

GEOLOGICAL SURVEY CIRCULAR 871-B



**Earthquakes  
in the United States,  
April-June 1981**



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

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GEOLOGICAL SURVEY CIRCULAR 871-B

**United States Department of the Interior**

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**Geological Survey**

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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, three photographs, 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  Hairline cracks 66  Large cracks (many) 67  Fell in large amounts  
 Dry wall 68  Hairline cracks 69  Large cracks (many) 70  Fell in large amounts

6. What outdoor physical effects were noted in your community?
- |   |   |  |  |
|---|---|--|--|
| Trees and bushes shaken                                   | 71 <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         |
|                | 106 <input type="checkbox"/> Separated from ceiling or floor |   |
| 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 |
- 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 | <input type="checkbox"/> Don't know               |
|                                       | 153 <input type="checkbox"/> Muddied       |   |   |
| 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.

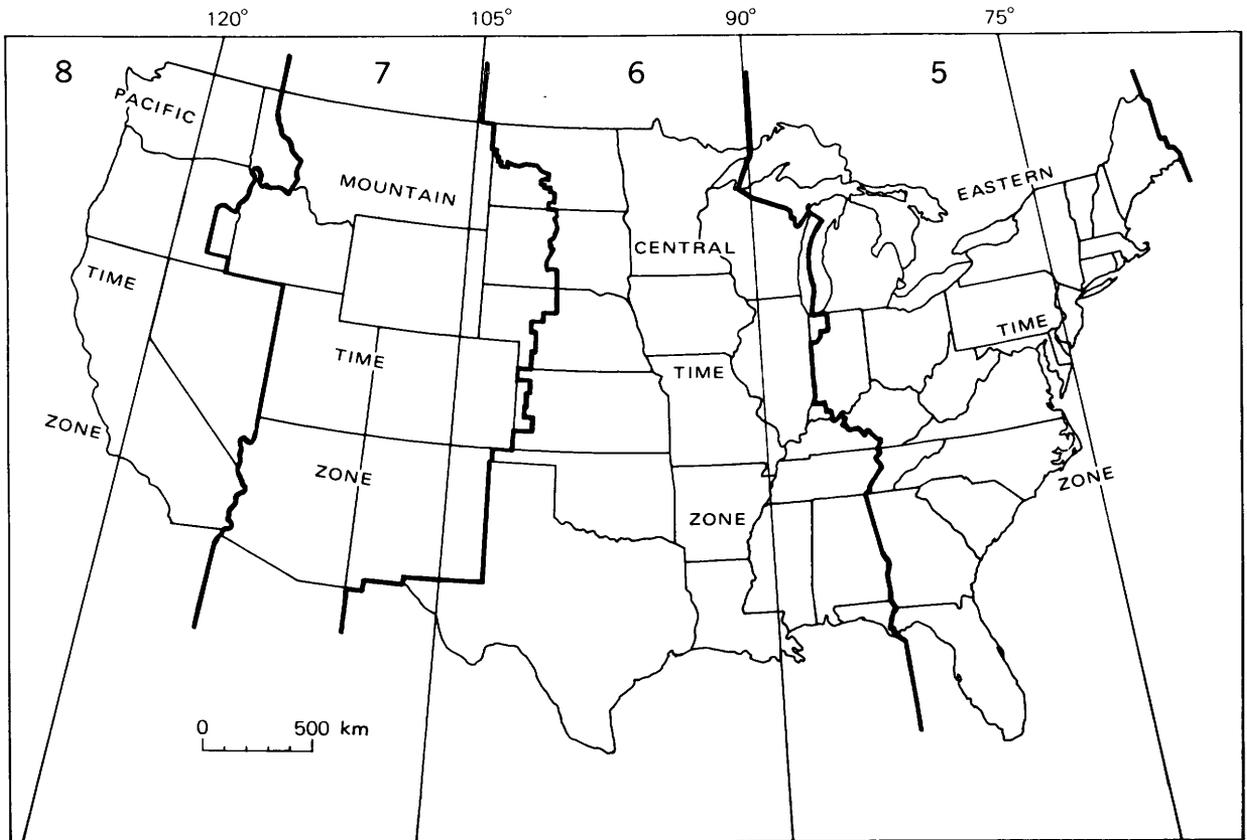


FIGURE 2.--Standard time zones of the conterminous United States. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

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 April-June 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

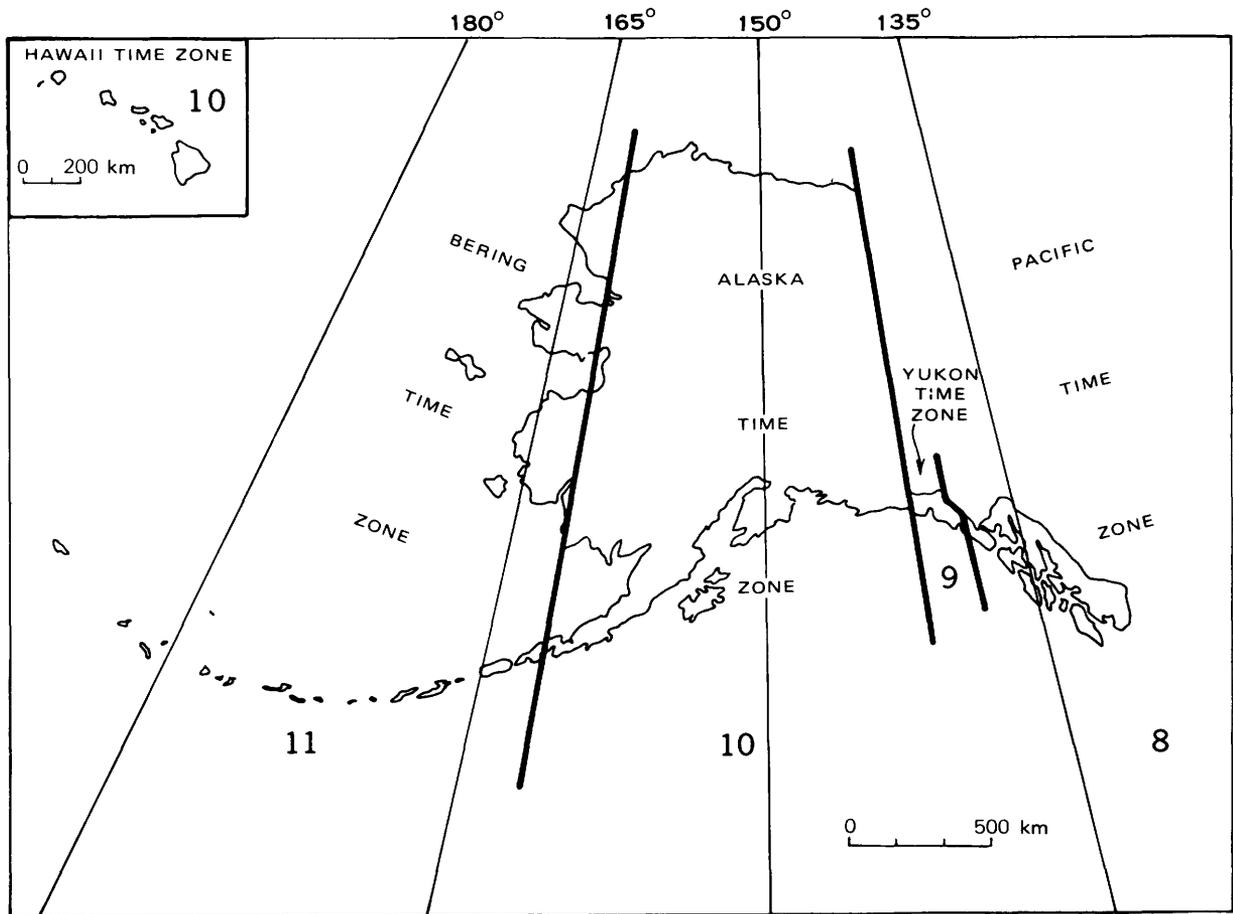


FIGURE 3.--Standard time zones of Alaska and Hawaii. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

the maximum trace amplitude in millimeters, written by a Wood-Anderson torsion seismometer, and  $\log A_0$  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.

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

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

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

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

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 mBLg 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.

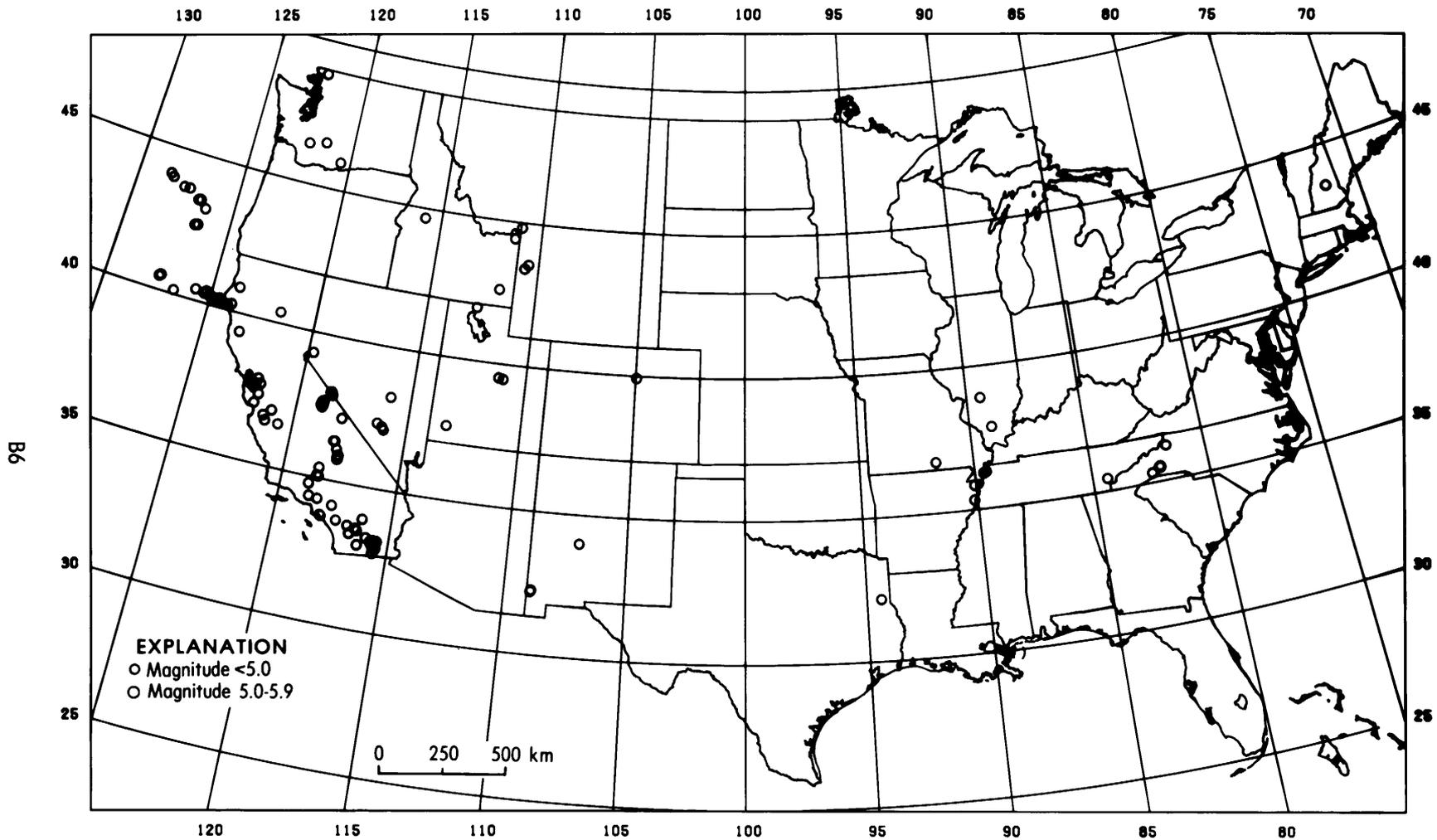


FIGURE 4.—Earthquake epicenters in the conterminous United States for April-June 1981, plotted from table 1.

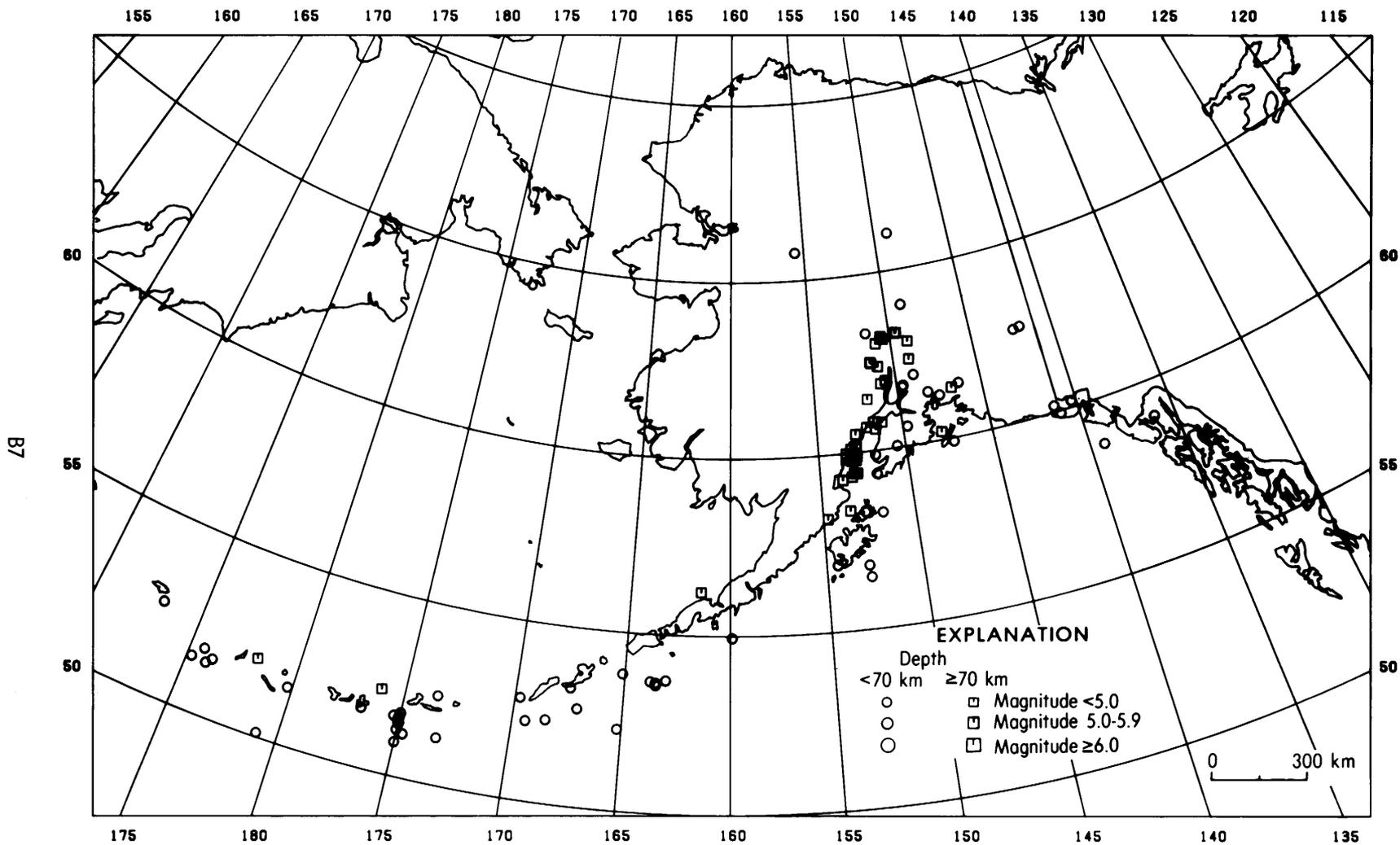


FIGURE 5.—Earthquake epicenters in Alaska for April-June 1981, plotted from table 1.

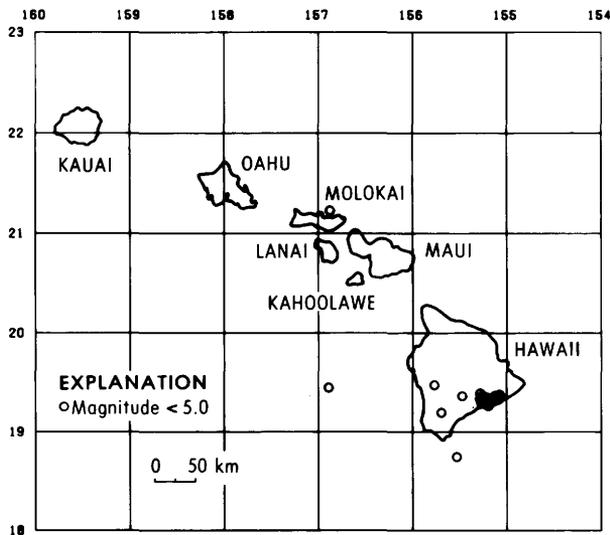


FIGURE 6.--Earthquake epicenters in Hawaii for April-June 1981, plotted from table 1.

## 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. Incausing 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 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; (H) U.S. Geological Survey, Hawaiian Volcano Observatory; (J) Weston Observatory, Massachusetts; (K) Tennessee Earthquake Information Center, Memphis; (M) National Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology,

Pasadena; (S) St. Louis University, St. Louis, Missouri; (T) Oklahoma Geological Survey, Leonard; (U) University of Utah, Salt Lake; (V) Virginia Polytechnic Institute and State University, Blacksburg; (W) University of Washington Seattle; (Z) Bollinger and others, 1982. 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, M <sub>a</sub> or MD			Date	Hour	Time			
ALASKA																	
APR.	2	16	10	43.7	62.63 N.	141.92 W.	33	4.5	...	4.3M	FELT	G	APR.	2	06	A.M.	AST
APR.	3	02	10	12.1	64.00 N.	148.97 W.	33	...	...	2.7M	...	G	APR.	2	04	P.M.	AST
APR.	3	22	14	01.2	59.89 N.	153.46 W.	156	...	...	...	...	G	APR.	3	12	P.M.	AST
APR.	4	15	21	04.2	53.72 N.	163.06 W.	16	4.8	...	4.0M	...	G	APR.	4	04	A.M.	BST
APR.	4	17	33	50.3	60.18 N.	141.28 W.	15	3.7	...	3.7M	...	G	APR.	4	07	A.M.	AST
APR.	4	23	17	31.3	51.50 N.	175.21 E.	33	4.6	...	3.6M	...	G	APR.	4	12	P.M.	BST
APR.	5	21	31	40.4	58.38 N.	153.49 W.	76	4.4	...	...	...	G	APR.	5	11	A.M.	AST
APR.	7	02	12	07.7	59.89 N.	152.81 W.	120	...	...	...	...	G	APR.	6	04	P.M.	AST
APR.	8	06	28	37.4	61.41 N.	148.22 W.	24	...	...	3.5M	III	G	APR.	7	08	P.M.	AST
APR.	10	06	50	20.1	66.05 N.	149.09 W.	33	...	...	4.5M	...	G	APR.	9	08	P.M.	AST
APR.	11	02	36	46.4	60.56 N.	149.72 W.	67	3.8	...	...	...	G	APR.	10	04	P.M.	AST
APR.	11	23	28	25.6	52.85 N.	169.79 W.	33	4.2	...	3.7M	...	G	APR.	11	12	P.M.	BST
APR.	12	19	09	02.1	60.11 N.	153.15 W.	152	...	...	...	...	G	APR.	12	09	A.M.	AST
APR.	14	16	00	42.2	52.23 N.	169.41 W.	38	4.6	...	...	...	G	APR.	14	05	A.M.	BST
APR.	15	08	14	16.9	60.60 N.	151.60 W.	83	4.1	...	...	...	G	APR.	14	10	P.M.	AST
APR.	16	09	21	46.7	63.16 N.	150.57 W.	127	...	...	...	...	G	APR.	15	11	P.M.	AST
APR.	17	15	59	05.3	52.48 N.	173.53 W.	33	5.0	4.7	5.3M	...	G	APR.	17	04	A.M.	BST
APR.	17	17	52	16.3	52.08 N.	178.08 E.	137	4.3	...	...	...	G	APR.	17	06	A.M.	BST
APR.	17	23	29	18.4	58.19 N.	154.73 W.	91	4.6	...	...	...	G	APR.	17	01	P.M.	AST
APR.	19	11	10	25.2	62.58 N.	142.36 W.	33	...	...	3.3M	...	G	APR.	19	01	A.M.	AST
APR.	19	13	29	38.0	58.72 N.	139.26 W.	15	3.7	...	3.7M	...	G	APR.	19	04	A.M.	YST
APR.	21	16	11	13.8	60.77 N.	151.19 W.	77	...	...	...	...	G	APR.	21	06	A.M.	AST
APR.	22	09	30	46.6	51.64 N.	176.80 W.	62	4.6	...	...	IV	G	APR.	21	10	P.M.	BST
APR.	23	23	20	26.0	56.47 N.	152.72 W.	33	4.4	...	...	...	G	APR.	23	01	P.M.	AST
APR.	23	23	52	36.7	62.94 N.	148.92 W.	81	4.5	...	...	V	G	APR.	23	01	P.M.	AST
APR.	24	01	38	53.8	62.47 N.	151.40 W.	92	...	...	...	...	G	APR.	23	03	P.M.	AST
APR.	24	07	52	52.9	59.35 N.	151.83 W.	33	4.0	...	4.2M	FELT	G	APR.	23	09	P.M.	AST
APR.	24	21	29	43.6	60.52 N.	152.77 W.	135	4.0	...	...	...	G	APR.	24	11	A.M.	AST
APR.	27	23	59	46.5	52.33 N.	168.50 W.	33	4.7	...	4.1M	...	G	APR.	27	12	P.M.	BST
APR.	30	01	11	38.0	61.96 N.	148.91 W.	52	3.6	...	2.9M	FELT	G	APR.	29	03	P.M.	AST
APR.	30	02	52	13.5	53.31 N.	167.49 W.	33	4.1	...	3.7M	...	G	APR.	29	03	P.M.	BST
APR.	30	16	44	09.5	59.42 N.	152.91 W.	129	4.3	...	...	...	G	APR.	30	06	A.M.	AST
APR.	30	21	18	10.3	63.22 N.	149.62 W.	110	4.7	...	...	...	G	APR.	30	11	A.M.	AST
APR.	30	23	12	25.4	52.58 N.	173.14 E.	41	4.7	...	4.0M	...	G	APR.	30	12	P.M.	BST
MAY	3	19	15	32.1	59.42 N.	153.08 W.	115	3.8	...	...	...	G	MAY	3	09	A.M.	AST
MAY	3	21	04	43.9	59.99 N.	153.43 W.	142	4.0	...	...	...	G	MAY	3	11	A.M.	AST
MAY	5	21	28	01.6	61.66 N.	149.66 W.	64	4.4	...	...	IV	G	MAY	5	11	A.M.	AST
MAY	7	17	18	44.6	51.31 N.	173.25 W.	33	4.4	...	...	...	G	MAY	7	06	A.M.	BST
MAY	10	19	12	28.3	61.51 N.	146.36 W.	33	...	...	3.0M	...	G	MAY	10	09	A.M.	AST
MAY	10	22	52	43.6	56.23 N.	161.46 W.	202	4.3	...	...	...	G	MAY	10	11	A.M.	BST
MAY	14	00	51	36.3	59.92 N.	141.04 W.	15	...	...	4.0M	...	G	MAY	13	02	P.M.	AST
MAY	15	14	07	24.4	60.04 N.	150.46 W.	64	...	...	...	...	G	MAY	15	04	A.M.	AST
MAY	15	18	14	24.9	58.25 N.	151.75 W.	14	3.8	...	3.1M	...	G	MAY	15	08	A.M.	AST
MAY	16	14	38	16.3	61.93 N.	150.64 W.	81	...	...	...	...	G	MAY	16	04	A.M.	AST
MAY	16	22	24	51.5	51.47 N.	175.92 E.	52	4.4	...	4.5M	...	G	MAY	16	11	A.M.	BST
MAY	17	09	00	02.5	53.68 N.	163.80 W.	35	4.4	...	4.2M	...	G	MAY	16	10	P.M.	BST
MAY	18	02	40	10.7	51.30 N.	175.03 W.	37	5.0	5.0	4.6M	III	G	MAY	17	03	P.M.	BST
MAY	18	04	38	56.7	51.67 N.	175.29 W.	33	4.3	...	...	...	G	MAY	17	05	P.M.	BST
MAY	18	06	36	04.0	50.95 N.	175.00 W.	51	4.3	...	...	...	G	MAY	17	07	P.M.	BST
MAY	18	07	56	53.5	51.65 N.	175.04 W.	44	4.7	...	...	III	G	MAY	17	08	P.M.	BST
MAY	18	08	05	37.0	51.21 N.	174.72 W.	33	3.9	...	...	...	G	MAY	17	09	P.M.	BST
MAY	18	09	01	41.1	51.77 N.	174.99 W.	52	4.3	...	...	...	G	MAY	17	10	P.M.	BST
MAY	18	14	30	57.9	51.61 N.	175.06 W.	47	4.5	4.4	...	...	G	MAY	18	03	A.M.	BST
MAY	18	18	02	10.5	51.49 N.	175.02 W.	48	4.6	...	...	...	G	MAY	18	07	A.M.	BST
MAY	19	20	19	38.1	51.50 N.	175.00 W.	43	4.4	...	...	...	G	MAY	19	09	A.M.	BST
MAY	20	15	05	40.1	62.35 N.	150.98 W.	95	3.7	...	...	...	G	MAY	20	05	A.M.	AST
MAY	21	20	29	31.5	59.78 N.	152.92 W.	117	4.6	...	...	FELT	G	MAY	21	10	A.M.	AST

Table 1.--Summary of U.S. earthquakes for April-June 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	Date	Hour
ALASKA--Continued															
MAY 23	19	14	00.7	61.84 N.	150.94 W.	77	...	...	...	...	G	MAY 23	09	A.M.	AST
MAY 25	02	30	18.6	65.78 N.	155.62 W.	33	...	...	3.6M	...	G	MAY 24	04	P.M.	AST
MAY 28	19	08	20.8	60.17 N.	152.82 W.	115	4.1	...	...	...	G	MAY 28	09	A.M.	AST
MAY 30	12	44	51.6	59.86 N.	152.96 W.	133	...	...	...	...	G	MAY 30	02	A.M.	AST
MAY 30	20	56	06.0	60.80 N.	151.65 W.	82	4.3	...	...	FELT	G	MAY 30	10	A.M.	AST
JUNE 1	10	51	08.6	51.82 N.	175.66 E.	33	4.7	...	...	...	G	MAY 31	11	P.M.	BST
JUNE 5	04	04	37.7	61.71 N.	149.62 W.	56	...	...	...	...	G	JUNE 4	06	P.M.	AST
JUNE 5	07	09	19.1	52.28 N.	165.20 W.	33	5.5	...	4.9M	III	G	JUNE 4	08	P.M.	BST
JUNE 5	12	53	37.7	63.24 N.	149.57 W.	109	...	...	...	...	G	JUNE 5	02	A.M.	AST
JUNE 5	16	44	58.5	63.10 N.	150.47 W.	133	...	...	...	...	G	JUNE 5	06	A.M.	AST
JUNE 7	10	52	53.2	62.49 N.	151.43 W.	101	...	...	...	...	G	JUNE 7	00	A.M.	AST
JUNE 7	17	52	33.9	53.83 N.	165.13 W.	33	5.0	...	4.6M	...	G	JUNE 7	06	A.M.	BST
JUNE 7	19	42	24.9	59.25 N.	153.74 W.	134	...	...	...	...	G	JUNE 7	09	A.M.	AST
JUNE 9	01	46	30.0	51.62 N.	176.17 E.	33	4.6	...	5.4M	...	G	JUNE 8	02	P.M.	BST
JUNE 10	02	50	24.4	58.31 N.	152.65 W.	33	4.1	...	3.4M	...	G	JUNE 9	04	P.M.	AST
JUNE 10	22	59	10.5	60.67 N.	152.09 W.	117	4.1	...	...	...	G	JUNE 10	12	P.M.	AST
JUNE 11	04	54	43.3	63.00 N.	150.95 W.	107	3.8	...	...	...	G	JUNE 10	06	P.M.	AST
JUNE 13	13	21	14.7	53.63 N.	163.53 W.	23	5.0	4.4	4.7M	...	G	JUNE 13	02	A.M.	BST
JUNE 14	04	56	23.1	63.32 N.	151.48 W.	11	...	...	3.2M	...	G	JUNE 13	06	P.M.	AST
JUNE 15	01	59	40.4	59.90 N.	147.25 W.	33	...	...	3.7M	...	G	JUNE 14	03	P.M.	AST
JUNE 16	01	32	34.4	60.23 N.	147.84 W.	113	...	...	...	...	G	JUNE 15	03	P.M.	AST
JUNE 17	09	55	57.2	61.41 N.	146.81 W.	72	...	...	...	...	G	JUNE 16	11	P.M.	AST
JUNE 18	17	23	51.1	56.80 N.	152.78 W.	33	4.6	...	3.7M	...	G	JUNE 18	07	A.M.	AST
JUNE 21	03	47	43.4	52.31 N.	176.08 W.	164	4.2	...	...	...	G	JUNE 20	04	P.M.	BST
JUNE 21	16	07	57.7	56.88 N.	154.42 W.	33	4.3	...	4.3M	...	G	JUNE 21	06	A.M.	AST
JUNE 22	04	16	42.8	58.99 N.	136.17 W.	27	4.4	3.6	4.5M	V	G	JUNE 21	08	P.M.	PST
JUNE 22	08	09	22.5	52.73 N.	167.09 W.	43	4.9	...	...	...	G	JUNE 21	09	P.M.	BST
JUNE 25	01	36	36.5	54.94 N.	159.91 W.	33	4.8	...	5.2M	II	G	JUNE 24	03	P.M.	AST
JUNE 25	13	23	26.5	59.31 N.	153.24 W.	111	4.7	...	...	...	G	JUNE 25	03	A.M.	AST
JUNE 26	12	40	21.0	51.60 N.	179.76 E.	63	4.8	...	...	...	G	JUNE 26	01	A.M.	BST
JUNE 27	10	43	25.4	62.43 N.	149.03 W.	88	...	...	...	...	G	JUNE 27	00	A.M.	AST
JUNE 27	22	59	47.9	53.57 N.	163.55 W.	31	4.5	4.0	4.5M	...	G	JUNE 27	11	A.M.	BST
JUNE 28	02	37	46.7	59.87 N.	151.79 W.	33	...	...	3.4M	...	G	JUNE 27	04	P.M.	AST
JUNE 28	04	36	38.0	60.18 N.	140.28 W.	15	4.5	...	4.4M	...	G	JUNE 27	07	P.M.	YST
JUNE 29	05	37	36.6	61.27 N.	147.56 W.	68	...	...	...	...	G	JUNE 28	07	P.M.	AST
JUNE 29	07	36	44.8	50.12 N.	179.06 E.	22	4.4	4.7	...	...	G	JUNE 28	08	P.M.	BST
JUNE 29	16	28	15.9	59.79 N.	153.18 W.	130	...	...	...	...	G	JUNE 29	06	A.M.	AST
JUNE 30	02	19	48.1	61.47 N.	151.86 W.	109	...	...	...	...	G	JUNE 29	04	P.M.	AST
ARKANSAS															
APR. 29	15	09	32.9	35.34 N.	90.14 W.	8	...	...	2.8G	FELT	K	APR. 29	09	A.M.	CST
JUNE 26	08	33	27.0	35.85 N.	90.07 W.	9	...	...	3.6G	V	K	JUNE 26	02	A.M.	CST
CALIFORNIA															
APR. 1	02	05	14.6	33.58 N.	116.83 W.	11	...	...	3.4P	...	P	MAR. 31	06	P.M.	PST
APR. 7	06	23	28.3	32.95 N.	116.30 W.	7	...	...	3.0P	...	P	APR. 6	10	P.M.	PST
APR. 11	04	13	24.1	38.05 N.	118.60 W.	5	...	...	3.7B	...	B	APR. 10	08	P.M.	PST
APR. 11	21	47	43.2	35.37 N.	118.48 W.	1	...	...	3.0P	...	P	APR. 11	01	P.M.	PST
APR. 11	23	47	10.8	37.78 N.	121.77 W.	22	...	...	3.5B	FELT	B	APR. 11	03	P.M.	PST
APR. 13	02	37	50.2	37.60 N.	118.87 W.	3	...	...	3.1P	...	P	APR. 12	06	P.M.	PST
APR. 13	07	37	56.6	37.56 N.	118.91 W.	13	...	...	3.1B	...	B	APR. 12	11	P.M.	PST
APR. 13	22	16	15.9	40.20 N.	124.41 W.	5	4.3	...	4.2B	FELT	B	APR. 13	02	P.M.	PST
APR. 18	00	35	40.8	38.06 N.	118.61 W.	5	...	...	3.7B	...	B	APR. 17	04	P.M.	PST
APR. 19	08	46	49.8	35.82 N.	117.78 W.	5	4.4	...	3.8P	...	P	APR. 19	00	A.M.	PST
APR. 19	08	54	04.4	35.85 N.	117.78 W.	7	...	...	3.3P	...	P	APR. 19	00	A.M.	PST
APR. 19	09	02	11.0	35.80 N.	117.78 W.	6	4.5	...	4.2P	V	P	APR. 19	01	A.M.	PST
APR. 19	09	02	49.7	35.85 N.	117.78 W.	8	4.4	...	4.5P	V	P	APR. 19	01	A.M.	PST
APR. 19	09	19	57.3	35.78 N.	117.78 W.	6	4.3	...	4.1P	...	P	APR. 19	01	A.M.	PST
APR. 20	01	37	41.6	33.32 N.	116.70 W.	15	...	...	3.4P	...	P	APR. 19	05	P.M.	PST
APR. 20	19	21	09.7	37.47 N.	118.87 W.	6	...	...	3.0P	...	P	APR. 20	11	A.M.	PST
APR. 20	23	44	55.1	40.25 N.	124.54 W.	11	...	...	3.5B	...	B	APR. 20	03	P.M.	PST
APR. 22	06	28	51.0	33.12 N.	115.65 W.	5	...	...	3.4P	V	P	APR. 21	10	P.M.	PST
APR. 23	03	35	28.2	35.82 N.	117.78 W.	5	...	...	3.3P	...	P	APR. 22	07	P.M.	PST
APR. 23	06	15	51.6	32.75 N.	115.60 W.	10	...	...	3.0P	FELT	P	APR. 22	10	P.M.	PST

Table 1.--Summary of U.S. earthquakes for April-June 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	Date	Hour		
																Date	Hour
CALIFORNIA--Continued																	
APR.	24	02	58	47.5	33.15 N.	115.63 W.	1	...	...	3.0P	...	P	APR.	23	06	P.M.	PST
APR.	25	02	11	54.8	33.12 N.	115.63 W.	4	...	...	4.1P	FELT	P	APR.	24	06	P.M.	PST
APR.	25	02	13	37.1	33.10 N.	115.63 W.	5	...	...	3.1P	...	P	APR.	24	06	P.M.	PST
APR.	25	03	42	40.8	33.12 N.	115.62 W.	6	...	...	3.1P	...	P	APR.	24	07	P.M.	PST
APR.	25	07	03	13.6	33.12 N.	115.65 W.	10	4.4	...	3.9P	FELT	P	APR.	24	11	P.M.	PST
APR.	25	07	41	06.5	37.62 N.	118.91 W.	5	...	...	3.6B	FELT	G	APR.	24	11	P.M.	PST
APR.	25	13	36	45.7	33.12 N.	115.65 W.	6	...	...	3.3P	...	P	APR.	25	05	A.M.	PST
APR.	25	13	54	23.4	33.10 N.	115.65 W.	3	...	...	3.1P	...	P	APR.	25	05	A.M.	PST
APR.	25	17	24	03.7	33.10 N.	115.63 W.	2	...	...	3.4P	...	P	APR.	25	09	A.M.	PST
APR.	25	17	43	40.0	33.10 N.	115.63 W.	5	...	...	3.1P	...	P	APR.	25	09	A.M.	PST
APR.	25	19	10	49.6	33.12 N.	115.63 W.	1	...	...	3.0P	...	P	APR.	25	11	A.M.	PST
APR.	25	19	41	37.4	37.09 N.	121.89 W.	10	4.4	...	4.1B	VI	B	APR.	25	11	A.M.	PST
APR.	26	04	27	23.9	33.10 N.	115.63 W.	4	...	...	3.4P	...	P	APR.	25	08	P.M.	PST
APR.	26	10	58	08.7	33.12 N.	115.65 W.	5	...	...	3.8P	...	P	APR.	26	02	A.M.	PST
APR.	26	11	04	33.0	33.10 N.	115.65 W.	5	...	...	3.2P	...	P	APR.	26	03	A.M.	PST
APR.	26	12	00	13.2	33.13 N.	115.67 W.	5	...	...	3.1P	...	P	APR.	26	04	A.M.	PST
APR.	26	12	02	00.7	33.12 N.	115.65 W.	9	...	...	3.9P	...	P	APR.	26	04	A.M.	PST
APR.	26	12	05	57.1	33.10 N.	115.63 W.	5	4.2	...	4.0P	...	P	APR.	26	04	A.M.	PST
APR.	26	12	09	28.4	33.13 N.	115.65 W.	6	5.5	6.0	5.6P	VII	P	APR.	26	04	A.M.	PST
APR.	26	12	27	57.1	33.05 N.	115.68 W.	14	...	...	3.1P	...	P	APR.	26	04	A.M.	PST
APR.	26	12	40	45.0	33.10 N.	115.67 W.	9	...	...	4.2P	...	P	APR.	26	04	A.M.	PST
APR.	26	12	57	43.1	33.13 N.	115.60 W.	8	...	...	3.1P	...	P	APR.	26	04	A.M.	PST
APR.	26	12	59	21.1	33.08 N.	115.70 W.	2	...	...	3.4P	...	P	APR.	26	04	A.M.	PST
APR.	26	13	03	13.4	33.12 N.	115.60 W.	8	...	...	3.8P	...	P	APR.	26	05	A.M.	PST
APR.	26	13	09	01.4	33.15 N.	115.77 W.	5	...	...	3.1P	...	P	APR.	26	05	A.M.	PST
APR.	26	13	48	11.8	33.13 N.	115.62 W.	1	...	...	3.0P	...	P	APR.	26	05	A.M.	PST
APR.	26	14	43	01.0	33.10 N.	115.63 W.	5	...	...	3.1P	...	P	APR.	26	06	A.M.	PST
APR.	26	15	22	14.1	33.12 N.	115.60 W.	11	...	...	3.6P	...	P	APR.	26	07	A.M.	PST
APR.	26	15	43	57.3	33.12 N.	115.58 W.	6	...	...	3.7P	...	P	APR.	26	07	A.M.	PST
APR.	26	16	33	09.1	33.12 N.	115.65 W.	5	...	...	3.7P	...	P	APR.	26	08	A.M.	PST
APR.	26	17	42	26.0	33.15 N.	115.65 W.	1	...	...	3.5P	...	P	APR.	26	09	A.M.	PST
APR.	26	20	38	44.2	33.12 N.	115.63 W.	6	...	...	3.2P	...	P	APR.	26	12	P.M.	PST
APR.	26	20	56	22.1	33.12 N.	115.60 W.	3	...	...	3.2P	...	P	APR.	26	12	P.M.	PST
APR.	26	21	58	54.5	33.10 N.	115.63 W.	5	...	...	3.2P	...	P	APR.	26	01	P.M.	PST
APR.	27	02	55	49.5	33.12 N.	115.62 W.	6	...	...	3.5P	...	P	APR.	26	06	P.M.	PST
APR.	27	12	33	56.6	33.18 N.	115.67 W.	8	...	...	3.0P	...	P	APR.	27	04	A.M.	PST
APR.	27	16	48	30.6	33.07 N.	115.70 W.	6	...	...	3.1P	...	P	APR.	27	08	A.M.	PST
APR.	30	12	11	34.7	33.18 N.	115.50 W.	8	...	...	3.2P	...	P	APR.	30	04	A.M.	PST
APR.	30	15	18	00.0	33.18 N.	115.50 W.	14	...	...	3.3P	...	P	APR.	30	07	A.M.	PST
APR.	30	20	09	46.1	33.52 N.	116.50 W.	15	...	...	3.1P	...	P	APR.	30	12	P.M.	PST
MAY	2	02	11	05.4	35.92 N.	117.77 W.	5	...	...	3.2P	...	P	MAY	1	06	P.M.	PST
MAY	4	06	44	38.2	34.30 N.	118.32 W.	8	...	...	2.0P	FELT	P	MAY	3	10	P.M.	PST
MAY	4	18	41	02.7	33.47 N.	116.43 W.	15	...	...	3.0P	...	P	MAY	4	10	A.M.	PST
MAY	5	13	59	05.9	36.38 N.	118.07 W.	1	...	...	3.1P	...	P	MAY	5	05	A.M.	PST
MAY	5	14	34	52.8	36.40 N.	118.03 W.	1	...	...	3.1P	...	P	MAY	5	06	A.M.	PST
MAY	6	05	56	58.9	33.73 N.	118.03 W.	14	...	...	3.1P	FELT	P	MAY	5	09	P.M.	PST
MAY	7	01	02	37.9	37.99 N.	118.56 W.	15	4.4	...	4.5B	IV	B	MAY	6	05	P.M.	PST
MAY	9	22	58	13.1	32.95 N.	115.53 W.	11	...	...	3.0P	...	P	MAY	9	02	P.M.	PST
MAY	11	11	50	28.7	37.74 N.	122.01 W.	15	...	...	2.5B	IV	B	MAY	11	03	A.M.	PST
MAY	17	17	10	27.4	40.39 N.	121.66 W.	5	...	...	3.0B	...	G	MAY	17	09	A.M.	PST
MAY	18	14	39	13.5	37.94 N.	121.94 W.	5	...	...	2.5B	III	G	MAY	18	06	A.M.	PST
MAY	18	21	32	48.5	37.23 N.	117.90 W.	6	...	...	3.1P	IV	P	MAY	18	01	P.M.	PST
MAY	19	09	56	41.3	33.18 N.	115.55 W.	4	...	...	3.1P	...	P	MAY	19	01	A.M.	PST
MAY	20	17	21	31.4	36.98 N.	121.04 W.	10	...	...	3.7B	FELT	B	MAY	20	09	A.M.	PST
MAY	23	18	50	21.2	36.12 N.	117.87 W.	1	...	...	3.1P	...	P	MAY	23	10	A.M.	PST
MAY	26	11	41	07.4	40.30 N.	124.59 W.	33	4.3	...	4.7B	IV	G	MAY	26	03	A.M.	PST
MAY	31	03	36	37.6	40.87 N.	123.77 W.	33	...	...	3.7B	...	G	MAY	30	07	P.M.	PST
JUNE	3	05	29	03.5	34.15 N.	117.62 W.	13	...	...	3.0P	IV	P	JUNE	2	09	P.M.	PST
JUNE	4	06	24	56.3	32.97 N.	115.55 W.	15	...	...	2.7P	FELT	P	JUNE	3	10	P.M.	PST
JUNE	4	11	51	33.2	33.67 N.	117.37 W.	12	...	...	3.4P	V	P	JUNE	4	03	A.M.	PST
JUNE	4	12	23	13.8	39.36 N.	123.31 W.	11	...	...	3.6B	IV	B	JUNE	4	04	A.M.	PST
JUNE	4	14	26	35.6	33.67 N.	117.37 W.	12	...	...	3.0P	FELT	P	JUNE	4	06	A.M.	PST
JUNE	6	06	37	27.1	37.53 N.	118.86 W.	5	...	...	3.5B	...	G	JUNE	5	10	P.M.	PST
JUNE	6	06	56	04.3	37.56 N.	118.86 W.	5	...	...	3.2B	...	G	JUNE	5	10	P.M.	PST
JUNE	8	03	09	05.5	36.75 N.	121.36 W.	12	...	...	4.2B	IV	B	JUNE	7	07	P.M.	PST

Table 1.--Summary of U.S. earthquakes for April-June 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	P.M.	PST		
CALIFORNIA--Continued																	
JUNE	12	02	58	20.8	35.07 N.	118.42 W.	5	...	...	3.1P	...	P	JUNE	11	06	P.M.	PST
JUNE	12	06	06	07.3	34.35 N.	118.67 W.	15	...	...	3.8P	IV	P	JUNE	11	10	P.M.	PST
JUNE	12	11	02	46.4	33.25 N.	115.98 W.	4	...	...	3.8P	FELT	P	JUNE	12	03	A.M.	PST
JUNE	12	19	22	38.1	37.62 N.	118.90 W.	4	...	...	3.1P	...	P	JUNE	12	11	A.M.	PST
JUNE	16	12	16	19.2	33.87 N.	116.25 W.	3	...	...	3.1P	...	P	JUNE	16	04	A.M.	PST
JUNE	16	14	27	29.1	33.25 N.	115.98 W.	4	...	...	3.0P	...	P	JUNE	16	06	A.M.	PST
JUNE	22	04	57	47.3	35.10 N.	118.52 W.	4	...	...	4.0P	V	P	JUNE	21	08	P.M.	PST
JUNE	22	07	31	46.1	33.25 N.	115.97 W.	3	...	...	3.1P	...	P	JUNE	21	11	P.M.	PST
JUNE	22	18	03	10.6	33.75 N.	118.08 W.	6	...	...	2.6P	FELT	P	JUNE	22	10	A.M.	PST
JUNE	25	00	01	20.6	36.55 N.	120.64 W.	6	...	...	2.8B	...	G	JUNE	24	04	P.M.	PST
JUNE	25	11	37	07.8	40.18 N.	124.17 W.	5	...	...	3.7B	IV	B	JUNE	25	03	A.M.	PST
JUNE	26	01	43	27.0	36.56 N.	121.24 W.	5	...	...	3.0B	...	B	JUNE	25	05	P.M.	PST
JUNE	26	13	27	35.8	37.54 N.	118.94 W.	2	...	...	3.4B	...	B	JUNE	26	05	A.M.	PST
JUNE	27	13	58	47.2	40.23 N.	123.97 W.	11	...	...	3.8B	...	B	JUNE	27	05	A.M.	PST
JUNE	28	08	33	15.3	37.67 N.	118.87 W.	5	...	...	3.0P	...	P	JUNE	28	00	A.M.	PST
JUNE	28	16	33	56.7	37.41 N.	121.78 W.	5	...	...	2.5B	FELT	G	JUNE	28	08	A.M.	PST
JUNE	29	05	59	48.5	34.75 N.	118.80 W.	15	...	...	3.0P	...	P	JUNE	28	09	P.M.	PST
JUNE	30	02	30	51.4	37.67 N.	118.90 W.	6	...	...	3.0P	...	P	JUNE	29	06	P.M.	PST
JUNE	30	08	31	51.0	37.56 N.	118.89 W.	5	...	...	3.6B	...	B	JUNE	30	00	A.M.	PST
JUNE	30	08	32	53.0	37.60 N.	118.88 W.	8	...	...	3.1P	...	P	JUNE	30	00	A.M.	PST
CALIFORNIA--OFF THE COAST																	
APR	17	01	31	40.4	40.42 N.	125.27 W.	5	4.3	...	4.2B	V	B	APR.	16	05	P.M.	PST
MAY	9	18	11	47.4	40.40 N.	125.75 W.	10	...	...	3.6B	...	G	MAY	9	10	A.M.	PST
MAY	17	01	12	01.6	40.15 N.	126.76 W.	5	...	...	3.7B	...	B	MAY	16	05	P.M.	PST
JUNE	14	23	53	58.0	40.20 N.	124.60 W.	5	4.5	4.4	4.0B	IV	B	JUNE	14	03	P.M.	PST
JUNE	21	06	20	37.0	40.25 N.	124.69 W.	24	4.4	...	4.0B	IV	B	JUNE	20	10	P.M.	PST
JUNE	23	21	50	20.4	40.34 N.	125.35 W.	20	4.0	...	3.8B	...	B	JUNE	23	01	P.M.	PST
JUNE	24	07	36	22.3	40.30 N.	125.04 W.	5	...	...	3.5B	...	B	JUNE	23	11	P.M.	PST
JUNE	24	14	15	21.5	40.24 N.	124.90 W.	5	...	...	3.4B	...	B	JUNE	24	06	A.M.	PST
JUNE	25	18	49	38.4	40.54 N.	127.49 W.	10	3.5	...	...	...	G	JUNE	25	10	A.M.	PST
JUNE	25	18	59	39.5	40.49 N.	127.56 W.	10	...	...	...	...	G	JUNE	25	10	A.M.	PST
COLORADO																	
APR.	2	16	10	06.4	39.91 N.	104.95 W.	9	4.3	...	3.8G	VI	Z	APR.	2	09	A.M.	MST
HAWAII																	
APR.	1	10	00	39.4	21.23 N.	156.87 W.	0	...	...	3.7H	...	H	APR.	1	00	A.M.	HST
APR.	2	12	49	11.2	19.33 N.	155.20 W.	9	...	...	3.0H	...	H	APR.	2	02	A.M.	HST
APR.	18	06	26	19.4	19.34 N.	155.28 W.	2	...	...	3.7H	III	H	APR.	17	08	P.M.	HST
APR.	23	13	44	34.2	19.38 N.	155.07 W.	9	...	...	3.4H	III	H	APR.	23	03	A.M.	HST
APR.	24	08	48	41.0	19.33 N.	155.12 W.	9	...	...	3.1H	...	H	APR.	23	10	P.M.	HST
APR.	27	14	57	53.6	19.32 N.	155.12 W.	9	...	...	3.0H	...	H	APR.	27	04	A.M.	HST
APR.	27	21	29	21.5	19.27 N.	155.19 W.	3	...	...	3.4H	III	H	APR.	27	11	A.M.	HST
APR.	28	18	46	29.3	19.32 N.	155.18 W.	10	...	...	3.0H	III	H	APR.	28	08	A.M.	HST
APR.	30	11	15	33.4	19.39 N.	155.28 W.	3	...	...	3.1H	IV	H	APR.	30	01	A.M.	HST
MAY	2	12	36	07.5	19.30 N.	155.22 W.	11	...	...	3.8H	III	H	MAY	2	02	A.M.	HST
MAY	2	17	10	46.3	19.33 N.	155.13 W.	9	...	...	3.2H	II	H	MAY	2	07	A.M.	ST
MAY	7	12	47	59.7	19.33 N.	155.22 W.	9	...	...	3.2H	II	H	MAY	7	02	A.M.	HST
MAY	12	21	40	03.1	19.33 N.	155.19 W.	9	...	...	3.0H	...	H	MAY	12	11	A.M.	HST
MAY	14	07	03	30.2	19.33 N.	155.23 W.	10	...	...	3.4H	...	H	MAY	13	09	P.M.	HST
MAY	14	21	16	06.8	19.35 N.	155.22 W.	9	...	...	3.0H	III	H	MAY	14	11	A.M.	HST
MAY	17	19	21	45.6	19.33 N.	155.23 W.	10	...	...	3.2H	II	H	MAY	17	09	A.M.	HST
MAY	21	10	57	39.8	19.20 N.	155.70 W.	7	...	...	3.5H	...	H	MAY	21	00	A.M.	HST
MAY	22	23	44	44.8	18.75 N.	155.53 W.	26	...	...	3.8H	...	H	MAY	22	01	P.M.	HST
MAY	25	12	11	19.1	19.33 N.	155.22 W.	9	...	...	3.1H	III	H	MAY	25	02	A.M.	HST
MAY	26	10	10	04.6	19.33 N.	155.13 W.	8	...	...	3.0H	...	H	MAY	26	00	A.M.	HST
JUNE	1	03	25	25.8	19.48 N.	155.77 W.	10	...	...	3.2H	...	H	MAY	31	05	P.M.	HST
JUNE	1	08	32	00.1	19.45 N.	156.89 W.	31	...	...	3.0H	...	H	MAY	31	10	P.M.	HST
JUNE	2	20	24	21.9	19.37 N.	155.48 W.	10	...	...	3.2H	...	H	JUNE	2	10	A.M.	HST
JUNE	3	11	55	20.1	19.35 N.	155.10 W.	9	...	...	3.1H	...	H	JUNE	3	01	A.M.	HST
JUNE	6	20	32	25.2	19.39 N.	155.28 W.	3	...	...	3.1H	III	H	JUNE	6	10	A.M.	HST

Table 1.--Summary of U.S. earthquakes for April-June 1981--Continued

Date (1981)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time			
	hr	min	s				mb	MS	ML, M <sub>n</sub> or MD			Date	Hour		
HAWAII--Continued															
JUNE	9	07	12 07.8	19.36 N.	155.12 W.	8	...	...	3.4H	III	H	JUNE	8 09	P.M.	HST
JUNE	16	01	43 22.7	19.35 N.	155.22 W.	10	...	...	3.5H	III	H	JUNE	15 03	P.M.	HST
JUNE	17	19	12 41.1	19.36 N.	155.25 W.	9	...	...	3.0H	...	H	JUNE	17 09	A.M.	HST
JUNE	21	02	27 16.2	19.30 N.	155.26 W.	9	...	...	3.0H	...	H	JUNE	20 04	P.M.	HST
JUNE	21	11	14 37.3	19.33 N.	155.13 W.	9	...	...	3.0H	...	H	JUNE	21 01	A.M.	HST
JUNE	30	21	46 25.7	19.32 N.	155.22 W.	11	...	...	3.5H	II	H	JUNE	30 11	A.M.	HST
IDAHO															
APR.	15	18	46 37.8	44.40 N.	111.29 W.	5	...	...	3.8G	III	G	APR.	15 11	A.M.	MST
MAY	27	05	46 15.9	42.59 N.	111.73 W.	5	...	...	3.1G	IV	G	MAY	26 10	P.M.	MST
JUNE	6	23	47 39.8	44.67 N.	115.80 W.	5	...	...	3.4G	...	G	JUNE	6 03	P.M.	PST
ILLINOIS															
APR.	8	01	53 13.0	38.87 N.	89.38 W.	1	...	...	3.5S	FELT	S	APR.	7 07	P.M.	CST
JUNE	9	14	15 47.7	37.82 N.	89.02 W.	20	...	...	3.4S	V	S	JUNE	9 08	A.M.	CST
MISSOURI															
MAY	25	22	50 18.2	36.76 N.	91.63 W.	1	...	...	3.0S	III	S	MAY	25 04	P.M.	CST
NEVADA															
APR.	28	22	54 50.0	38.05 N.	118.57 W.	6	4.2	...	4.6B	IV	B	APR.	28 02	P.M.	PST
APR.	29	11	55 52.8	39.27 N.	119.77 W.	10	...	...	4.2B	V	B	APR.	29 03	A.M.	PST
APR.	30	14	35 00.0	37.18 N.	116.08 W.	0	...	...	3.4P	...	E	APR.	30 06	A.M.	PST
MAY	7	02	18 28.4	37.95 N.	118.53 W.	6	...	...	3.2P	...	P	MAY	6 06	P.M.	PST
MAY	29	16	00 00.0	37.10 N.	116.00 W.	0	4.2	...	4.5B	...	E	MAY	29 08	A.M.	PST
JUNE	6	18	00 00.0	37.30 N.	116.33 W.	0	5.5	4.2	5.4B	...	E	JUNE	6 10	A.M.	PST
JUNE	11	18	00 43.5	38.26 N.	115.91 W.	5	...	...	3.6G	...	G	JUNE	11 10	A.M.	PST
NEW HAMPSHIRE															
JUNE	28	22	42 35.0	43.56 N.	71.56 W.	2	...	...	3.0J	FELT	J	JUNE	28 05	P.M.	EST
NEW MEXICO															
MAY	4	10	55 29.7	32.24 N.	108.88 W.	5	...	...	3.0G	...	G	MAY	4 03	A.M.	MST
MAY	7	01	38 17.8	32.20 N.	108.90 W.	5	...	...	3.2G	...	G	MAY	6 06	P.M.	MST
MAY	9	12	35 50.8	33.99 N.	107.03 W.	5	...	...	3.1G	V	G	MAY	9 05	A.M.	MST
NORTH CAROLINA															
APR.	9	07	10 31.4	35.48 N.	82.07 W.	5	...	...	3.0G	V	G	APR.	9 02	A.M.	EST
APR.	9	12	02 37.4	35.50 N.	82.11 W.	7	...	...	2.7K	...	K	APR.	9 07	A.M.	EST
APR.	10	06	04 59.8	35.51 N.	82.06 W.	1	...	...	2.5K	...	K	APR.	10 01	A.M.	EST
MAY	5	21	21 57.9	35.33 N.	82.43 W.	13	...	...	3.5V	VI	K	MAY	5 04	P.M.	EST
JUNE	3	20	54 22.4	36.21 N.	81.65 W.	1	...	...	3.0V	V	G	JUNE	3 03	P.M.	EST
OREGON--OFF THE COAST															
APR.	2	14	02 56.8	42.58 N.	126.53 W.	10	4.4	...	...	...	G	APR.	2 06	A.M.	PST
APR.	19	18	32 28.3	43.94 N.	128.31 W.	10	4.5	...	...	...	G	APR.	19 10	A.M.	PST
APR.	20	08	51 49.5	44.04 N.	128.46 W.	10	4.5	...	...	...	G	APR.	20 00	A.M.	PST
APR.	24	21	23 08.4	42.56 N.	126.67 W.	10	4.3	...	...	...	G	APR.	24 01	P.M.	PST
MAY	10	04	13 31.4	43.41 N.	126.72 W.	10	4.9	4.6	4.8B	...	G	MAY	9 08	P.M.	PST
MAY	29	04	35 20.7	43.42 N.	126.84 W.	10	4.1	...	...	...	G	MAY	28 08	P.M.	PST
MAY	31	03	56 48.9	43.71 N.	127.39 W.	10	4.3	...	...	...	G	MAY	30 07	P.M.	PST
JUNE	6	10	57 54.2	43.44 N.	126.71 W.	10	4.1	...	...	...	G	JUNE	6 02	A.M.	PST
JUNE	10	13	39 29.2	43.71 N.	127.65 W.	10	4.2	...	...	...	G	JUNE	10 05	A.M.	PST
JUNE	19	00	41 10.7	43.18 N.	126.39 W.	10	4.3	...	...	...	G	JUNE	18 04	P.M.	PST

Table 1.—Summary of U.S. earthquakes for April-June 1981—Continued

Date (1981)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML, Ma or MD			Date	Hour				
RHODE ISLAND																	
APR.	3	09	24	12.5	41.59 N.	71.22 W.	1	...	...	2.7J	V	J	APR.	3	04	A.M.	EST
TENNESSEE																	
APR.	2	06	32	40.9	35.43 N.	84.38 W.	3	...	...	2.6K	...	K	APR.	2	01	A.M.	EST
APR.	25	16	30	30.8	36.24 N.	89.59 W.	6	...	...	2.6S	...	S	APR.	25	10	A.M.	GST
MAY	29	14	56	12.2	36.28 N.	89.49 W.	4	...	...	2.3K	FELT	K	MAY	29	08	A.M.	GST
TEXAS																	
JUNE	9	01	46	33.1	32.14 N.	94.40 W.	5	...	...	3.0T	IV	G	JUNE	8	07	P.M.	CST
UTAH																	
APR.	5	05	40	40.0	37.61 N.	113.30 W.	2	4.2	...	4.5U	V	U	APR.	4	10	P.M.	MST
APR.	11	08	08	02.5	41.86 N.	112.67 W.	2	...	...	3.1U	IV	U	APR.	11	01	A.M.	MST
MAY	14	05	11	04.1	39.48 N.	111.06 W.	1	4.5	...	3.5U	V	U	MAY	13	10	P.M.	MST
JUNE	9	19	12	18.5	39.51 N.	111.25 W.	5	...	...	2.8U	...	U	JUNE	9	12	P.M.	MST
WASHINGTON																	
MAY	1	10	06	23.0	46.37 N.	122.25 W.	9	...	...	2.9G	IV	W	MAY	1	02	A.M.	PST
MAY	13	05	00	36.2	46.37 N.	122.25 W.	11	4.1	...	4.1G	V	W	MAY	12	09	P.M.	PST
MAY	27	10	02	44.1	46.37 N.	122.26 W.	11	...	...	2.7G	FELT	W	MAY	27	02	A.M.	PST
MAY	28	08	56	02.7	46.53 N.	121.42 W.	4	4.3	...	3.7G	IV	W	MAY	28	00	A.M.	PST
MAY	28	09	10	46.0	46.53 N.	121.41 W.	4	4.8	4.3	4.3G	IV	W	MAY	28	01	A.M.	PST
JUNE	14	13	12	57.8	45.95 N.	120.49 W.	14	...	...	3.1G	...	W	JUNE	14	05	A.M.	PST
JUNE	23	00	05	28.2	48.83 N.	122.17 W.	6	...	...	3.1G	FELT	W	JUNE	22	04	P.M.	PST
WYOMING																	
MAY	6	19	26	01.9	43.41 N.	110.65 W.	5	...	...	3.7G	IV	G	MAY	6	12	P.M.	MST
MAY	12	10	18	14.0	43.54 N.	110.49 W.	5	...	...	3.0G	...	G	MAY	12	03	A.M.	MST
MAY	22	07	56	41.0	44.83 N.	111.00 W.	7	...	...	4.2G	IV	G	MAY	22	00	A.M.	MST

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
April-June 1981

[Sources of the hypocenters, magnitudes, and macroseismic data: (B) University of California, Berkeley; (C) Los Alamos National Laboratory, Los Alamos, New Mexico; (E) U.S. Department of Energy, Las Vegas, Nevada; (G) U.S. Geological Survey, National Earthquake Information Service; (H) U.S. Geological Survey, Hawaiian Volcano Observatory; (J) Weston Observatory, Massachusetts; (K) Tennessee Earthquake Information Center, Memphis; (M) National Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis, Missouri; (T) Oklahoma Geological Survey, Leonard; (U) University of Utah, Salt Lake; (V) Virginia Polytechnic Institute and State University, Blacksburg, (W) University of Washington, Seattle; (Z) Bollinger and others, 1982. 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  
-----

- 2 April (G) Central Alaska  
Origin time: 16 10 43.7  
Epicenter: 62.63 N., 141.92 W.  
Depth: Normal.  
Magnitude: 4.5 mb(G), 4.3 ML(M)  
  
Felt at Northway (M).
- 8 April (G) Southern Alaska  
Origin time: 06 28 37.4  
Epicenter: 61.41 N., 148.22 W.  
Depth: 24 km  
Magnitude: 3.5 ML(M)  
Intensity III: Butte (M).  
Intensity II: Anchorage (M), Palmer (M).
- 22 April (G) Andreanof Islands, Aleutian Islands  
Origin time: 09 30 46.6  
Epicenter: 51.64 N., 176.80 W.  
Depth: 62 km  
Magnitude: 4.6 mb(G)  
Intensity IV: Adak (M).
- 23 April (G) Southern Alaska  
Origin time: 23 52 36.7  
Epicenter: 62.94 N., 148.92 W.  
Depth: 81 km  
Magnitude: 4.5 mb(G)  
Intensity V: Eagle River (few items thrown from store shelves, few small objects overturned and fell, few windows cracked, felt by many).  
Intensity IV: Anchorage (M), Cantwell, Gold Creek (M), Sutton.  
Intensity III: Anchorage (M), Skwentna.
- 24 April (G) Kenai Peninsula  
Origin time: 07 52 52.9  
Epicenter: 59.35 N., 151.83 W.  
Depth: Normal.  
Magnitude: 4.0 mb(G), 4.2 ML(M)  
  
Felt at Homer (M).
- 30 April (G) Southern Alaska  
Origin time: 01 11 38.0  
Epicenter: 61.96 N., 148.91 W.

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
April-June 1981--Continued

-----  
Alaska--Continued  
-----

- Depth: 52 km  
Magnitude: 3.6 mb(G), 2.9 ML(M)  
  
Felt at Palmer (M).
- 5 May (G) Southern Alaska  
Origin time: 21 28 01.6  
Epicenter: 61.66 N., 149.66 W.  
Depth: 64 km  
Magnitude: 4.4 mb(G)  
  
The earthquake damaged a pipeline leading from a storage tank to a terminal at the Port of Anchorage and 168 gallons of diesel fuel was spilled (press report).  
  
Intensity IV: Anchorage, Butte (M), Chickaloon (M), Chugiak, Hope, Knik (M), Palmer, Sutton, Wasilla (M), Willow.  
Intensity III: Elmendorf Air Force Base, Fort Richards, Moose Pass, Skwentna, Talkeetna, Tyonek.
- 18 May (G) Andreanof Islands, Aleutian Islands  
Origin time: 02 40 10.7  
Epicenter: 51.30 N., 175.03 W.  
Depth: 37 km  
Magnitude: 5.0 mb(G), 5.0 MS(G), 4.6 ML(M)  
Intensity III: Adak (M).
- 18 May (G) Andreanof Islands, Aleutian Islands  
Origin time: 07 56 53.5  
Epicenter: 51.65 N., 175.04 W.  
Depth: 44 km  
Magnitude: 4.7 mb(G)  
Intensity III: Adak (M).
- 21 May (G) Southern Alaska  
Origin time: 20 29 31.5  
Epicenter: 59.78 N., 152.92 W.  
Depth: 117 km  
Magnitude: 4.6 mb(G)  
  
Felt over the entire Kenai Peninsula and at Anchorage (M).
- 30 May (G) Kenai Peninsula  
Origin time: 20 56 06.0  
Epicenter: 60.80 N., 151.65 W.  
Depth: 82 km  
Magnitude: 4.3 mb(G)  
  
Felt at Anchorage (M).
- 5 June (G) Southern Alaska  
Origin time: 07 09 19.1  
Epicenter: 52.28 N., 165.20 W.  
Depth: Normal.

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

-----  
Alaska--Continued  
-----

Magnitude: 5.5 mb(G), 4.9 ML(M)  
Intensity III: Palmer.

22 June (G) Southeastern Alaska  
Origin time: 04 16 42.8  
Epicenter: 58.99 N., 136.17 W.  
Depth: 27 km  
Magnitude: 4.4 mb(G), 3.6 MS(G),  
4.5 ML(M)

Intensity V:  
United States--

Alaska--  
Gustavus (few windows cracked, some glassware broken, few small objects overturned and fell, few items thrown from store shelves).  
Haines (few windows cracked, felt by many).  
Skagway (hairline cracks in plaster walls, small objects overturned, few items thrown from store shelves).

Intensity IV:  
United States--  
Alaska--Tenakee Springs.

Intensity III:  
Canada--  
Yukon Territory--Whitehorse.

Felt:  
United States--  
Alaska--Douglas, Glacier Bay area (M).

25 June (G) South of Alaska  
Origin time: 01 36 36.5  
Epicenter: 54.94 N., 159.91 W.  
Depth: Normal.  
Magnitude: 4.8 mb(G), 5.2 ML(M)  
Intensity II: Sand Point (M).

-----  
Arizona  
-----

5 April (U) Southwestern Utah  
Origin time: 05 40 40.0

See Utah listing.

-----  
Arkansas  
-----

29 April (K) Northeastern Arkansas  
Origin time: 15 09 32.9  
Epicenter: 35.34 N., 90.14 W.  
Depth: 8 km  
Magnitude: 2.8 Mn(G), 2.7 MD(K),  
3.0 Mn(S)

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

-----  
Arkansas--Continued  
-----

Felt at the Wapanocca National Wildlife Refuge, Arkansas, and at Shelby Forest State Park, Tennessee (K).

26 June (K) Northeastern Arkansas  
Origin time: 08 33 27.0  
Epicenter: 35.85 N., 90.07 W.  
Depth: 9 km  
Magnitude: 3.6 Mn(G), 3.4 MD(K),  
3.5 Mn(S)

Intensity V:  
Blytheville (few windows cracked; windows, doors, and dishes rattled; felt by and awakened few).  
Dell (few small objects overturned and fell, hanging pictures swung, felt by and awakened many).  
Roseland (one broken window--press report).

Intensity IV: Burdette, Leachville, Luxora.  
Intensity III: Dearman (K).

-----  
California  
-----

11 April (B) Central California  
Origin time: 23 47 10.8  
Epicenter: 37.78 N., 121.77 W.  
Depth: 22 km  
Magnitude: 3.5 ML(B)  
Felt: Antioch (B), Brentwood (press report), Byron (B), Concord (B), Dublin (B), Livermore (B), Pleasanton (B), San Ramon (B), Walnut Creek (B).

13 April (B) Northern California  
Origin time: 22 16 15.9  
Epicenter: 40.20 N., 124.41 W.  
Depth: 5 km  
Magnitude: 4.3 mb(G), 4.2 ML(B)

Felt at Petrolia (B).

19 April (P) Southern California  
Origin time: 09 02 11.0  
Epicenter: 35.80 N., 117.78 W.  
Depth: 6 km  
Magnitude: 4.5 mb(G), 4.2 ML(P)

This was the first in a swarm of quakes in this area (press report).

Intensity VI: Trona (elevated water tanks cracked, hairline cracks in plaster and and dry wall, few items thrown from store

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

California--Continued	
	shelves, light furniture overturned, few windows cracked).
	<u>Intensity IV:</u> Inyokern, Kernville, Pearsonville, Ridgecrest.
	<u>Intensity III:</u> Bakersfield, California Hot Springs, Lake Isabella.
19 April (P) Southern California	
Origin time:	09 02 49.7
Epicenter:	35.85 N., 117.78 W.
Depth:	8 km
Magnitude:	4.4 mb(G), 4.5 ML(P)
	The intensity data could not be differentiated from the earthquake at 09 02 11.0, thus the effects listed above apply equally to this event.
22 April (P) Imperial Valley	
Origin time:	06 28 51.0
Epicenter:	33.12 N., 115.65 W.
Depth:	5 km
Magnitude:	3.4 ML(P)
	This was the largest earthquake in a swarm occurring in the Imperial Valley beginning on April 21 (press report).
	<u>Intensity V:</u>
	Calexico (hairline cracks in plaster walls, few small objects overturned, felt by all).
	Westmorland (few items thrown from store shelves, few small objects overturned and fell).
	<u>Intensity IV:</u> El Centro, Heber, Niland.
	<u>Intensity II:</u> Brawley (press report), Imperial.
23 April (P) Imperial Valley	
Origin time:	06 15 51.6
Epicenter:	32.75 N., 115.60 W.
Depth:	10 km
Magnitude:	3.0 ML(P)
	Felt at El Centro (P).
25 April (P) Imperial Valley	
Origin time:	02 11 54.8
Epicenter:	33.12 N., 115.63 W.
Depth:	4 km
Magnitude:	4.1 ML(P)
	This was the strongest earthquake in a swarm in this area that occurred on April 25 and 26.
	<u>Felt:</u> Brawley, El Centro, and Westmorland (press report).

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

California--Continued	
25 April (P) Imperial Valley	
Origin time:	07 03 13.6
Epicenter:	33.12 N., 115.65 W.
Depth:	10 km
Magnitude:	4.4 mb(G), 3.9 ML(P)
	Felt in the Imperial Valley (telephone report).
25 April (G) Owens Valley area	
Origin time:	07 41 06.5
Epicenter:	37.62 N., 118.91 W.
Depth:	5 km
Magnitude:	3.6 ML(B), 3.7 ML(P)
	Felt at Mammoth Lakes (P).
25 April (B) Central California	
Origin time:	19 41 37.4
Epicenter:	37.09 N., 121.89 W.
Depth:	10 km
Magnitude:	4.4 mb(G), 4.1 ML(B)
	This earthquake was felt throughout the San Francisco Bay area, San Jose, and Monterey Bay area (B).
	<u>Intensity VI:</u> Watsonville (foundation cracked, few items thrown from store shelves, glassware and dishes broke).
	<u>Intensity V:</u>
	Capitola (few items thrown from store shelves, few small objects overturned and fell, felt by many).
	Santa Cruz (china broken, vase knocked off and broken--press report).
	Soquel (mobile home moved off its foundation--press report).
	<u>Intensity IV:</u> Aptos, Ben Lomond, Boulder Creek, Carmel Valley, Felton, Los Gatos, Monterey, New Almaden, Salinas, San Gregorio.
	<u>Intensity III:</u> Davenport, Morgan Hill, Moss Landing, Pittsburg, Pleasanton, Redwood City, Redwood Estates.
	<u>Intensity II:</u> Daly City, Hollister, Holy City, San Francisco.
	<u>Felt:</u> Mount Eden.
26 April (P) Imperial Valley	
Origin time:	12 09 28.4
Epicenter:	33.13 N., 115.65 W.
Depth:	6 km
Magnitude:	5.5 mb(G), 6.0 MS(G), 5.6 ML(P), 6.3 ML(B)
	This earthquake was the largest in a swarm of at least 40 quakes which occurred in

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

California--Continued

this area from April 24-28. It was felt over an area of approximately 73,500 sq km of California and Arizona (fig. 7). No injuries were reported, but several people reported being jolted out of their beds. The maximum intensity of VII was assigned to Westmorland and Calipatria based mostly on extensive building damage. The preliminary estimates of property loss range from 1-3 million dollars. Much of the information listed below was taken from L. M. Barnhard (1982).

Twelve buildings in Westmorland were severely damaged; an additional 30 sustained minor damage; and 70% of the town's 900 homes, many built of adobe and red brick, were damaged. City officials ordered the demolition of ten downtown buildings that were damaged beyond repair and five homes were condemned. Six mobile homes were knocked off their foundations and nine homes suffered minor damage to their foundations, porches, and walls. At least 300 homes lost electricity for 1 hour after the quake when lines and relays were knocked out. Pipes connecting four water filtration vats to the city water system were broken; as a result water supply to Westmorland was interrupted for 10 hours after the quake. Two of the legs on the water storage tower bowed and the tower was leaking. At the municipal waste water treatment plant the quake knocked a giant stirrer, called a clarifier, off its axis. The sewage plant sustained an estimated \$40,000 damage. Total damage at Westmorland was estimated at \$1.5 million.

Subsidence was reported on several rural roads in the area and scores of "mudpots," puddles of oozing soil, formed in nearby fields. One country road west of Westmorland collapsed producing a 2-foot drop off. On State Highway 111 near Calipatria a 1-inch crack appeared on the road with another 1-inch crack running parallel to the highway for about 600 yards (press reports).

Primary damage in rural areas consisted of broken unreinforced, concrete-lined irrigation canals. The total estimated cost of repair to canals was placed at approximately \$100,000 according to the Imperial Valley Irrigation District. Concrete on two stretches of the Vail Canal, totalling about 700 feet between Calipatria and

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

California--Continued

Westmorland, cracked and the earthen embankment beneath the cracked concrete washed away. Also, several bridges sustained cracking and chipping of concrete. Ground and road pavement cracks were widespread (fig. 8).

The California Division of Mines and Geology (McJunkin and Kaliakin, 1981) reported a peak vertical acceleration (spike) of 0.80 g and peak horizontal accelerations of 0.49 g and 0.39 g were recorded on the strong-motion instruments at Westmorland's Fire Station.

Intensity VII: The most common effects at the places listed below were foundations cracked and destroyed, large cracks and partial collapse of exterior adobe and wood walls, interior walls fell, underground pipes broke, large cracks in highways and sidewalks, stone walls fell, hairline cracks in dry wall, large cracks in plaster walls, chimneys fell, some windows broken out, many small objects overturned and fell, many dishes and glassware broke, many items fell from store shelves, felt by and awakened all. Damage reports listed below are from Barnhard and others (1982).

California--

Calipatria--

The Herald Newspaper office on Main Street sustained moderate cracking of plaster walls and some plaster fell. Heavy furniture and shelves moved and trays of steel type-set were thrown down.

At Main Street and Sorenson Avenue bricks were thrown down from the parapet of the two-story brick drug-store.

On the north side of Main Street east of Sorenson Avenue bricks from the parapet of a one-story unreinforced concrete building fell onto the roof of the Farmers Business Service building causing it to collapse.

A grocery store, opposite the above-listed building on Main Street, lost merchandise valued at \$2,000. A small amount of plaster fell from an interior wall.

Damaged fuel tanks at Railroad Avenue and North Street spilled 2000 to 3000 gallons of fuel.

Route 86, the town's main street, was closed for fear that buildings along it might collapse. Concrete pillars

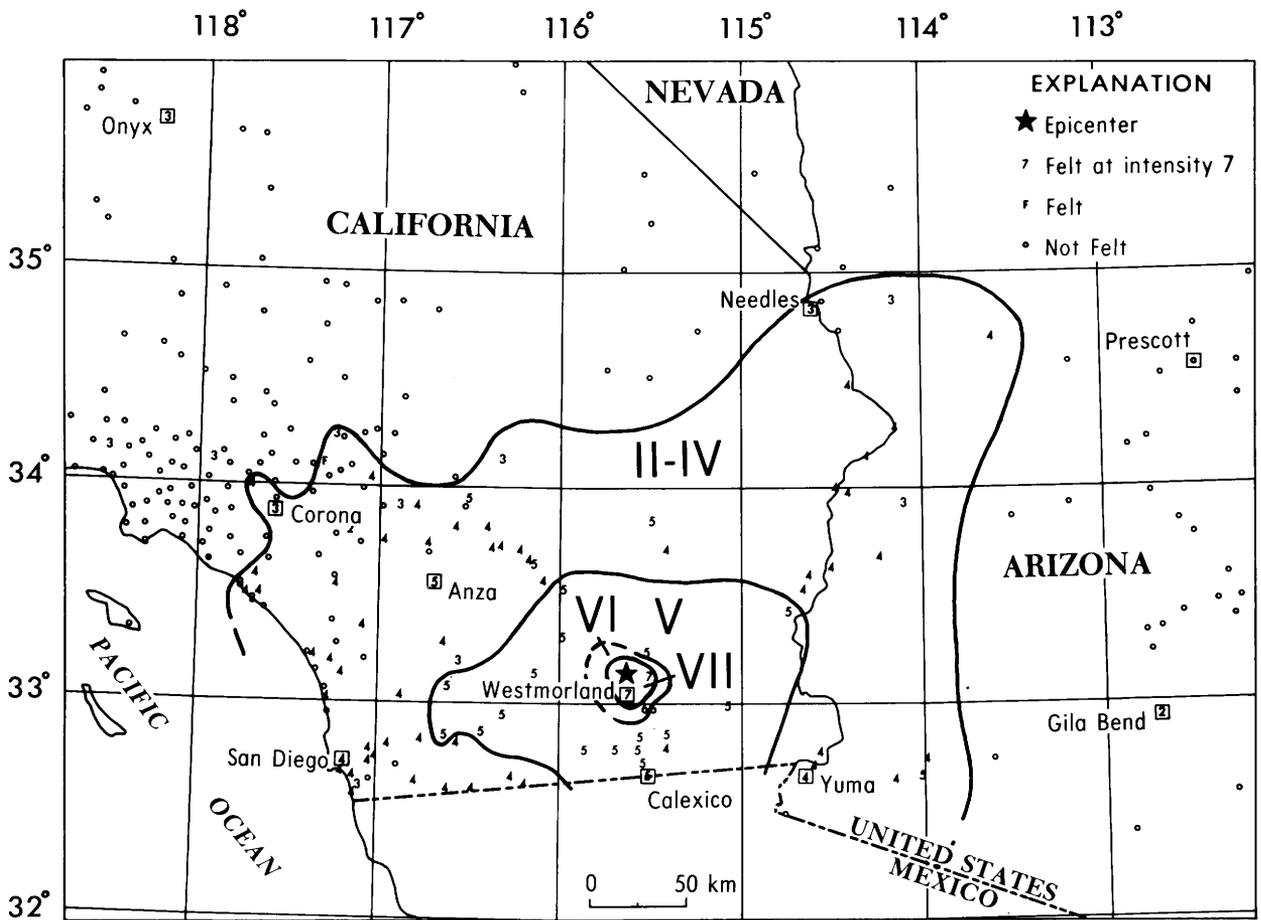


FIGURE 7.--Isoseismal map for the Imperial Valley, California earthquake of 26 April 1981, 12 09 28.4 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

California--Continued

California--Continued

holding up cantilevered upper stories of a number of the buildings had begun to crack (press reports).  
 Westmorland--  
 An adobe building (231, 239 and 241 West Main Street) was damaged beyond repair. The west wall fell on the roof of the adjoining building. The east wall collapsed entirely allowing the roof to fall in.  
 The Westmorland fire station on West Main Street had a crack open about 1/2 inch in the brick veneer of the northwest corner.  
 Porter's Fountain (Main and F Street) was badly damaged. Concrete columns

at the corners of the building tilted outward towards the street and separated from the upper story of the building (fig. 9). Subsequently, the building was torn down. The hotel at 178 Main Street had damage to a structural column which tilted outward leaving a 6-inch separation between the wall and the remainder of the building.  
 Westmorland City Hall sustained relatively minor exterior damage in the form of tile loss on the roof and a cracked chimney. Interior damage was restricted to minor wall cracks. A dwelling at 263 First Street had a



FIGURE 8.--Photograph of damage to Vail Irrigation Canal, located between Calipatria and Westmorland (photo provided by Imperial Valley Press).

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

California--Continued

California--Continued

cracked living room floor and extensive cracks in the plaster walls. The west wall of the kitchen had a crack from ceiling to floor along vertical joints.

An adobe dwelling at 271 North Street had the walls shift about 2 inches causing severe cracking.

An adobe storage shed at 152 West Sixth Street was destroyed when the west wall and roof collapsed.

A building at Seventh and H Streets was badly damaged when the rear wall and a portion of the roof collapsed. The front wall was cracked and windows were broken.

An adobe building at 162 East Third Street was so badly damaged it was condemned (fig. 10). The foundation collapsed in the rear and the east wall collapsed. Severe cracking occurred in all the walls.

The laundromat at 100 North Center Street was damaged when the front wall separated about 2 inches from the south wall. The north wall was

also cracked and windows were jarred loose from their frames.

At St. Joseph's Church three plaster statues were thrown to the floor and broken and a bell fell 20 feet from the steeple to the ground.

Intensity VI:

California--Brawley (Bottles and canned goods were thrown from grocery shelves, doors were knocked out of alignment, some cracks in exterior walls, many pictures fell off walls, television sets were knocked over in homes, and tiles were shaken off roofs. The Mayfair Market lost \$3-4,000 in merchandise).

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 windows cracked, hanging pictures swung and some out of place, felt by all and awakened many.

Arizona--Tacna.

California--Agua Caliente Springs (Cane-brake Canyon), Alamorio, Anza, Calexico,



FIGURE 9.--Photograph of damage to Porter's Fountain, Westmorland (photo provided by Imperial Valley Press).

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

California--Continued

California--Continued

Descanso, Desert Hot Springs, Eagle Mountain, El Centro (natural gas line broke--press report), Glamis, Heber, Imperial, Julian, Mount Laguna, Niland, North Shore, Ocotillo, Palo Verde, Perrys Corner, Plaster City, Salton City, Seeley, Thermal.

Heights), San Juan Capistrano, San Luis Rey, San Marcos, Santee, Spring Valley, Tecate, Thousand Palms, Vista, Warner Springs, Winterhaven, Yucaipa.

Intensity IV:

Arizona--Ehrenberg, Martinez Lake, Parker, Poston, Quartzsite, Roll, Wellton, Wikieup, Yuma.

Intensity III:

Arizona--Bouse, Riviera.

California--Azusa, Banning, Cedar Glen, Chula Vista, Corona, Dana Point, Encino, Joshua Tree, Laguna Beach, Needles, Onyx, Ranchita.

Intensity II:

Arizona--Gila Bend, Stanfield.

California--Nuevo.

Felt:

California--San Bernardino (press report).

California--Alpine, Bard, Blythe, Boulevard, Cabazon, Campo, Cardiff-by-the-sea, Chino, Coachella, Coronado, Desert Center, Desert Hot Springs, Dulzura, Guatay, Havasu Lake, Hemet, Holtville, Idyllwild, Imperial Beach, Indian Wells, Indio, Jacumba, La Mesa, Laguna Niguel, Lemon Grove, Lindbergh Field (San Diego), Lost Lake, Mecca, Mission Viejo, Murrieta, National City, Pala, Palm Desert, Palm Springs, Parker Dam, Pine Valley, Potrero, Ramona, Ripley, San Diego, San Diego (College Heights, Morena, Pacific Beach, University

28 April (B) California-Nevada border region  
Origin time: 22 54 50.0

See Nevada listing.

29 April (B) Lake Tahoe area  
Origin time: 11 55 52.8

See Nevada listing.

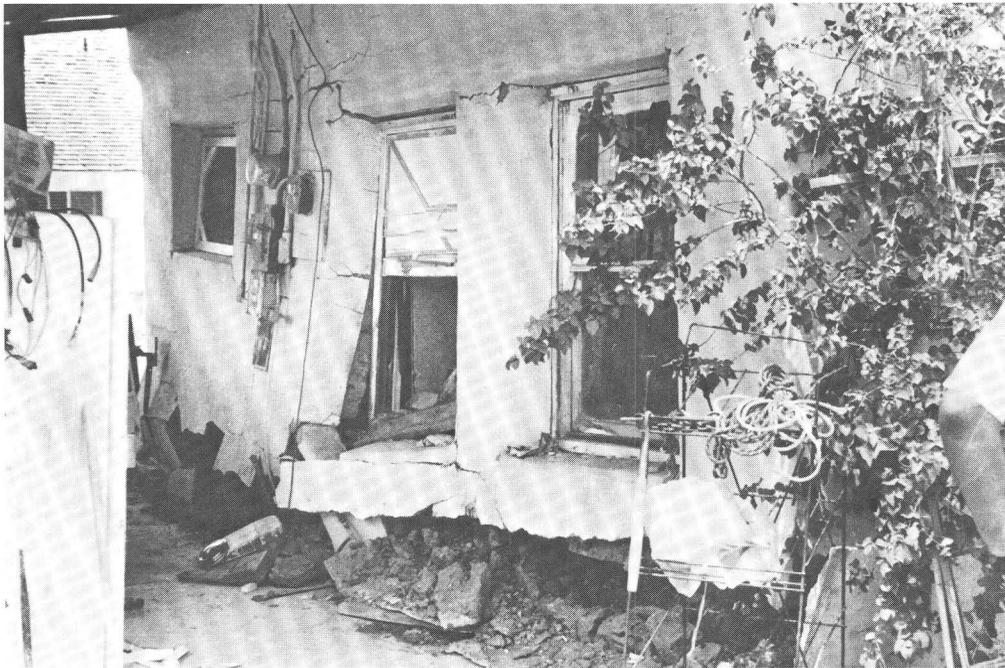


FIGURE 10.--Photograph of damage to adobe building at 162 East Third Street, Westmorland (photo provided by Imperial Valley Press).

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

California--Continued	
4 May (P) Southern California	
Origin time:	06 44 38.2
Epicenter:	34.30 N., 118.32 W.
Depth:	8 km
Magnitude:	2.0 ML(P)
Felt at Sunland (P).	
6 May (P) Southern California	
Origin time:	05 56 58.9
Epicenter:	33.73 N., 118.03 W.
Depth:	14 km
Magnitude:	3.1 ML(P)
Felt at Seal Beach (P) and in northern Orange County (press report).	
7 May (B) California-Nevada border region	
Origin time:	01 02 37.9
Epicenter:	37.99 N., 118.56 W.
Depth:	15 km
Magnitude:	4.4 mb(G), 4.5 ML(B), 4.3 ML(P)
<u>Intensity IV:</u>	
California--Bishop, Hume, Huntington Lake, Kings Canyon National Park, Lakeshore.	

California--Continued	
<u>Intensity III:</u>	
California--Benton.	
Nevada--Dyer.	
<u>Felt:</u>	
California--Mammoth Lakes (P), Toms Place.	
11 May (B) Central California	
Origin time:	11 50 28.7
Epicenter:	37.74 N., 122.01 W.
Depth:	15 km
Magnitude:	2.5 ML(B)
<u>Intensity IV:</u> San Leandro.	
<u>Felt:</u> Alameda (B), San Lorenzo (B).	
18 May (G) Central California	
Origin time:	14 39 13.5
Epicenter:	37.94 N., 121.94 W.
Depth:	5 km
Magnitude:	2.5 ML(B)
<u>Intensity III:</u> Clayton.	
18 May (P) Central California	
Origin time:	21 32 48.8
Epicenter:	37.23 N., 117.90 W.
Depth:	6 km
Magnitude:	3.1 ML(P)

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

California--Continued	
	<p><u>Intensity IV</u>: Deep Springs.  <u>Intensity III</u>: Independence.</p>
20 May (B) Central California	<p>Origin time: 17 21 31.4                      Epicenter: 36.98 N., 121.04 W.                      Depth: 10 km                      Magnitude: 3.7 ML(B)</p> <p>Felt at Los Banos and San Luis Reservoir area (B).</p>
26 May (G) Northern California	<p>Origin time: 11 41 07.4                      Epicenter: 40.30 N., 124.59 W.                      Depth: 33 km                      Magnitude: 4.3 mb(G), 4.7 ML(B)</p> <p>The dominance of intensity IV results from reports of people being awakened, since this earthquake occurred at night; otherwise this event was reported as not felt.</p> <p><u>Intensity IV</u>: Arcata, Bayside, Blue Lake, Bridgeville, Carlotta, Eureka, Fields Landing, Fortuna, Honeydew, Kneeland, Loleta, McKinleyville, Miranda, Petrolia, Piercy, Redway, Rio Dell, Salmon Creek Road, Scotia, Weott.</p>
3 June (P) Southern California	<p>Origin time: 05 29 03.5                      Epicenter: 34.15 N., 117.62 W.                      Depth: 13 km                      Magnitude: 3.0 ML(P)</p> <p>Felt in western San Bernardino and northern Riverside counties (press report).</p> <p><u>Intensity IV</u>: Etiwanda.  <u>Intensity III</u>: Ontario.                      Felt: Fontana (press report), Rancho Cucamonga (P).</p>
4 June (P) Imperial Valley	<p>Origin time: 06 24 56.3                      Epicenter: 32.97 N., 115.55 W.                      Depth: 15 km                      Magnitude: 2.7 ML(P)</p> <p>Felt in the Imperial Valley (P).</p>
4 June (P) Southern California	<p>Origin time: 11 51 33.2                      Epicenter: 33.67 N., 117.37 W.                      Depth: 12 km                      Magnitude: 3.4 ML(P)</p>

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

California--Continued	
	<p><u>Intensity V</u>: Lake Elsinore (few small objects overturned and fell, felt by and awakened many, building trembled strongly).  <u>Intensity IV</u>: Bonsall, Homeland, Murrieta, Norco, Nuevo, Perris, Silverado, Sunnymead, Vista, Wildomar.  <u>Intensity III</u>: Corona, Riverside.                      Felt: San Clemente.</p>
4 June (B) Northern California	<p>Origin time: 12 23 13.8                      Epicenter: 39.36 N., 123.31 W.                      Depth: 11 km                      Magnitude: 3.6 ML(B)  <u>Intensity IV</u>: Redwood Valley, Ukiah, Willits.                      Felt: Potter Valley (press report).</p>
4 June (P) Southern California	<p>Origin time: 14 26 35.6                      Epicenter: 33.67 N., 117.37 W.                      Depth: 12 km                      Magnitude: 3.0 ML(P)</p> <p>Felt in Riverside County (P).</p>
8 June (B) Central California	<p>Origin time: 03 09 05.5                      Epicenter: 36.75 N., 121.36 W.                      Depth: 12 km                      Magnitude: 4.2 ML(B)  <u>Intensity IV</u>: Castroville, Chualar, Salinas, Tres Pinos.  <u>Intensity III</u>: Dos Palos, Hollister, Marina, Paicines, Seaside, Watsonville.                      Felt: Carmel, Monterey Bay area (press report), San Francisco (B).</p>
12 June (P) Southern California	<p>Origin time: 06 06 07.3                      Epicenter: 34.35 N., 118.67 W.                      Depth: 15 km                      Magnitude: 3.8 ML(P)</p> <p>Felt from Santa Monica to the Antelope Valley north of Los Angeles (press report).</p> <p><u>Intensity IV</u>: Agoura, Canyon Country, Chatsworth, Saugus, Simi Valley, Sylmar.  <u>Intensity III</u>: Canoga Park, Granada Hills, Green Valley, Lebec, Leona Valley, Piru, Reseda, Sun Valley, Thousand Oaks.                      Felt: Antelope Valley, Pasadena, San Fernando Valley, Santa Clarita Valley, and Santa Monica (P).</p>

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

California--Continued	
12 June (P) Southern California	
Origin time:	11 02 46.4
Epicenter:	33.25 N., 115.98 W.
Depth:	4 km
Magnitude:	3.8 ML(P)
Felt at Salton City (press report).	
22 June (P) Southern California	
Origin time:	04 57 47.3
Epicenter:	35.10 N., 118.52 W.
Depth:	4 km
Magnitude:	4.0 ML(P), 4.1 ML(B)
Intensity V:	Arvin (hairline cracks in plaster walls, few small objects overturned and fell), Tehachapi (few small objects overturned and fell, few windows cracked, building trembled strongly).
Intensity IV:	Keene, Lamont.
Intensity III:	Frazier Park, Leona Valley.
Felt:	Bakersfield (P), Mojave (press report).
22 June (P) Southern California	
Origin time:	18 03 10.6
Epicenter:	33.75 N., 118.08 W.
Depth:	6 km
Magnitude:	2.6 ML(P)
Felt at Long Beach and Seal Beach (P).	
25 June (B) Northern California	
Origin time:	11 37 07.8
Epicenter:	40.18 N., 124.17 W.
Depth:	5 km
Magnitude:	3.7 ML(B)
Intensity IV:	Rio Dell.
28 June (G) Central California	
Origin time:	16 33 56.7
Epicenter:	37.41 N., 121.78 W.
Depth:	5 km
Magnitude:	2.5 ML(B)
Felt in eastern San Jose (press report).	

California--Off the coast

17 April (B) Northern California	
Origin time:	01 31 40.4
Epicenter:	40.43 N., 125.27 W.
Depth:	5 km
Magnitude:	4.3 mb(G), 4.2 ML(B)
Intensity V:	Arcata (few items thrown from store shelves, few small objects overturned and fell, few windows cracked).
Intensity III:	Miranda.

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

California--Off the coast--Continued	
14 June (B) Northern California	
Origin time:	23 53 58.0
Epicenter:	40.20 N., 124.60 W.
Depth:	5 km
Magnitude:	4.5 mb(G), 4.4 MS(G), 4.0 ML(B)
Intensity IV:	Ferndale (B), Fortuna (B), Rio Dell.
21 June (B) Northern California	
Origin time:	06 20 37.0
Epicenter:	40.25 N., 124.69 W.
Depth:	24 km
Magnitude:	4.4 mb(G), 4.0 ML(B)
Intensity IV:	Blocksburg, Carlotta, Miranda, Petrolia, Phillipsville, Rio Dell, Scotia.
Intensity III:	Bridgeville, Garberville, Loleta.

Colorado

2 April (Z) Northern Colorado	
Origin time:	16 10 06.4
Epicenter:	39.91 N., 104.95 W.
Depth:	9 km
Magnitude:	4.3 mb(G), 3.8 ML(G), 4.5 Mn(T)

This earthquake was felt over approximately 7,000 sq km of Denver and the surrounding area (figures 11 and 12). It is located in the area of the 1967 Rocky Mountain Arsenal earthquakes. Five aftershocks were located by Bollinger and others (1982).

Intensity VI:

Commerce City--At the Adams City Senior High School there were many large cracks in the plaster walls of the second floor in the section of the building that was built in the 1930's. Cracks occurred both at corners and in the center of the walls. One diagonal crack extended through the wall into the next classroom.

Thornton--The most common effects reported in Thornton were hairline cracks in plaster and drywall, hanging pictures fell, buildings shook strongly, and felt by many. The Thornton City Hall had 2-foot-long hairline cracks in the basement walls and the fire alarms were tripped. At KR Lighting Supply, across from the Thornton City Hall, built in the 1950's, there were cracks in the

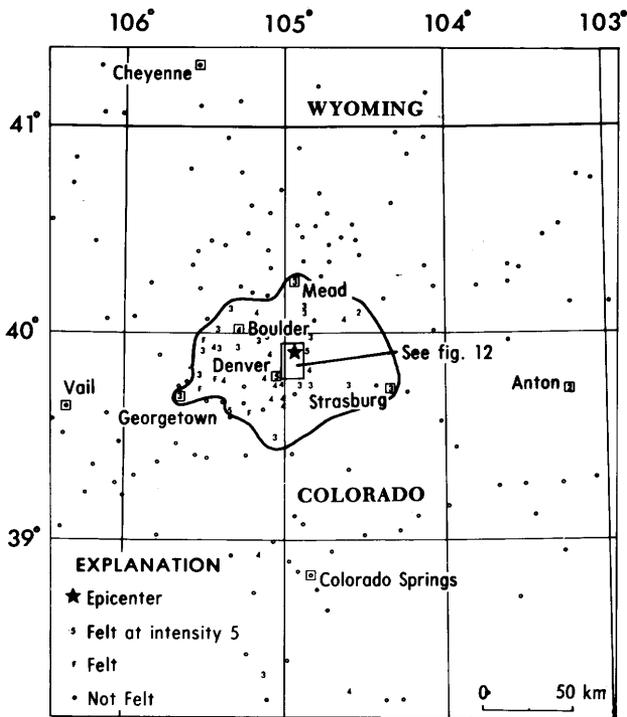


FIGURE 11.--Intensity map for the northern Colorado earthquake of 2 April 1981, 16 10 06.4 UTC. Arabic numerals are used to represent Modified Mercalli intensities at specific sites.

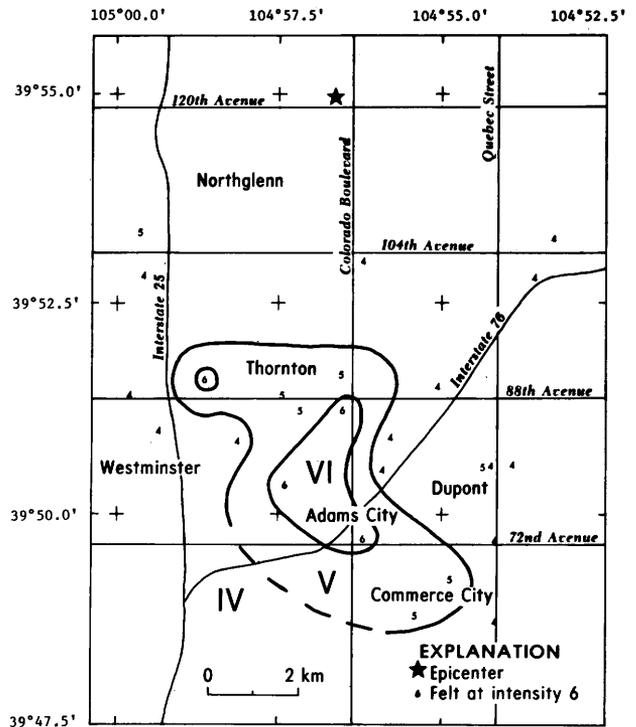


FIGURE 12.--Isoseismal map for the epicentral area of the northern Colorado earthquake of 2 April 1981, 16 10 06.4 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

Colorado--Continued

east and west facing walls (cinderblock) and cracks that followed the mortar seams around windows and doors. Part of the west facing wall was also slightly pushed outward. One window was cracked. The Thornton vehicle maintenance shop, located at the site of the old sewage disposal plant on East 88th Avenue, had 1/4" cracks between the juncture of the ceiling and a circular reinforced concrete wall and had many cracks in the wallboard at the corners of doorways where there were joints. At the Number 1 Auto Parts Store at 2401 E. 88th Avenue many items fell onto the floor. One employee who lived 3 blocks away said all his wife's plants were knocked to the floor.

Between Commerce City and Thornton at York Street and East 78th Avenue the Assumption Catholic School had cracks in the plaster walls of some of the classrooms.

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

Colorado--Continued

Intensity V: The most common effects at the places listed below were few small objects overturned and fell; few items thrown from store shelves; windows, doors, and dishes rattled; and hanging objects swung slightly.

Adams City.

Commerce City (Suspended ceiling tiles fell at the Metropolitan National Bank at 6565 East 73rd; and there was damage at a store at 64th Avenue and Ivy Street).

Denver (4301 W. 53rd Avenue).

Evergreen.

Henderson.

Northglenn (few windows cracked and hair-line cracks in plaster walls).

Thornton (Meadows Elementary School at Monroe and East 91st Avenue).

Intensity IV: Arvada, Boulder, Broomfield, Denver (Loretto, Montclair, 3003 Tejon Street, Westwood, Windsor Gardens),

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

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Colorado--Continued

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Divide, Dupont (Post Office, service station at Rosemary Street and East 80th Avenue, store at Olive Street and East 80th Avenue), Eastlake, Edgewater, Englewood, Golden Gate Canyon, Hazeltine Heights, Hudson, Lakewood (press report), Mesa, Niwot, Pinecliffe, Rocky Mountain Arsenal, Thornton (104th Avenue and Riverdale Road).

Intensity III: Aurora, Boulder Canyon (6 miles west of Boulder--telephone report), Brighton, Central City, Coal Creek Canyon (Golden), Dacono, Denver (Alcott, Cherry Creek, Downtown, Merchandise Mart, North Pecos, Park Hill), Eagle, Eldorado Springs, Erie, Firestone, Georgetown, Golden, Jamestown, Lafayette, Lakewood, Louisville, Louviers, Lowry Air Force Base, Mead, Rollinsville, Strasburg, Sugarloaf Road in Boulder County (telephone report), Watkins, Wondervu (Coal Creek Canyon).

Intensity II: Anton, Keenesburg.

Felt: Black Hawk (telephone report), Eldorado Canyon (telephone report), Idaho Springs (press report), Nederland (telephone report), Stanley (telephone report), Stapleton International Airport (press report), Westminster (telephone report).

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Hawaii

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18 April (H) Island of Hawaii  
 Origin time: 06 26 19.4  
 Epicenter: 19.34 N., 155.28 W.  
 Depth: 2 km  
 Magnitude: 3.7 ML(H)  
Intensity III: Volcano.

23 April (H) Island of Hawaii  
 Origin time: 13 44 34.2  
 Epicenter: 19.38 N., 155.07 W.  
 Depth: 9 km  
 Magnitude: 3.4 ML(H)  
Intensity III: Hilo.  
Intensity II: Papaikou.

27 April (H) Island of Hawaii  
 Origin time: 21 29 21.5  
 Epicenter: 19.27 N., 155.19 W.  
 Depth: 3 km  
 Magnitude: 3.4 ML(H)  
Intensity III: Hilo.

28 April (H) Island of Hawaii  
 Origin time: 18 46 29.3

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

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Hawaii--Continued

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Epicenter: 19.32 N., 155.18 W.  
 Depth: 10 km  
 Magnitude: 3.0 ML(H)  
Intensity III: Hilo.

30 April (H) Island of Hawaii  
 Origin time: 11 15 33.4  
 Epicenter: 19.39 N., 155.28 W.  
 Depth: 3 km  
 Magnitude: 3.1 ML(H)  
Intensity IV: Hawaii Volcanoes National Park.  
Intensity III: Volcano.

2 May (H) Island of Hawaii  
 Origin time: 12 36 07.5  
 Epicenter: 19.30 N., 155.22 W.  
 Depth: 11 km  
 Magnitude: 3.8 ML(H)  
Intensity III: Hilo, Keaau, Papaikou.

2 May (H) Island of Hawaii  
 Origin time: 17 10 46.3  
 Epicenter: 19.33 N., 155.13 W.  
 Depth: 9 km  
 Magnitude: 3.2 ML(H)  
Intensity II: Hilo.

7 May (H) Island of Hawaii  
 Origin time: 12 47 59.7  
 Epicenter: 19.33 N., 155.22 W.  
 Depth: 9 km  
 Magnitude: 3.2 ML(H)  
Intensity II: Volcano.

14 May (H) Island of Hawaii  
 Origin time: 21 16 06.8  
 Epicenter: 19.35 N., 155.22 W.  
 Depth: 9 km  
 Magnitude: 3.0 ML(H)  
Intensity III: Volcano.

17 May (H) Island of Hawaii  
 Origin time: 19 21 45.6  
 Epicenter: 19.33 N., 155.23 W.  
 Depth: 10 km  
 Magnitude: 3.2 ML(H)  
Intensity II: Volcano.

25 May (H) Island of Hawaii  
 Origin time: 12 11 19.1  
 Epicenter: 19.33 N., 155.22 W.  
 Depth: 9 km  
 Magnitude: 3.1 ML(H)  
Intensity III: Volcano.

6 June (H) Island of Hawaii  
 Origin time: 20 32 25.2  
 Epicenter: 19.39 N., 155.28 W.

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
April-June 1981--Continued

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Hawaii--Continued

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Depth: 3 km  
 Magnitude: 3.1 ML(H)  
Intensity III: Hawaiian Volcano Observatory.

9 June (H) Island of Hawaii  
 Origin time: 07 12 07.8  
 Epicenter: 19.36 N., 155.12 W.  
 Depth: 9 km  
 Magnitude: 3.4 ML(H)  
Intensity III: Volcano.

16 June (H) Island of Hawaii  
 Origin time: 01 43 22.7  
 Epicenter: 19.35 N., 155.22 W.  
 Depth: 10 km  
 Magnitude: 3.5 ML(H)  
Intensity III: Volcano.

30 June (H) Island of Hawaii  
 Origin time: 21 46 25.7  
 Epicenter: 19.32 N., 155.22 W.  
 Depth: 11 km  
 Magnitude: 3.5 ML(H)  
Intensity II: Hawaiian Volcano Observatory,  
 Hilo, Paho, Volcano.

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Idaho

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15 April (G) Hebgen Lake region  
 Origin time: 18 46 37.8  
 Epicenter: 44.40 N., 111.29 W.  
 Depth: 5 km  
 Magnitude: 3.8 ML(G)  
Intensity III: West Yellowstone.

6 May (U) Southwestern Utah  
 Origin time: 19 26 01.9

See Wyoming listing.

27 May (G) Southeastern Idaho  
 Origin time: 05 46 15.9  
 Epicenter: 42.59 N., 111.73 W.  
 Depth: 5 km  
 Magnitude: 3.1 ML(G)  
Intensity IV: Grace.

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Illinois

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8 April (S) Southern Illinois  
 Origin time: 01 53 13.0  
 Epicenter: 38.87 N., 89.38 W.  
 Depth: 1 km  
 Magnitude: 3.5 Mn(S), 3.0 MD(K)  
Felt: Greenville and Vandalia  
 (press report).

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
April-June 1981--Continued

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Illinois--Continued

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9 June (S) Southern Illinois  
 Origin time: 14 15 47.7  
 Epicenter: 37.82 N., 89.02 W.  
 Depth: 20 km  
 Magnitude: 3.4 Mn(S), 3.0 MD(K)  
Intensity V: Carterville (a few cracked  
 windows, a few glassware or dishes broken,  
 and a few small objects overturned and  
 fell).  
Intensity III: Cobden, Ewing, Herrin, John-  
 ston City, Zeigler.  
Intensity II: Thompsonville, Valier.  
Felt: Cambria (press report), Car-  
 bondale (S), Herrin (S) Marion (press  
 report).

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Massachusetts

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3 April (J) Southeastern Rhode Island  
 Origin time: 09 24 12.5

See Rhode Island listing.

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Missouri

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25 May (S) Southern Missouri  
 Origin time: 22 50 18.2  
 Epicenter: 36.76 N., 91.63 W.  
 Depth: 1 km  
 Magnitude: 2.6 Mn(T), 3.0 Mn(S),  
 2.6 MD(K)  
Intensity III: Alton, Brandsville.

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Montana

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15 April (G) Hebgen Lake region  
 Origin time: 18 46 37.8

See Idaho listing.

22 May (G) Yellowstone National Park  
 Origin time: 07 56 41.0

See Wyoming listing.

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Nevada

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28 April (B) California-Nevada border region  
 Origin time: 22 54 50.0  
 Epicenter: 38.05 N., 118.57 W.  
 Depth: 6 km

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
April-June 1981--Continued

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Nevada--Continued

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Magnitude: 4.2 mb(G), 4.6 ML(B),  
4.6 ML(P)

Felt in the Mono Lake area (press report).

Intensity IV:  
California--Benton, Topaz.

Intensity III:  
California--Lee Vining.  
Nevada--Goldfield, Hawthorne.

Intensity II:  
California--Big Oak Flat.

Felt:  
California--Mono Lake (P).

29 April (B) Lake Tahoe area  
Origin time: 11 55 52.8  
Epicenter: 39.27 N., 119.77 W.  
Depth: 10 km  
Magnitude: 4.2 ML(B)

Intensity V: The most common effects at the places listed below were few small objects overturned and fell, few items thrown from store shelves, hanging pictures swung.  
Nevada--Carson City, Crystal Bay (few windows cracked, hairline cracks in plaster and dry wall), Incline Village.

Intensity IV:  
California--Carnelian Bay, Floriston, Iowa Hill, Sierraville, Soda Springs, Truckee.  
Nevada--Dayton, Gardnerville, Minden, Reno, Silver City, Virginia City, Yerington, Washoe City (press report).

Intensity III:  
California--Kyburz.  
Nevada--Smith.

Intensity II:  
Nevada--Silver Springs.

Felt:  
California--Alta, Auburn (B), Grass Valley (B), South Lake Tahoe (B), Topaz.  
Nevada--Glenbrook.

30 April (E) Southern Nevada  
Origin time: 14 35 00.0  
Epicenter: 37.18 N., 116.09 W.  
Depth: 0 km  
Magnitude: 3.4 ML(P)

Nevada Test Site explosion "VIDE" at 37°10'38.40" N., 116°05'05.14" W., surface elevation 1373 m, depth of burial 323 m.

7 May (B) California-Nevada border region  
Origin time: 01 02 37.9

See California listing.

Table 2.--Summary of macroseismic data for U.S. earthquakes,  
April-June 1981--Continued

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Nevada--Continued

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29 May (E) Southern Nevada  
Origin time: 16 00 00.0  
Epicenter: 37.10 N., 116.00 W.  
Depth: 0 km  
Magnitude: 4.2 mb(G), 4.5 ML(B)

Nevada Test Site explosion "ALIGOTE" at 37°06'06.67" N., 116°00'14.63" W., surface elevation 1338 m, depth of burial 320 m.

6 June (E) Southern Nevada  
Origin time: 18 00 00.0  
Epicenter: 37.30 N., 116.33 W.  
Depth: 0 km  
Magnitude: 5.5 mb(G), 4.2 MS(G),  
5.4 ML(B)

Nevada Test Site explosion "HARZER" at 37°18'12.23" N., 116°19'32.15" W., surface elevation 2100 m, depth of burial 637 m.

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New Hampshire

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28 June (J) Central New Hampshire  
Origin time: 22 42 35.0  
Epicenter: 43.56 N., 71.56 W.  
Depth: 2 km  
Magnitude: 3.0 Mn(J)

Felt in the Lake Winnisquam region (press report).

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New Mexico

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9 May (G) Southwestern New Mexico  
Origin time: 12 35 50.8  
Epicenter: 33.99 N., 107.03 W.  
Depth: 5 km  
Magnitude: 3.1 ML(G), 2.9 MD(C)  
Intensity V: Socorro (hairline cracks in plaster, few small objects overturned, hanging pictures swung).  
Intensity III: San Antonio.  
Intensity II: Lemitar.

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North Carolina

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9 April (G) Western North Carolina  
Origin time: 07 10 31.4  
Epicenter: 35.48 N., 82.07 W.  
Depth: 5 km  
Magnitude: 3.0 Mn(G), 3.2 MD(K)  
Intensity V:  
Burnsville (few windows cracked, small

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

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 North Carolina--Continued  
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objects overturned and fell).  
 Old Fort (few small objects overturned, felt by and awakened many).  
Intensity IV: Candler, Forest City, Marion, Mill Spring, Spindale, Sugar Hill (press report), Union Mills.  
Intensity II: Edneyville.  
Felt: Dysartsville, Glenwood (press report), Old Fort Mountain (press report).

5 May (K) Eastern North Carolina  
 Origin time: 21 21 57.9  
 Epicenter: 35.33 N., 82.43 W.  
 Depth: 13 km  
 Magnitude: 3.5 Mn(V), 3.3 MD(K)

There was a noise that sounded like a sonic boom associated with this earthquake (press report). It was felt over an area of approximately 4,000 sq km of North Carolina, South Carolina, Tennessee, and Virginia (fig. 13). Several wells were muddied in the vicinity of Dana, North Carolina (K).

Intensity VI:

North Carolina--

Hendersonville (concrete on patio cracked and sidewalk shifted 2 inches, washing machines moved--press report; a few cracked windows, merchandise thrown off store shelves, and glassware broken).

Zirconia (foundation cracked, hairline cracks in plaster and dry wall, many items thrown from store shelves, few windows cracked, felt by all).

Intensity V: The most common effects at the places listed below were some merchandise thrown from store shelves, a few cracked windows and a few small objects overturned and fell.

North Carolina--Balfour, Brevard, Edneyville, Etowah, Flat Rock, Naples, Pisgah Forest (hairline cracks in plaster and dry wall), Skyland, Tuxedo.

South Carolina--Landrum.

Intensity IV:

North Carolina--Arden, Asheville (Grace), Columbus, Dana, East Flat Rock, Fletcher, Horse Shoe, Mill Spring, Mountain Home, Penrose, Rosman, Saluda, Tryon.

South Carolina--Cleveland, Gramling, Marietta, Mountain Rest, Tigerville.

Intensity III:

North Carolina--Cedar Mountain, Lake Toxaway, Lynn, Marion.

Intensity II:

South Carolina--Taylors, Travelers Rest.

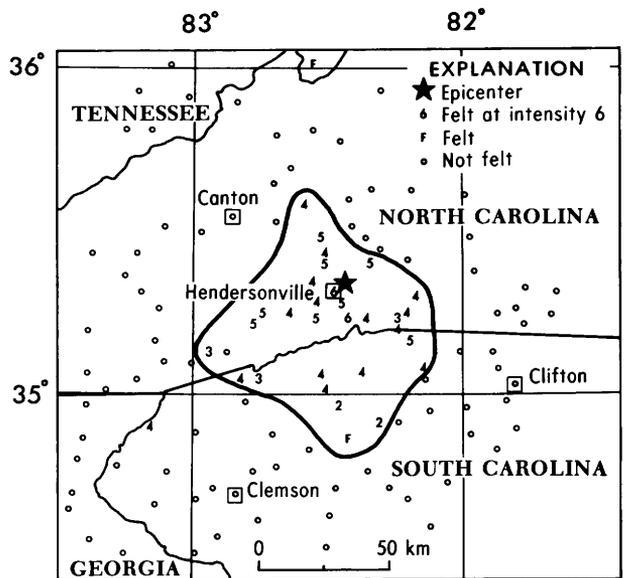


FIGURE 13.--Intensity map for the western North Carolina earthquake of 5 May 1981, 21 21 57.9 UTC. Arabic numerals are used to represent Modified Mercalli intensities at specific sites.

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

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 North Carolina--Continued  
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Felt:

North Carolina--Slick Rock Mountain (press report).  
 South Carolina--Greenville-Spartansburg area (V).  
 Tennessee--Flag Pond (K).  
 Virginia--Bondtown (K), Tacoma (K).

3 June (G) Northeastern North Carolina

Origin time: 20 54 22.4  
 Epicenter: 36.21 N., 81.65 W.  
 Depth: 1 km  
 Magnitude: 3.0 Mn(V), 2.3 MD(K)

The Watauga Democrat in Boone, North Carolina, reported a quarry blast at about the same time this quake was reported felt.

Intensity V: Boone (few items thrown from store shelves, a few glassware and dishes were broken, hanging pictures fell, many small objects overturned and fell).

Intensity II: Tiptlett.

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

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Oregon

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13 May (W) Southwestern Washington  
Origin time: 05 00 36.2

See Washington listing.

28 May (W) Southern Washington  
Origin time: 09 10 46.0

See Washington listing.

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Rhode Island

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3 April (J) Southeastern Rhode Island  
Origin time: 09 24 12.5  
Epicenter: 41.59 N., 71.22 W.  
Depth: 1 km  
Magnitude: 2.7 Mn(J)

This earthquake was felt throughout the East Bay of Rhode Island and in the neighboring areas of Massachusetts (press report).

Intensity V:

Rhode Island--Jamestown (few small objects overturned and fell; windows, doors, and dishes rattled).

Intensity IV:

Massachusetts--Dartmouth, East Freetown, Fall River, Westport.  
Rhode Island--Adamsville, Little Compton, Middletown (press report), Newport, Portsmouth, Saunderstown, Tiverton, Warwick.

Felt:

Massachusetts--Fairhaven (press report).  
Rhode Island--Barrington (press report), Bristol (press report), Providence, Warren (press report), Wickford (press report).

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South Carolina

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5 May (K) Eastern North Carolina  
Origin time: 21 21 57.9

See North Carolina listing.

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Tennessee

---

29 April (K) Northeastern Arkansas  
Origin time: 15 09 32.9

See Arkansas listing.

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

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Tennessee--Continued

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5 May (K) Eastern North Carolina  
Origin time: 21 21 57.9

See North Carolina listing.

29 May (K) Northwestern Tennessee  
Origin time: 14 56 12.2  
Epicenter: 36.28 N., 89.49 W.  
Depth: 4 km  
Magnitude: 2.3 MD(K), 2.3 Mn(S)

Felt at Ridgely (K).

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Texas

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9 June (G) Eastern Texas  
Origin time: 01 46 33.1  
Epicenter: 32.14 N., 94.40 W.  
Depth: 5 km  
Magnitude: 3.0 Mn(T)  
Intensity IV: Center, northern end of the Toledo Bend Reservoir (K).

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Utah

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5 April (U) Southwestern Utah  
Origin time: 05 40 40.0  
Epicenter: 37.61 N., 113.30 W.  
Depth: 2 km  
Magnitude: 4.2 mb(G), 4.5 ML(U)

Intensity V: The most common effects at the places listed below were few items thrown from store shelves, few small objects overturned and fell, hanging pictures out of place, felt by many.  
Utah--Cedar City (few windows cracked), Kanarraville, New Harmony (hanging pictures fell), Springdale.

Intensity IV:

Utah--Antimony, Beryl, Cannonville, Henrieville, La Verkin, Milford, Newcastle, Rockville, Rubys Inn, Summit, Tropic.

Intensity III:

Utah--Kanab, Leeds, Orderville, Toquerville.

Intensity II:

Utah--Hurricane.

Felt:

Arizona--Colorado City (press report).  
Utah--Ivins (press report), Kane County (press report), St. George (press report).

11 April (U) Northern Utah  
Origin time: 08 08 02.5

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

Utah--Continued	
Epicenter:	41.86 N., 112.67 W.
Depth:	2 km
Magnitude:	3.1 ML(U)
<u>Intensity IV:</u>	Utah--Snowville.
<u>Felt:</u>	Idaho--Stone (telephone report).
14 May (U) Northern Utah	
Origin time:	05 11 04.1
Epicenter:	39.48 N., 111.06 W.
Depth:	1 km
Magnitude:	4.5 mb(G), 3.5 ML(U), 4.0 ML(G)
<u>Intensity V:</u>	Orem (hairline cracks in plaster walls, few items thrown from store shelves, few small objects overturned and fell, felt by and awakened many).
<u>Intensity IV:</u>	Elsinore, Goshen, Sigurd.
<u>Intensity III:</u>	Hiawatha.
9 June (U) Central Utah	
Origin time:	19 12 18.5
Epicenter:	39.51 N., 111.25 W.
Depth:	5 km
Magnitude:	2.8 ML(U)
	Possible explosion.
Virginia	
5 May (K) Eastern North Carolina	
Origin time:	21 21 57.9
	See North Carolina listing.
Washington	
1 May (W) Southwestern Washington	
Origin time:	10 06 23.0
Epicenter:	46.37 N., 122.26 W.
Depth:	9 km
Magnitude:	2.9 ML(G)
<u>Intensity IV:</u>	Elbe.
<u>Felt:</u>	Elk Lake area (press report).
13 May (W) Southwestern Washington	
Origin time:	05 00 36.2
Epicenter:	46.37 N., 122.25 W.
Depth:	11 km
Magnitude:	4.1 mb(G), 4.1 ML(G)
<u>Intensity V:</u>	Washington--Ariel (There were reports of hairline cracks in dry wall and hanging pictures swung. This report also listed

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

Washington--Continued	
	cracked and broken chimneys and cracked foundations. However, this was discounted because the same report stated there was no damage to buildings).
<u>Intensity IV:</u>	Washington--Amboy, Ashford, Cinebar, Docketon, Glenoma, Hockinson, Longview, Mineral, Morton, Mossyrock, Packwood, Randle, Silver Creek, Silver Lake, Toutle, White Salmon.
<u>Intensity III:</u>	Oregon--Rainier. Washington--Cathlamet, Elbe, La Center, Napavine, Oakville, Olalla, Ryderwood, Yacolt.
<u>Intensity II:</u>	Washington--Carrolls, Centralia, Salkum, Seahurst, Tacoma, Tahuya.
27 May (W) Southwestern Washington	
Origin time:	10 02 44.1
Epicenter:	46.37 N., 122.26 W.
Depth:	11 km
Magnitude:	2.7 ML(G)
	Felt at Camp Baker and Camp 12 on the north side of Mt. St. Helens (press report).
28 May (W) Southern Washington	
Origin time:	08 56 02.7
Epicenter:	46.53 N., 121.42 W.
Depth:	4 km
Magnitude:	4.3 mb(G), 3.7 ML(G), 3.7 MD(W)
<u>Intensity IV:</u>	Mineral, White Pass.
<u>Felt:</u>	Packwood and Randle (press report).
28 May (W) Southern Washington	
Origin time:	09 10 46.0
Epicenter:	46.53 N., 121.41 W.
Depth:	4 km
Magnitude:	4.8 mb(G), 4.3 MS(G), 4.3 ML(G), 3.9 MD(W)
<u>Intensity IV:</u>	Washington--Cinebar, Elbe, Ephrata (press report), Glenoma, Longmire, Morton, Moses Lake (press report), Packwood, Randle, Toutle, White Pass.
<u>Intensity III:</u>	Washington--Ashford, Klickitat.
<u>Intensity II:</u>	Washington--Tacoma.
<u>Felt:</u>	Oregon--Portland (W). Washington--Seattle (Capitol Hill--W), Kelso (press report), Longview (W), Olympia (press report), Othello (W).

Table 2.--Summary of macroseismic data for U.S. earthquakes, April-June 1981--Continued

Washington--Continued	
23 June (W) Northwestern Washington	
Origin time:	00 05 28.2
Epicenter:	48.83 N., 122.17 W.
Depth:	6 km
Magnitude:	3.1 ML(G)
Felt at Demming, Everson and Van Zandt (press report).	
Wyoming	
6 May (G) Western Wyoming	
Origin time:	19 26 01.9
Epicenter:	43.41 N., 110.65 W.
Depth:	5 km
Magnitude:	3.7 ML(G)
<u>Intensity IV:</u>	
Wyoming--Jackson.	
<u>Intensity III:</u>	
Idaho--Palisades.	
<u>Intensity II:</u>	
Wyoming--Teton Village.	
22 May (G) Yellowstone National Park	
Origin time:	07 56 41.0
Epicenter:	44.83 N., 111.00 W.
Depth:	7 km
Magnitude:	4.2 ML(G)
<u>Intensity IV:</u>	
Montana--West Yellowstone, Hebgen Lake Dam (30 km northwest of West Yellowstone), Duck Creek area (13 km north of West Yellowstone).	
<u>Intensity III:</u>	
Wyoming--Madison Junction.	

## ACKNOWLEDGMENTS

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

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