

GEOLOGICAL SURVEY CIRCULAR 871-C



# Earthquakes in the United States July–September 1981



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By C. W. Stover, J. H. Minsch, P. K. Dunbar,  
and G. W. Baldwin

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**G E O L O G I C A L   S U R V E Y   C I R C U L A R   8 7 1 – C**

**United States Department of the Interior**

**JAMES G. WATT, *Secretary***



**Geological Survey**

**Dallas L. Peck, *Director***

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## INTRODUCTION

The earthquake information in this publication supplements that published in the NEIS (National Earthquake Information Service) publications, PDE ("Preliminary Determination of Epicenters") and "Preliminary Determination of Epicenters Monthly Listing," by providing detailed felt and intensity data for U.S. earthquakes. The purpose of this circular is to provide a complete listing of 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 four 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 ☐ Standard time  
☐ PM ☐ Daylight time

Name of person filling out form \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ County \_\_\_\_\_

State \_\_\_\_\_ Zip code \_\_\_\_\_

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

PERSONAL REPORT

2. Did you personally feel the earthquake? 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 <input type="checkbox"/> Hairline cracks	66 <input type="checkbox"/> Large cracks (many)	67 <input type="checkbox"/> Fell in large amounts
Dry wall	68 <input type="checkbox"/> Hairline cracks	69 <input type="checkbox"/> Large cracks (many)	70 <input type="checkbox"/> Fell in large amounts

---

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

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

---

7a. Check below any structural damage to buildings.

Foundation	102 <input type="checkbox"/> Cracked	103 <input type="checkbox"/> Destroyed
Interior walls	104 <input type="checkbox"/> Split	105 <input type="checkbox"/> Fallen
Exterior walls	107 <input type="checkbox"/> Large Cracks	108 <input type="checkbox"/> Bulged outward
	109 <input type="checkbox"/> Partial collapse	110 <input type="checkbox"/> Total collapse
106 <input type="checkbox"/> Separated from ceiling or floor		

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

111 <input type="checkbox"/> Wood	112 <input type="checkbox"/> Stone	113 <input type="checkbox"/> Brick veneer	114 <input type="checkbox"/> Other _____
115 <input type="checkbox"/> Brick	116 <input type="checkbox"/> Cinderblock	117 <input type="checkbox"/> Reinforced concrete	118 <input type="checkbox"/> Mobile home

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

<input type="checkbox"/> Don't know	119 <input type="checkbox"/> Sandy soil	120 <input type="checkbox"/> Marshy	121 <input type="checkbox"/> Fill
122 <input type="checkbox"/> Hard rock	123 <input type="checkbox"/> Clay soil	124 <input type="checkbox"/> Sandstone, limestone, shale	

d. Was the ground:

125 <input type="checkbox"/> Level	126 <input type="checkbox"/> Sloping	127 <input type="checkbox"/> Steep?
------------------------------------	--------------------------------------	-------------------------------------

e. Check the approximate age of the building:

128 <input type="checkbox"/> Built before 1935	129 <input type="checkbox"/> Built 1935-65	130 <input type="checkbox"/> Built after 1965
--	--	---

---

8. Check below any structural damage to

Bridges/Overpasses	131 <input type="checkbox"/> Concrete	132 <input type="checkbox"/> Wood	133 <input type="checkbox"/> Steel	134 <input type="checkbox"/> Other _____
Damage was	135 <input type="checkbox"/> Slight	136 <input type="checkbox"/> Moderate	137 <input type="checkbox"/> Severe	
Dams	138 <input type="checkbox"/> Concrete	139 <input type="checkbox"/> Large earthen		
Damage was	140 <input type="checkbox"/> Slight	141 <input type="checkbox"/> Moderate	142 <input type="checkbox"/> Severe	

---

9. What geologic effects were noted in your community?

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

---

10a. What percentage of buildings were damaged?

Within 2 city blocks of your location	<input type="checkbox"/> None	155 <input type="checkbox"/> Few (about 5%)
	156 <input type="checkbox"/> Many (about 50%)	157 <input type="checkbox"/> Most (about 75%)

b. In area covered by your zip code

	<input type="checkbox"/> None	158 <input type="checkbox"/> Few (about 5%)
	159 <input type="checkbox"/> Many (about 50%)	160 <input type="checkbox"/> 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.

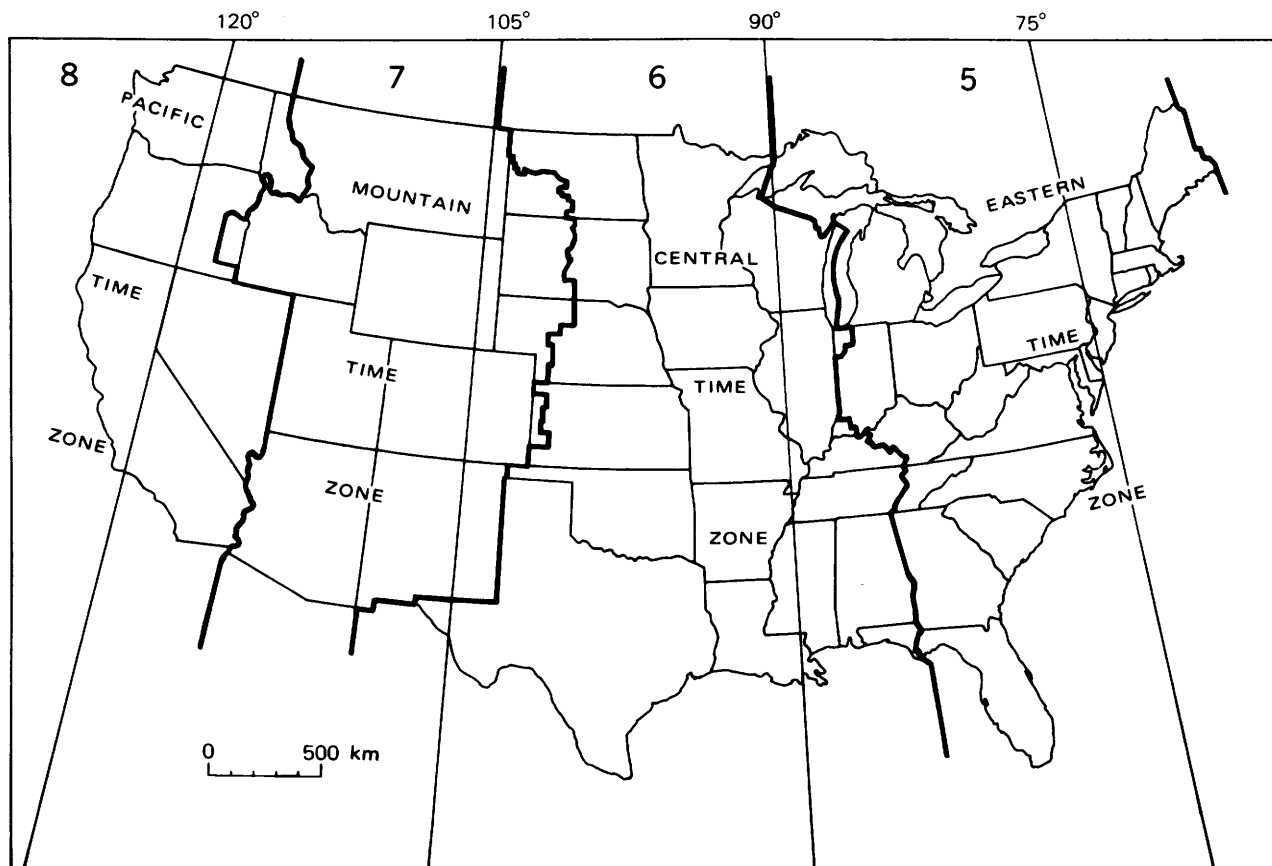


FIGURE 2.--Standard time zones of the conterminous United States. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

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 July-September 1981. 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  $18 < T < 22$ ; and D is the distance, in geocentric degrees (station to epicenter), and  $20^\circ < D < 160^\circ$ . No depth correction is made for 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  $0.1 < T < 3.0$ , and A, the ground amplitude in micrometers, is not necessarily the maximum of the P-wave group. Q is a function of distance D and depth h, where  $D > 5^\circ$ .

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

as defined by Richter (1958, p. 340), where A is

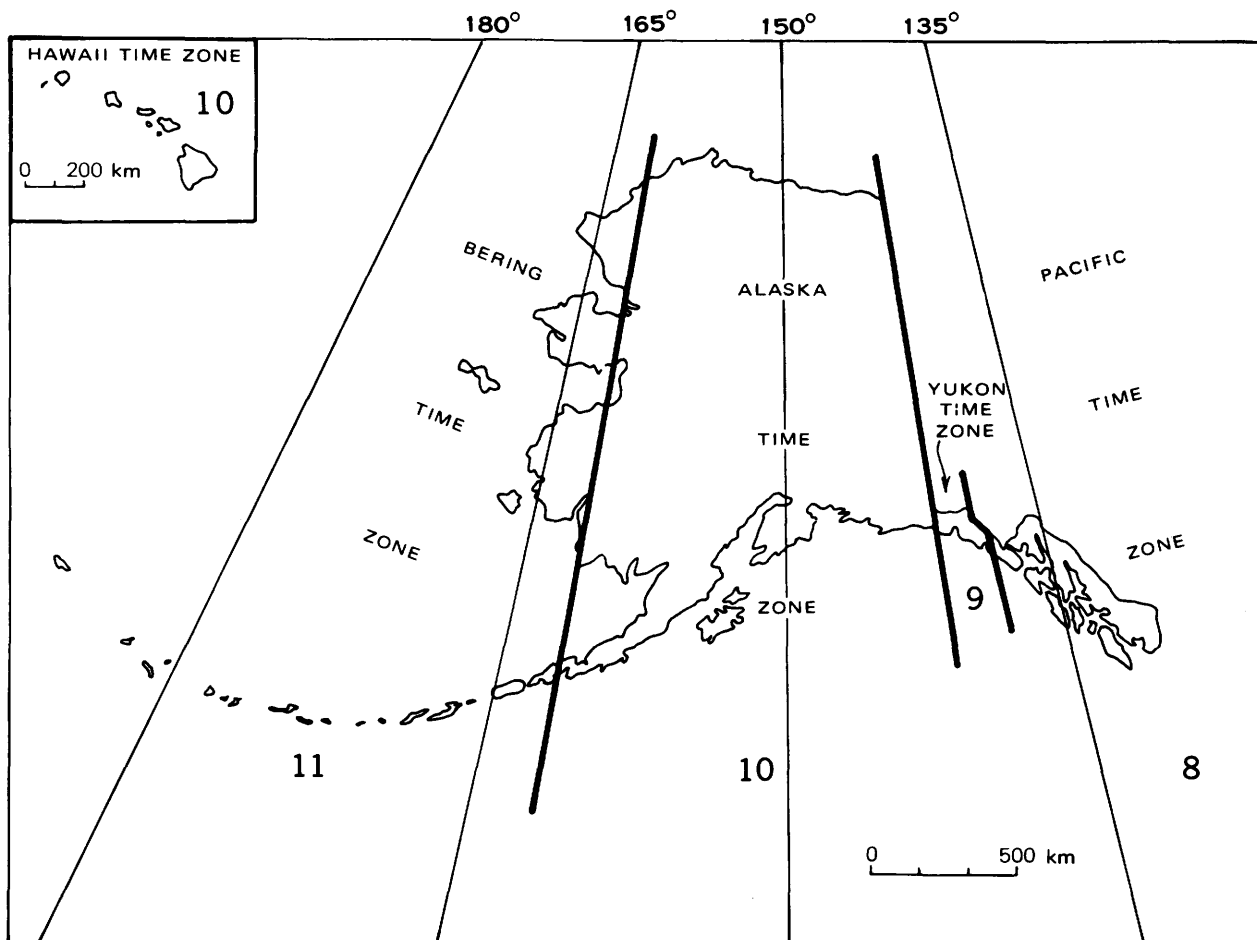


FIGURE 3.--Standard time zones of Alaska and Hawaii. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

the maximum trace amplitude in millimeters, written by a Wood-Anderson torsion seismometer, and  $\log A$  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.

$$M_n = 3.75 + 0.90(\log D) + \log(A/T) \quad (4)$$

$$0.5^\circ \leq D \leq 4^\circ,$$

$$M_n = 3.30 + 1.66(\log D) + \log(A/T)$$

$$4^\circ \leq D \leq 30^\circ,$$

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

MD is used in this publication for the duration or coda length magnitude. MD is usually computed from the difference, in seconds, between  $P_n$  or  $P_g$ -wave arrival time and the time

the final coda amplitude decreases to the background-noise amplitude. These magnitudes are normally correlated with ML or  $mbL_g$  so that resulting magnitudes are compatible. Thus the formulas vary for different geographic regions and seismograph systems.

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.

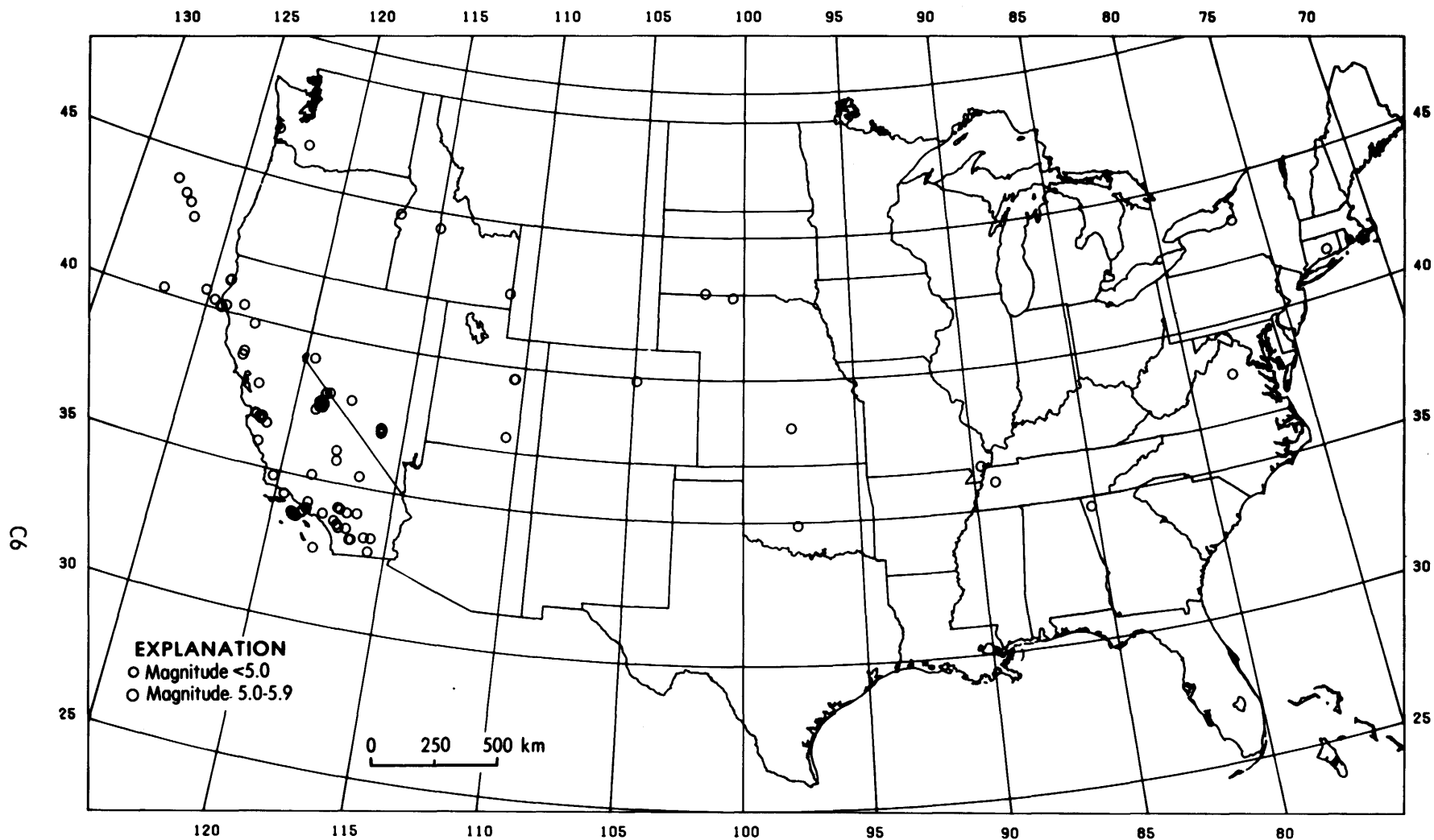


FIGURE 4.--Earthquake epicenters in the conterminous United States for July-September 1981, plotted from table 1.

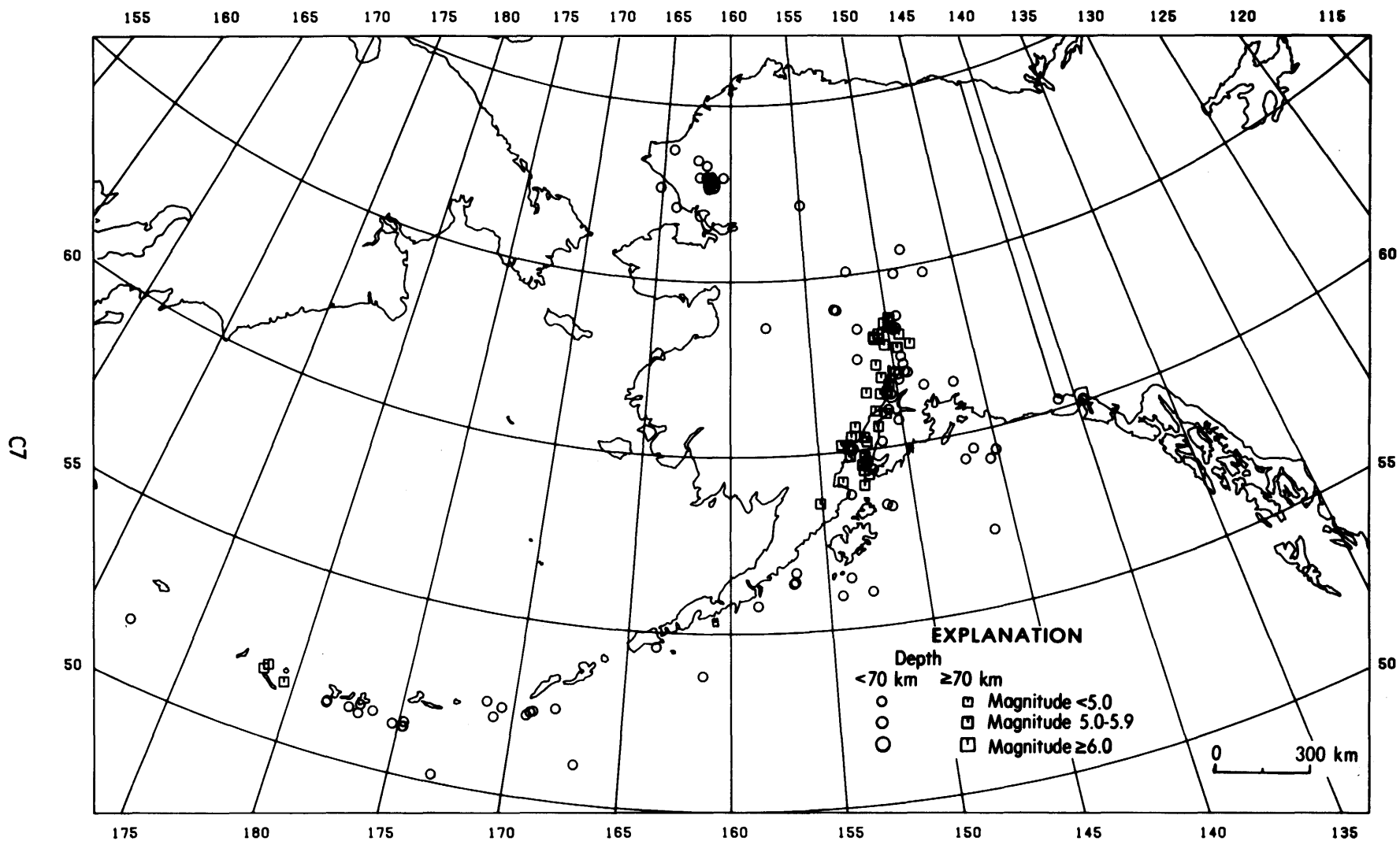


FIGURE 5.--Earthquake epicenters in Alaska for July-September 1981, plotted from table 1.

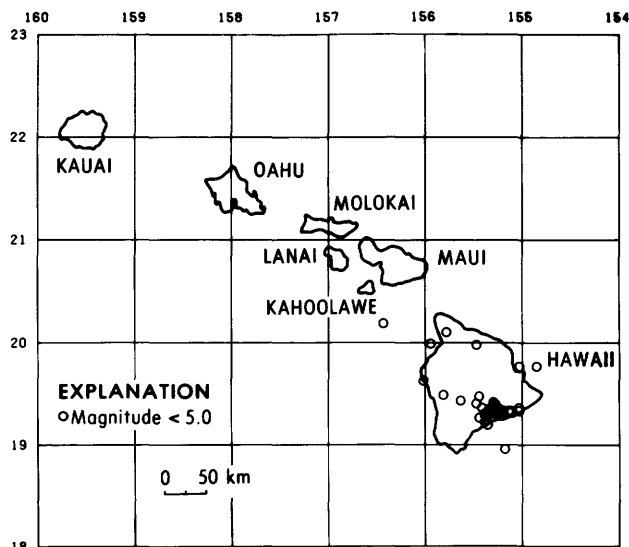


FIGURE 6.--Earthquake epicenters in Hawaii for July-September 1981, plotted from table 1.

## 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

poorly built or badly designed buildings, adobe houses, old walls (especially where laid up without mortar), spires, etc. Cracked chimneys to considerable extent, walls to some extent. Fall of plaster in considerable to large amount, also some stucco. Broke numerous windows, furniture to some extent. shook down loosened brickwork and tiles. Broke weak chimneys at the roof-line (sometimes damaging roofs). Fall of cornices from towers and high buildings. Dislodged bricks and stones. Overturned heavy furniture, with damage from breaking. Damage considerable to concrete irrigation ditches.

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

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

X. Cracked ground, especially when loose and wet, up to widths of several inches; fissures up to a yard in width ran parallel

to canal and stream banks. Landslides considerable from river banks and steep coasts. Shifted sand and mud horizontally on beaches and flat land. Changed level of water in wells. Threw water on banks of canals, lakes, rivers, etc. Damage serious to dams, dikes, embankments. Severe to well-built wooden structures and bridges, some destroyed. Developed dangerous cracks in excellent brick walls. Destroyed most masonry and frame structures, also their foundations. Bent railroad rails slightly. Tore apart, or crushed endwise, pipe lines buried in earth. Open cracks and broad wavy folds in cement pavements and asphalt road surfaces.

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

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

Table 1.—Summary of U.S. earthquakes for July–September 1981

[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, Golden, Colorado, or Network Operations Branch, Menlo Park, California; (H) U.S. Geological Survey, Hawaiian Volcano Observatory; (J) Weston Observatory, Massachusetts; (K) Tennessee Earthquake Information Center, Memphis; (L) Lamont-Doherty Geological Observatory, Palisades, N.Y.; (M) National

Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis, Missouri; (T) Oklahoma Geological Survey, Leonard; (U) University of Utah, Salt Lake; (V) Virginia Polytechnic Institute and State University, Blacksburg; (W) University of Washington Seattle. N, Normal depth; UTC, Universal Coordinated Time. For names of local time zones, see figures 2 and 3. Leaders (...) indicate no information available]

Date (1981)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time							
	hr	min	s				mb	MS	ML, Mn or MD			Date	Hour						
ALASKA																			
JULY	1	19	00	18.3	59.15 N.	153.77 W.	121	...	...	...	...	G	JULY	1	09	A.M.	AST		
JULY	2	11	46	16.8	57.15 N.	146.10 W.	33	4.3	...	...	...	G	JULY	2	01	A.M.	AST		
JULY	2	13	25	19.9	59.41 N.	152.53 W.	152	4.4	...	...	...	G	JULY	2	03	A.M.	AST		
JULY	3	10	08	11.9	61.05 N.	151.47 W.	72	3.8	...	...	...	G	JULY	3	00	A.M.	AST		
JULY	4	07	45	02.3	67.71 N.	161.64 W.	33	4.8	4.9	...	FELT	G	JULY	3	08	P.M.	BST		
JULY	4	08	21	07.0	67.95 N.	162.33 W.	33	...	...	...	...	G	JULY	3	09	P.M.	BST		
JULY	4	16	53	07.3	51.50 N.	177.34 W.	51	4.7	...	4.4M	FELT	G	JULY	4	05	A.M.	BST		
JULY	5	02	31	07.8	58.32 N.	151.22 W.	33	...	...	3.4M	...	G	JULY	4	04	P.M.	AST		
JULY	6	01	22	03.2	67.95 N.	160.57 W.	33	4.7	...	...	...	G	JULY	5	03	P.M.	AST		
JULY	7	09	19	25.0	67.67 N.	161.24 W.	33	...	...	3.6M	...	G	JULY	6	10	P.M.	BST		
JULY	7	09	46	57.4	67.77 N.	161.40 W.	33	4.6	...	3.9M	...	G	JULY	6	10	P.M.	BST		
JULY	8	17	19	12.8	59.28 N.	146.86 W.	33	...	...	3.5M	...	G	JULY	8	07	A.M.	AST		
JULY	9	16	43	48.8	61.58 N.	148.38 W.	33	...	...	2.2M	FELT	G	JULY	9	06	A.M.	AST		
JULY	10	01	39	31.0	51.65 N.	176.87 W.	55	5.0	...	...	IV	G	JULY	9	02	P.M.	BST		
JULY	10	09	06	05.9	60.60 N.	151.40 W.	80	3.8	...	...	...	G	JULY	9	11	P.M.	AST		
JULY	11	08	58	07.9	52.41 N.	170.58 W.	52	5.0	...	...	...	G	JULY	10	09	P.M.	BST		
JULY	12	01	27	56.3	67.71 N.	161.20 W.	33	5.2	5.0	...	FELT	G	JULY	11	02	P.M.	BST		
JULY	12	01	58	53.4	67.75 N.	161.63 W.	33	...	...	3.5M	...	G	JULY	11	02	P.M.	BST		
JULY	12	03	44	33.1	67.96 N.	161.76 W.	33	4.0	...	3.7M	...	G	JULY	11	04	P.M.	BST		
JULY	12	10	42	42.3	67.90 N.	161.75 W.	33	...	...	3.3M	...	G	JULY	11	11	P.M.	BST		
JULY	12	14	33	54.1	67.64 N.	161.60 W.	33	4.8	4.3	...	...	G	JULY	12	03	A.M.	BST		
JULY	12	17	03	25.5	52.45 N.	169.12 W.	39	5.2	4.7	...	...	G	JULY	12	06	A.M.	BST		
JULY	13	05	58	01.1	67.79 N.	161.46 W.	12	4.9	4.3	...	...	G	JULY	12	06	P.M.	BST		
JULY	13	09	11	33.4	67.81 N.	161.43 W.	33	...	...	...	...	G	JULY	12	10	P.M.	BST		
JULY	13	16	10	42.8	67.96 N.	161.54 W.	33	...	...	3.9M	...	G	JULY	13	05	A.M.	BST		
JULY	13	18	27	01.2	59.42 N.	152.04 W.	28	...	...	3.4M	III	G	JULY	13	08	A.M.	AST		
JULY	13	22	10	02.4	50.21 N.	173.16 W.	6	5.5	4.7	5.3M	...	G	JULY	13	11	A.M.	BST		
JULY	14	01	27	36.3	52.30 N.	169.41 W.	28	4.7	4.6	...	...	G	JULY	13	02	P.M.	BST		
JULY	15	07	51	55.1	51.49 N.	174.79 W.	41	4.9	...	...	...	G	JULY	14	08	P.M.	BST		
JULY	15	08	25	37.0	51.37 N.	174.78 W.	39	5.0	...	4.9M	...	G	JULY	14	09	P.M.	BST		
JULY	15	08	46	47.7	48.59 N.	175.59 W.	33	...	...	...	...	G	JULY	14	09	P.M.	BST		
JULY	15	13	05	40.0	51.35 N.	174.82 W.	36	5.0	...	4.5M	...	G	JULY	15	02	A.M.	BST		
JULY	16	04	22	04.3	67.82 N.	161.17 W.	33	4.5	...	4.1M	...	G	JULY	15	05	P.M.	BST		
JULY	19	02	45	51.7	60.73 N.	150.17 W.	33	...	...	3.3M	...	G	JULY	18	04	P.M.	AST		
JULY	19	09	20	27.0	63.29 N.	149.62 W.	17	4.2	...	4.2M	...	G	JULY	18	11	P.M.	AST		
JULY	19	15	35	01.4	61.51 N.	150.68 W.	62	...	...	...	...	G	JULY	19	05	A.M.	AST		
JULY	19	23	38	58.0	60.66 N.	152.75 W.	125	3.8	...	...	...	G	JULY	19	01	P.M.	AST		
JULY	20	14	08	57.9	62.02 N.	149.82 W.	66	...	...	...	...	G	JULY	20	04	A.M.	AST		
JULY	20	14	53	52.0	64.77 N.	138.51 W.	15	4.4	...	4.1M	...	G	JULY	20	05	A.M.	YST		
JULY	20	22	32	37.6	64.81 N.	138.37 W.	15	...	...	3.6M	...	G	JULY	20	01	P.M.	YST		
JULY	21	03	17	20.5	59.28 N.	152.27 W.	84	4.5	...	4.1M	...	G	JULY	20	05	P.M.	AST		
JULY	23	10	13	55.7	63.21 N.	150.68 W.	135	...	...	...	...	G	JULY	23	00	A.M.	AST		
JULY	23	13	37	15.0	63.67 N.	157.70 W.	33	...	...	...	...	G	JULY	23	03	A.M.	AST		
JULY	23	13	37	43.6	60.18 N.	151.31 W.	33	...	...	...	...	G	JULY	23	03	A.M.	AST		
JULY	24	06	36	55.0	63.51 N.	150.20 W.	141	...	...	...	...	G	JULY	23	08	P.M.	AST		
JULY	24	13	44	19.8	63.13 N.	149.35 W.	114	...	...	...	...	G	JULY	24	03	A.M.	AST		
JULY	25	01	16	25.7	63.66 N.	149.37 W.	33	...	...	3.4M	...	G	JULY	24	03	P.M.	AST		
JULY	25	18	31	58.7	67.79 N.	161.55 W.	33	...	...	4.1M	...	G	JULY	25	07	A.M.	BST		
JULY	25	23	49	02.6	58.38 N.	151.50 W.	33	4.5	...	4.6M	...	G	JULY	25	01	P.M.	AST		
JULY	26	21	19	08.0	63.43 N.	151.96 W.	33	...	...	3.0M	...	G	JULY	26	11	A.M.	AST		
JULY	26	22	33	58.7	60.94 N.	150.85 W.	72	4.6	...	...	III	G	JULY	26	12	P.M.	AST		
JULY	27	02	24	56.5	58.78 N.	153.38 W.	33	...	...	3.1M	...	G	JULY	26	04	P.M.	AST		
JULY	27	13	31	13.6	64.86 N.	149.07 W.	23	...	...	4.3M	IV	G	JULY	27	03	A.M.	AST		
JULY	27	23	05	19.3	63.38 N.	149.94 W.	116	4.4	...	...	...	G	JULY	27	01	P.M.	AST		



Table 1.--Summary of U.S. earthquakes for July-September 1981--Continued

Date (1981)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML, Mn or MD			Date	Hour				
ALASKA--Continued																	
JULY 29	09	22	58.8	67.97 N.	161.41 W.	33	...	...	...	...	G	JULY 28	10	P.M.	BST		
JULY 30	14	31	22.4	62.82 N.	148.79 W.	109	...	...	...	...	G	JULY 30	04	A.M.	AST		
AUG. 1	01	42	16.4	60.14 N.	153.18 W.	114	5.2	...	...	V	G	JULY 31	03	P.M.	AST		
AUG. 2	06	40	25.6	52.60 N.	168.13 W.	33	4.4	...	...	...	G	AUG. 1	07	P.M.	BST		
AUG. 3	05	26	07.2	67.78 N.	161.53 W.	33	...	...	3.2M	...	G	AUG. 2	06	P.M.	BST		
AUG. 5	10	21	50.8	59.58 N.	152.61 W.	101	...	...	...	...	G	AUG. 5	00	A.M.	AST		
AUG. 5	23	25	02.1	61.47 N.	150.40 W.	47	...	...	3.2M	...	G	AUG. 5	01	P.M.	AST		
AUG. 7	11	31	15.9	60.39 N.	153.03 W.	133	...	...	...	...	G	AUG. 7	01	A.M.	AST		
AUG. 7	17	57	18.8	61.85 N.	149.81 W.	54	...	...	...	...	G	AUG. 7	07	A.M.	AST		
AUG. 8	17	14	43.7	65.49 N.	148.33 W.	33	...	...	3.8M	...	G	AUG. 8	07	A.M.	AST		
AUG. 8	21	32	06.1	51.96 N.	178.60 E.	105	4.9	...	...	...	G	AUG. 8	10	A.M.	BST		
AUG. 8	22	24	15.2	63.08 N.	150.94 W.	153	...	...	...	...	G	AUG. 8	12	P.M.	AST		
AUG. 9	19	54	43.3	52.13 N.	170.87 W.	38	4.5	...	4.4M	...	G	AUG. 9	08	A.M.	BST		
AUG. 11	21	27	48.7	59.78 N.	152.43 W.	121	...	...	...	...	G	AUG. 11	11	A.M.	AST		
AUG. 12	05	34	12.0	60.08 N.	153.29 W.	145	...	...	...	...	G	AUG. 11	07	P.M.	AST		
AUG. 13	15	42	50.5	61.57 N.	150.60 W.	75	...	...	...	IV	G	AUG. 13	05	A.M.	AST		
AUG. 15	10	30	56.9	56.38 N.	156.78 W.	53	5.1	...	...	...	G	AUG. 15	00	A.M.	AST		
AUG. 15	11	22	28.2	56.40 N.	156.68 W.	33	...	...	3.7M	...	G	AUG. 15	01	A.M.	AST		
AUG. 15	18	05	50.4	63.38 N.	149.88 W.	122	...	...	...	...	G	AUG. 15	08	A.M.	AST		
AUG. 16	04	23	18.8	59.81 N.	152.41 W.	90	...	...	...	...	G	AUG. 15	06	P.M.	AST		
AUG. 16	15	30	05.9	51.59 N.	176.25 W.	52	4.5	...	...	...	G	AUG. 16	04	A.M.	BST		
AUG. 18	22	55	35.3	55.77 N.	158.60 W.	61	4.4	...	...	...	G	AUG. 18	12	P.M.	AST		
AUG. 22	05	58	21.0	61.53 N.	151.04 W.	72	4.3	...	...	III	G	AUG. 21	07	P.M.	AST		
AUG. 23	10	58	15.6	60.19 N.	153.65 W.	195	...	...	...	...	G	AUG. 23	00	A.M.	AST		
AUG. 24	01	43	38.7	55.94 N.	154.34 W.	33	4.3	...	4.7M	...	G	AUG. 23	03	P.M.	AST		
AUG. 24	15	46	27.6	51.51 N.	178.35 W.	56	5.2	...	...	III	G	AUG. 24	04	A.M.	BST		
AUG. 25	09	23	55.6	59.52 N.	146.30 W.	33	...	...	3.4M	...	G	AUG. 24	11	P.M.	AST		
AUG. 26	09	16	14.8	59.69 N.	152.25 W.	33	...	...	3.0M	...	G	AUG. 25	11	P.M.	AST		
AUG. 27	01	50	02.2	59.84 N.	153.24 W.	126	...	...	...	...	G	AUG. 26	03	P.M.	AST		
AUG. 28	03	56	16.5	61.59 N.	151.88 W.	101	...	...	...	...	G	AUG. 27	05	P.M.	AST		
AUG. 28	04	46	57.5	64.02 N.	153.15 W.	33	...	...	3.0M	...	G	AUG. 27	06	P.M.	AST		
AUG. 28	04	49	38.8	64.05 N.	153.30 W.	33	...	...	3.6M	...	G	AUG. 27	06	P.M.	AST		
AUG. 28	09	04	24.7	61.74 N.	150.45 W.	71	5.1	...	...	V	G	AUG. 27	11	P.M.	AST		
AUG. 28	12	36	51.3	52.42 N.	169.28 W.	39	5.1	4.3	...	...	G	AUG. 28	01	A.M.	BST		
AUG. 29	15	48	19.6	63.15 N.	150.97 W.	137	...	...	...	...	G	AUG. 29	05	A.M.	AST		
AUG. 30	18	01	53.1	59.64 N.	152.37 W.	106	...	...	...	...	G	AUG. 30	08	A.M.	AST		
AUG. 30	19	47	27.9	55.99 N.	152.80 W.	33	...	...	3.2M	...	G	AUG. 30	09	A.M.	AST		
AUG. 31	12	14	00.9	56.42 N.	153.82 W.	33	...	...	3.4M	...	G	AUG. 31	02	A.M.	AST		
AUG. 31	12	47	03.0	68.72 N.	164.36 W.	33	...	...	...	...	G	AUG. 31	01	A.M.	BST		
SEPT. 1	04	09	00.0	63.08 N.	150.66 W.	133	...	...	...	...	G	AUG. 31	06	P.M.	AST		
SEPT. 1	15	34	06.8	63.31 N.	149.46 W.	33	...	...	...	...	G	SEPT. 1	05	A.M.	AST		
SEPT. 2	12	16	58.9	67.62 N.	165.20 W.	33	...	...	...	...	G	SEPT. 2	01	A.M.	BST		
SEPT. 2	14	41	06.4	53.79 N.	161.36 W.	33	4.8	...	4.5M	...	G	SEPT. 2	03	A.M.	BST		
SEPT. 3	18	44	13.4	51.38 N.	175.30 W.	33	4.7	...	4.1M	III	G	SEPT. 3	07	A.M.	BST		
SEPT. 3	22	26	28.2	67.11 N.	154.96 W.	10	...	...	3.1M	...	G	SEPT. 3	12	P.M.	AST		
SEPT. 4	05	52	02.7	63.63 N.	149.85 W.	144	...	...	...	...	G	SEPT. 3	07	P.M.	AST		
SEPT. 5	23	33	22.5	58.99 N.	152.60 W.	87	...	...	...	...	G	SEPT. 5	01	P.M.	AST		
SEPT. 6	13	20	20.1	56.67 N.	156.61 W.	49	4.4	...	4.8M	...	G	SEPT. 6	03	A.M.	AST		
SEPT. 7	04	55	23.6	62.58 N.	152.19 W.	18	4.3	...	3.5M	...	G	SEPT. 6	06	P.M.	AST		
SEPT. 7	09	57	10.8	60.22 N.	152.16 W.	119	...	...	...	...	G	SEPT. 6	11	P.M.	AST		
SEPT. 8	02	53	26.7	51.64 N.	179.51 E.	86	4.5	...	...	...	G	SEPT. 7	03	P.M.	BST		
SEPT. 8	07	01	16.9	51.47 N.	178.37 W.	55	4.9	...	...	FELT	G	SEPT. 7	08	P.M.	BST		
SEPT. 8	13	50	51.9	62.27 N.	149.43 W.	33	...	...	3.0M	...	G	SEPT. 8	03	A.M.	AST		
SEPT. 9	18	00	01.8	60.36 N.	152.26 W.	131	...	...	...	...	G	SEPT. 9	08	A.M.	AST		
SEPT. 10	01	30	38.7	62.76 N.	149.64 W.	101	4.3	...	...	...	G	SEPT. 9	03	P.M.	AST		
SEPT. 10	11	06	23.6	65.09 N.	152.22 W.	15	4.2	...	4.0M	FELT	G	SEPT. 10	01	A.M.	AST		
SEPT. 11	05	02	30.8	60.07 N.	139.57 W.	33	4.2	...	4.1M	...	G	SEPT. 10	08	P.M.	YST		
SEPT. 11	05	51	22.6	59.37 N.	145.10 W.	33	4.0	...	3.7M	...	G	SEPT. 10	07	P.M.	AST		
SEPT. 11	08	39	50.1	60.27 N.	140.93 W.	15	4.0	...	4.4M	...	G	SEPT. 10	11	P.M.	YST		
SEPT. 12	22	08	46.4	52.52 N.	171.28 W.	33	4.3	...	...	...	G	SEPT. 12	11	A.M.	BST		
SEPT. 13	20	11	43.3	54.58 N.	163.62 W.	33	...	...	4.0M	...	G	SEPT. 13	09	A.M.	BST		
SEPT. 14	02	13	53.5	61.05 N.	150.66 W.	56	...	...	...	...	G	SEPT. 13	04	P.M.	AST		
SEPT. 14	07	39	37.8	51.82 N.	178.47 E.	107	4.7	...	...	...	G	SEPT. 13	08	P.M.	BST		

Table 1.—Summary of U.S. earthquakes for July-September 1981--Continued

Date (1981)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML, Mn or MD			Date	Hour				
ALASKA--Continued																	
SEPT. 15	13	05	19.3	51.71 N.	172.05 E.	33	4.5	...	4.2M	...	G	SEPT. 15	02	A.M.	BST		
SEPT. 16	00	29	27.5	62.50 N.	149.47 W.	33	...	...	3.1M	...	G	SEPT. 15	02	P.M.	AST		
SEPT. 16	10	10	18.9	62.88 N.	150.38 W.	101	4.1	...	...	...	G	SEPT. 16	00	A.M.	AST		
SEPT. 16	12	11	05.2	63.08 N.	150.95 W.	132	4.4	...	...	...	G	SEPT. 16	02	A.M.	AST		
SEPT. 17	00	18	55.3	60.02 N.	139.62 W.	23	3.8	...	4.3M	...	G	SEPT. 16	03	P.M.	YST		
SEPT. 18	15	15	19.8	62.06 N.	149.40 W.	33	...	...	3.0M	...	G	SEPT. 18	05	A.M.	AST		
SEPT. 21	07	04	42.6	62.09 N.	149.97 W.	33	...	...	3.2M	...	G	SEPT. 20	09	P.M.	AST		
SEPT. 21	12	08	51.5	62.77 N.	149.58 W.	109	...	...	...	...	G	SEPT. 21	02	A.M.	AST		
SEPT. 21	21	43	20.7	62.36 N.	151.06 W.	116	...	...	...	...	G	SEPT. 21	11	A.M.	AST		
SEPT. 23	07	38	52.0	59.15 N.	145.50 W.	33	...	...	3.2M	...	G	SEPT. 22	09	P.M.	AST		
SEPT. 24	12	41	32.6	67.08 N.	163.96 W.	33	4.3	...	4.1M	...	G	SEPT. 24	01	A.M.	BST		
SEPT. 25	06	42	46.8	51.09 N.	167.05 W.	33	4.5	...	...	...	G	SEPT. 24	07	P.M.	BST		
SEPT. 25	22	56	13.1	51.41 N.	176.89 W.	47	4.2	...	...	...	G	SEPT. 25	11	A.M.	BST		
SEPT. 26	10	48	53.4	61.51 N.	146.62 W.	55	...	...	...	...	G	SEPT. 26	00	A.M.	AST		
SEPT. 26	17	43	09.6	62.01 N.	149.25 W.	58	4.7	...	...	FELT	G	SEPT. 26	07	A.M.	AST		
SEPT. 27	06	46	43.8	63.60 N.	149.81 W.	153	...	...	...	...	G	SEPT. 26	08	P.M.	AST		
SEPT. 27	12	12	48.3	58.59 N.	155.12 W.	154	...	...	...	...	G	SEPT. 27	02	A.M.	AST		
SEPT. 27	15	15	12.9	64.75 N.	147.12 W.	22	...	...	3.8M	IV	G	SEPT. 27	05	A.M.	AST		
SEPT. 27	16	59	03.5	68.45 N.	162.46 W.	33	3.9	...	3.7M	...	G	SEPT. 27	05	A.M.	BST		
SEPT. 27	19	48	11.7	61.98 N.	150.87 W.	73	3.7	...	...	...	G	SEPT. 27	09	A.M.	AST		
SEPT. 28	19	20	54.6	68.29 N.	161.81 W.	33	...	...	4.4M	...	G	SEPT. 28	08	A.M.	BST		
CALIFORNIA																	
JULY 2	01	28	21.9	39.83 N.	122.66 W.	10	...	...	3.2B	...	G	JULY 1	05	P.M.	PST		
JULY 2	08	10	54.0	41.10 N.	124.22 W.	25	4.4	3.5	4.2B	V	G	JULY 2	00	A.M.	PST		
JULY 2	08	22	15.1	41.12 N.	124.22 W.	26	4.6	...	3.5B	...	G	JULY 2	00	A.M.	PST		
JULY 5	00	31	16.3	33.67 N.	117.37 W.	9	...	...	3.1P	...	P	JULY 4	04	P.M.	PST		
JULY 5	10	30	48.7	35.77 N.	117.72 W.	5	...	...	3.1P	...	P	JULY 5	02	A.M.	PST		
JULY 5	12	31	00.5	35.77 N.	117.72 W.	5	...	...	3.0P	...	P	JULY 5	04	A.M.	PST		
JULY 5	13	33	50.8	35.77 N.	117.72 W.	5	...	...	3.0P	...	P	JULY 5	05	A.M.	PST		
JULY 5	17	45	24.4	35.77 N.	117.73 W.	7	...	...	3.0P	...	P	JULY 5	09	A.M.	PST		
JULY 6	19	53	43.9	33.87 N.	117.87 W.	4	...	...	3.2P	IV	P	JULY 6	11	A.M.	PST		
JULY 9	13	30	46.2	37.72 N.	118.90 W.	10	...	...	2.6P	FELT	P	JULY 9	05	A.M.	PST		
JULY 9	13	31	17.8	37.72 N.	118.87 W.	8	...	...	3.1P	FELT	P	JULY 9	05	A.M.	PST		
JULY 9	14	52	35.8	37.67 N.	118.97 W.	6	...	...	2.9P	FELT	P	JULY 9	06	A.M.	PST		
JULY 9	23	18	29.0	37.67 N.	118.97 W.	6	...	...	3.0P	...	P	JULY 9	03	P.M.	PST		
JULY 10	03	31	20.8	37.63 N.	118.75 W.	5	...	...	3.2B	...	G	JULY 9	07	P.M.	PST		
JULY 10	11	33	53.2	33.27 N.	115.98 W.	4	...	...	2.6P	FELT	P	JULY 10	03	A.M.	PST		
JULY 10	20	27	49.5	37.68 N.	118.95 W.	6	...	...	3.0P	...	P	JULY 10	12	P.M.	PST		
JULY 13	16	37	09.7	38.03 N.	118.76 W.	5	...	...	3.3B	...	B	JULY 13	08	A.M.	PST		
JULY 17	16	37	31.6	40.16 N.	124.34 W.	18	4.9	4.1	4.2B	VI	B	JULY 17	08	A.M.	PST		
JULY 21	04	31	17.3	34.28 N.	119.63 W.	6	...	...	3.1P	...	P	JULY 20	08	P.M.	PST		
JULY 25	06	24	21.5	33.48 N.	116.78 W.	1	...	...	3.1P	...	P	JULY 24	10	P.M.	PST		
JULY 25	20	05	54.7	36.12 N.	117.82 W.	6	...	...	3.0P	...	P	JULY 25	12	P.M.	PST		
JULY 25	21	48	13.3	36.55 N.	121.07 W.	8	...	...	3.0B	...	B	JULY 25	01	P.M.	PST		
JULY 26	06	13	09.4	35.13 N.	118.65 W.	5	...	...	3.4P	FELT	P	JULY 25	10	P.M.	PST		
JULY 29	21	28	08.1	33.15 N.	116.52 W.	5	...	...	3.5P	III	P	JULY 29	01	P.M.	PST		
JULY 29	23	37	48.9	33.80 N.	118.73 W.	4	...	...	3.3P	...	P	JULY 29	03	P.M.	PST		
JULY 29	23	39	56.9	33.78 N.	118.73 W.	5	...	...	3.9P	III	P	JULY 29	03	P.M.	PST		
JULY 30	01	56	55.2	33.78 N.	118.75 W.	2	...	...	3.7P	FELT	P	JULY 29	05	P.M.	PST		
JULY 30	11	56	01.0	33.80 N.	118.73 W.	5	...	...	3.6P	FELT	P	JULY 30	03	A.M.	PST		
AUG. 1	06	42	14.6	33.78 N.	118.73 W.	6	...	...	3.2P	...	P	JULY 31	10	P.M.	PST		
AUG. 4	13	27	10.2	36.71 N.	121.41 W.	3	...	...	3.0B	IV	B	AUG. 4	05	A.M.	PST		
AUG. 5	16	56	12.7	35.38 N.	116.60 W.	11	...	...	3.0P	...	P	AUG. 5	08	A.M.	PST		
AUG. 6	11	10	12.7	34.80 N.	120.25 W.	1	...	...	3.7P	IV	P	AUG. 6	03	A.M.	PST		
AUG. 6	22	31	09.2	37.55 N.	118.83 W.	6	...	...	3.6P	...	P	AUG. 6	02	P.M.	PST		
AUG. 9	04	43	15.1	32.82 N.	115.73 W.	10	...	...	3.0P	...	P	AUG. 8	08	P.M.	PST		
AUG. 9	15	52	03.3	37.63 N.	118.94 W.	12	...	...	3.5B	...	B	AUG. 9	07	A.M.	PST		
AUG. 9	16	01	10.9	37.63 N.	118.93 W.	6	...	...	3.0P	...	P	AUG. 9	08	A.M.	PST		
AUG. 12	10	20	28.3	37.39 N.	119.06 W.	5	...	...	3.1P	...	G	AUG. 12	02	A.M.	PST		
AUG. 12	22	58	35.8	34.15 N.	118.58 W.	2	...	...	2.9P	II	P	AUG. 12	02	P.M.	PST		
AUG. 13	20	31	22.4	37.56 N.	118.87 W.	5	...	...	3.4B	...	G	AUG. 13	12	P.M.	PST		
AUG. 14	01	09	33.9	33.95 N.	118.58 W.	5	...	...	3.4P	IV	P	AUG. 13	05	P.M.	PST		

Table 1.—Summary of U.S. earthquakes for July-September 1981—Continued

Date (1981)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time							
	hr	min	s				mb	MS	ML, Mn or MD			Date	Hour						
CALIFORNIA--Continued																			
AUG.	14	12	49	59.6	36.77	N.	121.29	W.	9	...	...	4.2B	IV	B	AUG.	14	04	A.M.	PST
AUG.	16	11	23	29.0	34.12	N.	117.17	W.	5	...	...	3.2P	FELT	P	AUG.	16	03	A.M.	PST
AUG.	18	09	23	54.6	33.80	N.	118.75	W.	4	...	...	3.5P	...	P	AUG.	18	01	A.M.	PST
AUG.	18	15	31	14.7	34.08	N.	116.42	W.	11	...	...	3.0P	...	P	AUG.	18	07	A.M.	PST
AUG.	19	12	02	00.7	33.55	N.	117.20	W.	6	...	...	2.8P	FELT	P	AUG.	19	04	A.M.	PST
AUG.	21	12	00	35.0	36.80	N.	121.62	W.	5	...	...	3.0B	...	B	AUG.	21	04	A.M.	PST
AUG.	22	12	30	57.8	38.83	N.	122.79	W.	3	...	...	3.3B	...	B	AUG.	22	04	A.M.	PST
AUG.	22	19	31	45.2	40.21	N.	124.12	W.	5	...	...	3.2B	...	B	AUG.	22	11	A.M.	PST
AUG.	22	20	54	23.8	37.63	N.	118.90	W.	9	...	...	3.6B	FELT	B	AUG.	22	12	P.M.	PST
AUG.	23	04	32	29.8	37.95	N.	117.57	W.	6	...	...	3.0P	...	P	AUG.	22	08	P.M.	PST
AUG.	24	04	52	18.2	37.61	N.	118.88	W.	23	...	...	3.8B	IV	B	AUG.	23	08	P.M.	PST
AUG.	25	07	29	22.9	37.62	N.	118.90	W.	6	...	...	3.1P	...	P	AUG.	24	11	P.M.	PST
AUG.	27	10	01	24.8	37.83	N.	121.79	W.	13	...	...	3.0B	...	B	AUG.	27	02	A.M.	PST
AUG.	28	01	42	01.9	33.30	N.	115.68	W.	4	...	...	3.4P	...	P	AUG.	27	05	P.M.	PST
AUG.	30	03	31	23.6	40.37	N.	123.31	W.	9	...	...	3.2B	...	B	AUG.	29	07	P.M.	PST
SEPT.	4	00	28	53.3	33.15	N.	116.57	W.	15	...	...	3.8P	IV	P	SEPT.	3	04	P.M.	PST
SEPT.	4	00	39	25.5	33.15	N.	116.57	W.	15	...	...	3.6P	FELT	P	SEPT.	3	04	P.M.	PST
SEPT.	8	12	34	43.3	38.00	N.	118.76	W.	8	...	...	3.6B	...	B	SEPT.	8	04	A.M.	PST
SEPT.	12	21	23	07.8	34.17	N.	117.27	W.	7	...	...	3.6P	V	P	SEPT.	12	01	P.M.	PST
SEPT.	13	19	59	48.5	34.15	N.	117.27	W.	5	...	...	3.0P	FELT	P	SEPT.	13	11	A.M.	PST
SEPT.	14	08	19	38.8	36.66	N.	121.33	W.	5	...	...	3.1B	...	B	SEPT.	14	00	A.M.	PST
SEPT.	14	18	42	03.5	34.17	N.	117.28	W.	6	...	...	2.7P	FELT	P	SEPT.	14	10	A.M.	PST
SEPT.	15	01	54	15.3	34.17	N.	117.28	W.	7	...	...	2.5P	FELT	P	SEPT.	14	05	P.M.	PST
SEPT.	16	01	16	59.8	33.60	N.	118.98	W.	9	...	...	3.2P	...	P	SEPT.	15	05	P.M.	PST
SEPT.	16	01	19	11.4	33.60	N.	118.97	W.	5	...	...	3.6P	...	P	SEPT.	15	05	P.M.	PST
SEPT.	16	07	57	13.8	34.17	N.	117.25	W.	9	...	...	3.1P	FELT	P	SEPT.	15	11	P.M.	PST
SEPT.	16	07	57	42.5	34.17	N.	117.27	W.	4	...	...	3.0P	...	P	SEPT.	15	11	P.M.	PST
SEPT.	16	12	41	15.0	40.11	N.	124.30	W.	5	4.8	3.9	4.5B	V	B	SEPT.	16	04	A.M.	PST
SEPT.	16	12	45	58.4	40.11	N.	124.33	W.	5	...	...	3.4B	...	B	SEPT.	16	04	A.M.	PST
SEPT.	17	02	59	18.2	35.87	N.	121.25	W.	5	...	...	3.2B	...	B	SEPT.	16	06	P.M.	PST
SEPT.	17	12	36	04.8	37.57	N.	118.89	W.	10	...	...	3.4B	III	B	SEPT.	17	04	A.M.	PST
SEPT.	18	11	04	18.0	37.60	N.	118.85	W.	5	...	...	3.0B	...	B	SEPT.	18	03	A.M.	PST
SEPT.	23	10	32	48.4	38.67	N.	122.82	W.	3	...	...	2.5B	IV	G	SEPT.	23	02	A.M.	PST
SEPT.	24	14	00	26.3	36.79	N.	121.58	W.	4	...	...	3.3B	FELT	B	SEPT.	24	06	A.M.	PST
SEPT.	25	06	48	53.2	37.55	N.	118.89	W.	15	...	...	3.7B	IV	B	SEPT.	24	10	P.M.	PST
SEPT.	25	14	13	38.0	34.02	N.	116.85	W.	21	...	...	3.3P	FELT	P	SEPT.	25	06	A.M.	PST
SEPT.	27	21	25	57.0	37.53	N.	118.88	W.	2	...	...	3.2B	...	B	SEPT.	27	01	P.M.	PST
SEPT.	28	07	34	39.1	36.79	N.	121.59	W.	5	4.2	3.4	3.9B	IV	B	SEPT.	27	11	P.M.	PST
SEPT.	28	10	57	39.6	33.47	N.	117.10	W.	9	...	...	3.3P	...	P	SEPT.	28	02	A.M.	PST
SEPT.	30	11	53	26.9	37.59	N.	118.89	W.	5	5.6	5.8	5.9B	VI	B	SEPT.	30	03	A.M.	PST
SEPT.	30	12	06	06.3	37.61	N.	118.90	W.	28	...	...	3.3B	...	B	SEPT.	30	04	A.M.	PST
SEPT.	30	12	15	47.6	37.62	N.	118.88	W.	1	...	...	3.4B	...	B	SEPT.	30	04	A.M.	PST
SEPT.	30	12	22	26.2	37.59	N.	118.85	W.	5	...	...	3.3B	...	B	SEPT.	30	04	A.M.	PST
SEPT.	30	12	22	55.1	37.56	N.	118.80	W.	30	...	...	3.5B	FELT	B	SEPT.	30	04	A.M.	PST
SEPT.	30	12	25	21.0	37.63	N.	118.87	W.	5	...	...	3.2B	...	B	SEPT.	30	04	A.M.	PST
SEPT.	30	12	48	40.1	37.62	N.	118.89	W.	5	...	...	3.3B	...	B	SEPT.	30	04	A.M.	PST
SEPT.	30	13	05	48.5	37.65	N.	118.87	W.	5	4.7	...	4.8B	V	B	SEPT.	30	05	A.M.	PST
SEPT.	30	13	18	45.5	37.65	N.	118.89	W.	5	...	...	3.1B	...	B	SEPT.	30	05	A.M.	PST
SEPT.	30	13	49	27.5	37.63	N.	118.88	W.	5	...	...	3.0B	...	B	SEPT.	30	05	A.M.	PST
SEPT.	30	14	09	15.9	37.64	N.	118.89	W.	5	...	...	3.0B	...	B	SEPT.	30	06	A.M.	PST
SEPT.	30	14	15	14.0	37.61	N.	118.90	W.	8	...	...	3.1B	...	B	SEPT.	30	06	A.M.	PST
SEPT.	30	14	27	06.9	37.62	N.	118.87	W.	3	...	...	3.0B	...	B	SEPT.	30	06	A.M.	PST
SEPT.	30	14	33	45.8	37.62	N.	118.87	W.	7	...	...	3.9B	FELT	B	SEPT.	30	06	A.M.	PST
SEPT.	30	14	39	15.2	37.65	N.	118.90	W.	2	...	...	3.5B	...	B	SEPT.	30	06	A.M.	PST
SEPT.	30	14	40	13.2	37.64	N.	118.89	W.	5	...	...	3.6B	FELT	B	SEPT.	30	06	A.M.	PST
SEPT.	30	14	50	06.8	37.58	N.	118.94	W.	3	...	...	4.3B	FELT	B	SEPT.	30	06	A.M.	PST
SEPT.	30	15	06	34.0	37.64	N.	118.89	W.	5	...	...	3.3B	...	B	SEPT.	30	07	A.M.	PST
SEPT.	30	15	12	11.1	37.57	N.	118.92	W.	7	...	...	3.0B	...	B	SEPT.	30	07	A.M.	PST
SEPT.	30	15	20	48.0	37.65	N.	118.89	W.	3	...	...	3.5B	FELT	B	SEPT.	30	07	A.M.	PST
SEPT.	30	15	46	24.2	37.65	N.	118.89	W.	5	...	...	3.2B	...	B	SEPT.	30	07	A.M.	PST
SEPT.	30	16	08	53.3	37.63	N.	118.92	W.	2	...	...	3.0B	...	B	SEPT.	30	08	A.M.	PST
SEPT.	30	16	34	32.7	37.54	N.	118.90	W.	10	...	...	3.7B	FELT	B	SEPT.	30	08	A.M.	PST
SEPT.	30	16	49	33.8	37.65	N.	118.89	W.	5	...	...	3.1B	...	B	SEPT.	30	08	A.M.	PST
SEPT.	30	18	16	22.7	37.67	N.	118.89	W.	3	...	...	3.2B	...	B	SEPT.	30	10	A.M.	PST
SEPT.	30	19	35	12.3	37.55	N.	118.85	W.	8	...	...	4.0B	FELT	B	SEPT.	30	11	A.M.	PST

Table 1.—Summary of U.S. earthquakes for July–September 1981--Continued

Date (1981)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML, Mn or MD			Date	Hour				
CALIFORNIA--Continued																	
SEPT. 30	19	48	20.7	37.62 N.	118.89 W.	5	...	...	3.5B	FELT	B	SEPT. 30	11	A.M.	PST		
SEPT. 30	21	25	59.5	37.52 N.	118.79 W.	23	...	...	3.3B	...	B	SEPT. 30	01	P.M.	PST		
SEPT. 30	22	04	02.6	37.52 N.	118.91 W.	1	...	...	3.1B	...	B	SEPT. 30	02	P.M.	PST		
SEPT. 30	22	12	05.8	37.53 N.	118.92 W.	6	...	...	3.0B	...	B	SEPT. 30	02	P.M.	PST		
SEPT. 30	23	05	56.6	37.64 N.	118.89 W.	3	...	...	3.3B	...	B	SEPT. 30	03	P.M.	PST		
CALIFORNIA--OFF THE COAST																	
JULY 11	19	24	06.5	40.56 N.	125.19 W.	27	4.4	...	3.8B	...	G	JULY 11	11	A.M.	PST		
JULY 11	21	50	29.0	32.63 N.	118.00 W.	5	4.3	...	4.3P	IV	P	JULY 11	01	P.M.	PST		
AUG. 7	17	51	44.7	40.29 N.	124.70 W.	5	...	...	3.5B	...	B	AUG. 7	09	A.M.	PST		
SEPT. 4	15	50	50.3	33.67 N.	119.12 W.	5	5.4	5.9	5.2P	VI	P	SEPT. 4	07	A.M.	PST		
SEPT. 4	15	57	42.9	33.65 N.	119.08 W.	5	...	...	3.5P	...	P	SEPT. 4	07	A.M.	PST		
SEPT. 4	17	04	59.7	33.62 N.	119.03 W.	6	...	...	3.2P	...	P	SEPT. 4	09	A.M.	PST		
SEPT. 5	00	41	48.4	33.63 N.	119.12 W.	8	...	...	3.5P	FELT	P	SEPT. 4	04	P.M.	PST		
SEPT. 5	04	02	57.6	33.67 N.	119.13 W.	8	...	...	3.2P	...	P	SEPT. 4	08	P.M.	PST		
SEPT. 5	04	18	47.5	33.62 N.	119.05 W.	8	...	...	3.0P	...	P	SEPT. 4	08	P.M.	PST		
SEPT. 5	09	56	05.7	37.65 N.	118.90 W.	2	...	...	3.0P	...	P	SEPT. 5	01	A.M.	PST		
SEPT. 6	09	17	00.6	33.72 N.	119.18 W.	6	...	...	3.6P	...	P	SEPT. 6	01	A.M.	PST		
SEPT. 6	18	30	31.1	33.67 N.	119.08 W.	5	...	...	3.0P	...	P	SEPT. 6	10	A.M.	PST		
SEPT. 10	05	45	55.5	33.68 N.	119.13 W.	6	...	...	3.3P	...	P	SEPT. 9	09	P.M.	PST		
SEPT. 10	18	08	01.5	33.68 N.	119.13 W.	9	...	...	3.1P	...	P	SEPT. 10	10	A.M.	PST		
SEPT. 11	05	58	24.0	33.73 N.	119.18 W.	6	...	...	3.7P	FELT	P	SEPT. 10	09	P.M.	PST		
SEPT. 15	19	56	12.1	33.62 N.	119.03 W.	5	...	...	3.0P	...	P	SEPT. 15	11	A.M.	PST		
SEPT. 21	10	08	08.2	33.63 N.	119.05 W.	5	...	...	3.2P	FELT	P	SEPT. 21	02	A.M.	PST		
SEPT. 26	20	23	36.0	40.20 N.	127.10 W.	5	...	...	4.2B	...	B	SEPT. 26	12	P.M.	PST		
COLORADO																	
SEPT. 16	19	58	38.9	39.88 N.	104.91 W.	5	...	...	2.1G	IV	G	SEPT. 16	12	P.M.	MST		
CONNECTICUT																	
AUG. 4	02	01	37.2	41.54 N.	72.47 W.	5	...	...	2.2J	FELT	J	AUG. 3	10	P.M.	EST		
GEORGIA																	
SEPT. 4	17	21	44.6	34.64 N.	85.17 W.	4	...	...	2.6K	...	K	SEPT. 4	12	P.M.	EST		
HAWAII																	
JULY 2	12	31	54.7	19.32 N.	155.19 W.	10	...	...	3.6H	III	H	JULY 2	02	A.M.	HST		
JULY 3	23	28	42.6	19.39 N.	155.28 W.	3	...	...	3.1H	IV	H	JULY 3	01	P.M.	HST		
JULY 6	20	30	38.6	19.34 N.	155.20 W.	10	...	...	3.0H	...	H	JULY 6	10	A.M.	HST		
JULY 10	01	12	21.2	19.43 N.	155.63 W.	4	...	...	3.0H	...	H	JULY 9	03	P.M.	HST		
JULY 17	13	03	15.8	19.39 N.	155.28 W.	3	...	...	3.1H	...	H	JULY 17	03	A.M.	HST		
JULY 20	16	12	46.4	19.33 N.	155.22 W.	10	...	...	3.9H	IV	H	JULY 20	06	A.M.	HST		
JULY 21	17	59	16.5	19.27 N.	155.45 W.	10	...	...	3.9H	IV	H	JULY 21	07	A.M.	HST		
JULY 23	11	38	17.5	18.95 N.	155.18 W.	46	...	...	3.0H	...	H	JULY 23	01	A.M.	HST		
JULY 24	21	37	42.2	19.40 N.	155.48 W.	10	...	...	3.0H	...	H	JULY 24	11	A.M.	HST		
JULY 28	03	15	16.0	19.32 N.	155.19 W.	10	...	...	3.3H	III	H	JULY 27	05	P.M.	HST		
JULY 28	20	00	44.9	19.34 N.	155.03 W.	9	...	...	4.1H	V	H	JULY 28	10	A.M.	HST		
JULY 28	20	18	33.9	19.37 N.	155.03 W.	8	...	...	3.3H	IV	H	JULY 28	10	A.M.	HST		
JULY 30	01	57	50.0	19.36 N.	155.25 W.	10	...	...	3.4H	II	H	JULY 29	03	P.M.	HST		
AUG. 1	20	34	02.3	19.33 N.	155.13 W.	10	...	...	3.0H	...	H	AUG. 1	10	A.M.	HST		
AUG. 2	18	48	16.2	20.11 N.	155.78 W.	23	...	...	3.0H	III	H	AUG. 2	08	A.M.	HST		
AUG. 4	17	47	50.6	19.47 N.	155.45 W.	9	...	...	3.0H	II	H	AUG. 4	07	A.M.	HST		
AUG. 6	23	00	18.0	19.77 N.	155.03 W.	40	...	...	3.2H	...	H	AUG. 6	01	P.M.	HST		
AUG. 10	15	32	19.6	19.38 N.	155.27 W.	1	...	...	3.1H	III	H	AUG. 10	05	A.M.	HST		
AUG. 10	15	42	09.4	19.38 N.	155.28 W.	2	...	...	4.2H	IV	H	AUG. 10	05	A.M.	HST		
AUG. 10	16	05	58.2	19.38 N.	155.27 W.	2	...	...	3.1H	III	H	AUG. 10	06	A.M.	HST		
AUG. 10	16	23	39.3	19.31 N.	155.28 W.	5	...	...	3.6H	III	H	AUG. 10	06	A.M.	HST		
AUG. 10	17	23	12.9	19.32 N.	155.34 W.	8	...	...	3.4H	III	H	AUG. 10	07	A.M.	HST		
AUG. 10	17	47	51.7	19.31 N.	155.35 W.	1	...	...	3.4H	III	H	AUG. 10	07	A.M.	HST		

Table 1.—Summary of U.S. earthquakes for July-September 1981--Continued

Date (1981)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML, Mn or MD			Date	Hour				
HAWAII--Continued																	
AUG. 10	18 20	08.7	19.32 N.	155.35 W.	5	4.4	...	4.2H	IV	H	AUG. 10	08	A.M.	HST			
AUG. 10	18 41	40.0	19.33 N.	155.33 W.	3	...	...	3.1H	III	H	AUG. 10	08	A.M.	HST			
AUG. 10	19 40	35.0	19.31 N.	155.36 W.	4	4.7	...	4.5H	IV	H	AUG. 10	09	A.M.	HST			
AUG. 10	20 43	59.0	19.33 N.	155.31 W.	6	...	...	3.1H	III	H	AUG. 10	10	A.M.	HST			
AUG. 10	23 02	57.8	19.35 N.	155.34 W.	0	...	...	3.2H	III	H	AUG. 10	01	P.M.	HST			
AUG. 10	23 29	11.3	19.30 N.	155.36 W.	7	...	...	3.6H	III	H	AUG. 10	01	P.M.	HST			
AUG. 11	04 53	46.6	19.30 N.	155.39 W.	5	...	...	3.6H	III	H	AUG. 10	06	P.M.	HST			
AUG. 11	05 17	17.2	19.32 N.	155.32 W.	4	...	...	3.3H	III	H	AUG. 10	07	P.M.	HST			
AUG. 11	05 23	43.4	19.24 N.	155.37 W.	3	...	...	3.3H	III	H	AUG. 10	07	P.M.	HST			
AUG. 11	06 46	29.0	19.31 N.	155.38 W.	3	...	...	3.0H	...	H	AUG. 10	08	P.M.	HST			
AUG. 11	13 53	36.3	19.29 N.	155.38 W.	6	...	...	3.3H	...	H	AUG. 11	03	A.M.	HST			
AUG. 11	18 47	29.8	19.23 N.	155.38 W.	9	...	...	3.1H	...	H	AUG. 11	08	A.M.	HST			
AUG. 12	04 20	42.4	19.20 N.	155.35 W.	7	...	...	3.3H	III	H	AUG. 11	06	P.M.	HST			
AUG. 14	18 02	18.1	19.98 N.	155.47 W.	24	...	...	3.0H	...	H	AUG. 14	08	A.M.	HST			
AUG. 15	09 51	36.8	19.99 N.	155.95 W.	15	...	...	3.2H	...	H	AUG. 14	11	P.M.	HST			
AUG. 17	01 14	32.7	19.40 N.	155.28 W.	15	...	...	3.4H	III	H	AUG. 16	03	P.M.	HST			
AUG. 19	12 38	47.3	19.32 N.	155.13 W.	9	...	...	3.5H	...	H	AUG. 19	02	A.M.	HST			
AUG. 22	22 05	20.3	20.18 N.	156.43 W.	10	4.3	...	4.4H	IV	G	AUG. 22	12	P.M.	HST			
SEPT. 1	20 42	17.6	19.77 N.	154.86 W.	42	...	...	3.1H	...	H	SEPT. 1	10	A.M.	HST			
SEPT. 7	08 21	46.2	19.63 N.	156.02 W.	42	...	...	3.3H	III	H	SEPT. 6	10	P.M.	HST			
SEPT. 7	08 34	47.6	19.42 N.	155.29 W.	10	...	...	3.3H	III	H	SEPT. 6	10	P.M.	HST			
SEPT. 22	13 55	01.7	19.33 N.	155.12 W.	9	...	...	3.1H	...	H	SEPT. 22	03	A.M.	HST			
SEPT. 22	14 49	24.0	19.33 N.	155.13 W.	9	...	...	3.3H	III	H	SEPT. 22	04	A.M.	HST			
SEPT. 22	16 50	23.7	19.32 N.	155.12 W.	10	...	...	3.9H	IV	H	SEPT. 22	06	A.M.	HST			
SEPT. 22	16 50	23.7	19.32 N.	155.12 W.	10	...	...	3.9H	IV	H	SEPT. 22	06	A.M.	HST			
SEPT. 27	11 50	00.6	19.37 N.	155.42 W.	11	...	...	3.4H	III	H	SEPT. 27	01	A.M.	HST			
SEPT. 28	22 07	31.4	19.43 N.	155.63 W.	2	...	...	3.8H	...	H	SEPT. 28	12	P.M.	HST			
SEPT. 28	22 25	07.4	19.49 N.	155.81 W.	8	...	...	3.1H	...	H	SEPT. 28	12	P.M.	HST			
SEPT. 30	17 04	45.7	19.31 N.	155.23 W.	10	...	...	3.9H	IV	H	SEPT. 30	07	A.M.	HST			
IDAHO																	
SEPT. 5	22 09	33.2	44.44 N.	114.95 W.	5	...	...	3.2G	...	G	SEPT. 5	03	P.M.	MST			
SEPT. 29	05 39	48.1	44.69 N.	116.99 W.	5	...	...	3.3G	IV	G	SEPT. 28	10	P.M.	MST			
SEPT. 30	04 17	31.3	42.53 N.	111.15 W.	5	3.7	...	3.9G	IV	G	SEPT. 29	09	P.M.	MST			
KANSAS																	
AUG. 1	01 58	44.1	38.31 N.	97.86 W.	5	...	...	2.8T	...	G	JULY 31	07	P.M.	CST			
MASSACHUSETTS																	
SEPT. 12	02 44	45.4	41.57 N.	70.61 W.	3	...	...	2.1J	FELT	J	SEPT. 11	09	P.M.	EST			
MISSOURI																	
SEPT. 30	14 28	37.0	36.56 N.	89.65 W.	8	...	...	2.5S	...	S	SEPT. 30	08	A.M.	CST			
NEBRASKA																	
SEPT. 7	00 38	09.1	42.89 N.	100.52 W.	5	...	...	3.1T	...	G	SEPT. 6	06	P.M.	CST			
NEVADA																	
JULY 10	14 00	00.0	37.13 N.	116.03 W.	0	...	...	4.2B	...	E	JULY 10	06	A.M.	PST			
JULY 16	15 00	00.1	37.09 N.	116.02 W.	0	...	...	3.3G	...	E	JULY 16	07	A.M.	PST			
AUG. 5	13 41	00.0	37.15 N.	116.04 W.	0	...	...	2.8G	...	E	AUG. 5	05	A.M.	PST			
AUG. 27	14 31	00.0	37.16 N.	116.07 W.	0	...	...	4.3B	...	E	AUG. 27	06	A.M.	PST			
SEPT. 4	15 00	00.1	37.06 N.	116.05 W.	0	...	...	3.8B	...	E	SEPT. 4	07	A.M.	PST			
SEPT. 12	18 12	58.6	38.06 N.	118.59 W.	16	...	...	4.3B	FELT	B	SEPT. 12	10	A.M.	PST			
SEPT. 24	15 00	00.0	37.01 N.	116.02 W.	0	...	...	3.5G	...	E	SEPT. 24	07	A.M.	PST			
SEPT. 30	03 14	03.5	39.15 N.	119.59 W.	8	...	...	3.4B	IV	G	SEPT. 29	07	P.M.	PST			

Table 1.--Summary of U.S. earthquakes for July-September 1981--Continued

Date (1981)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time	
	hr	min	s				mb	MS	ML, Mn or MD			Date	Hour
NEW YORK													
SEPT. 16	14	41	33.8	43.43 N.	76.39 W.	9	...	...	2.6L	...	L	SEPT. 16	09 A.M. EST
OKLAHOMA													
JULY 11	21	09	22.5	34.88 N.	97.68 W.	5	...	...	3.5T	IV	T	JULY 11	03 P.M. CST
OREGON—OFF THE COAST													
JULY 6	17	40	54.1	43.34 N.	127.06 W.	10	3.6	...	...	...	G	JULY 6	09 A.M. PST
SEPT. 21	10	58	27.8	44.03 N.	127.97 W.	10	3.7	...	...	...	G	SEPT. 21	02 A.M. PST
SEPT. 21	13	28	00.3	42.89 N.	126.73 W.	10	4.2	...	...	...	G	SEPT. 21	05 A.M. PST
SEPT. 25	23	10	34.5	43.60 N.	127.41 W.	10	4.4	...	...	...	G	SEPT. 25	03 P.M. PST
SOUTH DAKOTA													
SEPT. 13	22	16	29.7	43.04 N.	101.85 W.	5	...	...	3.4T	V	G	SEPT. 13	03 P.M. MST
TENNESSEE													
AUG. 7	11	53	41.8	35.95 N.	89.12 W.	10	...	...	4.0S	VI	K	AUG. 7	05 A.M. CST
UTAH													
SEPT. 10	07	55	09.3	37.51 N.	110.54 W.	7	...	...	3.1U	...	U	SEPT. 10	00 A.M. MST
SEPT. 21	08	01	33.9	39.58 N.	110.44 W.	7	...	...	3.2U	III	U	SEPT. 21	01 A.M. MST
SEPT. 22	05	02	59.7	39.60 N.	110.42 W.	7	...	...	3.0U	...	U	SEPT. 21	10 P.M. MST
VIRGINIA													
JULY 30	11	59	48.5	38.19 N.	78.09 W.	6	...	...	1.4V	III	V	JULY 30	06 A.M. EST
WASHINGTON													
AUG. 23	16	22	17.4	46.36 N.	122.25 W.	8	...	...	3.0W	FELT	W	AUG. 22	08 A.M. PST
SEPT. 6	19	34	45.9	46.67 N.	123.88 W.	35	...	...	3.1G	III	W	SEPT. 6	11 A.M. PST

Table 2.--Summary of macroseismic data for U.S. earthquakes, July-September 1981

[Sources of the hypocenters, magnitudes, and macroseismic data: (B) University of California, Berkeley; (D) University of Montana, Missoula; (E) U.S. Department of Energy, Las Vegas, Nevada; (G) U.S. Geological Survey, National Earthquake Information Service, Golden, Colorado, or Network Operations Branch, Menlo Park, California; (H) U.S. Geological Survey, Hawaiian Volcano Observatory; (J) Weston Observatory, Massachusetts; (K) Tennessee Earthquake Information Center, Memphis; (L) Lamont-Doherty Geological Observatory, Palisades, N.Y.; (M) National Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer; (O) Seismological Service of Canada, Ottawa; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis, Missouri; (T) Oklahoma Geological Survey, Leonard; (U) University of Utah, Salt Lake; (V) Virginia Polytechnic Institute and State University, Blacksburg; (W) University of Washington, Seattle. 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]

Table 2.--Summary of macroseismic data for U.S. earthquakes, July-September 1981--Continued

Alaska	
4 July (G) Northwestern Alaska	
Origin time:	07 45 02.3
Epicenter:	67.71 N., 161.64 W.
Depth:	Normal.
Magnitude:	4.8 mb(G), 4.9 MS(G)
Felt in the Kotzebue area (M).	
4 July (G) Andreanof Islands, Aleutian Islands	
Origin time:	16 53 07.3
Epicenter:	51.50 N., 177.34 W.
Depth:	51 km
Magnitude:	4.7 mb(G), 4.4 ML(M)
Felt on Adak (M).	

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

ALASKA--Continued	
9 July (G) Southern Alaska	
Origin time:	16 43 48.8
Epicenter:	61.58 N., 148.38 W.
Depth:	Normal.
Magnitude:	2.2 ML(M)
Felt at Chickaloon (M).	
10 July (G) Andreanof Islands, Aleutian Islands	
Origin time:	01 39 31.0
Epicenter:	51.65 N., 176.87 W.
Depth:	55 km
Magnitude:	5.0 mb(G)
Intensity IV:	Adak (M).
12 July (G) Northwestern Alaska	
Origin time:	01 27 56.3
Epicenter:	67.71 N., 161.20 W.
Depth:	Normal.
Magnitude:	5.2 mb(G), 5.0 MS(G)
Intensity III:	Kotzebue.
13 July (G) Southern Alaska	
Origin time:	18 27 01.2
Epicenter:	59.42 N., 152.04 W.
Depth:	28 km
Magnitude:	3.4 ML(M)
Intensity III:	Homer and Seldovia (M).
26 July (G) Kenai Peninsula	
Origin time:	22 33 58.7
Epicenter:	60.94 N., 150.85 W.
Depth:	72 km
Magnitude:	4.6 mb(G)
Intensity III:	Anchorage (press report).
27 July (G) Central Alaska	
Origin time:	13 31 13.6
Epicenter:	64.86 N., 149.07 W.
Depth:	23 km
Magnitude:	3.8 ML(M)
Intensity IV:	Nenana.
Intensity III:	Fairbanks (M).
1 August (G) Southern Alaska	
Origin time:	01 42 16.4
Epicenter:	60.14 N., 153.19 W.
Depth:	114 km
Magnitude:	5.2 mb(G)
Intensity V:	The most common effects at the places listed below were few small objects overturned and fell; windows, doors, and dishes rattled; felt by many. Clam Gulch (few items thrown from store shelves), Eagle River, Sterling, Sutton.
Intensity IV:	Anchorage, Chugiak, Cooper Landing, Copper Center, Homer, Huffman, Kasilof, Kenai, Larsen Bay, Moose Pass, Nikishka, Ninilchik, Port Graham, Seldo-

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

ALASKA--Continued	
	via, Skwentna.
Intensity III:	Egegik, Elmendorf Air Force Base, Ouzinkie, Pedro Bay, Seward, Soldotna, Tyonek, Willow.
Intensity II:	Kodiak, Palmer (M).
Felt:	Anchor Point, Valdez (M).
13 August (G) Southern Alaska	
Origin time:	15 42 50.5
Epicenter:	61.57 N., 150.60 W.
Depth:	75 km
Magnitude:	None computed.
Intensity IV:	Anchorage (press report).
Felt:	Big Lake, Chugiak, Eagle River, and Wasilla (press report).
22 August (G) Southern Alaska	
Origin time:	05 58 21.0
Epicenter:	61.53 N., 151.04 W.
Depth:	72 km
Magnitude:	4.3 mb(G)
Intensity III:	Anchorage (M).
24 August (G) Andreanof Islands, Aleutian Islands	
Origin time:	15 46 27.6
Epicenter:	51.51 N., 178.35 W.
Depth:	56 km
Magnitude:	5.2 mb(G)
Intensity III:	Adak (M).
28 August (G) Southern Alaska	
Origin time:	09 04 24.7
Epicenter:	61.74 N., 150.45 W.
Depth:	71 km
Magnitude:	5.1 mb(G)
Intensity V:	The most common effects at the places listed below were few items thrown from store shelves; few small objects overturned and fell; windows, doors, and dishes rattled; felt by and awakened many. Chugiak, Nikishka (few glassware broken), Palmer (press report), Valdez (few windows cracked), Willow.
Intensity IV:	Anchorage, Cantwell, Chitina, Cooper Landing, Eagle River, Homer, Sutton, Tyonek.
Intensity III:	Ester, McKinley Park, Whittier.
Felt:	Sterling.
28 August Southern Alaska	
Origin time:	21 48
Epicenter:	Not located.
Depth:	None computed.
Magnitude:	None computed.
Intensity IV:	Kenai, Skwentna, Sutton.

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

ALASKA--Continued

California

- 3 September (G) Andreanof Islands, Aleutian Islands  
Origin time: 18 44 13.4  
Epicenter: 51.38 N., 175.30 W.  
Depth: Normal.  
Magnitude: 4.7 mb(G), 4.1 ML(M)  
Intensity III: Adak (M).
- 8 September (G) Andreanof Islands, Aleutian Islands  
Origin time: 07 01 16.9  
Epicenter: 51.47 N., 178.37 W.  
Depth: 55 km  
Magnitude: 4.9 mb(G)  
  
Felt on Adak (M).
- 10 September (G) Central Alaska  
Origin time: 11 06 23.6  
Epicenter: 65.09 N., 152.22 W.  
Depth: 15 km  
Magnitude: 4.2 mb(G), 4.0 ML(M)  
  
Felt at Tanana (M).
- 26 September (G) Southern Alaska  
Origin time: 17 43 09.6  
Epicenter: 62.01 N., 149.25 W.  
Depth: 58 km  
Magnitude: 4.7 mb(G)  
  
Felt at Anchorage (M), Gold Creek (M),  
Matanuska-Susitna Valley (press report),  
Palmer (M), Talkeetna (M).
- 27 September (G) Central Alaska  
Origin time: 15 15 12.9  
Epicenter: 64.75 N., 147.12 W.  
Depth: 22 km  
Magnitude: 3.8 ML(M)  
Intensity IV: Fairbanks (one dish and one  
lamp fell; windows, doors, and dishes rattled;  
hanging objects swung slightly; felt by and awakened many).

Arkansas

- 7 August (K) Western Tennessee  
Origin time: 11 53 41.8  
  
See Tennessee listing.

- 2 July (G) Northern California  
Origin time: 08 10 54.0  
Epicenter: 41.10 N., 124.22 W.  
Depth: 25 km  
Magnitude: 4.4 mb(G), 3.5 MS(G),  
4.2 ML(B)  
Intensity V:  
Eureka (few small objects overturned,  
hanging pictures swung out of place, one  
man on the third floor of the post  
office reported being knocked to the  
floor while trying to stand, felt by  
many).  
Trinidad (few small objects overturned,  
felt by many).  
Intensity IV: Arcata, Bayside, Blue Lake,  
Carlotta, Hoopa, Hyampom, Kneeland,  
Loleta, McKinleyville, Phillipsville, Rio  
Dell, Salyer, Samoa, Scotia, Westhaven.  
Intensity III: Willow Creek.
- 3 July Southern California  
Origin time: 13 45  
Epicenter: Not located.  
Depth: None computed.  
Magnitude: None computed.  
Intensity III: Los Angeles (press report).
- 6 July (P) Southern California  
Origin time: 19 53 43.9  
Epicenter: 33.87 N., 117.87 W.  
Depth: 4 km  
Magnitude: 3.2 ML(P)  
Intensity IV: Placentia, Yorba Linda.  
Intensity III: Brea, Garden Grove.  
Felt: Fullerton (press report) and  
Orange County (P).
- 9 July (P) Owens Valley area  
Origin time: 13 30 46.2  
Epicenter: 37.72 N., 118.90 W.  
Depth: 10 km  
Magnitude: 2.6 ML(P)  
  
Felt at Mammoth Lakes (P).
- 9 July (P) Owens Valley area  
Origin time: 13 31 17.8  
Epicenter: 37.72 N., 118.87 W.  
Depth: 8 km  
Magnitude: 3.1 ML(P)  
  
Felt at Mammoth Lakes (P).
- 9 July (P) Owens Valley area  
Origin time: 14 52 35.8  
Epicenter: 37.67 N., 118.97 W.  
Depth: 6 km



Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

CALIFORNIA--Continued	
Magnitude:	2.9 ML(P)
Felt at Mammoth Lakes (P)	
10 July (P) Imperial Valley	
Origin time:	11 33 53.2
Epicenter:	33.27 N., 115.98 W.
Depth:	4 km
Magnitude:	2.6 ML(P)
Felt at San Diego (P).	
17 July (B) Northern California	
Origin time:	16 37 31.6
Epicenter:	40.16 N., 124.34 W.
Depth:	18 km
Magnitude:	4.9 mb(G), 4.1 MS(G), 4.2 ML(B)
Felt in Humboldt, Mendocino, and Sonoma Counties (press report). At Honeydew about 10 sheep were observed running like they were being chased just seconds before the earthquake.	
<u>Intensity VI:</u> Honeydew (light furniture overturned, many small objects overturned and fell, many glassware and dishes were broken, many items thrown from store shelves, hanging pictures fell, felt by all).	
<u>Intensity V:</u> The most common effects at the places listed below were few items thrown from store shelves, few small objects overturned and fell, few glassware and dishes were broken. Petrolia, Phillippsville, Rio Dell, Scotia.	
<u>Intensity IV:</u> Alderpoint, Blocksburg, Bridgeville, Eureka, Ferndale, Fields Landing, Hydesville, Loleta, Miranda, Rio Dell, Weott, Whitethorn.	
<u>Intensity III:</u> Bayside, Bodega Bay (press report), Fortuna, Garberville, Redcrest, Redway, Samoa, Wildwood, Zenia.	
24 July (G) California-Mexico border region	
Origin time:	11 38 48.4
Epicenter:	32.08 N., 116.27 W.
Depth:	10 km
Magnitude:	4.3 mb(G), 4.6 ML(P)
<u>Intensity V:</u> California--Descanso (few glassware and dishes were broken; windows, doors, and dishes rattled).	
<u>Intensity IV:</u> California--Alpine, Campo, El Cajon, Escondido, Jacumba, Lemon Grove, Mount Laguna, San Diego, Santa Ysabel.	

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

CALIFORNIA--Continued	
<u>Intensity III:</u> California--Boulevard, Calexico, Potrero. <u>Felt:</u> Mexico--Tecate (press report).	
26 July (P) Southern California	
Origin time:	06 13 09.4
Epicenter:	35.13 N., 118.65 W.
Depth:	5 km
Magnitude:	3.4 ML(P)
Felt at Bear Valley (P).	
29 July (P) Southern California	
Origin time:	21 28 08.1
Epicenter:	33.15 N., 116.52 W.
Depth:	5 km
Magnitude:	3.5 ML(P)
<u>Intensity III:</u> Lake Cuyamaca.	
29 July (P) Southern California	
Origin time:	23 39 56.9
Epicenter:	33.78 N., 118.73 W.
Depth:	5 km
Magnitude:	3.9 ML(P)
This is the largest in a swarm of earth- quakes which occurred in this area on July 29-30.	
<u>Intensity III:</u> Hawthorne, Malibu, Seal Beach. <u>Felt:</u> Century City (P), Hermosa Beach (press report), Pasadena (P), Redondo Beach (P), Santa Monica (P).	
30 July (P) Southern California	
Origin time:	01 56 55.2
Epicenter:	33.78 N., 118.75 W.
Depth:	2 km
Magnitude:	3.7 ML(P)
Felt in the South Bay area (press report).	
30 July (P) Southern California	
Origin time:	11 56 01.0
Epicenter:	33.80 N., 118.73 W.
Depth:	5 km
Magnitude:	3.6 ML(P)
Felt at Hermosa Beach (P).	
4 August (B) Central California	
Origin time:	13 27 10.2
Epicenter:	36.71 N., 121.41 W.
Depth:	3 km
Magnitude:	3.0 ML(B)
<u>Intensity IV:</u> Tres Pinos. <u>Felt:</u> Hollister (B).	

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

CALIFORNIA--Continued	
6 August (P) Southern California	
Origin time:	11 10 12.7
Epicenter:	34.80 N., 120.25 W.
Depth:	1 km
Magnitude:	3.7 ML(P)
<u>Intensity IV:</u>	Los Alamos, Santa Maria (press report).
<u>Felt:</u>	San Luis Obispo County (press report).
12 August (P) Southern California	
Origin time:	22 58 35.8
Epicenter:	34.15 N., 118.58 W.
Depth:	2 km
Magnitude:	2.9 ML(P)
<u>Intensity II:</u>	Woodland Hills (press report).
14 August (P) Southern California	
Origin time:	01 09 33.9
Epicenter:	33.95 N., 118.58 W.
Depth:	5 km
Magnitude:	3.4 ML(P)
<u>Intensity IV:</u>	Santa Monica (press report).
14 August (B) Central California	
Origin time:	12 49 59.6
Epicenter:	36.77 N., 121.29 W.
Depth:	9 km
Magnitude:	4.2 ML(B)
<u>Intensity IV:</u>	Carmel Valley, Monterey, Paicines, Redwood Estates, San Juan Bautista.
<u>Felt:</u>	Hollister (B).
16 August (P) Southern California	
Origin time:	11 23 29.0
Epicenter:	34.12 N., 117.17 W.
Depth:	5 km
Magnitude:	3.2 ML(P)
Felt at San Bernardino (P).	
19 August (P) Southern California	
Origin time:	12 02 00.7
Epicenter:	33.55 N., 117.20 W.
Depth:	6 km
Magnitude:	2.8 ML(P)
Felt at Sun City (P).	
22 August (B) Owens Valley area	
Origin time:	20 54 23.8
Epicenter:	37.63 N., 118.90 W.
Depth:	9 km
Magnitude:	3.6 ML(B), 3.7 ML(P)
Felt in the Mammoth Lakes area (B).	

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

CALIFORNIA--Continued	
24 August (B) Owens Valley area	
Origin time:	04 52 18.2
Epicenter:	37.61 N., 118.88 W.
Depth:	23 km
Magnitude:	3.8 ML(B), 3.6 ML(P)
<u>Intensity IV:</u>	June Lake, Mammoth Lakes.
<u>Intensity III:</u>	Lakeshore.
4 September (P) Southern California	
Origin time:	00 28 53.3
Epicenter:	33.15 N., 116.57 W.
Depth:	15 km
Magnitude:	3.8 ML(P)
This is the first of two quakes in this area. A sound like an explosion was heard at the time of the first quake.	
<u>Intensity IV:</u>	Campo, Nuevo, Pala, Poway, Santa Ysabel, Warner Springs.
<u>Intensity III:</u>	Julian, Lake Cuyamaca, San Marcos, Valley Center.
<u>Felt:</u>	Escondido (P), Mount Laguna, Palm Springs (press report), San Diego (press report).
5 September (P) Southern California	
Origin time:	00 41 48.4
Epicenter:	33.63 N., 119.12 W.
Depth:	8 km
Magnitude:	3.5 ML(P)
Felt at Santa Monica (P).	
11 September (P) Southern California	
Origin time:	05 58 24.0
Epicenter:	33.73 N., 119.18 W.
Depth:	6 km
Magnitude:	3.7 ML(P)
Felt at Agoura (P).	
12 September (P) Southern California	
Origin time:	21 23 07.8
Epicenter:	34.17 N., 117.27 W.
Depth:	7 km
Magnitude:	3.6 ML(P)
This was the first and largest in a swarm of eight quakes which were felt in the San Bernardino area on September 12-16.	
<u>Intensity V:</u>	Highland (foundation cracked, pendulum clock stopped, few windows cracked).
<u>Intensity IV:</u>	Colton, Redlands, Rimforest, San Bernardino, Skyforest, Yucaipa.
<u>Intensity III:</u>	Loma Linda, Mentone, Patton.
<u>Intensity II:</u>	Forest Falls.

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

CALIFORNIA--Continued	
13 September (P) Southern California	
Origin time: 19 59 48.5	
Epicenter: 34.15 N., 117.27 W.	
Depth: 5 km	
Magnitude: 3.0 ML(P)	
Felt at San Bernardino (press report).	
14 September Southern California	
Origin time: 09 07	
Epicenter: Not located.	
Depth: None computed.	
Magnitude: None computed.	
Felt at San Bernardino (press report).	
14 September (P) Southern California	
Origin time: 18 42 03.5	
Epicenter: 34.17 N., 117.28 W.	
Depth: 6 km	
Magnitude: 2.7 ML(P)	
Felt at San Bernardino (press report).	
15 September (P) Southern California	
Origin time: 01 54 15.3	
Epicenter: 34.17 N., 117.28 W.	
Depth: 7 km	
Magnitude: 2.5 ML(P)	
Felt at San Bernardino (press report).	
16 September (P) Southern California	
Origin time: 07 57 13.8	
Epicenter: 34.17 N., 117.25 W.	
Depth: 9 km	
Magnitude: 3.1 ML(P)	
Felt at San Bernardino (press report).	
16 September Southern California	
Origin time: 08 02	
Epicenter: Not located.	
Depth: None computed.	
Magnitude: None computed.	
Felt at San Bernardino (press report).	
16 September (B) Northern California	
Origin time: 12 41 15.0	
Epicenter: 40.11 N., 124.30 W.	
Depth: 5 km	
Magnitude: 4.8 mb(G), 3.9 MS(G), 4.5 ML(B)	
<u>Intensity V:</u> The most common effects at the places listed below were few small objects overturned and fell; windows, doors, and dishes rattled; felt by and awakened many.	

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981

CALIFORNIA--Continued	
Miranda, Redway, Weott (few windows cracked, hairline cracks in plaster and dry wall), Whitehorn.	
<u>Intensity IV:</u> Alderpoint, Branscomb, Bridgeville, Carlotta, Eureka, Garber- ville, Leggett, Loleta, Miranda, Phillips- ville, Piercy, Redcrest, Rio Dell, Salmon Creek Road, Scotia.	
<u>Intensity III:</u> Blue Lake, Fields Landing.	
<u>Felt:</u> Ferndale (B), Petrolia (B).	
16 September Southern California	
Origin time: 13 57	
Epicenter: Not located.	
Depth: None computed.	
Magnitude: None computed.	
Felt at San Bernardino (press report).	
17 September Southern California	
Origin time: 00 07	
Epicenter: Not located.	
Depth: None computed.	
Magnitude: None computed.	
<u>Intensity IV:</u> Redlands.	
17 September (B) Owens Valley area	
Origin time: 12 36 04.8	
Epicenter: 37.57 N., 118.89 W.	
Depth: 10 km	
Magnitude: 3.4 ML(B), 3.5 ML(P)	
<u>Intensity III:</u> Mammoth Lakes (press report).	
<u>Felt:</u> Bishop (P).	
23 September (G) Central California	
Origin time: 10 32 48.4	
Epicenter: 38.67 N., 122.82 W.	
Depth: 3 km	
Magnitude: 2.5 ML(B), 2.4 MD(G)	
<u>Intensity IV:</u> Healdsburg and Santa Rosa (press report).	
24 September (B) Central California	
Origin time: 14 00 26.3	
Epicenter: 36.79 N., 121.58 W.	
Depth: 4 km	
Magnitude: 3.3 ML(B)	
Felt at Salinas (B).	
25 September (B) Owens Valley area	
Origin time: 06 48 53.2	
Epicenter: 37.55 N., 118.89 W.	
Depth: 15 km	
Magnitude: 3.7 ML(B), 3.7 ML(P)	
<u>Intensity IV:</u> Lakeshore.	
<u>Felt:</u> Mammoth Lakes area (B).	

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981

CALIFORNIA--Continued	
25 September (P) Southern California	
Origin time:	14 13 38.0
Epicenter:	34.02 N., 116.85 W.
Depth:	21 km
Magnitude:	3.3 ML(P)
Felt at Banning (P).	
28 September (B) Central California	
Origin time:	07 34 39.1
Epicenter:	36.79 N., 121.59 W.
Depth:	5 km
Magnitude:	4.2 mb(G), 3.4 MS(G), 3.9 ML(B)
<u>Intensity IV:</u> Big Sur, Castroville, Chualar, Hollister, Soledad, Salinas, San Juan Bautista, Tres Pinos.	
<u>Intensity III:</u> Carmel Valley.	
<u>Intensity II:</u> Paicines.	
30 September (B) Owens Valley area	
Origin time:	11 53 26.9
Epicenter:	37.59 N., 118.89 W.
Depth:	5 km
Magnitude:	5.6 mb(G), 5.8 MS(G), 5.9 ML(B), 5.8 ML(P)
This earthquake was felt over an area of approximately 92,000 sq km of California and Nevada (fig. 7). It was the first and largest in a swarm of earthquakes in this area. The quake knocked out power at the Mono County Sheriff's substation for 1 hour, and briefly in Crowley Lake, and at the Mammoth Lakes airport. Phone service was also interrupted in Mammoth Lakes. The quake caused rockslides in Convict Canyon and there were football-sized rocks found on the roads near Tioga Pass (Yosem- ite).	
<u>Intensity VI:</u>	
California--Mammoth Lakes (Small landslides, chimneys cracked, hairline cracks in plaster and dry wall, few win- dows cracked, few items thrown from store shelves, felt by all and awakened many. At the Hot Creek Fish Hatchery near Mammoth Lakes gas lines were bro- ken, flowing spring water was muddied, and 200,000 fingerling rainbow trout were dumped from troughs and killed. A shopping center under construction had broken windows and damaged walls--press report).	
<u>Intensity V:</u> The most common effects at the places listed below were few windows cracked, few items thrown from store shelves, few small objects overturned	

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

CALIFORNIA--Continued	
and fell, few glassware and dishes were broken, water splashed onto sides of lakes and swimming pools, felt by and awakened many.	
California--Auberry (small landslides), Bishop (power outages), Crowley Lake, Fresno, Friant, Kaweah, La Grange (hairline cracks in plaster walls), Madera, Merced, Modesto (press report), Orange Cove, Piedra, Pioneer, Riverdale, Shaver Lake, Sonora, Three Rivers (one woman was knocked out of bed--press report), Tom's Place, Traver, Tulare, Vernalis, Wishon, Yosemite National Park (burglar alarms went off in the park valley and a lot of rocks fell--press report).	
<u>Intensity IV:</u>	
California--Angels Camp, Armona, Arnold, Atwater, Avery, Badger, Bakersfield, Bass Lake, Benton, Big Creek, Big Oak Flat, Biola, Bodfish, Burrell, Caliente, Camino, Camptonville, Cantua Creek, Caruthers, Chinese Camp, Clements, Coa- linga, Coarsegold, Copperopolis, Cor- coran, Del Rey, Dinuba, Dos Palos, Ducor, Dunlap, El Nido, El Portal, Escalon, Fish Camp, French Camp, Galt, Garden Valley, Georgetown, Grant Grove (Kings Canyon National Park), Groveland, Hanford, Hathaway Pines, Holt, Hornitos, Hughson, Hume, Independence, Ione, Isle- ton, June Lake, Kerman, Kern River Val- ley, Lakeshore, Le Grand, Lee Vining, Lindsay, Lone Pine, Long Barn, Lost Hills, Maricopa, Mariposa, Midpines, Miramonte, Mi-Wuk Village, Moccasin, Mountain Ranch, Murphys, Nevada City, Oakhurst, Olancho, O'Neals, Orosi, Patterson, Pine Grove, Pinecrest (4 miles west), Porterville, Posey, Prather, Rail Road Flat, Raymond, Reed- ley, Rio Vista, Ripon, River Pines, Ryde, Sacramento, San Bernardino, San Joaquin, Scotia, Selma, Snelling, Squaw Valley, Strawberry, Sultana, Sutter Creek, Taft, Thornton, Tipton, Toll- house, Tracy, Tranquillity, Tuolumne, Turlock, Twain Harte, Vallecito, Valley Home, Visalia, Vista, Waukena, Wilsey- ville, Winton, Wofford Heights, Woodlake.	
Nevada--Dyer (Fish Lake Valley), Hawthorne, Luning.	
<u>Intensity III:</u>	
California--Albion, Anza, Arvin, Ballico, Barton, Brentwood, Byron, California Hot Springs, Carmel Valley, Castella, Cas- troville, Chicago Park, Davis (press	

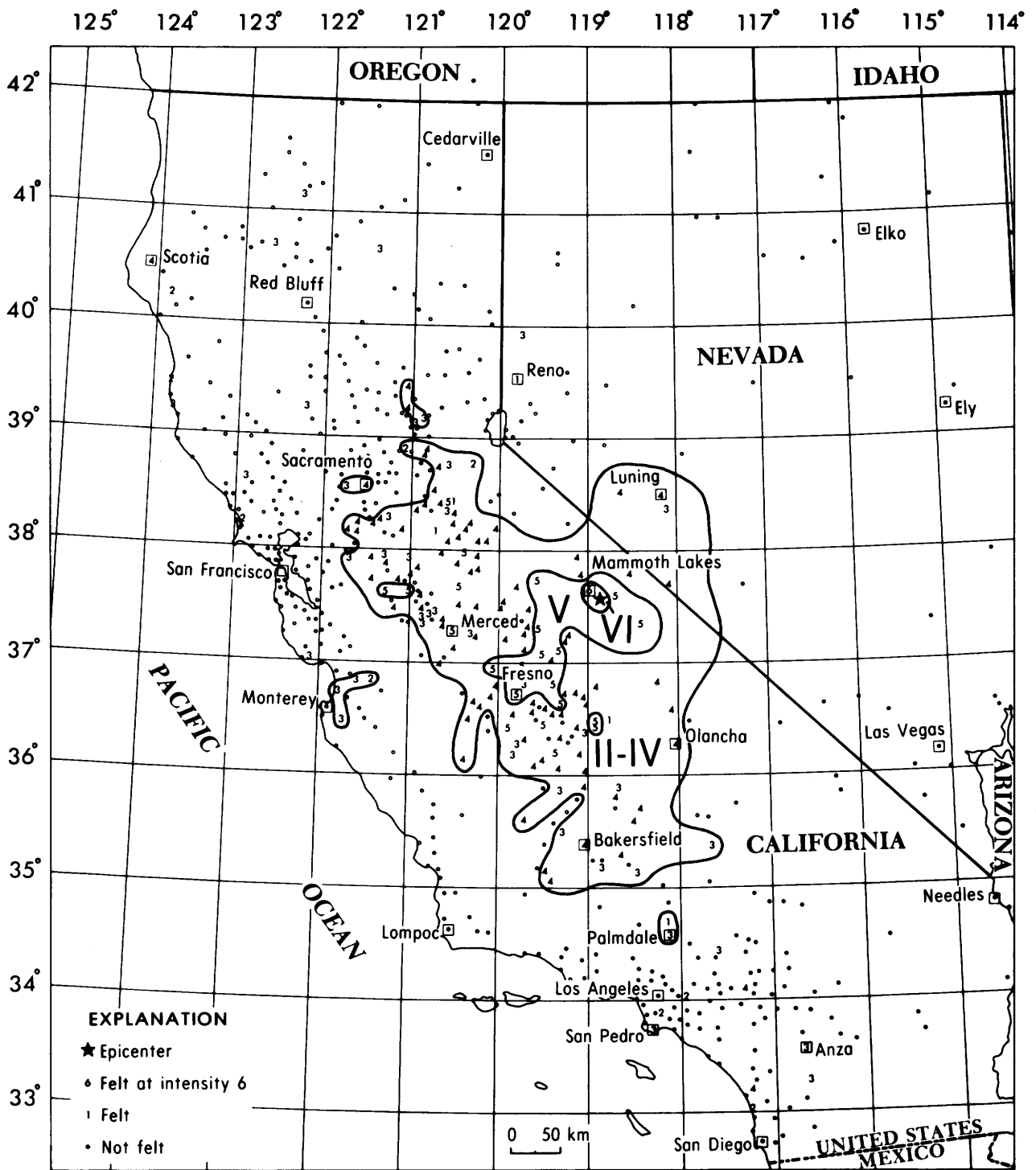


FIGURE 7.--Isoseismal map for the Owens Valley area, California, earthquake of 30 September 1981, 11 53 26.9 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

CALIFORNIA--Continued	
	report), Delhi, Earlimart, Farmington, Felton, French Gulch, Glencoe, Gold Run, Healdsburg, Herald, Hilmar, Johannesburg, Lemoncove, Lemoore, Maxwell, Old Station, Palmdale, Phelan, Planada, Pollock Pines, San Juan Bautista, San Pedro, Shafter, Stevinson, Stockton (press report), Stratford, Tehachapi, Warner Springs.
	Nevada--Babbitt, Gardnerville, Mina.
<u>Intensity II:</u>	
	California--Auburn, Cardiff-by-the-sea, Compton (press report), Fort Bragg, Hollister, Kyburz, La Puente, Miranda, Tomales.
<u>Felt:</u>	
	California--Lancaster (press report), San Andreas, Sequoia National Park, West Point.
	Nevada--Reno (B).
30 September (B) Owens Valley area	
Origin time:	12 22 55.1
Epicenter:	37.56 N., 118.80 W.
Depth:	30 km
Magnitude:	3.5 ML(B)
	Felt at Mammoth Lakes (B).
30 September (B) Owens Valley area	
Origin time:	13 05 48.5
Epicenter:	37.65 N., 118.87 W.
Depth:	5 km
Magnitude:	4.7 mb(G), 4.8 ML(B), 4.6 ML(P)
The data for this event is incomplete because many reports combined the effects of this earthquake with the earlier event at 11 53 26.9.	
<u>Intensity V:</u> The most common effects at the places listed below were few items thrown from store shelves; few small objects overturned and fell; hanging pictures swung; windows, doors, and dishes rattled.	
California--Bishop (hanging pictures fell), Mammoth Lakes (few windows cracked, few glassware and dishes were broken, hairline cracks in plaster and dry wall), Piedra, Traver, Yosemite National Park.	
<u>Intensity IV:</u>	
California--Ahwahnee, Armona, Arnold, Auberry, Bass Lake, Big Creek, Cantua Creek, Chinese Camp, Clovis, Coarsegold, Cutler, Earlimart, Firebaugh, Foresthill, French Camp, Friant, George-	

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

CALIFORNIA--Continued	
	town, Groveland, Hanford, Hathaway Pines, Independence, Ione, Madera, Orosi, Pioneer, Porterville, Prather, River Pines, Selma, Shaver Lake, Sierra, Strathmore, Tipton, Waukena, Wilseyville, Woodlake.
	Nevada--Dyer (Fish Lake Valley).
<u>Intensity III:</u>	
	California--Atwater, Biola, California Hot Springs, El Portal, Fresno, Glencoe, Hilmar, Lemoncove, Lindsay, Lost Hills, Pollock Pines, San Joaquin, Tollhouse, Tranquillity, Visalia.
	Nevada--Mina.
<u>Intensity II:</u>	
	California--Glennville.
<u>Felt:</u>	
	California--San Andreas, Sequoia National Park, West Point, Wofford Heights.
30 September (B) Owens Valley area	
Origin time:	14 33 45.8
Epicenter:	37.62 N., 118.87 W.
Depth:	7 km
Magnitude:	3.9 ML(B), 3.5 ML(P)
	Felt at Mammoth Lakes (telephone report).
30 September (B) Owens Valley area	
Origin time:	14 40 13.2
Epicenter:	37.64 N., 118.89 W.
Depth:	5 km
Magnitude:	3.6 ML(B), 3.2 ML(P)
	Felt at Mammoth Lakes (B).
30 September (B) Owens Valley area	
Origin time:	14 50 06.8
Epicenter:	37.58 N., 118.94 W.
Depth:	3 km
Magnitude:	4.3 ML(B), 4.1 ML(P)
	Felt at Mammoth Lakes (B).
30 September (B) Owens Valley area	
Origin time:	15 20 48.0
Epicenter:	37.65 N., 118.89 W.
Depth:	3 km
Magnitude:	3.5 ML(B), 3.3 ML(P)
	Felt at Mammoth Lakes (B).
30 September (B) Owens Valley area	
Origin time:	16 34 32.7
Epicenter:	37.54 N., 118.90 W.
Depth:	10 km
Magnitude:	3.7 ML(B), 3.4 ML(P)
	Felt at Mammoth Lakes (B).

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

CALIFORNIA--Continued	
30 September (B) Owens Valley area	
Origin time:	19 35 12.3
Epicenter:	37.55 N., 118.85 W.
Depth:	8 km
Magnitude:	4.0 ML(B), 3.6 ML(P)
Felt at Mammoth Lakes (B).	
30 September (B) Owens Valley area	
Origin time:	19 48 20.7
Epicenter:	37.62 N., 118.89 W.
Depth:	5 km
Magnitude:	3.5 ML(B), 3.3 ML(P)
Felt at Mammoth Lakes (B).	

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California--Off the coast

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- 11 July (P) Southern California
- Origin time: 21 50 29.0
- Epicenter: 32.63 N., 118.00 W.
- Depth: 5 km
- Magnitude: 4.3 mb(G), 4.3 ML(P)
- Intensity IV: Coronado.
- Intensity III: Avalon, Costa Mesa, Cypress, San Diego (Lindbergh Field), Spring Valley, Tustin.
- Intensity II: San Pedro.
- 4 September (P) Southern California
- Origin time: 00 39 25.5
- Epicenter: 33.15 N., 116.57 W.
- Depth: 15 km
- Magnitude: 3.6 ML(P)
- Felt: Escondido (P), Julian (press report), Palm Springs (press report), San Diego (press report).
- 4 September (P) Southern California
- Origin time: 15 50 50.3
- Epicenter: 33.67 N., 119.12 W.
- Depth: 5 km
- Magnitude: 5.4 mb(G), 5.9 MS(G), 5.2 ML(P), 5.6 ML(B)

This is the largest earthquake to occur in this area since the 1971 quake in the San Fernando Valley. It was felt in southern California from San Luis Obispo to the Mexican border. Telephone service in some areas was disrupted briefly, burglar alarms were set off, and elevators were knocked out of service. Amtrak trains between Los Angeles and San Diego were halted temporarily while authorities inspected bridges along the route, but no damage was found. The felt area for this

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

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CALIFORNIA--Off the coast--Continued

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earthquake, not including any possible disturbance offshore, was approximately 33,000 sq km (fig. 8).

Intensity VI: Marina del Rey (some windows broken, interior and exterior walls cracked, light furniture overturned, few glassware broken, small objects overturned and fell, felt by all).

Intensity V: The most common effects at the places listed below were hairline cracks in plaster and dry wall, few items thrown from store shelves, few small objects overturned and fell, few glassware and dishes were broken, few windows cracked, felt by many.

Avalon.

Bell.

Buellton.

Carpinteria.

East Irvine.

Florence.

La Mirada.

Lennox.

Lomita.

Long Beach.

Los Alamitos.

Los Angeles (Telephone service was disrupted and one elevator was knocked out of service. The 55-story Security Pacific Bank building swayed and many people reported feeling dizzy. The 365-foot-high Vincent Thomas Bridge which connects Los Angeles with Terminal Island swayed, but was not damaged--press report).

Manhattan Beach.

Palos Verdes Peninsula.

Paramount.

Pomona.

Port Hueneme.

Rosemead (a chimney was reported cracked).

San Diego (Lindbergh Field).

San Pedro (concrete patio had a quarter-inch wide crack for 20 or 30 feet --press report).

Santa Ana (Two new cracks were found in the Orange County Hall of Administration building).

Santa Catalina Island (one observer described the earthquake as a real sharp jolt, then it kind of rolled after that and the lights started swinging--press report),

Santa Monica (hundreds of automobile burglar alarms were triggered in parking lots along the beaches--press report). Sherman Oaks (\$50 of merchandise fell off shelves at the Hughes Market--press

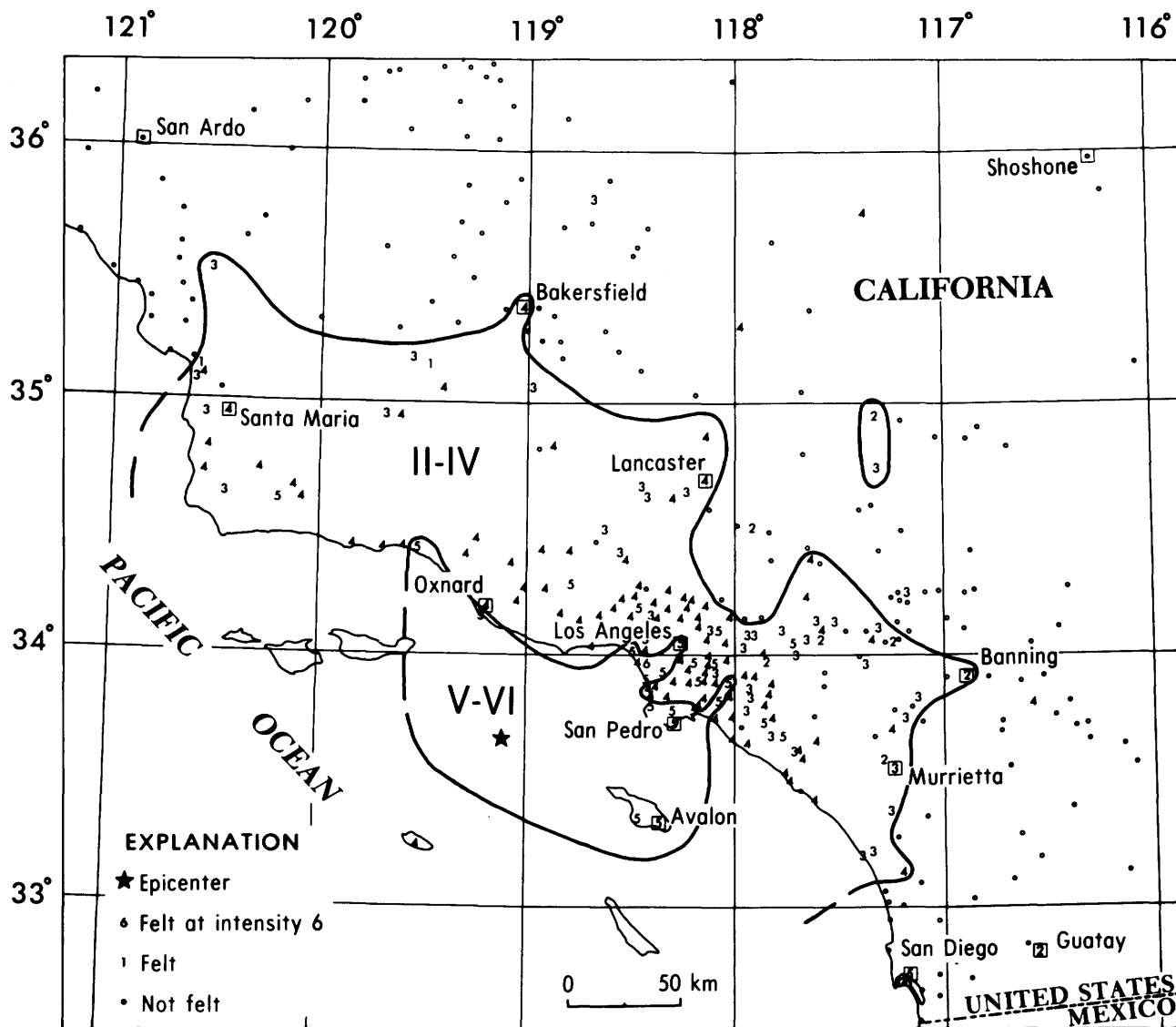


FIGURE 8.--Isoseismal map for the southern California earthquake of 4 September 1981, 15 50 50.3 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.



Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

CALIFORNIA--Off the coast--Continued
report).
Simi Valley.
<u>Intensity IV:</u> Agoura, Altadena, Arcadia, Atwood, Bakersfield, Bellflower, Brea, Burbank, Calabasas, Camarillo, Canoga Park, Cantil, Casmalia, Colton, Compton, Costa Mesa, Cucamonga, Culver City, Cuyama, Cypress, Downey, El Monte, El Toro Marine Corps Air Station, Encino, Fillmore, Gardena, Glendale, Goleta, Halcyon, Hawthorne, Hermosa Beach, Huntington Beach, Huntington Park, La Canada, La Crescenta (press report), La Habra, Laguna Beach, Laguna Niguel, Lakewood, Lancaster, Lawndale, Lebec, Leona Valley, Long Beach (Signal Hill), Los Alamos, Los Olivos, Lynwood, Malibu, Maricopa, Mission Viejo, Monrovia, Montebello, Monterey Park, Monterey, Moorpark, Mt. Baldy, Newhall, Northridge, Norwalk, Oakview, Ojai, Orange, Oxnard, Palm Springs, Pasadena, Pico Rivera, Piru, Placentia, Quail Valley, Redondo Beach, Reseda, Rosamond, San Clemente, San Marcos, San Nicolas Island, Santa Barbara (The Harbor Patrol office was briefly evacuated but no injuries or damage were reported--press report), Santa Maria, Santa Paula, Santa Ynez, Seal Beach, Sepulveda, Somis, South El Monte, South Gate, South Pasadena, Summerland, Sun Valley, Sunland, Sylmar, Thousand Oaks, Torrance, Trabuco Canyon, Trona, Tustin, Universal City, Vandenberg Air Force Base, Venice, Ventura, Vernon, Walnut, Westminster, Whittier, Wilmington, Wrightwood, Yorba Linda.
<u>Intensity III:</u> Alta Loma, Anaheim, Baldwin Park, Beverly Hills, Castaic, Chino, City of Industry, Covina, Creston, Etiwanda, Fallbrook, Fellows, Fullerton, Garden Grove, Green Valley, Guadalupe, Hazard, Helendale, Irvine, La Verne, Laguna Hills, Lake Hughes, Lakeview, Lompoc, Maywood, Mettler, Midway City, Mission Hills, Murrieta, New Cuyama, North Hollywood, Oceano, Oceanside, Ontario, Posey, Quartz Hill, Riverside, Romoland, San Bernardino, San Diego, San Diego Naval Air Station, San Fernando, San Gabriel, San Joaquin, San Luis Rey, Santa Fe Springs, Saugus, Skyforest, Stanton, Sunset Beach, Woodland Hills.
<u>Intensity II:</u> Banning, Bryn Mawr, Diamond Bar, Guasti, Guatay, March Air Force Base, Pearlblossom, Pine Valley, South Whittier, Wildomar.
<u>Felt:</u> Arroyo Grande (press report), Taft (press report).

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

CALIFORNIA--Off the coast--Continued
21 September (P) Southern California
Origin time: 10 08 08.2
Epicenter: 33.63 N., 119.05 W.
Depth: 5 km
Magnitude: 3.2 ML(P)
Felt at Los Angeles (P).
Colorado
16 September (G) Northern Colorado
Origin time: 19 58 38.9
Epicenter: 39.88 N., 104.91 W.
Depth: 5 km
Magnitude: 2.1 ML(G)
<u>Intensity IV:</u> Denver (Park Hill--press report).
<u>Felt:</u> Commerce City, Thornton, and parts of Denver (press report).
Connecticut
4 August (J) Southern Connecticut
Origin time: 02 01 37.2
Epicenter: 41.54 N., 72.47 W.
Depth: 5 km
Magnitude: 2.2 Mn(J)
Felt and heard near Moodus, Connecticut (J).
Hawaii
2 July (H) Island of Hawaii
Origin time: 12 31 54.7
Epicenter: 19.32 N., 155.19 W.
Depth: 10 km
Magnitude: 3.6 ML(H)
<u>Intensity III:</u> Hilo, Papaikou, Volcano.
3 July (H) Island of Hawaii
Origin time: 23 28 42.6
Epicenter: 19.39 N., 155.28 W.
Depth: 3 km
Magnitude: 3.1 ML(H)
<u>Intensity IV:</u> Hawaiian Volcano Observatory.
<u>Intensity II:</u> Volcano.
20 July (H) Island of Hawaii
Origin time: 16 12 46.4
Epicenter: 19.33 N., 155.22 W.
Depth: 10 km
Magnitude: 3.9 ML(H)

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

HAWAII--Continued	
	<u>Intensity IV:</u> Hilo.
	<u>Intensity III:</u> Pahala, Volcano.
	<u>Intensity II:</u> Captain Cook, Kealakekua.
21 July (H) Island of Hawaii	
Origin time:	17 59 16.5
Epicenter:	19.27 N., 155.45 W.
Depth:	10 km
Magnitude:	3.9 ML(H)
<u>Intensity IV:</u>	Pahala.
<u>Intensity III:</u>	Hawaiian Ocean View Estates, Hilo, Volcano.
<u>Intensity II:</u>	Captain Cook.
28 July (H) Island of Hawaii	
Origin time:	03 15 16.0
Epicenter:	19.32 N., 155.19 W.
Depth:	10 km
Magnitude:	3.3 ML(H)
<u>Intensity III:</u>	Volcano.
28 July (H) Island of Hawaii	
Origin time:	20 00 44.9
Epicenter:	19.34 N., 155.03 W.
Depth:	9 km
Magnitude:	4.1 ML(H)
<u>Intensity V:</u>	Kalapana, Wahaula.
<u>Intensity IV:</u>	Glenwood, Hawaiian Acres, Paradise Park.
28 July (H) Island of Hawaii	
Origin time:	20 18 33.9
Epicenter:	19.37 N., 155.03 W.
Depth:	8 km
Magnitude:	3.3 ML(H)
<u>Intensity IV:</u>	Puna.
<u>Intensity III:</u>	Glenwood, Hilo.
30 July (H) Island of Hawaii	
Origin time:	01 57 50.0
Epicenter:	19.36 N., 155.25 W.
Depth:	10 km
Magnitude:	3.4 ML(H)
<u>Intensity II:</u>	Volcano.
2 August (H) Island of Hawaii	
Origin time:	18 48 16.2
Epicenter:	20.11 N., 155.78 W.
Depth:	23 km
Magnitude:	3.0 ML(H)
<u>Intensity III:</u>	Ahualoa.
4 August (H) Island of Hawaii	
Origin time:	17 47 50.6
Epicenter:	19.47 N., 155.45 W.
Depth:	9 km
Magnitude:	3.0 ML(H)
<u>Intensity II:</u>	Hawaiian Volcano Observatory.

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

HAWAII--Continued	
10 August (H) Island of Hawaii	
Origin time:	15 32 19.6
Epicenter:	19.38 N., 155.27 W.
Depth:	1 km
Magnitude:	3.1 ML(H)
<u>Intensity III:</u>	Volcano.
10 August (H) Island of Hawaii	
Origin time:	15 42 09.4
Epicenter:	19.38 N., 155.28 W.
Depth:	2 km
Magnitude:	4.2 ML(H)
<u>Intensity IV:</u>	Hawaii Volcanoes National Park, Volcano.
10 August (H) Island of Hawaii	
Origin time:	16 05 58.2
Epicenter:	19.38 N., 155.27 W.
Depth:	2 km
Magnitude:	3.1 ML(H)
<u>Intensity III:</u>	Volcano.
10 August (H) Island of Hawaii	
Origin time:	16 23 39.3
Epicenter:	19.31 N., 155.28 W.
Depth:	5 km
Magnitude:	3.6 ML(H)
<u>Intensity III:</u>	Volcano.
<u>Intensity II:</u>	Hilo.
10 August (H) Island of Hawaii	
Origin time:	17 23 12.9
Epicenter:	19.32 N., 155.34 W.
Depth:	8 km
Magnitude:	3.4 ML(H)
<u>Intensity III:</u>	Pahala.
<u>Intensity II:</u>	Volcano.
10 August (H) Island of Hawaii	
Origin time:	17 47 51.7
Epicenter:	19.31 N., 155.35 W.
Depth:	1 km
Magnitude:	3.4 ML(H)
<u>Intensity III:</u>	Pahala.
<u>Intensity II:</u>	Volcano.
10 August (H) Island of Hawaii	
Origin time:	18 20 08.7
Epicenter:	19.32 N., 155.35 W.
Depth:	5 km
Magnitude:	4.4 mb(G), 4.2 ML(H)
<u>Intensity IV:</u>	Pahala.
<u>Intensity III:</u>	Hawaii Volcanoes National Park, Volcano.
<u>Felt:</u>	Hilo.

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981

HAWAII--Continued	
10 August (H) Island of Hawaii	
Origin time:	18 41 40.0
Epicenter:	19.33 N., 155.33 W.
Depth:	3 km
Magnitude:	3.1 ML(H)
<u>Intensity III:</u>	Pahala.
10 August (H) Island of Hawaii	
Origin time:	19 40 35.0
Epicenter:	19.31 N., 155.36 W.
Depth:	4 km
Magnitude:	4.5 ML(H)
<u>Intensity IV:</u>	Pahala.
<u>Intensity III:</u>	Volcano.
10 August (H) Island of Hawaii	
Origin time:	20 43 59.0
Epicenter:	19.33 N., 155.31 W.
Depth:	6 km
Magnitude:	3.1 ML(H)
<u>Intensity III:</u>	Pahala.
10 August (H) Island of Hawaii	
Origin time:	23 02 57.8
Epicenter:	19.35 N., 155.34 W.
Depth:	0 km
Magnitude:	3.2 ML(H)
<u>Intensity III:</u>	Pahala.
10 August (H) Island of Hawaii	
Origin time:	23 29 11.3
Epicenter:	19.30 N., 155.36 W.
Depth:	7 km
Magnitude:	3.6 ML(H)
<u>Intensity III:</u>	Pahala.
11 August (H) Island of Hawaii	
Origin time:	04 53 46.6
Epicenter:	19.30 N., 155.39 W.
Depth:	5 km
Magnitude:	3.6 ML(H)
<u>Intensity III:</u>	Pahala, Volcano.
11 August (H) Island of Hawaii	
Origin time:	05 17 17.2
Epicenter:	19.32 N., 155.32 W.
Depth:	4 km
Magnitude:	3.3 ML(H)
<u>Intensity III:</u>	Pahala, Volcano.
11 August (H) Island of Hawaii	
Origin time:	05 23 43.4
Epicenter:	19.24 N., 155.37 W.
Depth:	3 km
Magnitude:	3.3 ML(H)
<u>Intensity III:</u>	Volcano.

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

HAWAII--Continued	
12 August (H) Island of Hawaii	
Origin time:	04 20 42.4
Epicenter:	19.20 N., 155.35 W.
Depth:	7 km
Magnitude:	3.3 ML(H)
<u>Intensity III:</u>	Pahala.
17 August (H) Island of Hawaii	
Origin time:	01 14 32.7
Epicenter:	19.40 N., 155.28 W.
Depth:	15 km
Magnitude:	3.4 ML(H)
<u>Intensity III:</u>	Glenwood, Hawaii Volcanoes National Park, Hawaiian Volcano Observa- tory, Volcano.
22 August (H) Island of Hawaii	
Origin time:	22 05 20.3
Epicenter:	20.18 N., 156.43 W.
Depth:	10 km
Magnitude:	4.3 mb(G), 4.4 ML(H)
<u>Intensity IV:</u>	Island of Maui--Kahului, Wailuku.
<u>Intensity III:</u>	Island of Hawaii--Ahualoa, Kamuela, Kohala, Kona. Island of Maui--Hana, Kula.
7 September (H) Island of Hawaii	
Origin time:	08 21 46.2
Epicenter:	19.63 N., 156.02 W.
Depth:	42 km
Magnitude:	3.3 ML(H)
<u>Intensity III:</u>	Ahualoa.
7 September (H) Island of Hawaii	
Origin time:	08 34 47.6
Epicenter:	19.42 N., 155.29 W.
Depth:	10 km
Magnitude:	3.3 ML(H)
<u>Intensity III:</u>	Pahala.
22 September (H) Island of Hawaii	
Origin time:	14 49 24.0
Epicenter:	19.33 N., 155.13 W.
Depth:	9 km
Magnitude:	3.3 ML(H)
<u>Intensity III:</u>	Hilo.
<u>Felt:</u>	Puna (press report).
22 September (H) Island of Hawaii	
Origin time:	16 50 23.7
Epicenter:	19.32 N., 155.12 W.
Depth:	10 km
Magnitude:	3.9 ML(H)
<u>Intensity IV:</u>	Hilo.
<u>Intensity III:</u>	Puna.

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

HAWAII--Continued	
27 September (H) Island of Hawaii	
Origin time:	11 50 00.6
Epicenter:	19.37 N., 155.42 W.
Depth:	11 km
Magnitude:	3.4 ML(H)
Intensity III:	Pahala, South Point.
30 September (H) Island of Hawaii	
Origin time:	17 04 45.7
Epicenter:	19.31 N., 155.23 W.
Depth:	10 km
Magnitude:	3.9 ML(H)
Intensity IV:	Hawaiian Acres, Hilo.
Intensity III:	Pahala.
Intensity II:	Hualalai, Volcano.
Felt:	North Kohala and Puna (press report).
Idaho	
29 September (G) Western Idaho	
Origin time:	05 39 48.1
Epicenter:	44.69 N., 116.99 W.
Depth:	5 km
Magnitude:	3.3 ML(G), 3.5 ML(D)
Intensity IV:	Cambridge.
30 September (G) Southeastern Idaho	
Origin time:	04 17 31.3
Epicenter:	42.53 N., 111.15 W.
Depth:	5 km
Magnitude:	3.7 mb(G), 3.9 ML(G), 3.8 ML(U)
Intensity IV:	Bern, Dingle.
Intensity III:	Geneva, Georgetown (press report), Ovid, Paris, St. Charles, Thatcher.
Intensity II:	Montpelier.
Massachusetts	
12 September (J) Southeastern Massachusetts	
Origin time:	02 44 45.4
Epicenter:	41.57 N., 70.61 W.
Depth:	3 km
Magnitude:	2.1 Mn(J)
Felt in the Falmouth area (J).	

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

Mississippi	
7 August (K) Western Tennessee	
Origin time:	11 53 41.8
See Tennessee listing.	
Missouri	
7 August (K) Western Tennessee	
Origin time:	11 53 41.8
See Tennessee listing.	
Nevada	
10 July (E) Southern Nevada	
Origin time:	14 00 00.096
Epicenter:	37.13 N., 116.03 W.
Depth:	0 km
Magnitude:	4.2 ML(B)
Nevada Test Site explosion "NIZA" at	
37°07'42.97" N., 116°02'01.59" W., surface	
elevation 1293 m, depth of burial 341 m.	
16 July (E) Southern Nevada	
Origin time:	15 00 00.096
Epicenter:	37.09 N., 116.02 W.
Depth:	0 km
Magnitude:	3.3 ML(G)
Nevada Test Site explosion "PINEAU" at	
37°05'19.31" N., 116°01'09.73" W., surface	
elevation 1286 m, depth of burial 204 m.	
5 August (E) Southern Nevada	
Origin time:	13 41 00.086
Epicenter:	37.15 N., 116.04 W.
Depth:	0 km
Magnitude:	2.8 ML(G)
Nevada Test Site explosion "HAVARTI" at	
37°09'13.47" N., 116°02'06.27" W., surface	
elevation 1310 m, depth of burial 200 m.	
27 August (E) Southern Nevada	
Origin time:	14 31 00.088
Epicenter:	37.16 N., 116.07 W.
Depth:	0 km
Magnitude:	4.3 ML(B)
Nevada Test Site explosion "ISLAY" at	
37°09'37.50" N., 116°03'59.48" W., surface	
elevation 1323 m, depth of burial 294 m.	

Table 2.--Summary of macroseismic data for U.S. earthquakes, July-September 1981--Continued

NEVADA--Continued	
4 September (E) Southern Nevada	
Origin time:	15 00 00.103
Epicenter:	37.06 N., 116.05 W.
Depth:	0 km
Magnitude:	3.8 ML(B)
Nevada Test Site explosion "TREBIANO" at 37°03'29.11" N., 116°02'53.06" W., surface elevation 1238 m, depth of burial 305 m.	
12 September (B) California-Nevada border region	
Origin time:	18 12 58.6
Epicenter:	38.06 N., 118.59 W.
Depth:	16 km
Magnitude:	4.3 ML(B), 4.1 ML(P)
Felt in the Mono Lake area (B).	
24 September (E) Southern Nevada	
Origin time:	15 00 00.089
Epicenter:	37.01 N., 116.02 W.
Depth:	0 km
Magnitude:	3.5 ML(G)
Nevada Test Site explosion "CERNADA" at 37°00'30.67" N., 116°01'25.68" W., surface elevation 1208 m, depth of burial 213 m.	
30 September (G) Western Nevada	
Origin time:	03 14 03.5
Epicenter:	39.15 N., 119.59 W.
Depth:	8 km
Magnitude:	3.4 ML(B)
Intensity IV:	Carson City.
Intensity III:	Minden, Schurz.
Felt:	Reno (press report), Virginia City (telephone report).
30 September (B) Owens Valley area	
Origin time:	11 53 26.9
See California listing.	
30 September (B) Owens Valley area	
Origin time:	13 05 48.5
See California listing.	
New York	
4 July (L) Southern Ontario	
Origin time:	23 16 33.0
Epicenter:	45.11 N., 74.61 W.
Depth:	16 km
Magnitude:	3.5 Mn(L), 3.7 Mn(O)

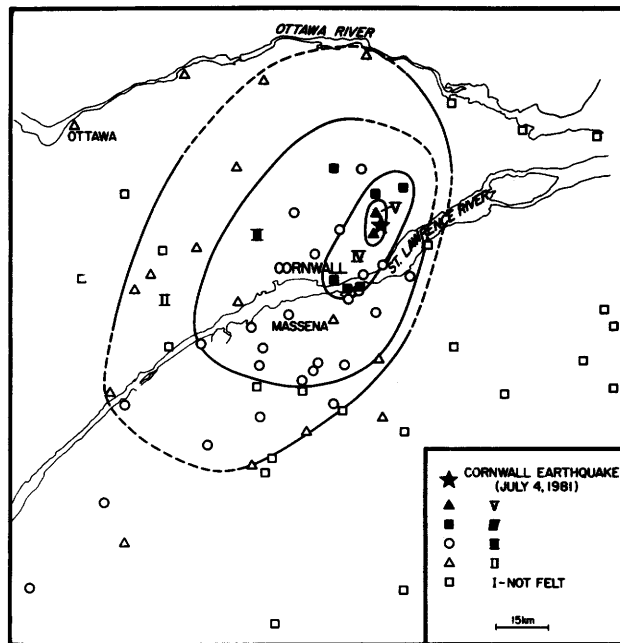


FIGURE 9.--Isoseismal map for the southern Ontario earthquake of 4 July 1981, 23 16 33.0 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Symbols are used to represent these intensities at specific sites (from Schlesinger-Miller and others, 1981).

Table 2.--Summary of macroseismic data for U.S. earthquakes, July-September 1981--Continued

NEW YORK--Continued	
There were two earthquakes recorded on July 4 at 23 16 33.0 and at 23 19 17.5, but the intensity data could only be associated with the first quake. Within the next 4 days, 20 additional quakes occurred ranging in size from magnitude 0.5 to 3.3 (Schlesinger-Miller and others, 1981). Figure 9 shows the extent of the felt area.	
<u>Intensity V:</u>	The most common effects at the places listed below were few small objects overturned and fell; few glassware and dishes were broken; windows, doors, and dishes rattled.
New York--Brushton (a few small objects overturned), St. Regis Falls and Waddington (a few small objects overturned and fell and some glassware was broken).	
<u>Intensity IV:</u>	
New York--Fort Covington, Hogansburg, Lawrenceville, West Bangor, Winthrop.	
<u>Intensity III:</u>	
New York--Bangor, Chase Mills, Chateaugay, Dickinson Center, Helena, Lisbon, Malone, Moira, North Bangor.	

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

NEW YORK--Continued

Felt:

New York--Brasher Falls, Louisville,  
Malone, Massena (press report).  
Canada--Ottawa, Ontario.

5 July (L) Southern Ontario

Origin time: 21 47 23.9  
Epicenter: 45.11 N., 74.61 W.  
Depth: 16 km  
Magnitude: 3.3 Mn(L)

Intensity IV:

New York--West Bangor.

Intensity III:

New York--Burke.

Felt:

Canada--Cornwall, Ontario (press report).  
New York--Franklin and St. Lawrence County  
(press report).

Oklahoma

11 July (T) Southern Oklahoma

Origin time: 21 09 22.5  
Epicenter: 34.88 N., 97.68 W.  
Depth: 5 km  
Magnitude: 3.5 Mn(T)  
Intensity IV: Bradley, Erin Springs (T).  
Intensity III: Lindsay.  
Felt: Alex.

South Dakota

13 September (G) Southern South Dakota

Origin time: 22 16 29.7  
Epicenter: 43.04 N., 101.85 W.  
Depth: 5 km  
Magnitude: 3.4 Mn(T)  
Intensity V: Tuthill (few small objects  
overturned and fell, few glassware and  
dishes were broken).  
Intensity IV: Cedar Butte, Martin, Vetat.  
Intensity III: Saint Francis.  
Intensity II: Kadoka.

Tennessee

7 August (K) Western Tennessee

Origin time: 11 53 41.8  
Epicenter: 35.95 N., 89.12 W.  
Depth: 10 km  
Magnitude: 4.0 Mn(S), 4.0 Mn(V),  
4.0 MD(K)

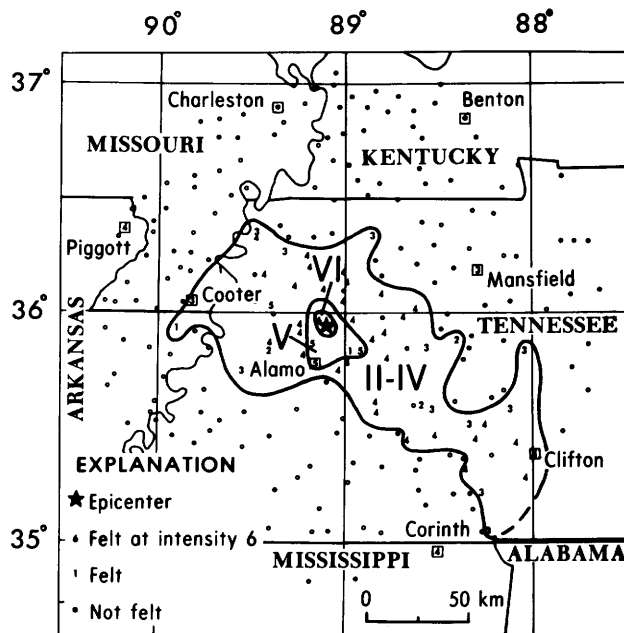


FIGURE 10.--Isoseismal map for the western Tennessee earthquake of 7 August 1981, 11 53 41.8 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981

TENNESSEE--Continued

This earthquake was felt over an area of approximately 10,000 sq km of Arkansas, Mississippi, Missouri, and Tennessee (fig. 10).

Intensity VI:

Tennessee--Eaton (two concrete patios were cracked and tile was cracked in one bathroom, felt by all).

Intensity V: The most common effects at the places listed below were few small objects overturned and fell; few windows cracked; windows, doors, and dishes rattled.

Tennessee--Alamo, Crockett Mills, Dyersburg, Humboldt.

Intensity IV:

Arkansas--Piggott.

Mississippi--Corinth.

Tennessee--Atwood, Bath Springs, Bemis, Bogota, Bradford, Clifton, Dyer, Friendship, Fruitdale, Gadsden, Gibson, Halls, Henderson, Jacks Creek, Jackson, Kenton, Maury City, Medina, Milan, Morris Chapel, Newbern, Obion, Olive Hill,

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
July-September 1981--Continued

TENNESSEE--Continued

Rutherford, Sardis, Scotts Hill,  
Tigrett, Trenton, Trezevant, Trimble,  
Wynnborg, Yorkville.

Intensity III:

Missouri--Cooter.

Tennessee--Cedar Grove, Decaturville,  
Elbridge, Huron, Lenox, Mansfield, Mar-  
tin, Oakfield, Pickwick Dam, Reagan,  
Ripley, Savannah, Spring Creek, Sugar  
Tree, Tiptonville.

Intensity II:

Tennessee--Clarksburg, Gates, Luray.

Felt:

Arkansas--Blytheville (press report).

Missouri--Caruthersville (press report).

Tennessee--Humboldt (press report).

Utah

21 September (U) Northeastern Utah

Origin time: 08 01 33.9

Epicenter: 39.58 N., 110.44 W.

Depth: 7 km

Magnitude: 3.2 ML(U), 3.5 ML(G)

Intensity IV: East Carbon.

Intensity III: Sunnyside.

Virginia

30 July (V) Central Virginia

Origin time: 11 59 48.5

Epicenter: 38.19 N., 78.09 W.

Depth: 6 km

Magnitude: 1.4 MD(V)

Intensity III: Orange and Unionville (V).

Washington

23 August (W) Southwestern Washington

Origin time: 16 22 17.4

Epicenter: 46.36 N., 122.25 W.

Depth: 8 km

Magnitude: 3.0 MD(W)

Felt at Randle and Glenoma (press report).

6 September (W) Southwestern Washington

Origin time: 19 34 45.9

Epicenter: 46.67 N., 123.88 W.

Depth: 35 km

Magnitude: 3.1 ML(G)

Intensity III: Oysterville, Tokeland.

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