

GEOLOGICAL SURVEY CIRCULAR 819-B



Earthquakes in the United States, April-June 1978

Earthquakes in the United States, April–June 1978

By J. H. Minsch, C. W. Stover, and P. Hubiak

GEOLOGICAL SURVEY CIRCULAR 819-B

United States Department of the Interior
CECIL D. ANDRUS, *Secretary*



Geological Survey
H. William Menard, *Director*

CONTENTS

	Page
Introduction.....	B1
Discussion of tables.....	1
Modified Mercalli Intensity Scale of 1931.....	8
Acknowledgments.....	26
References cited.....	27

ILLUSTRATIONS

	Page
FIGURE 1. "Earthquake Report" form.....	B2
2. Map showing standard time zones of the conterminous United States.....	4
3. Map showing standard time zones of Alaska and Hawaii.....	5
4. Map of earthquake epicenters in the conterminous United States for April-June 1978.....	6
5. Map of earthquake epicenters in Alaska for April-June 1978.....	7
6. Map of earthquake epicenters in Hawaii for April-June 1978.....	8
7. Isoseismal map for the southern California earthquake of 4 June 1978..	19
8. Isoseismal map for the southern California earthquake of 5 June 1978..	20
9. Isoseismal map for the western Montana earthquake of 23 April 1978...	23
10. Isoseismal map for the west Texas earthquake of 16 June 1978.....	25

TABLES

	Page
TABLE 1. Summary of U.S. earthquakes for April-June 1978:	
Alaska.....	B10
California.....	12
California--Off the coast.....	13
Colorado.....	13
Hawaii.....	13
Idaho.....	14
Illinois.....	14
Maryland.....	14
Mississippi.....	14
Missouri.....	14
Montana.....	14
Nebraska.....	14
Nevada.....	14
New Jersey.....	14
New York.....	14
Oklahoma.....	14
Oregon--Off the coast.....	14
South Carolina.....	15
Texas.....	15
Washington.....	15
Wyoming.....	15

	Page
2. Summary of macroseismic data for U.S. earthquakes, April-June 1978:	
Alaska.....	B15
Arizona.....	16
California.....	16
California--Off the coast.....	20
Colorado.....	20
Hawaii.....	20
Idaho.....	22
Illinois.....	22
Montana.....	22
Nebraska.....	22
Nevada.....	23
New Jersey.....	24
New Mexico.....	24
New York.....	24
Oklahoma.....	24
Texas.....	24
Washington.....	26
Wyoming.....	26

Earthquakes in the United States, April-June 1978

By J. H. Minsch, C. W. Stover, and P. Hubiak

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," to the extent of providing detailed felt and intensity data, as well as isoseismal maps for U.S. earthquakes. The purpose 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 answering inquiries by the public.

This publication contains two major sections. The first (table 1) 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 consists of four maps and table 2, which lists detailed intensity information. The list of earthquakes in table 1 was compiled from those located in Alaska or off the coasts that were published in the PDE; from hypocenters located in the conterminous United States using the U.S. Geological Survey program SEDAS; from hypocenters in California above magnitude 3.0, supplied by 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 any others that were felt or that caused damage, regardless of magnitude or availability of a hypocenter. Known or suspected explosions are also listed.

The intensities and macroseismic data were compiled from information obtained through questionnaires, from newspaper articles, and with the cooperation of other Government agencies, State institutions, local organizations, and individuals. (See "Acknowledgments" for a list of collaborators.)

Figure 1 is the questionnaire in current use by the NEIS. Other versions of this questionnaire 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 primary method used by the NEIS to collect macroseismic information is a questionnaire canvass using the "Earthquake Report" forms, which are mailed to postmasters in the area affected by the earthquake. The postmasters complete the forms and return them to the NEIS, where they are evaluated and an intensity value is assigned. The intensity observations are mapped and contoured by isoseismals. Isoseismal contours present a generalization of intensity data and an extrapolation of these data to regions from which there are no observations; they do not necessarily account for every individual observation.

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

DISCUSSION OF TABLES

The parameters for the earthquakes in table 1 and table 2 include the date, origin time, hypocenter (epicenter and focal depth), magnitude, intensity, and hypocenter source. The origin time and date are listed in Universal

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

- 2a. Did you personally feel the earthquake? 1 ☐ Yes ☐ No
b. Were you awakened by the earthquake? 2 ☐ Yes ☐ No
c. Were you frightened by the earthquake? 3 ☐ Yes ☐ No
d. Were you at 4 ☐ Home 5 ☐ Work 6 ☐ Other? _____
e. Town and zip code of your location at time of earthquake _____
f. Check your activity when the earthquake occurred: 4
7 ☐ Walking 8 ☐ Sleeping 9 ☐ Lying down 10 ☐ Standing
11 ☐ Driving (car in motion) 12 ☐ Sitting 13 ☐ Other _____
g. Were you 14 ☐ Inside or 15 ☐ Outside?
h. If inside, on what floor were you? 16 _____
i. Vibration could be described as 17 ☐ Light 18 ☐ Heavy
j. Was there earth noise? ☐ No 19 ☐ Faint 20 ☐ Moderate 21 ☐ Loud
k. Direction of noise ☐ North ☐ South ☐ East ☐ West
l. Estimated duration of shaking 22 ☐ Sudden, sharp (less than 10 secs) 23 ☐ Long (30-60 secs)
24 ☐ 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 25 ☐ Few 26 ☐ Several 27 ☐ Many 28 ☐ All?
b. This earthquake awakened ☐ No one 29 ☐ Few 30 ☐ Several 31 ☐ Many 32 ☐ All?
c. This earthquake frightened ☐ No one 33 ☐ Few 34 ☐ Several 35 ☐ Many 36 ☐ All?
4. What indoor physical effects were noted in your community?
Windows, doors, dishes rattled 37 ☐ Yes ☐ No
Buildings creaked 38 ☐ Yes ☐ No
Building trembled (shook) 39 ☐ Slightly 40 ☐ Strongly
Hanging pictures (more than one) 41 ☐ Swung 42 ☐ Out of place 43 ☐ Fallen
Liquid in small containers 44 ☐ Spilled 45 ☐ Slightly disturbed
Windows 46 ☐ Few cracked 47 ☐ Some broken 48 ☐ Many broken
Were small objects (dishes, knick-knacks, lamps) ☐ Unmoved 49 ☐ Moved
50 ☐ Overturned 51 ☐ Broken?
Were light furniture or small appliances ☐ Unmoved 52 ☐ Moved
53 ☐ Overturned 54 ☐ Damaged seriously
Were heavy furniture or appliances ☐ Unmoved 55 ☐ Overturned
56 ☐ Moved 57 ☐ Damaged seriously
Did hanging objects or doors swing? 58 ☐ Slightly 59 ☐ Moderately 60 ☐ Violently
Can you estimate direction? ☐ North/South ☐ East/West ☐ Other _____
Pendulum clocks 61 ☐ Stopped 62 ☐ Started 63 ☐ Faster or slower

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	64 ☐ Large cracks	65 ☐ Fell in large amounts
Dry wall	66 ☐ Large cracks	67 ☐ Fell in large amounts
Ceiling tiles	68 ☐ Large cracks	69 ☐ Fell in large amounts

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

Trees and bushes shaken	70 ☐ Slightly	71 ☐ Moderately	72 ☐ Strongly
Standing vehicles rocked	73 ☐ Slightly	74 ☐ Moderately	
Moving vehicles rocked	75 ☐ Slightly	76 ☐ Moderately	
Water splashed onto sides of lakes, ponds, swimming pools	77 ☐ Yes	☐ No	
Elevated water tanks	78 ☐ Cracked	79 ☐ Twisted	80 ☐ Fallen (thrown down)
Industrial cooling units	81 ☐ Displaced	82 ☐ Rotated	83 ☐ Fallen
Tombstones	84 ☐ Displaced	85 ☐ Cracked	86 ☐ Rotated
	87 ☐ Fallen		
Chimneys	88 ☐ Bricks loosened	89 ☐ Twisted	90 ☐ Fallen
	91 ☐ Broken at roof line	92 ☐ Bricks fallen	
Railroad tracks bent	93 ☐ Slightly	94 ☐ Greatly	
Stone or brick fences /walls	95 ☐ Open cracks	96 ☐ Fallen	97 ☐ Destroyed
Underground pipes	98 ☐ Broken	99 ☐ Out of service	
Highways or streets	100 ☐ Large cracks	101 ☐ Large displacements	
Sidewalks	102 ☐ Large cracks	103 ☐ Large displacements	

7a. Check below any structural damage to buildings.

Foundation	104 ☐ Cracked	105 ☐ Destroyed
Interior walls	106 ☐ Split	107 ☐ Fallen
Exterior walls	108 ☐ Separated from ceiling or floor	109 ☐ Large Cracks
	110 ☐ Bulged outward	111 ☐ Partial collapse
	112 ☐ Total collapse	113 ☐ Moved on foundation
Building	114 ☐ Shifted off foundation	

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

115 ☐ Wood	116 ☐ Stone	117 ☐ Brick veneer	118 ☐ Other _____
119 ☐ Brick	120 ☐ Cinderblock	121 ☐ Reinforced concrete	122 ☐ Mobile home

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

☐ Don't know	123 ☐ Sandy soil	124 ☐ Marshy	125 ☐ Fill
126 ☐ Hard rock	127 ☐ Clay soil	128 ☐ Sandstone, limestone, shale	

d. Was the ground:

129 ☐ Level	130 ☐ Sloping	131 ☐ Steep?
------------------------------------	--------------------------------------	-------------------------------------

e. Check the approximate age of the building:

132 ☐ Built before 1935	133 ☐ Built 1935-65	134 ☐ Built after 1965
--	--	---

8. Check below any structural damage to

Bridges/Overpasses	135 ☐ Concrete	136 ☐ Wood	137 ☐ Steel	138 ☐ Other _____
Damage was	139 ☐ Slight	140 ☐ Moderate	141 ☐ Severe	
Dams	142 ☐ Concrete	143 ☐ Large earthen		
Damage was	144 ☐ Slight	145 ☐ Moderate	146 ☐ Severe	

9. What geologic effects were noted in your community?

Ground cracks	147 ☐ Wet ground	148 ☐ Steep slopes	149 ☐ Dry and level ground
Landslides	150 ☐ Small	151 ☐ Large	
Slumping	152 ☐ River bank	153 ☐ Road fill	154 ☐ Land fill
Were springs or well water disturbed?	155 ☐ Level changed	156 ☐ Flow disturbed	
	157 ☐ Muddied	☐ Don't know	
Were rivers or lakes changed?	158 ☐ Yes	☐ No	☐ Don't know

10a. What percentage of buildings were damaged?

Within 2 city blocks of your location	☐ None	159 ☐ Few (about 5%)
	160 ☐ Many (about 50%)	161 ☐ Most (about 75%)

b. In area covered by your zip code

	☐ None	162 ☐ Few (about 5%)
	163 ☐ Many (about 50%)	164 ☐ 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.

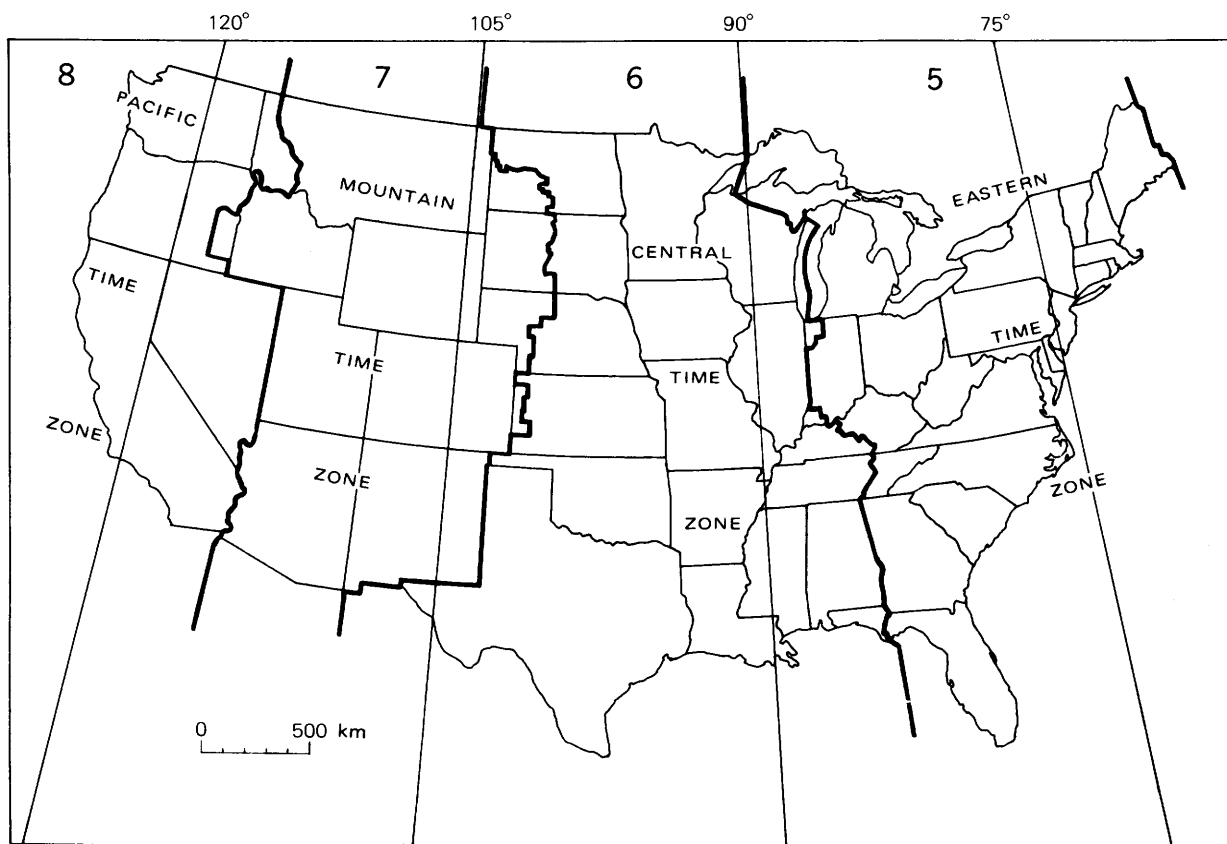


FIGURE 2.--Standard time zones of the conterminous United States. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

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 that claimed by the institution supplying the hypocenter and is not necessarily the accuracy indicated by the number of decimals listed. The epicenters located by the NEIS have a varying degree of accuracy, usually two-tenths of a degree or less, depending on their continental or oceanic location. The oceanic hypocenters are less accurate than those on the continent, even though both are listed to two decimals. Depths are listed to the nearest whole kilometer.

Figures 4-6 are maps summarizing the earthquake activity for the conterminous United States, Alaska, and Hawaii for the period April-June 1978. The magnitudes plotted in these figures are based on ML or mbLg; if neither was computed, then on MS; and finally on mb, when it was the only magnitude computed.

The magnitude values listed in tables 1 and 2 were furnished by cooperating institutions or determined by the 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 NEIS is the source. In table 2 the magnitude source is the same as the location source unless indicated otherwise, by an alphabetic character to the right of the magnitude value. The magnitude values calculated by the 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 horizontal surface-wave ground amplitude, in micrometers; T is the period, in seconds, and $18 \leq T \leq 22$; and D is the distance, in geocentric degrees (station to epicenter), and $20^\circ \leq D \leq 160^\circ$. No depth correction is made for depths less than 50 km.

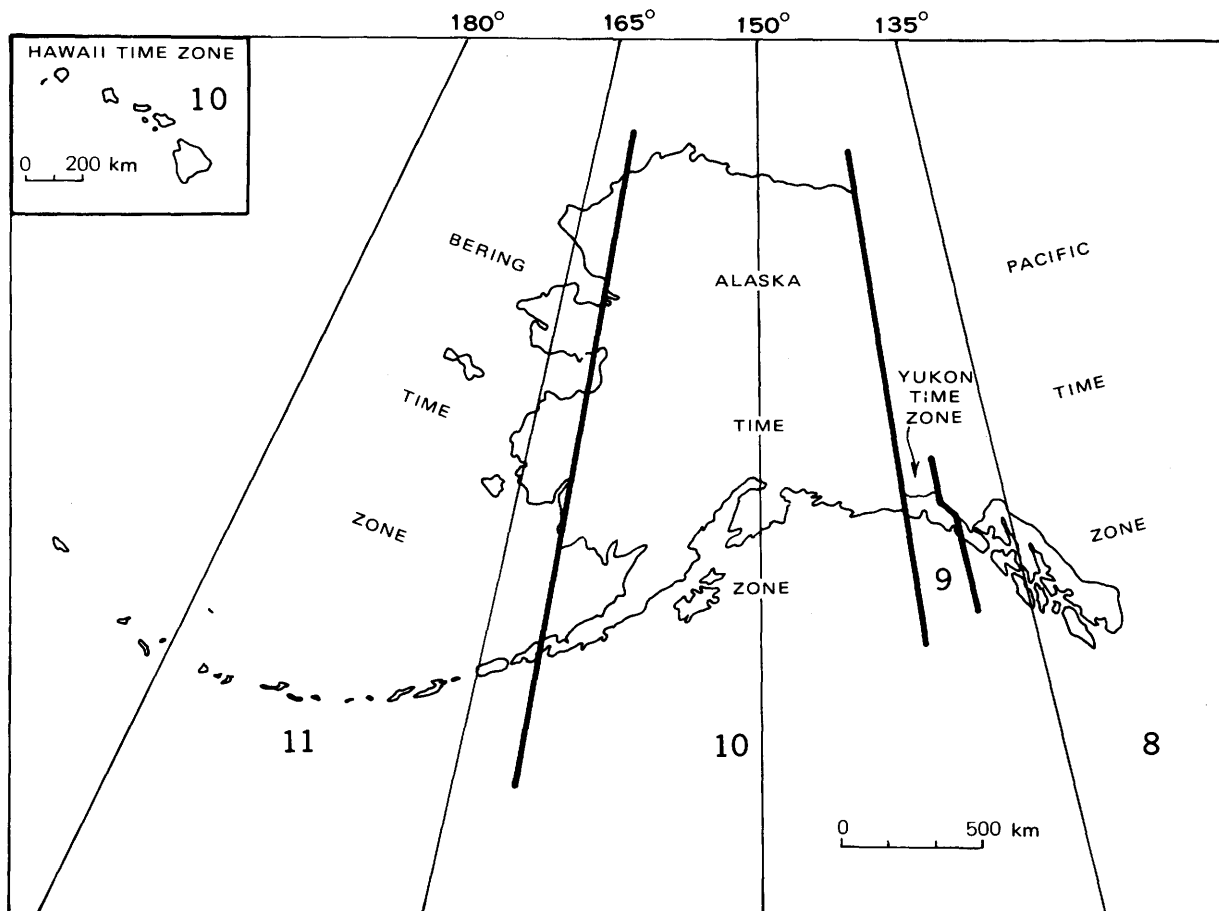


FIGURE 3.--Standard time zones of Alaska and Hawaii. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

$$mb = \log(A/T) + Q(D, h), \quad (2)$$

as defined by Gutenberg and Richter (1956), except that T , the period in seconds, is restricted to $0.1 \leq T \leq 3.0$, and A , the ground amplitude in micrometers, is not necessarily the maximum of the P-wave group. Q is a function of distance D and depth h , where $D \geq 5^\circ$.

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

as defined by Richter (1958, p. 340), where A is the maximum trace amplitude in millimeters, written by a Wood-Anderson torsion seismometer, and $\log A_0$ is a standard value as a function of distance, where the distance is ≤ 600 km. ML values are also calculated from other seismometers by conversion of recorded ground motion to the expected response of the torsion seismometer.

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

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

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

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

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

All of the intensity values (indicated by Roman numerals) listed in this summary were derived, using the Modified Mercalli Intensity Scale of 1931 (Wood and Neumann, 1931) shown below, from the evaluation of "Earthquake Report" forms; from field reports by U.S. Geological Survey personnel, engineering firms, or universities; and from detailed macroseismic data communicated to the NEIS by people in the area affected by the earthquake. All earthquake reports received which contain minimal information are assigned

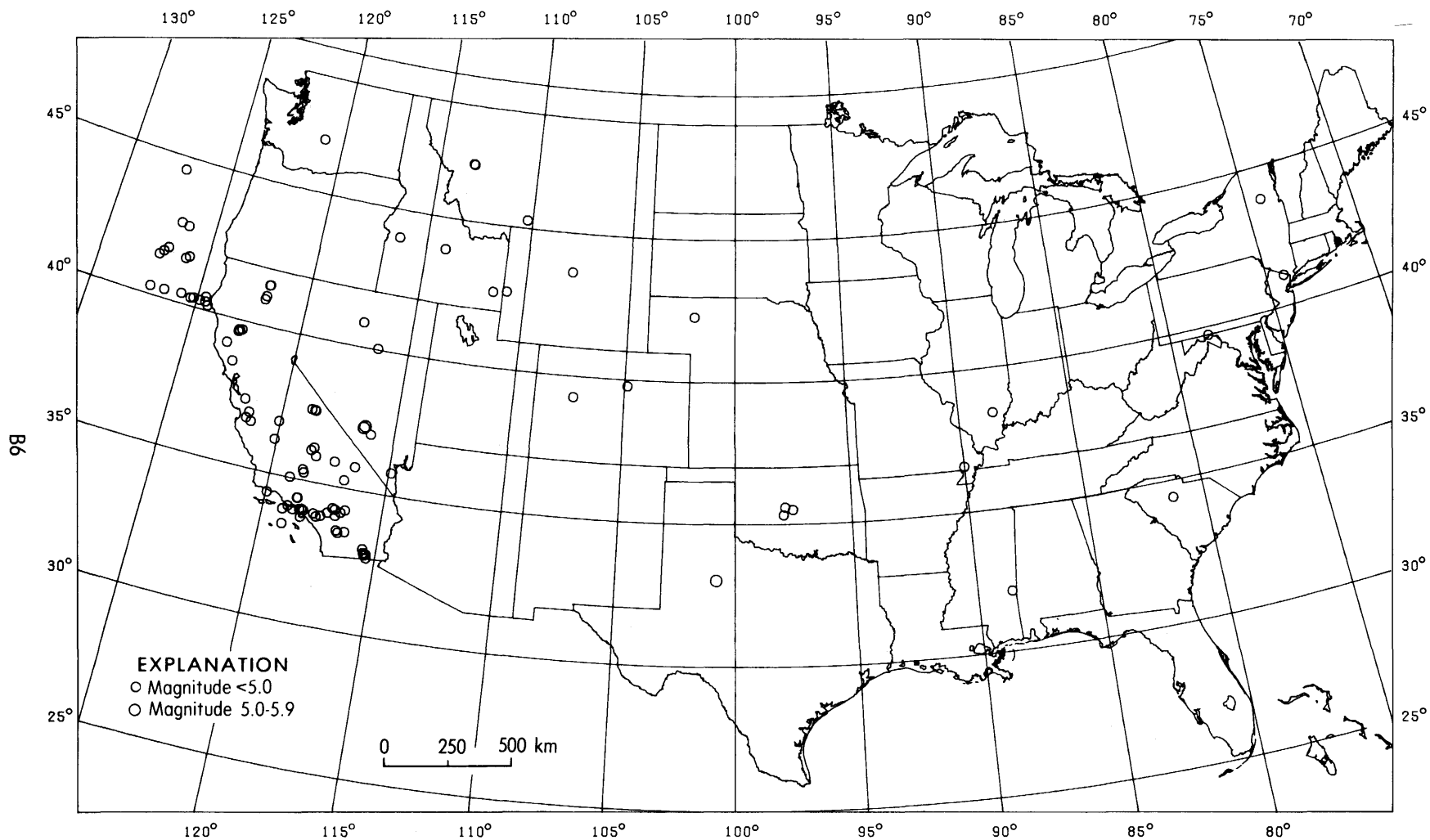


FIGURE 4.--Earthquake epicenters in the conterminous United States for April-June 1978, plotted from table 1.

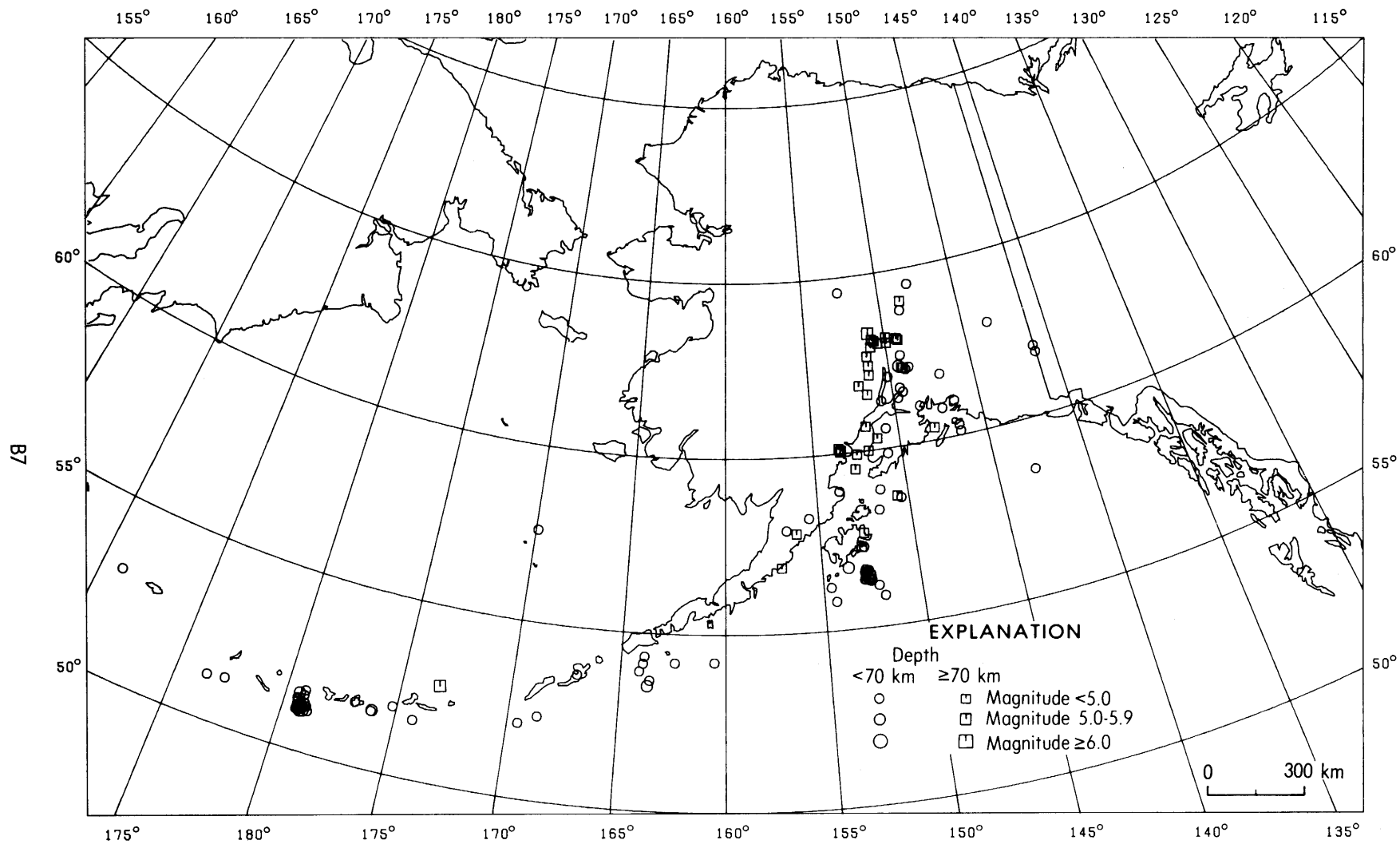


FIGURE 5.--Earthquake epicenters in Alaska for April-June 1978, plotted from table 1.

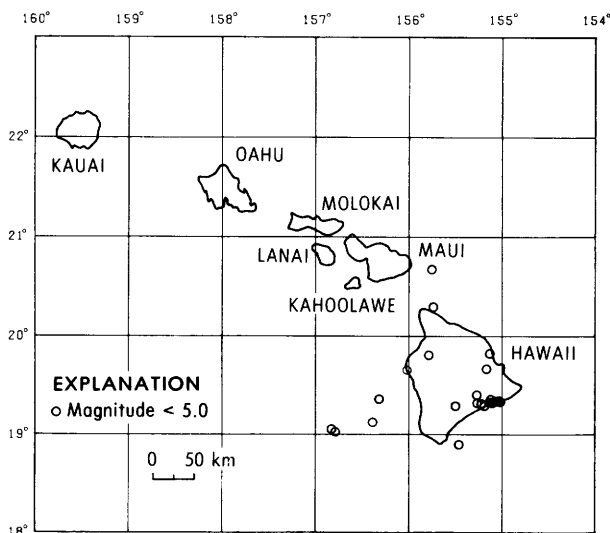


FIGURE 6.—Earthquake epicenters in Hawaii for April-June 1978, plotted from table 1.

an Intensity II. These reports are filed in the offices of the NEIS or in government archives and are available for detailed study.

MODIFIED MERCALLI INTENSITY SCALE OF 1931

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

- I. Not felt - or, except rarely under especially favorable circumstances. Under certain conditions, at and outside the boundary of the area in which a great shock is felt: sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced; sometimes trees, structures, liquids, bodies of water, may sway--doors may swing, very slowly.
- II. Felt indoors by few, especially on upper floors, or by sensitive, or nervous persons. Also, as in grade I, but often more noticeably: sometimes hanging objects may swing, especially when delicately suspended; sometimes trees, structures, liquids, bodies of water, may sway, doors may swing, very slowly; sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced.
- III. Felt indoors by several, motion usually rapid vibration. Sometimes not recognized to be an earthquake at first. Duration estimated in some

cases. Vibration like that due to passing of light, or lightly loaded trucks, or heavy trucks some distance away. Hanging objects may swing slightly. Movements may be appreciable on upper levels of tall structures. Rocked standing motor cars slightly.

- IV. Felt indoors by many, outdoors by few. Awakened few, especially light sleepers. Frightened no one, unless apprehensive from previous experience. Vibration like that due to passing of heavy or heavily loaded trucks. Sensation like heavy body striking building or falling of heavy objects inside. Rattling of dishes, windows, doors; glassware and crockery clink and clash. 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 April-June 1978

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

Administration, Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis, Missouri; (T) University of Oklahoma, Leonard; (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 (1978)	Origin time			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	(UTC)						mb	MS	ML or mbLg			Date	Hour				
	hr	min	s														
ALASKA																	
APR.	2	16	46	11.3	62.55 N.	149.17 W.	54	...	...	4.5A	...	A	APR.	2	06	A.M.	AST
APR.	3	16	08	53.0	62.18 N.	148.79 W.	33N	...	...	3.0M	...	G	APR.	3	06	A.M.	AST
APR.	6	04	44	04.2	64.08 N.	148.65 W.	130	3.6	...	...	...	G	APR.	5	06	P.M.	AST
APR.	9	17	12	59.9	60.69 N.	151.84 W.	101	4.5	...	...	III	G	APR.	9	07	A.M.	AST
APR.	10	10	47	02.9	63.07 N.	150.64 W.	131	4.2	...	...	...	G	APR.	10	00	A.M.	AST
APR.	10	18	12	56.4	58.29 N.	151.67 W.	33N	3.8	...	2.6A	...	G	APR.	10	08	A.M.	AST
APR.	11	05	12	55.1	53.53 N.	163.73 W.	33N	5.5	5.6	...	...	G	APR.	10	06	P.M.	BST
APR.	12	01	56	28.4	63.13 N.	149.92 W.	100	...	...	...	...	G	APR.	11	03	P.M.	AST
APR.	12	03	42	03.5	56.42 N.	152.69 W.	14	6.0	6.6	5.8A	V	G	APR.	11	05	P.M.	AST
APR.	12	03	48	55.6	56.74 N.	153.64 W.	23	5.2	...	...	...	G	APR.	11	05	P.M.	AST
APR.	12	04	16	05.7	56.50 N.	152.53 W.	33N	4.7	...	4.6A	...	G	APR.	11	06	P.M.	AST
APR.	12	04	20	40.0	57.69 N.	152.62 W.	87	4.6	...	...	...	G	APR.	11	06	P.M.	AST
APR.	12	04	26	56.5	56.63 N.	152.63 W.	16	4.7	...	4.3A	...	G	APR.	11	06	P.M.	AST
APR.	12	04	47	16.6	56.35 N.	152.56 W.	15	4.6	...	5.1A	...	G	APR.	11	06	P.M.	AST
APR.	12	05	22	28.9	56.46 N.	152.58 W.	24	5.1	...	5.1M	...	G	APR.	11	07	P.M.	AST
APR.	12	08	56	19.2	56.37 N.	152.54 W.	19	4.6	...	3.6M	...	G	APR.	11	10	P.M.	AST
APR.	12	09	33	38.2	56.58 N.	152.84 W.	27	5.1	4.5	4.5M	...	G	APR.	11	11	P.M.	AST
APR.	12	10	40	43.8	55.86 N.	151.90 W.	33N	4.4	...	3.5M	...	G	APR.	12	00	A.M.	AST
APR.	12	22	07	06.4	61.82 N.	147.02 W.	22	...	...	3.1M	...	G	APR.	12	12	P.M.	AST
APR.	13	13	59	58.6	56.17 N.	152.17 W.	33	4.5	...	3.5M	...	G	APR.	13	03	A.M.	AST
APR.	14	18	27	10.2	56.36 N.	152.86 W.	33N	4.3	...	3.8A	...	G	APR.	14	08	A.M.	AST
APR.	15	08	08	44.4	60.30 N.	151.27 W.	90	3.5	...	...	...	G	APR.	14	10	P.M.	AST
APR.	15	17	33	14.7	61.76 N.	141.09 W.	33N	3.3	...	3.8M	...	G	APR.	15	07	A.M.	AST
APR.	15	18	09	50.6	61.96 N.	141.13 W.	33N	...	...	3.5M	...	G	APR.	15	08	A.M.	AST
APR.	16	08	49	17.6	59.50 N.	152.72 W.	87	3.9	...	...	...	G	APR.	15	10	P.M.	AST
APR.	16	09	50	52.2	56.66 N.	152.76 W.	24	4.9	4.2	4.6M	...	G	APR.	15	11	P.M.	AST
APR.	16	20	36	18.2	62.95 N.	143.44 W.	33N	...	...	3.0M	...	G	APR.	16	10	A.M.	AST
APR.	17	05	49	51.1	54.15 N.	163.96 W.	33N	4.8	...	...	...	G	APR.	16	06	P.M.	BST
APR.	18	02	18	08.3	56.37 N.	152.84 W.	33N	4.5	...	4.0M	...	G	APR.	17	04	P.M.	AST
APR.	18	20	40	32.4	56.51 N.	152.70 W.	24	...	...	4.8A	...	A	APR.	17	10	A.M.	AST
APR.	19	01	49	03.5	60.14 N.	153.54 W.	158	4.6	...	...	II	G	APR.	18	03	P.M.	AST
APR.	19	14	52	18.1	61.00 N.	146.49 W.	40	...	...	3.3M	IV	G	APR.	19	04	A.M.	AST
APR.	21	03	56	30.4	53.68 N.	163.64 W.	51	4.4	...	...	...	G	APR.	20	04	P.M.	BST
APR.	21	10	01	17.0	60.00 N.	151.83 W.	92	4.1	...	...	...	G	APR.	21	00	A.M.	AST
APR.	21	20	40	37.7	64.53 N.	147.95 W.	30	...	...	3.7M	II	G	APR.	21	10	A.M.	AST
APR.	22	13	24	04.8	56.48 N.	152.82 W.	33N	4.7	4.0	...	...	G	APR.	22	03	A.M.	AST
APR.	23	08	24	51.3	62.39 N.	151.21 W.	75	...	...	...	...	G	APR.	22	10	P.M.	AST
APR.	23	11	00	08.0	53.69 N.	167.05 W.	33N	4.1	...	...	...	G	APR.	23	00	A.M.	BST
APR.	24	04	28	47.0	51.64 N.	176.09 W.	53	5.2	4.8	...	III	G	APR.	23	05	P.M.	BST
APR.	25	00	21	31.3	58.22 N.	155.51 W.	33N	3.7	...	2.9A	...	G	APR.	24	02	P.M.	AST
APR.	25	07	36	06.2	60.05 N.	153.46 W.	171	4.5	...	...	...	G	APR.	24	09	P.M.	AST
APR.	27	01	41	17.3	56.57 N.	152.72 W.	33N	4.7	4.4	4.6M	...	G	APR.	26	03	P.M.	AST
APR.	28	02	52	58.8	57.29 N.	152.70 W.	70	4.3	...	...	...	G	APR.	27	04	P.M.	AST
APR.	29	17	30	31.3	63.81 N.	148.74 W.	33N	...	...	3.4M	...	G	APR.	29	07	A.M.	AST
APR.	30	11	47	52.1	60.35 N.	147.91 W.	88	...	...	...	...	G	APR.	30	01	A.M.	AST
MAY	1	04	10	51.1	51.25 N.	176.39 E.	33N	4.2	...	...	...	G	APR.	30	05	P.M.	BST
MAY	2	06	57	44.7	61.58 N.	151.48 W.	110	...	...	...	...	G	MAY	1	08	P.M.	AST
MAY	5	05	32	47.4	63.30 N.	150.97 W.	134	5.2	...	...	IV	G	MAY	4	07	P.M.	AST
MAY	8	14	05	24.7	62.97 N.	149.88 W.	92	3.2	...	...	...	G	MAY	8	04	A.M.	AST
MAY	11	00	23	37.6	51.67 N.	176.10 W.	59	5.6	5.9	...	IV	G	MAY	10	01	P.M.	BST
MAY	12	12	16	03.9	62.25 N.	149.40 W.	67	5.1	...	...	IV	G	MAY	12	02	A.M.	AST
MAY	12	14	59	47.8	62.18 N.	149.13 W.	71	...	...	...	...	G	MAY	12	04	A.M.	AST
MAY	12	16	00	37.3	53.92 N.	164.14 W.	33N	4.9	...	...	...	G	MAY	12	05	A.M.	BST
MAY	13	13	43	53.7	62.20 N.	149.22 W.	75	...	...	...	...	G	MAY	13	03	A.M.	AST
MAY	15	19	56	48.9	54.34 N.	163.91 W.	33N	4.4	...	...	...	G	MAY	15	08	A.M.	BST
MAY	16	01	11	36.0	62.00 N.	150.16 W.	33	...	...	2.8M	...	G	MAY	15	03	P.M.	AST
MAY	17	08	45	33.8	53.03 N.	170.98 E.	24	5.0	4.0	...	...	G	MAY	16	09	P.M.	BST
MAY	21	00	42	41.9	63.06 N.	149.24 W.	90	...	...	...	...	G	MAY	20	02	P.M.	AST

Table 1.--Summary of U.S. earthquakes for April-June 1978--Continued

Date (1978)	Origin time				Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time						
	(UTC)			mb				MS	ML or mbLg	Date			Hour						
	hr	min	s																
ALASKA--Continued																			
MAY	21	14	55	32.8	56.36 N.	152.58 W.	33N	4.7	3.6	4.3M	...	G	MAY	21	04	A.M.	AST		
MAY	22	13	05	47.1	51.78 N.	176.88 W.	62	4.7	...	...	...	G	MAY	22	02	A.M.	BST		
MAY	23	02	25	04.8	57.80 N.	156.20 W.	140	3.9	...	...	...	G	MAY	22	04	P.M.	AST		
MAY	24	06	16	55.4	51.23 N.	179.21 W.	25	6.0	6.7	...	IV	G	MAY	23	07	P.M.	BST		
MAY	24	06	33	17.6	51.14 N.	179.07 W.	33N	5.0	...	...	...	G	MAY	23	07	P.M.	BST		
MAY	24	06	47	25.1	51.46 N.	179.44 W.	33N	4.5	...	...	...	G	MAY	23	07	P.M.	BST		
MAY	24	07	19	10.9	51.15 N.	179.38 W.	33N	4.5	...	...	...	G	MAY	23	08	P.M.	BST		
MAY	24	07	20	54.4	51.27 N.	179.27 W.	33N	4.9	...	...	...	G	MAY	23	08	P.M.	BST		
MAY	24	07	34	05.6	51.23 N.	179.27 W.	33N	4.2	...	...	...	G	MAY	23	08	P.M.	BST		
MAY	24	07	40	55.2	51.58 N.	179.15 W.	33N	4.3	...	...	...	G	MAY	23	08	P.M.	BST		
MAY	24	07	49	30.6	51.31 N.	179.16 W.	33N	4.5	...	...	...	G	MAY	23	08	P.M.	BST		
MAY	24	08	19	25.1	51.16 N.	178.86 W.	33N	3.9	...	...	...	G	MAY	23	09	P.M.	BST		
MAY	24	08	30	00.4	58.54 N.	150.38 W.	33N	...	...	3.5M	...	G	MAY	23	10	P.M.	AST		
MAY	24	09	23	56.7	51.20 N.	179.18 W.	33N	4.8	...	...	...	G	MAY	23	10	P.M.	BST		
MAY	24	09	25	46.5	51.38 N.	179.08 W.	33N	4.3	...	...	...	G	MAY	23	10	P.M.	BST		
MAY	24	09	31	02.6	54.23 N.	160.55 W.	33N	4.0	...	...	...	G	MAY	23	11	P.M.	AST		
MAY	24	09	46	14.3	51.38 N.	179.40 W.	33N	4.2	...	...	...	G	MAY	23	10	P.M.	BST		
MAY	24	09	53	03.4	51.13 N.	179.20 W.	33N	5.2	5.4	...	III	G	MAY	23	10	P.M.	BST		
MAY	24	11	35	23.7	51.27 N.	179.38 W.	33N	4.1	...	...	...	G	MAY	24	00	A.M.	BST		
MAY	24	13	35	16.7	60.85 N.	147.24 W.	33N	...	...	3.4M	...	G	MAY	24	03	A.M.	AST		
MAY	24	15	01	00.1	51.72 N.	179.16 W.	33N	3.9	...	...	...	G	MAY	24	04	A.M.	BST		
MAY	24	18	54	29.8	51.45 N.	179.42 W.	33N	4.8	3.7	...	...	G	MAY	24	07	A.M.	BST		
MAY	24	22	00	22.5	51.14 N.	179.29 W.	33N	4.2	...	...	...	G	MAY	24	11	A.M.	BST		
MAY	24	23	49	37.3	51.24 N.	179.30 W.	33N	4.5	...	...	...	G	MAY	24	12	P.M.	BST		
MAY	25	10	39	57.4	64.55 N.	152.59 W.	33N	...	...	4.0M	IV	G	MAY	25	00	A.M.	AST		
MAY	27	14	50	09.1	60.55 N.	150.70 W.	38	...	...	3.5M	...	G	MAY	27	04	A.M.	AST		
MAY	28	19	02	10.7	52.13 N.	169.53 W.	36	4.1	...	...	...	G	MAY	28	08	A.M.	BST		
MAY	29	06	24	44.6	60.08 N.	153.42 W.	152	4.1	...	...	...	G	MAY	28	08	P.M.	AST		
MAY	31	18	29	25.6	61.36 N.	149.70 W.	44	...	...	3.0M	II	G	MAY	31	08	A.M.	AST		
JUNE	2	16	23	45.1	54.20 N.	162.45 W.	21	4.4	...	...	...	G	JUNE	2	05	A.M.	BST		
JUNE	3	20	18	36.7	51.34 N.	177.19 E.	58	4.2	...	...	...	G	JUNE	3	09	A.M.	BST		
JUNE	3	23	11	07.7	56.21 N.	154.59 W.	33N	4.4	...	...	...	G	JUNE	3	01	P.M.	AST		
JUNE	4	11	32	28.0	58.91 N.	153.72 W.	13	...	...	3.2M	...	G	JUNE	4	01	A.M.	AST		
JUNE	6	11	39	39.6	62.99 N.	150.42 W.	117	3.6	...	...	...	G	JUNE	6	01	A.M.	AST		
JUNE	7	12	37	47.6	59.93 N.	152.50 W.	98	...	...	...	...	G	JUNE	7	02	A.M.	AST		
JUNE	8	02	49	03.6	60.10 N.	146.45 W.	68	3.9	...	...	...	G	JUNE	7	04	P.M.	AST		
JUNE	9	22	08	11.0	52.38 N.	168.67 W.	33N	4.9	4.1	...	...	G	JUNE	9	11	A.M.	BST		
JUNE	10	08	23	59.6	57.92 N.	156.72 W.	10	4.5	3.9	4.6M	II	G	JUNE	9	10	P.M.	AST		
JUNE	10	13	02	03.3	62.99 N.	149.14 W.	102	...	...	...	...	G	JUNE	10	03	A.M.	AST		
JUNE	10	19	35	10.2	60.30 N.	146.45 W.	20	4.8	...	4.7M	IV	G	JUNE	10	09	A.M.	AST		
JUNE	11	05	01	15.7	62.13 N.	148.99 W.	51	...	...	...	...	G	JUNE	10	07	P.M.	AST		
JUNE	11	07	53	20.6	58.84 N.	151.46 W.	69	...	...	...	...	G	JUNE	10	09	P.M.	AST		
JUNE	12	00	26	41.7	58.56 N.	142.90 W.	33N	...	...	3.4M	...	G	JUNE	11	02	P.M.	AST		
JUNE	12	07	30	39.3	59.86 N.	150.76 W.	55	4.0	...	...	III	G	JUNE	11	09	P.M.	AST		
JUNE	12	15	28	41.5	61.03 N.	148.53 W.	48	...	...	3.9A	...	G	JUNE	12	05	A.M.	AST		
JUNE	14	11	27	03.8	61.63 N.	149.51 W.	33N	...	...	3.6M	...	G	JUNE	14	01	A.M.	AST		
JUNE	18	19	31	04.1	62.65 N.	151.21 W.	85	...	...	...	...	G	JUNE	18	09	A.M.	AST		
JUNE	19	19	05	03.2	51.66 N.	174.20 W.	33	4.9	3.9	...	...	G	JUNE	19	08	A.M.	BST		
JUNE	20	02	30	08.6	56.87 N.	157.09 W.	99	4.6	...	...	...	G	JUNE	19	04	P.M.	AST		
JUNE	21	02	37	55.5	57.29 N.	152.86 W.	83	4.2	...	...	...	G	JUNE	20	04	P.M.	AST		
JUNE	22	02	22	07.0	61.50 N.	149.35 W.	33N	...	...	2.7M	...	G	JUNE	21	04	P.M.	AST		
JUNE	22	05	14	04.1	63.12 N.	150.81 W.	121	...	...	...	...	G	JUNE	21	07	P.M.	AST		
JUNE	22	05	41	27.7	51.61 N.	179.41 W.	33N	4.8	5.9	5.0M	III	G	JUNE	21	06	P.M.	BST		
JUNE	22	10	38	22.6	51.91 N.	175.22 W.	33N	4.3	...	...	...	G	JUNE	21	11	P.M.	BST		
JUNE	24	01	20	42.7	51.28 N.	178.95 W.	66	4.6	...	...	...	G	JUNE	23	02	P.M.	BST		
JUNE	24	23	17	59.6	58.61 N.	150.60 W.	75	4.2	...	...	...	G	JUNE	24	01	P.M.	AST		
JUNE	25	01	11	29.9	62.12 N.	151.24 W.	98	3.8	...	...	...	G	JUNE	24	03	P.M.	AST		
JUNE	26	02	52	56.5	57.61 N.	169.92 W.	33N	4.2	...	...	...	G	JUNE	25	03	P.M.	BST		
JUNE	27	23	40	58.0	55.82 N.	154.40 W.	15	4.8	4.0	4.6M	...	G	JUNE	27	01	P.M.	AST		
JUNE	29	06	44	30.6	61.34 N.	150.74 W.	52	...	...	...	...	G	JUNE	28	08	P.M.	AST		
JUNE	29	08	52	33.4	62.91 N.	150.91 W.	119	...	...	...	...	G	JUNE	28	10	P.M.	AST		
JUNE	29	09	10	57.6	52.76 N.	173.31 W.	147	5.0	...	...	...	G	JUNE	28	10	P.M.	BST		
JUNE	30	18	13	23.7	61.84 N.	151.92 W.	123	...	...	...	...	G	JUNE	30	08	A.M.	AST		

Table 1.--Summary of U.S. earthquakes for April-June 1978--Continued

Date (1978)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML or mbLg			Date	Hour				
CALIFORNIA																	
APR.	1	10	52	27.4	34.20 N.	116.97 W.	6	3.8	...	4.2P	V	P	APR.	1	02	A.M.	PST
APR.	1	13	14	23.5	37.50 N.	118.77 W.	10	...	...	3.1B	...	B	APR.	1	05	A.M.	PST
APR.	1	18	13	00.5	41.47 N.	121.85 W.	2	...	...	3.5B	...	B	APR.	1	10	A.M.	PST
APR.	4	03	23	31.8	37.84 N.	122.06 W.	8	...	...	2.5B	II	B	APR.	3	07	P.M.	PST
APR.	4	23	38	01.7	40.42 N.	124.41 W.	20	...	...	3.6B	...	B	APR.	4	03	P.M.	PST
APR.	8	09	22	16.5	39.14 N.	123.19 W.	5	...	...	3.2B	IV	G	APR.	8	01	A.M.	PST
APR.	9	16	00	41.1	35.38 N.	118.63 W.	5	...	...	3.0P	...	P	APR.	9	08	A.M.	PST
APR.	11	11	39	42.4	32.88 N.	115.52 W.	18	...	...	3.1P	...	P	APR.	11	03	A.M.	PST
APR.	11	23	17	06.5	36.21 N.	118.36 W.	5	...	...	3.5B	...	G	APR.	11	03	P.M.	PST
APR.	12	02	07	39.3	36.22 N.	120.10 W.	5	...	...	3.0B	...	G	APR.	11	06	P.M.	PST
APR.	14	17	22	35.2	40.28 N.	124.19 W.	20	...	...	3.4B	...	B	APR.	12	09	A.M.	PST
APR.	14	04	13	28.0	32.82 N.	115.45 W.	5	...	...	3.1P	...	P	APR.	13	08	P.M.	PST
APR.	14	10	01	05.2	35.28 N.	116.83 W.	5	...	...	3.7P	II	P	APR.	14	02	A.M.	PST
APR.	14	15	00	33.9	36.75 N.	121.50 W.	5	...	...	3.1B	...	B	APR.	14	07	A.M.	PST
APR.	15	12	38	18.7	34.37 N.	118.67 W.	5	...	...	3.0P	...	P	APR.	15	04	A.M.	PST
APR.	17	00	21	23.6	34.25 N.	117.08 W.	3	...	...	3.0P	...	P	APR.	16	04	P.M.	PST
APR.	17	03	43	07.1	35.93 N.	118.22 W.	5	...	...	3.5B	...	G	APR.	16	07	P.M.	PST
APR.	18	08	54	18.6	39.66 N.	122.77 W.	4	...	...	3.2B	...	B	APR.	18	00	A.M.	PST
APR.	18	17	11	39.6	39.68 N.	122.79 W.	2	...	...	3.2B	...	B	APR.	18	09	A.M.	PST
APR.	18	22	42	36.2	33.88 N.	117.55 W.	6	...	...	3.0P	II	P	APR.	18	02	P.M.	PST
APR.	19	01	38	17.7	39.67 N.	122.76 W.	9	...	...	3.4B	...	B	APR.	18	05	P.M.	PST
APR.	19	04	19	50.8	39.67 N.	122.75 W.	8	...	...	3.2B	...	B	APR.	18	08	P.M.	PST
APR.	22	13	04	27.8	34.05 N.	118.97 W.	14	3.4	...	3.2P	III	P	APR.	22	05	A.M.	PST
APR.	25	01	32	59.7	39.71 N.	122.64 W.	5	...	...	2.9B	...	G	APR.	24	05	P.M.	PST
APR.	25	04	58	38.2	33.00 N.	115.58 W.	11	...	...	2.4P	II	P	APR.	24	08	P.M.	PST
APR.	25	05	13	25.3	33.00 N.	115.58 W.	9	...	...	2.3P	II	P	APR.	24	09	P.M.	PST
APR.	25	21	56	30.2	33.72 N.	118.37 W.	4	...	...	2.5P	II	P	APR.	25	01	P.M.	PST
APR.	25	22	06	32.4	33.98 N.	116.93 W.	5	...	...	3.1P	...	P	APR.	25	02	P.M.	PST
APR.	26	06	08	21.9	33.95 N.	118.30 W.	5	...	...	2.7P	II	P	APR.	25	10	P.M.	PST
APR.	29	03	32	11.8	33.83 N.	117.73 W.	5	4.6	...	3.2P	III	P	APR.	28	07	P.M.	PST
APR.	29	04	03	46.2	34.23 N.	116.57 W.	6	...	...	3.8P	V	P	APR.	28	08	P.M.	PST
MAY	1	08	02	54.4	34.37 N.	119.97 W.	5	...	...	3.7P	IV	P	MAY	1	00	A.M.	PST
MAY	1	18	24	40.2	33.95 N.	118.75 W.	9	...	...	3.0P	...	P	MAY	1	10	A.M.	PST
MAY	2	06	17	29.4	32.85 N.	115.42 W.	4	...	...	3.2P	...	P	MAY	1	10	P.M.	PST
MAY	2	10	37	04.8	32.85 N.	115.42 W.	5	...	...	3.1P	...	P	MAY	2	02	A.M.	PST
MAY	6	09	17	02.3	37.47 N.	118.56 W.	14	...	...	3.5B	...	B	MAY	6	01	A.M.	PST
MAY	6	10	14	14.9	37.47 N.	118.57 W.	8	...	...	3.7B	IV	B	MAY	6	02	A.M.	PST
MAY	8	01	07	02.4	36.83 N.	120.03 W.	9	...	...	3.3B	II	B	MAY	7	05	P.M.	PST
MAY	8	06	56	23.3	37.37 N.	121.75 W.	3	...	...	3.4B	III	B	MAY	7	10	P.M.	PST
MAY	10	15	55	40.5	37.38 N.	121.75 W.	2	...	...	3.3B	III	B	MAY	10	07	A.M.	PST
MAY	11	05	47	32.4	34.00 N.	118.35 W.	5	...	...	2.8P	III	P	MAY	10	09	P.M.	PST
MAY	11	11	56	05.6	37.37 N.	121.76 W.	3	...	...	3.8B	IV	B	MAY	11	03	A.M.	PST
MAY	11	11	56	56.6	37.37 N.	121.76 W.	2	...	...	3.8B	IV	B	MAY	11	03	A.M.	PST
MAY	11	12	18	11.8	37.38 N.	121.75 W.	4	3.7	...	3.7B	IV	B	MAY	11	04	A.M.	PST
MAY	11	12	28	03.5	37.38 N.	121.75 W.	4	...	...	3.4B	IV	B	MAY	11	04	A.M.	PST
MAY	11	17	57	40.6	34.00 N.	118.45 W.	5	...	...	2.9P	III	P	MAY	11	09	A.M.	PST
MAY	12	00	27	47.6	37.38 N.	121.76 W.	1	...	...	3.0B	...	B	MAY	11	04	P.M.	PST
MAY	12	15	49	24.5	33.48 N.	116.43 W.	5	...	...	3.0P	...	P	MAY	12	07	A.M.	PST
MAY	17	00	45	16.8	41.45 N.	121.88 W.	2	...	...	3.1B	...	B	MAY	16	04	P.M.	PST
MAY	20	05	50	57.0	40.45 N.	123.29 W.	1	...	...	3.0B	...	B	MAY	19	09	P.M.	PST
MAY	22	21	56	06.9	36.64 N.	121.31 W.	4	3.7	...	3.7B	II	B	MAY	22	01	P.M.	PST
MAY	22	22	01	58.2	36.64 N.	121.31 W.	5	...	...	2.9B	II	B	MAY	22	02	P.M.	PST
MAY	23	05	01	16.5	32.70 N.	115.37 W.	6	...	...	3.4P	...	P	MAY	22	09	P.M.	PST
MAY	23	09	16	50.8	33.90 N.	119.17 W.	5	4.0	...	3.9P	IV	P	MAY	23	01	A.M.	PST
MAY	23	20	14	10.3	33.90 N.	119.17 W.	5	...	...	3.2P	...	P	MAY	23	12	P.M.	PST
MAY	25	06	43	05.9	34.15 N.	116.72 W.	6	...	...	3.3P	...	P	MAY	24	10	P.M.	PST
MAY	26	14	12	39.4	32.87 N.	115.48 W.	5	...	...	3.0P	...	P	MAY	26	06	A.M.	PST
MAY	27	18	22	41.3	38.54 N.	122.74 W.	9	...	...	3.8B	II	B	MAY	27	10	A.M.	PST
MAY	31	05	16	49.2	32.87 N.	115.48 W.	10	...	...	2.7P	II	P	MAY	30	09	P.M.	PST
MAY	31	11	44	45.2	32.87 N.	115.48 W.	10	...	...	2.9P	II	P	MAY	31	03	A.M.	PST
JUNE	4	03	57	17.3	33.92 N.	117.83 W.	6	...	...	3.5P	V	P	JUNE	3	07	P.M.	PST
JUNE	5	16	03	03.8	33.42 N.	116.70 W.	12	3.9	...	4.4P	V	P	JUNE	5	08	A.M.	PST
JUNE	8	23	48	52.3	35.87 N.	117.37 W.	5	...	...	3.4P	...	P	JUNE	8	03	P.M.	PST
JUNE	11	19	08	26.0	41.44 N.	121.88 W.	2	...	...	3.2B	...	B	JUNE	11	11	A.M.	PST
JUNE	11	20	12	03.9	41.44 N.	121.89 W.	2	...	...	3.5B	II	B	JUNE	11	12	P.M.	PST

Table 1.--Summary of U.S. earthquakes for April-June 1978--Continued

Date (1978)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time			
	hr	min	s				mb	MS	ML or mbLg			Date	Hour		
CALIFORNIA--Continued															
JUNE 12	03	03	35.2	41.46 N.	121.86 W.	2	...	...	3.0B	...	B	JUNE 11	07	P.M.	PST
JUNE 12	03	22	29.1	40.92 N.	121.96 W.	5	...	...	3.3B	...	G	JUNE 11	07	P.M.	PST
JUNE 12	06	17	34.3	36.09 N.	118.44 W.	5	...	...	3.4B	...	G	JUNE 11	10	P.M.	PST
JUNE 12	09	18	44.1	41.46 N.	121.86 W.	2	...	...	3.8B	II	B	JUNE 12	01	A.M.	PST
JUNE 14	04	27	49.4	34.38 N.	118.63 W.	6	...	...	2.9P	II	P	JUNE 13	08	P.M.	PST
JUNE 14	19	44	33.4	33.50 N.	116.78 W.	5	...	...	3.0P	...	P	JUNE 14	11	A.M.	PST
JUNE 16	04	21	31.9	35.03 N.	119.13 W.	5	4.1	...	4.1P	V	P	JUNE 15	08	P.M.	PST
JUNE 17	22	31	24.2	35.82 N.	116.47 W.	6	...	...	3.1P	...	P	JUNE 17	02	P.M.	PST
JUNE 21	19	26	05.0	35.28 N.	118.57 W.	4	...	...	3.1P	...	P	JUNE 21	11	A.M.	PST
JUNE 22	06	04	29.2	36.95 N.	121.45 W.	2	...	...	2.8B	...	B	JUNE 21	10	P.M.	PST
JUNE 25	07	31	11.4	34.05 N.	117.27 W.	5	...	...	3.1P	II	P	JUNE 24	11	P.M.	PST
CALIFORNIA--OFF THE COAST															
APR. 3	13	46	57.8	33.37 N.	119.08 W.	1	...	...	3.4P	...	P	APR. 3	05	A.M.	PST
APR. 11	08	34	23.0	40.31 N.	127.27 W.	15	...	...	3.7B	...	G	APR. 11	00	A.M.	PST
APR. 19	09	42	14.6	40.38 N.	126.48 W.	5	4.1	...	4.7B	...	B	APR. 19	01	A.M.	PST
APR. 24	20	15	11.5	41.57 N.	125.61 W.	10	4.2	...	3.8B	...	B	APR. 24	12	P.M.	PST
MAY 5	07	49	29.6	41.57 N.	125.80 W.	5	4.7	...	4.2B	...	B	MAY 4	11	P.M.	PST
MAY 10	18	30	25.0	40.37 N.	125.10 W.	5	...	...	4.0B	...	B	MAY 10	10	A.M.	PST
MAY 21	16	34	19.2	40.31 N.	124.57 W.	20	4.4	...	3.7B	...	B	MAY 21	08	A.M.	PST
MAY 23	21	42	02.9	40.44 N.	124.85 W.	35	4.6	...	4.4B	IV	B	MAY 23	01	P.M.	PST
MAY 29	00	46	35.1	40.39 N.	126.20 W.	5	4.5	...	4.8B	...	B	MAY 28	04	P.M.	PST
JUNE 1	18	38	20.9	40.34 N.	124.84 W.	5	3.7	...	4.0B	IV	B	JUNE 1	10	A.M.	PST
JUNE 18	23	04	52.7	40.31 N.	125.29 W.	5	4.4	3.9	4.2B	...	B	JUNE 18	03	P.M.	PST
JUNE 19	12	50	54.1	40.28 N.	124.35 W.	20	...	...	3.5B	...	B	JUNE 19	04	A.M.	PST
JUNE 29	11	28	10.4	41.54 N.	127.43 W.	5	4.7	...	4.1B	...	B	JUNE 29	03	A.M.	PST
JUNE 29	11	42	25.1	41.91 N.	127.55 W.	5	4.3	4.4	4.0B	...	B	JUNE 29	03	A.M.	PST
JUNE 29	11	45	04.2	41.63 N.	127.13 W.	15	4.5	...	...	...	G	JUNE 29	03	A.M.	PST
COLORADO															
MAY 29	16	45	18.0	39.28 N.	107.32 W.	5	...	...	3.0G	...	G	MAY 29	09	A.M.	MST
JUNE 10	20	57	53.5	39.78 N.	104.87 W.	20	...	...	2.9G	IV	G	JUNE 10	01	P.M.	MST
HAWAII															
APR. 3	04	28	32.9	19.30 N.	155.19 W.	9	...	...	3.0H	III	H	APR. 2	06	P.M.	HST
APR. 6	13	47	14.1	19.33 N.	155.13 W.	10	...	...	3.2H	III	H	APR. 6	03	A.M.	HST
APR. 8	02	43	44.2	19.83 N.	155.14 W.	29	...	...	3.6H	IV	H	APR. 7	04	P.M.	HST
APR. 12	19	35	28.0	19.33 N.	155.12 W.	10	...	...	3.1H	...	H	APR. 12	09	A.M.	HST
APR. 13	06	55	12.7	19.34 N.	155.07 W.	8	...	...	3.4H	IV	H	APR. 12	08	P.M.	HST
MAY 3	17	29	06.4	19.29 N.	155.50 W.	8	...	...	3.1H	IV	H	MAY 3	07	A.M.	HST
MAY 11	00	23	57.9	19.32 N.	155.11 W.	9	...	...	3.0H	...	H	MAY 10	02	P.M.	HST
MAY 16	06	45	42.1	19.36 N.	156.31 W.	32	...	...	3.0H	...	H	MAY 15	08	P.M.	HST
MAY 23	07	09	26.7	19.31 N.	155.22 W.	10	...	...	3.4H	IV	H	MAY 22	09	P.M.	HST
MAY 24	13	59	15.4	19.35 N.	155.03 W.	7	...	...	3.3H	...	H	MAY 24	03	A.M.	HST
MAY 27	13	41	03.0	19.65 N.	156.02 W.	8	...	...	3.0H	...	H	MAY 27	03	A.M.	HST
JUNE 1	05	16	44.8	20.30 N.	155.74 W.	7	...	...	3.1H	...	H	MAY 31	07	P.M.	HST
JUNE 3	01	02	02.1	19.67 N.	155.16 W.	14	...	...	3.2H	IV	H	JUNE 2	03	P.M.	HST
JUNE 4	08	00	44.9	19.81 N.	155.79 W.	16	...	...	3.0H	IV	H	JUNE 4	10	P.M.	HST
JUNE 11	06	07	44.7	19.33 N.	155.11 W.	10	...	...	3.0H	...	H	JUNE 10	08	P.M.	HST
JUNE 12	21	57	12.1	19.40 N.	155.26 W.	3	...	...	3.0H	IV	H	JUNE 12	11	A.M.	HST
JUNE 13	02	49	35.0	18.90 N.	155.46 W.	15	...	...	3.4H	IV	H	JUNE 12	04	P.M.	HST
JUNE 13	16	54	01.2	19.34 N.	155.05 W.	6	...	...	3.1H	IV	H	JUNE 13	06	A.M.	HST
JUNE 16	08	22	19.8	19.05 N.	156.83 W.	7	...	...	3.0H	...	H	JUNE 15	10	P.M.	HST
JUNE 18	03	34	23.7	19.34 N.	155.02 W.	9	...	...	3.0H	...	H	JUNE 17	05	P.M.	HST
JUNE 20	09	36	53.5	20.67 N.	155.76 W.	6	...	...	3.3H	...	H	JUNE 19	11	P.M.	HST
JUNE 21	10	20	44.1	19.32 N.	155.22 W.	10	...	...	3.4H	III	H	JUNE 21	00	A.M.	HST
JUNE 22	04	49	55.0	19.03 N.	156.78 W.	11	...	...	3.1H	...	H	JUNE 21	06	P.M.	HST
JUNE 23	08	03	29.7	19.13 N.	156.38 W.	13	...	...	3.1H	...	H	JUNE 22	10	P.M.	HST
JUNE 23	11	47	58.6	19.32 N.	155.26 W.	11	4.9	...	4.2H	IV	H	JUNE 23	01	A.M.	HST
JUNE 30	04	31	10.9	19.36 N.	155.12 W.	9	...	...	3.0H	...	H	JUNE 29	06	P.M.	HST
JUNE 30	22	28	02.8	19.17 N.	155.48 W.	9	...	...	3.1H	III	H	JUNE 30	12	P.M.	HST

Table 1.--Summary of U.S. earthquakes for April-June 1978--Continued

Date (1978)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML or mbLg			Date	Hour				
IDAHO																	
APR.	3	10	10	08.1	44.05 N.	116.36 W.	5	...	...	3.2G	IV	G	APR.	3	02	A.M.	PST
APR.	20	14	56	47.6	42.66 N.	111.55 W.	5	...	...	2.5G	IV	G	APR.	20	07	A.M.	MST
APR.	26	07	16	45.3	43.91 N.	114.11 W.	5	...	...	3.1G	...	G	APR.	25	11	P.M.	PST
ILLINOIS																	
JUNE	2	02	07	28.8	38.42 N.	88.46 W.	20	...	...	3.5V	IV	S	JUNE	1	08	P.M.	CST
MARYLAND																	
APR.	26	19	30	23.3	39.70 N.	78.24 W.	15	...	...	3.1V	...	G	APR.	26	02	P.M.	EST
MISSISSIPPI																	
JUNE	9	23	15	19.1	32.09 N.	88.58 W.	10	...	...	3.3G	...	G	JUNE	9	05	P.M.	CST
MISSOURI																	
APR.	3	12	24	21.1	36.62 N.	90.00 W.	5	...	...	3.1S	...	S	APR.	3	06	A.M.	CST
MONTANA																	
APR.	14	09	18	06.8	45.30 N.	110.26 W.	5	...	...	2.8G	...	G	APR.	14	02	A.M.	MST
APR.	23	23	24	37.0	46.97 N.	113.27 W.	5	4.5	4.3	4.9G	V	G	APR.	23	04	P.M.	MST
APR.	23	23	36	43.7	47.00 N.	113.31 W.	5	...	...	3.7G	II	G	APR.	23	04	P.M.	MST
MAY	19	10	50	19.5	47.00 N.	113.31 W.	5	...	...	3.2G	...	G	MAY	19	03	A.M.	MST
NEBRASKA																	
MAY	7	16	06	19.6	42.30 N.	101.93 W.	15	...	...	4.3G	IV	G	MAY	7	10	A.M.	CST
NEVADA																	
APR.	10	07	31	55.9	40.06 N.	116.42 W.	5	...	...	3.0G	...	G	APR.	9	11	P.M.	PST
APR.	11	15	30	00.2	37.30 N.	116.33 W.	0	5.3	...	5.3B	...	E	APR.	11	07	A.M.	PST
APR.	11	17	45	00.1	37.23 N.	116.37 W.	0	5.5	4.5	5.3B	...	E	APR.	11	09	A.M.	PST
APR.	20	13	15	47.3	35.80 N.	114.90 W.	10	...	...	1.9G	II	G	APR.	20	05	A.M.	PST
APR.	20	13	18	44.5	35.80 N.	114.90 W.	10	...	...	1.9G	II	G	APR.	20	05	A.M.	PST
MAY	23	05	47	55.4	40.87 N.	117.26 W.	11	4.1	...	4.6B	V	G	MAY	22	09	P.M.	PST
JUNE	1	17	00	00.0	37.03 N.	116.04 W.	2	...	...	3.4G	...	G	JUNE	1	09	A.M.	PST
NEW JERSEY																	
JUNE	30	20	13	43.6	41.07 N.	74.20 W.	5	...	...	2.9L	IV	L	JUNE	30	03	P.M.	EST
JUNE	30	22	39	49.7	41.08 N.	74.20 W.	6	...	...	2.2L	III	L	JUNE	30	05	P.M.	EST
NEW YORK																	
APR.	5	14	45	49.5	43.86 N.	74.24 W.	11	...	...	2.6L	...	L	APR.	5	09	A.M.	EST
OKLAHOMA																	
MAY	17	23	11	15.7	35.33 N.	97.91 W.	5	...	...	2.3T	I	T	MAY	17	05	P.M.	CST
MAY	18	00	19	22.4	35.50 N.	97.50 W.	5	...	...	2.7T	III	T	MAY	17	06	P.M.	CST
MAY	18	00	32	17.6	35.60 N.	97.83 W.	5	...	...	2.1T	II	T	MAY	18	06	P.M.	CST
OREGON--OFF THE COAST																	
APR.	15	15	29	23.1	42.76 N.	126.67 W.	15	4.1	...	...	...	G	APR.	15	07	A.M.	PST
APR.	23	20	10	02.4	44.55 N.	127.24 W.	15	3.9	...	...	...	G	APR.	23	12	P.M.	PST
JUNE	18	01	03	45.3	42.70 N.	126.29 W.	15	4.3	...	...	...	G	JUNE	17	05	P.M.	PST

Table 1.--Summary of U.S. earthquakes for April-June 1978--Continued

Date (1978)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML or mbLg			Date	Hour				
SOUTH CAROLINA																	
APR.	22	06	36	22.7	34.39 N.	81.32 W.	0	...	...	2.6V	...	G	APR.	22	01	A.M.	EST
TEXAS																	
JUNE	16	11	46	54.2	33.03 N.	100.77 W.	10	4.4	...	5.3G	V	G	JUNE	16	05	A.M.	CST
WASHINGTON																	
JUNE	27	02	18	58.8	46.86 N.	120.96 W.	1	...	...	3.7G	II	W	JUNE	26	06	P.M.	PST
WYOMING																	
APR.	15	05	23	50.8	42.72 N.	110.88 W.	5	...	...	2.5G	II	G	APR.	14	10	P.M.	MST
JUNE	6	21	23	34.7	43.63 N.	107.83 W.	5	4.0	...	3.7G	...	G	JUNE	6	02	P.M.	MST
JUNE	7	12	28		YELLOWSTONE NAT.	PARK	.	...	...	...	IV	.	JUNE	7	05	A.M.	MST
JUNE	8	15	01	54	YELLOWSTONE NAT.	PARK	.	...	...	...	III	.	JUNE	8	08	A.M.	PST
JUNE	18	22	40		YELLOWSTONE NAT.	PARK	.	...	...	...	III	.	JUNE	18	03	P.M.	MST
JUNE	19	05	43		YELLOWSTONE NAT.	PARK	.	...	...	...	IV	.	JUNE	18	10	P.M.	MST

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1978

[Sources of the hypocenters and magnitudes: (A) Geophysical Institute, University of Alaska, Fairbanks; (B) University of California, Berkeley; (D) University of Montana, Missoula; (E) U.S. Department of Energy, Las Vegas, Nevada; (G) U.S. Geological Survey, National Earthquake Information Service; (H) U.S. Geological Survey, Hawaiian Volcano Observatory; (L) Lamont-Doherty Geological Observatory, Palisades, New York; (M) National Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis, Missouri; (T) University of Oklahoma, Leonard; (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]

Alaska

- 9 April (G) Kenai Peninsula
 Origin time: 17 12 59.9
 Epicenter: 60.69 N., 151.84 W.
 Depth: 101 km
 Magnitude: 4.5 mb
Intensity III: Anchorage (M), Kenai (M).
Intensity II: Homer (M).
- 12 April (G) Kodiak Island region
 Origin time: 03 42 03.5
 Epicenter: 56.42 N., 152.69 W.
 Depth: 14 km
 Magnitude: 6.0 mb, 6.6 MS, 6.5 MS(B), 6.3 MS(P), 5.8 ML(A)
Intensity V: Sitkinak Island.
Intensity IV: Kodiak, Old Harbor (M).
Intensity III: Ouzinkie.
Intensity II: Olga Bay (M), Zechar Bay (M).

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1978--Continued

Alaska--Continued

- 19 April (G) Southern Alaska
 Origin time: 01 49 03.5
 Epicenter: 60.14 N., 153.54 W.
 Depth: 158 km
 Magnitude: 4.6 mb
Intensity II: Anchorage (M).
- 19 April (G) Southern Alaska
 Origin time: 14 52 18.1
 Epicenter: 61.00 N., 146.49 W.
 Depth: 40 km
 Magnitude: 3.3 ML(M)
Intensity IV: Valdez (M).
- 21 April (G) Central Alaska
 Origin time: 20 40 37.7
 Epicenter: 64.53 N., 147.95 W.
 Depth: 30 km
 Magnitude: 3.7 ML(M)
Intensity II: College (M).
- 24 April (G) Andreanof Islands, Aleutian Islands
 Origin time: 04 28 47.0
 Epicenter: 51.64 N., 176.09 W.
 Depth: 53 km
 Magnitude: 5.2 mb, 4.8 MS
Intensity III: Adak.

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

Alaska--Continued	
5 May (G) Southern Alaska	
Origin time:	05 32 47.4
Epicenter:	63.30 N., 150.97 W.
Depth:	134 km
Magnitude:	5.2 mb
<u>Intensity IV:</u>	Skwentna, Talkeetna, Willow to Wide Pass (M).
<u>Intensity III:</u>	Anchorage to Palmer (M).
11 May (G) Andreanof Islands, Aleutian Islands	
Origin time:	00 23 37.6
Epicenter:	51.67 N., 176.10 W.
Depth:	59 km
Magnitude:	5.6 mb, 5.9 MS, 5.8 MS(B)
<u>Intensity IV:</u>	Adak (M).
12 May (G) Central Alaska	
Origin time:	12 16 03.9
Epicenter:	62.25 N., 149.40 W.
Depth:	67 km
Magnitude:	5.1 mb
Felt throughout the Susitna Valley (press report).	
<u>Intensity IV:</u>	Anchorage, Chugiak, Elmen- dorf AFB, Gakona, Girdwood, Glennallen, Gold Creek (M), Homer, Kashwitna (M), McKinley Park, Palmer (M), Skwentna, Talkeetna, Wasilla (M), Whittier.
<u>Intensity III:</u>	Fairbanks (M).
<u>Intensity II:</u>	Ester, Moose Pass.
24 May (G) Andreanof Islands, Aleutian Islands	
Origin time:	06 16 55.4
Epicenter:	51.23 N., 179.21 W.
Depth:	25 km
Magnitude:	6.0 mb, 6.7 MS, 6.4 mb(P), 6.2 MS(P), 6.4 MS(B)
<u>Intensity IV:</u>	Adak (M).
24 May (G) Andreanof Islands, Aleutian Islands	
Origin time:	09 53 03.4
Epicenter:	51.13 N., 179.20 W.
Depth:	Normal.
Magnitude:	5.2 mb, 5.4 MS
<u>Intensity III:</u>	Adak.
25 May (G) Central Alaska	
Origin time:	10 39 57.4
Epicenter:	64.55 N., 152.59 W.
Depth:	Normal.
Magnitude:	4.0 ML
<u>Intensity IV:</u>	Tanana.
31 May (G) Southern Alaska	
Origin time:	18 29 25.6
Epicenter:	61.36 N., 149.70 W.
Depth:	44 km

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

Alaska--Continued	
Magnitude:	3.0 ML(M)
<u>Intensity II:</u>	Palmer (M).
10 June (G) Alaska Peninsula	
Origin time:	08 23 59.6
Epicenter:	57.92 N., 156.72 W.
Depth:	10 km
Magnitude:	4.5 mb, 3.9 MS, 4.6 ML(M)
<u>Intensity II:</u>	Egegik (M).
<u>Intensity I:</u>	King Salmon (M).
10 June (G) Southern Alaska	
Origin time:	19 35 10.2
Epicenter:	60.30 N., 146.45 W.
Depth:	20 km
Magnitude:	4.8 mb, 4.7 ML(M)
<u>Intensity IV:</u>	Cordova (M).
<u>Intensity III:</u>	Anchorage (M), Valdez (M).
12 June (G) Kenai Peninsula, Alaska	
Origin time:	07 30 39.3
Epicenter:	59.86 N., 150.76 W.
Depth:	55 km
Magnitude:	4.0 mb
<u>Intensity III:</u>	Homer (M).
22 June (G) Andreanof Islands, Aleutian Islands	
Origin time:	05 41 27.7
Epicenter:	51.61 N., 179.41 W.
Depth:	Normal.
Magnitude:	4.8 mb, 5.9 MS, 5.0 ML(M)
<u>Intensity III:</u>	Adak (M).
Arizona	
5 May (P) Baja California	
Origin time:	21 03 15.8
See California listing.	
California	
1 April (P) Southern California	
Origin time:	10 52 27.4
Epicenter:	34.20 N., 116.97 W.
Depth:	6 km
Magnitude:	4.2 ML, 3.8 mb(G)
<u>Intensity V:</u>	Angelus Oaks, Big Bear City, Llano, Rosamund.
<u>Intensity IV:</u>	Big Bear Lake, Blue Jay, Bryn Mawr, Cedar Glen, Coachella, Fawn- skin, Forest Falls, Green Valley Lake, Highland, Loma Linda, Lucerne Valley, Redlands, Running Springs, Sunnymead, Yucaipa.
<u>Intensity III:</u>	Palm Springs.

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

California--Continued	
4 April (B) Northern California	
Origin time:	03 23 31.8
Epicenter:	37.38 N., 122.06 W.
Depth:	8 km.
Magnitude:	2.5 ML
<u>Intensity II:</u>	Alamo (B), Walnut Creek (B).
8 April (B) Northern California	
Origin time:	09 22 18.9
Epicenter:	39.19 N., 123.14 W.
Depth:	5 km
Magnitude:	3.2 ML
<u>Intensity IV:</u>	Talmage, Willits.
<u>Intensity III:</u>	Redwood Valley, Ukiah.
14 April (P) Central California	
Origin time:	10 01 05.2
Epicenter:	35.28 N., 116.83 W.
Depth:	5 km
Magnitude:	3.7 ML
<u>Intensity II:</u>	Goldestone Tracking Station.
18 April (P) Southern California	
Origin time:	22 42 36.2
Epicenter:	33.88 N., 117.55 W.
Depth:	6 km
Magnitude:	3.0 ML
<u>Intensity II:</u>	Corona, Riverside.
22 April (P) Southern California	
Origin time:	13 04 27.8
Epicenter:	34.05 N., 118.97 W.
Depth:	14 km
Magnitude:	3.4 mb(G), 3.2 ML
<u>Intensity III:</u>	Malibu to Point Dume (P).
25 April (P) Imperial Valley region	
Origin time:	04 58 38.2
Epicenter:	33.00 N., 115.58 W.
Depth:	11 km
Magnitude:	2.4 ML
<u>Intensity II:</u>	Brawley (P).
25 April (P) Imperial Valley region	
Origin time:	05 13 25.3
Epicenter:	33.00 N., 115.58 W.
Depth:	9 km
Magnitude:	2.3 ML
<u>Intensity II:</u>	Brawley (P).
25 April (P) Southern California	
Origin time:	21 56 30.2
Epicenter:	33.72 N., 118.37 W.
Depth:	4 km
Magnitude:	2.5 ML
<u>Intensity II:</u>	Long Beach (P).

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

California--Continued	
26 April (P) Southern California	
Origin time:	06 08 21.9
Epicenter:	33.95 N., 118.30 W.
Depth:	5 km
Magnitude:	2.7 ML
<u>Intensity II:</u>	Hawthorne (P), Los Angeles (P), Northern Orange County (press report), Santa Monica (P).
29 April (P) Southern California	
Origin time:	03 32 11.8
Epicenter:	33.83 N., 117.73 W.
Depth:	5 km
Magnitude:	3.2 ML
<u>Intensity III:</u>	Santa Ana, Villa Park (P).
29 April (P) Southern California	
Origin time:	04 03 46.2
Epicenter:	34.23 N., 116.57 W.
Depth:	6 km
Magnitude:	3.8 ML
<u>Intensity V:</u>	Landers.
<u>Intensity IV:</u>	Fawnskin, Lake Arrowhead, Riverside.
<u>Intensity III:</u>	Helendale, Orange, Santa Ana.
<u>Intensity II:</u>	Anaheim Hills (press report), Big Bear (P), Tustin (press report).
1 May (P) Southern California	
Origin time:	08 02 54.4
Epicenter:	34.37 N., 119.97 W.
Depth:	5 km
Magnitude:	3.7 ML
<u>Intensity IV:</u>	Goleta, Santa Barbara.
5 May (P) Baja California	
Origin time:	21 03 15.8
Epicenter:	32.22 N., 115.32 W.
Depth:	5 km
Magnitude:	4.8 mb(G), 4.1 MS(G), 5.5 ML
<u>Intensity IV:</u>	Arizona--San Luis, Yuma.
	California--Calexico, Del Mar, Campo, El Centro, Heber, Ocotillo, Potrero, Seeley.
<u>Intensity III:</u>	California--Plaster City, San Diego.
6 May (B) Owens Valley region	
Origin time:	10 14 14.9
Epicenter:	37.47 N., 118.57 W.
Depth:	8 km
Magnitude:	3.7 ML
<u>Intensity IV:</u>	Bishop.

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

California--Continued	
8 May (B) Central California	
Origin time:	01 07 02.4
Epicenter:	36.83 N., 120.03 W.
Depth:	9 km
Magnitude:	3.3 ML
<u>Intensity II:</u>	Madera.
8 May (B) Central California	
Origin time:	06 56 23.3
Epicenter:	37.37 N., 121.75 W.
Depth:	3 km
Magnitude:	3.4 ML
This earthquake is the beginning of a swarm along the Calaveras fault northeast of San Jose.	
<u>Intensity III:</u>	East San Jose (press report).
10 May (B) Central California	
Origin time:	15 55 40.5
Epicenter:	37.38 N., 121.75 W.
Depth:	2 km
Magnitude:	3.3 ML
<u>Intensity III:</u>	East San Jose (press report).
11 May (P) Southern California	
Origin time:	05 47 32.4
Epicenter:	34.00 N., 118.35 W.
Depth:	5 km
Magnitude:	2.8 ML
<u>Intensity III:</u>	Culver City, Inglewood, Los Angeles, Santa Monica, Southgate.
11 May (B) Central California	
Origin time:	11 56 05.6
Epicenter:	37.37 N., 121.76 W.
Depth:	3 km
Magnitude:	3.8 ML
<u>Intensity IV:</u>	East San Jose.
11 May (B) Central California	
Origin time:	11 56 56.6
Epicenter:	37.37 N., 121.76 W.
Depth:	2 km
Magnitude:	3.8 ML
<u>Intensity IV:</u>	East San Jose.
11 May (B) Central California	
Origin time:	12 18 11.8
Epicenter:	37.38 N., 121.75 W.
Depth:	4 km
Magnitude:	3.7 mb(G), 3.7 ML
<u>Intensity IV:</u>	East San Jose.

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

California--Continued	
11 May (B) Central California	
Origin time:	12 28 03.5
Epicenter:	37.38N., 121.75 W.
Depth:	4 km
Magnitude:	3.4 ML
<u>Intensity IV:</u>	East San Jose.
11 May (P) Southern California	
Origin time:	17 57 40.6
Epicenter:	34.00 N., 118.45 W.
Depth:	5 km
Magnitude:	2.9 ML
<u>Intensity III:</u>	Beverly Hills, Inglewood, Santa Monica.
22 May (B) Central California	
Origin time:	21 56 06.9
Epicenter:	36.64 N., 121.31 W.
Depth:	4 km
Magnitude:	3.7 mb(G), 3.5 ML
<u>Intensity II:</u>	Hollister, Stone Canyon.
22 May (B) Northern California	
Origin time:	22 01 58.2
Epicenter:	36.64 N., 121.31 W.
Depth:	5 km
Magnitude:	2.9 ML
<u>Intensity II:</u>	Hollister (B), Stone Canyon (B).
23 May (P) Southern California	
Origin time:	09 16 50.8
Epicenter:	33.90 N., 119.17 W.
Depth:	5 km
Magnitude:	4.0 mb(G), 3.9 ML
<u>Intensity IV:</u>	Compton, Hollywood Beach (press report), Oxnard (press report), Port Hueneme (press report), Silver Strand Beach.
<u>Intensity III:</u>	Glendale.
<u>Intensity II:</u>	Point Mugu.
27 May (B) Northern California	
Origin time:	18 22 41.3
Epicenter:	38.54 N., 122.74 W.
Depth:	9 km
Magnitude:	3.8 ML
<u>Intensity II:</u>	Santa Rosa (B), Sonoma County (B).
31 May (P) Imperial Valley region	
Origin time:	05 16 49.2
Epicenter:	32.87 N., 115.48 W.
Depth:	10 km
Magnitude:	2.7 ML
<u>Intensity II:</u>	Brawley.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

California--Continued

31 May (P) Imperial Valley region

Origin time: 11 44 45.2
Epicenter: 32.87 N., 115.48 W.
Depth: 10 km
Magnitude: 2.9 ML
Intensity II: Brawley.

4 June (P) Southern California

Origin time: 03 57 17.3
Epicenter: 33.92 N., 117.83 W.
Depth: 6 km
Magnitude: 3.5 ML

This earthquake was felt over an area of approximately 1,700 sq km (fig. 7).

Intensity V: Whittier (light furniture and small objects shifted).

Intensity IV: Anaheim, Arcadia, Atwood, Big Bear City, Bonsall, Brea, Buena Park, Burbank, Costa Mesa, Covina, Cudahy, Cypress, Diamond Bar, Downey, El Segundo, Fawnskin, Fountain Valley, Fullerton, Garden Grove, Gardena, Glendale, Hancock, Ladera Heights, La Habra, Long Beach, Los Angeles, Maywood, Midway City, Monrovia, Monterey Park, Montrose, Murrieta, Norwalk, Paramount, Pasadena, Placentia, Pomona, San Jacinto, Sierra Madre, South Gate, Stanton, Sunset Beach, Vista, West Covina, Westminster, Wildomar, Yorba Linda.

Intensity III: Glendora, Glenoaks, Los Alamitos, Santa Ana.

Intensity II: Altadena, Green Valley Lake, Huntington Beach, Montclair, Phelan, San Gabriel, Van Nuys.

5 June (P) Southern California

Origin time: 16 03 03.8
Epicenter: 33.42 N., 116.70 W.
Depth: 12 km
Magnitude: 3.9 mb(G), 4.4 ML

This earthquake was felt over an area of approximately 11,000 sq km (fig. 8).

Intensity V: Anza (hairline cracks in exterior brick walls, small objects shifted), Winchester (few cracked windows; windows, doors, and dishes rattled).

Intensity IV: Aguanga, Alpine, Banning, Bonita, Borrego Springs, Camp Pendleton, El Cajon, Escondido, Guatay, Hemet, Idyllwild, Indio, Jamul, Julian, La Mirada, Laguna Niguel, Lakeside, North Palm Springs, Pala, Palm Springs, Palomar Mountain, Pauma Valley, Pico Rivera, Pine

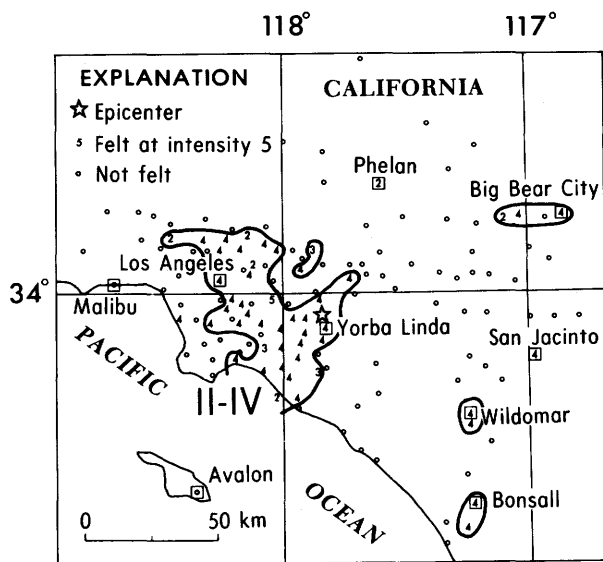


FIGURE 7.—Isoseismal map for the southern California earthquake of 4 June 1978, 03 57 17.3 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

California--Continued

Valley, Pomona, Ramona, Ranchita, San Diego, San Diego NAB, San Marcos, Santa Ysabel, Valley Center, Vista, Warner Springs.

Intensity III: Boulevard, Del Mar, La Jolla, Mountain Center, North Shore, Palm Desert, Pico Rivera, Rincon Springs (press report), San Diego--Lindbergh Field, South Whittier.

Intensity II: Lake Elsinore, Mt. Baldy.

11 June (B) Northern California

Origin time: 20 12 03.9
Epicenter: 41.44 N., 121.89 W.
Depth: 2 km
Magnitude: 3.5 ML
Intensity II: Mt. Shasta area (B).

12 June (B) Northern California

Origin time: 09 18 44.1
Epicenter: 41.46 N., 121.86 W.
Depth: 2 km
Magnitude: 3.8 ML
Intensity II: Mt. Shasta area (B).

14 June (P) Southern California

Origin time: 04 27 49.4
Epicenter: 34.38 N., 118.63 W.

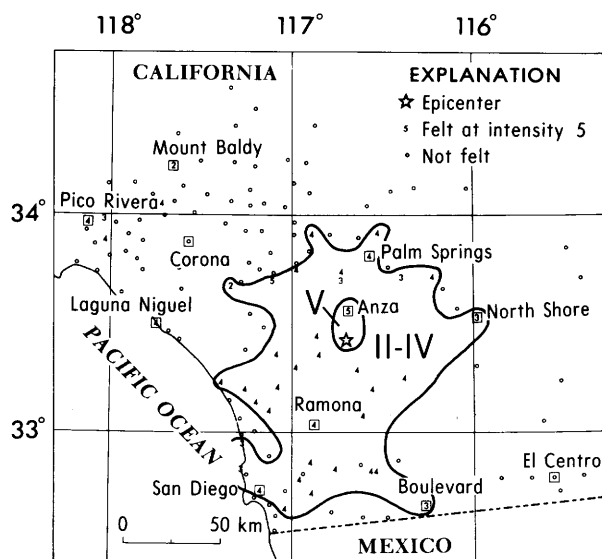


FIGURE 8.—Isoseismal map for the southern California earthquake of 5 June 1978, 16 03 03.8 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.—Summary of macroseismic data for U.S. earthquakes, April-June 1978--Continued

California--Continued

Depth: 6 km
Magnitude: 2.9 ML
Intensity II: Newhall (P).

16 June (P) Central California
Origin time: 04 21 31.9
Epicenter: 35.03 N., 119.13 W.
Depth: 5 km
Magnitude: 4.1 mb(G), 4.1 ML, 4.4 ML(B)
Intensity V: Mettler (small objects overturned), Pumpkin Center (furniture shifted), Tupman (small objects fell).
Intensity IV: Fellows, Lebec, Taft.
Intensity III: Frazier Park, Shafter.
Intensity II: Buena Vista pumping plant (P), New Cuyama, Santa Barbara (P), Saugus.

25 June (P) Southern California
Origin time: 07 31 11.4
Epicenter: 34.05 N., 117.27 W.
Depth: 5 km
Magnitude: 3.1 ML
Intensity II: Fontana (P).

Table 2.—Summary of macroseismic data for U.S. earthquakes, April-June 1978--Continued

California--Off the coast

23 May (B) Northern California
Origin time: 21 42 02.9
Epicenter: 40.44 N., 124.85 W.
Depth: 20 km
Magnitude: 4.4 mb(G), 4.6 ML
Intensity IV: Bayside, Eureka, Fortuna, Miranda.
Intensity III: Bridgeville, Eel River and Van Duzen River Valleys (press report).

1 June (B) Northern California
Origin time: 18 38 20.9
Epicenter: 40.34 N., 124.84 W.
Depth: 5 km
Magnitude: 3.7 mb, 4.0 ML(B)
Intensity IV: Rio Dell.

Colorado

10 June (G) Northern Colorado
Origin time: 20 57 53.5
Epicenter: 39.78 N., 104.87 W.
Depth: 20 km
Magnitude: 2.9 ML
Intensity IV: Denver (Park Hill), Denver (1335 Rosemary St, 1680 Magnolia St, 1603 Clermont St--press report), Thornton (2501 E. 104th St--press report), Henderson (1098 Brighton Road).
Intensity III: Commerce City.
Intensity II: Thornton (post office).

Hawaii

The places shown below followed by (H) designate intensity values assigned by the Hawaiian Volcano Observatory.

3 April (H) Island of Hawaii
Origin time: 04 28 32.9
Epicenter: 19.30 N., 155.19 W.
Depth: 9 km
Magnitude: 3.0 ML
Intensity III: Volcano (H).

6 April (H) Island of Hawaii
Origin time: 13 47 14.1
Epicenter: 19.33 N., 155.13 W.
Depth: 10 km
Magnitude: 3.2 ML
Intensity III: Hilo (H).

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

Hawaii--Continued	
8 April (H) Island of Hawaii	
Origin time:	02 43 44.2
Epicenter:	19.83 N., 155.14 W.
Depth:	29 km
Magnitude:	3.6 ML
<u>Intensity IV:</u>	Hilo (H), Papaiko (H), Pepeekeo (H), Honolulu (H).
<u>Intensity III:</u>	Glenwood (H), Hawaiian Volcano Observatory (H), Honokaa (H), Laupahoehoe (H).
<u>Intensity II:</u>	Ahualoa (H), Hawaiian Ocean View Estates (H), Waimea (H).
13 April (H) Island of Hawaii	
Origin time:	06 55 12.7
Epicenter:	19.34 N., 155.07 W.
Depth:	8 km
Magnitude:	3.4 ML
<u>Intensity IV:</u>	Hawaii Volcanoes National Park (H), Hilo (H).
3 May (H) Island of Hawaii	
Origin time:	17 29 06.4
Epicenter:	19.29 N., 155.50 W.
Depth:	8 km
Magnitude:	3.1 ML
<u>Intensity IV:</u>	Pahala (H).
23 May (H) Island of Hawaii	
Origin time:	07 09 26.7
Epicenter:	19.31 N., 155.22 W.
Depth:	10 km
Magnitude:	3.4 ML
<u>Intensity IV:</u>	Hilo (H).
<u>Intensity III:</u>	Glenwood (H), Hawaii Vol- canoes National Park (H), Mountainview (H), Papaikou (H), Volcano (H).
3 June (H) Island of Hawaii	
Origin time:	01 02 02.1
Epicenter:	19.67 N., 155.16 W.
Depth:	14 km
Magnitude:	3.2 ML
<u>Intensity IV:</u>	Hilo (H).
<u>Intensity III:</u>	Glenwood (H), Hawaii Vol- canoes National Park (H), Honokaa (H), Kalapana (H), Paauilo (H), Volcano (H).
4 June (H) Island of Hawaii	
Origin time:	08 00 44.9
Epicenter:	19.81 N., 155.79 W.
Depth:	16 km
Magnitude:	3.0 ML
<u>Intensity IV:</u>	Kona (H).

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

Hawaii--Continued	
12 June (H) Island of Hawaii	
Origin time:	21 57 12.1
Epicenter:	19.40 N., 155.26 W.
Depth:	3 km
Magnitude:	3.0 ML
<u>Intensity IV:</u>	Kilauea Caldera (H).
<u>Intensity III:</u>	Hawaiian Volcano Observa- tory (H), Hawaii Volcanoes National Park (H), Volcano (H).
13 June (H) Island of Hawaii	
Origin time:	02 49 35.0
Epicenter:	18.90 N., 155.46 W.
Depth:	15 km
Magnitude:	3.4 ML
<u>Intensity IV:</u>	Hawaiian Ocean View Estates (H), Naalehu (H).
13 June (H) Island of Hawaii	
Origin time:	16 54 01.2
Epicenter:	19.34 N., 155.05 W.
Depth:	6 km
Magnitude:	3.1 ML
<u>Intensity IV:</u>	Kalapana (H), Kapaahu (H).
<u>Intensity III:</u>	Mountainview (H), Volcano (H), Wainaku (H).
21 June (H) Island of Hawaii	
Origin time:	10 20 44.1
Epicenter:	19.32 N., 155.22 W.
Depth:	10 km
Magnitude:	3.4 ML
<u>Intensity III:</u>	Hawaii Volcanoes National Park (H), Pahala (H), Volcano (H).
23 June (H) Island of Hawaii	
Origin time:	11 47 52.6
Epicenter:	19.32 N., 155.26 W.
Depth:	11 km
Magnitude:	4.9 mb(G), 4.2 ML
<u>Intensity IV:</u>	Captain Cook, Hawaii Vol- canoes National Park, Hamakua (H), Hilo, Honokaa, Honomu, Keaau, Kukuihaele, Kurtistown, Naalehu, Paauhau, Paauilo, Pahala, Pahoa, Papaikou, Pepeekeo, Puna (H), Volcano.
<u>Intensity III:</u>	Kau, Kohala, Kona.
<u>Intensity II:</u>	Kalaupapa.
30 June (H) Island of Hawaii	
Origin time:	22 28 02.8
Epicenter:	19.17 N., 155.48 W.
Depth:	9 km
Magnitude:	3.1 ML
<u>Intensity III:</u>	Hawaiian Ocean View Estates (H).

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

Idaho	
3 April (G) Western Idaho	
Origin time:	10 10 08.1
Epicenter:	44.05 N., 116.36 W.
Depth:	5 km
Magnitude:	3.2 ML, 3.6 ML(D)
<u>Intensity IV:</u>	Sweet.
20 April (G) Southeastern Idaho	
Origin time:	14 56 47.6
Epicenter:	42.66 N., 111.55 W.
Depth:	5 km
Magnitude:	2.5 ML
<u>Intensity IV:</u>	Conda.
<u>Intensity III:</u>	Soda Springs (telephone report).
23 April (G) Western Montana	
Origin time:	23 24 37.0
See Montana listing.	
Illinois	
2 June (S) Southern Illinois	
Origin time:	02 07 28.8
Epicenter:	38.42 N., 88.46 W.
Depth:	20 km
Magnitude:	3.5 mbLg(V)
<u>Intensity IV:</u>	Fairfield, Flora.
Montana	
23 April (G) Western Montana	
Origin time:	23 24 37.0
Epicenter:	46.97 N., 113.27 W.
Depth:	5 km
Magnitude:	4.5 mb, 4.3 MS, 4.9 ML

This earthquake was felt over an area of approximately 94,000 sq km of eastern Idaho and western Montana (fig. 9).

Intensity V:

Montana--Ovando (hanging pictures fell), Ravalli (small objects overturned).

Intensity IV:

Idaho--Calder, North Fork.
Montana--Anaconda, Arlee, Augusta, Big Arm, Black Eagle, Bonner, Boulder, Butte, Canyon Creek, Carter, Charlo, Choteau, Clancy, Clinton, Conrad, Corvallis, Deer Lodge,

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

Montana--Continued	
Dixon, East Helena, Elliston, Fairfield, Florence, Frenchtown, Garrison, Great Falls, Greenough, Hall, Hamilton, Helena, Helmsville, Hot Springs, Jefferson City, Kalispell, Lincoln, Lolo, Marysville, Milltown, Missoula, Moiese, Monarch, Montana City, Oilmont, Pablo, Paradise, Pendroy, Philipsburg, Polson, Power, Radersburg, Rollins, Ronan, Saint Ignatius, Saint Regis, Saltese, Seeley Lake, Silver Star, Simms, Sunburst, Sun River, Superior, Swan Lake, Toston, Townsend, Trout Creek, Troy, Ulm, Valier, Victor, Warm Springs, Whitehall, White Sulphur Springs, Winston.	
<u>Intensity III:</u>	
Idaho--Elk River, Headquarters.	
Montana--Basin, Brady, Cascade, Darby, Dutton, Essex, Fort Shaw, Jackson, Kevin, Orofino, Raynesford, Stockett, Sula, Vaughn, Willow Creek, Wolf Creek.	
<u>Intensity II:</u>	
Idaho--Kellogg.	
Montana--Fort Benton, Heart Butte, Polaris, Sand Coulee, Wise River, Wisdom.	
23 April (G) Western Montana	
Origin time:	23 36 43.7
Epicenter:	47.00 N., 113.31 W.
Depth:	5 km
Magnitude:	3.7 ML
<u>Intensity II:</u>	Dixon, Polson (telephone report).

Nebraska

7 May (G) Central Nebraska

Origin time: 16 06 19.6
Epicenter: 42.30 N., 101.93 W.
Depth: 15 km
Magnitude: 4.3 mbLg, 4.0 mbLg(S)
Intensity IV: Arthur, Ashby, 27 km north and 5 km east of Ashby, 27 km north of Ashby, 26 km north of Ashby, 16 km north of Ashby, 10 km south of Ashby, 26 km south of Ashby, 27 km north of Bingham, 60 km west of Hyannis, 13 km southwest of Lewellen, 13 km north of Mullen, Whitman, 37 km north of Whitman.
Intensity III: Elsie, 56 km north of Hyannis, 40 km north-northeast of Mullen, 5 km west of Oshkosh.

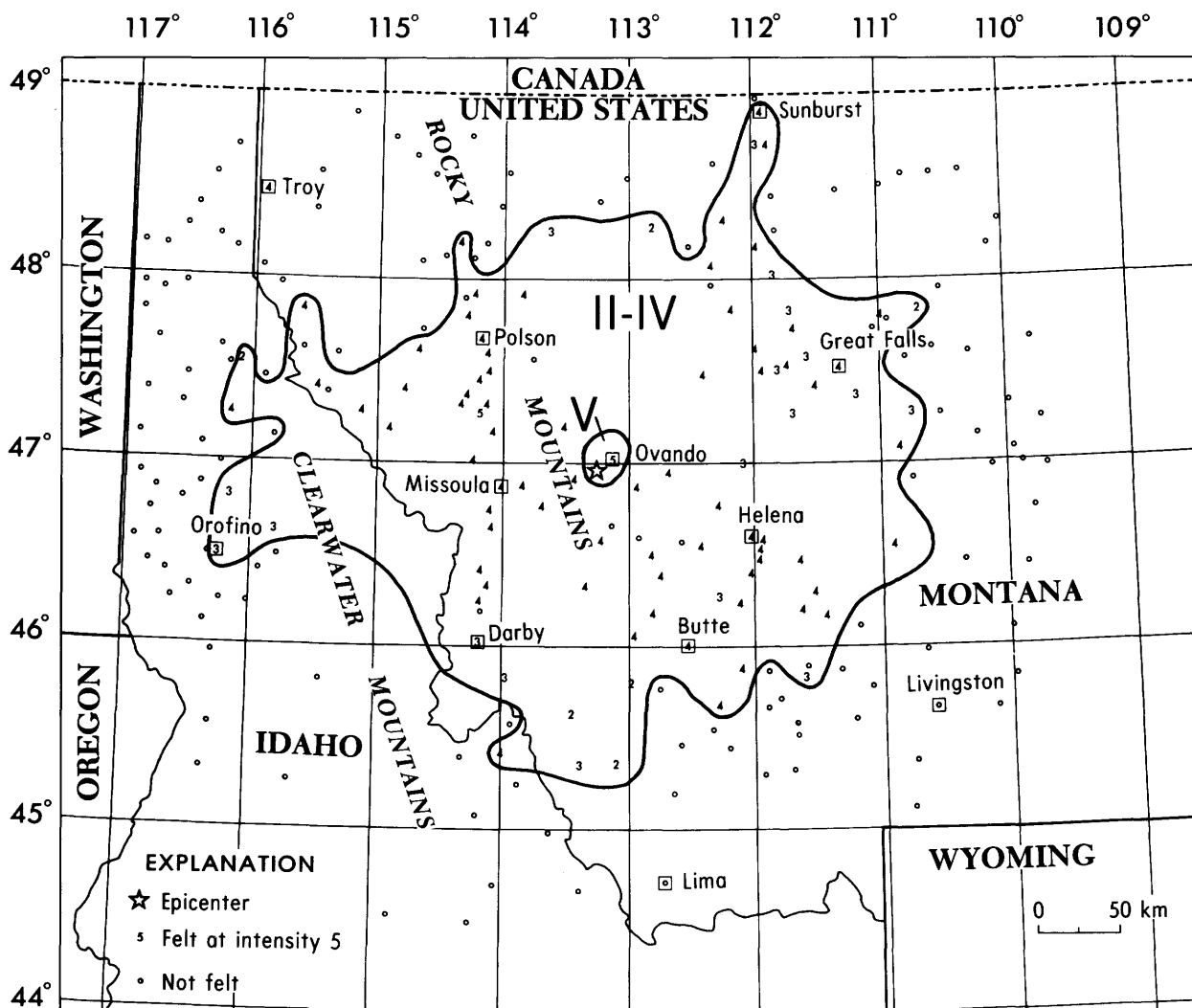


FIGURE 9.--Iseseismal map for the western Montana earthquake of 23 April 1978, 23 24 37.0 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1978--Continued

Nevada

11 April (E) Southern Nevada

Origin time: 15 30 00.161
 Epicenter: 37.30 N., 116.33 W.
 Depth: 0 km
 Magnitude: 5.3 mb(G), 5.3 ML(B)

Nevada Test Site explosion "FONDOTTA"
 at 37 17'58.66" N., 116 19'36.12" W.,
 surface elevation 2099 m, depth of
 burial 633 m.

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1978--Continued

Nevada--Continued

11 April (E) Southern Nevada

Origin time: 17 45 00.073
 Epicenter: 37.23 N., 116.37 W.
 Depth: 0 km
 Magnitude: 5.5 mb(G), 4.5 MS(G),
 5.3 ML(B)

Nevada Test Site explosion "BACKBEACH"
 at 37 14'00.57" N., 116 22'06.49" W.,
 surface elevation 2066 m, depth of
 burial 611 m.

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

Nevada--Continued	
20 April (G) Southern Nevada	
Origin time:	13 15 47.3
Epicenter:	35.80 N., 114.90 W.
Depth:	10 km
Magnitude:	1.9 ML
<u>Intensity II:</u>	Boulder City.
20 April (G) Southern Nevada	
Origin time:	13 18 44.5
Epicenter:	35.80 N., 114.90 W.
Depth:	10 km
Magnitude:	1.9 ML
<u>Intensity II:</u>	Boulder City.
23 May (G) Northern Nevada	
Origin time:	05 47 55.4
Epicenter:	40.87 N., 117.26 W.
Depth:	11 km
Magnitude:	4.1 mb, 4.6 ML(B)
<u>Intensity V:</u>	Battle Mountain, Valmy.
<u>Intensity IV:</u>	Golconda, Winnemucca.
New Jersey	
30 June (L) Northern New Jersey	
Origin time:	20 13 43.6
Epicenter:	41.07 N., 74.20 W.
Depth:	5 km
Magnitude:	2.9 mbLg
<u>Intensity IV:</u>	New Jersey--Mahwah (press report), Oakland (press report). New York--Hillburn (press report), Suffern (press report). <u>Intensity III:</u> New York--Pine Grove (press report), Sloatsburg (press report), Tuxedo Park (press report).
30 June (L) Northern New Jersey	
Origin time:	22 39 49.7
Epicenter:	41.08 N., 74.20 W.
Depth:	6 km
Magnitude:	2.2 ML
<u>Intensity III:</u>	Oakland, New Jersey-- Suffern, New York area (press report).
New Mexico	
16 June (G) West Texas	
Origin time:	11 46 54.2
See Texas listing.	

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

New York	
30 June (L) Northern New Jersey	
Origin time:	20 13 43.6
See New Jersey listing.	
30 June (L) Northern New Jersey	
Origin time:	22 39 49.7
See New Jersey listing.	
Oklahoma	
17 May (T) Central Oklahoma	
Origin time:	23 11 15.7
Epicenter:	35.53 N., 97.91 W.
Depth:	5 km
Magnitude:	2.3 mbLg
<u>Intensity I:</u>	El Reno (T).
18 May (T) Central Oklahoma	
Origin time:	00 19 22.4
Epicenter:	35.50 N., 97.50 W.
Depth:	5 km
Magnitude:	2.7 mbLg
<u>Intensity III:</u>	El Reno (T).
18 May (T) Central Oklahoma	
Origin time:	00 32 17.6
Epicenter:	35.60 N., 97.83 W.
Depth:	5 km
Magnitude:	2.1 mbLg
<u>Intensity II:</u>	El Reno (T).
Texas	
16 June (G) West Texas	
Origin time:	11 46 54.2
Epicenter:	33.03 N., 100.77 W.
Depth:	10 km
Magnitude:	4.4 mb, 5.3 ML, 4.6 mbLg(S)
This earthquake was felt over an area of approximately 52,000 sq km of west Texas (fig. 10).	
<u>Intensity V:</u>	Texas--Carlsbad (hanging pictures fell, small objects broke), Flu- vanna (one broken window, hanging pictures fell, light furniture shifted), Justiceburg (unconfirmed report of cracked plaster), Peacock (few cracked windows), Rotan (light furniture shifted), Snyder (cracked

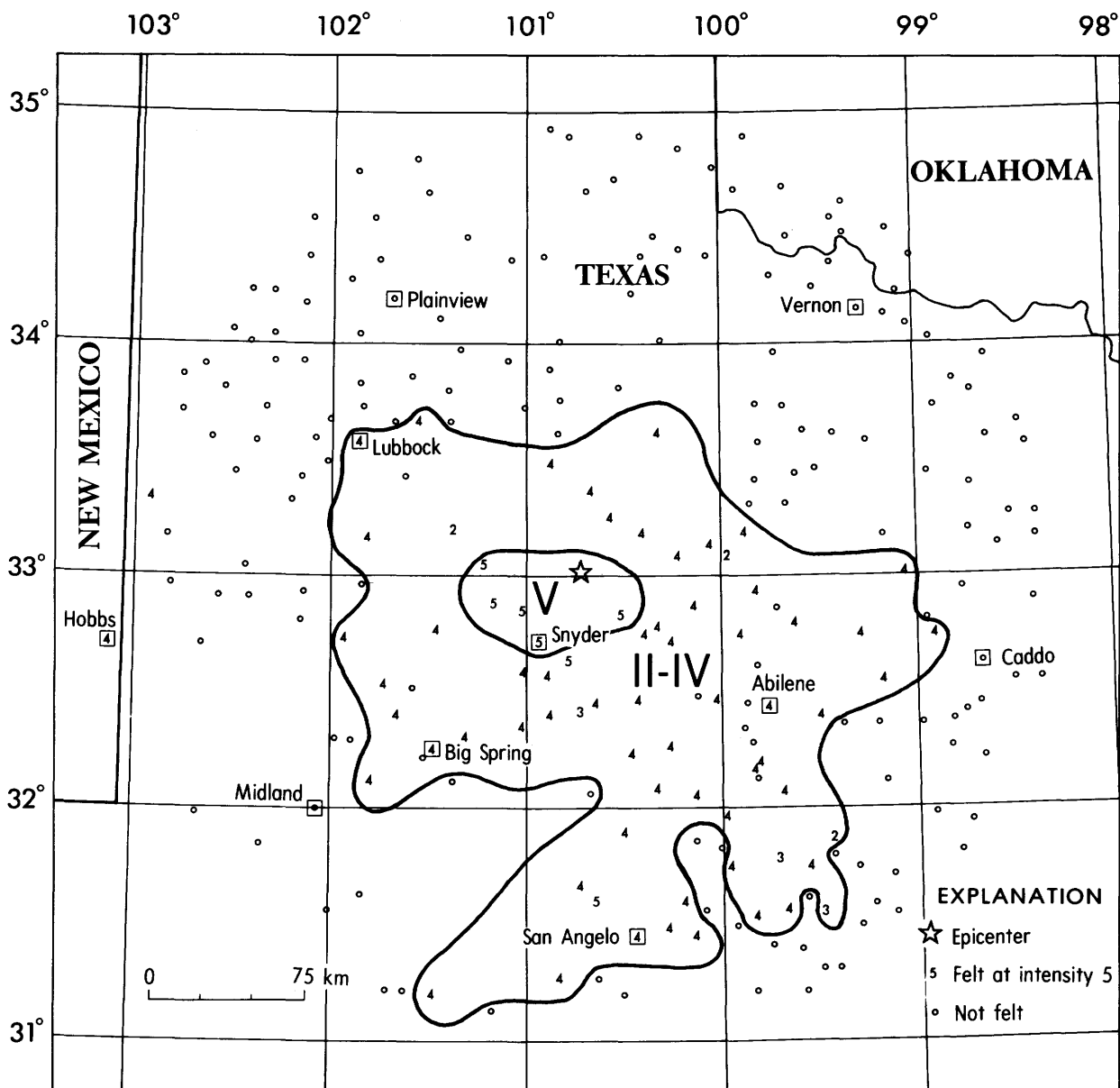


FIGURE 10.--Isoseismal map for the west Texas earthquake of 16 June 1978, 11 46 54.2 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

Texas--Continued	
window, mirror fell and broke).	
<u>Intensity IV:</u>	
New Mexico--Hobbs.	
Texas--Abilene, Ackerly, Albany	
(press report), Anson, Aspermont,	
Ballinger, Big Lake, Big Spring,	
Blackwell, Breckenridge, Bronte,	
Coahoma, Coleman, Clyde, Colorado	
City, Dermott, Dunn, Eola, Gail,	
Girard, Goldsboro, Goodfellow AFB,	
Guthrie, Hamlin, Hermleigh, Ira,	
Jayton, Knott, Lamesa, Lorenzo,	
Lubbock, Lueders, Maryneal, McCaul-	
ley, Mereta, Merkel, Mertzon,	
Miles, Moran, New Home, Nolan, Old	
Glory, Ovalo, Roby, Roscoe, Rule,	
San Angelo, San Angelo--Angelo	
State University, Spur, Stamford,	
Stanton, Sylvester, Sweetwater	
(press report), Tahoka, Tuscola	
(press report), Valdera, Veribest,	
Water Valley, Westbrook, Windgate,	
Winters, Woodson.	
<u>Intensity III:</u>	
Texas--Gouldbusk, Loraine, Talpa.	
<u>Intensity II:</u>	
Texas--Glen Cove, Post, Sagerton.	

Washington	
27 June (W) Washington	
Origin time:	02 18 58.8
Epicenter:	46.86 N., 120.96 W.
Depth:	1 km
Magnitude:	3.7 ML(G)
<u>Intensity II:</u>	Naches Ranger Station
(W), Snoqualmie.	

Wyoming	
15 April (G) Western Wyoming	
Origin time:	05 23 50.8
Epicenter:	42.72 N., 110.88 W.
Depth:	5 km
Magnitude:	2.5 ML
<u>Intensity II:</u>	Afton.
7 June Yellowstone National Park	
Origin time:	12 28
Epicenter:	Not located.
Depth:	None computed.
Magnitude:	None computed.
<u>Intensity IV:</u>	Canyon Village.
<u>Intensity III:</u>	Lake.

Table 2.--Summary of macroseismic data for U.S. earthquakes,
April-June 1978--Continued

Wyoming--Continued	
8 June Yellowstone National Park	
Origin time:	15 01 54
Epicenter:	Not located.
Depth:	None computed.
Magnitude:	None computed.
<u>Intensity III:</u>	Old Faithful.
18 June Yellowstone National Park	
Origin time:	22 40
Epicenter:	Not located.
Depth:	None computed.
Magnitude:	None computed.
<u>Intensity III:</u>	Old Faithful.
19 June Yellowstone National Park	
Origin time:	05 43
Epicenter:	Not located.
Epicenter:	Not located.
Depth:	None computed.
Magnitude:	None computed.
<u>Intensity IV:</u>	Lake-Fishing Bridge area.

ACKNOWLEDGMENTS

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

ALASKA:	Staff of National Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer.
CALIFORNIA:	Clarence R. Allen, Seismological Laboratory, California Institute of Technology, Pasadena. Bruce A. Bolt, Seismograph Station, University of California, Berkeley.
HAWAII:	Robert Y. Koyanagi, U.S. Geological Survey, Hawaiian Volcano Observatory, Hawaii National Park.
MISSOURI:	Otto Nuttli, Department of Geology and Geophysics, St. Louis University, St. Louis.
MONTANA:	Anthony Qamar, University of Montana, Missoula.
NEW YORK:	Lynn R. Sykes and Yash P. Aggarwal, Lamont-Doherty Geological Observatory, Columbia University, Palisades.
OKLAHOMA:	James E. Lawson, Jr., Earth Sciences Observatory, University of Oklahoma, Leonard.
VIRGINIA:	G. A. Bollinger, Department of Geological Sciences, Virginia

Polytechnic Institute and
State University, Blacksburg.
WASHINGTON: Robert S. Crosson, Geophysics
Program, University of Wash-
ington, Seattle.

Acknowledgment is also given to Paula Smith for
aid in editing the manuscript, drafting the
isoseismal maps, and preparing the computerized
manuscript.

REFERENCES CITED

Bath, Markus, 1966, Earthquake energy and magni-
tude, in Physics and chemistry of the

Earth, Volume 7: Oxford and New York, Per-
gamon Press, p. 115-165.
Gutenberg, B. and Richter, C. F., 1956, Magni-
tude and energy of earthquakes: *Annali di*
Geofisica, v. 9, no. 1, p. 1-15.
Nuttli, O. W., 1973, Seismic wave attenuation
and magnitude relations for eastern North
America: *Journal of Geophysical Research*,
v. 78, no. 5, p. 876-885.
Richter, C. F., 1958, *Elementary seismology*:
San Francisco, Calif., W. H. Freeman and
Co., Inc., 768 p.
Wood, H. O., and Neumann, F., 1931, Modified
Mercalli Intensity Scale of 1931: *Bulletin*
of the Seismological Society of America, v.
21, no. 4, p. 277-283.

