GEOLOGICAL SURVEY CIRCULAR 853-D

Earthquakes in the United States October–December 1980

Earthquakes in the United States October–December 1980

By C. W. Stover, J. H. Minsch, P. K. Smith and F. W. Baldwin

GEOLOGICAL SURVEY CIRCULAR 853–D

1982

United States Department of the Interior

JAMES G. WATT, *Secretary*

Geological Survey

Dallas L. Peck, *Director*

Free on application to Branch of Distribution, U.S. Geological Survey, 604 South Pickett Street, Alexandria, VA 22304

CONTENTS

ILLUSTRATIONS

TABLES

Earthquakes in the United States, October-December 1980

By C. W. Stover, J. H. Minsch, P. K. Smith, and F. W. Baldwin

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 macroseismic 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 three maps and table 2. This section also contains information on events that 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 Observatory; 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.

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 indicated by the number of decimals

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 ☐ PM ☐ Standard time ☐ 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? 1☐ Yes ☐ No
   Were you awakened by the earthquake? 2☐ Yes ☐ No
   Were you frightened by the earthquake? 3☐ Yes ☐ No
   Were you at 4☐ Home 5☐ Work 6☐ Other? _____
   Town and zip code of your location at time of earthquake _____
   Check your activity when the earthquake occurred:
   7☐ Walking 8☐ Sleeping 9☐ Lying down 10☐ Standing
   11☐ Driving (car in motion) 12☐ Sitting 13☐ Other_____
   Were you 14☐ Inside or 15☐ Outside?
   If inside, on what floor were you? 16 _____
   Did you have difficulty in standing or walking 17☐ Yes 18☐ No
   Vibration could be described as 19☐ Light 20☐ Moderate 21☐ Strong
   Was there earth noise? ☐ No 22☐ Faint 23☐ Moderate 24☐ Loud
   Direction of noise ☐ North ☐ South ☐ East ☐ West
   Estimated duration of shaking 25☐ Sudden, sharp (less than 10 secs) 26☐ Long (30-60 secs) 27☐ 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	28☐ Few	29☐ Several	30☐ Many	31☐ All?
b. This earthquake awakened ☐ No one	32☐ Few	33☐ Several	34☐ Many	35☐ All?
c. This earthquake frightened ☐ No one	36☐ Few	37☐ Several	38☐ Many	39☐ All?

4. What indoor physical effects were noted in your community?
   Windows, doors, dishes rattled 40☐ Yes ☐ No
   Walls creaked 41☐ Yes ☐ No
   Building trembled (shook) 42☐ Slightly 43☐ Strongly
   Hanging pictures (more than one) 44☐ Swung 45☐ Out of place 46☐ Fallen
   Windows 47☐ Few cracked 48☐ Some broken out 49☐ Many broken out
   Small objects overturned 50☐ Few 51☐ Many
   Small objects fallen 52☐ Few 53☐ Many
   Glassware/dishes broken 54☐ Few 55☐ Many
   Light furniture or small appliances 56☐ Overturned 57☐ Damaged seriously
   Heavy furniture or appliances 58☐ Overturned 59☐ Damaged seriously
   Did hanging objects or doors swing? 60☐ Slightly 61☐ Moderately 62☐ Violently
   Can you estimate direction? ☐ North/South ☐ East/West ☐ Other_____
   Items thrown from store shelves 63☐ Few 64☐ 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 85☐ Fallen	83☐ Cracked	84☐ Rotated
Chimneys	86☐ Cracked 89☐ Broken at roof line	87☐ Twisted	88☐ Fallen 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.

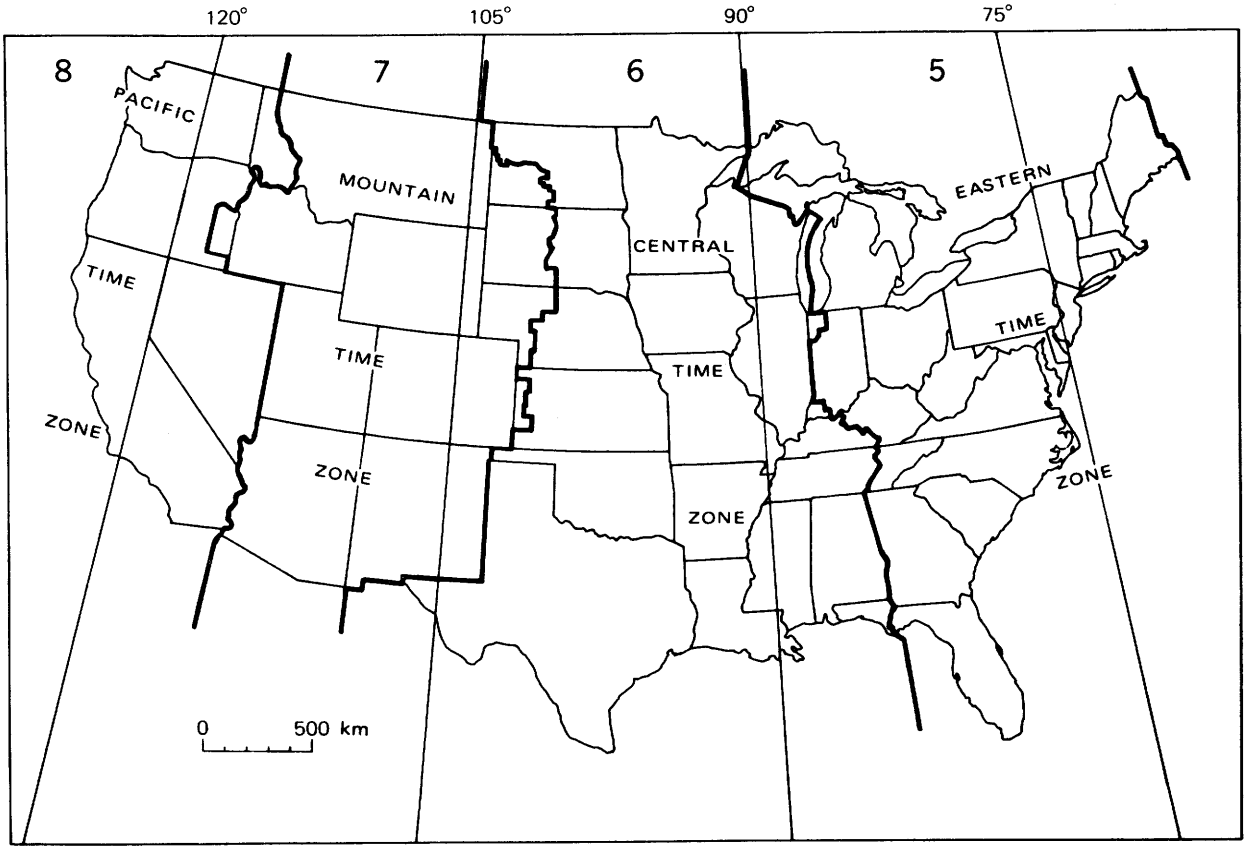

FIGURE 2.--Standard time zones of the conterminous United States. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

listed. The epicenters located by the NEIS usually are accurate to two-tenths of a degree or less. In general, epicenters located offshore are less accurate than those on land, even though they are listed to two decimals. In regions covered by dense networks of seismographs such as California, epicenter accuracy is significantly better than the two-tenths of a degree listed. 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 1980. The annual summaries are shown in figures 7-9. The magnitudes represented in these figures are based on ML or Mn; if neither was computed, then on MS; and finally on mb, when it was the only magnitude computed.

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. 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 $20° \leq D \leq 160°$. 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 $D \geq 5°$.

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

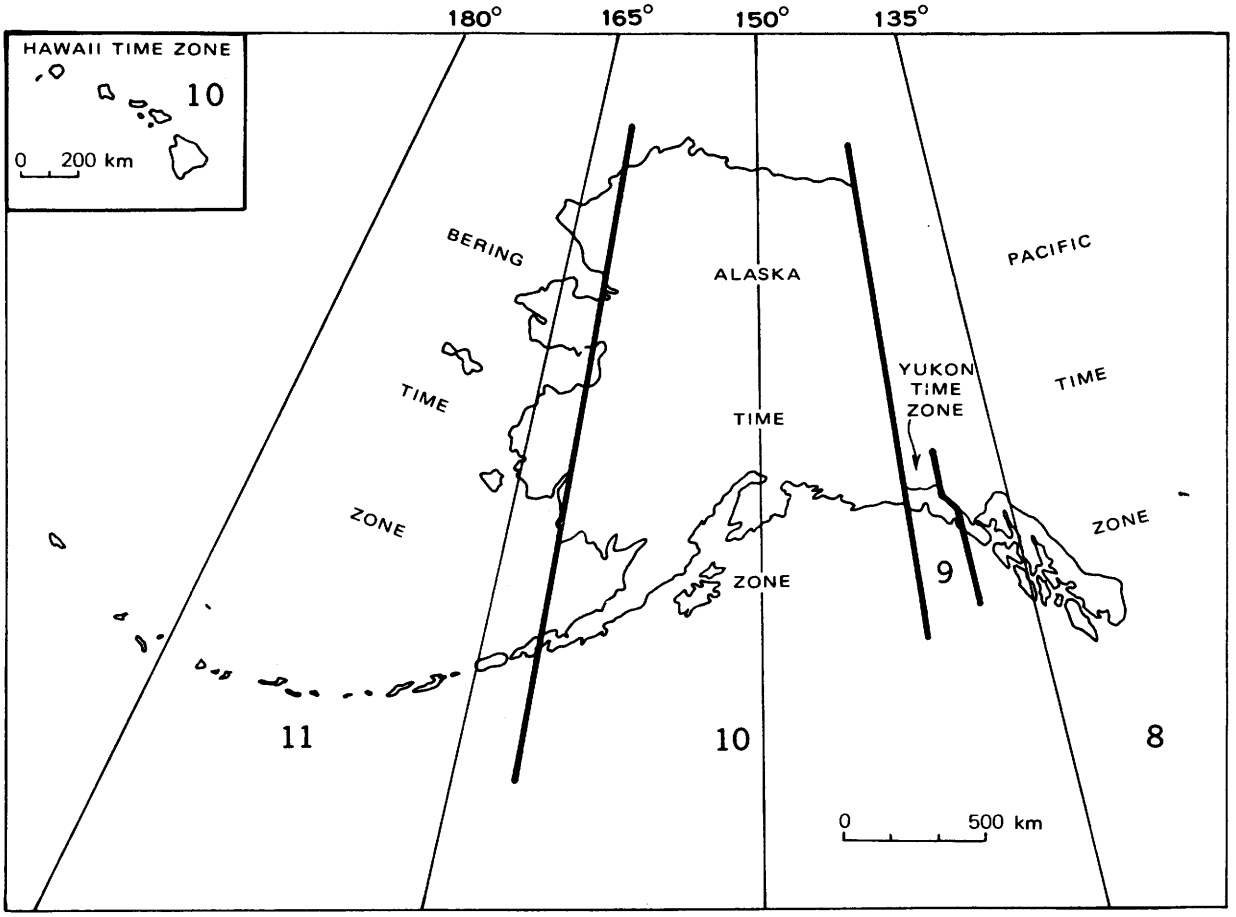

FIGURE 3.--Standard time zones of Alaska and Hawaii. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

as defined by Richter (1958, p. 340), where A is the maximum trace amplitude in millimeters, written by a Wood-Anderson torsion seismometer, and log A_o is a standard value as a function of distance, where the distance is $\leq$600 km. ML values are also calculated from other seismometers by conversion of recorded ground motion to the expected response of the torsion seismometer.

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

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

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

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 that 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.

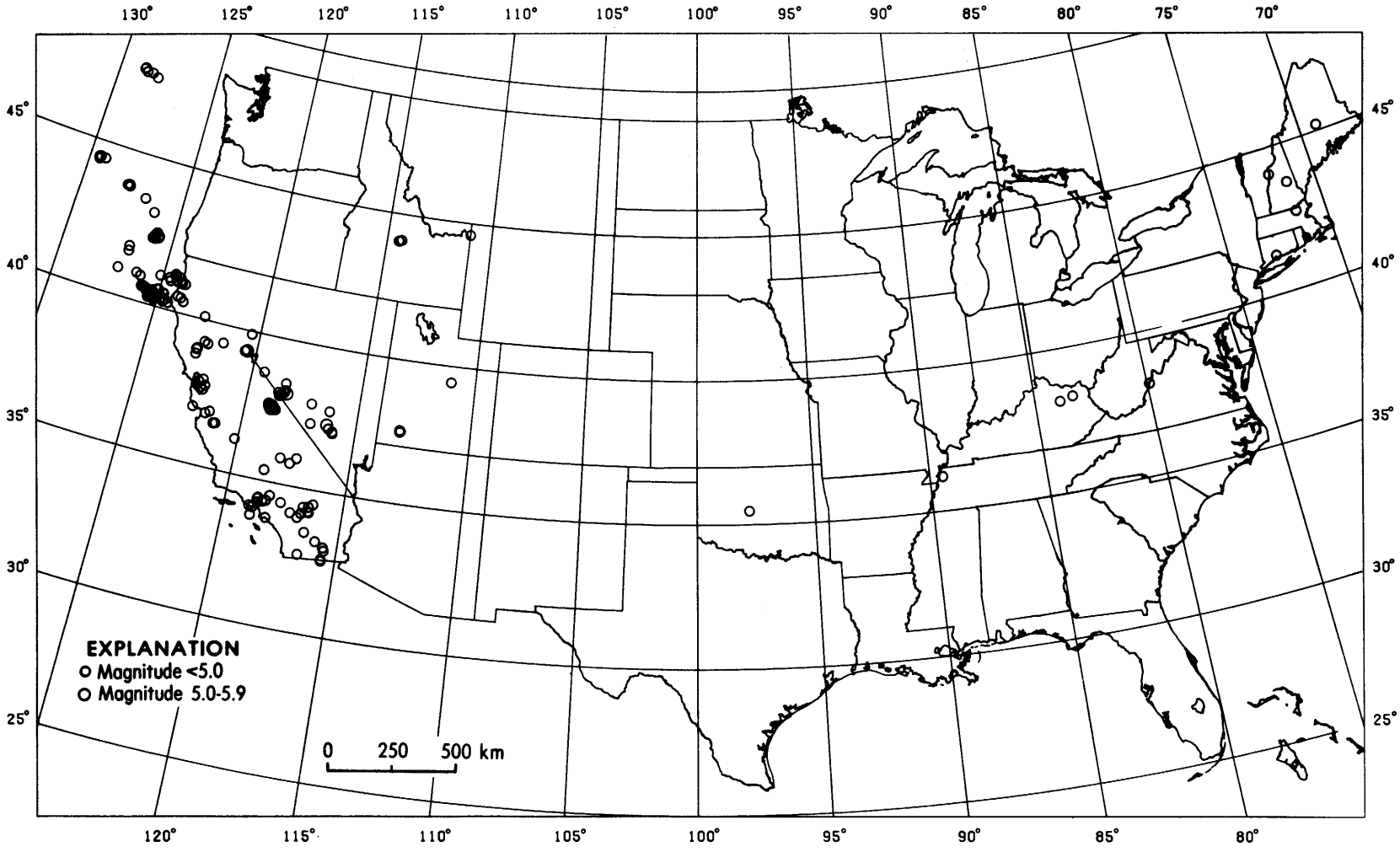

FIGURE 4.--Earthquake epicenters in the conterminous United States for October-December 1980, plotted from table 1.

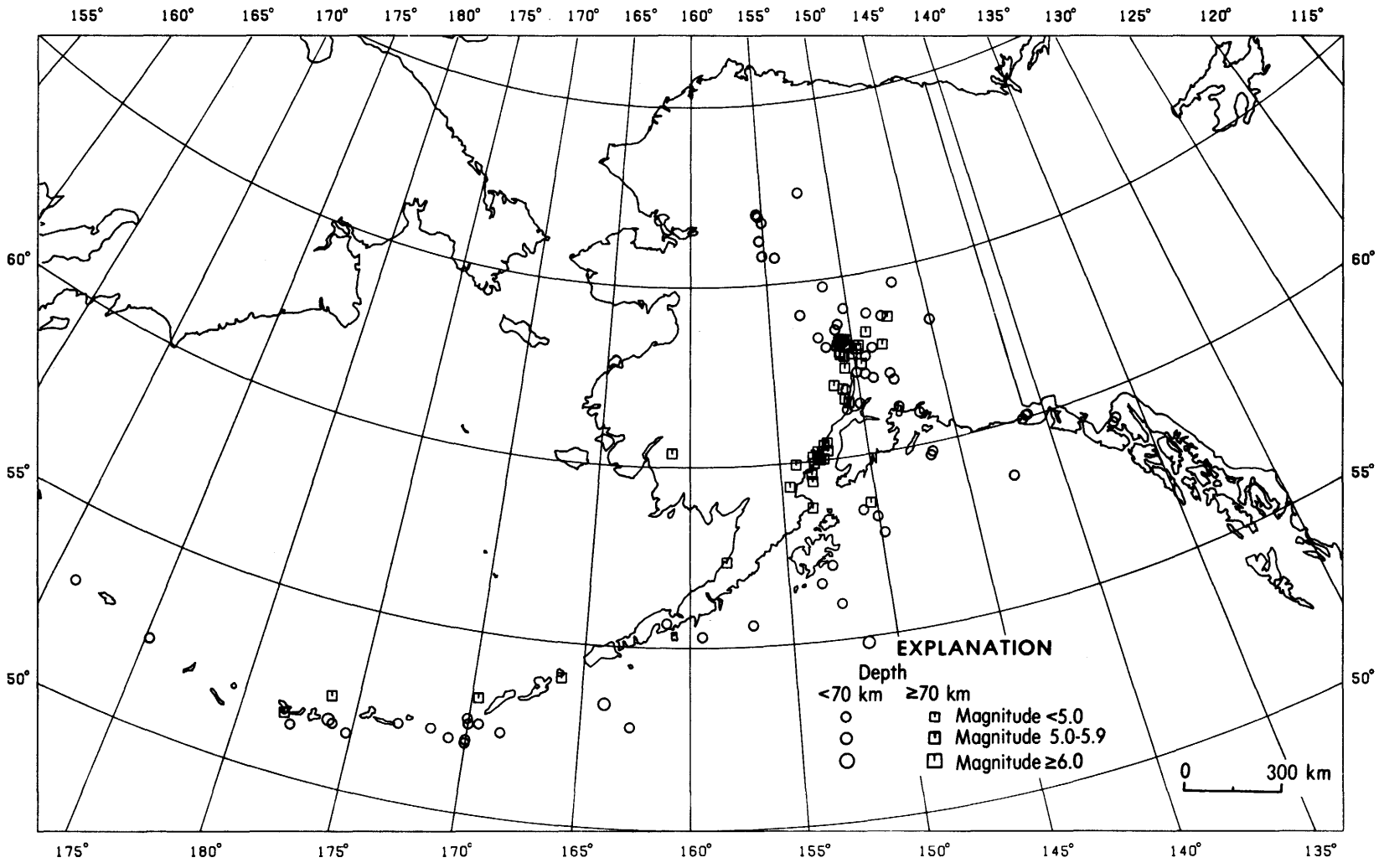

FIGURE 5.--Earthquake epicenters in Alaska for October-December 1980, plotted from table 1.

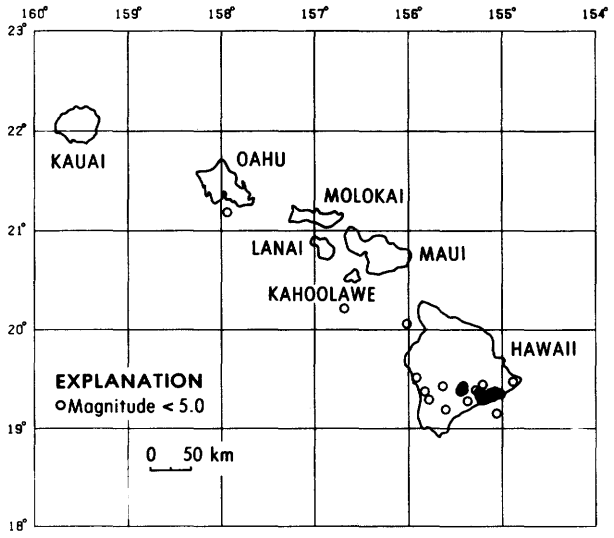

FIGURE 6.--Earthquake epicenters in Hawaii for October-December 1980, plotted from table 1.

MODIFIED MERCALLI INTENSITY SCALE OF 1931

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

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

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

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

IV. Felt indoors by many, outdoors by few. Awakened few, especially light sleepers. Frightened no one, unless apprehensive from previous experience. Vibration like that due to passing of heavy or heavily loaded trucks. Sensation like heavy body striking building or falling of heavy objects inside. Rattling of dishes, windows, doors; glassware and crockery clink and clash. Creaking of walls, frame, especially in the upper range of this grade. Hanging objects swung, in numerous instances. Disturbed liquids in open vessels slightly. Rocked standing motor cars noticeably.

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

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

VII. Frightened all--general alarm, all ran outdoors. Some, or many, found it difficult to stand. Noticed by persons driving motor cars. Trees and bushes shaken moderately to strongly. Waves on ponds, lakes, and running water. Water turbid from mud stirred up. Incaving to some extent of sand or gravel stream banks. Rang large church bells, etc. Suspended objects made to quiver. Damage negligible in buildings of good design and construction, slight to moderate in well-built ordinary buildings, considerable in

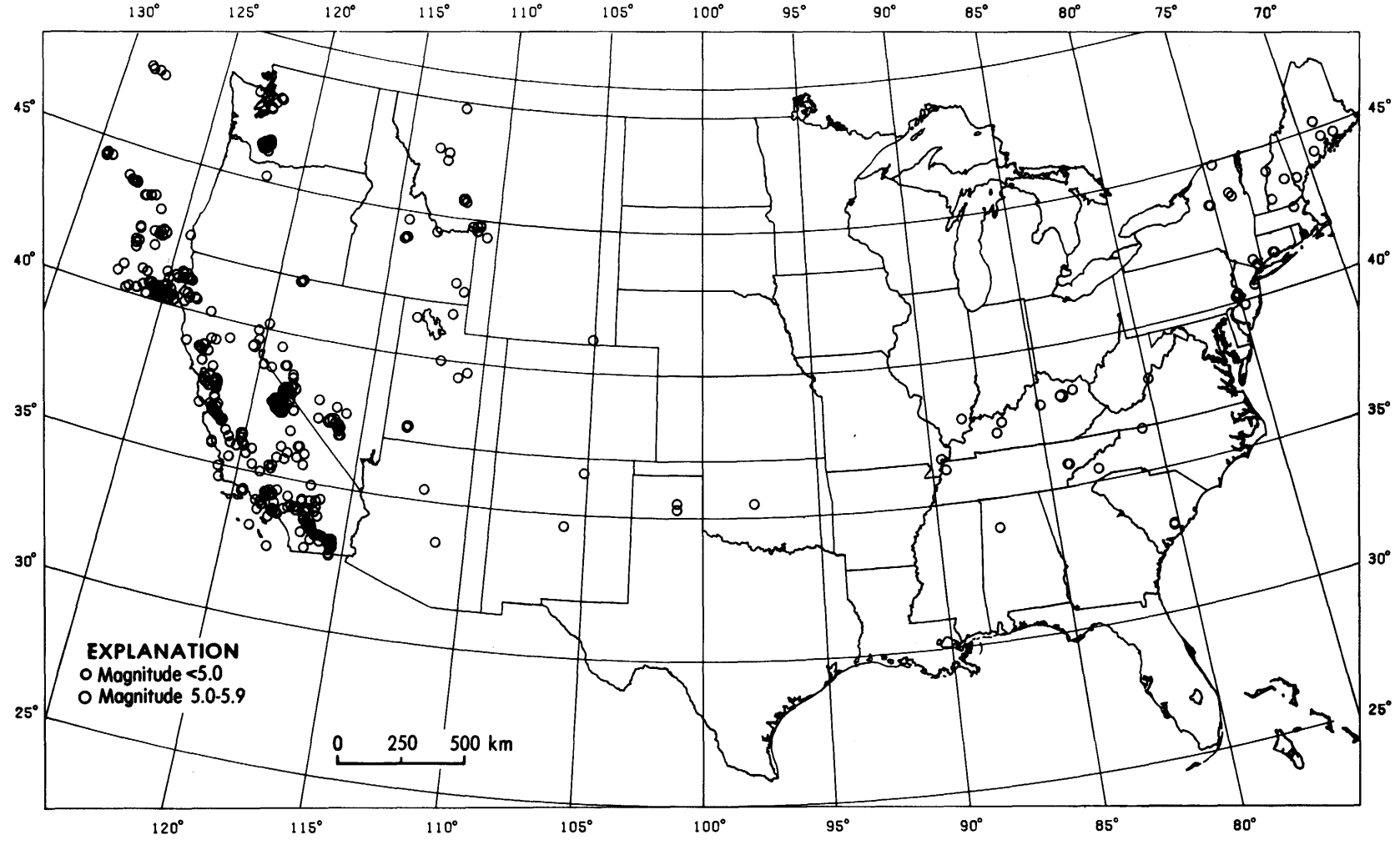

FIGURE 7.--Summary of earthquake epicenters in the conterminous United States for January-December 1980.

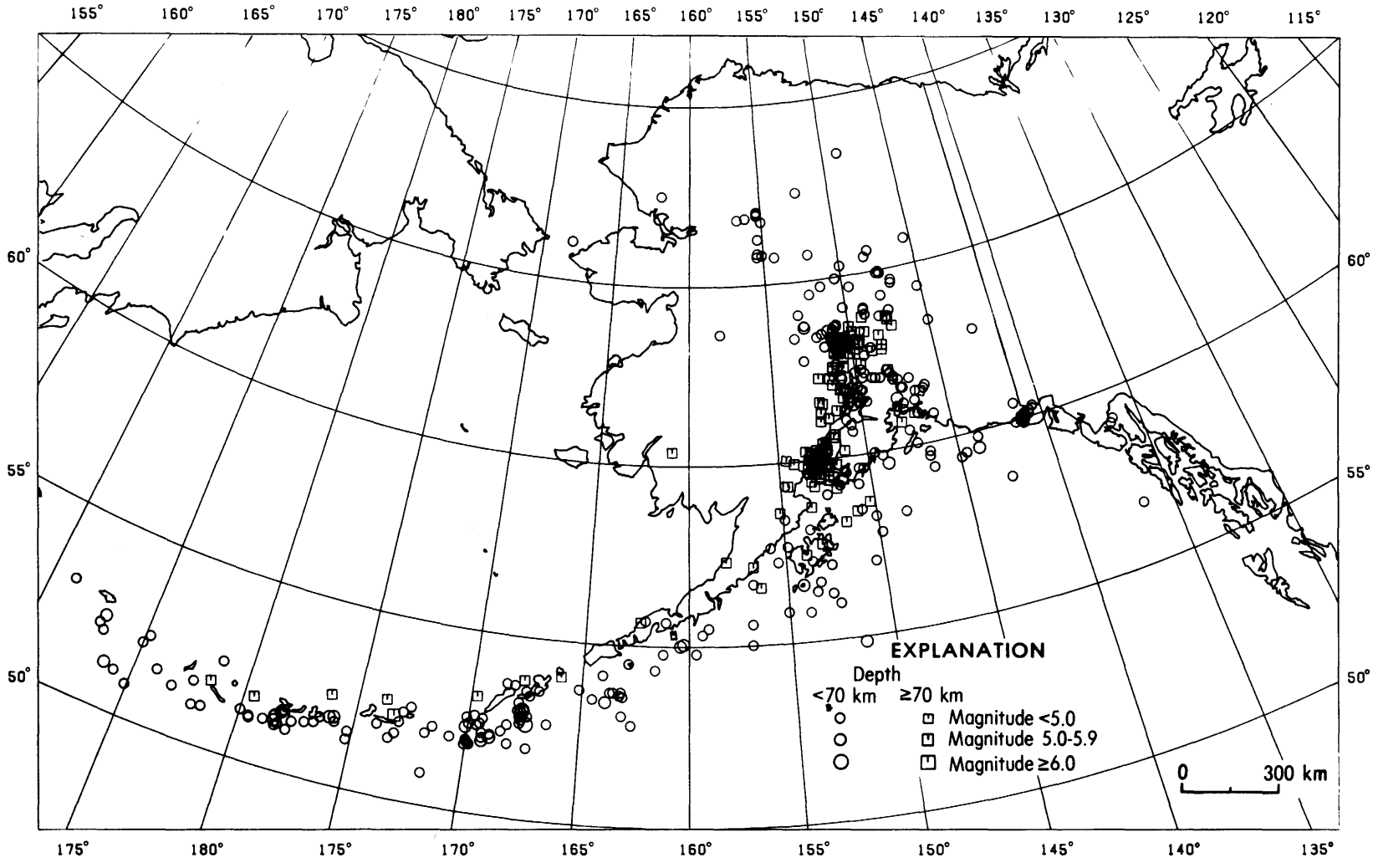

FIGURE 8.--Summary of earthquake epicenters in Alaska for January-December 1980.

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.

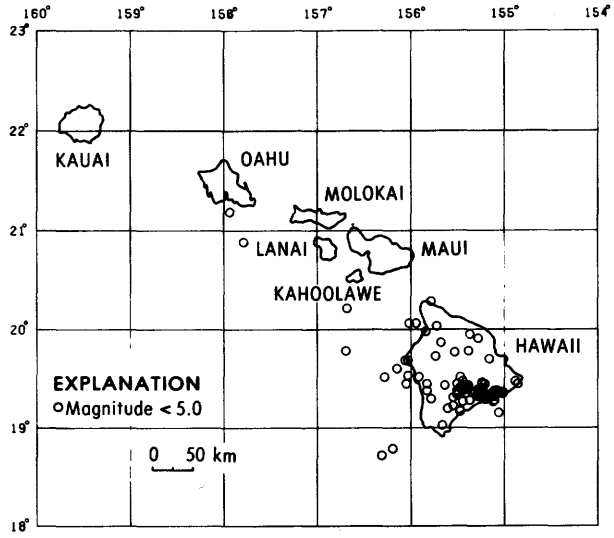

FIGURE 9.--Summary of earthquake epicenters in Hawaii for January-December 1980.

Table 1.--*Summary of U.S. earthquakes for October-December 1980*

[Sources of the hypocenters and magnitudes: (B) University of California, Berkeley; (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; (K) Tennessee Earthquake Information Center, Memphis; (M) National Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis, Missouri; (T) University of Oklahoma, Leonard; (U) University of Utah, Salt Lake; (V) Virginia Polytechnic Institute and State University, Blacksburg. N, Normal depth; UTC, Universal Coordinated Time. For names of local time zones, see figures 2 and 3. Leaders (...) indicate no information available]

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
ALASKA													
OCT. 2	11	17	38.4	61.43 N.	150.07 W.	33N	...	...	2.7M	...	G	OCT. 2	01 A.M. AST
OCT. 5	07	22	5.9	58.54 N.	142.52 W.	15	...	...	4.1M	...	G	OCT. 4	09 P.M. AST
OCT. 6	14	57	35.2	66.73 N.	155.06 W.	33N	4.6	4.5	4.7M	III	G	OCT. 6	04 A.M. AST
OCT. 6	15	15	10.4	58.26 N.	150.07 W.	33N	4.5	...	4.6M	...	G	OCT. 6	05 A.M. AST
OCT. 6	17	51	59.2	57.06 N.	152.72 W.	33N	4.7	...	4.0M	...	G	OCT. 6	07 A.M. AST
OCT. 6	19	31	12.3	66.99 N.	155.37 W.	33N	...	...	...	...	G	OCT. 6	09 A.M. AST
OCT. 6	19	42	25.8	66.92 N.	155.29 W.	33N	4.5	...	4.2M	...	G	OCT. 6	09 A.M. AST
OCT. 6	23	33	31.4	59.98 N.	141.27 W.	15	...	...	3.9M	...	G	OCT. 6	01 P.M. AST
OCT. 7	18	22	1.9	62.83 N.	150.10 W.	98	4.0	...	...	...	G	OCT. 7	08 A.M. AST
OCT. 9	07	13	45.8	65.80 N.	155.16 W.	33N	4.2	...	4.5M	...	G	OCT. 8	09 P.M. AST
OCT. 10	00	56	43.2	62.91 N.	150.87 W.	92	...	...	...	...	G	OCT. 9	02 P.M. AST
OCT. 11	12	59	25.5	60.26 N.	152.83 W.	130	...	...	...	...	G	OCT. 11	02 A.M. AST
OCT. 11	13	40	41.8	52.17 N.	171.61 W.	33N	4.5	...	4.6M	...	G	OCT. 11	02 A.M. BST
OCT. 11	15	51	25.5	54.83 N.	151.42 W.	33N	4.7	...	5.2M	...	G	OCT. 11	05 A.M. AST
OCT. 12	00	39	30.7	52.34 N.	168.53 W.	33	...	...	4.3M	...	G	OCT. 11	01 P.M. BST
OCT. 12	11	51	13.5	63.39 N.	152.05 W.	33N	...	...	4.2M	...	G	OCT. 12	01 A.M. AST
OCT. 12	16	30	29.1	63.37 N.	149.08 W.	110	...	...	...	...	G	OCT. 12	06 A.M. AST
OCT. 13	07	38	14.5	60.08 N.	140.91 W.	15	...	...	3.5M	...	G	OCT. 12	10 P.M. YST
OCT. 13	08	15	24.4	63.21 N.	150.59 W.	147	...	...	...	...	G	OCT. 12	10 P.M. AST
OCT. 13	17	12	30.9	63.68 N.	147.58 W.	89	...	...	...	...	G	OCT. 13	07 A.M. AST
OCT. 14	15	53	38.8	54.03 N.	165.99 W.	85	4.5	...	...	IV	G	OCT. 14	04 A.M. BST
OCT. 14	17	36	14.3	66.95 N.	155.37 W.	33N	...	...	3.8M	...	G	OCT. 14	07 A.M. AST
OCT. 15	09	20	12.9	55.67 N.	161.13 W.	24	5.0	...	4.9M	IV	G	OCT. 14	10 P.M. BST
OCT. 15	18	34	58.0	63.24 N.	150.44 W.	136	...	...	...	...	G	OCT. 15	08 A.M. AST
OCT. 16	12	46	20.5	55.30 N.	159.39 W.	10	4.5	...	...	...	G	OCT. 16	02 A.M. AST
OCT. 16	23	46	35.7	58.71 N.	153.43 W.	79	...	...	...	...	G	OCT. 16	01 P.M. AST
OCT. 18	15	39	51.8	62.70 N.	149.33 W.	33N	...	...	3.2M	...	G	OCT. 18	05 A.M. AST
OCT. 19	01	21	22.1	58.66 N.	150.30 W.	110	...	...	...	...	G	OCT. 18	03 P.M. AST
OCT. 19	11	35	53.1	59.94 N.	154.11 W.	178	...	...	...	...	G	OCT. 19	01 A.M. AST
OCT. 20	08	06	18.9	51.56 N.	175.26 W.	53	4.4	...	...	...	G	OCT. 19	09 P.M. BST

Table 1.--*Summary of U.S. earthquakes for October-December 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
ALASKA--Continued													
OCT. 20	15	50	42.7	52.00 N.	170.02 W.	17	4.8	4.0	...	...	G	OCT. 20	04 A.M. BST
OCT. 20	21	29	17.1	63.09 N.	150.40 W.	117	...	...	...	...	G	OCT. 20	11 A.M. AST
OCT. 21	06	30	14.5	62.93 N.	148.18 W.	91	4.3	...	...	...	G	OCT. 20	08 P.M. AST
OCT. 22	15	33	55.7	59.65 N.	146.64 W.	33N	4.8	4.5	4.4M	...	G	OCT. 22	05 A.M. AST
OCT. 23	01	47	25.4	51.72 N.	175.92 W.	61	4.9	...	...	...	G	OCT. 22	02 P.M. BST
OCT. 23	07	37	22.4	63.04 N.	149.63 W.	100	3.7	...	...	...	G	OCT. 22	09 P.M. AST
OCT. 23	15	34	41.8	62.91 N.	148.84 W.	41	...	...	2.6M	...	G	OCT. 23	05 A.M. AST
OCT. 24	02	30	28.2	59.76 N.	146.52 W.	33N	4.3	...	3.8M	...	G	OCT. 23	04 P.M. AST
OCT. 24	02	51	50.7	61.93 N.	147.87 W.	33N	...	...	2.8M	...	G	OCT. 23	04 P.M. AST
OCT. 24	12	22	0.4	60.04 N.	152.55 W.	110	...	...	...	...	G	OCT. 24	02 A.M. AST
OCT. 25	17	16	41.5	55.59 N.	156.91 W.	33N	4.9	...	4.3M	...	G	OCT. 25	07 A.M. AST
OCT. 26	17	57	11.3	62.03 N.	151.46 W.	102	3.8	...	...	...	G	OCT. 26	07 A.M. AST
OCT. 26	22	33	50.7	52.49 N.	169.53 W.	43	4.8	...	4.8M	...	G	OCT. 26	11 A.M. BST
OCT. 28	13	15	46.5	52.45 N.	176.24 W.	178	4.7	...	...	...	G	OCT. 28	02 A.M. BST
OCT. 30	03	45	26.6	62.51 N.	149.62 W.	80	...	...	...	III	G	OCT. 29	05 P.M. AST
OCT. 30	12	01	31.2	62.95 N.	149.82 W.	121	...	...	...	...	G	OCT. 30	02 A.M. AST
OCT. 30	17	11	22.7	60.07 N.	141.04 W.	15	4.3	...	4.3M	...	G	OCT. 30	07 A.M. AST
OCT. 30	20	53	9.4	57.34 N.	158.08 W.	125	4.7	...	...	...	G	OCT. 30	10 A.M. AST
OCT. 31	01	17	38.2	59.08 N.	136.64 W.	33N	4.0	...	3.7M	...	G	OCT. 30	05 P.M. PST
NOV. 1	03	05	40.6	62.11 N.	148.02 W.	33N	...	...	3.0M	...	G	OCT. 31	05 P.M. AST
NOV. 2	03	20	30.5	61.61 N.	150.92 W.	73	...	...	...	...	G	NOV. 1	05 P.M. AST
NOV. 7	02	37	58.0	60.89 N.	146.80 W.	33N	...	...	1.3M	...	G	NOV. 6	04 P.M. AST
NOV. 7	08	26	26.3	57.78 N.	149.84 W.	33N	...	...	3.3M	...	G	NOV. 6	10 P.M. AST
NOV. 8	21	50	15.8	63.37 N.	145.05 W.	33N	...	...	4.2M	...	G	NOV. 8	11 A.M. AST
NOV. 9	08	44	50.2	52.36 N.	175.18 E.	33N	...	...	4.3M	...	G	NOV. 8	09 P.M. BST
NOV. 9	23	24	9.3	59.93 N.	153.10 W.	129	...	...	...	...	G	NOV. 9	01 P.M. AST
NOV. 12	09	05	19.7	59.64 N.	153.30 W.	145	...	...	...	II	G	NOV. 11	11 P.M. AST
NOV. 12	20	26	28.9	64.06 N.	153.03 W.	33N	...	...	4.5M	...	G	NOV. 12	10 A.M. AST
NOV. 13	09	25	3.4	60.12 N.	153.12 W.	143	...	...	...	...	G	NOV. 12	11 P.M. AST
NOV. 14	09	53	25.1	62.46 N.	150.65 W.	101	...	...	...	...	G	NOV. 13	11 P.M. AST
NOV. 15	09	36	22.6	51.41 N.	177.70 W.	33N	4.4	...	4.0M	...	G	NOV. 14	10 P.M. BST
NOV. 16	13	52	55.7	65.73 N.	154.29 W.	10	...	...	2.9M	...	G	NOV. 16	03 A.M. AST
NOV. 16	18	39	28.0	63.10 N.	151.63 W.	33N	...	...	3.3M	...	G	NOV. 16	08 A.M. AST
NOV. 17	14	46	40.1	63.27 N.	150.64 W.	146	...	...	...	...	G	NOV. 17	04 A.M. AST
NOV. 21	14	56	13.4	51.80 N.	176.14 W.	53	5.6	5.7	...	V	G	NOV. 21	03 A.M. BST
NOV. 22	16	27	27.0	59.33 N.	154.57 W.	137	4.6	...	...	...	G	NOV. 22	06 A.M. AST
NOV. 23	18	52	52.6	60.08 N.	152.83 W.	138	...	...	...	III	G	NOV. 23	08 A.M. AST
NOV. 24	14	33	57.5	60.41 N.	152.45 W.	120	...	...	...	...	G	NOV. 24	04 A.M. AST
NOV. 25	00	05	0.5	60.46 N.	152.26 W.	112	4.3	...	...	...	G	NOV. 24	02 P.M. AST
NOV. 26	08	38	0.4	63.05 N.	150.47 W.	135	...	...	...	...	G	NOV. 25	10 P.M. AST
NOV. 26	08	55	11.8	52.45 N.	170.00 W.	48	4.6	4.0	...	...	G	NOV. 25	09 P.M. BST
NOV. 26	10	50	10.9	56.60 N.	153.34 W.	33N	4.6	...	...	...	G	NOV. 26	00 A.M. AST
NOV. 26	10	55	43.6	55.99 N.	152.46 W.	33N	4.7	...	...	...	G	NOV. 26	00 A.M. AST
NOV. 27	22	54	14.9	59.19 N.	136.43 W.	33N	4.1	...	4.2M	FELT	G	NOV. 27	02 P.M. PST
NOV. 28	02	18	31.8	52.78 N.	162.74 W.	33N	4.9	...	4.3M	...	G	NOV. 27	03 P.M. BST
NOV. 28	06	37	15.3	53.41 N.	163.95 W.	33N	5.0	...	...	...	G	NOV. 27	07 P.M. BST
NOV. 28	17	44	1.2	60.24 N.	152.24 W.	111	4.6	...	...	...	G	NOV. 28	07 A.M. AST
NOV. 29	03	54	40.5	61.89 N.	151.00 W.	80	...	...	...	...	G	NOV. 28	05 P.M. AST
NOV. 29	10	18	54.0	53.21 N.	169.74 W.	99	4.5	...	...	...	G	NOV. 28	11 P.M. BST
NOV. 29	14	31	30.6	51.67 N.	178.08 W.	73	4.5	...	...	...	G	NOV. 29	03 A.M. BST
NOV. 29	18	19	46.4	63.24 N.	150.65 W.	149	...	...	...	...	G	NOV. 29	08 A.M. AST
NOV. 30	17	54	38.9	63.74 N.	147.96 W.	33N	...	...	3.4M	...	G	NOV. 30	07 A.M. AST
NOV. 30	21	31	47.3	59.43 N.	153.27 W.	87	4.9	...	...	V	G	NOV. 30	11 A.M. AST
DEC. 3	13	19	46.7	52.59 N.	170.08 W.	50	4.8	4.6	...	...	G	DEC. 3	02 A.M. BST
DEC. 5	04	05	33.5	63.87 N.	148.84 W.	11	...	...	2.7M	...	G	DEC. 4	06 P.M. AST
DEC. 5	16	59	29.8	62.22 N.	149.49 W.	33N	...	...	3.0M	...	G	DEC. 5	06 A.M. AST
DEC. 6	05	22	17.6	63.11 N.	150.96 W.	127	4.1	...	...	...	G	DEC. 5	07 P.M. AST
DEC. 6	19	32	54.5	52.13 N.	173.07 W.	65	4.7	...	...	...	G	DEC. 6	08 A.M. BST
DEC. 7	03	00	47.1	64.59 N.	146.90 W.	25	...	...	3.0M	...	G	DEC. 6	05 P.M. AST
DEC. 11	08	51	17.5	60.12 N.	153.15 W.	151	...	...	...	...	G	DEC. 10	10 P.M. AST
DEC. 11	22	10	57.4	60.03 N.	152.70 W.	118	...	...	...	III	G	DEC. 11	12 P.M. AST
DEC. 12	16	00	9.9	60.38 N.	160.99 W.	82	...	...	...	...	G	DEC. 12	06 A.M. AST
DEC. 12	16	49	23.9	64.12 N.	150.25 W.	33N	...	...	3.0M	...	G	DEC. 12	06 A.M. AST
DEC. 12	17	34	49.7	62.86 N.	150.83 W.	110	...	...	...	...	G	DEC. 12	07 A.M. AST
DEC. 12	23	36	49.6	61.31 N.	150.86 W.	61	...	...	...	...	G	DEC. 12	01 P.M. AST

Table 1.--*Summary of U.S. earthquakes for October-December 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
ALASKA--Continued													
DEC. 13	21	49	24.6	64.78 N.	151.38 W.	33N	...	...	3.6M	...	G	DEC. 13	11 A.M. AST
DEC. 14	03	45	35.8	61.16 N.	147.88 W.	26	...	...	3.1M	...	G	DEC. 13	05 P.M. AST
DEC. 14	06	27	29.8	52.99 N.	171.06 E.	24	5.6	4.8	4.7M	...	G	DEC. 13	07 P.M. BST
DEC. 15	00	35	14.4	61.49 N.	150.72 W.	72	...	...	...	...	G	DEC. 14	02 P.M. AST
DEC. 16	04	28	21.0	66.23 N.	155.32 W.	5	...	...	4.7M	...	G	DEC. 15	06 P.M. AST
DEC. 18	02	44	29.4	63.69 N.	150.74 W.	33N	...	...	3.3M	...	G	DEC. 17	04 P.M. AST
DEC. 18	20	54	13.1	63.56 N.	150.95 W.	37	...	...	3.4M	...	G	DEC. 18	10 A.M. AST
DEC. 20	08	35	8.9	62.08 N.	149.05 W.	70	...	...	...	...	G	DEC. 19	10 P.M. AST
DEC. 20	10	11	40.4	61.86 N.	150.80 W.	53	...	...	3.2M	...	G	DEC. 20	00 A.M. AST
DEC. 21	02	17	59.0	63.22 N.	150.80 W.	126	...	...	...	...	G	DEC. 20	04 P.M. AST
DEC. 22	03	35	24.4	62.30 N.	150.01 W.	33N	...	...	3.3M	...	G	DEC. 21	05 P.M. AST
DEC. 24	12	10	58.4	51.92 N.	170.04 W.	33N	5.0	4.5	...	...	G	DEC. 24	01 A.M. BST
DEC. 24	14	54	59.6	67.47 N.	152.29 W.	33N	...	...	3.7M	...	G	DEC. 24	04 A.M. AST
DEC. 26	07	58	42.2	52.00 N.	170.77 W.	33N	4.7	...	...	...	G	DEC. 25	08 P.M. BST
DEC. 27	17	07	48.9	62.78 N.	150.59 W.	106	3.8	...	...	...	G	DEC. 27	07 A.M. AST
DEC. 27	22	33	46.1	58.48 N.	150.74 W.	33N	4.7	...	3.2M	...	G	DEC. 27	12 P.M. AST
CALIFORNIA													
OCT. 2	12	47	1.7	37.99 N.	122.07 W.	17	...	...	3.1B	IV	B	OCT. 2	04 A.M. PST
OCT. 2	23	07	44.6	37.60 N.	118.90 W.	1	...	...	3.0P	...	P	OCT. 2	03 P.M. PST
OCT. 4	16	38	22.6	37.53 N.	118.85 W.	4	...	...	4.1B	FELT	B	OCT. 4	08 A.M. PST
OCT. 4	16	42	18.4	37.53 N.	118.85 W.	5	...	...	3.6B	...	B	OCT. 4	08 A.M. PST
OCT. 4	22	46	16.3	37.55 N.	118.83 W.	5	...	...	3.0P	...	P	OCT. 4	02 P.M. PST
OCT. 5	11	38	27.6	37.58 N.	118.87 W.	12	...	...	3.4P	...	P	OCT. 5	03 A.M. PST
OCT. 5	20	28	52.4	37.53 N.	118.82 W.	9	...	...	3.0P	...	P	OCT. 5	12 P.M. PST
OCT. 6	06	40	1.6	34.35 N.	118.30 W.	6	...	...	3.2P	FELT	P	OCT. 5	10 P.M. PST
OCT. 6	15	27	10.6	35.37 N.	118.60 W.	5	...	...	3.2P	...	P	OCT. 6	07 A.M. PST
OCT. 6	15	56	9.4	37.53 N.	118.88 W.	5	...	...	3.0P	...	P	OCT. 6	07 A.M. PST
OCT. 9	19	48	56.3	37.48 N.	118.80 W.	5	...	...	3.3P	...	P	OCT. 9	11 A.M. PST
OCT. 10	14	55	59.5	34.23 N.	118.63 W.	2	...	...	2.0P	FELT	P	OCT. 10	06 A.M. PST
OCT. 10	15	55	49.1	37.68 N.	118.98 W.	2	...	...	3.0P	...	P	OCT. 10	07 A.M. PST
OCT. 10	17	54	3.2	37.65 N.	118.91 W.	5	...	...	3.0P	...	G	OCT. 10	09 A.M. PST
OCT. 10	17	57	57.9	37.67 N.	118.97 W.	9	...	...	3.0P	...	P	OCT. 10	09 A.M. PST
OCT. 11	07	51	7.2	37.68 N.	118.97 W.	9	...	...	3.0P	...	P	OCT. 10	11 P.M. PST
OCT. 11	08	08	52.5	37.67 N.	118.97 W.	9	...	...	3.0P	...	P	OCT. 11	00 A.M. PST
OCT. 12	00	35	19.2	37.68 N.	118.98 W.	9	...	...	3.2P	...	P	OCT. 11	04 P.M. PST
OCT. 12	13	55	6.6	37.50 N.	118.88 W.	8	...	...	3.4P	...	P	OCT. 12	05 A.M. PST
OCT. 13	01	16	45.3	40.41 N.	123.81 W.	30	4.3	...	3.9B	IV	B	OCT. 12	05 P.M. PST
OCT. 13	02	46	53.9	36.59 N.	121.09 W.	10	...	...	4.1B	IV	B	OCT. 12	06 P.M. PST
OCT. 13	05	16	0.8	37.65 N.	118.85 W.	9	...	...	3.0P	...	P	OCT. 12	09 P.M. PST
OCT. 13	05	20	16.8	37.63 N.	121.97 W.	5	...	...	2.5B	III	G	OCT. 12	09 P.M. PST
OCT. 13	08	54	39.2	36.58 N.	121.22 W.	4	...	...	3.1B	...	B	OCT. 13	00 A.M. PST
OCT. 13	13	38	42.3	34.38 N.	117.67 W.	10	...	...	2.8P	FELT	P	OCT. 13	05 A.M. PST
OCT. 13	14	31	44.9	34.38 N.	118.65 W.	16	...	...	3.2P	...	P	OCT. 13	06 A.M. PST
OCT. 13	22	59	13.8	40.54 N.	123.97 W.	5	...	...	3.4B	...	G	OCT. 13	02 P.M. PST
OCT. 14	10	52	40.0	37.48 N.	118.87 W.	7	...	...	3.2P	...	P	OCT. 14	02 A.M. PST
OCT. 16	13	55	7.3	40.12 N.	122.69 W.	5	...	...	3.2B	...	G	OCT. 16	05 A.M. PST
OCT. 18	03	54	30.5	34.37 N.	116.70 W.	8	...	...	3.4P	...	P	OCT. 17	07 P.M. PST
OCT. 18	06	41	54.0	33.98 N.	116.85 W.	16	...	...	3.0P	...	P	OCT. 17	10 P.M. PST
OCT. 18	16	49	5.5	37.50 N.	118.87 W.	4	...	...	4.0P	FELT	P	OCT. 18	08 A.M. PST
OCT. 19	02	54	34.1	38.10 N.	118.53 W.	5	...	...	3.2P	...	G	OCT. 18	06 P.M. PST
OCT. 19	22	59	52.4	34.37 N.	116.70 W.	9	...	...	3.1P	...	P	OCT. 19	02 P.M. PST
OCT. 21	03	04	9.7	37.57 N.	118.94 W.	5	...	...	3.5B	...	B	OCT. 20	07 P.M. PST
OCT. 21	11	01	4.5	36.22 N.	120.12 W.	0	...	...	3.4P	...	P	OCT. 21	03 A.M. PST
OCT. 21	12	26	14.4	34.40 N.	118.63 W.	4	...	...	3.0P	FELT	P	OCT. 21	04 A.M. PST
OCT. 21	21	31	45.7	38.02 N.	118.57 W.	14	...	...	3.6B	...	B	OCT. 21	01 P.M. PST
OCT. 23	03	56	18.2	35.77 N.	117.60 W.	6	...	...	3.0P	...	P	OCT. 22	07 P.M. PST
OCT. 23	21	40	11.5	37.51 N.	118.63 W.	25	...	...	3.7B	IV	B	OCT. 23	01 P.M. PST
OCT. 24	09	12	39.7	37.65 N.	118.83 W.	5	...	...	3.3P	...	P	OCT. 24	01 A.M. PST
OCT. 24	23	30	21.9	34.40 N.	116.47 W.	5	...	...	3.2P	...	P	OCT. 24	03 P.M. PST
OCT. 25	05	26	44.1	37.62 N.	118.93 W.	5	...	...	4.3B	FELT	B	OCT. 24	09 P.M. PST
OCT. 25	05	35	23.2	37.62 N.	118.93 W.	5	...	...	3.6B	...	B	OCT. 24	09 P.M. PST
OCT. 25	06	02	6.8	37.63 N.	118.92 W.	5	...	...	3.2B	...	B	OCT. 24	10 P.M. PST

Table 1.--*Summary of U.S. earthquakes for October-December 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
OCT. 25	20	32	35.1	36.98 N.	122.25 W.	11	...	...	3.6B	...	B	OCT. 25	12 P.M. PST
OCT. 26	20	56	22.9	32.62 N.	115.58 W.	15	...	...	3.8P	FELT	P	OCT. 26	12 P.M. PST
OCT. 30	03	45	25.2	37.55 N.	118.83 W.	5	...	...	4.3B	IV	B	OCT. 29	07 P.M. PST
OCT. 30	04	36	53.5	36.22 N.	120.13 W.	6	...	...	3.0P	...	P	OCT. 29	08 P.M. PST
OCT. 30	13	40	18.2	33.77 N.	118.17 W.	5	...	...	2.0P	FELT	P	OCT. 30	05 A.M. PST
OCT. 31	12	55	36.7	32.67 N.	115.58 W.	4	4.2	...	4.5P	VI	P	OCT. 31	04 A.M. PST
NOV. 2	09	42	4.4	34.10 N.	117.20 W.	6	...	...	3.1P	IV	P	NOV. 2	01 A.M. PST
NOV. 2	23	39	24.6	37.88 N.	122.25 W.	5	...	...	3.1B	FELT	B	NOV. 2	03 P.M. PST
NOV. 3	05	31	27.4	37.59 N.	118.72 W.	5	...	...	3.2B	...	G	NOV. 2	09 P.M. PST
NOV. 3	09	10	6.8	35.97 N.	117.32 W.	6	...	...	3.0P	...	P	NOV. 3	01 A.M. PST
NOV. 5	05	17	32.0	34.30 N.	118.45 W.	14	...	...	2.6P	FELT	P	NOV. 4	09 P.M. PST
NOV. 7	20	17	38.8	38.80 N.	122.69 W.	5	...	...	3.1B	...	G	NOV. 7	12 P.M. PST
NOV. 8	10	27	34.0	41.12 N.	124.25 W.	19	6.2	7.2	7.0B	VII	G	NOV. 8	02 A.M. PST
NOV. 8	11	13	40.0	40.56 N.	124.13 W.	15	4.3	...	3.8B	...	G	NOV. 8	03 A.M. PST
NOV. 9	05	48	21.3	34.22 N.	116.45 W.	5	...	...	3.4P	III	P	NOV. 8	09 P.M. PST
NOV. 9	09	56	18.4	37.62 N.	118.88 W.	6	...	...	3.0P	...	P	NOV. 9	01 A.M. PST
NOV. 10	05	06	20.6	41.02 N.	124.06 W.	15	...	...	3.9B	...	G	NOV. 9	09 P.M. PST
NOV. 10	06	24	10.7	41.03 N.	123.92 W.	15	...	...	4.0B	...	G	NOV. 9	10 P.M. PST
NOV. 11	05	30	12.6	37.56 N.	118.88 W.	5	...	...	3.7B	...	B	NOV. 10	09 P.M. PST
NOV. 11	10	19	2.9	38.01 N.	118.60 W.	5	...	...	4.8B	III	B	NOV. 11	02 A.M. PST
NOV. 11	10	33	51.2	38.03 N.	118.59 W.	9	...	...	4.0B	FELT	B	NOV. 11	02 A.M. PST
NOV. 17	20	52	50.1	33.25 N.	115.95 W.	2	...	...	3.2P	...	P	NOV. 17	12 P.M. PST
NOV. 17	22	59	46.1	38.12 N.	118.67 W.	5	...	...	3.5B	...	B	NOV. 17	02 P.M. PST
NOV. 18	04	36	56.0	33.25 N.	115.95 W.	0	...	...	3.0P	...	P	NOV. 17	08 P.M. PST
NOV. 18	10	59	53.6	37.53 N.	118.80 W.	4	...	...	3.0P	...	P	NOV. 18	02 A.M. PST
NOV. 18	13	44	15.8	34.05 N.	118.80 W.	16	...	...	2.3P	FELT	P	NOV. 18	05 A.M. PST
NOV. 18	20	21	41.8	34.22 N.	116.43 W.	3	...	...	3.2P	...	P	NOV. 18	12 P.M. PST
NOV. 19	09	34	32.7	37.78 N.	121.91 W.	10	...	...	2.8B	IV	G	NOV. 19	01 A.M. PST
NOV. 20	12	17	49.8	33.00 N.	115.53 W.	11	...	...	3.2P	IV	P	NOV. 20	04 A.M. PST
NOV. 21	13	02	3.7	39.89 N.	120.38 W.	5	...	...	3.1B	...	G	NOV. 21	05 A.M. PST
NOV. 21	23	10	43.1	37.54 N.	118.88 W.	15	...	...	3.7B	...	B	NOV. 21	03 P.M. PST
NOV. 22	00	21	17.1	37.52 N.	118.87 W.	18	...	...	4.1B	FELT	B	NOV. 21	04 P.M. PST
NOV. 23	05	02	23.6	37.57 N.	118.87 W.	6	...	...	3.0P	...	P	NOV. 22	09 P.M. PST
NOV. 24	05	49	31.4	36.86 N.	121.63 W.	5	...	...	3.1B	FELT	B	NOV. 23	09 P.M. PST
NOV. 24	19	10	47.9	39.22 N.	122.22 W.	5	...	...	3.3B	...	B	NOV. 24	11 A.M. PST
NOV. 24	20	35	0.8	37.68 N.	118.98 W.	4	...	...	3.2P	...	P	NOV. 24	12 P.M. PST
NOV. 25	00	59	49.9	37.61 N.	118.94 W.	5	...	...	3.5B	...	B	NOV. 24	04 P.M. PST
NOV. 25	01	04	30.3	37.67 N.	119.02 W.	4	...	...	3.2P	...	P	NOV. 24	05 P.M. PST
NOV. 25	01	27	43.8	37.65 N.	118.95 W.	2	...	...	3.3P	...	P	NOV. 24	05 P.M. PST
NOV. 25	01	30	3.7	37.67 N.	118.95 W.	5	...	...	3.0P	...	P	NOV. 24	05 P.M. PST
NOV. 25	01	32	50.7	37.60 N.	118.93 W.	5	...	...	3.5B	...	B	NOV. 24	05 P.M. PST
NOV. 25	02	08	47.6	37.60 N.	118.93 W.	5	...	...	3.4B	...	B	NOV. 24	06 P.M. PST
NOV. 25	13	24	56.9	33.00 N.	115.53 W.	10	...	...	3.0P	FELT	P	NOV. 25	05 A.M. PST
NOV. 25	21	16	14.3	37.52 N.	118.82 W.	8	...	...	3.1P	...	P	NOV. 25	01 P.M. PST
NOV. 28	17	11	40.2	39.29 N.	120.52 W.	5	...	...	3.3B	FELT	B	NOV. 28	09 A.M. PST
NOV. 28	18	21	13.1	39.30 N.	120.43 W.	5	4.9	...	5.2B	VI	B	NOV. 28	10 A.M. PST
DEC. 1	07	52	17.8	34.07 N.	118.95 W.	15	...	...	2.6P	FELT	P	NOV. 30	11 P.M. PST
DEC. 1	14	30	41.3	34.13 N.	116.73 W.	11	...	...	3.2P	...	P	DEC. 1	06 A.M. PST
DEC. 1	15	39	0.6	39.37 N.	121.57 W.	5	...	...	2.8G	IV	G	DEC. 1	07 A.M. PST
DEC. 2	12	27	59.8	33.25 N.	115.95 W.	2	...	...	3.2P	...	P	DEC. 2	04 A.M. PST
DEC. 2	18	31	7.3	39.32 N.	120.45 W.	5	...	...	3.2B	...	G	DEC. 2	10 A.M. PST
DEC. 5	00	53	12.7	37.61 N.	118.87 W.	5	...	...	3.6B	...	B	DEC. 4	04 P.M. PST
DEC. 8	16	56	49.1	38.72 N.	119.48 W.	4	...	...	3.8B	...	B	DEC. 8	08 A.M. PST
DEC. 8	17	28	59.3	38.71 N.	119.47 W.	22	...	...	3.5B	...	B	DEC. 8	09 A.M. PST
DEC. 9	15	42	14.3	33.09 N.	115.60 W.	5	...	...	2.6P	...	P	DEC. 9	07 A.M. PST
DEC. 12	13	13	17.5	39.26 N.	122.41 W.	5	...	...	3.4B	...	G	DEC. 12	05 A.M. PST
DEC. 12	14	24	8.1	38.95 N.	122.66 W.	5	...	...	3.2B	IV	G	DEC. 12	06 A.M. PST
DEC. 12	14	27	16.6	38.98 N.	122.68 W.	5	...	...	3.2B	IV	G	DEC. 12	06 A.M. PST
DEC. 12	14	57	8.2	38.95 N.	122.70 W.	7	...	...	3.9B	IV	B	DEC. 12	06 A.M. PST
DEC. 12	21	17	10.4	38.96 N.	122.67 W.	5	...	...	3.3B	...	G	DEC. 12	01 P.M. PST
DEC. 13	04	10	16.3	35.88 N.	118.03 W.	5	...	...	3.1P	...	P	DEC. 12	08 P.M. PST
DEC. 13	06	48	12.8	33.52 N.	116.47 W.	5	...	...	3.0P	...	P	DEC. 12	10 P.M. PST
DEC. 13	14	15	47.2	34.50 N.	116.28 W.	5	...	...	3.4P	...	P	DEC. 13	06 A.M. PST
DEC. 14	09	24	53.6	37.59 N.	118.93 W.	4	...	...	3.5B	...	B	DEC. 14	01 A.M. PST
DEC. 14	20	19	15.9	37.63 N.	118.93 W.	5	...	...	3.5B	...	B	DEC. 14	12 P.M. PST

Table 1.--*Summary of U.S. earthquakes for October-December 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
DEC. 15	11	50	38.7	37.61 N.	118.98 W.	5	...	...	3.6B	...	B	DEC. 15	03 A.M. PST
DEC. 15	12	10	40.9	37.62 N.	118.90 W.	3	...	...	3.2P	...	P	DEC. 15	04 A.M. PST
DEC. 22	19	35	17.6	32.73 N.	116.60 W.	16	...	...	3.6P	IV	P	DEC. 22	11 A.M. PST
DEC. 24	12	00	11.3	36.94 N.	121.46 W.	7	...	...	3.4B	FELT	B	DEC. 24	04 A.M. PST
DEC. 24	13	25	49.6	37.55 N.	118.92 W.	4	...	...	4.0B	V	B	DEC. 24	05 A.M. PST
DEC. 24	15	47	33.3	37.60 N.	118.90 W.	10	...	...	3.4P	...	P	DEC. 24	07 A.M. PST
DEC. 24	15	48	33.5	37.56 N.	118.90 W.	5	4.2	...	4.6B	V	B	DEC. 24	07 A.M. PST
DEC. 26	06	22	20.4	37.47 N.	118.87 W.	5	...	...	3.1P	...	G	DEC. 25	10 P.M. PST
DEC. 26	17	25	13.2	37.63 N.	118.88 W.	4	...	...	3.1P	...	P	DEC. 26	09 A.M. PST
DEC. 28	03	40	37.9	37.63 N.	118.90 W.	6	...	...	3.3P	...	P	DEC. 27	07 P.M. PST
DEC. 30	08	19	22.1	34.55 N.	118.15 W.	11	...	...	2.6P	FELT	P	DEC. 30	00 A.M. PST
DEC. 30	20	11	26.6	33.75 N.	118.83 W.	3	...	...	3.0P	...	P	DEC. 30	12 P.M. PST
DEC. 31	12	16	29.4	37.70 N.	122.12 W.	11	...	...	3.5B	IV	B	DEC. 31	04 A.M. PST
DEC. 31	20	22	46.2	37.57 N.	118.88 W.	5	...	...	3.2P	...	P	DEC. 31	12 P.M. PST
CALIFORNIA—OFF THE COAST													
OCT. 22	02	29	12.7	40.97 N.	126.26 W.	5	4.2	...	4.1B	...	B	OCT. 21	06 P.M. PST
NOV. 1	22	20	3.5	40.24 N.	124.50 W.	33	...	...	3.5B	...	B	NOV. 1	02 P.M. PST
NOV. 8	10	47	32.9	40.36 N.	125.20 W.	15	4.8	...	4.7B	...	G	NOV. 8	02 A.M. PST
NOV. 8	10	51	18.4	40.27 N.	125.44 W.	15	4.7	...	4.9B	...	G	NOV. 8	02 A.M. PST
NOV. 8	11	20	38.7	40.25 N.	124.74 W.	15	5.0	...	4.7B	...	G	NOV. 8	03 A.M. PST
NOV. 8	11	25	38.4	40.24 N.	125.18 W.	15	...	...	3.7B	...	G	NOV. 8	03 A.M. PST
NOV. 8	13	36	43.4	40.59 N.	125.11 W.	15	...	...	3.9B	...	G	NOV. 8	05 A.M. PST
NOV. 8	15	27	9.0	40.53 N.	124.81 W.	15	...	...	3.7B	...	G	NOV. 8	07 A.M. PST
NOV. 8	16	47	50.2	40.45 N.	125.55 W.	15	4.3	3.8	4.4B	...	G	NOV. 8	08 A.M. PST
NOV. 8	16	52	29.0	40.43 N.	125.46 W.	15	4.4	4.3	4.8B	...	G	NOV. 8	08 A.M. PST
NOV. 8	17	14	21.5	40.95 N.	127.14 W.	15	4.3	...	4.5B	...	G	NOV. 8	09 A.M. PST
NOV. 8	18	31	19.6	40.60 N.	125.06 W.	15	3.7	3.6	4.2B	...	G	NOV. 8	10 A.M. PST
NOV. 8	20	47	48.0	40.37 N.	125.40 W.	15	...	...	4.2B	...	G	NOV. 8	12 P.M. PST
NOV. 8	22	47	52.3	40.57 N.	125.07 W.	15	4.6	4.2	5.0B	...	G	NOV. 8	02 P.M. PST
NOV. 8	23	05	32.2	41.00 N.	124.61 W.	15	4.7	...	4.1B	...	G	NOV. 8	03 P.M. PST
NOV. 8	23	07	10.4	40.53 N.	124.78 W.	15	4.6	5.0	4.7B	...	G	NOV. 8	03 P.M. PST
NOV. 9	01	58	57.2	41.07 N.	124.34 W.	15	4.1	...	4.3B	...	G	NOV. 8	05 P.M. PST
NOV. 9	03	47	52.1	40.40 N.	125.13 W.	15	4.1	4.0	4.1B	...	G	NOV. 8	07 P.M. PST
NOV. 9	04	09	8.8	40.50 N.	125.34 W.	15	5.0	4.3	5.2B	...	G	NOV. 8	08 P.M. PST
NOV. 9	06	59	51.3	40.43 N.	125.27 W.	15	4.1	3.6	4.3B	...	G	NOV. 8	10 P.M. PST
NOV. 9	08	00	15.1	40.29 N.	125.07 W.	15	3.9	3.0	4.1B	...	G	NOV. 9	00 A.M. PST
NOV. 9	08	26	47.4	41.10 N.	125.13 W.	15	...	...	3.9B	...	G	NOV. 9	00 A.M. PST
NOV. 10	15	41	5.4	40.33 N.	124.66 W.	22	4.3	...	4.1B	...	G	NOV. 10	07 A.M. PST
NOV. 10	20	42	20.6	41.22 N.	124.43 W.	15	4.6	...	4.0B	...	G	NOV. 10	12 P.M. PST
NOV. 10	23	59	27.1	40.56 N.	125.67 W.	13	4.8	3.1	4.8B	...	&	NOV. 10	03 P.M. PST
NOV. 13	03	49	26.1	41.10 N.	124.69 W.	12	...	...	3.9B	...	G	NOV. 12	07 P.M. PST
NOV. 15	07	37	28.2	40.57 N.	125.85 W.	17	...	...	3.9B	...	G	NOV. 14	11 P.M. PST
NOV. 16	02	01	8.5	41.26 N.	124.46 W.	11	4.7	...	4.2B	...	G	NOV. 15	06 P.M. PST
NOV. 18	21	41	26.4	40.34 N.	124.69 W.	21	...	...	3.7B	III	G	NOV. 18	01 P.M. PST
NOV. 26	04	34	13.3	40.57 N.	125.77 W.	14	...	...	3.7B	...	G	NOV. 25	08 P.M. PST
NOV. 26	10	02	45.2	40.58 N.	125.78 W.	13	...	...	3.6B	...	G	NOV. 26	02 A.M. PST
NOV. 26	16	42	50.1	40.49 N.	125.56 W.	22	4.5	...	4.5B	...	B	NOV. 26	08 A.M. PST
DEC. 7	02	56	16.6	40.90 N.	126.03 W.	15	5.0	...	3.7B	...	G	DEC. 6	06 P.M. PST
DEC. 23	22	51	16.6	41.63 N.	126.88 W.	15	4.9	4.5	4.3B	...	G	DEC. 23	02 P.M. PST
DEC. 23	23	10	4.8	41.77 N.	126.92 W.	15	4.9	...	...	...	G	DEC. 23	03 P.M. PST
CONNECTICUT													
OCT. 24	17	27	38.2	41.32 N.	72.87 W.	7	...	...	2.8J	IV	J	OCT. 24	12 P.M. EST
OCT. 25	00	41	28.3	41.33 N.	72.88 W.	6	...	...	2.7J	IV	J	OCT. 24	07 P.M. EST
HAWAII													
OCT. 5	08	55	16.6	19.34 N.	155.12 W.	8	...	...	3.2H	III	H	OCT. 4	10 P.M. HST
OCT. 9	21	05	55.6	19.38 N.	155.83 W.	13	...	...	3.3H	...	H	OCT. 9	11 A.M. HST
OCT. 10	12	26	10.5	19.35 N.	155.02 W.	7	...	...	3.1H	...	H	OCT. 10	02 A.M. HST
OCT. 15	06	34	29.5	19.34 N.	155.23 W.	10	...	...	3.4H	...	H	OCT. 14	08 P.M. HST
OCT. 18	07	15	37.8	19.28 N.	155.37 W.	8	...	...	3.0H	...	H	OCT. 17	09 P.M. HST

Table 1.--*Summary of U.S. earthquakes for October-December 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
HAWAII--Continued													
OCT. 22	06	38	25.1	19.38 N.	155.08 W.	4	...	...	3.4H	III	H	OCT. 21	08 P.M. HST
OCT. 22	07	48	19.6	19.37 N.	155.12 W.	1	...	...	3.7H	III	H	OCT. 21	09 P.M. HST
OCT. 22	08	05	42.2	19.37 N.	155.10 W.	1	...	...	3.0H	...	H	OCT. 21	10 P.M. HST
OCT. 22	20	16	55.5	19.47 N.	154.88 W.	5	...	...	3.5H	IV	H	OCT. 22	10 A.M. HST
OCT. 25	23	30	29.2	19.33 N.	155.22 W.	9	...	...	3.0H	...	H	OCT. 25	01 P.M. HST
OCT. 26	11	50	42.0	19.44 N.	155.64 W.	3	...	...	3.3H	...	H	OCT. 26	01 A.M. HST
OCT. 28	10	47	56.4	19.39 N.	155.41 W.	11	...	...	3.1H	...	H	OCT. 28	00 A.M. HST
OCT. 30	20	29	14.0	19.45 N.	155.21 W.	27	...	...	3.6H	IV	H	OCT. 30	10 A.M. HST
OCT. 31	21	39	58.0	19.33 N.	155.22 W.	10	...	...	3.2H	...	H	OCT. 31	11 A.M. HST
NOV. 3	02	44	33.8	19.38 N.	155.24 W.	0	...	...	3.2H	IV	H	NOV. 2	04 P.M. HST
NOV. 4	16	22	32.4	19.39 N.	155.43 W.	11	...	...	3.5H	III	H	NOV. 4	06 A.M. HST
NOV. 6	06	41	42.6	19.32 N.	155.23 W.	10	...	...	3.7H	III	H	NOV. 5	08 P.M. HST
NOV. 10	03	57	28.6	19.43 N.	155.42 W.	10	...	...	3.1H	...	H	NOV. 9	05 P.M. HST
NOV. 12	02	05	22.5	19.38 N.	155.44 W.	9	...	...	3.0H	...	H	NOV. 11	04 P.M. HST
NOV. 12	21	38	2.0	21.19 N.	157.93 W.	10	...	...	4.0H	IV	G	NOV. 12	11 A.M. HST
NOV. 15	04	22	24.9	19.39 N.	155.44 W.	9	...	...	3.5H	III	H	NOV. 14	06 P.M. HST
NOV. 17	05	46	38.4	19.33 N.	155.18 W.	10	...	...	3.6H	III	H	NOV. 16	07 P.M. HST
NOV. 17	10	47	36.5	19.30 N.	155.22 W.	10	...	...	3.8H	III	H	NOV. 17	00 A.M. HST
NOV. 23	11	31	55.9	19.36 N.	155.05 W.	9	...	...	4.2H	IV	H	NOV. 23	01 A.M. HST
NOV. 23	11	35	40.0	19.36 N.	155.05 W.	9	...	...	3.2H	III	H	NOV. 23	01 A.M. HST
NOV. 24	02	46	59.3	19.19 N.	155.61 W.	10	...	...	3.0H	...	H	NOV. 23	04 P.M. HST
DEC. 1	18	42	33.5	19.52 N.	155.92 W.	11	...	...	3.4H	IV	H	NOV. 23	08 A.M. HST
DEC. 4	11	16	19.1	19.39 N.	155.28 W.	3	...	...	3.1H	III	H	DEC. 4	01 A.M. HST
DEC. 10	01	09	20.6	19.33 N.	155.12 W.	10	...	...	3.1H	...	H	DEC. 9	03 P.M. HST
DEC. 12	04	02	10.9	20.06 N.	156.02 W.	10	...	...	3.4H	...	H	DEC. 11	06 P.M. HST
DEC. 14	22	57	46.0	19.33 N.	155.13 W.	9	...	...	3.0H	...	H	DEC. 14	12 P.M. HST
DEC. 15	12	14	00.4	19.33 N.	155.13 W.	10	...	...	3.1H	III	H	DEC. 15	02 A.M. HST
DEC. 15	15	33	08.3	19.33 N.	155.20 W.	9	...	...	3.6H	III	H	DEC. 15	05 A.M. HST
DEC. 15	19	19	14.4	19.42 N.	155.43 W.	11	...	...	3.1H	...	H	DEC. 15	09 A.M. HST
DEC. 15	20	07	12.0	19.44 N.	155.41 W.	9	...	...	3.1H	...	H	DEC. 15	10 A.M. HST
DEC. 16	06	11	36.2	19.36 N.	155.25 W.	10	...	...	3.5H	III	H	DEC. 15	08 P.M. HST
DEC. 19	07	09	35.8	20.22 N.	156.68 W.	2	...	...	3.5H	...	H	DEC. 18	09 P.M. HST
DEC. 21	17	04	35.4	19.36 N.	155.08 W.	9	...	...	3.4H	III	H	DEC. 21	07 A.M. HST
DEC. 22	04	43	30.9	19.15 N.	155.06 W.	32	...	...	3.0H	...	H	DEC. 21	06 P.M. HST
DEC. 30	21	30	55.3	19.30 N.	155.78 W.	10	...	...	3.9H	IV	H	DEC. 30	11 A.M. HST
IDAHO													
NOV. 7	09	15	24.2	44.11 N.	114.32 W.	5	...	...	2.9G	...	G	NOV. 7	02 A.M. PST
NOV. 7	09	19	26.5	44.07 N.	114.41 W.	5	...	...	3.1G	...	G	NOV. 7	02 A.M. PST
NOV. 7	09	20	7.4	44.05 N.	114.46 W.	5	...	...	3.4G	...	G	NOV. 7	02 A.M. PST
KENTUCKY													
NOV. 27	05	26	54.6	38.31 N.	83.33 W.	5	...	...	2.5K	...	K	NOV. 27	00 A.M. EST
DEC. 30	03	07	8.1	38.20 N.	83.91 W.	11	...	...	1.6K	III	K	DEC. 29	10 P.M. EST
MAINE													
NOV. 22	21	28	23.2	45.22 N.	69.16 W.	5	...	...	2.6J	FELT	J	NOV. 22	04 P.M. EST
MASSACHUSETTS													
NOV. 23	00	39	32.4	42.62 N.	71.39 W.	1	...	...	2.5J	V	J	NOV. 22	07 P.M. EST
NEVADA													
OCT. 2	01	48	13.5	37.28 N.	117.02 W.	5	...	...	3.0P	...	G	OCT. 1	05 P.M. PST
OCT. 24	19	15	0.1	37.07 N.	116.00 W.	0	4.4	...	4.4B	...	E	OCT. 24	11 A.M. PST
OCT. 25	00	30	59.0	37.79 N.	116.28 W.	5	...	...	3.8P	...	G	OCT. 24	04 P.M. PST
OCT. 31	18	00	0.1	37.21 N.	116.20 W.	0	4.7	...	4.9B	...	E	OCT. 31	10 A.M. PST
NOV. 7	04	13	55.0	37.95 N.	117.10 W.	5	...	...	3.2P	...	P	NOV. 6	08 P.M. PST
NOV. 14	16	50	0.1	37.11 N.	116.02 W.	0	4.1	...	4.5B	...	E	NOV. 14	08 A.M. PST
DEC. 17	15	10	0.1	37.32 N.	116.31 W.	0	5.1	...	5.0B	...	E	DEC. 17	07 A.M. PST

Table 1.--*Summary of U.S. earthquakes for October-December 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
NEVADA--Continued													
DEC. 19	16	57	45.2	38.48 N.	118.42 W.	5	...	...	3.7P	III	P	DEC. 19	08 A.M. PST
DEC. 28	22	58	8.7	38.14 N.	118.27 W.	23	4.6	...	5.0B	IV	B	DEC. 28	02 P.M. PST
DEC. 28	23	00	38.5	38.22 N.	118.37 W.	5	...	...	3.9P	...	P	DEC. 28	03 P.M. PST
DEC. 28	23	05	38.8	38.17 N.	118.38 W.	5	...	...	4.0B	FELT	B	DEC. 28	03 P.M. PST
DEC. 29	12	24	54.7	38.17 N.	118.43 W.	5	...	...	3.6B	...	B	DEC. 29	04 A.M. PST
NEW HAMPSHIRE													
NOV. 5	22	40	01.4	43.66 N.	71.36 W.	5	...	...	2.7J	...	J	NOV. 5	05 P.M. EST
OKLAHOMA													
NOV. 2	10	00	49.3	35.47 N.	97.78 W.	8	...	...	3.0T	V	T	NOV. 2	04 A.M. CST
OREGON--OFF THE COAST													
NOV. 18	06	48	15.8	43.51 N.	126.83 W.	15	4.0	...	...	...	G	NOV. 17	10 P.M. PST
NOV. 20	23	20	33.8	42.47 N.	125.83 W.	15	...	...	...	...	G	NOV. 20	03 P.M. PST
DEC. 3	12	12	8.3	43.13 N.	126.25 W.	15	...	...	...	...	G	DEC. 3	04 A.M. PST
DEC. 14	22	17	10.1	43.76 N.	127.70 W.	15	4.2	3.3	...	...	G	DEC. 14	02 P.M. PST
DEC. 20	21	56	28.8	43.80 N.	127.84 W.	15	4.2	...	...	...	G	DEC. 20	01 P.M. PST
DEC. 20	22	20	14.8	43.81 N.	127.73 W.	15	4.1	...	...	...	G	DEC. 20	02 P.M. PST
DEC. 23	22	27	20.6	44.46 N.	129.50 W.	15	4.8	4.6	...	...	G	DEC. 23	02 P.M. PST
DEC. 23	22	56	52.3	44.43 N.	129.58 W.	15	4.7	...	...	...	G	DEC. 23	02 P.M. PST
DEC. 23	23	51	20.5	44.37 N.	129.53 W.	15	4.7	...	...	...	G	DEC. 23	03 P.M. PST
DEC. 24	03	08	19.7	44.44 N.	129.26 W.	15	3.9	...	...	...	G	DEC. 23	07 P.M. PST
DEC. 24	13	29	15.3	42.37 N.	125.73 W.	15	5.2	5.3	5.0B	...	G	DEC. 24	05 A.M. PST
DEC. 24	14	00	55.5	42.39 N.	125.91 W.	15	4.0	...	...	...	G	DEC. 24	06 A.M. PST
DEC. 24	19	40	1.2	42.38 N.	125.70 W.	15	4.3	...	...	...	G	DEC. 24	11 A.M. PST
DEC. 25	15	32	27.9	42.29 N.	125.96 W.	15	4.2	3.8	...	...	G	DEC. 25	07 A.M. PST
DEC. 27	05	23	24.3	42.27 N.	125.84 W.	15	4.3	...	...	...	G	DEC. 26	09 P.M. PST
TENNESSEE													
DEC. 2	08	59	30.0	36.21 N.	89.43 W.	11	...	...	3.8S	V	S	DEC. 2	02 A.M. CST
UTAH													
DEC. 21	18	25	10.5	37.53 N.	113.04 W.	7	...	...	3.2U	FELT	U	DEC. 21	11 A.M. MST
DEC. 27	04	34	16.2	37.54 N.	113.09 W.	7	...	...	3.0U	...	U	DEC. 26	09 P.M. MST
DEC. 27	06	28	3.6	39.45 N.	111.11 W.	7	...	...	2.5U	...	G	DEC. 26	11 P.M. MST
DEC. 27	18	09	22.3	37.50 N.	113.10 W.	7	...	...	2.8U	...	U	DEC. 27	11 A.M. MST
DEC. 29	07	12	53.1	37.49 N.	113.07 W.	7	...	...	3.1U	...	U	DEC. 29	00 A.M. MST
VERMONT													
DEC. 25	16	58	35.6	44.10 N.	72.09 W.	10	...	...	2.5J	...	J	DEC. 25	11 A.M. EST
VIRGINIA													
NOV. 5	21	48	14.7	38.18 N.	79.90 W.	4	...	...	2.8V	FELT	V	NOV. 5	04 P.M. EST
WASHINGTON--OFF THE COAST													
DEC. 21	01	55	17.2	47.81 N.	128.74 W.	15	4.8	4.3	...	...	G	DEC. 20	05 P.M. PST
DEC. 21	05	53	44.9	47.62 N.	127.99 W.	15	4.3	...	...	...	G	DEC. 20	09 P.M. PST
DEC. 21	12	13	12.0	47.72 N.	128.59 W.	15	4.6	3.8	...	...	G	DEC. 21	04 A.M. PST
DEC. 21	14	32	15.5	47.71 N.	128.29 W.	15	4.0	...	...	...	G	DEC. 21	06 A.M. PST
DEC. 21	22	46	34.0	47.78 N.	128.74 W.	15	4.6	...	...	...	G	DEC. 21	02 P.M. PST
WYOMING													
NOV. 14	21	08	10.4	44.59 N.	111.04 W.	11	...	...	3.2G	III	G	NOV. 14	02 P.M. MST

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*

[Sources of the hypocenters, magnitudes, and macroseismic data: (B) University of California, Berkeley; (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; (K) Tennessee Earthquake Information Center, Memphis; (L) Lamont-Doherty Geological Observatory, Palisades, N.Y.; (M) National Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis, Missouri; (T) University of Oklahoma, Leonard; (U) University of Utah, Salt Lake; (V) Virginia Polytechnic Institute and State University, Blacksburg. 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

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

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

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

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

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

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

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

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

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

Alaska--Continued

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

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

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

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

Felt at Haines (M).

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

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

California

2 October (B) Central California
- Origin time: 12 47 01.7
- Epicenter: 37.99 N., 122.07 W.

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

California--Continued

Depth: 17 km
Magnitude: 3.1 ML(B)
Intensity IV: Pacheco (press report).
Felt: Benicia, Concord, Martinez, Pittsburg, Walnut Creek (press reports), and Orinda (B).

4 October (B) Owens Valley area
Origin time: 16 38 22.6
Epicenter: 37.53 N., 118.85 W.
Depth: 4 km
Magnitude: 4.1 ML(B), 4.0 ML(P)

Felt in the Mammoth Lakes area (B).

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

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

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

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

13 October (B) Northern California
Origin time: 01 16 45.3
Epicenter: 40.41 N., 123.81 W.
Depth: 30 km
Magnitude: 4.3 mb(G), 3.9 ML(B)
Intensity IV: Bridgerville, Carlotta, Eureka, Miranda, Redcrest, Rio Dell, Weott.
Intensity III: Bayside, Blue Lake, Phillipsville, Redway, Salyer, Scotia, Whitehorn.
Felt: Garberville (B), Loleta (press report), Myers Flat.

13 October (B) Central California
Origin time: 02 46 53.9
Epicenter: 36.59 N., 121.09 W.
Depth: 10 km
Magnitude: 4.1 ML(B)
Intensity IV: Seaside.
Intensity III: Aromas, Carmel Valley, Monterey, Tres Pinos.

13 October (G) Central California
Origin time: 05 20 16.8
Epicenter: 37.63 N., 121.97 W.
Depth: 5 km

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

California--Continued

Magnitude: 2.5 ML(B)
Intensity III: Fremont and Hayward (press report), Union City.

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

Felt at Wrightwood (P).

18 October (P) Owens Valley area
Origin time: 16 49 05.5
Epicenter: 37.50 N., 118.87 W.
Depth: 4 km
Magnitude: 4.0 ML(P), 3.8 ML(B)

Felt in the Mammoth Lakes area (B).

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

Felt at Granada Hills (P).

23 October (B) Owens Valley area
Origin time: 21 40 11.5
Epicenter: 37.51 N., 118.63 W.
Depth: 25 km
Magnitude: 3.7 ML(B), 3.9 ML(P)
Intensity IV: Bishop, Tom's Place.

25 October (B) Owens Valley area
Origin time: 05 26 44.1
Epicenter: 37.62 N., 118.93 W.
Depth: 5 km
Magnitude: 4.3 ML(B), 4.3 ML(P)

Felt in the Mammoth Lakes area (B).

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

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

30 October (B) Owens Valley area
Origin time: 03 45 25.2
Epicenter: 37.55 N., 118.83 W.
Depth: 5 km
Magnitude: 4.3 ML(B), 4.0 ML(P)
Intensity IV: Benton.

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

California--Continued

Intensity III: Ahwahnee, Badger.
Intensity II: Bishop.
Felt: Mammoth Lakes (B), Tom's Place.

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

Felt at San Pedro (P).

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

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

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

2 November (B) Central California
Origin time: 23 39 24.6
Epicenter: 37.88 N., 122.25 W.
Depth: 5 km
Magnitude: 3.1 ML(B)

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

5 November (P) Southern California
Origin time: 05 17 32.0
Epicenter: 34.30 N., 118.45 W.

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

California--Continued

Depth: 14 km
Magnitude: 2.6 ML(P)

Felt at Northridge and San Fernando (P).

8 November (G) Northern California
Origin time: 10 27 34.0
Epicenter: 41.12 N., 124.25 W.
Depth: 19 km
Magnitude: 6.2 mb(G), 7.2 MS(G), 7.0 ML(B)

This earthquake was the largest in this area since the 1956 Gorda Basin earthquake of magnitude 7.0 and the largest in the conterminous United States since the El Centro earthquake on October 15, 1979. It was felt over an area of approximately 97,000 sq km from northern Oregon to the San Francisco Bay area (fig. 10).

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

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

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

People who were outdoors when the quake struck said they heard a long, rumbling roar and saw flashes in the sky as power

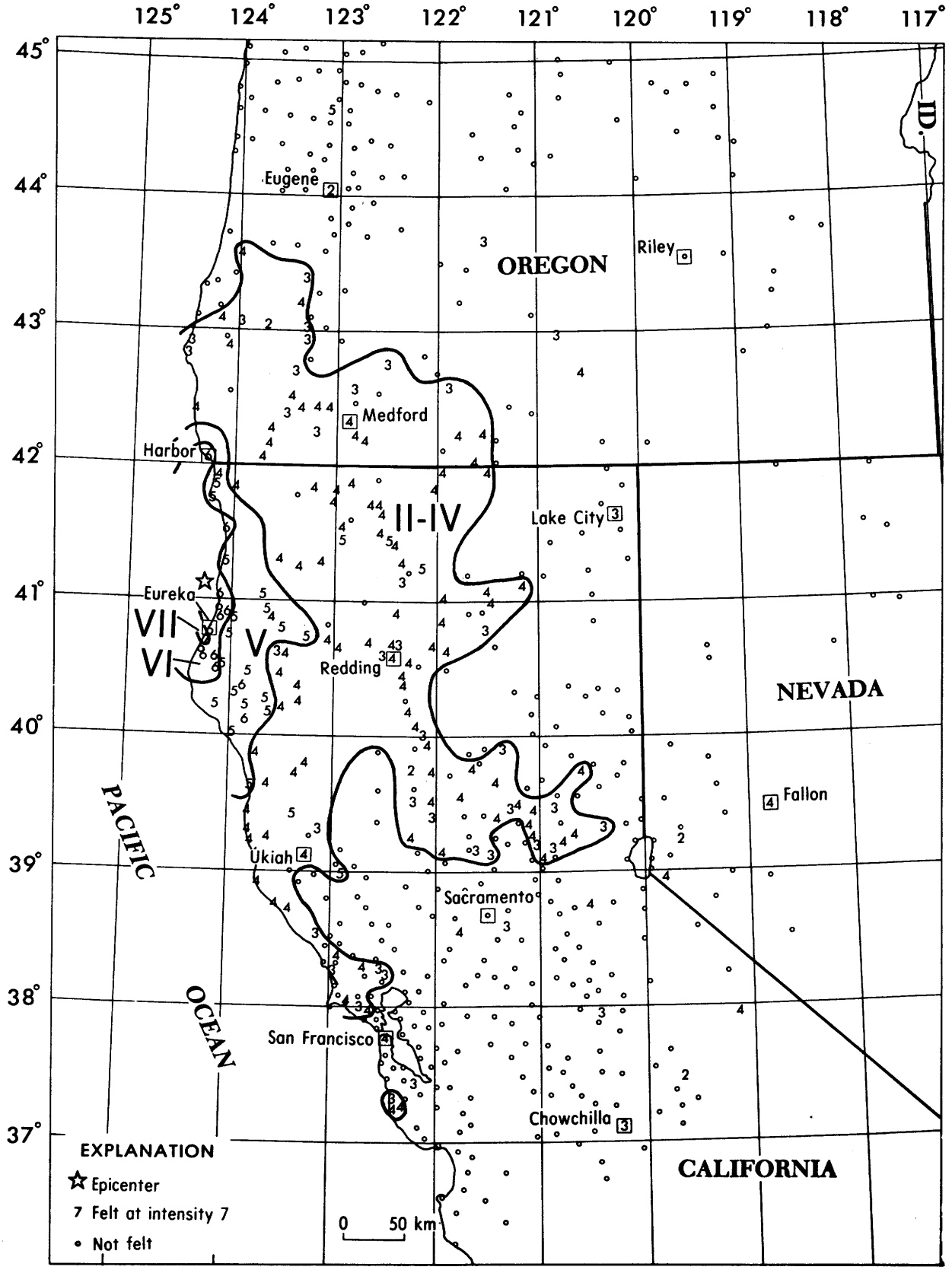

FIGURE 10.--Isoseismal map for the northern California earthquake of 8 November 1980, 10 27 34.0 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

California--Continued

lines arced out. The motion was described as a rolling kind of quake, like being on a ship.

Ground surface failures such as numerous small landslides and liquifaction which caused slumping occurred along the Eel River and the Big Lagoon sand spit (Kilbourne and Saucedo, 1981). Cracks in roads and parking lots also resulted from the shaking. Kilbourne and Saucedo (1981) reported that unusual waves in the Sacrament-San Joaquin Delta region were observed from this earthquake. People sleeping aboard boats in parts of the Delta were awakened by a twisting "seiche" type wave that swept through the region.

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

Intensity VII:

California--

Fields Landing (Two houses were moved off their 2-foot high pier-type foundations. One unreinforced chimney fell, a gas main was reported broken as well as some water and sewer lines, the post office had two broken windows, and telephone service was a interrupted. The most damage in this area was to the Tompkins Road Overpass on Highway 101 where two of the southbound spans collapsed onto the railroad tracks below.

Intensity VI:

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

California--

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

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

California--Continued

crack in a laminated beam and damage to some sheetrock--press report).

Blue Lake.

Eureka (Electric lines whipped violently enough that they touched and shorted. Pacific Gas and Electric Company said electrical service was knocked out to 7,500 customers, but the power was quickly restored. About a dozen plate-glass windows in businesses and some windows in homes were broken. The courthouse also had a few minor crakcs in walls, law books were thrown off the top shelves of the two-floor library, and a typewriter was destroyed when it fell off a cabinet. At the Northwest Pacific Railroad yard boxcar doors slammed and locomotives jumped on the tracks. Two buildings built on pilings tilted. The Veterans Memorial Building had mezzanine-level pillars shaken loose. At the Welfare Department Building (929 Koster Street) portions of the suspended ceiling fell down along with a fluorescent light fixture, and paper was thrown out of filing cabinets.

Ferndale (few pictures fell, many dishes broke).

Fortuna.

Klamath (light furniture overturned).

Loleta (College of the Redwoods had extensive damage to the pottery shop and broken windows--press report).

McKinleyville.

Myers Flat.

Redway.

Rio Dell (the face of the concrete abutments of Painter Street overcrossing were cracked).

Samoa (The Crown-Simpson Pulp Mill on the Samoa Peninsula was shut down for about 18 hours due to damage occurring on the 4th floor of the bleach plant, where a 10-foot chunk of concrete fell about 30 feet and smashed into a "process stock tank."--press report),

Trinidad.

Westhaven.

Oregon--

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

Harbor (chimneys cracked).

Intensity V:

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

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

California--Continued

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

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

Intensity III:
California--Alleghany, Beale Air Force Base, Brownsville, Castella, Cazadero, Cedar Ridge, Chowchilla, Dillon Beach, El Verano, Forest Knolls, Gold Run, Hat Creek, Igo, Jamestown, Lake City, Los Molinos, Manchester, Marysville, Palo Alto, Potter Valley, Princeton, Project City, Rancho Cordova, Round Mountain, San Gregorio, Shasta, Soda Springs, The Sea Ranch, Tobin, Vineburg, Whiskeytown, Willows.
Oregon--Applegate, Canyonville (press report), Chiloquin, Colonial Valley (press report), Langlois, La Pine, Myrtle Creek, Myrtle Point, Prospect, Shady Cove, Sixes, Summer Lake, Sutherlin, Wilderville, Wolf Creek.

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

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

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

11 November (B) California-Nevada border region
Origin time: 10 19 02.9
Epicenter: 38.01 N., 118.60 W.
Depth: 5 km
Magnitude: 4.8 ML(B), 4.5 ML(P)
Intensity III: Bear Valley, Lee Vining.
Felt: Mono Lake (B) and Shaver Lake (P).

11 November (B) California-Nevada border region
Origin time: 10 33 51.2
Epicenter: 38.03 N., 118.59 W.
Depth: 9 km
Magnitude: 4.0 ML(B), 3.8 ML(P)

Felt at Mono Lake (B).

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

Felt at Westlake Village and Woodland Hills (P).

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

California--Continued

19 November (G) Central California
Origin time: 09 34 32.7
Epicenter: 37.78 N., 121.91 W.
Depth: 10 km
Magnitude: 2.8 ML(B)

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

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

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

Intensity IV: Brawley (press report).

22 November (B) Owens Valley area
Origin time: 00 21 17.1
Epicenter: 37.52 N., 118.87 W.
Depth: 18 km
Magnitude: 4.1 ML(B), 3.8 ML(P)

Felt at Mammoth Lakes (B).

24 November (B) Central California
Origin time: 05 49 31.4
Epicenter: 36.86 N., 121.63 W.
Depth: 5 km
Magnitude: 3.1 ML(B)

Felt at Watsonville (B).

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

Felt at El Centro (P).

28 November (B) Northern California
Origin time: 17 11 40.2
Epicenter: 39.29 N., 120.52 W.
Depth: 5 km
Magnitude: 3.3 ML(B)

This is a foreshock of the earthquake on November 28 at 18 21 13.1. It was felt at the Royal Gorge recreation office (1 mile from epicenter--press report) and at Truckee (B).

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

California--Continued

28 November (B) Northern California
Origin time: 18 21 13.1
Epicenter: 39.31 N., 120.43 W.
Depth: 5 km
Magnitude: 4.9 mb(G), 5.2 ML(B)

This earthquake was centered west of Truckee in a lightly populated mountainous area. It was felt over an area of approximately 36,500 sq km from Reno, Nevada to the San Francisco Bay area of California (fig. 11). Some people reported that the quake had a dizzying roll and nauseated them. The noise associated with the earthquake was described as a loud or like a sonic boom. There were also reports of booming noises echoing off the granite walls of the High Sierra. A reporter at Donner Lake on the crest of the Sierra near Truckee, California, said water in the lake splashed and sloshed for 2 minutes after the quake stopped.

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

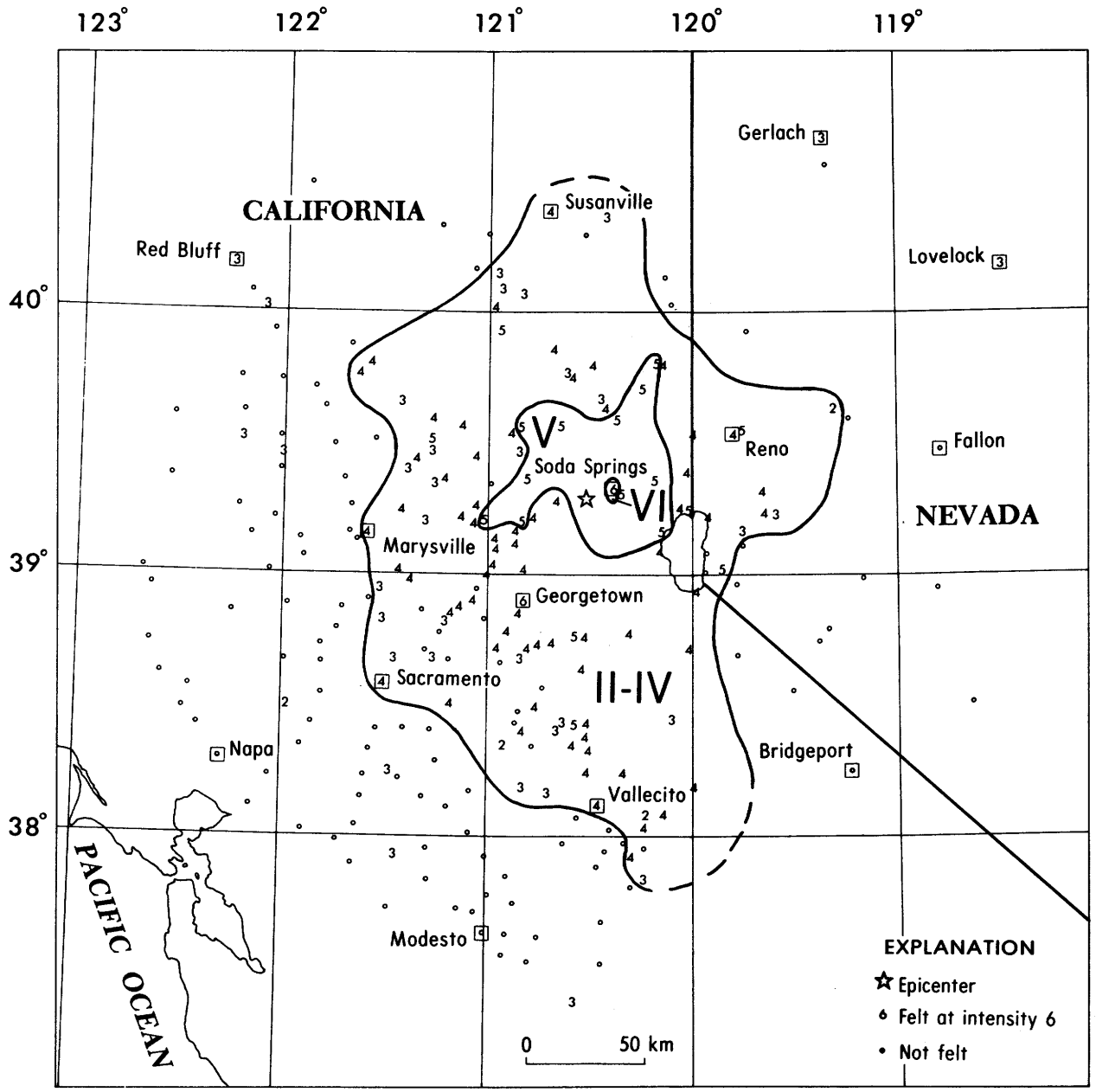

FIGURE 11.--Isoseismal map for the northern California earthquake of 28 November 1980, 18 21 13.1 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

California--Continued

Sierraville, Truckee, Twin Bridges, Vinton, Washington.
Nevada--Crystal Bay, Genoa, Sparks.

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

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

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

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

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

California--Continued

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

Felt at Thousand Oaks (P).

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

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

Felt at Brawley (P).

12 December (G) Northern California
Origin time: 14 24 08.1
Epicenter: 38.95 N., 122.66 W.
Depth: 5 km
Magnitude: 3.2 ML(B)

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

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

12 December (G) Northern California
Origin time: 14 27 16.6
Epicenter: 38.98 N., 122.68 W.
Depth: 5 km
Magnitude: 3.2 ML(B)
Intensity IV: Clearlake Park, Lucerne.
Felt: Lakeport (press report).

12 December (B) Northern California
Origin time: 14 57 08.2
Epicenter: 38.95 N., 122.70 W.
Depth: 7 km
Magnitude: 3.9 ML(B)
Intensity IV: Clearlake Park, Lucerne.
Intensity III: Cobb.
Felt: Kelseyville, Lakeport, and Middletown (press reports).

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

California--Continued

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

24 December (B) Central California
Origin time: 12 00 11.3
Epicenter: 36.94 N., 121.46 W.
Depth: 7 km
Magnitude: 3.4 ML(B)

Felt at Hollister (B).

24 December (B) Owens Valley area
Origin time: 13 25 49.6
Epicenter: 37.55 N., 118.92 W.
Depth: 4 km
Magnitude: 4.0 ML(B), 3.6 ML(P)
Intensity V: Mammoth Lakes (hanging objects swung slightly; small objects overturned and fell; hanging pictures out of place; windows, doors, and dishes rattled; felt by many).

24 December (B) Owens Valley area
Origin time: 15 48 33.5
Epicenter: 37.56 N., 118.90 W.
Depth: 5 km
Magnitude: 4.2 mb(G), 4.6 ML(B), 4.5 ML(P)

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

28 December (B) Owens Valley area
Origin time: 22 58 08.7

See Nevada listing.

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

Felt at Lancaster and Palmdale (P).

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

California--Continued

31 December (B) Central California
Origin time: 12 16 29.4
Epicenter: 37.71 N., 122.12 W.
Depth: 11 km
Magnitude: 3.5 ML(B)

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

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

California--Off the coast

18 November (G) Northern California
Origin time: 21 41 26.4
Epicenter: 40.34 N., 124.69 W.
Depth: 21 km
Magnitude: 3.7 ML(B)
Intensity III: Rio Dell.

Connecticut

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

25 October (J) Southern Connecticut
Origin time: 00 41 28.3
Epicenter: 41.33 N., 72.88 W.
Depth: 6 km
Magnitude: 3.0 Mn(G), 2.7 Mn(J), 3.1 MN(L)
Intensity IV: Middlebury (press report), Waterbury (press report).
Intensity III: Naugatuck, North Haven, Seymour.
Felt: Ansonia (press report), Derby, East Haven (press report), northeast of New Haven (J).

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

Hawaii

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

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

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

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

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

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

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

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

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

Hawaii--Continued

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

Felt at Wheeler Air Force Base.

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

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

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

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

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

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

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

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

Hawaii--Continued

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

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

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

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

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

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

Kentucky

30 December (K) Northeastern Kentucky
Origin time: 03 07 08.1
Epicenter: 38.20 N., 83.91 W.
Depth: 11 km
Magnitude: 1.6 ML(K)
Intensity III: Moorefield, Sharpsburg.
Felt: Bethel, East Union, Little Rock, Mount Sterling, North Middletown, and Sherburne (press reports).

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

Maine

22 November (J) Central Maine
Origin time: 21 28 23.2
Epicenter: 45.22 N., 69.16 W.
Depth: 5 km
Magnitude: 2.6 Mn(J)

Felt in the Dover-Foxcroft area (J).

Massachusetts

23 November (J) Northeastern Massachusetts
Origin time: 00 39 32.4
Epicenter: 42.62 N., 71.39 W.
Depth: 1 km
Magnitude: 2.5 Mn(J)
Intensity V:
Massachusetts--North Chelmsford (trees and bushes shook slightly, standing and moving vehicles rocked slightly, small objects overturned and fell, hanging objects swung slightly, buildings shook strongly, windows, doors, and dishes rattled, felt by many).
Intensity IV:
Massachusetts--Lowell (press report).
Intensity III:
Massachusetts--Chelmsford, Highlands (press report), Tyngsboro.
Intensity II:
Massachusetts--Billerica.
Felt:
Massachusetts--Amesburg (J), Dracut (press report), Salem (J), Lawrence (J).
New Hampshire--Salem (J).

Missouri

2 December (S) Northwestern Tennessee
Origin time: 08 59 30.0

See Tennessee listing.

Nevada

24 October (E) Southern Nevada
Origin time: 19 15 00.116
Epicenter: 37.07 N., 116.00 W.
Depth: 0 km
Magnitude: 4.4 mb(G), 4.4 ML(B)

Nevada Test Site explosion "DUTCHESS" at 37°04'28.47" N., 115°59'57.35" W., surface elevation 1292 m, depth of burial 427 m.

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

Nevada--Continued

31 October (E) Southern Nevada
Origin time: 18 00 00.090
Epicenter: 37.21 N., 116.20 W.
Depth: 0 km
Magnitude: 4.7 mb(G), 4.9 ML(B)

Nevada Test Site explosion "MINERS IRON" 37°12'40.53" N., 116°12'19.36" W., surface elevation 2239 m, depth of burial 390 m.

8 November (G) Northern California
Origin time: 10 27 34.0

See California listing.

14 November (E) Southern Nevada
Origin time: 16 50 00.084
Epicenter: 37.11 N., 116.02 W.
Depth: 0 km
Magnitude: 4.1 mb(G), 4.5 ML(B)

Nevada Test Site explosion "DAUPHIN" at 37°06'41.37" N., 116°01'07.16" W., surface elevation 1333 m, depth of burial 320 m.

28 November (B) Northern California
Origin time: 18 21 13.1

See California listing.

17 December (E) Southern Nevada
Origin time: 15 10 00.086
Epicenter: 32.37 N., 116.31 W.
Depth: 0 km
Magnitude: 5.1 mb(G), 5.0 ML(B)

Nevada Test Site explosion "SERPA" at 37°19'29.21" N., 116°18'42.24" W., surface elevation 2055 m, depth of burial 573 m.

19 December (P) Western Nevada
Origin time: 16 57 45.2
Epicenter: 38.48 N., 118.42 W.
Depth: 5 km
Magnitude: 3.7 ML(P)
Intensity III: Mina, Nevada.

28 December (B) Western Nevada
Origin time: 22 58 08.7
Epicenter: 38.14 N., 118.27 W.
Depth: 23 km
Magnitude: 4.6 mb(G), 5.0 ML(B), 4.6 ML(P)
Intensity IV:
California--Mono City.
Nevada--Luning, Mina.
Intensity III:
California--Bridgeport (press report), Hume, Miramonte.
Nevada--Dyer, Hawthorne.
Felt:
California--Mono Lake (B).

28 December (B) Western Nevada
Origin time: 23 05 38.8
Epicenter: 38.17 N., 118.38 W.
Depth: 5 km
Magnitude: 4.0 ML(B), 3.6 ML(P)

Felt at Mono Lake (B).

New Hampshire

23 November (J) Northeastern Massachusetts
Origin time: 00 39 32.4

See Massachusetts listing.

Oklahoma

2 November (T) Central Oklahoma
Origin time: 10 00 49.3
Epicenter: 35.47 N., 97.78 W.
Depth: 8 km
Magnitude: 3.0 Mn(T)
Intensity V: Mustang (hanging objects swung slightly, small objects overturned and fell, felt by and awakened a few).
Intensity IV: El Reno (press report), Yukon (press report).
Felt: Banner (telephone report), Bethany (telephone report), Piedmont (telephone report), Surrey Hills area (press report).

Oregon

8 November (G) Off coast of northern California
Origin time: 10 33 51.2

See California--Off the coast listing.

Tennessee

2 December (S) Northwestern Tennessee
Origin time: 08 59 30.0
Epicenter: 36.21 N., 89.43 W.
Depth: 11 km
Magnitude: 3.8 Mn(K), 3.8 Mn(S)

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

Tennessee--Continued

This earthquake was felt over an area of approximately 1,700 sq km of northwestern Tennessee and southeastern Missouri (fig. 12). Some of the information listed below was supplied by the Tennessee Earthquake Information Center.

Intensity VI:
Tennessee--
Madie (foundation cracked, small objects broke, felt by and awakened all).
Ridgely (exterior brick walls cracked, small objects fell, hanging pictures fell, felt by and awakened all).

Intensity V:
Missouri--
Caruthersville (unsupported brick garden wall cracked and moved).
Tennessee--
Elbridge (windows cracked in a new one-story brick home).
Hornbeak (trees and bushes shook slightly, few windows cracked, windows, doors, and dishes rattled, felt by and awakened many).
Lane (windows broke in an old two-story building).
Miston (small objects shifted slightly, felt by and awakened all, hanging pictures fell).
Owl Hoot (light furniture shifted, small lamp knocked over, felt by all).
Running Reelfoot Bayou--3 miles southeast of Ridgely (TV moved away from wall, building trembled and creaked).
Tiptonville (trees and bushes shook slightly, light furniture overturned, small objects overturned and fell, hanging pictures out of place, felt by and awakened several).

Intensity IV:
Missouri--Hayti, Kinfolk Ridge.
Tennessee--Bogota, Broadmoor, Cat Corner, Cottonwood, Gratio, Kenton, Mitchell, Mooring, Newbern, Obion, Samburg, Tennemo, Wynnburg.

Intensity III:
Missouri--Braggadocio, Rives.

Intensity II:
Tennessee--Halls.

Utah

21 December (U) Southwestern Utah
Origin time: 18 25 10.5
Epicenter: 37.53 N., 113.04 W.

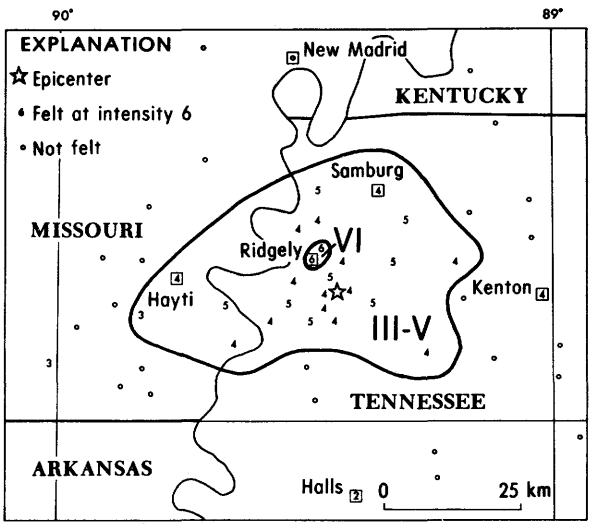

FIGURE 12.--Isoseismal map for the northwestern Tennessee earthquake of 2 December 1980, 08 59 30.0. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

Utah--Continued

Depth: 7 km
Magnitude: 3.2 ML(U)

Felt at Cedar City and Kanarraville (telephone report).

Virginia

5 November (V) Northern Virginia
Origin time: 21 48 14.7
Epicenter: 38.18 N., 79.90 W.
Depth: 4 km
Magnitude: 2.8 Mn(V)

Felt in Bath County (telephone report).

Wyoming

18 October (G) Yellowstone National Park
Origin time: 21 45 53.4
Epicenter: 44.65 N., 110.52 W.
Depth: 3 km
Magnitude: 2.7 ML(G)
Intensity III: Canyon Village area.

Table 2.--*Summary of macroseismic data for U.S. earthquakes, October-December 1980*--Continued

Wyoming--Continued

18 October (G) Yellowstone National Park
Origin time: 21 57 08.7
Epicenter: 44.64 N., 110.52 W.
Depth: 1 km
Magnitude: 2.7 ML(G)
Intensity III: Canyon Village area.

14 November (G) Yellowstone National Park
Origin time: 21 08 10.4
Epicenter: 44.59 N., 111.04 W.
Depth: 11 km
Magnitude: 3.2 ML(G)
Intensity III: West Yellowstone, Montana.

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.
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.
MASSACHUSETTS: Staff of Weston Observatory, Weston.
MISSOURI: Otto Nuttli, Department of Geology and Geophysics, St. Louis University, St. Louis.
NEW YORK: Lynn R. Sykes and Yash P. Aggarwal, Lamont-Doherty Geological Observatory, Columbia University, Palisades.
OKLAHOMA: James E. Lawson, Jr., Oklahoma Geophysical Observatory, Oklahoma Geological Survey, Leonard.
TENNESSEE: A. Johnson, Tennessee Earthquake Information Center, Memphis.
UTAH: Department of Geological and Geophysical Sciences, University of Utah, Salt Lake City.
VIRGINIA: G. A. Bollinger, Department of Geological Sciences, Virginia Polytechnic Institute and State University, Blacksburg.
WYOMING: R. A. Hutchinson, National Park Service, Yellowstone National Park.

REFERENCES CITED

Bath, Markus, 1966, Earthquake energy and magnitude, in Physics and chemistry of the Earth, Volume 7: Oxford and New York, Pergamon Press, p. 115-165.

Gutenberg, B. and Richter, C. F., 1956, Magnitude and energy of earthquakes: Annali di Geofisica, v. 9, no. 1, p. 1-15.

Kilbourne, R. T. and Saucedo, G. J., 1981, Gorda Basin earthquake, Northwestern California: California Geology, v. 34, no. 3, p. 53-57.

Meehan, J. F., 1981, Trinidad-Offshore, California earthquake, November 8, 1980, in Earthquake Engineering Research Institute Newsletter, edited by David J. Leeds, v. 15, no. 1, Part B, p. 73-113.

Nuttli, O. W., 1973, Seismic wave attenuation and magnitude relations for eastern North America: Journal of Geophysical Research, v. 78, no. 5, p. 876-885.

Richter, C. F., 1958, Elementary seismology: San Francisco, W. H. Freeman, 768 p.

Wood, H. O., and Neumann, F., 1931, Modified Mercalli Intensity Scale of 1931: Seismological Society of America Bulletin, v. 21, no. 4, p. 277-283.