GEOLOGICAL SURVEY CIRCULAR 853-A

Earthquakes in the United States January–March 1980

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

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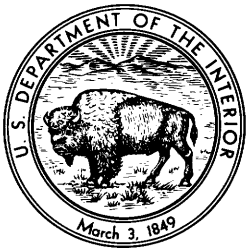
1981

United States Department of the Interior

JAMES G. WATT, *Secretary*



Geological Survey

Doyle G. Frederick, *Acting Director*

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

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Earthquakes in the United States, January-March 1980

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INTRODUCTION

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

This publication contains two major sections. The first part (table 1), which is mainly concerned with data obtained by seismographs, is a tabular listing of earthquakes in chronological order by State, consisting of the following basic information: date, origin time, hypocenter, magnitude, maximum intensity, and computational source of the hypocenter. The second section, which concerns intensity information, consists of four maps, two 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 ☐ PM ☐ Standard time ☐ Daylight time

Name of person filling out form _____

Address_____

City_____ County_____

State_____ Zip code_____

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

PERSONAL REPORT

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

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

COMMUNITY REPORT

Town and zip code _____

DO NOT INCLUDE EFFECTS FROM OTHER COMMUNITIES/TOWNS
Check one box for each question that is applicable.

3a.	The earthquake was felt by	☐ No one	28☐ Few	29☐ Several	30☐ Many	31☐ All?
b.	This earthquake awakened	☐ No one	32☐ Few	33☐ Several	34☐ Many	35☐ All?
c.	This earthquake frightened	☐ No one	36☐ Few	37☐ Several	38☐ Many	39☐ All?

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

Windows, doors, dishes rattled	40☐ Yes	☐ No	
Walls creaked	41☐ Yes	☐ No	
Building trembled (shook)	42☐ Slightly	43☐ Strongly	
Hanging pictures (more than one)	44☐ Swung	45☐ Out of place	46☐ Fallen
Windows 47☐ Few cracked	48☐ Some broken out	49☐ Many broken out	
Small objects overturned	50☐ Few	51☐ Many	
Small objects fallen	52☐ Few	53☐ Many	
Glassware/dishes broken	54☐ Few	55☐ Many	
Light furniture or small appliances	56☐ Overturned	57☐ Damaged seriously	
Heavy furniture or appliances	58☐ Overturned	59☐ Damaged seriously	
Did hanging objects or doors swing?	60☐ Slightly	61☐ Moderately	62☐ Violently
Can you estimate direction?	☐ North/South	☐ East/West	☐ Other_____
Items thrown from store shelves	63☐ Few	64☐ Many	

Continued on the reverse side

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

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

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

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

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

7a. Check below any structural damage to buildings.

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

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

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

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

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

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

e. Check the approximate age of the building:

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

8. Check below any structural damage to

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

9. What geologic effects were noted in your community?

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

10a. What percentage of buildings were damaged?

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

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

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

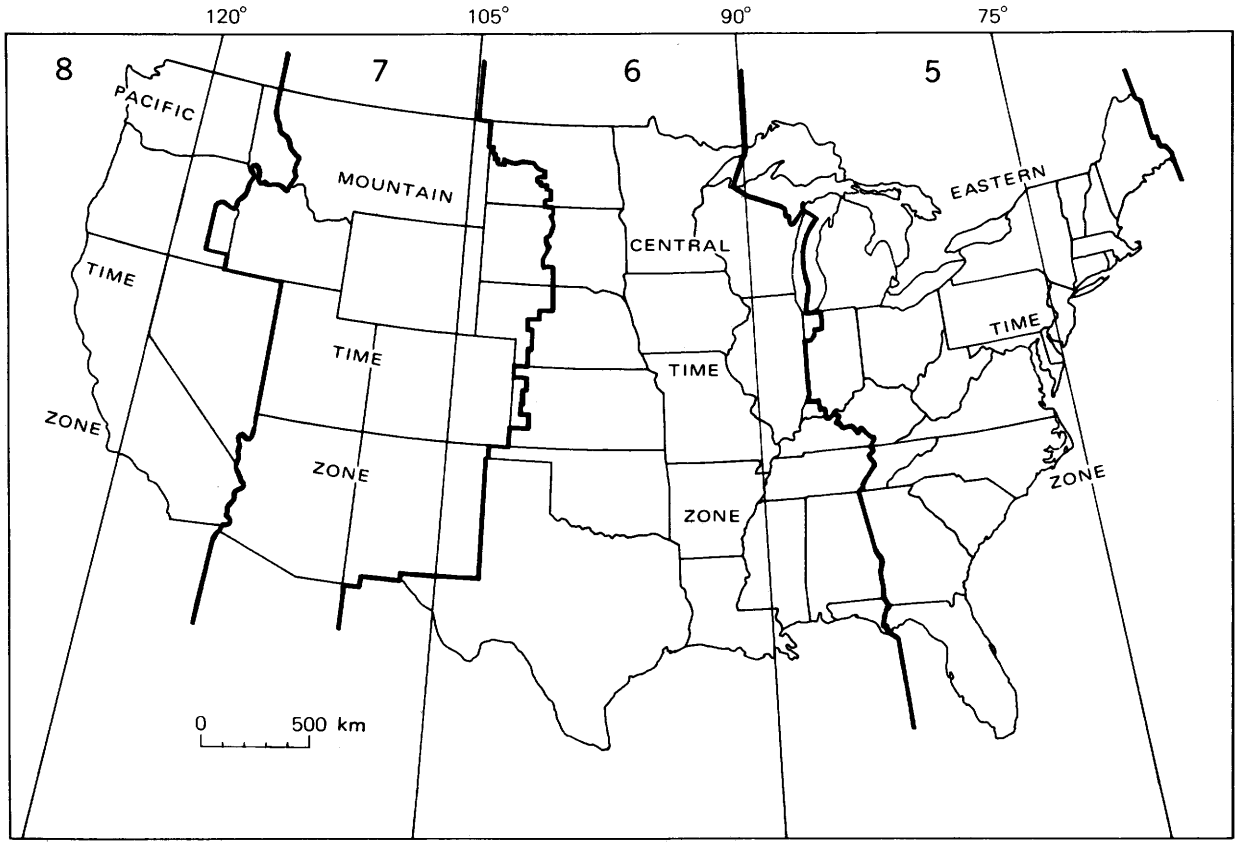

FIGURE 2.--Standard time zones of the conterminous United States. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

listed. The epicenters located by the NEIS usually are accurate to two-tenths of a degree or less. In general, epicenters located offshore are less accurate than those on land, even though they are listed to two decimals. In regions covered by dense networks of seismographs such as California, epicenter accuracy is significantly better than the two-tenths of a degree listed. Depths are listed to the nearest whole kilometer.

Figures 4-6 are maps summarizing the earthquake activity for the conterminous United States, Alaska, and Hawaii for the period January-March 1980. 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. In table 2, the magnitude source is the same as the location source unless indicated otherwise by an alphabetic character to the right of the magnitude value. The magnitude values calculated by NEIS are based on the following formulas:

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

as adopted by the International Association of Seismology and Physics of the Earth's Interior (IASPEI; Bath, 1966, p. 153), where A is the maximum vertical surface-wave ground amplitude, in micrometers; T is the period, in seconds, and $18 \leq T \leq 22$; and D is the distance, in geocentric degrees (station to epicenter), and $20° \leq D \leq 160°$. No depth correction is made for depths less than 50 km.

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

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

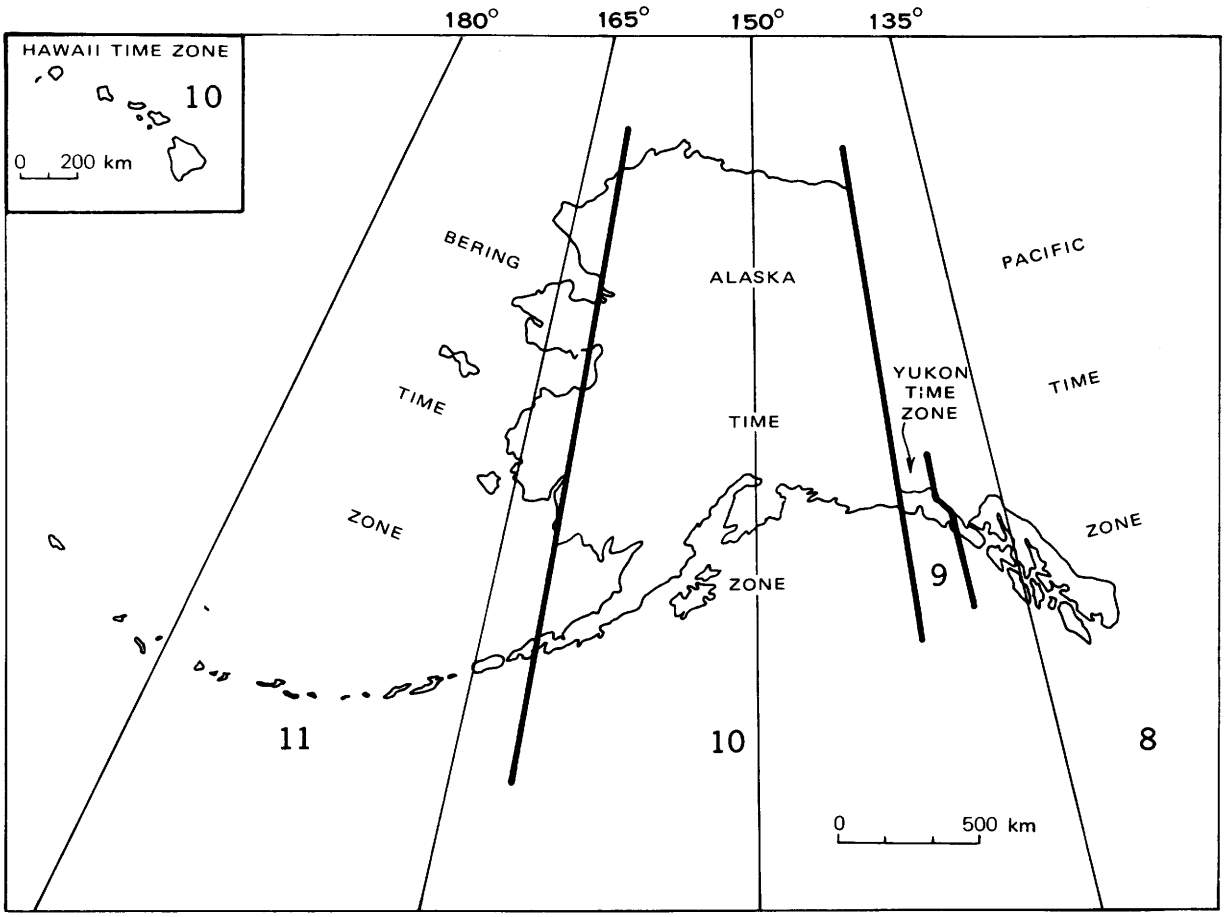

FIGURE 3.--Standard time zones of Alaska and Hawaii. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

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

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

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

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

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

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

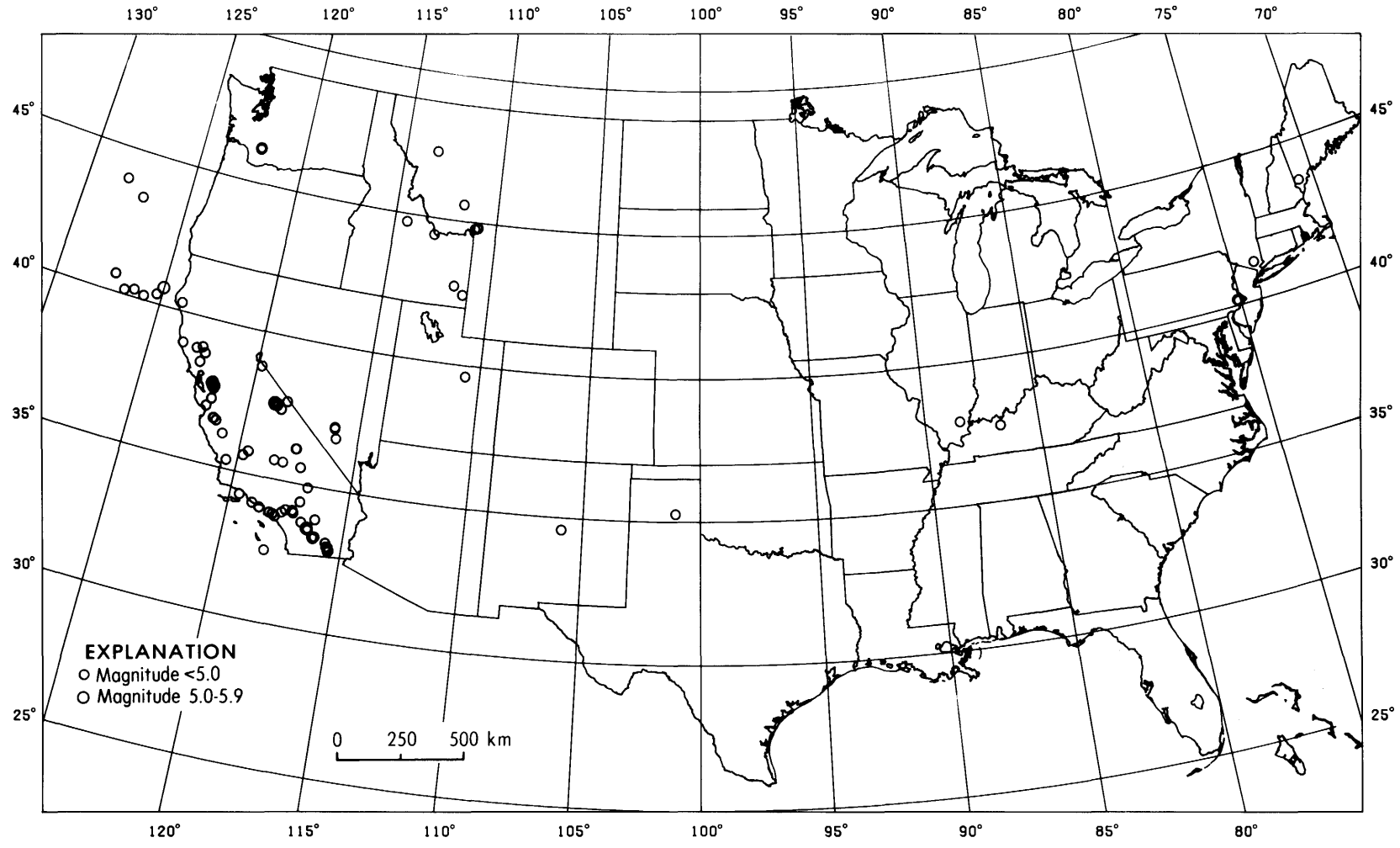

FIGURE 4.--Earthquake epicenters in the conterminous United States for January-March 1980, plotted from table 1.

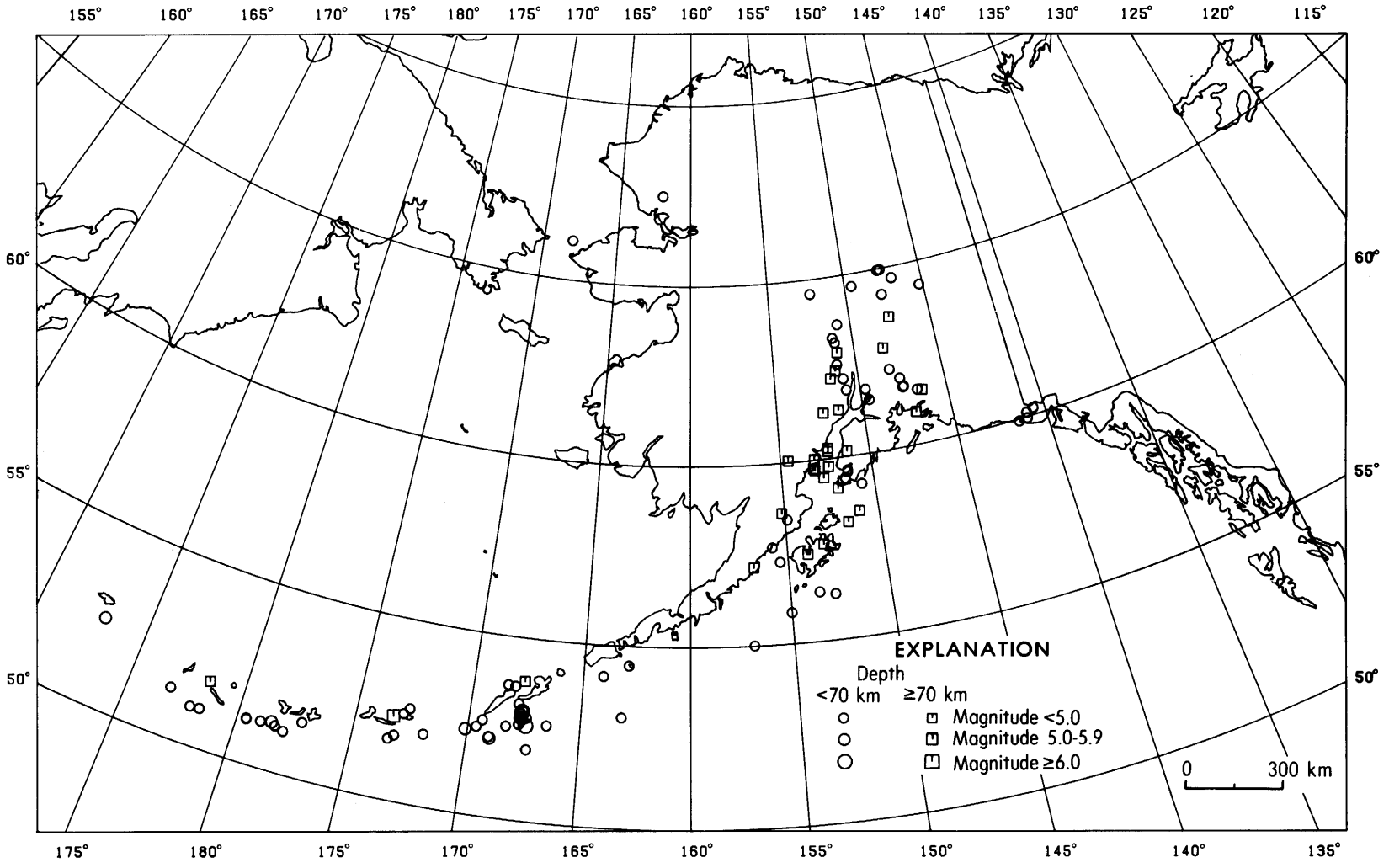

FIGURE 5.--Earthquake epicenters in Alaska for January-March 1980, plotted from table 1.

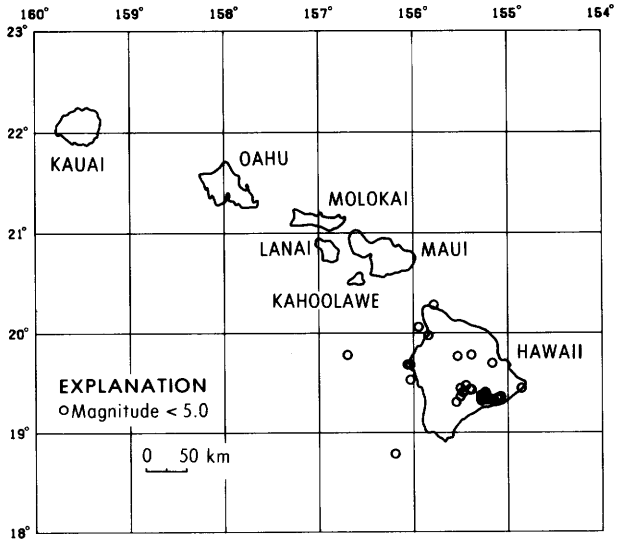

FIGURE 6.--Earthquake epicenters in Hawaii for January-March 1980, plotted from table 1.

MODIFIED MERCALLI INTENSITY SCALE OF 1931

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

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

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

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

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

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

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

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

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 January-March 1980*

[Sources of the hypocenters and magnitudes: (B) University of California, Berkeley; (D) University of Montana, Missoula; (E) U.S. Department of Energy, Las Vegas, Nevada; (G) U.S. Geological Survey, National Earthquake Information Service; (H) U.S. Geological Survey, Hawaiian Volcano Observatory; (J) Weston Observatory, Massachusetts; (L) Lamont-Doherty Geological Observatory, Palisades, N.Y.; (M) National Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis, Missouri; (T) University of Oklahoma, Leonard; (U) University of Utah, Salt Lake; (W) University of Washington, Seattle; (Z) Cockerham and others, 1980. N, Normal depth; UTC, Universal Coordinated Time. For names of local time zones, see figures 2 and 3. Leaders (...) indicate no information available]

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
ALASKA													
JAN. 1	07	53	29.3	60.20 N.	152.33 W.	93	4.2	...	...	...	G	DEC. 31	09 P.M. AST
JAN. 4	03	47	36.9	61.66 N.	147.44 W.	66	3.7	...	...	FELT	G	JAN. 3	05 P.M. AST
JAN. 4	03	58	9.2	61.65 N.	147.53 W.	33N	...	...	3.0M	...	G	JAN. 3	05 P.M. AST
JAN. 5	23	03	28.8	59.19 N.	150.69 W.	33N	...	...	3.1M	...	G	JAN. 5	01 P.M. AST
JAN. 6	19	51	2.9	51.26 N.	178.96 W.	57	4.5	...	...	...	G	JAN. 6	08 A.M. BST
JAN. 8	08	46	28.5	52.62 N.	169.38 W.	58	4.8	...	...	...	G	JAN. 7	09 P.M. BST
JAN. 8	19	17	52.8	60.04 N.	154.58 W.	157	...	...	...	...	G	JAN. 8	09 A.M. AST
JAN. 9	17	29	40.0	51.20 N.	179.58 W.	33N	4.9	4.0	...	...	G	JAN. 9	06 A.M. BST
JAN. 10	05	54	21.2	58.62 N.	155.15 W.	143	...	...	...	...	G	JAN. 9	07 P.M. AST
JAN. 10	17	18	39.3	61.90 N.	147.60 W.	66	...	...	...	...	G	JAN. 10	07 A.M. AST
JAN. 11	01	38	10.3	61.31 N.	151.43 W.	87	...	...	...	...	G	JAN. 10	03 P.M. AST
JAN. 11	04	39	56.2	63.17 N.	151.13 W.	33N	...	...	3.0M	...	G	JAN. 10	06 P.M. AST
JAN. 11	08	58	40.3	62.56 N.	151.16 W.	33N	...	...	2.7M	...	G	JAN. 10	10 P.M. AST
JAN. 12	05	51	20.1	62.89 N.	151.08 W.	167	...	...	...	...	G	JAN. 11	07 P.M. AST
JAN. 12	08	09	40.2	62.14 N.	150.90 W.	33N	...	...	3.2M	...	G	JAN. 11	10 P.M. AST
JAN. 12	08	53	59.3	52.32 N.	170.11 W.	35	4.6	...	5.0M	...	G	JAN. 11	09 P.M. BST
JAN. 12	21	50	20.0	60.12 N.	141.03 W.	15	...	...	4.0M	...	G	JAN. 12	11 A.M. AST
JAN. 14	02	54	26.8	61.45 N.	149.55 W.	55	...	...	...	...	G	JAN. 13	04 P.M. AST
JAN. 16	01	21	19.0	51.23 N.	179.59 W.	50	4.9	...	...	...	G	JAN. 15	02 P.M. BST
JAN. 16	15	15	19.3	61.46 N.	146.44 W.	71	...	...	...	...	G	JAN. 16	05 A.M. AST
JAN. 16	22	42	40.6	53.03 N.	163.15 W.	36	4.7	...	...	...	G	JAN. 16	11 A.M. BST
JAN. 17	09	51	36.3	60.89 N.	147.03 W.	81	...	...	...	...	G	JAN. 16	11 P.M. AST
JAN. 17	17	46	54.5	58.47 N.	151.03 W.	90	3.6	...	...	...	G	JAN. 17	07 A.M. AST
JAN. 19	07	02	35.0	51.32 N.	178.49 W.	50	5.8	5.7	...	FELT	G	JAN. 18	08 P.M. BST
JAN. 20	03	11	44.7	56.28 N.	152.78 W.	33N	4.5	...	4.3M	...	G	JAN. 19	05 P.M. AST
JAN. 22	06	16	11.6	52.43 N.	169.65 W.	49	4.5	...	4.8M	...	G	JAN. 21	10 P.M. BST
JAN. 24	21	59	10.2	57.61 N.	152.72 W.	33N	...	...	...	...	G	JAN. 24	11 A.M. AST
JAN. 26	14	49	33.1	66.08 N.	168.03 W.	33N	4.5	...	...	...	G	JAN. 26	03 A.M. BST
JAN. 27	04	59	36.6	51.65 N.	173.43 W.	23	4.9	4.0	4.2M	...	G	JAN. 26	05 P.M. BST
FEB. 1	19	49	5.3	59.72 N.	153.12 W.	111	...	...	...	...	G	FEB. 1	09 A.M. AST
FEB. 2	04	29	31.1	59.93 N.	141.55 W.	15	...	...	3.5M	...	G	FEB. 1	06 P.M. AST
FEB. 2	05	08	14.0	57.27 N.	155.41 W.	66	4.3	...	...	...	G	FEB. 1	07 P.M. AST
FEB. 3	20	40	13.3	64.65 N.	149.55 W.	33N	...	...	3.0M	III	G	FEB. 3	10 A.M. AST
FEB. 5	10	04	49.6	62.20 N.	148.12 W.	48	...	...	3.7M	...	G	FEB. 5	00 A.M. AST
FEB. 6	10	43	39.9	51.79 N.	173.19 W.	32	5.2	4.6	...	...	G	FEB. 5	11 P.M. BST
FEB. 7	22	46	52.8	52.42 N.	172.93 W.	44	4.4	...	...	...	G	FEB. 7	11 A.M. BST
FEB. 8	05	51	16.7	64.68 N.	146.87 W.	10	...	...	3.3M	IV	G	FEB. 7	07 P.M. AST
FEB. 9	01	28	59.2	51.03 N.	177.90 E.	33N	4.7	...	...	...	G	FEB. 8	02 P.M. BST
FEB. 9	02	58	5.4	59.15 N.	151.98 W.	86	3.8	...	...	...	G	FEB. 8	04 P.M. AST
FEB. 10	02	32	28.1	61.27 N.	152.33 W.	139	3.5	...	...	...	G	FEB. 9	04 P.M. AST
FEB. 10	08	01	12.3	52.58 N.	172.68 W.	33N	4.3	...	...	...	G	FEB. 9	09 P.M. BST
FEB. 10	16	08	37.7	59.41 N.	151.56 W.	57	3.4	...	...	...	G	FEB. 10	06 A.M. AST
FEB. 12	04	31	6.4	63.65 N.	150.82 W.	69	...	...	...	...	G	FEB. 11	06 P.M. AST
FEB. 12	08	42	29.0	52.29 N.	173.35 W.	75	5.2	...	...	...	G	FEB. 11	09 P.M. BST
FEB. 13	02	18	18.5	54.14 N.	164.07 W.	48	4.4	...	...	...	G	FEB. 12	03 P.M. BST
FEB. 13	15	49	3.0	64.95 N.	147.72 W.	33N	...	...	...	III	G	FEB. 13	05 A.M. AST
FEB. 14	22	02	52.2	60.29 N.	152.29 W.	110	...	...	...	...	G	FEB. 14	12 P.M. AST
FEB. 15	15	31	48.0	57.67 N.	153.09 W.	98	...	...	...	...	G	FEB. 15	05 A.M. AST
FEB. 15	16	15	25.1	58.20 N.	151.66 W.	99	...	...	...	...	G	FEB. 15	06 A.M. AST
FEB. 17	17	59	29.7	51.34 N.	176.85 E.	21	4.3	...	...	...	G	FEB. 17	06 A.M. BST
FEB. 18	11	15	2.2	51.25 N.	178.31 W.	53	5.0	4.5	...	...	G	FEB. 18	00 A.M. BST
FEB. 18	11	30	14.3	62.80 N.	148.23 W.	96	...	...	...	...	G	FEB. 18	01 A.M. AST
FEB. 20	18	21	27.9	57.17 N.	156.77 W.	97	4.6	...	...	...	G	FEB. 20	08 A.M. AST
FEB. 23	22	54	31.0	61.81 N.	150.81 W.	33N	...	...	3.1M	...	G	FEB. 23	12 P.M. AST
FEB. 24	00	10	56.6	51.07 N.	178.34 E.	45	4.7	...	4.2M	...	G	FEB. 23	01 P.M. BST
FEB. 29	02	23	4.2	64.28 N.	147.69 W.	33N	...	...	3.5M	...	G	FEB. 28	04 P.M. AST
FEB. 29	19	20	36.0	51.16 N.	177.90 W.	53	4.9	4.2	...	...	G	FEB. 29	08 A.M. BST

Table 1.--*Summary of U.S. earthquakes for January-March 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
ALASKA--Continued													
MAR. 2	00	28	23.0	59.62 N.	151.36 W.	13	4.4	...	4.3M	IV	G	MAR. 1	02 P.M. AST
MAR. 2	20	34	28.3	59.57 N.	151.35 W.	11	...	...	3.5M	...	G	MAR. 2	10 A.M. AST
MAR. 3	09	46	42.0	60.16 N.	151.25 W.	77	3.5	...	...	...	G	MAR. 2	11 P.M. AST
MAR. 3	15	27	8.8	59.48 N.	152.72 W.	112	...	...	...	...	G	MAR. 3	05 A.M. AST
MAR. 5	19	59	57.6	59.97 N.	141.10 W.	15	3.4	...	...	...	G	MAR. 5	09 A.M. AST
MAR. 6	17	00	5.8	59.76 N.	153.23 W.	127	4.1	...	...	...	G	MAR. 6	07 A.M. AST
MAR. 9	03	28	7.4	51.85 N.	178.40 E.	111	4.8	...	...	...	G	MAR. 8	04 P.M. BST
MAR. 9	18	30	6.1	56.36 N.	153.56 W.	33N	4.5	...	4.6M	...	G	MAR. 9	08 A.M. AST
MAR. 10	11	48	52.2	54.47 N.	162.92 W.	52	4.8	...	...	IV	G	MAR. 10	00 A.M. BST
MAR. 10	12	40	24.0	57.42 N.	153.95 W.	79	4.6	...	...	...	G	MAR. 10	02 A.M. AST
MAR. 11	03	47	2.8	52.19 N.	169.03 W.	20	5.2	4.6	...	...	G	MAR. 10	04 P.M. BST
MAR. 12	10	23	41.7	61.76 N.	149.70 W.	57	...	...	...	...	G	MAR. 12	00 A.M. AST
MAR. 12	23	04	35.4	52.15 N.	168.98 W.	40	5.4	5.2	...	II	G	MAR. 12	12 P.M. BST
MAR. 13	03	29	35.8	64.97 N.	147.57 W.	21	...	...	3.1M	III	G	MAR. 12	05 P.M. AST
MAR. 14	02	09	30.5	59.78 N.	152.38 W.	85	...	...	...	...	G	MAR. 13	04 P.M. AST
MAR. 14	03	53	32.9	60.01 N.	153.10 W.	138	...	...	...	...	G	MAR. 13	05 P.M. AST
MAR. 14	20	28	6.5	55.02 N.	156.91 W.	33N	4.5	...	...	...	G	MAR. 14	10 A.M. AST
MAR. 15	05	58	13.3	51.53 N.	177.20 W.	41	4.7	4.3	...	...	G	MAR. 14	06 P.M. BST
MAR. 15	17	48	20.2	64.59 N.	152.26 W.	33N	...	...	3.0M	...	G	MAR. 15	07 A.M. AST
MAR. 15	21	45	10.0	52.41 N.	173.02 E.	31	5.0	...	...	...	G	MAR. 15	10 A.M. BST
MAR. 15	22	37	43.4	60.18 N.	140.64 W.	15	...	...	...	...	G	MAR. 15	01 P.M. YST
MAR. 16	07	41	21.5	63.30 N.	151.21 W.	33N	...	...	3.5M	...	G	MAR. 15	09 P.M. AST
MAR. 16	23	34	11.0	62.40 N.	151.32 W.	125	...	...	...	...	G	MAR. 16	01 P.M. AST
MAR. 17	07	37	33.7	59.99 N.	153.14 W.	132	4.9	...	...	III	G	MAR. 16	09 P.M. AST
MAR. 19	19	16	8.9	61.50 N.	146.72 W.	66	3.5	...	...	...	G	MAR. 19	09 A.M. AST
MAR. 21	20	29	36.3	53.81 N.	167.69 W.	93	4.3	...	...	...	G	MAR. 21	09 A.M. BST
MAR. 22	05	44	32.2	58.42 N.	154.88 W.	35	4.1	...	3.4M	...	G	MAR. 21	07 P.M. AST
MAR. 23	21	15	42.3	57.68 N.	155.77 W.	33N	4.0	...	4.4M	...	G	MAR. 23	11 A.M. AST
MAR. 24	02	17	37.5	52.82 N.	167.68 W.	33N	4.9	...	...	...	G	MAR. 23	03 P.M. BST
MAR. 24	03	59	51.3	52.97 N.	167.67 W.	33N	6.2	6.9	6.9M	V	G	MAR. 23	04 P.M. BST
MAR. 24	04	02	19.3	52.60 N.	167.45 W.	33N	6.1	...	...	...	G	MAR. 23	05 P.M. BST
MAR. 24	04	10	16.5	53.68 N.	168.44 W.	33N	4.8	...	...	...	G	MAR. 23	05 P.M. BST
MAR. 24	04	41	59.1	52.89 N.	167.71 W.	33N	5.0	...	...	...	G	MAR. 23	05 P.M. BST
MAR. 24	04	53	20.3	52.53 N.	168.31 W.	33N	4.5	...	...	...	G	MAR. 23	05 P.M. BST
MAR. 24	06	40	9.6	51.96 N.	167.32 W.	33N	4.7	...	...	...	G	MAR. 23	07 P.M. BST
MAR. 24	07	09	14.7	52.82 N.	167.62 W.	33N	4.9	...	...	...	G	MAR. 23	08 P.M. BST
MAR. 24	08	04	48.4	52.63 N.	167.76 W.	33N	4.6	...	...	...	G	MAR. 23	09 P.M. BST
MAR. 24	17	23	57.6	52.82 N.	167.44 W.	33N	4.6	...	...	...	G	MAR. 24	06 A.M. BST
MAR. 25	07	47	45.4	64.35 N.	145.23 W.	33N	...	...	3.0M	...	G	MAR. 24	09 P.M. AST
MAR. 25	10	17	35.5	53.18 N.	167.85 W.	33N	4.9	...	...	...	G	MAR. 24	11 P.M. BST
MAR. 25	21	44	54.2	52.97 N.	167.76 W.	45	4.8	...	...	...	G	MAR. 25	10 A.M. BST
MAR. 26	00	12	0.5	53.66 N.	168.08 W.	33N	4.5	...	...	...	G	MAR. 25	01 P.M. BST
MAR. 27	02	05	49.0	62.19 N.	151.63 W.	108	3.3	...	...	...	G	MAR. 26	04 P.M. AST
MAR. 27	11	00	48.7	52.73 N.	167.65 W.	33N	4.4	...	...	...	G	MAR. 27	00 A.M. BST
MAR. 27	22	20	26.9	52.79 N.	167.75 W.	33N	4.7	...	...	IV	G	MAR. 27	11 A.M. BST
MAR. 28	09	23	40.9	53.00 N.	167.62 W.	30	4.9	4.1	...	III	G	MAR. 27	10 P.M. BST
MAR. 28	21	12	8.7	51.97 N.	171.91 W.	55	4.8	...	...	...	G	MAR. 28	10 A.M. BST
MAR. 29	05	44	0.5	67.49 N.	162.00 W.	33N	...	...	3.3M	...	G	MAR. 28	06 P.M. BST
MAR. 29	13	19	59.2	55.86 N.	155.02 W.	33N	4.2	...	3.9M	...	G	MAR. 29	03 A.M. AST
MAR. 30	11	38	56.3	52.66 N.	166.52 W.	31	4.8	...	4.4M	...	G	MAR. 30	00 A.M. BST
MAR. 31	16	26	8.3	63.62 N.	147.55 W.	105	...	...	...	...	G	MAR. 31	06 A.M. AST
CALIFORNIA													
JAN. 1	02	09	25.7	36.21 N.	120.85 W.	5	...	...	3.2B	...	B	DEC. 31	06 P.M. PST
JAN. 1	04	28	41.4	32.90 N.	115.50 W.	5	...	...	3.0P	FELT	P	DEC. 31	08 P.M. PST
JAN. 7	19	56	56.2	37.61 N.	118.92 W.	5	...	...	3.3B	FELT	B	JAN. 7	11 A.M. PST
JAN. 8	19	10	11.5	34.02 N.	117.57 W.	6	...	...	3.3P	IV	P	JAN. 8	11 A.M. PST
JAN. 9	19	53	21.9	38.44 N.	122.56 W.	14	...	...	3.0B	IV	B	JAN. 9	11 A.M. PST
JAN. 10	05	01	59.4	37.44 N.	118.56 W.	5	...	...	3.2B	...	B	JAN. 9	09 P.M. PST
JAN. 12	20	11	5.9	32.97 N.	115.55 W.	5	...	...	4.1P	IV	P	JAN. 12	12 P.M. PST
JAN. 13	21	12	34.1	33.12 N.	115.70 W.	5	...	...	3.5P	FELT	P	JAN. 13	01 P.M. PST
JAN. 14	23	51	52.5	37.63 N.	118.86 W.	5	...	...	4.0B	FELT	B	JAN. 14	03 P.M. PST
JAN. 15	00	00	19.0	37.63 N.	118.87 W.	5	...	...	3.2B	FELT	B	JAN. 14	04 P.M. PST

Table 1.--*Summary of U.S. earthquakes for January-March 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
JAN. 15	13	35	51.6	33.70 N.	116.83 W.	6	...	...	2.8P	FELT	P	JAN. 15	05 A.M. PST
JAN. 15	20	28	22.0	36.18 N.	117.60 W.	8	...	...	3.7P	V	P	JAN. 15	12 P.M. PST
JAN. 17	01	11	39.5	37.02 N.	121.82 W.	13	...	...	3.6B	FELT	B	JAN. 16	05 P.M. PST
JAN. 17	09	31	21.4	33.83 N.	118.22 W.	5	...	...	2.2P	FELT	P	JAN. 17	01 A.M. PST
JAN. 18	09	09	30.9	33.93 N.	117.73 W.	7	...	...	3.1P	...	P	JAN. 18	01 A.M. PST
JAN. 19	17	05	29.0	38.96 N.	123.52 W.	8	...	...	3.2B	FELT	B	JAN. 19	09 A.M. PST
JAN. 21	06	30	56.4	33.73 N.	117.98 W.	6	...	...	2.1P	FELT	P	JAN. 20	10 P.M. PST
JAN. 22	15	08	47.0	37.63 N.	118.92 W.	5	...	...	3.0P	...	G	JAN. 22	07 A.M. PST
JAN. 24	18	58	42.4	37.83 N.	121.79 W.	7	...	...	2.7B	...	Z	JAN. 24	10 A.M. PST
JAN. 24	19	00	9.7	37.83 N.	121.79 W.	8	5.3	5.9	5.5B	VII	Z	JAN. 24	11 A.M. PST
JAN. 24	19	01	02.2	37.80 N.	121.76 W.	3	...	...	5.2B	FELT	Z	JAN. 24	11 A.M. PST
JAN. 24	19	01	45.2	37.83 N.	121.74 W.	2	...	...	4.3B	FELT	Z	JAN. 24	11 A.M. PST
JAN. 24	19	03	19.2	37.84 N.	121.80 W.	1	...	...	4.8B	FELT	Z	JAN. 24	11 A.M. PST
JAN. 24	19	12	42.1	37.84 N.	121.80 W.	3	...	...	3.5B	FELT	Z	JAN. 24	11 A.M. PST
JAN. 24	19	56	5.2	37.84 N.	121.81 W.	9	...	...	3.7B	FELT	Z	JAN. 24	11 A.M. PST
JAN. 25	05	12	43.2	37.83 N.	121.78 W.	6	4.2	...	4.9B	FELT	Z	JAN. 24	09 P.M. PST
JAN. 25	05	21	47.7	37.85 N.	121.78 W.	4	...	...	3.5B	FELT	Z	JAN. 24	09 P.M. PST
JAN. 25	05	24	36.6	37.85 N.	121.80 W.	5	4.2	...	4.6B	FELT	Z	JAN. 24	09 P.M. PST
JAN. 25	05	29	45.2	37.85 N.	121.80 W.	3	...	...	4.0B	FELT	Z	JAN. 24	09 P.M. PST
JAN. 25	07	45	59.8	37.84 N.	121.80 W.	3	...	...	3.5B	FELT	Z	JAN. 24	11 P.M. PST
JAN. 25	13	39	2.5	37.84 N.	121.79 W.	3	...	...	4.2B	FELT	Z	JAN. 25	05 A.M. PST
JAN. 25	14	03	27.7	37.84 N.	121.79 W.	4	...	...	4.0B	FELT	Z	JAN. 25	06 A.M. PST
JAN. 26	23	53	6.0	34.40 N.	117.03 W.	5	...	...	3.1P	...	P	JAN. 26	03 P.M. PST
JAN. 27	01	20	26.7	34.05 N.	117.28 W.	14	...	...	2.9P	IV	P	JAN. 26	05 P.M. PST
JAN. 27	02	33	36.2	37.75 N.	121.71 W.	10	5.0	5.0	5.8B	VII	Z	JAN. 26	06 P.M. PST
JAN. 27	07	12	39.3	36.59 N.	121.26 W.	5	...	...	3.0B	...	B	JAN. 26	11 P.M. PST
JAN. 27	10	58	1.5	37.84 N.	121.80 W.	8	...	...	4.1B	FELT	Z	JAN. 27	02 A.M. PST
JAN. 29	01	46	4.2	37.79 N.	121.75 W.	9	...	...	3.6B	FELT	Z	JAN. 28	05 P.M. PST
JAN. 30	08	36	24.1	37.65 N.	118.93 W.	14	...	...	3.0B	...	B	JAN. 30	00 A.M. PST
JAN. 30	20	17	45.7	37.65 N.	118.93 W.	5	...	...	3.2B	...	B	JAN. 30	12 P.M. PST
JAN. 31	10	48	17.2	37.63 N.	118.88 W.	13	...	...	3.2B	...	B	JAN. 31	02 A.M. PST
FEB. 3	20	12	26.0	37.59 N.	118.94 W.	4	...	...	3.2B	...	B	FEB. 3	12 P.M. PST
FEB. 4	01	22	56.4	37.29 N.	121.68 W.	6	...	...	3.2B	FELT	B	FEB. 3	05 P.M. PST
FEB. 4	06	03	20.0	38.77 N.	122.43 W.	18	...	...	3.2B	IV	B	FEB. 3	10 P.M. PST
FEB. 6	09	36	2.8	37.63 N.	118.78 W.	5	...	...	3.2B	...	B	FEB. 6	01 A.M. PST
FEB. 8	19	53	26.3	34.93 N.	116.80 W.	10	...	...	3.1P	...	P	FEB. 8	11 A.M. PST
FEB. 9	09	17	50.2	33.80 N.	118.08 W.	4	...	...	2.7P	IV	P	FEB. 9	01 A.M. PST
FEB. 13	06	31	13.2	33.28 N.	116.17 W.	7	...	...	3.2P	...	P	FEB. 12	10 P.M. PST
FEB. 13	07	45	49.6	38.97 N.	122.59 W.	5	...	...	3.5B	IV	B	FEB. 12	11 P.M. PST
FEB 14	08	16	32.7	38.88 N.	122.86 W.	5	...	...	3.0B	FELT	B	FEB. 14	00 A.M. PST
FEB. 14	14	30	56.3	37.59 N.	118.91 W.	5	...	...	3.2B	...	B	FEB. 14	06 A.M. PST
FEB. 16	01	45	13.8	34.27 N.	119.60 W.	8	...	...	3.1P	FELT	P	FEB. 15	05 P.M. PST
FEB. 16	15	09	8.2	33.02 N.	115.62 W.	5	...	...	3.9P	FELT	P	FEB. 16	07 A.M. PST
FEB. 16	18	27	26.4	37.56 N.	118.75 W.	5	...	...	3.8B	FELT	B	FEB. 16	10 A.M. PST
FEB. 20	08	53	51.6	34.05 N.	119.00 W.	14	...	...	3.2P	FELT	P	FEB. 20	00 A.M. PST
FEB. 20	10	23	29.9	33.97 N.	117.22 W.	6	...	...	2.5P	FELT	P	FEB. 20	02 A.M. PST
FEB. 21	18	57	29.8	37.66 N.	121.68 W.	6	...	...	3.7B	IV	Z	FEB. 21	10 A.M. PST
FEB. 22	02	30	42.6	37.59 N.	118.83 W.	5	...	...	4.1B	FELT	B	FEB. 21	06 P.M. PST
FEB. 22	13	39	19.5	33.23 N.	116.28 W.	7	...	...	3.5P	III	P	FEB. 22	05 A.M. PST
FEB. 22	13	39	23.7	33.22 N.	116.22 W.	5	...	...	3.9P	III	P	FEB. 22	05 A.M. PST
FEB. 22	13	45	22.9	33.23 N.	116.23 W.	7	...	...	3.1P	III	P	FEB. 22	05 A.M. PST
FEB. 22	22	26	27.0	37.89 N.	121.78 W.	13	...	...	3.5B	III	B	FEB. 22	02 P.M. PST
FEB. 23	00	57	37.4	37.58 N.	118.79 W.	5	...	...	3.2B	...	B	FEB. 22	04 P.M. PST
FEB. 25	10	47	38.7	33.52 N.	116.55 W.	6	5.1	4.7	5.5P	VI	P	FEB. 25	02 A.M. PST
FEB. 25	10	59	25.3	33.50 N.	116.53 W.	15	...	...	3.4P	...	P	FEB. 25	02 A.M. PST
FEB. 25	11	05	8.8	33.52 N.	116.52 W.	16	...	...	3.3P	FELT	P	FEB. 25	03 A.M. PST
FEB. 25	11	40	49.3	33.52 N.	116.55 W.	10	...	...	3.0P	FELT	P	FEB. 25	03 A.M. PST
FEB. 25	14	00	7.3	33.50 N.	116.53 W.	5	...	...	3.7P	...	P	FEB. 25	06 A.M. PST
FEB. 25	14	51	32.3	33.50 N.	116.53 W.	6	...	...	3.3P	...	P	FEB. 25	06 A.M. PST
FEB. 25	19	02	17.3	33.52 N.	116.52 W.	7	...	...	3.2P	...	P	FEB. 25	11 A.M. PST
FEB. 25	23	43	32.3	36.20 N.	117.58 W.	5	...	...	3.9P	...	P	FEB. 25	03 P.M. PST
FEB. 26	23	42	40.2	32.85 N.	115.55 W.	5	...	...	3.0P	...	P	FEB. 26	03 P.M. PST
FEB. 27	01	28	57.2	32.95 N.	115.57 W.	2	...	...	3.6P	...	P	FEB. 26	05 P.M. PST
FEB. 27	01	41	52.7	32.97 N.	115.57 W.	6	...	...	3.2P	...	P	FEB. 26	05 P.M. PST
FEB. 27	02	38	6.5	32.98 N.	115.57 W.	1	...	...	3.2P	...	P	FEB. 26	06 P.M. PST

Table 1.--*Summary of U.S. earthquakes for January-March 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
CALIFORNIA--Continued													
FEB. 28	11	39	22.6	40.28 N.	124.01 W.	5	...	...	3.4B	FELT	B	FEB. 28	03 A.M. PST
FEB. 29	23	58	52.8	35.33 N.	120.45 W.	5	...	...	3.3P	...	P	FEB. 29	03 P.M. PST
MAR. 6	07	45	25.1	35.57 N.	117.25 W.	1	...	...	3.0P	...	P	MAR. 5	11 P.M. PST
MAR. 6	11	03	44.7	36.66 N.	121.39 W.	5	...	...	3.8B	IV	B	MAR. 6	03 A.M. PST
MAR. 6	11	05	9.0	36.67 N.	121.37 W.	7	...	...	4.0B	FELT	B	MAR. 6	03 A.M. PST
MAR. 10	01	10	42.1	35.61 N.	119.80 W.	5	...	3.1B	3.3P	...	G	MAR. 9	05 P.M. PST
MAR. 10	06	54	22.3	33.88 N.	116.27 W.	7	...	...	3.7P	IV	P	MAR. 9	10 P.M. PST
MAR. 10	21	04	29.7	33.88 N.	116.27 W.	7	...	...	3.3P	...	P	MAR. 10	01 P.M. PST
MAR. 12	08	08	29.2	33.48 N.	116.52 W.	7	...	...	3.0P	...	P	MAR. 12	00 A.M. PST
MAR. 15	07	30	11.1	37.56 N.	118.89 W.	5	...	...	3.3P	...	G	MAR. 14	11 P.M. PST
MAR. 15	15	30	46.2	37.60 N.	118.81 W.	16	...	...	3.8B	FELT	B	MAR. 15	07 A.M. PST
MAR. 16	02	17	16.0	35.67 N.	118.45 W.	5	...	...	2.7P	...	P	MAR. 15	06 P.M. PST
MAR. 17	03	41	17.8	35.65 N.	118.07 W.	6	...	...	3.0P	...	P	MAR. 16	07 P.M. PST
MAR. 19	13	54	19.7	37.75 N.	118.35 W.	5	...	...	3.5B	...	B	MAR. 19	05 A.M. PST
MAR. 20	11	04	38.6	37.59 N.	118.89 W.	19	...	...	3.1B	...	B	MAR. 20	03 A.M. PST
MAR. 20	11	05	42.9	37.62 N.	118.93 W.	22	...	...	3.8B	FELT	B	MAR. 20	03 A.M. PST
MAR. 20	11	07	48.1	37.61 N.	118.94 W.	12	...	...	3.1B	...	B	MAR. 20	03 A.M. PST
MAR. 20	14	26	42.5	37.63 N.	118.92 W.	18	...	...	3.2B	...	B	MAR. 20	06 A.M. PST
MAR. 20	16	42	48.3	37.63 N.	118.93 W.	5	...	...	3.7B	FELT	B	MAR. 20	08 A.M. PST
MAR. 20	22	14	33.9	37.63 N.	118.91 W.	5	...	...	3.8B	FELT	B	MAR. 20	02 P.M. PST
MAR. 20	23	54	12.2	37.62 N.	118.91 W.	5	...	...	3.3B	FELT	B	MAR. 20	03 P.M. PST
MAR. 21	02	23	48.0	35.78 N.	119.60 W.	5	...	...	3.2P	...	P	MAR. 20	06 P.M. PST
MAR. 21	03	49	45.2	37.61 N.	118.91 W.	5	...	...	3.1B	...	B	MAR. 20	07 P.M. PST
MAR. 21	09	09	28.1	37.60 N.	118.90 W.	5	...	...	3.2P	...	G	MAR. 21	01 A.M. PST
MAR. 22	14	12	55.0	38.79 N.	119.82 W.	5	...	...	3.7B	FELT	B	MAR. 22	06 A.M. PST
MAR. 25	05	31	43.1	33.95 N.	118.67 W.	8	...	...	2.9P	FELT	P	MAR. 24	09 P.M. PST
MAR. 26	14	41	56.2	37.63 N.	118.94 W.	5	...	...	3.7B	FELT	B	MAR. 26	06 A.M. PST
MAR. 26	16	21	41.1	37.61 N.	118.92 W.	5	...	...	3.1P	...	G	MAR. 26	08 A.M. PST
MAR. 27	02	26	4.3	37.62 N.	118.91 W.	4	...	...	4.3B	IV	B	MAR. 26	06 P.M. PST
MAR. 27	02	29	14.6	37.66 N.	118.92 W.	16	...	...	3.6B	FELT	B	MAR. 26	06 P.M. PST
MAR. 29	06	14	8.3	37.62 N.	118.94 W.	5	...	...	3.5B	FELT	B	MAR. 28	10 P.M. PST
MAR. 29	07	27	46.3	37.63 N.	118.92 W.	5	...	...	3.4B	...	B	MAR. 28	11 P.M. PST
MAR. 29	18	31	19.2	37.67 N.	118.89 W.	5	...	...	3.3B	...	B	MAR. 29	10 A.M. PST
MAR. 30	08	34	9.5	37.62 N.	118.90 W.	5	...	...	3.4B	FELT	B	MAR. 30	00 A.M. PST
CALIFORNIA--OFF THE COAST													
FEB. 3	12	42	17.0	32.53 N.	118.15 W.	5	...	...	3.1P	...	P	FEB. 3	04 A.M. PST
FEB. 8	10	56	25.4	40.16 N.	126.76 W.	5	3.9	...	4.4B	...	B	FEB. 8	02 A.M. PST
FEB. 14	11	42	13.6	40.63 N.	127.33 W.	5	4.1	...	4.1B	...	B	FEB. 14	03 A.M. PST
MAR. 3	14	17	4.6	40.60 N.	125.03 W.	5	5.0	5.2	5.1B	IV	B	MAR. 3	06 A.M. PST
MAR. 7	01	44	31.1	40.27 N.	126.31 W.	5	...	...	3.8B	...	B	MAR. 6	05 P.M. PST
MAR. 17	09	42	53.4	40.14 N.	125.83 W.	5	...	...	3.7B	...	B	MAR. 17	01 A.M. PST
MAR. 28	22	00	10.0	40.35 N.	125.25 W.	5	...	...	3.4B	...	B	MAR. 28	02 P.M. PST
HAWAII													
JAN. 1	15	07	03.1	19.33 N.	155.11 W.	10	...	...	3.4H	III	H	JAN. 1	05 A.M. HST
JAN. 3	11	06	16.7	19.39 N.	155.25 W.	3	...	...	3.4H	III	H	JAN. 3	01 A.M. HST
JAN. 15	23	41	02.7	19.68 N.	156.03 W.	35	...	...	3.8H	...	H	JAN. 15	01 P.M. HST
JAN. 17	05	03	39.8	19.38 N.	155.24 W.	3	...	...	3.1H	III	H	JAN. 16	07 P.M. HST
JAN. 17	07	59	56.1	19.38 N.	155.24 W.	4	...	...	3.4H	III	H	JAN. 16	09 P.M. HST
JAN. 17	16	23	39.8	19.40 N.	155.24 W.	4	...	...	3.1H	III	H	JAN. 17	06 A.M. HST
JAN. 17	22	21	47.5	19.37 N.	155.08 W.	8	...	...	3.3H	...	H	JAN. 17	12 P.M. HST
JAN. 18	05	33	42.2	19.33 N.	155.22 W.	10	...	...	3.6H	III	H	JAN. 17	07 P.M. HST
JAN. 20	01	28	48.6	19.31 N.	155.54 W.	27	...	...	4.6H	V	H	JAN. 19	03 P.M. HST
JAN. 20	12	58	02.1	19.45 N.	154.86 W.	9	...	...	3.1H	...	H	JAN. 20	02 A.M. HST
JAN. 21	03	52	15.3	19.35 N.	155.28 W.	33	...	...	3.1H	III	H	JAN. 20	05 P.M. HST
JAN. 22	17	52	04.6	19.33 N.	155.22 W.	8	...	...	3.5H	III	H	JAN. 22	07 A.M. HST
JAN. 24	02	37	24.6	19.45 N.	155.50 W.	10	...	...	3.3H	...	H	HAN. 23	04 P.M. HST
JAN. 24	21	14	40.5	19.33 N.	155.20 W.	10	...	...	3.6H	III	H	JAN. 24	11 A.M. HST
JAN. 29	05	14	02.2	19.38 N.	155.24 W.	3	...	...	3.1H	III	H	JAN. 28	07 P.M. HST
JAN. 30	07	14	54.2	19.35 N.	155.26 W.	28	...	...	3.6H	III	H	JAN. 29	09 P.M. HST
FEB. 2	19	31	44.5	19.38 N.	155.24 W.	3	...	...	3.0H	...	H	FEB. 2	09 A.M. HST

Table 1.--*Summary of U.S. earthquakes for January-March 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
HAWAII--Continued													
FEB. 5	22	48	09.8	19.36 N.	155.23 W.	29	...	...	3.8H	IV	H	FEB. 5	12 P.M. HST
FEB. 10	23	07	43.9	19.68 N.	156.07 W.	36	...	...	3.1H	...	H	FEB. 10	01 P.M. HST
FEB. 13	05	00	08.4	19.38 N.	155.28 W.	3	...	...	3.2H	III	H	FEB. 12	07 P.M. HST
FEB. 15	22	59	25.9	19.33 N.	155.18 W.	8	...	...	3.1H	II	H	FEB. 15	12 P.M. HST
FEB. 18	02	16	13.7	19.78 N.	155.38 W.	25	...	...	3.8H	IV	H	FEB. 17	04 P.M. HST
FEB. 18	10	13	17.7	19.47 N.	155.44 W.	11	...	...	3.5H	IV	H	FEB. 18	00 A.M. HST
FEB. 18	16	43	13.5	20.28 N.	155.78 W.	0	...	...	3.3H	II	H	FEB. 18	06 A.M. HST
FEB. 19	19	18	42.9	19.39 N.	155.24 W.	4	...	...	3.1H	III	H	FEB. 19	09 A.M. HST
FEB. 25	02	48	10.6	20.06 N.	155.95 W.	10	...	...	3.7H	III	H	FEB. 24	04 P.M. HST
FEB. 26	10	30	06.9	19.33 N.	155.20 W.	10	...	...	3.6H	III	H	FEB. 26	00 A.M. HST
MAR. 2	05	38	28.2	19.78 N.	156.69 W.	16	...	...	4.2H	III	H	MAR. 1	07 P.M. HST
MAR. 2	15	24	57.2	19.37 N.	155.50 W.	9	...	...	3.0H	...	H	MAR. 2	05 A.M. HST
MAR. 3	00	07	06.7	19.38 N.	155.24 W.	1	...	...	3.1H	III	H	MAR. 2	02 P.M. HST
MAR. 5	10	21	06.9	18.79 N.	156.19 W.	32	...	...	3.1H	...	H	MAR. 5	00 A.M. HST
MAR. 8	05	47	42.5	19.33 N.	155.19 W.	10	...	...	3.2H	III	H	MAR. 7	07 P.M. HST
MAR. 10	02	27	20.7	19.33 N.	155.22 W.	9	...	...	3.1H	III	H	MAR. 9	04 P.M. HST
MAR. 12	12	57	52.7	19.36 N.	155.23 W.	2	4.6	...	4.3H	V	H	MAR. 12	02 A.M. HST
MAR. 15	08	04	08.2	19.35 N.	155.10 W.	8	...	...	3.0H	...	H	MAR. 14	10 P.M. HST
MAR. 15	15	42	09.9	19.43 N.	155.40 W.	12	...	...	3.2H	...	H	MAR. 15	05 A.M. HST
MAR. 21	17	46	39.8	19.53 N.	156.03 W.	13	...	...	3.3H	III	H	MAR. 21	07 A.M. HST
MAR. 21	22	56	20.2	19.77 N.	155.53 W.	15	...	...	3.7H	III	H	MAR. 21	12 P.M. HST
MAR. 22	11	09	53.5	19.44 N.	155.39 W.	11	...	...	3.3H	II	H	MAR. 22	01 A.M. HST
MAR. 26	05	16	31.7	19.98 N.	155.84 W.	5	...	...	4.0H	IV	H	MAR. 25	07 P.M. HST
MAR. 26	20	56	40.1	19.70 N.	155.17 W.	29	...	...	3.4H	...	H	MAR. 26	10 A.M. HST
MAR. 28	09	24	02.6	19.32 N.	155.28 W.	34	...	...	3.3H	II	H	MAR. 27	11 P.M. HST
MAR. 28	18	32	03.0	19.40 N.	155.47 W.	9	...	...	3.1H	...	H	MAR. 28	08 A.M. HST
IDAHO													
JAN. 5	14	17	13.5	44.72 N.	114.39 W.	5	...	...	3.6G	...	G	JAN. 5	06 A.M. PST
FEB. 21	06	39	40.0	44.40 N.	112.98 W.	5	...	...	3.0D	...	G	FEB. 20	11 P.M. MST
FEB. 29	19	33	38.5	42.72 N.	111.73 W.	7	...	...	3.3U	IV	U	FEB. 29	12 P.M. MST
MAR. 10	20	28	41.0	42.44 N.	111.28 W.	1	...	...	3.3U	...	U	MAR. 10	01 P.M. MST
ILLINOIS													
MAR. 13	02	23	13.4	37.93 N.	88.45 W.	19	...	...	3.3S	FELT	S	MAR. 12	08 P.M. CST
KENTUCKY													
MAR. 23	21	38	15.0	37.63 N.	86.69 W.	6	...	...	3.3S	IV	S	MAR. 23	03 P.M. CST
MAINE													
FEB. 9	13	11	36.0	43.56 N.	70.76 W.	0	...	...	2.4J	FELT	J	FEB. 9	08 A.M. PST
MONTANA													
MAR. 10	14	48	56.5	47.30 N.	113.39 W.	5	4.0	...	4.4G	IV	G	MAR. 10	07 A.M. MST
MAR. 11	04	03	34.1	45.58 N.	111.70 W.	5	...	...	4.0G	...	G	MAR. 10	09 P.M. MST
NEVADA													
FEB. 28	15	00	0.1	37.13 N.	116.09 W.	0	4.4	...	4.4B	...	E	FEB. 28	07 A.M. PST
MAR. 8	15	35	0.1	37.18 N.	116.08 W.	0	3.9	...	4.0B	...	E	MAR. 8	07 A.M. PST
MAR. 15	04	46	24.1	36.80 N.	115.97 W.	5	...	...	3.2P	...	G	MAR. 14	08 P.M. PST
NEW MEXICO													
MAR. 22	00	49	12.5	34.59 N.	105.91 W.	5	...	...	3.4G	IV	G	MAR. 21	05 P.M. MST
NEW YORK													
JAN. 17	10	13	16.1	41.31 N.	73.93 W.	3	...	...	2.9L	IV	L	JAN. 17	05 A.M. EST

Table 1.--*Summary of U.S. earthquakes for January-March 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
OREGON--OFF THE COAST													
MAR. 20	15	24	9.2	43.93 N.	128.11 W.	15	4.1	4.0	...	...	G	MAR. 20	07 A.M. PST
MAR. 30	13	49	37.4	43.43 N.	127.12 W.	15	5.2	4.7	...	...	G	MAR. 30	05 A.M. PST
PENNSYLVANIA													
MAR. 5	17	06	54.5	40.19 N.	75.16 W.	5	...	...	3.5L	IV	G	MAR. 5	12 P.M. EST
MAR. 11	06	00	26.0	40.16 N.	75.10 W.	5	...	...	3.7L	IV	G	MAR. 11	01 A.M. EST
TEXAS													
FEB. 21	20	42	0.9	35.28 N.	101.08 W.	5	...	...	2.9T	...	G	FEB. 21	02 P.M. CST
UTAH													
MAR. 1	15	18	25.6	39.62 N.	110.68 W.	7	...	...	2.8U	...	U	MAR. 1	08 A.M. MST
WASHINGTON													
MAR. 20	23	47	43.3	46.21 N.	122.19 W.	4	...	...	4.1G	...	W	MAR. 20	03 P.M. PST
MAR. 22	22	22	42.2	46.21 N.	122.19 W.	3	4.3	...	3.5G	...	W	MAR. 22	02 P.M. PST
MAR. 23	15	22	42.9	46.22 N.	122.21 W.	1	...	...	3.4G	...	W	MAR. 23	07 A.M. PST
MAR. 24	13	14	42.2	46.20 N.	122.22 W.	2	...	...	3.2G	...	W	MAR. 24	05 A.M. PST
MAR. 24	21	56	49.6	46.21 N.	122.19 W.	3	4.2	...	4.2G	...	W	MAR. 24	01 P.M. PST
MAR. 25	04	07	9.7	46.21 N.	122.19 W.	4	4.2	...	3.4G	...	W	MAR. 24	08 P.M. PST
MAR. 25	07	08	46.2	46.20 N.	122.19 W.	4	4.2	...	3.4G	...	W	MAR. 24	11 P.M. PST
MAR. 25	13	42	14.0	46.20 N.	122.19 W.	4	...	...	3.3G	...	W	MAR. 25	05 A.M. PST
MAR. 25	17	18	47.0	46.21 N.	122.18 W.	1	...	...	3.5G	...	W	MAR. 25	09 A.M. PST
MAR. 25	21	50	51.3	46.21 N.	122.20 W.	3	...	...	3.4G	...	W	MAR. 25	01 P.M. PST
MAR. 25	22	22	14.7	46.20 N.	122.17 W.	3	...	...	3.4G	...	W	MAR. 25	02 P.M. PST
MAR. 25	22	53	1.7	46.20 N.	122.18 W.	4	3.8	...	3.7G	...	W	MAR. 25	02 P.M. PST
MAR. 26	01	06	30.0	46.21 N.	122.19 W.	2	...	...	3.5G	...	W	MAR. 25	05 P.M. PST
MAR. 26	02	03	18.4	46.22 N.	122.19 W.	4	4.3	...	3.8G	...	W	MAR. 25	06 P.M. PST
MAR. 26	02	36	0.0	46.20 N.	122.19 W.	4	4.2	...	3.5G	...	W	MAR. 25	06 P.M. PST
MAR. 26	03	36	24.1	46.21 N.	122.18 W.	4	...	...	3.5G	...	W	MAR. 25	07 P.M. PST
MAR. 26	04	10	43.4	46.20 N.	122.20 W.	3	...	...	3.1G	...	W	MAR. 25	08 P.M. PST
MAR. 26	04	14	28.9	46.21 N.	122.19 W.	4	3.8	...	3.7G	...	W	MAR. 25	08 P.M. PST
MAR. 26	05	00	4.4	46.21 N.	122.18 W.	3	4.1	...	3.6G	...	W	MAR. 25	09 P.M. PST
MAR. 26	07	17	21.9	46.21 N.	122.18 W.	4	3.8	...	3.5G	...	W	MAR. 25	11 P.M. PST
MAR. 26	09	10	7.9	46.21 N.	122.18 W.	4	4.1	...	3.5G	...	W	MAR. 26	01 A.M. PST
MAR. 26	09	44	2.7	46.21 N.	122.17 W.	4	4.2	...	3.8G	...	W	MAR. 26	01 A.M. PST
MAR. 26	17	07	10.7	46.19 N.	122.19 W.	7	4.1	...	4.0G	...	W	MAR. 26	09 A.M. PST
MAR. 26	20	37	49.0	46.21 N.	122.19 W.	5	...	...	3.7G	...	W	MAR. 26	12 P.M. PST
MAR. 27	03	40	5.7	46.22 N.	122.18 W.	5	4.1	...	3.9G	...	W	MAR. 26	07 P.M. PST
MAR. 27	03	48	58.5	46.21 N.	122.19 W.	5	4.2	...	3.9G	...	W	MAR. 26	07 P.M. PST
MAR. 27	04	26	10.1	46.20 N.	122.17 W.	7	4.0	...	3.4G	...	W	MAR. 26	08 P.M. PST
MAR. 27	05	30	43.5	46.21 N.	122.19 W.	4	...	...	3.4G	...	W	MAR. 26	09 P.M. PST
MAR. 27	06	33	24.0	46.20 N.	122.23 W.	1	4.1	...	3.8G	...	W	MAR. 26	10 P.M. PST
MAR. 27	07	39	15.6	46.21 N.	122.18 W.	5	...	...	3.4G	...	W	MAR. 26	11 P.M. PST
MAR. 27	12	32	54.6	46.21 N.	122.19 W.	4	...	...	3.4G	...	W	MAR. 27	04 A.M. PST
MAR. 27	14	55	54.7	46.21 N.	122.19 W.	4	4.2	...	3.9G	...	W	MAR. 27	06 A.M. PST
MAR. 27	15	55	3.8	46.22 N.	122.20 W.	6	4.0	...	3.6G	...	W	MAR. 27	07 A.M. PST
MAR. 27	18	55	44.9	46.21 N.	122.19 W.	5	...	...	3.6G	...	W	MAR. 27	10 A.M. PST
MAR. 27	20	16	43.1	46.21 N.	122.19 W.	5	3.9	...	3.8G	...	W	MAR. 27	12 P.M. PST
MAR. 27	22	00	5.6	46.22 N.	122.20 W.	4	4.6	...	4.5G	...	W	MAR. 27	02 P.M. PST
MAR. 28	01	51	12.6	46.21 N.	122.18 W.	5	4.1	...	3.7G	...	W	MAR. 27	05 P.M. PST
MAR. 28	03	35	50.9	46.21 N.	122.19 W.	5	...	...	3.1G	...	W	MAR. 27	07 P.M. PST
MAR. 28	08	28	25.7	46.22 N.	122.18 W.	4	4.3	...	4.2G	...	W	MAR. 28	00 A.M. PST
MAR. 28	12	51	19.4	46.22 N.	122.18 W.	5	3.7	...	3.6G	...	W	MAR. 28	04 A.M. PST
MAR. 28	13	59	38.5	46.21 N.	122.19 W.	5	4.0	...	3.7G	...	W	MAR. 28	05 A.M. PST
MAR. 28	15	18	43.4	46.21 N.	122.20 W.	2	...	...	3.6G	...	W	MAR. 28	07 A.M. PST
MAR. 28	22	50	56.7	46.18 N.	122.20 W.	5	3.7	...	3.7G	...	W	MAR. 28	02 P.M. PST
MAR. 28	23	50	28.5	46.22 N.	122.19 W.	4	...	...	3.7G	...	W	MAR. 28	03 P.M. PST
MAR. 29	05	48	47.3	46.21 N.	122.19 W.	5	...	...	3.8G	...	W	MAR. 28	09 P.M. PST

Table 1.--*Summary of U.S. earthquakes for January-March 1980*--Continued

Date (1980)	Origin time (UTC) hr	min	s	Lat	Long	Depth (km)	Magnitude mb	MS	ML or Mn	Maximum intensity	Hypocenter source	Local time Date	Hour
WASHINGTON--Continued													
MAR. 29	08	36	56.8	46.21 N.	122.17 W.	5	4.0	...	3.8G	...	W	MAR. 29	00 A.M. PST
MAR. 29	10	34	40.5	46.22 N.	122.18 W.	4	3.7	...	3.5G	...	W	MAR. 29	02 A.M. PST
MAR. 29	11	51	48.2	46.21 N.	122.19 W.	6	4.1	...	4.0G	...	W	MAR. 29	03 A.M. PST
MAR. 29	13	01	50.9	46.20 N.	122.21 W.	1	3.7	...	3.7G	...	W	MAR. 29	05 A.M. PST
MAR. 29	15	05	24.9	46.21 N.	122.18 W.	4	3.7	...	3.8G	...	W	MAR. 29	07 A.M. PST
MAR. 29	15	35	39.4	46.20 N.	122.18 W.	5	4.2	...	4.2G	...	W	MAR. 29	07 A.M. PST
MAR. 29	19	01	1.9	46.22 N.	122.18 W.	4	...	...	3.4G	...	W	MAR. 29	11 A.M. PST
MAR. 29	20	55	52.1	46.21 N.	122.19 W.	4	...	...	4.0G	...	W	MAR. 29	12 P.M. PST
MAR. 29	23	20	40.7	46.20 N.	122.19 W.	4	4.1	...	3.9G	...	W	MAR. 29	03 P.M. PST
MAR. 30	02	56	19.8	46.22 N.	122.19 W.	3	4.2	...	3.8G	...	W	MAR. 29	06 P.M. PST
MAR. 30	03	53	54.9	46.20 N.	122.20 W.	2	4.1	...	3.9G	...	W	MAR. 29	07 P.M. PST
MAR. 30	07	42	17.3	46.21 N.	122.18 W.	3	4.1	...	3.8G	...	W	MAR. 29	11 P.M. PST
MAR. 30	09	16	53.2	46.21 N.	122.19 W.	5	4.2	...	4.2G	...	W	MAR. 30	01 A.M. PST
MAR. 30	12	39	57.8	46.21 N.	122.17 W.	5	4.1	...	3.7G	...	W	MAR. 30	04 A.M. PST
MAR. 30	13	32	25.4	46.22 N.	122.19 W.	5	4.3	...	4.2G	...	W	MAR. 30	05 A.M. PST
MAR. 30	17	55	10.2	46.22 N.	122.18 W.	5	4.5	...	4.4G	...	W	MAR. 30	09 A.M. PST
MAR. 30	22	47	11.9	46.22 N.	122.19 W.	4	4.4	...	4.2G	...	W	MAR. 30	02 P.M. PST
MAR. 31	02	44	6.3	46.21 N.	122.19 W.	4	4.2	...	4.1G	...	W	MAR. 30	06 P.M. PST
MAR. 31	07	49	42.2	46.22 N.	122.19 W.	4	...	...	4.4G	...	W	MAR. 30	11 P.M. PST
MAR. 31	08	12	52.0	46.22 N.	122.20 W.	4	4.2	...	4.1G	...	W	MAR. 31	00 A.M. PST
MAR. 31	11	34	10.0	46.22 N.	122.19 W.	4	4.6	...	4.4G	...	W	MAR. 31	03 A.M. PST
MAR. 31	14	49	1.3	46.22 N.	122.19 W.	4	4.4	...	4.3G	...	W	MAR. 31	06 A.M. PST
MAR. 31	19	29	11.5	46.21 N.	122.18 W.	4	...	...	3.8G	...	W	MAR. 31	11 A.M. PST
MAR. 31	19	37	10.1	46.20 N.	122.18 W.	3	4.5	...	3.9G	...	W	MAR. 31	11 A.M. PST
WYOMING													
FEB. 20	12	07	23.5	44.84 N.	110.89 W.	1	...	...	...	...	G	FEB. 20	05 A.M. MST
FEB. 20	12	07	52.8	44.80 N.	110.92 W.	1	...	...	3.3G	IV	G	FEB. 20	05 A.M. MST
FEB. 22	10	18	27.7	44.81 N.	110.90 W.	1	4.5	...	4.7G	IV	G	FEB. 22	03 A.M. MST
FEB. 27	06	05	49.5	44.76 N.	111.04 W.	5	...	...	3.4G	IV	G	FEB. 26	11 P.M. MST

Table 2.--*Summary of macroseismic data for U.S. earthquakes, January-March 1980*

[Sources of the hypocenters, magnitudes, and macroseismic data: (B) University of California, Berkeley; (D) University of Montana, Missoula; (E) U.S. Department of Energy, Las Vegas, Nevada; (G) U.S. Geological Survey, National Earthquake Information Service; (H) U.S. Geological Survey, Hawaiian Volcano Observatory; (J) Weston Observatory, Massachusetts; (L) Lamont-Doherty Geological Observatory, Palisades, N.Y.; (M) National Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis, Missouri; (U) University of Utah, Salt Lake City; (Z) Cockerham and others, 1980. 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

4 January (G) Southern Alaska
Origin time: 03 47 36.9
Epicenter: 61.66 N., 147.44 W.
Depth: 66 km
Magnitude: 3.7 mb(G)

Felt at Anchorage (M).

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

Alaska--Continued

19 January (G) Andreanof Islands, Aleutian Islands
Origin time: 07 02 35.0
Epicenter: 51.32 N., 178.49 W.
Depth: 50 km
Magnitude: 5.8 mb(G), 5.7 MS(G)

Felt on Adak Island.

3 February (G) Central Alaska
Origin time: 20 40 13.3
Epicenter: 64.65 N., 149.55 W.
Depth: Normal.
Magnitude: 3.0 ML(M)
Intensity III: Nenana (M).

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

Alaska--Continued

8 February (G) Central Alaska
Origin time: 05 51 16.7
Epicenter: 64.68 N., 146.87 W.
Depth: 10 km
Magnitude: 3.3 ML(M)
Intensity IV: Eielson AFB.
Intensity III: Fairbanks.

13 February (G) Central Alaska
Origin time: 15 49 03.0
Epicenter: 64.95 N., 147.72 W.
Depth: Normal.
Magnitude: None computed.
Intensity III: North Pole (M).

2 March (G) Southern Alaska
Origin time: 00 28 23.0
Epicenter: 59.62 N., 151.36 W.
Depth: 13 km
Magnitude: 4.4 mb(G), 4.3 ML(M)
Intensity IV: Homer (M).

10 March (G) Alaska Peninsula
Origin time: 11 48 52.2
Epicenter: 54.47 N., 162.92 W.
Depth: 52 km
Magnitude: 4.8 mb(G)
Intensity IV: Cold Bay (M).

12 March (G) Umnak Island, Aleutian Islands
Origin time: 23 04 35.4
Epicenter: 52.15 N., 168.98 W.
Depth: 40 km
Magnitude: 5.4 mb(G), 5.2 MS(G)
Intensity II: Nikolski (M).

13 March (G) Central Alaska
Origin time: 03 29 35.8
Epicenter: 64.97 N., 147.57 W.
Depth: 21 km
Magnitude: 3.1 ML(M)
Intensity III: College (M), Fairbanks (M), Fort Wainwright (M), Murphy Dome (M), North Pole (M).

17 March (G) Southern Alaska
Origin time: 07 37 33.7
Epicenter: 59.99 N., 153.14 W.
Depth: 132 km
Magnitude: 4.9 mb(G)
Intensity III: Kenai (M).
Intensity II: Anchorage (M).

24 March (G) Fox Islands, Aleutian Islands
Origin time: 03 59 51.3
Epicenter: 52.97 N., 167.67 W.
Depth: Normal.

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

Alaska--Continued

Magnitude: 6.2 mb(G), 6.9 MS(G), 6.9 ML(M)
Intensity V: Nikolski (M), Unalaska.
Intensity IV: Dutch Harbor (press report).
Intensity III: Akutan.

27 March (G) Fox Islands, Aleutian Islands
Origin time: 22 20 26.9
Epicenter: 52.79 N., 167.75 W.
Depth: Normal.
Magnitude: 4.7 mb(G)
Intensity IV: Nikolski (M).

28 March (G) Fox Islands, Aleutian Islands
Origin time: 09 23 40.9
Epicenter: 53.00 N., 167.62 W.
Depth: 30 km
Magnitude: 4.9 mb(G), 4.1 MS(G)
Intensity III: Nikolski (M).

California

1 January (P) Imperial Valley
Origin time: 04 28 41.4
Epicenter: 32.90 N., 115.50 W.
Depth: 5 km
Magnitude: 3.0 ML(P)

Felt in the Imperial Valley (press report).

7 January (B) Owens Valley area
Origin time: 19 56 56.2
Epicenter: 37.61 N., 118.92 W.
Depth: 5 km
Magnitude: 3.0 ML(B)

Felt at Mammoth Lakes (B).

8 January (P) Southern California
Origin time: 19 10 11.5
Epicenter: 34.02 N., 117.57 W.
Depth: 6 km
Magnitude: 3.3 ML(P)

Intensity IV: Etiwanda.
Intensity III: Ontario (press report).
Felt: Riverside (P), Upland (P).

9 January (B) Northern California
Origin time: 19 53 21.9
Epicenter: 38.44 N., 122.56 W.
Depth: 14 km
Magnitude: 3.0 ML(B)
Intensity IV: Santa Rosa.

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

California--Continued

12 January (P) Imperial Valley
Origin time: 20 11 05.9
Epicenter: 32.97 N., 115.55 W.
Depth: 5 km
Magnitude: 4.1 ML(P)
Intensity IV: Brawley, El Centro.
Intensity III: Heber, Imperial.

13 January Northern California
Origin time: 00 54
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.
Intensity IV: Willits.

13 January (P) Imperial Valley
Origin time: 21 12 34.1
Epicenter: 33.12 N., 115.70 W.
Depth: 5 km
Magnitude: 3.5 ML(P)

Felt in the Imperial Valley (press report).

14 January (B) Owens Valley area
Origin time: 23 51 52.5
Epicenter: 37.63 N., 118.86 W.
Depth: 5 km
Magnitude: 4.0 ML(B), 4.2 ML(P)

Felt at Lake Crowley (P) and Mammoth Lakes (B).

15 January (B) Owens Valley area
Origin time: 00 00 19.0
Epicenter: 37.63 N., 118.87 W.
Depth: 5 km
Magnitude: 3.2 ML(B), 3.4 ML(P)

Felt at Lake Crowley (P).

15 January (P) Southern California
Origin time: 13 35 51.6
Epicenter: 33.70 N., 116.83 W.
Depth: 6 km
Magnitude: 2.8 ML(P)

Felt at Riverside (P).

15 January (P) Southern California
Origin time: 20 28 22.0
Epicenter: 36.18 N., 117.60 W.
Depth: 8 km
Magnitude: 3.7 ML(P), 3.9 ML(B)
Intensity V: Darwin (few windows cracked, light furniture and small objects moved, hanging pictures swung, felt by many).
Intensity II: China Lake.

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

California--Continued

17 January (B) Central California
Origin time: 01 11 39.5
Epicenter: 37.02 N., 121.82 W.
Depth: 13 km
Magnitude: 3.6 ML(B)

Felt at San Jose and Santa Cruz (B) and also as far north as southern San Francisco (press report).

17 January (P) Southern California
Origin time: 09 31 21.4
Epicenter: 33.83 N., 118.22 W.
Depth: 5 km
Magnitude: 2.2 ML(P)

Felt at Compton (P).

19 January (B) Northern California
Origin time: 17 05 29.0
Epicenter: 38.96 N., 123.52 W.
Depth: 8 km
Magnitude: 3.2 ML(B)

Felt in the Point Arenas area (B).

21 January (P) Southern California
Origin time: 06 30 56.4
Epicenter: 33.73 N., 117.98 W.
Depth: 6 km
Magnitude: 2.1 ML(P)

Felt at Huntington Beach (P).

24 January (B) Central California
Origin time: 19 00 09.7
Epicenter: 37.83 N., 121.79 W.
Depth: 8 km
Magnitude: 5.3 mb(G), 5.9 MS(G), 5.5 ML(B)

One death (possibly from a heart attack) and 44 injuries resulted from this earthquake. Most of the injuries were due to flying glass; overturned furniture, bookcases, and the like: and falling ceiling tile and light fixtures. Alameda County officials estimated the total damage at about $11.5 million, most of which about $10 million (Woods, 1980), occurred in the Lawrence Livermore Laboratory nuclear research center. The earthquake was felt over an area of approximately 75,000 sq km of central California (fig. 7).

The overpass at Interstate 580 and Greenville Road was closed temporarily for repairs because the paving settled nearly

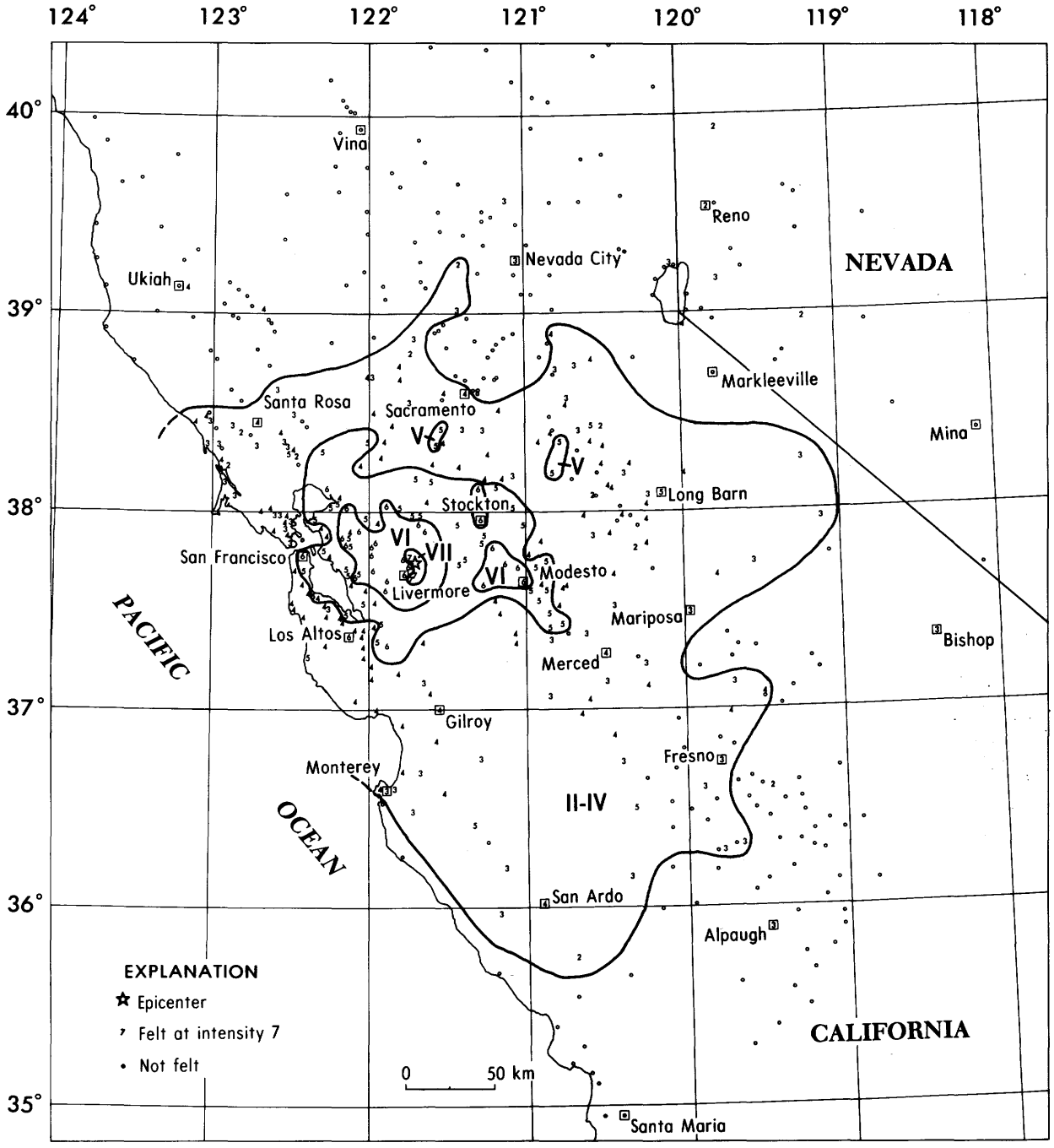

FIGURE 7.--Isoseismal map for the central California earthquake of 24 January 1980, 19 00 09.7 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

30 cm as a result of shaking in the roadbed fill material on which the piers rested (Woods, 1980). The only damage to the bridge was some cracking and spalling of concrete to the southeast abutment of the overpass. The overpass is four lanes, with separate bridges for the east and west traffic.

The majority of the damage reported was of a non-structural type. Even Lawrence Livermore Laboratory experienced little structural damage to the buildings. The most commonly reported damage consisted of broken gas and water lines, broken windows and glassware, some loss of bricks to tops of chimneys, overturned book shelves and furniture, mobile homes knocked off supports, cracked plaster, and falling of acoustical ceiling tile.

Woods (1980) noted that new zones of surface rupture were observed south of Vasco Road and across Laughlin Road along a projected trace of the Greenville fault. A discontinuous surface rupture was observed where the fault crossed Vasco Road, showing two cracks, each with as much as 2 cm of right-lateral offset. The cracks were traced approximately 2000 m to the northwest and 300 m to the southeast of Vasco Road. Right-lateral displacement showing 5-10 mm of offset was also observed on Laughlin Road and to the northwest for about 300 m.

Cockerham and others (1980) located one foreshock a little more than 1 min before this event at 1858 UTC and 568 aftershocks in the next 30 hours. This earthquake and its two largest aftershocks are significant because they are the largest earthquakes to have occurred in this area since the magnitude 5 event of June 11, 1903.

Intensity VII:

California--

Lawrence Livermore Laboratory--The press reported that damage, described as minor to moderate, was sustained in about 30 buildings and 29 trailer offices. The earthquakes damaged furniture, bookcases, ceiling tiles, light fixtures, scientific equipment, elevators, stairwells, storage racks, water and gas mains, and heavy equipment. Also damaged were concrete block walls used to shield workers from radiation.

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

California--Continued

Inside buildings, there was damage to light fixtures and acoustic tiles fell, TV monitors were knocked to the floor; lamps, bookcases, planters and blackboards were toppled to the floor or onto desks, and in many cases were broken. Pictures fell off walls and many windows were broken.

The Shiva Laser fusion equipment was slightly damaged when 12.7-by-1.9-cm (5-by-3/4-inch) bolts were sheared off from the four-story, 181,436 kg, 18-m high steel frame that held the laser. Realignment of the 20 laser arms will cost an estimated $200,000. Nearby, the Argus laser project sustained $100,000 damage when two laser amplifiers were tossed from their frames, and an amplifier used to intensify laser beams was knocked to the floor. One $10,000 piece of glasswork was damaged beyond repair. Damage was also done to the building housing the Argus project.

Vasco Road north of Livermore--At the Ordway Ranch, located near the Alameda-Contra Costa County line, the solid ranch-style house suffered severe structural damage. A 3.6-by-2.4-m (12-by-8-foot) fireplace of stone and brick cracked and parted from the wall as did a smaller fireplace in another room. Appliances in the kitchen were shifted about, tiles fell from the bathroom wall, stereo speakers were knocked off the living room wall and were tossed 1.2 m (4 feet) away from the wall, bottles of liquor and glassware were thrown to the floor in the dining room and broke, and part of a thick brick wall was knocked down. Horses and cattle ran wildly in circles.

At one home the fireplace was moved 2.5 cm (1 inch) away from the wall, the hot water heater was moved 0.3 m (1 foot) across the floor, the wall was cracked in some places, and a stereo system was destroyed. An observer reported the telephone poles near his home looked like rubber poles because they were shaking 0.3 m (1 foot) from side to side. He said even his two diesel trucks moved and the porch from the house separated by 2.5 cm (1 inch). A third person said it

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

California--Continued

knocked out bricks in five different places in her home.

Wente Brothers Winery on Tesla Road, 4 km (2 1/2 miles) southeast of Livermore--The winery suffered the loss of more than 94,632 liters (25,000 gallons) of wine when three brewing tanks and two fermenting tanks tumbled from their foundations (fig. 8). More wine was lost when six oak barrels split open and 18 stainless-steel tanks buckled and wine overflowed from each tank. The shaking caused 168 of 208 wine tanks to suffer collapse or failure to some degree. It also bent one of four supports of the elevated water tank near the winery (fig. 9).

Intensity VI:

California--

Brentwood--large cracks reported in stucco and dry wall and in exterior brick and cinderblock walls, bricks loosened in chimneys, underground pipes broke, water splashed onto sides of swimming pools, trees and bushes shook strongly, a few windows cracked, in grocery stores many jars and cans fell from shelves and some broke; the press reported that aisles in stores swayed too much to allow patrons to run outside; however, at a beauty shop everyone ran outside.

Byron--the press reported that at Byron School "the lunch trays went every which way and the refrigerators bounced across the floor, desks flew everywhere and the kids cried." Other reports included overturned knick-knacks or lamps, water splashed onto sides of swimming pools, buildings shook strongly, felt by many.

Danville--cracks in brick fences or walls, acoustical ceiling tiles fell, water splashed onto sides of swimming pools, trees and bushes shook strongly, hanging objects swung violently, some windows broke, felt by all.

Diablo--large cracks in the dry wall at the post office, ceiling tiles fell in the country club, water splashed onto sides of swimming pools, hanging objects swung violently, small objects overturned and broke, felt by many.

Dublin--The press reported considerable damage to businesses. The K-Mart store reported damage of $100,000 from numerous light fixtures and acoustical tiles falling and lots of damaged merchandise. Liquor stores in the area reported high loss from breakage due to bottles being knocked to the floor and broken. Some plate glass windows were broken, grocery stores had aisles cluttered with fallen goods, and schools reported minor damage including cracked plaster and broken light fixtures. There was one report of a cracked swimming pool.

Greenville North Subdivision (northeast of Springtown)--The press reported the experiences of one resident as follows: "The door was 1.5 m (5 feet) from where I was, but I could not get to it. The force of the quake knocked me down. Glass was flying from the cabinets, the bookshelves fell over, all the dishes had fallen and broken, and the desk was 0.3 m (1 foot) deep in books. A neighbor's water heater had fallen over in the garage and broken the gas line."

On the south side of Dalton Avenue the subdivision was enclosed by a brick wall about 1.8 m (6 feet) high. Three sections, each about 1.8-2.4 m (6-8 feet) long, were knocked down in different places over a distance of about 3 blocks.

Hayward--large cracks in stucco and plaster wall with some falling, ceiling tiles fell in large amounts, 1.2-m (4-foot) cracks in exterior walls, small objects overturned and fell, hanging pictures fell, felt by many. At California State University, acoustical tiles fell from a gymnasium ceiling and some of the glassware in the science building tumbled off counters and broke.

Livermore--The damage in Livermore decreased from east to west across the city. Most of the damage to chimneys, homes, and businesses occurred in the downtown area and to the east toward

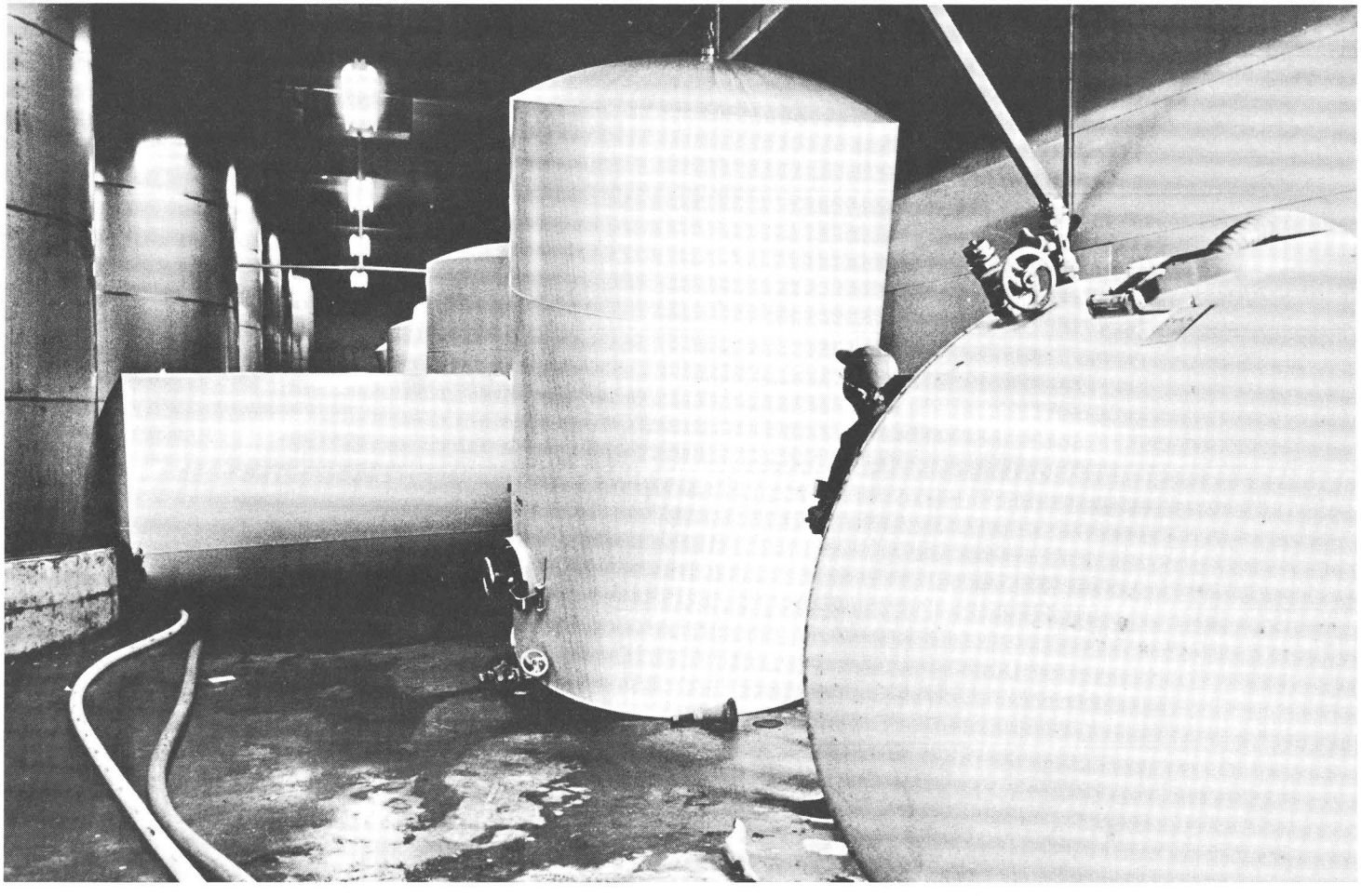

FIGURE 8.--Photograph of damage to fermenting tanks at the Wente Brothers Winery near Livermore, Calif. (photo provided by Tri-Valley Herald-News).

FIGURE 9.--Photograph of damage to one support of the elevated water tank at the Wente Brothers Winery near Livermore, Calif. (photo provided by Tri-Valley Herald-News).

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

California--Continued

the Lawrence Livermore Laboratory. The newspaper did not report any damage in the western parts of the city, which is primarily of newer construction.

The press reported minor damage in the business area such as broken windows in Al's Music House and Van's Health Food Store; vases were toppled over and broken at the Holiday Shop, a gift store; liquor was shaken off the shelves and broken at the Bottle, Book and Smoke Shop; many rows of wine and liquor crashed to the floor at Palomar Market; and goods fell to the floor in such numbers that grocery stores were closed temporarily for cleaning.

Other damage reported included fallen plaster and superficial damage to arches in front of St. Michael's Catholic Church on Maple Street; Intel Corporation at 250 Mines Road had seven employees injured, electronic manufacturing equipment that fell to the floor, and a ruptured water line; schools on the east side of Livermore reported books knocked off shelves in the library, objects on walls fell, tiles shaken loose from the ceiling. The Jackson Avenue school reported a broken 7.6-cm (3-inch) water main and the Junction Avenue school had a broken gas line, cracked walls and ceilings, and a buckled floor in one building. At the City Hall about 10 percent of the acoustical ceiling tile fell, bookshelves collapsed, and cracks appeared in the walls. On Trevarno Road cracks were reported in many stucco buildings, a 36 kg (80 lb) piece of chimney was reported thrown down, and a hot water heater was toppled.

Damage to chimneys in the eastern section of the city, especially to older chimneys, was mostly loosening of bricks or a few bricks knocked from the top. A few modern chimneys showed evidence of some cracking.

In Livermore there are many brick or cinderblock fences separating subdivisions from highly travelled streets. Most are about 1.8 m (6 feet) high and one brick or block thick. The only damage to these walls was found on Dalton Avenue west of Vasco Road in northeast Livermore where three 1.8-m (6-foot) sections over a two-block length were knocked down. There was no apparent exterior damage to houses in the area.

Lodi--The press reported ceiling and stucco cracks in the Delta Convalescent Home and a big crack in one wall of the Gross Convalescent Home. There were other reports of knickknacks falling off shelves, chandeliers swinging and water from a swimming pool being splashed 0.5 m (1 1/2 feet) over the sides.

Los Altos--large cracks in interior stucco walls and exterior cinderblock walls, light furniture and small objects moved, felt by many.

Manteca--The press reported some cracks in the ceilings and crumbling in the exterior stucco of the Manteca Community Hospital. Also, at Manteca East Union High School the earthquake was described as tremendously felt with tables and fish tanks jumping around the classroom.

Martinez--Some windows broke, light furniture and small objects moved, hanging pictures swung, buildings shook strongly, felt by many.

Modesto--The press reported the swimming pool cracked and two windows were shattered at the Suburban Lodge Motel on McHenry Avenue. Other damage reported was a cracked driveway at a home and a cracked wall at Enslen School. At a home near downtown, the people ran outside, a shelf smashed to the floor and cracks appeared in a bedroom ceiling.

Moraga--Some windows broke, light furniture and small objects moved, felt by many. At St. Mary's College Library books fell from stacks on the second floor.

Morgan Territory Road near the Alameda-Contra Costa County line--The press reported a half-built 11-room house swayed about 28 cm (11 inches) knocking everything out of alinement. The quake ripped nails from ceiling

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

California--Continued

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

California--Continued

joists, snapped two-by-fours, popped out sliding glass doors and put a permanent ripple in one side of the house. The repairs were estimated to cost $30,000.

Orinda--Black's Grocery and Meat Market, located next to the Post Office suffered considerable breakage of bottles and dented cans as contents of shelves were shaken to the floor.

Pittsburg--The press reported cracks in the building support beams housing the Signode Corporation. Other reports were of cracked plaster and dry wall, walls separated from ceiling or floor, water splashed onto sides of swimming pools, few windows cracked, felt by many.

Pleasanton--Schools reported minor damage including cracked plaster and broken light fixtures. People ran into the streets, and a fire truck was bounced about (press report). Other effects were some windows broke, light and heavy furniture moved, water splashed onto sides of swimming pools, hanging pictures fell, felt by all.

Ripon--bricks were loosened on chimneys, water splashed onto sides of swimming pools, trees and bushes shook strongly, light furniture and small objects moved, felt by many.

Salida--a driveway was cracked and a heavy lamp moved (press report).

San Francisco--The press reported fallen plaster from a ceiling in City Hall and some cracks in the exterior ornate. The California Highway Patrol reported the Golden Gate and Bay Bridges swayed slightly but no structural damage was detected. A store owner reported a hanging bell over a door rang violently. Except for the minor damage to city hall, the San Francisco area suffered no damage.

San Jose--Some windows were broken, elevated water tanks were twisted, water splashed onto sides of swimming pools, light and heavy furniture moved, hanging pictures swung out of place, felt by all. The press described the motion as rolling and

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

California--Continued

swaying, lasting for more than 10 seconds. People ran out of the County Administration Building. The motion was especially strong in the upper floors of high rise buildings. At Orchard Elementary School some books were toppled from shelves, people were reported nauseous, and a piano on rollers moved.

San Ramon--interior walls in a cinderblock building split, hanging pictures swung out of place, the building shook strongly, felt by all.

Springtown (suburb of Livermore)--the Holiday Inn had no structural damage but had more than 150 lamps and 80 television sets broken, many broken dishes in the kitchen and broken liquor bottles at the bar. All the bottles in the storeroom were broken. Some ceiling tiles fell in the lobby and a plate glass window was smashed. Some hairline cracks appeared in the cinderblock walls of the stairwells.

At the Beacon gas station several large windows were broken and tires were scattered over the floor. Also, at Springtown Towing Garage a van on a 1.2-m (4-foot) high jack rolled off the jack and crashed through the window (press report).

A resident reported to the press "All I remember is that I opened the door and it threw me down on the kitchen floor. The whole house started to move and the lamp in the kitchen was swinging so hard it looked like it was going to hit the ceiling. My son hid under the bed."

In the Sunrise Mobile Home Park, 95 of 133 mobile homes were damaged when they were knocked off their supports (fig. 10). The exterior damage included crumpled foundation skirts, broken gas and water lines, and damaged porches and other exterior additions. In the interior, furniture and loose items were thrown on the floor sometimes blocking doorways.

Stockton--The 1907 six-story Clark Hotel had large diagonal cracks across the face of the building and cracks in the parapet on the sixth floor. A man on

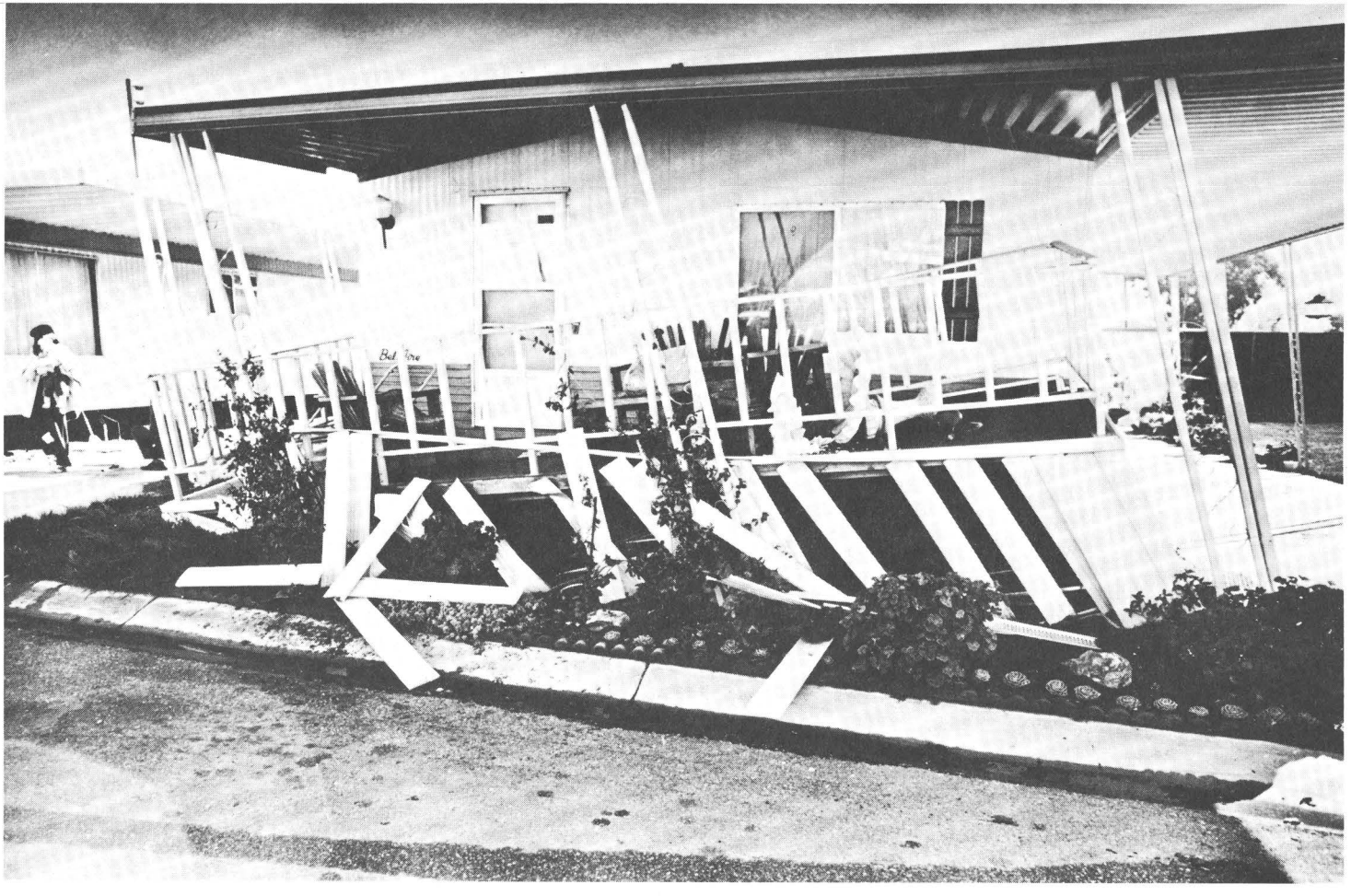

FIGURE 10.--Photograph of damage to a mobile home in the Sunrise Mobile Home Park in Springtown, Calif. (photo provided by Tri-Valley Herald-News).

California--Continued

the fourth floor was thrown out of bed. The State Employee Credit Union, 919 North Center, had a large crack that ran the length of the ground floor. The 1873 Weber Primary Building suffered a crack under the stairway leading to the second floor. The police facility at 22 East Market Street reported cracks in the wall. An estimated 12,000 volumes along with shelves fell to the floor in the Pharmacy School Library of the University of the Pacific. A gas line was broken at Pacific Horizon High School.

A man driving near the intersection of the Crosstown Freeway and Interstate 5 described the effect of the earthquake as follows: "When I first noticed, I was entering the highest part of the freeway, it felt like I had a flat tire. I started to lose control so I hit my brakes. I noticed in my rearview mirror that a guy in a station wagon behind me completely lost control and hit a guardrail. I also noticed about four or five other motorists stop and jump out of their cars. The freeway was really waving. The highway lamps were at a 45-degree angle. I have never seen anything like it."

A dining room chandelier was knocked to the floor and shattered at 1026 Sunny Oaks Way in north Stockton. Nearby a large front window was knocked out. All of the above information was taken from press reports.

Sunol--some windows broke, water splashed onto sides of swimming pools, light furniture and small objects moved, buildings shook strongly, felt by many.

Vallejo--large cracks in plaster and ceiling tile, elevated water tanks cracked, few windows cracked, hanging pictures and plants swung, felt by many.

Vernalis--bricks loosened on chimneys, water splashed onto sides of swimming pools, a few windows cracked, light furniture and small objects moved, hanging pictures swung, felt by many.

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

California--Continued

Walnut Creek—some windows broke, water splashed onto sides of swimming pools, trees and bushes shook moderately, light and heavy furniture moved, hanging pictures swung out of place, felt by all.

Intensity V: The most common effects reported for the places listed below were few windows cracked, light and heavy furniture moved, small objects moved or overturned and a few broke, water splashed onto sides of swimming pools, moving and standing vehicles rocked, buildings shook strongly, hanging objects swung in varying degree (slightly to violently), trees and bushes shook moderately to strongly, felt by many or all. All of these effects were not reported at every town or city. Some detailed effects published in newspapers are listed after the appropriate city names.

California--Antioch, Banta, Brisbane, Burlingame, Cantua Creek, Castro Valley, Clarksburg, Concord (St. Mary's College), Courtland, Crockett, Delhi, East Palo Alto (a man was reportedly knocked to the floor from a swivel chair, a candle and flag fell over, hanging lamps swung strongly), El Verano, Farmington, French Camp, Hilmar, Holt, Hughson, Isleton, Jackson, Keyes, Knightsen, Lathrop, Linden, Long Barn, Milpitas (an automobile assembly plant was shut down because of damage to a water main--press report), Napa (some cracks in the ceiling of a home), Newark, Oakland (a filing cabinet in the county administrative building moved; windows were broken on 39th Avenue in the eastern section of the city and in the 7300 block of Woodrow Drive in Montclair. This indicates the eastern part of the city may approach an intensity VI), Oakdale (cans fell to the floor in Gong's Grocery Store), Oakley, Pescadero, Pioneer, Rheem Valley, Richmond (one resident reported a crack in the ceiling of her home, another said everything fell off her hutch), Rio Vista, Ripon, Riverbank, Rodeo, San Francisco International Airport, San Leandro, San Lorenzo, Santa Clara, Soledad, South San Francisco, Tracy, Turlock, Vacaville, Valley Springs (few dishes broke), Victor.

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

California--Continued

Intensity IV:

California--Acampo, Alameda, Alviso, Arnold, Auberry, Belmont, Benicia, Berkeley, Bethel Island, Boyes Hot Springs, Broderick, Ceres (press report), Chinese Camp, Chowchilla, Chualar, Clayton, Clearlake Oaks, Copperopolis, Crows Landing, Cupertino, Daly City, Denair, Dillon Beach, Dixon, Dos Palos, El Cerrito, El Granada, Elmira, El Portal, Empire, Escalon, Esparto, Fairfield, Firebaugh, Forest Knolls, Fremont, Friant, Georgetown, Gilory (press report), Glencoe, Groveland, Gustine, Half Moon Bay, Hayward, Herald, Hickman, Holy City, Hood, Ione, Jenner, Kenwood, Lafayette, La Grange, La Honda, Larkspur, Lockeford, Los Altos, Los Gatos, Marina, Menlo Park, Merced, Millbrae, Mill Valley, Moffett Field, Moss Beach, Moss Landing, Mountain Ranch, Mountain View, Mount Eden, Mount Hamilton, Mount Herman, Murphys, New Almaden, Newark, Newman, Pacifica, Pacific Grove, Palo Alto, Patterson, Pinecrest, Pollock Pines, Port Costa, Rail Road Flat, Redwood City, Redwood Estates, River Pines, Ryde, Sacramento, San Ardo, San Bruno, San Juan Bautista, San Leandro, San Martin, San Mateo, San Rafael, Santa Rita Park, Santa Rosa, Saratoga, Sloughhouse, Sonora, Soquel, South Dos Palos, South Lake Tahoe, South San Leandro, Stinson Beach, Sunnyvale, Sutter Creek, Talmage, Thornton, Travis AFB, Tuolumne, Twain Harte, Union City, Vallecito, Valley Home, Villa Grande, Waterford, Watsonville, Westley, Winters, Woodacre, Woodland, Yolo.

Intensity III:

California--Alpaugh, Belvedere-Tiburon, Bishop, Bodega, Bodega Bay, Bridgeport, Calistoga, Camino, Carmel Valley, Castle AFB, Clements, Coalinga (press report), Corte Madera, Cotati, Davis, Eldridge, Elk Grove, El Nido, Fairfax, Fresno (press report), Glen Ellen, Graton, Hanford (press report), Hathaway Pines, Inverness, Jolon, King City, Lee Vining, Le Grand, Lemoore, Los Banos, Madison, Mariposa, Marshall, Mendota, Mi-Wuk Village, Monte Rio, Morgan Hill, Monterey, Mt. Aukum, Nevada City, O'Neals, Paicines, Pinegrove, Placerville, Raisin, Robbins, Saint Helena, Salinas, San Anselmo, San Carlos, San Quentin, Sausalito, Seaside, Snelling, Stevinson, Strawberry Valley, Tahoe Vista, Wheatland, Wilton, Winton, Yosemite National Park.

Nevada--Carson City.

Intensity II:

California--Angels Camp, Browns Valley, Knights Landing, Moccasin, Reedley, San Miguel, Sebastopol, Sonoma, Tomales, Weed Heights, West Point.

Nevada--Gardnerville, Reno.

Felt:

California--Lake Berryessa, Rio Vista, Rohnert Park, Stanford University (all from press reports).

24 January (Z) Central California
Origin time: 19 01 02.2
Epicenter: 37.80 N., 121.76 W.
Depth: 3 km
Magnitude: 5.2 ML(B)

Felt throughout the San Francisco area (B) aftershock of the 24 January 19 00 09.7 earthquake.

24 January (Z) Central California
Origin time: 19 01 45.2
Epicenter: 37.83 N., 121.74 W.
Depth: 2 km
Magnitude: 4.3 ML(B)

Felt throughout the San Francisco Bay area (B). Aftershock of the 24 January 19 00 09.7 earthquake.

24 January (Z) Central California
Origin time: 19 03 19.2
Epicenter: 37.84 N., 121.80 W.
Depth: 1 km
Magnitude: 4.8 ML(B)

Felt throughout the San Francisco Bay area (B). Aftershock of the 24 January 19 00 09.7 earthquake.

24 January (Z) Central California
Origin time: 19 12 42.1
Epicenter: 37.84 N., 121.80 W.
Depth: 3 km
Magnitude: 3.5 ML(B)

Felt in the Livermore area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

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

California--Continued

24 January (Z) Central California
Origin time: 19 56 05.2
Epicenter: 37.84 N., 121.81 W.
Depth: 9 km
Magnitude: 3.7 ML(B)

Felt in the Livermore area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

25 January (Z) Central California
Origin time: 05 12 43.2
Epicenter: 37.83 N., 121.78 W.
Depth: 6 km
Magnitude: 4.2 mb(G), 4.9 ML(B)

Felt throughout the San Francisco Bay area and in the San Joaquin Valley area from Sacramento to Fresno (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

Intensity IV: Daly City, Mill Valley (press report), San Francisco.
Intensity III: San Carlos.

25 January (Z) Central California
Origin time: 05 21 47.7
Epicenter: 37.85 N., 121.78 W.
Depth: 4 km
Magnitude: 3.5 ML(B)

Felt in the Livermore area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

25 January (Z) Central California
Origin time: 05 24 36.6
Epicenter: 37.85 N., 121.80 W.
Depth: 5 km
Magnitude: 4.2 mb(G), 4.6 ML(B)

Felt in the San Francisco Bay-San Joaquin Valley area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

Intensity IV: Daly City.

25 January (Z) Central California
Origin time: 05 29 45.2
Epicenter: 37.85 N., 121.80 W.
Depth: 5 km
Magnitude: 4.0 ML(B)

Felt in the San Francisco Bay-San Joaquin Valley area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

25 January (Z) Central California
Origin time: 07 45 59.8
Epicenter: 37.84 N., 121.80 W.
Depth: 3 km
Magnitude: 3.5 ML(B)

Felt in the Livermore area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

25 January (Z) Central California
Origin time: 13 39 02.5
Epicenter: 37.84 N., 121.79 W.
Depth: 3 km
Magnitude: 4.2 ML(B)

Felt in the San Francisco Bay-San Joaquin Valley area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

Intensity IV: Daly City.

25 January (Z) Central California
Origin time: 14 03 27.7
Epicenter: 37.84 N., 121.79 W.
Depth: 4 km
Magnitude: 4.0 ML(B)

Felt in the San Francisco Bay-San Joaquin Valley area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

27 January (P) Southern California
Origin time: 01 20 26.7
Epicenter: 34.05 N., 117.28 W.
Depth: 14 km
Magnitude: 2.9 ML(P)
Intensity IV: San Bernardino (press report).

27 January (Z) Central California
Origin time: 02 33 36.2
Epicenter: 37.75 N., 121.71 W.
Depth: 10 km
Magnitude: 5.0 mb(G), 5.0 MS(G), 5.8 ML(B)

This earthquake also occurred on the Greenville fault (Woods, 1980) at a location about 14 km south of the event of 24 January. It was located about 10 km northeast of Livermore and much closer than the 24 January event; however, it did much less damage to Livermore and the even closer Lawrence Livermore Laboratory. The worst damage documented was to the Tassajara Valley area and to Danville, which are located 17 and 28 km northwest of the epicenter.

Even though this earthquake occurred very near the Interstate 580 and Greenville

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

California--Continued

Road intersection, the only additional damage was the sinking of the road bed about 2.5 cm and a few new cracks in the concrete overpass.

Six persons were treated at the Livermore hospital for cuts and bruises resulting from flying glass and falling ceiling tiles and supports. Electrical power was off temporarily in some areas of Livermore, Dublin, Pleasanton, and Walnut Creek. Many residents of Livermore described the effect of this earthquake as a jarring motion while the effect of the one on 24 January was described as a more rolling motion.

Woods (1980) noted that new zones of surface rupture were observed south of Vasco Road and across Laughlin Road. The crack across Laughlin Road displayed 1-2 mm of additional right-lateral movement.

Intensity VII:

Danville--a brick chimney was broken at the roof line, a living room fireplace was damaged, 75 m of stone wall was demolished, a dining room hutch crashed to the floor shattering china, an archway was warped; and walls and ceilings were cracked; there were 1.3-cm cracks in some sidewalks and cracks in an asphalt patio (press reports).

Tassajaro Valley (east of Danville)--cracked walls, cracks in concrete, badly damaged fireplace, broken glassware and other items that fell to the floor. One home had the walls separate from the ceiling so much that one could see into the attic; another house had stones from the fireplace crash to the floor ripping a hole in it; another house reported that a chimney fell, two windows broke, and nearly everything on the walls and shelves fell to the floor. There was another report of stoves being torn loose and water tanks toppled.

At Rancho del Sol, the owner reported a swimming pool for horses was damaged when a filter system weighing several tons came off its foundation and all the pipes were broken. Inside the house, the bay windows broke, the refrigerator flew open and everything was thrown out, the refrigerator moved a foot from the wall, and the pipes to the water system were broken loose. A neighbor's horse corral was thrown down. About 50 homes in the community were damaged in this area (all from press reports).

Intensity VI:

Antioch--some windows broke, bricks loosened on chimneys, acoustical ceiling tile fell in Fry's supermarket and merchandise fell from shelves, light and heavy furniture moved, hanging pictures fell, felt by all.

Boulder Creek--large cracks occurred in stucco, bricks were loosened in chimneys, small landslides were reported, felt by many.

Brentwood--the press reported a double-wide mobile home was split and dishes and knickknacks were dumped from cupboards and shelves.

Diablo--large cracks in stucco and dry wall, water splashed onto sides of swimming pools, trees and bushes shook strongly, felt by all.

Dublin--The press reported a row of light fixtures at the K-Mart store on Dublin Boulevard fell to the floor injuring six people. At Mel's Liquors numerous bottles were broken but not as many as were broken in the 24 January shock. A restaurant, also on Dublin Boulevard, reported a false beam fell to the floor. There were also reports of merchandise knocked off shelves and fallen acoustical ceiling tiles.

Livermore--Six people were injured by flying window glass and falling acoustical ceiling tiles, and merchandise was thrown from shelves in supermarkets. The abutment of the overpass at Interstate 580 and Greenville Road was cracked. Bricks were loosened on chimneys, water splashed onto sides of swimming pools, felt by many.

At the Lawrence Livermore Laboratory the only effects reported were some bottles of chemicals broken and library books thrown from shelves. However, across the street at Sandia Laboratories some file cabinets were knocked over and a sprinkler pipe was broken.

Pittsburg--some broken windows, large cracks in interior and exterior walls,

report of a chimney broken at the roof line, felt by many. The press reported the owner of the Cellar Bar was thrown off balance and the light fixtures swung. Also, a home at 61 Salano Avenue was damaged when a new addition separated from the house with a 0.6-cm crack. Many cracks appeared in the walls.

Pleasant Hill--The press reported fist-sized chunks of concrete fell from the ceiling of the Pleasant Hill Bay area Rapid Transit station.

Pleasanton--Many items were thrown to the floor in supermarkets. Cracks appeared in the First Street overpass and there were reports of broken gas lines and water leaks (press report). Other reports were windows cracked, water splashed onto sides of swimming pools, felt by many.

San Carlos--plaster fell in large amounts, small objects moved, felt by all.

San Ramon--plaster and dry wall cracked, foundation cracked, interior walls split, small objects overturned and broke, and hanging pictures fell. The press reported merchandise fell off shelves in large amounts.

Stockton--windows broke and new paint cracked, pictures shifted, shelf contents moved in the Central Valley area. In the Colonial Heights area of North Stockton one resident reported hairline cracks in his walls. A reporter said that his home had several cracks in the walls, that the whole house had moved, and that the dinner table moved 5 cm (2 inches) (press report).

Walnut Creek--store windows broke in the downtown area including two large plate glass windows at Afghan Imports (1442 North Main Street), one at the Crocker Bank and another at a stereo store on Broadway. Stock fell off shelves in stores and some acoustical ceiling tiles fell (press report).

Intensity V: The general effects reported were a few windows cracked, water splashed onto sides of swimming pools, small objects moved or overturned, hanging pictures swung out of place, light furniture moved, trees and bushes shook, standing vehicles rocked, and felt by many or all. All of these effects were not necessarily felt at every location.

Byron, Crockett, El Cerrito, Empire, Hayward, Lafayette, Millbrae, Mill Valley (press report), Mountain View, Mount Eden, Napa (press report), Palo Alto, Oakland, Ripon, Rio Vista, Salida, San Francisco, San Francisco International Airport (in the north terminal a false ceiling gave way near gates 81 and 27 and some acoustical tiles fell--press report), San Geronimo, San Mateo, Springtown-Holiday Inn, Vallejo.

Intensity IV: Alamo, Belmont, Ben Lomond, Brisbane, Burlingame, Campbell, Ceres, Concord, Courtland, Crows Landing, Daly City, El Granada, Farmington, Fairfield, Fremont (press report), French Camp, Holt, Isleton, Keyes, La Honda, Lathrop, Linden, Lodi, Manteca (press report), Modesto, New Almaden, Newman, Oakley, Port Costa, Redwood Estates, Richmond, Ross, San Jose, San Leandro, San Lorenzo, Santa Clara, Santa Rosa, Saratoga, South San Francisco, Thornton, Travis AFB, Union City, Vacaville (press report), Vernalis, Victor, Walnut Grove, Woodland.

Intensity III: Benecia, Crockett, Holy City, Keyes, Larkspur, Maxwell, Pleasant Hill, Rio Vista (press report), Rodeo, Ryde, Sacramento (press report), San Carlos, San Pablo, Sunnyvale, Sunol, Yosemite Valley.

Intensity II: San Martini.

Felt: Davis, Tracy, and the Lake Tahoe area (press reports).

27 January (Z) Central California
Origin time: 10 58 01.5
Epicenter: 37.84 N., 121.80 W.
Depth: 8 km
Magnitude: 4.1 ML(B)

Felt in the San Francisco Bay-San Joaquin Valley area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

29 January (Z) Central California
Origin time: 01 46 04.2
Epicenter: 37.79 N., 121.75 W.
Depth: 9 km
Magnitude: 3.6 ML(B)

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

California--Continued

Felt in the San Francisco Bay-San Joaquin Valley area (B). Aftershock of the 24 January, 19 00 09.7 earthquake.

29 January (P) Baja California
Origin time: 19 49 02.8
Epicenter: 32.05 N., 116.25 W.
Depth: 5 km
Magnitude: 4.4 ML(P)
Intensity III: San Diego (press report).

4 February (B) Central California
Origin time: 01 22 56.4
Epicenter: 37.29 N., 121.68 W.
Depth: 6 km
Magnitude: 3.2 ML(B)

Felt at San Jose (B).

4 February (B) Northern California
Origin time: 06 03 20.0
Epicenter: 38.77 N., 122.43 W.
Depth: 18 km
Magnitude: 3.2 ML(B)
Intensity IV: Angwin and Calistoga (press report).

9 February (P) Southern California
Origin time: 09 17 50.2
Epicenter: 33.80 N., 118.08 W.
Depth: 4 km
Magnitude: 2.7 ML(P)
Intensity IV: Lakewood, Long Beach, Los Alamitos (press reports).

13 February (B) Northern California
Origin time: 07 45 49.6
Epicenter: 38.97 N., 122.59 W.
Depth: 5 km
Magnitude: 3.5 ML(B)
Intensity IV: Clearlake Highlands, Lakeport (press report), Willits.
Intensity II: Santa Rosa.

14 February (B) Northern California
Origin time: 08 16 32.7
Epicenter: 38.88 N., 122.86 W.
Depth: 5 km
Magnitude: 3.0 ML(B)

Felt in the Clear Lake area (B).

16 February (P) Southern California
Origin time: 01 45 13.8
Epicenter: 34.27 N., 119.60 W.
Depth: 8 km
Magnitude: 3.1 ML(P)

Felt at Carpenteria (P).

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

California--Continued

16 February (P) Imperial Valley
Origin time: 15 09 08.2
Epicenter: 33.02 N., 115.62 W.
Depth: 5 km
Magnitude: 3.9 ML(P)

Felt at Brawley and nearby areas (press report).

16 February (B) Owens Valley area
Origin time: 18 27 26.4
Epicenter: 37.56 N., 118.75 W.
Depth: 5 km
Magnitude: 3.8 ML(B), 3.6 ML(P)

Felt at Mammoth Lakes (B).

20 February (P) Southern California
Origin time: 08 53 51.6
Epicenter: 34.05 N., 119.00 W.
Depth: 14 km
Magnitude: 3.2 ML(P)

Felt at Thousand Oaks (P).

20 February (P) Southern California
Origin time: 10 23 29.9
Epicenter: 33.97 N., 117.22 W.
Depth: 6 km
Magnitude: 2.5 ML(P)

Felt at Riverside (P).

21 February (B) Central California
Origin time: 18 57 29.8
Epicenter: 37.66 N., 121.68 W.
Depth: 6 km
Magnitude: 3.7 ML(B)
Intensity IV: Livermore.

22 February (B) Owens Valley area
Origin time: 02 30 42.6
Epicenter: 37.59 N., 118.83 W.
Depth: 5 km
Magnitude: 4.1 ML(B), 3.8 ML(P)

Felt at Mammoth Lakes (B) and in the Owens Valley (P).

22 February (P) Southern California
Origin time: 13 39 19.5
Epicenter: 33.23 N., 116.28 W.
Depth: 7 km
Magnitude: 3.5 ML(P)
Intensity III: Borrego Springs (press report).

22 February (P) Southern California
Origin time: 13 39 23.7
Epicenter: 33.22 N., 116.22 W.

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

California--Continued

Depth: 5 km
Magnitude: 3.9 ML(P)
Intensity III: Borrego Springs (press report).

22 February (P) Southern California
Origin time: 13 45 22.9
Epicenter: 33.23 N., 116.23 W.
Depth: 7 km
Magnitude: 3.1 ML(P)
Intensity III: Borrego Springs (press report).

22 February (B) Central California
Origin time: 22 26 27.0
Epicenter: 37.89 N., 121.78 W.
Depth: 13 km
Magnitude: 3.5 ML(B)
Intensity III: Livermore (press report).

25 February (P) Southern California
Origin time: 10 47 38.7
Epicenter: 33.52 N., 116.55 W.
Depth: 6 km
Magnitude: 5.1 mb(G), 4.7 MS(G), 5.5 ML(P), 5.6 ML(B)

The press reported several small landslides that forced the closing of State Highway 74 between Spring Crest and Palm Desert. Also, open cracks as much as 3.8 cm wide were reported in State Highway 74 near its junction with State Highway 71. This earthquake was felt over an area of approximately 46,000 sq km of the land area of southern California (fig. 11). No data was available from Mexico. The preponderance of intensity IV in figure 11 is due to the time of the earthquake, 2:47 a.m. local time and unless people were awakened or already awake the event went unnoticed.

Intensity VI:
Anza--large cracks in interior dry wall and plaster walls, small objects overturned and broke, a few windows cracked, felt by and awakened all.

Garner Valley (near Lake Hemet)--the press reported cracked plaster and items on shelves fell.

Idyllwild--unconfirmed reports of slight damage to bridges or overpasses, bricks loosened on chimneys, water splashed onto sides of swimming pools, few windows cracked, felt by and awakened all.

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

California--Continued

Palm Desert--Plate glass windows in businesses broke, hanging pictures swung out of place, felt by all and awakened many. In the Rancho Mirage area a gas line broke causing an unoccupied home to catch fire and burn (press report).

Intensity V: The general effects reported were a few windows cracked, small objects moved or overturned, hanging pictures swung and a few fell, light furniture moved, people awakened, and buildings shook.

Alpine, Big Bear Lake, Bonsall, Cathedral City, El Cajon, Hemet (a mobile home moved on its foundation), Highland, Jacumba, La Quinta, Lucerne Valley, Mecca, Miramar, Mountain Center, North Palm Springs, Palomar Mountain, Redlands, San Jacinto, San Marcos, Sunset Beach, Temecula, Vista.

Intensity IV: Aguanga, Alta Loma, Anaheim, Angelus Oaks, Arcadia, Azusa, Beaumont, Blue Jay, Bonita, Boulevard, Brawley, Buena Park, Cabazon, Calexico, Calimesa, Campo, Canebrake Canyon, Carlsbad, Cedar Glen, Chino, Chula Vista, Claremont, Coachella, Colton, Corona, Coronado, Costa Mesa, Crestline, Crest Park, Cypress, Dana Point, Darwin, Descanso, Desert Center, Downey, Dulzura, Eagle Mountain, Escondido, Etiwanda, Fallbrook, Fawnskin, Fontana, Fountain Valley, Fullerton, Glendale, Guatay, Homeland, Imperial, Imperial Beach, Indio, Irvine, Julian, Laguna Niguel, Lake San Marcos, Lakeside, Lakeview, Lakewood, La Mesa, La Mirada, Leucadia, Lemon Grove, Loma Linda, Long Beach, Los Alamitos, Mentone, Mira Loma, Monrovia, Moreno, Morongo Valley, Mount Laguna, Murrieta, National City, Niland, North Shore, Norwalk, Ocotillo, Oceanside, Pala, Palm Springs, Pauma Valley, Perris, Placentia, Potrero, Poway, Ramona, Rialton, Riverside, Salton City, San Bernardino, San Diego, San Diego (Lindbergh Field), San Dimas, San Luis Rey, San Pedro, Santa Ana, Santa Ysabel, Santee, Seeley, Silverado, South Pasadena, Spring Valley, Sun City, Sunnymead, Tecate, Temecula, Thermal, Torrance, Trabuco Canyon, Twin Peaks, University City, Valley Center, Vista (press report), Walnut, Warner Springs, Westminster, Westmoreland, White Water, Whittier, Wildomar, Wilmington, Winchester, Yorba Linda, Yucaipa, Yucca Valley.

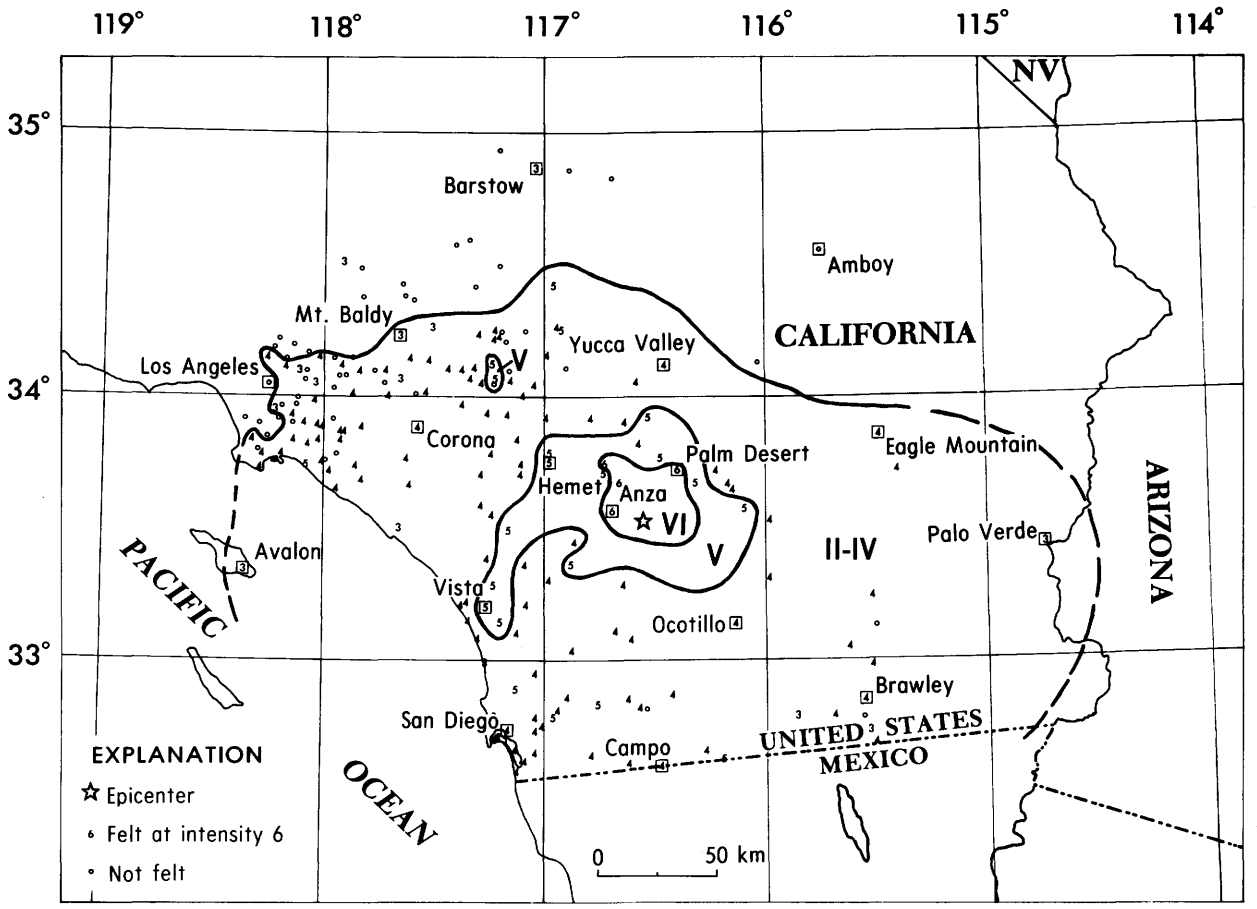

FIGURE 11.--Isoseismal map for the southern California earthquake of 25 February 1980, 10 47 38.7 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

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

California--Continued

Intensity III: Avalon, Barstow, El Centro (press report) El Monte, Heber, Lytle Creek, Mt. Baldy, Ontario, Palo Verde, Pearblossom, Plaster City, San Gabriel, San Juan Capistrano, Solana Beach, South Gate.

25 February (P) Southern California
Origin time: 11 05 08.8
Epicenter: 33.52 N., 116.52 W.
Depth: 16 km
Magnitude: 3.3 ML(P)

Felt at Indio. Aftershock of the 25 February, 10 47 38.7 earthquake.

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

California--Continued

25 February (P) Southern California
Origin time: 11 40 49.3
Epicenter: 33.52 N., 116.55 W.
Depth: 10 km
Magnitude: 3.0 ML(P)

Felt at Indio. Aftershock of the 25 February, 10 47 38.7 earthquake.

28 February (B) Northern California
Origin time: 11 39 22.6
Epicenter: 40.28 N., 124.01 W.
Depth: 5 km
Magnitude: 3.4 ML(B)

Felt in the epicentral area (B).

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

California--Continued

6 March (B) Central California
Origin time: 11 03 44.7
Epicenter: 36.66 N., 121.39 W.
Depth: 5 km
Magnitude: 3.8 ML(B)
Intensity IV: Chualar, Hollister.
Intensity II: Paicines.
Felt: Salinas (B).

6 March (B) Central California
Origin time: 11 05 09.0
Epicenter: 36.67 N., 121.37 W.
Depth: 7 km
Magnitude: 4.0 ML(B)

Felt at Hollister and Salinas (B).

10 March (P) Southern California
Origin time: 06 54 22.3
Epicenter: 33.88 N., 116.27 W.
Depth: 7 km
Magnitude: 3.7 ML(P)
Intensity IV: Thousand Palms, Palm Desert, Rancho Mirage.
Intensity III: Coachella, Indio.
Felt: Palm Springs (P).

15 March (B) Owens Valley area
Origin time: 15 30 46.2
Epicenter: 37.60 N., 118.81 W.
Depth: 16 km
Magnitude: 3.8 ML(B), 3.6 ML(P)

Felt at Mammoth Lakes (B).

20 March (B) Owens Valley area
Origin time: 11 05 42.9
Epicenter: 37.62 N., 118.93 W.
Depth: 22 km
Magnitude: 3.8 ML(B), 4.1 ML(P)

Felt at Mammoth Lakes (B).

20 March (B) Owens Valley area
Origin time: 16 42 48.3
Epicenter: 37.63 N., 118.93 W.
Depth: 5 km
Magnitude: 3.7 ML(B), 3.9 ML(P)

Felt at Mammoth Lakes (B).

20 March (B) Owens Valley area
Origin time: 22 14 33.9
Epicenter: 37.63 N., 118.91 W.
Depth: 5 km
Magnitude: 3.8 ML(B), 3.7 ML(P)

Felt at Mammoth Lakes (B).

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

California--Continued

20 March (B) Owens Valley area
Origin time: 23 54 12.2
Epicenter: 37.62 N., 118.91 W.
Depth: 5 km
Magnitude: 3.3 ML(B), 3.1 ML(P)

Felt at Mammoth Lakes (B).

22 March (B) Lake Tahoe area
Origin time: 14 12 55.0
Epicenter: 38.79 N., 119.82 W.
Depth: 5 km
Magnitude: 3.7 ML(B)

Felt at Markleville (B).

25 March (P) Southern California
Origin time: 05 31 43.1
Epicenter: 33.95 N., 118.67 W.
Depth: 8 km
Magnitude: 2.9 ML(P)

Felt at Malibu (P).

26 March (B) Owens Valley area
Origin time: 14 41 56.2
Epicenter: 37.63 N., 118.94 W.
Depth: 5 km
Magnitude: 3.7 ML(B), 3.8 ML(P)

Felt at Mammoth Lakes (B).

27 March (B) Owens Valley area
Origin time: 02 26 04.3
Epicenter: 37.62 N., 118.91 W.
Depth: 4 km
Magnitude: 4.3 ML(B), 4.3 ML(P)
Intensity IV: Lee Vining.
Intensity III: Bass Lake, Bishop, Crowley Lake, Mariposa.
Felt: Long Valley Dam (P), Mammoth Lakes (B).

27 March (B) Owens Valley area
Origin time: 02 29 14.6
Epicenter: 37.66 N., 118.92 W.
Depth: 16 km
Magnitude: 3.6 ML(B), 3.2 ML(P)

Felt at Mammoth Lakes (B).

29 March (B) Owens Valley area
Origin time: 06 14 08.3
Epicenter: 37.62 N., 118.94 W.
Depth: 5 km
Magnitude: 3.5 ML(B), 3.5 ML(P)

Felt at Mammoth Lakes (B).

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

California--Continued

30 March (B) Owens Valley area
Origin time: 08 34 09.5
Epicenter: 37.62 N., 118.90 W.
Depth: 5 km
Magnitude: 3.4 ML(B), 3.1 ML(P)

Felt at Mammoth Lakes (B).

California--Off the coast

3 March (B) Northern California
Origin time: 14 17 04.6
Epicenter: 40.60 N., 125.03 W.
Depth: 5 km
Magnitude: 5.0 mb(G), 5.2 MS(G), 5.1 ML(B)
Intensity IV: Honeydew, Loleta, Miranda, Petrolia, Rio Dell, Scotia.
Intensity III: Weott.
Felt: Eureka (B).

Connecticut

17 January (L) Southeastern New York
Origin time: 10 13 16.1

See New York Listing.

Hawaii

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

1 January (H) Island of Hawaii
Origin time: 15 07 03.1
Epicenter: 19.33 N., 155.11 W.
Depth: 10 km
Magnitude: 3.4 ML
Intensity III: Hilo (H), Papaikou (H).

3 January (H) Island of Hawaii
Origin time: 11 06 16.7
Epicenter: 19.39 N., 155.25 W.
Depth: 3 km
Magnitude: 3.4 ML(H)
Intensity III: Hawaii Volcanoes National Park (H).

17 January (H) Island of Hawaii
Origin time: 05 03 39.8
Epicenter: 19.38 N., 155.24 W.

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

Hawaii--Continued

Depth: 3 km
Magnitude: 3.1 ML(H)
Intensity III: Hawaii Volcanoes National Park (H), Volcano (H).

17 January (H) Island of Hawaii
Origin time: 07 59 56.1
Epicenter: 19.38 N., 155.24 W.
Depth: 4 km
Magnitude: 3.4 ML(H)
Intensity III: Hawaii Volcanoes National Park (H), Volcano (H), Volcano Golf Course (H).

17 January (H) Island of Hawaii
Origin time: 16 23 39.8
Epicenter: 19.40 N., 155.24 W.
Depth: 4 km
Magnitude: 3.1 ML(H)
Intensity III: Hawaii Volcanoes National Park (H), Volcano (H).

18 January (H) Island of Hawaii
Origin time: 05 33 42.2
Epicenter: 19.33 N., 155.22 W.
Depth: 10 km
Magnitude: 3.6 ML(H)
Intensity III: Hawaiian Volcano Observatory (H), Volcano (H).
Intensity II: Captain Cook (H), Kainaliu (H).

20 January (H) Island of Hawaii
Origin time: 01 28 48.6
Epicenter: 19.31 N., 155.54 W.
Depth: 27 km
Magnitude: 4.6 ML(H)
Intensity V: Hawaiian Ocean View Estates (H), Volcano (H).
Intensity IV: Ainahou (H), Glenwood (H), Hilo (H), Huihui Ranch (H), Mountain View (H), Waimer (H).
Intensity III: Captain Cook (H), Hamakua (H), Kona (H), Mauna Loa Observatory (H).

21 January (H) Island of Hawaii
Origin time: 03 52 15.3
Epicenter: 19.35 N., 155.28 W.
Depth: 33 km
Magnitude: 3.1 ML(H)
Intensity III: Kilauea Military Camp (H).

22 January (H) Island of Hawaii
Origin time: 17 52 04.6
Epicenter: 19.33 N., 155.22 W.
Depth: 8 km
Magnitude: 3.5 ML(H)
Intensity III: Hilo (H).

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

Hawaii--Continued

24 January (H) Island of Hawaii
Origin time: 21 14 40.5
Epicenter: 19.33 N., 155.20 W.
Depth: 10 km
Magnitude: 3.6 ML(H)
Intensity III: Ahualoa (H).

29 January (H) Island of Hawaii
Origin time: 05 14 02.2
Epicenter: 19.38 N., 155.24 W.
Depth: 3 km
Magnitude: 3.1 ML(H)
Intensity III: Kilauea Military Camp (H).

30 January (H) Island of Hawaii
Origin time: 07 14 54.2
Epicenter: 19.35 N., 155.26 W.
Depth: 28 km
Magnitude: 3.6 ML(H)
Intensity III: Volcano (H).

5 February (H) Island of Hawaii
Origin time: 22 48 09.8
Epicenter: 19.36 N., 155.23 W.
Depth: 29 km
Magnitude: 3.8 ML(H)
Intensity IV: Hilo (H).

13 February (H) Island of Hawaii
Origin time: 05 00 08.4
Epicenter: 19.38 N., 155.28 W.
Depth: 3 km
Magnitude: 3.2 ML(H)
Intensity III: Hawaii Volcanoes National Park (H), Volcano (H).

15 February (H) Island of Hawaii
Origin time: 22 59 25.9
Epicenter: 19.33 N., 155.18 W.
Depth: 8 km
Magnitude: 3.1 ML(H)
Intensity II: Hilo (H).

18 February (H) Island of Hawaii
Origin time: 02 16 13.7
Epicenter: 19.78 N., 155.38 W.
Depth: 25 km
Magnitude: 3.8 ML(H)
Intensity IV: Ahualoa (H), Honokaa (H), Kamuela (H).
Intensity III: Hilo (H).
Intensity II: Volcano (H).

18 February (H) Island of Hawaii
Origin time: 10 13 17.7
Epicenter: 19.47 N., 155.44 W.
Depth: 11 km
Magnitude: 3.5 ML(H)
Intensity IV: Volcano.

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

Hawaii--Continued

18 February (H) Island of Hawaii
Origin time: 16 43 13.5
Epicenter: 20.28 N., 155.78 W.
Depth: 0 km
Magnitude: 3.3 ML(H)
Intensity II: Kohala (H).

19 February (H) Island of Hawaii
Origin time: 19 18 42.9
Epicenter: 19.39 N., 155.24 W.
Depth: 4 km
Magnitude: 3.1 ML(H)
Intensity III: Hawaii Volcanoes National Park (H).

25 February (H) Island of Hawaii
Origin time: 02 48 10.6
Epicenter: 20.06 N., 155.95 W.
Depth: 10 km
Magnitude: 3.7 ML(H)
Intensity III: Kamuela (H), Kohala (H).

26 February (H) Island of Hawaii
Origin time: 10 30 06.9
Epicenter: 19.33 N., 155.20 W.
Depth: 10 km
Magnitude: 3.6 ML(H)
Intensity III: Volcano (H).

2 March (H) Island of Hawaii
Origin time: 05 38 28.2
Epicenter: 19.78 N., 156.69 W.
Depth: 16 km
Magnitude: 4.2 ML(H)
Intensity III: Kona (H).

3 March (H) Island of Hawaii
Origin time: 00 07 06.7
Epicenter: 19.38 N., 155.24 W.
Depth: 1 km
Magnitude: 3.1 ML(H)
Intensity III: Hawaii Volcanoes National Park (H).

8 March (H) Island of Hawaii
Origin time: 05 47 42.5
Epicenter: 19.33 N., 155.19 W.
Depth: 10 km
Magnitude: 3.2 ML(H)
Intensity III: Hilo (H).

10 March (H) Island of Hawaii
Origin time: 02 27 20.7
Epicenter: 19.33 N., 155.22 W.
Depth: 9 km
Magnitude: 3.1 ML(H)
Intensity III: Volcano (H).

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

Hawaii--Continued

12 March (H) Island of Hawaii
Origin time: 12 57 52.7
Epicenter: 19.36 N., 155.23 W.
Depth: 2 km
Magnitude: 3.9 ML(H)
Intensity V: Hawaii Volcanoes National Park (H), Hawaiian Volcano Observatory (H).
Intensity IV: Volcano (H).
Intensity III: Hilo (H).

21 March (H) Island of Hawaii
Origin time: 17 46 39.8
Epicenter: 19.53 N., 156.03 W.
Depth: 13 km
Magnitude: 3.3 ML(H)
Intensity III: Kealakekua (H).

21 March (H) Island of Hawaii
Origin time: 22 56 20.2
Epicenter: 19.77 N., 155.53 W.
Depth: 15 km
Magnitude: 3.7 ML(H)
Intensity III: Mauna Kea Observatory (H).
Intensity II: Kamuela (H).

22 March (H) Island of Hawaii
Origin time: 11 09 53.5
Epicenter: 19.44 N., 155.39 W.
Depth: 11 km
Magnitude: 3.3 ML(H)
Intensity II: Volcano (H).

26 March (H) Island of Hawaii
Origin time: 05 16 31.7
Epicenter: 19.98 N., 155.84 W.
Depth: 5 km
Magnitude: 4.0 ML(H)
Intensity IV: Kohala (H), Waimea (H).
Intensity III: Honokaa (H), Papaikou (H).

28 March (H) Island of Hawaii
Origin time: 09 24 02.6
Epicenter: 19.32 N., 155.28 W.
Depth: 34 km
Magnitude: 3.3 ML(H)
Intensity II: Volcano (H).

Idaho

29 February (U) Southeastern Idaho
Origin time: 19 33 38.5
Epicenter: 42.72 N., 111.73 W.
Depth: 7 km
Magnitude: 3.3 ML(U)
Intensity IV: Bancroft, Soda Springs.
Intensity III: Lava Hot Springs.

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

Illinois

13 March (S) Southern Illinois
Origin time: 02 23 13.4
Epicenter: 37.93 N., 88.45 W.
Depth: 19 km
Magnitude: 3.3 Mn(S)

Felt at Broughton, McLeansboro, and Walpole (telephone report).

Kentucky

23 March (S) Central Kentucky
Origin time: 21 38 15.0
Epicenter: 37.63 N., 86.69 W.
Depth: 6 km
Magnitude: 3.3 Mn(S)
Intensity IV: Axtel, Dundee, Glen Dean, Hawesville, McDaniels, Narrows.
Intensity III: Hardinsburg, Philpot, Vanzant, Woodbury.

Maine

9 February (J) Southwestern Maine
Origin time: 13 11 36.0
Epicenter: 43.56 N., 70.76 W.
Depth: 0 km
Magnitude: 2.4 Mn(J)

Felt in the epicentral area.

Montana

20 February (G) Yellowstone National Park
Origin time: 12 07 52.8

See Wyoming Listing.

22 February (G) Yellowstone National Park
Origin time: 10 18 27.7

See Wyoming Listing.

10 March (G) Western Montana
Origin time: 14 48 56.5
Epicenter: 47.30 N., 113.39 W.
Depth: 5 km
Magnitude: 4.0 mb(G), 4.4 ML(G)
Intensity IV: Seeley Lake.
Intensity III: Greenough, Ovanda.
Intensity II: Missoula (telephone report), Ronan.

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

Nevada

24 January (B) Central California
Origin time: 19 00 09.7

See California Listing.

28 February (E) Southern Nevada
Origin time: 15 00 00.093
Epicenter: 37.13 N., 116.09 W.
Depth: 0 km
Magnitude: 4.4 mb(G), 4.4 ML(B)

Nevada Test Site explosion "Tarko" at 37°07'35.57" N., 116°05'18.62" W., surface elevation 1307 m, depth of burial 369 m.

8 March (E) Southern Nevada
Origin time: 15 35 00.090
Epicenter: 37.18 N., 116.08 W.
Depth: 0 km
Magnitude: 3.9 mb(G), 4.0 ML(B)

Nevada Test Site explosion "Norbo" at 37°10'47.79" N., 116°04'59.21" W., surface elevation 1376 m, depth of burial 271 m.

New Jersey

5 March (G) Southeastern Pennsylvania
Origin time: 17 06 54.5

See Pennsylvania Listing.

11 March (G) Southeastern Pennsylvania
Origin time: 06 00 26.0

See Pennsylvania Listing.

New Mexico

22 March (G) Central New Mexico
Origin time: 00 49 12.5
Epicenter: 34.59 N., 105.91 W.
Depth: 5 km
Magnitude: 3.4 ML(G)
Intensity IV: Estancia, Mountainair, Willard.
Intensity III: Cedarvale, Torreon.

New York

17 January (L) Southeastern New York
Origin time: 10 13 16.1
Epicenter: 41.31 N., 73.93 W.
Depth: 3 km
Magnitude: 2.9 Mn(L), 2.7 Mn(J)

The press reported that this earthquake created turbulence on the Hudson River sending waves crashing against the opposite shoreline.

Intensity IV:
Connecticut--Bethel.
New York--Garrison, Peekskill.

Pennsylvania

5 March (G) Southeastern Pennsylvania
Origin time: 17 06 54.5
Epicenter: 40.19 N., 75.16 W.
Depth: 5 km
Magnitude: 3.5 Mn(L), 3.0 Mn(G), 2.9 Mn(J)

Some of the data listed below are from a questionnaire canvass by Dr. Richard A. Bischke, Temple University, Philadelphia. Figure 12 is an isoseismal map showing the results of Dr. Bischke's canvass. The isoseismals in figure 12 were drawn at Temple University and do not necessarily reflect all the data, as some of the intensities listed below are outisde the area covered by figure 12.

Intensity IV:
New Jersey--Crosswicks.
Pennsylvania--Dresler, Huntingdon Valley, Jenkintown, Wyncote.
Intensity III:
Pennsylvania--Abington (press report), Bala-Cynwyd, Blue Bell, Bryn Athyn, Busleton (press report), Cedars, Cheltenham, Hatboro, Horsham, Upper Moreland (press report), Willow Grove.
Intensity II:
New Jersey--Mount Holly, Trenton.
Pennsylvania--Spring Mount.

11 March (G) Southeastern Pennsylvania
Origin time: 06 00 26.0
Epicenter: 40.16 N., 75.10 W.
Depth: 5 km
Magnitude: 3.7 Mn(L), 3.2 Mn(G), 3.3 Mn(J)

Some of the data listed below are from a questionnaire canvass by Dr. Richard A. Bischke, Temple University, Philadelphia.

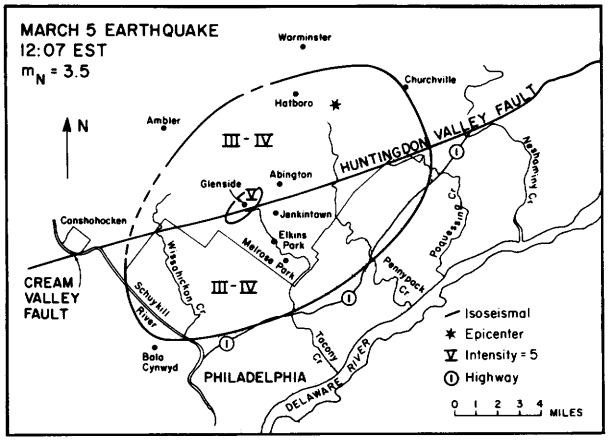

FIGURE 12.--Isoseismal map for the southeastern Pennsylvania earthquake of 5 March 1980, 17 06 54.5 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals (provided by Dr. Richard A. Bischke, Temple University, Philadelphia).

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

Pennsylvania--Continued

Figure 13 is an isoseismal map showing the results of Dr. Bischke's canvass. The isoseismals in figure 13 were drawn at Temple University and do not necessarily reflect all the data, as some of the intensities listed below are outside the area covered by figure 13.

Intensity V:
- Pennsylvania--
  - Abington (few plaster cracks, pictures askew).
  - Arosley (windows cracked).
  - Glenside (small objects fell, few plaster cracks).
  - Huntingdon Valley (small objects fell).
  - Jenkintown (books fell from shelf).

Intensity IV:
- New Jersey--Gibbstown.
- Pennsylvania--Busleton, Frankford (press report), Willow Grove.

Intensity III:
- Pennsylvania--South Philadelphia (press report).

Felt:
The press reported this earthquake was felt in the Philadelphia area at the following places: Ambler, Cheltenham, Chestnut Hill, Conshohocken, Germantown, Lower Moreland, Melrose Park, Mt. Airey, Newtown Square, Trevose, Upper Moreland, Westminster, West Norriton, West Philadelphia.

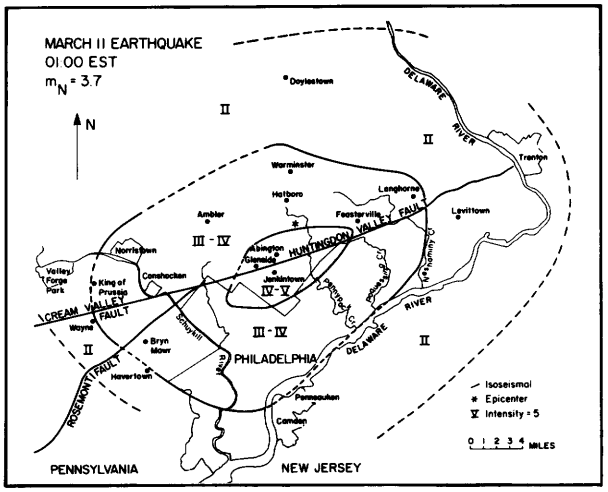

FIGURE 13.--Isoseismal map for the southeastern Pennsylvania earthquake of 11 March 1980, 06 00 26.0 UTC. Roman numerals represent Modified Mercalli intensities betwen isoseismals (provided by Dr. Richard A. Bischke, Temple University, Philadelphia).

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

Wyoming

20 February (G) Yellowstone National Park
- Origin time: 12 07 52.8
- Epicenter: 44.80 N., 110.92 W.
- Depth: 1 km
- Magnitude: 3.3 ML(G)

Intensity IV:
- Montana--Gardiner.
- Wyoming--Mammoth Hot Springs.

22 February (G) Yellowstone National Park
- Origin time: 10 18 27.7
- Epicenter: 44.81 N., 110.90 W.
- Depth: 1 km
- Magnitude: 4.5 mb(G), 4.7 ML(G)

Intensity IV:
- Montana--Pony, West Yellowstone.
- Wyoming--Mammoth Lakes.

Intensity III:
- Wyoming--Canyon, Old Faithful.

27 February (G) Yellowstone National Park
- Origin time: 06 05 49.5
- Epicenter: 44.76 N., 111.04 W.
- Depth: 5 km
- Magnitude: 3.4 ML(G), 3.3 ML(D)

Intensity IV: Mammoth Hot Springs.
Intensity III: Madison Junction.

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

Wyoming--Continued

21 March Yellowstone National Park
Origin time: 17 50
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.
Intensity IV: Grants Village.

24 March Yellowstone National Park
Origin time: 06 45
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.
Intensity III: Mammoth Hot Springs.

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