 115.84 W 32.93 N 115.70 W	2.90 3.10 0.90 2.90	S45E Down N45E West Down South N45W Down S45W	0.11 0.04 0.08 0.08 0.07 0.07 0.06 0.02 0.03	(1-peak) - - - - - - - - -

See footnotes at end of table

TABLE 5. SUMMARY OF U.S. ACCELEROGRAPH RECORDS RECOVERED DURING 1976 - CONTINUED

EVENT	STATION (OWNER) ¹	STATION COORD.	S-T TIME ² (SEC)	COMP	MAX ACCL ³ (G)	DURATION ⁴ (SEC)
4 November (cont.)	El Centro station 9 (USGS)	32.79 N 115.55 W	-		**	
	Imperial County Bldg. 940 Main Street (CDMG)	32.79 N 115.56 W	-		**	
	Note: Two additional records were obtained from a nine-channel CR-1 recorder at Imperial County Bldg. Maximum acceleration less than 0.05 <u>g</u> .					
4 November 1976 1412 UTC Imperial Valley 33.12N, 115.60W Magnitude 4.4	Niland Fire station (CDMG)	33.24 N 115.51 W	3.00		**	
	Imperial Valley Parachute test facility (CIT)	32.93 N 115.70 W	-		**	

- ¹ CDMG - California Division of Mines and Geology
 CIT - California Institute of Technology
 CWH - City of Whittier
 MWD - Metropolitan Water District
 USAE - U.S. Army Corps of Engineers
 USGS - U.S. Geological Survey
 UWCD - United Water Conservation District
 VA - Veterans Administration

- ² S-wave minus trigger time.
 * denotes S-P interval, that is, the earthquake occurred within the instrumental
 run-time of a previous event.

- ³ Unless otherwise noted, maximum acceleration was recorded at ground or basement level.
 ** denotes maximum acceleration is less than 0.05 g at ground stations or less than
 0.10 g at upper floors of buildings.

- ⁴ Duration for which peaks of acceleration exceed 0.10 g.

TABLE 6. SUMMARY OF NON-U.S. ACCELEROGRAPH RECORDS RECOVERED DURING 1976

EVENT	STATION (OWNER) ¹	STATION COORD.	S-T TIME ² (SEC)	COMP	MAX ACCL ³ (<u>G</u>)	DURATION ⁴ (SEC)
16 February 1976- 20 May 1976 Guatemala Epicenters and magnitudes unknown	Guatemala Zacapa station (USGS)	14.96 N 89.59 W	-	South Down East	0.14 0.05 0.11	1-peak - 1-peak
Note: Twelve additional shocks were recorded at Zacapa during this time period. Maximum acceleration less than 0.05 <u>g</u> .						
18 February 1976 0959 UTC Guatemala Epicenter and magnitude unknown	Guatemala City IBM building (USGS)	14.64 N 90.51 W	-	South Down East	0.05 0.10 0.05	- 1-peak -
20 February 1976 to 20 May 1976 Guatemala Epicenters and magnitudes unknown	Guatemala City IBM building (USGS)	14.64 N 90.51 W	-		**	
Note: Two additional records recovered at IBM building. Maximum acceleration less than 0.05 <u>g</u> .						
21 February 1976 to 26 May 1976 Guatemala Epicenters and magnitudes unknown	Guatemala Chichicastenango (USGS)	14.94 N 91.11 W	3.0	South Down East	0.20 0.06 0.14	1-peak - 0.2
			3.0	South Down East	0.19 0.07 0.10	0.8 - 1-peak
			3.4	South Down East	0.11 0.04 0.08	0.2 - -
Note: Three additional shocks were recorded at Chichicastenango. Maximum acceleration less than 0.05 <u>g</u> .						
1 March 1976 2330 UTC Managua, Nicaragua Epicenter and magnitude unknown	Chinandega, Nicaragua Cotton States Chemical (IIS)	12.62 N 87.13 W	-	N25W Down S65W	0.03 0.01 0.05	- - -
5 May 1976 to 6 May 1976 Guatemala Epicenter and magnitude unknown	Guatemala Puerto Santo Tomas (USGS)	15.69 N 88.62 W	-		**	

See footnotes at end of table

TABLE 6. SUMMARY OF NON-U.S. ACCELEROGRAPH RECORDS RECOVERED DURING 1976 - CONTINUED

EVENT	STATION (OWNER) ¹	STATION COORD.	S-T TIME ² (SEC)	COMP	MAX ACCL ³ (<u>G</u>)	DURATION ⁴ (SEC)
11 July 1976 1655 UTC Panama 7.34N, 78.47W Magnitude 6.6	Panama Canal Zone Administration bldg. (USGS)	8.96 N 79.55 W	-		**	
11 July 1976 2042 UTC Panama 7.41N, 78.13W Magnitude 7.0	Panama Canal Zone Administration bldg. (USGS)	8.96 N 79.55 W	-		**	
22 October 1976 0404 UTC Nicaragua 12.55N, 87.85W Magnitude 4.9	Chinandega, Nicaragua Cotton States Chemical (IIS)	12.62 N 87.13 W	-		**	

¹ USGS - U.S. Geological Survey
IIS - Institute for Seismic Investigations

² S-wave minus trigger time
* denotes S-P interval, that is, the earthquake occurred within the instrumental run-time of a previous event.

³ Unless otherwise noted, maximum acceleration was recorded at ground or basement level.
** denotes maximum acceleration is less than 0.05 g at ground stations or less than 0.10 g at upper floors of buildings.

⁴ Duration for which peaks of acceleration exceed 0.10 g.

Intensities Observed in States Beyond Epicentral Region

[Note: Number in parentheses indicates the number of earthquakes occurring on that date.]

Alabama: Felt Arkansas earthquake of March 25, V.

Arizona: Felt California earthquake of November 4, V; felt New Mexico earthquake of January 5, VI.

California: Felt Arizona earthquakes of February 4, IV and December 7, VI.

Colorado: Felt New Mexico earthquake of January 5, V.

Connecticut: Felt Rhode Island earthquake of March 11, V.

Georgia: Felt Tennessee=Georgia border earthquake of February 4, V.

Idaho: Felt Utah earthquake of November 5, IV.

Illinois: Felt Arkansas earthquake of March 25, V; felt Missouri earthquake of December 13, IV.

Indiana: Felt Arkansas earthquake of March 25, II.

Kentucky: Felt Arkansas earthquake of March 25, VI.

Massachusetts: Felt Rhode Island earthquake of March 11, V.

Mississippi: Felt Arkansas earthquake of March 25, VI.

Missouri: Felt Arkansas earthquakes of March 25, VI and September 25, IV.

Montana: Felt Wyoming earthquakes of October 19 (2), IV, December 8, V, December 9, V, December 19, VI, and December 20, IV.

New Mexico: Felt Texas earthquake of January 25, IV.

North Carolina: Felt Kentucky earthquake of January 19, V; felt Virginia=North Carolina border earthquake of September 13, IV.

Oklahoma: Felt Arkansas earthquake of March 25, II.

Oregon: Felt California (off the coast) earthquake of November 26, IV.

Puerto Rico: Felt Virgin Islands earthquake of October 15, V.

Rhode Island: Felt Massachusetts earthquake of May 10, IV.

South Carolina: Felt Virginia=North Carolina border earthquake of September 13, II.

Tennessee: Felt Arkansas earthquakes of March 25, VI and September 25, V; felt Kentucky earthquake of January 19, V; felt Missouri earthquake of May 22, V.

Texas: Felt Oklahoma earthquakes of April 16, IV and April 19, IV.

Utah: Felt New Mexico earthquake of January 5, IV.

Virginia: Felt Kentucky earthquake of January 19, V.

Virgin Islands: Felt Puerto Rico earthquake of March 29, II.

Washington: Felt California (off the coast) earthquake of November 26, II; felt Oregon earthquake of April 13, V.

West Virginia: Felt Kentucky earthquake of January 19, V; felt Virginia=North Carolina border earthquake of September 13, IV.

Wyoming: Felt Montana earthquakes of November 27, IV and December 20, III.

References

- Bath, Markus, 1966: Earthquake energy and magnitude, Physics and Chemistry of the Earth, 7, Oxford and New York, Pergamon Press, 115-165.
- Couch, R., and Farooqui, R., 1976: Investigations of the Deschutes Valley, Oregon earthquake of 12 April 1976: Oregon State Univ. Tech. Rept. GTR 760915, 89 pp.
- Etheredge, E.C., and Nielson, J.D., 1976: Strong-motion results from the Puente Hills, California earthquake of 1 January 1976, Seismic Engineering Program Report, Geol. Survey Circ. 736-A, 1-2.
- Fuis, G.S., Friedman, M.E., and Hileman, J.A., 1977: Preliminary catalog of earthquakes in southern California, July 1974-September 1976, U.S. Geol. Survey Open-File Report 77-181, 107 pp.
- Gutenberg, B., and Richter, C.F., 1956: Magnitude and energy of earthquakes: Annali di Geofisica, 9, no. 1, 1-15.
- Holdahl, S.R., 1977: Recent elevation change in southern California, NOAA Tech. Memo. NOS NGS-7, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C., 23 pp.
- Knudson, C.F., 1976: Preliminary report on the Guatemala earthquakes of February 1976, Seismic Engineering Program Report, Geol. Survey Circ. 736-A, 2-3.
- Lance, R.J., Fogle, G.H., and Long, L.T., 1977: Report on the earthquake of December 27, in southern Georgia: Earthquake Notes, 48, no. 1-2, 51-56.
- Nuttli, O.W., 1973: Seismic wave attenuation and magnitude relations for eastern North America, J. Geophys. Res. 78, no. 5, 876-885.
- Porcella, R.L., U.S. Geological Survey, Menlo Park, Calif., 1977 (personal communication).
- Porcella, R.L., and Nielson, J.D., 1976: Preliminary report on the Calipatria, California earthquake swarm: November 1976, Seismic Engineering Program Report, Geol. Survey Circ. 736-D, 1-3.
- Richter, C.F., 1958: Elementary Seismology: San Francisco, Calif., W.H. Freeman and Co., Inc., 768 pp.
- Risavich, F.A., and Porcella, R.L., 1976: Preliminary report on the northeast Arkansas earthquake of March 24, 1976, Seismic Engineering Program Report, Geol. Survey Circ. 736-B, 1-5.
- Wood, H.O., and Neumann, F., 1931: Modified Mercalli Intensity Scale of 1931, Bull. of Seismol. Soc. Am., 21, no. 4, 277-283.