

GEOLOGICAL SURVEY CIRCULAR 836-D



Earthquakes in the United States October–December 1979

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By C. W. Stover, J. H. Minsch, B. G. Reagor,
and P. K. Smith

G E O L O G I C A L S U R V E Y C I R C U L A R 8 3 6 - D

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INTRODUCTION

The earthquake information in this publication supplements that published in the NEIS (National Earthquake Information Service) publications, PDE ("Preliminary Determination of Epicenters") and "Preliminary Determination of Epicenters Monthly Listing," by providing detailed felt and intensity data, for U.S. earthquakes. The purpose of this circular is to provide a complete listing of macro-seismic effects of earthquakes, which can be used in risk studies, nuclear power plant site evaluations, seismicity studies, and to answer inquiries by the public.

This publication contains two major sections. The first part (table 1), which is mainly concerned with data obtained by seismographs, is a tabular listing of earthquakes in chronological order by State, consisting of the following basic information: date, origin time, hypocenter, magnitude, maximum intensity, and computational source of the hypocenter. The second section, which concerns intensity information, consists of two maps, four photographs, and table 2. This section also contains information on events which were felt but were not listed in the PDE because there was not enough instrumental data to obtain a solution. The list of earthquakes in table 1 was compiled from those located in the United States or nearby offshore areas that were published in the PDE; from aftershock studies carried out by the U.S. Geological Survey and other organizations; from hypocenters in California above magnitude 3.0 supplied by the California Institute of Technology, Pasadena, the University of California, Berkeley, and other offices of the U.S. Geological Survey; from hypocenters in Hawaii supplied by the Hawaiian Volcano Observa-

tory; and from other institutions as listed in the acknowledgments. Known or suspected explosions are also listed in table 1 and table 2.

The intensities and macroseismic data were compiled from information obtained from postal questionnaires, from newspaper articles, and from other Government agencies, State institutions, local organizations, and individuals. (See "Acknowledgments" for a list of collaborators.) Figure 1 is the questionnaire in use by the NEIS. Other types of questionnaires are used by State agencies, engineering firms, and other Government agencies to collect intensity data. Anyone wishing to submit felt or damage information on earthquakes for inclusion in future reports should send it to the National Earthquake Information Service, Stop 967, Box 25046, Denver Federal Center, Denver, CO 80225. Copies of the current "Earthquake Report" questionnaire can be obtained at this address.

The NEIS uses the postal questionnaire as the primary source of macroseismic data to carry out an intensity survey; however, on-site field investigations are made following earthquakes that do significant damage. The "Earthquake Report" forms are mailed to postmasters within the area affected by the earthquake. The completed forms are returned to the NEIS, where they are evaluated and intensity values are assigned to individual locations. In the case of large or significant earthquakes, the intensity observations are plotted and isoseismal maps are prepared. It should be pointed out that the isoseismals represent a general intensity level and that they do not necessarily agree with every individual observation.

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
EARTHQUAKE REPORT

Form Approved
OMB No. 42-R1700

Please answer this questionnaire and return as soon as possible

1. Was an earthquake felt by anyone in your town near the date and time indicated on the opposite page?

☐ No: Please refold and tape for return mail.

☐ Yes: Date _____ Time _____ ☐ AM ☐ Standard time
☐ PM ☐ Daylight time

Name of person filling out form _____

Address _____

City _____ County _____

State _____ Zip code _____

If you felt the earthquake, complete the following section. If others felt the earthquake but you did not, skip the personal report and complete the community report.

PERSONAL REPORT

2. Did you personally feel the earthquake? ☐ Yes ☐ No

Were you awakened by the earthquake? ☐ Yes ☐ No

Were you frightened by the earthquake? ☐ Yes ☐ No

Were you at ☐ Home ☐ Work ☐ Other? _____

Town and zip code of your location at time of earthquake _____

Check your activity when the earthquake occurred:

☐ Walking ☐ Sleeping ☐ Lying down ☐ Standing

☐ Driving (car in motion) ☐ Sitting ☐ Other _____

Were you ☐ Inside or ☐ Outside?

If inside, on what floor were you? ☐ _____

Did you have difficulty in standing or walking ☐ Yes ☐ No

Vibration could be described as ☐ Light ☐ Moderate ☐ Strong

Was there earth noise? ☐ No ☐ Faint ☐ Moderate ☐ Loud

Direction of noise ☐ North ☐ South ☐ East ☐ West

Estimated duration of shaking ☐ Sudden, sharp (less than 10 secs) ☐ Long (30-60 secs)

☐ Short (10-30 secs)

Continue on to next section which should include personal as well as reported observations.

COMMUNITY REPORT

Town and zip code _____

DO NOT INCLUDE EFFECTS FROM OTHER COMMUNITIES/TOWNS

Check one box for each question that is applicable.

3a. The earthquake was felt by ☐ No one ☐ Few ☐ Several ☐ Many ☐ All?

b. This earthquake awakened ☐ No one ☐ Few ☐ Several ☐ Many ☐ All?

c. This earthquake frightened ☐ No one ☐ Few ☐ Several ☐ Many ☐ All?

4. What indoor physical effects were noted in your community?

Windows, doors, dishes rattled ☐ Yes ☐ No

Walls creaked ☐ Yes ☐ No

Building trembled (shook) ☐ Slightly ☐ Strongly

Hanging pictures (more than one) ☐ Swung ☐ Out of place ☐ Fallen

Windows ☐ Few cracked ☐ Some broken out ☐ Many broken out

Small objects overturned ☐ Few ☐ Many

Small objects fallen ☐ Few ☐ Many

Glassware/dishes broken ☐ Few ☐ Many

Light furniture or small appliances ☐ Overturned ☐ Damaged seriously

Heavy furniture or appliances ☐ Overturned ☐ Damaged seriously

Did hanging objects or doors swing? ☐ Slightly ☐ Moderately ☐ Violently

Can you estimate direction? ☐ North/South ☐ East/West ☐ Other _____

Items thrown from store shelves ☐ Few ☐ Many

Continued on the reverse side

FIGURE 1.--Example of the "Earthquake Report" form used for evaluating the intensities of earthquakes. A, front side.

5. Indicate effects of the following types to interior walls if any:

Plaster/stucco 65 ☐ Hairline cracks 66 ☐ Large cracks (many) 67 ☐ Fell in large amounts
 Dry wall 68 ☐ Hairline cracks 69 ☐ Large cracks (many) 70 ☐ Fell in large amounts

6. What outdoor physical effects were noted in your community?

Trees and bushes shaken 71 ☐ Slightly 72 ☐ Moderately 73 ☐ Strongly
 Standing vehicles rocked 74 ☐ Slightly 75 ☐ Moderately
 Moving vehicles rocked 76 ☐ Slightly 77 ☐ Moderately
 Water splashed onto sides of lakes, ponds, swimming pools 78 ☐ Yes ☐ No
 Elevated water tanks 79 ☐ Cracked 80 ☐ Twisted 81 ☐ Fallen (thrown down)
 Tombstones 82 ☐ Displaced 83 ☐ Cracked 84 ☐ Rotated
 85 ☐ Fallen
 Chimneys 86 ☐ Cracked 87 ☐ Twisted 88 ☐ Fallen
 89 ☐ Broken at roof line 90 ☐ Bricks fallen
 Railroad tracks bent 91 ☐ Slightly 92 ☐ Greatly
 Stone or brick fences /walls 93 ☐ Open cracks 94 ☐ Fallen 95 ☐ Destroyed
 Underground pipes 96 ☐ Broken 97 ☐ Out of service
 Highways or streets 98 ☐ Large cracks 99 ☐ Large displacements
 Sidewalks 100 ☐ Large cracks 101 ☐ Large displacements

7a. Check below any structural damage to buildings.

Foundation 102 ☐ Cracked 103 ☐ Destroyed
 Interior walls 104 ☐ Split 105 ☐ Fallen 106 ☐ Separated from ceiling or floor
 Exterior walls 107 ☐ Large Cracks 108 ☐ Bulged outward
 109 ☐ Partial collapse 110 ☐ Total collapse

b. What type of construction was the building that showed this damage?

111 ☐ Wood 112 ☐ Stone 113 ☐ Brick veneer 114 ☐ Other _____
 115 ☐ Brick 116 ☐ Cinderblock 117 ☐ Reinforced concrete 118 ☐ Mobile home

c. What was the type of ground under the building?

☐ Don't know 119 ☐ Sandy soil 120 ☐ Marshy 121 ☐ Fill
 122 ☐ Hard rock 123 ☐ Clay soil 124 ☐ Sandstone, limestone, shale

d. Was the ground: 125 ☐ Level 126 ☐ Sloping 127 ☐ Steep?

e. Check the approximate age of the building:

128 ☐ Built before 1935 129 ☐ Built 1935-65 130 ☐ Built after 1965

8. Check below any structural damage to

Bridges/Overpasses 131 ☐ Concrete 132 ☐ Wood 133 ☐ Steel 134 ☐ Other _____
 Damage was 135 ☐ Slight 136 ☐ Moderate 137 ☐ Severe
 Dams 138 ☐ Concrete 139 ☐ Large earthen
 Damage was 140 ☐ Slight 141 ☐ Moderate 142 ☐ Severe

9. What geologic effects were noted in your community?

Ground cracks 143 ☐ Wet ground 144 ☐ Steep slopes 145 ☐ Dry and level ground
 Landslides 146 ☐ Small 147 ☐ Large
 Slumping 148 ☐ River bank 149 ☐ Road fill 150 ☐ Land fill
 Were springs or well water disturbed? 151 ☐ Level changed 152 ☐ Flow disturbed
 153 ☐ Muddied ☐ Don't know
 Were rivers or lakes changed? 154 ☐ Yes ☐ No ☐ Don't know

10a. What percentage of buildings were damaged?

Within 2 city blocks of your location ☐ None 155 ☐ Few (about 5%)
 156 ☐ Many (about 50%) 157 ☐ Most (about 75%)
 b. In area covered by your zip code ☐ None 158 ☐ Few (about 5%)
 159 ☐ Many (about 50%) 160 ☐ Most (about 75%)

Thank you for your time and information. Refold this card and tape for return mail.

FIGURE 1.--Example of the "Earthquake Report" form used for evaluating the intensities of earthquakes. B, reverse side.

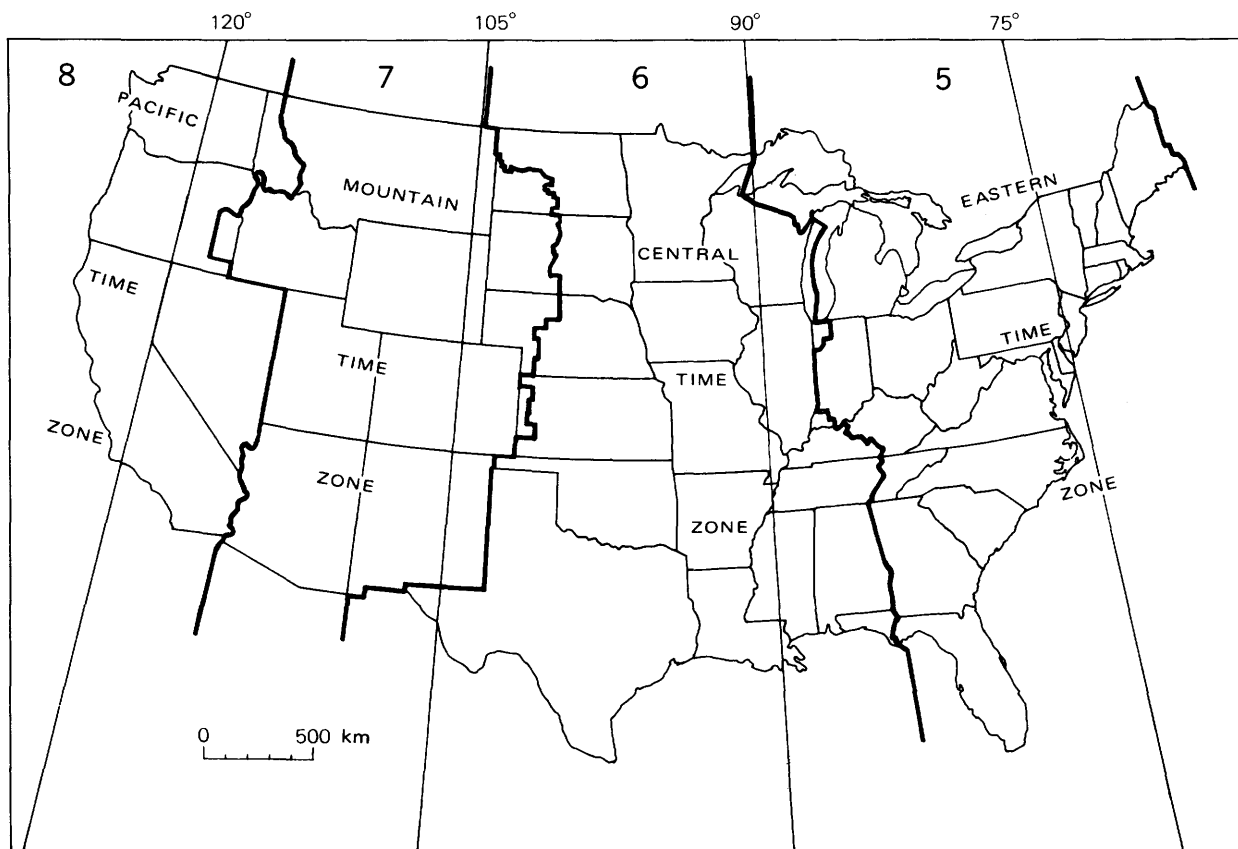


FIGURE 2.--Standard time zones of the conterminous United States. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

The data in table 2 will be included in the "Earthquake Description" section of the annual publication "United States Earthquakes," to which later data from other sources may be added. "United States Earthquakes" is published jointly by the U.S. Geological Survey, Department of the Interior, and the Environmental Data Service, National Oceanic and Atmospheric Administration, Department of Commerce.

DISCUSSION OF TABLES

The parameters for the earthquakes in table 1 and table 2 include the date, origin time, hypocenter (epicenter and focal depth), magnitude, intensity, and source of the computed solution. The origin time and date are listed in Universal Coordinated Time (UTC) and local standard time based on the time-zone maps in figures 2 and 3. The epicenters, which were taken from those published in the PDE, or from other

sources as noted, are listed here to two decimals. The accuracy of the epicenters is not necessarily the accuracy indicated by the number of decimals listed. The epicenters located by the NEIS usually have an accuracy of two-tenths of a degree or less. In general, epicenters located offshore are less accurate than those on land, even though both are listed to two decimals. In regions covered by dense networks of seismographs such as California, epicenter accuracy is significantly better than two-tenths of a degree. Depths are listed to the nearest whole kilometer.

Figures 4-6 are maps summarizing the earthquake activity for the conterminous United States, Alaska, and Hawaii for the period October-December 1979. The annual summaries are shown in figures 7-9. The magnitudes represented in these figures are based on ML or mbLg; if neither was computed, then on MS; and finally on mb, when it was the only magnitude computed.

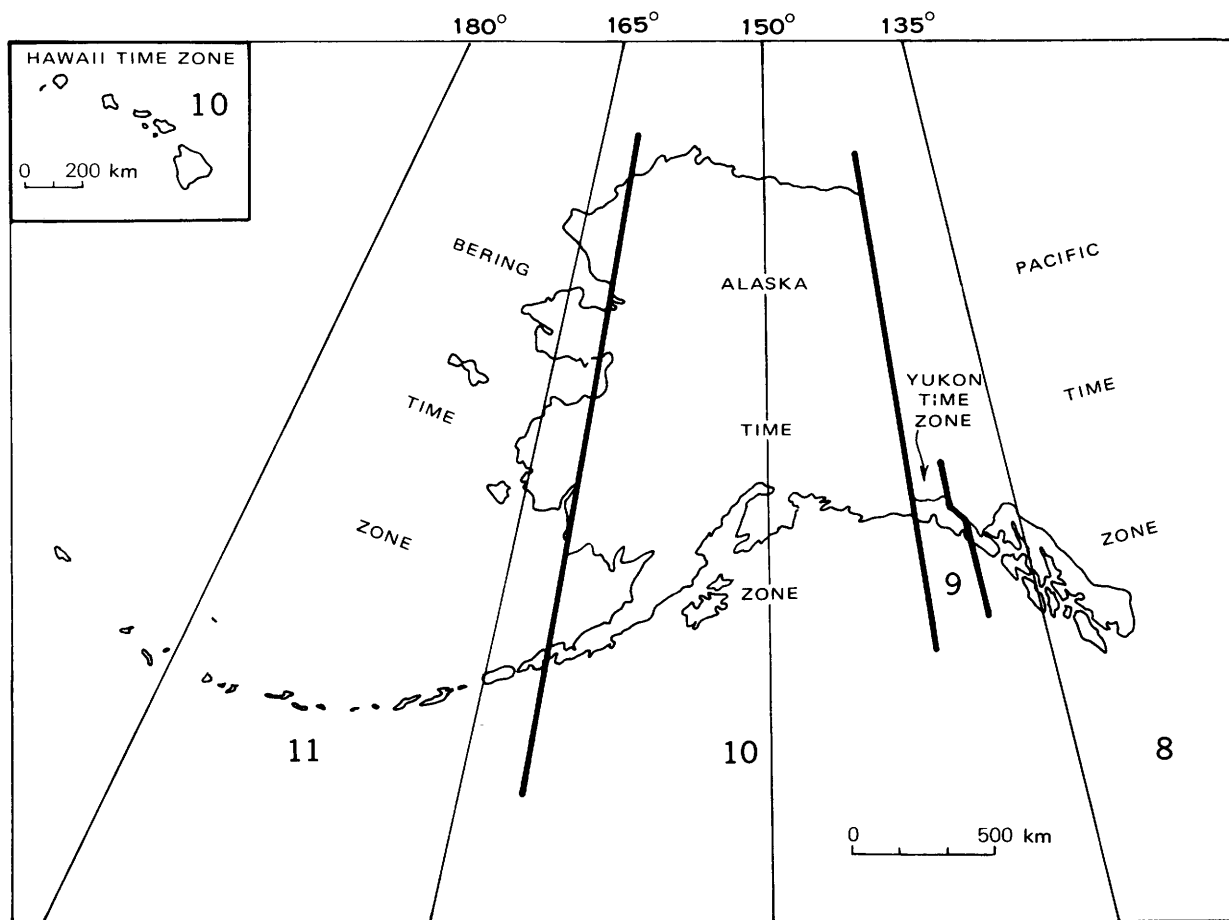


FIGURE 3.--Standard time zones of Alaska and Hawaii. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

The magnitude values listed in tables 1 and 2 were furnished by cooperating institutions or determined by NEIS. The computational sources are labeled according to the assigned letter codes shown in headnotes to tables 1 and 2; the letter follows the value listed under the column heading "Magnitude." In table 1, the absence of a letter code indicates that the source is NEIS. In table 2, the magnitude source is the same as the location source unless indicated otherwise by an alphabetic character to the right of the magnitude value. The magnitude values calculated by NEIS are based on the following formulas:

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

as adopted by the International Association of Seismology and Physics of the Earth's Interior (IASPEI; Bath, 1966, p. 153), where A is the maximum vertical

surface-wave ground amplitude, in micrometers; T is the period, in seconds, and $18 \leq T \leq 22$; and D is the distance, in geocentric degrees (station to epicenter), and $20^\circ \leq D \leq 160^\circ$. No depth correction is made for depths 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 $0.1 \leq T \leq 3.0$, and A , the ground amplitude in micrometers, is not necessarily the maximum of the P-wave group. Q is a function of distance D and depth h , where $D \geq 5^\circ$.

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

as defined by Richter (1958, p. 340), where A is the maximum trace amplitude

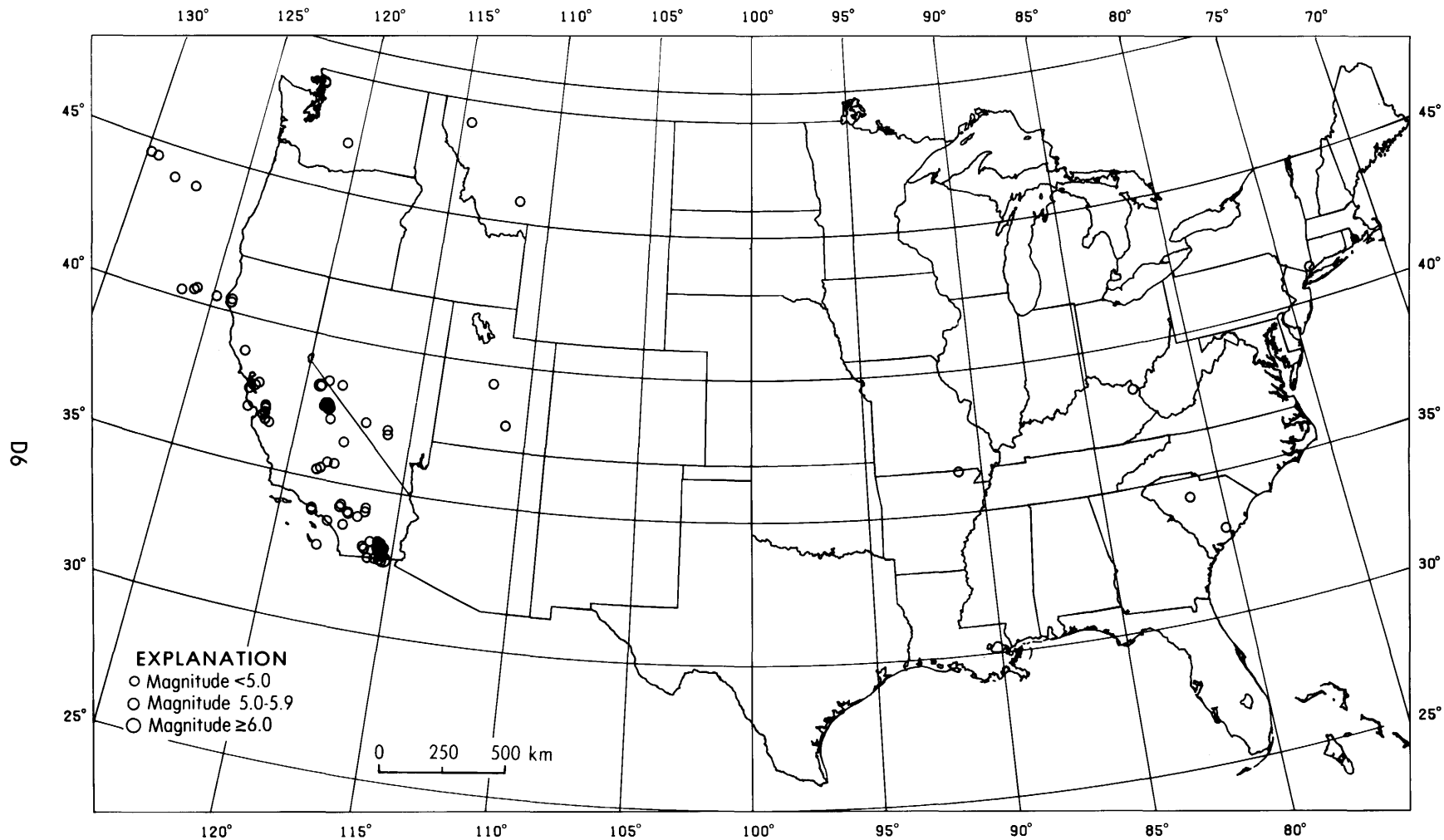


FIGURE 4.--Earthquake epicenters in the conterminous United States for October-December 1979, plotted from table 1.

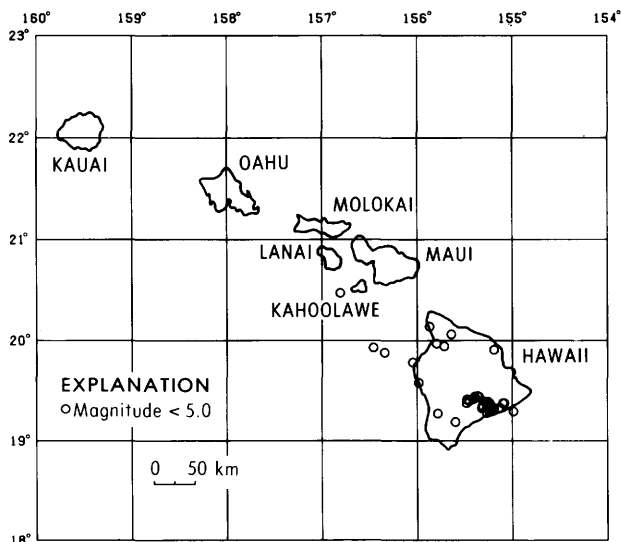


FIGURE 6.--Earthquake epicenters in Hawaii for October-December 1979, plotted from table 1.

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 L_g waves, and D is the distance in geocentric degrees.

All of the intensity values (indicated by Roman numerals) listed in this summary were determined, using the Modified Mercalli Intensity Scale of 1931 (Wood and Neumann, 1931) shown below, from the evaluation of "Earthquake Report" forms; from field reports by U.S. Geological Survey personnel, engineering firms, or universities; and from detailed macroseismic data communicated to the NEIS by people in the area affected by the earthquake. All earthquake reports received which contain minimal or sketchy information are listed only as "FELT." This does not imply that the earthquake was felt at a low intensity level, but indicates that the available data is not sufficient for

assigning a valid intensity value. These reports are filed in the offices of the NEIS or in government archives and are available for detailed study.

MODIFIED MERCALLI INTENSITY SCALE OF 1931

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

- I. Not felt - or, except rarely under especially favorable circumstances. Under certain conditions, at and outside the boundary of the area in which a great shock is felt: sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced; sometimes trees, structures, liquids, bodies of water, may sway--doors may swing, very slowly.
- II. Felt indoors by few, especially on upper floors, or by sensitive, or nervous persons. Also, as in grade I, but often more noticeably: sometimes hanging objects may swing, especially when delicately suspended; sometimes trees, structures, liquids, bodies of water, may sway, doors may swing, very slowly; sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced.
- III. Felt indoors by several, motion usually rapid vibration. Sometimes not recognized to be an earthquake at first. Duration estimated in some cases. Vibration like that due to passing of light, or lightly loaded trucks, or heavy trucks some distance away. Hanging objects may swing slightly. Movements may be appreciable on upper levels of tall structures. Rocked standing motor cars slightly.
- IV. Felt indoors by many, outdoors by few. Awakened few, especially light sleepers. Frightened no one, unless apprehensive from previous experience. Vibration like that due to passing of heavy or heavily loaded trucks. Sensation like heavy body striking building or falling of heavy objects inside. Rattling of dishes, windows, doors; glassware and crockery clink and clash.

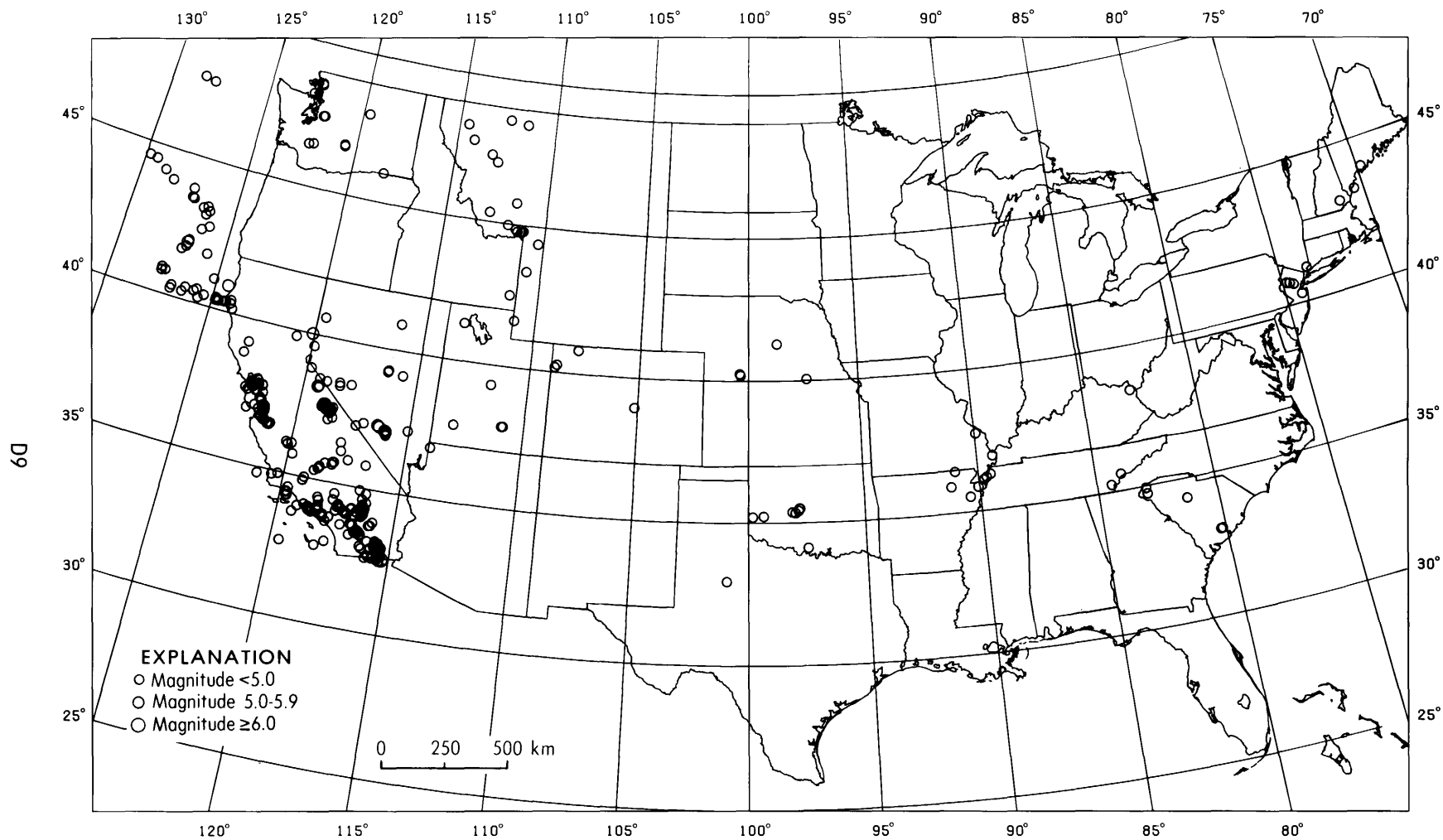


FIGURE 7.--Summary of earthquake epicenters in the conterminous United States for January-December 1979.

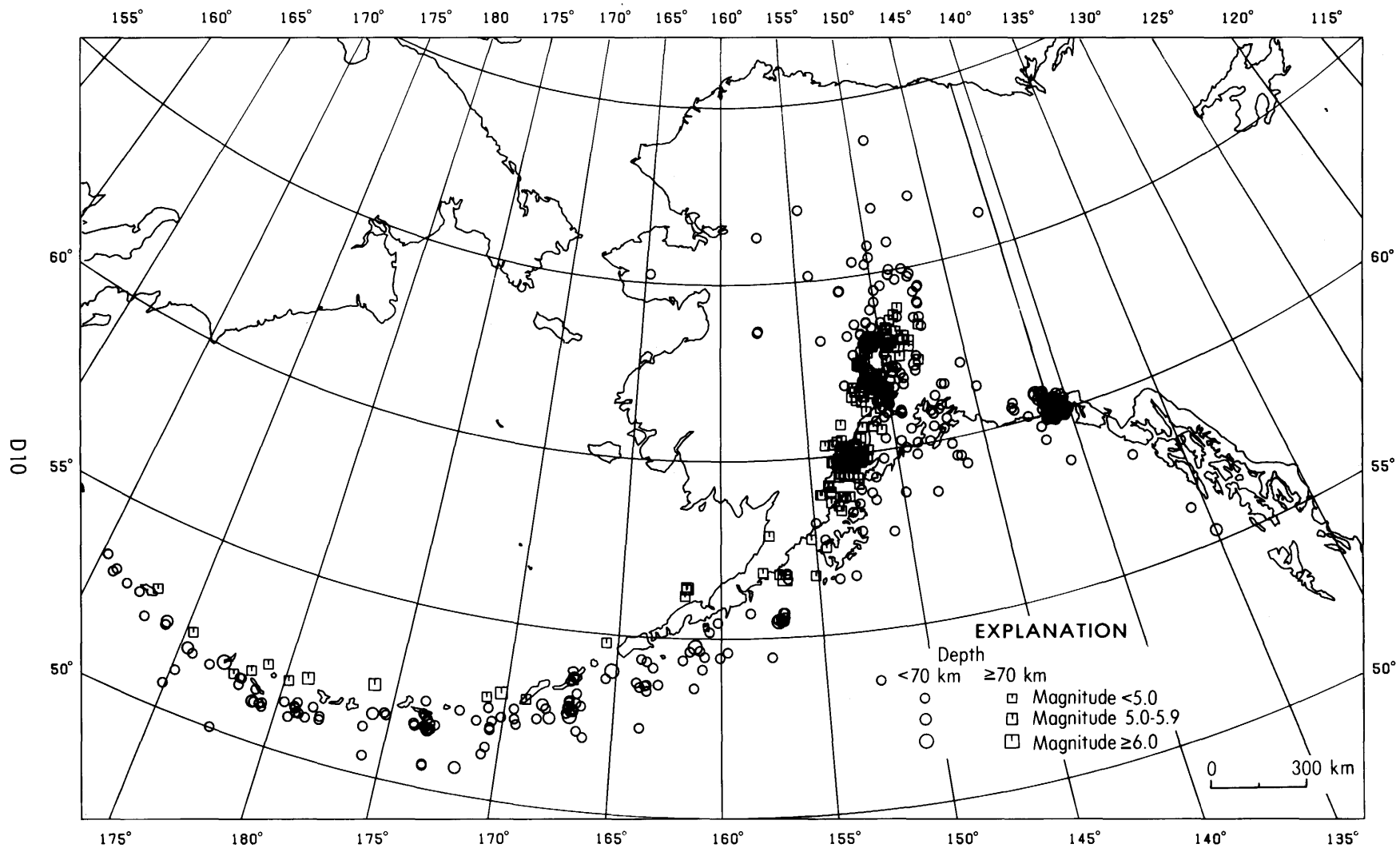


FIGURE 8.--Summary of earthquake epicenters in Alaska for January-December 1979.

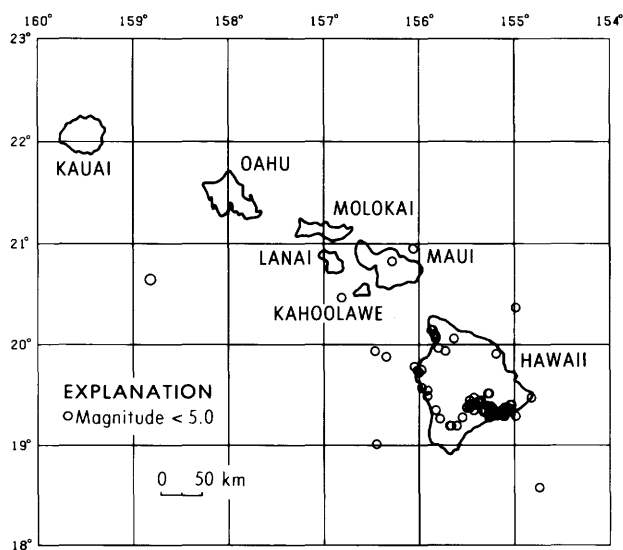


FIGURE 9.--Summary of earthquakes epicenters in Hawaii for January-December 1979.

Creaking of walls, frame, especially in the upper range of this grade. Hanging objects swung, in numerous instances. Disturbed liquids in open vessels slightly. Rocked standing motor cars noticeably.

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

Trees, bushes, shaken slightly to moderately. Liquid set in strong motion. Small bells rang--church, chapel, school, etc. Damage slight in poorly built buildings. Fall of plaster in small amount. Cracked plaster somewhat, especially fine cracks chimneys in some instances. Broke dishes, glassware, in considerable quantity, also some windows. Fall of knick-knacks, books, pictures. Overturned furniture in many instances. Moved furnishings of moderately heavy kind.

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

- VIII. Fright general--alarm approaches panic. Disturbed persons driving motor cars. Trees shaken strongly--branches, trunks, broken off, especially palm trees. Ejected sand and mud in small amounts. Changes: temporary, permanent; in flow of springs and wells; dry wells renewed flow; in temperature of spring and well waters. Damage slight in structures (brick) built especially to

withstand earthquakes. Considerable in ordinary substantial buildings, partial collapse: racked, tumbled down, wooden houses in some cases; threw out panel walls in frame structures, broke off decayed piling. Fall of walls. Cracked, broke, solid stone walls seriously. Wet ground to some extent, also ground on steep slopes. Twisting, fall, of chimneys, columns, monuments, also factory stacks, towers. Moved conspicuously, overturned, very heavy furniture.

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

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

slightly. Tore apart, or crushed endwise, pipe lines buried in earth. Open cracks and broad wavy folds in cement pavements and asphalt road surfaces.

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

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

Table 1.—Summary of U.S. earthquakes for October-December 1979—Continued

[Sources of the hypocenters and magnitudes: (B) University of California, Berkeley; (D) University of Montana, Missoula; (E) U.S. Department of Energy, Las Vegas, Nevada; (G) U.S. Geological Survey, National Earthquake Information Service; (H) U.S. Geological Survey, Hawaiian Volcano Observatory; (L) Lamont-Doherty Geological Observatory, Palisades, N.Y.; (M) National Oceanic and Atmospheric Administration,

Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis, Missouri; (U) University of Utah, Salt Lake; (W) University of Washington, Seattle. N, Normal depth; UTC, Universal Coordinated Time. For names of local time zones, see figures 2 and 3. Leaders (...) indicate no information available]

Date (1979)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML or mbLg			Date	Hour				
ALASKA																	
OCT.	2	06	07	57.6	51.08 N.	178.95 E.	50	4.5	...	...	...	G	OCT.	1	07	P.M.	BST
OCT.	2	06	25	10.0	51.09 N.	178.87 E.	42	5.0	...	...	...	G	OCT.	1	07	P.M.	BST
OCT.	4	02	48	47.6	62.95 N.	150.62 W.	117	3.6	...	...	...	G	OCT.	3	04	P.M.	AST
OCT.	6	22	49	52.6	58.45 N.	153.49 W.	78	3.9	...	...	...	G	OCT.	6	12	P.M.	AST
OCT.	7	05	59	21.8	61.22 N.	150.43 W.	9	...	...	3.1M	FELT	G	OCT.	6	07	P.M.	AST
OCT.	8	14	58	14.0	59.49 N.	153.36 W.	131	...	...	...	...	G	OCT.	8	04	A.M.	AST
OCT.	10	23	36	45.1	56.15 N.	135.75 W.	33N	4.4	...	...	FELT	G	OCT.	10	03	P.M.	PST
OCT.	10	23	46	7.6	61.49 N.	151.92 W.	114	...	...	...	...	G	OCT.	10	01	P.M.	AST
OCT.	13	07	03	19.7	51.96 N.	179.83 W.	100	4.6	...	...	...	G	OCT.	12	08	P.M.	BST
OCT.	13	13	58	16.1	63.01 N.	148.62 W.	90	4.0	...	...	...	G	OCT.	13	03	A.M.	AST
OCT.	15	06	24	1.2	51.77 N.	175.24 W.	54	4.8	...	...	IV	G	OCT.	14	07	P.M.	BST
OCT.	16	12	14	33.1	59.70 N.	141.79 W.	15	...	...	3.4M	...	G	OCT.	16	02	A.M.	AST
OCT.	16	21	16	5.2	51.85 N.	175.36 E.	34	5.3	5.2	...	II	G	OCT.	16	10	A.M.	BST
OCT.	17	23	34	8.1	59.96 N.	140.98 W.	15	4.5	...	4.9M	...	G	OCT.	17	02	P.M.	YST
OCT.	18	03	35	26.9	51.86 N.	177.13 E.	62	6.0	...	...	III	G	OCT.	17	04	P.M.	BST
OCT.	18	11	51	58.6	62.13 N.	150.22 W.	33N	...	...	3.8M	...	G	OCT.	18	01	A.M.	AST
OCT.	22	19	07	36.3	52.39 N.	173.60 W.	33N	4.9	...	...	...	G	OCT.	22	08	A.M.	BST
OCT.	24	06	06	0.4	63.60 N.	149.20 W.	128	...	...	...	...	G	OCT.	23	08	P.M.	AST
OCT.	24	06	13	42.8	62.55 N.	151.56 W.	134	...	...	...	...	G	OCT.	23	08	P.M.	AST
OCT.	24	22	19	35.5	65.24 N.	164.74 W.	33N	4.4	...	...	...	G	OCT.	24	11	A.M.	BST
OCT.	25	13	26	17.4	59.43 N.	153.12 W.	102	...	...	...	...	G	OCT.	25	03	A.M.	AST
OCT.	25	17	01	1.8	63.10 N.	150.68 W.	139	4.1	...	...	...	G	OCT.	25	07	A.M.	AST
OCT.	27	06	32	2.3	61.70 N.	149.58 W.	44	...	...	3.0M	II	G	OCT.	26	08	P.M.	AST
OCT.	27	14	37	0.4	62.03 N.	150.55 W.	33N	...	...	3.2M	...	G	OCT.	27	04	A.M.	AST
OCT.	27	22	16	59.2	59.38 N.	152.90 W.	77	4.1	...	...	FELT	G	OCT.	27	12	P.M.	AST
OCT.	28	06	24	9.8	59.86 N.	151.67 W.	82	...	...	...	FELT	G	OCT.	27	08	P.M.	AST
OCT.	29	13	42	25.5	52.63 N.	169.57 W.	25	4.8	4.4	4.9M	...	G	OCT.	29	02	A.M.	BST
NOV.	2	00	34	49.8	62.84 N.	151.01 W.	132	...	...	...	...	G	NOV.	1	02	P.M.	AST
NOV.	2	03	21	4.1	51.16 N.	178.05 W.	33N	4.8	4.6	4.3M	III	G	NOV.	1	04	P.M.	BST
NOV.	4	05	03	41.4	60.55 N.	143.01 W.	33N	...	...	4.2M	...	G	NOV.	3	07	P.M.	AST
NOV.	7	03	14	36.1	60.59 N.	150.68 W.	90	...	...	...	III	G	NOV.	6	05	P.M.	AST
NOV.	8	05	39	40.4	62.79 N.	150.84 W.	133	...	...	...	...	G	NOV.	7	07	P.M.	AST
NOV.	10	11	15	55.6	60.37 N.	141.37 W.	15	4.7	3.9	4.7M	...	G	NOV.	10	01	A.M.	AST
NOV.	11	07	53	46.5	60.65 N.	141.41 W.	15	...	...	3.7M	...	G	NOV.	10	09	P.M.	AST
NOV.	11	08	43	6.6	62.66 N.	149.85 W.	10	...	...	3.2M	...	G	NOV.	10	10	P.M.	AST
NOV.	11	16	22	51.1	60.05 N.	152.89 W.	140	...	...	...	...	G	NOV.	11	06	A.M.	AST
NOV.	11	19	18	14.7	59.40 N.	153.41 W.	140	...	...	...	...	G	NOV.	11	09	A.M.	AST
NOV.	12	07	22	28.8	62.24 N.	150.81 W.	30	...	...	3.2M	...	G	NOV.	11	09	P.M.	AST
NOV.	12	13	28	33.5	52.20 N.	169.39 W.	56	...	...	...	...	G	NOV.	12	02	A.M.	BST
NOV.	12	15	13	32.5	59.82 N.	140.81 W.	15	...	...	3.7M	...	G	NOV.	12	06	A.M.	YST
NOV.	14	23	00	42.8	61.38 N.	150.09 W.	57	5.1	...	...	V	G	NOV.	14	01	P.M.	AST
NOV.	15	02	08	34.8	61.26 N.	150.00 W.	49	...	...	3.8M	IV	G	NOV.	14	04	P.M.	AST
NOV.	15	07	15	13.2	60.18 N.	149.68 W.	69	...	...	...	IV	G	NOV.	14	09	P.M.	AST
NOV.	18	03	46	56.5	61.92 N.	151.19 W.	112	4.4	...	...	...	G	NOV.	17	05	P.M.	AST
NOV.	18	05	59	54.8	51.10 N.	178.68 W.	33N	3.9	...	4.3M	...	G	NOV.	17	06	P.M.	BST
NOV.	20	06	32	12.7	62.07 N.	151.00 W.	78	3.3	...	...	...	G	NOV.	19	08	P.M.	AST
NOV.	22	12	26	17.4	60.07 N.	142.37 W.	33N	3.4	...	3.6M	...	G	NOV.	22	02	A.M.	AST
NOV.	22	18	51	51.7	59.83 N.	141.14 W.	33N	3.5	...	3.9M	...	G	NOV.	22	08	A.M.	AST
NOV.	24	11	19	43.9	51.25 N.	178.05 W.	47	4.6	4.0	...	...	G	NOV.	24	00	A.M.	BST
NOV.	24	12	37	05.4	61.28 N.	150.07 W.	33N	...	...	3.7M	...	G	NOV.	24	02	A.M.	AST
NOV.	24	19	04	59.4	61.28 N.	147.30 W.	33N	...	...	4.0M	...	G	NOV.	24	09	A.M.	AST
NOV.	24	22	25	8.7	52.54 N.	170.75 W.	33N	4.5	...	...	...	G	NOV.	24	11	A.M.	BST
NOV.	25	14	20	32.9	60.23 N.	153.04 W.	152	4.1	...	...	...	G	NOV.	25	04	A.M.	AST
NOV.	27	15	28	8.7	62.41 N.	151.41 W.	103	...	...	...	...	G	NOV.	27	05	A.M.	AST
NOV.	27	23	42	39.9	63.59 N.	149.77 W.	33N	...	...	...	...	G	NOV.	27	01	P.M.	AST
NOV.	28	04	07	47.0	52.07 N.	166.36 W.	33N	4.4	...	...	...	G	NOV.	27	05	P.M.	BST
NOV.	28	17	50	2.0	58.84 N.	153.32 W.	102	...	...	...	...	G	NOV.	28	07	A.M.	AST
NOV.	28	22	45	58.6	51.44 N.	178.43 W.	58	4.5	...	...	...	G	NOV.	28	11	A.M.	BST

Table 1.—Summary of U.S. earthquakes for October-December 1979—Continued

Date (1979)		Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time				
		hr	min	s				mb	MS	ML or mbLg			Date	Hour			
ALASKA--Continued																	
NOV.	29	23	34	22.1	63.07 N.	150.87 W.	144	3.3	...	2.4M	...	G	NOV.	29	01	P.M.	AST
NOV.	30	03	25	35.0	62.07 N.	149.06 W.	30	...	...	...	...	G	NOV.	29	05	P.M.	AST
NOV.	30	08	28	25.7	60.79 N.	147.58 W.	41	...	...	2.8M	...	G	NOV.	29	10	P.M.	AST
DEC.	4	12	01	21.2	53.71 N.	164.02 W.	39	5.0	4.4	...	...	G	DEC.	4	01	A.M.	BST
DEC.	5	07	42	54.0	59.74 N.	152.08 W.	78	...	...	...	...	G	DEC.	4	09	P.M.	AST
DEC.	5	08	32	45.3	50.99 N.	179.41 W.	33N	4.8	...	4.0M	...	G	DEC.	4	09	P.M.	BST
DEC.	7	05	16	33.5	51.78 N.	173.00 W.	47	4.6	...	3.8M	...	G	DEC.	6	06	P.M.	BST
DEC.	7	09	37	20.0	59.61 N.	152.46 W.	85	...	...	...	...	G	DEC.	6	11	P.M.	AST
DEC.	7	22	29	20.7	58.58 N.	153.59 W.	89	...	...	...	...	G	DEC.	7	12	P.M.	AST
DEC.	9	07	03	48.4	60.32 N.	140.86 W.	15	4.9	4.1	5.0M	...	G	DEC.	8	10	P.M.	YST
DEC.	9	22	25	50.7	53.00 N.	170.24 W.	102	5.4	...	...	...	G	DEC.	9	11	A.M.	BST
DEC.	10	03	12	34.1	64.30 N.	147.40 W.	10	...	...	3.0M	...	G	DEC.	9	05	P.M.	AST
DEC.	11	21	56	6.1	65.03 N.	148.69 W.	21	...	...	3.4M	...	G	DEC.	11	11	A.M.	AST
DEC.	13	10	31	35.2	60.13 N.	153.18 W.	123	...	...	...	...	G	DEC.	13	00	A.M.	AST
DEC.	14	02	55	26.5	52.45 N.	163.78 W.	33N	4.8	...	4.6M	...	G	DEC.	13	03	P.M.	BST
DEC.	16	10	21	55.1	62.03 N.	151.03 W.	15	...	...	3.0M	...	G	DEC.	16	00	A.M.	AST
DEC.	17	18	58	56.9	61.74 N.	149.01 W.	43	...	...	...	...	G	DEC.	17	08	A.M.	AST
DEC.	19	06	43	46.7	61.93 N.	149.73 W.	33N	...	...	2.9M	...	G	DEC.	18	08	P.M.	AST
DEC.	21	02	40	28.2	60.03 N.	141.25 W.	33N	...	...	3.4M	...	G	DEC.	20	04	P.M.	AST
DEC.	21	16	35	4.5	63.30 N.	147.30 W.	33N	...	...	3.3M	...	G	DEC.	21	06	A.M.	AST
DEC.	21	20	16	50.2	68.74 N.	148.84 W.	33N	...	...	...	...	G	DEC.	21	10	A.M.	AST
DEC.	22	10	26	18.5	59.14 N.	154.02 W.	156	...	...	...	...	G	DEC.	22	00	A.M.	AST
DEC.	23	00	39	20.0	59.68 N.	152.54 W.	120	...	...	...	...	G	DEC.	22	02	P.M.	AST
DEC.	23	01	00	10.9	59.68 N.	152.53 W.	111	...	...	...	...	G	DEC.	22	03	P.M.	AST
DEC.	23	07	24	44.9	53.64 N.	166.97 W.	83	4.0	...	...	...	G	DEC.	22	08	P.M.	BST
DEC.	24	01	50	11.0	52.20 N.	179.07 E.	167	4.5	...	...	...	G	DEC.	23	02	P.M.	BST
DEC.	24	04	47	28.2	62.01 N.	151.41 W.	33N	...	...	3.5M	...	G	DEC.	23	06	P.M.	AST
DEC.	26	04	06	22.4	63.02 N.	150.44 W.	131	3.4	...	...	...	G	DEC.	25	06	P.M.	AST
DEC.	26	08	18	41.4	51.02 N.	179.33 E.	53	4.5	...	...	...	G	DEC.	25	09	P.M.	BST
DEC.	26	13	12	16.7	61.42 N.	151.62 W.	111	4.1	...	...	II	G	DEC.	26	03	A.M.	AST
DEC.	26	16	42	18.4	54.47 N.	160.05 W.	33N	4.4	...	...	...	G	DEC.	26	06	A.M.	AST
DEC.	27	07	21	28.2	51.14 N.	179.33 E.	33N	4.4	...	...	...	G	DEC.	26	08	P.M.	BST
DEC.	28	14	47	51.6	61.96 N.	150.52 W.	63	3.2	...	...	...	G	DEC.	28	04	A.M.	AST
DEC.	28	17	41	10.6	64.62 N.	152.18 W.	33N	...	...	3.3M	...	G	DEC.	28	07	A.M.	AST
DEC.	29	08	34	29.4	64.62 N.	152.21 W.	33N	...	...	3.0M	...	G	DEC.	28	10	P.M.	AST
DEC.	31	22	58	1.6	61.55 N.	146.60 W.	33N	...	...	3.5M	...	G	DEC.	31	12	P.M.	AST
ARKANSAS																	
NOV.	5	16	35	26.0	36.44 N.	91.01 W.	8	...	...	2.9S	IV	S	NOV.	5	10	A.M.	CST
CALIFORNIA																	
OCT.	1	11	52	00.7	37.60 N.	118.86 W.	10	...	...	2.9B	FELT	B	OCT.	1	03	A.M.	PST
OCT.	1	11	52	20.6	37.54 N.	118.82 W.	10	...	...	3.2B	FELT	B	OCT.	1	03	A.M.	PST
OCT.	1	12	37	2.3	37.60 N.	118.85 W.	12	...	...	3.0B	FELT	B	OCT.	1	04	A.M.	PST
OCT.	3	08	54	24.8	37.63 N.	118.91 W.	12	...	...	3.1B	FELT	B	OCT.	3	00	A.M.	PST
OCT.	3	08	58	30.8	37.62 N.	118.91 W.	10	...	...	3.0B	FELT	B	OCT.	3	00	A.M.	PST
OCT.	4	13	44	17.8	33.60 N.	117.23 W.	5	...	...	3.4P	III	P	OCT.	4	05	A.M.	PST
OCT.	5	04	51	38.6	37.52 N.	118.77 W.	5	...	...	3.0P	...	P	OCT.	4	08	P.M.	PST
OCT.	7	20	54	41.4	38.22 N.	119.35 W.	9	4.1	...	5.0B	IV	B	OCT.	7	12	P.M.	PST
OCT.	7	21	10	0.0	38.23 N.	119.36 W.	10	...	...	3.9B	...	B	OCT.	7	01	P.M.	PST
OCT.	7	21	20	53.0	38.23 N.	119.36 W.	11	...	...	4.4B	FELT	B	OCT.	7	01	P.M.	PST
OCT.	7	21	45	23.8	38.21 N.	119.33 W.	8	...	...	4.1B	...	B	OCT.	7	01	P.M.	PST
OCT.	7	23	31	44.8	38.21 N.	119.33 W.	10	...	...	3.8B	...	B	OCT.	7	03	P.M.	PST
OCT.	8	00	23	54.6	38.23 N.	119.36 W.	10	...	...	3.7B	...	B	OCT.	7	04	P.M.	PST
OCT.	8	00	47	44.8	38.22 N.	119.36 W.	9	...	...	4.0B	...	B	OCT.	7	04	P.M.	PST
OCT.	8	03	34	24.0	38.21 N.	119.32 W.	9	...	...	4.6B	FELT	B	OCT.	7	07	P.M.	PST
OCT.	8	09	38	36.4	38.21 N.	119.33 W.	10	...	...	3.8B	...	B	OCT.	8	01	A.M.	PST
OCT.	8	11	26	43.1	32.98 N.	116.28 W.	9	...	...	3.5P	...	P	OCT.	8	03	A.M.	PST
OCT.	8	12	14	2.0	38.23 N.	119.35 W.	9	...	...	4.1B	...	B	OCT.	8	04	A.M.	PST
OCT.	9	22	00	10.4	38.21 N.	119.34 W.	8	...	...	4.2B	...	B	OCT.	9	02	P.M.	PST
OCT.	13	20	46	12.0	36.81 N.	121.56 W.	4	...	...	3.4B	...	B	OCT.	13	12	P.M.	PST

Table 1.—Summary of U.S. earthquakes for October-December 1979—Continued

Date (1979)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML or mbLg			Date	Hour				
CALIFORNIA--Continued																	
OCT.	15	23	16	54.5	32.63 N.	115.33 W.	12	5.7	6.9	6.6P	IX	P	OCT.	15	03	P.M.	PST
OCT.	15	23	35	20.3	32.92 N.	115.55 W.	2	...	...	3.5P	...	P	OCT.	15	03	P.M.	PST
OCT.	15	23	43	14.1	32.58 N.	115.43 W.	2	...	...	3.4P	...	P	OCT.	15	03	P.M.	PST
OCT.	15	23	55	4.7	32.90 N.	115.55 W.	1	4.2	...	4.3P	...	P	OCT.	15	03	P.M.	PST
OCT.	16	01	00	13.9	32.91 N.	115.53 W.	5	4.3	...	4.6P	...	P	OCT.	15	05	P.M.	PST
OCT.	16	01	07	12.3	32.83 N.	115.48 W.	5	...	...	3.6P	...	P	OCT.	15	05	P.M.	PST
OCT.	16	01	14	23.0	32.88 N.	115.45 W.	4	...	...	4.3P	...	P	OCT.	15	05	P.M.	PST
OCT.	16	01	33	49.0	32.83 N.	115.47 W.	5	...	...	3.5P	...	P	OCT.	15	05	P.M.	PST
OCT.	16	01	39	6.6	32.97 N.	115.43 W.	5	...	...	4.0P	...	P	OCT.	15	05	P.M.	PST
OCT.	16	02	10	19.5	32.82 N.	115.40 W.	5	...	...	3.8P	...	P	OCT.	15	06	P.M.	PST
OCT.	16	03	01	57.8	32.80 N.	115.45 W.	5	...	...	3.0P	...	P	OCT.	15	07	P.M.	PST
OCT.	16	03	09	44.9	32.82 N.	115.45 W.	5	...	...	3.5P	...	P	OCT.	15	07	P.M.	PST
OCT.	16	03	10	47.1	32.96 N.	115.55 W.	9	4.5	...	4.5P	...	P	OCT.	15	07	P.M.	PST
OCT.	16	03	16	27.5	32.83 N.	115.42 W.	5	...	...	4.1P	...	P	OCT.	15	07	P.M.	PST
OCT.	16	03	39	34.8	32.97 N.	115.55 W.	10	4.4	...	4.4P	...	P	OCT.	15	07	P.M.	PST
OCT.	16	04	32	33.9	32.87 N.	115.45 W.	5	...	...	3.8P	...	P	OCT.	15	08	P.M.	PST
OCT.	16	05	16	15.2	32.83 N.	115.48 W.	5	...	...	3.5P	...	P	OCT.	15	09	P.M.	PST
OCT.	16	05	18	3.6	32.98 N.	115.48 W.	5	...	...	3.5P	...	P	OCT.	15	09	P.M.	PST
OCT.	16	05	23	1.8	32.82 N.	115.47 W.	5	...	...	3.2P	...	P	OCT.	15	09	P.M.	PST
OCT.	16	05	38	2.3	32.88 N.	115.52 W.	5	...	...	3.1P	...	P	OCT.	15	09	P.M.	PST
OCT.	16	05	41	17.7	32.82 N.	115.50 W.	5	...	...	3.0P	...	P	OCT.	15	09	P.M.	PST
OCT.	16	05	49	10.8	33.02 N.	115.57 W.	5	4.9	...	5.0P	...	P	OCT.	15	09	P.M.	PST
OCT.	16	06	12	0.9	32.91 N.	112.52 W.	5	...	...	4.0P	...	P	OCT.	15	10	P.M.	PST
OCT.	16	06	19	48.7	32.93 N.	115.54 W.	9	4.8	5.4	5.5B	...	P	OCT.	15	10	P.M.	PST
OCT.	16	06	55	23.6	32.98 N.	115.58 W.	5	4.3	...	4.5P	...	P	OCT.	15	10	P.M.	PST
OCT.	16	06	58	43.2	33.02 N.	115.58 W.	5	5.2	5.7	5.4P	VI	P	OCT.	15	10	P.M.	PST
OCT.	16	07	23	26.0	32.82 N.	115.42 W.	5	4.3	...	4.2P	...	P	OCT.	15	11	P.M.	PST
OCT.	16	07	35	3.2	32.82 N.	115.48 W.	6	...	...	3.5P	...	P	OCT.	15	11	P.M.	PST
OCT.	16	08	09	43.1	32.95 N.	115.48 W.	5	...	...	3.5P	...	P	OCT.	16	00	A.M.	PST
OCT.	16	08	14	34.0	32.82 N.	115.47 W.	5	...	...	3.0P	...	P	OCT.	16	00	A.M.	PST
OCT.	16	08	37	54.3	32.82 N.	115.45 W.	5	...	...	3.4P	...	P	OCT.	16	00	A.M.	PST
OCT.	16	09	23	21.8	32.92 N.	115.52 W.	5	...	...	3.9P	...	P	OCT.	16	01	A.M.	PST
OCT.	16	09	33	53.3	32.97 N.	115.53 W.	5	...	...	3.6P	...	P	OCT.	16	01	A.M.	PST
OCT.	16	09	36	43.0	32.90 N.	115.45 W.	4	4.1	...	4.0P	...	P	OCT.	16	01	A.M.	PST
OCT.	16	09	57	4.8	32.60 N.	115.50 W.	5	...	...	3.2P	...	P	OCT.	16	01	A.M.	PST
OCT.	16	10	11	54.9	32.97 N.	115.55 W.	5	...	...	3.8P	...	P	OCT.	16	02	A.M.	PST
OCT.	16	10	30	1.9	32.82 N.	115.45 W.	5	...	...	3.6P	...	P	OCT.	16	02	A.M.	PST
OCT.	16	10	34	38.5	32.97 N.	115.52 W.	5	...	...	3.7P	...	P	OCT.	16	02	A.M.	PST
OCT.	16	10	51	27.8	32.93 N.	115.55 W.	5	...	...	4.0P	...	P	OCT.	16	02	A.M.	PST
OCT.	16	11	15	57.0	33.05 N.	115.62 W.	5	...	...	3.5P	...	P	OCT.	16	03	A.M.	PST
OCT.	16	11	19	12.7	33.00 N.	115.57 W.	5	...	...	3.8P	...	P	OCT.	16	03	A.M.	PST
OCT.	16	11	46	56.2	32.90 N.	115.55 W.	5	4.5	...	4.8P	...	P	OCT.	16	03	A.M.	PST
OCT.	16	12	01	45.7	32.88 N.	115.48 W.	5	4.2	...	4.0P	...	P	OCT.	16	04	A.M.	PST
OCT.	16	12	25	47.4	32.98 N.	115.55 W.	5	...	...	3.4P	...	P	OCT.	16	04	A.M.	PST
OCT.	16	12	49	5.5	33.00 N.	115.57 W.	5	...	...	3.3P	...	P	OCT.	16	04	A.M.	PST
OCT.	16	12	54	16.2	32.85 N.	115.47 W.	5	...	...	3.1P	...	P	OCT.	16	04	A.M.	PST
OCT.	16	12	58	0.4	33.05 N.	115.57 W.	5	...	...	3.8P	...	P	OCT.	16	04	A.M.	PST
OCT.	16	13	14	57.5	32.80 N.	115.47 W.	5	...	...	3.0P	...	P	OCT.	16	05	A.M.	PST
OCT.	16	13	33	32.8	33.05 N.	115.57 W.	5	...	...	3.1P	...	P	OCT.	16	05	A.M.	PST
OCT.	16	14	08	33.9	33.02 N.	115.68 W.	5	...	...	3.2P	...	P	OCT.	16	06	A.M.	PST
OCT.	16	14	20	7.9	32.93 N.	115.55 W.	5	...	...	3.3P	...	P	OCT.	16	06	A.M.	PST
OCT.	16	15	00	2.0	33.07 N.	115.55 W.	5	...	...	4.0P	...	P	OCT.	16	07	A.M.	PST
OCT.	16	15	05	41.7	33.07 N.	115.60 W.	5	...	...	3.3P	...	P	OCT.	16	07	A.M.	PST
OCT.	16	15	09	6.6	32.93 N.	115.63 W.	5	...	...	3.2P	...	P	OCT.	16	07	A.M.	PST
OCT.	16	15	13	14.2	33.07 N.	115.55 W.	6	...	...	3.0P	...	P	OCT.	16	07	A.M.	PST
OCT.	16	15	16	1.5	33.03 N.	115.60 W.	6	...	...	3.3P	...	P	OCT.	16	07	A.M.	PST
OCT.	16	16	37	16.3	32.98 N.	115.58 W.	4	...	...	3.4P	...	P	OCT.	16	08	A.M.	PST
OCT.	16	17	22	54.9	33.02 N.	115.53 W.	5	...	...	3.8P	...	P	OCT.	16	09	A.M.	PST
OCT.	16	19	07	56.4	33.03 N.	115.60 W.	5	...	...	3.2P	...	P	OCT.	16	11	A.M.	PST
OCT.	16	21	48	43.9	33.07 N.	115.60 W.	6	...	...	3.9P	...	P	OCT.	16	01	P.M.	PST
OCT.	16	22	32	22.2	33.10 N.	115.58 W.	5	...	...	3.2P	...	P	OCT.	16	02	P.M.	PST
OCT.	16	23	12	36.9	33.07 N.	115.53 W.	6	...	...	3.3P	...	P	OCT.	16	03	P.M.	PST
OCT.	16	23	16	32.7	33.07 N.	115.57 W.	7	5.4	4.8	4.9P	...	P	OCT.	16	03	P.M.	PST

Table 1.—Summary of U.S. earthquakes for October–December 1979—Continued

Date (1979)		Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time				
		hr min s						mb	MS	ML or mblg			Date		Hour		
CALIFORNIA--Continued																	
OCT.	16	23	23	52.4	32.82 N.	115.47 W.	5			3.3P		P	OCT.	16	03	P.M.	PST
OCT.	17	00	00	59.5	33.18 N.	115.55 W.	5	...	...	3.0P	...	P	OCT.	16	04	P.M.	PST
OCT.	17	00	06	22.0	33.07 N.	115.55 W.	6	...	...	3.2P	...	P	OCT.	16	04	P.M.	PST
OCT.	17	00	14	55.7	33.07 N.	115.62 W.	5	...	...	3.2P	...	P	OCT.	16	04	P.M.	PST
OCT.	17	00	15	17.2	32.78 N.	115.50 W.	6	...	...	3.2P	...	P	OCT.	16	04	P.M.	PST
OCT.	17	01	29	52.8	32.97 N.	115.55 W.	6	...	...	3.2P	...	P	OCT.	16	05	P.M.	PST
OCT.	17	02	13	17.9	33.25 N.	115.67 W.	5	...	...	3.1P	...	P	OCT.	16	06	P.M.	PST
OCT.	17	02	28	18.8	33.08 N.	115.55 W.	5	...	...	3.4P	...	P	OCT.	16	06	P.M.	PST
OCT.	17	06	14	2.3	33.08 N.	115.55 W.	8	...	...	3.5P	...	P	OCT.	16	10	P.M.	PST
OCT.	17	08	38	52.7	33.03 N.	115.38 W.	8	...	...	3.1P	...	P	OCT.	17	00	A.M.	PST
OCT.	17	09	17	22.8	33.15 N.	115.65 W.	6	...	...	3.2P	...	P	OCT.	17	01	A.M.	PST
OCT.	17	16	17	36.3	33.00 N.	115.57 W.	5	...	...	3.3P	...	P	OCT.	17	08	A.M.	PST
OCT.	17	19	03	2.3	32.82 N.	115.48 W.	2	...	...	3.4P	...	P	OCT.	17	11	A.M.	PST
OCT.	17	19	14	38.1	32.97 N.	115.60 W.	7	...	...	4.1P	FELT	P	OCT.	17	11	A.M.	PST
OCT.	17	20	52	36.8	33.90 N.	118.63 W.	6	4.5	...	4.2P	V	P	OCT.	17	12	P.M.	PST
OCT.	17	22	45	33.4	33.10 N.	115.55 W.	5	4.8	...	4.5P	FELT	P	OCT.	17	02	P.M.	PST
OCT.	17	22	50	32.0	33.03 N.	115.50 W.	5	...	...	3.2P	...	P	OCT.	17	02	P.M.	PST
OCT.	17	22	54	20.5	33.03 N.	115.52 W.	4	...	...	3.4P	...	P	OCT.	17	02	P.M.	PST
OCT.	17	23	27	31.1	33.03 N.	115.50 W.	4	...	...	3.2P	...	P	OCT.	17	03	P.M.	PST
OCT.	17	23	35	29.2	33.08 N.	115.48 W.	5	...	...	3.2P	...	P	OCT.	17	03	P.M.	PST
OCT.	18	00	29	48.4	33.17 N.	115.67 W.	8	...	...	3.2P	...	P	OCT.	17	04	P.M.	PST
OCT.	18	02	14	47.9	33.15 N.	115.65 W.	6	...	...	3.0P	...	P	OCT.	17	06	P.M.	PST
OCT.	18	03	17	16.5	32.97 N.	115.60 W.	6	...	...	3.6P	...	P	OCT.	17	07	P.M.	PST
OCT.	18	04	25	43.2	33.93 N.	118.65 W.	16	...	...	3.0P	FELT	P	OCT.	17	08	P.M.	PST
OCT.	18	04	40	55.5	33.15 N.	115.63 W.	5	...	...	3.0P	...	P	OCT.	17	08	P.M.	PST
OCT.	18	12	01	9.7	32.97 N.	115.62 W.	9	...	...	3.5P	...	P	OCT.	18	04	A.M.	PST
OCT.	18	13	20	26.9	32.88 N.	115.50 W.	5	...	...	3.2P	...	P	OCT.	18	05	A.M.	PST
OCT.	18	14	56	19.9	33.03 N.	115.50 W.	4	...	...	3.3P	...	P	OCT.	18	06	A.M.	PST
OCT.	18	19	18	57.9	32.97 N.	115.62 W.	15	...	...	3.2P	...	P	OCT.	18	11	A.M.	PST
OCT.	19	10	35	8.6	32.98 N.	115.58 W.	5	...	...	3.4P	...	P	OCT.	19	02	A.M.	PST
OCT.	19	12	22	37.7	34.20 N.	117.53 W.	7	...	...	4.1P	V	P	OCT.	19	04	A.M.	PST
OCT.	19	19	42	38.3	32.73 N.	115.37 W.	4	...	...	3.3P	...	P	OCT.	19	11	A.M.	PST
OCT.	20	05	04	7.3	33.00 N.	115.57 W.	5	...	...	3.0P	...	P	OCT.	19	09	P.M.	PST
OCT.	20	06	25	38.5	36.56 N.	121.20 W.	9	...	...	3.4B	...	B	OCT.	19	10	P.M.	PST
OCT.	20	11	35	33.0	32.88 N.	115.47 W.	5	...	...	3.0P	...	P	OCT.	20	03	A.M.	PST
OCT.	20	14	52	55.3	32.83 N.	115.52 W.	7	...	...	3.3P	...	P	OCT.	20	06	A.M.	PST
OCT.	20	20	52	22.7	33.15 N.	115.65 W.	1	...	...	3.0P	...	P	OCT.	20	12	P.M.	PST
OCT.	21	18	17	57.8	32.98 N.	115.53 W.	5	...	...	3.3P	...	P	OCT.	21	10	A.M.	PST
OCT.	23	01	13	13.6	32.98 N.	115.57 W.	7	...	...	3.1P	...	P	OCT.	22	05	P.M.	PST
OCT.	23	10	55	37.9	40.43 N.	124.27 W.	19	...	...	4.0B	FELT	B	OCT.	23	02	A.M.	PST
OCT.	24	06	44	31.2	33.05 N.	115.48 W.	5	...	...	3.1P	...	P	OCT.	23	10	P.M.	PST
OCT.	24	13	32	50.0	34.18 N.	116.42 W.	8	...	...	3.4P	IV	P	OCT.	24	05	A.M.	PST
OCT.	28	23	12	25.7	37.50 N.	118.80 W.	5	...	...	3.0P	FELT	P	OCT.	28	03	P.M.	PST
OCT.	31	11	43	46.4	32.88 N.	115.48 W.	5	...	...	3.4P	FELT	P	OCT.	31	03	A.M.	PST
NOV.	1	09	29	33.5	33.10 N.	115.62 W.	8	...	...	3.0P	...	P	NOV.	1	01	A.M.	PST
NOV.	2	08	58	6.1	32.63 N.	115.72 W.	3	...	...	3.0P	...	P	NOV.	2	00	A.M.	PST
NOV.	4	09	30	30.5	33.02 N.	115.62 W.	5	...	...	3.0P	...	P	NOV.	4	01	A.M.	PST
NOV.	4	17	13	30.8	33.08 N.	115.55 W.	5	...	...	3.6P	IV	P	NOV.	4	09	A.M.	PST
NOV.	5	22	37	2.4	35.40 N.	118.62 W.	8	...	...	3.1P	...	P	NOV.	5	02	P.M.	PST
NOV.	5	22	44	31.5	33.20 N.	116.00 W.	6	...	...	3.2P	...	P	NOV.	5	02	P.M.	PST
NOV.	5	23	10	22.3	37.62 N.	118.90 W.	9	...	...	2.6B	...	B	NOV.	5	03	P.M.	PST
NOV.	6	04	30	59.0	32.92 N.	116.20 W.	7	...	...	3.2P	IV	P	NOV.	5	08	P.M.	PST
NOV.	7	06	27	24.0	37.62 N.	118.91 W.	11	...	...	3.8B	FELT	B	NOV.	6	10	P.M.	PST
NOV.	7	21	50	6.4	34.32 N.	116.40 W.	7	...	...	3.0P	...	P	NOV.	7	01	P.M.	PST
NOV.	9	09	00	52.8	37.62 N.	118.89 W.	7	...	...	3.3B	FELT	B	NOV.	9	01	A.M.	PST
NOV.	9	10	12	54.5	37.59 N.	118.90 W.	3	...	...	4.0B	FELT	B	NOV.	9	02	A.M.	PST
NOV.	9	17	33	14.8	37.62 N.	118.89 W.	7	...	...	2.9B	...	B	NOV.	9	09	A.M.	PST
NOV.	9	17	46	58.3	37.62 N.	118.88 W.	14	...	...	4.0B	FELT	B	NOV.	9	09	A.M.	PST
NOV.	9	17	54	15.0	37.60 N.	118.88 W.	3	...	...	4.3B	IV	B	NOV.	9	09	A.M.	PST
NOV.	9	20	10	58.2	37.62 N.	118.90 W.	15	...	...	3.1B	...	B	NOV.	9	12	P.M.	PST
NOV.	9	20	38	54.6	37.62 N.	118.89 W.	15	...	...	3.3P	...	B	NOV.	9	12	P.M.	PST
NOV.	9	21	04	49.2	37.62 N.	118.90 W.	13	...	...	3.6B	FELT	B	NOV.	9	01	P.M.	PST
NOV.	9	22	26	54.4	37.62 N.	118.90 W.	14	...	...	3.4B	FELT	B	NOV.	9	02	P.M.	PST
NOV.	9	22	59	33.3	37.63 N.	118.90 W.	16	...	...	3.6B	FELT	B	NOV.	9	02	P.M.	PST

Table 1.—Summary of U.S. earthquakes for October-December 1979—Continued

Date (1979)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML or mbLg			Date	Hour				
CALIFORNIA--Continued																	
NOV. 9	23	03	58.2	32.90 N.	115.48 W.	8	...	...	3.0P	...	P	NOV. 9	03	P.M.	PST
NOV. 10	09	45	8.9	37.62 N.	118.91 W.	17	...	...	4.0B	FELT	B	NOV. 10	01	A.M.	PST
NOV. 12	14	09	51.9	37.62 N.	118.90 W.	12	...	...	3.2P	...	B	NOV. 12	06	A.M.	PST
NOV. 13	07	56	55.1	36.90 N.	121.49 W.	10	...	...	2.8B	...	B	NOV. 12	11	P.M.	PST
NOV. 13	22	14	47.3	37.63 N.	118.92 W.	10	...	...	3.3B	...	B	NOV. 13	02	P.M.	PST
NOV. 14	01	05	44.7	37.61 N.	118.92 W.	10	...	...	3.4B	FELT	B	NOV. 13	05	P.M.	PST
NOV. 15	20	51	33.8	37.61 N.	118.87 W.	17	...	...	3.3B	FELT	B	NOV. 15	12	P.M.	PST
NOV. 16	21	48	25.6	37.60 N.	118.87 W.	18	...	...	3.8B	FELT	B	NOV. 16	01	P.M.	PST
NOV. 16	21	50	9.7	37.61 N.	118.89 W.	10	...	...	3.2B	...	B	NOV. 16	01	P.M.	PST
NOV. 17	18	46	40.7	37.60 N.	118.87 W.	18	...	...	3.3B	...	B	NOV. 17	10	A.M.	PST
NOV. 17	21	47	52.3	37.61 N.	118.87 W.	10	...	...	3.1B	...	B	NOV. 17	01	P.M.	PST
NOV. 19	04	55	52.4	37.62 N.	118.91 W.	18	...	...	3.2B	...	B	NOV. 18	08	P.M.	PST
NOV. 19	08	17	35.2	37.62 N.	118.89 W.	19	...	...	3.2B	...	B	NOV. 19	00	A.M.	PST
NOV. 19	17	39	57.4	32.98 N.	115.58 W.	5	...	...	3.0P	...	P	NOV. 19	09	A.M.	PST
NOV. 20	17	23	59.0	37.61 N.	118.88 W.	14	...	...	4.2B	FELT	B	NOV. 20	09	A.M.	PST
NOV. 21	08	59	46.6	37.61 N.	118.88 W.	9	...	...	3.1B	...	B	NOV. 21	00	A.M.	PST
NOV. 22	11	54	14.0	37.53 N.	118.73 W.	5	...	...	3.1P	...	P	NOV. 22	03	A.M.	PST
NOV. 22	19	44	11.3	35.65 N.	118.38 W.	4	...	...	3.0P	...	P	NOV. 22	11	A.M.	PST
NOV. 23	06	38	29.6	35.33 N.	118.78 W.	7	...	...	3.0P	...	P	NOV. 22	10	P.M.	PST
NOV. 23	11	09	14.9	36.45 N.	117.85 W.	7	...	...	3.0P	...	P	NOV. 23	03	A.M.	PST
NOV. 24	04	29	30.1	37.61 N.	118.84 W.	7	...	...	3.1B	...	B	NOV. 23	08	P.M.	PST
NOV. 25	06	47	00.1	37.60 N.	118.86 W.	6	...	...	2.9B	FELT	B	NOV. 24	10	P.M.	PST
NOV. 26	12	40	08.6	37.86 N.	121.99 W.	7	...	...	3.0B	FELT	B	NOV. 26	04	A.M.	PST
NOV. 26	12	43	57.6	37.86 N.	122.00 W.	5	...	...	2.8B	FELT	B	NOV. 26	04	A.M.	PST
NOV. 26	17	26	30.9	37.61 N.	118.83 W.	12	...	...	3.1B	...	B	NOV. 26	09	A.M.	PST
NOV. 27	14	39	3.5	38.43 N.	119.09 W.	8	...	...	3.1B	...	B	NOV. 27	06	A.M.	PST
NOV. 28	00	56	58.6	37.04 N.	121.47 W.	1	...	...	2.9B	...	B	NOV. 27	04	P.M.	PST
NOV. 28	10	53	18.0	33.97 N.	118.65 W.	12	...	...	2.7P	FELT	P	NOV. 28	02	A.M.	PST
NOV. 29	08	23	31.3	37.61 N.	118.84 W.	2	...	...	3.3B	...	B	NOV. 29	00	A.M.	PST
NOV. 29	15	09	41.0	35.63 N.	118.38 W.	3	...	...	2.7P	FELT	P	NOV. 29	07	A.M.	PST
NOV. 30	05	25	35.0	37.63 N.	118.89 W.	12	...	...	3.1B	...	B	NOV. 29	09	P.M.	PST
DEC. 2	00	46	27.7	32.63 N.	116.02 W.	13	...	...	3.9P	III	P	DEC. 1	04	P.M.	PST
DEC. 2	18	09	21.1	33.93 N.	118.65 W.	7	...	...	2.7P	FELT	P	DEC. 2	10	A.M.	PST
DEC. 6	07	14	49.3	37.15 N.	121.52 W.	9	...	...	3.0B	...	B	DEC. 5	11	P.M.	PST
DEC. 6	19	32	38.9	37.60 N.	118.87 W.	15	...	...	4.2B	FELT	B	DEC. 6	11	A.M.	PST
DEC. 7	23	54	36.1	33.98 N.	116.70 W.	5	...	...	3.3P	...	P	DEC. 7	03	P.M.	PST
DEC. 8	13	19	19.8	37.61 N.	118.88 W.	8	...	...	3.0B	...	B	DEC. 8	05	A.M.	PST
DEC. 8	13	20	50.3	37.61 N.	118.88 W.	10	...	...	3.0B	...	B	DEC. 8	05	A.M.	PST
DEC. 8	21	38	52.4	37.60 N.	118.90 W.	16	...	...	4.3B	FELT	B	DEC. 8	01	P.M.	PST
DEC. 9	02	08	16.8	37.61 N.	118.86 W.	14	...	...	3.5B	FELT	B	DEC. 8	06	P.M.	PST
DEC. 9	08	32	3.3	37.62 N.	118.90 W.	10	...	...	3.2B	...	B	DEC. 9	00	A.M.	PST
DEC. 10	11	11	59.3	37.62 N.	118.80 W.	5	...	...	3.0P	...	G	DEC. 10	03	A.M.	PST
DEC. 11	12	05	02.2	37.74 N.	122.13 W.	6	...	...	2.5B	FELT	B	DEC. 11	04	A.M.	PST
DEC. 11	18	32	39.7	37.60 N.	118.89 W.	5	...	...	3.1P	...	G	DEC. 11	10	A.M.	PST
DEC. 14	06	02	11.4	37.60 N.	118.95 W.	6	...	...	3.3B	...	B	DEC. 13	10	P.M.	PST
DEC. 16	06	00	54.3	33.97 N.	118.67 W.	9	...	...	3.2P	FELT	P	DEC. 15	10	P.M.	PST
DEC. 16	06	29	27.0	37.59 N.	118.86 W.	2	...	...	3.6B	FELT	B	DEC. 15	10	P.M.	PST
DEC. 16	06	51	53.3	37.16 N.	118.60 W.	7	...	...	3.4B	...	B	DEC. 15	10	P.M.	PST
DEC. 16	10	44	15.8	37.60 N.	118.87 W.	13	...	...	3.4B	FELT	B	DEC. 16	02	A.M.	PST
DEC. 17	06	54	53.1	37.06 N.	121.50 W.	11	...	...	2.9B	IV	B	DEC. 16	10	P.M.	PST
DEC. 18	00	59	23.5	35.64 N.	118.08 W.	5	...	...	3.2B	...	G	DEC. 17	04	P.M.	PST
DEC. 18	11	59	48.5	34.07 N.	117.15 W.	6	...	...	2.7P	IV	P	DEC. 18	03	A.M.	PST
DEC. 18	12	00	16.5	34.07 N.	117.13 W.	2	...	...	2.9P	FELT	P	DEC. 18	04	A.M.	PST
DEC. 18	15	37	13.8	34.02 N.	117.12 W.	8	...	...	3.3P	FELT	P	DEC. 18	07	A.M.	PST
DEC. 19	18	11	5.2	34.02 N.	117.12 W.	5	...	...	2.7P	FELT	P	DEC. 19	10	A.M.	PST
DEC. 20	02	27	36.8	37.62 N.	118.96 W.	10	...	...	3.5B	...	B	DEC. 19	06	P.M.	PST
DEC. 20	05	02	19.6	38.80 N.	122.80 W.	4	...	...	3.0B	FELT	B	DEC. 19	09	P.M.	PST
DEC. 20	12	29	56.1	37.59 N.	122.37 W.	15	...	...	2.0B	FELT	B	DEC. 20	04	A.M.	PST
DEC. 20	20	31	52.0	34.28 N.	117.47 W.	6	...	...	3.2P	...	P	DEC. 20	12	P.M.	PST
DEC. 21	20	40	25.3	32.78 N.	115.38 W.	5	4.5	...	4.6P	VI	P	DEC. 21	12	P.M.	PST		
DEC. 22	09	32	6.9	37.70 N.	118.87 W.	5	...	...	3.0P	...	G	DEC. 22	01	A.M.	PST
DEC. 22	18	54	15.7	36.68 N.	121.37 W.	5	...	...	3.3B	...	B	DEC. 22	10	A.M.	PST
DEC. 23	06	34	14.5	33.10 N.	115.60 W.	10	...	...	3.3P	...	P	DEC. 22	10	P.M.	PST

Table 1.—Summary of U.S. earthquakes for October-December 1979—Continued

Date (1979)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time		
	hr	min	s				mb	MS	ML or mbLg			Date	Hour	
CALIFORNIA--Continued														
DEC. 24	13	09	40.1	36.98 N.	122.20 W.	8	...	...	3.8B	FELT	B	DEC. 24	05 A.M.	PST
DEC. 25	14	17	10.8	37.27 N.	117.06 W.	5	...	...	4.2B	...	G	DEC. 25	06 A.M.	PST
DEC. 26	08	09	4.4	37.53 N.	118.80 W.	19	...	...	3.9B	FELT	B	DEC. 26	00 A.M.	PST
DEC. 28	02	52	38.1	37.63 N.	118.86 W.	5	...	...	3.1P	...	G	DEC. 27	06 P.M.	PST
DEC. 28	03	29	49.5	37.66 N.	118.87 W.	15	...	...	3.7B	FELT	B	DEC. 27	07 P.M.	PST
DEC. 28	04	40	38.7	37.64 N.	118.87 W.	7	...	...	3.2B	...	B	DEC. 27	08 P.M.	PST
DEC. 31	06	03	40.3	33.65 N.	117.90 W.	7	...	...	2.7P	FELT	P	DEC. 30	10 P.M.	PST
CALIFORNIA--OFF THE COAST														
OCT. 24	15	23	50.6	40.43 N.	124.70 W.	24	4.8	...	4.5B	IV	B	OCT. 24	07 A.M.	PST
OCT. 25	09	01	40.3	40.42 N.	124.51 W.	24	...	...	4.0B	...	B	OCT. 25	01 A.M.	PST
NOV. 8	04	30	27.9	40.32 N.	125.17 W.	5	4.7	3.7	4.5B	...	B	NOV. 7	08 P.M.	PST
NOV. 13	12	46	21.2	40.42 N.	125.66 W.	5	...	...	3.5B	...	B	NOV. 13	04 A.M.	PST
NOV. 15	07	09	58.2	32.75 N.	118.10 W.	11	...	...	3.2P	...	P	NOV. 14	11 P.M.	PST
DEC. 13	09	09	13.3	40.48 N.	126.31 W.	5	...	...	3.8B	...	B	DEC. 13	01 A.M.	PST
HAWAII														
OCT. 6	10	46	12.2	19.33 N.	155.22 W.	10	...	...	3.9H	IV	H	OCT. 6	00 A.M.	HST
OCT. 9	02	40	19.8	19.33 N.	155.19 W.	10	...	...	3.7H	III	H	OCT. 8	04 P.M.	HST
OCT. 13	01	59	25.8	19.38 N.	155.25 W.	4	...	...	3.0H	II	H	OCT. 12	03 P.M.	HST
OCT. 13	11	16	26.0	19.44 N.	155.35 W.	8	...	...	3.8H	III	H	OCT. 13	01 A.M.	HST
OCT. 13	12	58	51.0	19.45 N.	155.36 W.	7	...	...	3.1H	II	H	OCT. 13	02 A.M.	HST
OCT. 14	17	37	17.5	19.91 N.	155.19 W.	14	...	...	4.0H	IV	H	OCT. 14	07 A.M.	HST
OCT. 15	10	44	12.3	19.93 N.	156.46 W.	3	...	...	3.1H	...	H	OCT. 15	00 A.M.	HST
OCT. 17	05	54	37.8	19.32 N.	155.14 W.	9	...	...	3.1H	...	H	OCT. 16	07 P.M.	HST
OCT. 19	06	14	32.4	19.78 N.	156.05 W.	9	...	...	3.1H	...	H	OCT. 18	08 P.M.	HST
OCT. 20	23	59	12.0	19.41 N.	155.47 W.	11	...	...	3.3H	...	H	OCT. 20	01 P.M.	HST
OCT. 21	05	57	02.0	19.32 N.	155.20 W.	10	...	...	3.5H	III	H	OCT. 20	07 P.M.	HST
OCT. 28	18	36	49.3	19.33 N.	155.27 W.	37	...	...	3.1H	...	H	OCT. 28	08 A.M.	HST
OCT. 31	05	35	11.7	19.88 N.	156.34 W.	1	4.1	...	4.2H	IV	H	OCT. 30	07 P.M.	HST
OCT. 31	15	23	30.1	19.97 N.	155.80 W.	10	...	...	3.0H	...	H	OCT. 31	05 A.M.	HST
NOV. 1	02	57	50.7	19.29 N.	154.99 W.	39	...	...	3.0H	...	H	OCT. 31	04 P.M.	HST
NOV. 3	16	58	03.1	19.28 N.	155.27 W.	11	...	...	3.3H	...	H	NOV. 3	06 A.M.	HST
NOV. 4	04	09	51.6	20.06 N.	155.64 W.	13	...	...	3.0H	III	H	NOV. 3	06 P.M.	HST
NOV. 4	12	10	33.3	19.33 N.	155.19 W.	10	...	...	3.0H	...	H	NOV. 4	02 A.M.	HST
NOV. 11	10	25	33.6	19.36 N.	155.25 W.	11	...	...	3.5H	III	H	NOV. 11	00 A.M.	HST
NOV. 15	14	13	00.9	19.38 N.	155.24 W.	4	...	...	3.4H	IV	H	NOV. 15	04 A.M.	HST
NOV. 16	09	54	29.5	19.35 N.	155.23 W.	1	...	...	3.4H	III	H	NOV. 15	11 P.M.	HST
NOV. 16	20	24	26.1	19.37 N.	155.24 W.	2	...	...	3.1H	...	H	NOV. 16	10 A.M.	HST
NOV. 17	16	11	59.5	19.35 N.	155.22 W.	10	...	...	3.3H	IV	H	NOV. 17	06 A.M.	HST
NOV. 20	02	58	13.9	19.33 N.	155.13 W.	9	...	...	3.2H	...	H	NOV. 19	04 P.M.	HST
NOV. 21	07	29	38.0	19.38 N.	155.24 W.	3	...	...	3.2H	III	H	NOV. 20	09 P.M.	HST
NOV. 21	19	07	27.6	19.27 N.	155.78 W.	10	...	...	3.1H	...	H	NOV. 21	09 A.M.	HST
NOV. 23	03	42	30.7	19.31 N.	155.22 W.	9	...	...	3.1H	...	H	NOV. 22	05 P.M.	HST
NOV. 23	16	41	34.0	19.38 N.	155.25 W.	4	...	...	3.4H	IV	H	NOV. 23	06 A.M.	HST
NOV. 23	20	45	38.0	19.36 N.	155.25 W.	1	...	...	3.5H	IV	H	NOV. 23	10 A.M.	HST
NOV. 24	04	48	27.7	19.44 N.	155.39 W.	9	...	...	3.0H	...	H	NOV. 23	06 P.M.	HST
NOV. 25	07	31	06.8	19.40 N.	155.45 W.	13	...	...	3.5H	IV	H	NOV. 24	09 P.M.	HST
NOV. 25	10	50	01.9	19.32 N.	155.19 W.	9	...	...	3.4H	IV	H	NOV. 25	00 A.M.	HST
NOV. 26	03	51	25.0	19.33 N.	155.32 W.	32	...	...	3.1H	...	H	NOV. 25	05 P.M.	HST
NOV. 29	08	03	30.3	19.38 N.	155.08 W.	8	...	...	3.1H	...	H	NOV. 28	10 P.M.	HST
NOV. 30	10	55	47.9	19.58 N.	155.98 W.	11	...	...	3.1H	IV	H	NOV. 30	00 A.M.	HST
NOV. 30	20	15	41.8	19.39 N.	155.25 W.	3	...	...	3.0H	IV	H	NOV. 30	10 A.M.	HST
DEC. 5	22	05	04.8	19.33 N.	155.22 W.	10	...	...	3.4H	...	H	DEC. 5	12 P.M.	HST
DEC. 6	01	32	27.2	19.41 N.	155.47 W.	11	...	...	3.8H	IV	H	DEC. 5	03 P.M.	HST
DEC. 14	03	44	3.1	19.42 N.	155.41 W.	11	...	...	4.0H	IV	H	DEC. 13	05 P.M.	HST
DEC. 16	03	45	13.1	19.35 N.	155.31 W.	14	...	...	3.6H	IV	H	DEC. 15	05 P.M.	HST
DEC. 17	04	11	03.8	19.19 N.	155.60 W.	6	...	...	3.0H	...	H	DEC. 16	06 P.M.	HST
DEC. 17	09	44	25.4	19.39 N.	155.28 W.	4	...	...	3.2H	...	H	DEC. 16	11 P.M.	HST
DEC. 23	11	06	02.1	19.38 N.	155.24 W.	3	...	...	3.6H	...	H	DEC. 23	01 A.M.	HST
DEC. 24	11	44	08.2	19.38 N.	155.10 W.	8	...	...	3.1H	...	H	DEC. 24	01 A.M.	HST
DEC. 24	23	39	39.2	20.14 N.	155.87 W.	34	...	...	3.1H	...	H	DEC. 24	01 P.M.	HST

Table 1.—Summary of U.S. earthquakes for October-December 1979—Continued

Date (1979)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML or mbLg			Date	Hour				
HAWAII--Continued																	
DEC.	25	15	55	54.9	20.47 N.	156.81 W.	33	...	...	3.2H	...	H	DEC.	25	05	A.M.	HST
DEC.	28	21	25	49.9	19.30 N.	155.24 W.	10	...	...	3.1H	III	H	DEC.	28	11	A.M.	HST
DEC.	31	02	04	10.0	19.94 N.	155.72 W.	10	...	...	3.0H	...	H	DEC.	30	04	P.M.	HST
DEC.	31	04	59	57.9	19.38 N.	155.48 W.	10	...	...	3.2H	...	H	DEC.	30	06	P.M.	HST
KENTUCKY																	
NOV.	9	21	29	59.1	38.42 N.	82.88 W.	10	...	...	3.5S	V	G	NOV.	9	04	P.M.	EST
MONTANA																	
OCT.	16	18	33	44.6	48.24 N.	114.54 W.	5	...	...	3.1G	FELT	G	OCT.	16	11	A.M.	MST
NOV.	30	07	07	28.9	45.75 N.	111.56 W.	5	...	...	3.1D	...	G	NOV.	30	00	A.M.	MST
NEVADA																	
NOV.	29	15	00	0.1	36.99 N.	116.02 W.	0	3.8	...	...	...	E	NOV.	29	07	A.M.	PST
DEC.	14	18	00	0.1	37.14 N.	116.06 W.	0	...	...	3.6B	...	E	DEC.	14	10	A.M.	PST
DEC.	31	08	27	52.5	38.46 N.	118.43 W.	8	4.2	...	4.8B	IV	B	DEC.	31	00	A.M.	PST
NEW YORK																	
DEC.	30	14	15	12.3	41.16 N.	73.71 W.	4	...	...	3.0L	IV	L	DEC.	30	09	A.M.	EST
OREGON--OFF THE COAST																	
OCT.	31	18	43	12.9	43.97 N.	128.34 W.	15	4.7	...	...	...	G	OCT.	31	10	A.M.	PST
NOV.	1	06	35	8.9	44.56 N.	129.81 W.	15	4.2	...	...	...	G	OCT.	31	10	P.M.	PST
DEC.	12	14	39	11.4	43.86 N.	127.25 W.	15	...	...	...	...	G	DEC.	12	06	A.M.	PST
DEC.	21	11	06	36.8	44.50 N.	129.42 W.	15	...	...	...	...	G	DEC.	21	03	A.M.	PST
SOUTH CAROLINA																	
OCT.	8	23	20	10.1	34.31 N.	81.36 W.	5	...	...	2.9G	FELT	G	OCT.	8	06	P.M.	EST
DEC.	7	05	43	35.0	33.01 N.	80.17 W.	6	...	...	2.9G	IV	G	DEC.	7	00	A.M.	EST
UTAH																	
OCT.	6	10	12	35.2	39.29 N.	111.69 W.	7	...	...	3.2U	FELT	U	OCT.	6	03	A.M.	MST
OCT.	23	04	17	19.9	37.89 N.	110.93 W.	7	...	...	3.5U	FELT	U	OCT.	22	09	P.M.	MST
WASHINGTON																	
NOV.	26	23	18	27.0	48.54 N.	122.41 W.	20	4.1	...	3.9G	IV	W	NOV.	26	03	P.M.	PST
NOV.	27	02	13	46.5	48.59 N.	122.41 W.	20	...	...	3.3G	III	G	NOV.	26	06	P.M.	PST
DEC.	10	05	40	6.1	46.66 N.	120.58 W.	5	...	...	3.2G	IV	W	DEC.	9	09	P.M.	PST

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979

[Sources of the hypocenters, magnitudes, and macroseismic data: (B) University of California, Berkeley; (D) University of Montana, Missoula; (E) U.S. Department of Energy, Las Vegas, Nevada; (G) U.S. Geological Survey, National Earthquake Information Service; (H) U.S. Geological Survey, Hawaiian Volcano Observatory; (J) Weston Observatory, Massachusetts; (L) Lamont-Doherty Geological Observatory, Palisades, N.Y.; (M) National Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology, Pasadena; (Q) Pacific Geoscience Center, Sidney, B.C., Canada; (S) St. Louis University, St. Louis, Missouri; (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. 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 and explosions are listed]

Alaska

7 October (G) Southern Alaska
Origin time: 05 59 21.8
Epicenter: 61.22 N., 150.43 W.
Depth: 9 km
Magnitude: 3.1 ML(M)

Felt at Anchorage (M).

10 October (G) Southeastern Alaska
Origin time: 23 36 45.1
Epicenter: 56.15 N., 135.75 W.
Depth: Normal
Magnitude: 4.4 mb(G)

Felt at Sitka (M).

15 October (G) Andreanof Islands,
Aleutian Islands
Origin time: 06 24 01.2
Epicenter: 51.77 N., 175.24 W.
Depth: 54 km
Magnitude: 4.8 mb(G)
Intensity IV: Adak (M).

16 October (G) Rat Islands, Aleutian
Islands
Origin time: 21 16 05.2
Epicenter: 51.85 N., 175.36 E.
Depth: 34 km
Magnitude: 5.3 mb(G), 5.2
MS(G)
Intensity II: Shemya (M).

18 October (G) Rat Islands, Aleutian
Islands
Origin time: 03 35 26.9
Epicenter: 51.86 N., 177.13 E.
Depth: 62 km
Magnitude: 6.0 mb(G)
Intensity III: Shemya (M).

27 October (G) Southern Alaska
Origin time: 06 32 02.3
Epicenter: 61.70 N., 149.58 W.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

Alaska--Continued

Depth: 44 km
Magnitude: 3.0 ML(M)
Intensity II: Palmer (M).

27 October (G) Southern Alaska
Origin time: 22 16 59.2
Epicenter: 59.38 N., 152.90 W.
Depth: 77 km
Magnitude: 4.1 mb(G)

Felt in the Homer area (M).

28 October (G) Southern Alaska
Origin time: 06 24 09.8
Epicenter: 59.86 N., 151.67 W.
Depth: 82 km
Magnitude: None computed.

Felt in the Homer area (M).

2 November (G) Andreanof Islands,
Aleutian Islands
Origin time: 03 21 04.1
Epicenter: 51.16 N., 178.05 W.
Depth: Normal.
Magnitude: 4.8 mb(G), 4.6
MS(G), 4.3 ML(M)
Intensity III: Adak (M).

7 November (G) Southern Alaska
Origin time: 03 14 36.1
Epicenter: 60.59 N., 150.68 W.
Depth: 90 km
Magnitude: None computed.
Intensity III: Naptown (M).
Intensity II: Soldotna (M), Sterling (M).

14 November (G) Southern Alaska
Origin time: 23 00 42.8
Epicenter: 61.38 N., 150.09 W.
Depth: 57 km
Magnitude: 5.1 mb(G)
Intensity V:

Spenard (light furniture and small objects moved; hanging pictures swung; buildings shook strongly; windows, doors and dishes rattled; felt by several).

Wasilla (light furniture and small objects moved, hanging pictures knocked out of place; buildings creaked and shook, felt by several).

Intensity IV: Anchorage, Chugiak, Skwenta, Sutton, Whittier.
Intensity III: Anchorage--Mountain

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

Alaska--Continued	
View, Big Lake Area, Kenai, North Kenai, Palmer (M). <u>Intensity II</u> : Willow.	
15 November (G) Southern Alaska	
Origin time:	02 08 34.8
Epicenter:	61.26 N., 150.00 W.
Depth:	49 km
Magnitude:	3.8 ML(M)
<u>Intensity IV</u> :	Anchorage.
15 November (G) Kenai Peninsula	
Origin time:	07 15 13.2
Epicenter:	60.18 N., 149.68 W.
Depth:	69 km
Magnitude:	None computed.
<u>Intensity IV</u> :	Seward.
26 December (G) Southern Alaska	
Origin time:	13 12 16.7
Epicenter:	61.42 N., 151.62 W.
Depth:	111 km
Magnitude:	4.1 mb(G)
<u>Intensity II</u> :	Anchorage (M).
Arizona	
15 October (P) Imperial Valley area	
Origin time:	23 16 54.5
See California listing.	
11 December Central Arizona	
Origin time:	20 30
Epicenter:	Not located.
Depth:	None computed.
Magnitude:	None computed.
Felt by many in the Theodore Roosevelt Lake area.	
<u>Intensity IV</u> :	Roosevelt (press report).
21 December (P) Imperial Valley area	
Origin time:	20 40 25.3
See California listing.	
Arkansas	
5 November (S) Northern Arkansas	
Origin time:	16 35 26.0
Epicenter:	36.44 N., 91.01 W.
Depth:	8 km

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

Arkansas--Continued	
Magnitude:	2.9 mbLg(S)
<u>Intensity IV</u> :	Biggers, Dalton (S), Maynard.
<u>Intensity III</u> :	Reyno, Success.
California	
1 October (B) Owens Valley area	
Origin time:	11 51 59.2
Epicenter:	37.60 N., 118.92 W.
Depth:	5 km
Magnitude:	3.0 ML(B)
Felt at Mammoth Lakes (B).	
1 October (B) Owens Valley area	
Origin time:	11 52 19.6
Epicenter:	37.60 N., 118.92 W.
Depth:	5 km
Magnitude:	3.0 ML(B), 3.4 ML(P)
Felt at Mammoth Lakes (B).	
1 October (B) Owens Valley area	
Origin time:	12 37 00.9
Epicenter:	37.60 N., 118.92 W.
Depth:	5 km
Magnitude:	3.0 ML(B), 3.4 ML(P)
Felt at Mammoth Lakes.	
3 October (B) Owens Valley area	
Origin time:	08 54 22.8
Epicenter:	37.63 N., 118.95 W.
Depth:	5 km
Magnitude:	3.0 ML(B), 3.3 ML(P)
Felt at Mammoth Lakes (B).	
3 October (B) Owens Valley area	
Origin time:	08 58 29.1
Epicenter:	37.62 N., 118.93 W.
Depth:	8 km
Magnitude:	3.0 ML(B), 3.3 ML(P)
Felt at Mammoth Lakes (B).	
4 October (B) Southern California	
Origin time:	13 44 17.8
Epicenter:	33.60 N., 117.23 W.
Depth:	5 km
Magnitude:	3.4 ML(P)
<u>Intensity III</u> :	Lake Elsinore,

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued	
Lakeland Village, Murrieta, Rancho California, Sedco Hills, Sun City, Temecula, Wildomar (all from press reports).	
7 October (B) California-Nevada border region	
Origin time:	20 54 41.5
Epicenter:	38.22 N., 119.35 W.
Depth:	11 km
Magnitude:	4.1 mb(G), 5.2 ML(B)
Intensity IV:	Bridgeport, Friant, Midpines, Mountain Ranch, Murphys, Sonora, Strawberry, Yosemite National Park Lodge, Wawona.
Intensity III:	Soulsbyville, Topaz.
Intensity II:	El Portal, Pacific House.
7 October (B) California-Nevada border region	
Origin time:	21 20 53.0
Epicenter:	38.23 N., 119.36 W.
Depth:	11 km
Magnitude:	4.4 ML(B)
Felt at Bridgeport (B).	
8 October (B) California-Nevada border region	
Origin time:	03 34 24.0
Epicenter:	38.21 N., 119.32 W.
Depth:	9 km
Magnitude:	4.6 ML(B)
Felt at Bridgeport (B).	
15 October (P) Imperial Valley area	
Origin time:	23 16 54.5
Epicenter:	32.63 N., 115.33 W.
Depth:	12 km
Magnitude:	5.7 mb(G), 6.9 MS(G), 6.6 ML(P), 7.0 ML(B)
The felt area in the United States, covering parts of Arizona, California, and Nevada, was approximately 128,000 sq km (fig. 10). The total felt area cannot be computed because of lack of intensity data from Mexico and because the western boundary of the limit of perceptibility extends to the coast line of California. The press reported 91 people injured, mostly cuts from	

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued	
flying glass or bruises from falling objects; two homes destroyed, 1565 homes damaged; 11 businesses destroyed, and 440 businesses damaged; all in the Imperial Valley. There were also numerous bridges with cracked abutments and shifted roadbeds due to slumping or faulting. Extensive lateral slope failure occurred along many irrigation canals, including the All-American Canal.	
Neal and others (1979) reported the damage from the earthquake was estimated at \$30 million with the worst damage occurring in southern Imperial County and northeastern Baja, California. This figure encompasses both buildings and their contents and agricultural losses. The greatest single structure loss was to the Imperial County Services Building in El Centro, a six-story building whose support pillars failed and allowed partial collapse of the east portion of the building (fig. 11). Press accounts estimated the preliminary replacement cost at about \$7 million. The agriculture industry suffered losses due to damage to the irrigation systems of canals and probable damage to subsurface drain tiles in the fields which were cut by the movement along the Imperial Fault. The worst damage was to the All-American Canal which brings Colorado River water 129 km into the Imperial Valley. The earthquake shook down levees on both sides of the canal along a 13-km stretch of the canal east of Calexico. In some places the banks settled by more than 1 m.	
Mexicali, Mexico, suffered the same type of damage as the urban centers in California. The press reported about 100 homes, mostly adobe huts, were heavily damaged as was the airport terminal, and several buildings suffered ceiling cave-ins. There were also reports of walls collapsing, bricks falling from fronts of	

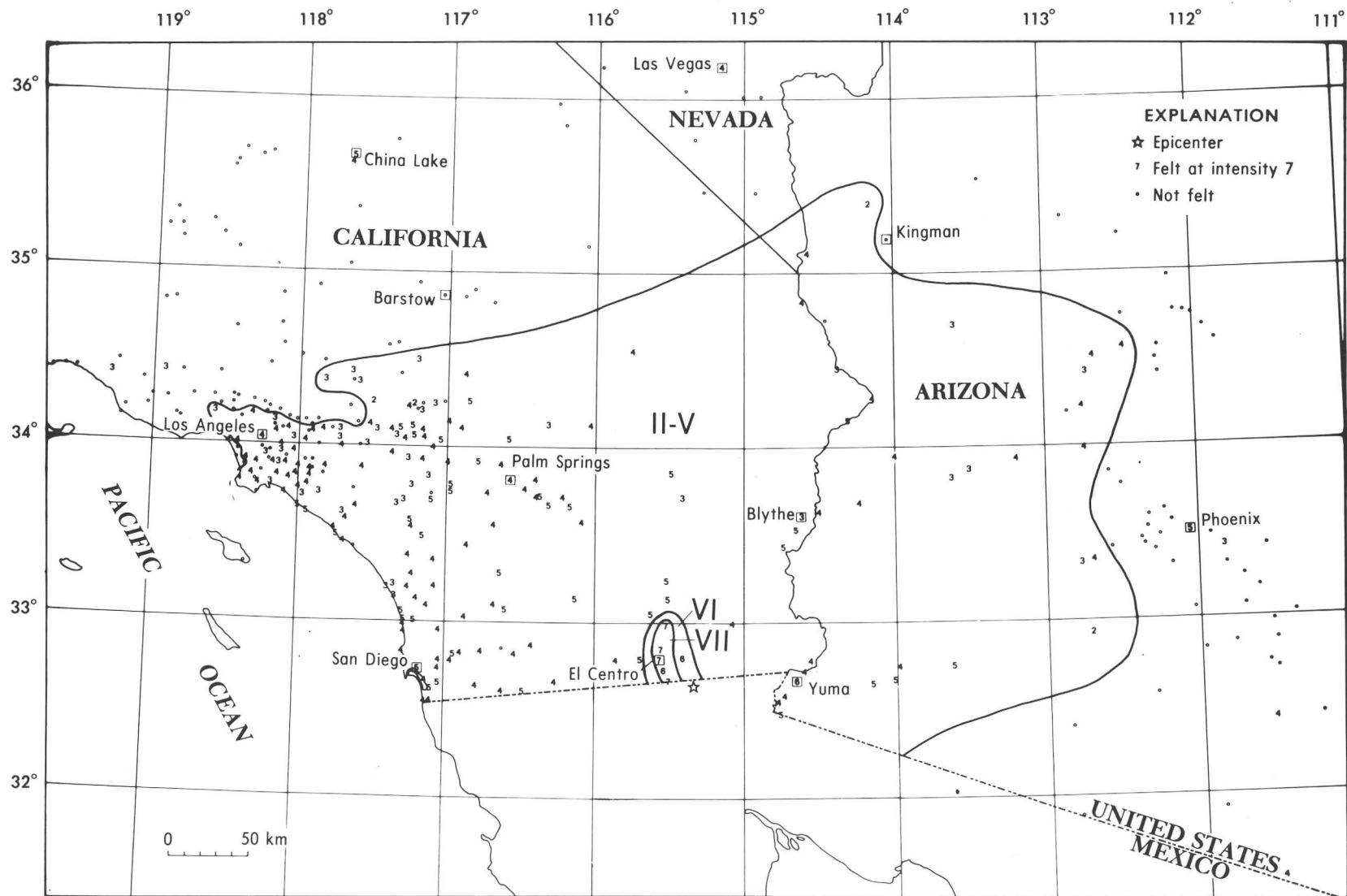


FIGURE 10.--Isoseismal map for the Imperial Valley, California earthquake of 15 October 1979, 23 16 54.5 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

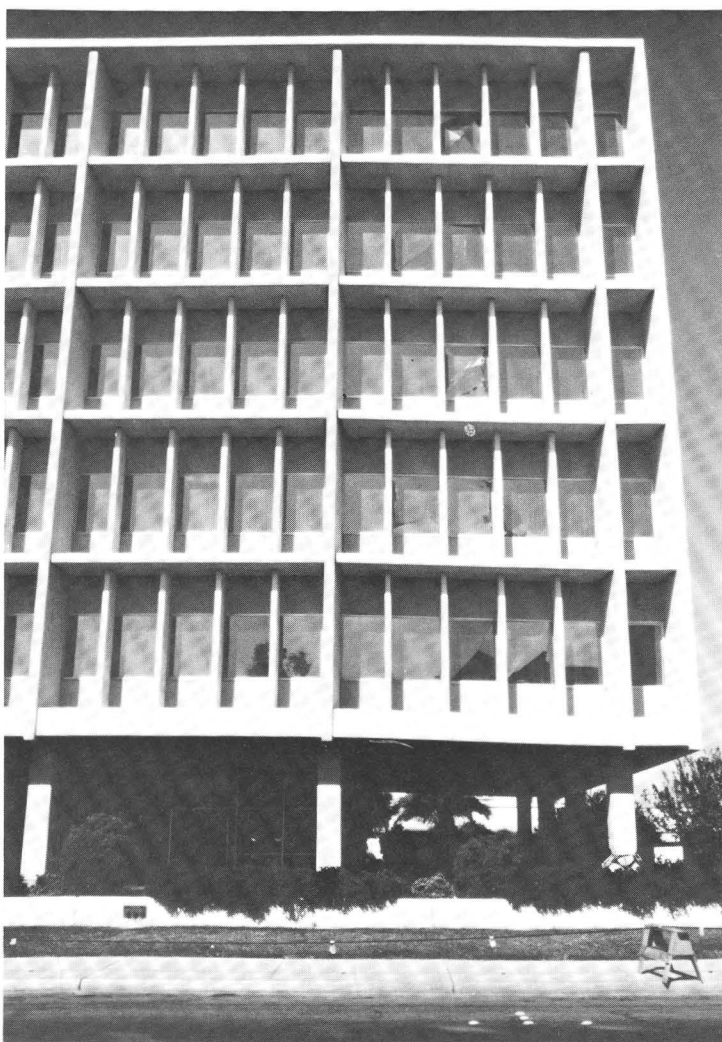


FIGURE 11.--Photograph of damage to the front of the Imperial County Services Building in Imperial, Calif.

Table 2.--Summary of macroseismic data for U.S. earthquakes, October-December 1979--Continued

California--Continued

stores, glass breakage, merchandise falling from shelves, debris littered sidewalks, and several breaks in water mains.

Reagor and others (1980) described the damage and effects of this earthquake and its aftershocks in the Imperial Valley as consisting of partially collapsed unreinforced brick walls; isolated instances of cracked or fallen cornices, parapets, and gables; a few chimneys damaged; display

Table 2.--Summary of macroseismic data for U.S. earthquakes, October-December 1979--Continued

California--Continued

windows broken or shattered; plaster cracked and fallen; sections of suspended ceiling tiles with framework displaced or fallen; shelves, counters shifted or overturned with merchandise thrown from shelves in many instances; all types of furniture moved with lighter furniture, bookcases and table lamps overturned; pictures and mirrors fallen; considerable quantities of glassware, dishes, and other small objects fallen and broken.

Table 2.—Summary of macroseismic data for U.S. earthquakes, October-December 1979—Continued

California--Continued

In the older section of the business districts, porticos were often extensively cracked and their columns were also cracked. Many people found it difficult to stand or to walk and, if sitting, had difficulty arising.

Neal and others (1979) made a comparison of the May 18, 1940 and October 15, 1979 Imperial Valley earthquakes and described this as follows: "Although of lesser extent, the October 15, 1979 ground rupture followed the same trace as the 1940 event, and showed many of the same features and characteristics. Both ruptures appeared to have maximum lateral displacements near the International Border, and predominant vertical displacement near the Mesquito Depression east of Imperial. Activity shifted to the north with both events having damaging aftershocks near Brawley. Also, like the 1979 event there is evidence that the Brawley fault under went sympathetic movement in 1940. The similarities also extend to the distribution and types of damage as described for the 1940 earthquake. In the 1940 event the structural damage was most severe in Brawley, and probably would have been so in the 1979 earthquake if it were not for the failure of the multi-million dollar County Services Building in El Centro."

Neal and others (1979) also described the rupture on the Imperial Fault as extending from about 4 km north of the International Border to about 4 km south of Brawley. Maximum lateral displacement was about 55 cm in Heber Dunes and the maximum vertical displacement was 19 cm southeast of Brawley. Lateral displacements were characterized by left stepping in echelon cracks and mole tracks. Vertical offsets showed a clean scarp at the base of the preexisting Imperial fault scarps. Secondary features observed by Neal and

Table 2.—Summary of macroseismic data for U.S. earthquakes, October-December 1979—Continued

California--Continued

others (1979) included sand boils and lateral spreading along the southern extent of the fault.

This earthquake triggered all of the USGS accelerographs within about 100 km of the epicenter and one as far away as 196 km. The maximum acceleration recorded was 1.74 g on the vertical component of El Centro Station No. 6 located about 27 km from the epicenter and about 1 km from the nearest point on the Imperial fault trace (Porcella and Matthiesen, 1979).

Many of the aftershocks were felt in the Imperial Valley, especially the one at 06 58 43.2, to which the press attributes additional damage in the Brawley area. Table 1 does not list all of the aftershocks of magnitude ≥ 3.0 that were recorded.

Reagor and others (1980) pointed out that the general level of maximum intensity assigned to this earthquake was VII with one exception. An intensity IX was assigned to El Centro because of failure of the Imperial County Services Building, a six-story reinforced concrete-frame structure which was designed under the 1967 provisions of the Uniform Building Code and was torn down after the failure.

Most of the damage descriptions for El Centro, Brawley, Calexico, and Imperial, California, listed below, were taken from Reagor and others (1980).

Intensity IX:

California--

El Centro--Although the general level of earthquake damage in El Centro is a VII, the Imperial County Services Building (ICSB), located on Main Street between Ninth and Eleventh Streets, has been given an intensity of IX (fig. 11). This six-story reinforced concrete-frame and

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued
<p>shear-wall structure, completed in 1971 at a construction cost of \$1.87 million (Rojahn and Ragsdale, 1980), was designed to be earthquake resistant. Although severely damaged, the building did not collapse. The major damage to the building was the failure of the four reinforced concrete support columns on the east side of the building (fig. 12). The concrete, at the base of the columns along the east side, was shattered and the vertical reinforced bars were severely bent. The partial collapse of these support columns allowed the eastern extremity of the building to sag about 30 cm (1 ft) (Rojahn and Ragsdale, 1980). In the upper levels of the building, the south-facing exterior wall was extensively</p>

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued
<p>cracked near the window frames. Also, in several instances partial separation occurred between the floors, walls, and ceilings. Fallen suspended ceiling tiles, damage to interior walls, and shifted or overturned office furniture were some of the effects reported to have occurred inside the building.</p>

Intensity VII:
California--

Brawley--Many buildings were damaged in the business district along Main Street between the 500 and 900 blocks. Damage at Brawley was further enhanced by aftershocks, which occurred near midnight on October 15. The aftershocks, according to several people were responsible for additional building damage, window breakage, and



FIGURE 12.--Photograph of damage to the east side of the Imperial County Services Building in Imperial, Calif.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued

the shaking of large quantities of merchandise from shelves.

McMahn's Furniture Store (500 block)--An estimated 15-m (50-ft) long crack about 2.5 cm (1 in) wide occurred in the west wall. Concrete columns which supported the balconies were moderately cracked at the ceiling connection. Ceiling tiles were dislodged and some fell. The dry wall was split and one section was thrown down from the south-facing wall. The building cornice cracked but did not fall. The east side of the metal sign, which covered the upper level store front, was shaken down.

Newberry Department Store (500 block)--The west brick wall was knocked away from the roof and partially collapsed. Twelve wooden support trusses were broken. Bricks fell from the roof and caused considerable damage to the interior of the store.

National Department Store (600 block)--There was some collapse of the roof. Fallen bricks caused dry-wall ceilings to split and fall. The cement floor in the storage area was cracked in a few places. Metal shelves that were bolted to concrete walls were thrown down.

Fire Station (800 block)--This building was a reinforced concrete structure with the roof supported by wooden beams. A few of these beams were reported to be cracked along their length. In the firehouse living quarters, a metal support bracket for one of the east-west beams was slightly twisted. A metal hose rack bolted to the west wall was thrown down. Roof tiles were dislodged and some fell. During the initial tremor, according to a fireman, "the trucks inside the garage were shaken so strongly they nearly touched each other."

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued

Victory Market (900 block)--The one-story building was a steel-frame and brick structure. The northeast corner of the east facing brick wall partially collapsed. There were 2.5-to-5.0-cm (1-to-2-in) open cracks in the west-facing brick wall in several places. In the middle of the 900 block the portico roof partially collapsed. In this area, according to the owner of the Victory Market, some of the buildings were condemned before the earthquake. Several homes in the 200 block of G Street were damaged. A stucco-covered chimney on the west side of the house shifted about 5 cm (2 in) from the wall. An attached wooden porch roof was shaken down from a wood-frame house across the street to the north. On Third Street, one block south, a few chimneys were either broken at the roof line or the upper tiers of bricks were thrown down to the west.

The press reported extensive damage to Tacos Pancho (201 Main Street) and about \$200,000 damage to the Elk's Lodge (196 State Street). There were also reports of an arcade broken off in front of Desert Shoes Store and a portion of the roof fallen inside Ellis' Department Store and lying on shelves.

New River Bridge (on State Highway 86 west of the city)--The abutments at each end of the bridge were cracked and chipped to the extent that the reinforcement bars were exposed at bridge level. Many of the support columns were cracked at the bridge deck connection. The asphalt road had settled about 12.5 cm (5 in) relative to the bridge.

Two and one-half kilometers south of Main Street on Dogwood Road an elevated water tower collapsed.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued

Calexico--Damage to several buildings occurred in the business district along Second and Third Streets. Many of the buildings' store fronts along Second Street exhibited large vertical and horizontal cracks in the exterior stucco walls.

McMahn's Furniture Store (104 East Second Street)--Partial collapse of the second-story west brick wall and parapet (fig. 13) caused the roof of the portico to cave-in. The upper story was condemned before the earthquake.

International Music Store (Third Street and Paulen)--The building was damaged by the partial collapse of the east brick fire wall which caved in the roof of the store, damaging merchandise and equipment.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued

The Port of Entry was damaged when the brick facade tumbled to the floor. It also suffered many plaster cracks (press report).

El Camino Real Hotel (Second and Pauline Streets)--The press reported the roof had collapsed.

San Diego State University's main building, which was built in 1915 and lost the second floor to an earthquake in 1927, suffered severe structural damage and was later condemned. There was no steel in several of the bearing walls which were severely damaged. Also, a basement support was cracked on both sides (press report).

Other effects reported by the press were as follows: The Unified School District buildings suffered damage to



FIGURE 13.--Photograph of damage to the McMahn's Furniture Store in Calexico, Calif.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued

walls, falling light fixtures, broken glass and overturned furniture; several street lights were knocked down; extensive merchandise damage in grocery and drug stores; many buildings sustained cracked and fallen plaster with a few porches damaged; along with broken water mains, leaks in gas lines, and electric lines knocked down.

El Centro--In the older business district most of the building damage was along Main and State Streets between Fourth and Eighth Streets, and in the 400 and 500 blocks on Broadway.

The newer shopping centers, located along Imperial Avenue and to the west of the older business district, appeared to have sustained only minor damage such as small plaster cracks and some fallen plaster, merchandise damage due to fall from shelves, and the displacement and occasional fall of suspended ceiling tiles with framework slightly bent or hanging down.

Hoffman Music Store (534 Main Street)--The brick and stucco veneer store front over the building was extensively fractured.

Deluxe Cleaners (119 North Fifth Street)--The two-story wood-frame and brick building was damaged by the partial collapse of the west facing parapet and by the fall of brick veneer from the second-story walls (fig. 14). The roof over the second story was reported to have collapsed. The upper story had been condemned before the earthquake.

Mayan Hotel (595 State Street)--The two-story steel frame and brick building with stucco veneer was moderately damaged. Along the length of the east wall, there was about 2.5 cm (1 in) of

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued

separation at the connections of the ceilings and floors. There was also considerable fallen and cracked plaster from ceilings and walls in all the rooms and in the lobby.

A duplex home (547 Vine Street) was declared structurally unsound according to the press due to a collapsed porch and structural damage to the interior.

The Firestone Tire building (Fourth and Main Streets) sustained separated walls and damage to the foundation (press report).

The Imperial Valley College (north of El Centro) had reported damage of about \$151,000. There was structural damage to the library building, much glass breakage in laboratories and classrooms, and some kind of damage to nearly all of the buildings (press report).

The city water storage tower (Third and Commerical Streets) was condemned due to damage to the bracing of the tower and bending of some of the steel support girders (press report).

Green's Custom Jewelry (113 North 5th Street)--Most of the brick facade fell onto the sidewalk (press report).

At Gio's Mobile Home Estates, on Lincoln Avenue, a large number of the nearly 90 mobile homes were damaged when they were shaken from their metal support stands. A concrete-block masonry fence, standing in an east-west direction, was partially thrown down at the south entrance to the mobile home park.

Other effects in and around El Centro--North of El Centro an oil tank split 15 cm (6 in) along a seam near the base at the Southern Pacific Pipeline tank farm. Underground water pipes were broken in many places; however, utilities

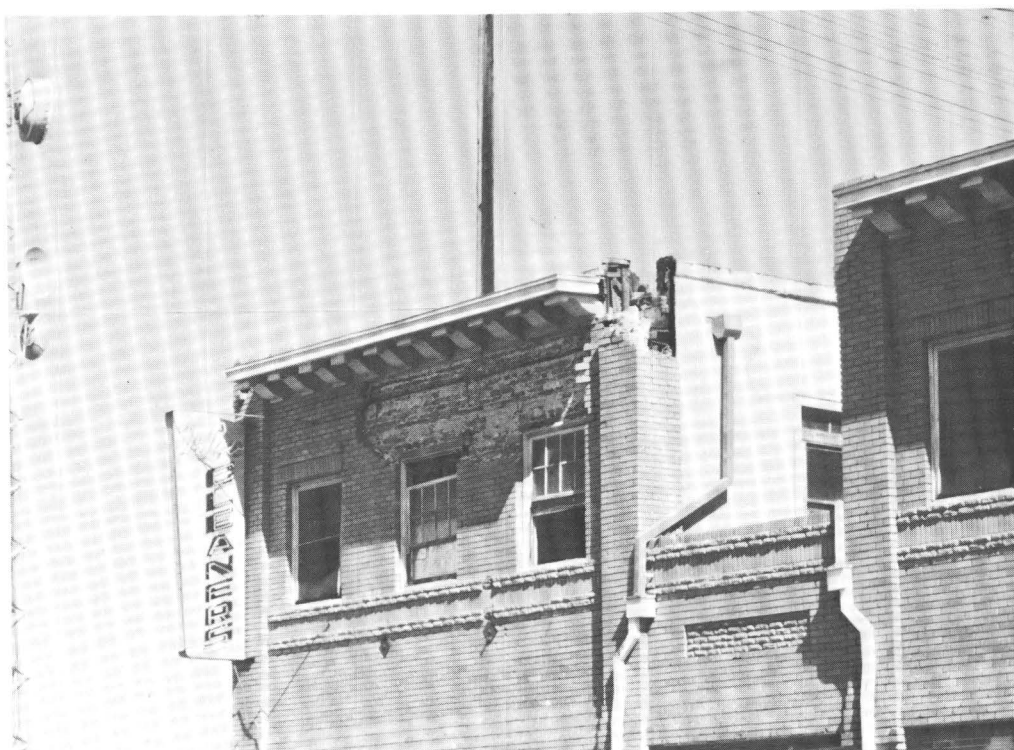


FIGURE 14.--Photograph of damage to the Deluxe Cleaners building in El Centro, Calif.

Table 2.--Summary of macroseismic data for U.S. earthquakes, October-December 1979--Continued

California--Continued

were interrupted for only a short period of time. Asphalt roads cracked, buckled, and slumped in many places, especially where the fault trace crossed the roadway. The San Diego and Arizona Eastern Railroad tracks were offset about 23 cm where they crossed the Imperial fault east of El Centro near Meloland.

Imperial--The press reported that more than 80 percent of the buildings in the downtown area had been condemned after sustaining damage estimated at \$1.8 million. Most of the damage occurred on the west side of Imperial Avenue. Several sewer pipes were also reported broken.

Lydia's Cafe (133 S. Imperial)--The one-story,

Table 2.--Summary of macroseismic data for U.S. earthquakes, October-December 1979--Continued

California--Continued

wood-frame and brick structure was damaged by the partial collapse of the south wall. Part of the roof was knocked out.

Imperial Hardware Store (125 Imperial)--The rear wall of the brick building was severely cracked and the top part of the building was pushed toward the west.

The police chief reported damage to the residential area of Imperial consisted of many stucco homes that moved on their foundations and others that had lateral cracks near their foundations. A masonry fence supporting a carport partially collapsed. Chimney bricks were loosened. At the police station, the plastered wall between the chief's office and the jail area cracked vertically and opened

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued

to a width of 2.5 cm (1 in). The police chief said, "I was in a doctor's office at the time of the initial tremor and I could not get up out of the chair due to the building moving in all directions at once. A loud roaring sound preceded the earthquake."

Intensity VI:

Arizona--

Yuma--The quake was reported felt much more strongly and did more damage in the Yuma Valley than on the Yuma Mesa about 15-30 m above the valley.

The press reported three pencil-wide cracks in the Juvenile Court Center (2849 Avenue B), a masonry building; one water main was broken; the roof of the Stardust Hotel was cracked; and windows cracked and goods were knocked off of shelves at the Yuma Marine Corps Air Station.

Other effects reported were cracks in plaster walls, light and heavy furniture moved, hanging pictures fell, felt by all.

Heber--cracked foundation and reports of interior walls separated from ceiling to floor, light and heavy furniture moved, few windows cracked, hanging pictures fell, felt by all.

Holtville--Store front windows in occupied building on Fifth and Holt Avenue were broken, a number of buildings sustained cracks in their exterior walls, many homes in the Ralph Simpson subdivision were damaged when brick fireplaces pulled away from the walls, the Barbara Worth Country Club had most of their dishes broken, and one house shifted off its foundation--type of foundation unknown (all from press reports).

California--Continued

Intensity V:

Arizona--Dateland, Parker, Phoenix, San Luis, Tacna, Wellton.

California--Big Bear City, Bonita, Cabazon, Campo, Cardiff by the Sea, China Lake, Chula Vista, Coachella, Eagle Mountain, Earp, Encinitas, Hemet, Highland, Huntington Beach, Jacumba, Julian, La Quinta, Laguna Niguel, Morongo Valley, Newport Beach, Niland, Ocotillo, Palm Desert, Palo Verde, Rancho Santa Fe, Redlands, Ripley, San Bernardino, San Diego, San Jacinto, Santee, Seeley, Temecula, Warner Springs, Westmoreland, Wildomar, Winchester, Yucaipa.

Intensity IV:

Arizona--Aguila, Bouse, Bullhead City, Ehrenberg, Gadsden, Glendale (press report), Palo Verde, Prescott, Quartzsite, Roll, Silver Bell, Skull Valley, Somerton, Wickenburg, Yarnell.

California--Aguanga, Alhambra, Alpine, Amboy, Anaheim, Angelus Oaks, Anza, Bard, Beaumont, Bonsall, Boulevard, Bryn Mawr, Buena Park, Burbank, Calimesa, Calipatria, Cathedral City, Chino, City of Industry, Corona, Costa Mesa, Covina, Crestline, Culver City, Cypress, Dana Point, Del Mar, Dulzura, East Highlands, El Cajon, Escondido, Etiwanda, Fallbrook, Forest Falls, Fullerton, Garden Grove, Glamis, Hawthorne, Idyllewild, Imperial Beach, Indio, La Jolla, La Mesa, La Puente, Laguna Beach, Lakeside, Lakewood, Lemon Grove, Loma Linda, Los Alamitos, Los Angeles, Lucerne Valley, Mecca, Mentone, Midway City, Mission Viejo, Montebello, Moreno, Mount Laguna, Murrieta, National City, Needles, Nestor, North Palm Springs, Norwalk, Pala, Palm Springs, Palos Verdes Peninsula, Parker Dam, Patton, Penasquitos (press report), Pine Valley, Plaster City,

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued

Potrero, Poway, Ramona, Rancho
Mirage, Redondo Beach, Rialto,
Ridgecrest, Riverside,
Rosemead, San Dimas, San Mar-
cos, Santa Ysabel, Solano
Beach, Surfside, Thousand
Palms, Torrance, Trabuco
Canyon, Twentynine Palms, Val-
ley Center, Vista, Westminster,
White Water, Whittier, Wilming-
ton, Winterhaven, Yorba Linda,
Yucca Valley (press report).
Nevada--Las Vegas.

Intensity III:

Arizona--Arlington, Kirkland,
Lake Havasu City, Mesa, Salome,
Sasabe, Tucson (press report),
Wenden, Wikieup.

California--Apple Valley,
Bellflower, Blythe, Carlsbad,
Claremont, Colton, Coronado .
(press report), Desert Center,
El Monte, El Toro, Fillmore,
Fontana, Fountain Valley,
Gardena, Green Valley Lake,
Joshua Tree, Lake Elsinore,
Lakeview, Long Beach, Mira
Loma, Oak View, Oceanside,
Paramount, Pasadena, Perris,
Phelan, Pico Rivera, Pinon
Hills, Pomona, Reseda, Running
Springs, San Luis Rey, Santa
Ana, South Gate, Stanton, Sun
City, Sunnymead, Valyermo.

Intensity II:

Arizona--Chloride, Gila Bend.
California--Blue Jay, Lytle
Creek.

Felt:

Arizona--Kingman (press report).
California--Santee (press
report).

16 October (P) Imperial Valley

Origin time: 06 58 43.2
Epicenter: 33.02 N., 115.58 W.
Depth: 5 km
Magnitude: 5.2 mb(G), 5.7
MS(G), 5.4 ML(P),
6.1 ML(B)

Reagor and others (1980) pointed
out that aftershocks caused addi-
tional damage, ascertained from
personal interviews with
residents in Imperial and Braw-
ley. The press cited one example

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued

in the description of damage at a
home (321 Main Street, Imperial)
where the main shock caused very
little damage but the one that
occurred near midnight buckled
the floor, caused walls to move
so that none were left vertical,
steps to the porch to crumple,
doors to jam shut, and a 16-
year-old girl to be thrown out of
the top of a bunk bed.

Intensity VI: Brawley, Imperial.

17 October (P) Imperial Valley

Origin time: 19 14 38.1
Epicenter: 32.97 N., 115.60 W.
Depth: 7 km
Magnitude: 4.1 ML(P)

Felt at El Centro (press report).

17 October (P) Southern California

Origin time: 20 52 36.8
Epicenter: 33.90 N., 118.63 W.
Depth: 6 km
Magnitude: 4.5 mb(G), 4.2
ML(P), 4.0 ML(B)

This earthquake occurred in the
same area as the one on January
1, 1979, 23 14 38.9 UTC which
caused minor damage. The press
reports that this shock widened a
2-foot crevice in the Big Rock
slide area by about 5 cm above
the Pacific Coast Highway in
Malibu. The highway was closed
temporarily because rocks had
rolled down onto the roadway.
Other minor rockslides were
reported near a tunnel in Malibu
Canyon. It was felt over an area
of approximately 5,200 sq km
(fig. 15).

Intensity V:

Compton (few windows cracked;
hanging pictures swung; win-
dows, doors, and dishes rat-
tled; felt by many).

La Costa (few windows cracked;
small objects moved, buildings
creaked; windows, doors, and
dishes rattled; felt by many).

Los Angeles--Ladera Heights
(small objects were moved and
overturned; standing vehicles
rocked moderately; moving vehi-
cles rocked slightly; windows,

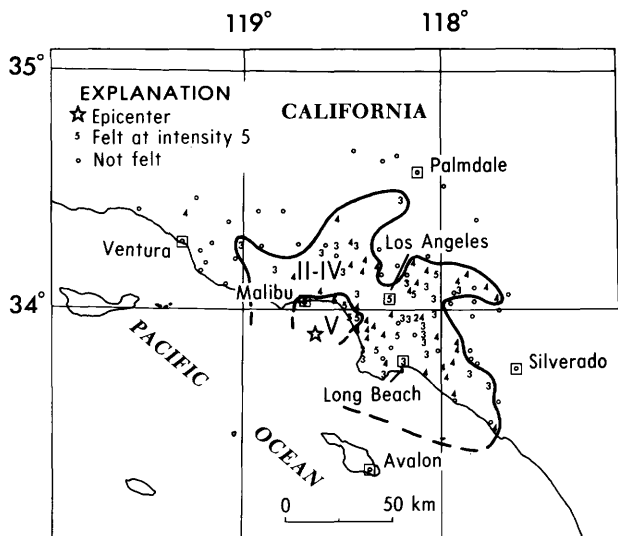


FIGURE 15.--Isoseismal map for the southern California earthquake of 17 October 1979, 20 52 36.8 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.--Summary of macroseismic data for U.S. earthquakes, October-December 1979--Continued

California--Continued

doors, and dishes rattled; felt by many).

Los Angeles--Rancho Park (small objects fell; buildings trembled and creaked; windows, doors, and dishes rattled; moderate earth noise; felt by many).

Malibu (rock slides on the Pacific Coast Highway, buildings shook strongly, house under construction almost collapsed--press report, felt by many).

Marina del Rey (few windows cracked; hanging pictures knocked out of place; buildings creaked; windows, doors, and dishes rattled; felt by many).

Monrovia (light furniture moved; buildings creaked; windows, doors, and dishes rattled; felt by many).

Monterey Park (light furniture and small objects moved, water splashed onto sides of swimming pools, hanging pictures knocked out of place, felt by many).

Pacific Palisades (at Palisades

Table 2.--Summary of macroseismic data for U.S. earthquakes, October-December 1979--Continued

California--Continued

Valley School desks were shaken and some books knocked off shelves; in a liquor store bottles rattled and shook; in a drug store a few plastic bottles were shaken from shelves--press report).

Santa Monica (light and heavy furniture moved; buildings shook strongly; windows, doors and dishes rattled; felt by few).

Santa Monica--Will Rogers area (hanging pictures fell; small objects moved; windows, doors, and dishes rattled; felt by several).

Venice (one crack reported in the post office ceiling where support pillars join the ceiling).

Walteria (light furniture moved, hanging pictures knocked out of place, felt by many).

Intensity IV: Agoura, Alhambra, Anaheim, Anaheim--Brookhurst Center, Arcadia (press report), Azusa, Barrington, Burbank, Canoga Park, Costa Mesa (press report), Crenshaw, Culver City, East Long Beach, Echo Park (press report), El Segundo, Figueroa, Florence, Fountain Valley, Fullerton, Garden Grove, Gardena, Gateway, Glendora, Hawthorne, Huntington Park, Inglewood, Inglewood-Morningside Park, La Mirada, La Verne, Laguna Niguel, Lawndale, Lennox, Lincoln Heights, Los Angeles, Los Angeles--West Adams, Midway City, Newhall (press report), North Inglewood, North Hollywood, North Hollywood--Victory Center, North Torrance, Oakview, Ocean Park, Palms, Playa del Rey, Pomona--Central District, San Marino, Seal Beach, Sierra Madre, Sun Valley, Sunset Beach, Surfside, Sylmar, Topanga, Torrance, Van Nuys, Vernon, Wilmington, Yorba.

Intensity III: Acton, Anaheim--Federal, Bell, Beverly Hills, Buena Park, Cerritos, Chatsworth, Covina, Cudahy, Diamond, East Irvine, El Monte, Encino, Granada Hills, Griffith, Huntington Park--State Street Area, Kester, Laurel Canyon, Long Beach, Los Alamitos, Los Angeles--Broadway

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued	
<p>Manchester area, Los Angeles-- Farmers Market area, Los Angeles--Veterans Administration area, Maywood, Mission Hills, North Hollywood--Valley Plaza area, North Hollywood--Valley Village area, Norwalk, Norwood Center, Orangehurst, Pacoima, Palos Verdes Peninsula, Panorama City, Perry, Preuss, Redondo Beach, Resada, Rosemead, San Gabriel, Santa Fe Springs, Somis, South El Monte, South Pasadena, Studio City, Sunkist, Tarzana, Terminal Island, Thousand Oaks, Westminster, Whittier, Van Nuys--Civil Center.</p>	
<u>Intensity II:</u> Pico Rivera, South Whittier.	
17 October (P) Imperial Valley	
Origin time:	22 45 33.4
Epicenter:	33.10 N., 115.55 W.
Depth:	5 km
Magnitude:	4.8 mb(G), 4.5 ML(P), 5.0 ML(B)
Felt in the Imperial Valley (press report).	
18 October (P) Southern California	
Origin time:	04 25 43.2
Epicenter:	33.93 N., 118.65 W.
Depth:	16 km
Magnitude:	3.0 ML(P)
Felt at Pacific Palisades and in the San Fernando Valley (press report).	
19 October (P) Southern California	
Origin time:	12 22 37.7
Epicenter:	34.20 N., 117.53 W.
Depth:	7 km
Magnitude:	4.1 ML(P), 4.2 ML(B)
<u>Intensity V:</u>	
Lytle Creek (hanging pictures fell, small objects moved, buildings creaked and shook, awakened and felt by all).	
<u>Intensity IV:</u> Alta Loma, Apple Valley, Azusa, Chino, Claremont, Cucamonga, Devore, Etiwanda, Fawnskin, Fontana, Green Valley Lake, Lake Arrowhead, La Puente, Mt. Baldy, Norco, Ontario, Perris, Phelan, Pinon Hills,	

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued	
<p>Pomona, Rancho Cucamonga (press report), Redlands, Rialto, River- side, San Bernardino, San Dimas, Upland, Wrightwood.</p>	
<u>Intensity III:</u> Arcadia, Corona, San Bernardino--West Side, Vic- torville.	
<u>Intensity II:</u>	Colton.
<u>Felt:</u>	Montclair.
23 October (B) Northern California	
Origin time:	10 55 38.8
Epicenter:	40.43 N., 124.11 W.
Depth:	5 km
Magnitude:	4.0 ML(B)
Felt in the Scotia area (B).	
24 October (P) Southern California	
Origin time:	13 32 50.0
Epicenter:	34.18 N., 116.42 W.
Depth:	8 km
Magnitude:	3.4 ML(P)
Felt at Yucca Valley (P).	
<u>Intensity IV:</u> Morongo Valley.	
28 October (P) Owens Valley area	
Origin time:	23 12 25.7
Epicenter:	37.50 N., 118.80 W.
Depth:	5 km
Magnitude:	3.0 ML(P)
Felt at Mammoth Lakes (P).	
31 October (P) Imperial Valley	
Origin time:	11 43 46.4
Epicenter:	32.88 N., 115.48 W.
Depth:	5 km
Magnitude:	3.4 ML(P)
Felt at Brawley and El Centro (P).	
4 November (P) Imperial Valley	
Origin time:	17 13 30.8
Epicenter:	33.08 N., 115.55 W.
Depth:	5 km
Magnitude:	3.6 ML(P)
<u>Intensity IV:</u> Brawley.	
6 November (P) Southern California	
Origin time:	04 30 59.0
Epicenter:	32.92 N., 116.20 W.
Depth:	7 km
Magnitude:	3.2 ML(P)
<u>Intensity IV:</u> Julian.	

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued	
7 November (B) Owens Valley area	
Origin time:	06 27 22.2
Epicenter:	37.64 N., 118.95 W.
Depth:	5 km
Magnitude:	3.9 ML(B), 3.7 ML(P)
Felt at Mammoth Lakes and Lake Crowley (P).	
9 November (B) Owens Valley area	
Origin time:	09 00 51.4
Epicenter:	37.61 N., 118.91 W.
Depth:	5 km
Magnitude:	3.4 ML(B), 3.3 ML(P)
Felt at Mammoth Lakes (B).	
9 November (B) Owens Valley area	
Origin time:	10 12 53.3
Epicenter:	37.61 N., 118.90 W.
Depth:	5 km
Magnitude:	4.0 ML(B), 4.0 ML(P)
Felt at Mammoth Lakes (B).	
9 November (B) Owens Valley area	
Origin time:	17 46 56.7
Epicenter:	37.63 N., 118.89 W.
Depth:	5 km
Magnitude:	3.8 ML(B), 4.1 ML(P)
Felt at Mammoth Lakes (B).	
9 November (B) Owens Valley area	
Origin time:	17 54 13.5
Epicenter:	37.61 N., 118.88 W.
Depth:	5 km
Magnitude:	4.2 ML(B), 4.4 ML(P)
<u>Intensity IV:</u> June Lake.	
<u>Intensity III:</u> Big Creek.	
<u>Felt:</u> Mammoth Lakes.	
9 November (B) Owens Valley area	
Origin time:	21 04 47.1
Epicenter:	37.66 N., 118.94 W.
Depth:	5 km
Magnitude:	3.7 ML(B), 3.2 ML(P)
Felt at Mammoth Lakes (B).	
9 November (B) Owens Valley area	
Origin time:	22 26 52.4
Epicenter:	37.63 N., 118.94 W.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued	
Depth:	5 km
Magnitude:	3.3 ML(B), 3.2 ML(P)
Felt at Mammoth Lakes (B).	
9 November (B) Owens Valley area	
Origin time:	22 59 31.7
Epicenter:	37.64 N., 118.89 W.
Depth:	5 km
Magnitude:	3.5 ML(B), 3.6 ML(P)
Felt at Mammoth Lakes (B).	
10 November (B) Owens Valley area	
Origin time:	09 45 07.0
Epicenter:	37.67 N., 118.96 W.
Depth:	5 km
Magnitude:	4.0 ML(B), 4.2 ML(P)
Felt at Mammoth Lakes (B).	
14 November (B) Owens Valley area	
Origin time:	01 05 42.5
Epicenter:	37.63 N., 118.96 W.
Depth:	5 km
Magnitude:	3.4 ML(B), 3.2 ML(P)
Felt at Mammoth Lakes (B).	
15 November (B) Owens Valley area	
Origin time:	20 51 31.8
Epicenter:	37.63 N., 118.94 W.
Depth:	5 km
Magnitude:	3.3 ML(B), 3.5 ML(P)
Felt at Mammoth Lakes (B).	
16 November (B) Owens Valley area	
Origin time:	21 48 23.6
Epicenter:	37.63 N., 118.93 W.
Depth:	5 km
Magnitude:	3.8 ML(B), 3.6 ML(P)
Felt at Mammoth Lakes (B).	
17 November Southern California	
Origin time:	05 25
Epicenter:	Not located.
Depth:	None computed.
Magnitude:	None computed.
<u>Intensity III:</u> Etiwanda.	

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued	
20 November (B) Owens Valley area	
Origin time:	17 23 57.1
Epicenter:	37.63 N., 118.95 W.
Depth:	5 km
Magnitude:	4.2 ML(B), 4.2 ML(P)
Felt at Mammoth Lakes (B).	
25 November (B) Owens Valley area	
Origin time:	06 46 59.9
Epicenter:	37.60 N., 118.82 W.
Depth:	5 km
Magnitude:	3.0 ML(B)
Felt at Mammoth Lakes (B).	
26 November (B) Central California	
Origin time:	12 40 08.7
Epicenter:	37.84 N., 122.01 W.
Depth:	6 km
Magnitude:	2.8 ML(B)
Felt at Danville (B).	
26 November (B) Central California	
Origin time:	12 43 57.6
Epicenter:	37.84 N., 122.02 W.
Depth:	5 km
Magnitude:	2.7 ML(B)
Felt at Danville (B).	
28 November (P) Southern California	
Origin time:	10 53 18.0
Epicenter:	33.97 N., 118.65 W.
Depth:	12 km
Magnitude:	2.7 ML(P)
Felt at Woodland Hills (P).	
29 November (P) Central California	
Origin time:	15 09 41.0
Epicenter:	35.63 N., 118.38 W.
Depth:	3 km
Magnitude:	2.7 ML(P)
Felt at Lake Isabella (P).	
2 December (P) Southern California	
Origin time:	00 46 27.7
Epicenter:	32.63 N., 116.02 W.
Depth:	13 km
Magnitude:	3.9 ML(P)
Felt in portions of Imperial and San Diego County.	

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued	
	<u>Intensity III:</u> Campo, Julian (Cuyamaca area).
	<u>Intensity II:</u> Painted Gorge Valley.
2 December (P) Southern California	
Origin time:	18 09 21.1
Epicenter:	33.93 N., 118.65 W.
Depth:	7 km
Magnitude:	2.7 ML(P)
Felt in West Los Angeles (P).	
6 December (B) Owens Valley area	
Origin time:	19 32 36.8
Epicenter:	37.62 N., 118.92 W.
Depth:	5 km
Magnitude:	4.2 ML(B), 4.3 ML(P)
Felt at Mammoth Lakes (B).	
8 December (B) Owens Valley area	
Origin time:	21 38 50.4
Epicenter:	37.66 N., 118.94 W.
Depth:	5 km
Magnitude:	4.3 ML(B), 4.3 ML(P)
Felt at Mammoth Lakes (B).	
9 December (B) Owens Valley area	
Origin time:	02 08 14.8
Epicenter:	37.61 N., 118.90 W.
Depth:	5 km
Magnitude:	3.6 ML(B), 3.5 ML(P)
Felt at Mammoth Lakes (B).	
11 December (B) Central California	
Origin time:	12 05 02.3
Epicenter:	37.75 N., 122.16 W.
Depth:	14 km
Magnitude:	2.7 ML(B)
Felt at Castro Valley and East Oakland (B).	
12 December (P) Baja California, Mexico	
Origin time:	21 37 41.0
Epicenter:	32.20 N., 116.23 W.
Depth:	5 km
Magnitude:	4.0 ML(P)
Felt in the Imperial Valley, California.	

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued	
16 December (P) Southern California	
Origin time: 06 00 54.3	
Epicenter: 33.97 N., 118.67 W.	
Depth: 9 km	
Magnitude: 3.2 ML(P)	
Felt in West Los Angeles and Pacific Palisades (P).	
16 December (B) Owens Valley area	
Origin time: 06 29 26.7	
Epicenter: 37.68 N., 118.98 W.	
Depth: 5 km	
Magnitude: 3.7 ML(B), 3.6 ML(P)	
Felt at Mammoth Lakes (B).	
<u>Intensity III:</u> June Lake.	
16 December (B) Owens Valley area	
Origin time: 10 44 14.0	
Epicenter: 37.62 N., 118.92 W.	
Depth: 5 km	
Magnitude: 3.5 ML(B), 3.2 ML(P)	
Felt at Mammoth Lakes (B).	
17 December (B) Central California	
Origin time: 06 54 52.9	
Epicenter: 37.07 N., 121.50 W.	
Depth: 13 km	
Magnitude: 3.1 ML(B)	
<u>Intensity IV:</u> Residents awakened near the epicenter (B).	
18 December (P) Southern California	
Origin time: 11 59 48.5	
Epicenter: 34.07 N., 117.15 W.	
Depth: 6 km	
Magnitude: 2.7 ML(P)	
Felt at San Bernardino (P).	
<u>Intensity IV:</u> Redlands	
18 December (P) Southern California	
Origin time: 12 00 16.5	
Epicenter: 34.07 N., 117.13 W.	
Depth: 2 km	
Magnitude: 2.9 ML(P)	
Felt at Redlands and San Bernardino (P).	
18 December (P) Southern California	
Origin time: 15 37 13.8	
Epicenter: 34.02 N., 117.12 W.	

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued	
Depth: 8 km	
Magnitude: 3.3 ML(P)	
Felt at Redlands and San Bernardino.	
19 December (P) Southern California	
Origin time: 18 11 05.2	
Epicenter: 34.02 N., 117.12 W.	
Depth: 5 km	
Magnitude: 2.7 ML(P)	
Felt at Redlands (P).	
20 December (B) Northern California	
Origin time: 05 02 18.7	
Epicenter: 38.80 N., 122.98 W.	
Depth: 5 km	
Magnitude: 3.2 ML(B)	
Felt at Cobb.	
20 December (B) Central California	
Origin time: 12 29 56.1	
Epicenter: 37.59 N., 122.38 W.	
Depth: 15 km	
Magnitude: 2.3 ML(B)	
Felt at San Jose.	
21 December (P) Imperial Valley area	
Origin time: 20 40 25.3	
Epicenter: 32.78 N., 115.38 W.	
Depth: 5 km	
Epicenter: 4.5 mb(G), 4.6 ML(P)	
<u>Intensity VI:</u>	
California--Imperial (large cracks in exterior walls, cracks in stone or brick fences, few windows cracked, light furniture moved, small objects overturned, hanging pictures out of place, felt by many).	
<u>Intensity V:</u>	
California--El Centro (few windows cracked, light furniture and small objects moved, felt by all).	
<u>Intensity IV:</u>	
Arizona--Somerton, Wellton, Yuma.	
California--Bard, Calexico, Heber.	
<u>Intensity III:</u>	
Arizona--Gadsden, San Luis, Yuma	
Marine Corps Air Station.	
California--Holtville, Plaster City, Ripley, Seeley.	

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Continued	
<u>Intensity II:</u>	
California--Salton City.	
<u>Felt:</u>	
California--San Diego (P).	
24 December (B) Central California	
Origin time:	13 09 39.8
Epicenter:	36.97 N., 122.27 W.
Depth:	9 km
Magnitude:	4.0 ML(B)
Felt at Bonnie Doon, Boulder Creek, Felton, Monterey Bay, and Santa Cruz (B).	
26 December (B) Owens Valley area	
Origin time:	08 09 04.8
Epicenter:	37.60 N., 118.84 W.
Depth:	5 km
Magnitude:	4.0 ML(B)
Felt at Mammoth Lakes (B).	
28 December (B) Owens Valley area	
Origin time:	03 29 49.7
Epicenter:	37.64 N., 118.89 W.
Depth:	5 km
Magnitude:	3.7 ML(B)
Felt at Mammoth Lakes (B).	
31 December (P) Southern California	
Origin time:	06 03 40.3
Epicenter:	33.65 N., 117.90 W.
Depth:	7 km
Magnitude:	2.7 ML(P)
Felt at Costa Mesa (P).	
31 December (B) Western Nevada	
Origin time:	08 27 51.9
See California listing.	
California--Off the coast	
24 October (B) Northern California	
Origin time:	15 23 48.6
Epicenter:	40.41 N., 124.83 W.
Depth:	20 km
Magnitude:	4.8 mb(G), 4.6 ML(B)
<u>Intensity IV:</u> Arcata, Bayside, Eureka, Fields Landing, Garber- ville, Loleta, Miranda, Phillips- ville, Rio Dell, Weott.	
<u>Intensity III:</u> Blue Lake, Hoopa,	

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

California--Off the coast--Continued	
Hydesville, Korbel, Redway, Scotia.	
<u>Intensity II:</u>	Carlotta.
<u>Felt:</u>	Ferndale, Fortuna.
Connecticut	
30 December (J) Southeastern New York	
Origin time:	14 15 11.9
See New York listing.	
Hawaii	
The locations shown below followed by (H) designate intensity values assigned by the Hawaiian Volcano Observatory.	
6 October (H) Island of Hawaii	
Origin time:	10 46 12.2
Epicenter:	19.33 N., 155.22 W.
Depth:	10 km
Magnitude:	3.9 ML
<u>Intensity IV:</u> Keaau.	
<u>Intensity III:</u> Hawaii Volcanoes National Park, Papaikou, Volcano.	
9 October (H) Island of Hawaii	
Origin time:	02 40 19.8
Epicenter:	19.33 N., 155.19 W.
Depth:	10 km
Magnitude:	3.7 ML
<u>Intensity III:</u> Hilo.	
13 October (H) Island of Hawaii	
Origin time:	01 59 25.8
Epicenter:	19.38 N., 155.25 W.
Depth:	4 km
Magnitude:	3.0 ML
<u>Intensity II:</u> Hilo.	
13 October (H) Island of Hawaii	
Origin time:	11 16 26.0
Epicenter:	19.44 N., 155.35 W.
Depth:	8 km
Magnitude:	3.8 ML
<u>Intensity III:</u> Hawaii Volcanoes National Park, Hilo, Keaau, Pohakuloa, Volcano.	
13 October (H) Island of Hawaii	
Origin time:	12 58 51.0
Epicenter:	19.45 N., 155.36 W.
Depth:	7 km

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

Hawaii--Continued	
Magnitude:	3.1 ML
<u>Intensity II:</u>	Kilauea Military Camp.
14 October (H) Island of Hawaii	
Origin time:	17 37 16.9
Epicenter:	19.91 N., 155.18 W.
Depth:	41 km
Magnitude:	4.0 ML
<u>Intensity IV:</u>	Kohala.
<u>Intensity III:</u>	Hawaii Volcanoes National Park, Honomu, Mountain- view.
21 October (H) Island of Hawaii	
Origin time:	05 57 02.0
Epicenter:	19.32 N., 155.20 W.
Depth:	10 km
Magnitude:	3.5 ML
<u>Intensity III:</u>	Papaikou, Puna areas, Volcano.
31 October (H) Island of Hawaii	
Origin time:	05 35 11.7
Epicenter:	19.88 N., 156.34 W.
Depth:	0 km
Magnitude:	4.2 ML
<u>Intensity IV:</u>	Holualoa, Kona.
4 November (H) Island of Hawaii	
Origin time:	04 09 51.6
Epicenter:	20.06 N., 155.64 W.
Depth:	13 km
Magnitude:	3.0 ML
<u>Intensity III:</u>	Waimea.
11 November (H) Island of Hawaii	
Origin time:	10 25 33.6
Epicenter:	19.36 N., 155.25 W.
Depth:	11 km
Magnitude:	3.5 ML
<u>Intensity III:</u>	Glenwood, Volcano.
15 November (H) Island of Hawaii	
Origin time:	14 13 00.9
Epicenter:	19.38 N., 155.24 W.
Depth:	4 km
Magnitude:	3.4 ML
<u>Intensity IV:</u>	Hawaii Volcanoes National Park.
16 November (H) Island of Hawaii	
Origin time:	09 54 29.5
Epicenter:	19.35 N., 155.23 W.
Depth:	1 km
Magnitude:	3.4 ML
<u>Intensity III:</u>	Hawaii Volcanoes National Park.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

Hawaii--Continued	
17 November (H) Island of Hawaii	
Origin time:	16 11 59.5
Epicenter:	19.35 N., 155.22 W.
Depth:	10 km
Magnitude:	3.3 ML
<u>Intensity IV:</u>	Pauahi Crater.
21 November (H) Island of Hawaii	
Origin time:	07 29 38.0
Epicenter:	19.38 N., 155.24 W.
Depth:	3 km
Magnitude:	3.2 ML
<u>Intensity III:</u>	Hawaii Volcanoes National Park, Hawaiian Volcano Observatory.
23 November (H) Island of Hawaii	
Origin time:	16 41 34.0
Epicenter:	19.38 N., 155.25 W.
Depth:	4 km
Magnitude:	3.4 ML
<u>Intensity IV:</u>	Hawaii Volcanoes National Park, Kilauea Military Camp, Volcano.
<u>Intensity III:</u>	Hawaii Ocean View Estates.
23 November (H) Island of Hawaii	
Origin time:	20 45 38.0
Epicenter:	19.36 N., 155.25 W.
Depth:	1 km
Magnitude:	3.5 ML
<u>Intensity IV:</u>	Hawaiian Volcano Observatory.
25 November (H) Island of Hawaii	
Origin time:	07 31 06.8
Epicenter:	19.40 N., 155.45 W.
Depth:	13 km
Magnitude:	3.5 ML
<u>Intensity IV:</u>	Volcano.
<u>Intensity III:</u>	Hilo.
25 November (H) Island of Hawaii	
Origin time:	10 50 01.9
Epicenter:	19.32 N., 155.19 W.
Depth:	9 km
Magnitude:	3.4 ML
<u>Intensity IV:</u>	Ainaloa, Hilo.
30 November (H) Island of Hawaii	
Origin time:	10 55 47.9
Epicenter:	19.58 N., 155.98 W.
Depth:	11 km
Magnitude:	3.1 ML
<u>Intensity IV:</u>	Donkey Mill, Kealahou.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

Hawaii--Continued	
30 November (H) Island of Hawaii	
Origin time:	20 15 41.8
Epicenter:	19.39 N., 155.25 W.
Depth:	3 km
Magnitude:	3.0 ML
Intensity IV:	Hawaii Volcanoes
	National Park, Hawaiian Volcano
	Observatory, Keanakakoi, Volcano.
6 December (H) Island of Hawaii	
Origin time:	01 32 27.2
Epicenter:	19.41 N., 155.47 W.
Depth:	11 km
Magnitude:	3.8 ML
Intensity IV:	Hawaiian Ocean View
	Estates, Kona.
Intensity III:	Volcano.
14 December (H) Island of Hawaii	
Origin time:	03 44 03.1
Epicenter:	19.42 N., 155.41 W.
Depth:	11 km
Magnitude:	4.0 ML
Intensity IV:	Hawaiian Ocean View
	Estates, Kona.
Intensity III:	Hilo, Papaikou,
	Volcano.
16 December (H) Island of Hawaii	
Origin time:	03 45 13.1
Epicenter:	19.35 N., 155.31 W.
Depth:	14 km
Magnitude:	3.6 ML
Intensity IV:	Glenwood.
28 December (H) Island of Hawaii	
Origin time:	21 25 49.9
Epicenter:	19.30 N., 155.24 W.
Depth:	10 km
Magnitude:	3.1 ML
Intensity III:	Hilo.

Kentucky

- 9 November (G) Northeastern Kentucky
- Origin time: 21 29 59.1
- Epicenter: 38.42 N., 82.88 W.
- Depth: 10 km
- Magnitude: 3.5 mbLg(S), 3.6 mbLg(V)

Felt in parts of Kentucky, Ohio,
and West Virginia.

Intensity V:

Kentucky--

Flatwoods (few windows cracked;

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

Kentucky--Continued

hanging pictures swung;
buildings creaked and shook;
windows, doors, and dishes
rattled; felt by all).
Rush (few windows cracked;
buildings shook; windows,
doors, and dishes rattled;
felt by many).

Intensity IV:

Kentucky--Ashland (Y),
Catlettsburg, Grayson, Greenup,
Worthington.
Ohio--Franklin, Furnace, Kitts
Hill, Haverhill, Lucasville,
South Webster, Wheelersburg.
West Virginia--Ona.

Intensity III:

Kentucky--Hitchins, South Ports-
mouth, South Shore, West
Liberty.

Intensity II:

Ohio--Friendship.

Felt:

Kentucky--Ironville (Y), Louisa
(Y), Raceland (Y), Summit (Y).
Ohio--Ironton (Y).

Montana

- 16 October (G) Northwestern Montana
- Origin time: 18 33 44.6
- Epicenter: 48.24 N., 114.54 W.
- Depth: 5 km
- Magnitude: 3.1 ML(G), 2.7 ML(D)

Felt in the Kalispell Valley.

- 21 November Northwestern Montana
- Origin time: 19 00
- Epicenter: Not located.
- Depth: None computed.
- Magnitude: None computed.
- Intensity II: Kalispell.

Nevada

- 15 October (P) Imperial Valley area
- Origin time: 23 16 54.5

See California listing.

- 29 November (E) Southern Nevada

Origin time: 15 00 0.096

Epicenter: 36.99 N., 116.02 W.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

Nevada--Continued

Depth: 0 km
Magnitude: 3.8 mb(G)

Nevada Test Site explosion "BACK-
GAMMON" at 36°59'38.25" N.,
116°01'26.79" W., surface eleva-
tion 1203 m, depth of burial 229
m.

14 December (E) Southern Nevada
Origin time: 18 00 00.091
Epicenter: 37.14 N., 116.06 W.
Depth: 0 km
Magnitude: 3.6 ML(B)

Nevada Test Site explosion "AZUL"
at 37°08'14.54" N., 116°03'47.06"
W., surface elevation 1302 m,
depth of burial 205 m.

31 December (B) Western Nevada
Origin time: 08 27 51.9
Epicenter: 38.40 N., 118.40 W.
Depth: 5 km
Magnitude: 4.2 mb(G), 4.9
ML(B), 4.8 ML(P)

Intensity IV:
California--Mammoth Lakes, Topaz.
Nevada--Babbitt, Hawthorne, Lun-
ing, Mina.

New York

30 December (L) Southeastern New York
Origin time: 14 15 12.3
Epicenter: 41.16 N., 73.71 W.
Depth: 4 km
Magnitude: 3.0 mbLg(L)

This earthquake was reported heard
at New Canaan, Ridgefield, and
Welton, Connecticut.

Intensity IV:
Connecticut--Cos Cob, Greenwich.
New York--Armonk, Bedford, Pur-
chase, Valhalla.

Intensity III:
Connecticut--Stamford (press
report).
New York--Bedford Hills, Briar-
cliff Manor, Maryknoll,
Pleasantville, Pound Ridge,
Thornwood, Whiteplains.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

New York--Continued

Felt:
New York--Greenburgh (press
report), Ossining (press
report).

Ohio

9 November (G) Northeastern Kentucky
Origin time: 21 29 59.1

See Kentucky listing.

South Carolina

8 October (G) Central South Carolina
Origin time: 23 20 10.1
Epicenter: 34.31 N., 81.36 W.
Depth: 5 km
Magnitude: 2.9 mbLg(G)

Felt at V. C. Summer Nuclear Power
Plant (telephone report).

7 December (G) Summerville area
Origin time: 05 43 35.0
Epicenter: 33.01 N., 80.17 W.
Depth: 6 km
Magnitude: 2.9 mbLg(G)
Intensity IV: Lincolnville, Sum-
merville (Twin Oaks).
Intensity II: Charleston.

Utah

6 October (U) Central Utah
Origin time: 10 12 35.2
Epicenter: 39.29 N., 111.69 W.
Depth: 7 km
Magnitude: 3.2 ML(U)

Felt at Ephraim (telephone report).

23 October (U) Southern Utah
Origin time: 04 17 19.9
Epicenter: 37.89 N., 110.93 W.
Depth: 7 km
Magnitude: 3.5 ML(U)

Felt in the epicentral area (tele-
phone report).

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

Washington	
15 November (Q) British Columbia, Canada	
Origin time:	16 12 47.6
Epicenter:	49.24 N., 122.35 W.
Depth:	15 km
Magnitude:	3.6 ML(Q)
Felt from Hope, B.C. to Langley, B.C.	
<u>Intensity III:</u>	
Canada--West Vancouver, B.C.	
United States--Sumas, Wash.	
26 November (W) Northwest Washington	
Origin time:	23 18 27.0
Epicenter:	48.54 N., 122.41 W.
Depth:	20 km
Magnitude:	4.1 mb(G), 3.9 ML(G)
<u>Intensity IV:</u> Acme, Bellingham (press report), Bow, Clearlake, Edison, Seattle, Sedro Woolley.	
<u>Intensity III:</u> Anacortes, Clallam Bay, Lopez, Lyman, Sekiu.	
<u>Intensity II:</u> Mount Vernon.	
<u>Felt:</u> Burlington (W).	
27 November (G) Northwestern Washington	
Origin time:	02 13 46.5
Epicenter:	48.59 N., 122.41 W.
Depth:	20 km
Magnitude:	3.3 ML(G)
<u>Intensity III:</u> Acme, Bow.	
10 December (W) Central Washington	
Origin time:	05 40 07.5
Epicenter:	46.66 N., 120.58 W.
Depth:	5 km
Magnitude:	3.2 ML(G), 3.4 ML(W)
<u>Intensity IV:</u> Selah, Yakima.	
West Virginia	
9 November (G) Northeastern Kentucky	
Origin time:	21 29 59.1
See Kentucky listing.	
Wyoming	
5 December Yellowstone National Park	
Origin time:	20 00 34
Epicenter:	Not located

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1979—Continued

Wyoming--Continued	
Depth:	None computed.
Magnitude:	None computed.
<u>Intensity III:</u> Grant Village.	
11 December Yellowstone National Park	
Origin time:	20 08 10
Epicenter:	Not located.
Depth:	None computed.
Magnitude:	None computed.
<u>Intensity III:</u> Old Faithful.	

ACKNOWLEDGMENTS

Listed below are the collaborators who furnished data to the National Earthquake Information Service for use in this circular:

ALASKA:	Staff of National Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer.
CALIFORNIA:	Clarence R. Allen, Seismological Laboratory, California Institute of Technology, Pasadena. Bruce A. Bolt, Seismograph Station, University of California, Berkeley.
CANADA:	Staff of Pacific Geoscience Center, Sidney, B.C., Canada.
HAWAII:	Robert Y. Koyanagi, U.S. Geological Survey, Hawaiian Volcano Observatory, Hawaii National Park.
KENTUCKY:	R. L. Street, Department of Geology, University of Kentucky, Lexington.
MISSOURI:	Otto Nuttli, Department of Geology and Geophysics, St. Louis University, St. Louis.
MONTANA:	Anthony Qamar, University of Montana, Missoula.
NEW YORK:	Lynn R. Sykes and Yash P. Aggarwal, Lamont-Doherty Geological Observatory, Columbia University, Palisades.

- VIRGINIA: G. A. Bollinger, Department of Geological Sciences, Virginia Polytechnic Institute and State University, Blacksburg.
- WASHINGTON: Robert S. Crosson, Geophysics Program, University of Washington, Seattle.
- WYOMING: R. A. Hutchinson, National Park Service, Yellowstone National Park.
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