

Abstracts of earthquake reports for the Pacific Coast and the Western Mountain Region / U.S. Department of Commerce, Environmental Services Administration, Coast and Geodetic Survey

San Francisco, Calif. : U.S. Coast and Geodetic Survey, 1934-1966

Find this Book Online: <https://hdl.handle.net/2027/uc1.31822006834931>

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA



Public Domain, Google-digitized

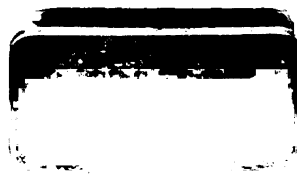
We have determined this work to be in the public domain, meaning that it is not subject to copyright. Users are free to copy, use, and redistribute the work in part or in whole. It is possible that current copyright holders, heirs or the estate of the authors of individual portions of the work, such as illustrations or photographs, assert copyrights over these portions. Depending on the nature of subsequent use that is made, additional rights may need to be obtained independently of anything we can address. The digital images and OCR of this work were produced by Google, Inc. (indicated by a watermark on each page in the PageTurner). Google requests that the images and OCR not be re-hosted, redistributed or used commercially. The images are provided for educational, scholarly, non-commercial purposes.

Generated at University of California, Berkeley through HathiTrust on 2025-07-09 18:18 GMT

UNIVERSITY OF CALIFORNIA, SAN DIEGO



3 1822 00683 4931





QF
1
A162-

U. S. DEPARTMENT OF COMMERCE

Sinclair Weeks, Secretary

COAST AND GEODETIC SURVEY

R. F. A. Studds, Director

ABSTRACTS OF EARTHQUAKE REPORTS
FOR
THE PACIFIC COAST AND THE
WESTERN MOUNTAIN REGION

MSA-77

January, February, March, 1953

Issued by the U. S. Coast and Geodetic Survey

Washington, D. C.

1953

DEPARTMENT OF COMMERCE

U. S. Coast and Geodetic Survey

**Seismological Field Survey
214 Old Mint Building
San Francisco 3, California**

**ABSTRACTS OF EARTHQUAKE REPORTS FOR THE PACIFIC COAST
AND THE WESTERN MOUNTAIN REGION**

MSA-77

1 January 1953 to 31 March 1953

The information in this report has been collected by the Seismological Field Survey of the U. S. Coast and Geodetic Survey with the assistance of State Collaborators in Seismology and through the voluntary cooperation of many local organizations and individuals. Additional cooperation is solicited. Blank questionnaires and special information pertaining to the work may be obtained by addressing the Director, U. S. Coast and Geodetic Survey, Washington 25, D. C.; the Chief, Seismological Field Survey at the above address; or the following State Collaborators in Seismology:

Arizona:	Dr. Eldred D. Wilson, University of Arizona, Tucson.
Colorado:	Dr. C. A. Heiland, Heiland Research Corporation, Denver.
Montana:	Professor Stephen W. Nile, Montana School of Mines, Butte.
Nevada:	Dr. David B. Slemmons, University of Nevada, Reno.
New Mexico:	Professor Stuart A. Northrop, University of New Mexico, Albuquerque.
Oregon:	Dr. Ira S. Allison, Oregon State College, Corvallis.
Utah:	Professor J. Stewart Williams, Utah State Agricul- tural College, Logan.
Washington:	Professor Howard A. Coombs, University of Washington, Seattle.
Wyoming:	Professor Horace D. Thomas, University of Wyoming, Laramie.

Copies of these reports may be obtained from the Supervisor, Western District, U. S. Coast and Geodetic Survey, 121 Customhouse, San Francisco 26, California; or from the Washington Office.

Earthquake information and questionnaire reports in the immediate vicinity of Lake Mead are collected by the Lake Mead Seismological Survey of the U. S. Coast and Geodetic Survey with headquarters at Boulder City, Nevada.

The abstracts are divided into three groups: (1) California and Western Nevada, (2) Washington and Oregon, and (3) the Western Mountain Region. This follows the scheme of classification in United States Earthquakes.

Intensity numbers refer to the Modified Mercalli Intensity Scale of 1931, in which, in the lower intensities, the disturbance of inanimate objects and personal reactions are given about equal weight. This intensity scale appears in abridged form on the last page of this report. All reports of whatever intensity from any town are listed under the highest intensity reported. Omission of intensity rating indicates insufficient information.

This report is prepared with the active collaboration of Professor Perry Byerly of the Seismographic Station of the University of California, and staff members of the Seismological Laboratory, California Institute of Technology. This permits an authentic appraisal of the material abstracted in the light of available instrumental and other information. Newspaper reports have been furnished by cooperative observers only and do not represent the results of a complete newspaper clipping service.

A condensed summary of these reports is published annually in the serial publication of the U. S. Coast and Geodetic Survey entitled "United States Earthquakes."

CALIFORNIA AND WESTERN NEVADA

(120th Meridian or Pacific Standard Time)

All places mentioned are in California unless otherwise stated.

Time marked with asterisk (*) determined instrumentally: Berkeley (B), Boulder City (BC), Pasadena (P), and Washington (W).

1953

1 January, 09:36.9*.

Epicenter 32.6°N , 117.1°W , near Tijuana. (P).

El Cajon-Grossmont area. "Two slight earthquakes were recorded at 9:37 A.M. and 10:22 A.M., P.S.T. The shocks were reported felt by a few persons in the El Cajon-Grossmont area." (SSA Bulletin, April 1953) (Definitely no shock recorded at 10:22 A.M. Pasadena.)

9 January, 03:52:06*.

Epicenter $35^{\circ}17'\text{N}$, $118^{\circ}35'\text{W}$, near Caliente. (P).

Tehachapi (central section). IV. Motion bumping, abrupt onset, lasted about 2 seconds. Felt by many. Buildings creaked; loose objects rattled. Ground: Rocky.

9 January, 18:52:31*.

Epicenter 27.5°N , 114.4°W , Lower California. (P).

San Diego. IV. Motion rapid, lasted about $1\frac{1}{4}$ minutes. Direction NE. Felt by several in home and community. Rattled windows; frame creaked. Hanging objects swung. Ground: Rocky, compact. About 7 calls were received from the El Cajon and Mt. Helix districts. People reported they heard a rumbling sound. (If this actually was felt in the San Diego area, the circumstance is remarkable. Pasadena.)

14 January, 23:25.

Tehachapi (central section). IV. Motion bumping, from NW, lasted 1 second, abrupt onset. Felt by many. Buildings creaked; loose objects rattled. Ground: Rocky.

18 January, 17:12:35*.

Epicenter $35^{\circ}18'\text{N}$, $118^{\circ}35'\text{W}$, near Caliente. (P).

Tehachapi (central section). Light tremor felt.

20 January, 00:13:22*.

Epicenter $35^{\circ}19'\text{N}$, $118^{\circ}30'\text{W}$, east of Caliente. (P).

Tehachapi (central section). IV. Motion bumping, abrupt onset, lasted 2 seconds. Felt by most people. Buildings creaked; loose objects rattled. Ground: Rocky.

24 to 31 January (no times given).

Bryson (Ernest Weferling Ranch). "During January 24 to 31 we had 10 separate light shocks."

25 January, 04:23:11*.

Epicenter $34^{\circ}07'N$, $117^{\circ}20'W$, near San Bernardino. (P).

San Bernardino. "Many residents of San Bernardino were awakened at about 4:30 A.M., P.S.T., by a sharp earthquake that apparently was not felt elsewhere in southern California." (SSA Bulletin, April 1953)

31 January, 05:35.

Tehachapi (central section). IV. Motion trembling, abrupt onset, lasted 1 second. Felt by many. Buildings creaked; loose objects rattled. Ground: Rocky.

31 January, 16:51.9*. Probably near Bear Mountain. (P).

Tehachapi (central section). IV. Motion bumping, like an upward push, abrupt onset, lasted 1 second. Felt by many. Buildings creaked; loose objects rattled. Moderately loud subterranean sounds like a muffled explosion heard before shock. Ground: Rocky.

January (latter part), about 21:30.

Eagle Mountain. Observer states that an earthquake was felt during the latter part of January.

1 February, 07:05.

Tehachapi (central section). IV. Motion bumping, abrupt onset, lasted 1 second. Felt by many. Buildings creaked; loose objects rattled. Ground: Rocky.

1 February, 13:48:29*.

Epicenter $35^{\circ}19'N$, $118^{\circ}30'W$, east of Caliente. (P).

Tehachapi (central section). IV. Motion trembling, gradual onset, lasted 2 seconds. Felt by many. Buildings creaked; loose objects rattled. Ground: Rocky.

1 February, 22:16.

Tehachapi (central section). IV. One bump or jar, lasted 1 second. Felt by many. Buildings creaked; loose objects rattled. Ground: Rocky.

3 February, 00:48.

East San Francisco Bay area. The press reported that a small earthquake, lasting 30 seconds, shook the East Bay area. Residents of Albany, Berkeley, and El Cerrito reported they felt the temblor. It was thought the epicenter was about 5 miles NW of the University of California campus.

3 February, 06:50.2*.

Epicenter $35.6^{\circ}N$, $121.1^{\circ}W$, near Cambria. (P).

Intensity V:

Atascadero. Motion rapid, lasted a few seconds. Felt by and awakened many in community, frightened few. Rattled windows. Ground: Soil, compact, level.

Creston. Motion slow, lasted 10 seconds. Awakened many in community. Rattled windows. Ground: Compact, level.

3 February, 06:50.2*. Intensity V. (cont.)

Morro Bay. Motion rapid, brief. Felt by (some outdoors) and awakened many in community. Rattled windows, doors, and dishes. Trees and bushes shaken slightly. Ground: Compact, sloping.

Pleyto School (near Bryson). Motion rapid. Felt by all and awakened many in home and community. Rattled windows; walls creaked. Ground: Compact, level and sloping. "This was one of the more severe, longer, and abrupt shocks. No forewarning with this one. Before many shocks we have felt here recently, there is either a rumble or a muffled thud before the shock is felt."

Santa Margarita. Motion rapid, very brief. Felt by and awakened many in community, frightened few. Rattled windows, doors, and dishes.

Intensity IV:

Bryson (Ernest Weferling Ranch). Motion rapid. Felt by many in community, awakened few. Rattled windows and doors. Ground: Soil.

Cayucos. Lasted 1 second. Felt by several, awakened few. Rattled windows. Ground: Soil, compact, level.

Paso Robles. Motion rapid. Felt by several and awakened few in community. Rattled windows.

San Luis Obispo. One brief, sharp shock. Motion rapid. Felt by many in community, awakened few. Ground: Compact.

Templeton. Motion slow, lasted 3 or 4 seconds. Felt by many in community. Direction E-W. Rattled windows and dishes. Ground: Soil, sloping.

Intensity I to III:

Bitterwater. Felt by several; by observer.

Casmalia. Very light. Felt by several in community.

Reported not felt:

Arroyo Grande, Avila, Big Sur, Cambria, Carmel, Carmel Valley, Cholame, Chualar, Coalinga, Concepcion, Gaviota, Gonzales, Gorda Station (via Big Sur), Greenfield, Guadalupe, Harmony, Idria, Jolon, Kettleman City, King City, Lompoc, Los Molinos, Nipomo, Paicines, Pozo Guard Station (via Santa Margarita), San Ardo, San Benito, San Lucas, San Miguel, Santa Barbara, Santa Inez, Seaside, Shandon, Soledad, Surf, Watsonville.

3 February, 20:36:16*. Epicenter 33°24'N, 116°34'W, near Warner Springs. (P)

Intensity V:

El Cajon Valley. Heavy jolt, with rumble. Some people frightened and ran outdoors.

Hauser Canyon (Campo). Motion rapid, sharp. Felt by several at Morena Lake, frightened few in home. Rattled windows, doors, and dishes. Shifted small objects. Ground: Decomposed granite, sloping.

Miramar. Motion rapid, momentary duration. Direction SE. Felt by all in community, awakened few. Rattled windows and dishes; frame creaked. Shifted pictures on walls. "Shock was a sudden jerk - almost like dynamite blast - lasted few seconds." Ground: Rocky, compact, level.

Palomar Mountain. Motion rapid. Two short jolts about 1 second apart. Felt by all in community, frightened few. Ground: Soil.

3 February, 20:36:16*. Intensity V. (cont.)

Warner Springs. Motion rapid, lasted about 45 seconds. Direction W. Felt by all in community, frightened all in home. Hanging objects swung W-E.

Intensity IV:

Borego Valley (Ensign Ranch). Motion bumping, from N to S, abrupt onset, lasted about 10 seconds. Felt by observer. Buildings creaked. Thunderous subterranean sounds heard immediately after shock.

Descanso. One good jar. Motion rapid, lasted 1 minute. Felt by many in community (some outdoors). Direction E. Rattled windows, doors, and dishes; house creaked. Ground: Rocky, sloping.

Dulzura. Motion slow, lasted 30 seconds. Felt by all in home. Rattled windows, doors, and dishes. Ground: Rocky, loose, compact, level, sloping, and steep.

Escondido. Motion slow, lasted 5 seconds. Felt by many. Ground: Compact, level.

Fallbrook. One single bump, abrupt onset. Felt by several. Loose cupboard doors, etc. rattled. Ground: Granite bedrock.

Fallbrook. III. One sharp jerk. Motion rapid, very brief. Felt by several.

Grossmont. Motion rapid, lasted 5 seconds. Felt by many in community. Rattled windows. Ground: Rocky.

Jacumba. Motion rapid, lasted 30 seconds. Felt in home. Windows rattled. Ground: Sandy, level.

Julian. Motion slow, sharp. Felt by many in community, frightened few. Rattled windows. Observer heard shock coming before it was felt. Sounded like an explosion. Ground: Soil, sloping.

Lakeside. Motion rapid, lasted 3 or 4 seconds. Felt by several in home. Rattled windows, doors, and dishes. Felt like an explosion. Ground: Rocky.

La Mesa (4627 Palm Avenue). Motion rapid, lasted a few seconds. Felt in home. Rattled windows. Felt like an explosion. Ground: Soil, rocky.

La Mesa (Calavo Gardens). Shock felt like a vertical drop, no horizontal motion, followed by a roar as though a heavily loaded truck were passing, lasted 30 seconds. Felt by all in home. Ground: Rocky, sloping.

La Mesa (Calavo Gardens). Motion slow, lasted 45 seconds. Felt by several and frightened few in home. Direction NE. Rattled windows and doors; house creaked. Ground: Rocky, sloping, steep. "Was about as strong as that on 12-25-51."

Mesa Grande. Motion rapid, lasted 2 seconds. Felt by many in community. Rattled windows, doors, and dishes; house creaked slightly. Ground: Decomposed granite, sloping.

Pala. Felt by several, lasted 1 minute. Rattled windows, doors, and dishes.

Ramona. Motion rapid, lasted 2 seconds. Felt by many in home. Direction NE. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Compact.

Ramona. Two shocks, motion bumping, abrupt onset. Felt by many. Buildings creaked; loose objects rattled. Moderately loud rumbling heard about 4 seconds before shock.

3 February, 20:36:16*. Intensity IV. (cont.)

- Rancho Mirage. Motion slow, lasted a few seconds. Felt in restaurant, frightened few. Ground: Level.
- Riverside. Motion rapid, lasted 10 seconds. Felt by all in home, awakened and frightened few. Direction NE. Rattled windows and doors; frame creaked. Ground: Soil, level.
- San Diego (10th and Imperial). Motion rapid, lasted 3 seconds. Felt by several in Dispatcher's office, frightened few in community. Direction NW-SE. Rattled windows, doors, and dishes. Ground: Soil, compact, level.
- San Diego (3932 Aragon Drive). Motion rapid. Felt by observer in home. Rattled windows. Ground: Compact.
- San Diego (Rolando Village). III. Sharp shock with rumble.. Motion rapid, lasted about 15 seconds. Felt by several in community. Direction NE. Ground: Rocky, sloping, steep.
- San Diego (707 West Broadway). II. Motion rapid. Felt by observer on 2nd floor. Ground: Level, filled in.
- Santa Ysabel. Motion started slow, ended with abrupt shake, lasted a few seconds. Felt by several in home. Direction SW-NE. Rattled windows. Ground: Rocky, sloping.
- Thermal. Motion rapid, abrupt onset, lasted 15 seconds. Felt by many (some outdoors), frightened few. Direction E. Rattled doors and dishes; house creaked. Hanging objects swung E. Trees, bushes shaken slightly. Ground: Soil, level.

Intensity I to III:

- Boulevard. Motion slow, rocking, N-S. Three distinct motions, not strong, but distinct. Felt only by observer. Ground: Soil, level.
- Desert Hot Springs. Motion slight, very brief. Felt by several. Slight rattling of windows, doors, and dishes.
- East San Diego. Motion rapid, brief. Felt by observer. Ground: Adobe, rocky.
- El Centro. Very light tremor. Motion slow, lasted 10 seconds. Felt by several. Ground: Soil, compact, level.
- Flinn Springs (2 miles E. of). Motion rapid, lasted a few seconds. Felt in home. Hanging objects swung. Ground: Sloping.
- Hemet. Shock felt. (No details)
- Indio. One very brief shock. Motion rapid. Felt by several (some outdoors). Ground: Soil, level.
- Mecca. Heavy jolt, abrupt onset. Felt by few. Bumping subterranean sounds heard before shock. "Just one sharp, jolting shock." Ground: Sandy.
- Mecca. Motion slow, lasting 30 seconds. Felt by several in community.
- Moreno. Motion slow. Felt by several in community. Ground: Compact.
- Perris. Motion rapid, momentary. Felt in home. Direction N. Trees, bushes shaken slightly. Ground: Compact.
- Potrero. Motion slow. One shock. Felt by several in community. Prolonged rumble heard before shock was felt.
- Poway. Brief, explosive-like jolt, lasting a few seconds.
- San Marcos. "Found two persons who said they felt slight jar."
- Temecula. Very light. Felt by several in community. Ground: Slightly sloping.
- Thousand Palms. Motion rapid, one jolt. Felt by several in home and house trailer. Ground: Rocky, loose desert soil.
- Westmorland. "Felt like a truck passing by to us."

3 February, 20:36:16*. (cont.)

Reported not felt:

Aguanga, Banning, Bonsall, Brawley, Calexico, Calimesa, Calipatria, Carlsbad, Coachella, Colton, Corona, Del Mar, Desert Center, Eagle Mountain, El Cajon, El Toro, Glamis, Guatay, La Jolla, Laguna Beach, Los Angeles, Mount Laguna, Niland, Oceanside, Joshua Tree, Palm City, Plaster City, San Bernardino, San Clemente, San Juan Capistrano, Santa Ana, San Ysidro, Silverado, Solana Beach, Trabuco Canyon, Twentynine Palms, White Water; reported not felt in Tijuana, Mexico.

4 February, 18:54.2*. Small record. (P).

Bryson (Ernest Weferling Ranch). IV. Motion rapid, lasted 10 seconds. Felt by many in community (some outdoors). Direction SW to NE. Rattled windows and doors; walls creaked. Hanging objects swung. Ground: Soil.

4 February, 22:30*. Small shock not far from Caliente. (P).

Tehachapi (central section). IV. Two shocks. First beginning gradual, second, abrupt. Motion trembling, followed by bumping. Felt by many. Buildings creaked; loose objects rattled. Ground: Rocky.

6 February, 16:03:26*.

Epicenter $37^{\circ}25'N$, $118^{\circ}10'W$, east of Laws. (P).

Laws. IV. One sudden rapid jar, lasted several seconds. Felt by many in community. House creaked. "Southwest side of our house was hit hard."

7 February, 08:42.

Tehachapi (central section). IV. Heavy jar, abrupt onset, lasted 2 seconds. Felt by many. Buildings creaked; loose objects rattled. Muffled explosive-like sounds heard before shock was felt. Ground: Rocky.

9 February, 06:45:54*.

Epicenter $35^{\circ}17'N$, $118^{\circ}37'W$, near Caliente. (P).

Tehachapi (central section). IV. Heavy jolt, abrupt onset, lasted about 2 seconds. Felt by many. Buildings creaked; loose objects rattled. Ground: Rocky.

15 February, 01:10.

Fall River Mills (1 mile NW. of). IV. Abrupt drop or sway. Felt by several. Few heard rattling of loose objects. Disturbed objects observed by few. Several glasses broken in bar. Most people were unaware a shock had occurred. Ground: Loam.

15 February, 07:30.

Bryson (Ernest Weferling Ranch). Slight shock.

15 February, 13:00:41*, 13:04:21*.

Epicenter $35^{\circ}16'N$, $118^{\circ}34'W$, Bear Mountain. (P).

Arvin (Arvin High School). IV. Motion rapid, lasted 10 seconds. Felt by many in community (some outdoors). Direction N. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N. Trees, bushes shaken slightly. Shifted small objects. Ground: Soil.

- 15 February, 13:00:41*, 13:04:21*. (cont.)
Kern Canyon Powerhouse (near Bakersfield). IV. Motion slow, lasted 4 seconds. Felt by all at power plant. Rattled windows.
Ground: Rocky.
- 16 February, 11:30.
Arvin (Arvin High School). IV. Motion rapid, lasted 12 seconds.
Felt by several and frightened few in community (some outdoors). Direction NE. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NE. Trees, bushes shaken slightly. Shifted small objects. Ground: Soil.
- 17 February, 00:06.
Bryson (Pleyto School). III. Motion rapid, sharp jerk. Awakened observer. "There have been many such shocks in this neighborhood since the big one on 21 November 1952, often 2 or 3 a day."
Ground: Compact.
- 18 February, 06:10.
Bryson (Ernest Weferling Ranch). Mild shock.
- 19 February, 00:12:06*.
Epicenter $35^{\circ}18'N$, $118^{\circ}30'W$, near Caliente. (P).
Arvin. V. Motion rapid, lasted 15 seconds. Felt by and awakened many in community (some outdoors), frightened few. Direction N. Rattled windows, doors, and dishes. Hanging objects and doors swung N. Shifted small objects. Ground: Soil.
Bakersfield. "Residents of Bakersfield and surrounding areas felt a number of earthquakes early on the morning of February 19. No damage was reported." (SSA Bulletin, April 1953)
Edison. IV. Motion rapid, lasted 2 seconds. Felt by many and awakened few in community. Rattled windows; house creaked. Loud roaring before and during shock. Ground: Compact, level.
Fillmore. II. Motion slow, lasted 2 seconds. Felt by few. Direction N. Ground: Compact, level.
Jawbone Aqueduct Station ($35^{\circ}18'N$, $118^{\circ}02'W$). III. Motion rapid, lasted 4 seconds. Felt by and awakened observer. Direction W-E. Ground: Compact, level.
Tehachapi (central section). IV. Motion trembling or rolling, gradual onset, lasted about 6 seconds. Felt by many. Faint roaring sounds heard just before shock. Ground: Rocky.
- 20 February, 13:18:25*.
Epicenter $33^{\circ}17'N$, $116^{\circ}22'W$, near Borego. (P).
Borego Valley (Ensign Ranch). IV. Motion trembling, E-W, rapid onset. Felt by many. Buildings creaked; loose objects rattled. Ground: Sandy.
Santa Ysabel. IV. Began slow, ended with hard jerk, lasted 2 or 3 seconds. Felt by several in community. Direction SW to NE. Rattled windows. Ground: Rocky, sloping.
Warner Springs. Very short and moderate shock.
- 23 February, 01:10:40*. (B).
Pittville ($2\frac{1}{2}$ miles N. of). IV. Motion rapid, lasted 1 minute. Felt in home. House creaked "Unusual type of shock for this locality. Have felt many during the past two years. Two sharp shocks followed by rolling motion. Reverse of previous shocks."

- 23 February, 01:10:40*. (cont.)
Pittville. IV. Motion rapid, rolling, lasted 1 minute. Felt by several in home and community, awakened all in home. Direction N-S. Window blinds rattled. Felt very strongly in bed.
Pittville Powerhouse No. 3 (PG&E). III. Felt by several.
- 23 February, 09:11.7*.
Epicenter 35°22'N, 118°53'W, near Bakersfield. (P).
Bakersfield Steam Plant and Magunden Powerhouse. Sharp shock.
- 25 February, 17:15.
Cedarville (center section). III. Motion trembling, rapid onset, lasted for about 10 seconds. Felt by several.
- 25 February, 19:22:01*.
Epicenter 35°27'N, 118°48'W, Kern River Gorge. (P).
Bakersfield (PG&E). Motion slow, brief.
- 25 February, 20:23:00*.
Epicenter 35°27'N, 118°48'W, Kern River Gorge. (P).
Kern Canyon Powerhouse, PG&E (near Bakersfield). V. Motion rapid, brief. Broke windows.
- 1 March, 10:50.
Bryson (Ernest Weferling Ranch). V. Motion rapid, lasted 5 seconds. Felt by all in community. Rattled windows and doors. Ground: Soil.
- 3 March, 19:40.
Pleyto School (near Bryson). Heavy blast and light tremble.
- 4 March, 11:52:21*.
Epicenter 35°04'N, 118°26'W, near Tehachapi. (P).
Tehachapi (central section). V. Motion trembling, then a jar, gradual onset, lasted about 3 seconds. Felt by all. Buildings creaked; loose objects rattled. Heavy humming and bumping sounds heard at time of shock. Ground: Rocky.
Palos Verdes Hills. Sharp.
- 4 March, 13:40:03*.
Epicenter 33°20'N, 115°40'W, northwest of Niland. (P).
Westmorland. IV. Motion slow. Felt in business district. Rattled windows, doors, and dishes. Ground: Compact.
- 5 March, 04:21:33*.
Epicenter 33°45'N, 118°29'W, near Palos Verdes. (P).
Hermosa Beach. V. "Plaster was knocked from the walls of two buildings in Hermosa Beach." (SSA Bulletin, April 1953)
Los Angeles. The press reported that a rolling earthquake was felt in the beach areas west of here early this morning. Some residents of Redondo Beach, Hermosa Beach, and Westwood said they were awakened by a sharp, rolling shock. There were no reports of damage, police said. Also reported felt at Manhattan Beach, El Segundo, Inglewood, and Southwest Los Angeles.
Los Angeles (5900 Avion Drive). IV. Abrupt onset. Felt by many. Dishes rattled and beds shook. Few alarmed. Ground: Soil.

- 5 March, 04:21:33*. (cont.)
Palos Verdes. V. Awakened many. Dishes rattled; beds shook.
Reported not felt: Westchester.
- 10 March, 11:50*. Small shock not far from Woody. (P).
Kern Canyon Powerhouse (near Bakersfield). Light shock.
- 10 March, 18:17.
Bakersfield (PG&E). Light shock.
- 14 March, 09:22:36*.
Epicerter 37°39'N, 122°30'W. (B)
Hayward. "The Hayward area was slightly shaken by a small earthquake at 9:22:36 A.M., P.S.T. No damage was reported." (SSA Bulletin, April 1953)
- 14 March, 21:15.
El Portal. IV. Motion slow, lasted a few seconds. Felt by several in community, awakened some people. "Two slight shocks close together. Some people heard a rumbling sound." Ground: Soil, level.
- 16 March, 00:52:06*.
Epicerter 36°57'N, 121°40'W. (B).
Intensity V:
Gilroy. Motion slow, lasted about 30 to 45 seconds. Felt by and awakened many in community. Direction N. Rattled windows; walls creaked. Ground: Soil.
Santa Cruz. The press reported that scores of people were awakened. Windows rattled, dishes "danced" in cupboards and chandeliers swayed. It was preceded by a dull rumbling.
Santa Cruz (NE. section). IV. Motion swaying, rapid onset. Felt by several. Visible swaying of buildings and trees. Ground: Sandy.
- Intensity IV:
Monterey. Motion rapid, momentary duration. Felt by several (some outdoors) and awakened few in community. Rattled windows and dishes. Ground: Soil, sloping.
Morgan Hill (central section). Felt by several and alarmed few in community. Buildings creaked; loose objects rattled. Rumbling subterranean sounds heard by several before shock. Disturbed objects observed by several. Ground: Compact.
San Jose. Motion slow, very brief. Felt by several in community, awakened few, frightened few.
Watsonville. Motion rapid. Felt by many in home, awakened few. Rattled windows and doors. Ground: Level. The press described the shock as short and sharp in Watsonville.
- Intensity I to III:
Ben Lomond. Slight, brief shock. Felt by few in home.
San Francisco (1798 Grove St.). Motion slow, lasted about 1 second. Felt by observer awake in bed. "Very slight, but definite."
Sharp Park. Felt. (No details)

16 March, 00:52:06*. (cont.)

Reported not felt:

Alameda, Alamo, Antioch, Big Sur, Bolinas, Carmel, Carmel Valley, Castro Valley, Cayucos, Coalinga, Firebaugh, Gonzales, Idria, Jolon, Martinez, Newark, Newman, Oakland, Pinnacles, Redwood City, Richmond, Salinas, San Ardo, San Miguel, San Simeon, Vernalis, Volta.

17 March, 21:03.

Pleyto School (near Bryson). III. Motion rapid. Felt by several in home and community. Loud rumble. "Few light shocks felt since this one."

19 March, 18:57:33*.

Epicenter $34^{\circ}04'N$, $118^{\circ}22'W$, near Beverly Hills. (P).

Burbank. IV. The press reported hundreds of calls were received by Police from alarmed residents. Described as sharp. Checking disclosed that it was not felt in neighboring communities.

21 March, 21:19:01*.

Epicenter $38.8^{\circ}N$, $119.0^{\circ}W$. (W).

Emigrant Gap.(Blue Canyon Airport). IV. Motion trembling, rapid onset. Felt by several. Building creaked; loose objects rattled. Ground: Rocky.

Markleeville. IV. Motion rapid, lasted 2 seconds. Felt by several in community, frightened few. Direction W. Rattled windows.

Meyers. V. Motion rapid, lasted 3 or 4 seconds. Felt by all in community, awakened many in home, frightened many in community. House creaked. Hanging objects swung N-S. Shifted small objects. A very loud rumble preceded and accompanied shock. Ground: Loose, level.

Placerville, Salt Springs, and Spaulding Powerhouses (PG&E). IV. Motion rapid, lasted for fraction of second. Felt in community. Rattled windows.

Tahoe City. IV. Motion slow, lasted 3 seconds. Felt by all in home. Direction N-S. Hanging objects swung N-S. Ground: Rocky.

Yosemite National Park (Village Center). IV. Two shocks a few seconds apart. Motion trembling, not severe, rapid onset. Felt by many. Slight movement of lamps. Ground: Sandy.

Reported felt in Nevada:

Carson City. III. Slight trembling. Felt by several. Ground: Made.

Gardnerville. Shock felt. Observer from Markleeville, California stated that it was reportedly felt stronger here than at Markleeville.

22 March, 00:00.

Markleeville. Tremor felt. (No details).

22 March, 06:05.

Markleeville. IV. Motion slow, lasted 1 second. Felt by several in home and community, awakened all in home.

Meyers. V. Motion slow, lasted about 4 seconds. Felt by and awakened many in community, frightened few. Direction N-S. House creaked. Ground: Loose.

22 March, 06:05. (cont.)

Tahoe City. IV. Motion slow, lasted about 2 seconds. Felt by many in home, awakened few. Hanging objects swung N-S. Ground: Rocky.

22 March, 23:15.

Tehachapi (central section). IV. Motion bumping, abrupt onset, lasted 2 seconds. Felt by many. Ground: Rocky.

23 March, 09:06:37*.

Epicenter $34^{\circ}59'N$, $118^{\circ}54'W$. (P).

Wheeler Ridge. V. Motion rapid, hard jerk E-W, lasted 3 or 4 seconds. Felt by all and frightened many in community. Everyone went outside. Rattled windows, doors, and dishes; house creaked. Ground: Compact.

23 March, 09:42:48*.

Epicenter $34^{\circ}59'N$, $118^{\circ}58'W$. (P).

Wheeler Ridge. IV. Moderately hard shock. Rattled windows and doors. Ground: Compact.

25 March, 15:40 or 16:40.

Bakersfield (SW. section). IV. Motion rapid, jolting, lasted a second. Felt by several in home. Rattled windows; walls creaked. Trees, bushes shaken moderately. Ground: Soil, level.

- - - - -

WASHINGTON AND OREGON

(120th Meridian or Pacific Standard Time)

-- January.

No earthquakes were reported felt during the month of January at the following places:

Weather Bureau Stations:

Washington: Seattle.

Oregon: Portland.

24 February, 11:39:05*.

Seattle, Washington. IV. The press reported the earthquake as light. Calls to the Police came especially from the industrial area in Seattle's South End, but telephone reports to the press came from all over the city. Most callers described the shock as mild. Some reported that dishes rattled. University of Washington seismologists said the epicenter was in the immediate vicinity of Seattle.

24 February, 11:39:05*. (cont.)

Seattle (703 Federal Office Building). IV. Motion swaying, NW to SE, gradual onset. Felt by many. Building creaked; loose objects rattled. Ground: Made.

Seattle (Seattle-Tacoma Airport). IV. Motion rocking, NW to SE, gradual onset. Felt by many. Ground: Sandy.

-- February.

No earthquakes were reported felt during the month of February at the following place:

Weather Bureau Station:

Oregon: Portland.

-- March.

No earthquakes were reported felt during the month of March at the following places:

Weather Bureau Stations:

Washington: Seattle.

Oregon: Portland.

- - - -

WESTERN MOUNTAIN REGION

(105th Meridian or Mountain Standard Time)

-- January.

No earthquakes were reported felt during the month of January at the following places:

Weather Bureau Stations:

Arizona: None.

Colorado: "

Idaho: "

Montana: "

Nevada: "

New Mexico: "

Utah: "

Wyoming: "

-- February.

No earthquakes were reported felt during the month of February at the following places:

Weather Bureau Stations:

Arizona: None.

Colorado: "

Nevada: "

Idaho: "

New Mexico: "

Utah: "

Wyoming: "

8 March, 18:39:34*.

Helena, Montana. IV. Vibration, followed by few jolts, gradual onset, lasted about 3 seconds. Felt by many. Buildings creaked; loose objects rattled. Moderately loud bumping subterranean sounds heard before, during and after shock. Main feature was the loud rumbling. Some people were alarmed and a few left a theater. One report was received from Austin (near Helena) and stated that a shock was felt by several around 5 P.M. No date was given, but since it was received by Professor Nile shortly after 8 March, the card probably refers to the 8 March shock.

15 March, 08:30.

Alta, Wyoming (Teton County). IV. Motion shaking, E to W, abrupt onset. Felt by many. Buildings creaked; loose objects rattled. Thunderous subterranean sounds heard before and during shock and lasted 1 to 2 minutes. No alarm.

-- March.

No earthquakes were reported felt during the month of March at the following places:

Weather Bureau Stations:

<u>Arizona:</u>	None.
<u>Colorado:</u>	"
<u>Idaho:</u>	"
<u>New Mexico:</u>	"
<u>Nevada:</u>	Winnemucca.
<u>Utah:</u>	"

- - - -

BOULDER CITY

(120th Meridian or Pacific Standard Time)

3 February, 10:48:15* (BC).

Boulder City. Felt slightly.

15 February, 23:27:16* (BC).

Boulder City. Felt by one person.

15 February, 19:11:58* (BC).

Boulder City. Felt by one person.

28 February, 12:45:05* (BC).

Boulder City. III. Felt by several.

2 March, 12:46:40 (BC).

Boulder City. IV. Felt by many.

9 March, 19:05:20* (BC).

Boulder City. IV. Felt by nearly all. Rattled doors and windows.

- 10 March, 21:24:14* (BC).
Boulder City. IV. Felt by many.
- 24 March, 18:35:46* (BC).
Boulder City. III. Felt by several.
- 25 March, 19:04:45* (BC).
Boulder City. III. Felt by several.

- - - -

Late Report

Calipatria, California, December 28, 1952.-- "A sharp earthquake startled Calipatria residents about 7 P.M., P.S.T. No damage was reported." (BSSA, April 1953) (It is believed that P.M. in this report is in error, and that the shock is one recorded at 07:57:24* P.S.T., with epicenter at 32°59'N, 115°24'W, near Alamorio.)

MODIFIED MERCALLI INTENSITY SCALE OF 1931
(Abridged)

- I. Not felt except by a very few under especially favorable circumstances. (I Rossi-Forel Scale)
- II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (I to II Rossi-Forel Scale)
- III. Felt quite noticeably indoors, especially on upper floor of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing truck. Duration estimated. (III Rossi-Forel Scale)
- IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls made creaking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. (IV to V Rossi-Forel Scale)
- V. Felt by nearly everyone; many awakened. Some dishes, windows, etc. broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel Scale)
- VI. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight. (VI to VII Rossi-Forel Scale)
- VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars. (VIII Rossi-Forel Scale)
- VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Disturbed persons driving motor cars. (VIII to IX Rossi-Forel Scale)
- IX. Damage considerable in specially designed structures; well designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX Rossi-Forel Scale)
- X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks. (X Rossi-Forel Scale)
- XI. Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipe lines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
- XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

FOR OFFICIAL USE

U. S. DEPARTMENT OF COMMERCE

Sinclair Weeks, Secretary

COAST AND GEODETIC SURVEY

R. F. A. Studds, Director

ABSTRACTS OF EARTHQUAKE REPORTS
FOR
THE PACIFIC COAST AND THE
WESTERN MOUNTAIN REGION

MSA-78

April, May, June, 1953

Issued by the U. S. Coast and Geodetic Survey

Washington, D. C.

1953

DEPARTMENT OF COMMERCE

U. S. Coast and Geodetic Survey

Seismological Field Survey
214 Old Mint Building
San Francisco 3, California

ABSTRACTS OF EARTHQUAKE REPORTS FOR THE PACIFIC COAST
AND THE WESTERN MOUNTAIN REGION

MSA-78

1 April 1953 to 30 June 1953

The information in this report has been collected by the Seismological Field Survey of the U. S. Coast and Geodetic Survey with the assistance of State Collaborators in Seismology and through the voluntary cooperation of many local organizations and individuals. Additional cooperation is solicited. Blank questionnaires and special information pertaining to the work may be obtained by addressing the Director, U. S. Coast and Geodetic Survey, Washington 25, D. C.; the Chief, Seismological Field Survey at the above address; or the following State Collaborators in Seismology.

Arizona:	Dr. Eldred D. Wilson, University of Arizona, Tucson.
Colorado:	Dr. C. A. Heiland, Heiland Research Corporation, Denver.
Montana:	Professor Stephen W. Nile, Montana School of Mines, Butte.
Nevada:	Dr. David B. Slemmons, University of Nevada, Reno.
New Mexico:	Professor Stuart A. Northrop, University of New Mexico, Albuquerque.
Oregon:	Dr. Ira S. Allison, Oregon State College, Corvallis.
Utah:	Professor J. Stewart Williams, Utah State Agricultural College, Logan.
Washington:	Professor Howard A. Coombs, University of Washington, Seattle.
Wyoming:	Professor Horace D. Thomas, University of Wyoming, Laramie.

Copies of these reports may be obtained from the Supervisor, Western District, U. S. Coast and Geodetic Survey, 121 Customhouse, San Francisco 26, California; or from the Washington Office.

Earthquake information and questionnaire reports in the immediate vicinity of Lake Mead are collected by the Lake Mead Seismological Survey of the U. S. Coast and Geodetic Survey with headquarters at Boulder City, Nevada.

The abstracts are divided into three groups: (1) California and Western Nevada, (2) Washington and Oregon, and (3) the Western Mountain Region. This follows the scheme of classification in United States Earthquakes.

Intensity numbers refer to the Modified Mercalli Intensity Scale of 1931, in which, in the lower intensities, the disturbance of inanimate objects and personal reactions are given about equal weight. This intensity scale appears in abridged form on the last page of this report. All reports of whatever intensity from any town are listed under the highest intensity reported. Omission of intensity rating indicates insufficient information.

This report is prepared with the active collaboration of Professor Perry Byerly of the Seismographic Station of the University of California, and staff members of the Seismological Laboratory, California Institute of Technology. This permits an authentic appraisal of the material abstracted in the light of available instrumental and other information. Newspaper reports have been furnished by cooperative observers only and do not represent the results of a complete newspaper clipping service.

A condensed summary of these reports is published annually in the serial publication of the U. S. Coast and Geodetic Survey entitled "United States Earthquakes."

CALIFORNIA AND WESTERN NEVADA

(120th Meridian or Pacific Standard Time)

All places mentioned are in California unless otherwise stated.

Time marked with asterisk (*) determined instrumentally: Berkeley (B),
Boulder City (BC), Pasadena (P), and Washington (W).

1953

- 1 April, 21:17:33*.
Epicenter 35.1°N, 118.7°W, near Bear Mountain. P.
Tehachapi (central section). IV. Light jolt, abrupt onset, lasted
1 second. Felt by many. Buildings creaked. Ground: Rocky.
- 5 April, 22:15:17*.
Epicenter 32.2°N, 116.7°W, northwest of Guadalupe, Baja California. P.
El Cajon. IV. Press reported windows and doors rattled.
San Diego. III. Motion rapid. Felt by several in community.
- 7 April, 16:59:20*.
Epicenter 34.8°N, 120.6°W, near Casmalia. P.
Los Alamos (central section). IV. One big bump, like an explosion.
Felt by many. "Many people came out of buildings asking where
the explosion had occurred." Ground: Compact.
- 8 April, 15:08:09*.
Epicenter 35°22'N, 118°37'W, northwest of Caliente. P.
Kernville. IV. Two shocks. Motion rapid, lasted 4 seconds. Felt
by many in post office. Rattled windows and doors. Ground:
Compact.
- 9 April, 21:11:44*.
Epicenter 37.8°N, 118.2°W, east of Benton. P.
June Lake. IV. Motion rapid, brief, rumble and one sharp jolt.
Felt by many. Rattled windows, doors, and dishes; house
creaked. Ground: Rocky.
Long Valley Dam (north of Bishop). III. Motion rapid, lasted 1
second. Felt by several in home. Direction E-W. Hanging
objects swung. Ground: Rocky.
- 14 April, 16:29*.
Epicenter 35.8°N, 121.2°W, near Bryson?. P.
Bryson. IV. Direction seemed to be from N. Rattled windows; house
creaked. "This is the first heavy shock for weeks. However,
there was no damage. Started with a light jerk, continued
heavier, with jerks for a few seconds."
- 14 April, 21:30. (Not recorded by Pasadena or Berkeley.)
Bryson. Light shock felt.

28 April, 21:26:52*.

Epicenter 35.8°N , 121.2°W , near Bryson. P.

Bryson (Pleyto School). V. Lasted several seconds. Felt by several (some outdoors), awakened all in home. Rattled windows, doors, and radio; house creaked. Hanging objects swung. Shifted small objects. "This was the first heavy shock in several weeks. There was a blast-like sound, then a strong jerk, followed by several smaller shakes." Ground: Soil.

29 April, 04:47:45*.

Epicenter $35^{\circ}00'\text{N}$, $118^{\circ}44'\text{W}$, Tejon Ranch. P.

Bakersfield. IV. The press reported that the Bakersfield area felt a sharp earthquake, which shook buildings and rattled dishes. It was reported to be the heaviest shock felt in the Tehachapi area this year. No damage was reported.

Bakersfield. IV. Motion rapid, lasted 5 seconds. Felt by many in community. Direction indoors SE-NW. Pipes rattled. "Did not see hanging objects, doors, etc. swing, but they probably did, and it probably awakened all still sleeping." Ground: Soil, level.

Fillmore. III. Brief shock. Felt by several in home, awakened few. Direction N-S. Ground: Soil.

Hollywood and Glendale. Reported felt by the press.

Los Angeles. IV. Press reported the shock was felt by many in Los Angeles and vicinity and in most suburban cities, awakening light sleepers.

Los Angeles (southwest section). IV. Felt by many, considerable alarm for a mild tremor. Ground: Soil.

Tehachapi (central section). IV. Motion trembling, followed by jolt and trembling, gradual onset. Felt by many. Buildings creaked; loose objects rattled. Ground: Rocky.

Wheeler Ridge. V. Motion rapid, lasted 2 or 3 seconds. Felt by all in community, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Compact.

30 April, 22:48:22*.

Epicenter $35^{\circ}07'\text{N}$, $118^{\circ}27'\text{W}$, near Tehachapi. P.

Tehachapi (central section). IV. Light tremble, then heavy jolt, followed by heavy trembling, lasted about 3 seconds. Felt by most people. Building creaked; loose objects rattled. Ground: Rocky.

1 May, 21:50:41*.

Epicenter $34^{\circ}06'\text{N}$, $117^{\circ}38'\text{W}$, near Ontario. P.

Altadena. IV. Lasted several seconds. Felt by and frightened two in home. Rattled windows, doors, dishes, and bed. Ground: Clay.

Cantil. IV. Very light shock. Motion slow, lasted about 5 seconds. Felt by several in home. Direction NE-SW. House creaked. Ground: Sandy soil.

Etiwanda. IV. Motion rapid, lasted 3 seconds. Felt by many in community.

Fontana. Sharp and abrupt. No damage.

1 May, 21:50:41*. (cont.)

Los Angeles. IV. Press reported a sharp earthquake jarred parts of Los Angeles, Riverside, and San Bernardino counties. Felt in southwestern Los Angeles and Inglewood area, Riverside, San Bernardino, Corona, and nearby communities, also in the Pomona-C Claremont area. Lasted only a few seconds, rattling windows and dishes. Reported to have felt "more like an explosion."

Los Angeles (southwest section). IV. Felt like an explosion.

- Felt by many, few alarmed. Windows and dishes rattled. Ground: Soil.

Pasadena. IV. Motion rapid. Felt by observer in home. Rattled windows. Ground: Soil, loose, level.

Pomona (northwest section). IV. Motion bumping, gradual onset, lasted about 5 or 10 seconds. Felt by many. Disturbed lamp stands and shrubs swayed. Ground: Loam.

Riverside. V. Motion slow, lasted about 1 minute. Felt by, awakened, and frightened many in community. Rattled windows and doors; walls creaked. "Started slowly, then grew strong, ended with a hard bang. Scared me plenty." Slight after-shock at 21:52. Ground: Compact.

2 May, 01:55. Not recorded.

Tehachapi (central section). IV. Motion trembling, gradual onset, lasted 2 seconds. Felt by many. Ground: Rocky.

2 May, 03:56:50*.

Epicenter $35^{\circ}25'N$, $117^{\circ}52'W$, near Garlock. P.

Cantil. IV. Motion rapid, lasted 5 seconds. Quite sharp. Felt by and awakened many in home. Rattled windows, doors, and dishes; house creaked. Ground: Sandy soil.

Jawbone Aqueduct Station ($35^{\circ}18'N$, $118^{\circ}02'W$). III. Motion rapid, lasted about 4 seconds. Felt by observer in home. Direction W-E. Ground: Compact.

Tehachapi (central section). IV. Light jolt, abrupt onset, lasted 1 second. Felt by many. Ground: Rocky.

3 May, 06:24:25*.

Epicenter $35^{\circ}22'N$, $118^{\circ}37'W$, north of Caliente. Slightly smaller shocks with same epicenter at 06:47:09* and 06:49:08*. P.

Bakersfield. IV. Lasted about 4 seconds. Described as a "good" shock. Observer noticed motion particularly in table at which she was seated. Other things in the room swayed.

3 May, 18:30:23*.

Epicenter $34^{\circ}07'N$, $117^{\circ}18'W$, near San Bernardino. P.

Fontana. IV. Very sharp, vibrating shock. No damage.

San Bernardino. Press reported a sharp, brief shock in the San Bernardino and Riverside areas. No damage.

8 May, 00:15. Not recorded.

Lompoc (central section). III. Motion trembling, N-S, rapid onset, lasted about 1 minute. Felt by two.

14 May, 01:36:09*.

Epicenter $35^{\circ}31'N$, $121^{\circ}17'W$, off Cambria. P.

Bryson. V. Motion rapid, lasted 15 seconds. Felt in home. Direction NE-SW. Rattled windows, doors, and dishes; house creaked. Shifted small objects. Mountainous area. "No roar before shock. Shook violently at start, then tapered off."

14 May, 17:22:53*.

Epicenter $35^{\circ}07'N$, $118^{\circ}42'W$, west of Cummings Valley. P.

Tehachapi (central section). IV. Hard jar followed by rapid trembling, abrupt onset, lasted about 2 seconds. Felt by nearly all. Buildings creaked; loose objects rattled. Ground: Rocky.

14 May, 23:15. Not recorded by Pasadena or Berkeley.

Bryson (Pleyto School). IV. Light shock. Motion rapid, lasted about 4 seconds. Felt by observer in home. Direction NE. Rattled windows; walls creaked. Ground: Rocky soil, compact, sloping.

15 May, 11:20:50*.

Epicenter $33^{\circ}58'N$, $117^{\circ}39'W$, near Chino. P.

Ontario. "A light earthquake was felt in Ontario at 12:21 P.M., P.D.T." (BSSA, July, 1953)

19 May, 11:14.

Fall River Mills, near (Pit River Powerhouse No. 1, PG&E). IV.

Motion trembling, abrupt onset. Felt by many. Buildings creaked; loose objects rattled. Subterranean sounds somewhat like thunder, with slight whistling, were heard at time of shock or slightly after. "Thought by some to be due to nearby lightning strike." Ground: Rocky.

20 May, 13:23.

Hollister (7 miles south of). III. Motion rapid, lasted 2 seconds. Felt by several in community. Ground: Soil, level.

23 May, 13:16:24*.

Epicenter $37^{\circ}18'N$, $121^{\circ}37'W$. B.

Mount Hamilton (Lick Observatory). III. One jolt, accompanied by noise. Felt by many in one building, and by several in homes. Windows, doors, and dishes probably rattled slightly; walls probably creaked very slightly. Ground: On steep, rocky slope.

23 May, 18:08:08*.

Epicenter $35^{\circ}22'N$, $118^{\circ}40'W$, north of Caliente. P.

Bakersfield. III. Motion slow, lasted several seconds, just a gentle shaking. Felt by several in community. Rattled windows, doors, and dishes very slightly; house creaked very slightly. Ground: Soil, level.

24 May, 16:23:30*.

Epicenter $36^{\circ}49'N$, $121^{\circ}28'W$. B.

Gilroy. IV. Mild shock. Felt by many. Rattled windows.

24 May, 16:23:30*. (cont.)

Hollister. V. Press reported the rolling shock knocked over some glassware and dishes in Hollister but caused no other damage.

Hollister (Fire House). IV. Started with trembling, lasting 2 or 3 seconds, then abrupt shock, lasting about 2 seconds, then a general S-N swaying of loose objects. Swaying felt for about 1 minute. Felt by many. Building creaked and loose objects rattled. Disturbed objects observed by several. Window weights swung and chandeliers swung S-N. Few alarmed. Ground: Rocky, adobe.

Morgan Hill. IV. Motion rapid, lasted 4 seconds. Felt by many. Rattled windows, doors, and dishes. Hanging objects swung. Ground: Compact.

Salinas. III. Motion rapid, very slight and only one jerk, lasting 1 second. Felt by observer in home. Direction E. Ground: Soil, level.

San Juan Bautista. IV. Motion rapid, brief. Felt by many in home, awakened few. Ground: Soil.

Santa Cruz. III. Motion trembling, abrupt onset. Felt by several. Thunderous rumbling subterranean sounds heard during shock. Ground: Rocky.

Reported not felt:

Big Sur, Castroville, Chualar, Crows Landing, Gonzales, Idria, King City, Mount Hamilton (Lick Observatory), Paicines, San Jose, Tres Pinos, Volta, and Watsonville.

24 May, 19:24:01*.

Epicenter $35^{\circ}00'N$, $119^{\circ}01'W$, Wheeler Ridge. P.

Arroyo Grande. IV. Motion rapid, lasted 5 seconds. Felt by and frightened few in home. Direction NW-SE. Rattled windows and doors; walls creaked. Hanging objects swung NW-SE. Ground: Soil, level.

Bakersfield. IV. Motion slow. Felt by many in community. Chandeliers swung. "No jolt was felt with this shock. Motion seemed like small waves, which pushed upward rather than horizontally." Ground: Soil, level.

Castaic (near). Press reported an oil-line crew working near here felt the shock. No damage reported.

Caswell. VI. Press reported that some supplies tumbled from shelves and buildings rocked and rolled two or three times.

Fillmore. III. Light shock felt by a number of people.

Huasna (about 10 miles southeast of Arroyo Grande). IV. Felt by two people. Rattled doors. About 2 miles south of this location woman became nauseated and house swayed. "Few felt it, I imagine." Ground: Sandy.

Jawbone Aqueduct Station ($35^{\circ}18'N$, $118^{\circ}02'W$). III. Motion slow, lasted 10 seconds. Direction NW-SE. Felt by observer in home. Ground: Compact, level.

Lancaster. Reported felt moderately by the press.

Los Angeles. IV. Press reported the shock was felt by many throughout the city and in the San Gabriel Valley.

Lost Hills. IV. Motion rocking, rapid onset. Felt by one. Buildings creaked; loose objects rattled. Subterranean sounds heard.

24 May, 19:24:01*. (cont.)

Saugus (10 miles north of at Power Plant No. 2). Motion rapid, 1 jolt. Felt by several in community. Rattled windows. Ground: Soil, compact, level, sloping; canyon bottom.

Taft. V. Press reported West Side residents were routed from their homes, but no damage or injuries reported. There were some reports of articles being shaken off shelves in one or two homes. Another observer reported most people thought this shock was stronger than the one on the 23 May at 23:52:55*, and that it lasted longer.

Tehachapi (central section). IV. Many light shocks at short intervals, motion trembling, rapid onset. Felt by many. Ground: Rocky.

24 May, 20:08:00*.

Epicenter $39^{\circ}22'N$, $123^{\circ}16'W$. B.

Calpella. VI. "An earthquake at 9:08 P.M., P.D.T., cracked walls and twisted doors out of line at Calpella, six miles north of Ukiah." (BSSA, July 1953)

Calpella. VI. Motion rapid, lasted 3 seconds. Felt by all in home. Frame creaked. Shifted small objects and furnishings. Cracked plaster. Damage slight. Ground: Soil.

Hopland. IV. Felt by several in community. Felt like a heavy object had struck the building.

Lakeport. IV. Motion slow, lasted about 6 seconds. Felt by all in home, several in community. Rattled windows, doors, and dishes. Ground: Soil, compact, level.

Potter Valley (PG&E). V. Motion rapid, lasted 30 seconds. Direction SW-NE. Rattled windows, doors, and dishes; house creaked. Broke windows. Damage slight. Also reported felt at Mendocino.

Potter Valley. IV. Motion rapid, lasted fraction of second. Felt by many in home. Ground: Soil.

Ukiah (central section). VI. Motion bumping, abrupt onset, lasted about 5 to 8 seconds. Felt by many. Buildings creaked; loose objects rattled. Roaring subterranean sounds heard by few. Disturbed objects observed by few. Two walls reported cracked northeast of observer. Damage slight. Ground: Fertile soil.

Upper Lake. IV. Motion rapid, like an explosion, lasted 30 seconds. Felt by many in community. Ground: Level, compact.

Willits. IV. Motion rapid, lasted 30 seconds. Felt by many in home. Rattled windows; walls creaked. Ground: Soil, level.

Reported not felt:

Albion, Annapolis, Boonville, Dos Rios, Comptche, Fort Bragg, Gualala, Healdsburg, Laytonville, Longvale, Lower Lake, Manchester, Navarro, Rockport, and Westport.

27 May, 19:51:15*.

Epicenter $36.0^{\circ}N$, $120.5^{\circ}W$, near Parkfield. P.

Paso Robles. IV. Motion rapid, lasted 30 seconds. Felt by several in home and community. Direction NW. Rattled windows. Ground: Rocky soil.

San Miguel. II. Motion rapid, very sharp, but brief. Felt by several in home. "Apparently felt only in this area. Another shock felt around midnight." Ground: Rocky, level.

- 27 May, 22:00 (about).
Bakersfield. IV. Rattled windows and lamp shade on floor lamp.
- 27 May, 23:00 and 23:15.
Bakersfield. IV. Noticeable quivers felt. Later on same evening a shock rattled windows, awakening observer, after which a rocking motion was felt.
- 28 May, 21:00 to 21:15 (about).
Bakersfield. Quivers felt. "During recent nights several people have noticed the quivers such as were most common during the month following the July 21, 1952 earthquake. Not exactly shaking but sort of vibrating or very minute shaking, which is not noticeable unless one were in bed or sitting very still." (Pasadena reports that the seismograms at Woody show nothing to account for the "quivers" reported from Bakersfield on 27 and 28 May.)
- 31 May, 12:38:37*.
Epicenter $35^{\circ}09'N$, $118^{\circ}33'W$, west of Tehachapi. P.
Tehachapi (central section). IV. Motion seemed jerky, from W-E, abrupt onset, lasted 1 second. Felt by many. Buildings creaked; loose objects rattled. Ground: Rocky.
- 4 June, 03:40.
Creston. V. Motion slow, lasted 3 seconds. Felt by and awakened many in community. Rattled windows. Ground: Compact, level. (No earthquake recorded at this time. Pasadena reports the disturbance was probably from air waves caused by explosion fired at 03:15.)
- 9 June, 21:28:40*.
Epicenter $37^{\circ}00'N$, $119^{\circ}18'W$, north of Trimmer Springs. P.
Big Creek. Reported felt by Southern California Edison Company.
- 10 June, 04:10:51*.
Epicenter $35^{\circ}06'N$, $118^{\circ}31'W$, near Tehachapi. P.
Tehachapi (central section). IV. Motion trembling and jarring, rapid onset, lasted about 2 seconds. Felt by most people. Buildings creaked; loose objects rattled. Followed shortly by a very light tremble. Ground: Rocky.
- 12 June, 09:50:00*.
Epicenter $37^{\circ}44'N$, $122^{\circ}03'W$. B.
San Francisco Bay area. IV. Press reported a sharp, brief shock was felt in the Mission District in San Francisco, while other reports came from Atherton, Moraga, Alameda, and southern Oakland. In San Francisco doorbell chimes rang. At Moraga a definite jolt was felt, which toppled a vase to the floor, breaking it. People in Oakland said it felt like an explosion. No damage was reported from any locality.
- 13 June, 14:54:05*.
Epicenter $36^{\circ}46'N$, $121^{\circ}17'W$. B.
Hollister. Press reported a sharp, brief earthquake shook this city and ranch houses as far as five miles away.

13 June, 20:17:28* (main shock).

Epicenter $32^{\circ}50'N$, $115^{\circ}40'W$, near Imperial. P.

Sharp shock felt over an area of approximately 4800 square miles in southern California, principally in Imperial and San Diego counties. Maximum intensity of VII occurred in a very limited area in the Brawley-Westmorland region. Numerous aftershocks were recorded. Strongest aftershocks on the 14th were recorded at 20:28:56*, 20:29:58* (largest) and 20:51:52*. (See map on page 18)

Intensity VII:

Brawley (about 6 miles west of). J. E. Harshman Ranch. Motion rapid, lasted about $1\frac{1}{2}$ minutes. Felt by and frightened all in vicinity. Direction vertical. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Shifted small objects and furnishings. Overturned vases, etc., and small objects. Cracked plaster and ground. Knickknacks, books, and pictures fell. Broke dishes. Damage slight to wood, brick, masonry, and concrete. Refrigerator, beds, chests, etc., moved 6 inches east and 2 to 4 inches south. Two more quite sharp shocks felt on the same evening. Ground: Soil, sand and clay; loose.

Brawley (about 7 miles west of). R. V. Moore Ranch. Motion rapid, lasted 2 minutes. Felt by and frightened all in home. Direction E-W. Rattled windows, doors, and dishes; walls creaked. Trees, bushes shaken strongly. Shifted furnishings; overturned furniture. Cracked chimneys. Knickknacks fell. Broke dishes. Chimneys fell. Damage considerable to brick and masonry. "Have had on an average of 3 shocks a day. None as hard as the one on 13 June at 20:17:28*." Ground: Compact, level.

Brawley (about 7 miles west of). Charles L. Wieman Ranch. Motion rapid, lasted about $1\frac{1}{2}$ minutes. Felt by all in community, frightened all in home. Direction N-S. Rattled windows, doors, and dishes. Hanging objects swung S. Shifted furnishings. Overturned small objects and furniture. Cracked plaster. Fall of books, pictures, and plaster. Broke dishes. Damage considerable: cracked plaster and foundation of house. "This shock was by far the most severe we have ever felt. I would say it was at least twice as severe as the one in 1950. It came from the north without the slightest warning, struck with a terrific force and grew in intensity with a series of wrenching jerks for a minute and a half. For the first time my house, a cement stucco frame 26x42 feet, one and a half stories, was cracked loose from its foundation. I was much surprised to find that it remained on the foundation at all. Much plaster was broken, bookcases toppled, china scattered and broken, practically all furniture displaced; piano, electric stove, refrigerator were moved 6 inches. We immediately fled from the house and cut off all electricity. Two other severe shocks followed during the night and settling shocks have followed during the following week. Prior to 1940 shocks felt here apparently came from the west and were of a slow, swinging type. The later ones are of a sudden jolting kind that give no warning and apparently come from the north or slightly northwest. They seem to be growing

13 June, 20:17:28* (main shock). Intensity VII. (cont.)

with increasing violence, each major one seems to be about twice as strong as the preceding one."

Westmorland (3 miles south of). Press reported that the Imperial Valley Irrigation District suffered about \$600 damage to the Thistle Lateral Canal, where one of the canal structures was damaged and a half mile of canal bank cracked. Tokay Canal near the Dahm Ranch was cracked and there was considerable settlement of the ground there. A landslide along Tamarack Road near the New River Bridge blocked off the road for several hours.

Intensity VI:

Brawley. Motion slow, lasted 1 minute. Felt by and frightened all in community. Direction N-S. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N. Trees, bushes shaken moderately. Shifted small objects and furnishings. Overturned small objects. Knickknacks fell. Cracked plaster. Damage slight. Ground: Soil, level. The press reported two people were injured when crowds hurriedly left theaters.

Calxico. Motion slow, lasted 2 minutes. Felt by all and frightened many in community. Direction NW. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NW. Pendulum clock stopped, clock faced E. Shifted small objects and furnishings. Ground: Soil, level.

Imperial. Motion rapid, two sharp jerks. Felt by all and frightened many in community. Direction N-S. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Shifted small objects and furnishings. Overturned small objects. Cracked plaster. Knickknacks, books, pictures, and plaster fell. Ground: Compact.

Plaster City. Motion slow, lasted about 3 minutes. Felt by all and frightened many in community. Direction N-S. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N-S. Trees, bushes shaken moderately. Shifted small objects. Ground: Rocky soil.

Tamarack Ranch area. Press reported a steady series of shocks was felt in this area over the weekend, with glassware broken, lamps overturned, and houses shaken strongly.

Intensity V:

Calipatria. Motion slow. Felt by and frightened many in community (some outdoors). Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Soil.

Coachella Valley. Press reported that the Coachella Valley was gently rocked by a rolling shock which lasted about 2 minutes. Several clocks were stopped.

El Centro. Motion slow, lasted 2 minutes. Felt by all and frightened many in community. Direction E-W. Rattled windows, doors, and dishes; house creaked. Hanging objects swung E-W. Trees, bushes shaken slightly. Ground: Soil, level.

Heber. Motion slow. Felt by and frightened many in community. Rattled windows, doors, and dishes.

13 June, 20:17:28* (main shock). Intensity V. (cont.)

Holtville. Motion slow, easy, from N to S. Felt by and frightened many in home. Hanging objects swung N-S. Trees, bushes shaken slightly. Shifted some small objects and furnishings. Ground: Sandy, compact, level.

Jacumba. One major and several settling shocks felt. Motion slow, lasted 1 minute. Felt by all in general area, frightened few. Direction thought to be W-E. Doors swung W-E. Ground: Rocky.

Pine Valley. Motion rapid, lasted about 3 minutes. Felt by many or all in community, frightened few. Direction E. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken slightly. Shifted small objects and furnishings. Some knickknacks, books, and pictures fell. Ground: Compact, level.

Potrero. Motion rapid, lasted 3 seconds. Felt by all.

Rancho Mirage. Motion rolling, lasted 2 minutes. Felt by all and frightened many. Ground: Sandy.

Intensity V in Arizona:

Somerton. Motion slow, lasted 1 minute. Felt by and frightened many in community. Direction N-S. Rattled dishes. Hanging objects swung. Shifted small objects. Ground: Soil, compact.

Intensity IV:

Alpine. Motion sharp, lasted 2 seconds. Felt by few in community. Rattled windows. "Another shock of about the same intensity felt the following day, June 14, at about 09:00."

Bard. Motion slow, lasted 30 seconds. Felt by several in trailer. Rattled windows, doors, and dishes; house creaked. Ground: Silt.

Campo. Motion rapid, lasted 6 seconds. Felt by several in home. Walls creaked. Ground: Soil, level.

Hipass. Motion slow, lasted 30 seconds. Felt by all in home, frightened few. Ground: Compact.

Indio. Motion slow, lasted 1 minute. Felt by many in home, frightened few. Hanging objects swung. Ground: Soil, level.

Julian (east of, in Mason Valley). Two sharp tremors, lasted about 2 seconds. Felt in trailer. Rattled windows, doors, and dishes. Hanging objects swung. Also reported felt slightly in Julian.

Mecca (southeast section). Motion rolling, gradual onset. Felt by many.

Mecca. Felt by several in community, awakened few. Ground: Compact.

Mesa Grande. Motion slow, lasted 20 seconds. Felt by several in community. Rattled windows and doors slightly. Ground: Decomposed granite, sloping.

Mount Laguna. Two shocks. First shock lasted about 3 seconds; second shock was more severe and of longer duration. Motion rapid. Felt by many in community. Rattled windows, doors, and dishes very slightly. Ground: Rocky.

Niland. Motion rapid. Felt by many and frightened few in community (some outdoors). Rattled windows, doors, and dishes; walls creaked. Ground: Soil, compact, level.

13 June, 20:17:28* (main shock). Intensity IV. (cont.)

Palm Springs. Felt by and frightened few in community. Trees, bushes shaken slightly. "Slight shock."

Palo Verde. Motion slow, lasted 1 minute. Felt by several in home, outdoors by some, frightened few. Direction NE. Ground: Compact.

San Ysidro. Motion rapid, lasted 4 seconds. Felt by observer in home, outdoors by some, frightened few. Direction E-W. Hanging objects swung E-W. Ground: Soil, compact, level.

Thermal. Motion slow, gradual onset. Felt by several in community (some outdoors), awakened and frightened few. Direction circular. Rattled windows; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Ground: Soil, level.

Warner Springs. Motion rapid, lasted 2 or 3 seconds. Felt by many in home. Walls creaked. "Two or 3 lesser shocks were felt about 15 minutes later. Two shocks at 10:00 p.m. Felt by few. First shock at 20:17:28* strongest."

Intensity IV in Arizona:

Yuma. Felt by many in community (some outdoors), frightened few. Hanging objects swung. Ground: Level.

Yuma (west section). Three shocks, N-S, with 10-second intervals, abrupt onset, lasted about 3 seconds each. Felt by many. No particular alarm.

Intensity I to III:

Anza. Motion slow. Very few felt it. Very light shock.

Escondido. Motion slow, lasted 2 seconds. Felt by several in home. Direction NE. Ground: Soil, level.

Fallbrook. Motion rapid. Felt by several. Observer heard one loud creak in garage wall but felt no movement. Ground: Rocky, sloping.

Ranchita. Motion rapid, bumping, lasted about 1 second. Felt by observer in home. Ground: Rocky, compact.

Rancho Santa Fe. Motion moderate. Felt by several in community, outdoors by observer. Direction E. Ground: Compact.

San Diego (10th and Imperial). Motion slow, lasted about 2 seconds. Felt by several on 3rd floor. Ground: Soil.

San Jacinto. Motion slow. Felt by few.

Tecate. Motion slight, lasted 1 second. Direction N-S. Ground: Compact.

Winterhaven. Motion slow, lasted 1 second. Felt by several. Very little rattling of windows, doors, and dishes. Ground: Soil.

Reported not felt:

Alberhill, Amboy, Banning, Big Bear City, Bonsall, Corona, Del Mar, Desert Center, Descanso, Dulzura, Encinitas, Essex, Glamis, Joshua Tree, Grosemont, Laguna Beach, La Jolla, Lakeside, Leucadia, Lucerne Valley, Ludlow, Midland, Moreno, Needles, Oceanside, Pala, Palomar Mountain, Riverside, Rice (Iron Mountain), San Bernardino, San Juan Capistrano, Santa Ana, Santa Ysabel, Twentynine Palms, Vidal, Wildomar, Winchester.

13 June, 20:17:28* (main shock). (cont.)

Reported not felt in Arizona:

Agua Caliente, Arlington, Aztec, Bouse, Buckeye, Cactus, Chandler, Gila Bend, Maricopa, Mesa, Mobile, Mohawk, Parker, Poston, Phoenix, Quartzsite, Salome, San Luis, Sentinel, Vicksburg, Wickenburg, Wittman.

13 June, 20:29:58*. Aftershock of preceding.

El Centro. V. Motion slow, lasted 1 minute. Felt by all in community, frightened few. Direction E-W. Hanging objects swung E-W. Very light shock felt at 20:51:52*. Ground: Soil, compact, level.

14 June, 23:22:14*.

Epicenter $35^{\circ}10'N$, $118^{\circ}37'W$, north of Cummings Valley. P. Tehachapi (central section). IV. Sharp shaking, abrupt onset, lasted 2 seconds. Felt by most people. Buildings creaked; loose objects rattled. Moderately loud subterranean sounds, like heavy truck motor, heard before shock. Ground: Rocky.

14 June, 09:28:29*.

Epicenter $33^{\circ}03'N$, $117^{\circ}18'W$, near Encinitas. P. Alpine. Observer states shock of about intensity IV felt. Poway. Very slight brief shock.

14, 15, 16, 17, 18 June. Aftershocks of 13 June with epicenters at $32^{\circ}50'N$, $115^{\circ}40'W$. Many aftershocks from this epicenter. Among the largest were 16 June, 05:03:56*, 18 June 23:51:19*, 19 June, 02:01:30*.

Brawley (about 6 miles west of). J. E. Harshman Ranch. IV. Many light shocks felt on these dates, with some rattling of windows and dishes.

18 June, 14:00 (about).

Morongo Valley. IV. Motion slow. Felt by many in community, frightened few. Rattled windows. (This date may be in error and may refer to the shocks recorded on 14 June at 13:54:42* and 14:17:02* with epicenter at $34^{\circ}03'N$, $116^{\circ}40'W$, west of Morongo Valley.)

19 June (early morning). Aftershock of 13 June; probably 18 June at 23:51:19* or 19 June at 02:01:30*.

Brawley (about 6 miles west of). J. E. Harshman Ranch. IV. Awakened all in home.

20 June, 15:18:52*.

Epicenter $35^{\circ}22'N$, $118^{\circ}30'W$, northeast of Caliente. P. Jawbone Aqueduct Station ($35^{\circ}18'N$, $118^{\circ}02'W$). III. Motion slow, lasted 8 seconds. Direction W-E. Ground: Compact, level.

22 June, 07:22:31*.

Epicenter $36.0^{\circ}N$, $120.4^{\circ}W$, north of Parkfield. P. Coalinga. IV. Motion rapid, lasted 8 seconds. Felt by several, frightened few. Direction E-W. Rattled windows, doors, and dishes. Ground: Soil.

29 June, 03:08:24*.

Epicenter 39°43'N, 122°23'W. B.

Orland. V. Motion rapid. Awakened many in community. Rattled windows. Shifted small objects. Ground: Soil, compact, level.

Willows (northwest section). IV. Motion bumping, abrupt onset. Felt by many. Buildings creaked; loose objects rattled. Rattling subterranean sounds heard. Disturbed objects observed by few.

- - - - -

WASHINGTON AND OREGON

(120th Meridian or Pacific Standard Time)

-- April, May, June.

No earthquakes were reported felt during these months at the following places:

Weather Bureau Stations:

Washington: Seattle.

Oregon: Portland.

26 May, 23:33.

Sedro-Woolley (about 15 miles northwest of), Wash. IV. One jarring shock, lasting about 30 seconds. Direction W-E. Felt only by observer. Rattled stove and dishes. Hanging gasoline lamp swung W-E. Ground: Gravelly, level.

- - - - -

WESTERN MOUNTAIN REGION

(105th Meridian or Mountain Standard Time)

17 April, 22:15. Utah.

Elsinore. IV. Not felt by everyone. Rattled windows. Ground: Very unstable alluvium.

Monroe. IV. Felt by many. Rattled windows and objects on dresser. Bed shaken. Stacks of tablets in drug store slid down. Press reported houses were shaken, bottles on store shelves rattled, and few people were awakened; lasted about 15 seconds. Felt slightly 1.5 miles south and 2.0 miles west; not felt by observer 2.5 miles south. Sounds similar to those made by a truck rumbling by were heard at both Elsinore and Monroe.

-- April.

No earthquakes were reported felt during the month of April at the following places:

Weather Bureau Stations:

<u>Arizona:</u>	None.
<u>Colorado:</u>	"
<u>Idaho:</u>	"
<u>Nevada:</u>	"
<u>New Mexico:</u>	"
<u>Wyoming:</u>	"

11 May, 09:56.

Helena (west section), Mont. III. Motion rapid, lasted 2 seconds. Felt by several. Direction N-S. Ground: Rocky, sloping.

23 May, 19:54:29*.

Epicenter $40\frac{1}{2}^{\circ}\text{N}$, $111\frac{1}{2}^{\circ}\text{W}$, north-central Utah, W.

Salt Lake City, Utah. V. Press reported a light earthquake shook southern Salt Lake and northern Utah counties, rocking houses, shifting furniture and startling residents, but causing no damage or injuries. Residents of Lehi flooded the telephone exchange there with queries, and the Salt Lake Tribune received many calls from residents in and around Herriman, in the southwest corner of Salt Lake County. At Lehi telephone operators said the jolts shook their chairs and the switchboards; woman reported her house "bounced up and down."

-- May.

No earthquakes were reported felt during the month of May at the following places:

Weather Bureau Stations:

<u>Arizona:</u>	None.
<u>Colorado:</u>	"
<u>Nevada:</u>	"
<u>Idaho:</u>	"
<u>New Mexico:</u>	"
<u>Wyoming:</u>	"

4 June, 10:02:50, 12:24:32*.

Epicenter $44\frac{1}{2}^{\circ}\text{N}$, $110\frac{1}{2}^{\circ}\text{W}$, Yellowstone National Park, Wyoming. W.

Old Faithful, Yellowstone National Park. IV. Motion rapid, lasted 5 seconds. Felt by several in log house. Building creaked; loose objects rattled. Trees, bushes shaken slightly. Ground: Rocky. (These are the two strongest shocks of a swarm recorded on the Butte seismograph, all with epicenters in the Yellowstone National Park area.)

-- June.

No earthquakes were reported felt during the month of June at the following places:

Weather Bureau Stations:

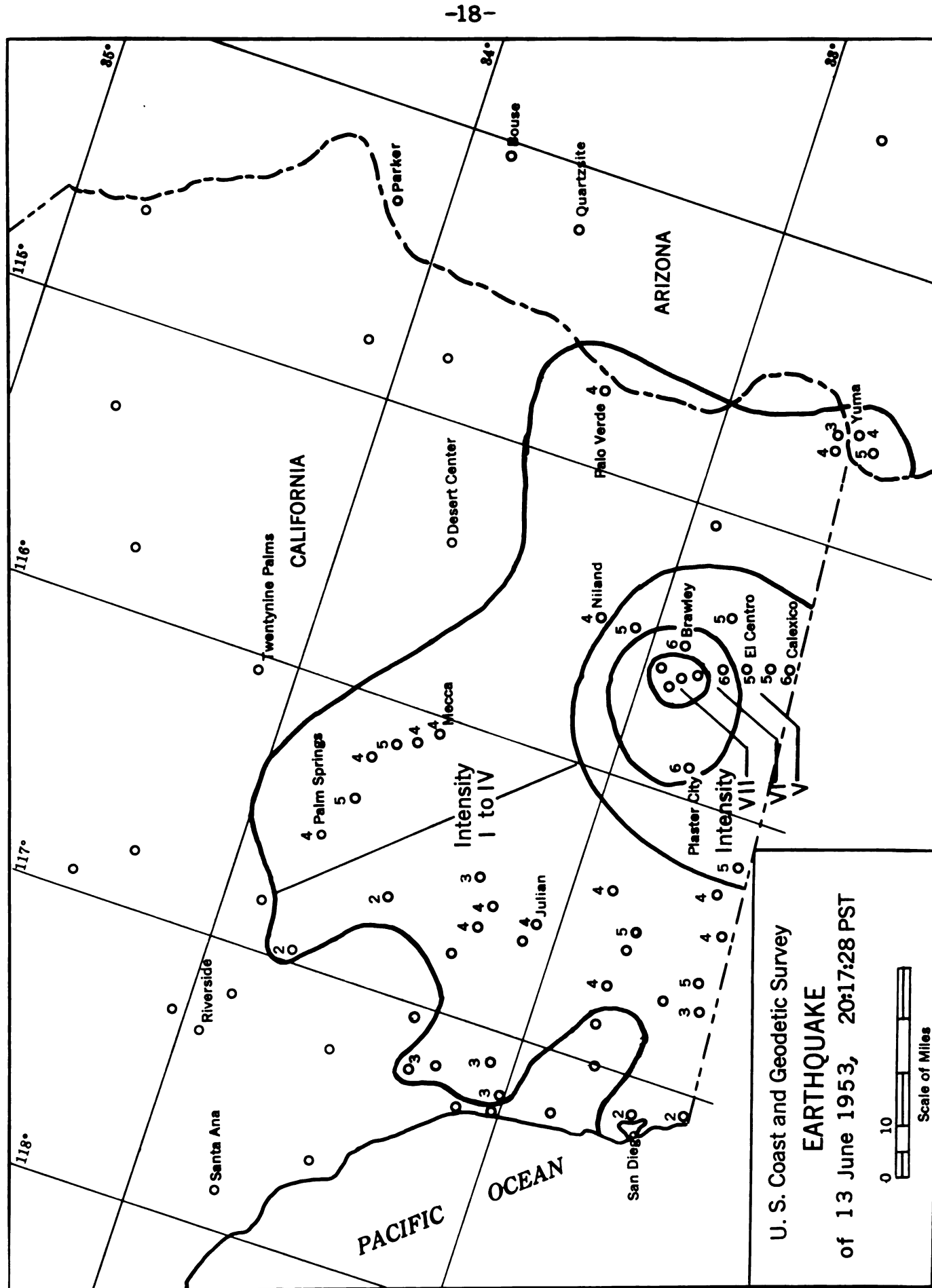
<u>Arizona:</u>	None.
<u>Colorado:</u>	"
<u>Idaho:</u>	"
<u>Montana:</u>	"
<u>Nevada:</u>	"
<u>New Mexico:</u>	"
<u>Utah:</u>	"

BOULDER CITY

(120th Meridian or Pacific Standard Time)

- 10 April, 15:40:08* (BC)
Boulder City. Reported felt by one person.
- 3 May, 15:43:32* (BC)
Boulder City. Reported felt by one person.
- 12 May, 14:51:13* (BC)
Boulder City. Reported felt by one person.
- 17 May, 23:03:02 (BC)
Hoover Dam. Reported felt slightly.
- 18 May, 05:15:01* (BC)
Boulder City. Reported felt slightly.
- 19 May, 21:35:29* (BC)
Boulder City. IV. Motion rapid, lasted about 2 seconds. Felt by
several in community. Direction N-S. Rattled doors.
Ground: Rocky.
- 22 May, 10:28:58* (BC)
Boulder City. Reported felt slightly.
- 24 May, 19:24:55* (BC)
Boulder City. Reported felt slightly.
- June.
No earthquakes were reported felt in the Lake Mead area during June.

- - - - -



MODIFIED MERCALLI INTENSITY SCALE OF 1931

(Abridged)

- I. Not felt except by a very few under especially favorable circumstances. (I Rossi-Forel Scale)
- II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (I to II Rossi-Forel Scale)
- III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing truck. Duration estimated. (III Rossi-Forel Scale)
- IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls made creaking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. (IV to V Rossi-Forel Scale)
- V. Felt by nearly everyone; many awakened. Some dishes, windows, etc. broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel Scale)
- VI. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight. (VI to VII Rossi-Forel Scale)
- VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars. (VIII Rossi-Forel Scale)
- VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Disturbed persons driving motor cars. (VIII+ to IX Rossi-Forel Scale)
- IX. Damage considerable in specially designed structures; well designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX+ Rossi-Forel Scale)
- X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water (slopped) splashed over banks. (X Rossi-Forel Scale)
- XI. Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipe lines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
- XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

U. S. DEPARTMENT OF COMMERCE

Sinclair Weeks, Secretary

COAST AND GEODETIC SURVEY

R. F. A. Studds, Director

ABSTRACTS OF EARTHQUAKE REPORTS
FOR
THE PACIFIC COAST AND THE
WESTERN MOUNTAIN REGION

MSA-79

July, August, September, 1953

Issued by the U. S. Coast and Geodetic Survey

Washington, D. C.

For Official Use

1954

DEPARTMENT OF COMMERCE

U. S. Coast and Geodetic Survey

Seismological Field Survey
214 Old Mint Building
San Francisco 3, California

ABSTRACTS OF EARTHQUAKE REPORTS FOR THE PACIFIC COAST
AND THE WESTERN MOUNTAIN REGION

MSA-79

1 July 1953 to 30 September 1953

The information in this report has been collected by the Seismological Field Survey of the U. S. Coast and Geodetic Survey with the assistance of State Collaborators in Seismology and through the voluntary cooperation of many local organizations and individuals. Additional cooperation is solicited. Blank questionnaires and special information pertaining to the work may be obtained by addressing the Director, U. S. Coast and Geodetic Survey, Washington 25, D. C.; the Chief, Seismological Field Survey at the above address; or the following State Collaborators in Seismology.

Arizona:	Dr. Eldred D. Wilson, University of Arizona, Tucson.
Colorado:	Dr. C. A. Heiland, Heiland Research Corporation, Denver.
Montana:	Professor Stephen W. Nile, Montana School of Mines, Butte.
Nevada:	Dr. David B. Slemmons, University of Nevada, Reno.
New Mexico:	Professor Stuart A. Northrop, University of New Mexico, Albuquerque.
Oregon:	Dr. Ira S. Allison, Oregon State College, Corvallis.
Utah:	Professor J. Stewart Williams, Utah State Agricul- tural College, Logan.
Washington:	Professor Howard A. Coombs, University of Washington, Seattle.
Wyoming:	Professor Horace D. Thomas, University of Wyoming, Laramie.

Copies of these reports may be obtained from the Supervisor, Western District, U. S. Coast and Geodetic Survey, 121 Customhouse, San Francisco 26, California; or from the Washington Office.

A-4439-4(14)+

Earthquake information and questionnaire reports in the immediate vicinity of Lake Mead are collected by the Lake Mead Seismological Survey of the U. S. Coast and Geodetic Survey with headquarters at Boulder City, Nevada.

The abstracts are divided into three groups: (1) California and Western Nevada, (2) Washington and Oregon, and (3) the Western Mountain Region. This follows the scheme of classification in United States Earthquakes.

Intensity numbers refer to the Modified Mercalli Intensity Scale of 1931, in which, in the lower intensities, the disturbance of inanimate objects and personal reactions are given about equal weight. This intensity scale appears in abridged form on the last page of this report. All reports of whatever intensity from any town are listed under the highest intensity reported. Omission of intensity rating indicates insufficient information.

This report is prepared with the active collaboration of Professor Perry Byerly of the Seismographic Station of the University of California, and staff members of the Seismological Laboratory, California Institute of Technology. This permits an authentic appraisal of the material abstracted in the light of available instrumental and other information. Newspaper reports have been furnished by cooperative observers only and do not represent the results of a complete newspaper clipping service.

A condensed summary of these reports is published annually in the serial publication of the U. S. Coast and Geodetic Survey entitled "United States Earthquakes."

CALIFORNIA AND WESTERN NEVADA

(120th Meridian or Pacific Standard Time)

All places mentioned are in California unless otherwise stated

Time marked with asterisk (*) determined instrumentally: Berkeley (B),
Boulder City (BC), Pasadena (P), and Washington (W).

1953

1 July, 14:17.3*.

Epicenter $34^{\circ}35'N$, $121^{\circ}22'W$, off Point Arguello; location very rough. P.

Point Arguello Light Station (Surf). IV. Motion rapid, jolting, lasted 1 to 2 seconds. Felt by many indoors and outdoors, frightened few in home. Rattled windows, doors, and dishes. Ground: Rocky, level.

13 July, 03:00.

Palmetto, Nevada (southeast of Dyer near California-Nevada border). III. Light shock, lasted 4 or 5 seconds. Direction S-N.

16 July, 23:15.

Westport. II. Motion slow, lasted few seconds. Felt by observer in home. Ground: Soil, compact.

20 July, 01:20:13*. P.

Los Angeles. IV. Press reported a sharp jolt awakened people from Los Angeles east to Pomona and Chino. One man in Los Angeles said his chair was shaken sharply.

Pomona. IV. Motion swaying SW-NE, abrupt onset. House creaked. "I talked with several who felt shock. Very slight. Anyone asleep might not have felt it." Ground: Sandy.

Riverside. IV. Mild shock, like a slow wave, lasted 1 to 2 seconds. Awakened and frightened few in community. House creaked slightly. Ground: Compact, level.

25 July, 08:13:58*.

Epicenter $37^{\circ}07'N$, $121^{\circ}46'W$. B.

Pescadero. Felt in home and community. (No details). Ground: Level. San Francisco Bay area. Press reported a light shock was felt.

28 July, 09:09:46*.

Epicenter $35^{\circ}05'N$, $119^{\circ}07'W$, north of San Emigdio Ranch. P.

Maricopa. Press reported the shock was felt near Maricopa.

5 August, 04:20:59*.

Epicenter $35^{\circ}01'N$, $119^{\circ}03'W$, near Wheeler Ridge. P.

Taft. Press reported the shock as sharp at Taft and Maricopa.

6 August, 03:20:04*.

Epicenter 35°03'N, 119°08'W, east of Maricopa. P.

Cuyama (valley section). IV. Felt by many, general alarm. Motion swaying, gradual onset. Buildings creaked; loose objects rattled. Very slight visible swaying of buildings and trees. Pictures swung slightly.

Maricopa and Taft. Reported felt by the press.

12 August, 10:33:59*.

Epicenter 35°49'N, 118°23'W, near Kernville. P.

Kernville. Press reported an earthquake jolted Kernville for 10 to 15 seconds. Felt slightly at Bakersfield.

14 August, 20:15:41*.

Epicenter 40°29'N, 124°13'W. B.

Ferndale area. Press reported a light earthquake jarred the Ferndale area.

16 August, 08:30:41*.

Epicenter 33°05'N, 115°40'W, near Westmorland. P.

El Centro. Minor shock felt.

23 August, 04:21:58*.

Epicenter 40°29'N, 121°45'W. B.

Mineral. V. Direction NE-SW. Felt by many or all in community, awakened many. Roaring noise heard. Ground: Rocky, compact, sloping. Awakened some people at Manzanita Lake.

29 August, 18:26:26*.

Epicenter 34°00'N, 116°51'W, north of Banning. P.

Banning. IV. Motion described as grinding, lasted 3 seconds. Felt by several in home, frightened few in community. Ground: Rocky, loose.

Following information from telephone company operators: Felt sharply at Whitewater; also felt at Banning, Hemet and Palm Springs. Not felt at other points, including Blythe, El Centro, San Bernardino and Indio.

3 September, 03:00.

Creston. Shock reported felt. (No details)

3 September, 19:54:24*.

Epicenter 36°02'N, 120°17'W, near Stone Canyon. P.

Creston. IV. Motion jerking, lasted 10 seconds. Felt by several in community. Rattled windows. Ground: Compact, level.

Paso Robles. IV. Radio report said the shock rattled windows and shook buildings in Paso Robles.

4 September, 07:36:15*.

Epicenter 35°12'N, 118°38'W, near Bear Mountain. P.

Tehachapi (central section). V. Slight trembling, increasing to a heavy jolt, followed by subsiding tremors, gradual onset, lasted 1 to 3 seconds. Felt by all. Buildings creaked; loose objects rattled. Light bumping sound heard at time of jolt. Ground: Rocky.

11 September, 22:41:16*.

Epicenter $35^{\circ}22'N$, $118^{\circ}53'W$, near Edison. P.

Bakersfield. IV. Press reported a rolling earthquake of short duration was felt throughout the Bakersfield area. No damage reported. Both Bakersfield and Kern County officials received telephone calls. Windows shook and loose objects rattled.

12 September, 11:29.

Tehachapi (central section). IV. Motion vertical, then jar; abrupt onset, lasted 1 second. Building creaked; loose objects rattled. Bumping sounds heard with the jar. Ground: Rocky.

15 September, 01:45.

Westport. III. Motion rapid, lasted 3 or 4 seconds. Felt by observer. "Apparently I was the only one awake." Ground: Rocky soil.

22 September, 22:21:51*.

Epicenter $35.7^{\circ}N$, $121.1^{\circ}W$. B.

Bryson. V. Motion rapid, lasted several seconds. Felt by all; awakened and frightened all in home. Rattled windows and doors; house creaked. "First shake very severe, then trembling for several seconds."

25 September, 19:34:29*.

Epicenter $39.6^{\circ}N$, $119.8^{\circ}W$. W.

Sharp shock felt over approximately 12,000 square miles of western Nevada and northeastern California. See map on page 12. Maximum intensity VI. Minor damage at Reno, Nevada.

Intensity VI in Nevada:

Olinghouse Canyon (northeast of Reno). Press reported 2 people ran from a mine when a stope caved in, sending ore rattling into the main tunnel. Neither was injured.

Reno. Press reported 2 chimneys toppled, canned goods fell, and cracked plaster reported generally throughout the northwest part of town. Buildings severely jarred. In a newspaper office lights swayed, pictures and framed maps were knocked askew. In the west section of town a 2-story house swayed so violently electrical wires leading into the building were ripped away. Hundreds telephoned newspaper office asking if the jarring motion was an explosion or earthquake. People went outside. Reported to be a single jolt.

Reno (Mackay School of Mines, University of Nevada). Considerable damage to plaster in the Mackay School of Mines building. Many objects were overturned in museum.

Reno (Weather Bureau Airport Station in southeast section). V. Motion bumping E-W, abrupt onset. Felt by many. Building creaked; loose objects rattled. Faint bumping subterranean sounds heard at time of shock and continued for about 30 seconds. Disturbed objects observed by several. Recording sheets on micro-barograph and weighing rain gage showed check marks on graph - both are oriented E-W. Office pendulum clock stopped, 21 inch pendulum swinging E-W. Damage slight to buildings: cracks widened in old structures. Few alarmed.

25 September, 19:34:29*. Intensity VI in Nevada. (cont.)

Vista (1/2 mile east of, on U. S. Highway 40 about 6 miles west of Reno). Press reported a small rock slide, believed to be caused by the earthquake, covered about half of one traffic lane.

Intensity VI:

Floriston. Motion rapid, lasted 40 seconds. Felt by all in community. Rattled windows and doors. Plaster cracked. Ground: Rocky.

Intensity V in Nevada:

Cinnabar Hill Ranch (south of Reno). Press reported dishes fell.

Fernley. Motion slow, lasted 10 seconds. Felt by many and frightened few in community. Rattled windows and doors. Hanging objects swung. Shifted small objects and furnishings. Ground: Soil.

Sparks. Motion rapid. Felt by all and frightened all in home. House creaked. Ground: Soil, level.

Virginia City. Motion rapid, lasted 5 seconds. Felt by and frightened many in community. Hanging objects swung. Ground: Rocky.

Intensity V:

Baxter. Motion slow, lasted 6 seconds. Felt by many or all in community, frightened many. Rattled windows; walls creaked. Widened small crack in masonry. Ground: Rocky soil, sloping, partly filled in.

Chilcoot. Motion rapid, lasted less than a minute. Felt by all in home, frightened few. Direction E-W. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Shifted small objects. Damage slight. Ground: Level.

La Porte. Light shock lasting a few seconds. Felt by several in home, awakened few. Overturned vases, etc., small objects; pictures fell. Ground: Level.

Intensity IV in Nevada:

Carson City. Motion rapid, momentary duration. Felt by several in home. Rattled dishes. Hanging objects swung. Ground: Soil.

Gabbs. Motion slow. Felt by several in home. Rattled windows.

Gerlach. Motion slow, lasted 30 seconds. Felt by one in hotel. Direction N-S. Walls creaked. Ground: Marshy, level.

Nixon. Motion slow, lasted 2 seconds. Felt by several and frightened few in community. Rattled dishes. Ground: Soil.

Yerington. Felt by several in community. Rattled windows, doors, and dishes.

Intensity IV:

Browns Valley. Motion rapid, lasted about 15 seconds. Felt by several in family. Rattled windows; house creaked. Ground: Rocky, sloping.

Camptonville. Felt by several (outdoors by some), awakened and frightened few in community. Rattled windows. Hanging objects swung. Ground: Soil.

25 September, 19:34:29*. Intensity IV. (cont.)

- Downieville. Motion rapid, lasted about 2 seconds. Felt by several in home. Walls creaked. Ground: Rocky soil, level; filled-in mined-over land. "Most homes here are built on mined-over land and few people seemed to notice shock as such due to large logging trucks going through town day and night."
- Doyle. Motion trembling, abrupt onset. Two shocks. Felt by several. Building creaked; loose objects rattled. Ground: Sandy.
- Doyle. Motion rapid. Felt by many; frightened few. Direction NE. Rattled windows and doors. Hanging objects, doors, etc., swung. Ground: Loose, level.
- Forbestown. Motion rapid. Felt by several in community. Rattled windows, doors, and dishes; house creaked. Ground: Rocky soil, compact, sloping.
- Greenville. Momentary duration. Felt by many in home. Ground: Soil.
- Gridley. Motion rapid. Felt by several in community. Rattled windows, doors, and dishes. Shifted small objects and furnishings.
- Herlong. Motion rapid, lasted 10 seconds. Felt in home. House creaked. Ground: Sandy.
- Knights Landing. Motion rapid, brief. Felt by several in home and community. Direction E-W. Floor lamp swayed. "We were all leaning against something." Ground: Soil, compact, level.
- Lake Spaulding (Emigrant Gap). Motion swaying, gradual onset. Felt by several. Building creaked; loose objects rattled. Rumbling subterranean sounds heard before shock by several. Building shook. One domino fell over on table. No unusual alarm.
- Meridian. Motion slow, lasted a few seconds. Felt by several in home. Rattled dishes.
- Meyers. Motion slow, lasted 3 seconds. Frightened few in home. Bed swayed. Ground: Soil, level.
- Nevada City (northeast section). Motion trembling, rapid onset, lasted about 1 minute. Felt by several. Building creaked; loose objects rattled. Faint subterranean sounds like rolling thunder heard at time of shock. Ground: Rocky.
- Omo Ranch. Motion slow, lasted 10 seconds. Felt by all in home. Rattled windows and doors; frame creaked. Ground: Soil, compact, sloping.
- Oroville. Mild shock. Felt by several in community. Rattled windows, doors, and dishes.
- Placerville. Very slight. Awakened few. Rattled windows.
- Portola. Motion slow, lasted 30 seconds. Felt by many in community. Rattled windows. Ground: Compact.
- Tahoe City. Motion rapid, lasted few seconds. Felt by all in home. Direction N-S. Walls creaked. Hanging objects swung N-S. Ground: Rocky.
- Truckee. Motion rocking, N-S, rapid onset. Felt by many. Buildings creaked; loose objects rattled. Building movement felt. Mirrors and flowers moved. Many observed movement of objects. Ground: Rocky.
- Washington. Felt by many in community. Rattled windows, doors, and dishes; house creaked.
- Wendel. Felt by several in home. Some said beds shook. At depot the agent reported it moved his revolving chair on castors. "Shook my floor, that is all."

25 September, 19:34:29*. Intensity IV. (cont.)

Woodland. Motion slow. Felt by many in office building, frightened few. Rattled windows, doors, and dishes some. Ground: Soil.

Intensity I to III in Nevada:

Perrin. Felt. (No details)

Pyramid. Motion slow, lasted 3 seconds. Felt in home. Direction S-N. Ground: Level.

Verdi. Press reported residents hardly noticed shock.

Wadsworth. Motion rapid, lasted about a minute. Felt by several in home.

Intensity I to III:

Auburn. Motion slow. Felt by several. Slight shock.

Bijou. Motion slow, lasted 2 seconds. Felt by several in home. Direction N. Ground: Rocky soil.

Chico. Very slight. Felt by few.

Colfax. Felt by several in homes.

College City. Motion rapid, lasted 2 seconds. Seemed like one jar. Felt by several.

Deer Creek (PG&E). Shook observer's house.

Quincy. Motion rapid, lasted 2 to 3 seconds. Felt by several. Seemed like an E-W jerk.

Sacramento. Press reported a slight rocking motion was felt.

Sierraville. Felt by several in home. Direction E-W. Ground: Compact.

Susanville. Motion slow. Felt by several in home. Ground: Rocky, soil, loose.

Reported not felt in Nevada:

Austin, Eureka, Fallon, Hawthorne, Lovelock, Mina, Minden, Tonopah, Winnemucca.

Reported not felt:

Belden, Bridgeport, Brooks, Butte City, Camp Connell, Carmichael, Clarksburg, Clay, Coleville, Colusa, Davis, Dunnigan, Elk Grove, Jackson, Las Plumas, Little Valley, Loyalton, Madison, Markleeville, Milford, Mineral, Ono, Oregon House, Paynes Creek, Pleasant Grove, Plymouth, Ravensdale, Roseville, Red Bluff, Sheridan, Shingle, Stirling City, Tehama, Vista, West Point, Westwood.

30 September, 19:56:15*.

Epicenter 35.3°N, 121.6°W. B.

Big Sur. IV. One very pronounced brief jolt resembling an explosion and immediately preceded by a loud noise like thunder, lasted 1 second. Felt by many in community (some outdoors), frightened few. One person thought it was 2 shakes about 2 seconds apart. Ground: Rocky soil, level, sloping.

- - - -

WASHINGTON AND OREGON

(120th Meridian or Pacific Standard Time)

-- July, August, September.

No earthquakes were reported felt during these months at the following places:

Weather Bureau Stations:

Washington: Seattle.

Oregon: Portland.

- - - - -

WESTERN MOUNTAIN REGION

(105th Meridian or Mountain Standard Time)

29 July, 22:45 (about).

Greenriver, Utah. V. Three slight shocks. Motion slow, lasted 45 seconds. Felt by and awakened many in community. Direction from N or SE. Rattled windows and doors. Ground: Compact soil.

-- July.

No earthquakes were reported felt during the month of July at the following places:

Weather Bureau Stations:

Arizona: None.

Colorado: "

Idaho: "

Montana: "

Nevada: "

New Mexico: "

7 August, 00:04. Montana.

Flathead Lake (east shore, about 12 miles south of Bigfork). III. Awakened one in home. Ground: Rocky.

Swan Lake. IV. Single loud report and jerk. Felt by and awakened several in community, frightened few. Dead chicken lying on second floor of barn seven feet above ground was jerked through large opening. Ground: Compact soil and gravel.

8 August, 09:50. Montana.

Flathead Lake (east shore, about 12 miles south of Bigfork). VI. Motion bumping, sharp jar and bang, abrupt onset. Felt by most people. Buildings creaked; loose objects rattled. One old 2-story solid brick building at Yellow Bay had some cracks. At observer's home doors on 2 sheds sagged after earthquake, making opening and closing difficult. Window shade cords hit

8 August, 09:50. Montana. (cont.)

against window pane and dishes on table rattled slightly. One man driving tractor said steering was difficult. "Peak of cherry harvest and most people too busy to make exact observations or show much concern." Ground: Rocky.

Swan Lake. V. Motion rapid, lasted about half second. Felt by many and frightened few in community. Rattled dishes and windows. Hanging objects swung. Shifted small objects. Stovepipe, unsupported except at base, tilted about 10 degrees in the direction of north 55 degrees west (magnetic). Ground: Compact soil and gravel.

8 August, 18:15. Montana.

Flathead Lake (east shore, about 12 miles south of Bigfork). Felt; (no details).

Swan Lake. II. Mild shock. Felt by some people. Ground: Compact, soil and gravel.

14 August, 12:47. Montana.

Clarkston. III. Motion jolting, lasted 2 seconds. Accompanied by rumble. Felt by several in community. Ground: Gravelly.

Lombard (about 5 miles southeast of). IV. Motion rapid, lasted 2 seconds. Walls creaked. Ground: Rocky, sloping, steep.

15 August, 04:45.

Clarkston, Montana. IV. Motion jolting, lasted 6 seconds. Felt in home and community. Rattled windows. Direction W.

15 August, 08:35. Montana.

Clarkston. IV. Motion jolting, lasted 6 seconds. Felt in home and community. Rattled windows.

Lombard. IV. Three tremors, one at 08:35, 08:36, 08:40. Motion rapid. First shock lasted about 2 seconds; second and third shock lasted about 1 second each. Felt by several in home and community, awakened few. Rattled windows; walls creaked. Railroad men were called out to patrol track for falling rocks.

Toston. III. Coffee pot vibrated.

16 August, 08:37*, 09:00*, 09:36*. Utah.

Salt Lake City area. IV. Press reported three distinct but light earth tremors were felt by many and awakened some people. Felt as a distinct rocking motion on 5th floor of the Union Pacific Building in Salt Lake City. Reports came from scattered portions of Salt Lake County but the majority of reports came from westside residents of Salt Lake City in the Rose Park area. Rattled dishes. The second shock seemed sharpest to a Rose Park resident who said dishwasher and refrigerator, about 1/2 inch apart, bumped against each other. Reports were received from as far south as Granger and as far west as the Salt Lake Municipal Airport area. One resident of the airport area said she was awakened about 06:00 by what she considered to be an earthquake and that the subsequent shocks were also distinctly felt. It was

16 August, 08:37*, 09:00*, 09:36*. Utah. (cont.)
thought a "slight slip" of the Warm Springs branch fault
was indicated. The Warm Springs branch runs from a point
near St. Mark's Hospital northwest toward Woods Cross.

— August.

No earthquakes were reported felt during the month of August at the
following places:

Weather Bureau Stations:

<u>Arizona:</u>	None.
<u>Colorado:</u>	"
<u>Idaho:</u>	"
<u>Nevada:</u>	"
<u>New Mexico:</u>	"

— September.

No earthquakes were reported felt during the month of September at
the following places:

Weather Bureau Stations:

<u>Arizona:</u>	None.
<u>Colorado:</u>	"
<u>Idaho:</u>	"
<u>Montana:</u>	"
<u>Nevada</u>	Winnemucca.
<u>New Mexico:</u>	None.
<u>Utah:</u>	"

- - - - -

BOULDER CITY

(120th Meridian or Pacific Standard Time)

12 July, 09:19:35*.BC.

Boulder City. IV. Felt by many.

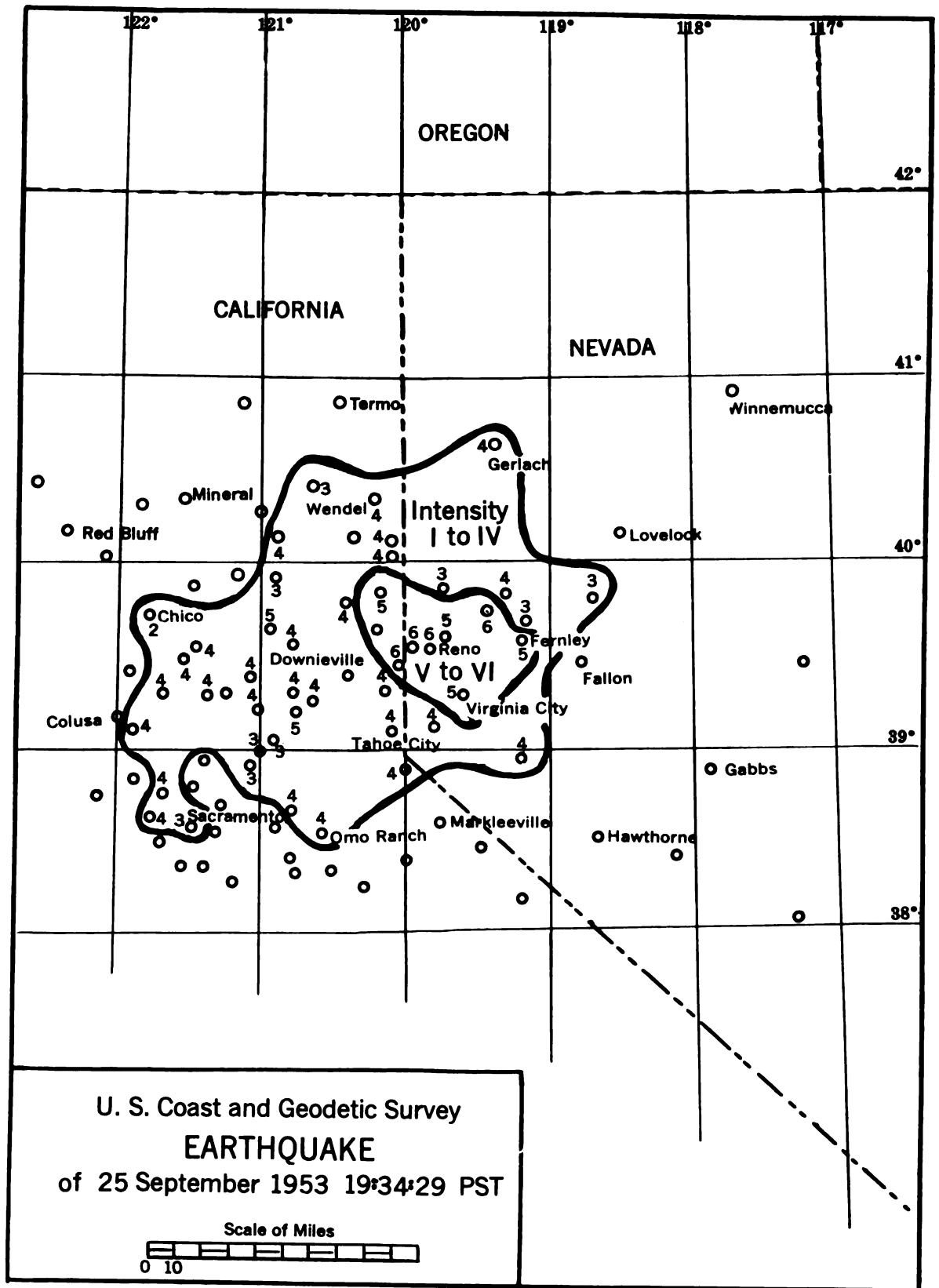
18 September, 22:35:07*.BC.

Boulder City. III. Felt by several.

28 September, 07:08:46*.BC.

Boulder City and Hoover Dam. III. Felt by several.

- - - - -



MODIFIED MERCALLI INTENSITY SCALE OF 1931

(Abridged)

- I. Not felt except by a very few under especially favorable circumstances. (I Rossi-Forel Scale)
- II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (I to II Rossi-Forel Scale)
- III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing truck. Duration estimated. (III Rossi-Forel Scale)
- IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls made creaking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. (IV to V Rossi-Forel Scale)
- V. Felt by nearly everyone; many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel Scale)
- VI. Felt by all; many frightened and run indoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight. (VI to VII Rossi-Forel Scale)
- VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars. (VIII Rossi-Forel Scale)
- VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Disturbed persons driving motor cars. (VIII+ to IX Rossi-Forel Scale)
- IX. Damage considerable in specially designed structures; well designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX+ Rossi-Forel Scale)
- X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks. (X Rossi-Forel Scale)
- XI. Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipe lines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
- XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

U. S. DEPARTMENT OF COMMERCE

Sinclair Weeks, Secretary

COAST AND GEODETIC SURVEY

R. F. A. Studds, Director

✓ ABSTRACTS OF EARTHQUAKE REPORTS
FOR
THE PACIFIC COAST AND THE
WESTERN MOUNTAIN REGION

MSA-80

October, November, December, 1953

Issued by the U. S. Coast and Geodetic Survey

Washington, D. C.

1954

FOR OFFICIAL USE

DEPARTMENT OF COMMERCE

U. S. Coast and Geodetic Survey

**Seismological Field Survey
14 Old Mint Building
San Francisco 3, California**

**ABSTRACTS OF EARTHQUAKE REPORTS FOR THE PACIFIC COAST
AND THE WESTERN MOUNTAIN REGION**

MSA-80

1 October 1953 to 31 December 1953

The information in this report has been collected by the Seismological Field Survey of the U. S. Coast and Geodetic Survey with the assistance of State Collaborators in Seismology and through the voluntary cooperation of many local organizations and individuals. Additional cooperation is solicited. Blank questionnaires and special information pertaining to the work may be obtained by addressing the Director, U. S. Coast and Geodetic Survey, Washington 25, D. C.; the Chief, Seismological Field Survey at the above address; or the following State Collaborators in Seismology.

Arizona:	Dr. Eldred D. Wilson, University of Arizona, Tucson.
Colorado:	Dr. C. A. Heiland, Heiland Research Corporation, Denver.
Montana:	Professor Stephen W. Nile, Montana School of Mines, Butte.
Nevada:	Dr. David B. Slemmons, University of Nevada, Reno.
New Mexico:	Professor Stuart A. Northrop, University of New Mexico, Albuquerque.
Oregon:	Dr. Ira S. Allison, Oregon State College, Corvallis.
Utah:	Professor J. Stewart Williams, Utah State Agricultural College, Logan.
Washington:	Professor Howard A. Coombs, University of Washington, Seattle.
Wyoming:	Professor Horace D. Thomas, University of Wyoming, Laramie.

Copies of these reports may be obtained from the Supervisor, Western District, U. S. Coast and Geodetic Survey, 121 Customhouse, San Francisco 26, California; or from the Washington Office.

A-4454-4(30)+

Earthquake information and questionnaire reports in the immediate vicinity of Lake Mead are collected by the Lake Mead Seismological Survey of the U. S. Coast and Geodetic Survey with headquarters at Boulder City, Nevada.

The abstracts are divided into three groups: (1) California and Western Nevada, (2) Washington and Oregon, and (3) the Western Mountain Region. This follows the scheme of classification in United States Earthquakes.

Intensity numbers refer to the Modified Mercalli Intensity Scale of 1931, in which, in the lower intensities, the disturbance of inanimate objects and personal reactions are given about equal weight. This intensity scale appears in abridged form on the last page of this report. All reports of whatever intensity from any town are listed under the highest intensity reported. Omission of intensity rating indicates insufficient information.

This report is prepared with the active collaboration of Professor Perry Byerly of the Seismographic Station of the University of California, and staff members of the Seismological Laboratory, California Institute of Technology. This permits an authentic appraisal of the material abstracted in the light of available instrumental and other information. Newspaper reports have been furnished by cooperative observers only and do not represent the results of a complete newspaper clipping service.

A condensed summary of these reports is published annually in the serial publication of the U. S. Coast and Geodetic Survey entitled "United States Earthquakes."

CALIFORNIA AND WESTERN NEVADA

(120th Meridian or Pacific Standard Time)

All places mentioned are in California unless otherwise stated

Time marked with asterisk (*) determined instrumentally: Berkeley (B),
Boulder City (BC), Pasadena (P), and Washington (W).

1953

7 October, 06:59:21*.

Epicenter $35^{\circ}02'N$, $118^{\circ}51'W$, west of Tejon Ranch. P.

Bakersfield. IV. Lasted about 15 seconds. Felt by many in community. Rattled dishes. Observer was standing at time of shock and did not feel any motion, although noticeable creaking of house was heard. Ground: Soil.

Cactus Peak (Coso Range). Felt. (Reported to Seismological Laboratory)

Glendale. IV. Dishes moved. (Reported to Seismological Laboratory)

Kern County. IV. Press reported the shock was felt throughout the San Joaquin Valley and in parts of Southern California. No damage or injuries were reported. Three rapid jolts, rattling windows, doors, and dishes in Bakersfield, Shafter, and Arvin, were felt.

Tehachapi, 7 miles south of (in mountain camp). V. Light tremble, gradual onset, then heavier motion, lasted about 4 seconds. Felt by all in camp. Rattling of loose objects and creaking of houses heard by most everyone. Roaring subterranean sounds heard by most everyone at time of shock. Some alarm. Ground: Rocky.

Wheeler Ridge. V. Motion rapid, lasted 5 seconds. Frightened all in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Shifted and overturned small objects. Ground: Compact, sloping.

Reported not felt: Tujunga.

8 October, 04:00. Not recorded. P.

Tehachapi, 7 miles south of (in mountain camp). III. One jerk, lasted about 1 second. Felt by several. Ground: Rocky.

8 October, 15:40:46*.

Epicenter $40^{\circ}19'N$, $124^{\circ}25'W$. B.

Ferndale. Reported as light, local shock.

10 October, 10:49.1*.

Epicenter $31.8^{\circ}N$, $116.1^{\circ}W$, Baja California. P.

Point Loma (San Diego). V. Motion rapid, lasted about 45 seconds.

Felt by several. Direction E-W. Pendulum clock, facing north, stopped at Spanish Lighthouse, Point Loma. Ground: Steep.

12 October, 11:35.

Reno, Nev. Slight shock. Felt by few. (BSSA, Jan. 1954)

13 October, 10:41:03*.

Epicenter $35^{\circ}36'N$, $118^{\circ}32'W$, west of Bodfish. P.

Bodfish (Borel Powerhouse). V. Motion rapid, lasted 8 seconds. Felt by all and frightened few in community. Direction S-N. Rattled windows and doors; house creaked. Ground: Rocky soil, sloping and steep. Shock at 10:41:03* was strong, with 5 other light shocks at 1/2-minute intervals. About 12 shocks in 15 minutes. Felt strongly 12 miles north; not felt 18 miles north nor 25 miles southwest. First shock strong enough to cause alarm signal on oil level in large transformer bank.

16 October, 11:53:59*.

Epicenter $35^{\circ}00'N$, $118^{\circ}32'W$, near White Oak Lodge. P.

Tehachapi (central section). IV. Felt by most people. Motion trembling and jarring, gradual onset. Loose objects rattled; house creaked. Moderately loud roaring subterranean sounds heard during shock by most people. Ground: Rocky.

21 October, 08:02:38*.

Epicenter $34^{\circ}19'N$, $119^{\circ}42'W$, off Santa Barbara. P.

Agoura. III. Motion not actually felt, although observer saw and heard small delicately balanced objects shake and rattle.

Fillmore. III. Motion slow, brief. Slight motion felt by few people sitting or lying down; not felt by persons walking or standing. Ground: Level.

Goleta (Post Office Building). IV. Motion rapid, lasted 3 seconds. Felt by all at Post Office. Direction N-S. Ground: Compact soil, level.

Los Prietos Ranger Station (about 22 miles NE. of Santa Barbara). IV. Motion rocking and swaying, NE-SW, abrupt onset. Felt by many at station; few alarmed. Loose objects rattled; buildings creaked. Ground: Rocky; narrow river valley (Santa Ynez River).

Santa Barbara Area. V. The press reported the shock was felt from beyond Goleta as far south as Ventura and Port Hueneme. It was described as a hard, rolling motion. At Goleta fire station fire trucks were shaken, windows rattled, and doors banged. Montecito fire station reported receiving quite a number of calls, as did local police and sheriff's offices. One resident reported a beer stein fell off a shelf and broke. Another said a pane of glass in a French door on El Arco Drive was cracked. Others said their coffee splashed out of cups.

Santa Barbara (west section). V. Motion rocking, N-S, gradual onset. Felt by many. Loose objects rattled; building creaked. Thunderous subterranean sounds, like an explosion, heard by several before shock. Disturbed objects observed by several. Visible shaking of buildings. Ornaments fell from shelf. Big chart on wall was partially knocked off wall, wall facing east 78° . Ground: Part adobe.

25 October, 21:00 (about). Not recorded. B.

Hollister, 7 miles south of. Slight shock felt.

26 October, 07:50:57*.

Epicenter $36^{\circ}52'N$, $121^{\circ}37'W$. B.

Hollister, 7 miles south of. IV. Motion slow, brief. Felt by several in home. Rattled windows and doors. Ground: Soil.

29 October, 15:58:46*.

Epicenter $36^{\circ}47'N$, $121^{\circ}21'W$. B.

Hollister, 7 miles south of. IV. One hard shock. Motion slow, brief. Felt by several in home. Direction NW-SE. Rattled windows; walls creaked. Ground: Soil.

29 October, 23:35:45*.

Epicenter $37^{\circ}38'N$, $118^{\circ}18'W$, White Mountains. P.

Big Creek and Florence Lake (Southern California Edison Co.). Felt. (Reported to Seismological Laboratory)

Yosemite National Park (Yosemite Village). IV. Several mild, short shakes, lasted 2 seconds. Bed shook; windows rattled. Noticed by several sitting up and awakened several. Ground: Sandy.

30 October (no time given).

Fresno. A sharp earthquake was felt in Vermillion Valley. No damage was reported. (BSSA, Jan. 1954)

4 November, 03:56. Not recorded. P.

Bakersfield, 606 Jefferson St. III. Continuous hammering motion, no twisting effect, seemed to come from south, lasted 20 to 30 seconds. Felt by observer in home. Ground: Soil, compact, level. Observer's time may be in error. A shock was recorded at 05:19:35* with epicenter at $35^{\circ}07'N$, $118^{\circ}40'W$, west of Cummings Valley.

4 November, 07:31:02*.

Epicenter $33^{\circ}57'N$, $117^{\circ}20'W$, near Riverside. P.

Riverside and Colton. Felt. (Reported to Seismological Laboratory)

5 November, 04:40:31*.

Epicenter $35^{\circ}08'N$, $118^{\circ}39'W$, Cummings Valley. P.

Tehachapi (central section). IV. Hard jolt, lasted 1 second, abrupt onset. Felt by many. Rattling of loose objects and creaking of building heard by many. Ground: Rocky.

5 November, 18:07. Not recorded. P.

Tehachapi (central section). II. Light tremor, lasted 1 second, abrupt onset. Ground: Rocky.

11 November, 13:52:26*.

Epicenter $35^{\circ}07'N$, $118^{\circ}32'W$, west of Tehachapi. P.

Tehachapi (central section). IV. Motion bumping, lasted 1 second, abrupt onset. Felt by very many. Rattling of loose objects and creaking of buildings heard by many. Subterranean sounds heard by some people west of town. Ground: Rocky.

12 November, 10:32:09*.

Epicenter $35^{\circ}35'N$, $118^{\circ}28'W$, east of Bodfish. P.

Bodfish (Post Office). V. Motion rapid. Felt by all. Walls creaked. "Shock was quite severe, more like a heavy blast. Different from any I have ever felt. Some of my neighbors felt one some time during last night. I did not feel it." Ground: Soil, compact.

Bodfish (Borel Powerhouse). V. Motion rapid, lasted 3 seconds. Felt by all in home and powerhouse, frightened few in home. Rattled windows, doors, and dishes; walls creaked. Trees, bushes shaken slightly. Caused alarms to operate in powerhouse. Cracks in walls seemed to be larger. "Heavy, sharp shock, like a blast. Sounded like rock cracking; some thought they could hear rocks rolling." Ground: Rocky.

19 November, 21:18.

Oakland. A minor earthquake shook East Oakland and San Leandro. No damage was reported. (BSSA, Jan. 1954)

23 November, 05:39:07*.

Epicenter $33^{\circ}06'N$, $116^{\circ}27'W$, east of Julian. P.

Borrego Springs (Ensign Ranch in NE. San Diego County). IV. Motion trembling from E-W, gradual onset. Felt by majority of people. Rattling of loose objects and creaking of buildings heard by many. Moderately loud rumbling subterranean sounds heard by many before and during shock. Slight visible swaying of buildings. Beds moved. Ground: Sandy.

Fallbrook, 4 miles south of. IV. Felt by observer, awakened few. Noticeable rumble for 3 or 4 seconds, followed by slight creaking of heavy timber roof of solidly built 1-story concrete-block building on granite foundation. Ground: Rocky.

Hemet. IV. Motion rapid. Felt by several in home and community, awakened few. Ground: Soil, level.

Julian. IV. Motion rapid, brief. Felt by and awakened many in community, frightened few. Rattled windows, doors, and dishes; house creaked. Ground: Rocky.

Lakeside. V. One sharp shock, lasted about 20 seconds. Awakened many in community. Direction NE. Hanging objects swung. Ground: Compact.

San Diego. IV. Motion rapid, lasted 45 seconds. Felt by several in community, awakened few. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. This reporter states that it was felt by many from Descanso to Mount Helix. Also that a series of dull thuds were reported from these districts through El Cajon Valley from 00:05 to 01:52 on 21 November. Reports from El Cajon Valley districts similar to those from San Diego. Ground: Rocky.

Warner Springs. III. Motion rapid, lasted 2 to 5 seconds. Felt by several in home. Seemed to be one heavy N-S shock.

23 November, 12:39:01*.

Epicenter $35^{\circ}28'N$, $118^{\circ}27'W$, near Havilah. P.

Bear Mountain (Kern County). Felt.

Bodfish (Borel Powerhouse). V. Motion rapid, lasted 5 seconds. Felt

23 November, 12:39:01*. (cont.)

by many and frightened few in community, felt outdoors by some. Direction S-N. Rattled windows and doors; house creaked. "This was a fairly hard shake. Set off level alarms in large transformer bank. Shaking ended with a violent up-and-down movement. Reported felt 12 and 18 miles N. and 40 miles NW. of here." Ground: Rocky.

Cantil. IV. Motion slow, lasted 2 seconds. Slight shock, movement from W-E. Felt by many in home. Direction E-W. Ground: Sandy, level.

Coso Junction. III. Motion slow, lasted 3 seconds. Felt by several in home. Very slight vertical movement. Ground: Rocky soil, level.

Kernville. Felt.

Tehachapi (central section). IV. Two jarring shocks, lasted 1 second each, with interval of several seconds between jars. Rattling of loose objects and creaking of buildings heard by most of population. Bumping subterranean sounds heard at time of shock. Ground: Rocky.

23 November, 21:46:06*.

Epicenter $35^{\circ}53'N$, $116^{\circ}58'W$, near Needle Peak, Panamint Range. P.

Tecopa. IV. Motion slow, lasted 10 seconds. Felt by many in community. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken slightly. Ground: Loose.

Reported not felt: Amboy, Baker, Barstow, Big Bear City, Desert Hot Springs, Cadiz, Cima, Daggett, Essex, Fenner, Helendale, Hinkley, Ivanpah, Joshua Tree, Lucerne Valley, Ludlow, Needles, Newberry, Rice, Twentynine Palms, White Water, Yermo, Yucca Valley.

25 November, 20:30. Not recorded. B.

Oakland, 930 East 14th St. III. Motion rapid, lasted about 1 minute. Felt by observer in home. Direction N-S. Frightened observer. Seemed different than most shocks. Ground: Level and sloping.

26 November, 06:30:52*.

Epicenter $38^{\circ}45'N$, $119^{\circ}45'W$. B.

Markleeville. IV. Motion rapid, sharp jerk. Felt by several in home, awakened few.

26 November, 08:19:13*.

Epicenter $35^{\circ}19'N$, $118^{\circ}32'W$, east of Caliente. P.

Kern Canyon Powerhouse (PG&E). IV. Very decided shock. Also reported felt at Bakersfield. Rattled windows, doors, and dishes.

Tehachapi (central section). IV. Slight tremble, abrupt onset, lasted 1 second. Felt by many. Loose objects rattled; buildings creaked. Ground: Rocky.

29 November, 23:22:54*.

Epicenter $35^{\circ}20'N$, $118^{\circ}31'W$, east of Caliente. P.

Woody. Felt sharply. People awakened.

3 December, 16:22:51*.

Epicenter $35^{\circ}45'N$, $118^{\circ}13'W$, north of Onyx. P.

Kernville. A sharp, short earthquake was felt. (BSSA, Jan. 1954)

- 3 December, 18:55 and 20:46. Not recorded. B.
Oakland, 930 East 14th St. IV. Lasted one second each. Felt by observer in home and another person felt minor quiver. House creaked. Prolonged quiver felt between the two shocks.
- 9 December, 03:53:53*.
Epicenter $34^{\circ}01'N$, $116^{\circ}18'W$, southwest of Twentynine Palms. P.
Palm Springs. A slight shock was felt. (BSSA, Jan. 1954)
- 9 December, 22:30 (about). Not recorded. B.
Oakland, 930 East 14th St. IV. Slight quivering. Heard walls creak.
- 10 December, 11:33. Not recorded. B.
Oakland, 930 East 14th St. IV. Observer sitting in chair felt slight NW. shove. House creaked.
- 15 December, 04:44:36*.
Epicenter $35^{\circ}13'N$, $118^{\circ}49'W$, near Arvin. P.
Arvin. V. One sharp horizontal motion. Felt by all in community. Direction N. Overturned small objects; knickknacks fell. Broke dishes.
Bakersfield. The press reported a minor earthquake jarred portions of southeastern Kern County, but no damage was reported by authorities. The shock was felt in the Lamont-Weedpatch-Arvin areas. The sheriff's office in Bakersfield said it received no calls or damage reports from residents.
Bakersfield. IV. Motion rapid, lasted 2 seconds. Felt by observer in home. House creaked.
Jawbone Aqueduct Station ($35^{\circ}18'N$, $118^{\circ}02'W$). III. Motion slow, lasted 3 or 4 seconds. Direction E-W. Felt by observer in home. Ground: Compact.
Weedpatch Substation (PG&E). III. Motion rapid, lasted 4 seconds. Also felt slightly at Kern Steam Plant (PG&E), near Bakersfield.
- 15 December, 16:04:26*.
Epicenter $36^{\circ}55'N$, $121^{\circ}39'W$. B.
Aptos. IV. Motion rapid, lasted 10 seconds. Felt by many in Post Office. Direction NE. Rattled windows and doors. Hanging objects swung NE. Ground: Soil, level.
Gilroy. Press reported sharp shocks were felt.
Los Gatos. III. Motion slow, lasted 10 seconds. Felt by several in community, outdoors by some. Ground: Soil, compact.
Moss Landing. III. Motion rapid, lasted 3 seconds. Felt in Post Office. Slight rattling of windows and doors.
Reported not felt: Alcatraz, Altamont, Antioch, Big Sur, Clayton, Coal-
inga, Cupertino, Dos Palos, El Nido, Greenfield, Gustine, Fairfield, Fire-
baugh, Idria, Lafayette, Livermore, Napa, Newman, Oakland, Paicines, Paso
Robles, Patterson, Pleasanton, Pescadero, Petaluma, Pinole, Point Reyes
Station, Redwood City, Richmond, Ripon, San Ardo, San Leandro, San Lucas,
San Simeon, Santa Cruz, Santa Rosa, Stockton, Tracy, Turlock, Vernalis,
Volta, Walnut Creek.
- 16 December, 02:54:22*.
Epicenter $36^{\circ}33'N$, $121^{\circ}24'W$. B.
Hollister, 7 miles south of. V. Motion rapid. Felt by and awakened

16 December, 02:54:22*. (cont.)

many in community, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Soil.

Hollister. V. Motion rapid. Felt by and awakened many in community. Rattled windows, doors, and dishes; house creaked. Ground: Alluvium.

16 December, 04:10.

Gualala, $6\frac{1}{2}$ miles north of. III. Motion rapid, abrupt onset. Light shock noticed only by few people who were awake. Ground: Rocky soil, compact, sloping.

16 December, 15:09:39*, 20:50:30*, 21:13:12* (main shock), 21:39:41*, 22:54:27*.

Epicenter $36^{\circ}55'N$, $121^{\circ}40'W$. B.

The main shock of this series was felt over approximately 3500 square miles of the coastal region of west-central California. (See map.) Maximum intensity VI.

15:09:39*.

Glenwood. IV. Motion slow. Rattled windows, doors, and dishes; house creaked slightly.

Moss Landing. IV. Motion rapid. Felt in home; frightened all in home.

Moss Landing Steam Plant (PG&E). II. Motion slow, brief.

San Francisco. IV. The press reported a small shock was felt in the western part of the city. Windows rattled in the Mission District.

Santa Cruz. III. The press reported a number of people felt a mild, rolling shock.

South San Francisco. IV. Felt by several. Rattled windows. Ground: Compact, sloping.

Watsonville. Press reported movement was described as slight by residents of the area.

20:50:30*.

Hollister, 7 miles south of. IV. Motion rapid, lasted about 25 seconds. Felt by many in home and community, frightened few. Direction NW-SE. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NW-SE. Ground: Soil, level.

Milpitas. III. Motion slow, brief. Direction S-N. Felt in home. Ground: Compact.

Milpitas. III. Motion slow. Felt by several in community (some outdoors). Direction S-N. Ground: Compact.

Moss Landing. IV. Motion rapid. Felt by and frightened all in home. Rattled windows, doors.

Moss Landing Steam Plant (PG&E). II. Brief shock felt.

San Juan Bautista. IV. Motion rapid, lasted 10 seconds. Felt by many in home. Walls creaked.

Santa Cruz area. Mild shock felt.

Watsonville. The press reported the shock was described as slight by residents of the area.

16 December series of shocks (cont.).

21:03.

Hollister. IV. Motion rapid, lasted several seconds. Felt by all in home, outdoors by some. "Felt by almost everyone in town; however, the intensity was noticeably less than the shock at 21:13:12*." Ground: Alluvium.

21:13:12* (main shock).

Intensity VI:

Chittenden Pass Road, between Chittenden Junction and Watsonville.

The press reported boulders were strewn on the road some five miles west of Chittenden Junction.

Watsonville. Motion rapid, lasted 3 seconds. Felt by many in homes and office, frightened few. Rattled windows and doors; house creaked. Hanging objects swung NE. Trees, bushes shaken moderately. Shifted small objects. Damage slight.

Watsonville. V. The press reported the main shock was heavy enough to rock concrete buildings. Described as sharp.

Intensity V:

Alviso. Motion slow, momentary duration. Felt by all. Ground: Marshy.

Chualar Canyon. Motion rapid. Felt by all in country. Rattled windows. Ground: Rocky. "Also felt in Chualar."

Gilroy. Sharp shock. Motion rapid. Felt by many in home. Direction seemed NE. Rattled windows and dishes. Hanging objects swung. Shifted and overturned small objects; knickknacks fell. Ground: Soil, level. Light shock at 21:39:41*.

Hollister. Motion slow and rolling, lasted about 2 seconds. Felt by all in community. Rattled windows, doors, and dishes. Hanging objects swung.

Hollister (Fire House). IV. Motion rocking and swaying, rapid onset. Felt by many. Buildings creaked; loose objects rattled. Disturbed objects observed by many. Visible swaying of building and trees. Chandelier swung from S-N. "Three shocks felt: 20:50:30*, 21:13:12*, 21:39:41*. The shock at 21:13:12* was the strongest and the longest, seemed about IV intensity and less for the other two. Shock at 20:50:30* lasted about 20 seconds; at 21:39:41* about 15 seconds." Ground: Adobe.

Hollister, 7 miles south of. IV. Motion rapid and slow, lasted about 1 minute. Felt by many in home and community, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NW-SE. Ground: Soil.

Los Gatos. Motion slow, lasted 1 minute or less. Felt by and frightened many in community (some outdoors). Rattled windows, doors, and dishes; frame creaked. Hanging objects swung. Trees, bushes shaken slightly. Shifted small objects. Ground: Soil.

Mount Hermon (Santa Cruz County). Motion slow, gradual onset. Felt by all. Windows rattled; house creaked. Hanging objects swung. "We were startled." Ground: Compact, sandy, sloping.

Santa Cruz. The press reported a sharp shock, but no damage. Several dozen Santa Cruz residents reported feeling the shock which set hanging lights to swinging. One person reported the shock nearly toppled the Christmas tree. Most reports telephoned to newspaper

16 December series of shock (cont.)

office indicated the shock was stronger in the Soquel and Capitola districts (few miles east of Santa Cruz). One person reported a mild shock was felt at 20:50:30*. The heavier shock at 21:13:12* knocked shades off the lamps in her home. A number of people living on Riverside Avenue, Broadway, Dakota and Poplar Avenues reported their houses shook. Strong at 129 Lighthouse Avenue, where man reported, "I was afraid the force of the shock would throw my baby out of bed." As an indication of the lesser intensity in other sections of Santa Cruz, a man living on Laurel Street above Mission Street reported only that he felt his chair shake. A number of people also reported a milder, rolling shock was felt at 15:09:39*.

Santa Cruz. IV. Motion slow. Felt by many in community. Rattled windows; frame creaked. Hanging objects swung E-W. Ground: Compact.

Santa Cruz. III. Motion trembling, abrupt onset. Roaring subterranean sounds heard by several. Ground: Made.

Intensity IV:

Aptos. Motion rapid. Felt by many in home. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Soil, level.

Ben Lomond. Motion trembling and swaying. Felt by many. Creaking of buildings heard by many. Hanging objects swung. Ground: Sandy, rocky.

Castroville. Slight movement felt, lasted about 1 minute. Felt by several in community. Doors rattled.

Glenwood. Motion slow, lasted about 1 minute. Felt in home, outdoors by some. Rattled windows, doors, and dishes; house creaked some.

Half Moon Bay. Rattled windows, doors, and dishes.

Hayward. Motion slow, lasted 1 second. Felt by several in home. Rattled windows. "Caused 'galloping' motion of chairs."

Hayward. Felt by observer in home. Rattled dishes.

Hayward. Motion rapid, lasted about 1 second. Felt by two in home. Bulb fell off Christmas tree.

Hayward. Short, sharp shock. Felt by observer in home. Rattled windows, doors, and dishes slightly. Ground: Soil.

Morgan Hill. Motion felt like sudden drop. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Few alarmed. Ground: Soil. Shock also felt at 15:09:39*.

Moss Landing Steam Plant (PG&E). Shock described as severe. Brief duration.

Moss Landing. Motion rapid. Felt by and awakened all in home. Rattled windows, doors, and dishes.

Oakland, 1702-92nd Ave. Motion slow, lasted 1 or 2 seconds. Felt by all in home. Rattled windows.

Palo Alto. Felt by all in room at Stanford University. Hanging objects swung.

Redwood City. Motion sharp, lasted 1 second. Felt by many in community, frightened few. "Most people reported sharp shock like an explosion."

16 December series of shocks (cont.)

21:13:12* (main shock). Intensity IV (cont.)

San Francisco. Press reported the shock rattled dishes, jiggled Christmas trees, and caused houses to creak.

San Francisco, 2 Presidio Terrace. Motion rapid, lasted about 8 seconds. Felt in home, outdoors by some. Windows rattled; walls creaked. "Moderate shock. Movement seemed E-W." Ground: Rocky, sloping.

San Francisco, 2542-45th Ave. III. Motion slow, lasted 2 seconds. Felt by several in home. Ground: Sandy.

San Francisco, 458-19th Ave. III. Felt by 10 out of 13 in house, some lying down, some sitting. Of the three who did not feel the shock, two were working in the kitchen, and the other one was seated in a large overstuffed chair facing west. At the Women's City Club in downtown San Francisco on Sutter Street, third floor, 25 people were present at a gathering and none felt the shock. Observer states he overheard a man say he heard subterranean sounds but did not feel the shock.

San Martin. Motion slow, lasted 1 minute. Felt by many in community, awakened and frightened few. Direction N-S. Rattled windows and doors; house creaked. Hanging objects swung. "Felt three distinct shocks between 8 and 9:50 p.m."

South San Francisco. Felt by several in home and community. Rattled windows. Ground: Compact, sloping.

Intensity I to III:

Alameda. Motion slow, lasted 2 seconds. Felt by observer in home. Ground: Filled in, level.

Bolinas. "Claimed to have been felt by a few people." Ground: Rocky, soil.

Concord. Motion rapid, lasted few seconds. Felt by observer in home. "Very slight. Hardly anyone felt it."

Coyote. Momentary vibration similar to passing train felt. Felt in home. Windows, doors, and dishes rattled slightly.

Pescadero. Motion bumping. Felt by several in home. Ground: Soil.

Stinson Beach. Motion slow. Felt by several in home.

Soledad (near). J. A. Bell Ranch. Motion slow and weak. Ground: Deep soil.

Sunol. Slight shock felt by 2 people.

Tres Pinos. Very slight. "Not felt by many."

No shocks were reported felt on 16 December at the following places:

Alcatraz, Altamont, Antioch, Big Sur, Brentwood, Clayton, Coalinga, Corte Madera, Cupertino, Dos Palos, El Nido, Fairfield, Firebaugh, Greenfield, Gustine, Idria, Jolon, Lafayette, Lathrop, Livermore, Los Banos, Manteca, Mount Hamilton, Newark, Newman, Napa, Paicines, Paso Robles, Patterson, Petaluma, Pinole, Pleasanton, Richmond, Point Reyes Station, Rio Vista, Ripon, San Ardo, San Benito, San Leandro, San Lucas, and 15 miles east of; San Simeon, Santa Rosa, Stockton, Tracy, Turlock, Vernalis, Walnut Creek.

21:39:41*.

Hollister, 7 miles south of. IV. Motion rapid and slow, lasted about 25 seconds. Felt by many in community, awakened many in home. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NW-SE. Ground: Soil.

16 December series of shock (cont.)

21:39:41* (cont.)

Moss Landing. IV. Motion rapid. Felt by and frightened all in home.
Rattled windows, doors, and dishes.

Moss Landing Steam Plant (PG&E). III. Moderate, brief shock. Slight,
brief shock also felt at 22:54:27*.

20 December, 22:37:39*.

Epicenter 39.4°N , 123.1°W . B.

Willits. IV. Motion rapid, lasted 1 second. Felt by several in home,
awakened and frightened few. Rattled doors and windows; house
creaked. Hanging objects swung. Lighter shock felt at 22:46.

21 December, 01:30.

Willits. III. Felt by few.

21 December, 05:00. Not recorded. (Comment by Seismological Laboratory:

"This is a little surprising in view of the shock on 22 December at
19:42.3*."

Laws. IV. Motion rapid. Felt by several in home and community, fright-
ened few. Direction N-S. Ground: Rocky soil, level. "This was
a very noisy (rumbling) and rough shock, lasted only a few seconds.
No objects moved, but it was a hard jolt."

21 December, 13:15. Not recorded. B.

Oakland, 930 East 14th St. IV. Observer awakened from nap by 1 minute
of heavy quivering, up and down, slow.

22 December, 19:42.3*.

Epicenter 37.5°N , 118.0°W , east of Bishop. P.

Laws. IV. Motion rapid, abrupt. Felt by several in home. Direction
N-S. Walls creaked. "Just like a big blast only the rumble could
be heard before the jolt." Ground: Rocky soil, level.

22 December, 20:01. Not recorded. B.

Oakland, 930 East 14th St. III. Slight quivering, lasted 3 or 4 min-
utes.

23 December, 05:23:56* and 05:25:50*.

Epicenter $32^{\circ}02'\text{N}$, $118^{\circ}20'\text{W}$, north of Inglewood. P.

Los Angeles, 5900 Avion Drive (Weather Bureau Airport Station). IV.

Motion trembling, gradual onset. Felt by many, some alarmed. A
press report stated that two light earthquakes sent alarmed resi-
dents of the West Los Angeles, Culver City, South Bay, and Playa
del Rey areas to their telephones to ask police departments and
newspapers the nature of the temblor. The California Institute of
Technology said the shocks were slight.

25 December, 15:43:40*.

Epicenter $32^{\circ}02'\text{N}$, $118^{\circ}20'\text{W}$, north of Inglewood. P.

Los Angeles, 5900 Avion Drive (Weather Bureau Airport Station). IV.

Motion bumping, abrupt onset. The press reported a short, sharp
earthquake jolted the Redondo, Hermosa, Manhattan, and Palos
Verdes beach areas.

27 December, 17:32:42*.

Epicenter 36°54'N, 121°37'W. B.

Gilroy. IV. Motion slow. Very slight shock. Felt by few in store.
Rattled windows. Ground: Level.

Hollister. IV. Motion rapid. Felt by many in community (some out-
doors). "Observer was on floor of drilling rig, therefore, did
not feel it, but men sitting quietly in adjoining doghouse eat-
ing supper felt it over rig vibration." Ground: Alluvium.

Hollister, 7 miles south of. IV. Motion rapid, lasted about 30 sec-
onds. Felt by many in home and community. Rattled windows,
doors, and dishes; house creaked. Ground: Soil.

Moss Landing Steam Plant (PG&E). II. Motion rapid, lasted 1 second.

29 December, 03:46. Not recorded. P.

Tehachapi (central section). IV. Motion trembling, W-E, gradual onset,
lasted 2 seconds. Buildings creaked. Low, rumbling subterranean
sounds heard before and at time of shock. Ground: Rocky.

- - - - -

WASHINGTON AND OREGON

(120th Meridian or Pacific Standard Time)

-- October.

No earthquakes were reported felt during the month of October at the
following places:

Weather Bureau Stations:

Washington: Seattle.

Oregon: Portland.

-- November.

No earthquakes were reported felt during the month of November at the
following places:

Weather Bureau Stations:

Washington: Seattle.

Oregon: Portland.

15 December, 20:32:12* (recorded time at Corvallis, Ore.).

Felt over an area of approximately 3000 square miles in northwestern
Oregon and across the Columbia River at a few localities in
Washington. (See map.) Maximum intensity VI.

Intensity VI in Oregon:

Portland. The press reported chandeliers swung, dishes fell, and plaster
was cracked, but no serious damage resulted.

Portland. A 1-story building, facing on Broadway and abutting the Amba-
sador Apartments (SW. 6th Avenue) in the rear, was cracked away
from the juncture. Leak developed in apartment building. Felt
by many in building, although some did not feel it.

Portland, 01015 SW. Palatine Hill Road. Motion rapid, lasted about 30
seconds. Felt by and frightened all in home. House creaked

15 December, 20:32:12*. Intensity VI in Oregon. (cont.)

slightly. Shifted small objects and furnishings. Damage slight to walls. Ground: Level, compact.

Portland, 7090 N. University. Motion rapid, lasted 3 seconds. Felt by several in home. Rattled windows; walls creaked. Cracked chimney; damage slight to fireplace tile. Ground: Soil, compact, level.

Portland, 9529 N. Edison St. Motion rapid, lasted several seconds. Felt by many and frightened few in community. "Neighbors said dishes rattled; cracked walls, too."

Portland, 1485 SW. Cardinell Drive. Motion rapid, short. Felt by observer in home. Direction NE. Cracked plaster on ceiling of second floor. Ground: Soil, sloping and steep.

Portland, Council Crest District (SW. Portland). The press reported a ceiling was cracked. Shock accompanied by rumbling noise.

Intensity V in Portland:

3300 SW. Heather Lane (near Council Crest, SW. Portland). Motion rapid, lasted 3 seconds. Sharp, short jolt. Felt by observer in home, frightened many in community. Rattled windows and doors. "Jolt was sufficiently frightening to make me turn off gas and take other precautions." Ground: Soil, compact, sloping.

6103 SE. Clinton. Sudden, heavy shock, like enormous weight hitting roof, lasted about 5 seconds. Moderate tremor followed for several seconds. Loud noise with first shock, like boulder hitting roof. Entire neighborhood ran into street. Rattled windows, doors, and dishes; house creaked slightly. This area in delta between rivers, probably deep gravel below.

818 NE. Floral Place. Motion rapid and reciprocal, not oscillating, lasted 2 seconds. Felt by several in home. Rattled windows, doors, and dishes. Hanging objects swung E-W. Shifted small objects. Ground: Soil, compact.

7275 SW. Corbett Ave. Motion rapid, lasted 2 minutes. Felt by all in home, frightened many in community. Direction NE. Rattled windows and doors. Hanging objects swung. Books fell, light articles shifted. "A shock caused a tall table lamp to 'walk' on the afternoon of the 15th about 5:15 p.m." Ground: Compact, sloping.

99th to 101st on Failing St. (NE. Portland). Lasted a few seconds. Felt by few in community. Dishes rattled slightly. Some in neighborhood felt nothing; one felt slight tremor and heard dishes slide in cabinet. Ground: Loose to compact.

2534 SW. Arden Road. Motion rapid, lasted 10 to 15 seconds. Felt by all and frightened many in home. Hanging objects swung NW. Shifted small objects. "No preceding rumble noticed. Felt more like a blast than a shock. Objects seemed to have moved several inches. Cabinet on west wall tipped east then back again, movement was about 2 inches." Ground: Soil, sloping, compact.

2614 NE. Bryce St. Lasted a few seconds. Felt by and frightened many in community. Rattled windows and doors; houses shook. Ground: Rocky soil, level.

1829 NE. Wasco. Motion rapid, lasted 1 second. Felt by observer in home. Rattled dishes. Shifted small objects.

5th and Washington (J. C. Penny Store). Observer in store elevator at time of shock. Elevator seemed to rock back and forth, then drop, lasted only a few seconds.

15 December, 20:32:12*. Intensity V in Portland. (cont.)

- 5805 SW. Brugger. House shook violently. Rattled windows, doors, and dishes. Ground: Level, compact soil. About 100 feet beyond house, ground dips gently toward a wide, deep valley.
- 135 SE. 52nd St. Motion rapid, jerky, lasted a few seconds. Felt by and frightened all (8) in home. Rattled windows and doors. "Children in upstairs bedrooms were very frightened. Those sleeping were awakened and they are heavy sleepers. Thought front window pane would be shaken out and went outside to see if tall chimney was intact." Ground: Soil, compact, level.
- 2222 SW. 17th Ave. Motion rapid, lasted about 1 minute. Felt by observer in home, frightened one. Rattled windows and doors; house creaked. Trees, bushes shaken moderately. "I thought my gas heater was blowing up. There was a sharp explosive sound. Vent pipe was pushed out of entrance to chimney. Stove shook."

Intensity IV in Portland:

- 5455 SW. Patton Rd. Motion rapid. Frightened all in home. Rattled windows, doors, and dishes; house creaked. Resembled a high wind. Ground: Rocky soil, level.
- 2020 SE. Salmon. Motion rapid, instantaneous jolt. Felt by several in home. Rattled windows, doors, and dishes. Single jolt as if truck hit house. Ground: Sandy gravel, level, compact.
- 5226 SW. Menefee Dr. Motion rapid, vertical, lasted about 4 seconds. Felt by all in home. Ground: Soil, compact.
- 8009 SW. Taylors Ferry Rd. Motion slow, lasted 20 to 30 seconds. Felt by all in home. Rattled windows, doors, and dishes; walls creaked. Trees, bushes shaken slightly. Ground: Soil, level and sloping. "Three or four people reported to me they felt nothing in the area of 80th and Sandy Beach (NE. Portland). All in home at time of shock."
- 1535 SE. Henry St. Motion rapid, lasted 5 seconds. Felt by all in home. Rattled windows, doors, and dishes. "Over too fast to be frightened." Ground: Soil, compact, level.
- 218 NW. Flanders. Rumbling noise preceded shock. Felt by many in community. Observer was walking on street and did not feel it.
- 7607 N. Fowler Ave. Rumble sounded like truck passing by. "Felt no motion and wouldn't believe there had been an earthquake until neighbor to the west reported shaking walls at his home."
- 420 NW. Skyline Blvd. Motion rapid, slight, lasted 10 seconds. Felt by observer in home. Rattled dishes and pictures. Ground: Soil, compact, sloping.
- 2211 SW. Vista Ave. Motion slow, lasted 4 to 5 seconds. Felt by several in home. Direction NW. Rattled windows; house creaked slightly. Ground: Sloping.
- 6305 N. Omaha Ave. Motion slow, lasted 20 seconds. Felt by all in home. Walls creaked. Ground: Soil, compact.
- 8405 NW. Ogden (NW. Portland hills). Motion rapid, lasted 4 seconds. Felt by all in home. Rattled windows. Ground: Hard clay.
- 10th and Main Sts. Motion rapid, lasted a few seconds. Felt by many in Masonic Temple. Direction N-S. Windows, doors, and dishes rattled slightly; building creaked slightly. Ground: Gravelly, level.
- 4804 SW. Laurelwood Dr. Lasted 30 seconds. Felt by all in neighborhood, frightened few. Rattled windows. "Seemed more like a heavy explosion in neighborhood." Ground: Clay.

- 15 December, 20:32:12*. Intensity IV in Portland. (cont.)
- 12203 SW. Tryon Hill Rd. Motion slow, lasted 15 seconds. Felt by many in home. Direction from E. Rattled windows and doors; frame creaked. Ground: Soil, loose, level.
- 1224 SW. Westwood. Motion rapid, lasted 5 seconds. Felt like a gust of very strong wind. Felt by all and frightened few in home. Rattled windows. Ground: Compact, sloping and steep.
- 805 SE. 60th Ave. (Mt. Tabor District). Motion rapid, lasted about 15 seconds. Felt like jolting vibration caused by very heavy trucks passing on street, but more intense. Felt by many in home and community. Rattled windows, doors, and dishes. Ground: Soil, compact, level.
- 3569 NE. Stanton. Motion slow, lasted 5 to 10 seconds. Felt by several in home. Rattled windows, doors, and dishes. Fireplace and walls creaked. Felt only in front room of house. South fireplace and chimney shook. Front windows shook and rattled. Felt like furnace was exploding. Ground: Soil, level.
- 2755 NE. 51st Ave. Motion slow, lasted several seconds. Felt by several in community. Rattled windows. Bed shook and drawer pulls rattled. Ground: Gravel bed.
- 7704 SE. Taylor St. Motion jarring, lasted 2 seconds. Felt by all in home. Rattled windows, doors, and dishes. Ground: Soil, compact.
- 5679 SE. Menefee. Motion rapid, lasted 5 seconds. Felt by many in home, frightened few. Rattled dishes. "Too fast to do anything but gasp." Ground: Sloping, steep.
- 3536 NE. 27th Ave. Motion slow, lasted 1-1/2 minutes. Felt by all in home. Frame creaked. Ground: Compact, level.
- 1030 SE. 54th Ave. (westerly side of Mt. Tabor). Motion rapid, lasted 30 seconds at least. Felt by several in home. Rattled dresser. Felt by those sitting; only heard by those standing. "Shaking preceded by noise like collision of cars." Ground: Soil, compact, sloping.
- 3125 SE. 67th Ave. Lasted 10 seconds. Felt by about 50 people in church. Not severe, but very evident. Rumbling like distant explosion accompanied shock.
- 1808 SE. 35th Place. Motion rapid, sharp, lasted about 1-1/2 minutes. Felt by all in home. Direction NW-SE. Rattled windows and dishes. Ground: Filled in.
- NE. 54th and Sandy. Motion rapid, lasted 5 seconds. Felt by 2 in home. Rattled windows and dishes. Ground: Soil, overlying gravel.
- 2932 NE. 47th Ave. Motion rapid, lasted 2 or 3 seconds. Felt by many in community. Ground: Rocky soil, compact, level.
- 5428 SE. 43rd. Motion rapid, lasted 5 seconds. Rattled windows and doors. Ground: Soil, compact, level.
- 7114 SW. Brier Pl. Motion rapid, lasted 6 to 8 seconds. Felt in home and community. Rattled windows, doors, and dishes. Ground: compact, sloping.
- 6105 NE. Rodney. Felt by several in home. Rattled windows and doors.
- 3317 NE. 30th Ave. Motion rapid, lasted about 3 or 4 seconds. Felt by all in home. Rattled windows and dishes. Ground: Compact.
- 11808 SW. Riverwood Rd. Motion rapid, very brief. Felt by one in home. Rattled windows. Ground: Soil, loose, level.
- 5231 SE. Lincoln. Motion rapid, lasted about 2 seconds. Felt by all in home. Ground: Compact, sloping.

- 15 December, 20:32:12*. Intensity IV in Portland. (cont.)
- 3106 NE. 61st. Motion rapid, lasted 30 seconds. Felt by several in home, frightened few in community. Rattled windows and dishes. Animals and birds disturbed. Ground: Rocky, level.
- 1670 SW. Sunset Blvd. Motion slow, lasted 6 seconds. Felt by all in home. Ground: Soil, sloping.
- 3816 SW. Vista Way (Vista Hills). Motion rapid, lasted 1 to 2 seconds. Felt by all in home. Rattled windows and dishes. Ground: Soil, compact, sloping.
- 3424 NE. Oregon St. Sharp shock, lasted 30 seconds. Rumbling heard. House creaked.
- 3730 NE. Multnomah. Objects swung for some time.
- 0644 SW. Palatine Hill Rd. Strong motion was brief, about 10 seconds or less. Felt by all in home, frightened few. Mainly a low rumble heard. House creaked. Ground: Soil, compact, sloping.
- 3107 NE. 32nd Ave. Motion rapid, lasted 2 seconds. Felt by all in home. Sounded like car door being slammed out on street. Ground: Compact.
- 4206 NE. 30th. Motion rapid, 2 jolts, lasted about 3 seconds. Felt by observer in home; not noticed in basement. Rattled windows; walls creaked. Ground: Deep gravel and soil, level.
- 1561 SE. Linn St. Motion slow, lasted 15 seconds. Rattled windows. Ground: Compact.
- 10936 SW. 55th Ave. Motion rapid, lasted about 10 seconds. Felt by all in home, frightened few. Rattled windows and dishes. Ground: Rocky, sloping.
- 4327 SE. 26th Ave. Lasted 2 seconds. Windows rattled. Ground: Marshy.
- 6535 SE. Clinton St. Motion rapid, lasted 5 seconds. Felt by all in home. Direction vertical. Ground: Soil.
- 7185 SW. Lakeview Dr. Motion rapid, lasted a few seconds. Felt by and frightened all in home. Rattled windows and doors. Rumble like thunder heard. Ground: Compact, sloping.
- 2334 SE. Main St. Motion rapid, lasted about 30 seconds. Felt by observer in home. Rattled windows. Furniture swayed. Ground: Compact clay, level.
- 1966 SW. 5th Ave. Motion rapid, lasted 5 seconds. Three shocks felt with diminishing intensity. Motion rapid, lasted 5 seconds. Felt by all in home. Rattled windows and doors. Ground: Soil, compact, level.
- 3317 NE. 31st Ave. Shock heard rather than felt, explosive-like sound, lasted about 1 minute. Felt by all and frightened few in home. Rattled windows, doors, and dishes. Ground: Soil, filled in, sloping.
- 2504 NE. Dunckley St. Lasted 30 seconds. Felt by all in home. Rattled windows and doors; walls creaked. Ground: Glacial moraine.
- 1131 SW. Montgomery St. Motion rapid, momentary duration. Felt by all on 5th floor sitting. Ground: Compact.
- 2522 NE. 57th Ave. Motion rapid, lasted 10 seconds. Felt by 2 out of 3 in home. Rattled doors. Person standing heard rumble, but did not feel shock; person sitting heard rumbling sound and felt N-E motion. Sounded like a heavy object hit the roof and rolled along the length of the roof from W-E. Ground: Gravel, level.

15 December, 20:32:12*. Intensity IV in Portland. (cont.)

Old Oregon Shipyard. Motion slow, lasted 4 seconds. Felt by observer. Direction N. Laboratory equipment rattled. Frame creaked. Ground: Sand fill, level.

3441 NE. Oregon St. Motion rapid, lasted 30 to 45 seconds. Felt by many in community (some outdoors). Rattled windows. "Very sharp. Felt like an explosion right under my chair. House creaked sharply just once. Many people in area ran to basements, thinking furnaces had exploded." Ground: Soil, loose, level.

02473 SW. Military Rd. Motion rapid. Felt by observer in home. House creaked. Felt like concussion from nearby dynamite explosion. Ground: Soil, sloping.

2612 NE. 23rd Ave. Sharp, rapid shock, with no warning or aftershock. Felt by all in home. Rattled windows, doors, and dishes; house creaked. Ground: Gravelly, level.

5933 SE. Lafayette St. Motion rapid, lasted a few seconds. Felt by observer in home. Direction indoors N. "Noise and force was like big gust of wind against north wall of house. Buffet shook enough for door to swing open. Door was not closed tightly. Dishes in buffet rattled, but not those in china closet against south wall." Ground: Loose, level.

4016 N. Castle Ave. Motion rapid, lasted 5 seconds. Felt by all in home. Rattled everything; house creaked. Ground: Soil, compact, level.

1832 SW. Salmon. Motion rapid, lasted 15 seconds. Felt by 2 in home. Rattled windows, doors, and dishes. Ground: Sloping; steep to east.

7814 SW. Corbett Ave. Motion slow, lasted about 3 seconds. Felt by all in home. Ground: Soil, compact, level.

2658 SW. Corona. Motion rapid, lasted 2 seconds. Felt by all in home. Direction E-W. Ground: Loose.

141 NE. Buffalo St. Motion rapid, lasted 5 to 10 seconds. Felt by all in home. Trees, bushes shaken slightly. Ground: Soil, compact, sloping.

No address given. Motion sharp, lasted about 2 or 3 seconds. Felt in home, frightened few. Ground: Soil, sloping.

Intensity I to III in Portland:

8030 SW. Ruby Terrace. Motion slow, lasted 3 to 4 seconds. Felt by several in home. Ground: Compact, sloping.

Kings Heights District. Felt in home. Ground: Soil, sloping, steep.

1534 SE. 56th Ave. Motion rapid. Felt by observer in home. Ground: Sloping, compact. "Sharp shock, no swaying."

8131 SE. Crystal Springs. One jolt. Felt by observer in home. Direction seemed N-S. Ground: Gravelly, level.

3145 NE. 46th Ave. Motion rapid, lasted about 3 to 5 seconds. Felt by observer in home. Rattled windows, doors, dishes slightly. Ground: Gravelly, level.

2064 SE. 72nd Ave. Motion rapid, lasted 2 seconds. Felt by observer in home. Sounded and felt like nearby explosion. Ground: Soil, compact, level.

SE. Glisan and 20th Ave. Felt by several. Rumbling heard. Vertical motion. Ground: Level, compact.

5305 SE. Ramona St. (SE. Portland area). Motion jarring, rapid, lasted 1 second. Felt by several in home. Ground: Compact, level.

- 15 December, 20:32:12*. Intensity I to III in Portland. (cont.)
- 7315 SE. 52nd Ave. Motion slow, lasted 5 seconds. Felt by observer in home. "Errol Heights Fire Department was inspected for earthquake effects but none were noticed. Other business places just felt a slight tremor; some people in homes were not aware that a shock had occurred." Ground: Compact, level.
- 2914 SW. Labbe Ave. Motion slow, lasted about 30 seconds. Felt by several in home. Ground: Rocky soil, compact, sloping.
- 3934 SE. Boise. Motion slow, 3 sharp jolts, lasted about 2 minutes. Felt by observer in home. Ground: Soil, compact.
- 8014 SE. 35th Ave. Motion slow, lasted 5 to 10 seconds. Felt by 2 in home. Ground: Soil, compact, level.
- 1504 SE. Oxford (Waverly Heights near Milwaukie and mouth of Johnson Creek). Motion rapid, lasted 1 second. Felt by several in home. "Sensation was more like the slamming of an outside door than anything else." Ground: Boulders and clay, level and sloping.
- 6930 SE. 32nd Ave. Motion slow, lasted 3 seconds. Felt by observer in home. Ground: Soil, level, sloping.
- SE. Portland area (West Moreland District). "We were in a group in West Moreland District in SE. Portland in a frame house. Those sitting on inside wall felt nothing at all; those near outside wall felt just a slight jar, not violent enough to describe."
- 6116 NE. Cleveland. Motion jerky, lasted a few seconds. Felt by observer in home. Ground: Soil, compact, level.
- 4931 NE. Glisan St. Motion slow, lasted about 8 seconds. Felt by several in apartment. "Sounded like rumble of passing freight train about 2 blocks away, only sharper." Ground: Soil, compact, sloping.
- 2269 NW. Everett. Motion rapid, lasted 2 to 3 seconds. Felt by observer in home. Ground: Soil, compact.
- 4017 NE. Shaver St. Motion rapid, lasted 3 seconds. Felt in home. Trees, bushes shaken slightly. Ground: Gravelly, level.
- 1350 SE. Flavel St. Lasted about 30 seconds. Felt by observer. Ground: Soil, level.
- 3540 NE. Couch St. Motion rapid. Felt by observer in home. Direction NE. "At the time I was not sure if it was an earthquake or an explosion. I have felt many earthquakes both in the States and in South America and this shock seemed different than the others." Ground: Compact.
- 1202 SW. Cardinell Dr. Motion rapid, lasted a few seconds. Felt by 2 in home.
- Y.M.C.A. Building (downtown Portland). Motion slow, lasted about 3 seconds. Felt by observer sitting in room. Ground: Compact, level.
- Corner SW. 20th and Main. Motion rapid, lasted 1 or 2 seconds. Felt by observer in home; wife walking and did not notice it. Direction E-W. Ground: Soil, compact, sloping.
- 10707 NE. Glisan St. Motion felt which seemed to start at the south end of the house and move north. Two other locations several blocks SE. of this location merely felt a slight jolt.
- Roy. VI. Motion rapid, lasted 5 to 7 seconds. Felt by all in entire area, frightened many. Direction E-W. Rattled windows, doors, and dishes. Hanging objects swung E-W. Cracked plaster. Knick-knacks fell. Ground: Soil; marshy at 200 to 300 ft.

15 December, 20:32:12*. (cont.)

Intensity VI in Washington:

Vancouver, 316 W. 44th St. Motion rapid, lasted 6 seconds. Felt by many in home, frightened 10-year-old child. Rattled windows; walls creaked slightly. Hanging objects swung. Cracked plaster in newer home. Ground: Rocky soil, loose, level.

Vancouver. Motion sharp. Felt by and frightened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Cracked plaster. Damage slight. "Seemed more sudden and sharper than last shock. My commercial building of block and concrete shaken badly, but slight damage." Ground: Soil, level.

Vancouver, 907 W. 44th St. IV. Motion rapid, lasted a few seconds. Felt by and frightened all in home (3). Rattled windows, doors, and dishes. Ground: Soil, level.

Vancouver (Minnehaha Grade School). IV. Lasted about 5 seconds. Felt by all at school program. Noise from stage props. Ground: Soil, compact.

Vancouver, 2901 Columbia St. IV. Motion rapid, lasted about 1-1/2 minutes. Felt by 2 in home, awakened and frightened few in community. Rattled windows; walls creaked. Ground: Level, compact.

Vancouver Barracks. IV. Motion rapid, lasted about 10 to 15 seconds. Difficult to determine whether it was an earthquake, explosion, or heavy truck passing. Very light shock. Direction N-S. Felt by many and frightened few in community. Rattled windows. Ground: Gravelly, compact.

Intensity V in Oregon:

Beaverton. Motion rapid, lasted 2 seconds. Felt by all in building, outdoors by some, frightened many in community. Rattled windows. "Phones went dead." Ground: Soil, compact, level.

Beaverton Airport. IV. Hangers rattled and doors shook. "At the time we thought it was a strong gust of wind. The shop hanger is of rather flimsy wood construction with a concrete floor laid over sod."

Canby. Motion rapid, lasted 5 seconds. Felt by several in home. "Our home is solidly built and our plaster did not crack, while some in Canby did. I was sitting at the table writing and felt my chair quiver. Knew it was an earthquake. Windows rattled in town. Did not awaken rest of family who had gone to bed." Ground: Soil, compact, level.

Clatskanie. Motion rapid, lasted about 4 seconds. Felt by many in home. Direction NE. Rattled windows, doors, and dishes. Trees, bushes shaken slightly. Shifted small objects and furnishings. Ground: Rocky, sloping, steep.

Hillsboro. Motion slow, lasted 15 seconds. Felt by and frightened many in community, some outdoors. Direction N-S. Rattled windows, doors, and dishes. Hanging doors swung. Trees, bushes shaken slightly. Ground: Loose, level.

Hillsboro. IV. Motion rapid. Felt by many and frightened few in home. Direction E. Rattled windows, doors, and dishes; walls creaked. Ground: Soil.

15 December, 20:32:12*. Intensity V in Oregon. (cont.)

McMinnville, 10th and Evans Sts. Motion slow, lasted 5 seconds. Felt by observer in home. Shifted small objects. Ground: Compact soil. Another observer reported: "No shock felt in this area."

Intensity IV in Oregon:

Aurora. Motion rapid, instantaneous. A rapid hard jolt. Felt by many in community, all in buildings. House creaked. Ground: Compact, level soil.

Buxton. Estimates of duration ranged from 2 to 5 seconds. Felt by many and frightened few in community, some outdoors. Rattled windows; house creaked. Electric wires on house whipped. Roaring noise reported by one person.

Carlton. Motion rapid, lasted 1 second. Felt in home. Rattled windows, doors. Ground: Soil, sloping.

Forest Grove. Motion rapid, lasted 5 to 10 seconds. Felt by observer in Post Office. Rattled windows and doors. Ground: Soil, loose.

Forest Grove. Motion rapid, lasted 3 to 4 seconds, jar only. Felt by many in home, frightened few in community. Frame creaked. "In basement of 2-1/2 story house there was a definite creaking and jar." Ground: Soil, compact, level.

Milwaukie, 1 mile south of. Motion moderate, lasted 10 to 15 seconds. Felt by all in home, frightened one. Direction vertical. Rattled lamp shades. Ground: Soil, compact, level.

Milwaukie. III. Motion rapid, lasted 20 seconds. Felt by several in home. Ground: Soil, loose, level.

Multnomah (near). Felt by many in community, frightened few. "I was asleep. I awakened about 8:30 p.m., but did not know about the shock until morning." Ground: Compact, sloping and steep.

Multnomah. III. Observer in basement did not feel shock; family upstairs noticed slight motion. Ground: Compact, sloping.

Newberg. Motion rapid, lasted 2 or 3 seconds. Felt by several in home. Direction E-W. Rattled windows, doors, and dishes. Hanging objects swung E-W. Ground: Soil, level.

Oak Grove, 1-1/2 miles east of. Motion slow. Sound like wind blowing heard. Felt by observer in home. Direction W-E. Rattled doors; frame creaked. Ground: Rocky, loose, sloping.

Oak Grove. III. Motion slow, lasted about 30 seconds. Felt by observer in home. Ground: Soil, compact, level.

Oregon City. Motion rapid, lasted about 1/2 second. Felt by several in home. Rattled windows and doors; frame creaked. Hanging objects swung E. Ground: Compact, level.

Oswego. Motion rapid, lasted 1 second. Felt by several in home. House creaked. Ground: Rocky, sloping, steep.

Oswego. III. Motion rapid, brief. Felt by several in home. Ground: Rocky. "Felt like a blast."

Oswego, 1 mile north of. III. Motion rapid, lasted 2 minutes. Felt by several in home and community. Rattled windows, doors, and dishes very slightly. "Thought it was a freight train below our rocky headland." Ground: Very solid rock.

Oswego. III. Motion rapid, lasted 30 seconds. Felt by 2 in home. Ground: Rocky, sloping and steep.

15 December, 20:32:12*. Intensity IV in Oregon. (cont.)

Tigard. Motion rapid, lasted 20 seconds. Felt by many in community.
Ground: Sandy.

Troutdale. Motion slow, lasted 5 to 6 seconds. Felt by observer at work. Rattled windows and doors; building creaked. "Electrical recording meters affected at Bonneville substation but not at Troutdale Aluminum Plant. Possibly meters faced in different directions." Ground: Sand fill, level.

Troutdale. Motion rapid, lasted 1 second. Felt by all in home. Rattled windows and doors. "Felt like shock from large bomb. Shaking severe and short."

Troutdale. Motion rapid, lasted about 10 seconds. Felt by several in home. Rattled windows, doors, and dishes. "I was standing on concrete garage floor. Noticed and heard sharp, strong jar which rattled fruit jars on nearby shelves. Wife upstairs felt shock, too. Strong easterly wind blowing which had been causing some vibration of house and noise from TV antenna. Shock was distinctly noticeable above this."

Woodburn. Felt by several in community, frightened few. Rattled windows, doors, and dishes slightly; house creaked. Hanging objects swung. Shifted small objects slightly. Ground: Soil.

Intensity IV in Washington:

Battle Ground. Motion bumping, rapid onset. Felt by many in community. Buildings creaked; loose objects rattled. "Very definitely an earthquake of very short duration. Made one feel funny inside. At first I thought the children were rolling furniture around in the adjoining room but soon realized that they could not create that strong an up-and-down shake with any thing they could handle." Ground: Rocky.

Kalama. Sudden bump and jar. Felt by several. Building creaked; loose objects rattled. Ground: Clay soil with some rock in subsoil; on hillside.

Intensity I to III in Oregon:

Amity. Momentary duration. Felt by several in community, some outdoors. Ground: Soil, level.

Molalla. Motion rapid, lasted 5 seconds. Felt like heavy blast. Felt by several in community. Ground: Rocky, compact.

Plymouth (press reported this location as Plymouth; could not be located on map, possibly Philomath). Just southwest of Corvallis. Press reported screen door banged and dishes rattled slightly.

Rex. Motion slow, lasted 1 or 2 seconds. Felt by several in home. Dull thud heard. Seemed to be single slip to south. Ladder creaked. Ground: Compact, sloping.

Saint Helens. Motion slow, momentary duration, slight jar. Ground: Rocky.

Salem. Motion slow. Felt by observer in home. Mostly felt as slight vibration. Heard rumbling noise. Ground: Soil, valley fill.

Towns reporting the shock felt (no details):

Dundee, 1/4 mile west of (Red Hills).

Gable, 4 miles south of.

Mill City. (Press)

15 December, 20:32:12*. Towns reporting the shock felt (no details). (cont.)
Oswego Lake, about a mile north and east of (on edge of Trion Creek
ravine.
Vernonia. (Press)
Williamette.

Intensity I to III in Washington:

Kelso, 6 miles north of (on Sandy Bend loop just west of west side of
Highway 99. Shock distinctly felt and heard.

Reported not felt in Oregon:

Albany, Astoria, Cannon Beach, Corvallis, Dallas, Detroit Dam (Detroit),
Eugene, Gervais, Gresham, Hood River, Jefferson, Monmouth, Mount Angel,
Newport, Pendleton, Stayton.

Reported not felt in Washington:

Kelso, Longview, Vancouver (east section).

-- December.

No earthquakes were reported felt during the month of December at the
following places:

Weather Bureau Stations:

Washington: Seattle.

- - - - -

WESTERN MOUNTAIN REGION

(105th Meridian or Mountain Standard Time)

8 October, 13:19:46*. State of Arizona.

Epicenter 34-3/4°N, 111°W. W.

Leupp. IV. Motion rapid, momentary duration. Felt by 2 on west side
of house. "Other residents in the community did not feel the
shock. It was very still when we felt it. Door on south swayed;
windows rattled on west side of house. Ground: Level, soil.

Red Hill Ranch (35 miles SW. of Winslow). V. Sharp rumble, rapid onset.
House shook. Wall paper cracked.

State Route 65 between Macks Crossing and Bly (about 34°39'N, 111°07'W).

IV. Single jar, rapid onset. Felt by 2 in small house trailer.
Trailer shaken. "Shock first taken for dynamite blast, but no
blast could be seen. Subterranean sounds heard a few seconds
before shock was felt. This appears to be an active area. At
tank in the road in the same area the bedrock has opened out
across the road in the past year, showing at the surface by a
vertical-sided pothole in the topsoil in the road. Pebbles
dropped in the crack, which lies in a N-S direction, indicate
a depth of at least 20 feet." Ground: Rocky soil over sandstone
bedrock.

Reported not felt:

Flagstaff, Holbrook, Young.

21 October, 20:00 (about).

Panguitch, Utah area (Garfield County). V. The press reported a damaged potato cellar north of Panguitch appeared to be the only damage from recent earthquake shocks felt in this area. Three 2-foot pine log timbers snapped in the cellar, letting tons of dirt down onto the newly harvested crop of potatoes. Residents of Panguitch reported three sharp earthquake shocks during the past week. The first and most severe was felt about 8 p.m. on October 21 and was likened to the reverberation of a window-rattling explosion. Some thought boiler or furnace had exploded. The second shock was reported on October 24 at 1:50 p.m. This time some people said it felt like the floor had dropped out from under foot for a fraction of an inch, and there was a blast-like sound.

-- October.

No earthquakes were reported felt during the month of October at the following places:

Weather Bureau Stations:

<u>Idaho:</u>	None.
<u>Montana:</u>	"
<u>Nevada:</u>	"
<u>New Mexico:</u>	"

23 November, 06:30.

Helmville, Mont. V. Motion rapid. Rattled windows, doors, and dishes. Knocked clock off shelf. Broke water pipe in basement.

-- November.

No earthquakes were reported felt during the month of November at the following places:

Weather Bureau Stations:

<u>Arizona:</u>	None.
<u>Colorado:</u>	"
<u>Idaho:</u>	"
<u>Nevada:</u>	"
<u>New Mexico:</u>	"
<u>Utah:</u>	"

-- December.

No earthquakes were reported felt during the month of December at the following places:

Weather Bureau Stations:

<u>Arizona:</u>	None.
<u>Colorado:</u>	"
<u>Idaho:</u>	"
<u>Nevada:</u>	"
<u>New Mexico:</u>	"

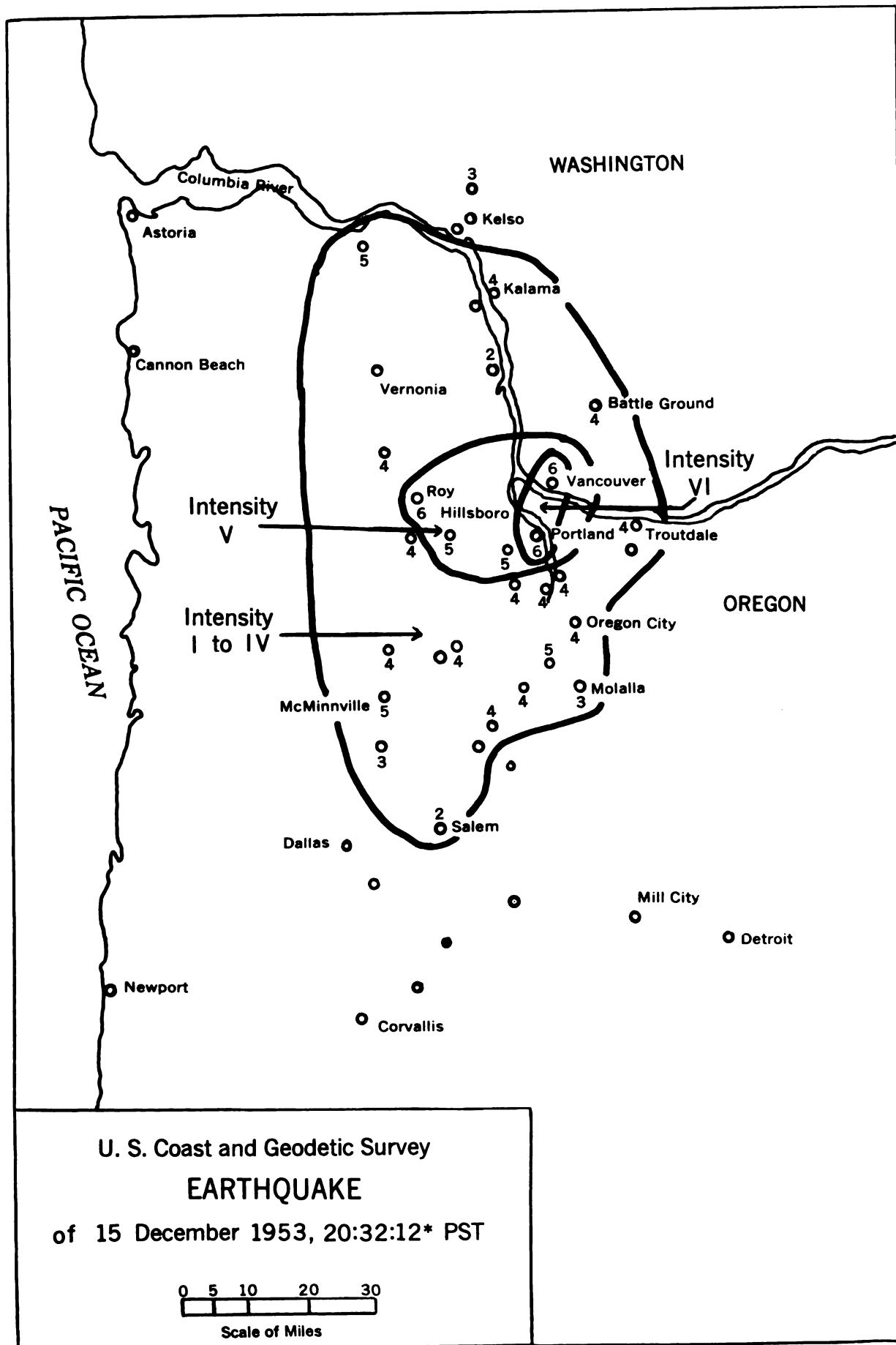
- - - - -

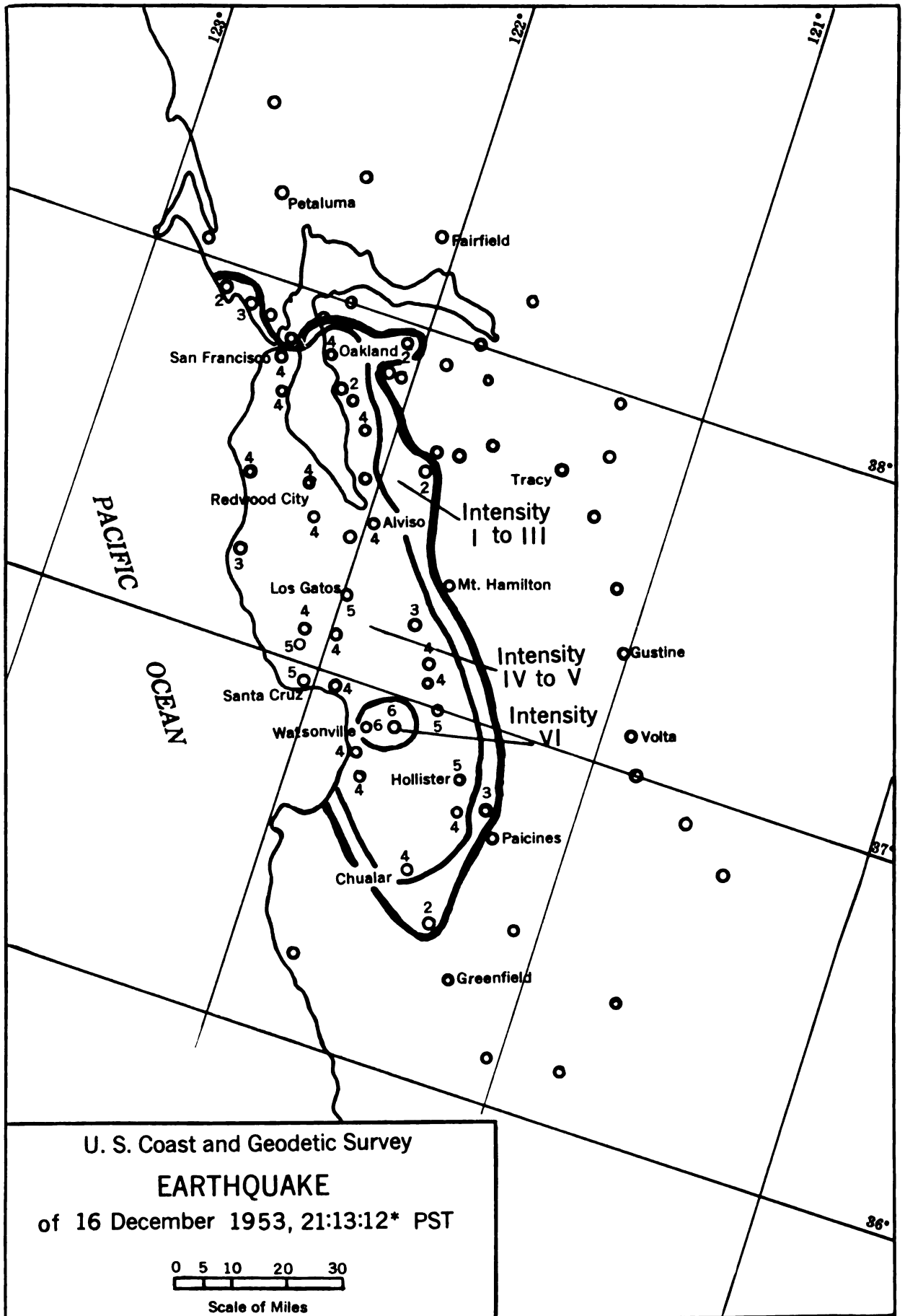
BOULDER CITY

(120th Meridian or Pacific Standard Time)

- 9 October, 14:21:13*. BC.
Boulder City and Hoover Dam. IV. Felt by many in Boulder City and
Hoover Dam. Rattled windows, doors, and dishes.
- 11 October, 19:15:28*. BC.
Boulder City. III. Felt by several.
- 11 October, 01:48:48*. BC.
Boulder City and Hoover Dam. IV. Awakened many.

- - - - -





MODIFIED MERCALLI INTENSITY SCALE OF 1931
(Abridged)

- I. Not felt except by a very few under especially favorable circumstances. (I Rossi-Forel Scale)
- II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (I to II Rossi-Forel Scale)
- III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing truck. Duration estimated. (III Rossi-Forel Scale)
- IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls made creaking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. (IV to V Rossi-Forel Scale)
- V. Felt by nearly everyone; many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel Scale)
- VI. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight. (VI to VII Rossi-Forel Scale)
- VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars. (VIII Rossi-Forel Scale)
- VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Disturbed persons driving motor cars. (VIII+ to IX Rossi-Forel Scale)
- IX. Damage considerable in specially designed structures; well designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX+ Rossi-Forel Scale)
- X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks. (X Rossi-Forel Scale)
- XI. Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipe lines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
- XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

U. S. DEPARTMENT OF COMMERCE

Sinclair Weeks, Secretary

COAST AND GEODETIC SURVEY

R. F. A. Studds, Director

ABSTRACTS OF EARTHQUAKE REPORTS
FOR
THE PACIFIC COAST AND THE
WESTERN MOUNTAIN REGION

MSA-81

January, February, March, 1954

Issued by the U. S. Coast and Geodetic Survey

Washington, D. C.

1954

FOR OFFICIAL USE

KARL DYK

162
2
54

DEPARTMENT OF COMMERCE

U. S. Coast and Geodetic Survey

Seismological Field Survey
14 Old Mint Building
San Francisco 3, California

ABSTRACTS OF EARTHQUAKE REPORTS FOR THE PACIFIC COAST
AND THE WESTERN MOUNTAIN REGION

MSA-81

1 January 1954 to 31 March 1954

The information in this report has been collected by the Seismological Field Survey of the U. S. Coast and Geodetic Survey with the assistance of State Collaborators in Seismology and through the voluntary cooperation of many local organizations and individuals. Additional cooperation is solicited. Blank questionnaires and special information pertaining to the work may be obtained by addressing the Director, U. S. Coast and Geodetic Survey, Washington 25, D.C.; the Chief, Seismological Field Survey at the above address; or the following State Collaborators in Seismology:

Arizona:	Dr. Eldred D. Wilson, University of Arizona, Tucson.
Colorado:	Dr. C. A. Heiland, Heiland Research Corporation, Denver.
Montana:	Professor Stephen W. Nile, Montana School of Mines, Butte.
Nevada:	Dr. David B. Slemmons, University of Nevada, Reno.
New Mexico:	Professor Stuart A. Northrop, University of New Mexico, Albuquerque.
Oregon:	Dr. Ira S. Allison, Oregon State College, Corvallis.
Utah:	Professor J. Stewart Williams, Utah State Agricul- tural College, Logan.
Washington:	Professor Howard A. Coombs, University of Washington, Seattle.
Wyoming:	Professor Horace D. Thomas, University of Wyoming, Laramie.

Copies of these reports may be obtained from the Supervisor, Western District, U. S. Coast and Geodetic Survey, 121 Customhouse, San Francisco 26, California; or from the Washington Office.

Earthquake information and questionnaire reports in the immediate vicinity of Lake Mead are collected by the Boulder City, Nevada office of the Seismological Field Survey, U. S. Coast and Geodetic Survey.

The abstracts are divided into three groups: (1) California and Western Nevada, (2) Washington and Oregon, and (3) the Western Mountain Region. This follows the scheme of classification in United States Earthquakes.

Intensity numbers refer to the Modified Mercalli Intensity Scale of 1931, in which, in the lower intensities, the disturbance of inanimate objects and personal reactions are given about equal weight. This intensity scale appears in abridged form on the last page of this report. All reports of whatever intensity from any town are listed under the highest intensity reported. Omission of intensity rating indicates insufficient information.

This report is prepared with the active collaboration of Professor Perry Byerly of the Seismographic Station of the University of California, and staff members of the Seismological Laboratory, California Institute of Technology. This permits an authentic appraisal of the material abstracted in the light of available instrumental and other information. Newspaper reports have been furnished by cooperative observers only and do not represent the results of a complete newspaper clipping service.

A condensed summary of these reports is published annually in the serial publication of the U. S. Coast and Geodetic Survey entitled "United States Earthquakes."

CALIFORNIA AND WESTERN NEVADA

(120th Meridian or Pacific Standard Time)

All places mentioned are in California unless otherwise stated

Time marked with asterisk (*) determined instrumentally: Berkeley (B),
Boulder City (BC), Pasadena (P), and Washington (W).

1954

- 1 January, 05:30:00*.
Epicenter 39.0° N., 123.2° W., 8 miles south of Ukiah. (B)
Ukiah (about 4 miles SSW. of). III. Two shocks close together.
Felt by several. Ground: Rocky.
- 4 January, 10:50:56*, 15:31:52*.
Epicenter for first shock $33^{\circ}16'$ N., $116^{\circ}03'$ W., near Truckhaven;
second shock $33^{\circ}16'$ N., $116^{\circ}06'$ W., near Borego Valley. (P)
San Geronio Pass. "Residents of the Pass reported feeling two earth-
quakes on January 4, the first at 10:50 A.M., the second at
3:32 P.M., P.S.T., a third tremor was reported as occurring
about 8 P.M. on January 5." (BSSA, April 1954)
- 5 January, 19:48:44*.
Epicenter $33^{\circ}57'$ N., $116^{\circ}58'$ W., near Beaumont. (P)
Hemet. IV. Felt by several in home. Rattled windows and doors.
"Slight shake." Ground: Soil.
- 11 January, 15:34. No disturbance recorded by Palo Alto seismographs at
this time. (B)
Palo Alto (SE. section). II. Felt by very few in area. Ground: Adobe.
- 12 January, 03:02:00*.
Epicenter $35^{\circ}10'$ N., $118^{\circ}31'$ W., northwest of Tehachapi. (P)
Tehachapi (central section). IV. Heavy shaking, rapid onset, lasted
3 seconds. Direction seemed W-E. Very loud humming sound
heard during shock. Felt by many. Creaking of buildings and
rattling of loose objects heard by many. Ground: Rocky.
- 12 January, 15:33:49*.
Epicenter $35^{\circ}00'$ N., $119^{\circ}01'$ W., west of Wheeler Ridge Post Office;
epicenter very close to that of the major earthquake of 21 July
1952. (P)
Strong and widely felt aftershock of 21 July 1952 Kern County earth-
quake. The generally felt area was approximately 35,000 square
miles. (See map.) In Sacramento, San Diego, and San Francisco
it was reported felt slightly by very few on the upper floors
of tall buildings. Maximum intensity of VII-VIII occurred in
a small area of southwest Kern County between Wheeler Ridge and
Buena Vista Lake. The Press reported a 12-inch gas pipeline was

12 January, 15:33:49*. (cont.)

broken on the Ridge Route between Los Angeles and Taft, gas pipelines in the Maricopa Flats area south of Taft were damaged, and pipelines were cracked at the Paloma Oil Field. One isolated instance of damage was reported from Long Beach, where an old 2-story frame house slid off foundation, causing considerable damage to the structure.

Intensity VII-VIII:

Maricopa Seed Farm (about 15 miles E. of Maricopa). Inspectors from the Pacific Fire Rating Bureau reported the main damage occurred at the Maricopa Seed Farm, as follows: Broke bracing rods (rod details poor) in 3 steel-frame corrugated-iron buildings designed to resist lateral force of 5 per cent gravity. Stretched anchor bolts on 100-foot elevated water tank; one tank base shattered. Asphalt paving cracked. Some concrete-pipe and steel-line breakage. Unanchored platform pole transformers fell in an area around the Maricopa Seed Farm within a radius of about 2-1/2 miles. Toppled stacked seed boxes.

Intensity VI:

- Arvin.** Motion slow, lasted 1 minute. Felt by all in post office, outdoors by some, frightened many. Rattled windows, doors, and dishes; houses creaked. Hanging objects swung. Trees, bushes shaken moderately. Shifted and overturned small objects. Cracked plaster. Damage slight. Ground: Compact.
- Bakersfield.** The Press reported a sharp shock with rolling motion. Direction NW-SE. Workmen on buildings hurried from scaffoldings for safety and many people rushed from stores and office buildings. Only building damage reported was a 20-foot crack in an inside wall of the Bakersfield Savings and Loan Company. Switchboard at the office of the Bakersfield Californian was out of commission temporarily.
- Bakersfield.** Motion slow, lasted 35-40 seconds. Felt by many in office, frightened few. Direction NE. Rattled windows, doors, and dishes. Hanging objects swung NE. Lamps suspended 3 feet from ceiling swung in an arc of approximately 2 feet. Trees, bushes shaken moderately. Very slight plaster cracks. Ground: Soil, level, compact.
- Bakersfield.** Motion rapid, lasted 30 seconds. Felt by all and frightened many in community. Rattled windows, doors, and dishes. Hanging objects swung N-S. Pendulum clock facing S. stopped. Trees, bushes shaken moderately. Ground: Soil, level, compact.
- Bakersfield.** Motion slow, lasted about 1 minute. Felt by all, frightened few. Direction NE-SW. Rattled windows, doors, and dishes. Pendulum clock facing E. stopped. Trees, bushes shaken strongly. Shifted small objects and furnishings. Ground: Sandy soil, level.
- Cuyama (central section).** Motion swaying, N-S, gradual onset, lasted 15 seconds. Felt by all, many alarmed. Buildings creaked; loose objects rattled. Disturbed objects observed by all. Visible swaying of buildings and trees. Pictures moved N-S. Ground: Sandy.

12 January, 15:33:49*. Intensity VI. (cont.)

Cuyama. IV. Motion rolling, lasted 30 seconds. Felt in post office. Direction N-S. Rattled windows, doors, and dishes slightly; house creaked some. Hanging objects swung. Ground: Compact.

Di Giorgio. Motion slow, lasted about 30 seconds. Felt by all in community, frightened few. Direction NW. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Shifted small objects and furnishings. Few knickknacks, etc., fell. "In my opinion this shock was the strongest of the rolling kind and had the longest duration." Ground: Soil, compact, level.

Mison. Motion slow, lasted about 1 minute. Frightened many in community. Direction S-N. Rattled windows and doors; walls creaked. Hanging objects swung S-N. Trees, bushes shaken moderately. Shifted and overturned small objects. Ground: Compact.

Mison Oil Field (Sec. 23, T30S., R29E.). V. Motion slow and twisting, lasted about 10 seconds. Felt by all in community. Direction indoors N-S. Rattled windows and fluorescent fixtures; house creaked. "Shock was strong, slow, and twisting, and felt generally. Ended with up-and-down motion." Ground: Soil, compact.

Frazier Park. Motion rolling, lasted 6 seconds. Felt by all and frightened many in community. Direction E-W. Rattled windows, doors, and dishes; house creaked. Hanging objects swung E-W. Shifted small objects. Knickknacks fell. The Press reported 3 shocks were felt, one about 8 minutes after the first, and the third about 3 hours later. Ground: Rocky soil, sloping.

Goleta. Motion gentle, rolling, slow, lasted about 15 seconds. Felt by several in office, outdoors by observer, frightened few in community. Rattled windows; house creaked. Hanging objects swung. Slight plaster cracks; some plaster fell. Damage slight. Ground: Soil, level.

Goleta. IV. Motion slow, lasted about 30 seconds. Felt by all in post office. Building creaked. Ground: Soil, level.

Gorman. Motion slow. Felt by all in community. Direction N. Rattled windows, doors, and dishes. Hanging objects swung. Shifted small objects. Ground: Soil, level.

Jawbone Aqueduct Station (35°18' N., 118°02' W.). Motion rapid, lasted 6 seconds. Felt by many in community (some outdoors). Direction NW-SE. Rattled windows, doors, and dishes; houses creaked. Trees, bushes shaken slightly. Cracked plaster. Ground: Level, Compact.

Lake Hughes. Motion slow, rolling, lasted 1 minute. Felt by all in community, frightened few. Direction NE. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Shifted small objects. Ground: Decomposed granite, sloping.

Lamont. Motion rapid. Felt by all in community, frightened few. Direction E-W. Hanging objects swung E-W. Pendulum clock facing S. stopped. Trees, bushes shaken moderately. Ground: level, compact.

Lebec. Motion rapid, lasted about 1 minute. Felt by all and frightened few in community. Direction N. Rattled windows, doors,

12 January, 15:33:49*. Intensity VI. (cont.)

and dishes; frame creaked. Hanging objects swung N. Trees, bushes shaken moderately. Shifted and overturned small objects. Knickknacks fell. Broke one bottle in store. Ground: Soil, compact.

Long Beach. The Press reported a house at Long Beach fell off foundation. Police said the building, which housed 3 apartments, was a total loss. (Two-story frame house and appeared old from picture in newspaper.) The house shook and swayed for an hour after the shock, then finally slid off foundation, settling on the ground 18 inches west of its 2-foot-high foundation. Caused cracked walls, broken gas pipes, and a general warping of the entire building.

Long Beach. V. Motion slow, lasted 1 minute. Felt by several in post office, frightened few in community. Rattled windows. Hanging objects swung. Pendulum clock facing N. stopped. Shifted small objects. Damage slight, if any. Ground: Level, compact.

Long Beach (6th and Pine Sts.). IV. Motion swaying, rapid onset. Felt by many.

Los Angeles. The Press reported minor plaster cracks in the walls of the City Hall above the 20th floor. Bottled water containers nearly toppled. Chandeliers swayed throughout the city. In the greater Los Angeles area, the southwestern part seemed to have been shaken the hardest, but a few cracked windows was the only damage reported. All sheriff's substations in the county reported feeling the earthquake.

Los Angeles (Weather Bureau Airport Station, 5900 Avion Drive). V. Motion rolling, N-S, abrupt onset. Felt by many, general alarm. Buildings creaked; loose objects rattled. Disturbed objects observed by many. Visible swaying of buildings and trees; doors swung N-S. Ground: Soil.

Los Angeles (Weather Bureau Office, Post Office Building). V. Several shocks. Motion rocking and swaying. Direction variable. Felt by many, few alarmed. Disturbed objects observed by several. Windows and clock pendulums rattled. Ground: Made.

Los Angeles (828 South Figueroa St.). V. Felt by many. Objects swung and were displaced. "Personnel of our office, located on the second and fifth floors of the building, felt the motion quite definitely. A visitor and I were sitting in my office on the ground floor, which is a slab directly on earth, and we did not notice it at all. One rod hanger, out of many, supporting a commercial fluorescent light fixture on the fifth story of a reinforced-concrete building, broke at the connection. The connection was poorly made, the threads being barely engaged." Ground: Sandy.

Los Angeles (124 West 4th St.). V. Motion swaying, NW, rapid onset. Felt by many, very few alarmed. Building creaked; loose objects rattled. Disturbed objects observed by few. Visible swaying of buildings and trees. Old patched cracks were reopened. "Everyone on upper stories (4 or more high) of buildings in this area noticed the shock and at least stopped work. I noticed that in alley on the ground outside my window, men who were shoveling debris did not pause in their work and apparently did not notice it. I later interviewed a taxi

12 January, 15:33:49*. Intensity VI. (cont.)

driver and he did not notice it while driving in this area."

Ground: Gravelly soil; gently sloping terrain.

Los Angeles (6th and Grand Sts.). IV. Long duration. Felt by all in office building. Hanging objects swung. Ground: Compact.

Los Angeles (2500 West 6th St.). IV. Motion slow, lasted 45 seconds. Felt by all at place of business, frightened few. Hanging objects swung. Ground: Soil, compact, level.

Los Angeles (City Hall). IV. Motion slow, lasted 20 seconds. Felt by all in building, frightened few. Direction SE-NW. Rattled doors. Hanging objects swung. Ground: Soil.

McFarland. Motion slow, lasted 1 minute. Felt by all in community, some outdoors, active. Rattled windows, doors, and dishes slightly. Hanging objects swung N. Pendulum clock stopped. Ground: Soil, level.

McKittrick. Motion rapid, rolling. Frightened many in community. Direction NE. Rattled windows, doors; house creaked. Hanging objects swung. Pendulum clock facing N. stopped. Ground: Soil, sloping.

Maricopa. Motion rapid, lasted 45 seconds. Felt by all and frightened many in community. Direction SW. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Pendulum clock facing N. stopped. Shifted and overturned small objects. Cracked plaster. Knickknacks fell. Broke dishes. Damage slight. Ground: Compact, level.

North Hollywood. Motion slow, lasted about 3 seconds. Felt by and frightened many in community (some outdoors). Direction W-E. Rattled windows, doors, and dishes some. Hanging objects swung W-E. Cracked plaster. Damage slight to masonry and concrete. Ground: Soil, level.

North Hollywood (SW. section). IV. Two shocks in rapid succession. Motion rolling, NE-SW, onset was rapid jerk, then rolling, lasted 30-45 seconds. Rattling of loose objects heard by all in building. Overhead light fixtures swayed. Ground: Sandy.

Santa Barbara. Motion slow, lasted 45 seconds. Felt by and frightened many in home and community (some outdoors). Direction E-W. Rattled windows, doors, and dishes slightly; houses creaked slightly. Hanging objects swung E-W. Trees, bushes shaken slightly. Shifted small objects slightly. Plaster cracked and fell. Damage slight. Ground: Soil, compact, level.

Santa Barbara. Motion slow, lasted 15 seconds. Felt by all and frightened many in community. Direction NE. Rattled windows and doors; house creaked. Hanging objects swung NE. Knickknacks, books, and pictures fell. Broke dishes. "Possibly vases, etc., were broken." Ground: Soil, compact, level.

Santa Barbara (west section). V. Motion swaying, gradual onset. Felt by many. Buildings creaked; loose objects rattled. Visible swaying of buildings. Chandeliers swung. "Quite a few doubtful of movement." Ground: Sandy loam.

Santa Barbara (County Court House). IV. Motion rapid, lasted 20 seconds. Felt by many at work in Court House. Hanging objects swung. Ground: Level, compact.

12 January, 15:33:49*. Intensity VI. (cont.)

Santa Barbara. IV. Motion slow, lasted about 50 seconds, gentle rolling, E-W. Felt outdoors by some, frightened few. House creaked. Lights swung E-W. Ground: Compact, level.

Sequoia National Park (Three Rivers). Motion slow, lasted about 30 seconds. Felt by all in office, by some outdoors. Direction SE. Rattled windows and doors; walls creaked. Trees, bushes shaken moderately. Cracked plaster. Ground: Compact.

Shafter. Motion slow, lasted 5 seconds. Felt by all in community. Direction N-S. Rattled windows, doors, and dishes. Hanging objects swung N. Trees, bushes shaken strongly. Shifted small objects. Ground: Loose.

Taft. Motion rapid, lasted about 20 seconds. Very severe shake, with a low rumbling noise before and after. Felt by and frightened many. Rattled windows, doors, and dishes. Trees, bushes shaken strongly. Shifted and overturned small objects. Knickknacks, books, and pictures fell.

Taft. Motion rapid, lasted several seconds. Felt by and frightened all in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Pendulum clock stopped. Trees, bushes shaken strongly. Cracked plaster.

Tehachapi. The Press reported the police department described the shock as the strongest since the 21 July shock of 1952. Plates rolled off shelves. Jolted all buildings. Some telephone lines out near Tehachapi.

Tehachapi. Motion slow, lasted 20-30 seconds. Felt by all in post office, by others outdoors. Rattled windows and dishes; buildings creaked. Pendulum clocks facing N. stopped. Trees, bushes shaken slightly. Overturned small objects. "Another shock felt at 03:02 on same day." Ground: Soil, compact, level.

Tehachapi. V. Motion swaying, rapid onset, lasted about 10 seconds. Felt by most people. Buildings creaked; loose objects rattled. Roaring subterranean sounds heard by most people during shock. Disturbed objects observed by many. Ground: Rocky.

Ventucopa. Motion rapid, lasted 8 seconds. Felt by all in area, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Shifted small objects slightly. Cracked plaster. Broke one window. Shifted chimney. Knickknacks, books, and pictures fell. Damage slight. "Shock was short and snappy at end." Ground: Rocky soil, compact, level.

Ventura and Newhall areas. The Press reported broken telephone lines appeared to be the only damage in the Ventura-Newhall areas. Several new plaster cracks appeared in the City Hall at Ventura. All telephone lines out at Newhall.

Ventura. V. Motion slow, lasted 10 seconds. Felt by all in post office building, outdoors by some, frightened few. Direction N-S. Hanging objects swung N-S. Trees, bushes shaken moderately. Ground: Level, compact.

Wasco. Motion slow, lasted 1 minute. Felt by all in community. Rattled windows, doors, and dishes; walls creaked. Trees, bushes shaken strongly. Shifted small objects and furnishings. Cracked plaster. Damage slight. Ground: Soil, level.

12 January, 15:33:49*. Intensity VI. (cont.)

Wheeler Ridge. Motion rapid, lasted 25-30 seconds. Felt by all in community, frightened few. Direction N-NE. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N. Trees, bushes shaken strongly. Shifted and overturned small objects. Cracked plaster. Knickknacks fell. "Not felt in cars traveling N-S; strongly felt in cars traveling E-W. Felt stronger north of here at Mettler Station." Ground: Compact, sloping.

Intensity V:

Acton. Motion steady, lasted 20 seconds. Felt by many in home and community. Rattled windows, doors, dishes, and scales. Hanging objects swung N. Shifted and overturned small objects. Ground: Compact, level.

Bodfish (Borel Powerhouse). Moderately strong shock. Motion rapid, lasted about 10 seconds. Felt by all, frightened few. Rattled windows and doors; house creaked. Trees, bushes shaken moderately. Damage slight, if any. "Another very light shock felt by observer on the 13th at about 05:00." Ground: Rocky.

Buellton. Motion slow. Felt by all in community.

Buttonwillow. Motion rolling, lasted 1 minute. Felt by all in community, frightened few. Direction N-S? Rattled windows; walls creaked. Trees, bushes shaken moderately. Damage slight, if any. Ground: Soil, compact, level.

Corona. Motion rapid, lasted 10 seconds. Felt by several in office building, frightened few. Hanging objects swung. Trees, bushes shaken slightly. Shifted small objects. Ground: Soil.

Creston. Motion slow, lasted 10 seconds. Felt by all in home and community, frightened few. Rattled windows, doors, and dishes; house creaked some. Trees, bushes shaken slightly. Ground: Level, compact.

Fillmore. Motion slow, lasted about 1 minute. Felt by all in area. Direction E-W. Rattled windows. Trees, bushes shaken slightly.

Fresno. The Press reported a few bricks fell from the fireplace chimney of one building. Felt by many. People in tall buildings of the business district felt the strongest effects of the shock. One person reported, "It felt like swinging over a wide arc." One woman thought she was having a dizzy spell until, "I looked out the window and saw the tower on The Bee building swaying."

Fresno (Weather Bureau Office). IV. Motion swaying, E-W, rapid onset. Felt by many, numerous persons slightly alarmed. Disturbed objects observed by few. Plumb bob in Weather Bureau Office barometer case, freely hung, swung in E-W direction. Ground: Sandy loam.

Fresno. IV. Motion slow, lasted 30 seconds. Felt by many. Direction NW-SE. Rattled windows and doors. "I was sitting in car. Felt a gentle movement and noticed the front emblem was moving slightly from left to right. In my office, on 6th floor of steel and concrete building, the doors swung almost closed. Shock was two slight tremors followed by heavier one." Ground: Soil, level, compact.

Fresno (Post Office Building). IV. Motion slow, lasted 5 seconds. Rattled windows, doors, and dishes. Ground: Compact.

12 January, 15:33:49*. Intensity V. (cont.)

- Glenville. Motion slow, lasted about 8 seconds. Felt by all in community. Rattled windows, doors, and dishes.
- Grapevine. Motion rapid, lasted about 1 minute. Felt by and frightened many in community, some outdoors. Direction NE. Rattled windows, doors, and dishes; building creaked. Hanging objects swung. Trees, bushes shaken moderately. Ground: Rocky, compact.
- Hanford. Motion slow, long duration. Felt in post office. Direction E-W. Rattled windows, doors, and dishes; building creaked. Hanging objects swung. Pendulum clock stopped. Ground: Compact.
- Oildale. Motion rapid, lasted 45 seconds. Felt by all in community. Hanging objects swung. Ground: Soil.
- Kernville. Motion slow, lasted about 45 seconds. Felt by all in community. Direction N-S. Rattled windows and doors; house creaked. Ground: Compact.
- Llano (7-1/2 miles SE. of). Motion rocking, N-S, abrupt onset, lasted about 5 seconds. Felt by all. Ground: Sandy.
- Miracle Hot Springs. Motion beginning slow, then rapid, lasted 1 minute. Felt by all in community, frightened few. Direction circular. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken slightly. Ground: Rocky, sloping and steep.
- Kern County Airport (about 2 miles W. of Oildale). Motion rocking, NE-SW, rapid onset, lasted about 1 minute. Felt by all. Creaking of buildings and rattling of loose objects heard by many. Rumbling subterranean sounds heard before shock. Ground: Sandy.
- Ojai. Motion slow, lasted 1 minute. Felt by all in community, frightened few. Direction W. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken slightly. Ground: Rocky, sloping.
- Oxnard. Motion slow. Felt by all in community. Direction NE. Hanging objects swung NE. Ground: Soil, level.
- Oxnard (American Crystal Sugar Co.). IV. Motion swaying, gradual onset, lasted 45 seconds. Felt by many. Direction SE-NW. Venetian blinds and blind pulls swayed. Ground: Sandy.
- Palmdale. Motion rapid, lasted 3 seconds. Felt by all in post office, by observer outdoors, active. Hanging objects swung N. Pendulum clock stopped. Ground: Soil, compact, level.
- Pasadena. Motion slow, lasted 15-20 seconds. Felt by all in office, frightened few. Direction seemed N-S. Rattled windows, doors, and dishes strongly; building creaked some and rolled with shock. Light fixtures swung. Cracked plaster. Damage slight, if any.
- Pasadena. Motion rocking, N-S, rapid onset. Felt by all, few alarmed. Creaking of buildings and rattling of loose objects heard by many. Bumping subterranean sounds heard by many at time of shock. Chandeliers swung. Ground: Loam.
- Pasadena. IV. Motion rapid, lasted 5-6 seconds. Felt by all in place of business, frightened few. Rattled windows, doors, and dishes. Ground: Soil, level.
- Piru. Motion slow, lasted 1 minute. Felt by all in community, frightened few. Direction E-W. House creaked. Hanging objects swung E-W. Ground: Soil, level.

12 January, 15:33:49*. Intensity V. (cont.)

- Porterville. Motion slow, lasted 5 seconds. Felt by all in community. Direction N-S. Rattled windows and doors; house creaked. Hanging objects swung. Ground: Soil, compact.
- Riverside. Motion slow, lasted about 10 seconds. Felt by all, frightened few. Rattled windows; frame creaked. Ground: Compact.
- Riverside. Motion slow, lasted 2 minutes. Felt by all. Direction NE. Ground: Level.
- Roads End. Motion slow, rocking, lasted 40 seconds. Felt by all in community. Direction N. Rattled windows and doors; house creaked. Ground: Rocky.
- San Dimas. Motion rapid, lasted 30 seconds. Felt by several in post office, frightened few. Direction E. Rattled windows; walls creaked. Hanging objects swung. Trees, bushes shaken slightly.
- Sanger. Motion slow, rolling, lasted 10 seconds. Felt by all and frightened few in community. Hanging objects swung. Direction N-S. Ground: Soil, compact, level.
- San Jacinto. Motion slow, rolling, lasted 40 seconds. Felt in post office and frightened few in community. Building creaked. Hanging objects swung. Trees, bushes shaken slightly. Slight plaster cracks.
- Santa Maria. Motion slow, lasted 3-5 seconds. Felt by all and frightened few in community. Hanging objects swung. Ground: Soil, level.
- Somis. Motion rapid, sharp, lasted about 1-1/2 minutes. Felt by all in post office. Direction SE-NW. Rattled windows, doors, and dishes, cans and bottles; house creaked. Hanging objects swung NW. Shifted small objects and furnishings. Ground: Compact, level.
- Three Rivers. Motion slow, momentary duration. Felt by all and frightened few in community. Direction NE. Rattled windows, doors, and dishes. Trees, bushes shaken moderately. Ground: Rocky, filled in.
- Tupman. Motion rapid, long duration. Felt by all and frightened many in community. Direction NE-SW. Rattled windows and doors. Trees, bushes shaken moderately to strongly. Ground: Compact, sloping.
- Valyermo. Motion slow, lasted about 30 seconds. Felt by all in home, by some outdoors. Direction N-S. House creaked. Hanging objects swung N. Slight plaster cracks. Ground: Soil, compact, level.
- Van Nuys. Motion slow, lasted about 1 minute. Felt by all in community. Direction NW. Hanging objects swung. The Press reported the City Hall swayed. Ground: Soil, level.
- Victorville. Two shocks, second shock a few seconds later. Gradual onset. Direction NE-SW. Felt by all; no general alarm. Venetian blinds swayed and overhead lights on cords swayed NE-SW. Ground: Sandy.
- Visalia. Motion rolling, lasted about 1 minute. Felt all over area, frightened few. Direction N. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Shifted small objects. Ground: Compact, level.

12 January, 15:33:49*. Intensity V. (cont.)

Walnut. Motion rapid, started with jerk, then settled down to diminishing tremble for 1-1/2 minutes. Felt by all in post office, frightened few. Direction SW-NE. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Shifted a few small objects and furnishings. Ground: Level.

Woody. Motion slow, lasted 30 seconds. Felt in post office and by some outdoors, frightened many. Direction N. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Shifted small objects. Ground: Soil, compact, level.

Intensity IV:

Adelanto. Motion slow, beginning gradual, lasted 30-45 seconds. Felt by many, by some outdoors. Rattled windows, doors, and dishes. Hanging objects swung. Ground: Sandy, loose, level.

Alpaugh. "Quite strong. Motion rolling. No damage."

Alta Loma. Motion slow, lasted 1 minute. Felt by many in community. Hanging objects swung. Ground: Soil, level.

Avalon. Motion rapid. Felt on wharf, frightened few. Direction N. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Rocky.

Barstow. Motion slow, lasted 5 seconds. Felt by many in home, frightened few. Direction W. Hanging objects swung. Ground: Soil, compact, level.

Beverly Hills (Post Office). Motion slow, lasted 2 seconds. Felt in community, frightened few. Ground: Soil, compact, level.

Big Creek. Motion rapid, lasted 3 seconds. Felt by several in home and community, frightened few in home. House creaked. Ground: Rocky, mountainous.

Bigpine. Motion rapid. Felt by several. Walls creaked.

Boron. Motion slow. Felt by many in post office, by some outdoors. Ground: Clay, sandy, compact, level.

Caliente. Slow, rolling motion, lasted 1 minute. Felt by many in home and community, frightened few. Rattled windows, doors, and dishes strongly; house creaked. Hanging objects swung. Ground: Compact, level.

California Hot Springs. Motion rapid, lasted 5 seconds. Felt by most everyone. Walls creaked. Doors swung. Ground: Rocky soil, compact.

Camarillo. Lasted 15 seconds. Felt by many in community. Hanging objects swung.

Cantil. Motion slow, lasted 10 seconds. Felt by many in post office. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken slightly. Ground: Sandy.

Carpinteria. Motion slow, lasted about 5 seconds. Felt by many in office building. Rattled windows. Ground: Soil, level.

Caruthers. Motion slow, lasted about 3 seconds. Felt by several in post office, by some outdoors, frightened few; awakened baby on second floor. Rattled windows, doors, and dishes. Light fixtures swung about 6 inches NW. Ground: Sandy, level.

Coalinga. Motion slow, lasted 30 seconds. Felt by many in home, by some outdoors. Direction E. Rattled windows, doors, and dishes. Trees, bushes shaken slightly. Ground: Soil, compact.

12 January, 15:33:49*. Intensity IV. (cont.)

Coalinga. III. Very light. Lasted about 3 seconds.

Corcoran. Motion slow, lasted 1 minute. Felt by many (some outdoors) and frightened few in community. Direction NW. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Ground: Soil.

Culver City. Motion slow, lasted about 45 seconds. Felt by many (some outdoors) and frightened few in community. Direction N-S. Hanging objects swung N. Ground: Soil, compact, level.

Desert Springs. Motion slow, rocking, lasted about 1 minute. Felt over entire area. Direction NE. Rattled windows, doors, and dishes slightly. Ground: Soil, compact, level.

Ducor. Motion slow, lasted about 1 minute. Felt by many in community. Direction N-S. Walls creaked. Hanging objects swung.

El Monte. Motion slow, lasted about 1 minute. Felt by all in post office. Hanging objects swung. Ground: Soil, level.

Etiwanda. Motion slow, lasted 2 seconds. Felt by several in store. Building creaked. Hanging objects swung.

Exeter. Motion rapid, brief. Felt in home and community (some outdoors). Direction N-S. Rattled windows, doors, and dishes. Hanging objects swung. "One short jolt in this area." Ground: Soil, level.

Falling Springs (Golden Creek in San Gabriel Canyon). Two shocks, light, gradual onset; second shock lasted about 10 seconds. Direction E-W. Creaking of buildings and rattling of loose objects heard by observer. Ground: Rocky.

Fawnskin. Lasted 15 seconds. Felt by all in home. House creaked. Ground: Rocky, level, sloping, steep.

Fullerton. Sharp shock. Direction E-W for about 30 seconds, then N-S for a few seconds. Venetian blind pulls swung and heavy drop lights swung some.

Fullerton. Motion swaying, E-W, abrupt. Felt by many, few alarmed. Creaking of buildings and rattling of loose objects heard by many. Subterranean sounds heard by many after shock. Light fixtures on cords swung E-W.

Glendale. Motion rapid. Felt in home, by some outdoors, frightened few in home and community. Rattled windows and doors; walls creaked. Hanging objects swung. Trees, bushes shaken slightly. Ground: Sandy.

Haiwee Powerhouse (Coso Junction). Motion slow, lasted 5-10 seconds. Felt by several at powerhouse; by observer outdoors, active. Direction N-S. Frame creaked. Lights in powerhouse and cottage swung N-S 1/2 inch for 4 minutes after shock. Ground: Rocky soil, compact.

Hawthorne. Motion rapid, rolling, lasted 1 second. Felt by many, frightened few. Hanging objects swung. Ground: Compact, level.

Helendale. Motion slow, lasted 1 minute. Felt by several in community. Direction N-S. Rattled windows, doors, and dishes. Hanging objects swung. Ground: Soil, level.

Hinkley. Motion slow, rolling. Felt by many in community (some outdoors). Direction E-W. Rattled windows and doors; frame creaked. Hanging objects swung E-W. Shifted picture.

Huntington Park. Motion slow, lasted 2 seconds. Felt by many. The Press described the shock as heavy.

12 January, 15:33:49*. Intensity IV. (cont.)

Huntington Park (6550 Miles Ave.). Motion slow, N-S. Felt by many. Fluorescent chandeliers shook. Ground: Level.

Huntington Park (City Hall). Motion swaying, rolling, gradual onset. Felt by many. Disturbed objects observed by few. Hat rack and door swung E-W. Ground: Sandy loam.

Independence. Motion slow, lasted 2 seconds. Felt by several in community (some outdoors). House creaked. Ground: Rocky soil.

Ivanhoe. Motion rapid, lasted 2 seconds. Felt in post office. Rattled windows and doors. Ground: Compact.

Keene. Motion rapid, lasted 20 seconds. Felt by many in home, frightened few. Walls creaked. Hanging objects swung. Trees, bushes shaken slightly. Ground: Soil, compact.

Kettleman City. Motion slow. Felt by many and frightened few in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Soil.

Kings Canyon National Park (Grant Grove). Very light rolling motion, lasted about 30 seconds. Felt in community. Direction NE-SW. Rattled windows. Ground: Compact.

Laguna Beach. Motion rocking, gradual onset. Felt by many.

La Habra. Motion rapid, lasted about 1 minute. Felt by many in post office. Hanging objects swung. Ground: Compact, level.

Lancaster. Motion rapid, rolling, lasted 35 seconds. Felt by many in home. Rattled windows, doors, and dishes slightly. Hanging objects swung slightly. Ground: Soil, level.

Lompoc (Fire House). Motion swaying, gradual onset. Felt by several, few alarmed. Building creaked; loose objects rattled. Spoons and cutlery hanging on wall rack swung E-W; water in glass jug swayed. Ground: Sandy.

Lone Pine. Motion slow, lasted 5 seconds. Felt by many.

Los Alamos. Lasted for quite some time. Felt by most everyone. Hanging lamps swayed.

Los Alamos. Motion slow. Felt by many and frightened few in community. Rattled post office boxes; building creaked. Ground: Soil, compact.

Los Prietos Ranger Station (22 miles NE. of Santa Barbara). Motion swaying, gradual onset, lasted about 30 seconds. Creaking of buildings and rattling of loose objects heard by many. Trees swayed. Pictures and light cords swung. "Eleven families here; 25 people felt shock." Ground: Compact.

Lost Hills. Motion slow, lasted 30 seconds. Felt by many and frightened few in community (some outdoors). Direction W-E. Rattled windows. Hanging objects swung. Ground: Compact, level.

Manhattan Beach. Motion slow, long duration. Felt by several in restaurant. Hanging objects swung. The Press reported pictures swung on walls at Manhattan Beach and Redondo Beach. Ground: Sandy.

Maywood. Motion rolling, swaying, lasted 30 seconds. Gentle movement. Felt by many, frightened few. Ground: Level, compact.

Mendota. Motion slow, lasted 1 minute. Felt by many in community (some outdoors). Hanging objects swung. Trees, bushes shaken slightly. Ground: Soil.

Mojave. Motion rapid. Felt by many and frightened few in community (some outdoors). Rattled windows, doors, and dishes. Trees, bushes shaken slightly. Ground: Soil, compact.

12 January, 15:33:49*. Intensity IV. (cont.)

- Monrovia. Motion rapid, lasted about 5 seconds. Felt by several in home. Direction circular. Rattled windows, doors, and dishes, and drop leaves on table; house creaked. Hanging objects swung N. "Dog very excited before shock was felt."
- Moorpark. Motion slow, lasted 40 seconds. Felt in place of business, frightened few. Direction N. Hanging objects swung N. Ground: Soil.
- Newbury Park. Strong shock, lasted about 30 seconds. Felt by several in post office. Ground: Compact, level.
- Newport-Balboa. Motion rapid, abrupt onset. Felt by few. Direction E-W. Rattled windows and doors. Ground: Sandy.
- Olive View. Motion slow, lasted 20 seconds. Felt by several and frightened few in community. Direction N-S. House creaked. Ground: Compact, level.
- Paso Robles. Motion rapid, lasted 15 seconds. Felt by many in community.
- Pearblossom. Motion rapid, lasted 10 seconds. Moderate shock. Felt by observer at post office. Direction E. Rattled equipment. Ground: Level, compact.
- Pine Flat Resort (2 miles above California Hot Springs). Felt by many in community. Rattled windows and doors; house creaked. Ground: Compact, level.
- Pismo Beach. Motion slow, lasted 2 seconds. Frightened few in community. Walls creaked. Hanging objects swung E-W. Ground: Soil.
- Pixley. Motion rapid, lasted 30 seconds. Felt by many in community (some outdoors). Direction E-W. Trees, bushes shaken slightly.
- Pomona. Abrupt onset, long duration. Light fixtures swayed. Ground: Sandy.
- Raisin. Motion rapid, lasted about 10 seconds. Felt by many in home and community, frightened few. Direction NW-E. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Soil, compact.
- Reedley. Felt by many. Direction NE. Hanging objects swung.
- Rosamond (Sec. 3, T9N., R15W.). Motion slow, rolling, lasted 5 seconds. Felt by observer in home. Direction seemed N-S. "Felt like house passed over a wave." Ground: Soil, level.
- San Bernardino. Motion slow, lasted 5 seconds. Felt by many in community. Hanging objects swung. Ground: Compact.
- San Fernando. Motion slow, lasted 15 seconds. Felt by many in community. Direction NE-SW. Rattled windows, doors, and dishes. Hanging objects swung. Trees, bushes shaken moderately. Ground: Compact, level.
- San Gabriel (Fire House). Motion awaying, N-S, gradual onset. Felt by several, few alarmed. Disturbed objects observed by several. Light fixtures and rocking chairs swayed N-S. Ground: Sandy loam.
- San Joaquin. Motion slow, lasted 10 seconds. Felt by several in post office and community (some outdoors), frightened few in home. Rattled windows and dishes. Hanging objects swung. Rocking chair rocked. Ground: Soil, level.

12 January, 15:33:49*. Intensity IV. (cont.)

San Pedro (Post Office). Motion rapid, lasted 3 seconds. Felt by many in community (some outdoors). Direction seemed E. Walls creaked. Light fixtures suspended from the ceiling on chains swung E-W. Cords on the FBX board rattled. Ground: Sandy, sloping.

San Pedro. Motion slow, lasted about 5 seconds. Felt by many. Direction N-S. Hanging objects swung. Ground: Soil, sloping.

Santa Ana. Motion slow, momentary duration. Felt by many in community. Direction N-S. Hanging objects swung. Ground: Compact.

Santa Ana. Motion slow, long duration. Felt by several at Court House Annex. Direction E-W. Chandeliers swung. Trees, bushes shaken slightly. Ground: Soil, level.

Santa Anita Race Track. Bleachers rocked.

Santa Paula. Slight shock. Motion slow, lasted 10 seconds. Felt by many and frightened few in community (some outdoors). Direction N-S. Rattled windows slightly. Hanging light fixtures swung N-S. Trees, bushes shaken slightly. Ground: Compact, level.

Santa Susana. Motion slow, lasted 20 seconds. Felt by all in store. Frame creaked. Ground: Level, compact.

Saugus (Power Plant No. 1). Motion rapid, lasted 10 seconds. Felt by many (some outdoors). Direction N-S. Rattled windows, doors, and dishes very slightly; house creaked very slightly. Ground: Rocky, steep.

Saugus (Power Plant No. 2). Motion rolling, gradual onset. Series of tremors. Felt by many. Ground: Rocky.

Saugus. Motion slow, lasted 40 seconds. Felt by several and frightened few in community. Direction N. Hanging objects swung N. Ground: Soil.

Shandon. Motion slow, lasted 10 seconds. Felt by many in community.

Springville. Motion rapid, lasted about 30 seconds. Felt by many and frightened few in community. Direction NE. Rattled doors and windows. Trees, bushes shaken slightly. Ground: Rocky.

Stratford. Motion rapid, lasted 4 seconds. Felt by many in post office, frightened few in community. Rattled windows and dishes. Hanging objects swung N-S. Ground: Soil, compact.

Temecula. Motion slow, weak, rolling, long duration. Felt by many in home. Ground: Soil, compact.

Terra Bella. Lasted about 15 seconds. Felt by many (some outdoors) and frightened few in community. Rattled windows, doors, and dishes. Ground: Soil.

Tipton. Motion rapid, lasted 30 seconds. Felt by many in post office building, frightened few in community. Rattled windows, doors, and dishes. Hanging objects swung. Ground: Soil, compact, level.

Tujunga. Motion slow, lasted 2 seconds. Felt in community. Trees, bushes shaken slightly. Ground: Rocky, sandy, sloping and steep.

Tulare. Motion slow, lasted 5 seconds. Felt by many in post office building, frightened few in community. Rattled windows and doors. Hanging objects swung NW-SE. Ground: Soil, level.

Verice (Post Office). Motion slow, lasted 25 seconds. Felt by many in community. Direction N-S. Hanging objects swung. Ground: Sandy, level.

12 January, 15:33:49*. Intensity IV. (cont.)

Weldon. Motion slow, lasted 10-15 seconds. Felt in home and community. Rattled windows and doors; house creaked. Ground: Soil.

Wheatley Ranch (about 10 miles SE. of Ventucopa). Motion slow, rolling, N-S. Felt in home and community, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N-S. Trees, bushes shaken slightly. Ground: Rocky soil, loose, level, sloping and steep.

Wheeler Springs. Motion rapid, long duration. Felt by all in home. Rattled dishes.

Wheeler Springs (2 miles SW. of). Motion trembling, gradual to rapid onset. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Chandeliers swayed slightly E-W. Ground: Alluvium.

Whittier. The Press reported the shock was especially sharp.

Yermo. Motion slow, rolling, long duration. Felt by many (some outdoors) and frightened few in community. Ground: Level.

Yosemite National Park (Yosemite Village). Gentle, swaying motion, E-W, gradual onset, lasted about 30 seconds. Felt by several. Noise like rustling of trees heard. Faint roaring subterranean sounds heard by several before shock. Very slight visible swaying of building and trees. Light fixtures swung 4 inches E-W. "Only a few aware of shock."

Intensity I to III:

Banning. Felt by very few.

Benton. Motion slow, lasted about 30 seconds. Felt by several in community. Direction N-S. Very slight rattling of windows, doors, and dishes. Trees, bushes shaken slightly. Ground: Rocky.

Bishop. Seismograph operated at this place, but no motion felt by observer.

Cantua Creek. Felt slightly.

Cedar Springs and Summit. Motion slow, lasted 1 second. Felt by few in community. Ground: Loose, sloping.

Dos Palos. Felt by several in community.

Edwards. Slight E-W motion.

Five Points. Motion slow, several sways. Felt in post office. Hanging objects swung. Ground: Soil.

Friant. Motion slow, lasted 1 minute. Felt by observer in post office. Hanging objects swung. Ground: Sandy.

Hemet. Very smooth, rolling motion. Felt by several in home. Direction NE-SW. Ground: Soil, level.

Huron. Motion slow, lasted a few seconds. Felt by several.

Idria. Motion rocking, lasted 2-3 seconds. Felt by observer in home. Ground: Compact.

Inyokern. Felt by several.

King City. Motion slow. Felt in community.

Le Grand. Felt by several (some outdoors). Ground: Soil, level.

Mariposa. Motion rapid, long duration. Felt by several in home. "I did not feel it. Reports vague."

Olancho. Motion slow, long duration. Felt by several in home and community (some outdoors). Direction S-N. Hanging objects swung S-N. Trees, bushes shaken slightly. Ground: Soil, level.

12 January, 15:33:49*. Intensity I to III. (cont.)

- Ontario. Motion rapid, lasted a few seconds. Felt by several. Direction E. Hanging objects swung E. Ground: Soil.
- Owens. Lasted 3 seconds. Felt by several in office. Direction N-S. Hanging objects swung. Ground: Level, filled in.
- Parkfield. Motion slow, long duration. Felt by several in home and community.
- Sacramento. The Press reported three distinct shakes were felt on the 14th floor of the Elks Building. Building swayed from N-S. Only report of shock being felt in this area. Other reports stated no shock was felt.
- San Diego. Motion slow, lasted about 15 seconds. Felt by several in home and community. Direction N-S. Hanging objects swung. Ground: Compact.
- San Francisco (S.P. Building, 65 Market St.). Motion slow, rolling, lasted 15-20 seconds. Felt by many on 10th floor. Direction E-W. Felt like motion of rolling boat. Hanging objects swung E-W. Ground: Level, filled in; building on piling.
- San Luis Obispo. Momentary shock felt by few. "Too light and too brief for observations."
- Santa Ynez. Motion rapid, lasted 1 second. Felt by several in post office. Direction S. Rattled windows, doors, and dishes slightly. Ground: Compact, level.
- Seal Beach (Seal Beach Steam Plant). Motion rocking, abrupt onset, lasted 20 seconds. Felt by several. Ground: Filled in.
- Solromar. Motion rapid, long duration. Felt by two in home. Direction NE. Ground: Sloping.
- South Haiwee Reservoir (8 miles N. of Coso Junction). Very slight shock. Motion rolling, lasted 1 second. Direction E-W. Felt in home. Ground: Compact, sloping.
- Stockton. Slight shock. Motion slow, lasted 1 minute. Felt by several in community. Rattled windows, doors, and dishes slightly; house creaked slightly. Ground: Loose. Other reports stated no shock was felt.
- Tinemaha Reservoir (Independence). Motion rapid, lasted 1 second. Felt by one in home. Hanging objects swung W-E. Ground: Compact, level.
- Topanga. Felt by some in post office.
- Torrance. Very lightly felt.
- Trabuco Canyon. "Some said they felt it. I didn't."
- Trona. Felt by several.
- Westend. Distinct shock, but not sharp. Motion slow, E-W, lasted 10 seconds. Felt by several in community. Ground: Loose, level.
- Reported felt by the Press (no details given): Buttonwillow (20 miles W. of), Delano, Indio, Inglewood, Merced.

Reported not felt: Alberhill, Antioch, Anza, Big Sur, Claraville, Courtland, Crows Landing, Darwin, Deep Springs, El Portal, Escondido, Fairfield, Gonzales, Joshua Tree, Keeler, Knowles, La Grange, Laws, Leevining, Little Lake, Livermore, Lucerne Valley, Markleeville, Madera, Modesto, Morgan Hill, Mt. Baldy, Mount Hamilton, Newberry, Oakland, Oceanside, Palm Springs, Pisgah Substation (15 miles W. of Ludlow), Redwood City, Randsburg, Running Springs, San Ardo, San Benito,

- 12 January, 15:33:49*. Reported not felt. (cont.)
San Clemente, San Jose, San Martin, San Miguel, San Simeon, Santa Cruz, Santa Isabel, Sonora, South San Francisco, Surf, Tollhouse, Tracy, Twentynine Palms, Volta, Watsonville, Wildomar, and Wishon.
- 12 January, 17:45:31*.
Epicenter 35°02' N., 119°06' W., west of Wheeler Ridge. (P)
Frazier Park. The Press reported a shock was felt about 3 hours after the one at 15:33:49*.
Ventucopa. Felt. (No details)
- 13 January, 05:00.
Bodfish (Borel Powerhouse). Slight shock felt. (Pasadena reported there was no shock recorded at or near this time to account for this report.)
- 17 January, 23:00.
Big Creek. IV. One jolt, 3 shakes, lasted 20 seconds. Direction NE. Felt by several in home and community, awakened few. Ground: Rocky. (Pasadena reported there was no record at Tinemaha to account for this report.)
- 22 January, 21:09:14*.
Epicenter 33°50' N., 118°08' W., north of Long Beach. (P)
Long Beach. "No damage was reported from a sharp earthquake that jolted the Long Beach area from Burbank to Los Alamitos about 9:10 P.M., P.S.T." (BSSA, April 1954)
Pasadena reports: "The Press report as quoted is confusing. Burbank is not in the Long Beach area, and it is doubtful whether this shock was felt there. Stated to have been felt for about 2 seconds at the Long Beach Municipal Airport. Felt also at Lakewood and Los Altos, near Long Beach."
- 26 January, 01:43:22*.
Epicenter 34°30' N., 120°20' W., west of Las Cruces. (P)
Santa Ynez. Motion rapid, lasted 7 seconds. Direction seemed SW-NE. Felt by several in home and community. Ground: Soil, compact, level.
- 27 January, 06:19:48*.
Epicenter 35°09' N., 118°38' W., west of Tehachapi (Cummings Valley). (P)
Sharp shock felt over about 12,000 square miles of south-central California. Maximum intensity VI. Damage negligible.
Intensity VI:
Arvin. Motion rapid, lasted 15 seconds. Felt by, awakened, and frightened all. Direction N-S. Rattled windows; house creaked. Hanging objects swung. Pendulum clock stopped. Trees, bushes shaken moderately. Shifted small objects and furnishings. Damage slight. Ground: Compact.
Arvin. Motion slow, lasted 10 seconds. Felt by and awakened all in community, frightened few. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Trees, bushes shaken moderately. Shifted small objects. Ground: Soil, level.

27 January, 06:19:48*. Intensity VI. (cont.)

Frazier Park. Motion slow. Felt by and awakened all in community.

Keene. Motion rapid, lasted 10 seconds. Felt by and awakened many in community, frightened few. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken moderately. Overturned vases. Cracked plaster. Damage slight.

Lake Hughes. Motion slow. Felt by and awakened all in community.

Rattled windows and doors.

Tehachapi. Heavy jolt, followed by violent shaking, W-E, abrupt onset, lasted 30 seconds. Felt by all in community. Creaking of buildings and rattling of loose objects heard by all. Thunderous subterranean sounds, like a loud explosion, heard at time of shock. Disturbed objects observed by many. House shook violently. "A very heavy shock." Ground: Rocky.

Tehachapi. Motion rapid, lasted about 20 seconds. Felt by all and frightened many in community. Direction S-N. Rattled windows, doors, and dishes; house creaked. Shifted and overturned small objects. Picture fell. Ground: Rocky.

Wheeler Ridge. Motion rapid, lasted 6 seconds. Awakened all in community, frightened few; felt by some outdoors. Direction N-NE. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NE. Ground: Compact.

Intensity V:

Caliente. Motion jerky, lasted 30 seconds. Felt by all and frightened many in community. Rattled windows, doors, and dishes; walls creaked. Ground: Soil, level.

Di Giorgio. Motion rapid, lasted 15 seconds. Awakened all in home. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N. Shifted small objects. "This shock did not last as long as the January 12 shock; however, I thought it was of more magnitude. It hit with a very good jolt, shook hard for several seconds, then tapered off to a sort of quiver that continued for several more seconds." Ground: Soil, level.

Glendale. Motion rapid, abrupt onset. Felt by and awakened all. Direction circular. Rattled windows and doors; walls creaked. Hanging objects swung. Ground: Soil, sloping; filled in.

Grapevine. Two rapid shakes, lasted few seconds. Felt by and frightened many in community (some outdoors). Direction E. Rattled windows, doors, and dishes; house creaked. Ground: Rocky, compact.

Lebec. Motion rapid, lasted about 15 seconds. Felt by and awakened many in community. Rattled windows and doors. Ground: Soil, compact.

Miracle Hot Springs. Motion jerky, brief. Felt by all and awakened many in community. Direction NE. House creaked. Ground: Rocky soil, sloping and steep.

Mojave. Motion slow, lasted about 10 seconds. Felt by many (some outdoors) and awakened many in community, frightened few. Rattled windows, doors, and dishes. Trees, bushes shaken slightly. Ground: Soil, compact.

Monolith. Motion rapid, lasted 15 seconds. Felt by, awakened, and frightened many in community. Rattled windows, doors, and dishes; house creaked. Ground: Rocky, compact.

27 January, 06:19:48*. Intensity V. (cont.)

San Fernando. Motion slow. Felt by and awakened many, frightened few; felt mainly in homes. Rattled windows, doors, and dishes. "Many people inquired if shock had been felt, which was the first intimation I had that a shock had been felt." Ground: Compact, level.

Intensity IV:

Acton. Motion slow, lasted 15 seconds. Felt by several and awakened few in community. "Not widely felt."

Agoura. Awakened few. Light frame houses creaked slightly.

Bakersfield. Motion rapid. Felt by many in community. House creaked. Ground: Soil, compact.

Buttonwillow. Weak shock. Motion slow. Felt by several and awakened few in community.

Cantil. Motion slow, lasted 10 seconds. Felt by several in home, awakened few. Direction SW-NE. Rattled windows, doors, and dishes; house creaked. Ground: Sandy.

Claraville. Motion slow, lasted 3 seconds. Felt in home. Direction E-W. House creaked. "Rumble, then jar, then another rumble and jolt." Ground: Rocky soil, sloping.

Edison. Motion rapid. Felt by several, awakened and frightened few in community. Rattled windows; frame creaked. Trees, bushes shaken slightly.

Fillmore. Short duration. Hanging objects swung. "Felt by most people sitting or lying down; not felt by those walking or standing."

Gaviota. Felt in community. Rattled windows, doors, and dishes.

Gorman. Motion slow, lasted 30 seconds. Felt in home, awakened and frightened few. Direction E-W. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Ground: Loose.

Hanford. Awakened few. House creaked slightly. "Very lightly felt."

Hinkley. Felt by several in home lying down. Walls creaked.

Jawbone Aqueduct Station ($35^{\circ}18' N.$, $118^{\circ}02' W.$). Motion rapid, lasted 3 seconds. Felt by many in community (some outdoors). Direction E-W. Ground: Compact.

Johnsondale. Reported as sharp shock.

Kettleman City. Felt by several. Rattled windows. Ground: Soil.

Lost Hills. Motion slow. Felt by several and awakened few in community.

Maricopa. Motion slow. Felt by several, awakened and frightened few in community. Rattled windows, doors, and dishes. Ground: Loose.

Pozo Guard Station (near Pozo). Felt by and awakened all in home. Ground: Soil, compact, level.

Rosamond (Sec. 3, T9N, R15 W). Motion rapid, lasted about 7 seconds. Felt by two lying down. "Felt heavy thud, then rumbling heard. Vertical shaking of bed for about 7 seconds." Ground: Soil, level.

Santa Susana. Motion slow. Felt by many in home, awakened few.

Sequoia National Park (Ash Mountain). Motion moderate, lasted 10 seconds. Felt by several in home lying down. Rattled windows, doors, and dishes. Ground: Rocky.

27 January, 06:19:48*. Intensity IV. (cont.)

Taft. Observer states: "Felt by all. Hearsay. I did not feel it."

Terra Bella. Awakened few. "Very light."

Valyermo. Motion rapid, lasted 5 seconds. Direction vertical. Felt by several in home. Rattled windows, doors, and dishes. Ground: Soil, compact.

Ventura. Motion slow, lasted 6 seconds. Felt by observer in home, awakened few in community. Direction E-W. Rattled windows, doors, and dishes slightly; house creaked slightly. Trees, bushes shaken slightly. Ground: Soil, level, compact.

Visalia. Felt by several and awakened few in home. Rattled windows. Ground: Soil, level.

Walnut. Motion rapid, lasted 3 seconds. Felt by few in home, awakened few in community. Direction SW-NE. House creaked very slightly. "Started with quiver, then jolt, then quivering." Ground: Shale, sloping.

Wasco. Motion rapid, lasted 4 seconds. Generally felt, awakened and frightened few. Direction N-S. Trees, bushes shaken slightly. Ground: Soil.

Intensity I to III:

Caruthers. Felt by very few. "Truck on street could cause more motion."

Cholame. Motion jerking. Felt by several.

Kernville. Two shocks. Felt by few. First shock felt about 04:00.

Los Alamitos. Motion slow. Felt by several in community.

Los Angeles (1615 West 4th St.). Motion rocking, seemed circular, 2-3 seconds' duration. Felt by several in community. "Very minor shock. People were not awakened; many did not notice it." Ground: Hard clay.

Manhattan Beach. Motion slow, lasted few seconds. Felt by observer lying down. Ground: Soil.

Pasadena (S. section). Two shocks. Felt by several. First shock about 05:25. Ground: Loam.

Riverview (suburb of Bakersfield). Felt by several in community (some outdoors).

San Diego. "Did not feel shock, but objects swung slightly N-S."

Saugus. "Very slight here."

Tupman. Motion slow, lasted few seconds. "In my home it was not felt by one in bed and asleep; not felt by one in kitchen. Felt only by one in bed and awake."

Wofford Heights (Isabella). Motion slow, lasted 5 seconds. Felt in home. Ground: Rocky soil, sloping.

Reported not felt: Adelanto, Alhambra, Avenal, Baldwin Park, Barstow, Bartlett, Beaumont, Beverly Hills, Bigpine, Bishop, Boron, California Hot Springs, Cantua Creek, Carpinteria, Claremont, Coalinga, Corcoran, Corona, Coso Junction, Creston, Darwin, Earlimart, Edwards, Fawnskin, Glendora, Helendale, Hollywood, Independence, Inglewood, Inyokern, Keeler, Kingsburg, Kings Canyon National Park, La Habra, Lake Arrowhead, La Mirada, Little Lake, Los Alamos, Lucerne Valley, Madera, Markleeville, Maywood, McFarland, Newberry, North Hollywood, Oildale, Olancho, Ontario, Palos Verdes Estates, Parkfield, Paso Robles, Phelan, Port Hueneme, Puente, Randeburg, San Ardo, San Bernardino, San Clemente,

27 January, 06:19:48*. Reported not felt. (cont.)

San Luis Obispo, Santa Ana, Santa Maria, Santa Monica, Santa Ynez, Springville, Stratford, Three Rivers, Tipton, Torrance, Trabuco Canyon, Trona, Tulare, Wheatley Ranch (about 10 miles SE. of Ventucopa), Wheeler Springs, Whittier, Wildomar, Wrightwood, and Yosemite National Park.

31 January, 20:23:57*, 20:32:02*, 21:10:07*.

Epicenter 32.3° N., 115.3° W. These shocks and many smaller ones originated well to the south of the international boundary. (P) Chula Vista. (20:32) III. Motion slow, lasted 1 minute. Felt by observer in home. Observer, sitting on spring-suspended contour chair, felt chair move from W-E; two sitting on solid couch did not feel shock.

El Centro. V. The Press reported light fixtures and window curtains swayed, and theater patrons rushed to the street as three distinct shocks rocked the Imperial Valley. Police said the shocks were sharp and reverberated for "a minute with an off-and-on rolling motion." Imperial Irrigation District authorities said the shocks were reported felt at all headings, but no damage occurred to the canal system. Blythe, Yuma, and San Diego reported feeling the shocks. Shocks were not severe enough to cause panic. No damage reported.

Imperial. V. Four shocks felt. Motion swaying, S-N, gradual onset. Felt by all, few alarmed. Ponded water disturbed in canals. Creaking of buildings and rattling of loose objects heard by many. Rumbling subterranean sounds heard by many before shock; observer heard sounds during second shock. Disturbed objects observed by many. Pictures, Venetian blinds, and bridge lamps swayed. Grandfather clock stopped. "In Mexico, near Black Butte, there was a remada thrown down and a light brush shack leveled. Also, pumice blowholes opened in the earth." Ground: Adobe.

Imperial. (20:23, 20:32) IV. Motion slow, first shock lasted 5-10 seconds, second lasted 35 seconds. Felt by all in office on 3rd floor. Direction of first shock NW-SE, of second E-W. During second shock coffee moved in cups. Ground: Soil.

San Diego (S.D. Gas & Electric Plant, Kettner & Broadway). (20:23, 20:32) III. Motion rapid, first shock lasted 15-20 seconds, second shock lasted 35 seconds. Felt by several in community. Direction N. Hanging objects swung. Also felt at the Silver Gate Plant, foot of Sampson Street.

Reported felt in Arizona:

Somerton. (20:23) IV. Motion rapid and slow, lasted 2 minutes. Felt by many in home and community. Direction N-S. "Some reported 2 shocks on 31st and one early on February 1."

Yuma. (20:23, 21:10). III. Motion trembling, very light. Felt by few. "Gentle tremor."

1 February, 05:05:29*. Aftershock of 31 January.

El Centro. IV. The Press reported the shock jolted people awake.

2 February, 14:58:29*.

Epicenter $33^{\circ}05'$ N., $117^{\circ}30'$ W., off Oceanside. Small and possibly artificial in origin. (P)

San Clemente. IV. Motion rapid, lasted 2 seconds. Felt by several in post office. Rattled windows; walls creaked. Ground: Soil, level.

4 February, 11:08:14*.

Epicenter $37^{\circ}45'$ N., $122^{\circ}07'$ W., northeast of San Leandro. (B)

Moderate shock felt in the San Francisco Bay region, principally in Contra Costa and Alameda counties. Felt area about 500 square miles. Maximum intensity V.

Intensity V:

Hayward. Motion rapid. Felt by many in community. Rattled windows, doors, and dishes. Hanging objects and doors swung. Shifted small objects. Ground: Compact, level.

Hayward. IV. Motion rapid, lasted 2 seconds. Felt by all in home. Rattled windows and doors. Ground: Soil, sloping.

Walnut Creek. Long duration. Felt by and frightened many (some outdoors). Rattled windows, doors, and dishes; house creaked. Doors swung. Shifted small objects. Damage slight, if any. Ground: Rocky soil, compact.

Intensity IV:

Alameda. Motion rapid, lasted 1 second. Felt by all in post office building. Rattled windows and doors. Ground: Level.

Alamo. Motion rapid, lasted 4 seconds. Felt by many in post office. Rattled windows. Ground: Soil, compact.

Moraga. Felt by several. Rattled windows, doors, and dishes.

Moraga Substation (PG&E). III. Motion rapid, lasted 2 seconds. Felt by several.

Oakland (Municipal Airport). One instantaneous shock, abrupt onset. Felt by many. Creaking of buildings and rattling of loose objects heard by many. "The shock was considered ordinary." Ground: Filled land in bay.

Oakland (Main Post Office). Sharp jolt. Motion rapid, lasted 1 or 2 seconds. Felt by all at work. Rattled windows. Ground: Compact, level.

Oakland (13th and Alice Sts. Post Office). Motion rapid, lasted 1 second. Felt by all in office. Rattled windows and doors. "This is the first shock occurring between the hours of 08:00 and 17:00 which I have felt in this office in last 10 years." Ground: Soil, compact, level.

Oakland (17th and Clay Sts., PG&E). III. Lasted 2 seconds. Felt by several on 7th floor.

San Leandro. Felt by many and frightened few in community.

San Ramon. Motion slow, brief. Felt by many in home. Rattled windows, doors, and dishes; house creaked. Ground: Level.

Intensity I to III:

Lafayette. Motion rapid. Felt by several in home. Trees, bushes shaken slightly. "Very slight shock." Ground: Soil, compact, sloping.

4 February, 11:08:14*. Intensity I to III. (cont.)

Mission San Jose. Very slight shock felt by few.

Mount Eden. Motion slow, momentary duration. Felt by several in community (some outdoors). Ground: Compact soil, level.

Port Costa. Felt by some. "Not too strong here."

San Francisco. The Press reported the shock was slightly felt.

Reported not felt: Alcatraz, Altamont, Alviso, Antioch, Berkeley (post office), Brentwood, Byron, Clayton, Collinsville, Concord, Daly City, Decoto, Diablo, El Cerrito, Fairfield, Half Moon Bay, Livermore, Milpitas, Montara, Mount Hamilton, Newark, Palo Alto, Pinole, Pleasanton, Port Chicago, Redwood City, Richmond, Rio Vista, San Bruno, San Jose, San Rafael, San Quentin, Sausalito, Stinson Beach, and Sunol.

4 February, 12:48:41*.

Epicenter $35^{\circ}21' N.$, $118^{\circ}58' W.$ (P)

Bakersfield. The Press reported a sharp shock jolted Bakersfield, but there were no reports of damage. East Bakersfield residents reported feeling a single shock. People called police in the belief there had been an explosion.

Bakersfield (PG&E). III. Felt by several. Motion rapid.

Edison Oil Field. IV. Motion fairly rapid, lasted about 5 seconds.

Felt by many in community. House creaked. "Shock quite strong.

Apparently much stronger here than in Bakersfield." Ground:

Soil, compact.

Reported not felt: Wheeler Ridge.

6 February, 16:09:53*.

Epicenter $35^{\circ}02' N.$, $119^{\circ}06' W.$, west of Wheeler Ridge. (P)

Cuyama (central section). IV. Motion swaying, gradual onset. Felt by many. Creaking of buildings and rattling of loose objects heard by many. "Shock was felt by all in buildings. I was riding in car and did not notice it."

Lebec. IV. Motion rapid, lasted about 6 seconds. Felt by many in community (some outdoors). Direction N-S. Rattled windows and doors. Ground: Soil, loose, level.

Taft. "A slight earthquake was felt in Taft at 4:10 P.M., P.S.T." (BSSA, April 1954)

Tehachapi (central section). IV. Fairly heavy jar, abrupt onset, lasted 1 second. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Ground: Rocky.

Wheeler Ridge. IV. Motion rapid, lasted 3 seconds. Felt by many and frightened few in community. Direction NE. Rattled windows; walls creaked.

8 February, 07:23:45*.

Epicenter $37^{\circ}48' N.$, $122^{\circ}08' W.$, northeast of San Leandro. (B)

Alamo. IV. Motion rapid, lasted 2 seconds. Felt by several in home; awakened few in community. Walls creaked. Ground: Soil, compact, level.

Berkeley. The Press reported attendants at Herrick Memorial Hospital felt the shock.

8 February, 07:23:45*. (cont.)

Canyon. IV. Windows rattled; house creaked. Direction seemed NW-SE. "One light shock followed immediately by a stronger one, both of only seconds' duration." Ground: Fairly loose top soil, clay underneath, also broken shale strata.

Hillsborough. Rumbling noise heard.

Oakland (Eastern Police Station). IV. The Press reported metal lockers on second floor rocked and swayed.

Oakland. IV. Felt by observer lying down. Rattled doors.

Oakland. III. Motion rapid, brief. Felt by several.

Pescadero. II. Lasted 3-4 seconds. Felt by observer in home.

Pleasanton. III. Motion rapid, lasted few seconds. Six-year-old child thought someone shook bed. "No other reports." Ground: Soil, level.

Port Costa. III. Felt by some in community. "I was driving to work and did not feel it." Ground: Sloping and steep.

San Francisco. IV. The Press reported numerous calls came from the St. Francis Wood area, the Richmond, Westlake, Geneva, and Inglewood districts, one call came from the Clay and Kearny district. All described the shock as slight but stronger than other recent ones. Dishes rattled in the 1300 block on Funston Avenue.

San Francisco (2542-45th Ave.). IV. Felt by several in home. Rattled doors. Ground: Sandy.

San Francisco Bay Area. V. "A sharp earthquake rattled dishes and windows throughout the Bay area at 7:24 A.M., P.S.T. The tremor was felt as far north as Martinez and south to Hayward. Broken crockery was the only damage reported." (BSSA, April 1954)

10 February, 15:58:38*.

Epicenter $34^{\circ}56'$ N., $119^{\circ}04'$ W., west of Grapevine Station. (P)

Bakersfield. Reported as sharp shock.

Cuyama (central section). IV. Motion swaying, N-S, gradual onset. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Not felt by observer riding in car.

Edison Oil Field (Sec. 23, T30S, R29E). IV. Motion jolting, very brief. Felt by many in community. Building creaked. Ground: Compact, soil.

Fillmore. III. Felt by several. Objects swung.

Frazier Park. Strongly felt.

Goleta (Post Office). III. Motion slow, brief. Felt by several in post office, by some outdoors. Direction E-W. Hanging objects swung. Ground: Compact.

Grapevine. V. Two hard jolts. Motion up and down. Felt by all. Ground: Rocky soil.

Lebec. V. Motion rapid, lasted about 10 seconds. Felt by all and frightened many in community, awakened few children. Direction E-W. Ground: Soil, compact, sloping.

Ojai. IV. Motion trembling, gradual onset, lasted about 5 seconds. Direction E-W. Felt by many. "We were sitting at a table and only a very slight movement was felt from E-W." Ground: Clay.

Santa Barbara. IV. Felt by many.

10 February, 15:58:38*. (cont.)

Shafter. IV. Motion slow, lasted 5 seconds. Felt by many in community (some outdoors), frightened few. Direction N. Rattled windows; walls creaked. Trees, bushes shaken slightly. Ground: Loose.

Ventura. II. Felt by few.

Wheeler Ridge. V. Two hard shocks followed by light shaking for few seconds. Motion rapid, lasted 15 seconds. Felt by all and frightened many in community (some outdoors). Direction E-NE. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken slightly. Shifted small objects. "Shock felt harder at Grapevine, 6 miles S-SE of here."

12 February, 01:44:28*.

Epicenter 33°20' N., 116°26' W., northwest of Borego Valley. (P)

Alpine. V. Motion sharp, lasted 10 seconds. Felt by and awakened many in community, frightened few. Direction SE-NW. Rattled windows, doors, and dishes; house creaked. "Rumble, then sharp shock." Ground: Rocky.

Borego Valley. Reported as sharp shock.

Julian. V. Motion rapid. Felt by and awakened many in community, frightened few. House creaked. "A very sharp jolt."

Ranchita. V. Motion rapid, lasted about 1-1/2 minutes. Awakened all in home. Direction N-S. Rattled windows.

San Diego (3370 Albatross St.). IV. Felt by several in home lying down, awakened and frightened few in home. Rattled windows.

San Diego (3412 Russell St.). IV. Motion rapid. Felt by many and awakened few in community. Rattled windows and dishes. Direction E-W. "Sharp jolt followed by rapid motion." Ground: Compact.

San Diego (NW. section, Weather Bureau Office). IV. Motion swaying, rapid onset. Felt by many, some alarmed. Guard at Gillespie Field reported buildings creaked and loose objects rattled. Ground: Made.

San Diego (10th and Imperial Sts.). III. Motion rapid, lasted 5 seconds. Felt by all in office, sitting. Direction E-W. Ground: Soil.

Thermal. V. Motion rapid, abrupt onset. Felt by and awakened many in community, frightened few. Direction circular. Rattled windows, doors, and dishes; house creaked. Ground: Soil.

Also felt at Calexico, Brawley, Holtville, Riverside, and Escondido (Pacific Tel. and Tel. Co.).

Reported not felt: El Cajon. "Noted item in paper. No report of shock being felt here."

14 February, 09:38:15*.

Epicenter 37°48' N., 122°04' W., east of San Leandro Reservoir. (B)

El Cerrito. Reported felt. (No details)

18 February, 14:13. Not recorded at Tinemaha or China Lake Stations. (P)

Benton Quarantine Station (Benton). IV. Motion rapid, lasted about 10 seconds. Felt by many in community, awakened few in home. Direction N. Walls creaked. Ground: Rocky soil, level.

19 February, 13:06:28*.

Epicenter $37^{\circ}46'$ N., $122^{\circ}08'$ W., northeast of San Leandro. (B)
Canyon. V. Motion slow, lasted about 2 seconds. Felt by observer in home, and by neighbor who thought she was having a dizzy spell. Direction seemed SE-NW. Rattled windows and doors; house creaked and swayed. Cracked plaster. Damage slight.
Hayward. "A small, sharp earthquake was felt in the Hayward area at 1:06 P.M., P.S.T. A few window panes rattled, but no damage was reported." (BSSA, April 1954)
Moraga. V. Motion slow, lasted 5 seconds. Felt by one person in home. Rattled windows and doors; house creaked. Hanging objects swung E-W. Shifted water cooler and stand.

20 February, 14:07:13*.

Epicenter 39.5° N., 120.0° W., west of Reno, Nevada. (B)
Reno, Nevada. "A very light earthquake was felt by a few residents of Reno on the afternoon of February 20." (BSSA, April 1954)

24 February, 14:30:22*.

Epicenter $35^{\circ}04'$ N., $119^{\circ}04'$ W., north of Wheeler Ridge. (P)
Bakersfield. IV. Slow, slight up-and-down swinging motion, lasted about 20 seconds. Felt by many in office, frightened few. Rattled windows and doors; walls creaked. Ground: River bottom.
Grapevine. Felt. (No details.)
Taft. IV. Motion slow, lasted about 2 seconds. Felt by all in office. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Soil, compact, sloping; alluvial fan.
Tupman. IV. Motion slow, lasted about 1 minute. Felt by several and awakened few in home, frightened few in community. Direction NW. Rattled windows very slightly; house creaked. Ground: Soil, compact, sloping.
Wheeler Ridge. V. Two sharp shocks. Motion rapid, lasted 5 seconds. Felt by all in community. Direction NW. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N. Trees, bushes shaken slightly. Ground: Compact.
Reported not felt: Edison Oil Field (Sec. 23, T30S, R29E).

2 March, 13:18:00*.

Epicenter $34^{\circ}00'$ N., $118^{\circ}28'$ W., near Culver City. (P)
Los Angeles area. The Press reported a very slight shock was felt by residents of Leimert Park, Culver City, and Inglewood. The tremor was a short jolt, according to residents of the Southwest Los Angeles area who reported it to police and newspapers.
Los Angeles (SW. section, Weather Bureau Airport Station). III. Abrupt onset. Felt by several, few alarmed. Short jolt. Ground: Soil.

5 March, 20:49:53*.

Epicenter $35^{\circ}17'$ N., $118^{\circ}27'$ W., north of Tehachapi. (P)
Tehachapi (central section). IV. Motion bumping, abrupt onset, lasting 2 seconds. Felt by most people. Creaking of buildings and rattling of loose objects heard by most people. Ground: Rocky.

9 March, 11:55:30*.

Epicenter 35.9° N., 120.5° W., west of Parkfield. (B)
Paso Robles (26 miles NE. of). The Press reported a slight earthquake

- 9 March, 11:55:30* (cont.)
which rattled windows and dishes was felt 26 miles northeast of Paso Robles.
- 12 March, 22:21:59*.
Epicenter $35^{\circ}19'$ N., $118^{\circ}32'$ W., east of Caliente. (P)
Tehachapi (central section). IV. Light jar, abrupt onset, lasted 1 second. Creaking of building and rattling of loose objects heard by observer. Ground: Rocky.
- 17 March, 13:40.
Chilcoat. IV. Motion rapid, lasted about 15 seconds. Felt by few in home, sitting. Rattled windows.
- 18 March, 20:32:31*.
Epicenter 39.1° N., 119.6° W., southeast of Carson City, Nev. (B)
Carson City, Nev. (central section). III. Motion trembling, very mild, gradual onset. Felt by several. Ground: Sandy.
- 19 March, 01:54:29* (main shock).
Epicenter $33^{\circ}17'$ N., $116^{\circ}11'$ W., Santa Rosa Mountains. (P)
Strong shock felt over approximately 40,000 square miles of southern California and a small area of southwestern Nevada and western Arizona. (See map.) Main effects of the earthquake were some window and plaster damage and merchandise thrown off shelves in stores. Recorded aftershocks were numerous. The largest in the first few hours occurred at 02:15:22*, 02:19:57*, 02:21:17*, 05:08:04*, 06:00:57*. One of the smaller shocks was at 02:32:19* (felt at Mecca). Epicenters of these are all near that of the principal shock. That at 02:21:17* was much the largest aftershock.
- Intensity VI:
- Alberhill. Motion slow, lasted 15 seconds. Felt by all in home; awakened all and frightened few in community. Direction E-W. Rattled windows; tile creaked. Ground: Level, compact.
- Borrego Springs. Motion rapid, lasted 25 seconds. Felt by and awakened all in community, frightened few. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken moderately. Shifted small objects, overturned vases and small objects. Knickknacks and books fell. Other shocks felt at 02:15, 02:20, and 02:21.
- Boulevard. Motion slow, long duration. Felt by, awakened, and frightened all in community. Rattled windows, doors, and dishes. Hanging objects swung E-W. Overturned vases, etc., small objects, and groceries. Few glass objects broken. Ground: Level.
- Brawley. Motion slow, long duration. Felt by and awakened all in community, frightened many. Direction circular. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Soil, level, compact.
- Cathedral City. Motion rapid, abrupt onset. Felt by and awakened all in community, frightened few. Direction N. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N. Shifted and overturned small objects, vases, etc. Knickknacks fell. "Only known damage in stores was due to stock falling off shelves." Ground: Compact, sloping.

19 March, 01:54:29* (main shock). Intensity VI. (cont.)

Coachella. The Press reported near panic among prisoners as the jail rocked and swayed. Windows and plaster reported cracked.

Coachella. Lasted 30 seconds. Felt by, awakened, and frightened all in community. Direction W-E. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Pendulum clock stopped. Trees, bushes shaken strongly. Shifted small objects and furnishings, overturned vases and small objects. Knickknacks, books, and pictures fell. Ground: Loose.

Coachella. Motion rapid. Felt by and awakened all in community, frightened many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung E-W. "Nearly as strong as the 1948 shock." Ground: Soil.

Coachella. Motion rapid, lasted 45 seconds. Felt over entire community, awakened and frightened many. Direction NW. Strong rattling of windows, doors, and dishes; house creaked moderately. Hanging objects swung NE. Trees shaken. Knickknacks fell. Opened old crack in grocery store.

El Centro. Police in all Imperial Valley towns reported a strong, rolling shock, lasting for about 2 minutes, and followed by a milder one at 02:21. Bedroom lights snapped on throughout the county, bottles toppled from grocery shelves in the north end, and at Pioneer Memorial Hospital several patients who hadn't been able to move suddenly sat up in bed. Door chimes sounded. No canal system damage.

El Centro. Motion both rapid and slow, long duration. Felt by, awakened, and frightened all in community. Direction N-S, then E-W. Rattled everything. Trees, bushes shaken moderately. Shifted small objects, overturned vases. Cracked plaster. Knickknacks fell. Broke dishes. Damage slight. Ground: Soil.

Garnet. Long duration. Felt by and awakened all in community. Direction W. Rattled windows, doors, and dishes. Shifted dishes. Rumble preceded shock. Ground: Desert soil.

Indio. The Press reported windows and plaster cracked.

Indio. Motion slow, rolling. Direction NE. Felt by and awakened all in community, frightened many. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken strongly. Shifted small objects and furnishings, overturned vases. Cracked plaster. Knickknacks fell. Damage slight. Shook some groceries from store shelves.

Indio. V. Motion rapid, lasted 30 seconds. Felt by and awakened all in home. Rattled windows and doors; house creaked. Hanging objects swung. Damage slight. "Light shock at 02:20." Ground: Loose, sandy.

Jacumba. Motion rapid. Felt by all in this area, awakened many. Cracked plaster; loose plaster fell from walls of several structures. Damage slight. "Light shock felt about 15 minutes later, with diminishing after tremors." Ground: Rocky soil, loose, level, sloping and steep.

Jamul. Motion rapid and slow, lasted 30 seconds. Awakened all in community, frightened few. Much vibration. Direction N-S. "Most severe shock in many years." Ground: Rocky, level.

Kane Springs. Knickknacks fell.

19 March, 01:54:29* (main shock). Intensity VI. (cont.)

La Jolla. Motion rapid, long duration. Direction NE. Felt by and awakened many in community, frightened few. Rattled windows, doors, and dishes in all buildings; house creaked strongly. Hanging objects swung. Pendulum clock stopped. Cracked plaster and few walls. Ground: Compact.

Lakeside. Motion slow, long duration. Direction W-E. Felt by many and frightened few in community, awakened all in home. Rattled dishes; walls creaked. Cans and jars rolled off shelves in stores. "About 5 small shocks followed. The strongest of these at about 02:21. Last one felt at 06:00 and was very slight." Ground: Compact, level.

Lakeside. Motion rapid, long duration. Direction E-W. Felt by and awakened many in community, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Shifted small objects and furnishings, overturned vases, etc., small objects. Cracked plaster. Damage slight. Ground: Rocky.

La Mesa. Motion rapid, long duration. Felt by, awakened, and frightened all in home, felt outdoors by others. Rattled windows and doors; walls creaked. Cracked plaster. "Two movements definitely felt, one following almost immediately after the other." Ground: Compact.

Mecca. Motion rapid, very strong shaking for 30 seconds. Preceded by loud noise. Felt by and awakened all in community, frightened many. Rattled windows, doors, and dishes; house creaked. Shifted pictures, overturned vases. Knickknacks fell. "Worst shock since 1928 in Mecca." Slight shocks felt on 22 and 23.

Mecca. Motion rapid. Felt by and awakened all in community, frightened many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Overturned small objects. Cracked plaster. Pictures fell. "Loosened heavy rocks on Highway 195, 5 miles east of Mecca." Ground: Compact.

Mecca (3 miles SE. of). Motion shaking, S-N, abrupt onset. Felt by most people. Creaking of buildings and rattling of loose objects heard by most people. Roaring subterranean sounds heard at time of shock by most people. Disturbed objects observed by several. Buildings and trees swayed visibly. Canned goods knocked off shelves. Damage slight. Other shocks felt at 02:20, 02:21, 02:32, 05:08, and 06:00. Ground: Sandy.

Mount Laguna. Rapid and sharp vertical motion. Felt by and awakened all in community, frightened many. Rattled windows, doors, and dishes. Hanging objects swung. Shifted some jars on store shelves, overturned vases and small objects. Knickknacks fell. "Seemed stronger than the 1940 Imperial Valley shock. Eased off with short tremors until 02:04." Ground: Rocky, compact.

Niland. Motion slow, long duration. Felt by and awakened all in community, frightened few. Rattled windows. Ground: Compact soil.

Oasis (16 miles SE. of Coachella). Broke 12-inch surface concrete irrigation pipe. (Field investigation revealed that the break in concrete pipe reported from Oasis may not have been caused

19 March, 01:54:29* (main shock). Intensity VI. (cont.)

by the earthquake as both hot and cold water had been running in the same pipe and could have caused the crack.)

Palm Springs. The Press reported it broke a water pipe in hotel. Caused a parked truck to roll. Several swimming pools were reported cracked.

Palm Springs. Motion rapid, long duration. Felt by all in community, frightened many. Direction SE. Windows, doors, and dishes rattled; some houses creaked. Trees, bushes shaken strongly. Overturned vases, etc., small objects. Cracked plaster. Fall of knickknacks, books, pictures, and plaster. Damage slight. Ground: Sandy, level.

Palm Springs. Motion rapid, lasted 20 seconds. Felt by many in home, frightened all in community. Rattled windows, doors, and dishes; frame creaked. Hanging doors swung. Pendulum clock stopped. Shifted small objects. Cracked plaster. Damage slight. Ground: Compact.

Rancho Mirage. Motion rapid, momentary duration. Felt by and frightened all in area. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Overturned small objects. Cracked plaster. Damage slight.

Riverside. Motion rapid, lasted 35 seconds. Felt by all, awakened and frightened many in community. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken moderately. Cracked plaster. Damage slight. Ground: Compact.

Riverside. V. Motion slow, lasted about 1 minute. Awakened all in home, frightened many in community. Rattled windows; frame creaked. "Moderate shock. No roar or special noises. Long and steady shaking."

San Bernardino. The Press reported 2 high-voltage lines swung together and caused a minor power interruption in one section of the city. Cracks were reported in the City Hall. Snapped power line leading to house. (The fire in San Bernardino was not caused by the earthquake.)

San Bernardino. V. Motion rapid. Felt by and awakened many, frightened few. Rattled windows.

San Bernardino. V. Motion slow, lasted 30 seconds. Awakened all in home. Rattled windows slightly. Hanging objects swung. "Didn't even get out of bed." Ground: Compact, level.

San Bernardino (NW. section). V. Motion rocking and swaying, N-S. Felt by many, few alarmed. Creaking of buildings and rattling of loose objects heard by many. Rumbling subterranean sounds heard at beginning of shock. Bed rocked gently for about 18 seconds. Ground: Sand and clay.

San Jacinto. Motion slow, lasted 30 seconds. Direction N. Awakened all and frightened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N. Pendulum clock stopped. Shifted furnishings, overturned vases and small objects. Cracked plaster. Knickknacks and plaster fell. Damage slight. Ground: Compact, level.

San Marcos. Motion sharp, rapid. Felt by all and awakened many in community, frightened few. Direction N. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken moderately.

19 March, 01:54:29* (main shock). Intensity VI. (cont.)

Shifted small objects, overturned vases and small objects. Cracked walls. Knickknacks fell. Damage slight. "Two separate shocks. Reported as sharpest in years." Ground: Soil, compact, level.

Thermal. Motion rapid, abrupt onset, lasted 30 seconds. Felt by and awakened all in community, frightened many. Direction NE. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Shifted small objects, overturned vases and small objects. Ground: Soil, level.

Thousand Palms. Motion slow, lasted several seconds. Felt by many and frightened all in home, awakened many or all in community. Rattled windows, doors, dishes, and pictures. Hanging objects swung. Overturned small objects. "I felt only one shock. Did not feel other slighter shocks." Ground: Rocky soil.

Thousand Palms. Motion slow, rolling, lasted 40 seconds. Direction N. Felt by all and frightened many in home, awakened all in community. Rattled windows, doors, and dishes. Knickknacks fell. "Shock at 02:20 was not as strong as first one. Three small shocks between first and second one." Ground: Soil, level.

Valerie Jean. Motion slow, lasted 20 seconds. Felt by and awakened all in home. Rattled windows, doors, and dishes. Pendulum clock, facing N., stopped. Jumped the pendulum to the back of the clock and into a metal frame in the back of the pendulum. Minor crack, running N-S, full length of concrete floor which is 12 feet long. Ground: Soil, compact.

Warner Springs. Motion rapid, lasted 35 seconds. Awakened all in community. House creaked. Shifted small objects and furnishings. Same report for the shock at 02:15, but shorter duration.

Westmorland (Squeaky Springs). Trailer knocked off blocks. Knickknacks fell.

White Water. Motion slow. Felt by and awakened all in community, frightened few. Rattled windows, doors; walls creaked. Ground: Loose.

White Water. V. Distinct shock, lasted about 10 seconds. Felt by nearly all of scattered population. Creaking of buildings and rattling of loose objects heard by nearly all. Frightened few. "Some people reported feeling 3 shocks. I felt 2." Ground: Rocky.

Wildomar. Motion strong, rolling, slow, lasted about 30-40 seconds. Felt by, awakened, and frightened many in community. Rattled windows, doors, and dishes; house creaked. Pendulum clock, facing SE., stopped. Some shifting of small objects and furnishings; some overturning of vases and small objects. Damage slight. "Shock felt at 02:25." Ground: Compact.

Intensity VI in Arizona:

Topock (near). Cracked concrete on two A.T. & S.F. bridges. (Reported by Yucca postmaster.)

Topock. IV. Motion slow, lasted 3 seconds. Felt by several and awakened few in community. Rattled windows. Hanging objects swung. Trees, bushes shaken slightly. Ground: Soil.

19 March, 01:54:29* (main shock). (cont.)

Intensity V:

- Adelanto.** Motion slow, rolling, lasted several seconds. Felt by and awakened many in community. Rattled windows, doors, and dishes. Hanging objects swung. Ground: Loose, sandy, level.
- Aguanga.** Felt by most people in community, awakened many, frightened few. Rattled windows and doors. "Have felt several since this one." Ground: Compact, level.
- Amboy.** Felt by and awakened all in community. Long duration. Direction E-W. Hanging objects swung E-W.
- Amboy.** Motion rocking, abrupt onset. Felt by and awakened most people. Creaking of buildings and rattling of loose objects heard by most people. Ground: Sandy.
- Anza.** "Shock quite strong in the Valley. Very strong on the south side of Mt. Thomas, about 3 miles from Anza post office. I felt two shocks later on, some felt three. Also felt shock at 8:15 p.m. on the 22nd."
- Baker.** Lasted 3 seconds. Felt by observer. Direction NE-N. Trees, bushes shaken moderately. Overturned vases. Damage slight.
- Balboa.** Motion slow, gradual onset, lasted about 10-15 seconds. Direction N-S. House creaked. Hanging objects swung N-S. Ground: Sandy.
- Banning.** Motion slow, lasted 4 seconds, followed in 20-30 seconds by small shake. Felt by many in community, awakened all in home, frightened few in home and community. Rattled windows, doors, and dishes; house creaked. Pendulum clocks stopped. Chandeliers swung for full half minute. Ground: Rocky.
- Barstow.** Motion rapid. Felt by, awakened, and frightened many in community. Direction E. Hanging objects swung. Ground: Compact.
- Big Bear City.** Motion rapid. Felt by many in community, awakened and frightened all in home. Rattled windows and doors; walls creaked. Ground: Rocky, compact, sloping.
- Blythe.** Motion slow, rolling, long duration. Felt by and awakened many in community, frightened few. Rattled windows, doors, and dishes. Hanging objects swung. Ground: Soil.
- Bonsall.** Motion slow, lasted 30 seconds. Felt by, awakened, and frightened many in community. Rattled windows, doors, and dishes; frame creaked. Ground: Level.
- Cadiz.** Motion slow, long duration. Felt by many in vicinity, awakened few. Rattled windows, doors, and dishes. Stopped wall clock. Ground: Rocky.
- Calxico.** Motion slow, lasted 2 minutes. Direction E-W. Felt by all in home, awakened and frightened many in community (some outdoors). Rattled windows, doors, and dishes; house creaked. Hanging objects swung E-W. Pendulum clock, facing E., stopped. Trees, bushes shaken strongly. Shifted small objects and furnishings. Ground: Loose, level.
- Calimesa.** Motion rapid, lasted 30 seconds. Felt by many in community, awakened all in home. Direction N-S. Ground: Soil.
- Campo (Morena Village).** Motion rapid, long duration. Very strong and sharp, continuous heavy vibration. Felt by and awakened many in community, frightened few in home. Rattled windows, doors, and dishes; house creaked. Ground: Compact.

19 March, 01:54:29* (main shock). Intensity V. (cont.)

Chula Vista. Motion rapid, long duration. Felt by, awakened, and frightened many in community. Rattled windows. Ground: Soil, compact.

Chula Vista. Motion slow. Felt by many and awakened all in home, felt outdoors by some. Hanging objects swung. Ground: Soil, compact, level.

Chula Vista. Motion rapid. Awakened all in home. Hanging objects swung. Ground: Level, compact.

Colton. Lasted about 1 minute. Felt by and awakened many, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Soil.

Corona. Motion slow, lasted 20 seconds. Awakened and frightened many in community. Rattled windows and doors; house creaked. Hanging objects swung. Pendulum clock stopped. Shifted small objects and furnishings. Ground: Compact, level.

Del Mar. Motion slow, long duration. Felt by and awakened many in community. Rattled windows, doors, and dishes. Hanging objects swung.

Descanso. Motion rapid, long duration. Felt by and frightened many in community, awakened all in home. Direction NW. Rattled windows and doors. Ground: Rocky, sloping and steep.

Desert Center. Motion rocking, abrupt onset. Shocks felt from 01:54 to 06:00. Felt by all, frightened few. Creaking of buildings and rattling of loose objects heard by all. Visible swaying of buildings and trees during first shock at 01:54 and also during later shock at 02:21. Ground: Rocky.

Desert Center (5 miles NE. of). Motion slow, long duration. Two peaks about 10 seconds apart. Felt by many in home and community, awakened and frightened all in home. Direction NW-SE. Rattled windows and doors; house creaked. Another very minor shock at 02:24 felt by many, short duration. Ground: Level, loose.

Desert Center (Eagle Mountain). IV. Motion swaying, E-W, abrupt onset. Felt by several. Creaking of building and rattling of loose objects heard by several. Roaring subterranean sounds heard after shock. Ground: Rocky.

Dulzura. Long duration. Felt by all in area, frightened few. Rattled windows and doors; house creaked. "I was awakened at 2:15 a.m. only, and watched my alarm clock 1 minute." Ground: Rocky.

El Cajon. Motion rapid, long duration. Awakened all and frightened many in community. Direction NW. Rattled windows and dishes; house creaked. Ground: Rocky, level.

El Cajon (E. section). Motion rapid, long duration. Felt by, awakened, and frightened all in home. Rattled windows, doors, and dishes; walls creaked. Ground: Sloping.

Escondido. Motion slow, long duration. Felt by and awakened many in home, frightened few in home, felt outdoors by some. Rattled windows. Shifted small objects. Trees, bushes shaken slightly. Ground: Compact, sloping.

Fawnskin. Motion sharp and rapid, lasted about 1 minute. Felt by all in home, awakened many in community, felt outdoors by some. Direction N-S. Rattled windows, doors, and dishes. Ground: Rocky, compact, sloping and steep.

19 March, 01:54:29* (main shock). Intensity V. (cont.)

Fontana. Motion rapid. Felt by and awakened many in home, felt outdoors by some. Rattled windows, doors, and dishes.

Forest Home. Motion rapid. Felt by and awakened many in community, frightened few. Ground: Rocky soil, compact, sloping and steep.

Fullerton. The Press reported it awakened most people. Pendulum clock stopped at high school. Motion described as rocking. No damage reported in Orange County.

Fullerton. IV. Motion rocking, rapid onset. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Ground: Sandy.

Glamis. Motion slow. Awakened many in community. Walls creaked.

Glendora. Motion slow, lasted 10 seconds. Awakened many in community. Ground: Soil, level.

Helendale. Motion rapid, lasted about 1 minute. Felt by and awakened many. Rattled windows, doors, and dishes; house creaked. Ground: Rocky soil.

Hemet. Motion slow, swaying, lasted about 1 minute. Felt by and awakened many in community, frightened few. Direction NE-SW. Pendulum clocks stopped, one facing W. and one facing S. Shifted small objects and furnishings. Another sway felt at 02:20 and double but light sway felt at 02:21. Several barely noticeable sways felt in between. Ground: Soil.

Holtville. Motion slow, lasted about 1-1/2 minutes. Felt by and awakened many in home, frightened few. Direction N-SE. "Several very light shocks felt later." Ground: Level and steep.

Huntington Beach. Motion rapid. Felt by and awakened many in community. Rattled windows. Ground: Soil, compact, level.

Huntington Park. Motion swaying, N-S, gradual onset. Felt by and awakened many. Rattling of loose objects heard by many. Disturbed objects observed by several. Press reported 100 clocks stopped in store. Lights swayed. Ground: Loam.

Imperial. Two shocks, one at 01:54 and 02:21. Motion swaying NE-SW, gradual onset. Felt by and awakened most people, frightened few. Water in canal slopped a little. Creaking of buildings and rattling of loose objects heard by many. Faint rumbling subterranean sounds heard by few before shock. Disturbed objects observed by many. Venetian blinds swung out 6 inches, bridge lamps rocked, dishes moved on shelves, and a grandfather clock was held to keep from falling. Pendulum clock stopped, pendulum swinging N-S. Ground: Adobe.

Julian. Motion slow. Felt by and awakened many in community, frightened few. Direction NE. Rattled doors; walls creaked. "Additional small shocks felt for 1/2 hour. Also 2 small shocks felt about 6:00 a.m."

Laguna Beach. Motion rocking, gradual onset. Felt by and awakened many. Creaking of buildings and rattling of loose objects heard by many. Ground: Rocky.

Leucadia. Two shocks felt. Motion rapid, long duration. Felt by and awakened many in community, frightened few. House creaked. Direction SE-NW. "Shock reported at 8:30 p.m. not felt here."

19 March, 01:54:29* (main shock). Intensity V. (cont.)

Long Beach. Motion rocking, abrupt onset. Felt by all in community. Creaking of buildings and rattling of loose objects heard by all. Ground: Sandy.

Los Angeles. The Press reported plaster was cracked on the upper stories of the 28-story City Hall. Touched off many burglar alarms.

Los Angeles (1647 W. 11th St.). Motion rocking, N-S, rapid onset. Felt by many. Pendulum clock stopped, pendulum swinging E-W. Ground: Sandy.

Los Angeles (SW. section). Two main shocks: 01:54 and 02:20. Motion rolling, gradual onset. Felt by and alarmed many. Creaking of buildings and rattling of loose objects heard by many. Disturbed objects observed by few. Few reports of plaster knocked loose. Ground: Soil.

Los Angeles (4680 N. Figueroa St.). Motion rapid, lasted 30 seconds. Awakened all in home. Ground: Soil, level, filled in.

Los Angeles (W. 78th and Figueroa). Motion slow, lasted 1 minute. Awakened all in home. Direction E. House creaked. Ground: Soil, level.

Los Angeles (1860 Maltman Ave.). Lasted 10 seconds. Awakened all in home. Rattled windows; house creaked. Ground: Rocky, sloping, steep.

Los Angeles (706 S. Wilton Pl.). IV. Felt by several and awakened few in home. Ground: Level.

Los Angeles (2516 E. 3rd St.). IV. Motion sharp, lasted 10 seconds. Awakened few in home. Rattled windows and doors. Hanging objects swung. Ground: Compact.

Ludlow. Three shocks in 30 seconds. Motion rapid. Felt by (some outdoors) and awakened many. Direction N-S. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N-S. Pendulum clock stopped. Trees, bushes shaken. Ground: Rocky, sandy, loose, level.

Ludlow. Motion rapid, lasted 30 seconds. Felt by and awakened many. Direction W-E. Rattled windows, doors, and dishes. Ground: Compact.

Mesa Grande. Motion rapid, long duration. Felt by and awakened all in home, frightened many in home. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Shifted small objects and furnishings. Ground: Soil, sloping.

Midland. Strong motion, momentary duration. Felt by and awakened many in community. Direction N-S. Rattled windows, doors, and dishes. Ground: Rocky, level.

Moreno. Motion slow, lasted few seconds. Awakened many in community. Direction E. Rattled windows; walls creaked. Observer felt shock at 02:25 outdoors; felt by others. Ground: Compact.

Mount Baldy. Felt by and awakened many in community.

Mount Helix (near San Diego). Motion rapid, long duration. Felt by and awakened all in home, frightened few. Rattled windows and doors; walls creaked. Ground: Rocky, sloping.

Mount Wilson. Felt by and awakened many in community. Rattled windows, doors, and dishes. Hanging objects swung.

19 March, 01:54:29* (main shock). Intensity V. (cont.)

- Needles.** Motion slow, long duration. Felt by and awakened many in community. Direction E-W. Rattled windows, doors, and dishes. Ground: Soil, compact, level.
- Newberry.** Motion slow, lasted 15 seconds. Felt by and awakened many. Rattled windows. Ground: Soil, compact, level.
- North Hollywood.** Several shocks. Motion rolling, E-W. Felt by and awakened many. Scattered reports of slight plaster cracks. Ground: Sandy.
- North Hollywood.** III. Motion slow, lasted 30 seconds. Felt by observer in home.
- Oceanside.** Motion slow, long duration. Felt by and awakened many in community, frightened few in home. Rattled windows. Cracked plaster. Ground: Soil.
- Ontario.** Felt by and awakened many in community. Rattled windows, doors, and dishes.
- Pala.** Motion slow, lasted 30 seconds. Direction E-W. Felt by all in home, awakened many in community. Rattled windows, doors, and dishes.
- Pasadena.** Motion rapid, lasted 10 seconds. Felt by and awakened all in home. Hanging objects swung. Ground: Compact.
- Perris.** Motion rapid, lasted 30 seconds. Felt by many in community, awakened all in home, frightened few. Direction N-S. Rattled windows, doors, and dishes. Hanging objects swung. Trees, bushes shaken moderately. Ground: Compact.
- Plaster City.** Motion rapid. Felt by, awakened, and frightened many in community. Rattled windows, doors, and dishes; frame creaked. Hanging objects swung. Ground: Soil, compact, level.
- Potrero.** Motion slow, lasted about 1 minute. Felt by many, awakened all in home, frightened few. Rattled windows, doors, and dishes. Overturned vases.
- Ramona.** Shocks felt from 01:54 to 06:00. Motion slow. Direction SW. Felt by and awakened all in home. Rattled windows, doors, and dishes. Pendulum clock, facing W., stopped. Shifted pictures. "Lived here for 20 years. This was the strongest and longest. First shock strong and lasted for over a minute. Later shocks were not strong." Ground: Rocky, hilly.
- Redlands.** Motion slow, rolling. Direction NE. Felt by all in community, awakened all in home, frightened few. Hanging objects swung. Ground: Compact.
- Rice.** Motion rapid, momentary duration. Felt by and awakened many in community. Rattled windows. Also felt at Iron Mountain, about 20 miles westerly from Rice.
- Rolling Hills.** Motion slow, lasted 30 seconds. Felt by and awakened all in home. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N. Shifted small objects. Bed on castors rolled N-S. Ground: Soil, compact, sloping and steep.
- Seal Beach.** Motion bumping, abrupt onset. Felt by and awakened many. Building creaked; loose objects rattled. Disturbed objects observed by one. Chairs and chandeliers moved slightly. Ground: Sandy.
- San Diego.** The Press reported plaster was knocked off a ceiling in the San Diego Union Tribune building and a broken power line

- 19 March, 01:54:29* (main shock). Intensity V. (cont.)
caused a temporary blackout in one section of the city. Set off fire alarms at the Naval Hospital.
- San Diego. Two shocks: 01:54 and 02:21. Motion rapid, long duration. Awakened many. Direction N. House creaked. Hanging objects swung.
- San Diego (Power Plant). Four shocks felt: 01:54 (strong), 02:15 (slight), 02:21 (moderate), and 02:23 (slight). Motion rapid, long duration. Direction N-S. Felt by and awakened many in community, frightened few. Rattled windows and doors. Ground: Compact, level, filled in.
- San Diego (4328 Osprey). Motion rapid, lasted 10 seconds. Felt by and awakened all in home, frightened few in community. Hanging objects swung. "Awakened by creaking of house and rattling of windows." Ground: Soil, compact, sloping.
- San Diego (Silver Gate Power Plant). IV. Motion slow, lasted 25 seconds. Felt by all at power plant. Hanging objects swung NW-SE. Ground: Sandy.
- Santa Ana. Felt by and awakened many in community. Ground: Soil, level.
- Santa Ysabel. Motion rapid, long duration. Direction S-N. Felt by all in community, awakened many in home, frightened few. Rattled windows, doors, and dishes; house creaked. "Most severe and longest shock felt in 25 years." Ground: Rocky, granitic, sloping.
- San Ysidro. Motion slow, long duration. Frightened few in community. Rattled windows and doors; house creaked. Hanging objects swung. Pendulum clock, facing N., stopped. Ground: Rocky, level, compact.
- Summit. Motion slow, long duration. Direction NW. Felt by and awakened many in community, frightened few. Rattled windows and doors. Ground: Compact, level.
- Trabuco Canyon. Motion slow, lasted about 30 seconds. Direction N-S. Awakened many in community. Rattled windows, doors, and dishes; walls creaked. Ground: Rocky.
- Twentynine Palms. Motion rapid, lasted 4 seconds. Direction NE. Awakened many in community, all in home, frightened few in home. Rattled windows and doors; house creaked. Damage slight. Ground: Rocky, loose, sloping.
- Valermo. Motion slow, lasted 1 minute. Awakened and frightened all in home. Cracked plaster. Ground: Marshy, level.
- Victorville. Motion slow, lasted 1 minute. Direction N-S. Felt by many in community, awakened all in home. Rattled windows, doors, and dishes. Ground: Soil, compact.
- Westmorland. Motion slow, long duration. Felt by all in home, awakened many and frightened few in community. Rattled windows, doors, and dishes. Hanging objects swung. "Some people said they felt other shocks, but I only felt one." Ground: Soil, compact, level.
- Yermo. Motion slow. Felt by and awakened many in community. Rattled windows. Hanging objects swung. Ground: Sandy; desert.
- Yorba Linda. Motion rocking. Felt by and awakened many.
- Yucca Valley. Motion rapid, one jolt. Awakened many and frightened few in community. Curtains swayed. Ground: Compact.

19 March, 01:54:29* (main shock). (cont.)

Intensity V in Arizona:

- Poston.** Motion rapid, long duration. Felt by and awakened many in community. Rattled windows, doors, and dishes; house swayed. Hanging objects swung. Trees, bushes shaken moderately. Shifted small objects and furnishings. Ground: Soil.
- Yuma.** Motion slow, lasted 30 seconds. Felt by and awakened many in community, frightened few. Rattled windows, doors, and dishes; house creaked. Shifted small objects and furnishings.

Intensity IV:

- Acton.** Motion slow, lasted 30 seconds. Direction E-W. Felt by and awakened few in community. Ground: Soil.
- Alhambra.** Motion slow, lasted 30 seconds. Awakened observer. Rattled windows. Second shock felt by observer. Ground: Soil, compact, level.
- Altadena.** Motion rapid. Felt by several in home, awakened few. Ground: Soil, sloping and steep.
- Burbank (Lockheed Air Terminal).** Motion rolling, rapid onset. Felt by several, few alarmed. Ground: Sandy.
- Castaic.** Motion slow, momentary duration. Felt by several and awakened few in community. Hanging objects swung.
- Death Valley Junction.** Motion slow, lasted 10 seconds. Direction E-W. Felt by several and awakened few in community. Walls creaked. Hanging objects swung. Ground: Sandy, compact, level.
- Essex.** Motion slow, lasted 45 seconds. Felt by several in community. Rattled windows, doors, and dishes some.
- Fenner.** Motion rapid. Felt by observer in home, awakened few. Walls creaked. Ground: Soil, level.
- Hipass.** Motion slow. Awakened few in home. Slight creaking of house. Ground: Loose, level.
- Hollywood.** The Press reported lights and chandeliers were shaken. Quite sharp.
- Jawbone Aqueduct Station.** Motion slow, lasted about 6 seconds. Felt by many in home, awakened few. Direction NW-SE. Ground: Level, compact.
- Kelso.** Awakened few in community. Rattled windows, doors, and dishes; house creaked. Ground: Level.
- Lake Hughes.** Lasted 2-4 seconds. Felt by several, awakened few. Rattled windows.
- Lucerne Valley.** Motion slow, long duration. Awakened few in community. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Ground: Soil.
- Maywood.** Lasted 15 seconds. Awakened few in community. Overhead lights continued to swing until 02:00. Ground: Level, compact.
- Mill Creek (117°05' W., 34°05' N.).** Motion trembling, N-S, gradual onset. Felt by observer. Buildings creaked; loose objects rattled. "Just a slight shock here."
- Morongo Valley.** The Press reported a sharp jolt was felt.
- Mountain Center.** Motion rapid, long duration. Direction SE. Awakened observer. Rattled windows, doors, and dishes; house creaked. Ground: Soil.
- Oxnard.** Motion slow. Felt by several and awakened few in community. Ground: Soil, level.

19 March, 01:54:29* (main shock). Intensity IV. (cont.)

Parker Dam. Motion rapid, long duration. Felt by several and awakened few in community. Rattled windows.

Pisgah Substation (near Ludlow). Motion slow, long duration. Felt by and awakened observer. Rattled doors. Ground: Soil, compact, level; caliche.

Pomona. Motion swaying, E-W, gradual onset. Felt by 2 in home. Buildings creaked; loose objects rattled. Window weights rattled for 30 seconds before shock was felt. House awayed. Disturbed objects observed. Another shock felt at 02:20. Ground: Loam.

Ridgecrest. Awakened few in home. Rattled windows; house creaked.

San Clemente. Motion slow, lasted 45 seconds. Felt by several and awakened few in community. Rattled windows and doors. Second shock felt at 02:21 and lasted 5 seconds. Ground: Soil, compact, sloping and steep.

San Gabriel. Lasted 30 seconds. Felt by observer in home, awake. Direction N. Rattled windows and doors; house creaked. Hanging objects swung E-W. Ground: Soil, level.

Shoshone. Motion slow. Awakened few in community. Rattled windows. Ground: Level.

Sun Valley. One woman reported to the Press that her bed was severely shaken. Awakened many in San Fernando Valley towns. Direction was generally reported as E-W.

Tecopa. Motion slow. Felt by and awakened several in community. Rattled windows; walls creaked. Ground: Soil, compact.

Tujunga. Motion slow, lasted 5 seconds. Direction E-W. Felt by several and awakened few in community. Ground: Rocky, sloping and steep.

Whittier. Motion rapid, lasted about 20 seconds. Felt by several in home, awakened few. Direction NW. House creaked. Ground: Soil, level.

Tucca Grove. Six short shakes. Motion slow. Felt by 2 in cabin. Rattled dishes and windows.

Intensity IV in Arizona:

Parker. Motion slow. Felt by and awakened several in community. Rattled windows, doors, and dishes; house creaked. Ground: Rocky, sandy soil.

Parker. Motion rolling, abrupt. Felt by and awakened several. Ground: Rocky.

Quartzsite. Motion slow, long duration. Awakened few in community. House creaked slightly. Ground: Rocky soil.

Quartzsite. Motion slow, long duration. Direction NE-SW. Awakened few in community. Walls creaked. Trees, bushes shaken slightly. Ground: Rocky soil, compact.

Wellton. Slight awaying. Felt by and awakened several.

Intensity I to III:

Bard. Motion slow, very brief. Awakened one in home. Ground: Soil, level.

Cantil. Lasted 2 seconds. Felt by several in community.

Fillmore. Just a few people barely felt shock.

- 19 March, 01:54:29* (main shock). Intensity I to III. (cont.)
Glendale. Felt by and awakened one in home.
Palmdale. "Only evidence of shock here was stopping of clocks in several homes. Did not awaken anyone."
San Fernando Power Plant. Light shock. Motion slow, lasted 5 seconds. Felt by several at plant. Hanging objects swung N. Ground: Soil, compact, level.
Tehachapi. The Press reported the shock as weak. Another Press report stated the shock was not felt.

Intensity I to III in Arizona:

Bouse. "Cannot say definitely if shock was felt here. Some say it was, others say it wasn't. I did not feel it."

Intensity I to III in Nevada:

Goodsprings. Motion slow. Felt by 2 in home. "Light shock." Ground: Rocky.

Searchlight. Motion slow, rocking. Felt by one. Hanging objects swung. Ground: Rocky, level.

Reported not felt: Agoura, Bakersfield, Beverly Hills (Post Office), Boron, Camarillo, Cima, Compton, Coso Junction, Darwin, Stovepipe Wells Hotel (Death Valley), Edwards, Frazier Park, Gardena, Hinkley, Inyokern, Ivanpah, Lennox, Manhattan Beach, Mojave, Nipton, Port Hueneme, Rosamond, San Dimas, Santa Barbara, Santa Monica, Santa Susana, Tehachapi, Trona, Ventura, Vidal, Weldon, Wheeler Ridge, Willowbrook, Winterhaven.

Reported not felt in Arizona: Bullhead City, Chloride, Dome, Hackberry, Kingman, Oatman, Somerton, Vicksburg, Wenden.

Reported not felt in Nevada: Beatty, Blue Diamond, Jean, Las Vegas, Pahrump, Sloan.

- 22 March, 20:14:50*. Aftershock of 19 March.
Epicenter $33^{\circ}17' N, 116^{\circ}11' W$, Santa Rosa Mountains. (P)
Anza. Felt. (No details)
Chino. III. Motion rolling, lasted about 15 seconds. Direction N-S. Felt by observer in home. Ground: Soil.
Descanso. IV. Motion rapid, long duration. Direction E-W. Felt by many in community, awakened all in home. Rattled windows, doors, and dishes; house creaked. Hanging objects, doors, etc., swung E-W. Ground: Rocky soil, sloping and steep.
El Centro. IV. Motion slow, lasted 10 seconds. Frightened few.
Fawnskin. IV. Motion rapid, lasted 15 seconds. Felt by many in home. Direction N. Rattled dishes; walls creaked. Ground: Rocky.
Imperial Valley. IV. The Press reported the shock rattled windows and dishes, but caused no damage as far as could be ascertained.
Indio. IV. Motion slow, lasted 15 seconds. Felt by many in home. Rattled windows. Hanging objects swung. Ground: Loose.
Los Angeles. IV. The Press reported it was felt in the Los Angeles area as a sharp shock, followed by a slow, rolling motion. No damage reported.

22 March, 20:14:50*. (cont.)

Mecca. Felt slightly.

Palm Springs. VI. Motion slow, lasted 5 seconds. Felt by and frightened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Pendulum clock stopped. Shifted small objects and furnishings. Cracked plaster. Damage slight. Ground: Compact, level.

Pomona (NW. section). IV. Motion rocking, swaying, abrupt onset, lasted 10 seconds. Felt by 2. Lamp stand and curtains swayed. Ground: Sandy loam.

San Diego (114-10th St.). IV. Motion slow, lasted 10 seconds. Direction E-W. Felt by all in building.

San Diego. III. Motion rapid, long duration. Direction NE. Hanging objects swung. Ground: Compact.

Santa Ysabel. V. Motion rapid, lasted 1 minute. Direction E-W. Felt by all in community, frightened few. Rattled windows, doors, and dishes; house creaked. "Almost as severe as the one on the 19th March." Ground: Granitic, sloping.

Thermal. IV. Motion slow, gradual onset. Direction circular. Felt by many (some outdoors), frightened few. Trees, bushes shaken slightly. Rattled windows, doors, and dishes slightly. Ground: Soil, level.

Thousand Palms. IV. Motion slow, rolling, lasted 15 seconds. Direction N. Felt by and awakened many in home, frightened few. Rattled windows, doors, and dishes.

Thousand Palms. IV. One sharp jolt, like a distant explosion. Felt in home and community. Ground: Rocky soil.

23 March, 21:17:32*. Aftershock of 19 March.

Epicenter 33°17' N., 116°11' W., Santa Rosa Mountains. (P)

Cathedral City (2 miles E. of). IV. Felt in home. Rattled windows, doors, and dishes. Ground: Alluvium.

Palm Springs. III. Motion slow, lasted 1 second. Felt by several in home. Ground: Compact.

27 March, 07:43:31*.

Epicenter 36°31' N., 121°10' W., northeast of Soledad. (B)

Greenfield. IV. Motion slow, lasted 20 seconds. Direction N-S. Preceded by rumble. Felt by many. Rattled windows, doors, and dishes; house creaked. Ground: Loose, level.

Hollister (7 miles S. of). IV. Weak shock. Motion slow, lasted 5 seconds. Felt by several in home and community. Rattled windows; walls creaked. Ground: Soil.

King City. Lasted 5 seconds. Felt in post office.

Pinnacles National Monument. V. Motion rapid, abrupt onset. Felt by all, awakened all who were still asleep; awakened observer asleep on the ground in sleeping bag. Ground: Soil, compact, level and sloping.

San Benito. IV. Motion slow, brief. Direction NE-SW. Awakened all in home. Rattled windows; house creaked.

31 March, 16:36:24*.

Epicenter 36°44' N., 121°18' W., southeast of Tres Pinos. (B)

Hollister (7 miles S. of). V. Motion rapid, lasted 10 seconds. Felt

31 March, 16:36:24*. (cont.)

by all in community, frightened few. Rattled windows, doors, and dishes; house creaked. "Sharper than the shock on the 27th March." Ground: Soil.

- - - - -

WASHINGTON AND OREGON

(120th Meridian or Pacific Standard Time)

-- January.

No earthquakes were reported felt during the month of January at the following places:

Weather Bureau Stations:

Washington: Seattle.

Oregon: Portland.

1 February, 17:23.

Canby, Ore. Reported felt. (Private amateur seismograph station in Portland, Ore. reported recording this shock.)

-- February.

No earthquakes were reported felt during the month of February at the following places:

Weather Bureau Stations:

Washington: Seattle.

Oregon: Portland.

16 March, 07:56. State of Washington.

Felt over approximately 3000 square miles of western Washington, principally in King and Pierce counties. Very moderate. Maximum intensity V. The University of Washington reported that the shock very likely originated along the Mt. Si Fault.

Intensity V:

Buckley. Motion rapid, lasted 2 seconds. Direction E-W. Felt by and awakened many in community. Rattled doors; frame creaked. Ground: Compact, level.

Buckley (NE. section). IV. One bump, like explosion, abrupt onset. Felt by many. Ground: Rocky.

Kapowsin. Motion rapid, lasted few seconds. Felt by several and frightened few in community. Rattled windows and dishes. Shifted small objects. Ground: Compact, sloping.

Lester. Motion slow, lasted 5 seconds. Felt by many in home and post office; awakened all in home. Rattled windows, doors, and dishes. Ground: Soil, compact, level.

North Bend. Motion rapid. Awakened all in home. "No great disturbance. A rumble, then a slight shaking of my house."

16 March, 07:56. State of Washington. Intensity V. (cont.)

Palmer (Tacoma Headworks). Motion rapid, lasted 1-2 seconds. Felt by all in community, frightened few. Rattled windows and dishes; only frame houses creaked. Trees, bushes shaken slightly. "A quick, sharp shock." Ground: Rocky, sloping and steep.

Sumner. Motion rapid, lasted 15 seconds. Direction N-S. Felt by many (some outdoors) and frightened few in community. Rattled windows. Hanging objects swung. Trees, bushes shaken slightly. Shifted small objects and knickknacks fell. Ground: Soil.

Intensity IV:

Carbonado. One very slight jar. Felt by several in home and community (some outdoors). Rattled windows. Ground: Rocky.

Carnation. Motion rapid. Felt by several in community (some outdoors). Direction E. Rattled windows. Ground: Compact, level.

Cougar Mountain (near Issaquah, about 1 mile south of Route 10, eastward from Seattle). A thud, and rattling of stove.

Cumberland. Motion slow. Felt by several and awakened few in community. Rattled windows. Hanging objects swung.

Des Moines. Motion slow, lasted 5 seconds. Felt by several in home. Quivering from N-S. Rattled windows and dishes. Sound like a clap of thunder or big gun fired at great distance. Ground: Soil, sloping.

Enumclaw. Motion rapid, lasted 3 seconds. Felt by many in home and community. Rattled doors. Ground: Soil, compact, level.

Fall City. Motion rapid, brief. Felt by all in post office building. Rattled mail boxes. "Several people remarked about the shock. Nothing serious." Ground: Compact, level.

Hobart. Loud noise preceded shock; rumbling lasted 10 seconds after shock. Rattled dishes.

Kent (SE. section). Very short shake, abrupt onset. Felt by several. Rattling of loose objects heard by several; brief shake of buildings. Ground: Clay.

Orting. Motion rapid, lasted 5 seconds. Felt by many and awakened few in community, frightened few. Rattled windows and dishes.

Parkland. Motion rapid, lasted 3 seconds. Felt by 2 in home. Direction NE. Rattled windows and doors; frame creaked. Trees, bushes shaken slightly. Ground: Rocky soil.

Parkland. III. About 5 people reported to postmaster they felt a slight shock. (No details.) "I did not feel shock,—think I was driving at the time."

Preston. Motion rapid, lasted 2-4 seconds. Felt by many (some outdoors) in community. Rattled windows, doors, and dishes; walls creaked. "Shock felt slightly here." Ground: Compact soil, level.

Snoqualmie. Motion rapid. Felt by many in post office, outdoors by others, frightened few. Rattled windows and dishes. Trees, bushes shaken slightly. Ground: Rocky soil, compact; marshy.

Intensity I to III:

Kanaskat. Motion slow, lasted 2 seconds. Felt in home and community. House creaked slightly. Ground: Rocky soil.

Lake City (near N. end of Lake Washington). Felt by one person in bed.

Maple Valley. Motion slow, lasted 10-20 seconds. Felt in home. Very slight rattling of windows, doors, and dishes. Ground: Soil.

- 16 March, 07:56. State of Washington. Intensity I to III. (cont.)
Mercer Island (south tip). Felt slightly at breakfast table.
Milton. Shock very light. Motion rapid, lasted 1 second. Unnoticed by many. Ground: Compact.
Northgate (at north boundary of Seattle). Felt by one in bed.
Olympia (Olympia Municipal Airport). Slight shock. Radio station received 2 reports from Tumwater district and 2 from West Olympia. One observer reported stovepipes rattled. Ground: Gravelly.
Port Orchard. Motion slow, lasted 2-3 seconds. Two slight tremors right together. Felt in home and community. Ground: Sloping.
Puyallup (NW. section). One bumping motion, abrupt onset. Felt by several. Faint subterranean sounds heard by some at time of shock. Ground: Clay.
Ravensdale. "While walking through lobby of post office, just before 8 a.m., I heard a slight creak of the floor boards. No shock was felt. I went back over the area again but floor did not creak. Don't think it was heavy enough to be felt in this area."
Redmond (2 miles due east of, at Union Hill). Sharp jar, lasting 30 seconds, like heavy blast, followed by trembling which was enough to set house plant leaves shaking. Felt by observer. Ground: Compact, level.
Renton. Lasted 2 seconds. Felt in home. Ground: Soil, level.
Seattle (Weather Bureau Airport Station). Motion rocking, E-W, gradual onset, lasted several seconds. Felt by several. Barograph needle moved upward about 3/8 inch. Ground: Glacial till.
Seattle (Yale and Olive Sts.). Felt by one in bed.
Seattle (Fort Lawton area). Awakened one in bed.
Tacoma (central section on bluff above bay). Motion bumping, up and down. Two shocks right together. Felt by several. Ground: Clay.
Reported felt with no details given: East Tacoma, Lake Burien, Maplewild, Seahurst.

Reported not felt: Bremerton, Burien, Burton, Cove, Du Pont, Gig Harbor, Kirkland, Lakebay, Olalla, Richmond Beach, Steilacoom, Vashon, Vaughn, and Winslow.

-- March.

No earthquakes were reported felt during the month of March at the following place:

Weather Bureau Station:

Oregon: Portland.

- - - - -

WESTERN MOUNTAIN REGION

(105th Meridian or Mountain Standard Time)

11 January, 23:55.

Lander, Wyo. (7 miles SW. of, in Sinks Canyon). II. Motion trembling,

11 January, 23:55. (cont.)

gradual onset. Felt by 2; not felt by 2 others at same place. "Such ground trembling not uncommon here. Have had greater shocks that must have been purely local, as not noted by people in Lander area. Probably caused by underground channel of Popo Agie between 'Sinks' and 'Rise' in the quarter mile above the observer's residence." Ground: Rocky; in narrow canyon.

20 January, 13:50:01*. State of Wyoming.

Epicenter $41\frac{1}{2}^{\circ}$ N., $105\frac{1}{2}^{\circ}$ W., southeastern Wyoming. (W)

Felt over approximately 2000 square miles in southeastern Wyoming; one location in Colorado, 4 miles north of Cowdrey, reported the shock was felt. Maximum intensity V. No damage reported.

Intensity V:

Albany. Motion rapid, lasted 2 minutes. Felt by several indoors and outdoors. Rattled windows. Hanging objects. Shifted furnishings.

Centennial. Motion like heavy dynamite blast, trembling, abrupt onset. Felt by all, general alarm. Creaking of buildings and rattling of loose objects heard by many. "A man living at the head of Lake Hattie said his house swayed, and a man living at the head of the Little Laramie River said a plate that was standing on edge in the cupboard fell down." Ground: Rocky; in valley.

Centennial. IV. Motion rapid, lasted several seconds. "There were 2 distinct shocks."

Foxpark. Felt by all. Second shock felt about 20:00.

Jelm. Motion rapid, lasted 10 seconds. Direction E-W. Felt by all in community. Building creaked; loose objects rattled. Shifted small objects. "The second shock came about 19:00, and was light and shorter."

Laramie. Motion rapid, lasted several seconds. Roaring noise heard. Felt by most people (indoors mainly), awakened and frightened some. Much rattling. Hanging objects swung. The Press reported that just about every building in town shook slightly, windows rattled, and dishes "hopped" off tables.

Larmie (University of Wyoming, NE. section). IV. Motion trembling, rapid onset. Felt by many. Creaking of buildings and rattling of loose objects heard by many. "Vibration like iron-wheeled truck going down hall." Ground: Soil, shale; in valley.

Intensity IV in Colorado:

Cowdrey (4 miles N. of). Motion rapid, lasted 15 seconds. Direction SW. Rattled windows, doors, and dishes; house creaked.

Intensity I to III:

Tie Siding. Motion slow, very brief. Felt by observer in home.

Reported not felt: Baggs, Bosler, Elk Mountain, Encampment, Fletcher Park, Garrett, McFadden, Medicine Bow, Rawlins, Saratoga, Savery, and Sinclair.

Reported not felt in Colorado: Coalmont, Estes Park, Glendevey, and Walden.

22 January, 22:00 (about).

Jelm, Wyo. IV. "Very hard but short. It shook things around here. I have talked to people living on both sides of me and they felt it too."

23 January, 18:58.

Alcova, Wyo. (Alcova Government Community, SE. side of North Platte River). IV. One shock, slight tremble before and after, with bumping in between, rapid onset. Rattling of loose objects heard by many. Felt by all occupants of 12 houses; none alarmed. "Felt like an explosion close by, -without the noise." Ground: Sandy.

28 January, 23:20.

Clarkston, Mont. IV. Motion slow, lasted 4 seconds. Felt by observer in home, lying down. Walls creaked. Ground: Gravelly.

31 January, 20:30.

Hot Springs State Park, Wyo. (Big Spring). V. "Reports that some of the large stones around the Big Spring were dislodged and that the stone platform at west edge was loosened."

Thermopolis, Wyo. (NW. section). IV. Slight, rocking motion, lasted 3 or 4 seconds. Felt by many, many alarmed. Creaking of buildings and rattling of loose objects heard by several.

-- January.

No earthquakes were reported felt during the month of January at the following places:

Weather Bureau Stations:

<u>Arizona:</u>	None.
<u>Idaho:</u>	"
<u>Montana:</u>	"
<u>Nevada:</u>	"
<u>New Mexico:</u>	"
<u>Utah:</u>	"

21 February, 13:20:51*.

Epicenter 40° N., $108-3/4^{\circ}$ W., northwestern Colorado. (W)

This location has a probable error of about $1/2$ degree and is about $1/2$ degree east of the Yampa Fault.

Cameo. Felt.

Fruita and Loma (observer located between Fruita and Loma). IV. Ground shook noticeably. Hanging plants swung.

Grand Junction. IV. Direction N-S. Felt by several. Rattled dishes on stoves and rattled Venetian blinds. Observer thought heater had exploded. Door on north side of house rattled several times; door on west side did not rattle.

Mack (2 miles N. of). Felt.

Reported felt in Utah:

Dinosaur National Monument (Castle Park area). IV. Felt by rancher. Windows and dishes rattled; house shook. Chairs "danced" on floor.

-- February.

No earthquakes were reported felt during the month of February at the following places:

Weather Bureau Stations:

<u>Arizona:</u>	None.
<u>Colorado:</u>	"
<u>Idaho:</u>	"
<u>Montana:</u>	"
<u>Nevada:</u>	"
<u>New Mexico:</u>	"
<u>Utah:</u>	"

9 March, 04:58.

Salt Lake City, Utah. II. Motion trembling, abrupt onset. Felt by few. Faint rumble heard by few at time of shock. "This shock was so light that it was heard only by people sitting quietly in buildings, particularly tower operators in administration building of Airport No. 1, Salt Lake City. Also felt and heard by the forecaster on duty in CAA building about 200 feet from the administration building." Ground: Sandy.

31 March, 07:00.

Greenriver, Utah. IV. Motion slow, lasted 5-10 seconds. Felt by many in community. Rattled windows, doors, and dishes slightly. Ground: Soil, level.

-- March.

No earthquakes were reported felt during the month of March at the following places:

Weather Bureau Stations:

<u>Colorado:</u>	None.
<u>Idaho:</u>	"
<u>Nevada:</u>	"
<u>New Mexico:</u>	"

- - - - -

BOULDER CITY

(120th Meridian or Pacific Standard Time)

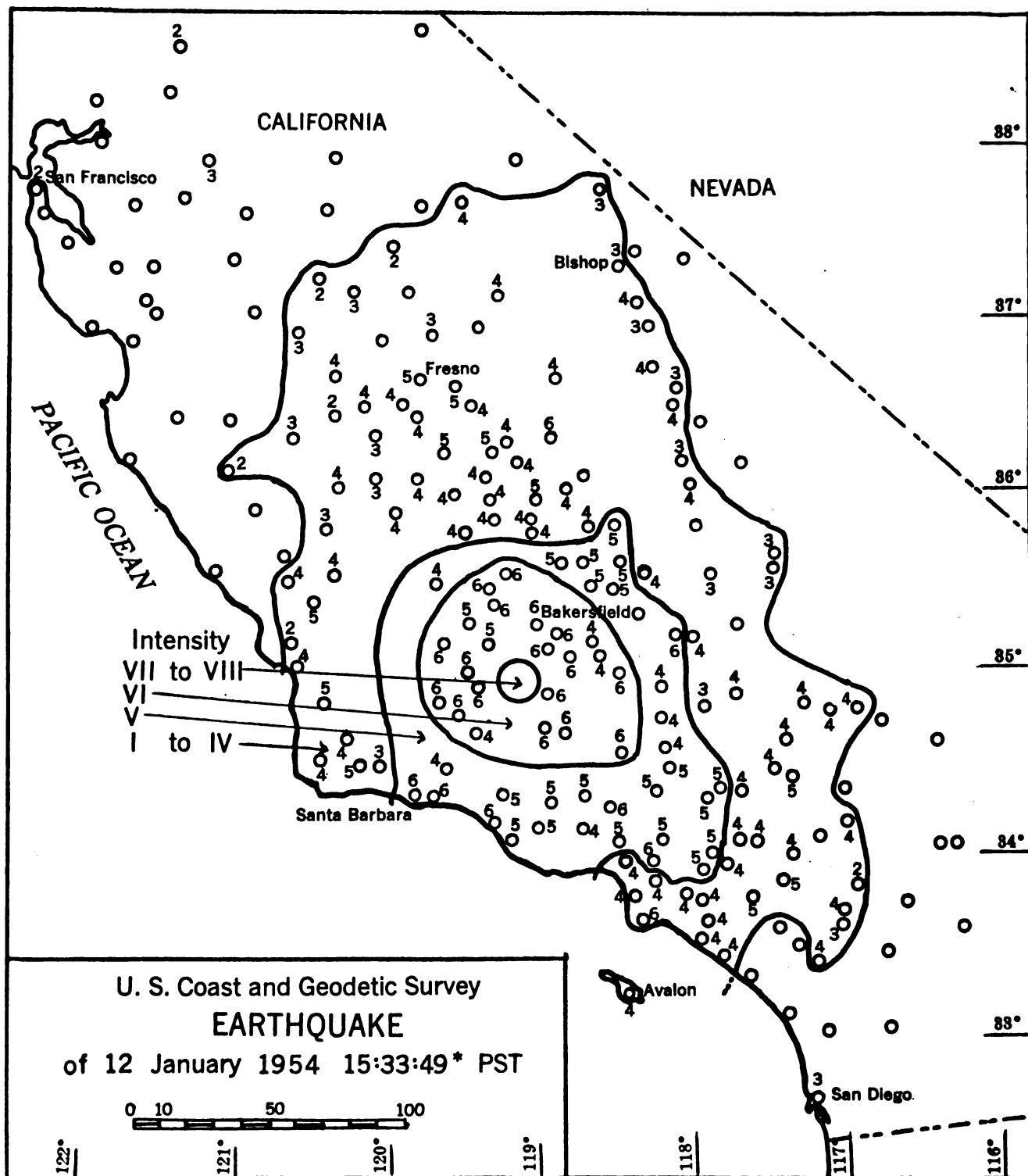
-- January and February.

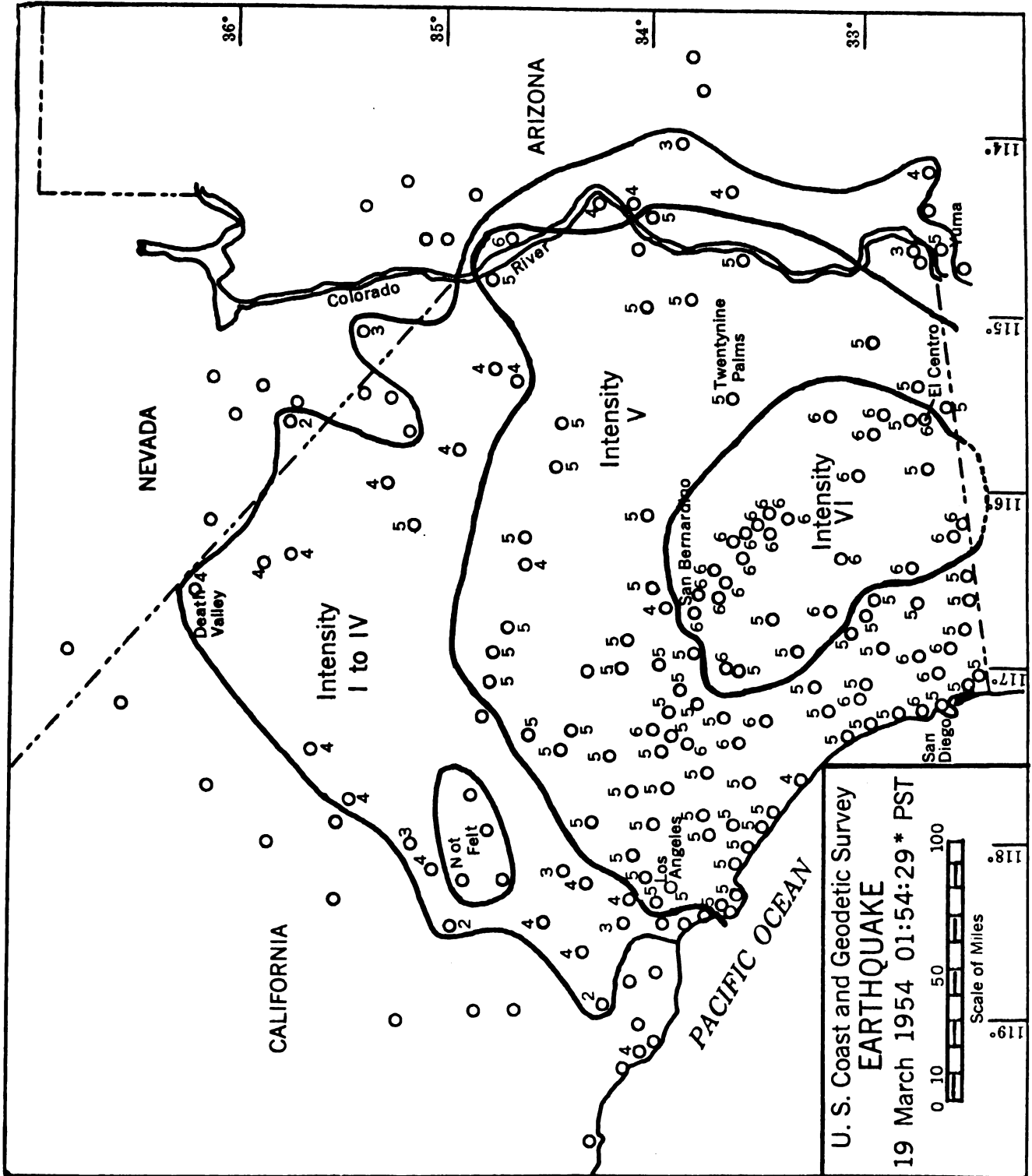
No earthquakes reported felt during these months.

18 March, 05:20:42* (BC).

Boulder City. IV. Felt by and awakened few.

- - - - -





MODIFIED MERCALLI INTENSITY SCALE OF 1931
(Abridged)

- I. Not felt except by a very few under especially favorable circumstances. (I Rossi-Forel Scale)
- II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (I to II Rossi-Forel Scale)
- III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing truck. Duration estimated. (III Rossi-Forel Scale)
- IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls made creaking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. (IV to V Rossi-Forel Scale)
- V. Felt by nearly everyone; many awakened. Some dishes, windows, etc. broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel Scale)
- VI. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight. (VI to VII Rossi-Forel Scale)
- VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars. (VIII Rossi-Forel Scale)
- VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Disturbed persons driving motor cars. (VIII+ to IX Rossi-Forel Scale)
- IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX+ Rossi-Forel Scale)
- X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks. (X Rossi-Forel Scale)
- XI. Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipe lines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
- XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

U. S. DEPARTMENT OF COMMERCE

Sinclair Weeks, Secretary

COAST AND GEODETIC SURVEY

R. F. A. Studds, Director

ABSTRACTS OF EARTHQUAKE REPORTS
FOR
THE PACIFIC COAST AND THE
WESTERN MOUNTAIN REGION

MSA-82

April, May, June, 1954

KARL DYK

Issued by the U. S. Coast and Geodetic Survey

Washington, D. C.

1954

FOR OFFICIAL USE

DEPARTMENT OF COMMERCE

U. S. Coast and Geodetic Survey

Seismological Field Survey
14 Old Mint Building
San Francisco 3, California

ABSTRACTS OF EARTHQUAKE REPORTS FOR THE PACIFIC COAST
AND THE WESTERN MOUNTAIN REGION

MSA-82

1 April 1954 to 30 June 1954

The information in this report has been collected by the Seismological Field Survey of the U. S. Coast and Geodetic Survey with the assistance of State Collaborators in Seismology and through the voluntary cooperation of many local organizations and individuals. Additional cooperation is solicited. Blank questionnaires and special information pertaining to the work may be obtained by addressing the Director, U. S. Coast and Geodetic Survey, Washington 25, D.C.; the Chief, Seismological Field Survey at the above address; or the following State Collaborators in Seismology:

Arizona:	Dr. Eldred D. Wilson, University of Arizona, Tucson.
Colorado:	Dr. C. A. Heiland, Heiland Research Corporation, Denver.
Montana:	Professor Stephen W. Nile, Montana School of Mines, Butte.
Nevada:	Dr. David B. Slemmons, University of Nevada, Reno.
New Mexico:	Professor Stuart A. Northrop, University of New Mexico, Albuquerque.
Oregon:	Dr. Ira S. Allison, Oregon State College, Corvallis.
Utah:	Professor J. Stewart Williams, Utah State Agricul- tural College, Logan.
Washington:	Professor Howard A. Coombs, University of Washington, Seattle.
Wyoming:	Professor Horace D. Thomas, University of Wyoming, Laramie.

Copies of these reports may be obtained from the Supervisor, Western District, U. S. Coast and Geodetic Survey, 121 Customhouse, San Francisco 26, California; or from the Washington Office.

Earthquake information and questionnaire reports in the immediate vicinity of Lake Mead are collected by the Boulder City, Nevada office of the Seismological Field Survey, U. S. Coast and Geodetic Survey.

The abstracts are divided into three groups: (1) California and Western Nevada, (2) Washington and Oregon, and (3) the Western Mountain Region. This follows the scheme of classification in United States Earthquakes.

Intensity numbers refer to the Modified Mercalli Intensity Scale of 1931, in which, in the lower intensities, the disturbance of inanimate objects and personal reactions are given about equal weight. This intensity scale appears in abridged form on the last page of this report. All reports of whatever intensity from any town are listed under the highest intensity reported. Omission of intensity rating indicates insufficient information.

This report is prepared with the active collaboration of Professor Perry Byerly of the Seismographic Station of the University of California, and staff members of the Seismological Laboratory, California Institute of Technology. This permits an authentic appraisal of the material abstracted in the light of available instrumental and other information. Newspaper reports have been furnished by cooperative observers only and do not represent the results of a complete newspaper clipping service.

A condensed summary of these reports is published annually in the serial publication of the U. S. Coast and Geodetic Survey entitled "United States Earthquakes."

CALIFORNIA AND WESTERN NEVADA

(120th Meridian or Pacific Standard Time)

All places mentioned are in California unless otherwise stated

Time marked with asterisk (*) determined instrumentally: Berkeley (B),
Boulder City (BC), Pasadena (P), and Washington (W).

1954

5 April, 21:29. Not recorded. (P)

San Diego. II. Motion rapid. Direction E-W. Felt by several in home.

6 April, 05:06:45*.

Epicenter $34^{\circ}59'$ N., $118^{\circ}50'$ W., Tejon Ranch. (P)

Tehachapi (central section). IV. Motion rocking, W-E, abrupt onset, lasted 1 second. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Ground: Rocky.

6 April, 23:05:02*.

Epicenter $39^{\circ}22'$ N., $120^{\circ}09'$ W., northeast of Truckee. (B)

Reno, Nev. IV. Motion rapid, lasted 10 seconds. Direction NW-SE. Felt by many in community. Rattled windows and doors. Ground: Soil, level.

9 April, 04:01:22*.

Epicenter $35^{\circ}28'$ N., $118^{\circ}42'$ W., Kern River Gorge. (P)

Tehachapi (central section). II. Lasted about 1 second, abrupt onset. Felt like a strong gust of wind hit the house from the northwest. Ground: Rocky.

9 April, 06:20, 15:40.

Bryson (Pleyto School). IV. Both shocks sharp, motion rapid, first of longer duration than second. Direction NE. First shock awakened all in home. Rattled windows, doors, and dishes; house creaked. Ground: Rocky.

9 April, 21:18:58*.

Epicenter $35^{\circ}18'$ N., $118^{\circ}32'$ W., east of Caliente. (P)

Bealville and Woodford. IV. Felt sharply. (Santa Fe Railway offices). Tehachapi (central section). IV. Motion bumping, heavy jolt, abrupt onset. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Explosive-like sounds heard twice just before shock. Ground: Rocky.

10 April, 14:16:52*.

Epicenter $37^{\circ}15'$ N., $121^{\circ}46'$ W., near Coyote. (B)

Glenwood. III. Motion rapid, lasted 3 seconds. Felt by several in home.

10 April, 14:16:52*. (cont.)

Morgan Hill. IV. Motion swaying, abrupt onset. Creaking of buildings and rattling of loose objects heard by many. Few alarmed. Ground: Clay.

Mount Hamilton. IV. Motion rapid, lasted 2 seconds. Felt by two in home. Frame creaked. Ground: Rocky.

San Jose. IV. Police department received many calls. No damage reported. Shock was "straight up-and-down with sideways rock."

San Martin. IV. Motion rapid, lasted few seconds. Direction NE-SW. Felt by many in community (some outdoors), frightened few. Rattled windows; house creaked. Hanging objects swung. Ground: Soil.

Santa Cruz. Reported felt.

20 April, 01:11:30*, 01:18:35*.

Epicenter 36°07' N., 117°56' W., near Haiwee. (P)

Haiwee Power Plant and Dam. (01:18:35) IV. Motion rapid, lasted several seconds. Direction NE-SW. Felt by several in camp and by the operator at plant. Felt strongly in wooden buildings at camp. Awakened several families. Windows, doors, and dishes rattled.

Haiwee Station (Seismological Laboratory, Cal-Tech.). Both shocks reported felt.

22 April, 10:44:10*, 10:50:13* (main shock), 11:08:32*.

Epicenter 36°54' N., 121°41' W., east of Watsonville. (B)

Main shock felt over an area of approximately 2500 square miles of the coastal region of west-central California. Slight damage reported from Aptos and Gilroy. Maximum intensity VI.

Intensity VI:

Aptos. Motion rapid, lasted 6 seconds. Felt by all in post office, frightened few in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Shifted small objects and furnishings, fall of knickknacks, broke dishes. Damage slight. Ground: Rocky soil, sloping and steep; filled.

Gilroy. Motion rapid, lasted 1 minute. Direction W-E. Felt by and frightened many in community (some outdoors). Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken moderately to strongly. Shifted small objects. Cracked plaster and walls; plaster fell. Damage slight. Shock at 10:44:10 felt. Ground: Soil, level.

Gilroy. V. The press reported the shock was strongly felt. Patrons fled from cafe. The 3-story Milias Hotel creaked. Rattled dishes on shelves.

Intensity V:

Moss Landing. Felt by all in post office. Rattled windows, doors, and dishes; building creaked. Shifted small objects and furnishings.

Moss Landing Steam Plant (PG&E). IV. Motion rapid, lasted 10 seconds. First shock at 10:44:10 was sharp with up-and-down motion; second shock was short and sharp with E-W rolling motion. Felt by several (some outdoors).

22 April, 10:44:10*, 10:50:13* (main shock), 11:08:32*. (cont.)

Intensity IV:

Bolinas. Motion slow. Frightened few in community. Rattled windows and doors. Trees, bushes shaken slightly. Ground: Soil, rocky.

Chualar. Felt by observer in post office. Rattled windows. "Slight shake."

Glenwood. Motion slow, lasted 10 seconds. Direction E-W. Felt by all in post office, by some outdoors. Rattled windows and doors; walls creaked. Post office safe shook. Ground: Soil, rocky.

Hollister. The press reported the earthquake at 10:50:13 as mild, causing some excitement but no damage. Felt stronger in older frame buildings and in 2-story structures. Few residents felt the first shock at 10:44:10.

Hollister (7 miles south of). Motion rapid, brief duration. Direction NW-SE. Felt by observer in home. Rattled windows and doors; house creaked. Boy at Vineyard School (8 miles south of Hollister) felt shock and saw marbles move on ground. Ground: Soil, level.

San Francisco. The press reported many calls were received from Telegraph Hill and from office workers on Montgomery Street. One man on Montgomery Street said a vase fell from his desk.

San Francisco (2425 Funston St.). Felt by all in home, outdoors by observer. "I was standing on concrete slab on ground level. Vibration was barely noticeable. Those in house on first floor felt it more noticeably. Short duration and weak intensity." Ground: Sandy, level.

San Francisco (2 Presidio Terrace). III. Motion slow, lasted 5 seconds. Felt by several in home. "A very mild shock. Barely felt by observer in bath on third floor." Ground: Rocky, sloping.

San Francisco (S.P. Bldg., 65 Market St.). III. Motion slow and steady, lasted 5 seconds. Direction N-S. Felt by several in office on 10th floor. Hanging objects swung N. Ground: Level; filled.

San Juan Bautista. Motion slow, lasted 2 seconds. Felt in home. Rattled windows.

San Martin. Motion slow, lasted 5 seconds. Direction N-S. Felt by several in community. Rattled windows and doors; walls creaked. Ground: Soil.

Watsonville. Motion rapid, lasted 5 seconds. Felt by many in community, awakened and frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NE. Trees, bushes shaken slightly. Ground: Soil, level.

Intensity I to III:

Corralitos (Enos Ranch). Sharp jolt. "Felt only by people in buildings."

Hayward. Motion rapid. Felt by several in home. Ground: Compact, level.

Los Gatos. Motion rapid, momentary duration. Felt by several in community. Ground: Compact, level.

22 April, 10:44:10*, 10:50:13* (main shock), 11:08:32*. Intensity I to III. (cont.)

Salinas. Motion rapid, lasted 2 seconds. Direction E. Felt by observer in office. "Very light shock." Ground: Compact, level.

Santa Cruz. Motion slow. Felt by several. Ground: Compact.

Reported felt by the press (no details): San Jose, Soquel, and at Monterey Bay Heights near Soquel.

Reported not felt: Alcatraz, Altamont, Antioch, Berkeley, Big Sur, Brentwood, Byron, Cantua Creek, Carmel Valley, Castroville, Clayton, Concord, Corte Madera, Coyote, Crows Landing, Cupertino, Daly City, Davenport, Dos Palos, Fairfield, Firebaugh, Gonzales, Greenfield, Gustine, Half Moon Bay, King City, Livermore, Lonoak, Los Banos, Martinez, Mendota, Milpitas, Montara, Monterey, Moraga, Mount Hamilton, Napa, Newark, Newman, Niles, Oakland, Paicines, Palo Alto, Patterson, Pescadero, Petaluma, Pinole, Pleasanton, Point Reyes, Redwood City, Richmond, San Ardo, San Leandro, San Lucas, Sausalito, Sharp Park, Soledad, Stinson Beach, Sunol, Tracy, Tranquillity, Tres Pinos, Vernalis, Volta, Walnut Creek, and Westhaven.

25 April, 12:33:27*.

Epicenter 36°56' N., 121°41' W, east of Watsonville. (B)

Strong shock felt over a land area of approximately 12,000 square miles. (See map.) Maximum intensity of VIII occurred in a very small area about 10 miles east of Watsonville along the Chittenden Road on the south bank of the Pajaro River. Numbered locations in the following reports relate to numbered arrows on the map of the epicentral area shown on page 41.

Intensity VIII:

- (1) In this area along the Chittenden Road on the south bank of the Pajaro River several houses were seriously damaged, the ground was cracked, and loose earth slid onto the road. The houses, all poorly built 1-story frame structures on sleepers, moved toward the river several inches. Frames were thrown out of plumb, furnishings were wrecked, and ground cracks paralleled the river. Evidence pointed to slumping of the loose foundation material as a cause. There was no fault trace evidence.

Intensity VII:

Aromas. The press reported that damage in the Aromas area was rather extensive. Several chimneys were shaken down; electric wires pulled loose from some homes, and three grocery stores suffered considerable loss when jars fell from shelves.

Aromas. VI. Motion rapid. Felt by all in community. Rattled windows, doors, and dishes. Hanging objects swung NE. Pendulum clock facing NE. stopped. Damage slight.

- (2) At this point the Chittenden Road crosses the Pajaro River. Abutment wing walls of the reinforced-concrete bridge were cracked, abutments slumped several inches and movement of the

25 April, 12:33:27*. Intensity VII. (cont.)

bridge was indicated by shift marks on the bearing plates. No serious damage to the bridge was apparent. Within 100 feet of the highway bridge a Southern Pacific Railroad bridge spans the road. No damage to the railroad bridge was apparent. Mr. James D. Hungate, Engineer, U. S. Geological Survey, reported effects at the highway bridge in a letter as follows: "When I arrived at the station on April 28, at 8:00 a.m., I found that the recorder had been moved about 6 inches from its usual position and that on April 25 the time of the shock was shown by a ragged crossline about half-inch long, followed by another line about an inch long in approximately a half hour. The river stage was raised about .35 feet but finally came back to normal about 36 hours later. The bridge upon which our gage shelter is mounted showed several cracks in the wing walls. Expansion joints had been moved back and forth a distance of one inch. Some settling of approaches was also noted." The following is from a report by the Pacific Fire Rating Bureau: About one mile east of Chittenden (milepost 90.4) small slides occurred in a cut and larger slides threatened. In this area about 160 feet of track moved approximately 3 inches toward the river and dropped about 2 inches. This was due to landslide settlement rather than faulting. Cracks appeared parallel to the track on the river side along the edge of the ballast. A pile trestle bridge (structure 90.16) rocked back and forth, and ground distortions where the pile entered the ground indicated half amplitude motion at the ground surface was about 1/2 inch. Cracked pavement was noted in the Chittenden Road almost directly across from the slide area at the Southern Pacific right-of-way. These cracks were the effect of ground settlement and incipient sliding rather than faulting. The road fractures were extensively, and unwarrantably, played up in the press.

- (3) A fairly large earth slide occurred at this point. The north wall of the Pajaro Gap here is fairly sheer and is composed of very loose alluvium. The following is from a report by the Pacific Fire Rating Bureau: The Southern Pacific's main coast line runs through a portion of the strongly shaken area. A pendulum scribe, located on the bridge which crosses the Pajaro River, had a maximum movement of about 3/4 inch from its position at rest. This instrument has recorded at least 30 shocks since 1933. The shock of December 31, 1948 gave a somewhat greater maximum displacement than this shock. A bridge at this site was damaged in the San Francisco 1906 shock. However, no damage was apparent in this shock. Seven glass batteries not braced to resist shock were reported broken due to banging together.
- (4) Most merchandise thrown off shelves of 1-story frame shed-like store. Motion was described as rolling, with perhaps an upward and northward jolt. Observer reported it was hard to stand. Shock was considered much stronger than the one on December 31, 1948.

25 April, 12:33:27*. Intensity VII. (cont.)

- (5) Interlaken District. The newspapers reported the Fiorovich residence in this area suffered \$25,000 damage. Investigation revealed that most of the damage was to expensive furnishings. Practically everything loose was moved or thrown down. Beds, desks, bureaus, refrigerator, and stove were moved up to 2 feet in all directions. The water heater in a closet was pulled 2 inches from the plaster walls, but no pipes were broken. The house, a fairly new well-built 1-story frame stucco structure, had many plaster cracks, but appeared in good condition. In this same area a 1-1/2 story residence of the same type construction had the full height brick chimney pulled loose and cracked. Breakage of dishes, etc., was general in the area. Plaster cracked. Few chimneys fell; many damaged. Headstones were twisted at the St. Francis Church cemetery.

Intensity VI:

- Aptos. Lasted 20 seconds. Direction NE. Felt by all in home and frightened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NE. Pendulum clock stopped. Trees, bushes shaken moderately. Shifted and overturned small objects. Fall of knickknacks, books, and pictures. Broke dishes. Damage slight to grocery and liquor store merchandise. Ground: Rocky soil, compact, level.
- Boulder Creek. One shock felt. Motion slow, lasted about 12 seconds. Direction E-W. Felt by all in community, frightened few. Rattled windows and dishes. Hanging objects seemed to swing in all directions. Shifted small objects. Bottles fell from drug store shelf. Ladies on second floor of 2-story building ran from building. Booth in which observer was sitting seemed to rock N-S.
- Capitola (near Santa Cruz). Observer from Santa Cruz states: "The shock was considerably stronger at Capitola than at Santa Cruz. Groceries were toppled from shelves, toys thrown from top shelves in a variety store, etc."
- Castroville. Motion slow, swaying, long duration. Direction E-W. Felt by all in surrounding territory, also felt on the ocean. Farmers claimed ground moved in wave-like motion. Rattled windows, doors, and dishes; houses creaked. Ground: All types.
- Corralitos (Enos Ranch). Motion swaying, then ending with sudden jolt and twist, gradual onset. Felt by all. Creaking of buildings and rattling of loose objects heard by many. Moderately loud subterranean sounds heard before shock. Disturbed objects observed by many. Objects fell N-S or NE-SW. Chairs, tables, and beds displaced; pictures, chandeliers, and doors swung; water in open containers swayed. Plaster cracked. Ground: Sandy; on hill.
- Cupertino. Motion rapid, long duration. Felt by all in home. Hanging objects swung E-W. Shifted small objects. Cracked plaster. Grocery stocks knocked off shelves. Damage slight. Ground: Soil, compact, level.

25 April, 12:33:27*. Intensity VI. (cont.)

Freedom. Motion rapid. Felt by and frightened all in community. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Trees, bushes shaken strongly. Cracked plaster, walls, chimneys. Pictures and plaster fell. Overturned furniture. Broke dishes. Twisting and fall of chimneys. Damage considerable to wood, brick, masonry, and concrete. "This was the strongest shock felt here since 1906. Merchandise fell from shelves in stores and broke. Stores closed."

Gilroy. The press reported cracks appeared in downtown store walls and in residential area homes, several windows broken and many others cracked. A few chimneys in the residential area were damaged. Considerable damage from stock breakage in stores. City Hall employees waded through fallen plaster and there were huge cracks in the old building. One courtroom had plaster all over the floor and hanging by a thread from great spreading cracks in walls and ceiling. Nearly all second floors in downtown buildings were damaged from cracks in walls, fallen plaster and rubble. Crossbeams on one remodeling job were knocked out of plumb. Hotel Milias's rooms were damaged from cracks and fallen plaster, and the elevator was reported damaged. Broke film being shown in theater. High school had minor plaster damage. People reported broken bric-a-brac, dishes, and light pieces of furniture. Cracks appeared in walls and ceilings of homes; many were new homes. American Trust Building, Montgomery Ward, and the J. C. Penny Company were among the hardest hit of the downtown buildings, all reporting extensive damage from cracks and fallen plaster, and cracked windows. Cars on streets rocked violently.

Gilroy. Motion rapid, long duration. Felt by all in community. "The shock in this area was quite severe. Motion rolling, like that felt on small boat at sea. Direction seemed to be circular. Damage, while not severe, was estimated to be quite heavy, since each residence had some damage. In homes, it seems the most damage was to antiques. Cracked and fallen plaster, cracked wallpaper, and damage to some dishes was the most common damage in homes. Pump shaft broken, causing pump to stop."

Glenwood. Motion slow, strong, rolling. Direction E-W. Felt by all in community, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung E-W. Trees, bushes shaken strongly. Ground: Rocky, sandy, sloping and steep.

Glenwood. V. Heavy, rolling motion, slow. Direction E-W. Felt by all in area. Shook wood frame house and bushes and chairs in yard. Light fixtures swayed for 5 minutes or more.

Glenwood. V. Motion slow, lasted 10 seconds. Direction E-W. Felt by all in community, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung E-W. Trees, bushes shaken slightly. Rumbling sound heard. Ground: Rocky, shale, compact, sloping.

25 April, 12:33:27*. Intensity VI. (cont.)

Hollister. The press reported the following damage: Drive-In Market - \$25; Penny-Wise Market - 2 x 2 foot piece of plaster off ceiling, \$10 loss in liquor stock, and \$50 plate-glass window broken; The Wardrobe - Plate-glass window broken; Bank of America - Slight plaster damage; Hollister National Bank - Windows loosened; Whalen's Drug Store - Cracked walls, estimated damage \$200; Holland Hotel - Cracked walls on first and second floors.

Hollister. Two shocks. Motion rocking and swaying, rapid onset. First shock lasted 10-15 seconds. Direction seemed circular at first, then S-N. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Bumping subterranean sounds heard by several at time of shock. Disturbed objects observed by many. Visible swaying of trees. Very slight damage to light structural parts, such as chimneys, tile roofs, ornaments, etc. Very few walls cracked, cracks ran S-N. Objects fell N-NE. Chandelier swung. Few plaster cracks, many powdered. Pendulum clock stopped, pendulum swinging S-N. Ground: Adobe.

Hollister. Motion rapid, lasted 20 seconds. Felt by all in community, frightened few. Direction E-W. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Pendulum clock facing N-S stopped. Trees, bushes shaken slightly. Shifted small objects and furnishings. Cracked windows and walls. Broke windows. Damage slight to brick and concrete. Ground: Rocky soil, level.

Hollister (7 miles south of). Motion slow, long duration. Direction NE-SW. Felt by all and frightened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NE. Pendulum clock stopped. Shifted and overturned small objects, knickknacks fell. Broke dishes. Damage slight. "One of the heaviest." Weak shock felt about 13:25 on same day.

Holy City. Motion rapid, long duration. Direction NE. Felt by all and frightened many in community. Rattled windows. Hanging objects swung. Pendulum clock stopped. Ground: Compact.

Los Gatos. The press reported Los Gatos and the West Valley felt the strongest earthquake in years, but there was no noticeable damage. Hundreds of residents rushed into the streets as the shock rattled windows and vibrated entire buildings. Safeway store reported several bottles fell from shelves. The Town Library building had several pre-existing cracks reopened and several new ones appeared. Several residents in the foothills overlooking the Santa Clara Valley reported they saw the valley floor move during shock. Typical description of the earthquake was that buildings gave a tremendous shudder, followed by a very deep rumble. Windows rattled and chandeliers and other pendant objects swung back and forth for several minutes.

Los Gatos. Direction N-S. Felt by all and frightened many in community. Rattled dishes; frame creaked. Hanging objects swung. Trees, bushes shaken moderately. Shifted small objects. Ground: Level, compact.

25 April, 12:33:27*. Intensity VI. (cont.)

Los Gatos (north-central section). V. Motion trembling and rocking, N-S, rapid onset. Felt by and alarmed many. Creaking of buildings and rattling of loose objects heard by many. Disturbed objects observed by several. Slight visible swaying of buildings and trees. Ground: Rocky.

Los Gatos (5 miles southwest of). Motion rolling, rapid onset. Building creaked; loose objects rattled. Rattling, creaking, and bumping subterranean sounds heard during shock. Andirons clanked. Slight cracks in porch floor and chimney. Ground: Rocky.

Madrone. Motion rapid. Felt by many in community (some outdoors), frightened few. Rattled windows and doors moderately; house creaked moderately. Hanging objects swung N. Trees, bushes shaken moderately. Few knickknacks fell. Damage slight. Ground: Soil, level.

Morgan Hill. Motion rapid, long duration. Felt by all and frightened many in community. Direction N-S. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Shifted small objects and furnishings. Ground: Loose, level.

Morgan Hill. Motion rocking, N-S, rapid onset. Felt by all, many alarmed. Creaking of buildings and rattling of loose objects heard by all. Faint rumbling subterranean sounds heard by several at time of shock. Coffee spilled from cup to saucer. Ground: Compact, clay.

Moss Landing. Motion rapid, momentary duration. Felt by all in home, frightened many in community. Rattled windows, doors, and dishes; house creaked. Shifted small objects. Trees, bushes shaken strongly. The press reported automobiles rocked violently. Ground: Soil.

Moss Landing. V. Motion slow, lasted 1 second. Felt by and frightened all in home. Ground: Soil, level.

Mount Hermon. Motion slow, lasted 30 seconds. Felt by and frightened all. House creaked. Hanging objects swung; N. Pendulum clock facing S. stopped. Spilled water from indoor containers in N. direction. Hanging flower pot swung for 15 minutes.

Mount Hermon. Motion rapid, long duration. Direction N-S. Felt by all in community, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Pendulum clock stopped. Trees, bushes shaken strongly. Shifted small objects, overturned vases, etc., small objects. Damage slight. Ground: Soil, compact, sloping and steep.

Niles. Motion rapid, lasted 2-4 seconds. Felt by all and frightened few in community. Direction E-W. Rattled windows and dishes; walls creaked. Hanging objects swung. Trees, bushes shaken slightly. Shifted small objects. Cracked plaster. Knickknacks fell. Ground: Soil.

Paicines. Motion slow, lasted 25 seconds. Direction N. Felt by all and frightened few in community. Rattled windows, doors, and dishes. Trees, bushes shaken slightly. Shifted small objects. Ground: Soil.

25 April, 12:33:27*. Intensity VI. (cont.)

San Juan Bautista. Motion slow, long duration. Felt by and frightened many in community. Rattled dishes. Hanging objects swung. The press reported only negligible plaster damage at San Juan Bautista Mission.

San Martin. Motion slow, long duration. Direction N-S. Felt by many and frightened few in community. Rattled windows and doors; house creaked. Hanging objects swung N. Shifted small objects and furnishings, overturned vases and small objects. Cracked plaster and windows. Knickknacks and pictures fell. Damage slight. Ground: Soil.

Santa Cruz (SW. section). Rapid, consecutive shocks. Motion swaying. Felt by several. Restaurant (on pier) chandeliers swayed in arc of about 1 foot. Few objects displaced in home. "No indications from individuals or radio stations that anything unusual happened here. Possibly the severest intensity was felt on the pier being constructed out into the ocean for a mile. I was in a restaurant about halfway out on the pier when the shock occurred."

Santa Cruz (E. section). V. Three shocks. Motion swaying, N-S, gradual onset. Felt by several, few alarmed. Buildings creaked; loose objects rattled. Rumbling subterranean sounds heard by several before shock. Disturbed objects observed by several. Plaster cracked in one instance.

Santa Cruz. V. Motion slow, rolling, lasted 20 seconds. Direction circular. Felt by many in community (some outdoors), frightened few. Rattled windows and doors; frame creaked. Hanging objects swung. Shifted and overturned small objects. Ground: Compact.

Soquel (2 miles N. of). Motion slow, lasted about 1 minute or less. Felt by all in home, frightened few. Hanging objects swung N. Shifted small objects, overturned vases. "Two distinct shocks with horizontal motion. Shocks close together and of short duration. Damage in this vicinity was minor." Ground: sloping.

Watsonville. The following is from a report by the Pacific Fire Rating Bureau: The press report implied structural damage to several buildings in Watsonville, and, in fact, one building was roped off for a short while. However, later examination revealed no structural damage. A number of structures were inspected, but no serious structural damage was found. Unreinforced brick structures with sand-lime mortar constitute the bulk of the downtown buildings and some showed evidence of being slightly loosened up. The Watsonville City Hall was most noticeable in this regard. The "loosening up" evidence was usually apparent in the form of cracked plaster and in the case of the City Hall it was fallen plaster in the east end of the council chambers (second floor of a two-story brick joisted building). No parapets fell and those parapets with cracks were determined to have been in that condition prior to the shock wherever inspected. The business district and much of the residential district is built on a river bottom

25 April, 12:33:27*. Intensity VI. (cont.)

having an average of 16 feet of silt to reasonably good bearing. Wood frame dwellings had a slight amount of plaster cracking. Relatively few instances of chimney damage occurred within the city limits.

Watsonville. The press reported widespread miscellaneous damage throughout the Pajaro Valley, but building inspectors said damage was minor. Grocery and liquor stores throughout the city suffered the heaviest loss from broken merchandise. No buildings in the city were closed as a result of the earthquake. The 40-year-old Lettunich Building, with the Bank of America on the first of four floors, had no major damage. Some concrete had been knocked from the front of the building, leading to a report that the building had been cracked. There was plaster damage in the Bank of America quarters and in some of the upstairs offices. Some plaster fell in one school building and in another fine particles of plaster were rubbed out of old cracks. Plaster was cracked in the Public Library and books were tossed off shelves. City Engineer reported there was no evidence of any break in the city's water mains. There were breaks in house connections leading from the mains. There were some reports of power interruptions when the high-voltage lines were whipped together, causing cutouts.

Watsonville. Motion rapid, lasted several seconds. Direction NE. Felt by all in community, frightened many. Rattled windows, doors, and dishes; house creaked. Hanging doors swung NE. Pendulum clock stopped. Trees, bushes shaken strongly. Shifted small objects and furnishings, overturned vases, small objects, and furniture. Cracked plaster, windows, walls, and chimneys. Knickknacks, books, pictures, and plaster fell. Broke dishes, windows, and furniture. Twisting and fall of chimneys. "Heaviest since 1906." Ground: Soil, level.

Intensity V:

Ben Lomond. Motion swaying, N-S, lasted about 3 seconds, rapid onset. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Disturbed objects observed by several. Visible swaying of buildings and trees. Few bottles fell off grocery store shelves.

Big Sur. Motion slow, lasted 30 seconds. Direction N-S. Felt by many in community (some outdoors), frightened few. Rattled windows, doors, and dishes; house creaked. Recently built garden pool slightly damaged. Static-like sounds heard on radio about 2 seconds before shock was felt. Ground: Rocky soil.

Carmel. The press reported a woman was rolled out of bed. At the Carmel Valley Farm Center a man said it felt like a child jumped up on his automobile.

Chualar. Motion slow, lasted 20 seconds. Felt by all in area, frightened few. Rattled windows, doors, and dishes; walls creaked. Ground: Rocky, sloping.

Coyote. Motion rapid, momentary duration. Direction NE. Felt by all in community, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NE. Trees,

25 April, 12:33:27*. Intensity V. (cont.)

bushes shaken moderately. "First sensation like an explosion, then slight vibration tapering off. Birds quickly left nests on tank house." Ground: Soil, compact, level.

Gonzales. Motion rapid, lasted about 15 seconds. Direction NW. Felt by all in community, frightened few. Rattled windows and dishes. Ground: Level, compact.

Los Banos. One distinct, strong shock. Motion rapid, lasted 2 seconds. Direction N. Felt by several (some outdoors), frightened few. Hanging objects swung N. Shifted small objects; knickknacks fell. Ground: Soil, level.

Los Banos. IV. Motion rapid, lasted 30 seconds. Felt by many in home. Direction NE-SW. Rattled windows; frame creaked. Hanging objects swung NE. Chandelier hung 2 feet below ceiling swung 3 inches NE-SW. "Second shock reported on radio at 2:55 p.m. was not felt here." Ground: Soil, compact, level.

Los Banos. IV. Sharp shock, followed by vibration. Direction N-S. Felt by several. Rattled dishes.

Los Banos (6 miles S. of). Motion rocking, E-W. Felt by all in home. Doorbell chimes rattled and moved in E-W direction. Dining table rocked. "Slight excitement." Ground: Adobe.

Marina. Motion rapid, long duration. Felt by many (some outdoors), frightened few in community. Rattled windows, doors, and dishes. Hanging objects swung. Broke two mirrors. Ground: Sandy.

Milpitas. Motion rapid, long duration. Felt by all and frightened many in community. Direction N-S. Rattled windows. Hanging objects swung N-S. Ground: Level, compact.

Monterey. Motion rapid, lasted 1 minute. Felt by all in home, felt outdoors, frightened few in home and community. Rattled windows, doors, and dishes. Hanging objects swung. Shifted small objects; knickknacks fell. Ground: Soil, compact, level.

Monterey Peninsula. The press reported the shock was generally felt. Stopped clocks. Crockery rattled.

Mountain View. Motion slow, long duration. Felt by and frightened all in home; felt outdoors. Direction E. Rattled windows and dishes. Hanging objects and doors swung. Trees, bushes shaken moderately. Ground: Soil, compact, level.

Newark. Felt by many in community. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Shifted small objects.

Palo Alto. Motion rapid. Felt by all in community. Rattled windows, doors, and dishes. Trees, bushes shaken slightly.

Palo Alto. The press reported magazines were shuffled off rack in one home.

Palo Alto. IV. Motion rapid, lasted 20 seconds. Felt by several in home and community, some outdoors, frightened few in home. Rattled windows, doors, and dishes. Ground: Soil.

Patterson. Motion slow, lasted 30 seconds. Direction NW-SE. Felt in community, frightened few. Rattled windows and doors. Hanging objects swung. Shifted small furnishings. Ground: Soil, compact.

Pinole. Motion slow. Felt by many in community. Rattled windows and dishes; walls creaked. Pendulum clock stopped. Ground: Rocky.

25 April, 12:33:27*. Intensity V. (cont.)

- Redwood City. The press reported a mirror swung like a pendulum along the wall. Weights on Cuckoo clock "danced." Chandelier fell in the Emerald Lake District.
- Redwood City. Motion slow, lasted 10 seconds. Felt by and frightened many in community. Direction S-N. Rattled windows, doors, and dishes. Shifted small objects and furnishings.
- Redwood City (Fire Station No. 2, west-central section). Motion rocking, gradual onset. Felt by many, few alarmed. Disturbed objects observed by many. Lamps and potted plants swung. Ground: Adobe.
- Redwood City (SE. section). IV. Motion swaying, gradual onset. Felt by many. Windows rattled slightly. Ground: Adobe.
- San Bruno. The press reported one instance of plaster cracking and window breaking.
- San Francisco. The press reported slight plaster damage, mainly in the Sunset District in the southwest portion of the city. In the neighborhood of Castro and 20th Sts., a woman said some plaster fell from ceiling and that chandeliers and bird cages swayed for fully 5 minutes after shock. Strong, rolling motion.
- San Francisco. Water levels in two roof pressure tanks fluctuated over three inches, causing alarms to operate. Buildings located at 974 Mission St. (5 stories) and 65 Market St. (11 stories).
- San Francisco (4740 California St.). Motion rapid, lasted 2 seconds. Considerable noise like a faraway thunderstorm and firecrackers exploding, also as if a sudden hard wind had shaken things. Direction W-E. Felt by all in home and 4 outside, frightened child. Rattled windows; frame creaked. Hanging objects swung NE. Pendulum clock facing SW. stopped. Trees, bushes shaken moderately. Ground: Soil.
- San Francisco (446-28th Ave.). Motion slow, rolling. Felt by several in home. One dish fell from dishrail. Shifted pictures on walls. Hanging objects swung. Ground: Loose.
- San Francisco (2425 Funston Ave.). Started slow, accelerated, then tapered off, lasted about 1 minute. Felt by and frightened all in home. Direction S-N. Rattled windows. Hanging objects swung. Ground: Compact, level, sandy.
- San Francisco (1141 Post St.). IV. Motion swaying, NE-SW, gradual onset. Rattled loose objects; building creaked.
- San Francisco (350 Grove St.). IV. Motion very rapid, lasted 4 seconds. Felt distinctly by all in home and many in neighborhood. Direction N-S. Building rocked. Rattled windows, doors, and dishes. Ground: Sandy soil, level.
- San Francisco (1045 Leavenworth St.). IV. Motion slow, lasted 2-3 seconds. Felt in home (active). Rattled windows; frame creaked. Ground: Sloping, steep.
- San Francisco (2 Presidio Terrace). IV. Motion rapid, strong. Felt by several in home. Rattled windows; walls creaked. Ground: Rocky, sloping.
- San Francisco (470-19th Ave.). IV. Motion slow, lasted about 1 minute. Felt by observer in home. House creaked. Hanging objects swung E-W. Ground: Soil, loose, level.

25 April, 12:33:27*. Intensity V. (cont.)

San Francisco (2764 Pierce St.). IV. Two shocks, with 2-second interval. Motion trembling, abrupt onset. Loose objects rattled. Cracking subterranean sounds heard at time of shock. Light table moved.

San Gregorio. Long duration. Felt in home and store. Hanging objects swung. Pendulum clock stopped. Shifted small objects and furnishings.

San Jose. Motion rapid, lasted about 1 minute. Direction W-E. Felt by many in community, frightened few. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken moderately. Ground: Compact, level.

San Jose. IV. Motion slow, lasted 5 seconds. Direction E-W. Felt by all in house trailer, frightened few. Rattled windows, doors, and dishes; trailer creaked. Hanging objects swung E-W. Ground: Blue clay.

San Jose. IV. The press reported no damage from jolt which was of short duration and felt more like the aftershock of an artillery blast than an earthquake. Distinct rumbling heard.

San Jose. IV. Motion moderate, lasted 30 seconds. Felt by all in home, frightened few. Rattled windows, doors, and dishes; house creaked slightly. Hanging objects swung.

San Lucas. Motion rapid, long duration. Felt by many in home, frightened few in community. Direction NE. Rattled windows, doors, and dishes; walls creaked. Trees, bushes shaken moderately. Shifted small objects; pictures fell. Ground: Soil, level.

Soledad. Motion rapid, lasted few seconds. Direction NE. Felt by and frightened many in community (some outdoors). Rattled windows, doors, and dishes. Ground: Compact, level.

Tres Pinos. Motion slow, lasted about 2 seconds. Felt by all and frightened few in community. Rattled windows; house creaked. Ground: Rocky soil, sloping.

Intensity IV:

Alviso. Motion slow, lasted 30 seconds. Direction E. Felt by many in community, frightened few. Rattled windows; walls creaked. Hanging objects swung NE. Ground: Marshy.

Antioch. Motion rapid, brief duration. Direction E-W. Felt by few. Rattled windows, doors, and dishes; house creaked. Ground: Soil.

Berkeley. Motion slow, lasted 10 seconds. Direction SE. Felt by observer in home. Rattled windows; walls creaked. Ground: Compact, sloping, steep.

Berkeley. Motion slow, rolling, lasted 30 seconds. Felt by many in home, some outdoors, frightened few. Direction N. Rattled windows. Hanging objects swung. Trees, bushes shaken moderately. Ground: Soil.

Bolinas. Felt by several in community, frightened few. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken slightly. Ground: Level.

Canyon. Motion slow, lasted about 20 seconds. Direction N-S. Felt by several in home and community. Rattled bottles, etc., in basement only. Floor lamp swayed 6 inches. Drawing table trembled. Ground: Shale, sloping.

25 April, 12:33:27*. Intensity IV. (cont.)

Carmel Valley. Motion slow, lasted 1 minute. Direction E. Felt by many in home, some outdoors. Rattled windows, doors, and dishes; frame creaked. Hanging objects swung E-W. Ground: Soil, level.

Carmel Valley. Motion slow, long duration. Felt by all in home. House creaked. Hanging objects swung E. Ground: Compact.

Chowchilla. Motion rapid, long duration. Felt by observer in home. Shook bed. Shifted small objects.

Chualar Canyon. Motion slow, lasted 20 seconds. Felt by many in country, frightened few. Rattled windows, doors, and dishes; walls creaked. Ground: Rocky, level.

Collinsville. Motion slow, long duration. Felt by many.

Colma. Felt by some, frightened few.

Concord. Very light. Felt by very few. Rattled windows. Ground: Compact.

Cotati. Motion slow, lasted about 30 seconds. Felt by observer in home. Rattled windows; frame creaked. Ground: Soil.

Crows Landing. Motion rapid, lasted 2 seconds. Felt in home. House creaked. Ground: Compact.

Dos Palos. Felt by many in community. Rattled windows, doors, and dishes. Hanging objects swung. Ground: Soil, level.

El Nido. Motion slow, lasted 10 seconds. Direction N-S. Felt by many. Trees, bushes shaken slightly. "Usual creaking and rumble, then motion. Those sitting felt some back-and-forth action due to spring in chair cushions." Ground: Soil.

Fairfax. Motion slow, lasted 10 seconds. Direction N-S. Felt by many in community. Hanging objects swung N-S. Ground: Compact, sloping.

Fairfax. III. Motion slow, rolling, lasted about 2 seconds. Direction S-N. Felt by several in home. Ground: Rocky, sloping and steep.

Fairfax. III. Motion slow, lasted about 30 seconds. Felt by observer. Hanging objects swung N-S. Shook soot from chimney. Ground: Rocky, level.

Fort Ord. The press reported a man standing on top of tank said it shook so violently he thought the driver had started the engine.

Greenfield. Felt very strongly. Motion rolling, long duration.

Gustine. Felt by many in community.

Half Moon Bay. Motion rapid, lasted few seconds. Felt by many in home.

Hastings Reservation (15 miles from Carmel Valley Village). Motion rapid, lasted about 20 seconds. Felt by observer in home. Rattled windows and doors; house creaked. Ground: Rocky, compact.

Hayward. Motion slow, momentary duration. Felt in home. Rattled windows, doors, and dishes; house creaked. Ground: Compact.

Herndon. Motion slow, lasted 1-2 seconds. Felt by several in homes, some outdoors. Rattled windows. "Felt only by inactive persons." Ground: Compact, level.

Inverness. Lasted 15 seconds. Direction N-S. Felt by many in community. Ground: Compact.

25 April, 12:33:27*. Intensity IV. (cont.)

- Livermore. Motion slow, lasted 10 seconds. Direction E-W. Felt by many in home and community, frightened few. Rattled windows. Hanging objects swung. Ground: Compact.
- Merced. Motion rapid, lasted 4 seconds. Felt by observer in home. Floor lamp swayed. Hanging objects swung. Ground: Soil, level.
- Mill Valley. The press reported chairs "danced" about in patio.
- Montara. Motion rapid, lasted 3 seconds. Felt in community (some outdoors). Walls creaked. Ground: Soil, compact.
- Moraga. Rattled windows, doors, and dishes; house creaked.
- Newman. Motion slow. Felt by many. Trees, bushes shaken slightly. Ground: Soil.
- Oakland (17th & Clay Sts., PG&E Dispatcher's Office). Motion rapid, lasted 1 minute. Direction N. Felt by many. Walls creaked. Hanging objects swung. Ground: Soil, level.
- Paloma Station (near Jamesburg). Motion swaying, E-W, gradual onset. Felt by several. Creaking of buildings and rattling of loose objects heard by several. Faint bumping subterranean sounds heard. No alarm. Ground: Sandy, rocky.
- Pescadero. Felt by many. Rattled windows. Ground: Soil, level.
- Pleasanton. Motion rapid, lasted 10 seconds. Felt by many in home and community (some outdoors), frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken slightly. Ground: Compact, level.
- Saint Helena. Slight motion, NE-SW. Felt by several. Creaking of buildings heard by several. Faint subterranean sounds heard. Lights hanging from ceiling swayed NE-SW. Ground: Sandy.
- Saint Mary's College. Motion swaying, NW-SE, gradual onset. Felt by many, mostly indoors. Creaking of buildings heard by many. "I would say that the shock was of moderate intensity." Ground: Sandy.
- San Leandro. Direction NW. Felt by several in community, frightened few in home. Ground: Soil, level, compact.
- San Mateo (SE. section). Motion rocking and swaying, about 4 bumps N-S, rapid onset. Dishes rattled; house creaked. Pendulums on stopped clocks swung N-S. Ground: Alluvial fill.
- San Quentin. The press reported switchboard operators felt the shock distinctly.
- San Rafael. Motion slow, lasted 2 seconds. Felt by several in home, frightened few. Rattled windows and doors.
- San Ramon. Motion slow, momentary duration. Felt by many.
- Sausalito. Motion rapid, lasted 20 seconds. Felt in home. Rattled windows, doors, and dishes; house creaked. Ground: Soil, compact.
- Seaside. Motion rapid and slow, long duration. Felt by many (some outdoors), frightened few. Hanging objects swung. Trees, bushes shaken slightly. Ground: Sandy.
- South San Francisco. Motion rapid, lasted 1-2 seconds. Felt by many. Rattled dishes. Ground: Compact.
- Stevinson. Motion rocking, lasted 30 seconds. Direction N-S. "Felt by most everyone sitting still or lying down; not felt if active. I was in car and did not feel it."

25 April, 12:33:27*. Intensity IV. (cont.)

Stinson Beach. Direction roughly N-S. Felt by many lying down on beach. House creaked. Hanging objects swung. Ground: Sandy, hilly.

Sunnyvale. The press reported a man said he felt no motion and was startled when doors swung back and forth.

Vallejo. Motion slow, lasted 10 seconds. Felt by observer in home. Direction E. Rattled windows; house creaked. Ground: Level, compact.

Vallejo. III. Motion slow, lasted 10 seconds. Direction E. Felt by observer in home. Ground: Compact, level.

Intensity I to III:

Alcatraz. Motion slow. Felt by several in 2 towers. Ground: Rocky. Big Sur (25 miles S. of). "Only 3 men sitting on a hill felt the shock."

Davenport. Motion slow. Direction N-S. Felt by several in home and community. Ground: Rocky.

Eureka Canyon (8 miles NNW. of Freedom). Motion swaying, gradual onset. Felt by observer on second floor (sitting). "No damage here." Ground: Hilly.

Firebaugh. Motion slow. (No details)

Fresno (Fresno Air Terminal). Felt by several in town. Swung pendulum (4 feet long) about 3/8 inch NNE-SSW. Ground: Sandy.

Jolon. Motion rapid and slow, lasted 1 minute. Felt by several in home. Hanging objects swung. Ground: Soil, level.

Kentfield. Motion trembling, abrupt onset. Felt by three. Shook building for few seconds. "Telephoned Hamilton Air Force Base and they said it was not felt. Thought it was wind shaking building until radio reported shock." Ground: Sandy.

Lathrop. Long duration. Felt by several in home. Hanging objects swung.

Livingston. Motion slow, lasted 20 seconds. Felt by several (some outdoors; quiet). Hanging objects swung. Ground: Level.

Lockwood. Felt by very few.

Lonoak (Mee Ranch). Slight motion, lasted 10 seconds. Felt by observer in home.

Madera. "I was sitting in home and felt a slight shock. Light hanging from center of room swung about an inch in E-W direction."

Manteca. Motion slow, lasted 10 seconds. Felt by several in community. Ground: Soil, level.

Modesto. Minor shock reported by one person on farm. Hanging objects swung. Ground: Soil, level.

Mount Hamilton. "Out of 15 frame houses it was felt only in one; felt on third floor of one reinforced-concrete building."

Novato. The press reported the shock was felt in one section of town; another section felt nothing.

Pebble Beach. The press reported a rocking motion was felt by man sitting outside in deck chair.

Petaluma. Motion rapid, lasted 10 seconds. Felt by several in home. Ground: Soil.

Point Reyes Station. Motion slow. Felt by several in community (some outdoors; quiet). Ground: Rocky, compact.

25 April, 12:33:27*. Intensity I to III. (cont.)

Richmond. Motion rapid. Direction NE. Felt by observer in home.
Ground: Soil, compact, level.

San Anselmo. The press reported a man sitting in chair said, "It felt like someone took me by the shoulders and shook me hard."

San Ardo. Felt. (No details)

San Joaquin. Motion slow, lasted 2 seconds. Felt by observer in home. Ground: Soil, level.

Santa Rosa. Motion slow, lasted few seconds. Felt by several in community. Hanging objects swung. Ground: Soil, level.

Snelling. Motion slow. Felt by few in community.

Sunol. Motion rapid, long duration. Felt by several in community. Hanging objects swung.

Tomales. "Very light shock." Felt by few.

Tracy. Motion slow, lasted 8-10 seconds. "Just a very slight motion felt in this area."

Turlock. Felt by few in community. Ground: Soil.

Vernalis. Motion slow, lasted 30-60 seconds. Felt by several in community (some outdoors). Hanging objects swung.

Volta. "One person reported a slight tremor. Our family and others did not feel it."

Reported not felt: Altamont, Avenal, Avila, Bakersfield, Birds Landing, Bloomfield, Bodega Bay, Bradley, Brentwood, Brooks, Byron, Calistoga, Cambria, Cantua Creek, Cayucos, Clayton, Cloverdale, Coalinga, Corte Madera, Coulterville, Creston, Dixon, Farmington, Five Points, Forestville, Fowler, Friant, Galt, Geyserville, Glen Ellen, Gualala, Hanford, Healdsburg, Holt, Hood, Hornitos, Idria, Kerman, Kettleman City, King City, Knights Ferry, La Grange, Lodi, Lost Hills, Mariposa, Markleeville, Mendota, Middletown, Monticello, Napa, Oakland (foothills), Oceano, O'Neals, Paso Robles, Piedra, Planada, Raisin City, Raymond, Rio Nido, Ripon, Riverdale, Sacramento, San Benito, Sanger, San Luis Obispo, San Miguel, San Simeon, Santa Margarita (20 miles SE. of), Santa Maria, Shandon, Sharp Park, Sonoma, Stewarts Point, Stockton, Stratford, Tassajara Hot Springs, Vacaville, Valley Home, Waterford, Westhaven, Winters, Woodland, and Yountville.

27 April, 20:53:07*.

Epicenter $36^{\circ}55'$ N., $121^{\circ}41'$ W., east of Watsonville. (B)

Moss Landing Steam Plant (PG&E). IV. Motion slow, lasted 20 seconds. Felt by many.

Salinas Substation (PG&E). II. Motion slow, lasted 20 seconds. Felt by observer.

29 April, 16:36:23*.

Epicenter $34^{\circ}02'$ N., $116^{\circ}46'$ W., northwest of Whitewater. (P)

Banning. III. One distinct jolt. "Could not determine direction."

Fawnskin. IV. Motion rapid, long duration. Felt by many in home. Rattled windows strongly; walls creaked. Ground: Rocky.

Palm Springs. A slight earthquake was felt in the Palm Springs area. (SSA Bulletin, July 1954)

30 April, 04:47.

Watsonville. IV. A number of persons were awakened. (SSA Bulletin, July 1954)

1 May, 14:04:39*.

Epicenter $35^{\circ}26'$ N., $118^{\circ}42'$ W., Kern River Gorge. (P)

Bakersfield. III. Motion slow, rolling, momentary duration. Felt by several.

Bakersfield (Kern River Powerhouse No. 1). IV. Motion bumping, rapid onset. Felt by several. Creaking of buildings and rattling of loose objects heard by several. Rumbling subterranean sounds heard by several at time of shock. Plant annunciator sounded. Ground: Rocky.

Bealville. IV. Felt sharply. (Santa Fe Railway offices)

Tehachapi (central section). IV. Motion bumping, abrupt onset, lasting 1 second. Felt by many. Creaking of buildings and rattling of loose objects heard by several. Ground: Rocky.

5 May, 03:01:14*, 05:09:46*.

Epicenter $27^{\circ}10'$ N., $112^{\circ}10'$ W., west-central part of the Gulf of California. (W)

San Diego. (05:09:46) II. Motion rapid. Felt by observer in home.

San Diego. II. The press reported the shocks caused chandeliers to sway. (SSA Bulletin, July 1954)

10 May, 06:24:23*.

Epicenter $36^{\circ}05'$ N., $120^{\circ}48'$ W., northeast of San Ardo. (B)

King City. Slight shock felt.

10 May, 20:12:20*.

Epicenter $35^{\circ}18'$ N., $118^{\circ}32'$ W., east of Caliente. (P)

Tehachapi. IV. Motion rapid, lasted 10-15 seconds. Direction E-W.

Felt by many in town and surrounding country. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Another shock felt about 22:00. Ground: Soil, compact.

Tehachapi (central section). IV. Light trembling, followed by heavy jarring, lasted 3 seconds. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Ground: Rocky.

12 May, 12:38:42*.

Epicenter $35^{\circ}26'$ N., $118^{\circ}42'$ W., near Kern River Gorge. (P)

Bakersfield. IV. Felt strongly. (Reported to Pasadena)

23 May, 15:52:43*.

Epicenter $34^{\circ}59'$ N., $118^{\circ}59'$ W., near Wheeler Ridge. (P)

Intensity IV:

Antelope Station (Los Angeles Aqueduct). Lasted about 4 seconds. Felt by several in community. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken slightly. Ground: Soil, compact, level.

Bakersfield. The press reported residents felt a sharp jolt, but authorities said it caused little excitement in the city.

Bakersfield. Motion fairly rapid. Felt strongly for 3 seconds, then rocked for about 1 minute. Direction N-S. Felt by many in community (some outdoors; quiet). Ground: Soil, level.

Cuyama Valley. One bump and away, gradual onset. Felt by all, few alarmed. Slight visible sway of buildings and trees.

23 May, 15:52:43*. Intensity IV? (cont.)

Fillmore. Brief duration. Felt by many. No alarm.

Los Angeles. The press reported a sharp, rolling shock was felt in Los Angeles and surrounding communities, but there were no reports of damage. Felt quite strongly in Glendale, Monrovia, and Altadena, also reported felt in the foothill communities of Glendora and Monrovia. In Los Angeles the shock was felt as a rolling motion. In downtown Los Angeles office workers reported they first felt dizzy and then noticed structures swaying slightly and fixtures moving with a rocking motion. At Glendale dishes rattled in cupboards. Seemed to be stronger in the foothill areas. There were no reports from Venice, West Los Angeles, Inglewood, or Long Beach.

North Hollywood. Motion rolling, N-S. Felt in buildings. Some rattling of loose objects and creaking of buildings. Venetian blinds and floor lamps swayed. "Friends and neighbors in houses or buildings for several miles around felt the shock."

Rolling Hills. Motion slow. Felt by several in home and community. Rattled windows and doors; house creaked. Hanging objects swung. "Felt by wife in house. I was outside pulling weeds on 'all fours' and never felt a thing." Ground: Soil; filled.

Saugus. Two shocks very close together. Motion trembling, then two distinct jerks, N-S, gradual onset. Felt by several. Rattling of loose objects reported by two. Ground: Rocky.

Saugus (10 miles N. of, Power Plant No. 2). Motion rapid, lasted 2 seconds. Felt by several in home, awakened one. Rattled windows. Ground: Soil, compact, level.

Saugus (Power Plant No. 1). III. Motion slow, lasted 1 second. Felt in powerhouse by observer (sitting). "Light shock."

Tehachapi. The press reported a very sharp shock, but no damage.

Tehachapi (central section). Motion trembling, then a jar, W-E, abrupt onset, lasted 2 seconds. Felt by most everyone. Creaking of buildings and rattling of loose objects heard by many. Ground: Rocky.

Tupman. Motion rapid to slow, lasted $1\frac{1}{2}$ minutes. Direction E-W. Felt by several in home, outdoors by observer. Rattled windows, doors, and dishes; house creaked. Ground: Soil, loose, level.

Wasco. Motion rapid, long duration. Felt by many in home and community (some outdoors).

Wheeler Springs. Motion trembling, slight rocking E-W, gradual onset. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Chandelier swung slightly. Ground: Alluvial; valley.

Intensity I to III:

Agoura. Motion slow, lasted 4 seconds. Felt by several in home. Direction N-S. House creaked slightly. Ground: Adobe, compact, level.

Bellflower. Motion slow, lasted 1 second. Felt by observer in home. Ground: Soil.

Hanford. Motion rapid. Felt by several in home, by observer outdoors. Direction E-W. Ground: Compact.

Piedra. Very slight movement felt by observer lying down.

San Fernando Power Plant (San Fernando). Motion slow. Felt by several in home and community. Ground: Level.

23 May, 15:52:43*. Intensity I to III. (cont.)

Springville. Motion slow, lasted 1 minute. Felt by observer in home (sitting). Ground: Soil.

Stratford. Motion slow, lasted 3 seconds. Direction NE. Felt by several in home. Ground: Soil, compact.

Whittier. Motion slow, lasted about 10 seconds. Felt by observer in home. Hanging objects swung. Ground: Soil.

Reported not felt: Adelanto, La Canada, Long Beach, North Pasadena, and Willowbrook.

25 May, 02:48:23*.

Epicenter $35^{\circ}39'$ N., $118^{\circ}31'$ W., near Isabella. (P)

Borel Powerhouse (Bodfish). V. Motion rapid. Started with an explosive sound and shook violently for about 4 seconds. Slight rumblings every few minutes for several hours after the first shock. Awakened many in home and community, frightened few. Rattled windows and doors; house creaked. Damage slight, if any. Ground: Rocky, sloping and steep.

28 May, 03:54:55*.

Epicenter $36^{\circ}50'$ N., $121^{\circ}42'$ W., east of Moss Landing. (V)

Moss Landing Steam Plant (PG&E). Motion rapid, brief.

28 May, 20:20:20*.

Epicenter $39^{\circ}28'$ N., $120^{\circ}20'$ W., northwest of Truckee. (B)

Blue Canon (Blue Canon Airport). IV. Motion trembling, abrupt onset. Felt by several; slightly alarmed. Creaking of buildings and rattling of loose objects heard by several. Disturbed objects observed by several. Fluorescent light unit swung N-S. Ground: Rocky.

Lake Spaulding (Emigrant Gap). III. Gradual onset, lasted 5 seconds. Rumble heard. Felt by several.

Norden. IV. Motion rapid, lasted 10 seconds. Direction E-W. Felt by many in home and community (some outdoors), frightened few. Rattled windows, doors, and dishes. Ground: Rocky, sloping and steep.

22 June, 01:33:03*, 03:49:29*, 04:50:04*, 06:23:19*, 09:08:00*.

Epicenter $36^{\circ}34'$ N., $121^{\circ}25'$ W., north of Gonzales. (B)

Aptos. (03:49:29) IV. Motion slow, lasted 2 seconds. Direction N-S. Felt by several in community, awakened few in home. Rattled windows, doors, and dishes; house creaked. Ground: Soil.

Aptos. (04:50:04) IV. Motion slow, lasted 3 seconds. Direction N-S. Felt by several in home, awakened few. Rattled windows and doors. Ground: Soil.

Big Sur. (01:33:03) IV. Motion moderate, lasted 2 seconds. Direction S-N. Felt by several in home and community, awakened few in home. Frame creaked. Ground: Rocky soil, compact.

Big Sur. (03:49:29) IV. Motion moderate, lasted 4 seconds. Direction S-N. Felt by several and awakened few in home and community. Frame creaked. Ground: Soil.

Big Sur. (04:50:04) IV. Motion moderate, lasted few seconds. Direction S-N. Felt by few in home. Walls creaked. Ground: Rocky soil.

- 22 June, 01:33:03*, 03:49:29*, 04:50:04*, 06:23:19*, 09:08:00* (cont.).
Chualar Canyon (9 miles E. of Chualar). (03:49:29, 04:50:04) V.
Very hard shocks. Motion rapid. Felt by and awakened many in community. Rattled windows, doors, and dishes; house creaked. "Starting at about 2 a.m. and lasting until 7 a.m., 15 shocks were felt. All were slight, except those at 03:49:29 and 04:50:04." Ground: Rocky.
- Gonzales. (03:49:29) V. Strong shock. Motion rapid. Direction NE. Felt by, awakened, and frightened many in community (some outdoors). Rattled windows, doors, and dishes; frame creaked. Hanging objects swung NE. "Four other shocks felt: 2 at 01:33:03, mild; 1 at 03:50 and 04:50:04, mild. Shocks lasted from 30 seconds to 1 minute each."
- Hollister (central section). (03:49:29) V. Motion very rapid, rocking. Felt by many, very few alarmed. Creaking of buildings and rattling of loose objects observed by many. Sash weights and chandelier swung. Other shocks felt at 01:33:03, light rolling motion; 04:15, medium shock, tapering off; 04:50:04, light rolling motion. Ground: Adobe, rocky.
- Monterey Peninsula. IV. The press reported 5 "moderate" shocks were felt. Windows and dishes rattled, but no damage or injuries reported. The heaviest occurred at 03:49:29. The other shocks were at 01:33:03, 04:50:04, 06:23:19, and 09:08:00.
- Mount Hermon. (03:49:29). IV. Motion rapid, abrupt onset, lasted 15 seconds. Awakened few. Rattled windows and doors; house creaked. "A second very light shock felt at 04:50:04."
- Salinas (PG&E). IV. Moderate to heavy shocks felt at 01:33:03 and 03:49:29.
- Soledad (Sec. 6, T19S., R5E.). (04:49:29) V. Motion slow, lasted 15 seconds. Awakened all in home. Walls creaked. Ground: Compact.

23 June, 23:16:33*.

Epicenter $34^{\circ}08'$ N., $118^{\circ}29'$ W., near Beverly Hills. (P)

"This very small shock was reported to us and by the press as being felt in the area of Santa Monica, Baldwin Hills, West Los Angeles, and Culver City." (Seismological Laboratory, Pasadena.)

- - - - -

WASHINGTON AND OREGON

(120th Meridian or Pacific Standard Time)

State of Oregon.

23 April, 11:19:26*.

Epicenter 45.1° N., 122.9° W., northeast of Salem. (B)

Portland area. IV. The press reported a slight shock was felt in scattered parts of the Portland area. Telephone calls reporting the shock came from the northeast, southeast, and

23 April, 11:19:26*. (cont.)

northwest sections of the city and from Oregon City, West Linn, Clackamas Heights, and Gladstone. Some residents of the area said there was only one distinct jolt accompanied by a sound like two cars colliding. No damage was reported. Salem (Weather Bureau Airport Station). IV. Felt by several. Wave-like motion, gradual onset. One report of water being spilled from a vase came from the south-central section. Another report from about 8 miles east of the city stated that it felt like a series of small wave-like motions, lasting about 10 seconds. Ground: Sandy.

-- April.

No earthquakes were reported felt during the month of April at the following place:

Weather Bureau Station:

Washington: Seattle.

State of Washington.

4 May, 17:45.

Moderate shock felt over approximately 1500 square miles of northwestern Washington in the Puget Sound area. Maximum intensity V.

Intensity V:

Tacoma. The press reported a sharp, quick earthquake shook dishes, windows, and nerves in Tacoma, but did little other damage. The epicenter was thought to be about 30 miles south of Seattle. Telephone operator said the shock seemed to lift her chair off the floor. Switchboard was flooded with calls. One Lakewood resident reported a china cabinet fell over, causing about \$50 damage. A northend resident reported a cracked basement wall. The College of Puget Sound reported there were 3 distinct shocks, direction N-S, lasting about 1-15 seconds.

Tacoma (Proctor P.O. Station). IV. Motion slow, lasted 1 second. Felt by several in post office. Building creaked. Ground: Soil.

Tacoma (South Tacoma P.O. at 56th and Puget Sound Ave.). III. Motion rapid, lasted 6-8 seconds. Observer sitting on stool with both feet on floor felt shock distinctly. Ground: Soil, compact, level.

Intensity IV:

Dieringer. Motion rapid, just one jolt. Felt by several in home. Rattled windows and dishes. Trees, bushes shaken slightly. "The jolt was so slight I thought it was a truck passing over the bridge. Some thought it was another blast." Ground: Soil, level.

Dockton. Motion rapid, lasted 3 seconds. Direction N-S. Felt by many in home and community (some outdoors). Ground: Sloping.

Gig Harbor. Lasted 2 seconds. Felt by many in community (some outdoors). Trees, bushes shaken slightly. Several people reported standing cars shook as if someone had jumped on the bumper. One or two reports of swaying light fixtures.

4 May, 17:45. Intensity IV. (cont.)

Puyallup. One loud thud, no motion felt. Frightened few in community (some outdoors). Trees, bushes shaken slightly. Ground: Sandy soil, level.

Seattle. Felt by several. Rattled windows, doors, and dishes in some sections.

Sumner. Very slight shock. Motion slow. Felt by many in community (some outdoors). Rattled dishes slightly. Ground: Soil, compact.

Sylvan. Motion rapid, lasted few seconds. Direction N. Felt by several in community, awakened few in home. Rattled windows very slightly. Ground: Gravelly, sloping.

Intensity I to III:

Alderton. Felt by several in community.

Burley. Motion rapid, lasted about 1 second. Felt by observer and wife, frightened wife. Sounded and felt like an explosion. Ground: Loose.

Dash Point. Motion rapid, lasted 1 second. Felt by several. Hanging objects swung.

Des Moines. Lasted few seconds. Felt by observer in home. Table shook. Ground: Compact, sloping.

Fragaria. Motion slow, lasted 1 second. Felt by several in home. "Very slight shock." Ground: Gravelly beach.

Milton. Two quick jerks. Felt by several.

Palmer. Motion slow. Felt by several.

Port Orchard. Lasted 5 seconds.

Preston. Motion weak, lasted 1 second. Felt by observer in home. Ground: Soil, compact, level.

Reported not felt: Altoona, Black Diamond, Buckley, Burien, Enumclaw, Kent, Lakebay, Maple Valley, McMillin, Nisqually, Olympia, Pacific, Port Blakely, Redmonds, Redondo, Seattle (Georgetown Station), Shelton, South Prairie, Silverdale, Tacoma (Fern Hill P.O.), Tully, Tukwila, Vaughn, Vega (Anderson Island), and Wilkeson.

15 May, 05:02:14*.

Epicenter 48° N., 122° W., northwest Washington. (W)

Moderately strong shock felt over an area of approximately 17,000 square miles of western Washington. (See map.) Damage negligible. Maximum intensity VI.

Intensity VI:

Belfair. Motion slow, lasted 1 minute. Felt by and awakened many in community. Rattled windows, doors, and dishes. Trees, bushes shaken slightly. "One concrete-block building had small crack which owner claimed was caused by the earthquake. No other damage reported." Ground: Soil, loose, sloping. Few reported a shock at 05:45.

Buckley. Motion slow, lasted 1 second. Awakened all in community, frightened few. Rattled windows and doors.

Burton. Motion rapid, lasted 1 minute. Felt by and awakened all in home. Rattled windows, doors, and metal tables. Shifted small objects; light, metal tables (on casters) rolled. Ground: Vashon till, level; north shore Quartermaster Harbor.

- 15 May, 05:02:14*. State of Washington. Intensity VI. (cont.)
- Burton. V. Lasted 20-30 seconds. Awakened many in home. Rattled windows, doors, and dishes. Ground: Soil, loose, compact, level.
- Edmonds. Lasted 30 seconds. Awakened all in community. Rattled dishes. Overturned vase. Ground: Sloping, loose.
- Elbe. Motion rapid. Felt by and awakened all in community, frightened many. Direction W-E. Rattled windows; frame creaked. Shifted small objects, overturned few small objects. Ground: Level.
- Hobart. Motion slow, long duration. Direction E. Felt by and awakened all in community, frightened few in home. Rattled windows, doors, and dishes; frame creaked. Ground: Compact, level.
- Hyak. Motion rapid. Felt by all and awakened and frightened many in community. Rattled windows, doors, and dishes; house creaked. Shifted and overturned small objects. Ground: On mountain pass; rocky.
- Lake Stevens. Motion rapid, lasted 1 minute. Direction NW. Felt by and awakened many in community, frightened few. Rattled windows and doors; shook north wall of bedroom. Cracked concrete retaining wall built day before. Ground: Compact, sloping.
- Manchester. Motion slow, lasted 1 minute. Felt by many in home, awakened and frightened all. Rattled windows, doors, and dishes. "Felt very distinctly." Ground: Compact, level.
- North Bend. Motion rapid, lasted about 20 seconds. Direction E. Awakened all in community, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken slightly. Shifted small objects. Damage slight. Ground: Steep.
- Preston. Motion rapid, lasted 20 seconds. Direction N-S, then NE-SW. Felt by all in community, awakened most, frightened many. Rattled windows, doors, and dishes; house creaked; doors opened. Hanging objects swung. Trees, bushes shaken slightly. Shifted small objects, overturned few small objects, knick-knacks fell. Ground: Soil, compact, level.
- Rollingbay. Lasted 30 seconds. Felt by and awakened all in community. Direction N-S.
- Ronald. Awakened all in community. Frame creaked.
- Scenic. Motion slow, lasted 45 seconds. Awakened all in community, frightened few. Rattled windows, doors, and dishes. Ground: Rocky soil.
- Seattle (1419 E. 66th St.). Motion slow, lasted 10-20 seconds. Awakened and frightened all in home. Rattled Venetian blinds. Hanging objects swung. Small plaster crack. Damage slight. Ground: Sloping; filled.
- Seattle (9634-28th NW.). Motion rapid, lasted 5 seconds. Awakened all in community. Rattled windows and doors; walls creaked. Hanging objects swung. Ground: Soil, compact, sloping and steep.
- Seattle (south side of Queen Anne Hill). Motion rapid, lasted about 20 seconds. Awakened all in community. Rattled windows, doors, and dishes. Ground: Soil.

- 15 May, 05:02:14*. State of Washington. Intensity VI. (cont.)
- Seattle (west section). V. Motion slow. Awakened many. Rattled windows and doors.
- Seattle (145 S. 106th St.). V. Motion rapid, lasted 30 seconds. Direction E-W. Felt by all in neighborhood, awakened many. Rattled windows; walls creaked. Hanging objects swung E-W. Ground: Compact, sloping.
- Seattle (Terminal Annex P.O.). V. Motion rapid, lasted 20 seconds. Felt by all in building, frightened few; felt by some outdoors. Direction NE. Rattled windows, doors, and dishes; building creaked. Ground: Soil, level.
- Seattle (Seattle-Tacoma Airport Weather Bureau Station). V. Motion slow, lasted 20 seconds. Felt by all at airport, awakened many in community. Shifted furnishings. Ground: Glacial till, compact, level.
- Seattle (346 N. 78th St.). V. Motion rapid, lasted 20 seconds. Direction N. Felt by, awakened, and frightened all in home. Rattled doors. Ground: Soil, compact, sloping.
- Seattle (University Station). V. Motion slow, lasted 15 seconds. Felt by observer at station; awakened many in community, frightened few. Ground: Soil, compact, sloping.
- Seattle (Laurelhurst Dist.). V. Motion slow, lasted 15 seconds. Felt by many in home, awakened many, frightened few. Rattled windows. Hanging objects swung NE. Ground: Compact.
- Seattle (5213 Columbia Drive). V. Motion slow, lasted 2-3 seconds. Awakened all in home. Rattled windows, dishes, and Venetian blinds. Hanging objects swung E-W. Ground: Soil, compact, level.
- Seattle (6729 Earl Ave.). IV. Motion rapid, lasted 30 seconds. Felt by several and awakened few in home. Rattled windows and bed shook. Ground: Soil, compact.
- Seattle (Windermere in NE. Seattle). IV. Motion slow, lasted about 20 seconds. Felt by observer in home, awakened one. Frame creaked. Ground: Compact, sloping.
- Seattle (north end). IV. Motion rapid, lasted 20 seconds. Direction NE. Felt by observer in home, awakened few in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Rocky.
- Seattle (1520 Ravenna Blvd.). IV. Motion rapid, lasted fraction of minute. Awakened few. Rattled doors. "Felt like someone shaking my bed."
- Seattle (13254-2nd Ave. S.). IV. Motion slow, lasted 1 minute. Direction N-S. Felt by several in home. Rattled dishes. Ground: Compact, level.
- Seattle (west section). IV. Motion rapid, very brief. Felt by several and awakened few in home. Rattled windows. Ground: Level, compact.
- Seattle (815 E. 104th St.). IV. Motion rapid, long duration. Felt by several in home, awakened and frightened few. Rattled dishes. Hanging objects swung NE. Ground: Compact, sloping.
- Skykomish. Motion rapid, lasted 20 seconds. Awakened and frightened many in community. Rattled windows, doors, and dishes; house creaked. Overturned small objects; broke dishes. Damage slight.

15 May, 05:02:14*. State of Washington. Intensity VI. (cont.)

Startup. Motion slow, long duration. Direction E-W. Felt by and awakened all in community, frightened many. Hanging objects swung E-W. Trees, bushes shaken strongly. Shifted small objects and furnishings. "Ran outdoors at time and saw electric light pole swaying in approximate E-W direction. This pole was wired N-S so the wire strength may have a small control over the swaying direction." Ground: Soil, compact, level.

Startup. V. Water in fish pool moved back and forth in E-W direction. Sounded like rumbling freight train. House quivered. Electric light wire between house and barn swayed E-W as if shaken by strong wind. "One door in house was hard to close before shock. Now it closes differently."

Sultan. Motion slow, lasted about 30 seconds. Felt by and awakened all in community, frightened many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Ground: Rocky, level.

Sultan. V. Motion rapid, lasted 1 minute. Direction SE. Awakened all and frightened few in home.

Tukwila. Motion rapid, long duration. Awakened all and frightened many in community. Rattled windows; houses creaked. Accompanied by loud noise. "Awakened from sound sleep." Ground: Compact.

Redmond (Union Hill, 5 miles east of Redmond). Motion rapid, lasted 3 seconds. Direction N-S. Felt by and awakened all in home. House creaked. Trees, bushes shaken moderately. Books fell. Ground: Soil, level.

Intensity V:

Alderton. Motion rapid, lasted 5 seconds. Direction S-N. Felt by and awakened many in community. Rattled windows, doors, and dishes. Ground: Soil, level.

Algona. Motion rapid, lasted 3 to 5 seconds. Direction N-S. Felt by many in community, awakened all in home. Rattled windows. Four cans fell from shelf in store, shelves face E-W. Ground: Marshy, level.

Allyn. Motion slow, momentary duration. Awakened many in community. Rattled windows. Ground: On Sherwood Creek; rocky, level.

Ashford. Awakened all in home.

Auburn. Motion slow, lasted about 30 seconds. Felt by some outdoors, awakened many and frightened few in community. Ground: Soil, level.

Bellevue. Motion rapid, momentary duration. Awakened all in home. "Sounded like running footsteps and a snap and rumble." Ground: Compact, level.

Black Diamond. Direction E-W. Motion rapid, lasted few seconds. Felt by and awakened many in community. Ground: Rocky soil.

Bothell. Motion rapid, sharp, lasted 30 seconds. Direction N. Felt by and awakened all in home, many in community, frightened all in home. House creaked. Ground: Compact, level.

Bremerton. Motion rapid, jarring, lasted about 20 seconds. Awakened all in home. Ground: Compact. "Another man (standing) observed practically the same effects. Said direction was E-W."

15 May, 05:02:14*. State of Washington. Intensity V. (cont.)

Bremerton (east section, on Manette Peninsula). "Family slept through it. I have talked to others, however, who were awakened, their homes shaken, books, displaced, etc. No reports of damage."

Bremerton. IV. Felt by several, awakened and frightened few in community.

Bremerton. IV. Motion slow, lasted about 1 minute. Felt by many in home, outdoors by some, awakened and frightened few. Rattled windows; walls creaked. Ground: Soil, level.

Bryant. Motion rapid, lasted 10 seconds. Felt by and awakened all in home. "Felt like a sharp slip, followed by tremors for several seconds." Ground: Compact, sloping.

Burien. Motion rapid, jarring, lasted 1 second. Felt by and awakened all in home. Ground: Soil.

Carbonado. Motion rapid, lasted about 10-12 seconds. Direction NE. Felt by and awakened many in community. Rattled windows and dishes. Shifted few small objects. Hanging objects swung NE. Ground: Soil, compact, level.

Cashmere. Motion rapid, lasted about 40 seconds. Felt by and awakened many in home, frightened few in home. Entire house shook.

Cashmere. IV. Motion slow, lasted 2 seconds. Direction E. Felt by several and awakened few in home and community. Ground: Rocky, level.

Cedar Falls. Motion rapid, lasted 30 seconds. Felt by and awakened many in community, frightened few. Rattled windows, doors, and dishes. Ground: Rocky, loose.

Cle Elum. Motion slow, lasted 10 seconds. Felt by and awakened many in community. Rattled windows; walls creaked. Ground: Soil, level.

Concrete. Motion rapid. Felt by many in community (some outdoors), awakened and frightened few. Pendulum clock facing W. stopped.

Cove. Motion rapid, lasted 4-5 seconds. Awakened many in home and community, frightened few. Rattled windows. Hanging objects swung. Ground: Rocky soil, compact, sloping.

Darrington. Lasted 2 seconds. Felt by and awakened many in community. Ground: Soil, compact, level.

Des Moines. Motion moderate, long duration. Felt by and awakened many in home and community, frightened few. Rattled windows, doors, and dishes; houses creaked. Ground: Soil, compact.

Dieringer. Motion rapid, lasted 40 seconds. Direction NW. Felt by many in community, awakened all in home. Trees, bushes shaken slightly. Ground: Soil, level.

Dockton. Motion rapid, lasted 4-5 seconds. Direction N-S. Felt by and awakened many in community, frightened few in home. Rattled windows and doors; house creaked. Ground: Compact, sloping.

Dryden. Motion slow, abrupt ending, lasted about 30 seconds. Awakened all in home. Rattled windows and dishes. Hanging objects swung. Ground: Soil, compact, level.

Easton. Motion rapid, lasted about 1 minute. Awakened all in home. Walls creaked. "Only part of population awakened."

Eatonville. Motion rapid, lasted 15 seconds. Felt by and awakened many in community. Rattled windows. Ground: Rocky, level.

15 May, 05:02:14*. State of Washington. Intensity V. (cont.)

- Eglon. Motion slow, lasted few seconds. Felt by and awakened all in home. Windows rattled for some time after shock. Ground: Soil, compact.
- Everett. Motion rapid, lasted 15 seconds. Felt by and awakened many in community, frightened few. Rattled windows, doors, and dishes. Hanging objects swung. Ground: Soil, compact, sloping.
- Fortson. Long duration. Rattled windows and dishes. "People here all remarked about beds shaking, etc."
- Fort Steilacoom. Felt by and awakened many in community, frightened few. Rattled windows. Shifted small objects. Damage slight, if any. Ground: Soil, loose.
- Glenoma. Motion rapid, lasted 30 seconds. Awakened and frightened many in community. Rattled windows and doors; frame creaked. "Tremor shook house, but no damage." Ground: Soil, compact, level.
- Gold Bar. Motion rapid, lasted 1 minute. Felt by and awakened many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Soil, level.
- Granite Falls. Motion rapid, lasted 15 seconds. Awakened all in home. Rattled windows, doors, and dishes; house creaked. Ground: Compact, sloping.
- Hadlock. Lasted about 1 minute. Direction N-S. Awakened many in community. Rattled windows, doors, and dishes; house creaked. "This was quite a shock. The house swayed back and forth several times after I heard the dishes rattling. There was no damage. Some did not feel it." Ground: Compact, level.
- Hansville. Motion slow, lasted 30 seconds. Direction S-N. Felt by and awakened many in community. Rattled windows and doors; walls creaked. Hanging objects swung. Trees, bushes shaken moderately. Shifted small objects. Slight settling of one door. "Shock was not felt by people moving outside. Reports of water forming waves and ripples." Ground: Marshy.
- Harper. Motion rapid, lasted 30 seconds. Direction NE. Felt by and awakened all in home. Rattled windows; walls creaked. Ground: Soil, level.
- Holden. Motion rapid, lasted about 5 seconds. Accompanied by sound like muffled blast and receding with wave-like effect. Felt by and awakened many in community. Rattled windows; walls creaked. Trees, bushes shaken moderately. Few knickknacks fell. Ground: Rocky.
- Houghton. Motion rapid. Felt by, awakened, and frightened many in community, some outdoors. House creaked. Trees, bushes shaken moderately. Shifted small objects.
- Index. Motion rapid, lasted about 1 minute. Loud roaring noise. Felt by and awakened many in home. Rattled windows, doors, and dishes. Trees, bushes shaken slightly. Ground: Rocky.
- Issaquah. Motion rapid, lasted 10 seconds. Awakened many and frightened few in community. Ground: Soil, compact, level.
- Kapowsin. Motion slow, lasted about 30 seconds. Direction NE. Felt by and awakened many in community, frightened few. Rattled windows, doors, and dishes. Trees, bushes shaken slightly. Shifted small objects. Ground: Sloping, compact, soil.

15 May, 05:02:14*. State of Washington. Intensity V. (cont.)

Kennydale. Motion moderate, lasted 25-30 seconds. Awakened many and frightened few in community. Rattled windows, doors, and dishes; house creaked. "Felt little swaying or waving motion. Frightened some young children. Personally, I heard it more than felt it." Ground: Gravelly soil, sloping and steep.

Kenmore. "Slept through it. Grocery store had some merchandise shaken off shelves."

Kent. Motion rapid. Awakened many in home. Sounded like a blast. Ground: Compact, level.

Kirkland. Motion rapid, very brief, with sharp thud. Felt by and awakened many in community. Rattled windows, doors, and dishes. Trees, bushes shaken slightly. Ground: Soil, compact, sloping.

Lakebay. Motion slow, rolling, lasted 20 seconds. Awakened all in home. House creaked. Ground: Marshy, sloping.

Lakeview. Motion rapid, quivering, lasted 1 minute. Awakened all in home. Shook mirror. House creaked. Ground: Rocky soil.

Leavenworth. Motion rapid, lasted 5 seconds. Felt by some outdoors (active), awakened many in community. Rattled windows, doors, and dishes. Shifted small objects.

Lester. Lasted about 12 seconds. Awakened many in community. Rattled windows, doors, and dishes. Ground: Soil, compact, level.

Lyman. Motion slow. Felt by and awakened many in community. Rattled windows and doors. Ground: Soil.

Maple Valley. Motion slow, lasted 10-15 seconds. Felt by and awakened many in homes. Houses creaked. "I talked with many people and all felt shock as I did." Ground: Soil.

McMillin. Motion slow, lasted 45 seconds. Felt by all in community. Rattled windows. Ground: Soil, level.

Milton. Motion rapid, lasted 10 seconds. Felt by and awakened many in community. Rattled windows. Ground: Compact.

Mirror Lake. Motion slow, lasted less than a minute. Felt by, awakened, and frightened many in community. Rattled windows. Hanging objects swung. Ground: Soil.

Monroe. Motion rapid, lasted 20 seconds. Felt by and awakened all in home, frightened few. Rattled windows, doors, and dishes. Hanging objects swung. Trees, bushes shaken moderately. Ground: Compact, level.

Olympia. Lasted about 15 seconds. Felt by, awakened, and frightened many in community. Direction vertical. Rattled windows, doors, and dishes. Ground: Compact, sloping.

Orilla. Motion slow, lasted 20 seconds. Two shocks. Felt by many in community, awakened all in home. Rattled windows and hose hanging on door; frame creaked. Ground: Sandy soil, level.

Orting. Motion slow, lasted 20 seconds. Felt by and awakened many in community, frightened few. Rattled windows. Ground: Rocky, level.

Oso. Motion rapid, lasted 5 seconds. Direction N. Felt by and awakened many in community, frightened few. Rattled windows, doors, and dishes. Hanging objects swung. "Awakened by rumble a few seconds before shock. Seemed to come from east. Rumble lasted longer than shock." Ground: Rocky, level.

- 15 May, 05:02:14*. State of Washington. Intensity V. (cont.)
- Packwood.** Motion rapid, lasted 10 seconds. Felt by (some outdoors) and awakened many in community. Rattled windows. Hanging objects swung. Trees, bushes shaken slightly. Ground: Compact.
- Portage.** Two or three light shocks felt, lasted few seconds. Awakened many and frightened few in community. Rattled windows. "Two out of four in our home awakened." Ground: Soil, level.
- Porter.** Motion rapid, lasted 3 seconds. Direction NE. Felt by several in home and community, awakened all in home. Frame creaked. Ground: Loose, sloping.
- Port Gamble.** Motion slow, lasted 30 seconds. Felt by all and awakened many in community, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Soil, compact, level.
- Port Ludlow.** Lasted 15 seconds. Felt by and awakened many in community. Rattled windows, doors, and dishes.
- Port Orchard.** Motion rapid, lasted about 1 minute. Direction SE-NW. Felt by and awakened many in community, frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NW. Ground: Compact, sloping and steep.
- Poulsbo.** Lasted about 1 minute. Felt by many, awakened all in home. Rattled windows, doors, and dishes; house creaked. Ground: Rocky, compact.
- Puyallup (Edgewood).** Lasted 10 seconds. Felt by several in community. Rattled windows. Shifted small objects. Ground: Soil, level.
- Puyallup.** Motion rapid, lasted 5 seconds. Direction E-W. Awakened many and frightened few in home. Rattled doors and dishes. Trees, bushes shaken slightly. Ground: Sandy.
- Restil (State Veterans Home).** Motion rapid, lasted 5 seconds. Felt by and awakened many in community, frightened few. Rattled windows and doors. Ground: Loose, sloping.
- Richmond Beach.** Motion moderate. Felt by and awakened many in community. Rattled windows. Ground: Soil, level.
- Rockport.** Motion rapid, lasted about 1 minute. Direction E-W. Awakened many in community. Rattled windows, doors, and dishes. "One person reported a second very light shock." Ground: Rocky, sloping.
- Roslyn.** Motion fairly slow, lasted 30 seconds. Felt by and awakened many, frightened few. Rattled windows, doors, and dishes; house creaked. Bushes shaken slightly. Ground: Rocky.
- Roy.** Lasted 15 seconds. Felt by and awakened many in community. Walls creaked.
- Seabeck.** Motion rapid, lasted few seconds. Felt by and awakened all in home. Entire house rattled and seemed to shake horizontally. Ground: Like hardpan, compact, sloping.
- Seabold.** Sharp jolt. Motion rapid, lasted few seconds. Felt by many in home and community. Shaking of bed awakened observer from sound sleep. House creaked. Ground: Hardpan, level.
- Seahurst.** Motion rapid, lasted 1 minute. Felt by and awakened many in community, frightened few. "Sharply felt in this area." Ground: Compact.

15 May, 05:02:14*. State of Washington. Intensity V. (cont.)

- Selleck. Motion slow, lasted 25 seconds. Direction N-S. Felt by and awakened many in community, frightened few. Slight rattling of windows, doors, and dishes; slight creaking of house. "Strongest shock felt here since 1949." Ground: Gravelly, level.
- Snoqualmie. Motion slow, lasted 3 seconds. Felt by, awakened, and frightened all in home. Hanging objects swung. Ground: Soil, compact, level.
- Snoqualmie Falls. Motion rapid, lasted 10 seconds. Felt by all in home, awakened many. Rattled dishes. Ground: Soil.
- Southworth. Awakened many in community, frightened few. Ground: Soil, compact, sloping.
- Spanaway. Awakened many in community. "Reports were that no rattling noises were heard, but people knew instantly that it was an earthquake."
- Steilacoom. Felt by several, and awakened and frightened few in community. Rattled dishes. Shifted and overturned small objects. Ground: Soil, level.
- Sumner. Motion rapid, lasted 30 seconds. Direction E-W. Felt by and awakened many in community, frightened few. Rattled windows. Ground: Soil, compact.
- Suquamish. Motion slow, lasted 15 seconds. "Awakened a good many people, but not strong enough to alarm the majority." Ground: Compact, sloping.
- Tacoma. Motion rapid, lasted 2 seconds. Felt by and awakened many. Ground: Compact, level.
- Tacoma. IV. Motion slow, lasted 20 seconds. Direction E-W. Awakened few in home and community. Rattled doors. Hanging objects swung E-W.
- Tacoma (Fern Hill Dist.). IV. Felt by several and awakened few in community. Observer awakened at end of shock.
- Tacoma (4128-6th Ave.). III. Motion rapid, lasted several seconds. Flashlight rolled back and forth on night stand. "Shock not even strong enough to cause me to get up."
- Tacoma (4412 N. 37th St.). III. Motion moderate, lasted about 3 seconds. Direction NE. Felt by those in home awake. "Very gentle shock." Ground: Rocky soil, compact, level.
- Trinidad. Motion slow, lasted 25 seconds. Felt by several in home, awakened few. Rattled windows slightly. Shifted small objects. Ground: Rocky soil, level.
- Vashon. Motion rapid, lasted 30-60 seconds. Awakened many in community. Rattled windows, doors, and dishes. Ground: Level, compact.
- Wauna. Motion rapid, lasted about 30 seconds. Awakened many in community. Windows, doors, and dishes vibrated; frame creaked. Ground: Compact, sloping.
- Wilkeson. Lasted several seconds. Direction seemed N-S. Awakened many in community. House creaked. "Upstairs, empty twin bed on casters moved south." Ground: Compact, level.
- Woodinville. Motion rapid, lasted 10 seconds. Felt by and awakened many in community. Rattled windows; walls creaked. Ground: Soil, compact.

15 May, 05:02:14*. State of Washington. Intensity V. (cont.)
Zenith. Motion rapid, lasted few seconds. Felt by and awakened many in home. House creaked. Direction S-N. "I was awakened and thought I had pushed my foot against foot of bed. Head of bed facing south, foot north." Ground: Compact, level.

Intensity IV:

Aberdeen. Motion rapid, momentary duration. Felt by several in home, awakened few.
Anacortes. Motion slow. Felt by several in home, awakened few. Rattled windows. Ground: Rocky soil, level.
Brewster. Lasted few seconds. Awakened few in home. Ground: Loose.
Burley. Lasted about 15 seconds. Felt by many, awakened few in home. Walls creaked. "Some people heard rumble." Ground: Compact.
Carnation. Motion rapid, lasted 30 seconds. Felt by several and awakened few in home, frightened few in community. Rattled windows; frame creaked. Ground: Soil, level.
Castle Rock. Motion rapid. Direction S-N. Awakened few. Rattled doors and dishes. Ground: Rocky, sloping to south.
Chelan (Lake Chelan State Park). Rapid vibration, lasted about 3 seconds. "Felt by many out of 20 in camp, awakened several of the 20 in camp." Ground: Loose.
Chelan. Motion slow, lasted 12 seconds. Direction W. Felt by many, awakened few in community. Rattled dishes. Hanging objects swung. Ground: Soil.
Chimacum. "Reported as quite noticeable."
Colby. Motion slow, long duration. Awakened and frightened 2 in home.
Coulee Dam. Felt by (some outdoors) and awakened few. "Weakly felt." Ground: Rocky, sloping.
Cumberland. Motion rapid. Felt by several in community, awakened and frightened few. Ground: Soil, level.
Ellensburg. Motion slow, lasted few seconds. Felt by many and awakened few in community. Hanging objects swung. Trees, bushes shaken slightly. Ground: Compact, level.
Enumclaw. Motion rapid, lasted 10 seconds. Awakened few in community. Trees, bushes shaken slightly.
Fragaria. Motion rapid then slow, lasted 2 seconds. Felt by several in home, awakened few in community. Ground: Rocky beach.
Graham. Motion moderate, lasted about 1 minute. Felt by and awakened several in home. Rattled windows; house creaked slightly. Shook bed. Ground: Loose, level.
Keyport. Motion sharp, lasted 10 seconds. Felt by several in home, awakened few in community. Ground: Compact, level.
Kingston. Motion rapid, lasted 15 seconds. Felt by several in community, frightened few. Direction S. Rattled doors. Ground: Rocky soil, level.
Lacey. Rattled windows. "Thought it was firing of big guns at Fort Lewis." Ground: Compact, level.
Lake Cushman (Hoodsport). Motion rapid, lasted 20 seconds. Direction NE-SW. Rattled windows, doors, and dishes. Ground: Compact.

- 15 May, 05:02:14*. State of Washington. Intensity IV. (cont.)
- Lakeside. Motion slow, lasted few seconds. Felt by several and awakened few in community.
- Leland. Motion quivering. Observer awakened by noise. Rattled windows and doors. "Neighbors slept through it." Ground: Lakeshore.
- Lilliwaup. Felt by several and awakened few in community. Rattled windows.
- Longmire. Felt by several in home, awakened few in community. Ground: Soil, compact, level.
- Longview. Motion slow. Felt by all in home. Rattled windows. Ground: Rocky.
- Longview (Coral Creek). III. Motion slow, lasted about 10 seconds. Felt by observer in bed. "Very gentle shock." Ground: Soil, compact, marshy, sloping.
- Lucerne. Awakened observer.
- Maltby. Motion slow, lasted 4 seconds. Felt by several in home, awakened few.
- Manson. Motion slow. Awakened few. Ground: Rocky, sloping and steep.
- Marblemount. Motion rapid, lasted about 40 seconds. Felt by several in home, awakened few and frightened few in community. Rattled windows, doors, and dishes; house creaked. Ground: Rocky.
- Midway. Motion slow, lasted 10 seconds. Felt in home and community. Rattled windows and doors.
- Montesano. The press reported an officer at the county jail said it felt as though the jail "floated on water" for a few seconds.
- Morton. Motion rapid, one sharp jolt. Direction N. Felt by several awake, awakened few in community. Rattled windows. "Several thought something hit house." Ground: Level, loose.
- Mount Vernon. Motion slow, lasted 2-3 seconds. Awakened observer. Walls creaked. Ground: Soil, loose, level.
- Nisqually. Motion rapid, lasted 10 seconds. Felt by several and awakened few in community. House creaked slightly.
- Olalla. Motion slow, lasted 30 seconds. Direction N. Felt by several in home, awakened few. Ground: Level; filled.
- Pacific. Motion slow, lasted 20 seconds. Direction N. Rattled windows, doors, and dishes. Ground: Compact, level.
- Port Blakely. Shock distinctly felt by 3 out of 5 employees of post office.
- Port Townsend. Observer awakened at end of shock.
- Possession Point (Whidby Island). Motion rapid, lasted 30 seconds. Awakened all in home. "Very light shock." Ground: Soil, compact, sloping.
- Quilcene. Motion slow. Felt by several and awakened few in community. Rattled windows, doors, and dishes; house creaked. Ground: Level.
- Randle. Motion slow, lasted few seconds. Felt by several and awakened few in community. Rattled windows. Ground: Compact soil.
- Ravensdale. Awakened 2 or 3 in home. Sounded like a bump. Ground: Rocky, level.
- Redondo. Motion rapid, lasted 30 seconds. Awakened few in home.
- Sedro-Woolley. Motion rapid, lasted about 30 seconds. Felt by several and awakened few in home. Ground: Soil, level.

- 15 May, 05:02:14*. State of Washington. Intensity IV. (cont.)
- Sedro-Woolley. Motion slow. Felt by several and awakened few in home. Ground: Soil, level.
- Silverdale. Motion slow, long duration. Awakened few in community.
- Snohomish. Motion rapid, lasted 3 seconds. Felt by all in home, awakened few and frightened few in home. Rattled windows, doors, and dishes. Hanging objects swung. Ground: Compact soil, sloping.
- South Bend. Awakened few. "Only 2 or 3 reported feeling a very moderate shock."
- Sylvan. Motion rapid, lasted about 1 minute. Direction N. Felt by many and awakened few in community. Rattled windows; walls creaked. Trees, bushes shaken slightly. Ground: Gravelly, compact.
- Thorp. Felt by several and awakened few in community. Rattled windows; walls creaked. Ground: Soil, level.
- Tracyton. Motion slow, lasted 15 seconds. Felt by observer in home, awakened few in community. House creaked. Ground: Soil.
- Trout Lodge (Naches). Motion rapid, lasted 10 seconds. Felt by several and awakened few in home. Walls creaked. Ground: Rocky soil.
- Tumwater. Motion rapid, lasted 30 seconds. Felt by several and awakened few in community. Rattled windows. Ground: Compact.
- Twisp. Motion slow, lasted 1 minute. Awakened few in community.
- Vaughn. Felt by several and awakened few in community.
- Vega (Anderson Island). Motion slow. Felt by several and awakened few.
- Waterville. Motion slow, lasted 1 minute. Felt by several and awakened few in community. Rattled windows. "Very slight."
- Wenatchee. Motion like vibration, lasted 2 seconds. Felt by many and awakened few in home, felt outdoors by some. Frame creaked. Trees, bushes shaken slightly. Ground: Soil, level.
- Winslow. Motion rapid, lasted 20 seconds. Felt by and awakened observer. Rattled windows and dishes.
- Winton. Motion slow, lasted 2 seconds. Direction E. Awakened and frightened few in home. Rattled windows. Trees, bushes shaken moderately. Ground: Soil, compact, level.
- Yelm. Motion rapid, lasted 3 seconds. Awakened few in community. Hanging objects swung. Ground: Loose, level.
- Yoman. Motion slow, lasted 3 seconds. Rattled windows. Hanging objects swung.

Intensity I to III:

- Beverly. Two people in depot said it felt like something hit building. "No one else noticed it, probably because trains cause the ground to tremble, and most people would have thought it was a train switching." Ground: Rocky, loose, level.
- Dabob. "Only one neighbor 2 miles from here reported feeling a tremor."
- Eastsound. Motion slow. Felt by few. "Very mild here."
- Grapeview. Motion rapid. Felt in community.
- Hoquiam. Motion slow, brief. Felt outdoors by observer. Ground: Marshy.
- Kittitas. Motion abrupt, lasted about 5 seconds. Felt by two in bed. Ground: Soil, level.

- 15 May, 05:02:14*. State of Washington. Intensity I to III. (cont.)
Lopez. Motion slow, lasted few seconds. Felt by several in bed.
Merritt (Leavenworth). Motion rapid, lasted about 40 seconds. Felt
in home lying down. Ground: Soil, level.
Shelton. Motion slow, lasted 5 seconds. Felt by two in home. "Light
shock." Ground: Compact.
South Prairie. Lasted 1 second. Felt in home.

Reported felt in Canada:

Victoria. III. The following was abstracted from a report received
from W. G. Milne, Seismologist, of the Department of Mines
and Technical Surveys, Royal Oak, B.C.: "I have made enquiries
about here and on the mainland as to the number of people feel-
ing the tremor. At Victoria, the radio station reports some
30 calls about the tremor. It was not generally felt and did
no damage ... One person in Vancouver is reported to have felt
the tremor but this has not been verified and one in a city of
400,000 seems unlikely. No other area in Canada reported feel-
ing the tremor."

Reported not felt: Acme, Adrian, Altoona, American Lake, Benton City,
Blaine, Cathlamet, Chehalis, Clearwater, Connell, Cove, Creosote,
Creston, Davenport, Doty, East Olympia, Ephrata, Forks, Frances,
Friday Harbor, Glacier, Glenwood, Goldendale, Granger, Humptulips,
Joyce, Kalalock, Kalama, Kelso, Klickitat, La Center, Lind, Longbranch,
Lynden, McCloud Air Force Base (Tacoma), Mansfield, Matlock, Mazama,
Mohler, Naselle, Neilton, Ocean Park, Okanogan, Olga, Oroville, Othello,
Oysterville, Pacific Beach, Palmer, Prosser, Raymond, Ritzville, Rock
Island, Sekiu, Sequim, Silver Creek, Tahuya, Tenino, Tieton, Tillicum,
Toledo, Trout Creek, Union, Vader, Vancouver, Warden, Winthrop, and
Yakima.

- 23 May, 05:45. State of Washington.
Twisp. V. Lasted 12 seconds. Felt by many. House shook from roof
down. Terrific roar.
Winthrop. V. Felt by and awakened many. House creaked. Hanging
objects swung. Reported as sharp, brief shock, like heavy
blast. Ground: Rocky.

- - - - -

WESTERN MOUNTAIN REGION

(105th Meridian or Mountain Standard Time)

- 29 April, 03:49:27*, 04:34:34*.
Epicenter $29\frac{1}{2}^{\circ}$ N., $112\frac{1}{2}^{\circ}$ W., Gulf of California. (W)
Douglas, Ariz. (Gadsden Hotel). III. Felt by resident lodger and
few transients. "Apparently very slight as whole town was
quite surprised to learn there had been any shock at all."
The earthquakes were felt in San Diego, California, and minor damage
was reported in western Mexico, in the towns of Guaymas,
Hermosillo, and Ciudad Obregon. (SSA Bulletin, July 1954)

-- April.

No earthquakes were reported felt during the month of April at the following places:

Weather Bureau Stations:

Colorado: None.
Idaho: "
Montana: "
Nevada: "
New Mexico: "
Utah: "

7 June, 17:16:13*.

Epicenter $47^{\circ}10'$ N., 116° W., northern Idaho. (W)

Chilco. IV. Motion slow, lasted 15 seconds. Felt by several in home. Rattled windows.

Harvard. IV. Motion rapid, lasted 1 minute. Felt by several in home and community (some outdoors), frightened few. Rattled windows, doors, and dishes; frame creaked. House plants shook.

Kellogg. V. Motion slow, lasted 30 seconds. Direction N-S. Felt by many (some outdoors). Rattled windows, doors, and dishes. Pendulum clock facing S. stopped. Ground: Rocky.

- - - - -

BOULDER CITY

(120th Meridian or Pacific Standard Time)

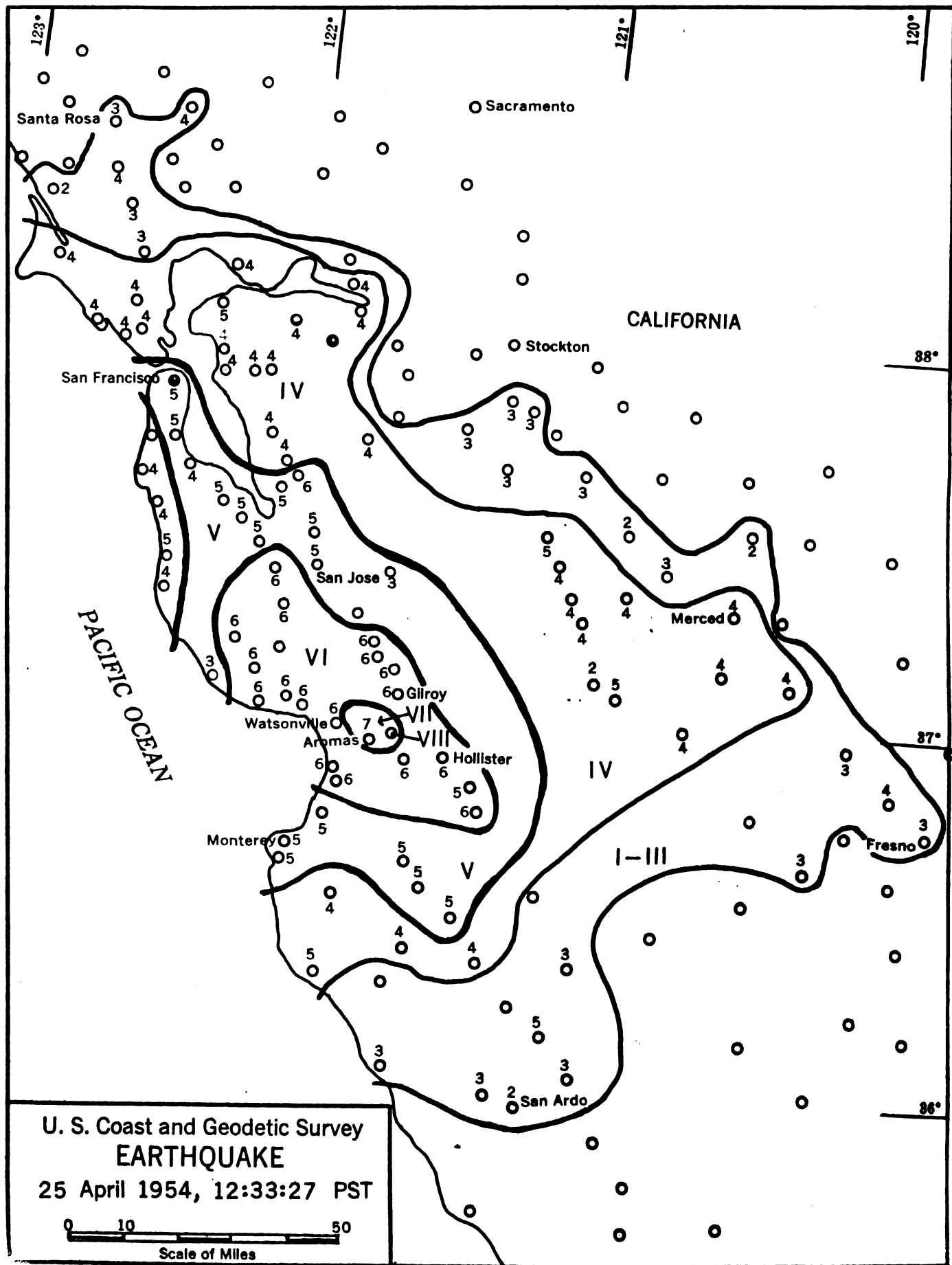
-- April, May.

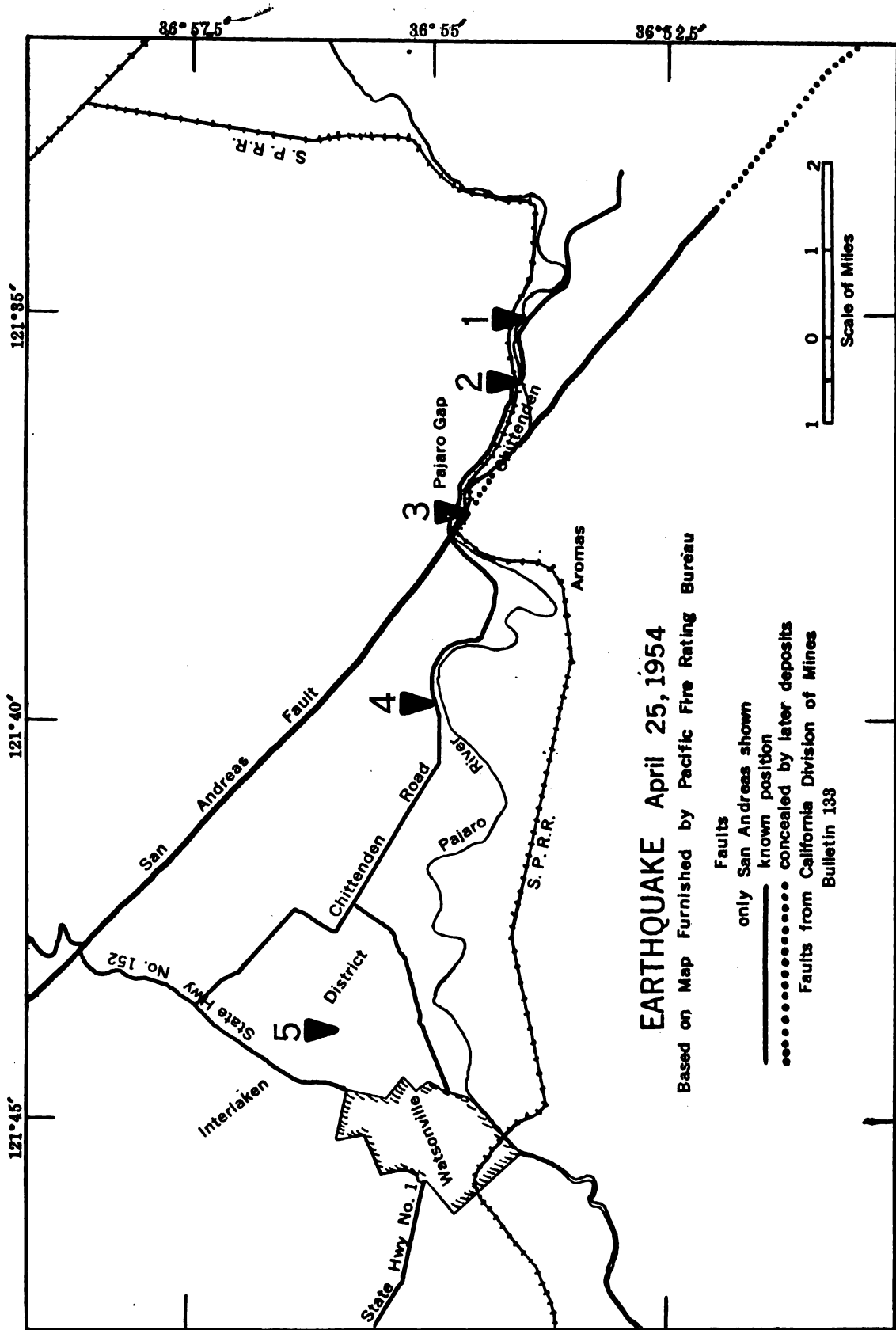
No earthquakes were reported felt in the Lake Mead area during these months.

14 June, 12:43:52* (BC).

Boulder City. III. Felt by several.

- - - - -





EARTHQUAKE April 25, 1954

Based on Map Furnished by Pacific Fire Rating Bureau

Faults

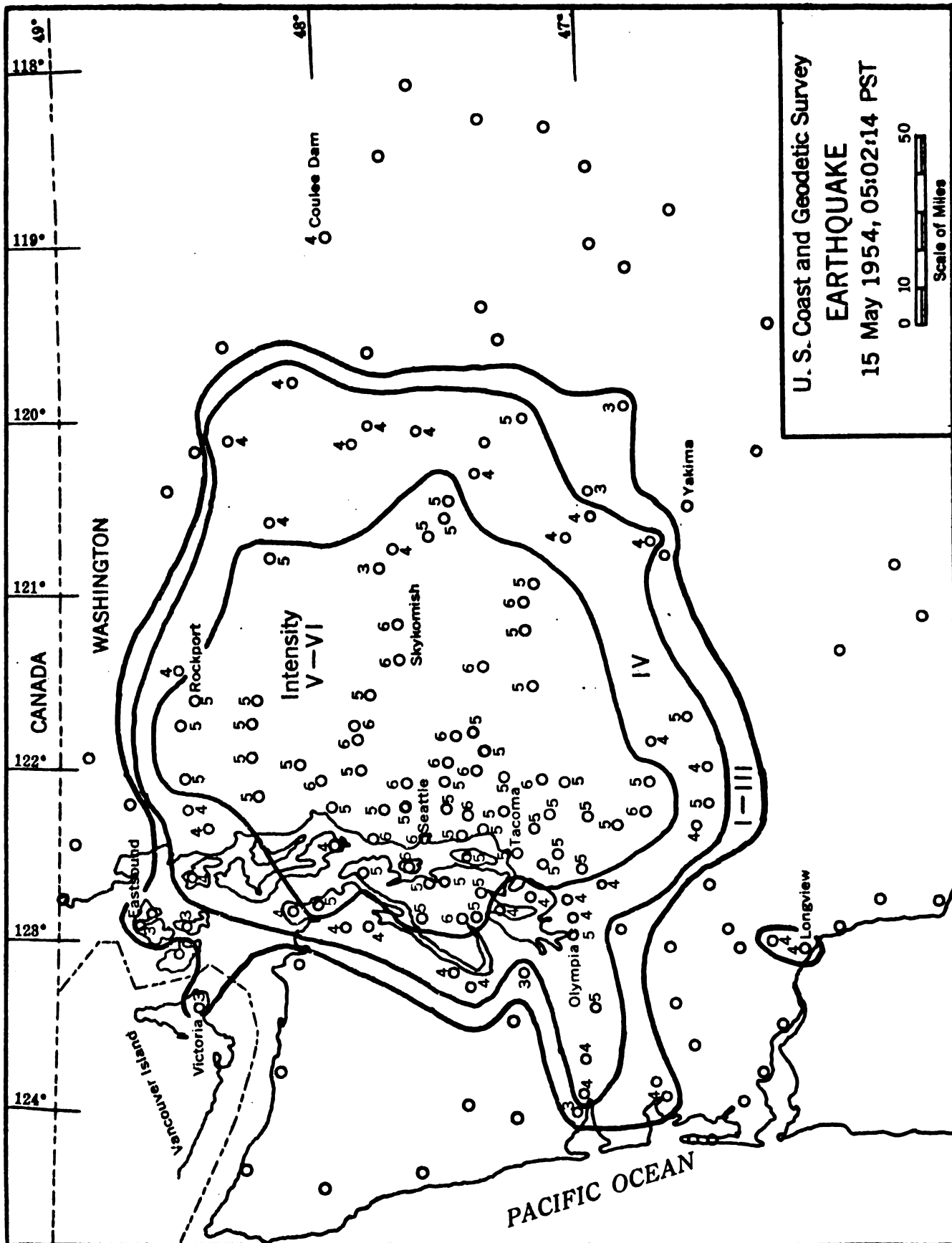
only San Andreas shown

known position

concealed by later deposits

Faults from California Division of Mines

Bulletin 133



MODIFIED MERCALLI INTENSITY SCALE OF 1931
(Abridged)

- I. Not felt except by a very few under especially favorable circumstances. (I Rossi-Forel Scale)
- II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (I to II Rossi-Forel Scale)
- III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing truck. Duration estimated. (III Rossi-Forel Scale)
- IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls made creaking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. (IV to V Rossi-Forel Scale)
- V. Felt by nearly everyone; many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel Scale)
- VI. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight. (VI to VII Rossi-Forel Scale)
- VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars. (VIII Rossi-Forel Scale)
- VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Disturbed persons driving motor cars. (VIII+ to IX Rossi-Forel Scale)
- IX. Damage considerable in specially designed structures; well designed frame structures thrown out of plumb; great in substantial buildings with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX+ Rossi-Forel Scale)
- X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.
- XI. Few, if any (masonry), structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipe lines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
- XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

U. S. DEPARTMENT OF COMMERCE

Sinclair Weeks, Secretary

COAST AND GEODETIC SURVEY

R. F. A. Studds, Director

ABSTRACTS OF EARTHQUAKE REPORTS
FOR
THE PACIFIC COAST AND THE
WESTERN MOUNTAIN REGION

MSA-83

July, August, September, 1954

Issued by the U. S. Coast and Geodetic Survey

Washington, D. C.

1954

FOR OFFICIAL USE

DEPARTMENT OF COMMERCE

U. S. Coast and Geodetic Survey

Seismological Field Survey
14 Old Mint Building
San Francisco 3, California

ABSTRACTS OF EARTHQUAKE REPORTS FOR THE PACIFIC COAST
AND THE WESTERN MOUNTAIN REGION

MSA-83

1 July 1954 to 30 September 1954

The information in this report has been collected by the Seismological Field Survey of the U. S. Coast and Geodetic Survey with the assistance of State Collaborators in Seismology and through the voluntary cooperation of many local organizations and individuals. Additional cooperation is solicited. Blank questionnaires and special information pertaining to the work may be obtained by addressing the Director, U. S. Coast and Geodetic Survey, Washington 25, D.C.; the Chief, Seismological Field Survey at the above address; or the following State Collaborators in Seismology:

Arizona:	Dr. Eldred D. Wilson, University of Arizona, Tucson.
Colorado:	Dr. C. A. Heiland, Heiland Research Corporation, Denver.
Montana:	Professor Stephen W. Nile, Montana School of Mines, Butte.
Nevada:	Dr. David B. Slemmons, University of Nevada, Reno.
New Mexico:	Professor Stuart A. Northrop, University of New Mexico, Albuquerque.
Oregon:	Dr. Ira S. Allison, Oregon State College, Corvallis.
Utah:	Professor J. Stewart Williams, Utah State Agricul- tural College, Logan.
Washington:	Professor Howard A. Coombs, University of Washington, Seattle.
Wyoming:	Professor Horace D. Thomas, University of Wyoming, Laramie.

Copies of these reports may be obtained from the Supervisor, Western District, U. S. Coast and Geodetic Survey, 121 Customhouse, San Francisco 26, California; or from the Washington Office.

Earthquake information and questionnaire reports in the immediate vicinity of Lake Mead are collected by the Boulder City, Nevada office of the Seismological Field Survey, U. S. Coast and Geodetic Survey.

The abstracts are divided into three groups: (1) California and Western Nevada, (2) Washington and Oregon, and (3) the Western Mountain Region. This follows the scheme of classification in United States Earthquakes.

Intensity numbers refer to the Modified Mercalli Intensity Scale of 1931, in which, in the lower intensities, the disturbance of inanimate objects and personal reactions are given about equal weight. This intensity scale appears in abridged form on the last page of this report. All reports of whatever intensity from any town are listed under the highest intensity reported. Omission of intensity rating indicates insufficient information.

This report is prepared with the active collaboration of Professor Perry Byerly of the Seismographic Station of the University of California, and staff members of the Seismological Laboratory, California Institute of Technology. This permits an authentic appraisal of the material abstracted in the light of available instrumental and other information. Newspaper reports have been furnished by cooperative observers only and do not represent the results of a complete newspaper clipping service.

A condensed summary of these reports is published annually in the serial publication of the U. S. Coast and Geodetic Survey entitled "United States Earthquakes."

CALIFORNIA AND WESTERN NEVADA

(120th Meridian or Pacific Standard Time)

All places mentioned are in California unless otherwise stated

Time marked with asterisk (*) determined instrumentally: Berkeley (B), Boulder City (BC), Pasadena (P), and Washington (W).

1954

4 July, 11:13:31*.

Epicenter $35^{\circ}19'$ north, $118^{\circ}55'$ west, near Bakersfield. (P) Bakersfield. IV. Press reported the shock was felt sharply in the city and slightly at Greenfield (about 10 miles south of Bakersfield). Preceded by a rumbling noise. No damage was reported.

5 July, 11:18:52*.

Epicenter $40^{\circ}26'$ north, $124^{\circ}16'$ west, south of Ferndale. (B) Eureka. Press reported a slight rumbling earthquake was felt in the Eureka-Ferndale area. No damage was reported.

6 July, 03:13:20*.

Epicenter $39^{\circ}25'$ north, $118^{\circ}32'$ west, east of Fallon, Nevada. (B) Felt over an area of approximately 130,000 square miles of Nevada, California, Oregon, and Utah. See map, page 64. Magnitude 6.8. Maximum intensity of IX was assigned to the ground fracture area which occurred on the east edge of Rainbow Mountain in the Stillwater Range of mountains about 15 miles southeast of Fallon, Nevada. Extensive damage occurred to canals and drainage systems, also to irrigation and drainage structures, with failure of the Coleman Diversion Dam located about 1 mile northwest of Fallon. Settlement, necessitating releveing, occurred, especially in the areas about 7 miles southwesterly from Fallon and in the Stillwater area. Paved highways in the Fallon and Stillwater areas were cracked and buckled in several places. A number of old concrete-block and brick buildings of poor construction in the Fallon business district were considerably damaged. Damage to the majority of dwellings in Fallon and elsewhere was slight. No deaths or serious injuries were reported. Several men at the Fallon Naval Auxiliary Air Station sustained minor injuries when heavy steel lockers were overturned. Many aftershocks occurred during July and August, decreasing during the latter part of September.

Intensity IX in Nevada:

Ground surface ruptures observed after the 6 July main shock appeared to fall into two categories: (1) ruptures that were possibly related to faulting and (2) ruptures that were related to movement of unstable ground. In the first category, there was a

6 July, 03:13:20*. Intensity IX in Nevada. (cont.)

practically continuous line of cracks in the Lahontan Lake Bed material for about 6 miles along the eastern edge of Rainbow Mountain in the Stillwater Range of mountains. Strike of the cracks was north and slightly east from a point near U. S. Highway 50. Relative movement was mountain side up, valley side down. Scarps from a fraction of an inch to a foot or more were observed and in places there were small grabens. Little or no horizontal movement was evident. North of Rainbow Mountain the cracking continued as an intermittent zone to beyond Stillwater Point reservoir. Southeast of Rainbow Mountain there were many small northeast trending cracks on the surface of Eight and Four Mile flats and some craterlets were found. At the time of the 14:07:41* shock on 6 July a northeast trending rupture of the graben type broke U. S. Highway 50 at a point about 5 miles southeast of Salt Wells. Additional small movements of the cracks along Rainbow Mountain were observed subsequent to aftershocks. In the second category there were many cracks and areas of settlement along ditches, in fields, and on roads in the agricultural lands south and west of Fallon.

Intensity VIII in Nevada:

Fallon-Stillwater-Salt Wells areas.

The following was abstracted from a report received from the Bureau of Reclamation, Region 4, Lahontan Basin Area Office, Carson City, Nevada: Damage resulted in many localities of the Newlands Project, ranging from slight cracking in the lining of the Truckee Canal tunnels west of Wadsworth, Nevada, which may or may not have been caused by the earthquake, to extensive damage to the canal and drainage systems of the project, particularly in the Lone Tree and Stillwater areas located approximately 7 miles southwest and 15 miles east, respectively, from Fallon, Nevada. Considerable damage was also inflicted on irrigation and drainage structures on the project, the largest individual structure being the Coleman Diversion Dam located approximately 1 mile northwest of Fallon. This structure failed because of displacement and cracking of the earth-fill abutments of the dam, which in turn permitted water to erode around the structure itself, causing it to partially over-turn, crack and settle. Numerous redwood box-type culverts, partially or completely collapsed. Most of these were located along the drainage channels and at points where roads or irrigation ditches crossed the drains. Longitudinal cracking and sloughing occurred in many places along both drainage channels and irrigation canal banks. In the Lone Tree and Stillwater areas canal banks settled from 1 to 3 feet and at the same time the bottoms of the canals were raised from 1 to 2 feet, and in an extreme case the bottom of a drain ditch was forced up approximately 5 to 6 feet. The electrical system of the Truckee-Carson Irrigation District suffered damage amounting to approximately \$4000. The major portion of this being to the transmission lines. Some connections were broken and displacement of the ground poles has caused excessive sag in some lines that will have to be restrung. The Stillwater

6 July, 03:13:20*. Intensity VIII in Nevada. (cont.)

Wildlife Management area sustained damage to their shops and to the East Side Canal serving some marsh and pasture area. Some private wells and water systems were damaged beyond repair and an undetermined acreage of the ranches in the project area suffered considerable damage due to the heaving action of the shock. In numerous instances large sand boils were formed by the water erupting from the cracks and fissures that appeared in lawns, cultivated farm ground, roads and native brush land. In some localities considerable acreage of farm land will have to be leveled due to the resulting undulating surface of the land. The earthquake damage to project facilities prevented delivery of irrigation water to approximately 80 per cent of the lands under the project. Estimated damage to the project facilities was \$197,295.

Fallen and vicinity:

Lone Tree District (about 7 miles south of Fallen). Press reported a sand channel running northwest-southeast was the center of the hardest hit area of Lone Tree. Beginning at a point some 200 yards from the Ralph Davis home, the canal banks, roadway and fields were cracked, sunk, and upheaved. Water from the canal splashed almost as high as the telephone poles and geysers spouted from fields. The Davis home suffered no damage, however, although a few flower pots in their greenhouse were broken. Cattle in the pasture stampeded and tore through fences into fields. Many fences were pushed out of line, some stretching very taut while others sagged. The canal was full to capacity when the shock occurred and water poured over the north bank into the Elmer Williams Ranch. The E. A. Sorenson Ranch was damaged to the extent of several thousand dollars. At this place new wells had to be dug and the entire water system repaired and reinstalled. One corner of their modern 1-1/2 story house settled several inches and the basement was badly cracked and partially flooded. In addition, the doors were jammed, the front porch jarred loose, and the lawn damaged by silt from water spouts. A drain ditch along the driveway was upheaved until its bottom came almost level with its banks. The Vernon Austins and Dennis Sorensens suffered considerable damage, although it was much exaggerated in some reports. Wells and pressure systems at both places were out of commission. Austin's well, the casing of which was heaved a foot above the surface, must be replaced. Although the 4-inch concrete floor at their place bulged and cracked, contents on shelves were undamaged. The house was undamaged. A bad crack in the Sorenson's grade-A barn will take considerable patching and a new brick garage settled in one corner. Fields on the Dick Bass Ranch were covered with 6 inches of water. Canals, fences, and take-outs were put out of line in many places and probably much land will have to be leveled. According to the School Board a new well will be needed at the school. The building itself has shifted on its foundation and several bad cracks have appeared. It is thought the school cesspool may be damaged. Adobe wall on the Clevenger Ranch toppled. Across U. S. Highway 95, to the east, the shock rocked the S. M. Taylor home, destroying the fireplace chimney. The "AA" canal sustained damage, water being splashed

6 July, 03:13:20*. Intensity IX in Nevada. (cont.)

practically continuous line of cracks in the Lahontan Lake Bed material for about 6 miles along the eastern edge of Rainbow Mountain in the Stillwater Range of mountains. Strike of the cracks was north and slightly east from a point near U. S. Highway 50. Relative movement was mountain side up, valley side down. Scarps from a fraction of an inch to a foot or more were observed and in places there were small grabens. Little or no horizontal movement was evident. North of Rainbow Mountain the cracking continued as an intermittent zone to beyond Stillwater Point reservoir. Southeast of Rainbow Mountain there were many small northeast trending cracks on the surface of Eight and Four Mile flats and some craterlets were found. At the time of the 14:07:41* shock on 6 July a northeast trending rupture of the graben type broke U. S. Highway 50 at a point about 5 miles southeast of Salt Wells. Additional small movements of the cracks along Rainbow Mountain were observed subsequent to aftershocks. In the second category there were many cracks and areas of settlement along ditches, in fields, and on roads in the agricultural lands south and west of Fallon.

Intensity VIII in Nevada:

Fallon-Stillwater-Salt Wells areas.

The following was abstracted from a report received from the Bureau of Reclamation, Region 4, Lahontan Basin Area Office, Carson City, Nevada: Damage resulted in many localities of the Newlands Project, ranging from slight cracking in the lining of the Truckee Canal tunnels west of Wadsworth, Nevada, which may or may not have been caused by the earthquake, to extensive damage to the canal and drainage systems of the project, particularly in the Lone Tree and Stillwater areas located approximately 7 miles southwest and 15 miles east, respectively, from Fallon, Nevada. Considerable damage was also inflicted on irrigation and drainage structures on the project, the largest individual structure being the Coleman Diversion Dam located approximately 1 mile northwest of Fallon. This structure failed because of displacement and cracking of the earth-fill abutments of the dam, which in turn permitted water to erode around the structure itself, causing it to partially over-turn, crack and settle. Numerous redwood box-type culverts, partially or completely collapsed. Most of these were located along the drainage channels and at points where roads or irrigation ditches crossed the drains. Longitudinal cracking and sleuthing occurred in many places along both drainage channels and irrigation canal banks. In the Lone Tree and Stillwater areas canal banks settled from 1 to 3 feet and at the same time the bottoms of the canals were raised from 1 to 2 feet, and in an extreme case the bottom of a drain ditch was forced up approximately 5 to 6 feet. The electrical system of the Truckee-Carson Irrigation District suffered damage amounting to approximately \$4000. The major portion of this being to the transmission lines. Some connections were broken and displacement of the ground poles has caused excessive sag in some lines that will have to be restrung. The Stillwater

6 July, 03:13:20*. Intensity VIII in Nevada. (cont.)

Wildlife Management area sustained damage to their shops and to the East Side Canal serving some marsh and pasture area. Some private wells and water systems were damaged beyond repair and an undetermined acreage of the ranches in the project area suffered considerable damage due to the heaving action of the shock. In numerous instances large sand boils were formed by the water erupting from the cracks and fissures that appeared in lawns, cultivated farm ground, roads and native brush land. In some localities considerable acreage of farm land will have to be leveled due to the resulting undulating surface of the land. The earthquake damage to project facilities prevented delivery of irrigation water to approximately 80 per cent of the lands under the project. Estimated damage to the project facilities was \$197,295.

Fallen and vicinity:

Lone Tree District (about 7 miles south of Fallen). Press reported a sand channel running northwest-southeast was the center of the hardest hit area of Lone Tree. Beginning at a point some 200 yards from the Ralph Davis home, the canal banks, roadway and fields were cracked, sunk, and upheaved. Water from the canal splashed almost as high as the telephone poles and geysers spouted from fields. The Davis home suffered no damage, however, although a few flower pots in their greenhouse were broken. Cattle in the pasture stampeded and tore through fences into fields. Many fences were pushed out of line, some stretching very taut while others sagged. The canal was full to capacity when the shock occurred and water poured over the north bank into the Elmer Williams Ranch. The E. A. Sorenson Ranch was damaged to the extent of several thousand dollars. At this place new wells had to be dug and the entire water system repaired and reinstalled. One corner of their modern 1-1/2 story house settled several inches and the basement was badly cracked and partially flooded. In addition, the doors were jammed, the front perch jarred loose, and the lawn damaged by silt from water spouts. A drain ditch along the driveway was upheaved until its bottom came almost level with its banks. The Vernon Austins and Dennis Sorensens suffered considerable damage, although it was much exaggerated in some reports. Wells and pressure systems at both places were out of commission. Austin's well, the casing of which was heaved a foot above the surface, must be replaced. Although the 4-inch concrete floor at their place bulged and cracked, contents on shelves were undamaged. The house was undamaged. A bad crack in the Sorenson's grade-A barn will take considerable patching and a new brick garage settled in one corner. Fields on the Dick Bass Ranch were covered with 6 inches of water. Canals, fences, and take-outs were put out of line in many places and probably much land will have to be leveled. According to the School Board a new well will be needed at the school. The building itself has shifted on its foundation and several bad cracks have appeared. It is thought the school cesspool may be damaged. Adobe wall on the Clevenger Ranch toppled. Across U. S. Highway 95, to the east, the shock rocked the S. M. Taylor home, destroying the fireplace chimney. The "AA" canal sustained damage, water being splashed

6 July, 03:13:20*. Intensity VIII in Nevada. (cont.)

4 feet over the banks and flooding the road. A huge, jagged crack appeared in the Taylor corral from which water and sand geysered. The entire center section of the corral sunk several inches and water ran into the adjacent fields. Several ditch banks and roadways on the ranch were cracked and broken. Bud Barney, whose ranch lies just south of the air base, reported a severe shock. Water in the metal stock troughs was forced over the sides nearly emptying them although the water depth had been about 24 inches. An adjacent road was badly flooded when water was splashed out of the canal and over the banks. Cracks in fields and water spout evidence was seen at the Warren and Frank Miller ranches.

Lone Tree District (Dennis Sorenson Ranch). Ground ruptured and lurched toward canal, causing canal to partially close up. Alfalfa field subsided. Sand volcanoes formed. Silt volcanoes formed on the front lawn of the elder Sorenson Ranch and serious damage occurred to the wood frame house.

Lone Tree District (Frey Ranch, W $\frac{1}{2}$, Sec. 5, T17N, R29E). East-west fence on south side of drain ditch shifted north.

Naval Auxiliary Air Station (about 5 miles southeast of Fallon).

The following was abstracted from a report received from the Commanding Officer: Boiler House: Building foundation cracked and subsided approximately 1 inch; boiler brickwork cracked; two fire boxes required replacement. Pumphouse foundation subsided approximately 8 inches, causing cracks; broken water main and other miscellaneous damage. Two high-line power poles leaned to a dangerous point. Two flocculation tanks put out of commission due to separators being shaken out of place. Main reservoir roof damaged, requiring extensive repairs. Entire water system required extensive purging and removal of debris prior to restoration of normal water supply. Incinerator building collapsed and was a complete loss. Water line leaks and breaks. Electrical distribution system repairs. Electrical short circuits in vacuum tubes and minor repairs to UHF primary and guard receivers. Ordnance inert building cracked at point where deck and bulkhead meet. Building settled causing overlap of $\frac{1}{8}$ inch to $\frac{1}{4}$ inch on doors. Numerous cracks appeared in building located at Gas Farm No. 2. Injuries to personnel were limited to minor lacerations, contusions and abrasions with the exception of an ankle joint fracture sustained by one man. Pending disclosure of further undetected damage, the total earthquake damage sustained is approximated at \$6464.

Harmon District (about 6 miles east of Fallon). Press reported there were large cracks in the highway and desert nearby. Large cracks appeared in the road leading toward the Alex Baumann place. The chimney at the large Ralph Johnson home was badly cracked and the adobe home of Charles Cress was so badly damaged that it cannot be lived in. The schoolhouse, as far as could be determined, was not damaged. Broken dishes and other articles were generally reported. Numerous cracks and dips appeared in the paved Stillwater road (State 42) about 6 miles east of Fallon, one place settling 12-18 inches. Shocks were still being felt in Harmon on Tuesday and Wednesday. Many people in the district saw the huge cloud of dust arising in the hills beyond Salt Wells during the Tuesday afternoon shock.

6 July, 03:13:20*. Intensity VIII in Nevada. (cont.)

Sageuspe Dam (about 5 miles northeast of Fallon). Press reported the dam settled about 1 foot, but was not seriously damaged.

Union District (about 5 miles south of Fallon). Press reported U. S. Highway 50 sunk to a depth of 18 inches for 200 feet, near a point called "Deadman's Curve." The chimney of the Union District building was wrecked, the roof covered with a mass of rubble. Water from the canal near the Leo Bergin Ranch was reported to have sloshed out 6 feet on both sides of the banks.

Fallon. VII. Press reported few structures in the business district escaped damage, some limited to loosened bricks, small cracks and fallen plaster, others to entire loss. The city engineer said repeated inspections have disclosed damage not at first evident. Succeeding tremors have opened up wider cracks and damaged walls below the roof levels. Four businesses have been vacated where weakened walls have been declared a hazard. These are the Sportcenter liquor store in the old Williams Estate building of stone construction, built 50 years ago, another the Esquire Club, under the same roof. This building was condemned to the top of the first floor. The Overland Hotel is the third business that was closed: walls were torn down to the top of the first floor. The Allen Hotel, shattered by the shock, was vacated immediately. The entire front wall was torn down to the foundation and side walls to the top of the first floor. The Fallon Mercantile building received major damage: 2 pilasters cracked; top walls and cornices torn down. The Fallon Fraternal Hall required extensive repairs. All of the east wall supporting the dance hall and the two adjoining corners may have to be torn down to the foundation. The top part of the front is being rebuilt. A new front to the upper part of the old Churchill County Bank building has replaced the broken stone masonry. Parts of the upper side walls were damaged. The front half of the old Fallon Meat Market was razed to the ground. The south half of the Chapman building has been completely restored. This is the building housing the Glad Shop, roof of which was caved in when the wall of the 2-story Bank Club toppled. Upper half of the Bank Club was condemned. The concrete-block Palace Club required extensive repairs to the upper walls. Others requiring replacement of the fire walls on down to the ceiling joists and horizontal strengthening are Neil Farrell's building, housing the Western Auto Supply, and the Fallon Standard building. Main Street structure, housing the Star Club and Eddie's Barbecue, had walls braced to keep them from falling. Two churches of concrete-block are not being used: the Baptist and the Christian Science. The city engineer reported these churches may have to be rebuilt. Several other business buildings required minor repairs. The greater number used for business escaped damage other than cracked plaster. School buildings had only slight damage, except the West End School, which had buckled concrete floors. The 2-story brick building containing the Sagebrush Club developed damage requiring more than minor repairs. A similar situation is seen in the 2-story brick Owl Club building. Several pumice-block structures erected in recent years escaped with only minor or no damage. They had both vertical and horizontal reinforcement. The city engineer reported about 30 inspections were completed to August

6 July, 03:13:20*. Intensity VIII in Nevada. (cont.)

21, with some damage apparent in every case, and 15 more were yet to be inspected. Some of the buildings first checked must be reinspected, due to the continuing shocks. It was reported about 20 chimneys were damaged. Damage to the majority of homes in Fallon was slight. The most severely damaged was a 2-story concrete-block dwelling on Williams Avenue. The house was severely cracked and portions will have to be rebuilt. Water heater in one home was twisted loose from its connections, and a gas stove in another home was ripped loose from its connections and shoved into the center of the floor. Breakage of dishes, figurines, etc., constituted the major portion of damage to other dwellings, while some home owners reported nothing out of place despite the severity of the shock. Liquors and glassware stocks sustained damage in several downtown buildings.

Fallon (central section). VII. Motion hard, jarring and twisting, abrupt onset. Rattling of loose objects and creaking of buildings heard by all. Subterranean sounds like a flight of jet bombers heard by many before and at beginning of shock. "There was so much noise from falling books, breaking dishes, crashing lamps, etc., I could not have heard a bell ring." Ground billowed and heaved like the ocean. Objects fell in all directions. Water slopped out of toilet bowl. General alarm from this shock and from continuing shocks. Ground: Sand and clay of old lake bottom.

Fallon (235 West Stillwater Ave.). VII. Motion rapid, lasted 2 minutes. Felt by all in home and community; frightened many. Rattled windows, doors, and dishes; walls creaked. Hanging objects, doors, etc., swung N-S. Trees, bushes shaken strongly. Shifted small objects, furnishings; overturned vases, etc., small objects, and furniture. Cracked plaster, windows, walls, chimneys, and ground. Knickknacks, books, pictures, and plaster fell. Broke dishes, windows, and furniture. Ground: Soil, level.

Fallon. VII. Felt by all and frightened many in community. Direction E-W. Rattled windows, doors, and dishes; walls creaked. Shifted small objects. Damage considerable. "I was driving south within the city of Fallon. I noticed the car had a motion as if the wheels were in a crooked rut. The motion of the shock was E-W most of the time." Ground: Soil.

Fallon. VII. Motion circular, lasted 30 seconds. Felt by, awakened, and frightened all in community. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken strongly. Shifted some small objects and furnishings; overturned some vases, etc., small objects, and furniture. Cracked plaster, windows, walls, chimneys, and ground. Knickknacks, books, pictures, plaster fell. Broke dishes, windows, and furniture. Ground: Sandy.

Fallon. VII. Motion rapid, lasted 1-2 minutes. Felt by, awakened, and frightened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects, doors, etc., swung. Pendulum clocks stopped. Shifted small objects and furnishings; overturned vases, etc., small objects, and furniture. Cracked plaster, windows, walls, chimneys, and ground. Knickknacks, books, pictures, plaster fell. Broke dishes. Damage considerable to brick and masonry. Ground: Marshy, level.

Fallon (390 West Virginia St.). VI. Motion rapid, lasted 1-2 minutes. Felt by and awakened all in community. Direction W-E. Rattled

6 July, 03:13:20*. Intensity VIII in Nevada. (cont.)

windows, doors, and dishes; house creaked. Hanging objects, doors, etc., swung. Trees, bushes shaken moderately. Shifted and overturned small objects. Cracked plaster slightly. Knickknacks fell. Ground: Sand fill.

Fallon (645 South Esmeralda). VI. Few fruit jars fell from shelves and broke. Shook silver chest off refrigerator. Vases overturned.

Fallon (about 2½ miles west of). VII. Forty-foot break in canal bank. (Probably delayed result of main shock.)

Fallon (about 3 miles south of, on west side of U. S. Highway 50). VII. Old weather-worn adobe building cracked. Adobe contained considerable straw.

Fallon (about 2 miles west of). VII. Motion both rapid and slow, lasted over 2 minutes. Felt by and awakened all in community; frightened many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N-S. Trees, bushes shaken strongly. Shifted small objects, furnishings; overturned vases, etc., small objects. Cracks plaster, windows, walls, chimneys, and ground. Knickknacks, books, pictures, plaster fell. Broke dishes and windows. Damage considerable to wood, brick, masonry, and concrete. "The shock was so severe I was unable to stand during the first part. First part was very rapid vibration, followed by N-S shifting movement that gradually slowed down to a stop. All shocks felt at my home have been a N-S shifting movement." Ground: Old Lake bed.

Fallon (about 1 mile northwest of the northwest corner of the Naval Air Station). VI. Shook house so violently observer thought it would collapse. Moved furniture about quite freely. Broke dishes, etc. Noises sounded like a freight train traveling at very high speed.

Fallon (about 1 mile northwest of bridge across Carson River (U. S. Highway 50). VI. "An awful roar followed by shock. Shock hit with a ripping sound of the house and we started to roll from N-S and up and down, then bed swayed E-W. I nearly rolled out of bed several times before my husband held my arm. The wind woke him. It scared me so much I couldn't move. Strange as it seems not a thing was out of place even to the alarm clock on the refrigerator. Lots of small cracks in the stuccoed walls. As soon as the shock was over the dense air moved out and the wind rushed in like being blown through a tunnel, but it didn't last long."

Fallon (about 5 miles northeast of Lahontan Dam). VI. Motion rapid, lasted 2 minutes. Direction E-W. Awakened all and frightened many in community. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Shifted furnishings; overturned small objects. Ground: Compact, level.

Fallon (Kaiser Aluminum & Chemical Plant, west bank of the Carson River, about 1½ miles west of Fallon). VI. No damage to all-steel constructed plant, but structure swayed considerably.

Stillwater and vicinity:

The press reported a dozen or more homes were damaged in the ranching areas. Chimneys toppled. In addition to considerable building damage in this area, some freak floods were reported in cases where cracks opened in the earth and water surged up.

6 July, 03:13:20*. Intensity VIII in Nevada. (cont.)

On the Gilbert Testolin Ranch cracks allowed water to flood to adjoining fields to a depth of several inches; road sunk to a depth of several inches leaving a wavy surface. On the Charles Kent Ranch there was a fissure 5 feet deep and 10 feet long. A water tank was toppled and chicken house twisted on foundation. Old river channel sank 4 feet. One old adobe house, a Stillwater land mark, was shaken down almost completely. The Martin Dodge home was reported damaged considerably. Stillwater flume collapsed. Officials said that the ground shifted under supports of the 150-foot flume, which will have to be replaced. Break in the "S" canal near Stillwater. There were rolls in the pavement on secondary roads near Stillwater. At the Hammie Kent Ranch sections of fields were raised and in other places dropped. Extensive re-leveling necessary. Artesian hot water wells in use in Stillwater were cut and a new one sprung up. Bridge badly damaged near the Osgood home in Stillwater. A woman in the area reported she had felt 21 earthquakes to July 8. At the Indian Reservation (about 4 miles west of Stillwater) ditches were twisted and portions of them raised or sunken, while structures were pushed upward.

Stillwater (Hammie Kent Ranch). Extensive ground breakage. Crack across south levee of creek about 200 feet southeast of ranch house. Cracks also paralleled creek bank on south side. Sand volcanoes formed and ground sloughed considerably. All but 6 inches of water slopped out of large water trough. Overturned haystack. Old one-room schoolhouse (wood and adobe) wrecked.

Stillwater (about $1\frac{1}{2}$ miles west of, near Stillwater School). State Highway 42 damaged. In the same locality mud boils formed in field.

Stillwater Point (east of Stillwater). Landslide covering many acres occurred on the steep western face of Stillwater Point. Many small earth slides occurred in the southern part of the Stillwater Range to the east and several small earth slides occurred on the steep eastern slopes of Rainbow Mountain.

Stillwater (about 2 miles east of, Wildlife Management Area Headquarters). Press reported the fish and wildlife shop and equipment yard located immediately over the fault which runs along the foothills, took a terrific pounding, but the metal structure was not damaged, nor was the heavily reinforced-concrete foundation. Every piece of equipment that could be torn loose inside the building, however, was turned over or dumped into one huge pile on the floor. Even pieces of equipment weighing thousands of pounds were knocked down or moved about. The floor was strewn with tires, tubes, nuts, bolts, tools, etc. which had been tossed from wall racks and bins. Cracks in the roadway near the shop 2 to 3 feet wide were reported and the equipment yard itself looked somewhat like a spider web with smaller cracks extending in all directions. The project's east canal was severely damaged for about 2 miles while 200 yards was almost completely filled in and clogged. A dragline was immediately pressed into service on the canal but a later shock wrenched and broke the track completely off the machine as the operator was at work. Concrete water structures showed no apparent damage.

Stillwater (northeast of). Water slopped out of large water troughs to distances of several feet.

6 July, 03:13:20*. Intensity VIII in Nevada. (cont.)

Stillwater (about 10 miles northeast of, in the Stillwater Range).

"A good many cracks were seen near the top of Table Mountain and north into Long Canyon. On the east side of the mountains in Dixie Valley there is a long crack at the foot of the mountains." (This report was received from Mrs. C. E. Kent of Stillwater, Nevada on September 28, and was reported to her by line riders. It is not known definitely which of the shocks caused the cracks.)

Stillwater (about 20 miles northeast of, north end of Dixie Valley).

Ground cracks reported. (Same source as preceding report.)

Stillwater (SE $\frac{1}{4}$, Sec. 7, T19N, R31E). VII. Old adobe-walled building partially collapsed. Across road from this location stock was thrown from shelves in store but oil drums remained in place, and the frame building was undamaged.

Salt Wells and vicinity:

Press reported a bar, restaurant and service station building at Salt Wells was shaken loose from its foundation and considerable stock destroyed. Yard paving, and ceiling of dance hall were cracked; the bar moved several inches. An 800-gallon water tank and supporting tower moved several inches. It was reported a well, 58 feet deep, with water level originally at 33 feet before shock was lowered to 28 feet. Water is less salty, tastes sulfurous, and smells like iodine. Ben Mathews reported his building had been twisted from its foundation, and that bottles and other articles in the building were broken.

Salt Wells (about 1 mile southeast of, on north side of U. S. Highway 50). Mole track.

Salt Wells (about 5 miles southeast of, on north side of U. S. Highway 50). NE-SW trending rupture zone. U. S. Highway settled at this point during the afternoon shock at 2:08.

Salt Wells (north edge of Salt Flat, 1 mile north of U. S. Highway 50 in Sec. 31, T17N, R32E). Crust of dry lake checked. In this same general location ground cracks occurred, also about 150 feet south of U. S. Highway 50. On the north edge of the dry lake about 50 geyserlets were seen.

Intensity VII: Nevada

Dixie Valley (about 25 miles northeast of Stillwater). Motion rapid, then slow. Felt by all in home and community; awakened all in home and frightened children in home. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Shifted and overturned small objects, books. Cracked plaster; small ground cracks. "The first big shock awakened all my children and I ran to the bedrooms to put them in my bed to quiet them. It was like walking on the deck of a ship in very bad weather. The doors between the rooms were swinging and pictures all swung. Horses stampeded, chickens made noise, and dog was very frightened." Ground: Compact, soil, level.

Intensity VI: Nevada

Austin. Motion rapid, lasted 1½ minutes. Felt by and awakened all in community; frightened few. Everything in house rattled; entire house creaked. Hanging objects swung. Trees, bushes shaken strongly. Shifted small objects and furnishings. "Felt very strongly here. Several lighter aftershocks felt." Ground: Rocky, steep.

6 July, 03:13:20*. Intensity VI in Nevada. (cont.)

Austin (6 miles north of). Motion rapid, lasted several seconds. Felt by all, awakened and frightened many in community. Rattled windows and blinds; frame creaked. Hanging objects swung. Shifted small objects and furnishings. Canned goods fell. A dresser facing south moved south about 1 inch. "Several more slight tremors felt on July 6. The two most severe tremors were preceded by a loud rear but no rear preceded smaller shakes." Ground: Marshy, level.

Austin (18 miles east of, Givens Ranch). Motion slow, lasted about 1 minute. Direction NE. Felt by and awakened all in home. Rattled windows. Hanging objects swung NE. Shifted small objects and furnishings. Knickknacks fell. Ground: Soil, sloping.

Carson City. Motion slow, lasted 45 seconds. Felt by and frightened all in community; awakened many. Direction N-S. Rattled windows and dishes; walls creaked. Hanging objects swung. Pendulum clocks facing east stopped. Shifted small objects. Plaster cracked and fell. Damage slight. Ground: Compact.

Carson City. Press reported the Capitol building had minor amount of plaster or loosened paint on floor. People ran from homes.

Carson City (northeast section). V. Motion swaying, N-S, gradual onset. Felt by nearly all; few alarmed. Creaking of buildings heard by nearly all.

Dayton. Motion slow, lasted about 2 minutes. Direction N-S. Felt by, awakened, and frightened all in community. Rattled windows and doors; frame creaked. Hanging objects swung. Ground: Soil, level.

East Walker River Ranch. (Report postmarked Yerington) Motion rapid, long duration. Awakened all and frightened few in home. Direction W-E. Rattled windows, doors, and dishes. Pendulum clock facing east stopped. Shifted and overturned small objects and furnishings. Ground: Rocky, sloping.

Eureka. Motion rolling, lasted several seconds. Direction E-W. Felt by all in community; awakened and frightened many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Pendulum clocks stopped. Shifted furnishings. Cracked plaster and walls. Books fell. Damage slight. "Most severe shock felt in this district for as long as most people can remember. Several weaker shocks since."

Eureka. Motion rolling, E-W. Felt by and awakened all in community; frightened many. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Pendulum clocks facing east stopped. Shifted and overturned small objects. Cracked plaster and walls. Damage slight. "Worst shock felt here in years."

Fernley. Motion rapid, lasted about 1 minute. Direction N-S. Felt by and awakened all in community; frightened many. Rattled windows and dishes; frame creaked. Hanging objects swung N-S. Pendulum clocks stopped. Shifted and overturned small objects. Cracked walls. Knickknacks and books fell.

Gabbs. Motion rapid, lasted about 2 minutes. Felt by and awakened all in community; frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Cracked walls. Damage slight.

Gabbs (about 13 miles northwest of, Kaiser Mine). Motion rapid, lasted 1 minute. Felt by and awakened all in community; frightened few. Hanging objects swung. Ground: Fairly compact.

6 July, 03:13:20*. Intensity VI in Nevada. (cont.)

- Gerlach.** Lasted 2 minutes or more. Direction N-S, also E-W. Awakened all and frightened many in community. Rattled windows and doors; walls creaked. Hanging objects swung. Pendulum clock facing SW stopped. Trees, bushes shaken moderately. Shifted furnishings; overturned small objects; knickknacks fell. Damage slight. "Splashed much water out of city water tanks. Broke water line. Broke cars loose and ran them through a switch in the railroad yards. Shook cans off shelves in the store."
- Hasen.** Felt by all. Lasted 15 seconds. Rattled windows, doors, and dishes. Groceries fell off shelves.
- Imlay.** Motion rolling, slow, lasted about $1\frac{1}{2}$ minutes. Direction N-S. Felt by, awakened, and frightened all in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Ground: Compact.
- Levelock.** Motion rapid, lasted nearly 1 minute. Felt by and awakened all in community; frightened few. Direction N-S. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N. Trees shaken moderately. Shifted and overturned small objects. Cracked plaster. Knickknacks fell. Damage slight. Ground: Compact soil.
- Levelock.** Press reported some merchants had damage from falling stock, dishes fell from shelves, and some plaster fell. A truck driver who had parked his big truck off U. S. Highway 40 about 30 miles east of Levelock to take a nap said the shock jerked him awake so abruptly he thought he had gone to sleep while driving.
- Luning.** Motion slow, lasted 15 seconds. Felt by, awakened, and frightened all in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Pendulum clock stopped. Trees, bushes shaken strongly. Shifted and overturned small objects; knickknacks fell. Broke dishes. "This was quite a heavy shock."
- Mason.** Motion rapid, abrupt onset. Direction circular, then E-W. Felt by all; awakened and frightened many. Pendulum clocks facing east-west stopped. Shifted and overturned small objects. Spilled liquids from indoor and outdoor containers in east-west direction. Cracked plaster. Damage slight. Ground: Rocky, soil, loose and compact; level and sloping.
- Mina.** Motion rapid, lasted about $1\frac{1}{2}$ minutes. Felt by and awakened all in community. Direction E-W. Rattled windows, doors, and dishes; house creaked. Hanging objects swung E-W. Shifted small objects and furnishings. Ground: Level.
- Minden.** Motion quite slow, lasted about $1\frac{1}{2}$ minutes. Awakened all in community; frightened few. Rattled windows and doors; house creaked. Hanging objects swung N. Pendulum clock stopped.
- Nixon.** Motion rapid, rolling. Felt by and awakened all in community; frightened few in home. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Ground: Soil.
- Pyramid.** Motion rapid, rotating, lasted 15 seconds. Direction NE. Awakened all in community. Very loud roaring noise heard. Ground: Heavy soil, level.
- Rawhide (Nevada Scheelite Mine).** Motion rapid, lasted 20 seconds. Awakened all and frightened many in community. Rattled windows, doors, and dishes; house creaked. Shifted and overturned some small objects and furnishings; few knickknacks, books, pictures fell. Some dishes broke. Damage slight. Ground: Filled in.
- Reno.** Press reported plaster was cracked in the northwest courtroom on the second floor of the County Courthouse. Felt by many.

6 July, 03:13:20*. Intensity VI in Nevada. (cont.)

- Reno. Motion rapid, long duration. Felt by and awakened many; frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Pendulum clock stopped. Trees, bushes shaken moderately. Cracked plaster. Damage slight. Ground: Soil, compact.
- Reno. V. Motion fairly rapid, lasted about 1 minute. Direction N-S. Felt by and awakened many in community; frightened many in home. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken strongly. Shifted small objects and furnishings slightly; overturned small objects. Ground: Soil, level.
- Reno. V. Motion slow, lasted 30 seconds. Felt by many in community; awakened all in home. Rattled windows, doors, and dishes. Hanging objects swung.
- Reese River. Motion rapid, lasted 1 minute. Felt by many in home; awakened many and frightened few in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Cracked plaster and chimneys. Damage slight. Ground: Compact.
- Schurz. Motion rapid, abrupt onset, lasted about 30 seconds. Direction SE-NW. Felt by and awakened all in community; slightly alarmed. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Shifted small objects and furnishings; overturned dishes. Spilled liquids from indoor and outdoor containers in E-W direction. Knickknacks fell. Trees, bushes shaken moderately. Merchandise on store shelves fell to floor.
- Silverpeak. Motion rapid, long duration. Felt by, awakened, and frightened all. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken strongly. Ground: Level.
- Smith. Motion slow. Felt by many in valley; awakened and frightened many in community. Rattled windows and doors; walls creaked. Hanging objects swung. Trees, bushes shaken moderately. Shifted small objects. Cracked plaster. Few knickknacks fell. Damage slight. Old pendulum clock facing east started. Ground: Level, compact.
- Sparks. Motion slow, rolling, lasted 30 seconds. Felt by and awakened all or many in community. House creaked. Hanging objects swung. Ground: Soil, compact.
- Virginia City. Motion rapid. Felt by, awakened, and frightened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Cracked plaster and walls. Knickknacks fell. Damage slight.
- Wabuska. Motion rapid. Direction NE. Awakened all in community; frightened few. Rattled windows, doors, and dishes; house creaked. Cans fell from store shelves.
- Wadsworth. Motion rapid, long duration. Felt by and awakened all in community; frightened many. Rattled windows and doors; house creaked. Hanging objects swung.
- Wellington. Motion rapid, lasted 1-2 minutes. Felt by and awakened all in community; frightened many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Overturned small objects. Ground: All types.
- Yerington. Motion moderate, lasted about 15 seconds. Felt by and awakened all in community. Considerable rattling of windows, doors, and dishes; house creaked. Shifted small objects and furnishings slightly. Ground: Compact, level.

6 July, 03:13:20*. Intensity VI in Nevada. (cont.)

Yerington (west section). Motion rolling, gradual onset. Felt by nearly all; people abruptly awakened. Rattling of loose objects and creaking of buildings heard by many. Roaring subterranean sounds heard by many before shock. Some objects disturbed. House trailer bounced. Plaster cracked on ceiling of third floor of Masonic Building.

Intensity VI:

Bridgeport. Motion rapid, lasted 1 minute. Felt by, awakened, and frightened all in community. Rattled windows; walls creaked. Trees, bushes shaken strongly.

Cedarville. Motion slow, lasted 1 minute. Awakened all in community. Rattled windows; walls creaked. Hanging objects swung NE-SW. Trees, bushes shaken strongly. Ground: Soil, level.

Coleville. Motion slow, lasted 2 minutes. Direction NE. Felt by, awakened, and frightened all in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NE. Trees, bushes shaken strongly. Ground: Rocky soil.

Deep Springs. Motion rapid, lasted 30 seconds. Direction NE. Awakened many; frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Shifted some small objects and furnishings. Cracked plaster and chimney; twisted chimney. Damage slight. Ground: Rocky and sandy.

Kyburz. Motion rapid, lasted several minutes. Direction SW. Felt by all; awakened and frightened many in community. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken moderately. Shifted small objects and furnishings; knickknacks fell. Ground: Rocky soil, compact, level.

Meyers. Motion rapid, lasted about 1 minute. Direction E-W. Awakened all in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung E-W. "I have lived here 11 years. This was the strongest we have felt." Ground: Soil.

Yosemite National Park. Motion rolling, lasted 40 seconds. Direction E-W. Felt by and awakened all in community; frightened many. Rattled windows, doors, and dishes. Hanging objects swung. Pendulum clocks stopped. Shifted furnishings; overturned small objects. Ground: Rocky.

Yosemite National Park. Motion slow, lasted 2 minutes. Direction E-W. Felt by all and awakened many in community; frightened many in home, few in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung E-W. Trees, bushes shaken slightly. Shifted small objects; knickknacks fell. Ground: Compact, level; lake bed.

Intensity V: Nevada

Battle Mountain. Motion slow, lasted about 2 minutes. Awakened and frightened all in home. Rattled windows; house creaked. Pendulum clock stopped. Ground: Compact.

Beowawe. Motion slow. Felt by many in community, all in home. Most everyone awakened by shaking of beds.

Carlin. Motion rapid, lasted about 30 seconds. Awakened many in community. Rattled windows, doors, and dishes. Hanging objects swung. Ground: Compact.

6 July, 03:13:20*. Intensity V in Nevada. (cont.)

- Coaldale.** Motion rapid, lasted 1 minute. Rumble heard. Awakened and frightened few in community. Rattled windows. Pendulum clock stopped. Ground: Soil.
- Crystal Bay.** Motion slow, lasted 1 minute. Awakened all; frightened few. Rattled windows; walls creaked. Hanging objects swung. Shifted small objects and furnishings. Ground: Soil.
- Dyer.** Motion slow, then rapid, then slow, lasted about 1 minute. Felt by, awakened, and frightened many in community. Direction E-W. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N. Shifted small objects. Ground: Level.
- Fish Lake Valley (Dyer).** Motion rocking, gradual onset. Felt by many. Rattling of loose objects and creaking of buildings heard by many. Roaring subterranean sounds heard by several before shock. Disturbed objects observed by several. Some reported cracks in plaster over seams in plasterboard in ceiling. Chains on bedroom windows swung E-W and made clicking sound against window frames. Coyotes howled, dogs barked, and chickens fell from roosts. Ground: Sandy loam.
- Glenbrook.** Felt by all and awakened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung.
- Golconda.** Motion slow. Felt by many all around the area; awakened and frightened many in community. Rattled windows and doors. Shifted small objects. Ground: Soil, compact.
- Goldfield.** Motion slow, then rolling, lasted about 1 minute. Felt by, awakened, and frightened many in community (some outdoors). Rattled windows, doors, and dishes; house creaked. Pendulum clock stopped. Damage none or slight. Ground: Rocky, compact.
- Goldpoint.** "Only one person felt the shock. He said he was awakened and almost thrown out of bed."
- Hawthorne.** Motion slow, lasted about 30 seconds. Felt by all and frightened many in community. Rattled windows; frame creaked. Hanging objects swung. "Although very strong the shock seemed to have a rolling motion, rather than the hard shaking effect of the strong shocks of 1932 and 1934 in this area." Ground: Soil, compact, level.
- Hawthorne (Naval Ammunition Depot).** Motion rapid, lasted about 2 minutes. Felt by and awakened many in community (some outdoors); frightened few in home. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken slightly. Ground: Soil, compact, level.
- Hiko.** Motion slow, lasted 10 seconds. Direction E-W. Awakened many in community. Frame creaked. Ground: Soil, level.
- J. D. Ranch (about 30 miles southwest of Palisade).** Motion slow, long duration. Awakened all in home; frightened all in community. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Ground: Soil.
- Jiggs.** Motion rapid, lasted 10 seconds. Awakened all in home. Rattled windows and doors; house creaked. Hanging objects swung.
- Millett Ranch (about 36 miles south of Austin).** Motion rapid, lasted 30 seconds. Direction E-W. Felt by and awakened all in home, frightened few. Rattled windows; house creaked. Pendulum clock facing north stopped. Trees, bushes shaken moderately. Ground: Compact, level.

6 July, 03:13:20*. Intensity V in Nevada. (cont.)

- Oroveda. Motion slow, lasted several minutes. Felt by many all over valley; awakened many in home and community. Rattled windows. Hanging objects swung. Ground: Rocky, compact.
- Palisade. Motion rapid. Felt by and awakened many in community (some outdoors); frightened few. Rattled windows and dishes. Trees, bushes shaken slightly. Direction NE. Ground: Rocky, compact, level.
- Paradise Valley. Motion slow, lasted few seconds. Felt by and awakened many in community; frightened few. Rattled windows.
- Steamboat Springs. Motion rapid, lasted 30 seconds. Felt by and awakened many in community; frightened few. Rattled windows, doors, and dishes. Hanging objects swung.
- Tonkin Ranch (about 40 miles southwest of Palisade). Motion rapid, lasted $1\frac{1}{2}$ minutes. Direction SW-NE. Felt by, awakened, and frightened all in home. Rattled windows and doors. Hanging objects swung. "Shook poultry from perches 17 miles southwest of here at the Santa Fe Ranch." Ground: Level, soil.
- Tonopah. Motion slow, lasted 10 seconds. Felt by, awakened, and frightened many. Rattled windows, doors, and dishes. Trees, bushes shaken slightly. Ground: Compact.
- Tonopah. Motion slow, direction NE-SW. Felt by and awakened many in community. Rattled windows; walls creaked in one old stone building. Ground: Rocky.
- Valmy. Motion slow, with a sort of rolling and twisting effect. Rumble heard. Awakened and frightened many in community. Rattled windows, doors, and dishes; house creaked. Cracked window. Trees, bushes shaken moderately. Ground: Compact.
- Verdi. Motion rolling, long duration. Direction E-W. Felt by and awakened many in community. House creaked. Hanging objects swung.

Intensity V:

- Applegate. Motion rapid, lasted 15 seconds. Felt by and awakened many in community. Rattled windows; house creaked. One chimney reported cracked. "Found one person who was awake at time of shock. Claims frame house and bird cage swayed." Ground: Rocky, level and sloping.
- Benton. Motion rolling, lasted 1-2 minutes. Direction N-S. Awakened many in home and community; frightened few. Rattled windows and doors. Hanging objects swung. Ground: Sandy.
- Benton Inspection Station (Benton). Motion slow, lasted 30 seconds. Direction N-S. Awakened many in community; felt by observer at work. Frame creaked. Hanging doors swung N. Ground: Soil, compact, level.
- Bigpine Power Plant (Bigpine). Motion slow, lasted 25 seconds. Felt by all at power plant. "Moderate intensity. Felt like a circular motion. Chains on crane in plant swung for 10 minutes after shock. Chains about 12 feet long and swung in about a 4-inch circle." Ground: Rocky soil, compact, sloping.
- Bigpine. IV. Felt by several in home. Rattled windows, doors, and dishes; house creaked. Hanging objects swung.
- Bishop. Motion rapid, then slow, long duration. Direction N-S. Felt by all in community; awakened and startled many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Shifted small furnishings. Ground: Glacial till; level.

6 July, 03:13:20*. Intensity V. (cont.)

Camp Connell. Motion rapid. Direction NW-SE. Awakened many and frightened few in community; felt by some outdoors. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung N. Trees, bushes shaken slightly. Shifted small objects; knickknacks fell. Ground: Compact.

Caruthers. Motion slow, lasted a few seconds. Direction NW. Felt by all in community; awakened many; frightened few. Slight rattling of windows, doors, and dishes; house creaked some. Hanging objects swung NW. "Shook so smoothly it broke nothing and frightened very few." Ground: Sandy, level.

Chilcoot. Motion rapid. Awakened many in community; frightened few. Direction E-W. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Overturned vases. Ground: Compact.

Colfax. Awakened many in community. Rattled windows. Shifted small objects.

Courtland. Motion rapid, lasted 1 minute. Awakened many and frightened few in community; felt by some outdoors. Hanging objects swung. Trees, bushes shaken slightly. Ground: Loose, level.

Doyle. Motion slow, lasted 30 seconds. Felt by and awakened many in community; frightened few. Rattled windows, doors, and dishes. Hanging objects swung. Shifted small objects. Ground: Loose, level.

Doyle. III. Motion rocking. Felt by several. "Several shocks felt."

El Portal. Motion slow, lasted a few seconds. Felt by all and awakened and frightened many in community. House creaked. Ground: Rocky, level.

Floriston. Motion slow. Felt by and awakened many in community; frightened few. Rattled windows, doors, and dishes. Caused water faucet to turn in kitchen of one house. Ground: Rocky.

Foresthill. Motion rapid, lasted about 1½ minutes. Felt by and awakened many in community; frightened few; felt by some outdoors. Direction NE. Rattled windows, doors, and dishes; house creaked. Shifted small objects. Trees, bushes shaken slightly. Ground: Rocky soil.

Galt. Motion slow, lasted a few seconds. Awakened many in community. Rattled windows; walls creaked. Pendulum clock stopped. Ground: Compact.

Herlong. Press reported a very strong shock was felt. Stopped some electric clocks. Man said his bed felt like it was on a roller coaster.

Huntington Lake. Motion rapid, lasted 10 seconds. Direction E. Awakened all in home. Ground: Rocky.

Jackson. Motion slow, rolling, lasted a few seconds. Direction E-W. Felt by and awakened many; frightened few. Roaring sound heard by some. Ground: Rocky, level.

Jackson (Tiger Creek Powerhouse). Motion rocking, abrupt onset. Felt by many. Disturbed objects observed by many. Beds swayed. Ground: Rocky.

Jackson (Electra Powerhouse, on bank of Mokelumne River). IV. Motion swaying N-S, gradual onset. Felt by three people. Creaking of wooden building heard by two people. Very few people disturbed. "About five shocks felt, lasting five seconds each." Ground: Rocky.

June Lake. Motion rapid, lasted 10 seconds. Awakened many in community; frightened few.

6 July, 03:13:20*. Intensity V. (cont.)

Kings Canyon National Park. Motion slow, lasted a few seconds. Direction up and down. Awakened all in home. Ground: Rocky.

Lake Alpine. Motion rapid, lasted about 1 minute. Felt by all in community; awakened many. Rattled windows and doors. Ground: Rocky.

La Porte. Felt by and awakened many. Rattled windows, doors, and dishes. Ground: Soil, compact.

Laws. Long rumble, then slow motion, very abrupt, lasted several seconds. Direction E-W. Felt by and awakened many. Rattled windows, doors, and dishes; house creaked. Windows rattled for some time after shock was over. Hanging objects swung. "Very severe shock." Ground: Compact.

Le Grand. Felt by and awakened many in community. House creaked. Small shock felt just before main one. Ground: Soil, compact, level.

Lodi (central section). Motion awaying. Felt by many. Rattling of loose objects and creaking of buildings heard by many. Moderately loud cracking and bumping subterranean sounds heard by many at time of shock, and resembled sounds made by a jet plane or a fast moving freight train. Several pendulum clocks hanging on E-W walls stopped. Ground: Made.

Lone Pine. Motion slow, lasted 1 minute. Direction N. Felt by and awakened many in community. Rattled windows, doors, and dishes. Ground: Soil.

Lone Pine. IV. Motion slow, lasted 15 seconds. Direction N-S. Felt by many and awakened few in community. House creaked. Trees, bushes shaken slightly.

Long Valley Dam (about 20 miles northwesterly from Bishop). Motion slow, rolling, lasted 20 seconds. Felt by and awakened all in home. Rattled windows, doors, and dishes; house creaked. Ground: Rocky, sloping.

Mammoth Lakes. Motion slow, lasted 2 minutes. Awakened many in community. Rattled windows, doors, and dishes; house creaked. Ground: Soil.

Markleeville. Motion slow, rolling, lasted about 15 seconds. Felt by and awakened many. Rattled windows, doors, and dishes; house creaked.

Meeks Bay. Motion rolling. Felt by and awakened all in home, many in community; frightened few. Rattled windows, doors, and dishes. Ground: Compact, level.

Merced. Motion rapid, lasted 30 seconds. Direction NE. Awakened all and frightened few in home. Rattled windows and doors; walls creaked. Hanging objects swung. Trees, bushes shaken moderately. Swung door chimes. Ground: Soil, compact, level.

Modesto. Motion slow. Direction NE. Felt by (some outdoors) and awakened many in community. Door chimes rang. Hanging objects swung NE. Trees, bushes shaken slightly. Ground: Soil, level. Pendulum mantle clock facing southwest stopped.

Norden. Motion rapid, lasted 3 seconds. Direction E-W. Felt by and awakened many in community. Ground: Rocky.

Omo Ranch. Motion slow, lasted 20 seconds. Direction E. Felt by all in community; awakened all in home. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NE-E. Trees, bushes shaken slightly. Ground: Soil, compact, sloping.

6 July, 03:13:20*. Intensity V. (cont.)

Owens River Gorge Control Power Plant (Inyo County). Motion slow, lasted 25 seconds. Felt by all at plant. Hanging objects swung. Ground: Rocky, sloping.

Pinecrest. Motion rapid. Direction NE. Awakened and frightened many in community. Rattled windows, doors, and dishes; walls creaked. Trees, bushes shaken slightly. Ground: Soil.

Placerville. Motion slow, lasted 30 seconds. Felt by all and awakened many in community; frightened few. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken slightly. Knick-knacks fell. Ground: Rocky, sloping and steep.

Portola. Motion rapid, lasted 15 seconds. Awakened many and frightened few in community. Rattled windows.

Ravendale. Motion rapid, lasted several seconds. Awakened all in home. Rattled windows; walls creaked.

Sacramento. Press reported the switchboard operator at the Sacramento Bee said she received at least 500 calls. One woman reported a water pipe broke in her home.

Sacramento. Motion slow, gentle rocking, lasted about 15 seconds. Direction W-E. Awakened all in home. Rattled windows; walls creaked. Shifted small objects, some toward west. Ground: Soil, level.

Sacramento. Motion slow, lasted several seconds. Felt by and awakened many in community. Rattled windows.

Sierraville. Motion slow, lasted 2 minutes. Awakened all in home. Rattled windows, doors, and dishes; house creaked. Ground: Marshy.

Snelling. Motion rapid, lasted 30 seconds. Felt by and awakened many in community. Rattled windows and doors. Ground: Soil, level.

Soda Springs. Awakened and frightened many in community. Ground: Rocky.

Sonora. Motion slow, lasted several seconds. Direction E-W. Felt by and awakened many in community. Rattled windows, doors, and dishes. Ground: Compact, level.

Stockton. Motion slow, lasted 30 seconds. Direction E. Awakened all in home. Rattled windows, doors, and dishes; house creaked.

Tahoe Valley. Motion rapid, lasted 1½ minutes. Direction E-W. Felt by all in home; awakened many and frightened few in community. Rattled windows, doors, and dishes; entire house shook. Hanging objects swung. Trees, bushes shaken strongly. Shifted small objects. "Heaviest shock here in 9 years." Ground: Rocky, level.

Thornton. Motion rolling, lasted over 1 minute. Direction E-W. Awakened and frightened many in community. Rattled windows; walls creaked. Hanging objects swung. Ground: Marshy.

Tinemaha Reservoir (Independence). Motion rapid, slow, lasted 10 seconds. Felt by all; awakened all in home. Rattled windows, doors, and dishes; house creaked. Ground: Soil, compact, level.

Truckee. Motion slow, lasted about 1 minute. Felt by many in home; awakened many in community. Rattled windows.

Wawona (south entrance Ranger Station, Yosemite Natl Park). Motion rolling, N-S, abrupt onset. Awakened and alarmed all in home. Creaking of buildings and rattling of loose objects heard by several. Visible swaying of buildings and trees. Curtains and lampshades swayed. Ground: Granitic soil.

Wendel. Motion slow, lasted 30 seconds. Direction NE-SW. Felt by (some outdoors), awakened, and frightened many in community. Rattled windows, doors, and dishes, and pictures on walls; house creaked. Shifted small objects and furnishings.

6 July, 03:13:20*. Intensity V. (cont.)

Woodland. Motion rapid, long duration. Felt by and awakened many in community; frightened few. Rattled windows. Doorbell chimes rang. Window weights hitting against wall awakened family. Ground: Soil, compact, level.

Intensity IV: Nevada

Austin (25 miles south of). Motion rapid. Felt by several in home. Rattled windows, doors, and dishes.

Beatty. Motion slow, lasted 10 seconds. Direction NW-SE. Felt by several in home. Rattled windows; walls creaked. Ground: Soil, level.

Beatty. Lasted 15 seconds. Felt in home.

Caliente. Motion slow, lasted 10 seconds. Felt by several and awakened few in community. Windows, doors, and dishes rattled slightly. "The few people who noticed the shock were in bed, some were awake, and a few were awakened by the motion." Ground: Soil.

Carp. Felt by several and awakened few in community. "A slight tremor." Ground: Rocky.

Deeth. Lasted 1½-2 minutes. Felt by several; awakened and frightened few in community. Rattled windows. Hanging objects swung N-S. Pendulum clock stopped. "Stopped all railroad clocks as far as Wendover, Utah."

Denio. Motion rapid, then slow, lasted 2 minutes. Direction E-W. Felt by several and awakened few in home. Rattled windows, doors, and dishes; house creaked.

Duckwater. Motion slow, lasted 2 seconds. Felt by several; awakened and frightened few in community. Ground: Soil, level.

Elko. Press reported some people were awakened. One man reported a crack was widened in his 3-story house. He said "It felt like the roof was being torn off." Chandeliers in the Commercial Hotel swung back and forth for what seemed to be 5 minutes. One woman reported her house creaked and another said the Clinic building trembled. Some people slept through the shock, while others did not immediately recognize it as an earthquake.

Elko (west section). Motion swaying, SE-NW, gradual onset. Felt by some. Creaking of buildings and rattling of loose objects heard by few. Car rattled. Sign swung. Disturbed objects observed by few. Ground: Sandy.

Elko. Motion slow, momentary duration. Direction E. "There was a slight creaking of house. No rattling of dishes and no displacement of moveable objects. It was so slight that I immediately fell asleep again. In my opinion it was extremely mild, although it awakened me. In some of the brick buildings it was more noticeable and some people got out of bed and moved around." Ground: Rocky soil, level.

Ely. Motion rapid, lasted 1 minute. Direction NE. Felt by several and awakened several in home. House creaked. Ground: Rocky, level.

Lund. Motion rapid, lasted 1 minute. Felt by and awakened many in home. Rattled windows and doors. Hanging objects swung.

McDermitt. Motion slow. Felt by several and frightened few in community. Ceiling creaked; windows, doors, and dishes rattled.

Red House. Awakened few. Ground: Soil.

Tungsten. Shock accompanied by noise like strong wind, which preceded shock by 30 seconds.

6 July, 03:13:20*. Intensity IV in Nevada. (cont.)

Tybo. Motion slow, lasted 2-3 minutes. Felt by and awakened several in home. Rattled windows and doors. Ground: Soil.

Winnemucca. Motion swaying, rapid onset. Felt by many. Venetian blinds swung N-S; radio console swayed N-S. Ground: Sandy.

Intensity IV:

Ahwahnee. Motion slow, lasted 10 seconds. Felt by and awakened few in home. Rattled loose articles; house creaked. Ground: Rocky, sloping.

Alamo. Motion rapid, lasted 20 seconds. Felt by several in home; awakened two. Walls creaked. Ground: Compact.

Alturas. Motion slight, lasted 1 minute. Felt by several; awakened few. "Just strong enough to be noticed by a few."

Auburn. Motion rolling, lasted about 2 minutes. Felt by observer. House creaked.

Baxter. Long duration. Felt by many in home; awakened few in home and community. Rattled windows. Ground: Rocky soil, compact, sloping.

Boca. Motion swaying, E-W. Felt by several. Rattling of loose objects and creaking of building heard by observer. Counter balance weight on water level recorder swung in E-W arc. Ground: Mountainous.

Brooks. Awakened few in community. Rattled windows, doors, and dishes.

Camp Nelson. Motion slow, lasted several minutes. Felt generally in area; awakened some; frightened few. Ground: Rocky soil, level, sloping.

Canyon. Motion slow, rocking, lasted several seconds. "Questioned several in community. One couple awakened, one by rattling of windows, the other by rocking of bed. Bed faced N-S, rocked E-W. Ground: Adobe, hilly.

Chico. Motion rapid. Felt by several and awakened all in home. Rattled windows. Ground: Soil.

Corcoran. Motion slow. Felt by several in home; awakened few. Hanging objects swung. Ground: Soil, loose, level.

Coulterville. Motion slow. Felt by several and awakened few in community. Rattled windows and dishes; house creaked. Hanging objects swung. Ground: Rocky.

Bullards Bar Powerhouse (Dobbins). Felt by observer and wife. Open windows rattled.

Downieville. Felt by several; awakened and frightened few in community. Rattled windows and doors; frame creaked. Ground: Rocky soil, compact.

El Nido. Motion slow, lasted 1 minute. Direction E. Felt by several; awakened few. Rattled windows, doors, and dishes; house creaked. Ground: Rocky, compact.

Fairfield. Awakened few.

Firebaugh. Felt by many.

Fort Bidwell. Felt by several and awakened few in community. Rattled windows, doors, and dishes. Hanging objects swung. "It was not felt in my home. Others described it as shaking houses strongly and rattling noises made by windows, doors, etc."

Fresno. Motion slow, lasted 2 seconds. Felt by observer in home, awakened few in community. Frame creaked. Felt in tall downtown buildings. "Shock was very slight. I happened to be awake and felt the bed shake very lightly from E-W, bed faces N-S. Ground: Soil, compact.

6 July, 03:13:20*. Intensity IV. (cont.)

Hanford. Felt by several; awakened few. Rattled windows. "Very slightly felt." Ground: Compact.

Hanford. III. Felt by several in community. Ground: Alluvium, level.

Hollister. Motion bumping, gradual onset. Felt by many; very few alarmed. Clock facing west, with pendulum swinging N-S, stopped. "I did not feel this shock at all." Ground: Adobe.

Hollister (7 miles south of). Motion slow, lasted a few seconds. Felt by several in home. Rattled windows; walls creaked. "If we had not been awake, we would not have felt it. Just recognizable as an earthquake." Ground: Soil, level.

Kettleman City. Felt by several in home; awakened few in community. Rattled windows and doors; house creaked. Ground: Soil.

Knights Ferry. Motion rapid, long duration. Felt by many; awakened few.

Leevining. Motion slow. Felt by several in community; awakened and frightened few. Rattled windows.

Livermore. Felt by several and awakened few in community.

Madeline. Motion rapid. Felt by several in home. Rattled windows, doors, and dishes.

Marysville. Motion rapid, lasted 5 seconds. Felt by many; awakened few in home. Rattled windows. Ground: Soil, compact, level.

Mather. Felt by several and awakened few in community.

Milford. "I did not feel shock at all, but a number of people were awakened." Ground: Rocky, loose.

Monticello. Motion slow, lasted 15 seconds. Felt by several in home; awakened few. Rattled windows; house creaked.

Napa. Motion rapid. Seemed to be two separate shocks, lasting about 1 minute each. Awakened two in home. Rattled windows and walls. "Awakened by trembling and shaking of house. Bed trembled quite a bit." Ground: Soil.

Newman. Motion slow. Awakened few. Rattled windows, doors, and dishes slightly. Ground: Soil.

Oakland. Press reported the control tower at the Oakland Airport swayed.

Oakland (17th and Clay Sts.). Motion slow, lasted about 1 minute. Direction E. Felt by many. Hanging objects swung E.

O'Neals. Felt by and awakened few in community. "Felt very slightly." Ground: Soil, loose, level.

Orland. "About six people contacted felt a slight motion. Two were awakened by a slight creaking noise."

San Joaquin. Motion slow. Felt by many and awakened few in home. Rattled windows. Ground: Soil, compact, level.

San Jose. Press reported people from Hollister north to Los Gatos and San Jose reported feeling the shock and hearing windows and dishes rattle.

Sloughhouse. Motion slow, lasted 15 seconds. Direction NE. Felt by many; awakened few. Ground: Compact.

Stevinson. Long duration. Felt by several; awakened few. Shook beds. Ground: Soil, level.

Stovepipe Wells Hotel (Death Valley). Motion slow, lasted 30 seconds. Felt by many in home, outdoors by observer; awakened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Ground: Compact, level.

Stratford. Motion slow, lasted several seconds. Felt by several in community; awakened few. Rattled windows. Hanging objects swung. Ground: Compact.

Susanville. Motion slow. Felt by several in community; awakened few. Ground: Soil, level.

6 July, 03:13:20*. Intensity IV. (cont.)

- Susanville (12 miles north of). Motion slow, momentary duration. Felt by several in home; awakened one. Rattled windows and doors. Ground: Rocky, sloping and steep.
- Tinemaha Reservoir (about 8 miles south of Bigpine). Motion slow, lasted 30 seconds. Felt by and awakened all in home. Rattled windows, doors, and dishes. Ground: Soil.
- Tinemaha Reservoir. Felt by several, lasted 10 seconds. Awakened all at station. Rattled windows. Ground: Compact, level.
- Tracy. Motion slow. Direction N-S? Felt by several; awakened few. House creaked. Ground: Soil, level.
- Trowbridge. Lasted 30 seconds. Felt in home, awakened and frightened few. Direction NE. Hanging objects swung.
- Vacaville. Motion slow, lasted 15 seconds. Felt by several in community. Rattled windows, doors, and dishes; house creaked.
- Westhaven. Motion slow, lasted 4 seconds. Direction NE. Felt by several and awakened few in community. Rattled windows; house creaked. Ground: Soil.
- Wishon. Motion rapid. Awakened few in home. Rattled windows; walls creaked. "Some campers sleeping on ground reported strong motion." Ground: Rocky, red clay, compact, sloping.

Intensity IV: Utah

- Wendover. Motion slow, lasted 2 minutes. Felt by several at CAA station; felt by some outdoors; awakened few in community. Rattled windows; frame creaked very slightly. Hanging objects swung. Direction N. Ground: Gravelly, level.

Intensity I to III: Nevada

- Cobre (3 miles from, at Valley Pass). Motion slow, lasted 30 seconds. Felt by observer in telegraph office. Ground: Soil, level.
- Twin Springs (60 miles east of Tonopah). Felt by several. Direction NE-SW. Motion slow, with rumble.
- Uvada. Motion slow, lasted about 1 minute. Felt by two.
- Warm Springs (50 miles east of Tonopah). Motion slow, with rumble. Felt by a number of people. Direction NE-SW.
- Wells. Motion slow, rolling, lasted about 4 seconds. Felt by several and awakened some in home.

Intensity I to III:

- Adin. Felt by several in community. Mild shock, lasted 4-5 seconds. Direction NE. Ground: Rocky, sloping.
- Gridley. Observer reported rumbling like distant train heard, but no shock was felt. Ground: Hardpan.
- Lake Spaulding (Emigrant Gap). Motion trembling, rapid onset. Felt by several. Ground: Rocky.
- Madera. Motion slight. Felt by one. Rattled window.
- Mariposa. Motion slow. Felt slightly by several.
- Mineral. Felt slightly by few.
- Quincy. Felt by several. Later shock also felt.
- Richvale. Three shocks felt by people in car; awakened one.
- San Francisco. Press reported the shock was felt at the City Prison and by police in the Richmond District.
- San Francisco (470-19th Ave.). Motion rapid, lasted a few seconds. Direction E-W. Felt by observer (awake). Ground: Slightly sloping N-S; sandy.

6 July, 03:13:20*. Intensity I to III. (cont.)

Visalia. Motion rapid, lasted a few seconds. Observer in bed (awake) heard latch on door rattle for possibly 10 seconds and felt bed shake slightly. "Cannot say if felt by others, but I doubt it."
Volta. Motion rapid, long duration. Felt in home.

Intensity I to III: Oregon

Whitehouse Ranch (about 20 miles SE. of Andrews). Felt by observer in bed. Ground: Soil, compact, level.

Reported not felt: Nevada

Alamo, Bunkerville, Contact, Currie, Goodsprings, Halleck, Jean, Las Vegas, McGill, Moapa, Mountain City, Pahrump, Pioche, Ruby Valley, Shoshone, Steptoe (near McGill), Tuscarora, Yelland Ranch (NE. of Ely, Spring Valley Road).

Reported not felt:

Alameda, Antioch, Arbuckle, Bakersfield, Berkeley, Big Sur, California Hot Springs, Calistoga, Canby, Coalinga, Darwin, Death Valley Junction, Delano, Dunnigan, Elk Creek, Exeter, Gonzales, Gridley, Hat Creek, Hayward, Independence, Inyokern, Knowles, Little Lake, Lost Hills, Lower Lake, Martinez, Mount Hamilton, Oregon House, Oroville, Paskenta, Pescadero, Petaluma, Pittville, Pulga, Red Bluff, Salinas, San Benito, San Martin, Santa Cruz, Santa Rosa, Sequoia Natl Park, Sharp Park, Shingletown, Shoshone, Stonyford, Tipton, Tollhouse, Trona, Vina, Walnut Creek, Willow Ranch, Willows, and Winters.

Reported not felt: Oregon

Lake View, New Pine Creek.

Reported not felt: Utah

Callao, Garrison, Modena.

6 July, 03:18:04*, 03:26:55*, 03:41, 03:49:00*, 04:53:59*, 04:56:28*, 05:36:00*. (P) Fallon, Nevada aftershocks.

State of Nevada:

Austin (6 miles north of). Aftershocks felt on 6th. (No times given.)

Carson City. (03:49:00*) Felt.

Ely. (03:18:04*) Felt.

Eureka. Several weaker shocks felt on 6th. (No times given.)

Fallon. (03:41, 03:49:00*, 04:53:59*). Felt. Ground: Sand and clay of old lake bottom.

Fernley. (03:49:00*) Felt.

Fish Lake Valley (central section; Dyer). (03:49:00*) Felt.

Gerlach. (03:41) Slight shock.

Hawthorne. (03:49:00*) III. Motion slow, very brief. Felt by several in home. "This was a very slight shock." Ground: Sandy, level.

Hawthorne. "Main shock followed by light tremors until 04:49:00* when another jolt shook buildings."

Mason. (03:26:55*, 03:49:00*) First shock weak; second, strong.

Minden. (03:49:00*) Light shock.

Nixon. (03:49:00*) Felt.

Schurz. (03:18:04*, 03:49:00*, 05:36:00*) Felt.

Winnemucca. (03:26:55*) IV. Motion slow, lasted about 30 seconds. Direction NE. Felt by many in home; awakened and frightened few in community. Doors swung. Ground: Soil, level.

6 July, 03:18:04*, 03:26:55*, 03:41, 03:49:00*, 04:53:59*, 04:56:28*,
05:36:00*. (F) Fallon, Nevada aftershocks. (cont.)
Winnemucca. (03:49:00*) Felt.
Yerington. (03:49:00*) Felt.

Baxter. (03:49:00*) Shock of momentary duration felt.
Jackson (Tiger Creek Powerhouse). (03:49:00*) Felt.
Jackson (Electra Powerhouse). Five shocks felt. Lasted 5 seconds each.
(No times given.)
Meyers. (04:53:59*) Felt.
Pescadero. (04:53:59* or 04:56:28*). Slight shock felt.
Sacramento. (03:18:04*) Felt.
Tahoe City. (03:26:55*) V. Motion slow, lasted 5 seconds. Felt by
and awakened many in home. Rattled windows; walls creaked. Hang-
ing objects swung. Pendulum clock stopped. Ground: Rocky.

6 July, 08:30.

Laws. IV. Motion slow, lasted several seconds. Felt by many in communi-
ty (some outdoors). Direction NE. House creaked. Hanging objects
swung.

6 July, 11:00. Fallon aftershock.
Wabuska, Nev. Felt.

6 July, 14:07:41*. Fallon aftershock.

Epicenter 39.3° north, 118.5° west, southeast of Fallon; Nev. (B)
State of Nevada:

Elko. III. "Very light shock noticed while sitting at desk in post
office. So slight that I did not know if it was an earthquake
until I looked at the hanging lights and saw them swaying very
slightly from E-W. It was not noticed by any of the others in
the workroom or the clerks in the financial section, although
others around town were aware of it."

Fallon. VI. Press reported the shock caused little additional damage.
Motion rolling. Clouds of dust arose in the Stillwater Range
east of Stillwater.

Fallon. V. Described as a violent, swaying motion in the central sec-
tion of town. Direction N-S. Ground: Sandy clay.

Fernley. V. Observer states effects were about the same as during the
first shock at 03:13:20*, but that it was not quite as strong.

Fish Lake Valley (central section; Dyer). V. Swayed building and trees
visibly. Cars in yard rolled back and forth in E-W direction.
Porch pillars swayed out of line with window frames.

Goldfield. Slight shock.

Hawthorne. IV. Motion slow, lasted 10 seconds. Felt by all in office
building. Rattled windows and doors. Ground: Soil, compact, level.

Hiko. III. Slight shock noticed by clock pendulum swinging.

Jiggs. Slight tremor. Also felt slight tremors on 7th.

Lovelock. V. Moderate shock felt by all. Semicircular motion. Objects
swayed. Buildings shook. Lasted 30 seconds.

Mason. V. Motion rapid, abrupt onset, lasted 1 minute. Felt by all.
Rattled windows, doors, and dishes. Hanging objects swung N-S.
Pendulum clock stopped. "Not quite as strong as the first one."
Ground: Rocky soil, loose, compact, level and sloping.

Nixon. IV. Motion rocking. Felt by all in building. Chandelier swung.

6 July, 14:07:41*. State of Nevada. (cont.)

Pyramid. IV. Motion rapid, gradual onset, lasted 20 seconds or more.
Direction NE. Felt by several; frightened few. Rattled windows.
Hanging objects swung. Ground: Soil, compact, level.

Salt Wells (about 5 miles southeast of). VII. U. S. Highway 50 settled at this point, necessitating filling and resurfacing of the road. The Highway Department reported this was noticed soon after the shock at 14:07:41*. Many persons observed a large cloud of dust arising in this area.

Schurz. Lasted about 10 seconds.

Wabuska. "Not as strong as the shock at 03:13:20*."

Winnemucca. III. Motion trembling, N-S, rapid onset. Felt by several. Venetian blinds swayed slightly. Little effect on people. Ground: Sandy.

Yerington. Felt.

Bexter. IV. Momentary duration. Frame store creaked.

Benton Inspection Station (Benton). IV. Motion slow, lasted 3 seconds. Direction N-S. Felt by many (some outdoors). Building creaked. Hanging objects swung N. Ground: Sandy, compact.

Brockway. IV. Rocked car back and forth 3 or 4 times in N-S direction. People in car parked next to observer also felt the shock. Observer reported five shocks were felt.

Chilcoot. "Not as strong as the first shock at 03:13:20*."

Doyle. Felt while sitting.

Jackson (Tiger Creek Powerhouse). Felt.

Lake Spaulding (Emigrant Gap). II. Motion rocking, rapid onset. Felt by one. Ground: Rocky.

Laws. IV. Motion rapid, lasted several seconds. Direction NE. Felt by many in home. Rattled doors; walls creaked. Ground: Rocky, level.

Long Valley Dam (about 20 miles northwest of Bishop). IV. Motion slow, lasted 15 seconds. Direction E-W. Felt by all in home. Rattled windows and doors. Ground: Rocky.

Markleeville. Slight shock.

Norden. III. Motion rapid, lasted 3 seconds. Direction E-W. Felt by several. Ground: Rocky.

Oakland (1625 Clay St., PG&E). III. Motion rolling, lasted 5 seconds. Direction NW-SE. Felt by several in System Dispatcher's office. Hanging objects swung N-S.

Sacramento. III. Motion slow, lasted 10 seconds. Direction E-W. Felt by several in home. "Very gentle motion. Just barely perceptible." Ground: Soil, level.

San Diego. II. Motion slow. Felt by several. Direction NE.

San Francisco. IV. Press reported police and newspaper phone operators received many calls. Some people felt the movement strongly downtown.

San Francisco (65 Market St., 10th floor). III. Motion slow, rolling, lasted 5 seconds. Direction N-S. Felt by all on 10th floor. Lights swung. Building creaked. Electric clocks stopped, clocks faced N. Ground: Filled.

Tahoe City. IV. Motion slow, lasted 3 seconds. Direction E-W. Felt by many in building. Walls creaked. Hanging objects swung. Ground: Rocky.

Wawona, South Entrance Ranger Station (Yosemite Natl Park). IV. Thud, sharp jolt, abrupt onset. Felt by several. Buildings creaked;

6 July, 14:07:41*. (cont.)

loose objects rattled. "Sharp jolting shock of very short duration felt by rangers on duty at this station." Ground: Granitic soil.

Yosemite National Park. IV. Motion slow, lasted 5 seconds. Direction E-W. Felt by many in community; frightened few. Rattled windows, doors, and dishes. Hanging objects swung E-W. Trees, bushes shaken slightly. Ground: Compact; lake bed.

6 July, 14:13:25*. (P) Fallon aftershock.
Barter. IV. Frame store creaked.

6 July, 15:57:07*. (P) Fallon aftershock.
Wabuska, Nev. Felt.

7 July, 18:13:56*. (P) Fallon aftershock.
Austin, Nev. (6 miles north of). Aftershocks felt on the 7th.
Minden, Nev. IV. Felt by many, but not as severe as the main shock on the 6th. Light fixtures swayed N.

7 July, 18:40.
Hollister (7 miles south of). IV. Motion slow. Felt by several; frightened few. Rattled windows, doors, and dishes; house creaked. "Easy, but long." (No earthquake recorded at this time at Palo Alto, B.)

8 July, 04:55:10* (P), 06:00. Fallon aftershocks.
Stillwater area, Nev. V. Press reported people held floor lamps to keep them from falling. Shock also felt at 06:00.

8 July, 11:31:57* (P). Fallon aftershock.
State of Nevada:
Austin (6 miles north of). V. Severe shock.
Dyer. Sharp, rapid shock. Motion E-W.
Lovelock. Light shock.
Minden. IV. Slight shock. House creaked; fixtures swayed.

9 July, 00:50:03*. (P) Fallon aftershock.
Lovelock, Nev. IV. Motion jerking, ending abruptly, lasted 3-4 seconds.
Awakened quite a number. Several thought direction was E-W.

10 July, 04:28:40*.
Epicenter $33^{\circ}02'$ north, $116^{\circ}29'$ west, near Julian. (P)
Descanso. IV. Motion rapid, gradual onset, lasted 3 seconds. Awakened and frightened few. Rattled windows, doors, and dishes.

12 July, 08:05:25*. (P) Fallon aftershock.
Fernley, Nev. IV. Motion rapid, lasted 2 seconds. Felt in post office; by some outdoors (quiet). Rattled windows and doors; walls creaked. Hanging objects swung. Ground: Soil.

17 July, 10:55:12*.
Epicenter $41^{\circ}18'$ north, $123^{\circ}34'$ west, northeastern Humboldt County. (B)
Cecilville (Sawyer's Blind Horse Ranch). V. Motion bumping, abrupt onset. Felt by two. Cracks appeared in dirt floor of storeroom. Rattling of loose objects and creaking of building heard by two.

17 July, 10:55:12*. (cont.)

Disturbed objects observed by two. Cup fell from cupboard on west wall. "No one in the immediate vicinity seems to have felt this shock. We have felt small tremors before but not as sharp as this one." Ground: Sandy.

Eureka. "An earthquake of mild intensity was felt in Eureka and vicinity. No damage was reported." (SSA Bull., October 1954)

Sawyers Bar and vicinity. III. Motion rapid, lasted a few seconds. Felt by several in community. Direction E. Trees, bushes shaken slightly. "Very minor shocks." Shock at 13:10 also felt at Blue Ridge Lookout.

18 July, 10:40. (Not recorded, P)

Tehachapi (central section). IV. Motion trembling and rocking, gradual onset, lasted 1-3 seconds. Felt by many. Rattled of loose objects and creaking of buildings heard by some. Ground: Rocky.

23 July, 16:00:41*.

Epicenter $34^{\circ}10'$ north, $118^{\circ}39'$ west, near Calabazas. (P)

Granada Hills (northwestern San Fernando Valley). V. Felt generally.

28 July, 23:09:42*.

Epicenter $37^{\circ}54'$ north, $121^{\circ}59'$ west, about 15 miles east of Berkeley in the Walnut Creek region. (B)

Walnut Creek. Reported felt. (No details)

29 July, 00:51:36*.

Epicenter $37^{\circ}25'$ north, $121^{\circ}20'$ west, about 15 miles northeast of Mount Hamilton. (B)

Gilroy, Hollister, Morgan Hill, and San Jose. Press reported a small earthquake was felt. Also reported felt on the San Francisco Peninsula.

31 July, 03:00, 07:15. Fallon aftershocks.

Fallon, Nev. (2 miles west of). Felt.

2 August, 02:18:53*. (P) Fallon aftershock.

Fallon, Nev. V. Press reported cracks in downtown buildings appeared to have been enlarged. It was reported two or three aftershocks were being felt every day. "It was not felt in Reno or other surrounding cities." (SSA Bull., January 1955)

10 August, 05:24.

Concord. "A light earthquake rattled dishes and windows in the Concord area. No damage was reported." (SSA Bull., October 1954)

12 August, 04:50:06*.

Epicenter $36^{\circ}54'$ north, $121^{\circ}39'$ west, east of Watsonville. (B)

Bakersfield. III. Motion rapid, lasted a few seconds. Awakened observer. Sort of rustling sound heard. "No one seems to have felt this but me."

Hollister. IV. Press reported the shock was strong enough to awaken some people. Motion swaying.

Hollister (7 miles south of). V. Motion rapid. Felt by and awakened many in community (some outdoors); frightened few. Rattled windows, doors, and dishes; house creaked. Ground: Soil.

12 August, 04:50:06*. (cont.)

Logan. VI. Some rockslides reported on road near Logan.

Moss Landing. V. Motion rapid, very light, lasted about 1 second.

Awakened all in home.

Pescadero. Lasted about 1 minute. Rumble heard. Felt in home lying down and sitting.

19 August, 13:46:32*.

Epicenter $39^{\circ}27'$ north, $123^{\circ}29'$ west, northwest of Willits. (B)

Comptche. III. Motion rapid, lasted 3 seconds. Felt by several in community. Direction N-S. Ground: Soil, compact, level.

20 August, 00:01:45*.

Epicenter $37^{\circ}40'$ north, $118^{\circ}40'$ west, northern Owens Valley. (P)

Benton. IV. Motion slow, lasted 1 minute. Direction NW-SE. Felt by many and awakened few in community. House creaked. Ground: Soil, level.

Long Valley Reservoir (about 20 miles northwesterly from Bishop). V. Motion rapid, lasted 10 seconds. Awakened all in home. Hanging objects swung E-W. Ground: Rocky.

20 August, 20:55:06*.

Epicenter $37^{\circ}57'$ north, $122^{\circ}19'$ west, El Cerrito Hills. (B)

El Cerrito, Richmond Annex, Southern Pacific Mole in Oakland, and Berkeley.

Reported felt at these locations. No details. Magnitude only 2.1, so probably not felt strongly anywhere. (Seismographic Station, University of California.)

22 August, 03:30, 05:37:22*.

Epicenter 38.6° north, 119.4° west, east of Markleeville. (B)

Markleeville. III. Motion slow, lasted 2-3 seconds. Felt by several in home.

22 August, 05:51:06*.

Epicenter $35^{\circ}20'$ north, $118^{\circ}51'$ west, near Edison. (P)

Bakersfield (Sec. 32, T29S, R29E). IV. Felt by several and awakened few in community. Preceded by rumbling. "Quite strong and apparently came from the NE. One person reported feeling a shock around 04:00 same day."

22 August (late afternoon). Fallon aftershock.

Fallon, Nev. (375 South Russell St.). Felt. No noticeable subterranean sounds.

23 August, 09:50. Fallon aftershock.

Paradise Valley, Nev. Felt.

23 August, 20:45. Fallon aftershock.

Mina, Nev. Felt. Direction N-S.

23 August, 21:51:32*. Aftershock of 6 July.

Epicenter $39^{\circ}35'$ north, $118^{\circ}27'$ west, east of Fallon, Nev. (B)

Felt over an area of approximately 150,000 square miles of Nevada,

California, and portions of Oregon, Idaho, and Utah. (See map, pg. 65)
Magnitude 6.8. Maximum intensity IX. Additional surface movement

23 August, 21:51:32*. (cont.)

occurred in the same rupture zone as that of 6 July earthquake, with the extension of surface breakage north for about 11 miles to the region southeast of Carson Sink. Damage to buildings, roads, and irrigation facilities occurred in the same general areas as those of the main shock on 6 July, with the exception of the Lovelock area where the Rogers Dam was considerably damaged.

Intensity VIII: Nevada

Fallon-Lovelock-Stillwater areas.

The following was abstracted from a report received from the Bureau of Reclamation, Region 4, Lahontan Basin Area Office, Carson City, Nevada: Damage to the Newlands Reclamation Project facilities occurred in the same general areas; however, some areas located a little further west sustained damage during this shock that were not affected by the July shock. The type of damage was practically the same as reported for the 6 July shock with reference to collapsed culverts, settlement and cracking of ditch and drain banks, canal and drain bottom upheavals and tilting and cracking of canal turnout and drop structures. In some instances the damage was more severe than that observed following the July shock. A large part of the emergency rehabilitation work that was completed was completely obliterated by this shock. Two concrete drop structures were seriously damaged, one being rendered useless and requiring replacement. The other can be put back into service for a limited period of time with some major repairs. Extensive damage was done to the already badly damaged business district of Fallon, with the condemnation of a two-room schoolhouse and several business houses. The state highway running east from Fallon to Stillwater was badly damaged in three different places. The roadway settled as much as three feet in some places and sustained longitudinal cracks ranging from 1 to 24 inches in width and up to 500 feet in length. The power distribution facilities of the Truckee-Carson Irrigation District, which operates the Newlands Project, suffered damage amounting to approximately \$5000. The type of damage consisted of sagging and broken transmission lines, pole displacement, broken service connections and short circuiting. Estimated damage to Project facilities was \$90,900.

Fallon vicinity (Lone Tree District). The following was abstracted from a report received from the Pacific Fire Rating Bureau: Road west of Lone Tree School shifted more towards north. At the D. Sorenson Ranch damage was similar to that occurring on 6 July. Barn and garage cracks opened up more. At the elder Sorenson Ranch a small 15 foot by 18 foot concrete building used as grain storage tipped toward east. Porch of house dropped now to about $3\frac{1}{2}$ inches.

Fallon vicinity ($4\frac{1}{2}$ miles north of Fallon). Motion rapid, lasted 1 minute. Direction N-S. Rattled windows, doors, and dishes; house creaked. Earth noises like distant thunder heard. Pictures fell S. "This place is near the Sagoupe Diversion Dam on the Carson River. Everything shook violently. The land was all shaken out of shape and ditches filled. Also out on the desert east and north about 4 miles is what is known as Indian Lakes. It is all cracked and sunken. Not too many water spouts in that place but lots of water spouts on this place. The first one brought up white sand; the second one, black sand." The press reported that new cracks appeared in the Sagoupe Dam.

12 August, 04:50:06*. (cont.)

Logan. VI. Some rockslides reported on road near Logan.

Moss Landing. V. Motion rapid, very light, lasted about 1 second.

Awakened all in home.

Pescadero. Lasted about 1 minute. Rumble heard. Felt in home lying down and sitting.

19 August, 13:46:32*.

Epicenter $39^{\circ}27'$ north, $123^{\circ}29'$ west, northwest of Willits. (B)

Comptche. III. Motion rapid, lasted 3 seconds. Felt by several in community. Direction N-S. Ground: Soil, compact, level.

20 August, 00:01:45*.

Epicenter $37^{\circ}40'$ north, $118^{\circ}40'$ west, northern Owens Valley. (P)

Benton. IV. Motion slow, lasted 1 minute. Direction NW-SE. Felt by many and awakened few in community. House creaked. Ground: Soil, level.

Long Valley Reservoir (about 20 miles northwesterly from Bishop). V. Motion rapid, lasted 10 seconds. Awakened all in home. Hanging objects swung E-W. Ground: Rocky.

20 August, 20:55:06*.

Epicenter $37^{\circ}57'$ north, $122^{\circ}19'$ west, El Cerrito Hills. (B)

El Cerrito, Richmond Annex, Southern Pacific Mole in Oakland, and Berkeley.

Reported felt at these locations. No details. Magnitude only 2.1, so probably not felt strongly anywhere. (Seismographic Station, University of California.)

22 August, 03:30, 05:37:22*.

Epicenter 38.6° north, 119.4° west, east of Markleeville. (B)

Markleeville. III. Motion slow, lasted 2-3 seconds. Felt by several in home.

22 August, 05:51:06*.

Epicenter $35^{\circ}20'$ north, $118^{\circ}51'$ west, near Edison. (P)

Bakersfield (Sec. 32, T29S, R29E). IV. Felt by several and awakened few in community. Preceded by rumbling. "Quite strong and apparently came from the NE. One person reported feeling a shock around 04:00 same day."

22 August (late afternoon). Fallon aftershock.

Fallon, Nev. (375 South Russell St.). Felt. No noticeable subterranean sounds.

23 August, 09:50. Fallon aftershock.

Paradise Valley, Nev. Felt.

23 August, 20:45. Fallon aftershock.

Mina, Nev. Felt. Direction N-S.

23 August, 21:51:32*. Aftershock of 6 July.

Epicenter $39^{\circ}35'$ north, $118^{\circ}27'$ west, east of Fallon, Nev. (B)

Felt over an area of approximately 150,000 square miles of Nevada, California, and portions of Oregon, Idaho, and Utah. (See msp.pg.65) Magnitude 6.8. Maximum intensity IX. Additional surface movement

23 August, 21:51:32*. (cont.)

occurred in the same rupture zone as that of 6 July earthquake, with the extension of surface breakage north for about 11 miles to the region southeast of Carson Sink. Damage to buildings, roads, and irrigation facilities occurred in the same general areas as those of the main shock on 6 July, with the exception of the Lovelock area where the Rogers Dam was considerably damaged.

Intensity VIII: Nevada

Fallon-Lovelock-Stillwater areas.

The following was abstracted from a report received from the Bureau of Reclamation, Region 4, Lahontan Basin Area Office, Carson City, Nevada: Damage to the Newlands Reclamation Project facilities occurred in the same general areas; however, some areas located a little further west sustained damage during this shock that were not affected by the July shock. The type of damage was practically the same as reported for the 6 July shock with reference to collapsed culverts, settlement and cracking of ditch and drain banks, canal and drain bottom upheavals and tilting and cracking of canal turnout and drop structures. In some instances the damage was more severe than that observed following the July shock. A large part of the emergency rehabilitation work that was completed was completely obliterated by this shock. Two concrete drop structures were seriously damaged, one being rendered useless and requiring replacement. The other can be put back into service for a limited period of time with some major repairs. Extensive damage was done to the already badly damaged business district of Fallon, with the condemnation of a two-room schoolhouse and several business houses. The state highway running east from Fallon to Stillwater was badly damaged in three different places. The roadway settled as much as three feet in some places and sustained longitudinal cracks ranging from 1 to 24 inches in width and up to 500 feet in length. The power distribution facilities of the Truckee-Carson Irrigation District, which operates the Newlands Project, suffered damage amounting to approximately \$5000. The type of damage consisted of sagging and broken transmission lines, pole displacement, broken service connections and short circuiting. Estimated damage to Project facilities was \$90,900.

Fallon vicinity (Lone Tree District). The following was abstracted from a report received from the Pacific Fire Rating Bureau: Road west of Lone Tree School shifted more towards north. At the D. Sorenson Ranch damage was similar to that occurring on 6 July. Barn and garage cracks opened up more. At the elder Sorenson Ranch a small 15 foot by 18 foot concrete building used as grain storage tipped toward east. Porch of house dropped now to about $3\frac{1}{2}$ inches.

Fallon vicinity ($4\frac{1}{2}$ miles north of Fallon). Motion rapid, lasted 1 minute. Direction N-S. Rattled windows, doors, and dishes; house creaked. Earth noises like distant thunder heard. Pictures fell S. "This place is near the Sagoupe Diversion Dam on the Carson River. Everything shook violently. The land was all shaken out of shape and ditches filled. Also out on the desert east and north about 4 miles is what is known as Indian Lakes. It is all cracked and sunken. Not too many water spouts in that place but lots of water spouts on this place. The first one brought up white sand; the second one, black sand." The press reported that new cracks appeared in the Sagoupe Dam.

23 August, 21:51:32*. Intensity VIII in Nevada. (cont.)

Fallon (West End School area). The following is from a report by the Pacific Fire Rating Bureau: West End School - three buildings. (1) Reinforced-concrete, one story; no damage. (2) Brick (poor quality) with stucco exterior. Damaged in July 6 shock, some repair. Severe cracks in walls and spandrels over windows. Sand boils around foundations. (3) Wood frame stucco, one story. Damage due to settlement of center portion. Horizontal cracks and floor line wider near center of building. Briggs dwelling: Stone chimney pulled away and sand boils around base, also settled slightly. General cracking of sidewalks and cracking of foundation walls. Interior walls cracked near fireplace. Owner states some sand boils in street on July 6. General cracking of sidewalks and horizontal movement of sidewalks in this area.

Fallon. VII. Press reported the walls of only one Fallon building fell over in town. That was the north wall of the Kent store which was undergoing repairs. The bricks crashed through the ceiling of the adjoining Western Union Telegraph Company office, piling heavy timbers and debris over counters and equipment. More cracks appeared in a number of business buildings and dwellings, a few of which were undergoing repairs. Business men and resident owners in some cases reported more damage from spilled merchandise and crockery, others less. Generally this loss was not as severe as during the July 6 earthquake. Not as many chimneys toppled and not as many buildings were so damaged as to require blocking off. Contrary to earlier reports, the Western Hotel, top of which had been rebuilt, suffered very little damage. The southwest part of town showed more effects from heaving ground during both shocks than any other section. The recent jolt broke a four-inch water main in two places (West End School area). So far as known there were no injuries. Except for the Fallon-Stillwater highway State 42, only minor damage has been observed in the inter-state highways and the secondary roads throughout the county.

Fallon (1 mile south from center of town on U. S. Highway 95). VII. Violent jolting and bumping motion, receding to a N-S sway, abrupt onset. Felt by all; general alarm. Ground cracks in all places as of July 6 and many more. Creaking of buildings and rattling of loose objects heard by all during the after tremors. Buildings seemed to dance, dip, and sway. Many chimneys fell (observer's chimney fell to S.), ornaments and dishes thrown from shelves. Walls badly cracked, cracks ran in all directions. Dishes and furniture displaced; some refrigerators tipped over. "The surface movement of this shock was much more violent than the July 6 shock. Stacks of baled hay were tumbled down. Objects on shelves were thrown to floor and didn't just slide off. The surface movement was much stronger in the areas of old stream beds." Ground: Sand and clay.

Fallon (98 Bailey St.). VII. Motion slow, lasted 1 minute. Direction E-W. Felt by all. Rattled windows, doors, and dishes. Earth noises heard. Hanging objects, pictures, and lighting fixtures swung E-W. Lamps all fell to floor; vases fell to floor and broke. Articles of furniture overturned. Brick chimney broke.

Fallon (406 South Maine St.). VII. Motion rapid, lasted 2 minutes. Direction N-S. Rattled windows, doors, and dishes; house creaked. House was too noisy to have heard any earth noises. Hanging objects, pictures, and lighting fixtures swung N-S. Small objects shifted;

23 August, 21:51:32*. Intensity VIII in Nevada. (cont.)

articles of furniture overturned. Severed chimney at roof line.

Fallon. VII. Motion rapid. Started slow, E-W, then sharp N-S movement. Felt by, awakened, and frightened all in community. Rattled everything; house creaked. Hanging objects swung S. Trees, bushes shaken strongly. Shifted small objects and furnishings; overturned all vases, etc., small objects. Cracked plaster, windows, walls, and chimneys. Some knickknacks, books, pictures, and plaster fell. Broke some dishes, windows, and furniture. Ground: Soil, compact, level.

Fallon (west on Highways 50 and 95). VII. Lariat Motel. Motion rapid, lasted about 1½ minutes. Awakened all. Rattled windows, doors; building creaked like it was breaking up. Terrific rumble heard. Toppled lamps, ornaments slid off shelves, all small objects shifted. Only damage was to four floor lamps. "Started with a jerk so strong my head was jerked back. Motion first E-W, then a positive N-S. Our building over 300 feet long, edged in Neon in two rows, swayed like an ocean wave. My husband was out on our blacktop parking spaces. He tried to run to me and couldn't. The ground under him felt like ocean waves and he fought for his balance. The Neon strips worked in a waving motion. Our huge Neon sign, on two 8-inch posts set in concrete, waved back and forth a good 18 inches. Crickets come out in droves before even an aftershock."

Fallon (198 E. Stillwater). VII. Motion rapid, long duration. Direction N-S. Felt by all in home. Doors swung and large objects swayed; small objects fell. Hanging objects, pictures, lighting fixtures swung N-S. Crack in foundation and basement cement wall buckled.

Fallon (375 South Russell St.). VII. Motion rapid, lasted 1 minute. Direction N-S. Rattled windows, doors, and dishes. Hanging objects, pictures, and lighting fixtures swung N-S. Shifted small objects; shifted articles of furniture. "House appears to have bounced off the pillars under the floor and the foundation has a crack. The damage to the building is cumulative and it is hard to attribute it to any one shock. The onset was abrupt with a hard jolting violence. It threw loose objects on the south wall into the middle of the floor and shifted our big 12-cubic-foot refrigerator to the north against wall. We lost a few dishes; however, most breakable objects in our home (the ones left from the July 6 shock) were down off the walls or securely placed with cupboard doors on the south wall nailed shut. All major shocks have a N-S movement. Hanging objects and water in containers move N-S." Two rather noticeable shocks felt in the afternoon.

Fallon. VII. Motion slow, then rapid, lasted about 1 minute. Direction N-S. Felt by and awakened all in home and community; frightened many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N. Trees, bushes shaken strongly. Shifted small objects and furnishings; overturned vases, small objects and furniture. Cracked plaster, walls, chimneys, ground. All knickknacks, books, and pictures fell. Broke dishes and windows. Twisting and fall of chimneys. Damage considerable to brick and masonry. Ground: Loose.

Fallon. VII. Motion rapid. Direction N-S. Felt by, awakened, and frightened all in community. Rattled windows, doors, and dishes, lamps, etc.; house creaked. Hanging objects swung N. Trees, bushes shaken strongly. Shifted small objects and furnishings; overturned

23 August, 21:51:32*. Intensity VIII in Nevada. (cont.)

vases and small objects. Cracked plaster, walls, chimneys, and ground. Knickknacks, books, pictures, and plaster fell. Damage considerable. Ground: Soil, compact, level.

Fallon. VII. Motion rapid, lasted $1\frac{1}{2}$ minutes. Direction circular. Felt by all and awakened many in community; frightened many in home. Rattled windows, doors, and dishes; house creaked. Hanging objects swung in circular motion. Shifted small objects and furnishings; overturned vases and small objects. Cracked plaster, walls, chimneys, and ground. Knickknacks, books, and plaster fell. Broke dishes and windows. Twisting and fall of chimneys. Damage considerable. Ground: Compact.

Fallon. VII. Motion rapid, lasted 1 minute. Felt by and awakened all in community; frightened many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NE. Trees, bushes shaken strongly. Shifted small objects and furnishings; overturned vases, small objects, and furniture. Cracked plaster, windows, walls, chimneys, and ground. Knickknacks, books, pictures, and plaster fell. Broke dishes, windows, and furniture. Damage considerable to brick, masonry, and concrete. Ground: Soil, level.

Fallon. VII. Motion rapid, lasted 3-5 minutes. Direction S-N. Rattled windows, doors, and dishes; house creaked. Hanging objects, pictures, lighting fixtures swung. Small objects fell off tables and stove. Roofing paper torn off house. "The shock threw me against the edge of the door and hurt my shoulder and knee. Six acres of my land has old cracks all around and the shock opened the cracks up some more."

Fallon. VI. Motion rapid, lasted 2 minutes. Direction E-W. Felt by all in home; awakened and frightened many in community. Strong rattling of windows, doors, and dishes; house creaked slightly. Hanging objects swung. Trees, bushes shaken strongly. Shifted small objects and furnishings; overturned vases, etc., small objects, and furniture. Cracked plaster, chimneys, and ground. Knickknacks and plaster fell. Ground: Loose, level.

Fallon (about 1 mile northwest of bridge across Carson River (Highway 50)). VI. Motion slow, rolling, N-S, lasted over 1 minute. Felt by and awakened all in home. Rattled windows, doors, and dishes; house creaked. Doors swung N-S. Small cracks in stucco-adobe garage. Empty fruit jars moved about 1 inch.

Fallon. VI. Motion sharp, rolling, lasted 5 minutes. Direction N-S. Felt by, awakened, and frightened all in community. Rattled everything; walls creaked. Lights went off. Shifted small objects and furnishings; overturned small objects. Knickknacks and books fell. Broke dishes. Damage slight. Ground: Soil, level.

Fallon. VI. Motion rapid, lasted $1\frac{1}{2}$ minutes. Awakened all and frightened all in community. Direction N. Rattled windows and dishes; walls creaked. Hanging objects swung. Pendulum clock stopped. Shifted and overturned small objects. Cracked walls. Knickknacks, books, pictures, and plaster fell. Damage slight. Ground: Level soil.

Fallon (105 E. Stillwater). VI. Motion slow, lasted about $1\frac{1}{2}$ minutes. Direction circular. Water in tub splashed strongly E-W. Rattled windows, doors, and dishes; house creaked. Hot water heater swayed. Sounded and felt as if everything was falling. Objects fell in all directions. Canned food fell, vases and bric-a-brac fell but nothing broke. Articles of furniture overturned in garage.

23 August, 21:51:32*. Intensity VIII in Nevada. (cont.)

Fallon (645 South Esmeralda). VI. Motion rapid, lasted about 1 minute. Direction E-W. Rattled windows, doors, and dishes; doors and cupboard doors banged. Vases and a pitcher overturned; a shell leaning against a south wall overturned. A badly cracked picture window pane had no further damage. "This shock was so sharp I thought better of walking. When I attempted to walk (after the shock ended) I banged into one wall and walked into a corner of the piano. I think my bungling around must have resulted from a sharp shaking, more severe than I realized."

Fallon (1 mile NW. of the NW. corner of the Naval Air Station). VI. Motion slow and long, changing to very rapid and short shakes, lasted about 1 minute. Direction approximately NE-SW. House moved slowly NW-SE. Observer states it was impossible to walk or stand without holding on to something. Hanging objects, pictures, and lighting fixtures swung. "Noises in the house were caused by the house vibrating to a point where no one sound could be recognized except a very distinct crunching sound. This shock caused the ceiling in my house to ripple with a wave length of roughly 6 inches but did not crack the plaster. My dog must hear the shocks coming because about 15 seconds before we feel them she barks very lustily."

Fallon. VI. Motion rapid, lasted 1 minute. Felt by, awakened, and frightened all in home. Rattled windows, doors, and dishes. Hanging objects swung. Shifted small objects and furnishings; overturned vases, etc., small objects. Cracked plaster. Knickknacks fell. Ground: Soil, level.

Fallon (390 West Virginia St.). VI. Motion rapid, sharp, lasted about 1 minute. Felt by all in county; awakened all in community; frightened few. Direction SW-NE. Rattled everything; everything creaked. Hanging objects swung. Shifted small objects and furnishings slightly. Knickknacks fell. Damage slight. Ground: Old lake bed; level. "Most persons I have talked with are of the opinion that this shock was sharper in intensity than the first one but did not have the definite rhythmic motion, nor did it last as long."

Fallon (south Taylor Road). VI. Motion rapid, lasted about 1½ minutes. Direction NE. Awakened and frightened all in community. Rattled everything. Hanging objects swung NE. Trees, bushes shaken strongly. Overturned small objects. Ground: Loose, level.

Fallon (232 Ferguson). VI. Motion rapid. Direction N-S. Awakened all in home. Rattled windows, doors, and dishes; house creaked. Hanging objects, pictures, lighting fixtures swung N-S. Shifted small objects. Few knickknacks broke. Cracks in ceiling.

Fallon (Harmon District, East Star Route). V. Motion rapid, lasted 5 minutes. Direction N-S. Awakened some in home. Rattled windows, doors, and dishes; house creaked. Shifted small objects. Lights went off.

Fallon (Gibson Ranch, 2 miles SW. of Fallon). V. Motion slow, lasted 3 minutes. Shaking N-S. Awakened some in home. Rattled windows, doors, and dishes; house creaked. Roaring noise heard. Hanging objects, pictures, lighting fixtures swung N-S. Shifted small objects. "I looked out the window and my bike was tipped over. China cups swung on hooks N-S. Sensation of seasickness."

Lovelock and vicinity. Press reported the greatest damage in this area was to the Rogers concrete and steel diversion dam located about 3

23 August, 21:51:32*. Intensity VIII in Nevada. (cont.)

miles northeast of Lovelock. The south abutment was cracked and a channel a hundred feet long dumped 300 acre feet of stored water down the river. A reinforcing piece of concrete on the east side of the dam was snapped off and slapped around like a giant hammer, doing injury to the stilling basin. The dam was built two years ago at a cost of \$40,000. Damage is estimated at \$10,000. The earth-fill crossing of the river east of the Tule Ranch southeast of town also went out. The jolts appeared to have been felt stronger in the upper valley on a line running through the Rogers Dam. At the John Aufdermaur Ranch, a quantity of canned food in glass jars crashed to the floor with considerable loss and other people had glassware broken.

Lovelock. VII. Press reported a ten-foot strip of facade at the top of the brick Lovelock Mercantile Building crashed onto the sidewalk. The cause was believed largely to have been a heavy sign that was suspended from the building. When swinging violently back and forth, weakness developed in the brickwork, laid 40 years ago. One alarm clock fell off shelf in same building. Merchandise fell in stores, with some loss from breakage. One old chimney reportedly fell and bricks fell from another. Throughout Lovelock minor home damage occurred. Cracks in stucco buildings were opened up. Large crack was opened up between partitions in the upper part of the Lovelock Mercantile Building. The adjacent Big Meadow Hotel had cracks opened up on its exterior. The Pershing Hotel was reported considerably affected.

Lovelock. VI. Motion rapid, lasted $1\frac{1}{2}$ minutes. Direction N-S. Felt by all in community; awakened all and frightened many in home. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N-S. Trees, bushes shaken strongly. Shifted small objects; overturned vases, etc., small objects. Cracked plaster, walls, and chimneys. Knickknacks, books, and pictures fell. Broke dishes. Brick damage slight. "Reports have been exaggerated. Apparent damage was slight, except for loss of the Rogers Dam. Few minor after-shocks."

Lovelock (Franklin and 11th). VI. Motion rapid, lasted about $1\frac{1}{2}$ minutes. Direction E-W. Awakened all and frightened some in home. Rattled windows, doors, and dishes; house creaked. Rumbling heard. Hanging objects, pictures, and lighting fixtures swung E-W. Small objects shifted. "My husband thought he heard an explosion at the onset. To me it felt as though the house was getting a good shaking."

Lovelock (435 Western Ave.). VI. Motion rapid, rolling, lasted 3 minutes. Awakened and frightened all in home. Rattled windows, doors, and dishes; house creaked. Hanging objects, pictures, and lighting fixtures swung N-S and E-W. Shifted small objects. "Brick from chimney next door thrown through a car window of car in driveway and dented car door, also brick from our chimney fell."

Lovelock area. V. Motion rapid, lasted $1\frac{1}{2}$ minutes. Motion seemed in all directions. Awakened some in home. Rattled windows, doors, and dishes. Earth noises heard. Hanging objects, pictures, and lighting fixtures swung. Shifted small objects. "First earthquake ever felt and I was scared."

Stillwater area. Press reported on the highway (State 42 in Sec. 19, T19N, R30E) from Fallon to Stillwater one 300-foot long crack gaped down the middle of the road, a yard wide and three to six feet deep. It was the largest of a jumble of big cracks. Every farmhouse reported

23 August, 21:51:32*. Intensity VIII in Nevada. (cont.)

broken dishes or such incidents as overturned stoves, ricocheting furniture and pianos skating about rooms. Concrete brick chimney fell through the roof of one farmhouse, causing a ten-foot hole in the roof. It was reported the Stillwater area suffered more severely than during the July 6 shock. The Indian Reservation also suffered severely: ditches were broken, drainage canals caved in and gates were thrown out of line. Near the cemetery on the Indian Reservation there were cracks and silt boils in road (Pacific Fire Rating Bureau).

Stillwater (just west of). Reinforced-concrete highway (State 42) bridge, one span, 30 feet by 40 feet. Approaches settled about 3 inches. Cracking of beams and signs of battering at one end. Wingwall moved out. (Pacific Fire Rating Bureau)

Stillwater (C. E. Kent Ranch, NW $\frac{1}{4}$, SE $\frac{1}{4}$, Sec. 7, T19N, R31E). Old channel filled in and new one made to south. Several cracks parallel to channel in banks. Motion rapid, long duration. Direction N-S. Awakened all in home except a 7-year-old child. Rattled windows, doors, and dishes; house creaked. Hanging pictures swung. Three lamps and one mirror fell; refrigerator standing against a south wall fell north. "On August 23, a well that ceased flow on July 6 began to flow again; another went dry. My hot artesian well stopped flowing on August 23. The boring machine went down 125 feet and found blue clay and sand below this, then they struck water. The well was bored 325 feet deep, temperature 178°. Brick cellar badly cracked. August 23rd shock caused numerous cracks just east of my house in the yard. We are still (9-28) having tremors nearly every day."

Stillwater area (on State 42 about 3 miles west of Stillwater, H. H. Shoffner Ranch). "My husband and I were asleep when the first tremendous shock hit our house. The south end seemed to go straight up, then up and down and back and forth all at the same time. There was no power or lights. Electric clocks stopped at 9:51 p.m.; other clocks crashed to the floor and broke so have no idea how long the hard shaking lasted. House rocked for a long time afterward. Broke dishes, glasses, knickknacks, planters, and table lamps; all other lamps were toppled to the floor but not broken. Pictures on walls were turned halfway around and hanging on end. All furniture on the south end of the house was moved to the middle of room; range and water heater moved about 1 inch towards north. Tipped over fruit closet full of fruit in the wash house next to south wall; closet fell north. Moved cement laundry tubs north about 2 feet, but didn't overturn. Washing machine, next to east wall, was moved north about 4 feet. Wheels were locked so it had to skid. Turned over gasoline tank and stand. Tank contained 400 gallons of gas. Knocked hole in tank but tank rolled over so very little gas was lost. Loosened foundation of house, cracked walls, and cement steps pulled loose from house. Our land is damaged the most. Sunk fields and ditch banks, and filled in drains. The fields have big cracks in them and holes where sand and water bubbled up."

Stillwater area (in Sec. 32, T19N, R30E (approx.)). Ground cracks.

Stillwater area. (VII) Motion rapid, long duration. Direction N-S. Rattled windows, doors, and dishes; house creaked. Earth noises heard. Hanging objects, pictures, and lighting fixtures swung N-S. Shifted small objects and overturned range.

23 August, 21:51:32". Intensity VIII in Nevada. (cont.)

Stillwater area. VII. Haystacks in the Stillwater area and to the west were more generally down than in the 6 July shock. (Pacific Fire Rating Bureau)

Stillwater. VII. Motion rapid, one punch. Felt by and awakened all in community; frightened few. Direction N. All dishes fell to floor. Hanging objects swung N. Trees, bushes shaken strongly. Shifted small objects and furnishings; overturned vases, etc., small objects and furniture. Cracked walls, chimneys, and ground. Knickknacks, books, pictures fell. Twisting and fall of chimneys.

Stillwater. VII. Old adobe house (badly damaged in the 6 July shock) collapsed.

Stillwater Wildlife Management Headquarters (about 2 miles east of Stillwater). Ground cracked north of station. West side generally up relative to east side. Cracks increased in faulting near Rainbow Mountain (about 8 miles south of this location).

Upsal Hogback (located in Sec. 2, T20N, R28E, and Sec. 35, T21N, R28E, about $3\frac{1}{2}$ miles southeast of Upsal Siding on S.P. R.R.). Ground displacement east of Upsal Hogback.

Intensity VII: Nevada

Dixie Valley (about 25 miles northeast of Stillwater). Motion rapid, lasted about $1\frac{1}{2}$ minutes. Direction E-W. Felt by all in home and community; awakened all and frightened children in home. Rattled windows, doors, and dishes; house creaked. Hanging objects swung W. Shifted small objects and furnishings; overturned small objects and furniture. Cracked plaster and walls. Knickknacks, books, pictures, and plaster fell. Damage slight. "This shock did much more damage than the 6 July shock, but didn't last as long. Following shocks have all been of a sharper intensity as compared to the shocks following the main shock of 6 July but the motion subsides abruptly."

Gerlach. Motion rolling. Direction NE-E. Felt by, awakened, and frightened many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NE. Pendulum clock stopped, clock faced SW. Trees, bushes shaken strongly. Shifted and overturned small objects. Cracked ground. Knickknacks, books fell. Broke furniture. "Splashed much water out of city water tank. Shook many cans and bottles, etc., off shelves in store. Shook articles down from walls in homes and shook machines over in movie hall. Shock lasted from 3-5 minutes, according to different people. Most severe shock ever felt in Gerlach." Ground: Marshy, level.

Imlay. Motion rapid, lasted 2 minutes. Direction E-W. Awakened and frightened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Pendulum clock stopped. Trees, bushes shaken strongly. Shifted small objects and furniture. Cracked plaster, windows, walls, and chimneys. Knickknacks, books, pictures, and plaster fell. Broke dishes and windows. Twisting and fall of chimneys. Damage slight. Ground: Soil, compact.

Intensity VI: Nevada

Austin. Motion rapid, lasted $1\frac{1}{2}$ minutes. Direction E-W. Felt by all; awakened many and frightened few in community. Rattled everything; houses creaked. Hanging objects swung E-W. Pendulum clock stopped, clock faced S. Trees, bushes shaken strongly. Shifted and overturned some small objects. Cracked one chimney. Damage slight. Ground: Rocky, steep.

23 August, 21:51:32*. Intensity VI in Nevada. (cont.)

- Battle Mountain.** Motion rapid, lasted 3 minutes. Direction E. Felt by, awakened, and frightened many in community. Rattled windows and doors; frame creaked. Hanging objects swung NE. Pendulum clock stopped. Damage slight to masonry. Ground: Soil, compact, level.
- Berlin.** Motion rapid, lasted $1\frac{1}{2}$ minutes. Felt by all in community; awakened and frightened many. House shook violently.
- Dayton.** Motion rolling, lasted about 2 minutes. Direction E-W. Felt by and awakened all in community; frightened all. Rattled windows, doors, and dishes; house creaked. Shifted small objects. Ground: Rocky, level.
- Empire.** Motion slow, lasted 2 minutes. Felt by all in community; awakened and frightened many. Direction E-W. Rattled windows, doors, and dishes. Hanging objects swung. Cracked plaster. Knickknacks fell. Ground: Rocky, level.
- Fernley.** Motion rapid, lasted 5 minutes. Direction N-S. Felt by, awakened, and frightened all in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N-S. Pendulum clock stopped. Trees, bushes shaken moderately. Shifted small objects and furnishings; overturned vases, etc., small objects and furniture. Cracked plaster, windows, walls, and chimneys. Knickknacks, books, pictures, and plaster fell. "This was the worst shock ever felt here." Small tremor felt at 11:05 p.m. Ground: Soil, loose, level.
- Flanigan.** Motion rolling, lasted 30-45 seconds. Direction N-S. Felt by and awakened all in community; frightened all in home. Loud roaring sound heard during shock. Rattled windows and doors; house creaked. Doors out of line. Concrete and plaster cracks. Damage slight. Ground: Level, filled in.
- Goldfield.** Motion rapid, lasted 45 seconds. Awakened few and frightened few in community. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Shifted small objects and furnishings; knickknacks, books, pictures, and plaster fell. Damage slight. Ground: Rocky, level; filled in.
- Hawthorne (Naval Ammunition Depot).** Motion rapid, lasted $1\frac{1}{2}$ minutes. Felt by all in community; awakened many and frightened few. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Trees, bushes shaken moderately. Shifted small objects. Ground: Soil, compact, level.
- Hawthorne. V.** Motion slow, lasted over 1 minute. Felt by all and frightened many in community. Direction E-W. Rattled windows, doors, and dishes; frame creaked. Hanging objects swung E-W. "Locally, this shock seemed to be stronger than the one on 6 July. Possibly because more people were awake. To me the motion seemed very great but not rapid. It was described as being like the motion of a rocking chair and seemed to have two or three peaks of intensity." Ground: Soil, compact, level.
- Hasen.** Motion rapid, lasted $1\frac{1}{2}$ to 2 minutes. Direction E-W. Awakened all in home. Rattled windows and doors. Rumbling subterranean sounds heard. "Most noticeable was the slow beginning, the gradual increase of strength and motion, and the inability to walk without support. A swinging plant swung E-W for about 15-20 minutes."
- Hasen. V.** Motion rapid, lasted 3 minutes. Felt by all. Rattled windows, doors, and dishes; house creaked.
- Mason.** Motion rapid, lasted 1-2 minutes. Direction NE-SW. Felt by and awakened all in community; frightened many. Rattled windows, doors, dishes, and piano. Hanging objects swung N-NE. Pendulum clock

23 August, 21:51:32*. Intensity VI in Nevada. (cont.)

facing north stopped. Trees, bushes shaken strongly. Shifted small objects and furnishings; overturned small objects. Cracked plaster, windows, walls, chimneys, and ground. Knickknacks fell. Twisting of chimneys. Damage slight. "We think this shock was stronger than the 6 July shock. Seemed to be circular motion, predominating NE-SW. Canned goods in store tipped N-S." Ground: Rocky soil, loose, level and sloping.

Pyramid. Motion rapid, lasted 2 minutes. Felt by, awakened, and frightened all in community. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung N-S. Ground: Rocky soil, level.

Rawhide. Motion rapid, lasted over 1 minute. Felt by and awakened all in community; frightened many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Shifted small objects and furnishings. Ground: Rocky.

Red House. Motion slow. Felt by and awakened all in community.

Reese River (about 40 miles SW. of Austin). Motion rapid, lasted 1½ minutes. Felt by and awakened many in community; frightened few. Rattled windows, doors, and dishes; house creaked. Cracked plaster and chimneys. Damage slight. "To us this was the strongest." Ground: Compact.

Schurz. Motion rapid, lasted about 1 minute. Direction E-W. Felt by and awakened all in community; frightened few. Rattled windows and blinds; frame creaked. Hanging objects swung. Pendulum clock facing south stopped. Shifted small objects. Ground: Compact, level.

Silverpeak. Motion rapid. Awakened all in community. Rattled windows, doors, and dishes; house creaked. Ground: Sloping, steep.

Twin Springs (60 miles east of Tonopah). Motion rapid, lasted 1½ minutes. Direction NW-SE. Felt by and awakened all in community. Rattled windows; frame creaked. Trees, bushes shaken moderately. Cracked plaster. Damage slight to concrete. "We have had several light shocks since this one. They all seem to shake about the same way, although some are just a light, rolling motion. Twin Springs is a cattle ranch, and all the animals seem upset and run around the fields for a short time after the larger shocks." Ground: Level, marshy.

Valmy. Motion slow at first, then severe shake, lasted 20 seconds. Direction N-S. Felt by and awakened all in community; frightened many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung N-S. Trees, bushes shaken moderately. Shifted small objects and furnishings; knickknacks, books, and pictures fell. Ground: Gravelly.

Virginia City. Motion slow, lasted 1 minute. Direction N-S. Felt by and awakened all in community; frightened many. Rattled windows; house creaked. Pendulum clock stopped. Trees, bushes shaken slightly. Ground: Rocky.

Wabaska. Motion rapid, lasted 1 minute. Felt in home and community (some outdoors; active); frightened few. Rattled windows, doors, and dishes. Hanging objects swung NE. Knocked some canned goods from store shelves. Ground: Rocky soil, compact.

Wadsworth. "I was away, but everyone in town says it was worse than the 6 July shock here."

23 August, 21:51:32*. Intensity VI in Nevada. (cont.)

Winnemucca. Press reported a sharp E-W motion jolted residents and created mild excitement. Although no serious damage was reported, store owners and housewives had the task of picking up scattered canned goods toppled from shelves in addition to broken glassware set too close to edges. Night clubs and hotels emptied after the first shock. The streets remained filled with people long after midnight. A drugstore wall was reportedly cracked.

Winnemucca (east section). Motion rolling, swaying, abrupt onset. Felt by all; few alarmed. Creaking of buildings and rattling of loose objects heard by nearly all. Disturbed objects observed by several. Few small cracks reported but may have been old. Water splashed from containers N-S. Pendulum clock with pendulum swinging NE-SW stopped. "I was awakened by violent swaying of the bed and by paint can falling from shelf in basement. Everyone in town was outside." Ground: Alluvial cone.

Winnemucca. Motion slow, lasted 30 seconds. Direction NW. Felt by and awakened many in community (some outdoors; active); frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NW. Damage slight. Ground: Soil.

Winnemucca (5 miles southwest of, at airfield). Motion rolling and swaying N-S, gradual onset. Everyone contacted felt the shock; few alarmed. Creaking of buildings and rattling of loose objects heard by nearly all. Window blinds appeared to sway mostly N-S; however, direction of movement was not too distinct. Pendulum clock stopped. "The shock came on gradually as from the rumbling of a near-by train. About 1 minute after start of shock the airport building was shaken severely for a period of about 20 seconds. This jolting was so hard one would have gone outside had the building been poorly constructed. At the end of this 20-second period gentle movements were felt for 2 or 3 minutes."

Yerington. Press reported the shock was strong enough to topple merchandise from store shelves and cause a few minor cracks in business structures and in the courthouse.

Yerington. Motion rapid. Awakened all in community. Rattled windows, doors, and dishes. Hanging objects swung NE. Overturned vases, etc., small objects, and furniture. Ground: Compact.

Intensity VI:

Baxter. Motion slow, lasted about 2 minutes. Awakened all in community; frightened few. Rattled windows, doors, and dishes; stairwell in center of house creaked. Hanging objects swung and hanging towels swung in arc of 6 to 8 inches. Ground: Soil, sloping, filled in.

Chilcoot. Hard shake, short duration. Felt by all in community. Some canned foods shaken from shelf.

Coleville. Motion slow, lasted $1\frac{1}{2}$ minutes. Direction NE. Felt by and awakened all in community; frightened many. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Shifted small objects. Damage slight. "Felt strongly by all." Ground: Rocky soil, compact, level and sloping.

Floriston. Lasted $1\frac{1}{2}$ minutes. Felt by and frightened many in community. Rattled windows. Hanging objects swung. Cracked plaster. Damage slight. Ground: Rocky, steep.

23 August, 21:51:32*. Intensity VI. (cont.)

Meeks Bay. Motion rolling, lasted 2 minutes. Felt by and awakened all in community; frightened many. Rattled windows, doors, and dishes; house creaked. Ground: Compact, level.

Sonora. Motion both rapid and slow. Direction NE. Felt by most people; awakened few; frightened many. Rattled windows and doors; frame creaked. Hanging objects swung NE. Cracked plaster and foundation. Damage slight to concrete. Ground: Rocky soil, compact, level.

Yosemite National Park. Motion slow, lasted 4-5 minutes. Direction E-W. Felt by and awakened all in community; frightened few. Everything shook; walls creaked. Hanging objects swung. Pendulum clock stopped. Shifted small objects. Damage slight.

Intensity VI: Utah

Lucin. Motion slow, lasted 2 minutes. Direction N. Felt by, awakened, and frightened all in community. Rattled windows; shook all houses. Hanging objects swung N. Ground: Soil, level.

Intensity V: Nevada

Beowawe. Motion rapid, lasted a few seconds. Felt by and awakened many in community; all in home. House creaked. "Awakened most everyone but in most instances it was over before one became fully awake. Telegrapher at railroad depot said the building shook considerably." Ground: Rocky, level.

Carlin. Motion rapid, lasted 1 minute. Felt by and awakened many in community (some outdoors; active); frightened few. Rattled windows, doors, and dishes. Hanging objects swung. Trees, bushes shaken moderately. Shifted small objects. "Pickup truck loaded with tanks and cans shook so strongly that rattling of contents awakened people in house." Ground: Compact.

Carson City (northeast section). Motion swaying, gradual onset. Direction W-E. Felt by many in community; few alarmed. Creaking of buildings and rattling of loose objects heard by many. Faint subterranean sounds heard by several at time of shock. Chimes on Capitol building rang. Chandeliers and flower pots swung W-E. Several electric clocks stopped. Ground: Sandy. Slight shock felt at 22:30.

Carson City. Motion slow, lasted 5 minutes. Direction E-W. Felt by and awakened many in community; frightened few. Hanging objects swung E-W. Ground: Soil, level.

Crystal Bay. Motion slow, lasted 5 minutes. Felt by several in home. Rattled windows, doors, and dishes; frame creaked. Hanging objects swung. Shifted small objects. Ground: Soil.

Deeth. Motion rapid, lasted 3-4 minutes. Felt by and awakened many in community. Rattled windows and doors. Splashed water in bath tub with rapid motion. Windows on east side of house rattled longer than windows on the west side. "This shock was stronger than the 6 July shock."

Denio. Motion slow, lasted 1 second. Felt by all. Direction NE. Ground: Soil.

Duckwater. Motion slow. Felt by several; awakened and frightened few. Rattled windows; walls creaked. Hanging objects swung; rocking chair rocked. Shifted furnishings; moved furniture.

Dyer. Motion slow, rocking, lasted about 1 minute. Direction E-W. Felt by and awakened many in community; frightened few. Rattled windows.

23 August, 21:51:32*. Intensity V in Nevada. (cont.)

- Hanging objects swung E-W. Ground: Soil, loam, level.
- East Walker River Ranch.** Motion slow, lasted 3 minutes. Direction E. Felt by many in homes; awakened all and frightened few in observer's home. Rattled windows, doors, and dishes; house creaked. Shifted small objects and furnishings. Ground: Rocky, loose, sloping.
- Eureka.** Motion slow. Direction E-W. Felt by and awakened many in community (some outdoors; quiet); frightened few. Rattled windows; walls creaked. Hanging objects swung. Pendulum clock facing north stopped. Shifted small objects. Ground: Soil, loose.
- Eureka.** IV. Press reported buildings rocked, but no damage. Rolling motion lasted about $1\frac{1}{2}$ minutes.
- Givens Ranch** (18 miles east of Austin). Motion slow, lasted about 1 minute. Direction NE. Felt by and awakened all in home. Rattled windows. Hanging objects swung NE. Shifted small objects and furnishings; knickknacks fell. Ground: Soil, sloping.
- Glenbrook.** Motion slow, rolling, lasted over 1 minute. Direction E. Awakened many and frightened few in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung E-W. Ground: Soil, compact.
- Golconda.** Motion rapid. Awakened and frightened all in home. Rattled windows, doors, and dishes; house creaked. Ground: Compact, level.
- Hiko.** Motion rapid, lasted 2 minutes. Felt by and awakened many in community; frightened few. Rattled windows and doors; walls creaked. Hanging objects swung NE-SW. Shifted beds on casters. Ground: Soil, compact, level.
- Jiggs.** Motion rapid, lasted 4 minutes. Direction E. Loud rumble heard. Felt by and awakened many in community, all in home; frightened few in home and community. Rattled windows and doors; house creaked. Bed swayed up and down. Hanging objects swung NE. Trees, bushes shaken moderately. Shifted small objects. "This shock was stronger than the one on 6 July." Ground: Soil, compact.
- Kaiser Mine** (about 70 miles southeast of Fallon). Motion rapid, lasted 1 minute. Felt by all and frightened few in community; awakened all in home. Rattled windows and doors. "Shock resembled an extremely strong gust of wind striking the house." Ground: Rocky, compact, sloping.
- Lamoille.** Motion slow, lasted 10 seconds. Awakened many in community; frightened few. Rattled windows, doors, and dishes. Hanging objects swung. Ground: Rocky, level.
- Luning.** Motion slow, very long and rolling, lasted 1 minute. Felt by all in community; awakened all in home; frightened few. Direction E. Rattled windows and dishes; walls creaked. Hanging objects swung. Trees, bushes shaken strongly. Ground: Compact.
- McDermitt.** Motion slow, lasted 3 minutes. Awakened many in community; frightened few. Rattled windows. Shifted small objects and furnishings. Ground: Level.
- Millett Ranch** (about 36 miles south of Austin). Motion rapid, lasted 15 seconds. Direction E-W. Felt by and awakened all at ranch. Rattled windows, doors, and dishes. Ground: Compact, level, marshy.
- Mina.** Motion slow, lasted about $1\frac{1}{2}$ minutes. Direction N-S and E-W. Awakened and frightened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung.
- Minden.** Motion slow, lasted about 5 minutes. Direction E-W. Felt by and awakened many in community; frightened few. Rattled windows,

23 August, 21:51:32*. Intensity V in Nevada.. (cont.)

- doors, and dishes; house creaked. Hanging objects swung E-W. Some pendulum clocks stopped. Ground: Soil.
- Montello.** Motion slow, lasted 30 seconds. Felt by many in home, awakened and frightened few. Rattled windows, doors, and dishes; house creaked. Pendulum clock stopped. Shifted small objects; knickknacks fell. Damage slight. Ground: Soil, loose.
- Nixon.** Motion rapid, lasted about 4 minutes. Direction E-W. Felt by all; awakened and frightened many in community. Hanging objects swung. Ground: Soil.
- Orovada.** Motion rapid, lasted 1 minute. Direction E-W. Felt by all in home; awakened many and frightened few in community. Rattled windows, doors, and dishes. Hanging objects swung. Pendulum clock facing south stopped. Shifted small objects. Damage slight. Ground: Soil, level, compact.
- Palisade.** Motion rapid, lasted 2 minutes. Direction E. Felt by several in community (some outdoors); awakened and frightened few in community. Rattled windows, doors, and dishes; house creaked. Trees, bushes shaken moderately. Pictures fell. Ground: Soil, compact, level.
- Paradise Valley.** Motion slow, lasted several minutes. Felt by and awakened many in community; frightened few. Rattled windows and doors. Hanging objects swung E-W. Ground: Soil, level.
- Reno.** Motion rapid, long duration. Felt by all; awakened and frightened many in community. Rattled windows and doors; walls creaked. Hanging objects swung. Trees, bushes shaken moderately.
- Shafter.** Motion rapid, lasted 10 seconds. Awakened all in home; frightened few in community.
- Smith.** Sharp, jerking motion, lasted 1 minute. Direction E-W. Felt by many in community; awakened all in home. Rattled windows and doors. Light cords swung E-W. Pendulum clock started. Ground: Level.
- Sparks.** Motion rolling, lasted 1 minute. Direction N-S. Felt by and frightened many in community. House creaked. Hanging objects swung N. "The motion seemed to be longer and more rolling than the 6 July shock. Good strong shock, and frightened all questioned." Ground: Soil, level, compact.
- Steamboat.** Motion slow, lasted 3 minutes. Direction E-W. Awakened all in home. "Not as strongly felt here as the 6 July shock." Ground: Level, compact.
- Tonkin Ranch** (about 40 miles southwest of Palisade). Motion slow, lasted 2 minutes. Felt by, awakened, and frightened all in home. Rattled windows and doors; walls creaked. Hanging objects swung E-W. Pendulum clock stopped, clock faced E-W. Ground: Soil, compact, sloping.
- Tonopah.** Motion slow, lasted about 1 minute. Direction NE-SW. Felt by and awakened many in community. Ground: Rocky.
- Tonopah.** Press reported dishes rattled and overhead chain fixtures swung slowly back and forth. One Tonopah resident, who lives on the outskirts, said it "Felt like the house was coming off the foundation." The CAA communication tower personnel reported radio receivers fell from racks.
- Tonopah** (8 miles east of). IV. Motion swaying, gradual onset. Direction S-N. Felt by many.

23 August, 21:51:32*. Intensity V in Nevada. (cont.)

- Tungsten.** Motion rapid, lasted 1 minute. Felt by many and awakened all in home. Rattled windows, doors, and dishes. Hanging objects swung. Ground: Rocky, level.
- Tungsten.** Motion rapid, lasted 1-2 minutes. Awakened all and frightened some in home. Rattled windows, doors, and dishes; house creaked. Hanging objects, pictures, and lighting fixtures swung.
- Verdi.** Motion rapid, lasted about 1 minute. Felt by all; awakened and frightened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. "This shock seemed to have a rocking motion and to last longer than most shocks." Ground: Rocky.
- Visbah Ranch** (25 miles south of Austin). Motion rapid. Felt by all in home. Rattled windows, doors, and dishes. Overturned small objects.
- Wells.** Motion rapid, lasted 3 minutes. Direction NE. Awakened many and frightened few in community. Rattled windows. Shifted small objects. Overturned vases; knickknacks fell. Ground: compact, level.
- Wells.** IV. Press reported the shock was felt by many and a number were awakened by rolling of beds. Others in bed but not asleep said they felt a distinct shock. The Capitol building creaked and "groaned" and a man ran from the building. No damage was reported.

Intensity V:

- Adin.** Motion slow, lasted 1 minute. Awakened and frightened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Compact.
- Alturas.** Motion trembling and rocking, gradual onset. Felt by many; few alarmed. Creaking of buildings and rattling of loose objects heard by many. Disturbed objects observed by several. Sewing machine rolled east to west; light fixtures swung east-west.
- Alturas.** IV. Motion slow, lasted 10 seconds. Felt by several and awakened few. Doors rattled slightly.
- Benton.** Motion slow, lasted 1 minute. Felt by and awakened many in community; frightened few. Rattled windows, doors, and dishes slightly; house creaked slightly. Hanging objects swung. "Another shock felt at 22:00, and small shocks felt all during night." Ground: Rocky soil, level.
- Benton Inspection Station** (Benton). Motion slow, lasted 2 minutes. Direction N. Felt by and awakened many in community. House creaked. Hanging objects swung. Shifted small objects. Ground: Sandy soil.
- Bishop.** Motion rapid, then slow, rocking, lasted 5 minutes. Direction N-S. Felt by all and awakened many in community; frightened few. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung; bell chimes rattled. Trees, bushes shaken moderately. Ground: Glacial till, level.
- Camp Connell.** Motion rapid, lasted 5 minutes. Direction N. Awakened many in community. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung N. Trees, bushes shaken slightly. Knickknacks fell. Ground: Rocky, compact, sloping.
- Cedarville.** Motion slow, lasted 30 seconds. Direction N. Awakened all in home. Hanging objects swung. Ground: Soil; filled in.
- Chico.** Press reported a crack appeared in the concrete-block Labor Temple building.
- Chico.** Motion rapid, lasted 10 seconds. Felt by many. Rattled dishes. Pendulum clock facing southwest stopped. Hanging lamps swung. "Some claim slight damage: cracked wall, etc."

23 August, 21:51:32*. Intensity V. (cont.)

Clements. Felt by and awakened many. Rattled windows.

Colfax. Motion slow to rapid, lasted 8-10 seconds. Felt by and awakened many in community; frightened few. Rattled windows and doors; walls creaked. "Some did not feel it at all. Some said it started with a slow motion, then increased, then nearly stopped, then another sharp shock. I was asleep and it shook my bed enough to awaken me, but I went right back to sleep. Wasn't sure if it was a shock."

Downieville. Motion slow, lasted 30 seconds. Direction SW. Felt by and awakened many in community; frightened few. Rattled windows and doors. Ground: Soil, compact.

Doyle. Motion rocking, rapid onset. Felt by many. Rattling of loose objects and creaking of buildings heard by several. Clocks stopped. Ground: Sandy.

Doyle. Motion rapid, lasted 30 seconds. Awakened many in community; frightened few. Rattled windows, doors, and dishes. Hanging objects swung. Pendulum clock stopped. Ground: Level, loose.

Eagleville. Motion rapid, lasted several minutes. Felt by (some outdoors; active) and awakened many in community; frightened few. Rattled windows; house creaked. Hanging objects swung N. Shifted small objects. Ground: Soil, level.

Foresthill. Motion slow, gradual onset, lasted about 3 minutes. Direction NE. Felt by many; awakened and frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NE. Shifted small objects and furnishings. Trees, bushes shaken slightly. Ground: Rocky soil.

Fort Bidwell. Motion rapid and slow, lasted about 10 seconds. Felt by all in community; awakened all in home. Hanging objects swung. Ground: Rocky soil.

Fort Bidwell (3/4 mile southeast of). IV. Motion rocking, abrupt. Direction E-W. Felt by many. Rattling of loose objects and creaking of buildings heard by many. House swayed noticeably. Window weights, dishes, and light articles rattled. "No particular alarm." Ground: Gravelly.

Galt. Motion slow, momentary duration. Awakened many in community. Rattled windows; frame creaked. Hanging objects swung. Ground: Level, compact.

Jackson. Motion slow, lasted 1 minute. Felt by many (some outdoors) and awakened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Rocky, sloping.

June Lake. Lasted about 30 seconds. Awakened many in community. House creaked. Trees, bushes shaken slightly.

Knights Ferry. Motion slow, lasted 1 minute. Felt by nearly all in community; awakened many; frightened few. Rattled windows and doors; walls creaked. Ground: Soil, loose, sloping.

Kybur. Motion rapid, lasted a few minutes. Felt by all and awakened many in community; frightened few. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Shifted small objects; knickknacks, books, and pictures fell. Ground: Rocky soil, compact, level.

Lake Spaulding (Emigrant Gap). Motion swaying, abrupt onset, tapered off, then built up to second shock. Direction SE-NW. Felt by several. Rattling of loose objects and creaking of buildings heard by several. Visible swaying of buildings and trees. Small unstable objects displaced. Ground: Rocky.

23 August, 21:51:32*. Intensity V. (cont.)

- La Porte.** Motion slow, lasted a few minutes. Felt by and awakened many in community; frightened few. Rattled windows and doors. "Two shocks felt here about 10 minutes apart."
- Laws.** Motion rapid, long duration. Direction E-W. Felt by and awakened many in community (some outdoors). Rattled windows and doors; house creaked. Hanging objects swung. "This was a strong shock and lasted for some time. Windows rattled long after shock had stopped." Ground: Level.
- Lodi (southeast section).** Motion swaying, gradual onset. Direction N-S. Felt by and alarmed many. Rattling of loose objects and creaking of buildings heard by many. Disturbed objects observed by many. Visible swaying of buildings and trees. Chandelier and other hanging objects swung. Other shocks felt at 21:55 and 22:29. Ground: Sandy.
- Madeline.** Motion slow. Felt by many (some outdoors) and awakened many in community; frightened few. Rattled windows and doors; house creaked.
- Merced.** Motion rolling, lasted 1 minute. Direction SE-NW. Awakened many in community; frightened few. Rattled windows and doors; walls creaked. Hanging objects swung. "About as strong as shock on 6 July." Ground: Soil, compact, level.
- Nevada City.** Two distinct shocks, followed by several light ones. Quite violent. Motion rolling, rapid, lasted 30 seconds. Direction E-W. Felt by many in home; awakened all. Rattled windows, doors, and dishes; house creaked. Rocking of bed awakened observer. "Strongest shock I ever felt." Ground: Rocky.
- Newman.** Motion rapid, lasted 2-3 minutes. Felt by many in home; awakened many. Rattled windows, doors, and dishes; house creaked some. Hanging objects swung. Shifted and overturned some small objects; knick-knacks fell. Ground: Soil, compact.
- Norden.** Motion rapid. Direction W. Felt by and awakened many in community. Rattled windows. Doors swung.
- Omo Ranch.** Motion slow, lasted 1 minute. Direction E. Felt by all and awakened many in community. Rattled windows and doors; house creaked. Trees, bushes shaken slightly. Ground: Soil.
- Orland.** Press reported one man said he found fallen plaster on a chair in his office and there was a crack in the wall of the concrete-block building that had not been there before. One woman saw chandeliers swaying in her home but did not feel the shock. In all the valley towns damage, if any, was minor, and most people slept through the shock. (The postmaster at Orland reported: "Except for this press report, I did not hear of anyone in Orland feeling the shock.")
- Owens Valley (Independence).** Motion slow. Felt by and awakened many in community. Hanging objects swung.
- Pinecrest.** Motion rapid, lasted 30 seconds. Direction NE-SW. Felt by many in community; frightened all in home. Entire house rattled and creaked. Ground: Soil, loose.
- Portola.** Motion rapid, lasted 8 seconds. Felt by many in home; awakened and frightened many. Rattled windows.
- Quincy.** Motion rapid, lasted about 30 seconds. Direction E. Shifted dishes.
- Ravendale.** Motion slow, lasted 1-2 minutes. Awakened many in community; frightened few. House creaked. Ground: Rocky soil, level.
- Red Bluff.** Motion slow. Awakened all in home. Pendulum clocks (4) stopped, clocks faced NE and NW. Ground: Soil, compact, level.

23 August, 21:51:32*. Intensity V. (cont.)

Red Bluff. IV. Press reported a woman heard a roaring noise and creaking of house. In the Antelope District a dizzy sensation was experienced. House creaked. Caused water pump to start and stop for a couple of minutes.

Roseville. Motion slow, rolling, lasted 2 seconds. Direction N. Felt by several on ranch; awakened all. Ground: Compact.

Sacramento. Press reported the shock was widely felt throughout Sacramento. Reports on the intensity ranged from sharp to a gentle rolling motion. Houses creaked and chandeliers swung all over the city. Dispatcher reported the Pacific Gas and Electric powerhouse on Jibboom Street was rocked. A woman at 2205-17th Street said her house swayed from side to side and Venetian blinds banged. Parrot fell from perch. In one home a floor lamp nearly fell over. Jiggled glasses and spilled liquid in many bars. Woman on the ninth floor of hotel said entire room seemed to rock and another hotel reported beds moved. Two traffic accidents occurred just as the shock struck. The big clock atop the City Hall stopped.

Sacramento (2619 Marty Way). IV. One slight bump, followed by an almost imperceptible swaying. Building creaked and loose objects rattled. Light fixtures and door chimes appeared to swing in E-W direction. Ground: Loam.

Sacramento. IV. Motion slow, lasted several seconds. Felt by many and frightened few in community. Rattled windows and doors. Hanging objects, doors, etc., swung.

San Andreas. Motion slow. Direction NE. Felt by (some outdoors) and awakened many in community; frightened few. Trees, bushes shaken slightly. Ground: Soil.

Sierra City (northeast section). One long shock, motion rocking, gradual onset. Felt by all. Rattling of loose objects and creaking of buildings heard by several. Roaring subterranean sounds heard by many before shock. Visible swaying of building and trees. Beds, chandeliers, and glassware swayed. "No alarm, but definitely felt by all. It was peculiar in the fact that it was heard 15 to 20 seconds before it was felt. In fact, it was so plain that I accused my wife of lighting the heating stove: sounded like a roaring fire."

Sierraville. Motion slow, lasted 1 minute. Direction E-W. Felt by, awakened, and frightened all in home. Rattled windows, doors, and dishes; house creaked. Ground: Marshy.

Stockton. Motion slow, lasted 10 seconds. Direction E-W. Awakened many in community. Hanging objects swung. Ground: Compact.

Tahoe City. Motion slow, lasted 10 seconds. Direction N., then E-W. Awakened many in community. House creaked. Hanging objects swung E-W. Ground: Rocky.

Thornton. Motion slow, lasted 1 minute. Direction E-W. Awakened many in community; frightened few. Rattled windows. Hanging objects swung. Ground: Marshy, level.

Trowbridge. Motion slow, lasted 30 seconds. Direction NE. Felt by many in community; awakened and frightened few. Rattled windows; walls creaked. Hanging objects swung. Trees, bushes shaken slightly. Shifted small objects. Ground: Compact, level.

Truckee. Motion slow. Direction E-W. Awakened many in community. Rattled windows, doors, and dishes. Shifted small objects and furnishings.

Tulelake. Motion slow. Direction E-W. Frightened many in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung NE. Trees, bushes shaken moderately. Shifted small objects. Ground: Marshy, level.

23 August, 21:51:32*. Intensity V. (cont.)

Tulelake. IV. Press reported whenever Fallon, Nevada, has an earthquake, the basin has one too, for on Monday night came that getting-to-be familiar feeling,-earthquake. Two northerly tugs were felt, then a settling to the south. Aftershocks were felt for another ten minutes. No real damage was done. Residents reported a slight sickness for a minute. Dishes rattled and doors creaked.

Tulelake. IV. Motion swaying, gradual onset, lasted altogether about 10 minutes. Felt by several. Rattling of loose objects heard by several. Doorbell chimes rang in some homes. Sliding doors moved. Ground: Reclaimed lake bed; organic peat.

Wawona (southwest section of Yosemite National Park). Two shocks felt. Motion bumping, abrupt onset. Direction S-N. Felt by and awakened several. Rattling of loose objects and creaking of buildings heard by several. Disturbed objects observed by several. Visible swaying of buildings and trees. Lamp shades and gun cases swayed. Movement observed in vaulted overhead. Mild alarm. Ground: Granitic soil.

Wendel. Motion rapid, lasted 1-2 minutes. Felt by many, some outdoors; awakened several. Building shook. Hanging objects swung NE.

"Friends coming from Susanville said car felt like it had four flat tires. Several experienced this feeling on way home. The Southern Pacific depot, which sets off ground, really shook. Chickens were all shaken off roost at one place. Barking dogs awakened people. Wall lamps swayed back and forth. To me the room shook more violently than ever before, but no damage and nothing shaken down."

Yosemite National Park (floor of Yosemite Valley). Motion rolling and swaying, abrupt onset, lasted about 30 seconds. Felt by most people. Disturbed objects observed by many. Lamps, pictures, and mirrors swayed. "Many people got out of bed to observe earthquake effects."

Yosemite National Park (Yosemite Valley). Motion rapid, lasted 30 seconds. Direction E-W. Felt by (some outdoors) and awakened many in community; frightened few. Hanging objects swung. Ground: Soil, level; old lake bed.

Yosemite National Park (near base of Yosemite Falls). IV. Seemed to be three shocks. Several bumps, followed by rolling motion. Felt by several. Building creaked; loose objects rattled. Rumbling subterranean sounds, like train approaching, heard short time before and during shock. Disturbed objects reported by one. Chandeliers swayed E-W. "For those who observed the shock there was mild interest." Ground: Deep unconsolidated ancient lake fill.

Intensity V: Idaho

Boise. Press reported lights and other fixtures swayed. Many calls were received from the Ustick area, along Harrison Boulevard, and from various points on the bench. One woman in the Ustick area reported her bed moved; another report stated chairs moved, and a man reported things moved in hotel room.

Boise. Motion rapid. Felt by and awakened many in community; frightened few. Rattled windows, doors, and dishes. Hanging objects swung. Shifted small objects and furnishings. Damage very slight, if any. Ground: Soil.

Grand View. Felt by several in home and community (some outdoors; active); awakened and frightened few. Shifted small objects and furnishings; pictures fell. Ground: Soil, level.

23 August, 21:51:32*. Intensity V in Idaho. (cont.)

- Nampa.** Press reported the shock was felt at various points in town. People called the police station and sheriff's office to find out what was happening. Windows were reported cracked.
- Weiser.** Motion slow, lasted 5 seconds. Awakened all in home. Rattled dishes; walls creaked. Hanging objects swung.

Intensity V: Oregon

- Jordan Valley.** Motion rapid, lasted 15-20 seconds. Direction W-E. Generally felt in town. Rattled windows, doors, and dishes. Shifted small objects and furnishings; overturned small objects. Lamps swayed; chair rocked. Chickens cackled; dogs barked. Ground: Level.
- Lakeview.** Felt by and awakened many in community; frightened few. Hanging objects swung.
- Merrill.** Motion slow, lasted 2 minutes. Felt generally (some outdoors; quiet); awakened few. Very slight rattling of windows, doors, and dishes; barely noticeable creaking of house. Shifted small objects and overturned small objects on shelves; knickknacks and books fell. Damage slight. Ground: Loose, level.
- Summer Lake.** Motion rapid, lasted about 1 minute. Felt by observer in home; awakened one. House creaked. Shifted small furnishings to east. Beds on casters rolled. Roaring sound like strong wind heard. Ground: Level.
- Valley Falls.** Motion slow. Felt by several in home; awakened few in community. Shook bed. Shifted small objects.
- Whitehorse Ranch** (about 20 miles SE. of Andrews). Motion slow, lasted about 5 seconds. Awakened many in community; frightened all in home. Hanging objects swung NE-SW. Ground: Soil, compact.

Intensity V: Utah

- Lynn.** Motion slow. Lasted 1 minute. Felt by many in community. Direction W-E. Rattled windows, doors, and dishes. Hanging objects swung. Shifted small objects and furnishings. Ground: Compact.
- Wendover.** Motion rapid, lasted 3 minutes. Felt by several at work; awakened few in community. Rattled windows and dishes. Hanging objects swung NE. Pendulum clock facing NE-SW stopped. Ground: Gravel base, compact, level.

Intensity IV: Nevada

- Alamo.** Motion slow. Felt by many in community; frightened few. Rattled windows slightly.
- Caliente.** Motion slow, lasted 30 seconds. Felt by many and awakened few in community. Hanging objects swung N. Ground: Soil, compact, level.
- Contact.** Motion slow, brief. Felt by several in community; awakened and frightened few. Rattled windows and doors; walls creaked.
- Currie.** Motion slow, lasted 30 seconds. Felt by many in home.
- Elko** (central section). Motion rocking, abrupt onset. Felt by most people. Creaking of buildings and rattling of loose objects heard by most. Disturbed objects observed by several. "Few alarmed, but just topic of conversation to most people." Ground: Compact soil.
- Ely.** Motion rapid, lasted 3 seconds. Direction NE. Felt by many in community. Rattled windows. Ground: Compact, level.
- Ely** (Yelland Field, Weather Bureau Airport Station). Motion trembling, rapid onset. Felt by few. Disturbed objects observed by few. Ground: Rocky.

23 August, 21:51:32*. Intensity IV in Nevada. (cont.)

- Fish Lake Valley (Dyer). Motion swaying, abrupt, lasted about 1 minute. Direction E-W. Felt by nearly all in valley; few alarmed. Creaking of buildings and rattling of loose objects heard by many. Loose chains on bedroom windows swung E-W; planters swung back and forth E-W. Ground: Sandy loam.
- Halleck. Motion rapid, lasted 1 minute. Felt by several and awakened few in community. Walls creaked. Ground: Soil, compact, level.
- Lund. Motion slow, lasted 1 minute. Direction E-W. Felt by many in home. Hanging objects swung. Ground: Soil.
- Mountain City. Motion slow, lasted 2-3 minutes. Felt by several and awakened few in community. House creaked. Ground: Rocky soil, level.
- Pioche. Motion slow, momentary duration. Awakened few. Trees, bushes shaken slightly.
- Ruby Valley. Motion slow, lasted 1½ minutes. Felt by many in community; awakened and frightened few. Rattled windows. Hanging objects swung.
- Shoshone. Motion slow, lasted about 35 seconds. Felt by several and frightened few in community. Rattled windows, doors, and dishes. Hanging doors swung NE.
- Springdale (Beatty). Motion moderate, lasted 3 minutes. Awakened observer. Entire house shook. Rattled windows, doors, and dishes. "Many shocks felt here."
- Vya (Sheldon Refuge). Motion slow, rocking, lasted 40-60 seconds. Direction N. Felt by several. Rattled windows, doors, and dishes. Trees, bushes shaken slightly.
- Wellington. Motion slow, lasted 2-3 minutes. Felt by several; awakened and frightened few in community. Rattled windows, doors, and dishes.
- Wilkins. Motion slow, momentary duration. Felt by several and awakened few in community. "Felt slight shock waves." Ground: Level.

Intensity IV:

- Ahwahnee. Motion rapid, lasted 2-3 seconds. Felt by few in community. House creaked. Ground: Rocky.
- Applegate. Motion slow, lasted 15 seconds. Felt by several in home; awakened and frightened few in community. Ground: Rocky, level.
- Arbuckle. Motion slow. Felt by several, outdoors by some. Walls creaked. "Felt mostly 5 miles south. Slight."
- Auburn. Motion slow. Felt by several. Rattled doors and dishes.
- Blue Canon Airport (Emigrant Gap). Motion bumping, gradual onset. Felt by several. Creaking of buildings and rattling of loose objects heard by several. Faint grating and scraping subterranean sounds heard by several for a few seconds at time of shock. Wall clock counter balance swayed. All slightly alarmed. Ground: Rocky.
- Caruthers. Motion slow, lasted a few seconds. Felt by several in home and community. Rattled windows, doors, and dishes; house creaked. Doors swung E-W. Ground: Sandy loam.
- Colusa. Motion rapid. Felt by many; awakened few. Rattled windows and dishes. Hanging objects swung.
- Coulterville. Motion rapid, lasted 30 seconds. Felt by many, outdoors by observer (active). Trees, bushes shaken slightly. Ground: Rocky.
- Courtland. Motion slow, lasted 15 seconds. Felt outdoors by some. Ground: Marshy.
- Dorris. Press reported the Butte Valley Star's building was shaken with an odd sort of undulation. The building creaked and all light fixtures swayed with a rhythmic motion. Creaking lasted for about 20 seconds,

23 August, 21:51:32*. Intensity IV. (cont.)

but the light fixtures and other hanging ornaments swung back and forth for several minutes. It was felt by many in the Macdoel and Mt. Hebron areas. The Southern Pacific section crew was called out to investigate the track. The Macdoel S. P. depot shook and creaked, and light fixtures swung.

Dorris. Felt by and frightened few in community. Rattled windows.

El Nido. Motion slow, lasted 2-3 minutes. Direction SE-NW. Felt by observer. Rattled windows and doors; house creaked. Hanging objects swung SE-NW. Ground: Soil, level.

El Portal. Motion slow, lasted 15 seconds. Felt by many in community; awakened many in home. Rattled windows. Ground: Filled in.

Firebaugh. Felt by several in home; awakened and frightened few.

Fresno. Motion slow, lasted 1 minute. Felt by and awakened few in community. Rattled windows, doors, and dishes.

Hanford. Motion slow, lasted about 30 seconds. Felt by several in community. Rattled windows and doors; walls creaked. Hanging objects swung. Not felt by observer in bed awake. Ground: Alluvium, level.

Hanford. Motion slow. Direction E-W. Felt by many in home. Rattled windows, doors, and dishes. Hanging objects swung.

Hollister (7 miles south of). Motion slow, lasted 20 seconds. Direction E-W. Felt by several in community; awakened and frightened few. Rattled doors; house creaked. Ground: Soil.

Kerman. Motion rapid, lasted 5 seconds. Awakened all in home. Windows rattled slightly. Ground: Compact.

Kings Canyon National Park. Motion rapid. Felt by many in home. Ground: Compact, sloping and steep.

Leevinig. Motion slow. Felt by many in community.

Mammoth Lakes. Motion slow, lasted 1 minute. Felt by many in home; awakened few. Rattled windows, doors, and dishes; house creaked. Ground: Soil, sloping and steep.

Markleeville. Motion slow, lasted about 20 seconds. Felt by observer in home. Frame creaked.

Marysville. Motion slow, lasted 30 seconds. Felt by and awakened many in home. Ground: Soil.

Mather. Motion slow. Felt by all in home; some outdoors (active); awakened few. Rattled windows, doors, and dishes; house creaked.

Milford. Motion slow. Felt by several in home; awakened few. Some rattling of windows, doors, and dishes; walls creaked. Trees, bushes shaken slightly. "We felt a gentle, swaying motion. Our house is very strongly built of logs. Other people in frame buildings felt it more strongly." Ground: Loose, sloping.

Mineral. Beds shook.

Modesto. Motion moderate, lasted 30-40 seconds. Felt by many in home and community. Gong type bell rang. Hanging objects swung E-W. Ground: Soil, level.

Oregon House. Motion rapid, lasted over 1 minute. Felt by few in hills; awakened and frightened few. Bed shook; windows rattled. "I was awakened by bed shaking and windows rattling. Did not know what it was at first, so did not awaken rest of family. Turned on radio and heard there had been an earthquake." Ground: Compact.

Oroville. Motion rapid. Felt by many in home; awakened few in community. Ground: Rocky soil, level.

Pittville. Motion slow, lasted about 25 seconds. Felt by several in home; awakened few in community. House creaked. Ground: Compact soil, level.

23 August, 21:51:32*. Intensity IV. (cont.)

Placerville. Motion slow, lasted 5 seconds. Felt by many in home; some outdoors (quiet); awakened few in community; frightened few in home. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Rocky, level.

Pollock Pines. Felt in home and community. Rattled windows, doors, and dishes; house creaked.

Prattville (west side of Lake Almanor). Motion bumping, felt like rolling rocks hitting foundation of house, rapid onset, lasted about 10 seconds, with maximum motion lasting about 5 seconds. Felt by observer and wife in house. Rattling of loose objects and creaking of buildings heard by many. Bumping subterranean sounds heard by many at and during shock. Light fixtures swung. "Quite widely felt; no alarm." Ground: Lava soil.

San Francisco. Press reported office worker said building "rolled like a ship at sea." Mounted deer head fell from a wall of KSAN studios on the tenth floor of the Merchandise Mart at Ninth and Market Streets.

San Joaquin. Motion slow. Felt by several in home; some outdoors (quiet); awakened few in home. Rattled windows; frame creaked. Ground: Soil, compact, level.

San Jose. Press reported many early-to-bed people were startled from sleep. Police said the Mercury's switchboards lit up with calls. Householders said the shock's noise sounded like prowlers in the attic or on the roof. Other reports were of shaken pictures and chandeliers and of jingling doorbell chimes. One man at 135 Viewmont Avenue, in the eastern foothills, said the shock caused beams in his open-beam living room ceiling to split.

San Martin. Motion slow, lasted 30 seconds. Direction NE-SW. House creaked. Hanging objects swung NE-SW. Ground: Soil.

Snelling. Motion slow, lasted 1 minute. Felt in community; awakened all in home; frightened few. Rattled windows, doors, and dishes; house creaked. "Felt slightly." Ground: River bottom.

Soda Springs. Felt by several in community (some outdoors); awakened and frightened few. Disturbed objects observed by several.

Stevinson. Motion slow, lasted few minutes. Direction E-W. Felt by several in community. Rattled windows, doors, and dishes; house creaked. Hanging objects swung. Ground: Soil.

Stirling City. Motion slow, lasted 1 minute. Direction N. Felt by many in community (some outdoors; quiet); awakened few. Hanging objects swung. Trees, bushes shaken slightly. Ground: Loose.

Susanville. Felt by several in home and community; awakened few in community. Hanging objects swung. Ground: Rocky, compact.

Westwood (3 miles SSW. of). Two shocks, lasted 3-5 seconds. Motion swaying, N-S, gradual onset. Felt by several; few alarmed. Creaking of buildings and rattling of loose objects heard by several. Disturbed objects observed by several. Hanging lantern swung about 2½ inches off center. Ground: Rocky (lava).

Woodland. Motion slow, lasted 2 minutes. Felt by many in community; awakened and frightened few. Rattled windows. Hanging objects swung. Ground: Soil.

Intensity IV: Idaho

Caldwell. Reported as quite heavy. Windows rattled; lamps swung.

Caldwell. II. Motion slow, lasted 2 seconds. Felt by few in town. "Just a slight tremor." Ground: Soil.

23 August, 21:51:32*. Intensity IV in Idaho. (cont.)

Emmett. Lasted 1 minute. Felt by several in community; awakened few. Faint earth noises heard. Rattled windows.

Emmett. Motion slow, lasted about 2 minutes. Awakened few in home. Rattled windows. Ground: Compact.

Hammett. Motion slow, lasted 30 seconds. "We were awakened and felt this rounding movement distinctly, but other people here were not awakened." Hanging objects swung. Trees, bushes shaken slightly. Ground: Compact, level.

Horse Shoe Bend. Motion slow, lasted 1 minute. Felt by several in community; awakened few. Ground: Rocky soil, level.

Maising. Reported as quite noticeable. Water in bath tub shaken.

Parma. Motion slow. Felt by many in home and community.

Intensity IV: Oregon

Adel. Motion rapid, lasted 2-3 minutes. Felt by several in home; awakened few. Rattled windows. Ground: Soil, loose, level.

Arock. Motion rapid, lasted 3 seconds. Felt by many in community; awakened few. Hanging objects swung. Ground: Compact, level.

Beatty. Motion slow, lasted 5-10 seconds. Felt by five in home and community; frightened some in home. Direction circular. Ground: Compact.

Burns (Federal Building). Motion swaying, S-N, lasted 1 minute. Felt by few. Doors rattled; desk lights quivered. Ground: Sandy loam.

Harper. Motion slow. Felt by several in home. Walls creaked. Hanging objects swung N. Ground: Compact.

Klamath Falls. Press reported doors banged against walls and dishes rattled.

Klamath Falls. Motion slow, lasted 1 minute. Direction N. Felt by many. Rattled windows. Hanging objects swung. Ground: Rocky.

Intensity IV: Utah

Ibapah. Motion slow. Felt by several in home. Rattled windows; walls creaked.

Milford. Pendulum clock facing north stopped. "No other information."

Murray. Felt by several. Rattled windows, doors, and dishes.

Salt Lake City. Press reported one of the strongest shocks in recent years shook Salt Lake City for up to 3 minutes.

Salt Lake City (west section). III. Motion trembling. Felt by several. Ground: Made.

Yost. Felt by several in community. Rattled windows. Hanging objects swung.

Intensity I to III: Nevada

Beatty. Slow, wavy motion felt in cafe.

Beatty. Motion slow, lasted 3 seconds. Felt by two in bar. Direction N-S. Hanging objects swung. Ground: Level.

Carp. Motion slow. Felt by several in home. Ground: Soil.

Lee. "Some say they felt it."

McGill. Motion slow, lasted a few seconds. Felt by few in community. Ground: Compact, sloping.

Yelland Ranch (Spring Valley Route, Ely). Motion slow, lasted about 1 second. Felt by several in home; awakened few. Shook bed slightly.

Intensity I to III:

Chester. Motion slow, lasted a few seconds. Felt by observer in home.

23 August, 21:51:32*. Intensity I to III. (cont.)

"Only evidence other than being slightly felt was revolving pendulum on clock swinging."

Dunnigan. Motion rocking, E-W. Observer felt slight shock while in bed awake. "Others here contacted said they did not feel it."

Gridley. Motion rolling, E-W, also N-S. Two shocks, lasted about 3 minutes. Felt by observer and station agent. Lamp cord swayed in depot. "Shock recorded on station seismograph." Ground: Hardpan.

Huntington Lake. Campers reported feeling a shock.

Jawbone Aqueduct Station (35°18'N, 118°02'W, north of Mojave). Motion slow, lasted 6 seconds. Direction NW-SE. Felt by observer in home lying down. Ground: Compact.

Knowles. Felt by several in community.

Le Grand. Felt by several in home.

Madera. "Felt here by some people."

Mariposa. Motion slow, lasted a few seconds. Felt in home. Slight rattling of windows, doors, and dishes. Motion rolling. Ground: Rocky, sloping and steep.

Oakland (17th and Clay Sts., PG&E). Motion slow, lasted 2 minutes. Slight rattling of windows.

Pittsburg. Motion slow, rolling, lasted 2 minutes. Direction E. Felt by observer at drive-in movie. Ground: Compact.

Pulga. Felt very slightly by three people.

Richvale. Motion slow, quivering, N-S, lasted 6-8 seconds. Felt by several. Dizzy sensation felt. Ground: Soil, compact, level.

Round Mountain. Motion slow. Felt by several in community. House creaked slightly. Hanging objects swung. Ground: Rocky soil, sloping.

Santa Cruz. Motion slow, very brief. Felt by very few in home and awakened few in home. Ground: Compact, level.

Tracy. "Very light." Felt by few.

Volcanoville (near Georgetown). Motion shaking, gradual onset. Felt by observer lying down.

Intensity I to III: Idaho

Hagerman. "A few felt what they say may have been a tremor. Our house lights came on about this time but that may not have been the reason."

Idaho City. Motion slow, lasted 5 seconds. "Felt slight shaking sensation while sitting in rocking chair." Ground: Soil.

Murphy. Motion slow, momentary duration. Felt by observer in home. "Just a slight movement. Thought I heard something."

Orchard. Motion slow, lasted 3 seconds. Motion up and down. Felt by observer in home lying down.

Oreana. Motion slow, momentary duration. Direction N-S. Felt in community.

Intensity I to III: Oregon

Adrian. "Very slight. Just felt by a few."

Brogan. "There was one or two who said they felt the tremor slightly. One felt house quiver and radio 'acted up.'"

Malin. Motion slow, lasted 10 seconds. Direction NW. Felt by several (some outdoors; quiet). Ground: Compact.

Reported not felt: Nevada

Goldpoint, Goodsprings, Jarbridge, Jean, Las Vegas, Moapa, and Pahrump.

23 August, 21:51:32*. (cont.)

Reported not felt:

Alameda, Alpaugh, Big Bend, Bigpine, Brooks, California Hot Springs, Calistoga, Callahan, Cholame, Coalinga, Crescent City, Darwin, Elk Creek, Fairfield, Gonzales, Hat Creek, Hayward, Hilts, Hollister, Independence, Inyokern, Livermore, Lone Pine, Lost Hills, Lower Lake, Martinez, Monticello, Mount Hamilton, Napa, Niles, Olancho, Paskenta, Pescadero, Petaluma, Platina, Pondosa, Redding, Salinas, San Benito, San Diego, Santa Rosa, Saratoga, Sequoia National Park, Shingletown, Shoshone, Stonyford, Stovepipe Wells Hotel (Death Valley), Tennant, Tionesta, Tipton, Tollhouse, Trona, Walnut Creek, Weaverville, Westhaven, Willows, Winters, Wishon, and Yreka.

Reported not felt: Idaho

Atlanta, Banks, Brunneau, Cascade, Castleford, Cliffs, Crouch, Fairfield, Grasmere, Hollister, Jerome, Lowman, Melba, Midvale, Mountain Home, Murtaugh, Ola, Payette, Pine, Placerville, Riddle, Star, Triangle, Twin Falls, and Wendel.

Reported not felt: Oregon

Ashland, Bly, Bonanza, Chemult, Diamond, Fort Klamath, Fort Rock, Grants Pass, Home Creek (Frenchglen), Medford, Paisley, Plush, Prospect, Riley, Riverside, Sheaville, Silver Lake, Vale, and Venator.

Reported not felt: Utah

Abraham, Beryl, Black Rock, Brigham City, Callao, Delle, Draper, Enterprise, Garfield, Garrison, Grantsville, Grouse Creek, Howell, Lakeside, Leamington, Lund, Newcastle, Park Valley, Roy, Saint George, Saint John, Snowville, Tooele, and Vernon.

26 August, 01:25:49*, 01:29:09*. Hollister area. (B).

Hollister. IV. "Hollister and Pajaro Valley residents were shaken by two earthquakes ... The first occurred at 2:25 A.M., P.D.T., and was strong enough to awaken sleepers. The second, preceded by a rumbling sound, followed a few minutes later. No damage was reported." (BSSA, January 1955)

Moss Landing. IV. (01:25:49) Felt by several; awakened few.

Moss Landing Steam Plant (PG&E). Both shocks reported as very slight.

26 August, 05:48:03*.

Epicenter 33°55' north, 119°30' west, near Anacapa Island. (P)

Glendale. III. Abrupt onset, lasted about 10 seconds. Felt by and awakened one in home. Ground: Filled in.

Hollywood. Press reported the Los Angeles Police Department received two calls from the Hollywood area.

Laguna Beach. III. Motion rocking, abrupt onset. Direction E-W. Felt by several. Ground: Seashore; reputedly filled in.

Long Beach. IV. "In Long Beach the jar was strong enough to sway light fixtures and move a chair." (BSA, January 1955) Press reported the Long Beach Police Department said their lights swung slightly and two persons called.

Los Alamos. III. Long sway. Felt by several.

Los Angeles (southwest section). IV. Felt by many. "No cause for alarm." Ground: Soil.

26 August, 05:48:03*. (cont.)

Maywood. V. Motion rapid, swaying, lasted 4 seconds. Direction circular. Felt by and awakened many in community; frightened few. Rattled windows, doors, and dishes.

Oxnard (central section). IV. Began with swaying motion, ended with rocking motion, gradual onset. Direction SE-NW. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Ground: Sandy loam.

San Fernando. IV. "San Fernando residents reported their houses swayed." (BSSA, January 1955)

Santa Barbara (west section). V. Motion bumping, rapid onset. Direction E-W. Felt by most people. Creaking of buildings and rattling of loose objects heard by many. Disturbed objects observed by many. Visible swaying of house. Chandeliers, Venetian blind cords, and electric light cords swung. Compass needle and compass turned around. Ground: Sandy loam.

Santa Barbara. V. Press reported many people were jarred awake by a short, sharp earthquake. No damage was reported.

Santa Rosa Island (Santa Barbara Channel island). Reported as sharp.

Santa Ynez. III. Slight jolt and quiver, lasted 5 seconds. Felt by several in home. Ground: Soil, compact, level.

Summerland (Fire Station). IV. Motion slow, gentle, rolling, lasted 15 seconds. Direction E-W. Felt by many (some outdoors; quiet); awakened and frightened few in community. Rattled windows, doors, and dishes; house creaked. Doors swung. Ground: Adobe, compact, sloping.

Torrance. IV. Motion rocking, abrupt onset. Felt by several. Creaking of buildings and rattling of loose objects heard by several. Moderately loud subterranean sounds heard. Disturbed objects observed by several. Visible swaying of buildings and trees.

Ventura. VI. "Plaster was shaken from the ceiling of the Ventura County courthouse. No other damage was reported." (BSSA, January 1955)

28 August, 21:13. Fallon, Nev. aftershock.

Dyer, Nev. Slight shock. Noticed by swinging of clock pendulum.

29 August (around 02:00). Fallon, Nev. aftershock.

Tonkin Ranch, Nev. (about 40 miles SW. of Palisade). Two slight shocks felt.

-- August, 10:00. (No date given.) Fallon, Nev. aftershock.

Wells, Nev. V. Motion rapid, lasted 3 seconds. Direction W-E. Felt by many in home; frightened few. Rattled windows and dishes; house creaked. Pendulum clock stopped. Trees, bushes shaken slightly. Shifted small objects; knickknacks fell. Ground: Compact, level.

30 August (night). Fallon, Nev. aftershock.

Fallon, Nev. (375 South Russell St.). IV. Gentle swaying, N-S, preceded by two shocks, one hard enough to make the building creak, and about 30-45 seconds apart. Roaring as of distant thunder immediately preceding the major shock. Hanging objects swung and water in containers moved N-S. No breakage of small objects.

31 August, 09:30 (about). Fallon, Nev. aftershock.

Markleeville. III. Motion slow. Felt by several in home and community (some outdoors).

31 August, 14:20:32*, 21:18:46*. Fallon, Nev. aftershocks.

Epicenter 39.6° north, 118.2° west, Dixie Valley. (B)

Intensity VII: Nevada

Stillwater Range (near Job's Peak, about 17 miles E-NE of Stillwater).

The following was abstracted from a report received from a member of a survey party of the U. S. Coast and Geodetic Survey: I was sitting on the ground when the earthquake started. It was a series of three violent shocks, rapid, hard vibrations, each lasting for about 15-20 seconds and about 15 seconds apart, with each series stronger than the one before. During all the series I could hear rocks pounding and sliding together, and sounded like it was directly below me. The last vibrating of the third series was by far the hardest and loudest. The slipping of rocks ended with a loud bang. It felt and sounded like the earth lurched and caught. Sage brush whipped very hard and fast and the parked jeep rocked very hard. By watching the sage brush and the mountain on which station Carson Sink 1880 is located, the earth appeared to be vibrating from 1 to 2 feet in each direction at the point where I was sitting. The shock was so violent I remained seated as I did not believe I could stand. I heard some minor local slides and sometimes a single rock rolling down a slope. A fairly solid looking outcrop of rock nearby kept up a steady clattering noise but nothing seemed to fall from it. All vibrations traveled in the same direction; also I could feel the vibrations at the same instant I heard them. At about 10:30 P.M., while I was at the station site of Carson Sink, I felt 3 or possibly 4 tremors a second or so apart which did not compare with the earlier shock, but were easily felt. Elsewhere they were compared as nearly equal to the first, as in Austin about 100 miles away. From 10:30 P.M. until 7:00 A.M. I counted ten more very mild shocks at one to three tremors each. I slept on the ground about 6 miles from where I was at the time of the first shocks from 4:00 A.M. until 7:00 A.M. and I do not believe I would have felt some of them as they were so mild."

Stillwater Range, West Lee Canyon (in area about 10 miles northeast of Stillwater). "Everything in cabin upset, even the stove. Only a few things were moved during the previous shocks."

Stillwater Range (in area about 20 miles northeast of Stillwater). "I was on my horse riding up lane when I heard this one before it hit. The fence posts and wire jumped and vibrated violently. The dust arose in columns out of Job's Canyon and up past IXL Canyon to the north, and south to several other canyons below Job's. The dust continued coming out of Cox Canyon longer than any of the others but that may be because it is practically solid rock."

Intensity VI: Nevada

Fallon. (14:20:32) Motion rapid, lasted 1 minute. Frightened all in community. Rattled dishes; walls creaked. Pendulum clock facing north stopped. Shifted and overturned small objects. Damage slight. Ground: Soil, level.

Fallon (1 mile south from center of town on U. S. Highway 95). (14:20:32) Preceded by two slight shocks. Gentle rocking and swaying motion, gradual onset, lasted about 1 minute. Felt by all; general alarm. Creaking of buildings and rattling of loose objects heard by all. Moderately loud subterranean sounds, like thunder, roaring, heard by all after the two preliminary tremors and prior to the main shock.

31 August, 14:20:32*, 21:18:46*. Intensity VI in Nevada. (cont.)

Disturbed objects observed by most persons. Buildings and trees rocked back and forth. Some damage to already damaged buildings: shook down bricks from broken places and widened cracks. Hanging objects and dishes, water in containers, etc., all moved in N-S direction. Pendulum clock stopped. People felt dizzy.

Fallon (Naval Auxiliary Air Station). (14:20:32) V. Motion slow, rocking, lasted 10-15 seconds. Felt by observer in car. Felt by all. "From a position near the south sentry gate on the NAAS I observed a large white dust cloud on a low mountain top several miles to the east. It was as if a portion of the hill fell off." Ground: Marshy.

Fallon (645 South Esmeralda). (14:20:32, 21:18:46) IV. Old-fashioned sewing machine shook. Children outside did not feel shock. One child in bed noticed it. "Following this shock (14:20:32) I was aware of 2 or 3 shakes,-just felt as if the house settled. Around 9 p.m. had a slight shake,-roar and a sway, and a short time later a longer one. The last one felt while in bed and seemed like waves from N-S. Rattled shelf leaning against wall."

Fallon (about 1 mile northwest of bridge across Carson River (U. S. Highway 50). (21:18:46) IV. "Shock seemed to hit the east side of the house more. The first shock jerked the house but only made it creak, then I heard a thud, then a little shake again."

Fernley. (14:20:32, 21:18:46). Motion slow, lasted 1 minute. Direction E-W. Felt by all and frightened few in community. Rattled windows and doors; house creaked. Cracked plaster. The second shock at 21:18:46 was very light, lasted about 1 minute. Ground: Soil.

Mason. (14:20:32, 21:18:46) Motion rapid, lasted 1½ minutes. Direction N-S. Felt by all in home and community; frightened few. Rattled windows, doors, and dishes. Hanging objects swung N. Pendulum clock facing north stopped. Trees, bushes shaken strongly. Shifted small objects. "The shock at 21:18:46 was slight. There have been many slight trembles." Ground: Rocky, level, sloping.

Intensity V: Nevada

Bureka. (14:20:32, 21:18:46). Motion slow, lasted a few seconds. Felt by many in community; second shock awakened many in community; frightened few. Rattled windows; walls creaked. Pendulum clock stopped. Shifted small objects.

Intensity IV: Nevada

Carson City. (14:20:32, 21:18:46) Motion trembling, gradual onset. Direction W-E. Felt by many; very few alarmed. Chandeliers and flower baskets swung. Ground: Sandy.

Fish Lake Valley (Dyer). (14:20:32) Lasted 1 minute, gradual onset. Felt by several; few startled. Fruit jars rocked back and forth. Hanging planters swung in rotating motion (counterclockwise). Felt dizzy sensation. Ground: Sandy loam.

Flanigan. (14:20:32, 21:18:46) First shock felt by track workers and some residents. Store building creaked. Slight rolling motion felt at 21:18:46.

Hawthorne (Naval Ammunition Depot). (14:20:32, 21:18:46). Motion rapid, lasted 30 seconds. Felt by many in community. "Second shock relatively weak tremor. Felt by few in area. Not felt by observer in building where seismograph is located." Ground: Soil, level.

- 31 August, 14:20:32*, 21:18:46*. Intensity IV in Nevada. (cont.)
- Jiggs. (14:20:32) Motion slow, lasted 3 seconds. Direction E. Felt by several in home. Rattled windows and doors; house creaked. Trees, bushes shaken slightly. "Felt as if I were being twirled very slowly. The noise was a low rumble." Ground: Soil, compact.
- Nixon. (14:20:32) Lasted 1 minute. Felt by all in store. Hanging objects swung. Ground: Soil.
- Paradise Valley. (14:20:32) Motion slow. Direction NE. Felt by several in community; frightened few. Walls creaked. Hanging objects swung NE. Ground: Soil, compact, level.
- Winnemucca. (14:20:32) Motion rocking, gradual onset, lasted about 4 minutes, very mild. Felt by two. Creaking of building and rattling of loose objects heard by two. Slight visible sway of building. Window blinds swung N-S. Ground: Sandy.

Intensity IV:

- Baxter. (14:20:32, 21:18:46) Motion slow, lasted 1 minute each. Direction E-W. Felt by many in community. House creaked slightly. Hanging objects swung. Trees, bushes shaken slightly.
- Chilcoot. (14:20:32) Motion rapid, lasted 20 seconds. Direction E-W. Rattled windows.
- Yosemite National Park (Government Center Residential Area). (21:18:46) Motion rocking, gradual onset. Felt by several. Creaking of buildings and rattling of loose objects heard by one. Ground: Rocky, sandy.
- Yosemite National Park (central Yosemite Valley). (14:20:32) III. Motion rolling. Felt by several. Light fixtures swung. Ground: Sandy.

Intensity I to III:

- Markleeville. (14:20:32) Motion slow, lasted about 8 seconds. Felt by several in home and community (some outdoors).
- San Diego. (21:18:46) Motion slow. Direction NE. Hanging objects swung NE. Felt by observer in home. (It is very doubtful if this shock was actually felt in San Diego. Ed.)

- 2 September, 23:12:10*.
Epicenter $34^{\circ}10'$ north, $118^{\circ}25'$ west. Very small shock. (P)
Van Nuys. Reported felt.
- 3 September, 08:14:17*.
Epicenter $33^{\circ}58'$ north, $118^{\circ}18'$ west, near Gardena. (P)
Southgate. Felt.
- 3 September, 20:30 (about). Fallon, Nev. aftershock.
Dixie Valley, Nev. Three sharp shocks close together. Several slight motions during the night. "I am not frightened but once in a while the children complain."
- 4 September, 04:03.
Tehachapi (central section). IV. Motion jolting, abrupt onset. Direction W-E. Creaking of building and rattling of loose objects heard by observer. Ground: Rocky.
- 7 September, 23:17:30*. Fallon, Nev. aftershock.
Fallon, Nev. Strong shock felt.

15 September, 20:51:04*.

Epicenter 37°18' north, 120°01' west, east of Merced. (B)

Coarsegold. VI. Press reported people were awakened over a large area. Residents in Oakhurst, Knowles, and Raymond reported hearing and feeling the shock, and it was reported felt several miles down Highway 41 from Coarsegold, and along the River Road. The first indication was a rumbling noise which lasted several seconds, followed by a fainter and diminishing rumble. The initial noise, most residents agreed, sounded like thunder, and ended with an explosive burst. Described as decidedly an earthquake in one building of rock, and as resembling concussion from an explosion in another of equally solid build. An irregular break in solidly packed earth, extending about 10 feet, was observed at the Coarsegold Forestry Camp. The break measured between an eighth and a quarter of an inch in width in some places and ran adjacent to the camp gasoline tanks. Camp supervisors said it was not there in the afternoon.

O'Neals (2½ miles west of, San Joaquin Experimental Range). IV. A bump or jolt, rapid onset, lasted a few seconds. Direction N or NE. Felt by two. Venetian blinds rattled. Subterranean sounds, low to moderate, like a muffled explosion, heard an instant before and during shock. "My wife and I were both startled. However, it was strong enough to make us think of getting out of the house if the shocks continued or became stronger." Ground: Rocky, sandy.

30 September, 15:33.

Brawley. IV. "A light earthquake shook the Imperial Valley on September 30 at 3:33 P.M., P.S.T. Residents of Brawley reported their houses creaked and dishes rattled. Several other shocks were felt in the afternoon and throughout the evening." (BSSA, January 1955)

- - - - -

WASHINGTON AND OREGON

(120th Meridian or Pacific Standard Time)

-- July, August, September.

No earthquakes were reported felt in Washington or Oregon during these months with the exception of the July and August Nevada shocks which were reported felt in scattered localities of the south and southwest portions of Oregon.

- - - - -

WESTERN MOUNTAIN REGION

(105th Meridian or Mountain Standard Time)

2 July, 03:43:13*.

Epicenter $38^{\circ}10'$ north, $116^{\circ}22'$ west, east of Tonopah, Nev. (B)
Twin Springs, Nev. (60 miles east of Tonopah). III. Shocks reported
felt on July 1, 2, 5. Felt by several. Direction NE-SW. Rumble
heard. Same report for Warm Springs (50 miles east of Tonopah).

3 July, 18:01.

Helena, Mont. (west section). II. Slight quivering, lasted 2-3 seconds.
Loud rumble heard during shock. Felt by one outdoors. Ground:
Rocky.

4 July, 00:40, 09:32:50*.

Epicenter 44.9° north, 110.8° west, Yellowstone National Park, Wyo. (W)
Yellowstone National Park (Mammoth). (00:40) V. Motion rapid, lasted
15 seconds. Felt by and awakened many in community; frightened
few. Loud rattling of windows, doors, and dishes; pronounced
creaking of house. Hanging objects swung. Shifted small objects
and furnishings. Ground: Rocky, level, sloping and steep.

Yellowstone National Park (Mammoth). (09:32:50) V. Motion rapid,
lasted 5 seconds. Direction N. Felt by many in community and
park in general (some outdoors). Rattled windows, doors, and
dishes; house creaked. Shifted small objects. Ground: Rocky,
level.

Yellowstone National Park (Old Faithful). (09:32:50) IV. Motion rapid,
lasted 15 seconds. Direction NW. Frightened few. Rattled win-
dows and doors; building creaked. Trees, bushes shaken slightly.
Ground: Rocky; geyserite.

Yellowstone National Park (Mammoth). (00:40), (09:32:50) V. Motion
rapid, lasted 5 seconds. Felt in Chief Ranger's office; fright-
ened few. Rattled windows, doors, and dishes. The shock at 00:40
awakened many in community. "This observer felt only slight vibra-
tion while sitting at a desk in the Chief Ranger's office, also
during the earlier shock while in bed. This shock was felt by
other individuals at Madison Junction, West Yellowstone Ranger
Station, and at Old Faithful Ranger Station, all in Yellowstone
National Park."

-- July.

No earthquakes were reported felt during the month of July at the follow-
ing places:

Weather Bureau Stations:

<u>Arizona:</u>	None.
<u>Colorado:</u>	"
<u>Idaho:</u>	"
<u>New Mexico:</u>	"

-- August.

No earthquakes were reported felt during the month of August at the following places:

Weather Bureau Stations:

Arizona: None.

Montana: "

New Mexico: "

10 September, 12:50.

Yellowstone National Park, Wyo. (Mammoth Hot Springs). IV. Motion slow, lasted 3-4 seconds. Felt by many in community. Ground: Rocky, level.

Yellowstone National Park, Wyo. (Mammoth Hot Springs). IV. Motion rapid, lasted 3 seconds. Felt by many in home. Rattled windows, doors, and dishes; walls creaked. Hanging objects swung. Ground: Level; travertine.

-- September.

No earthquakes were reported felt during the month of September at the following places:

Weather Bureau Stations:

Arizona: None.

Colorado: "

Idaho: "

Nevada: Winnemucca.

New Mexico: None.

- - - -

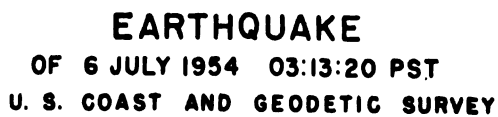
BOULDER CITY

(120th Meridian or Pacific Standard Time)

28 July, 10:40:02*, 10:43:13* (BC).

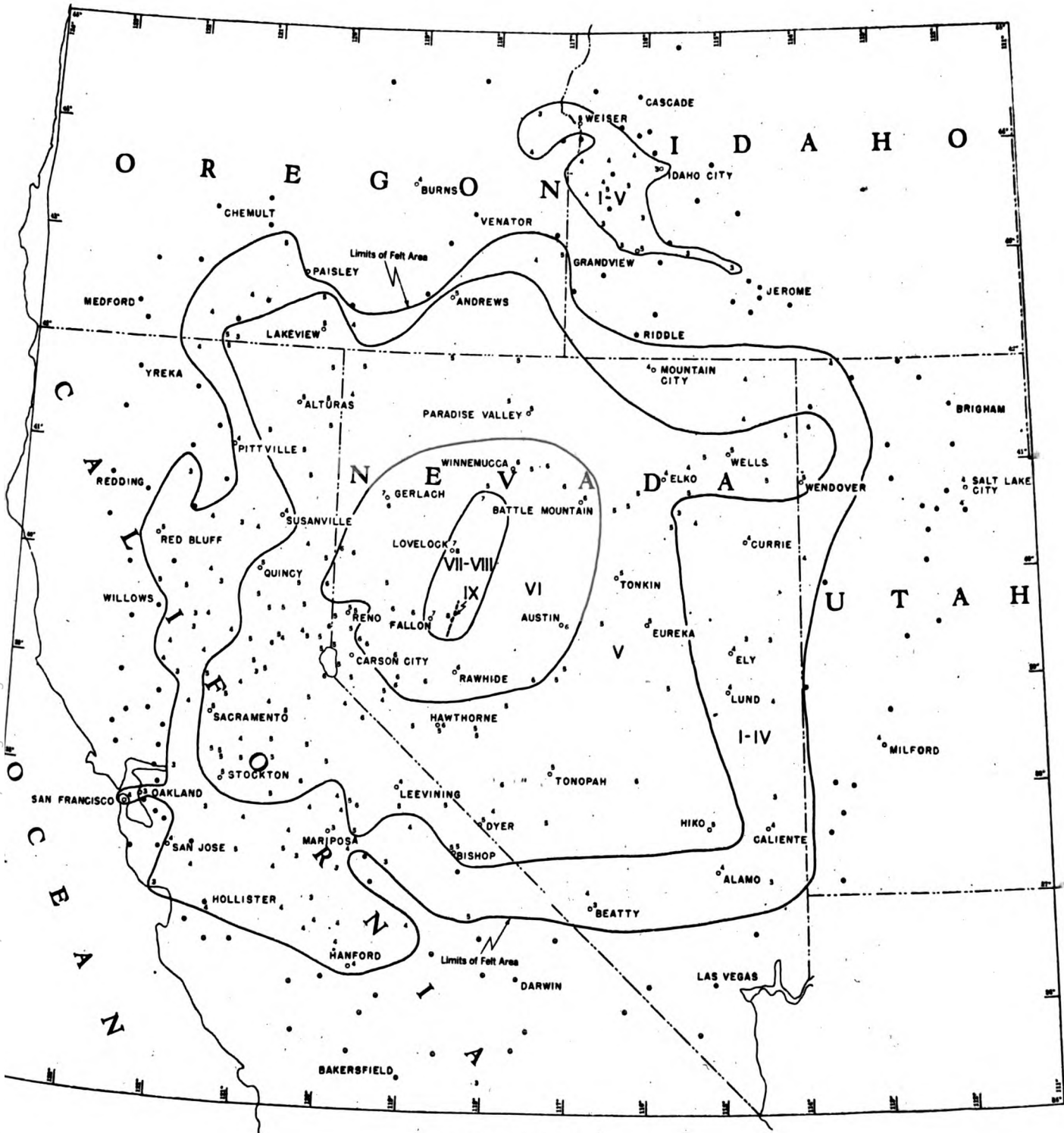
Boulder City. II. Felt by several.

- - - -



Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA



EARTHQUAKE
OF 23 AUGUST 1954 21:51:32 PST
U. S. COAST AND GEODETIC SURVEY

0 100
MILES

MODIFIED MERCALLI INTENSITY SCALE OF 1931
(Abridged)

- I. Not felt except by a very few under especially favorable circumstances. (I Rossi-Forel Scale)
- II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (I to II Rossi-Forel Scale)
- III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing truck. Duration estimated. (III Rossi-Forel Scale)
- IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls made creaking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. (IV to V Rossi-Forel Scale)
- V. Felt by nearly everyone; many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel Scale)
- VI. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight. (VI to VII Rossi-Forel Scale)
- VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars. (VIII Rossi-Forel Scale)
- VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Disturbed persons driving motor cars. (VIII+ to IX Rossi-Forel Scale)
- IX. Damage considerable in specially designed structures; well designed frame structures thrown out of plumb; great in substantial buildings with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX+ Rossi-Forel Scale)
- X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks. (X Rossi-Forel Scale)
- XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipe lines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
- XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

U. S. DEPARTMENT OF COMMERCE

Sinclair Weeks, Secretary

COAST AND GEODETIC SURVEY

R. F. A. Studds, Director

ABSTRACTS OF EARTHQUAKE REPORTS

FOR

THE PACIFIC COAST AND THE
WESTERN MOUNTAIN REGION

MSA-84

October, November, December, 1954

Issued by the U. S. Coast and Geodetic Survey

Washington, D. C.

1954

FOR OFFICIAL USE

DEPARTMENT OF COMMERCE

U.S. Coast and Geodetic Survey

Seismological Field Survey
14 Old Mint Building
San Francisco 3, California

ABSTRACTS OF EARTHQUAKE REPORTS FOR THE PACIFIC COAST
AND THE WESTERN MOUNTAIN REGION

MSA-84

1 October 1954 to 31 December 1954

The information in this report has been collected by the Seismological Field Survey of the U.S. Coast and Geodetic Survey with the assistance of State Collaborators in Seismology and through the voluntary cooperation of many local organizations and individuals. Additional cooperation is solicited. Blank questionnaires and special information pertaining to the work may be obtained by addressing the Director, U.S. Coast and Geodetic Survey, Washington 25, D.C.; the Chief, Seismological Field Survey at the above address; or the following State Collaborators in Seismology:

Arizona:	Dr. Eldred D. Wilson, University of Arizona, Tucson.
Colorado:	Dr. C. A. Heiland, Heiland Division, Minneapolis-Honeywell, 130 East Fifth Avenue, Denver.
Montana:	Professor Stephen W. Nile, Montana School of Mines, Butte.
Nevada:	Dr. David B. Slemmons, University of Nevada, Reno.
New Mexico:	Professor Stuart A. Northrop, University of New Mexico, Albuquerque.
Oregon:	Dr. Ira S. Allison, Oregon State College, Corvallis.
Utah:	Professor J. Stewart Williams, Utah State Agricultural College, Logan.
Washington:	Professor Howard A. Coombs, University of Washington, Seattle.
Wyoming:	Professor Horace D. Thomas, University of Wyoming, Laramie.

Copies of these reports may be obtained from the Supervisor, Western District, U. S. Coast and Geodetic Survey, 121 Customhouse, San Francisco 26, California; or from the Washington Office.

Earthquake information and questionnaire reports in the immediate vicinity of Lake Mead are collected by the Boulder City, Nevada office of the Seismological Field Survey, U.S. Coast and Geodetic Survey.

The abstracts are divided into three groups: (1) California and Western Nevada, (2) Washington and Oregon, and (3) the Western Mountain Region. This follows the scheme of classification in United States Earthquakes.

Intensity numbers refer to the Modified Mercalli Intensity Scale of 1931, in which, in the lower intensities, the disturbance of inanimate objects and personal reactions are given about equal weight. This intensity scale appears in abridged form on the last page of this report. All reports of whatever intensity from any town are listed under the highest intensity reported. Omission of intensity rating indicates insufficient information.

This report is prepared with the active collaboration of Professor Perry Byerly of the Seismographic Station of the University of California, and staff members of the Seismological Laboratory, California Institute of Technology. This permits an authentic appraisal of the material abstracted in the light of available instrumental and other information. Newspaper reports have been furnished by cooperative observers only and do not represent the results of a complete newspaper clipping service.

A condensed summary of these reports is published annually in the serial publication of the U.S. Coast and Geodetic Survey entitled "United States Earthquakes."

CALIFORNIA AND WESTERN NEVADA

(120th Meridian or Pacific Standard Time)

All places mentioned are in California unless otherwise stated

Time marked with asterisk (*) determined instrumentally: Berkeley (B),
Boulder City (BC), Pasadena (P), and Washington (W).

1954

- 1 October, 12:12:30*.**
Epicenter $33^{\circ}07'$ north, $115^{\circ}34'$ west, near Calipatria. P.
Brawley. Reported as sharper than tremors felt on September 30.
(SSA Bulletin, January 1955)
- 4 October, 18:38:08*.**
Epicenter $35^{\circ}19'$ north, $118^{\circ}39'$ west, near Caliente. P.
Bakersfield. III. Motion rapid, brief, lasted few seconds. Felt by
observer. Observer felt table shake.
- 7 October, (night).**
Stillwater, Nev. Felt.
- 16 October, 16:52:43*.**
Epicenter $37^{\circ}50'$ north, $122^{\circ}08'$ west, possibly an explosion. B.
Canyon. IV. Motion rapid, lasted 2 seconds. Direction SW. Felt
like concussion from explosion. Felt by several in home.
Windows rattled; floor trembled. Ground: Adobe over shale,
sloping.
- 17 October, 14:57:18*.**
Epicenter 31.5° north, 116.5° west, Baja California. W.
San Diego. IV. Motion rapid. Direction SE. Felt by many in com-
munity. Hanging objects swung. Press reported it was felt
in downtown buildings in San Diego. Also reported felt in the
Imperial Valley.
- 20 October, 18:45:52*.**
Epicenter $34^{\circ}00'$ north, $117^{\circ}10'$ west, near Redlands. P.
Redlands. "A number of persons reported feeling an earthquake . . .
It seemed to be localized in the south Redlands and Yucaipa
area, without damage." (SSA Bulletin, January 1955)
- 24 October, 01:44:05*, 02:41, 03:21:18*, 06:00.**
Epicenter $31\frac{1}{2}^{\circ}$ north, 116° west, Baja California. W.
El Centro. Press reported people in El Centro reported feeling two
shocks, one at 01:44 and another shortly after 06:00. Calexico,
12 miles south of El Centro, also felt the shocks.
San Diego. V. Press reported several light earthquakes were felt
in San Diego. Police said they received many calls from people

- 24 October, 01:44:05*, 02:41, 03:21:18*, 06:00. (cont.)
awakened by the shocks, but no damage was reported. Residents of nearby Coronado said windows shook and dishes rattled.
San Diego. IV. Motion slow. Direction N-S. Felt by many in home and community; awakened few. Hanging objects swung. Ground: Compact.
San Diego (Kettner Blvd. and Broadway). III. Motion slow, lasted 10 seconds. Direction N-S. Felt by several in powerhouse. Hanging objects swung N-S. Ground: Compact, level; filled in.
- 26 October, 00:28:28*.
Epicenter $33^{\circ}43'$ north, $117^{\circ}28'$ west, near Santiago Peak. P.
Corona and Riverside. Press reported the shock was felt sharply at Riverside; Pacific Tel and Tel Company reported it was felt sharply at Corona.
- 26 October, 08:22:26*.
Epicenter $33^{\circ}44'$ north, $117^{\circ}28'$ west, near Santiago Peak. P.
Riverside. Press reported it was felt sharply.
- 26 October, 18:25:42*.
Epicenter $38^{\circ}02'$ north, $121^{\circ}50'$ west, near Antioch. B.
Contra Costa Substation (PG&E). Felt.
- 29 October, 18:02:43*.
Epicenter $34^{\circ}02'$ north, $115^{\circ}33'$ west, east of Dale, Mojave Desert. P.
Desert Center (Hayfield Pumping Plant). IV. Motion trembling, gradual onset, very slight pause, then rapidly coming to a sharp and sudden ending, lasted altogether not over 6-7 seconds. Felt by five families. Creaking of buildings and rattling of loose objects heard by several. Observer felt floor move. Ground: Rocky.
Twentynine Palms (Joshua Tree National Monument). IV. Motion rapid, lasted 4 seconds. Direction NW. Felt by many in home, by some outdoors (active); frightened few in community. Rattled windows and doors; walls creaked. Ground: Rocky, loose, sloping.
- 31 October, 22:42:40*.
Epicenter $37^{\circ}04'$ north, $120^{\circ}35'$ west, south of Merced. B.
El Nido. V. Explosive-like motion. Awakened many. Windows, doors, and dishes rattled; house creaked. Ground: Compact.
El Portal. IV. Motion slow, lasted 10 seconds. Felt by many and frightened few in community. Windows rattled. Ground: Filled in, level.
Fresno. IV. Motion trembling, E-W, rapid onset, lasted 5-10 seconds. Rattling of loose objects and creaking of buildings heard by many. Ground: Sandy.
Le Grand. V. "Everyone contacted felt it."
Merced and Bakersfield. Felt by some people in Merced and Bakersfield.
Modesto. Press reported houses shook. Drive-in audience in Modesto reported seeing large meteor, and feeling the shock.
O'Neals (2 miles southwest of). IV. Direction of motion NW. Felt

31 October, 22142140*. (cont.)

by several. Moderately loud, rumbling earth noises heard by observer and wife during shock. "I believe some cracks in the adobe walls of our house were lengthened. Damage would be slight." Ground: Soil mantle averaging 1½ feet underlain by granite.

Yosemite National Park. IV. Abrupt onset, bump from E-W. Slight roar heard previous to shock but noise could not be positively identified. Felt by several. Creaking of buildings heard by several. Light fixtures swung E-W. Rock slide heard several miles up valley.

7 November, 00:39:31*.

Epicenter 33°52' north, 118°20' west, near Gardena. P.

Long Beach. IV. "A slight earthquake jarred the Long Beach and Lakewood areas . . . It caused chandeliers to swing, but no damage was reported." (SSA Bulletin, January 1955)

8 November through 10 November (no times given).

Whitmore (7 miles east of, at Huggards Mill). IV. Motion rapid, brief. Direction N-S. Felt by observer in home. Windows rattled. "The several sharp, short shocks also brought intermittent slight tremors. These seemed in opposite direction, or E-W." Ground: Soil, compact, sloping.

10 November, 10:07:21*.

Epicenter 39°04' north, 123°02' west, between Ukiah and Lakeport. B.

Felt over an area of approximately 2500 square miles of Lake and Mendocino counties in northwestern California. Maximum intensity VI. Springs in Mill Canyon (near Talmage) were reported to have decreased and increased in flow. Slight damage reported from several localities: plaster cracked; few windows broke.

Intensity VI:

Hopland. Motion slow. Felt like building was bumped by truck, then definite shake. Faint earth noises heard by many. Felt by all and frightened many in community. Windows and doors rattled; walls creaked. Small objects shifted; desks and chairs moved. Ground: Compact.

Nice. Strong shock. Motion rolling, lasted about 15 seconds. Felt by all in community. Windows, doors, and dishes rattled. Some small objects shifted and fell; dishes fell. Window cracked.

Potter Valley. Motion rapid, momentary duration. Felt by many in community, some outdoors. House creaked. Trees, bushes shaken moderately. Plaster cracked. Ground: Soil.

Talmage. Motion slow, long duration. Felt by many in community; frightened few. Moderate earth noises heard. Windows rattled. Hanging objects swung. Trees, bushes shaken moderately. Small objects overturned. Plaster cracked. Knickknacks fell. Damage slight. Ground: Soil, compact.

Talmage (Mill Canyon). "We examined the springs which are well up in the canyon; the upper spring was reported to have lost about 90 per cent of its flow. The other spring, some 1500 feet to

10 November, 10:07:21*. Intensity VI. (cont.)

the west and apparently at the same elevation, gained approximately the same amount as the upper spring had lost. The shock on December 16, centering in Nevada, was felt as only a slight roll at Talmage; however, the fire marshal upon making his rounds on December 16 noted that both springs had returned to normal flow. There are two concrete dams in the canyon impounding water for the state hospital; neither dam has any apparent damage. Also, there is a six-inch steel pipe line extending from the lower dam to the state property, and it showed no damage whatsoever as the result of either shock." (Report from the Board of Fire Underwriters of the Pacific.)

Willits. Press reported the shock was felt by many. No serious damage resulted, although a crack appeared in the concrete floor of the Willits Thrifty Center on Main Street.

Willits. Motion rapid, lasted 1 second. Felt by many in community; frightened few. Windows, doors, and dishes rattled; building creaked. Hanging objects swung E-W. Plaster cracked. Damage slight. Ground: Soil, compact.

Witter Springs. Motion slow, momentary duration. Felt by many in community. Loud earth noises heard. Trees, bushes shaken moderately. Vases overturned. Windows cracked. "My wife and I were in the store and didn't even feel a tremor, but most everyone else felt it very strongly." Ground: Rocky.

Intensity V:

Calpella. Lasted 5 seconds. Felt by many in home; frightened few. Windows and doors rattled; house creaked. Hanging objects swung N-S. Small objects shifted. Ground: Soil.

Kelseyville. Motion rapid, lasted 1 minute. Felt by and frightened many in community. Moderate earth noises heard by few. Windows and doors rattled. Hanging objects swung. "Shock was quite severe." Ground: Level, compact.

Lakeport. Press reported the only damage was a broken house window. Put the siren atop the City Hall out of commission.

Lakeport. Direction E-W. Moderate earth noises heard by observer. Frightened few. Windows and doors rattled. Trees, bushes shaken moderately. Ground: Soil.

Ukiah. Press reported newspaper and police stations were flooded with calls. People said the shock had a slow, rolling motion and lasted about 5 seconds. A big chandelier in coffee shop swung for several seconds.

Ukiah (Fire Department). Motion swaying, E-W, rapid onset. Felt by several; few alarmed. Trees swayed.

Ukiah (4 miles northwest of, at Pine Ridge). IV. Motion swaying, gradual onset. Felt by many. Disturbed objects observed by several. "Minor effects on people, - many didn't even know of it." Ground: Rocky.

Upper Lake. Lasted 5 seconds. Felt by many in post office. Windows and doors rattled; building creaked. Pendulum clock facing north stopped. Ground: Soil, level.

Upper Lake. Motion rapid, lasted 3-5 seconds. Felt by and frightened many in community. Faint earth noises heard. "Sounded like something fell, then shaking." Ground: Level, compact.

10 November, 10:07:21*. Intensity V. (cont.)

Yorkville. Motion slow, lasted 1 minute. Direction NE. Felt by several in home. Faint earth noises from NE. heard by few. Dishes rattled; walls creaked. Small objects shifted. Ground: Soil, compact, level.

Intensity IV:

Boonville (1 mile north of). Motion rapid. Awakened and frightened few. Windows, doors, and dishes rattled; frame creaked. "No reports of it being felt in Boonville." Ground: Soil, compact.
Clearlake Oaks. Motion rapid, lasted 15 seconds. Felt by many in home; frightened few in community. Windows and doors rattled. Trees, bushes shaken slightly. Ground: Rocky.
Hobergs. Motion slow, lasted 30 seconds. Faint earth noises from NNW. heard by observer 10 seconds before shock. Awakened few. Windows rattled; walls creaked.
Lucerne. Felt by many in post office. Moderate earth noises heard. "Felt like someone ran into house with a car. Did not seem to be so severe on the east side of Clear Lake."
Mendocino. Motion slow, lasted 1 minute. Felt by many in community, some outdoors. Faint earth noises heard by few. Trees, bushes shaken slightly. Ground: Compact.
Mendocino Substation (PG&E). III. Motion rapid, brief. Felt by several.
Redwood Valley. Motion rapid, lasted 3 seconds. Direction E. Felt by observer in home lying down. Walls creaked. Ground: Soil, compact, level.
Redwood Valley. III. Motion slow. Felt by several in store (sitting). "Not felt outside."

Intensity I to III:

Garberville. Motion slow, lasted 1 minute. Direction NE. Felt by several in home; awakened few. Ground: Compact.

Reported not felt: Albion, Alderpoint, Arbuckle, Barkersville, Bell Springs, Bodega Bay, Branscomb, Brooks, Butte City, Calistoga, Cloverdale, Colusa, Comptche, Covelo, Cummings, Delevan, Dos Rios, Dunnigan, Elk, Etnersburg, Forestville, Fort Bragg, Geyserville, Gualala, Guerneville, Healdsburg, Jenner, Laytonville, Longvale, Lower Lake, Manchester, Marshall, Middletown, Napa, Navarro, Orland, Paskenta, Petaluma, Philo, Piercy, Platina, Point Arena, Pope Valley, Red Bluff, Rockport, Rumsey, Santa Rosa, Spyrock, Stewarts Point, Stonyford, Westport, Wilbur Springs, Willows, Williams, Winters, and Woodland.

12 November, 04:26:47* (main shock), 05:16.7*, 05:23, 08:49.

Epicenter $31\frac{1}{2}^{\circ}$ north, 116° west, Baja California. W.

San Diego. Press reported the main shock was felt strongly throughout San Diego and Imperial counties and as far north as Los Angeles and San Bernardino. Awakened many in San Diego; in some places an underground rumbling was heard, houses creaked, doors and windows rattled, and suspended objects swung. Reports from the San Diego area indicated the shock was felt most distinctly in the El Cajon Valley. The sheriff's office at El Centro reported it gave them a "pretty good shaking." The first shock was reported as noticeably heavy in San Bernardino,

- 12 November, 04:26:47* (main shock), 05:16.7*, 05:23, 08:49. (cont.)
Long Beach, Brawley, Palm Springs, Newhall, and San Pedro.
Reported as barely felt in Los Angeles. Two heavy after-shocks were reported, one at 05:17 and another at 08:49.
More than 100 persons were reported homeless in the Baja California mining village of El Alamo, 70 miles south of Ensenada. It was reported most of the damage was caused by boulders falling from a mountain onto the village. No damage was reported in California.
- Agua Caliente. IV. Three shocks felt. Motion swaying, NW-SE, rapid onset. Rumbling earth noises heard at beginning and during shock. Felt by three persons. Buildings creaked; loose objects rattled. Ground: Sandy.
- Colton (Edison Substation). III. Motion slow, E-W. Felt by observer. Hanging objects swung E-W. Ground: Soil, compact.
- Fallbrook (4½ miles south of). IV. One noticeable "heave." Moderately loud, bumping and roaring earth noises, lasting about 9 seconds, heard by all in home before shock. Felt by many; observer awakened. Building creaked; loose objects rattled. Ground: Semi-hard granite.
- Grossmont. V. Motion rapid and slow. Felt by all in community; awakened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Ground: Rocky, level.
- Indio. IV. Motion slow, lasted about 5 seconds. Felt by several (active); awakened and frightened few in community. Building creaked. Trees, bushes shaken slightly. Ground: Soil, level.
- Moreno. IV. Motion slow, lasted a few seconds. Direction NE. Felt by many in community; awakened and frightened few. Windows rattled; walls creaked. Ground: Rocky.
- Ranchita. V. Motion rapid, lasted 2 minutes. Awakened many in community. Windows, doors, and dishes rattled. Ground: Rocky, sloping and steep.
- San Clemente. IV. Motion slow, lasted 20-30 seconds. Felt by many in home; awakened few. Walls creaked. Ground: Soil, sloping.
- San Diego (Lindbergh Field, Weather Bureau Office). IV. Motion swaying, E-W, rapid onset. Felt by many; some people in area awakened by swaying. Very slight visible swaying of buildings and trees. Light fixtures and pictures swung N-W.
- San Diego (PG&E, Station B). III. Motion rapid, lasted 3 minutes. Direction N-S. Felt by several. Hanging objects swung.
- San Diego (104-10th St.). III. Motion rapid, lasted 1 minute. Felt by several. Ground: Soil.
- Trabuco Canyon. V. Motion rapid, lasted 2-3 seconds. Awakened all in home.
- Walnut. V. Motion slow, lasted 30 seconds. Direction S-N. Awakened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Pendulum clock facing NE, stopped. "Motion seemed sliding rather than up and down. No noise or rumble." Ground: Shale, compact, sloping.
- Willdomar. V. Motion rapid, lasted 15 seconds. Direction N-S. Felt by some outdoors; awakened many; frightened few. Hanging objects swung. Some small objects and furnishings shifted. "Short, sharp, shaking type." Ground: Compact.

12 November, 04:26:47* (main shock), 05:16.7*, 05:23, 08:49. (cont.)

Reported felt in Arizona:

Somerton. V. Felt by and awakened many in community; frightened few.
Wellton. IV. Motion swaying. Felt by many; no alarm. Creaking of buildings and rattling of loose objects heard by many.
Yuma. IV. Motion rocking, N-S, rapid onset. Felt by many. Light fixtures and small objects swayed. Ground: Sandy.

14 November, 16:20.

Dyer, Nev. (Fish Lake Valley). IV. Rapid jerk, abrupt onset. Rumbling sound like distant explosion heard by several before shock. Felt by several; awakened observer. Slight swaying of pendulum on Anniversary clock. Ground: Sandy loam.

16 November, 23:23:57*.

Epicenter $36^{\circ}28'$ north, $118^{\circ}00'$ west, south of Lone Pine. P.

Coso Junction. IV. Motion sharp, S-N, lasted 1 second, rapid onset. Earth sounds heard by one person before shock. Felt by several in home. Creaking of house and rattling of loose objects heard by several. Ground: Soil, compact, sloping.

Keeler. V. Motion rapid, rolling. "Sounded like an explosion, then rumble and roll." Awakened many in community. Windows and doors rattled; walls creaked. Ground: Sloping.

Lone Pine. IV. Press reported the shock as short and sharp. Reported not felt at Bishop, 60 miles north.

17 November, 03:55:12*.

Epicenter $31\frac{1}{2}^{\circ}$ north, 116° west, Baja California aftershock. W.

Calexico and El Centro. IV. Press reported windows rattled and people were awakened. No damage reported.

San Diego. IV. Motion rapid, lasted about 45 seconds. Awakened few. Also sharp jolt reported felt at Mount Helix and Spring Valley (San Diego area).

17 November, 15:03:51*.

Epicenter $34^{\circ}30'$ north, $119^{\circ}07'$ west. P.

Fillmore. IV. Slight shock. Felt by quite a number of people.

Ojai. IV. Motion trembling, abrupt onset. Felt by many indoors. Creaking of buildings and rattling of loose objects heard by many. "I noticed two shocks. First a light one that seemed to merge into one a little stronger, although both were pretty weak. Do not believe they would have been felt by anyone outdoors." Ground: Rocky.

Pasadena. Two reports from Pasadena. (Press)

Los Angeles Metropolitan area. Reported as perceptible in the Los Angeles metropolitan area, especially toward the coast.

Santa Barbara to Santa Monica. Press reported a rolling shock was felt from Santa Barbara to Santa Monica. Described as sharp in Ventura, Oxnard, and Santa Barbara.

Santa Ynez. III. Motion slow, lasted 4 seconds. Felt by several in home. Ground: Compact, sloping.

Ventura. III. Motion sharp, lasted 30 seconds. Felt by several in post office. Direction E-W. Ground: Soil.

Reported not felt: Northridge (about 1 mile north of).

18 November, 21:53:51*.

Epicenter 40.5° north, 124.1° west, near Scotia. B.

Eureka (near bay shore). IV. Motion swaying, E-W, rapid onset.

Felt by many.

25 November, 03:16:35*.

Epicenter $40^{\circ}16'$ north, $125^{\circ}38'$ west, 65 miles off Cape Mendocino. B.

Widely felt, but moderate shock. Felt area approximately 9000 square miles of Humboldt and Mendocino counties in northwestern California, principally in Humboldt County. Reported felt slightly in San Francisco. Maximum intensity V.

Intensity V:

Bridgeville. Motion slow, lasted 30 seconds. Felt by and awakened many in community; frightened few. Windows, doors, and dishes rattled; house creaked.

Burnt Ranch. Motion rapid, lasted several seconds. Loud, rumbling earth noises from N-S heard by few. Felt by several and awakened few in community. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken moderately. Slight damage to fireplace. "Shock was strong enough to awaken a few." Ground: Compact, gravelly.

Carlotta. Motion slow, long duration. Felt by and awakened many in community; frightened few. Windows, doors, and dishes rattled; house creaked. Ground: Soil.

Eureka (north section). Motion bumping, rocking, N-S, gradual onset. Creaking of buildings and rattling of loose objects and windows heard by several. Pendulum clock facing S. with pendulum of 24 inches and swinging in E-W direction stopped and pendulum swung in circle before coming to rest; pendulum clock facing W. did not stop. Ground: Sandy.

Eureka. Motion slow, lasted 30 seconds. Direction N-S. Felt by and awakened many in community; frightened few. Faint earth noises heard by few. Windows rattled; walls creaked. Ground: Soil, level, compact and loose.

Ferndale. Motion slow, lasted 20 seconds. Felt by and awakened all in home; frightened few. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Pendulum clock stopped. Ground: Soil, level.

Ferndale. Motion slow, lasted 30 seconds. Felt by and awakened all in home; frightened many in community. Faint earth noises heard by observer. Windows, doors, and dishes rattled. Ground: Soil.

Fields Landing. Motion moderate, lasted about 1 minute. Felt by, awakened, and frightened all in home. Windows and doors rattled; house creaked. Ground: Level.

Hoopa. Motion slow. Felt by many in community; awakened all in home. Windows, doors, and dishes rattled; house creaked. Small objects and furnishings shifted; chairs rocked. Ground: Soil.

Hyampom. Motion slow, lasted 30 seconds. Direction NE. Felt by and awakened many in community; frightened few. Moderate earth noises heard by many few seconds before shock. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NE.

Korbel. Motion slow, very steady, long duration. Direction E-W. Felt by and awakened all in home. House creaked strongly. Ground: Soil, rocky.

25 November, 03:16:35*. Intensity V. (cont.)

- Loleta. Motion slow, lasted 15 seconds. Felt by and awakened many; frightened few. Direction E-W. Ground: Compact.
- Orick. Felt by and awakened many in community. Windows, doors, and dishes rattled. Ground: Soil.
- Pepperwood. Motion slow. Felt by and awakened all in home. Doors rattled. Ground: Soil.
- Scotia. Motion rapid, lasted 1 minute. Direction NE. Felt by and awakened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Ground: Soil, sloping.
- Scotia. Motion slow, lasted 30 seconds. Direction SW-NE. Felt by and awakened many in home. Windows rattled. Ground: Soil, compact, sloping.
- South Fork. Motion slow. Felt by and awakened many in community. Ground: Soil, level.

Intensity IV:

- Arcata. Felt by several in home; awakened few in community. Dishes rattled.
- Bell Springs. Hard shock. Motion rapid, lasted 1 minute. Direction N. Felt by and awakened observer. House creaked. "Hardest shock felt here since 1906." Ground: Compact.
- Fortuna. Motion slow, lasted 30 seconds. Moderate earth noises heard. Felt by several and awakened few in home; felt outdoors by some. Windows rattled. Trees, bushes shaken slightly. Ground: Soil, compact.
- Fort Bragg. Motion rapid, lasted 30 seconds. Direction N. Faint earth noises from N. heard by few. Felt by many in community; awakened many in home; frightened few. Windows and doors rattled; house creaked.
- Garberville. Motion rapid, lasted 1 minute. Direction NE. Felt by several in community; awakened few. Windows, doors, and dishes rattled. Hanging objects swung. Ground: Compact.
- Garberville (8 miles north of). Motion swaying, gradual onset. Felt by two persons. House creaked. Ground: Rocky.
- Garberville (8 miles south of, Hartsook Inn). Motion rolling and rocking. Noise lasted fully one minute.
- Holmes. Motion slow. Direction E-W. Felt by all in home. Ground: Soil, level.
- Miranda. Frightened few in community. Windows, doors, and dishes rattled; house creaked.
- Orleans. Motion slow. Felt by many; awakened few. Window blinds swung.
- Piercy. Motion slow, lasted 30 seconds. Direction E-W. Felt by several; awakened few. Ground: Compact.
- Point Arena. Motion rapid, lasted 10 seconds. Direction N. Felt by several in home; awakened few. Moderate earth noises like distant explosion from N. heard by observer. Ground: Rocky soil, compact.
- Rockport. Motion rapid, lasted 1 minute. Felt by several; awakened few. Windows rattled. Ground: Level.
- Samoa. Felt by many in community; awakened one in home. Doors rattled; house creaked. Ground: Sandy.

25 November, 03:16:35*. Intensity IV. (cont.)

Weott. Motion slow, lasted 30 seconds. Awakened few in community.
Direction SE-NW.

Willow Creek. Motion slow, lasted about 1 minute. Felt by many and
awakened few in community. Ground: Compact, level.

Intensity I to III:

Junction City. Felt.

San Francisco. Press reported the shock had a rolling motion.

San Francisco (350 Grove St.). Motion slow, lasted 3 seconds. Felt
by observer in bed (awake). "Barely distinguishable as earth-
quake." Ground: Sandy.

Spyrock. Motion rapid, lasted 1 minute. Earth noises from N. heard.
Awakened one in home. Ground: Rocky, compact, level.

Trinidad. Slight tremor. Felt by several.

Willits. Brief shock. Felt by few. House creaked slightly.

Reported not felt: Alderpoint, Cloverdale, Covelo, Crescent City,
Cummings, Douglas City, Fairfield, Happy Camp, Hayfork, Jenner,
Klamath, Lakeport, Laytonville, Napa, Orland, Platina, Point Reyes
Station, Red Bluff, Redding, Requa, Ruth, Santa Rosa, Scott Bar,
Smith River, Stewarts Point, Stonyford, Trinity Center, Ukiah,
Weaverville, Willows, Winters, Woodland, and Yreka.

Reported not felt in Oregon: Brookings, Cave Junction, Gold Beach,
Grants Pass, O'Brien, and Port Orford.

26 November, 00:49:21*.

Epicenter $36^{\circ}09'$ north, $117^{\circ}45'$ west, Coso Range, east of Haiwee. P.
Haiwee Power Plant (Coso Junction). V. Motion rapid, lasted 2-3
seconds. Direction NE-SW. Awakened and frightened all in
home. Windows, doors, and dishes rattled; house creaked.
Ground: Rocky, soil, compact.

Haiwee Reservoir (Coso Junction). IV. Motion rapid, lasted 1 second.
Direction W-E. Felt by many and awakened few in home. Ground:
Rocky, sloping.

26 November, 18:33:17*.

Epicenter $36^{\circ}09'$ north, $117^{\circ}45'$ west, Coso Range, east of Haiwee. P.
Haiwee Power Plant. IV. Motion rapid, lasted 2-3 seconds. Direction
NE-SW. Windows, doors, and dishes rattled; house creaked.
"Felt in an area of about 15 miles."

Haiwee Reservoir. IV. Motion rapid, lasted 2 seconds. Direction
NE-SW. Felt by all in home. Windows and dishes rattled; walls
creaked. Ground: Rocky, sloping.

30 November, 22:30:41*.

Epicenter $36^{\circ}43'$ north, $121^{\circ}29'$ west, near Hollister. B.
Hollister (south section). V. Two shocks. Motion bumping, rapid
onset. Direction seemed from S. Felt by many. Creaking of
buildings and rattling of loose objects heard by many. Glass-
ware in antique shop displaced. Ground: Adobe.

- 2 December, 12:06:51*.
Epicenter 34°00' north, 118°26' west, Culver City. P.
Inglewood. Felt. (Telephone report to Seismological Laboratory.)
- 12 December, 22:25.
Norden. II. Slight shock. Felt by few.
- 13 December, 02:49:26*.
Epicenter 39°17' north, 120°10' west, near Truckee. B.
Norden. V. Motion rapid. Direction SW. Felt by and awakened many
in community. House creaked. Ground: Rocky, sloping and
steep.
Soda Springs. III. Felt by several. (Soda Springs is about 1½ miles
west of Norden.)
- 16 December, 03:07:13*, 03:11:29*.
Epicenter 39°19' north, 118°12' west, near Frenchmans Station, Nev. B.
Major Nevada earthquake. Felt over an area of approximately 200,000
square miles of Nevada, California, Oregon, Idaho, and Utah,
as shown on the isoseismal map, page 104. Magnitude 7.4. The
maximum intensity of X was assigned to the spectacular surface
ruptures which occurred in an area roughly bounded by geo-
graphic coordinates of 39°07' north to 39°50' north, and
118°00' west to 118°15' west. Within this area there were
two major fault zones: In the north on the west side of Dixie
Valley along the east base of the Stillwater Range of mountains;
in the south on the east side of Fairview Valley in the Clan
Alpine Range. Faulting extended north and south for a linear
distance of approximately 55 miles, as shown by the dotted
lines on the isoseismal map. Due to the thinly settled region
of the epicentral tract, this potentially destructive earth-
quake caused relatively little property damage, and no deaths
or injuries were reported.

Intensity X to VIII:

Dixie Valley-Fairview Valley areas.

"One of the two major zones of faulting is the fracture system of the west side of Dixie Valley. It had from five to fifteen feet of vertical movement and some horizontal displacement. It is probably that Job Peak has moved upward several feet and northward a few feet with respect to Dixie Valley. The summit of Job Peak is about two miles from the Dixie Valley fault. The second major fracture zone is at the eastern base of Chalk Mountain, Fairview Peak, and Slate Mountain. It is along this fault zone that the largest movements have been observed. Where the fault zone crosses U.S. Highway 50, three miles south of Chalk Mountain, the vertical movement varies between 3 and 6 feet; the west side has moved northward a few feet with respect to the eastern side. East of Fairview Peak there are vertical movements of from 6-20 feet and horizontal displacements of from 4-12 feet. It is reasonable to expect that Fairview Peak has shifted several feet both vertically and horizontally with respect to adjoining valleys to the east." (David B. Slemmons, University of Nevada)

16 December, 03:07:13*, 03:11:29*. Intensity X to VIII. (cont.)

Dixie Valley-Fairview Valley areas. (cont.)

"A considerable amount of water with temperature of about 60° was flowing from the fracture at Mud Springs (west side of Dixie Valley). It had cut several trenches 2-3 feet deep down the slope toward the Dixie Valley Road, 1-3/4 miles away. Enough water had flowed onto the road to cause the County Road Department to put a culvert under the road. At Mud Springs the fault ran through unconsolidated alluvium sediments and the fracture was filled with mud and water. Where the fracture ran through more compact sediments the fissure was several feet to many feet deep, depending upon the ability of the walls of the fissure to remain intact during the motion of the earthquake." (Seismological Field Survey)

"There was just a little damage on the Four and Eight Mile flats. Toward Frenchmans, there were some rocks on the highway but traffic could get through. About 1/2 mile west of Frenchmans there was a very sharp roll about 1 foot high and 2 feet wide. Further east down the hill toward the little flat toward Westgate there were some very bad ones. One was impossible to get through, about 40 feet wide, and dropped just about a foot. Another one about 1/2 mile east was very dangerous, and it was necessary to detour. We understood there was a bad spot in the canyon east of Eastgate. The location of the rockslide on Carroll Summit is about 7 1/2 miles east of Eastgate, about 2 miles west of the actual summit. There were several large rocks on the pavement about the size of an automobile. They had to be blasted off. Faulting was due north and south with the line of movement east and west. We drove over the Gabbs Road and there seemed to be no serious damage there, only a few small cracks." (Public Service Commission, State of Nevada.) Press reported that a \$3000 liquor stock was destroyed in a bar at Frenchmans Station.

Intensity VII in Nevada:

Austin. Motion rapid, rolling, long duration. Felt by and awakened all in area; frightened many. Everything rattled and creaked. Pendulum clock stopped. Trees, bushes shaken strongly. Everything shifted; vases, etc., small objects, and furniture overturned. Plaster, windows, walls, chimneys, and ground cracked. Knickknacks, books, pictures, plaster, and walls fell. Dishes, windows, and furniture broke. Chimneys twisted and fell. "We have had small shocks every day since the two big ones. On December 20 there were three small shocks felt by many in Austin." Ground: Rocky.

Austin. VI. Felt by all. At Mom's Bar and Grill some wine bottles migrated eastward off shelf and a piece of plate glass, about 1 1/2 feet by 4 feet, on the N-S bar, was cracked in an E-W direction. Some cans fell from shelf in grocery store.

Austin (12 miles east of, on U.S. Highway 50 at the Frontier Tavern). Two shocks. Motion of first, shaking; second, rolling. Roaring earth noises preceded first shock. Case of canned goods knocked to floor. Stucco cracked. Clothes on hanger over N-S pipe swung NE-SW. Large coke box on casters and set parallel to N-S wall moved west 4 inches.

16 December, 03:07:13*, 03:11:29*. Intensity VII in Nevada. (cont.)

Austin (20 miles east of). VI. Awakened all in home and community; frightened few; observer in house trailer. Faint earth noises heard. Windows, doors, and dishes rattled. Plaster cracked. Damage slight. "Am not certain if any other shocks have been felt since this one." Ground: Soil, loose, sloping.

Bartine Ranch (24 miles west of Eureka, on U.S. Highway 50). Two shocks, first strongest. Roaring earth noises heard before second shock. Door swung back and forth. House creaked. One object knocked off shelf. Several new E-W cracks in compact ground of driveway. Cracks were nearly parallel to the highway and observer certain they were result of shock.

Carroll Station (east of Carroll Summit by 3 miles). Man and wife jumped out of bed and found it difficult to walk. Man, leaning on a light, wooden serving counter, said it rocked N-S; counter ran E-W. Parallel waves appeared in wooden floor. Two slot machines on a steel table nearly fell southward away from an E-W wall but finally merely slid a few feet to the east. Some cans migrated off N-S shelves. A light, table lamp moved south off an E-W shelf. Some bottles on an E-W shelf moved south against the wall. During the second shock, whisky bottles were held on shelf to keep from falling.

Carroll Summit (12.2 miles east of, on U.S. Highway 50). V. House shook strongly and doors rattled. First shock stronger than second one.

Clan Alpine Valley (Byers Ranch). Two shocks felt. Motion rapid, long duration. Loud earth noises heard, seemed to come from NW. Windows, doors, and dishes rattled strongly; everything creaked. Small objects and furnishings shifted. Some small objects and furniture overturned. Crumpled northwest corner of building. Damage slight. "Following these shocks there was one a day for a week or longer. Minor shakes up to the middle of January."

Dixie Valley. "The water is not flowing as much as the first days, but has held to the same amount for the past week. The motion must have been an all-around, up-and-down upheaval to get the windows open, and it felt like the movement of an old-fashioned butter churn. Dressers facing both N-S and E-W toppled, but pictures stayed on the walls, though turned at all angles. We are still (Dec. 27) having quite prolonged, gentler shakes, always accompanied by a loud boom, which almost sounds like bombing. Shocks subsided for a few days but during the last 36 hours have increased in intensity and duration. The booming sounds come from the north, west a little of true north. I have only heard two that sounded from the east."

Givens Ranch (12 miles east of Austin, on U.S. Highway 50, thence 5 miles north). Stucco on outside of stone house cracked and board ceiling pulled away from the stone walls by as much as 1 inch.

Kaiser Mine (about 13 miles northwest of Gabbs). Motion both rapid and slow, lasted about 5 seconds. Direction NE. Loud earth noises from W-NW, heard during shock. Felt by, awakened, and frightened all in community. House creaked. Hanging objects swung. Pendulum clock facing NE, fell to floor. Trees, bushes

16 December, 03:07:13*, 03:11:29*. Intensity VII in Nevada. (cont.) shaken strongly. Small objects and furnishings shifted. Piano moved. Plaster, windows, walls, chimneys, and ground cracked. Knickknacks, books, pictures, and plaster fell; walls reportedly fell. Dishes, windows, and furniture broke. Two and a half inch water line broke. Damage considerable. "There have been shocks of varying intensity continuously (Jan. 31, 1955) since the 16th December."

Kaiser Mine. Press reported timbers were crushed at the 200-foot level.

Lanning. Motion rapid, rolling, lasted 1 minute. Felt by, awakened, and frightened all. Windows, doors, and dishes rattled; walls creaked. Hanging objects swung. Pendulum clock stopped. Trees, bushes shaken strongly. Small objects shifted; vases and small objects overturned. Windows cracked. Knickknacks and pictures fell. Dishes and windows broke. Chimneys twisted. Damage considerable. "About \$2000 damage to Telephone Building." Ground: Rocky, compact.

Mesquite. Motion rapid, lasted 15 seconds. Felt by several in home; awakened few; frightened no one. Windows, doors, and dishes rattled. Shook one brick building down: 2 walls collapsed. (Must have been an extremely old and poorly constructed building. Ed.)

Mina. Motion slow, lasted about 2 minutes. Direction N-S. Felt by and awakened all in community; frightened many. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N-S. Small objects and furnishings shifted. Dishes broke. Threw water from 50-foot railway water tank for 25 feet in N-S direction for 5 minutes. Eight-inch water line running to Southern Pacific Railway water tank broke. Vertical crack in concrete wall of 1-story hotel. Grocery stock fell from shelves in 3 stores. "Second shock more severe and seemed to change from N-S to NW-NE motion, lasted 3 minutes."

Nevada Scheelite Mine (Rawhide). Motion rapid, lasted about 1 minute. Felt by and awakened all in community; frightened few. Moderate earth noises heard. Windows, doors, and dishes rattled; house creaked. Books fell. Dishes broke. Damage considerable to timbered stopes underground. "We are still (Jan. 8, 1955) having several shocks each day." Ground: Rocky, sloping.

Nevada Scheelite Mine (Rawhide). Motion rapid, lasted 40 seconds. Direction N. Awakened all and frightened many in community. Loud earth noises from N. heard by few. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N. Small objects and furnishings shifted. Knickknacks and pictures fell. Dishes broke. Ground cracked. Damage slight. Ground: Rocky, sloping.

Nevada Scheelite Mine ($\frac{1}{2}$ mile above). Motion rapid, lasted 30-60 seconds. Direction SW. Observer in house trailer. Felt by and awakened all; frightened few. Moderate earth noises from NE. heard. Windows, doors, and dishes rattled. Furnishings shifted. Vases, small objects, and furniture overturned. Knickknacks and books fell. Ground cracked. "Shock seemed to be a continuous wave below me. Rocks rattled down the canyon." Ground: Rocky, sloping.

16 December, 03:07:13*, 03:11:29*. Intensity VII in Nevada. (cont.)

Nevada Scheelite Mine (Rawhide). VI. Motion rapid. Felt by and awakened all in community; frightened few. Loud earth noises heard by many. Windows rattled; house creaked. Small objects shifted. "About $\frac{1}{2}$ gallon of water splashed out of fish tanks."

Nevada Scheelite Mine (Rawhide). VI. Motion rapid, lasted 30-60 seconds. Felt by, awakened, and frightened all in community. Loud earth noises from NE. heard by many. Windows, doors, and dishes rattled; house creaked. Small objects shifted. Vases and small objects overturned. Knickknacks, books, and pictures fell. Dishes broke. "Our house trailer is mounted on blocks and it shook in all directions with the rolling motion." Ground: Rocky, sloping.

Rawhide. Motion slow, lasted 1 minute. Felt by and awakened all in community; frightened few. Loud roaring earth noises heard. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects shifted. Vases and small objects overturned. Knickknacks and pictures fell. Dishes fell from shelves and broke. Ground cracked. Damage slight. "All pictures tilted about 15° toward north. Tremors continued every 5-10 minutes until 7:00 a.m."

Intensity VI in Nevada:

Baker. Motion slow, lasted 30 seconds. Felt by and awakened all in community. Faint earth noises heard. Windows rattled; house creaked.

Baker. V. Motion slow, lasted 5 minutes. Direction NE. Felt by many and frightened few in community. Windows rattled; walls creaked. Hanging objects swung. Pendulum clock facing N. stopped. Ground: Rocky soil, compact, sloping.

Battle Mountain. Motion rapid, lasted about 2 minutes. Awakened and frightened all in community. Direction NE. Windows and doors rattled; house creaked. Ground: Compact, level. Same report for shock at 03:11:29*.

Battle Mountain (Copper Canyon). Motion slow, lasted 3-4 minutes. Felt by and awakened all in community. Windows and dishes rattled. Small objects shifted and overturned. Plaster cracked. Knickknacks fell. Dishes broke. Damage slight. Ground: Rocky soil, sloping.

Beatty. Very strong, rolling motion, lasted about 5 minutes. Felt by entire population and frightened people; awakened all in observer's home. Windows, doors, and dishes rattled; house creaked. Pendulum clock stopped. Trees, bushes shaken strongly. Small objects shifted.

Carlin. Motion rapid, lasted 30 seconds. Direction W. Awakened many in community; felt outdoors. Windows, doors, and dishes rattled. Hanging objects swung. Pendulum clock stopped. Small objects and furnishings shifted. "The big trees at my house are trimmed so wind cannot blow limbs against house. The shock shook the trees so strongly that the big limbs beat against the roof top." Ground: Compact.

Carson City. Press reported the State Capitol building had the most damage. Big chunks of ornamental frieze fell from the ceiling of the Assembly Chamber in the 87-year-old building. Dozens of small cracks appeared in the walls. The State Prison warden

- 16 December, 03:07:13*, 03:11:29*. Intensity VI in Nevada. (cont.)
 reported "a good-sized hole" opened between two cell blocks. A door jammed tight for many years at the Capitol building suddenly swung open.
- Carson City. Motion slow, lasted 2 minutes. Direction N-S. Felt by, awakened, and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N-S. Pendulum clocks facing E. stopped. Plaster and chimneys cracked; plaster fell. Damage considerable to brick. Ground: Compact, sloping.
- Carson City. Both shocks felt. Motion slow, rolling; first shock lasted 1 minute; second, 30 seconds. Awakened all in community; frightened few. Windows and dishes rattled; frame creaked. Hanging objects swung N. Ground: Compact, level.
- Carson City. V. Both shocks felt. Motion rapid, N-S, lasted about 30-45 seconds each. Felt by and awakened all in home; frightened few. Windows rattled. Hanging lamps swung E-W during second shock. Ground: Rocky soil, compact.
- Carson City. V. Motion slow, lasted 20 seconds. Direction NW. Awakened and frightened many in community. Moderate earth noises from NE. heard by few. Dishes rattled. Hanging objects swung. Ground: Compact, level.
- Carson City. V. Both shocks felt. Motion rocking, S-N, gradual onset. Felt by many; few alarmed. Buildings creaked; loose objects rattled. Faint earth noises heard by several before shocks. Chimes rang. Chandeliers and doors swung N-S. Ground: Rocky, sandy.
- Carson City. V. Motion slow. Awakened and frightened all in home. Walls creaked. Ground: Filled in.
- Cherry Creek. Motion slow, lasted about 3 minutes. Awakened many in community. Windows rattled; house creaked. Concrete slightly cracked.
- Dayton. Motion rapid, lasted about 2 minutes. Direction N-S and W-E. Felt by and awakened all in community; frightened all. Windows and dishes rattled; house creaked. Pendulum clock facing W. stopped. Walls cracked; plaster fell. Damage slight. Ground: Soil, level.
- Deeth. Awakened all and frightened many in community. Windows, doors, and dishes rattled. Plaster cracked. Ground: Level.
- Dyer. Both shocks felt. The first shock was a hard, rolling motion, continued for about $1\frac{1}{2}$ minutes, then a slight motion felt and continued until a hard shock at 03:11 which lasted for about $1\frac{1}{2}$ minutes. Felt by and awakened all in community; frightened many. Windows, doors, and dishes rattled; walls creaked. Hanging objects swung SE-NW. Widened cracks in a few poorly constructed buildings. Pendulum on Anniversary clock swung NW-SE hitting sides of cup. Cupboard doors swung back and forth. Small ornaments on piano fell N. Kettles hanging on wall made clanging and bumping noise. Damage slight. "Some said they felt a shock at 06:00." Ground: Sandy loam.
- Duckwater. Both shocks felt. Motion slow. Awakened all and frightened few in community. Loud earth noises heard by many about 5 seconds before shock. Windows, doors, and dishes rattled; walls creaked. Ground: Rocky.

16 December, 03:07:13*, 03:11:29*. Intensity VI in Nevada. (cont.)

Duckwater. V. Both shocks felt. First lasted about 20 seconds, motion rapid; second, 10 seconds, motion slow. Direction N-S. First shock awakened and frightened many in community. Windows and dishes rattled. Hanging objects swung N-S. Small objects shifted. Ground: Level.

Elko (15 miles west of). Rocks rolled onto highway.

Elko (CAA office). V. Both shocks felt. Motion rolling, SE-NW, rapid onset. Felt by many. Buildings creaked; loose objects rattled. Bookcase swayed. Clothes on rack, curtains, and clock pendulum swung SE-NW. Pendulum clock on SE. wall stopped during both shocks; clock on NW. wall in police station stopped, pendulum swung SE-NW. Many people in town quite excited. Visible swaying of buildings and trees. Signs and wire fence rattled. Ground: Sandy clay.

Empire. Motion slow. Felt by and awakened many in community; frightened few. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects shifted. Vases and small objects overturned. Plaster, walls, chimneys, and ground cracked. Knickknacks, books, pictures, and plaster fell. Dishes broke. Damage slight. "No major shocks have been felt since the 16th."

Eureka. Motion slow, lasted 2-3 minutes. Direction N-S. Felt by all and awakened many in community; frightened few. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Pendulum clock stopped. Small objects shifted. Vases and small objects overturned. Plaster cracked. Knickknacks and plaster fell. Twisting and fall of chimneys. Damage slight.

Eureka. Two distinct shocks, followed by three others in several hours. First shock stronger by far, motion E-W; second, motion N-S, rocking. First shock knocked bottles of pills off shelves in kitchen; nothing fell during second shock. Felt by all. A light bulb on a wire in home swung about 2 feet. Some bricks knocked off chimneys and edges of brick fronts of buildings. Some pendulum clocks stopped. Some cans migrated off shelves in grocery stores. Rough finishing coat of plaster on E-W wall of court house cracked. Roar like wind heard during first shock.

Eureka (14 miles east of, on U.S. Highway 50). V. At least two shocks felt. Motion shaking during first shock; rolling during second. Observer thought floor might buckle. At the Eldorado Club a mirror hanging by wire over nail on a N-S wall swung several inches N-S.

Fallon. Press reported three shocks felt, with shock at 03:07 the strongest by far. Minor damage reported: some ceilings cracked, some bricks knocked loose, and few dishes and vases broken. Sent most people out of their beds. Bags of seed overturned. Intermittent smaller shocks felt until after 08:00.

Fallon. Motion both rapid and slow, lasted several minutes. Felt by, awakened, and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Some small objects and furnishings shifted. Plaster cracked. "Damage slight in Fallon." Ground: Compact, level.

16 December, 03:07:13*, 03:11:29*. Intensity VI in Nevada. (cont.)

Fallon. Motion slow, lasted 1 minute. Direction W. Felt by and awakened all in community; frightened many. Windows, doors, and dishes rattled; house creaked. Hanging objects and doors swung W. Pendulum clock facing S. stopped. Trees, bushes shaken strongly. Small objects shifted. Vases and small objects overturned. Knickknacks, books, and pictures fell. Dishes broke. Damage slight. Ground: Soil, level.

Fallon. Truckee-Carson Irrigation District officials reported that a survey of much of the Project revealed no apparent damage to the irrigation system. It is possible, however, that some of the canal banks sustained cracks which will not be apparent until next spring when irrigation water is released. There was no apparent damage at Lahontan Dam or at Colman Dam. It is believed, however, that a slight displacement occurred at the Carson Diversion Dam.

Fernley. Both shocks felt. Motion rapid, lasted 2 minutes. Direction E-W. Felt by and awakened all in community; frightened many. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Pendulum clock stopped. Trees, bushes shaken slightly. Small objects and furnishings shifted. Vases and small objects overturned. Plaster, windows, walls, and chimneys cracked. Knickknacks, books, pictures, and plaster fell. Damage slight. "Many small aftershocks during early morning. The last one felt at 06:20." Ground: Soil, level.

Flanigan. Both shocks felt. Motion slow, lasted about 2 minutes. Felt by, awakened, and frightened all in community; also felt by those on ranches in the region. Direction E-W, then N-S. Windows, doors rattled; house creaked. Hanging objects swung. Pendulum clock stopped. Plaster and walls cracked. "The duration was most frightening." Ground: Compact, level.

Colconda. Both shocks felt. Motion slow. Felt by and awakened all in community; frightened many. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects and furnishings shifted. Same report for shock at 03:11. Ground: Compact, level.

Halleck. Motion rapid, lasted about 2 minutes. Awakened all in community; frightened few. Windows, doors, and dishes rattled; house creaked. Small objects and furnishings shifted. "A shock which felt like the explosion of dynamite was felt a few seconds before the main shocks." Ground: Soil, compact.

Hawthorne (U.S. Naval Ammunition Depot). Motion rapid, lasted about $\frac{1}{2}$ -1 $\frac{1}{2}$ minutes. Felt by all and frightened many in community; awakened all in home. Windows, doors, and dishes rattled; walls creaked. Hanging objects swung. Small objects shifted. Moderate disturbance of ammunition reported. Trees, bushes shaken moderately. Ground: Soil, level.

Hawthorne (U.S. Naval Ammunition Depot). Moderate motion, lasted about 1 minute. Awakened many in community; frightened few; felt by some outdoors (active and quiet). Moderate earth noises heard by few. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken moderately. Ground: Soil, compact, level.

Hawthorne. V. Motion rapid. Awakened all in motel room. Ground: Level.

16 December, 03:07:13*, 03:11:29*. Intensity VI in Nevada. (cont.)

Hazen. Both shocks felt. Motion slow, lasted about 12 seconds. Direction NE. Felt by and awakened all. Windows, doors, and dishes rattled; house creaked. Clock fell.

Imlay. Motion slow. Awakened all and frightened many in community. House creaked. Hanging objects swung. Knickknacks and books fell. Ground: Compact.

Jiggs. Both shocks felt. Very noisy. First shock more noisy than shaking; second shock also noisy and shook in a rolling motion, much stronger than others, lasted about 4 minutes. Direction W-E. Felt by, awakened, and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Small objects shifted and overturned. Ground: Soil, loose.

Lovelock. Motion rapid to rolling, lasted about 1½ minutes. Felt by and awakened all in community; frightened many. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken slightly. Small objects and furnishings shifted. Vases and small objects overturned. Plaster and chimneys cracked; chimneys twisted slightly. Knickknacks fell. Dishes broke. "Fallen objects in stores caused the most damage." Damage slight. Ground: Soil, level, compact. Press reported electricity was off briefly in some sections east of Lovelock. Telephone switchboard out. First shock heaviest of three.

Lovelock. Motion slow. Felt by all; awakened all and frightened few in home. Faint earth noises from SE. heard by observer. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects shifted. Vases and small objects overturned. Knickknacks fell. Damage slight. Ground: Compact, level.

Lund. Motion slow, rolling. Felt by all and awakened many in community. Windows rattled; walls creaked. Hanging objects swung. Chimneys cracked.

Lund. V. Motion slow. Two shocks, lasted about 1½ minutes each. Direction NE. Felt by all; awakened many in community; awakened all and frightened all in home. Moderate earth noises heard by few immediately before shock. Windows and doors rattled; walls creaked. Hanging objects and doors swung. Small objects and furnishings shifted. Ground: Soil, compact.

Manhattan. Both shocks felt. Motion slow, rolling, lasted about 2 minutes. Felt by and awakened all in community; frightened few. Windows, doors, and dishes rattled. Hanging objects swung. Ground: Filled in.

Mason. Both shocks felt. Motion rapid, lasted over 1 minute. Direction NE-SW. Felt by and awakened all in community; frightened few. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NE-SW. Trees, bushes shaken strongly. Small objects shifted. Knickknacks fell. Ground cracked. "We think it was stronger than the one on July 6. Many slight shocks followed until 12:00." Ground: Rocky soil, loose, level and sloping.

Minden. Motion slow, rolling. Felt by and awakened all in community; frightened many. Windows, doors, and dishes rattled; house creaked. "Several lighter shocks later in the morning." Ground: Compact.

- 16 December, 03:07:13*, 03:11:29*. Intensity VI in Nevada. (cont.)
- Montello. Both shocks felt. Motion slow, lasted 10 seconds each. Felt by and awakened many in community; frightened many. Windows, doors, and dishes rattled; house creaked. Hanging objects and furnishings shifted. Plaster and windows cracked. Knickknacks, books, pictures, and plaster fell. Damage slight.
- Nixon. Both shocks felt. Motion rapid. Felt by and awakened all in community; frightened many. Windows and doors rattled; walls creaked. Hanging objects swung N-S.
- Orovada. Both shocks felt. Motion rapid. Direction circular. Awakened all in community; frightened few. Windows, doors, and dishes rattled; house creaked. Hanging objects swung; lights swung in circular motion. Trees, bushes shaken slightly. Small objects and furnishings shifted. Plaster cracked. Damage slight. "Strongest shocks felt." Ground: Soil, compact.
- Palisade. Both shocks felt. Motion slow, lasted 2 minutes. Awakened all in community; frightened few. Doors rattled. Ground: Soil, compact, level.
- Panaca. Both shocks felt. Motion rapid. Awakened and frightened all. Windows, doors, and dishes rattled; house creaked. Some plaster and windows cracked. Ground: Soil.
- Red House. Lasted several minutes. Awakened all. Felt by observer in depot. Windows rattled; building creaked.
- Ruby Valley. Both shocks felt. Motion slow, lasted few minutes. Felt by many (some outdoors); awakened many and frightened few in community. Moderate earth noises heard by many. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects and furnishings shifted. Vases, small objects, and furniture overturned. Knickknacks fell. Bird cages shaken off hooks and chickens fell from roosts. Ground: Soil, level.
- Ruby Valley (south end). Motion slow, lasted 1 minute. Direction W-E. Felt by all; awakened all and frightened few in home. Loud earth noises heard 2-3 seconds before shock. Windows, doors, and dishes rattled; house creaked. Hanging objects, doors, etc., swung. Small objects and furnishings shifted. Vases, small objects, and furniture overturned. Knickknacks, books, and pictures fell. Dishes broke. Damage slight. "Have felt many earthquakes along the San Andreas fault in California over a period of 40 years. This was possibly the strongest one I have ever experienced." Ground: Sloping.
- Schurz. Both shocks felt. Felt by and awakened all in community; frightened few. Windows, doors, and dishes rattled; frame creaked. Hanging objects swung. Small objects and furnishings shifted. Damage slight. Ground: Level.
- Silverpeak. Both shocks felt. Motion rapid. Direction E. Awakened all in community; frightened few. Moderate earth noises from E. heard. Windows rattled. Hanging objects swung. Trees, bushes shaken moderately. Small objects shifted and overturned. Knickknacks fell. Dishes broke. Plaster cracked. Damage slight. Ground: Soil, sloping.
- Smith. Both shocks felt. Direction of first shock SSE-WNW; second shock slightly different. Motion slow, lasted 3 minutes. Felt by and awakened many in community, all in home; frightened few.

16 December, 03:07:13*, 03:11:29*. Intensity VI in Nevada. (cont.)

Faint earth noises heard by few at time of shock. Windows, doors, and dishes rattled; house creaked. Doors swung. Trees, bushes shaken moderately. Small objects in stores shifted and overturned. Plaster cracked. Damage slight. Ground: Soil, loose.

Sparks. Both shocks felt. Lasted 2 minutes. Direction NE. Felt by and awakened all; frightened many in community. Loud earth noises from NE. heard by many 3 seconds before shock. Doors rattled; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Small objects and furnishings shifted. Knickknacks fell. Damage slight. Ground: Compact.

Stewart. Both shocks felt. Motion slow, lasted 1 minute. Awakened and frightened all in community. Faint earth noises heard by many about 15 seconds before shock. Damage slight. "This was by far the most severe shock we have ever felt in Stewart." Ground: Level.

Stillwater. Press reported few dishes and vases, etc., broke. At one home clay in the furnace was broken and the bottom broke out of the hot water heater again. Damage slight in Stillwater.

Stillwater. Both shocks felt. Motion slow, circular, lasted 20 seconds. Felt by and awakened all in home. Small objects and furnishings shifted. Ground: Soil, level.

Tonopah. All bottles shaken off shelves in bar. Plaster dropped from ceiling and few cracks appeared. Some people went outside and stood in the street.

Tonopah. V. Both shocks felt. Motion slow, lasted over 1 minute. Felt by and awakened all in home. Windows, doors, and dishes rattled. Hanging objects swung N-S, also E-W. Ground: Rocky

Tonopah (8 miles east-southeast of, CAA station). V. Both shocks felt. Motion swaying, E-W, gradual onset. Felt by many. Buildings creaked; loose objects rattled. Moderate roaring earth noises heard at peak of motion. Disturbed objects observed by many. Lights, curtains (east wall), clocks (south wall) swayed; teletypes swayed E-W. Pendulum clock stopped. Ground: Rocky.

Tungsten. Both shocks felt. Motion rapid, lasted 2-3 seconds. Awakened all in community; frightened few. Moderate earth noises heard. Windows rattled. Small objects shifted.

Tuscarora. Both shocks felt. Motion slow, lasted 3 minutes. Awakened many and frightened few in community. Faint earth noises heard by observer 3 seconds before shock. Walls creaked. Hanging objects swung. Small objects shifted. Knickknacks fell. Plaster cracked. Ground: Soil.

Ursine. Both shocks felt. Motion rapid, lasted 5 minutes. Felt by and awakened all in community. Loud earth noises heard. Windows and doors rattled; walls creaked. Ground: Compact, level.

Valmy. Both shocks felt. First slow and rolling; second rolling and severe. Felt by and awakened all in community; frightened few. Faint earth noises from S-N heard. Windows, doors, and dishes rattled; house creaked. Doors swung S-N. Trees, bushes shaken moderately. Small objects and furnishings shifted. Plaster cracked. Books and pictures fell. Ground: Compact, level.

16 December, 03:07:13*, 03:11:29*. Intensity VI in Nevada. (cont.)

Verdi. Felt by and awakened all in community; frightened many. Earth noises heard by many. Windows and dishes rattled; walls creaked. Ground: Rocky.

Wabuska. Both shocks felt. Motion slow. Felt by and awakened all in community; frightened few. Loud, roaring earth noises from NE. heard by many before shock. Windows, doors, and dishes rattled; house creaked slightly. Hanging objects swung. Cans fell from store shelves. Trees, bushes shaken strongly. Ground: Rocky, marshy, level.

Wadsworth. Motion slow, lasted 2-3 seconds. Felt by, awakened, and frightened all in community. Moderate earth noises heard by many. Windows and doors rattled; house creaked. Doors swung.

Wellington. Both shocks felt. Motion rolling, lasted several seconds. Felt by and awakened all; frightened few. Faint earth noises heard. Windows and doors rattled. Trees, bushes shaken slightly. Ground: Rocky, sloping.

Wilkins. Both shocks felt. Motion slow, brief. Awakened many in community. Small ground cracks. Ground: Soil, level.

Intensity VI:

Benton. Motion slow, lasted 5 minutes. Direction circular. Felt by and awakened all in community; frightened many. Loud earth noises heard by many. Windows and doors rattled; house creaked. Hanging objects swung. Trees, bushes shaken moderately to strongly. Small objects shifted. Knickknacks fell. Ground: Soil, level.

Benton Inspection Station (Benton). V. Both shocks felt. Motion slow. First shock lasted about 40 seconds; second, about 1½ minutes. Direction of first shock N-S; second, clockwise, rolling. Felt by all at work. Hanging objects swung. Ground: Compact, level, filled in.

Coleville. Motion slow, lasted 2 minutes. Direction N-S. Felt by, awakened, and frightened all in community. Moderate earth noises heard by few. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken strongly. Small objects shifted and overturned. "Second shock sort of circular in motion. Jarred all doors open in home and in a few other homes. Shook a few things from shelves. No damage to amount to anything." Ground: Rocky soil, compact, level and sloping.

Death Valley Junction. Motion slow, lasted 30 seconds. Awakened many in community; frightened few. Faint earth noises heard. Walls creaked. Plaster and windows cracked. Damage slight. Ground: Compact.

Death Valley (Park Village, Death Valley Nat'l Monument Headquarters). IV. Motion trembling, abrupt onset. Felt by several; few alarmed. Buildings creaked; loose objects rattled. Both shocks felt. Ground: Rocky.

Floriston. Motion slow. Felt by and awakened many in home; frightened few. Windows rattled. Hanging objects swung. Small objects shifted. Plaster cracked. "Not nearly as strong as the shocks of July and August." Ground: Rocky, steep.

Jackson. Two shocks felt. Motion slow. Direction E. Felt by and awakened many in community; frightened few. Faint earth noises heard by few. Windows, doors, and dishes rattled. Hanging

16 December, 03:07:13*, 03:11:29*. Intensity VI. (cont.)

objects swung NE. Pendulum clock stopped. Small objects and furnishings shifted. Vases and small objects overturned. Knickknacks, books, and pictures fell. "Very hard shock for this area." Ground: Rocky.

Long Valley Dam (about 20 miles northwesterly from Bishop). Both shocks felt. Motion slow. First shock lasted 40 seconds; second shock, 30 seconds. Direction E-W. Awakened all in community; frightened few. House creaked. Hanging objects swung. Ground: Rocky, level.

Mono Lake. Lasted 1 minute. Felt by and awakened all in community. Dishes rattled. Pendulum clock facing E. stopped. Small objects and furnishings shifted. Vases and small objects overturned. Ground: Rocky, sloping.

Sacramento. Press reported the shock caused an estimated \$20,000 damage to a 9,500,000-gallon underground water tank at the city's filtration plant when supporting column toppled and the roof settled to the water surface. Many people were awakened and some called police to report prowlers. Door chimes rang and a burglar alarm was set off in a downtown department store; bell at the Trinity Church rang.

Sacramento. (03:07, 03:11, 03:15, 03:17) Motion swaying, then trembling, abrupt onset. Felt by most people. Buildings creaked; loose objects rattled. Disturbed objects observed by most people. Swimming pools slopped over. Power interrupted by cable breaks. Plaster cracked. Pendulum clock facing E-W stopped. Few panic calls received. Ground: Soil.

Sacramento (701 K St.). V. Motion slow. Felt by many in community; awakened all in home; frightened few in community. Earth noises reported by some. Hanging objects swung.

Sacramento (west section). V. Motion rapid, two shocks, lasted 30 seconds each. Direction E-W. Awakened all in home. Doors rattled; roof creaked. Hanging objects swung E-W. Ground: Sandy soil, loose, level.

Sloughhouse. Motion rapid, lasted 5 minutes. Felt by and awakened all in community; frightened many. Moderate earth noises heard. Windows, doors, and dishes rattled; frame creaked. Small objects shifted. Ground: Compact.

Tinemaha Reservoir (about 12 miles north of Independence). Both shocks felt. First shock lasted 45 seconds; second, 15 seconds. Motion both rapid and slow. Direction N-S. Felt by and awakened all in community. Windows, doors, and dishes rattled; house creaked. Ground: Compact, level.

Yosemite National Park (eastward end of Yosemite Valley). First two shocks most severe; other shocks felt at intervals for 1/2 hour. Motion rocking, circular; lamp swung counterclockwise with slight emphasis E-W. Felt by and awakened many in community; frightened few. Buildings creaked; loose objects rattled. Roaring earth noises heard prior to shocks. Disturbed objects observed by many. "Quite evident building movement. In at least one building there were slight cracks in wall and woodwork slightly separated from wallboard. Some bottles, jars and cans toppled from shelves in store; some glassware broke. Some people took children and stationed themselves in door jambs." Damage slight. Another shock felt at 06:00. Ground: Unconsolidated ancient lake fill.

16 December, 03:07:13*, 03:11:29*. Intensity VI. (cont.)

Yosemite National Park. Intermittent shocks for 8 minutes. Motion slow. Direction E-W. Felt by and awakened all in community; frightened few. Faint earth noises heard. Windows and doors rattled; house creaked. Hanging objects swung. Vases and small objects overturned. Damage slight. Ground: Rocky soil, level.

Yosemite National Park (Government Center). Both shocks felt. Motion trembling, rocking, and rolling, rapid onset. Direction seemed E-W. Felt by, awakened, and frightened many. Building creaked; loose objects rattled. Moderately loud rumbling earth noises heard during shocks. Disturbed objects observed by many. Few bottles and jars were thrown to floor at store. Pictures, lamps, and window weights swung. Loose table mirror fell over against wall. "Many reported shocks. Most severe and noticeable in many years." Ground: Sandy, gravel over rock.

Yosemite National Park (Wawona). IV. Both shocks felt. Motion rolling, gradual onset. Felt by several. Building creaked; loose objects rattled. Several mildly alarmed. Ground: Granitic sand.

Intensity V in Nevada:

Basalt. Motion rapid, lasted about 12 seconds. Direction NE. Awakened many in community. Moderate earth noises heard 4 seconds before shock. Windows and doors rattled; house creaked. "Two light shocks felt since December 16." Ground: Compact.

Beowawe. Both shocks felt. Motion rolling, lasted 2 minutes. Felt by all, awakened many and frightened few in community. Windows and doors rattled; walls creaked. Hanging objects swung. Pendulum clock stopped. Ground: Soil, level.

Caliente. Both shocks felt. First shock had rapid motion, lasted 1½ minutes; second shock had slow motion, lasted 30 seconds. Awakened many in community; frightened few. House creaked slightly. Hanging objects swung E-W. Ground: Soil, compact, level.

Candelaria. Both shocks felt. Motion of first shock rolling; second, a sharp jar, lasted 2 and 1 seconds, respectively. Observer in house trailer. Felt by all and awakened all in trailer. Faint earth noises from N. heard by many 5 seconds before shock. Windows rattled; house creaked. Ground: Level, filled in.

Crystal Bay. Both shocks felt. Motion slow, lasted 3 minutes. Felt by and awakened many in community. Windows rattled. Hanging objects swung. Ground: Soil.

East Ely. Both shocks felt. Motion slow, rolling. Felt by (some outdoors; quiet) and awakened many in community.

Elgin. Felt by and awakened many in community; frightened few in home. Windows, doors, and dishes rattled; walls creaked. Hanging objects and doors swung. Ground: Sloping, filled in.

Ely. At the Hotel Nevada a bed facing E-W moved E-W. Bed shook during first shock and seemed to roll during second shock. Nearly everyone on the 6th or top floor of the hotel ran out into the halls and many moved to lower floors. Pendulum clocks stopped. Other observers reported that it felt like someone slammed door of nearby apartment; awakened by light tremor and

- 16 December, 03:07:13*, 03:11:29*. Intensity V in Nevada. (cont.)
thought dog had jumped on bed; steel gun cabinet rattled and bed facing E-W moved E-W. Both shocks reported to be about the same intensity.
- Ely. Motion rapid, lasted 2 minutes. Direction NE. Felt by many in community; awakened all in home. Windows, doors, and dishes rattled; house creaked. Ground: Compact, level, filled in.
- Ely. (Yelland Field) III. Two shocks felt. Motion trembling, from W., rapid onset. Felt by several.
- Gabbs. Press reported the shock was sharply felt.
- Gardnerville. Both shocks felt. Motion slow, lasted 45 seconds. Direction NE. Felt by, awakened, and frightened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects shifted. Ground: Soil, compact, level.
- Glenbrook. Both shocks felt. Motion slow, lasted 15-20 seconds. Direction NE. Awakened many in community; frightened many in home. House creaked. Ground: Soil, compact, level.
- Goldfield. Two distinct shocks. Motion rapid, lasted several seconds. Felt by, awakened, and frightened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Ground: Rocky, compact, level and sloping.
- Hiko. Motion slow, lasted 5 minutes. Direction N-S. Felt by some outdoors; awakened many in community. Windows, doors, and dishes rattled. Doors swung. Trees, bushes shaken moderately. Bed on casters moved. Ground: Soil, level.
- Lamoille. Motion rolling. Awakened and frightened many in community. Windows, doors, and dishes rattled. Hanging objects swung. Small objects shifted. Ground: Rocky.
- Logandale. Both shocks felt. Motion slow. Felt by several in home and community; awakened few. Windows rattled; beds shook; doors slammed. Clocks stopped. "First shock awakened people; second shock really scared them. Chickens cackled loudly."
- McDermitt. Both shocks felt. Motion slow. Awakened many in community. Windows rattled. Ground: Soil.
- McGill. Both shocks felt. Motion slow, lasted 2 minutes. Felt by several (some outdoors; quiet), awakened and frightened few in community. Windows, doors, and dishes rattled. Hanging objects swung. Plaster slightly cracked. Ground: Compact.
- Mountain City. Motion rapid. Felt by several, awakened and frightened few in community. Windows, doors, and dishes rattled; house creaked. Small objects shifted. "Felt more severely than previous shocks." Ground: Soil, level.
- Overton. Lasted 2 minutes. Awakened many in community. Windows rattled. Hanging objects swung. Ground: Compact.
- Pahrump. Both shocks felt. Heavy motion. Awakened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects and furnishings shifted. Doors standing open swung rapidly during first shock; second shock much lighter but swung the open doors. Ground: Compact.
- Paradise Valley. Long duration. Awakened many and frightened few in community. Direction NW-SE. Windows and doors rattled; entire house creaked. Hanging objects swung NW-SE. Wallpaper cracked. "Hardest shock so far." Ground: Soil, level, filled in.

16 December, 03:07:13*, 03:11:29*. Intensity V in Nevada. (cont.)

Pioche and Caselton. Felt by several; awakened few. Windows, doors, and dishes rattled. Trees, bushes shaken slightly. Some small objects shifted. Ground: Rocky.

Pioche. IV. Motion slow. Felt by many in community; awakened few. Some rattling of windows, doors, and dishes.

Reno. Both shocks felt. Motion slow. First shock lasted about 1½ minutes; second about 50 seconds. Direction SE. Felt by many; awakened all in home. Windows, doors, and dishes rattled; walls and roof creaked. Hanging objects swung E-W. Ground: Soil, compact, level. Press reported there was no damage in Reno.

Reno (Weather Bureau Airport Station). Three shocks felt: 03:07, 03:11, 03:16, lasted about 1½ minutes each. First two most severe; very light tremors between shocks. Motion rolling, changing to jolting, gradual onset. Felt by many. Buildings creaked; loose objects rattled. Earth noises heard by several. Disturbed objects observed by many. Visible swaying of buildings and trees. Overhead fluorescent fixtures in Weather Bureau office swung N-S. "A very light tremor at 05:16."

Silver City. Both shocks felt. Motion slow, lasted 1 minute. Felt by all; awakened all in home. Faint earth noises heard by few. Windows, doors, and dishes rattled; house creaked. Ground: Rocky, sloping.

Spring Valley (Ely). Motion slow. Direction N. Awakened all in home. Loud earth noises from NE heard. Windows rattled.

Steamboat. Both shocks felt. Motion slow, lasted 2 seconds. Awakened all in home. Ground: Rocky, loose.

Virginia City. Both shocks felt. Motion rapid. Felt by (some outdoors), awakened, and frightened many. Faint earth noises heard. Windows, doors, and dishes rattled. Hanging objects swung. Ground: Loose, sloping.

Wells. Both shocks felt. Motion slow, lasted 2-3 seconds, respectively. Direction E. Felt by many (some outdoors; quiet); awakened many and frightened few in community. Moderate earth noises heard by many. Windows, doors, and dishes rattled. Trees, bushes shaken slightly. Small objects and furnishings shifted. Ground: Compact, level.

Winnemucca. Both shocks felt. First swaying, SE-NW; second bumping. Felt by several; awakened and alarmed few. Buildings creaked; loose objects rattled. Disturbed objects observed by several. Canned goods and utensils fell in several places. Hanging objects swung SE-NW. Few pendulum clocks stopped. Some power outages with each shock. Other slight, swaying shocks felt at 05:16, 05:23, 06:18, 07:11.

Winnemucca (5 miles southeast of, CAA office (airport)). Two shocks felt. First shock swaying, with gradual onset; second rocking and bumping. Direction S-N. Felt by observer (only one at CAA office). Small objects displaced towards north or east. Small articles shaken off tables and all desk and filing cabinet drawers opened. Pendulum clock on south wall stopped at 03:07 and 03:11; pendulum swings E-W, during shock it swung N-S. Ground: Sandy.

Yerington. Both shocks felt. Motion moderate, lasted 60-80 seconds. Felt by all; awakened many and frightened few in community.

16 December, 03:07:13*, 03:11:29*. Intensity V in Nevada. (cont.)

Moderate earth noises from N-S heard few seconds before shock. Windows, doors, and dishes rattled; walls creaked. Ground: Soil, level.

Zephyr Cove. Both shocks felt. Motion slow. Felt by all; awakened many and frightened few in community. Moderate earth noises heard by observer. Windows rattled; walls creaked. Hanging objects swung. Ground: Soil, sloping.

Intensity V:

Ahwahnee. Motion rapid, lasted 10 seconds. Felt by and awakened many in community. Windows rattled; walls creaked. Trees, bushes shaken slightly. Ground: Rocky, sloping.

Amador City. Motion rapid, lasted few seconds, pause, then shook few seconds. Awakened all in home; few in community. Moderate earth noises like a series of blasts heard by few. Windows rattled. Hanging objects swung NE. "Tree leaves silhouetted against bedroom wall by street light swung back and forth very rapidly in what seemed a NE-SW direction." Ground: Rocky, compact, sloping.

Angels Camp. Motion rapid, abrupt onset. Direction E-W. Felt by (some outdoors; quiet) and awakened many; frightened few. Windows, doors, and dishes rattled. Hanging objects swung. Trees, bushes shaken moderately.

Applegate. Two shocks felt, 2 or 3 minutes apart. Motion slow, lasted 5 seconds. Felt by and awakened many; frightened few. Windows, doors, rattled; house creaked. Hanging objects swung. Ground: Rocky, sloping, steep.

Arvin. Motion slow. Felt by (some outdoors) and awakened many in community; frightened few. Direction NE. Moderate earth noises from NE, heard by few. Windows, doors, and dishes rattled. Ground: Soil.

Bakersfield. Sharp jolt, lasted 1 minute. Direction E-W. Felt by, awakened, and frightened most people. Windows, doors, and dishes rattled; frame creaked. Hanging objects swung. Pendulum clock stopped. Ground: Compact. Press reported it was the strongest shock since 1952, and that it set off burglar alarms.

Big Creek. Motion rolling, heavy for 10 seconds, then lesser intensity for 1 minute. Direction E-W. Awakened many; frightened few. Faint earth noises heard. Windows, doors, and dishes rattled; house creaked. Ground: Rocky, compact.

Big Pine. Lasted 10 minutes. Felt by and awakened all in home. Loud earth noises heard. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken strongly.

Bijou. Motion slow. Felt by and awakened many in community; frightened few. Faint earth noises heard. Dishes broke. Ground: Compact, sloping. "I was en route from Carson City, Nevada to Lake Tahoe by auto and did not notice any unusual effects."

Bishop. Motion slow, lasted about 30 seconds. Seemed to be circular motion after first fairly severe shock. Awakened many in community; all in home. Loud earth noises heard by many. Windows rattled; house creaked some. Door opened. Hanging objects swung. Ground: Compact, level.

16 December, 03:07:13*, 03:11:29*. Intensity V. (cont.)

Bishop. Motion slow, lasted 2-3 minutes. Awakened and frightened many in community. Windows and doors rattled; house creaked. Hanging objects swung E-W. Ground: Soil, compact, level.

Bishop. Awakened observer. Door swung about 3 inches back and forth. Bed facing E-W rocked N-S. Toy sewing machine slid to floor. Door chimes free to move in any direction swung N-S, then in circular motion.

Bishop (26 miles north of). Observer felt at least 5 shocks. Motion of first two shaking, third jolting, fourth rolling, and fifth shaking. First three shocks lasted about 1½ minutes. Picture hanging on N-S wall moved E-W and banged against wall; swung parallel to wall with rolling of the fourth shock. At Tom's Place some wine bottles migrated northward on an E-W shelf, one nearly fell.

Butte City. Felt by and awakened many. Hanging objects swung.

Camanche. Both shocks felt. Second shock slight. Motion slow, lasted 2 seconds. Felt by all in home; awakened many and frightened few in community. Moderate earth noises from E. heard by many. House creaked. Ground: Compact, level.

Caruthers. Motion slow, momentary duration. Direction SW. Felt by all in community; awakened and frightened many. Faint earth noises heard. Windows, doors, and dishes rattled; house creaked. Hanging objects swung SW. Trees, bushes shaken slightly. Ground: Sandy, level.

Chilcoat. Both shocks felt. Motion rocking, E-W, one bump, gradual onset. First shock lasted about 30 seconds. Two minutes later another shock of lesser intensity, lasted about 15-20 seconds. Felt by and awakened many. Building creaked; loose objects rattled. Chandeliers swung E-W.

Copperopolis. Three shocks felt. First two lasted several seconds; third about 1 second. Motion rapid. Felt by, awakened, and frightened many. Loud, roaring earth noises heard by few 1-2 seconds before shock. Windows rattled. Hanging objects swung NE. Ground: Rocky, sloping. "First heavy shock felt in this locality in years."

Corcoran. Motion slow. Felt by and awakened many. Faint earth noises heard. Windows, doors rattled; walls creaked. Hanging objects swung. Ground: Soil, compact.

Courtland. Motion slow, lasted 3 minutes. Direction N. Felt by and awakened many; frightened few. Faint earth noises heard. Windows and doors rattled; frame creaked. Hanging objects swung N. Small objects shifted; vases overturned; knickknacks fell. Ground: Loose.

Delano. Felt by and awakened many in community.

Dixon. Motion slow, rolling, strong. Two shocks, lasted about 5 minutes. Direction NE. Felt by, awakened, and frightened many in community. Loud rattling of windows, doors, and dishes; loud creaking of house. Hanging objects swung. Pendulum clock stopped. Ground: Soil, compact.

Downieville. Motion slow, lasted 30 seconds. Direction SE. Felt by and awakened many; frightened few. Moderate earth noises heard by many. House creaked. Ground: Rocky.

16 December, 03:07:13*, 03:11:29*. Intensity V. (cont.)

Doyle. Motion slow. Felt by (some outdoors; quiet) and awakened many; frightened few. Faint earth noises heard by many. Windows, doors, and dishes rattled; walls creaked. Doors swung. Small objects and furnishings shifted. Ground: Loose, level.

Electra Powerhouse (NW. 1/4, Sec. 33, T6N., R12E., Amador County). Both shocks felt. Motion rocking, gradual onset. Awakened many. Creaking of buildings and rattling of loose objects heard by many. Thunderous earth noises heard by several at time of shock. Ground: Rocky.

El Nido. Shocks felt for period of 7 minutes. Motion slow. Direction N-S. Felt by and awakened many. Windows rattled; frame creaked. Hanging objects swung. Ground: Compact.

El Portal. Motion rapid, lasted 15 seconds. Direction E. Felt by all in community; awakened all in home; frightened few in community. Faint earth noises from E. heard by many. Windows and doors rattled; frame creaked. Hanging objects swung E. Ground: Rocky, compact, sloping and steep.

Emigrant Gap. Motion slow, gentle shake, lasted about 2 minutes. Direction NE. Awakened many and frightened few in community. Ground: Rocky, compact, steep.

Escalon. Motion slow, lasted 2 minutes. Awakened all in home; many in community. Windows rattled. Hanging objects swung. Ground: Soil.

Farmington. Motion rapid. Felt by (some outdoors; quiet) and awakened many in community; frightened few. Moderate earth noises heard. "Shaking of beds was about the extent of effects as far as I have been able to learn. I knew nothing of it until told by others." Ground: Soil.

Firebaugh. Felt outdoors by some (active); awakened many; frightened few. Windows and doors rattled; walls creaked. Hanging objects swung.

Foresthill. Motion slow, lasted 1½ minutes. Direction E-W. Felt by and awakened many; frightened few. Windows, doors, and dishes rattled; house creaked. Hanging objects swung E-W. Pendulum clock facing N-S stopped. Trees, bushes shaken slightly. "Second shock lasted 30 seconds and was about same intensity." Ground: Rocky soil, level.

Fort Bidwell. Motion slow, lasted 10 seconds. Direction N-S. Awakened many or all in community; frightened few. Ground: Compact, level.

Fresno. Press reported many San Joaquin Valley residents were awakened; telephone calls indicated few were alarmed. Motion described as strong and rolling. One persons reported a floor lamp was knocked over and another said door chimes rang. No damage was reported.

Fresno (northeast section, Weather Bureau airport station). Both shocks felt. Motion rocking, E-W, rapid onset. Felt by many. Loose objects rattled. Disturbed objects observed by several. Visible swaying of buildings and trees reported by many; swinging of chandeliers reported by many. Pendulum on clock at Weather Bureau office swung in arc of about 3 inches. CAA control tower, 60 feet high, was reported to have swayed about 8 inches. Ground: Sandy.

16 December, 03:07:13*, 03:11:29*. Intensity V. (cont.)

Gonzales. Motion rapid. Direction NE. Felt by and awakened all in home; frightened few children. Faint earth noises heard. Beds rattled. Ground: Soil, compact.

Greenville. Motion slow, swaying, lasted about 20 seconds. Awakened many and frightened few in community. Small objects shifted. Plaster cracked slightly. Ground: Rocky, level.

Hanford. Motion slow, rolling, lasted several seconds. Felt by and awakened many in community; frightened few. Windows and doors rattled; house creaked. Hanging objects swung. Ground: Deep alluvium, level.

Hanford. Generally felt and most people awakened. Some slight damage to bric-a-brac, etc. "No serious damage to walls or home."

Hollister. Both shocks felt. Motion rocking and swaying, gradual onset. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Disturbed objects observed by several. Chandeliers and window sash weights swung. Pendulum clock facing N-S stopped; clock facing E-W did not stop. Ground: Adobe.

Independence. Motion slow. Felt by and awakened many in community; frightened few. Faint earth noises heard. Windows and doors rattled. Hanging objects swung.

Isleton. Awakened all in home; frightened few in community. Moderate earth noises heard by many. Windows, doors, and dishes rattled. Hanging objects swung. Doors opened. Ground: Soil, level.

Keeler. Motion rapid, rolling, shaking, lasted about 3 minutes. Rumbling earth noises preceded shock. Awakened many and frightened few in community. Windows, doors, and dishes rattled; house creaked. Ground: Sloping.

Knights Ferry. Motion slow, lasted 1 minute. Felt by and awakened many in community; frightened few. Ground: Loose, sloping.

Laws. (03:07) Motion very rapid, lasted 1 minute. Felt by (some outdoors; active), awakened, and frightened many in community. Direction circular. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Rumbling earth noises heard before shock. "This was the strongest shock I have ever felt here and have lived here 60 years. House rolled in every direction." Ground: Rocky, level.

Laws. (03:11) IV. Motion slow, lasted several seconds. Direction NE. Frightened few in community. Windows and doors rattled; house creaked.

Leevining. Motion slow, lasted 5 minutes. Direction S. Felt by all in community; awakened many; frightened few. Walls creaked. Ground: Soil, level.

Le Grand. Both shocks felt. Gentle shaking, long duration. Light fixtures swung. "Railroad crew called to check the track."

Livermore. Motion slow, lasted 2 minutes. Felt by and awakened many; frightened few. Earth noises from E. heard. Window weights rattled. Ground: Compact.

Locke. Two shocks felt, very short interval, lasted 2 minutes. Direction E-W. Faint earth noises heard. Felt by all in community; frightened many. Windows, doors, and dishes rattled. Hanging objects swung.

16 December, 03:07:13*, 03:11:29*. Intensity V. (cont.)

Lockeford. Lasted 30 seconds. Felt by some outdoors; awakened many and frightened few in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Ground: Soil.

Lodi (central section). Both shocks felt. Motion swaying, NW-SE. Awakened many. Creaking of buildings and rattling of loose objects heard by many. Rattling earth noises heard by several. Disturbed objects observed by many. Water stage recorder showed water in Mokelumne River, near Lodi, moved about 1 foot. Doors opened and chandeliers swung. Four-hundred-day clock stopped. "One person reported another shock at 04:40; not felt by many." Ground: Sandy.

Lone Pine. Motion slow, lasted 8 seconds. Direction N. Felt by and awakened many in community. Faint earth noises from N. heard by many. Windows, doors, and dishes rattled. Hanging objects swung NE. Ground: Compact.

Los Banos. Motion rapid, lasted 3 seconds. Direction NW-SE. Awakened many in community; frightened few. Bed moved. House creaked. Hanging objects swung NW-SE. Four chandeliers hanging 30 inches from ceiling swung NW-SE in arc of 6 inches. "The movement of the bed awakened us and, although awake, we felt no second or third shock." Ground: Compact, level.

Los Banos. Motion slow, lasted 10 seconds. Felt by and awakened many in community; frightened few. Moderate earth noises from N. heard by few 1 second before shock. Windows and doors rattled; walls creaked. Hanging objects swung N. Ground: Soil, compact, level.

Los Banos. (03:11) IV. Motion swaying, E-W. Awakened observer and wife. House creaked; loose objects rattled. Table between twin beds moved E-W and hit beds.

Madeline. Felt by and awakened many in community. Windows and dishes rattled; walls creaked. Ground: Compact.

Madison. Motion rapid, lasted 3 minutes. Felt by and awakened many in community; frightened few. Loud earth noises heard by many. Windows rattled; frame creaked. Hanging objects swung. Trees, bushes shaken slightly. Damage slight. Ground: Soil, level.

Markleeville. Motion slow, lasted 10 seconds. Felt by all and awakened many in community. Windows, doors, and dishes rattled; house creaked. Shock at 03:11 felt and had about same intensity.

Marysville. Motion slow, lasted 1 minute. Awakened many and frightened few in community. House creaked. Pendulum clock stopped. Ground: Level, filled in.

Merced. Motion rapid, lasted 15 seconds. Direction NW-SE. Felt by and awakened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken slightly. Small objects shifted. Ground: Rocky soil, compact, level.

Modesto. Motion slow, lasted 15 seconds. Direction E-W. Felt by all; awakened many and frightened few in community. Hanging objects swung. Ground: Compact.

Newman. Motion rapid. Felt by and awakened many in community. Faint earth noises heard. Ground: Soil.

Norden. Motion slow, rolling. Direction SW. Felt by (some outdoors; quiet) and awakened many. Windows and doors rattled. Ground: Rocky.

16 December, 03:07:13*, 03:11:29*. Intensity V. (cont.)

- Omo Ranch. Motion slow, lasted 30 seconds. Direction NE. Felt by all in community; awakened all in home. Windows and doors rattled; house creaked. Hanging objects swung NE. Ground: Soil, compact, level.
- Orland. Motion rapid. Felt by several and awakened few in community; frightened few. Windows rattled. Hanging objects swung. Trees, bushes shaken slightly. Small objects shifted. Ground: Soil, compact, level. Press reported doorbell chimes rang.
- Owenyo. Motion slow, rolling, gradual onset, lasted 3 minutes. Direction N-S. Awakened many and frightened few in community. Windows, doors, and dishes rattled; houses creaked. Hanging objects swung. Small objects shifted. "I live in a trailer and never noticed any shock at all. Other people said it was quite a rolling shock." Ground: Rocky, sandy.
- Pacific House. Motion slow, lasted 10 seconds. Direction N. Felt by and awakened many in community; frightened few. Windows, doors, and dishes rattled. Small objects shifted and overturned. Ground: Soil, compact, sloping.
- Placerville. Felt by and awakened many; frightened few. Windows and doors rattled; house creaked. Ground: Rocky.
- Porterville. Motion slow. Felt by and awakened many. Faint earth noises heard. Windows rattled. Pendulum clock stopped. Ground: Soil, compact.
- Porterville (northeast section). IV. Both shocks felt. Gradual onset. Felt by several. Windows rattled. Hanging objects swung. Press reported a slight shock.
- Portola. Motion slow, lasted 30 seconds. Awakened many. Faint earth noises heard. Ground: Compact. Press reported windows rattled.
- Ravendale. Both shocks felt. Motion slow. Felt by and awakened many in community. Moderate earth noises heard by few. Windows, doors, and dishes rattled; walls creaked. Knickknacks fell. Hanging lights swung. "Second shock much stronger."
- Raymond. Three shocks felt. Awakened all in home. Windows, doors, and dishes rattled; house creaked. Cans fell off store shelves.
- Santa Rosa. Motion slow. Direction E-W. Awakened many in community; frightened few. Windows, doors, and dishes rattled; house creaked. Hanging objects swung E-W. Pendulum clock facing S. stopped. Ground: Compact, level.
- Santa Rosa. Press reported both shocks were long and rolling. Chandeliers swung; door chimes rang; dogs barked. In all 14 or 15 residents called Santa Rosa police. Luggage suspended from wire in attic swung strongly back and forth. Men on duty at police station did not feel any shocks at all.
- Scotty's Castle (Death Valley). Motion rapid. Felt by and awakened many. Windows and doors rattled. Pendulum clock stopped.
- Sierraville. Motion slow. Direction E-W. Felt by all in community; awakened all in home. Windows and dishes rattled; house creaked. Hanging objects swung E-W. Ground: Marshy, level.
- Snelling. Motion rapid, lasted 20 seconds. Direction NE. Felt by and awakened many in community. Moderate earth noises from

16 December, 03:07:13*, 03:11:29*. Intensity V. (cont.)

- NE. heard by many 3 seconds before shock. Windows and doors rattled; walls creaked. Ground: Soil.
- Sonora. Motion slow, lasted several seconds. Awakened all in home. Faint earth noises heard by few. Windows rattled; walls creaked. Slight damage to beams. Ground: Soil, compact.
- Springville. Motion slow. Felt by (some outdoors) and awakened many in community; frightened few. Faint earth noises from NE. heard. Windows rattled; house creaked. Ground: Soil.
- Stevinson. Motion slow, long duration. Felt by many (some outdoors; quiet); awakened many in community. Direction N-S and E-W. Windows rattled. Ground: Soil, compact, level.
- Stockton. Both shocks felt. Motion slow, lasted 1 minute. Direction E. Awakened many. Windows rattled. Trees, bushes shaken slightly. Ground: Filled in.
- Tahoe City. Motion slow, lasted 15 seconds. Awakened all in home. House creaked. Hanging objects swung E-W. Ground: Rocky.
- Tahoe Pines. Motion slow, lasted 1 minute. Awakened many in community. Windows, doors, and dishes rattled. Hanging objects swung.
- Thornton. Both shocks felt. Motion slow, lasted 20 seconds. Direction E-W. Awakened many in community; frightened few. Windows rattled; house creaked. Ground: Marshy.
- Tiger Creek Powerhouse (NE. 1/4, Sec. 24, T7N., R13E., Amador County). Both shocks felt. Motion swaying, E-W, gradual onset. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Disturbed objects observed by many. "General comment: 'Another shock.' " Ground: Rocky. Another shock reported felt at 03:17.
- Tipton. Felt by and awakened many in community. Windows, doors, and dishes rattled.
- Tracy. Motion rapid, lasted 2 minutes. Direction NE. Awakened all in home; many in community. Moderate earth noises from NE. heard. Windows, doors, and dishes rattled. Hanging objects swung NE. Trees, bushes shaken slightly. Ground: Soil.
- Trona. Motion slow, lasted 15 seconds. Awakened many in community. Faint earth noises heard by observer. Walls creaked. Ground: Soil, level.
- Trona. IV. Very mild shock. Felt by very few. Houses creaked; loose objects rattled.
- Trowbridge. Motion rapid, lasted 30 seconds. Felt by and awakened many in home; felt outdoors by some; frightened few. Faint earth noises from NE. heard by few. Windows rattled; frame creaked. Hanging objects swung. Pendulum clock stopped. Small objects shifted. Ground: Soil, level.
- Tulelake. Motion slow. Felt by many in home; awakened few; felt outdoors by some (quiet). Windows, doors, and dishes rattled; house creaked. Doors swung. Small objects shifted and overturned. Damage none or slight. Ground: Marshy, loose.
- Tulelake. Press reported the first shock was followed by intermittent shocks for 8 minutes. Window curtains and lights swung in hotel. Man heard water slosh in the city's 75,000-gallon water tank. Shock felt generally. Both shocks felt 1 mile east of Mac's store where doorbell chimes rang.

16 December, 03:07:13*, 03:11:29*. Intensity V. (cont.)

- Vade. Motion rapid, lasted 20 minutes for all shocks. Felt by, awakened, and frightened all in home. Faint earth noises from E. heard by many 1 second before shock. Windows, doors, and dishes rattled; walls creaked. Small objects shifted. Ground: Marshy, level.
- Vinton. Motion rolling, 3 separate shocks. Felt by all in community; awakened and frightened all in home. Earth noises from E. heard. Windows, doors, and dishes rattled; walls creaked. Hanging objects swung. Ground: Soil.
- Visalia. Motion slow. Felt by and awakened many in community; frightened few. Faint earth noises heard by few. Windows rattled. Ground: Compact, level. Press reported light fixtures swung.
- Volcanoville (near Georgetown). Two shocks felt. Motion trembling, rapid onset. Building creaked; loose objects rattled. First shock was followed in a few seconds by a much stronger shock which shook the building quite hard. No visible damage. Ground: Lava.
- Waterford. Direction N. Awakened many or all in community.
- West Point. Awakened most of the community; frightened many. Windows, doors, and dishes rattled. Hanging objects swung. Ground: Rocky, sloping.

Intensity V in Idaho:

- Boise. Press reported dozens of people were awakened. Most residents who reported said their doorbell chimes rang during both shocks and Venetian blinds rattled. No damage reported.
- Boise. Motion rapid, lasted 1 minute. Felt by and awakened many in community; frightened few. Windows, doors, and dishes rattled; door chimes rattled. Hanging objects swung. Small objects shifted. Damage slight, if any. Ground: Soil, compact.
- Caldwell. Motion slow, lasted 10 minutes. Direction NE. Felt by and awakened many in community; frightened few. House creaked. Hanging objects swung NE. Doorbell chimes rang. "I went to the basement to inspect the heating system and found hanging articles swinging. Then I realized the meaning of the noise." Ground: Soil, compact, level.
- Nampa. Felt by (some outdoors) and awakened many in community; frightened few. Windows and doors rattled. Hanging objects swung. Ground: Rocky soil, level.

Intensity V in Oregon:

- Klamath Falls. Press reported the shock was generally felt in Klamath Falls, with reports varying from noises in the attic to doorbell chimes ringing and beds swaying. No serious damage reported.
- Merrill. Motion slow, lasted 10 minutes. Felt by many (some outdoors) and awakened many in community; frightened few. Faint earth noises heard by few. Windows and doors rattled; house creaked slightly. Hanging objects swung. Trees, bushes shaken slightly. Knickknacks fell. Press reported some people experienced a sort of floating sensation. Ground: Compact, level.

- 16 December, 03:07:13*, 03:11:29*. Intensity V in Oregon. (cont.)
Nyssa. Motion slow, brief. Felt by and awakened many in community; frightened few. Hanging objects swung. Small objects shifted. Ground: Rocky soil, compact.

Intensity V in Utah:

- Garrison. Awakened many in community. Faint earth noises heard. Windows, doors, and dishes rattled. Hanging objects swung. Ground: Soil.
Garrison. IV. Motion slow. Felt by several; awakened few. Moderate earth noises heard.
Ibapah. Motion rapid, lasted 3 minutes. Felt by all; awakened many; frightened few. Windows and doors rattled; house creaked. Hanging objects swung.
Lynn. Motion slow, lasted 30 seconds. Awakened many in community. Faint earth noises heard. Windows rattled. Ground: Soil.
Milford. Motion slow, lasted 30 seconds. Direction N. Awakened many and frightened few in community. Faint earth noises heard by few. Windows, doors, and dishes rattled; house creaked. Pendulum clock facing W. stopped. Ground: Soil, compact, level.
Salt Lake City. Press reported the police received calls from people who were awakened by noises attributed to prowlers. One man said he saw a downtown hotel sway.
Salt Lake City (west section). Three shocks felt. Motion rocking, slight, gradual onset. Felt by several. "Switchboard operator at the Newhouse Hotel in central Salt Lake City reported that guests of the hotel said the building swayed." Ground: Sandy.
Wendover. Awakened many in community. "Felt like an automobile had collided with solid object near house."
Wendover (2½ miles east of, on the Bonnieville salt flat). IV. Observer awakened by shaking of bed. Bed facing N-S, rocked E-W. Two shocks felt.

Intensity IV in Nevada:

- Alamo. Lasted few seconds. Felt by many in valley; awakened few; frightened few. Windows, doors, and dishes rattled; walls creaked.
Bunkerville. Motion slow. Felt slightly by several. "Strong enough to rattle the windows, etc."
Indian Springs. "Results of my inquiry was that only a few house trailer residents were awakened." Ground: Soil, compact, level.
Jarbridge. Motion slow, lasted 5 minutes. Rumble heard. Felt by several in home; awakened few. Ground: Rocky.
Lages Station, near (at Junction of U.S. Highways 50 and 93). Wife awakened by two distinct shocks; husband not awakened.
Las Vegas. Press reported 2 shocks felt. Felt by people in casinos, but no alarm. Windows rattled and lights swung in police station.
Lee. Motion rapid, lasted 2 seconds. Felt by several in community and on surrounding ranches. House creaked. Ground: Soil.
Pyramid. Motion rapid, lasted 1½-2 minutes. Direction seemed vertical at first, then W-E, then to twist in all directions.

16 December, 03:07:13*, 03:11:29*. Intensity IV in Nevada. (cont.)
Everything shook; walls creaked. "First time I ever felt a shock like this one, and I have felt many." Ground: Compact, level.

Shoshone. Both shocks felt. Motion slow, lasted about 1 minute each. Felt by several; frightened few. Windows rattled. Hanging objects swung NE.

Sloan. Awakened few in home. Doors rattled. "Jarred lights on in my home. Opened door across street in another home. We didn't know what it was until we read the papers."

Sunnyside. Motion slow, lasted 4 minutes. Felt by several; awakened and frightened few in community. Faint earth noises heard. Windows rattled; walls creaked. Ground: Soil, sloping.

Intensity IV:

Aberdeen (35 miles south of Bishop). Awakened observer.

Adelanto. Motion slow. Felt by several and awakened few in home. "Felt by only a few." Ground: Sandy, level.

Adin. Motion moderate. Felt by and awakened few in community. Windows and doors rattled.

Alameda. Press reported about 25 people called police and reported their door chimes rang.

Alturas. Motion slow, lasted 10 seconds. Felt by several; awakened few. Windows, doors, and dishes rattled; house creaked. Hanging objects swung.

Beverly Hills. Press reported person was awakened from sound sleep and observed bed shaking.

Brentwood. Press reported water in hillside swimming pool sloshed down the steps of home and water in another pool splashed back and forth.

Bullards Bar Powerhouse (PG&E, Dobbins). Both shocks felt. Felt by one in bed. Bed shook. House creaked; loose objects rattled.

Burlingame. Motion rapid, lasted 2 minutes. Felt by several and awakened many in home. Faint earth noises heard. Dishes rattled. Hanging objects did not swing.

Cantil. Motion slight, very slow. Felt by many in home; awakened few. Faint earth noises heard. House creaked. Ground: Sandy.

Canyon. Motion slow. Direction NW-SE. Rattling of windows awakened one man (light sleeper) out of four; no one awakened in neighbor's family of four. Ground: Clay, shale, sloping.

Canyondam (Lake Almanor). Both shocks felt. Motion rocking, NW-SE, gradual onset. Felt by observer. "Awakened by first shock. Windows rattled. Sound like high wind heard which grew louder, then at 03:11 rocking motion felt. Sound lasted about 2 minutes altogether; shock lasted about 20 seconds. First shock awakened me, but I don't know how it shook." Ground: Lava.

Chico. Felt by and awakened 2 in home. Moderate earth noises heard by two. House creaked.

Colusa. Motion slow, lasted 1 minute. Felt by observer and wife; awakened few. Windows and doors rattled. Hanging objects swung.

Coulterville. Both shocks felt. Motion jolting, rather abrupt. Felt by observer and others in neighborhood. Building creaked. "People just interested." Ground: Soil over soft slate.

16 December, 03:07:13*, 03:11:29*. Intensity IV. (cont.)

Dunnigan. Felt by several and awakened few in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. "Two farmers 2 miles apart were awakened by the cackling of pheasants, then heard rumbling sound; others were awakened by the noise and shaking."

Fairfield. "Few awakened by two slight shocks."

Haiwee Powerhouse (Coso Junction). Both shocks felt. Motion slow, gentle, swirling, both shocks lasted 2 minutes. Felt by observer at powerhouse; awakened few in community. Hanging objects swung in circular motion. "No indication on water flow chart." Ground: Rocky, level.

Hollywood. Press reported two persons were awakened by ringing of doorbell chimes and noticed trees swaying.

Jawbone Aqueduct Station (35°18'50" N., 118°02'40" W.). Both shocks felt. Motion rapid, lasted 6 and 4 seconds, respectively. Direction NE. Awakened few. Windows rattled. Ground: Compact, level.

King City. Motion slow. Felt by several and awakened few in community. Faint earth noises heard by few. Walls creaked. Ground: Soil, compact.

Kings Canyon National Park (Grant Grove). Motion rocking, rapid onset. Felt by several. Creaking of buildings and rattling of loose objects heard by several. Moderately loud roaring like rushing water heard. Beds and doors swayed NE. No alarm. Ground: Rocky.

Knowles. Motion rolling. Awakened few in community.

Lake City. Motion rapid, long duration. Felt by several in home and community, outdoors by some; awakened many in home; frightened few. Windows, doors, and dishes rattled; house creaked. "Observer was awakened and hardly realized what was happening; others who were up noticed light fixtures swaying and heard noises." Ground: Rocky.

Lake Hughes. "It awakened my husband and me in our 2-story frame house. I have not found anyone else who felt it." House creaked.

Las Plumas. Motion rapid, lasted 30 seconds. Awakened few in community. Stove doors rattled. Bed shaken quite strongly.

Los Angeles. Press reported the police received many calls. Felt slightly. Most reports came from the central and southern sections of the city. Some beach communities did not feel the shock. Chandeliers swayed on the 12th floor of the Pacific Telephone and Telegraph Company building.

Lost Hills. Motion slow, slight. Felt by several and awakened few in community.

Maricopa. Motion slow. Felt by several and awakened few in community.

Mariposa. Felt by several; awakened few. Windows rattled.

Northridge (1 mile north of). One person awakened by creaking of house. Family of four next door were not awakened.

Oakland (System Dispatcher's office, 17th & Clay Sts.). Motion slow, lasted 1 second. Direction E-W. Felt by several at 17th & Clay Sts.; awakened few in community. Windows rattled; house creaked.

Oakland. Press reported men in the 114-foot tower at Oakland Airport were shaken so sharply they said they were "ready to take to parachutes."

- 16 December, 03:07:13*, 03:11:29*. Intensity IV. (cont.)
- Oakland. III. Motion slow, lasted 30 seconds. Hanging objects swung. Ground: Level, filled in.
- Oregon House. Motion rapid, brief. Felt by observer in hills; awakened few. Ground: Rocky soil, sloping.
- Oroville. Press reported several were awakened.
- Piedra (Trimmer Route). Awakened observer. Sinking sensation felt. Bumping sound heard (observer states it was probably walls of house). House creaked; loose objects rattled.
- Quincy. Motion rolling. Felt by many.
- Raisin. Motion slow. Awakened few in community. Windows rattled. Ground: Soil, compact.
- Red Bluff. Pendulum clock facing N-NW stopped.
- Redwood City. Press reported a number of persons felt the shock. One woman said she was awakened and thought prowlers were on the roof. Venetian blinds shook in the sheriff's office and the California Highway Patrol reported their office building swayed.
- Redwood City. Felt by and awakened few.
- Richvale. Both shocks felt. Motion slow. Felt by and awakened few in homes. Doors rattled. Ground: Soil, compact, level.
- Roads End. Motion slow, lasted 1 minute. Felt by many in home and community; awakened many in home; frightened few. Faint earth noises heard by few. Doors rattled. Ground: Rocky.
- Roseville. Motion slow. Felt by observer in home. Windows and dishes rattled. Ground: Soil, sloping.
- Rumsey. Awakened few. Windows and doors rattled. Ground: Soil.
- San Ardo. Felt by few. Quite loud earth noises heard by few. Some rattling of windows, doors, and dishes.
- San Benito. Motion slow, lasted 3 seconds. Direction NE. Faint earth noises heard by few. Windows rattled; house creaked. Ground: Soil.
- San Joaquin. Motion rapid, lasted 20 seconds. Direction N-S. Felt by several in home and community; awakened few in home. Faint earth noises heard by few. Windows rattled; frame creaked. Trees, bushes shaken slightly. Ground: Soil, compact, level.
- Santa Maria. Awakened few in community. Hangar doors rattled at airport.
- Solromar. Motion slow, lasted 2 seconds. Felt by many in home and community; awakened few in home. Dishes rattled. Ground: Compact, sloping.
- Stirling City. Motion slow, lasted 1½ minutes. Felt by several in community; awakened and frightened few. Moderate earth noises heard. Windows, doors rattled; house creaked. Hanging objects swung. Trees, bushes shaken slightly.
- Strawberry Valley. Both shocks felt. Motion trembling, gradual onset. Felt by several. Building creaked. Dull, deep rattling earth noises heard by observer before and during shock.
- Susanville. Motion slow. Felt by several in community; awakened few.
- Taylorville and Genesee. Felt by many; frightened few in community. Direction E-W. Hanging objects swung at Genesee. Ground: Soil, level, sloping.
- Three Rivers. Motion slow, momentary duration. Direction NE. Felt by several in home; awakened few. Faint earth noises from NE. heard. Windows rattled. Ground: Rocky.

16 December, 03:07:13*, 03:11:29*. Intensity IV. (cont.)

Ventura. Motion slow. Direction NE. Felt by several (some outdoors; quiet) and awakened few in community. Ground: Soil, compact, level.

Volta. Lasted 2 minutes. Awakened few in community; frightened few. "Some reported heavy shock."

Watsonville. Motion slow, lasted 30 seconds. Felt by several; awakened few. Faint earth noises heard. Windows rattled. Trees, bushes shaken slightly. "Did not awaken me."

Westhaven. Motion slow, lasted 1 minute. Direction NE. Felt by several in community; awakened few. Faint earth noises from NE. heard. Windows rattled. Hanging objects swung NE. Ground: Soil.

Winters. Motion slow, lasted 2 seconds. Awakened few in community.

Intensity IV in Arizona:

Littlefield. Felt by several (some outdoors; quiet) and awakened few in community.

Intensity IV in Idaho:

Bruneau. Motion slow, lasted very few minutes. Felt by several in home; awakened few in community. Walls creaked. Ground: Soil, compact, level.

Fairfield. Felt by several; awakened few in community. Windows and doors rattled. Ringing of doorbell on south side of house awakened family.

Fruitland. Motion slow. Felt by many in community, outdoors by observer; awakened few. Hanging objects swung. Ground: Soil.

Grandview. Two shocks felt. Motion rapid, lasted 2 seconds. Felt by several in home and community; awakened few in community, one in home. Windows, doors, and dishes rattled; house creaked. Ground: Soil, compact.

Hagerman. Light tremor. Felt by several; awakened few in community. Faint earth noises heard.

Orchard. Both shocks felt. Sounded like a sudden wind. Motion slow, lasted 10 seconds. Felt by many in office; awakened and frightened few in home. Hanging objects swung N. "Both shocks sounded and felt about the same."

Oreana. Both shocks felt. Motion slow, lasted 2½ minutes. Felt by several and awakened few in community. Windows rattled.

Parma. Press reported some persons were awakened by ringing of doorbell chimes.

Rupert. Motion slow. Felt by several in community; awakened few. House creaked. Ground: Soil, level.

Star. Motion rapid, lasted 2 minutes. Felt by several in community. Frightened chickens. Doors rattled.

Intensity IV in Oregon:

Adel. Motion rapid, lasted 10 seconds. Felt by several and awakened few in home. Windows rattled. Ground: Soil, compact, level.

Adrian. Very light shock. Felt slightly by few; awakened few. Earth noises heard by few.

Arock. Motion rapid. Felt by several; awakened and frightened few in community. Windows rattled.

- 16 December, 03:07:13*, 03:11:29*. Intensity IV in Oregon. (cont.)
- Diamond. Motion slow. Felt by several; awakened few in community. Faint earth noises heard. Windows rattled. Ground: Soil.
- Frenchglen. Felt by three in home; awakened one. Pendulum clock facing W. stopped. Nothing swung; nothing rattled. Ground: Soil, level.
- Jordan Valley. Both shocks felt. Motion slow, lasted 2 seconds each. Direction E-W. Awakened many in home; frightened few in home and community. Sound like wind from E. heard by few. Walls creaked.
- Jordan Valley. III. Felt slightly by several. Faint earth noises heard.
- Juntura. Motion slow, lasted 2 minutes. Felt by and awakened several in community; frightened few. Faint earth noises heard by some. Some creaking of houses; some rattling of windows, doors, and dishes. Ground: Level, compact.
- Malin. Motion slow, rocking, lasted 1 minute. Awakened few in community. Faint earth noises heard. Windows rattled.
- Sprague River. Motion rapid, lasted 1 minute. Felt by several and awakened few in community. Moderate earth noises heard by few.
- White Horse Ranch (about 20 miles southeast of Andrews). Motion slow, lasted 30 seconds. Felt by several in home; awakened few. Faint earth noises heard by observer. Windows rattled; walls creaked. Ground: Soil, level.
- Worden. Felt by several; awakened few. Moderate earth noises heard. Windows, doors, and dishes rattled.

Intensity IV in Utah:

- Callao. Felt distinctly.
- Delta. Motion slow, lasted 6 seconds. Felt by several at railroad depot; by some outdoors (quiet); awakened few in community. Faint earth noises heard (from W.) by few 2 seconds before shock. Ground: Soil, level.
- Dugway. Awakened observer. Bed facing N-S moved N-S. Light bulb swung 4-5 minutes in N-S direction.
- Gandy. Motion rapid, lasted 5 minutes. Awakened and frightened few in community. Faint earth noises heard. Windows and dishes rattled. Beds shook.
- Grantsville. Awakened observer. Bed facing E-W moved E-W. Pull string on lamp swung for about 5 minutes.
- Park Valley. Motion rapid, brief. Felt by several; awakened and frightened few in community. Sounds like thunder heard by few. Ground: Soil, compact.
- Parowan. Motion rapid, lasted few seconds. Felt by, awakened, and frightened two persons in community about 4 miles apart. House creaked. Bed shook at one place. Ground: Compact.
- Provo. Motion slow, very slight. Felt by several at post office; awakened and frightened few in community. Hanging objects swung. Direction N. "About the only thing at all noticeable here was the electric light fixtures swinging N-S for a short time. No noises heard."
- Saint George. Motion slow. Felt by several and awakened few in community. Faint earth noises heard. Windows and dishes rattled. Ground: Rocky.

16 December, 03:07:13*, 03:11:29*. Intensity IV in Utah. (cont.)
Scipio. Motion slow. Felt by several in community. Dishes rattled.
Snowville. Motion slow, lasted 2 minutes. Felt by several and
awakened few in community. Faint earth noises heard.

Intensity I to III in Nevada:

Boulder City. Motion slow. Felt in community. Ground: Rocky.
Currie. Motion slow, lasted 2 minutes.

Intensity I to III:

Bakersfield. Motion rolling, brief. Only one person of many
questioned reported feeling shock. Awakened few.

Fillmore. "Few persons claim they felt a small shock, but so slight-
ly they were not sure until told about it later."

Montara. Felt by some.

Needles. Motion slow, lasted 30 seconds. Felt outdoors by some
(quiet). Hanging objects swung. Trees, bushes shaken slight-
ly. Ground: Soil, compact, level.

Project City. "Heard one report of shock being felt."

San Francisco. Press reported apparently few persons other than
tourists felt the shock. Police said the few calls they
received came mostly from hotels.

Santa Cruz. "Felt by one or two only."

Santa Monica, Manhattan Beach, and Vernon. Press reported scattered
calls were received by the police departments.

Stove Pipe Wells Hotel (Death Valley). Motion slow, lasted 3 seconds.
Felt at hotel. Very slight creaking of building.

Tehachapi. Felt by few in community. Faint earth noises heard. "Very
slight shock."

Waterman (Preston School). Felt by several.

Wheeler Ridge. Motion slow, lasted 10 seconds. Felt in community.

Intensity I to III in Arizona:

Fredonia. Motion slow, lasted 5 seconds. Direction NE. Faint earth
noises from SW. heard. "Felt by only one man who was just
getting up to go to work." Windows rattled. Ground: Soil,
compact.

Intensity I to III in Idaho:

Midvale (23 miles south of). Felt.

Payette. Very slight. Motion slow, lasted 2 minutes. Felt by several
in community. Faint earth noises heard by few. Slight rattling
of windows, doors, and dishes. Trees, bushes shaken very
slightly. Ground: Soil, compact, level.

Stowell. Felt.

Intensity I to III in Oregon:

Beatty. Felt by some outdoors; awakened few in home. "Just a rumbling
noise."

Brogan. "Few in community claimed they felt the shock." Faint earth
noises heard by few. Windows and dishes rattled.

Fort Klamath. "I think it was what awakened me. Bump against the
house felt."

Ontario. Press reported the earthquake was felt in this area.

16 December, 03:07:13*, 03:11:29*. Intensity I to III in Oregon. (cont.)
Riverside. Motion slow, lasted 1 minute. Felt by one in community.
Ground: Rocky soil, level.
Westfall. Felt by several.
Williams. Motion slow, brief. "Reported felt by 3 or 4 persons. So slight they didn't know what it was." Dishes rattled.

Intensity I to III in Utah:

Cedar City (6 miles north of). Two extremely light shocks, few minutes apart, lasted very few seconds each. Direction N-S. Hot pad hanging on E. wall swung slightly N-S. "Was able to locate only one family (2) that felt them at all." Ground: Soil, compact.

Enterprise. Two light shocks felt by very few.

Leamington. Slight shock. Felt by one in home. Chickens frightened. "Most persons not awakened." Ground: Soil, level.

Saint John. Motion slow, decidedly up and down, lasted 10 seconds. Door creaked. "The few who felt it happened to be awake, otherwise, I believe they would not have felt it." Ground: Compact, level.

Reported not felt in Nevada: Arden, Blue Diamond, Contact, Goodsprings, Henderson, Jean, Owyhee, Pittman, and Whitney.

Reported not felt: Acton, Amboy, Baker, Barstow, Big Sur, Blythe, Boron, Burney, Buttonwillow, Calistoga, Callahan, Chester, Cima, Claraville, Clearlake Oaks, Cloverdale, Coalinga, Coso Junction, Covelo, Cuyama, Darwin, Earp, Edwards, Elk Creek, Frazier Park, Gilroy, Gridley, Half Moon Bay, Hilts, Idria, Ivanpah, Lake Pillsbury, Lancaster, Little Lake, Lompoc, Los Angeles (Westchester District), Lucerne Valley, Ludlow, Middletown, Mojave, Mount Hamilton, Newhall, Ontario, Orange, Paicines, Parker Dam, Paskenta, Pescadero, Petaluma, Platina, Pondosa, Point Reyes Light Station, Prather, Randeburg, Redding, Rice, San Bernardino, San Luis Obispo, San Miguel, San Simeon, Santa Ana, Santa Barbara, Santa Susana, Shoshone, Stonyford, Tecopa, Tennant, Tionesta, Tracy, Trinity Center, Tupman, Valyermo, Vidal, Vina, Weaverville, Weed, Wheeler Springs, Willows, and Woodland.

Reported not felt in Arizona: Bullhead City, Hackberry, Kingman, Moccasin, Oatman, Parker, Peach Springs, Quartzsite, and Short Creek.

Reported not felt in Idaho:

Almo, American Falls, Atlanta, Bliss, Buhl, Burley, Carey, Cascade, Castleford, Challis, Clayton, Council, Crouch, Gooding, Hailey, Hollister, Idaho City, Jerome, King Hill, Kuna, Lowman, Malad City, Malta, Marsing, Melba, Midvale, Mountain Home, Murphy, Murtaugh, Oakley, Obsidian, Ola, Placerville, Richfield, Rockland, Rogerson, Shoshone, Smiths Ferry, Stanley, and Twin Falls.

Reported not felt in Oregon: Ashland, Baker, Bend, Bly, Bonanza, Bridgeport, Brothers, Burns, Butte Falls, Canyon City, Cave Junction, Chemult, Corvallis, Crane, Crescent, Drew, Drewsey, Durkee, Glendale, Grants Pass, Holland, Homecreek Ranch (via Frenchglen), Huntington, La Pine, Medford, Moro, Paisley, Paulina, Plush, Post, Prospect, Richland, Riley, Seneca, Shevlin, Silvies, Summer Lake, and Vale.

16 December, 03:07:10*, 03:11:29*. (cont.)

Reported not felt in Utah:

Beaver, Beryl, Brigham City, Coalville, Delle, Draper, Farmington, Fillmore, Garfield, Garland, Gunlock, Heber, Henrieville, Holden, Howell, Junction, Kanab, Knolls, Low, Manti, Minersville, Murray, Newcastle, Ogden, Panguitch, Portage, Silver City, Spanish Fork, Tooele, Toquerville, and Yost.

16 December, 06:24.1*. Nevada aftershock.

Laws. IV. Motion rapid, rather brief. Direction NE. Felt by many in community. Ground: Rocky.

16 December, 23:08:58*.

Epicenter 37°33' north, 122°08' west, east of San Leandro. B. Moderately strong shock felt over approximately 4500 square miles of west-central California. Maximum intensity VI. Minor damage reported from several localities.

Intensity VI:

Castro Valley. "In a food store in Castro Valley, shelves of canned goods were dumped on the floor." (BSSA, April 1955)

Hayward. "Plaster and walls were cracked." (BSSA, April 1955)

Hayward. V. Motion rapid, lasted few seconds. Felt by, awakened, and frightened all in home. Loud earth noises heard by observer. Windows rattled. Ground: Compact, level. Press reported houses shook.

Hayward. V. Motion rapid, lasted 5 seconds. Felt by and awakened all in home; frightened many; felt outdoors by some. Windows, doors, and dishes rattled. Ground: Soil, compact.

Oakland. "Chimneys were broken . . . water main broken. The only casualty was in Oakland, where a woman's nose was broken by falling plaster." (BSSA, April 1955)

Oakland. V. Press reported personnel in the control tower at the Oakland Airport said the 114-foot high structure "seemed to bounce up and down." Switchboard operator at the Oakland City Hall said she thought "the building was going to fall down." Many calls were received.

Oakland. V. Motion rapid, lasted 2 minutes. Felt by many in home; awakened many. Ground: Soil, sloping.

Oakland. V. Motion slow, lasted 3 seconds. Felt by, awakened, and frightened all in home. Hanging objects swung. Bird cage and flintware, which could only swing NW-SE, swung NW-SE.

Oakland. IV. Motion rapid, lasted 30 seconds. Motion up and down. Felt by all in building. Windows and doors rattled.

Oakland. IV. Lasted 7-10 seconds. Felt by all in home. Faint earth noises heard. Ground: Soil.

Oakland. IV. Motion rapid, 2 shocks, lasted 15 seconds. Direction E-W. Felt by several in home and community; frightened few. Windows, doors, and dishes rattled. Hanging objects swung E-W. Ground: Rocky, sloping.

Oakland. IV. Motion rapid, lasted 6 seconds. Felt by all in home; awakened one; frightened few. Doors rattled. Ground: Soil, compact.

San Leandro. "Plaster and walls were cracked." (BSSA, April 1955)

16 December, 23:08:58*. (cont.)

Intensity V:

- Alameda.** Motion rapid, lasted 3 minutes. Awakened many in community; frightened few in home. Loud earth noises from E. heard by few. Windows, doors, and dishes rattled; frame creaked. Hanging objects swung E. Water in aquarium splashed in E-W. direction. Ground: Level, sandy.
- Alameda.** IV. Motion slow, long duration. Felt by all in home. Loud earth noises from NE. heard by many 3 seconds before shock. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Press reported a woman said that noise preceding shock sounded like a bomb had exploded under her house.
- Berkeley.** Motion rapid, lasted 3 seconds. Direction E-W. Frightened all in home. Windows rattled; walls creaked. Ground: Adobe, clay, compact.
- Berkeley.** Motion rapid, lasted 5 seconds. Felt by several and awakened few in home. Windows and doors rattled. Trees, bushes shaken moderately. Ground: Rocky soil, compact, sloping.
- Burlingame.** Press reported only one instance of minor damage was reported on the Peninsula. It caused a crack in the double chimney at the Out of Town antique shop, 347 Primrose road, causing smoke to fill the premises when a fire was lighted the following morning. Firemen were called and discovered the crack. People on the Peninsula described the shock as up and down, rolling, and a sharp, solid punch.
- Canyon.** Motion rapid, jarring, lasted 7-10 seconds. Direction from E. Felt by two in home; children not awakened; awakened and frightened few in community. Windows rattled; houses creaked. Pictures askew. Rumble accompanied the short, hard shakes. Ground: Adobe, shale, compact.
- Canyon.** Motion rapid, jarring, lasted about 10 seconds. Felt like nearby explosion. Direction NE. Awakened and frightened few in community. Windows rattled; house creaked. "My house is partly on high stilts (steep canyon side) and it rocked back and forth after the first jar." Ground: Rocky, compact, sloping and steep.
- Canyon.** Motion rapid, lasted 10 seconds. Direction NE. Felt by many in community; awakened and frightened few. Moderate earth noises from NE. heard by observer. Windows and doors rattled; walls creaked. Ground: Rocky soil, compact, sloping and steep.
- Daly City.** Motion slow, lasted 4 seconds. Felt by (some outdoors) and awakened many in community; frightened few. Windows, doors, and dishes rattled. Hanging objects swung. Ground: Sandy soil, level and sloping, filled in.
- Lafayette.** Motion rapid. Felt by (some outdoors) and awakened many in community; frightened few. Lamps rattled; house creaked. Hanging objects swung. Small objects shifted.
- Mission San Jose.** Motion slow. Felt by many and awakened few in community. Faint earth noises heard. Bird cage knocked down. Ground: Adobe.
- Moraga.** Motion rapid. Felt by, awakened, and frightened all in home. Windows, doors, and dishes rattled. Ground: Compact.
- Mount Eden.** Motion rapid. Felt by and awakened many in community; frightened few. Ground: Compact, level.

16 December, 23:08:58*. Intensity V. (cont.)

- Newark. Motion rapid. Quite severe. Felt by nearly all and frightened many in community. Moderate earth noises heard. House creaked. Small objects shifted and overturned.
- Orinda. Motion rapid, lasted 30 seconds. Felt by and awakened all in home. Windows, doors, and dishes rattled. Ground: Soil, compact.
- Pinole. Motion slow. Felt by and awakened many in community. Faint earth noises heard. Windows and doors rattled. Ground: Rocky.
- Port Chicago. Motion slow. Awakened and frightened few in community. Windows, doors, and dishes rattled. Pendulum clock stopped.
- Redwood City. Motion slow, lasted about 6 seconds. Direction NW-SE. Felt by, awakened, and frightened many in community. Small objects shifted. Ground: Marshy.
- Redwood City. Press reported men at Fire Station No. 2 said they were almost rolled out of bed. Man in the sheriff's office said the entire building shook. Many calls were received.
- San Gregorio. Motion slow, momentary duration. Felt by and awakened all in home. Windows, doors, and dishes rattled.
- Stinson Beach. Direction E-W. Felt by many in community; awakened all in home. Ground: Sandy.
- Sunol. Motion rapid. Felt by several and awakened all in home. Loud earth noises heard. Windows and doors rattled.
- Vallejo. Motion rapid, lasted 1 second. Felt by and awakened many in community; frightened few. Windows rattled. Ground: Level, compact.
- Westlake District (northern San Mateo County boundary). Press reported a woman said the bed in which she was sleeping was moved out of position.

Intensity IV:

- Alamo. Felt by many in community; frightened few.
- Alcatraz. Motion up and down, lasted about 2 minutes. Cellhouse pipes along ceiling of roof jumped up and down. Steel doors rattled. "I have worked on the island for over 20 years and this is the first time I have felt a shock when one was felt in town."
- Alvarado. Motion rapid, lasted 30 seconds. Felt by many in home. Loud earth noises heard. Windows and doors rattled. Ground: Compact.
- Alviso. Motion slow. Felt by many and awakened few in community. Windows, doors, and dishes rattled; walls creaked. Ground: Marshy.
- Aptos. Motion slow. Felt by very few; awakened few in home and community.
- Belmont. Motion rapid. Felt by many and awakened few in community. House creaked. Trees, bushes shaken slightly. Ground: Soil, compact.
- Bolinas. Felt by many and awakened few in community. Faint earth noises heard. Walls creaked. Fire screen fell over.
- Concord. Motion slow, lasted 2 seconds. Awakened few in home. Ground: Soil, compact, level.
- Coyote. Felt by several; frightened few. Faint earth noises heard. Windows rattled; frame creaked. "Noticeable to few people in home."

16 December, 23:08:58*. Intensity IV. (cont.)

- Crows Landing. Felt by several. Moderate earth noises heard. Windows, doors, and dishes rattled. "Felt slightly here."
- Diablo. Felt by many and awakened few in community. Ground: Soil.
- Elmira. Motion slow. Felt by several and awakened few in community.
- Felton. Motion rapid. Felt by several in home. Windows rattled. Ground: Soil, sloping.
- Gilroy. Motion rapid, lasted 3 seconds. Felt by several in community; awakened and frightened few. Faint earth noises heard. Windows, doors, and dishes rattled; walls creaked.
- Half Moon Bay. Lasted 4 seconds. Awakened one in community. Windows rattled. Ground: Level, soil.
- Inverness. Motion rapid, rolling, lasted about 2 seconds. Direction NE-SW. Felt by several in home. Windows, doors, and dishes rattled; house creaked slightly. Ground: Soil, compact, level; on top of hill.
- Knightsen. Motion rapid, jolt. Felt by several in home; awakened few. Ground: Soil, level.
- Millbrae. Felt by many and awakened few in home. Dishes rattled. Ground: Compact. Press reported a man said he was almost toppled from chair and a woman said outside gate rattled.
- Palo Alto. Motion slow, lasted 5 seconds. Felt by many in community; awakened few. Ground: Soil, level.
- Petaluma. Motion rapid, lasted 5 seconds. Felt by many in community; outdoors by observer. Windows, doors, and dishes rattled. Hanging objects swung.
- Point Reyes Station. Felt by many in community; frightened few.
- Rio Vista. Motion slow. Felt by many and awakened few in community. "Not very severe in this area."
- Saint Mary's College. Motion swaying, SE-NW, gradual onset, lasted about 3 seconds. Felt by many. Building creaked; loose objects rattled. "Parakeets flew wildly about room." Ground: Sandy.
- San Francisco. Press reported more than 200 calls were received at police headquarters. Windows rattled and chandeliers swayed throughout the city.
- San Francisco (350 Grove St.). Sharp shock. Motion rapid, lasted 5 seconds. Direction E-W. Felt by many in neighborhood; awakened few. Windows, doors, and dishes rattled. Ground: Sandy.
- San Francisco (65 Market St., S.P. Building, 10th floor). Motion slow, lasted 1 minute. Felt by several in office; frightened few. Direction N-S, then E-W. Hanging objects swung N-S, then E-W. Ground: Filled in.
- San Francisco (2 Presidio Terrace). III. Motion slow, slight, lasted 7 seconds. Felt by observer. "The movement was a gentle trembling." Ground: Rocky, sloping.
- San Ramon. Motion slow, momentary duration. Felt by several. Faint earth noise heard. Windows and doors rattled; frame creaked.
- Santa Clara County. Press reported authorities received many calls.
- Santa Cruz. Lasted 1 minute. Felt by many and awakened few. Faint earth noises heard. Windows and doors rattled. Hanging objects swung N-S. Ground: Compact.
- Sonoma. Motion rapid, lasted 30 seconds. Direction N-S. Felt by and awakened two in home. Windows and doors rattled. Ground: Compact.

16 December, 23:08:58*. Intensity IV. (cont.)

South San Francisco. Motion rapid, momentary duration. Felt by many in home. Moderate earth noises heard. Ground: Soil, compact.

South San Francisco (San Francisco Airport). Press reported the control tower rocked for about 5 seconds. Strong swaying and rolling motion reported.

Tiburon. Felt by several and awakened few in community.

Tomales. Lasted 1 second. Felt by observer in home; awakened few in community. Ground: Compact, sloping.

Vacaville. Motion slow. Awakened few. Windows rattled. "Not very strong; however, shook beds enough to awaken people."

Vernalis. Motion slow, lasted few minutes. Felt by several and awakened few. Faint earth noises heard. Ground: Soil.

Walnut Creek. Motion rapid, lasted 30 seconds. Direction E. Felt by many in home and community; frightened few. Windows and doors rattled; frame creaked. Hanging objects swung. Ground: Rocky, compact, sloping.

Watsonville. Motion slow, lasted 15 seconds. Felt by several; awakened few. Faint earth noises heard. Windows rattled. Hanging objects swung. Trees, bushes shaken slightly.

Intensity I to III:

Bel Aire (Marin County). Motion rapid, horizontal, lasted about 3 seconds. Felt by observer in home lying down. Ground: Rocky, sandstone.

Birds Landing. Felt in community.

Cupertino. Motion slow, momentary duration. Direction E-W. Felt by observer in home lying down. Ground: Soil, sloping.

Danville. Felt in home.

Livingston. "Could not find anyone who could describe the shock, although it was reported felt."

Lodi. "A weak rattle of window weights in second story of building is only report of possible earthquakes."

Marshall. Felt by several in community.

Mill Valley. Motion rapid, lasted 3 seconds. Felt by several in home. Ground: Soil, compact, level.

Milpitas. Motion slow, lasted 2 seconds. Felt by several in community.

Montara. Felt by some persons.

Mount Hamilton. Motion slow, lasted 15-20 seconds. Felt by several. "Awakened no one, probably." Windows rattled slightly.

Newman. "Very few reported feeling the shock."

Richmond. Motion rapid, lasted few seconds. Faint earth noises heard. Ground: Compact, level.

San Rafael. Motion slow, lasted 1 second. Felt by several in home lying down. Moderate earth noises heard.

Sebastopol (1 mile east of). Motion slow. Faint earth noises heard. Ground: Compact.

Winters. Motion slow.

Reported not felt: Altamont, Aromas, Big Sur, Campbell, Castroville, Casadero, Clayton, Clements, Decoto, Fairfield, Hanford, Healdsburg, Isleton, Jenner, Linden, Los Banos, Modesto, Monticello, Mountain View, Novato, Oakdale, Paicines, Pleasant Grove, Point Reyes Light Station,

- 16 December, 23:08:58*. Reported not felt. (cont.)
Rumsey, Sacramento, Saint Helena, Salinas, San Benito, San Juan Bautista, San Martin, San Quentin, Santa Rosa, Stockton, Trowbridge, Turlock, and Valley Springs.
- 17 December, 07:22:31*.
Epicenter $36^{\circ}44'$ north, $121^{\circ}20'$ west, near Tres Pinos. B. Hollister. IV. Felt by many.
- 17 December, 16:02. Nevada aftershock.
Hawthorne, Nev. (Naval Ammunition Depot). V. Motion rapid, sharp, lasted 5 seconds. Felt by all and frightened few in community. Hanging objects swung E-W.
- 20 December (around noon). Nevada aftershock.
Battle Mountain, Nev. "We were down in 850-foot shaft. One man thought shaft was caving in. Not very severe."
- 20 December (no times given). Nevada aftershocks.
Austin, Nev. IV. Three small shocks reported. Felt by many.
- 20 December, 23:11:12*, 23:15.
Epicenter $32^{\circ}38'$ north, $117^{\circ}07'$ west, near National City. P. Jamul. IV. Motion rapid, brief. Felt by many in post office. Direction W-E. Windows rattled. Ground: Compact.
San Diego. V. Press reported a local earthquake jolted the El Cajon Valley, awakening thousands, rattling dishes, but causing no damage. Many people thought there had been an explosion. El Cajon police said it was the loudest earthquake they had ever heard and that it sounded like two big trucks had collided near headquarters. It was reported the shocks were felt in San Diego, Coronado, and as far north as Escondido.
San Diego (10th and Imperial). (23:11) IV. Motion slow, E-W, lasted 10 seconds. Felt by several at work. Windows rattled. Ground: Compact, filled in.
San Diego (707 W. Broadway). (23:11) III. Motion rapid, lasted about 1 second. Direction E-W. Felt by several. Ground: Filled in.
- 21 December, 11:56:29*.
Epicenter $40^{\circ}47'$ north, $123^{\circ}52'$ west, 12 miles east of Eureka. Magnitude 6.5. B.
Felt over a land area of approximately 50,000 square miles of northern California and southwestern Oregon, as shown on the isoseismal map, page 105. Maximum intensity VII. Principal structural damage occurred in the Eureka-Arcata areas and was considered moderate. The old City Hall and the old County Courthouse in Eureka were extensively cracked; several old poorly constructed brick walls bulged and there was some parapet damage, but damage in the main was to chimneys, plaster, plate-glass windows, and merchandise. In the poorly consolidated ground areas north and east of Eureka there were some pipeline failures and Eureka's main water reservoir (constructed in two halves) was cracked in one half. Numerous breaks occurred in Eureka's water distribution system, but none were serious. Two tall brick industrial stacks, cracked in the 1932 earthquake, were again cracked. One elevated steel water tank (not earthquake resistant)

21 December, 11:56:29*. (cont.)

had broken road. U.S. Highway 101 between Eureka and Arcata was cracked and bulged to some extent, but no serious damage occurred to roads or bridges. A press report stated: "A large section of the older downtown area of Eureka settled from two to six inches. The area, bounded roughly by E Street, Fourth Street, Broadway and the Bay, at one time was a tidal mud flat and was filled to allow construction of buildings. This sector of the city has been settling gradually for many years but sank rapidly during the earthquake. The settling was evident in a recent check of survey monuments and street grades. Some of the mud flat area was filled as long as a hundred years ago with redwood sawdust and slabwood being used for the primary fill and a layer of earth placed over this. Compaction of the fill has caused the gradual sinking of the area." One man fell into Humboldt Bay and was drowned and a number of people were injured by falling objects. One engineer arrived at Eureka the following day and stated in his report: "So minor was the visible damage and so rapid was the clean-up that when I entered the town there was no rubble on the ground, most of the glass windows had been replaced and in short it was difficult to tell that a shock had occurred just twenty-four hours previously." Some water main breaks in Arcata were reported, but damage here was also mainly to chimneys, plaster, plate-glass windows, and merchandise. The most serious damage reported outside of the Eureka-Arcata areas was the collapse of a wooden water tank at the Valley Flower Cooperative Creamery near Ferndale.

All reports relating to schools were abstracted from reports furnished by the California State Division of Architecture. Other organizations furnishing information were: Bechtel Corporation; Bethlehem Pacific Coast Steel Corporation; Hammond Lumber Company; and Pacific Fire Rating Bureau.

Intensity VII:

Arcata and vicinity.

Arcata. "The Arcata City Hall had plaster off wood lath in some rooms, one fluorescent lamp down, bookcases down in library but not in some other rooms. The Arcadia Hotel had a crack in north wall (brick). Brick cracked in floors of old brick building across from square in middle of block on H Street. The south wall of an old 2-story brick-walled building, adjacent to 1-story building, looked shattered but may have been due to age. Arcata Sewage Disposal Plant operator said ground settled an inch or so in spots, but there was no damage to equipment. Aside from broken windows and plaster damage, there was little damage to wooden buildings, which predominate, in Arcata. People in City Hall reported damage was much heavier west of Burns Freeway than to the east. Topography may have been a factor, as Arcata east of freeway is mostly on a hillside." Press reported several people were injured by falling objects. A 150-ton machine at the California Barrel Company was reportedly moved 4 inches across the floor.

21 December, 11:56:29*. Intensity VII. (cont.)

Arcata (2 miles northeast of, on Mad River). Man sitting on heels was toppled over. Loud grinding noise directly beneath him heard during shock; no rumbling noise heard before the shock. Swift current of Mad River suddenly stopped, water rushed across the river, then back, then upstream. Immediately the clear water was turned to a yellow muck. Swaying of trees sounded like a heavy windstorm.

Arcata. Loud rumbling, then strong, rapid S-N motion. Seemed to subside for about 3 seconds, then increased to a much stronger intensity in a SW-NE direction. "There appeared to be a large ground wave that looked to be about 2-3 feet in height which moved across the lumber yard in a northeasterly direction, toppling lumber piles in succession."

Arcata (Van Fleet Lumber Mill, about 1/2 mile southwest of Humboldt State College). Motion rapid, lasted 2 minutes. Direction W-E. Felt by and frightened all at lumber mill. Mill building creaked. Hanging objects swung. "Ground waves from W-E. E-S lumber piles fell to the W.; lumber piled E-W shifted but did not fall. There appeared to be an up-and-down motion of 18 inches. We walked about 50 feet to get away from falling lumber. Felt like being on a ship in heavy seas." Ground: Soil, marshy, filled in, level.

Arcata (5 miles southwest of, on Somoa Road). Strong, twisting motion. "Ran outside and ground was rolling so hard I could hardly stand. Looked like ocean waves. Trees swayed nearly to the ground. No serious damage. Cracks in wallpaper; boards pulled loose and protruding slightly. Groceries knocked from cupboards."

Arcata (1120 Bayside Road). Motion rapid, lasted 2 minutes. Direction E-W. Felt by and frightened many. House and contents made banging noise. Hanging objects swung E-W. Trees, bushes shaken strongly. Large objects shifted; small objects and furniture overturned. Chimneys and ground cracked. Fruit jars and dishes broke, mostly on E. side of house. Chimney twisted. Trees fell near house. Three-inch ground crack near house; area had unpleasant odor and foggy look. Ground: Compact, sloping.

Arcata (Fickle Hill Road, east of Arcata). Motion rapid, lasted 20 seconds. Direction E-W. Felt by all and frightened many in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung E-W. Trees, bushes shaken strongly. Small objects and furniture shifted and overturned. Plaster, windows, walls, chimneys, and ground cracked. Dishes, windows, and furniture broken. Damage slight. "Several more shocks felt; some strong." Ground: Compact, sloping, steep.

Arcata (5 miles north of, 1/10 mile east of U.S. Highway 101). Motion rapid, lasted 2 minutes. Hanging objects swung NE. "Saw rug between living room and bedroom double up like a caterpillar. Seemed like direction was E-W. Then second shock rocked the house violently. Floor lamp rocked NE-SW. Most of the dishes remained on table but were broken. All articles fell from medicine cabinet; fruit jars knocked off shelves. Moved kitchen range 2 inches south. Did not move house off foundation, but kitchen floor lowered in center. Man reported he was knocked down. Water heater pipe beat a half-inch hole in sheet rock." Ground: Soil, sloping.

21 December, 11:56:29*. Intensity VII. (cont.)

Arcata (1-1/2 miles north of, on Highway 299). Motion rapid, lasted 2 minutes. Felt by and frightened all in home. Direction E-W. Everything in house rattled; house creaked and rocked back and forth. Small objects shifted and overturned; knickknacks, books, and pictures fell. "My two sons were walking up the hill on Aldergrove Road and were knocked to the ground. They could not get up until it was over. They said fences, telephone poles, and trees swayed back and forth. Shock had a rolling motion like a boat in heavy seas. I became quite seasick before it stopped. Cupboard doors (facing south) were open; articles rocked, but nothing fell. House up the hill faces north and east. They lost almost all dishes from open cupboards. Our chimney sheared off, but no other damage. House 45 years old." Ground: Soil, compact, sloping and steep.

Arcata (6 miles north of, on U.S. Highway 101). Motion rapid, lasted 2-1/2 minutes. Direction E-W. People very frightened. "No warning, instantaneous shock, accompanied by sound like many tons of dynamite exploding under house. Everything cascaded to floor, seeming to start from the west. Observers outside said the ground rolled in billows; trees whipped. Our greatest loss was from broken dishes, and water heater out of commission. Family in trailer said they didn't hear a sound, but trailer rocked. Ground seemed to jerk with shocks until next afternoon." Ground: Filled in swamp.

Arcata (Sunnybrae District). Motion rapid, lasted 2 minutes. Direction NE. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NE. Pendulum clock facing NE. stopped. Trees, bushes shaken strongly. Small objects shifted and overturned; knickknacks fell. Dishes broke. Chimneys twisted and fell. Damage slight. Ground: Soil, compact, level.

Arcata (about 2 miles from ocean). Knickknacks fell to floor. Refrigerator moved 2 inches; television moved 1 foot. Cabinet doors opened. "Shock seemed to hit our house from W-E from the way I found things. No damage to the house inside or outside. House of wood construction with plastered walls."

Arcata (West Arcata). Motion rapid. Direction E-W. Felt by and frightened all in community. Windows, doors, and dishes rattled; entire house creaked. Hanging objects swung. Pendulum clock facing NW. stopped. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned; furniture overturned; knickknacks and books fell. Dishes and furniture broke. Stovepipe fell. Damage considerable. Ground: Compact, level.

Arcata (2 miles from, on Fickle Hill). Motion rapid. Direction E-W. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Pendulum clock stopped. Small objects shifted and overturned; furniture overturned; knickknacks and books fell. Dishes and furniture broke. Damage considerable to furniture and dishes. Ground: Compact, sloping.

Arcata (Glendale District). Motion rapid, lasted about 1 minute. Direction W-E. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung.

21 December, 11:56:29*. Intensity VII. (cont.)

Pendulum clock facing W. stopped. Small objects shifted and overturned; piano and heater shifted. Knickknacks and pictures fell. Chimneys twisted and fell. Damage considerable in locality. Ground: Soil, compact, sloping.

Arcata (343 G Street). Motion rapid. Direction N-S, then E-W. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N-S and E-W. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned. Bookcase and mangle overturned. Supplies and dishes in kitchen fell. Damage slight. "Our house is over 60 years old, 2 stories, redwood, no plaster. Objects upstairs fell E-W; dishes downstairs also fell E-W. Downstairs bookcase tipped N-S. My chief loss was about \$300 of ceramic greenware and finished work. I was in the garage shop loading a kiln when the shock struck; the posts and shelves promptly jiggled loose and collapsed. Seemed to come most strongly from the south, then north, and while I was trying to get my balance the jolting came from E-W. The second shock finished off the greenware." Ground: Compact, level.

Arcata (1660 J Street). Motion very rapid, lasted 2 minutes. Frightened all. Windows, doors, and dishes rattled; house creaked. Trees shaken strongly. Small objects and furniture shifted and overturned. Plaster and ground cracked. Dishes broke. Damage slight. Ground: Level.

Arcata (1090 C Street). Motion rapid, lasted 2 minutes. Felt by and frightened all. Small objects shifted and overturned; lamps fell. Dishes broke. Damage slight. "Threw my mother against the shelf and threw me against the stove. Felt like trying to go uphill with something pushing me back. House is 5 years old and very well built; no cracks in stucco." Ground: Clay.

Arcata (890-15th Street). Motion rapid, lasted 1 minute. Direction E. Felt by and frightened all in community. Windows, doors, and dishes rattled strongly; house creaked strongly. Hanging objects swung. Pendulum clock facing N. stopped. Trees, bushes shaken strongly. Small objects shifted and overturned. Knickknacks and books fell. Chimney twisted and fell. Ground: Soil, level.

Arcata (719-18th Street). Motion rapid, lasted about 30 seconds. Direction E-W. Felt by and frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NE. Small objects and furnishings shifted and overturned. Plaster cracked. Knickknacks fell. Dishes broke. Damage considerable to masonry. Ground: Soil, compact, level.

Arcata (1800 Fickle Hill Road, 8 miles back in the country). VI Motion rapid, lasted about 2 minutes. Felt by all indoors and outdoors. Distinct vertical motion felt while on flat roof. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken strongly; dead trees fell. Small objects and furnishings shifted and overturned; knickknacks, books, and pictures fell. Oil burner was shut off by shock. Ground: Soil, compact, sloping.

Arcata (on Warren Creek Road). VI. Motion rapid, lasted 2 minutes. Felt by and frightened all in home. Direction E-W. Windows,

21 December, 11:56:29*. Intensity VII. (cont.)

- doors, and dishes rattled; house creaked. Trees, bushes shaken strongly. Small objects, furnishings, and furniture shifted and overturned. Knickknacks fell. Dishes broke. Damage slight. Ground: Compact, sloping.
- Arcata** (Westhaven). VI. Motion rapid, lasted 2 minutes. Direction E. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NE. Electric stove shifted 16 inches. Small objects overturned in every room. Knickknacks fell. Dishes and lamp broke. Damage slight to trees. Ground: Soil.
- Arcata** (4 miles north of). VI. Motion rapid, then slow, lasted 1 minute. Felt by all in home; frightened one in home. Windows and dishes rattled. Small objects shifted and overturned. Books fell; empty fruit jars fell and broke. Telephone poles and wires swayed. Ground: Compact, level.
- Arcata** (2535 Alliance Road). VI. Motion rapid, lasted 2 minutes. Direction E-W. Felt by and frightened all in community. Windows and doors rattled; walls creaked. Hanging objects swung. Pendulum clock facing E. stopped. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned; overturned gun case. Knickknacks, books, and deer head fell. Flower pot broke. Ground: Compact, level.
- Arcata** (301 H Street). VI. Motion rapid at first, then rolling back and forth, lasted about 1-2 minutes. Felt by all in community; frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned. Knickknacks and books fell. Dishes broke. "No apparent damage to house which is 1 year old." Ground: Level, filled in.
- Arcata** (Bloomfield Acres). VI. Motion rapid, long duration. Direction from E. Felt by all and frightened many in community. Windows, doors, and dishes rattled; walls creaked. Hanging objects swung. Small objects and furnishings shifted; lamps overturned. Plaster, windows, and chimneys cracked. Knickknacks, books, and pictures fell. "Had at least 12 aftershocks."
- Arcata** (1-1/2 miles east of Arcata Airport). VI. Motion slow, lasted 2 minutes. Direction N-S, then E-W. Felt by all and frightened many in community. Hanging objects swung N-S and E-W. Trees, bushes shaken strongly. Small objects shifted and overturned; knickknacks and books fell. Dishes broke. Damage slight. Three-ton truck loaded with 8 tons of gravel rolled N-S and E-W. Ground: Soil, level.
- Arcata** (Sunset District). VI. Motion rapid, lasted about 2 minutes. Direction E-W. Frightened all in home. Dishes rattled; walls creaked. Hanging objects swung E-W. Bushes shaken strongly. Small objects and furnishings shifted and overturned. Plaster cracked. Knickknacks, books, and pictures fell. Dishes broke. Damage considerable to pictures, dishes, vases, and fish. Ground: Soil, compact, level.
- Arcata** (1-1/2 miles northwest of city limits). VI. Motion rapid, long duration. Frightened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects and furnishings

21 December, 11:56:29*. Intensity VII. (cont.)

shifted and overturned. Barn cracked. Knickknacks fell. Dishes broke. Damage slight to wood and concrete. Ground: Soil.

Arcata (6 miles north of, at Dows Prairie). VI. Motion rapid, lasted about 1 minute. Direction NE-SW. Frightened all. Windows, doors, and dishes rattled. Trees, bushes shaken strongly. Small objects shifted; vases overturned. Three glass jars broke. Damage slight. Ground: Loose, level.

Arcata (6/10 mile south of Dows Prairie School and Grange). VI. Motion rapid, long duration. Felt by observer outdoors. Windows and doors rattled. Trees, bushes shaken strongly. "Our big building really shook. Car across road rocked back and forth. When it stopped shaking, I ran a little way east, then I heard the most terrible rumble in the ground, seemed like it went NE. across our ground. I didn't hear it until the shaking stopped, but my husband working on the east side of the building heard the rumble about the time of shock. Three bottles fell from shelf in bathroom. Nothing else moved in house. Our house is very well built. Another shock about 8:50 p.m. I hear there have been around 40 shocks felt since the first one." Ground: Sandy loam, loose, level.

Arcata (Twin Park Addition). VI. Motion rapid, lasted 2 minutes. Direction NE. Felt by all in home; frightened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NE. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned; knickknacks fell. Damage slight. "No great damage here. House on low foundation." Ground: Soil, compact, level.

Arcata (1320 Sunset Ave., 1/2 mile NNW. of High School). VI. Motion rapid, lasted 10 seconds. Direction E-W. Felt by all in home; awakened and frightened few. Everything rattled and creaked. Hanging objects swung E-W. Trees, bushes shaken strongly. Small objects shifted; vases overturned; knickknacks fell. No damage. "House felt like it was on skids during the main shock. Felt several aftershocks." Ground: Soil, compact, level; on top of hill.

Arcata (Arcata Union High School). VI. Constructed in 1918. A small area of brick facing was shaken loose on the Administration Building. This building is a brick-faced frame structure of two stories and basement.

Arcata (about 3 miles from town, on Fickle Hill Road). VI. Motion twisting, lasted about 1-1/2 minutes. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken strongly. Small objects shifted and overturned; knickknacks fell. No damage. Ground: Soil, level.

Arcata (433 Arcata Blvd.). V. Motion rapid, lasted about 1 minute. Direction E-W. Felt by all in home; frightened few in neighborhood. Windows, doors, and dishes rattled; house creaked strongly. Hanging objects swung E-W. Trees, bushes shaken slightly. No damage. "My house is on a small hill which is, I believe, underlain with a sand or sandstone formation, and it does not shake or jar as other houses in the near vicinity. The damage to the residential district compares to the damage done by the 1932 shock. In that case the shock was preceded

21 December, 11:56:29*. Intensity VII. (cont.)

by a roar or rumble. This shock was more sudden and without warning. No damage to my house either time." Ground: Soil, compact, level.

Bayside. Motion rapid, lasted 2 minutes. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects and furnishings shifted; vases and small objects overturned. Plaster and ground cracked. Knickknacks, books, and pictures fell. Dishes broke. Damage considerable. Ground: Soil, level.

Bayside. Motion rapid, started with a roar like a blast, no light tremors first, lasted 1-2 minutes. Direction E-W. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects and doors swung. Trees, bushes shaken strongly. Small and large objects shifted; heavy stoves moved; vases and small objects overturned. Wallpaper cracked on north and east walls. Knickknacks and books fell. Dishes and clothes reel broke. One chimney fell and one twisted. Damage considerable. "Some chimneys thrown upward into the air." Ground: Compact, sloping.

Bayside. Motion rapid. General direction E-W. Felt by all in community; frightened all in home. Windows and dishes rattled; house creaked. Hanging objects swung E-W. Trees, bushes shaken strongly. Furnishings shifted; small objects and vases overturned; knickknacks fell. Dishes broke. Chimneys twisted and fell. Damage slight to brick and masonry. Ground: Soil, compact, level.

Bayside (Jacoby Creek Road). Motion rapid, lasted 1-1/2 minutes. Direction NE. Felt by all in home; outdoors by observer. Everything rattled; entire house creaked. Hanging objects swung NE. Trees, bushes shaken moderately. Knickknacks fell. "Neighbors had broken water pipeline." Ground: Soil, compact, sloping.

Bayside (1/2 mile north of post office). VI. Motion rapid. Frightened all in community; did not awaken 1-month-old baby. Everything rattled; house creaked. Shifted small objects and furnishings; knickknacks and books fell. Three or four dishes broke. Objects tended to shift NW. No damage. "Small, sharp shock felt at about 12:20 p.m. and a couple more same evening." Ground: Soil, compact, sloping.

Bayside (1 mile south of Horse Mountain). VI. Motion rapid, lasted only a few seconds. Direction mostly E-W. "Was sitting on back of parked pickup truck which seemed to drop down, then shake back and forth. Trees shaken strongly. No falling or moving rocks. No cracks or damage to concrete-block buildings on top of Horse Mountain." Ground: Rocky, sloping.

Bayside (2 miles southeast of, in mountains). VI. Motion rapid, lasted 10 seconds. Direction SW. Felt by and frightened all in home. Pendulum clock facing SW. stopped. Trees, bushes shaken strongly. Small objects and furnishings shifted; knickknacks fell. No damage. Ground: Soil, compact, level.

Beatrice. Motion rapid, abrupt onset, half-circular motion at first, strong, then violent SW-NE surge, lasted 1 minute. Felt by and frightened all. Everything rattled; house creaked. Hanging

21 December, 11:56:29*. Intensity VII. (cont.)

objects swung NE. Small objects and furnishings shifted; vases, small objects, and furniture overturned. Water spilled from outdoor containers and tanks in SW-NE direction. Plaster and chimneys cracked. Dishes and floor lamps broke. Chimneys twisted and fell. Trees, bushes shaken strongly. Damage considerable to brick. "One mile east there was less damage on a high hill of 500-foot elevation." Ground: Marshy, level.

Beatrice (1 mile from, on Hookton Road about 3 miles from Table Bluff Lighthouse). Motion rapid. Frightened all in community.

"Our house is 78 years old but well built and has been remodeled with new underpinnings. House seemed to settle, causing the windows and doors to drag. Wallpaper cracked all over the house. Moved all the beds and threw things all over upstairs, even the clothes fell in the closets. Moved the wood range and tipped the water heater over on the range. Milk thrown out of deep bowls. Side of well fell in and water pipes broke. Our next door neighbors live on marshy land, and their barn broke in half and settled down in the mud. My closest neighbors all had damage, but up on Table Mountain they didn't lose anything, although the houses were all shaken strongly." Ground: Soil, sloping.

Beatrice (2 miles north by northeast). Motion rapid, lasted 25 seconds. Direction E-W. Felt by and frightened all. Trees, bushes shaken strongly; some fell. "At first thought I was having a dizzy spell." Damage slight. Ground: Marshy; island.

Beatrice Bridge (8 miles south of Eureka). Broken guard rail and broken pavement on approaches. Moderate damage.

Blue Lake (Davis Creek). Press reported two boys fishing in Davis Creek managed to run free of a "sudden crack" at about midstream which travelling rapidly from the east bank dug a trench about a foot wide and three feet deep. Boulders were heard crashing down from the hills. Banks of the creek were reportedly caved in.

Blue Lake (McIntosh Lumber Company). Motion rapid, lasted about 30 seconds. Felt by and frightened all in community. Direction W-E. Everything rattled; building creaked. Lights and chain block swung W-E. Trees, bushes shaken strongly. Acetylene tanks, shafts of lumber, etc., shifted. Damage slight. Ground: Gravelly, level.

Blue Lake. "All my brick chimneys damaged. I have seven chimneys that have to be replaced. This was a terrible shock."

Blue Lake. Motion rapid, lasted 2 minutes. Direction NE. and W. Felt by and frightened all in community. Windows, doors, and dishes rattled; walls creaked. Trees, bushes shaken strongly. Small objects shifted; vases, etc., overturned. Plaster, windows, walls, and chimneys cracked. Plaster fell. Dishes broke. Chimneys twisted and fell. "Fireplaces and flues all fell in or twisted out of shape here." Damage considerable to brick. Ground: Soil, sloping and steep.

Blue Lake. Motion rapid. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken strongly. Large objects shifted; overturned vases, etc., and small objects. Plaster, windows, walls, and chimneys cracked. Knickknacks, books, and pictures fell. Dishes, windows, and furniture broke. Chimneys twisted and fell. Damage considerable. Ground: Soil, loose, level.

21 December, 11:56:29*. Intensity VII. (cont.)

Blue Lake (Chartin Road). Motion rapid, lasted 2 minutes. Direction E-W and N-S. Felt by all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects and furnishings shifted; vases, small objects, and furniture overturned. Chimneys cracked, two fell. Knickknacks and books fell. Dishes broke. Damage considerable. Ground: Soil, level; ancient river bed.

Blue Lake. "I was sitting in car, when I felt a slow movement, then car started to pitch back and forth, swinging sideways, and jumping up and down. I looked down the street and another car was jumping up and down and shaking all over. My car was on I Street (runs NE-SW) and was facing SW. Street seemed to have a rolling motion away from me to southwest. Chimney twisted but no bricks fell. Up and down the street chimneys were twisted, some had holes in them, and some were about ready to fall, others were sheared off at the roof. Chimneys on two new homes on this street were not damaged. No broken windows on any of the frame dwellings on this street. Downtown, two blocks away, large store windows were broken. Merchandise thrown all over the floors, causing merchants to close. A Cuckoo clock, with pendulum swinging NE-SW, stopped and a kitchen clock, with pendulum swinging NW-SE, stopped. "A B-47 jet plane was in the sky south of here and from the question mark they made with vapor trail, they must have witnessed some disturbance."

Blue Lake. Motion slow, ten shakes in 2 minutes. Direction NE. Felt by and frightened all in community. House creaked some. Hanging objects swung. Some small objects shifted and overturned. Door hinges cracked. Knickknacks fell. Dishes broke. Damage slight. "I was standing by a fence post when the shock started. I grabbed the post, then saw I couldn't let loose of it, and it kept hitting me on the side of the head."

Blue Lake. Motion rapid, lasted 2 minutes. Direction seemed to be circular. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects and furnishings shifted; 1100-lb. piano, facing N., shifted 3 inches. Vases, small objects, lamps, and Christmas tree overturned. Walls cracked. Knickknacks, books, and pictures fell. Dishes, table lamps and floor lamps broke. Two chimneys fell. Damage considerable to masonry. Ground: Compact, level.

Blue Lake (Blue Lake Elementary School); V. Completed January 1, 1954. Located at Junction of U.S. Highway 299 and Greenwood Avenue. Three-wing frame structure, plaster interior, stucco on exterior and breezeways. Main force of shock felt in E-W. direction. Previous settling plaster cracks were slightly widened, but to no appreciable degree. In the multi-purpose room small pieces of plaster were shaken loose on the top line of an indentation made in the wall for future stage erection; a 4-inch plaster crack was noted at the junction of one steel beam with the sidewall beam. A former plaster crack on a corner of the interior of the kindergarten was widened appreciably and very small pieces of plaster were shaken loose.

21 December, 11:56:29*. Intensity VII. (cont.)

Twelve to fourteen additional hairline cracks were opened on breezeway (ceiling). Rooms 3, 4, 5, 6, 7, 8, and 9 have identical plaster cracks on the west side of the classroom wall leading from the edge of the blackboard to the baseboard. One concrete joint on the second wing sidewalk shows a slight feathering of concrete dust on one joint, but no breakage or bulge is evident. There were no cracks or signs of damage to any outside walls. No breakage of glass noted and outside of bric-a-brac on shelves, potted plants, and one aquarium, damage was minor.

Blue Lake (Glen-Essex). V. Woman reported electric light fixtures suspended from ceiling swung and hit ceiling from one side to the other.

Brainard (U.S. Highway 101, halfway between Eureka and Arcata). "The highway was pushed up on the road seams (horizontal across road) in the vicinity of Brainard cut."

Crannell. Motion rapid, lasted 3 minutes. Direction W-E. Felt by all and frightened many in community. Windows and dishes rattled; frame creaked. Hanging objects swung E-W. Small objects shifted; vases and small objects overturned. Knick-knacks fell. Chimneys twisted and fell. Damage slight. Ground: Soil, compact, sloping.

Crannell. VI. Motion rapid, lasted about 1 minute. Direction N-S. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N-S and E-W. Small objects and furnishings shifted; vases and small objects overturned. Chimneys cracked. Knickknacks, books, and pictures fell. Dishes, mirrors, and lamps broke. Electric power cut off immediately. Damage slight. Ground: Rocky, steep, filled in.

Cummins Road (about 3 miles northeasterly from Eureka, off old Arcata Road). Motion rapid. Felt by and frightened all in community. Chimney broken off at roof. Fireplace pulled loose from house. Living room floor cracked full length, also by fireplace. Ceiling cracked and roof cracked in places. Deepfreeze, mangle, electric range, all shifted 2 feet. All dishes and lamps broke, also canned fruit. Plumbing broke in bath. Ground cracked in yard up to four inches wide.

Cutten (southeast suburb of Eureka). Motion rocking and rolling, lasted about 3 minutes. Direction NNW-SSE. Knocked heavy iron skillet and pan of coffee to the floor. Apartment-size gas range shifted 1-1/2 inches toward NNW. Floor covered with groceries and broken dishes from cupboards on E. and S. walls. Small radio, books, table lamps, and reading table knocked over. Christmas ornaments from chandelier and a few from Christmas tree on a table fell. Plant from bookcase fell. All pictures askew on walls. "House sways NNW, with all tremors. Felt like house would collapse. No brick chimneys above roof or brick buildings in this area."

Cutten (Cutten Elementary School District). Old school. Chimney destroyed. Chimney was being used as a vent for a gas furnace. No noticeable damage of any kind at the new Cutten School.

Elk River (located just off U.S. Highway 101). Motion rapid, lasted about 1-1/2 minutes. Direction W-E. Felt by and frightened

21 December, 11:56:29*. Intensity VII. (cont.)

all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Small objects and furnishings shifted; vases, small objects, and furniture overturned. Plaster, walls, and chimneys cracked. Knickknacks, books, pictures, and plaster fell. Dishes broke. Damage slight. Ground: Compact, soil, level, sloping and steep.

Eureka. There were some leaks in Eureka's water supply line from Sweesey Dam on the Mad River and concrete cracks in Eureka's main reservoir. There were about 30 breaks, but none serious, throughout the city's water distribution system. There was no serious damage to electric, gas, and telephone services. Several small fires were caused by shorted electrical circuits. One elevated steel water tank (not earthquake resistant) at the Eureka Redwood Plant nearly failed due to broken rods. One brick stack, 150-foot, at the Eureka Lumber Company, had 50 feet badly cracked, and a 175-foot brick stack at the Holmes-Eureka Lumber Company was badly cracked. Both stacks were cracked in the 1932 earthquake. There was some damage to U.S. Highway 101 between Eureka and Arcata. On Hawthorne Street, near U.S. Highway 101, there was a crack approximately 5 feet deep and 10 inches wide. The Eureka City Hall (built in 1904) and the Humboldt County Courthouse (built in 1885) were extensively damaged. The City Hall (brick masonry) had extensive plaster damage in all rooms except the council chamber which had been replaced with fibre wallboard. The front walls were badly cracked and leaned out. Interior plaster in all rooms of the County Courthouse (masonry walls) was badly cracked; wall leaned outwardly approximately 6 inches. Both buildings were evacuated. Of the business buildings, it appeared that Kress and Daly's stores were the most severely damaged. The building front of the Kress store was badly cracked and leaned outwardly. The west wall of Daly's buckled outwardly at the center. Both are old buildings. Several other old buildings had damage in the form of broken parapets, some cracks, extensive plaster damage, and broken plate-glass windows. Losses were heavy from fallen merchandise. Numerous chimneys were cracked and many fell in the residential areas; much plaster was cracked; and many dishes, ornaments, etc., fell and broke. One man was drowned when he fell from a wharf into Humboldt Bay and a number of people were injured by falling bricks and other objects.

Eureka - north section:

211 Fifth St. Motion rapid, lasted 20 seconds. Direction W-E. Felt by and frightened many. Windows, doors, and dishes rattled; walls creaked. Hanging objects swung W-E. Small objects and furnishings shifted. Plaster and ground cracked. Knickknacks, books, pictures, and plaster fell. Damage slight. "Very little damage to old Eagle Building." Ground: Rocky soil, level.

1313 Fifth St. Motion rapid, lasted 2 minutes. Felt by and frightened all. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects shifted and overturned; furniture overturned. Plaster, walls, and chimneys

21 December, 11:56:29*. Intensity VII. (cont.)

- cracked. Knickknacks, books, pictures, and plaster fell. Dishes broke. Chimney fell. Damage considerable to wood and brick. "Greatest damage to plastered walls: great cracks and fallen plaster." Ground: Soil, level.
- 1443 Fifth St. Motion rapid, lasted 45 seconds. Direction E-W. Frightened all. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Electric clock facing E. stopped. Small objects and furnishings shifted and overturned. Windows and chimneys cracked. Knickknacks fell. Windows broke. Chimney fell. Damage slight. Ground: Soil, level.
- 830 N St. Motion slow, lasted 1 minute. Direction E-W. Frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung E-W. Trees, bushes shaken strongly. Small objects shifted and overturned; furniture overturned. Knickknacks and books fell. Dishes broke. Damage slight. Ground: Compact.
- 730 H St. Motion slow at first, then rapid, lasted 30 seconds. Direction NE. Frightened all in home and community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NE. Pendulum clock facing NE. stopped. Trees, bushes shaken strongly. Small objects and furnishings shifted; small objects and furniture overturned. Plaster, walls, chimneys, and ground cracked. Knickknacks, books, pictures, and plaster fell. Dishes, windows, and furniture broke. Chimney twisted and fell. Damage considerable to wood and brick. Ground: Rocky.
- 350 E St. Motion rapid, lasted 30 seconds. Direction E-W. Frightened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Bushes shaken strongly. Furnishings shifted; small objects overturned. Ceiling plaster cracked. Knickknacks, books, and plaster fell. Dishes broke. Bookcases fell. Damage considerable.
- 1332 G St. Motion slow, lasted 30 seconds. Felt by and frightened observer. Windows, doors, and dishes rattled. Hanging objects swung E-W. Small objects and furnishings shifted and overturned. Chimneys cracked. Knickknacks and mirror fell. Dishes and lamps broke. Knocked observer down. Damage slight to brick and masonry. Ground: Compact, level.
- Third and G Sts. Motion rapid, seemed circular. Frightened all in community. Windows, doors, and dishes rattled; building creaked. Hanging objects swung in all directions; hanging Neon lights collapsed. Large cabinets shifted and doors opened; small objects overturned. Plaster, windows, walls, chimneys, and ground cracked. Knickknacks, books, and plaster fell. Dishes and windows broke. Chimneys fell. Damage considerable to brick, masonry, and glass. Ground: Filled in.
- 811 H St. Motion rapid, lasted 30 seconds. Direction circular. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung W-E. Trees, bushes shaken strongly. Everything shifted; small objects overturned. Plaster, walls, and chimneys cracked. Knickknacks, books, and plaster fell. Dishes broke. Chimneys fell. Damage considerable to brick and masonry. "The apartment was a mess." Ground: Filled in; slightly sloping.

21 December, 11:56:29*. Intensity VII. (cont.)

1304 J St. Motion rapid, strong, twisting, lasted 2 minutes. Felt by and frightened all in home. Windows, doors, and dishes rattled; house creaked (old house, 2 story). Hanging objects swung. Furnishings shifted; vases, etc., overturned. Plaster, walls, and chimneys cracked. Knickknacks and plaster fell. Chimneys twisted and fell. Damage considerable to brick. "Objects fell on W. wall, but mirror fell from N. wall, also. Three house plants on north porch window, only 1 knocked down; the others never moved. Two plants on south window, only 1 down. Large refrigerator moved 3 inches from wall, but vase on top not moved. Plaster badly cracked in all downstairs rooms. To me it was a very hard shock, with freakish actions."

211 S St. "Water pipes in kitchen broke. Chimney broke in 2 pieces and had to be removed. Objects fell. Stove doors opened. Cup half full of coffee had coffee splashed out."

Second and H Sts. Motion rapid, lasted 1 minute. Direction E-W. Felt by and frightened all in community. Everything rattled; walls creaked. Everything shifted; small objects overturned. Plaster, windows, walls, chimneys, and ground cracked. Wall fixtures broke. Damage considerable to brick, masonry, and concrete. "Where I work (F. Breeden Co.) a crack appeared in the ground near the Bay. It emitted some peculiar colored sand, and ran almost due E-W. Couldn't tell how far it extended because of piles of metal around it."

Third and Commercial Sts. Motion rapid, lasted 2 minutes. Direction S. Felt by and frightened all in community. Hanging objects swung. Trees, bushes shaken strongly. Small objects shifted and overturned. Plaster, windows, walls, chimneys, and ground cracked. Knickknacks and plaster fell. Dishes and windows broke. Damage considerable. Ground: Level, filled in.

328 E St. Motion rapid, lasted 2 minutes. "In newly remodeled part of building no lights or skylights were broken, no furniture overturned, and no papers scattered. On the floor below, the water container on cooler flipped out and landed upright on floor. Cracked plaster and floor tiles cracked in two places was the extent of damage in remodeled part of building. In the 'old building' damage was more extensive wherever remodeling had not been done. The storage room was a mess of strewn bound files and broken wooden shelves."

36 Fifth St. Motion rapid, lasted 2 minutes. Direction E-W. Felt by all in store. Windows, doors, and dishes rattled; building creaked. Hanging objects swung E-W. Small objects and furnishings shifted; furniture overturned. Plaster, windows, walls, chimneys, and ground cracked. Knickknacks, books, pictures, and plaster fell. Dishes, windows, and furniture broke. Chimneys twisted and fell. Damage considerable to wood and brick. Ground: Compact, level.

Highway U.S. 101 just north of Eureka city limits. "Driving car and going about 50 miles per hour. Car jumped from side to side and bounced around. Thought I was losing a rear wheel. I finally got the car stopped, and when I stepped on the ground it felt like the road raised 8 inches or more. As I drove toward Arcata, I found the highway broken in several places."

21 December, 11:56:29" Intensity VII. (cont.)

Sixth and J Sts. Motion rapid, lasted 10-15 seconds. Felt by all in office building (50 years old); frightened all in community. Office furnishings rattled; entire building creaked. Hanging objects swung. Trees, bushes shaken strongly. Large, heavy office furnishings shifted; small objects overturned. Plaster, walls, and chimneys cracked. Knickknacks and plaster fell. Chimney twisted. Damage considerable to brick. Ground: Level, compact.

423 Eleventh St. Motion rapid and slow, buckling, lasted 3 minutes. Direction NE. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NE. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned; furniture overturned. Plaster, walls, and chimneys cracked. Dishes broke. Chimneys twisted. Damage slight to brick. Ground: Soil, level.

230 Grant St. Motion rapid, lasted 2 minutes. Direction N-S and E-W. Felt by and frightened all in home. Windows, doors, and dishes rattled; frame creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects and furnishings shifted; small objects and bookcase overturned. Plaster and chimneys cracked. Knickknacks, books, and pictures fell. Dishes broke. Chimney twisted and fell. Damage slight to brick. Ground: Soil, level.

1020 Second St. (close to Bay). Motion rapid. Frightened all in community and someone nearby observer was screaming. Windows, doors, and dishes rattled; house creaked (over 80 years old). Small objects, furnishings, and furniture shifted and overturned; knickknacks, books, and pictures fell. Dishes and furniture broke. Damage slight. "House seemed to jump up and down. No plaster except ceiling downstairs. House is rough frame structure, sitting on piers. I cannot understand why this house did not fall. It sits high above the street as site was formerly on the side of a gulch. Ground was filled in years ago. Chimney with sheet metal top did not fall. There is not much brick above the roof and it did not even crack. Wires had recently been tightened and partially renewed on the metal top of chimney."

1012-15th St. Motion rapid, lasted 30 seconds. Direction E. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung E-W. Trees, bushes shaken strongly. Small objects and furnishings shifted; vases and lamps overturned. Damage slight. "Older chimneys fell all around us." Ground: Soil, compact, rolling.

1121 G St. Motion rapid, lasted 2 minutes. Direction seemed easterly at first, then N-S. Frightened many in community. Entire building creaked and rattled. Hanging objects swung NNE. Pendulum clock facing NW. stopped. Trees, bushes shaken strongly. Small objects shifted; moved stove 12 inches. Plaster and chimneys cracked; chimneys twisted and fell. Knickknacks, books, and pictures fell. Dishes and furniture broke. Damage considerable to masonry. "This shock was as sharp as the 1906 shock, but not nearly as long. First it was from N-S, then changed to E-W. I believe the walls moved as much as 10 inches, for heavy furniture

21 December, 11:56:29*. Intensity VII. (cont.)

was moved out a foot from the wall and the stove over a foot. Chimneys were cut off at roof line,- a total loss." Ground: Compact, level.

1121 B St. Motion rapid, lasted 1 minute. Direction of first shakes seemed N-S, later heavier shakes E-W. Frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung E-W. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned. Plaster, windows, walls, and chimneys cracked. Knickknacks, books, and plaster fell. Dishes and windows broke. Bath tub moved 4 inches from S. wall. Chimneys twisted. Damage considerable. Ground: Soil, compact, level.

Eureka - northeast section:

1535 Sixth St. Motion rapid, lasted 2 minutes. Felt by and frightened all in home. Windows, doors, and dishes rattled. Hanging objects swung. Small objects and furnishings shifted; vases, small objects, and furniture overturned. Chimneys fell. Dishes broke. Damage slight to brick.

2742 East Seventh St. Motion rapid. Direction E-W. Windows, doors, and dishes rattled. Small objects and furnishings shifted and overturned. Chimneys fell. Knickknacks, books fell. Dishes broke. Damage to brick. Ground: Soil, level.

921 S St. (close to Myrtle Grove Cemetery). Motion rapid, long duration. Felt by observer in home. Windows, doors, and dishes rattled. Hanging objects swung. Table and bed shifted; small objects overturned; furniture overturned. Knickknacks fell. Dishes broke. Foundation of house and sidewalk cracked; ground cracked. "Myrtle Grove Cemetery is right above us on the hill. The cemetery is flat. Some ground is broken, many cement tops of tombs are cracked through the side and some are broken and so are the curbs. Some of the monuments have fallen over and some are broken and some have moved to the very end and are ready to fall. Vases are turned over and some are broken. This cemetery is very old. My uncle was caretaker there for the last 30 years, and that is how I know what was broken by the earthquake and what has been broken by bad boys."

1481 Myrtle Ave. Motion rapid, lasted about 30 seconds. Direction E-W. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned; furniture overturned. Plaster, windows, walls, and chimneys cracked. Knickknacks, books, pictures, and plaster fell. Dishes and furniture broke. Chimneys twisted and fell. "I was here during the 1906 shock. This one seemed as strong, but not as long. I was working on a linotype facing N. in newspaper office. The pressure seemed to be from E-W. All the machines facing E. were torn from their moorings and were 'walking' around the room."

1911-17th St. Motion rapid, lasted 6 seconds. Frightened all. Windows, doors, and dishes rattled; house creaked. Small objects and furnishings shifted and overturned; knickknacks and books fell. "Thunder-like noise seemed to come from SW. and fade out toward NW. I noticed street pavement moving up and

21 December, 11:56:29*. Intensity VII. (cont.)

down on 16th Street for about 6 seconds, then house started to shake. People left houses and were very frightened. House (on piers) seems to be twisted around towards west about 1/4 inch and moved about 1/8 inch south."

Eureka - east section:

- 2213 Harris St. Motion rapid, lasted 1 minute. Direction E. Felt by and frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NE. Small objects and furnishings shifted; vases, small objects, and furniture overturned. Plaster, walls, and ground cracked. Knickknacks, books, pictures, and plaster fell. Dishes broke. Damage slight. Ground: Rocky soil, sloping.
- 1570 East Ave. Motion rapid. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Small objects and furnishings shifted; small objects and furniture overturned; knickknacks fell. Damage slight. New 1-story house with concrete-block foundation.
- 3707 East Trinity St. (off Myrtle Ave.). Motion rapid, lasted about 10 seconds. Direction NNE. Frightened all in community. Windows, doors, and dishes rattled; walls creaked. Hanging objects swung NNE. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned; furniture overturned. Plaster, walls, and chimneys cracked. Knickknacks, books, pictures, and plaster fell. Dishes, windows, and furniture broke. Chimneys twisted and fell. Damage considerable to household articles. "Our house is more or less on a hillside. We had much more damage than our two neighbors. Such furnishings as chests of drawers and refrigerators were overturned."
- 2430 Myrtle Ave. Motion rapid, lasted 2 minutes. Felt by all in community; frightened few. Everything rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned; some furniture overturned. Plaster, walls, and chimneys cracked. Knickknacks, books, pictures, and plaster fell. Dishes and furniture broke. Chimneys fell. Damage considerable. "I started to rise and was thrown to my knees. I finally managed to get about 25 feet south, then was thrown against the right door frame. I was thrown right and left as I continued through the house. Finally reached my baby and found him still asleep; the house was still shaking. Large marble-top bureau on the south wall was moved north 15 inches and large refrigerator moved about 2 inches to north. Tile splashboard cracked loose from wall. Leg broke on very large flat-top desk on the east wall. Large rocking chair was turned over on side toward east. Marble top on table was moved 2 inches to west side of frame. Almost all dishes and glassware down from cupboards. Objects from west wall were thrown to east. Walls in every room were cracked. Chimney thrown to west side of house. Some neighbors said the shock was E-W, but we had heavy objects moved N-S." Ground: Level, compact.
- 2570 Myrtle Ave. Motion rapid. Frightened all in community. Windows, doors, and dishes rattled. Small objects shifted; vases overturned; knickknacks fell. Dishes broke. "Chimneys down all around us." Ground: Compact, level.

21 December, 11:56:29*. Intensity VII. (cont.)

1864 Myrtle Ave. Motion rapid, lasted about 12 seconds. Direction N-S. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Trees shaken strongly. Small objects and furnishings shifted; vases, small objects, and furniture overturned. Plaster, chimneys cracked. Dishes and furniture broke. Chimneys twisted and fell. Damage considerable to brick, dishes, and furniture. "This earthquake was much worse than April 18, 1906." Ground: Soil, compact, level.

2036 S St. Motion rapid. Frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N. and E-W. Trees, bushes shaken strongly. Small objects and furnishings shifted; vases, small objects, and furniture overturned. Plaster, windows, walls, and chimneys cracked. Knickknacks, books, pictures, and plaster fell. Dishes and windows broke. Chimneys twisted and fell. Damage considerable to brick. Ground: Soil, sloping, marshy.

2200 Harrison St. Motion rapid. Direction E-W. Frightened many. Windows, doors, and dishes rattled; building creaked. Hanging objects swung E-W. Large objects and furnishings shifted. Plaster and walls cracked. Dishes and windows broke. Chimneys twisted and fell. Damage considerable to concrete. Ground: Soil, compact, level.

Eureka - south section:

4271 D St. (4 miles south of City Hall). Motion rapid, lasted 2 minutes. Direction SW-NE. Frightened all in community. Windows, doors, and dishes rattled. Hanging objects swung. Trees, bushes shaken strongly. Small objects and furnishings shifted; vases, small objects, and furniture overturned. Plaster, windows, walls, chimneys, and ground cracked. Dishes and windows broke. Damage slight. "Did not have brick chimney; neighbor's chimney twisted." Ground: Soil, compact, sloping.

129 Artina Ave. (Pine Hill District). Motion rapid, lasted about 2 minutes. Direction NE. Frightened all. Windows and dishes rattled. Hanging objects swung. Trees, bushes shaken strongly. Small objects shifted and overturned; knickknacks fell. Furniture broke. Walls cracked. Damage slight to wood. Ground: Compact.

2853 Lowell St. Motion rapid, lasted 2 minutes. Direction NE. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NE. Pendulum clock stopped. File cabinet overturned. Damage slight. Ground: Soil.

4185 D St. Lasted 3 minutes. "Felt floor moving under my feet like house was tipping over. Held on to ironing board to keep from falling; ironing board bounced up and down." Everything rattled; loud creaking of floor. Small objects and furnishings shifted; small objects overturned. One window and ceiling of kitchen cracked. Dented top of hot water tank. Loose shingles bulged on roof. Damage slight.

4114 D St. Motion rapid, sudden, jerky, noisy. Direction E-W, then N-S. "Could not stand up. Frightened all in home; many in community. Windows and doors rattled. Hanging objects swung N-S. Trees, bushes shaken strongly. Piano shifted. Small objects overturned; knickknacks fell. Dishes and lamps broke; water heater broke. Chimneys twisted. Damage considerable. Ground: Soil, compact, level.

21 December, 11:56:29*. Intensity VII. (cont.)

Eureka - southeast section:

3383 Park St. Motion rapid, lasted 2 minutes. Sounded and felt like motion came from W. and travelled east. Felt by all in home; frightened few. Windows, doors, and dishes rattled; house creaked. Hanging objects swung E. Trees, bushes shaken strongly. Small objects and furnishings shifted; small objects and furniture overturned; pictures fell; floor lamp fell and broke. Ground cracked. Damage slight to concrete foundation. "Objects fell to the east." Ground: Soil, compact.

Eureka - southwest section:

1127 McDonald St. Frightened all in community. Motion rapid, lasted 5 seconds. "Standing in kitchen of our 1-story, 3-year-old, ranch-style frame house. Hung on to sink to keep from falling. Looked like floor was moving in waves. House creaked loudly. Only one milk bottle fell from drainboard; nothing else toppled. Flower baskets outside, with 4-foot supporting wires, swung in arcs of 4 feet. They weigh 30 lbs. each. The baskets hang on west side of house and swung directly N-S., parallel to the house. Ground: Compact, level; reportedly filled with sandy, gravelly clay.

3214 High St. Motion rapid, lasted 2 minutes. Direction N-S. Felt by and frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N-S. Trees, bushes shaken slightly. Small objects shifted; knickknacks fell. Some cabinets and wash trays moved and cabinets cracked loose from walls. Damage slight. Ground: Soil, level, compact.

3265 Cooper Ave. Motion rapid, lasted 2 minutes. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects and dressers shifted; knickknacks fell. Ground: Compact soil, level.

3200 Broadway (Holmes-Eureka Lumber Co.). Motion rapid, lasted 2 minutes. Direction N-S. Frightened all in community. Everything rattled; everything creaked. Trees, bushes shaken strongly. Furnishings shifted; small objects, etc., overturned; knickknacks and books fell. Lumber piles fell. Ground: Soil, compact, level.

5553 Noe Ave. VI. Motion rapid, long duration. Direction seemed N-S. Felt by and frightened all in home. Windows, doors, and dishes rattled; house creaked. Small objects and furnishings shifted; small objects and bookcase overturned; knickknacks, books, and pictures fell. Ground: Soil, level, compact.

Eureka - West section:

268 Wabash Ave. Motion slow. Felt by and frightened observer in home. Windows, doors, and dishes rattled; frame creaked. Hanging objects swung NW. Small objects and furnishings shifted; vases overturned. Dishes broke. Chimneys fell. Damage slight. Ground: Soil, sloping.

1804 A St. Motion rapid, lasted 2 minutes. Direction N. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned; furniture overturned. Plaster, windows, walls, and chimneys cracked. Knickknacks, books, and pictures fell. Dishes broke. Chimneys twisted and fell. Damage to masonry.

21 December, 11:56:29*. Intensity VII. (cont.)

"I was outside when the shock occurred. Ground rolled in waves about 3 feet high and 3 feet apart. Light poles whipped. Chimney sheared off about 30 seconds after shock started. Strongest part of shock was after the first 30 seconds."

1924 Spring St. Motion rapid, lasted 2 minutes. Direction S-N.

Felt by and frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N. Small objects and furnishings shifted; small objects and furniture overturned. Walls and chimneys cracked. Books, pictures, and lamps fell. Dishes and dresser mirror broke. Chimneys fell. Damage considerable to brick. "Shock hit very suddenly, like a terrific bump against south wall. Impossible to stand up. Telephone poles, about 80 feet high, whipped about like fishing rods, and wires jumped so violently we were afraid they would break. Trembling continued for more than 30 minutes."

2317 Spring St. Motion rapid. Frightened many in neighborhood.

Windows, doors, and dishes rattled; house creaked strongly. Hanging objects swung. Pendulum clocks and electric clocks stopped. Small objects and furnishings shifted; small objects and furniture overturned. Chimneys cracked and twisted. Knickknacks fell. One leg of television table twisted. Damage to brick. Ground: Soil, level.

2614 Union St. Motion rapid, lasted 2 minutes. Felt by all in

home; frightened many. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects and furnishings shifted; small objects and some furniture overturned. Plaster cracked. Knickknacks, books, and pictures fell; canned fruit fell and broke. Damage slight. Ground: Soil, level.

1407 Albee St. VI. Motion rapid, lasted 2 minutes. Direction N-S.

Frightened all in home. Doors rattled; house creaked. Hanging objects swung N-S. Small objects and furnishings shifted; furniture overturned. Plaster cracked in hallway. Damage slight. Ground: Level.

2121 Albee St. VI. Motion rapid, lasted 2 minutes. Frightened all

in home. Windows, doors, and dishes rattled. Hanging objects swung. Pendulum clock stopped. Trees, bushes shaken strongly. Furnishings shifted; furniture overturned. Knickknacks fell. Damage slight. Ground: Compact.

Eureka - central section:

Eureka Senior High School. The main buildings were constructed about 1915, and suffered extensive plaster cracking, some cracks also in the plastered walls, and a few in the floors. Plaster is on wood lath. Considerable amount of plaster fell throughout the structure, and a lot more cracked.

Eureka Junior High School. Built in 1926. Visible damage was mostly cracked plaster of ceilings and some cracking of walls. Considerable amount of plaster fell. In the auditorium the plastered ceiling was cracked north and south over the balcony and east and west near the north as well as the south walls. Large chunks of ornamental cast plastered trim fell. Plaster fell from ceilings of many classrooms. Books and articles from shelves tumbled to the floor. The district superintendent of Eureka schools stated that Field Act schools had resisted the shock without damage.

21 December, 11:56:29*. Intensity VII. (cont.)

- 243 Huntoon St. Motion rapid, lasted 2 minutes. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken strongly. Small objects shifted and overturned. Chimneys and ground cracked. Knickknacks, books, and pictures fell. Dishes broke. Chimneys twisted and fell. Damage moderate to concrete. "There were several cracks in the sidewalk. Across the street from us a house was shifted about 1 to 1-1/2 inches off foundation and pieces of cement-block broke off at the corners of the house. On the northeast corner of the house there was a 2-3 inch break in the 2-foot high cement foundation."
- 268 Huntoon St. Motion rapid, long duration. "Our house is constructed entirely of wood, 1-1/2 stories, with full basement supported on 6 x 6 inch posts 7 and 8 feet long, fairly well braced. Part of the basement is floored with 2-inch planks and part has only hardpan earth. Each post is on concrete blocks 10 x 10 inches. First surge was a terrific bump from below, then a surge to the south, with dishes and glass falling and the building creaking and groaning, then a sway to the north, then a sway to the south. Fish tanks on casters rolled back and forth about 18 inches. Water, 2-1/2 inches from top of tanks, slopped over on floor. Water in toilet tank slopped over on floor. Gas range moved 2 inches to south. Three bricks in chimney broken. Nineteen-foot well was pushed out of line so that the curb is not level. There are earth cracks about the well curb and house and completely across Huntoon Street (runs east-west). Some of the cracks are still (12-26) 3/8 inch wide."
- 910 Huntoon St. Motion rapid, lasted several minutes. Direction W-E. Felt by all in community; frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Piano, stove, and hot water heater shifted. Outside stucco cracked. Knickknacks, books, and articles from all open shelves fell. "Others spoke of rolling motion, but we were jerked about as we grasped for doors and tried to reach our big oak dining table for cover. Noise that preceded shock sounded like a train going through the house and was distinctly heard above the noise that the house and falling objects were making." Ground: Compact, level; filled in about 50 years ago.
- 2719 California St. Motion rapid, lasted 5 minutes. Direction N-S. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N-S. Pendulum clock stopped. Furnishings shifted; refrigerator overturned. Knickknacks, books, and pictures fell. Dishes and furniture broke. Chimneys twisted and fell. "Knocked off my feet and could not get up." Ground: Sloping.
- 1330 Wood St. Motion rapid, lasted few seconds. Direction NW. Felt by all and frightened many in community. Windows, doors, and dishes rattled. Hanging objects swung. Small objects shifted and overturned. Plaster, windows, walls, chimneys, and ground cracked. Knickknacks and pictures fell. Chimneys twisted and fell. Damage considerable. "To me the shock was violent for only a few seconds but so violent that I could not move. Floor

21 December, 11:56:29*. Intensity VII. (cont.)

shook violently back and forth. When the shaking stopped, I ran outdoors, and I could hear wooden buildings in the immediate vicinity rattling and creaking. Sounds progressed to the northwest. Scratches in paint where one building touches another indicated a horizontal movement of at least $3/4$ inch. One building was wood; the other brick and concrete." Ground: Soil, loose, sloping.

2004 F St. Motion rapid, lasted 2 minutes. Direction W-E. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Small objects and furnishings shifted; small objects overturned. Windows and chimneys cracked. Knickknacks, books, and pictures fell. Dishes and furniture broke. Chimneys fell. Damage considerable to brick. Ground: Compact, level.

2210 C St. Motion rapid, lasted 2 minutes. Direction E-W. Frightened all. Windows, doors, and dishes rattled; house creaked. Pendulum clock stopped. Small objects shifted and overturned. Plaster and windows cracked. Knickknacks fell. Dishes, vases, and jars broke. Chimneys twisted and fell. Damage slight. "Worst shock ever experienced." Ground: Soil, compact, level, filled in.

3436 I St. Motion rapid, jerky. Direction N-S. Windows, doors, and dishes rattled; house creaked. "Articles on shelf above stove, facing west, were not disturbed, nor were pictures on wall. Articles facing north and south fell to floor. I was facing north; first motion pitched me forward, second, pitched me south and I fell to floor. I scooted out the door, as I thought the house would be pulled apart. When I got outside, I saw wires jerking up and down, none were swinging."

2012 G St. Motion slow, jerky, lasted 2 minutes. Direction E-W. "My son (10 years old) was thrown to the ground. Car jolted up and down. My daughter could not get down the stairs. I grabbed the door to keep by balance; tried to walk but couldn't. Saw lamps and china treasures falling but couldn't reach them. Marble-topped table overturned; another slid several feet north-east on congolesum floor. Books on shelves running east-west fell out. Our house was built about 1885, typical frame redwood, and lurches and groans. No cracks in wallpaper. Believe chimney was weakened." Ground: Compact, level.

2915 Williams St. Motion rapid, lasted 2 minutes. Windows, doors, and dishes rattled; house creaked. Electric clocks stopped. Small objects and furnishings shifted. Plaster cracked in bathroom and kitchen. Dresser lamp broke. Two chimneys cracked. "Fireplace and kitchen chimney must be replaced." Ground: Soil, level.

Eureka - north-central section:

1734 K St. Vases and small objects overturned. Plaster, windows, walls, and chimneys cracked. Knickknacks, books, and plaster fell. Windows broke. Chimneys twisted and fell.

1930 H St. Motion rapid, lasted 30 seconds. Direction E-W. Frightened all. Frame creaked. Hanging objects swung. Pendulum clock facing W. stopped. Small objects and furnishings (dresser) shifted; vases and small objects overturned; knickknacks fell. Dishes broke. Damage considerable to dishes, etc.

21 December, 11:56:29*. Intensity VII. (cont.)

"Appears house moved on base 1/2 inch to west." Ground: Soil, compact, slightly sloping.

1922 F St. Motion rapid, lasted 15 seconds. Direction NE. Frightened all in home. Windows, doors, and dishes rattled loudly; frame creaked. Hanging objects swung NE. Pendulum clock facing N. stopped. Trees, bushes shaken strongly. Small objects and furnishings shifted; vases and small objects overturned. Plaster cracked. Knickknacks and books fell. Dishes broke. Chimneys fell. Damage considerable to brick. Ground: Compact, level.

274 Brett St. Motion rapid, lasted 2 minutes. Direction NE. Felt by and frightened all in neighborhood. Windows, doors, and dishes rattled; walls creaked. Hanging objects swung NE. Electric clocks stopped. Trees, bushes shaken strongly. Beds and chairs shifted; vases and small objects overturned. Chimneys cracked. Knickknacks fell. Dishes broke. Chimney twisted. Damage slight to brick chimney. "House seemed to rock and heave, opening latched cupboard doors. Chimney cracked and shifted; held intact by TV antenna. Extension chimney over kitchen stove broken loose from main chimney but held from falling by guy wires. Two cars parked in front of house, about 4 feet apart, with brakes set, were bumper to bumper after shock. Telephone poles rocked and wires whipped." Damage slight.

1735 G St. Motion rapid, lasted 2-3 minutes. Felt by and frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Heavy furniture shifted; vases, small objects, and furniture overturned. Chimneys cracked. Knickknacks, books, and pictures fell. Dishes and furniture broke. Damage slight to wood. Ground: Compact, level, clay.

1525 J St. "House violently shaken. Front steps pushed from building about 2 inches to west. Small portion of fireplace chimney thrown down, probably 40 bricks in all. Many dishes broke. Our impression was that shock came full force all at once."

1803 F St. Motion rapid, lasted 30 seconds. Direction N-S. Frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N. Pendulum clock facing W. stopped. Small objects and furnishings shifted; vases, small objects, and furniture overturned. Knickknacks and pictures fell. Dishes broke. Damage considerable to plaster and brick flue. "The first shock at our house was a very hard jar with a rising and dropping sensation, then swaying north-south. Both houses on this property seemed to sway north as though going into the street. Light fixtures swung north-south and every article tipped over fell toward north, but the large flue, hot water tank, and other stationary fixtures were moved south. Tenants in the smaller house in the rear also thought their house was going into the street and was at such an angle to the north that they had difficulty getting out the rear door to the south. With the full basement the main building is about 3 stories high."

Eureka. Of the 75 other reports received from all sections of Eureka, 69 of the 75 reported small objects and knickknacks fell; 35,

21 December, 11:56:29*. Intensity VII. (cont.)

dishes and knickknacks broke; 7, plaster cracked; 14, chimneys slightly damaged; 39, slight damage (no details).

Ferndale. A large water storage tank (wooden) at the Valley Flower Cooperative Creamery, several miles west of Ferndale at Park Kenyon, collapsed. Power lines nearby fell. Structural damage occurred to a number of stores in Ferndale and consisted mainly of broken plate-glass windows and cracked or fallen chimneys. Merchandise fell and broke in some stores.

Ferndale. Motion rapid, lasted 2 minutes. Felt by observer in home; awakened 6-month-old baby; frightened all in home. Dishes rattled; walls creaked. Hanging objects swung. Small objects shifted; vases, small objects, and furniture overturned. Knickknacks and books fell. Dishes and furniture broke. Damage slight. Ground: Soil, level.

Ferndale. Motion rapid at first, then slow, lasted about 2 minutes. Direction SE-NW. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Small objects and furnishings shifted; vases, small objects, and some furniture overturned. Knickknacks fell. Damage slight. Ground: Soil, compact, sloping and steep.

Ferndale (4-1/2 miles east of). Motion rapid, lasted 2 minutes. Felt by and frightened all in home. Everything rattled; house creaked. Gun in rack shifted NW. Some small objects and furnishings shifted; few vases and small objects overturned. Wallpaper cracked. Knickknacks and pictures fell. One jelly glass broke. "Trees in orchard swayed (NE-SW, I think) and looked like rapidly bowing dancers. Made people dizzy. Ground: Soil, compact, level; filled in with gravel and silt.

Ferndale. VI. Motion slow. Direction E-W. Felt by all in home; frightened all. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken strongly. Small objects shifted and overturned; knickknacks fell. Damage slight. Ground: Soil, level.

Ferndale. VI. Motion rapid, lasted 2 minutes. Direction N. Felt by all in home; frightened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Furnishings shifted; small objects overturned. Pictures fell. Damage slight. Ground: Soil, compact, level.

Ferndale. VI. Motion slow, lasted 1 minute. Felt by all and frightened many in community. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken strongly. Small objects and furnishings shifted; small objects and furniture overturned. Plaster, windows, walls, and chimneys cracked. Dishes and windows broke. Damage slight.

Ferndale. VI. Motion rapid, lasted 1 minute. Direction N-S. Felt by and frightened all in community. Windows, doors, and dishes rattled. Hanging objects swung. Small objects and furnishings shifted; vases, small objects and furniture overturned. Plaster, windows cracked. Knickknacks, books, and pictures fell. Dishes, windows, and furniture broke. Damage considerable. Ground: Soil.

21 December, 11:56:29*. Intensity VII. (cont.)

Ferndale. VI. Motion rapid, lasted 30 seconds. Direction E-W. Felt by all and frightened many in community. Windows, doors, and dishes rattled; house creaked. Doors swung. Pendulum clock facing E. stopped. Small objects and furnishings shifted; vases and small objects overturned. Windows and chimneys cracked. Knickknacks fell. Dishes and windows broke. Ground: Soil.

Ferndale (Ferndale Union High School). VI. No damage, except to 3/4-inch water pipe under shop floor of Shop Building. File cabinets and unlocked locker door flew open. Two trophies fell from top of high bookcase and broke. Glass in a framed charter, which had been propped up on same bookcase, broke. Tier of Coca-Cola bottle cases toppled. One small piece of glassware fell from a shelf in the supply room and broke. It was the opinion of the district superintendent that good housekeeping practices of the teachers and custodians were responsible for the small amount of damage to small breakable objects.

Ferndale Elementary School: Constructed in 1923, 1-1/2 story, wood-frame building with stucco exterior. Plaster cracks were noted in the upper part of the building in several rooms, portions of the main hallway and east and west halls. The exterior part of the building showed two cracks in the stucco on the east wall. It was the opinion of State Division of Architecture authorities that the cracks were more likely due to shrinkage.

Fieldbrook. Motion rapid, lasted 20 seconds. Direction NE. Felt by all and frightened few in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NNE. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned; knickknacks, books, and pictures fell. Chimney cracked. Dishes broke. One-half inch shift of fireplace chimney about 3 feet below top. "Heard no roar until shock was about half over. Held on to fence in order to keep balance. Ground shook, seemed NE-SW, with a back-and-forth motion with what seemed about 2-1/2 to 3 feet movements. Power poles shook strongly and where wires were close together they wrapped around each other."

Fieldbrook (in the woods near Fieldbrook). Motion rapid, lasted 1-1/2 minutes. Extremely loud earth noises heard. Direction W-E. Felt by and frightened all. Trees shaken very strongly; limbs and some trees fell. Ground cracked. Ground: Rocky, steep.

Fieldbrook. Motion slow, lasted about 1 minute. Felt by all in home; frightened all. Windows, doors, and dishes rattled; walls creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects shifted and overturned. Damage considerable to underpinnings of house. Ground: Compact, level.

Fieldbrook (on Fieldbrook Road). Motion rapid, lasted 2 minutes. Felt by and frightened all in home and community. Dishes rattled; walls creaked. Hanging objects and doors swung W-E. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned; furniture moved; knickknacks, books, and pictures fell. Many dishes broke. Chimneys shifted. Damage considerable. Ground: Level.

21 December, 11:56:29*. Intensity VII. (cont.)

Fields Landing area (King Salmon District). The following was abstracted from a report received from the Bechtel Corporation: Several septic tanks raised 6 inches or more out of the ground. There was a large band of surface cracks in the flat area of King Salmon, the line of which pointed somewhat toward the power plant site. However, further observation indicated that the cracks occurred over quite a bit of the flat, filled area. No overall study was made of the pattern but they seemed to be rather haphazard. Several of the wood "sea walls" had failed and there was considerable cracking and caving adjacent. There was also several sand "boils" and reports that water spurted up out of these cracks. Reports that the ground shook so hard people could hardly stand up. One fence showed a curvature and sagging. The owner claimed that it had been straight and true to a string. Small section of shallow buried water pipe forced out of the ground. The general terrain indicates that this King Salmon area is a basin of firm material filled with softer material.

Fields Landing. Motion rapid. Direction E-W. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung E-W. Trees, bushes shaken strongly. Small objects and furnishings shifted; vases overturned. Windows, chimneys, and ground cracked. Knickknacks, books, pictures, plaster fell. Windows and furniture broke. Chimneys twisted and fell. Ground: Level, marshy, filled in.

Fortuna. Press reported that overall damage in Fortuna probably will not exceed \$10,000. Bistrin's Department Store had a couple of cracks, several broken windows, and stock damage. Authorities reported damage in Fortuna was very light considering the severity of the shock.

Fortuna. Motion slow, lasted 20 seconds. Direction W-E Felt by and frightened all in area. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Pendulum clock stopped. Trees, bushes shaken strongly. Small objects and furnishings shifted; small objects and furniture overturned. Plaster, windows, walls, and chimneys cracked. Knickknacks, books, pictures, and plaster fell. Dishes, windows, and furniture broke. Three or four chimneys fell. Damage considerable to wood and brick.

Fortuna (corner Main and 10th Sts.). Motion moderate, lasted less than 1 minute. Felt by all and frightened many in community. Windows cracked. In church at 10th and N Streets an organ was shifted 3 inches and organ pipes knocked down. Damage slight. Ground: Level.

Fortuna (856-8th St.). Motion rapid, lasted 1 minute. Direction NE. Felt by and frightened all in community. Windows, doors, and dishes rattled; frame creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects shifted and overturned; knickknacks fell. "Nearly fell and clung to door until it was over. My house is 60 years old, solidly built; not a thing out of line." Ground: Soil.

Fortuna (144 Hansen Drive). Motion rapid, lasted 2 minutes. Direction E-W. Felt by and frightened all in community. Windows, doors, and dishes rattled. Hanging objects swung W. Trees, bushes

21 December, 11:56:29*. Intensity VII. (cont.)

shaken strongly. Vases and small objects overturned. Plaster and walls cracked. Knickknacks and pictures fell. Dishes broke. "Held to sink in order to remain standing." Ground: Compact.

Fortuna (U.S. Highway 101). "Most violent ever felt. Sitting in parked car headed out of Fortuna toward Scotia. Car seemed to leap from east to west, then shake in all directions. Left car and could not keep balance except by holding on to it. Could see rolling motion of ground which seemed to last for about 2 minutes. At 12:20 p.m. there was a slight shock."

Fortuna (3 miles south of, on Drake's Hill). VI Motion rapid, moderate. Direction at first E-W, then N-S. Felt by several in home and by four outside; startled all. Hanging objects swung in circular motion. Pendulum clock stopped. Trees whipped. Ground: Steep hill formed by break away from bluff years ago.

Fortuna (Fortuna Union High School). VI. Main Building, constructed in 1915. No new cracks in plaster and no evidence of plaster on any of the floors. Some plaster cracks may have been slightly enlarged. Building safe in every way. Agricultural Building, constructed in 1916. Teacher very frightened. Books and exhibits fell to floor where not fastened to wall. No damage to building. Building considered safe in every way. Industrial Arts Building, constructed in 1921. Few minor cracks in concrete floor but otherwise no damage. Auditorium, constructed in 1926. No damage except a few minor plaster cracks in boys' toilet room where plaster was not replaced with celotex. Building considered safe in every way. Cafeteria Building, constructed in 1939. No evidence of damage, although some of the beams in kitchen were moved enough to break the paint seams. Farm Shop, constructed in 1939. Few minor cracks in concrete floor. Boys' Gym, constructed in 1952. Cracks in concrete floor and a few small cracks along south wall but these are believed due to shrinkage. "There is an interesting indication of what I consider typical shock action on the south wall of the gym where it joins a lower structure forming the entrance lobby at the west end. This lower structure is concrete without much vertical wall bracing and it is evident that there was some pounding where it is connected to the higher more rigid main gym building. The damage was limited to slight spalling of surface concrete and movement of a piece of metal flashing but there was some action there. There is no indication of similar action where a low wood-frame locker building joins the main gym at the east end, presumably because this building is relatively light and was adequately anchored to the gym. There is spalling of finish coat and possibly a little concrete along a couple of horizontal construction joints in the east wall of the gym which could very well have been caused by the shock. This effect had not been noticed before I called attention to it, and the School Superintendent was quite sure it had not been there before the shock." Classroom Units A and B, constructed in 1953. Minor cracks around some of the windows from the ceiling to the upper corner of the windows. Small cracks in several room corners.

21 December, 11:56:29. Intensity VII. (cont.)

Fortuna (847-9th St.). VI. Motion rapid, lasted 2 minutes. Felt by all in home; frightened many. Dishes rattled; frame creaked. Hanging objects swung. Small objects shifted and overturned; knickknacks fell. Ground: Filled in.

Fortuna (1292 Home Ave.). VI. Motion rapid, lasted 30 seconds. Direction N-S. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N-S. Vases and small objects overturned. Ground: Soil, rocky, loose, sloping.

Fortuna (1 mile north of). VI. Motion rapid, lasted 2 minutes. Direction N-S. Frightened all in community. Hanging objects swung north. Trees, bushes shaken very strongly. Small objects and furnishings shifted; vases overturned; knickknacks fell. "Hardest shock I ever felt."

Fortuna (1 mile south of). VI. Motion rapid, lasted 2 minutes. Felt by all and frightened few in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung E-W. Trees, bushes shaken strongly. Some furniture and small items shifted or thrown down in neighborhood. Ground: Compact, level.

Fortuna (369-11th St.). V. Motion rapid, lasted 2 minutes. Felt by observer in home; frightened no one. Dishes rattled. Hanging objects swung. Door chimes rang. Small objects shifted and overturned. Ground: Level, filled in.

Fortuna (Sandy Prairie Road, 1/4 mile north of Humboldt Drive-In). IV. Motion slow, lasted 1 minute. Direction E-W. Felt by several in car, by observer outside (active), frightened no one.

Korbel. Motion rapid, lasted about 2 minutes. Direction NE. Felt by and frightened all in community. "Town shaken violently. Large plate-glass windows in the office of Northern Redwood Lumber Company broke. Large piles of stacked lumber tumbled. Large fluorescent lights swung violently in post office where I was working. Tried to get out of the building as it felt like it was twisting apart but the door was jammed. Numerous persons lost complete sets of dishes and all their canned fruit. All lamps tipped over. Huge oil cook stove in our home moved 12 inches, also moved many refrigerators here. Threw a huge bookcase full of books and knickknacks across the living room, breaking all breakable things. Many terra cotta chimneys caved in." Ground: Soil, compact.

Korbel. Motion rapid, lasted 2 minutes. Direction E-W. Felt by and frightened all in community. Everything rattled; house creaked. Hanging objects swung E-W. Trees, bushes shaken strongly. Everything movable shifted; small objects and furniture overturned. Plaster, walls, chimneys, and ground cracked. Knickknacks, books, pictures, and plaster fell. Dishes broke. Chimneys twisted and fell. Damage considerable to brick and masonry. "Our well water was like a thin mud for almost two days." Ground: Soil, level.

Korbel. Motion rapid, lasted 2 minutes. Felt by all in home; frightened all. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Furnishings shifted; small objects and furniture overturned; knickknacks, books fell. Dishes and windows broke. Chimneys twisted and fell. Damage considerable. Ground: Rocky, sloping.

21 December, 11:56:29*. Intensity VII. (cont.)

Korbel. Motion rapid, lasted 2 minutes. Direction E-W. Felt by and frightened all in community. Windows, doors, and dishes rattled; frame creaked. Hanging objects swung E-W. Pendulum clock stopped. Trees, bushes shaken strongly. Small objects and furnishings shifted; small objects and furniture overturned. Plaster, windows, walls, chimneys, and ground cracked. Knickknacks, books, and pictures fell. Dishes broke. Chimneys twisted and fell. Damage considerable. Ground: Soil, compact, sloping.

Korbel. Motion rapid, lasted 2 minutes. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned. Windows, chimneys, and ground cracked. Knickknacks, books, and pictures fell. Dishes and windows broke. Chimney twisted and fell. Damage slight. Ground: Soil, sloping.

Korbel (5 miles east of). Motion rapid, lasted 2 minutes. Direction N. Felt by and frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects and doors swung N. Pendulum clock facing N. stopped. Trees, bushes shaken strongly. Small objects shifted and overturned; knickknacks and pictures fell. Chimney twisted and fell. Damage slight to brick. Ground: Soil, sloping.

Kneeland Road (Old Kneeland Road, about 4 airline miles east of Eureka in mountains). Motion rapid, lasted about 3 minutes. "Started easy and gained strength rapidly. Could hardly stand, and when I started to walk, I was knocked against door. Knocked heavy wood cook stove off base. Dishes fell from cupboard; all loose appliances fell to floor; knocked over all table lamps. Moved house 1 inch to the east on foundation and twisted it out of line. Telephone out of order." Ground: Rocky soil, sloping.

McKinleyville (1 mile east of). Motion rapid, lasted about 1 minute. Direction E-W. Felt by all in home; frightened many. Windows, doors, and dishes rattled; frame creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned; furniture overturned; heavy refrigerator facing W. moved; knickknacks, books, and pictures fell. Dishes broke. Chimneys cracked. Ground: Compact, level.

McKinleyville. Motion rapid, lasted 2 minutes. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NE. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned. Plaster and chimneys cracked. Knickknacks and plaster fell. Dishes and jars of fruit broke. Chimneys fell. Damage considerable to brick. Ground: Soil, level.

McKinleyville. Motion rapid. Felt by and frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects and furnishings shifted and overturned. Knickknacks and books fell. Chimneys twisted and fell. Damage slight. Ground: Soil, compact, level.

McKinleyville (McKinleyville Ave. near Bel Nor Lane). Motion slow, lasted about 2 minutes. Direction N-S. Small objects overturned; knickknacks fell; dishes fell and broke. Electric clock stopped.

21 December, 11:56:29*. Intensity VII. (cont.)

Sixteen-foot rolling door on overhead track rolled back and forth several feet. Heavy tires leaning against wall moved 6 feet from wall. Damage slight. Ground: Level, compact.

McKinleyville. Motion rapid, lasted 2 minutes. Direction SW. Felt by and frightened all in community. Very loud earth noises heard. Windows, doors, and dishes rattled strongly; house creaked strongly. Hanging objects swung NE. Trees, bushes shaken strongly. Small objects, furnishings, and furniture shifted and overturned. Walls cracked. Knickknacks, books, and pictures fell. Dishes broke. Water splashed from fish bowl. Ground: Level.

Mitchell Heights (2 miles east of Eureka). Motion rapid, lasted 2 minutes. Direction S-N. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Pendulum clock facing N. stopped. Trees, bushes shaken strongly. Small objects and furnishings shifted; vases, small objects, and furniture overturned. Chimneys cracked. Knickknacks, books, and pictures fell. Dishes broke. Chimneys twisted and fell. Damage considerable to brick. Ground: Compact, sloping.

Mitchell Hill or Ryan Slough (about 2 miles east of Eureka). Motion rapid, heavy. Felt by all in community; frightened all in home. Windows, doors, and dishes rattled; house creaked. Small objects and furnishings shifted; vases, small objects, and furniture overturned. Walls cracked. Knickknacks, books, and pictures fell. Dishes broke. Chimneys twisted and cracked. Ground: Compact, sloping.

Mitchell Heights (upper). Motion rapid, lasted 2 minutes. Frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Cupboard shelves emptied. Trees, bushes shaken strongly. Small objects and furnishings shifted; small objects and furniture overturned. Plaster, windows, walls, chimneys, and ground cracked. Knickknacks, books, pictures, and plaster fell. Dishes broke. Chimneys twisted. Damage considerable. Ground: Soil, sloping.

Mitchell Road (lower Mitchell Road). Motion rapid, lasted 10 seconds. Direction NE. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NE. Trees, bushes shaken strongly. Small objects and furnishings shifted; small objects and furniture overturned. Plaster, windows, chimneys, and ground cracked. Knickknacks, books, pictures, and plaster fell. Dishes and windows broke. Wrecked plumbing and septic tank. Damage considerable to brick, masonry, concrete, and wood. Ground: Soil, compact, sloping.

Pigeon Point Road (halfway between Ryan Slough and Freshwater Corners on the south side of Lower Pigeon Point Road). Motion rapid, lasted 2 minutes. Direction NE. Frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects and furnishings shifted; vases and small objects overturned. Walls cracked. Knickknacks and books fell. Dishes broke. "House shook sideways as well as up and down, with a hard jolting motion. Many dishes fell from kitchen cupboard on the west wall. Water heater shifted and connection loosened so that water

21 December, 11:56:29*. Intensity VII. (cont.)

ran out on the floor. House is constructed of logs in vertical position and is on piling on one side due to being partly on a slope. Ceiling has small beams and they show fine cracks. Trees, telephone poles and wires jumped and swung violently."

Pigeon Point (5 miles east of Eureka). V. Motion rapid. Felt by all in home; frightened no one. Windows and dishes rattled; frame creaked. Hanging objects swung NE. Small objects shifted and overturned; knickknacks fell. Three cups broke. Ground: Soil, compact.

Rio Dell. Press reported grocery stores suffered the most damage in the form of broken merchandise. There was a large crack in Thompson's Furniture Store, and some homes in the area were moved a couple of inches from their foundations.

Rio Dell (Old Monument Road, above Dean Creek, about 1/2 mile from U.S. Highway 101). "Our house faces N. Many books, dishes, knickknacks, and miscellaneous articles fell. Right half of an 8-foot shelf of books on the E. wall was thrown to floor. Fireplace on west side of the living room has deep crack in the floor and up inside inner walls, also in the rock-faced front. Kitchen stove and oil heater against the N. wall were twisted about, perhaps 6 inches into the room. Much canned goods against a N. wall fell to floor. Kitchen floor was very wet from leaking hot water pipe. Dining room table in the center of room bounced toward the W. about 4 inches. Seemed to affect the east and west sides of our house more than others, but there were things fallen and broken in every room. House is quite high above the ground on the SE. corner. Basement door on the E. side was hard to close. Frightened all in community."

Rio Dell (Tip Top Bar). VI. Motion slow, lasted at least a minute. Direction N-S. Felt by all in bar; frightened many. Bottles and glasses rattled. Light objects jumped up and down. Heavy shuffleboard shifted 5 inches S. and shifted heavy cash register facing N. 4 inches N. Ground: Soil, compact, level.

Rio Dell. VI. Motion rapid, lasted 2 minutes. Direction E-W. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung E-W. Trees, and bushes shaken strongly. Small objects and furnishings shifted and overturned; furniture shifted. Knickknacks and books fell. Dishes broke. Chimney twisted. Water shaken out of toilet tank and sugar from sugar bowl. Ground: Soil, compact, level.

Rio Dell (Rio Dell Elementary School). Built in 1952. The shock was quite strong in this area, but no apparent damage was done to the school.

Rohnerville. Motion rapid, sudden, no warning. Felt by and frightened all in community. Everything rattled; house creaked; floor heaved. Hanging objects swung. Furnishings shifted; vases and small objects overturned; knickknacks, books, and pictures fell. Dishes broke. Damage slight. "Ground crack in driveway less than half mile N. Chimney broke next door to my house. Others had more china, canned fruit, etc., broken." Ground: Soil, level.

21 December, 11:56:29*. Intensity VII. (cont.)

Rohnerville. VI. Motion rapid, lasted 2 minutes. First shock S-N, hard shock E-W. Frightened all in community. Windows, doors, and dishes rattled; house creaked and twisted E-W. Hanging objects swung. Outside electric wires whipped strongly. Trees, bushes shaken moderately. Small objects shifted and overturned. Lamps broke. Damage slight to wood. Ground: Soil, compact, level.

Rohnerville (Rohnerville Elementary School). VI. Several stacks of chairs knocked over. Door to the deepfreeze opened. Several days later a leak developed in one of the radiant heat pipes. Pipe repaired by clamping. No plaster breaks or other damage.

Samoa. The following report was abstracted from a report received from the Hammond Lumber Company:

Some cracks (not serious) in smoke stack.

Several floor beams in Fuel House split.

Leaks in three water tanks and some braces loosened.

One post split in Sawmill.

Several breaks in fire protection mains.

Broken guy line on Crane 10 runway.

Several braces fell from Planing Mill monorail system.

Some knee braces fell in Planing Mill building.

Two trusses moved in Warehouse 14.

Warehouses 11, 12, 12-A and 13 settled and moved several inches.

(It appears that a considerable ground area on which these warehouses are built settled and shifted toward the bay.)

Blowpipe from Dry Sorter to Factory buckled.

Floor in Warehouse 16 cracked.

Main office out of shape and some plaster fell.

Fresh water main from tanks to Power Plant broken.

Machinery in finger-joint department out of alignment.

Some lumber piles fell; considerable loss of lumber.

Bad crack in upper side wall of No. 1 Furnace.

Some brick lining fell in No. 3 Furnace.

Plant No. 2:

One break in fire main.

Three posts in Sawmill damaged.

Floor in Carrier Shop buckled.

Some lumber piles fell; some lumber loss.

Samoa. Approximately 41 dwelling chimneys damaged.

Samoa. (Fairhaven District). Motion rapid, violent, lasted about 2 minutes. Direction N. and E-W. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N. Trees, bushes shaken strongly. Small objects shifted and overturned; clock toppled; floor lamp fell toward N. and broke. "Was outdoors. Felt slight tremor, then violent upheaval. Ground seemed to rise up and down and give a twisting sensation. Lost balance and very nearly thrown off my feet, and held on to fence to keep from falling." Ground: Level, sandy.

Samoa. VI. Motion rapid, lasted 2 minutes. Direction E-W. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects and lamps shifted and overturned; knickknacks and books fell. Dishes broke. Damage slight to dishes. Ground: Sandy, sloping.

21 December, 11:56:29*. Intensity VII. (cont.)

Worthington District (about 3 miles east of downtown Eureka). Motion rapid, lasted about 2 minutes. Direction E-W. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NW. Trees, bushes shaken strongly. Small objects shifted and overturned; knickknacks fell. Fireplace chimney broke about a foot above roof; top part moved 2 inches off base but did not topple. Ground: Soil, compact, sloping.

Intensity VI:

- Alton. Motion rapid. Felt by all in community. Windows, doors, and dishes rattled; frame creaked. Trees, bushes shaken slightly. Small objects shifted; knickknacks fell. Dishes broke. Damage slight. "Slight shock felt about half hour later."
- Alton. Motion slow, lasted 2-3 minutes. Direction NE. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken strongly. Bottle fell. Ceiling popped. Ground: Soil, compact, level.
- Blocksburg. Felt by all in community; frightened few. Windows, doors, and dishes rattled; frame creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects shifted.
- Briceland. Motion slow, rolling, lasted 1 minute. Direction N-S. Felt by all in community; frightened few. Dishes rattled; house creaked. Trees, bushes shaken strongly. Ground: Sloping and steep.
- Bridgeville. Motion slow, lasted 10 seconds. Direction seemed E-W. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects shifted and overturned. Knickknacks and pictures fell. Dishes broke. Knocked merchandise from shelves, breaking a few articles. Plaster cracked in ceiling of second story (2-story house). Boulders rolled down onto the highway. Ground: Rocky.
- Burnt Ranch. Motion rapid, beginning gradual. Direction E-W. Felt by all; frightened many. Windows, doors, and dishes rattled; house creaked. Hanging objects swung E-W. Small objects and furnishings shifted; vases, small objects overturned. Water spilled E-W from indoor containers. Walls and chimneys cracked. Knickknacks and books fell. Damage slight. Ground: Rocky, loose, sloping.
- Carlotta. Motion slow, lasted 2 minutes. Direction SE-NW. Felt by all and frightened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NE. Trees, bushes shaken strongly. Small objects and furnishings shifted; vases and small objects overturned; knickknacks, books, and pictures fell. Dishes broke. Chimneys twisted. Damage slight. Ground: Compact, level.
- Castella. Motion rolling, lasted 1 minute. Felt in all types of houses. Windows, doors, dishes, and Christmas tree rattled. Hanging objects swung. Trees, bushes shaken moderately. Small objects and furnishings shifted. Plaster cracked and fell; knickknacks fell. Damage slight. Ground: Rocky soil.

21 December, 11:56:29*. Intensity VI. (cont.)

Cobb's (25 miles east of Bridgeville). "Knocked down an A-frame used in the woods. Frightened most of the men in the woods so badly that they stopped work and came home. Even men working on tractors in the woods felt it."

Denny. Motion heavy, abrupt onset. Direction NNE. Felt by and frightened all. Windows, doors, and dishes rattled; house creaked. Hanging objects swung NNE. Pendulum clock facing W. stopped. Small objects and furnishings shifted; small objects overturned. Knickknacks fell. Jars of fruit, etc., broke. Trees, bushes shaken strongly. Damage slight. Ground: Rocky.

Dyerville. Felt by and frightened all in community. Windows, doors, and dishes rattled; walls creaked. Hanging objects swung. Trees, bushes shaken strongly. Ground: Soil.

Fernbridge. Slight damage to bent of west approach of Fernbridge highway bridge. (Concrete believed to have been faulty.) Soil displaced around base of pile supporting west approach due to rocking of bridge.

Fernbridge. Motion rapid, lasted 1 minute or more. Direction N-S. Frightened all in community. Windows, doors, and dishes rattled. Trees, bushes shaken strongly. Furnishings shifted; small objects overturned. Ceiling cracked. Knickknacks fell. Dishes broke. Ground: River soil, loose, sloping.

Fernbridge. Motion rapid, lasted 1-1/2 minutes. Felt by and frightened all in home. Windows, doors, and dishes rattled; house creaked. Small objects shifted and overturned. Ground: Compact.

Fort Seward. Motion slow, swaying, lasted 2 minutes. Direction NE. Felt by all and frightened many in community. Trees, bushes shaken moderately. Small objects and furnishings shifted. Ground: Soil, level.

Fort Seward. V. Motion slow. Direction N-S. Felt by several in house trailer. House trailer faced N-S and seemed to go up and down. Windows in another house rattled. "Few mild shocks felt after first one." Ground: Marshy.

Freshwater (Freshwater Elementary School District). Old Building, constructed in 1897. One-story, typical frame construction of that period. Located at Three Corners. Two or three cracks in plaster; two concentric rings on lighting fixtures came down; steps to school slightly misplaced; a few books and supplies scattered. Water pump pipes had few leaks. Oil heaters moved (fallen soot). New Building, steel "I" beams. All wood structure inside and out. Large plate-glass windows. Ninety per cent completed. Slight cracks in concrete; 6-inch square of plaster broken in janitor's room where heat return pipes go through wall. (This breakage is very probably due to action on a pipe about 2-1/2 inches in diameter full of water which runs horizontally through the length of the building. It is supported by pipe hangers except where it enters the janitor's room.)

Gerber. Motion slow, lasted few seconds. Direction N-S. Felt by many in home and frightened few in community. Windows and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Plaster cracked. Pictures fell. Ground: Soil.

21 December, 11:56:29*. Intensity VI. (cont.)

- Hayfork.** Motion rapid, gradual onset, lasted 1 minute. Felt by all and frightened few. Windows, doors, and dishes rattled; walls creaked. Hanging objects and doors swung. Plaster and windows cracked. Trees, bushes shaken moderately to strongly. Damage slight. Ground: Rocky soil, level, sloping and steep.
- Holmes.** Motion rapid, lasted 2 minutes. Direction E-W. Felt by all in home. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken strongly. Small objects shifted. Pictures fell. Ground: Soil, level.
- Honeydew.** Motion rapid, lasted 15 seconds. Direction NW. Felt by all and frightened many in community. Dishes rattled; walls creaked. Hanging objects swung NW. Trees, bushes shaken moderately. Small objects shifted; knickknacks fell. Ground: Rocky, level.
- Hoopa.** Motion rapid. Direction S-N. Felt by and frightened all. Windows, doors, and dishes rattled. Trees, bushes shaken strongly. Small objects and furnishings shifted. Split hot water tank. Dishes, windows, and furniture broke. Ground: Compact.
- Hyampom.** Motion rapid, abrupt onset, lasted less than 1 minute. Direction W-E. Felt by all and frightened few. Windows, doors, and dishes rattled; house creaked. Hanging objects and doors swung W-E. Small objects and furnishings shifted; vases and small objects overturned. Water and oil spilled from indoor and outdoor containers and tanks. Chimneys cracked. Knickknacks, books, pictures, and plaster fell. Trees, bushes shaken strongly. Damage slight. Ground: Rocky, level.
- Hydesville.** Motion rapid, lasted 10 seconds. Direction circular. Felt by all in area and frightened all or most. Everything rattled; house creaked. Hanging objects swung. Pendulum clock facing N-S. stopped. Trees, bushes shaken strongly. Small objects and furnishings shifted; small objects overturned; knickknacks fell. Ground: Compact.
- Hydesville.** Motion rapid, lasted about 1-1/2 minutes. Felt by all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N. Trees, bushes shaken strongly. Small objects and furnishings shifted. "Considerable noise." Ground: Soil, level.
- Kekawaka (84 miles south of Eureka).** "Shock very strong, lasted about 10 seconds. Direction N-S. Large oak tree seemed to sway about 6 feet. A 6 x 6 foot truck that I was leaning on moved about a foot. Felt by all on job." Ground: Rocky soil, steep.
- Klamath.** Motion rapid, lasted 3 minutes. Frightened many. Windows, doors, and dishes rattled. Hanging objects swung. Liquid in outdoor containers spilled.
- Kneeland Mountain (Hunt Ranch).** Motion rapid, lasted 30 seconds. Direction NE. Felt by and frightened all; awakened baby. Windows, doors, and dishes rattled. Hanging objects swung. Trees, bushes shaken strongly. Small objects and furnishings shifted; knickknacks fell; lamps overturned. One dish broke. Separated rafters from walls on very old pole barn. Almost knocked observer down. Ground: Rocky, sloping.

21 December, 11:56:29*. Intensity VI. (cont.)

Loleta. Direction E-W. Felt by and frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Furnishings shifted; vases and lamps overturned. Chimneys cracked. Knickknacks, books, and pictures fell. Dishes broke. Damage considerable. Ground: Compact, sloping.

Loleta. Motion rapid. Direction E-W. Frightened all in community. Windows, doors, and dishes rattled; walls creaked. Hanging objects swung E-W. Trees, bushes shaken strongly. Small objects and furnishings shifted; vases, small objects, and furniture overturned. Plaster, windows, walls, and chimneys cracked. Knickknacks, books, pictures, and plaster fell. Dishes, windows, and furniture broke. Ground: Soil, compact, level; filled in.

Loleta (2 miles southeast of Old Table Bluff Lighthouse). Motion rapid, lasted 30 seconds. Direction NE. Frightened all in community. Trees, bushes shaken strongly. Small objects shifted; knickknacks fell. Ground: Compact, sloping.

Loleta (2 miles north of, Table Bluff, off U.S. Highway 101). Small objects overturned; knickknacks fell; lamps overturned and broke. Dishes broke; fruit jars fell from shelves and broke.

McCloud. Motion trembling, rapid onset, lasted 30 seconds. Felt by many. Faint rumbling earth sounds heard by several after shock. Buildings creaked; loose objects rattled. Light fixtures swayed. Ten-inch wooden water main broke. Ground: Sandy.

McCloud. IV. Motion slow, lasted 8 seconds. Direction circular. Felt by many. Windows, doors, and dishes rattled. Hanging objects swung.

Miranda. Motion rapid. Felt by all and frightened many in community. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken strongly. Small objects and furnishings shifted; vases, small objects, and furniture overturned; knickknacks, books, and picture fell. Ground: Compact.

Miranda (Miranda Elementary School). V. "This is a new wood-frame and stucco building with plaster interior finish. Inspection disclosed the typical earthquake cracks at the juncture of vertical resisting elements and other walls. The cracks were very small, less than 1/64 inch, and had not been noticed by the principal, the custodian or the contractor."

Orick. Motion rapid, abrupt onset, lasted 1-1/2 minutes. Direction E. Felt by all and frightened few in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects and furnishings shifted; vases, small objects, and furniture overturned. Water and oil spilled from outdoor and indoor containers and tanks. Knickknacks, books, pictures, and plaster fell. Trees, bushes shaken strongly. Damage slight. Ground: Soil.

Orick. Press reported Dimmick's Store was badly cracked.

Orick (about 3 miles north of). "House stands where Lost Man Creek joins Prairie Creek, about 3 miles north of Orick on U.S. Highway 101. House moved rather gently with a shuddering motion, then shook violently for about 30 seconds. Articles on shelves running N-S were overturned and fell. Heavy

21 December, 11:56:29*. Intensity VI. (cont.)

mounted deer head on N. wall twisted halfway around. Water tumbler thrown about 2 feet from night stand. House a short distance from here, on compact soil, had several lamps, a large mirror, and dishes overturned and broke. My husband was at the Hammond Lumber Company office, and all men went outside. The air there was full of leaves, twigs, and small branches. High chimney on the Mill building swayed violently and guy wires whipped. My neighbors driving slowly over a rough driveway were completely unaware of shock, and were the only ones in this community who did not feel it. In Orick the only damage I have heard about was to food in glass containers and bottled goods in a grocery store. No windows or buildings damaged." Ground: Old creek bed, level; filled in.

Orland. Press reported many persons felt the shock. An underground water pipe behind the Johnson Shoe Store broke and water flooded the alley. Rack of brooms knocked over in one store. Ceramic tile in home cracked. Pipe in bathroom of one home broke and water flooded adjoining room. Water sloshed in old swimming pool west of town.

Orland. Motion slow, lasted 2 seconds. Felt by many and frightened few in community. Damage slight.

Orleans. Motion rapid, lasted 2 minutes. Direction SW. Felt by all; frightened few. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Pendulum clock stopped. Small objects and furnishings shifted; knickknacks, books, pictures, and plaster fell. Trees, bushes shaken moderately. Damage slight. Ground: Rocky, level.

Pepperwood. Motion rapid, lasted about 1 minute. Direction NE. Felt by all and frightened many in community. Windows, doors, and dishes rattled; house creaked. Trees, bushes shaken strongly. Small objects shifted and overturned; knickknacks and books fell. Plaster cracked. Damage slight. Ground: Soil.

Piercy. Motion slow, gradual onset, lasted 30 seconds. Felt by many and frightened few in community. Windows and doors rattled; frame creaked. Water spilled from outdoors containers and tanks. Ground: Rocky, compact, steep.

Proberta. "Nothing violent about the shock here. Just a slow, swaying motion, N-S, lasting about 15 seconds. Trees swayed 2-3 feet and things hanging in the store swung at least a foot. Nauseated feeling for at least 3 hours afterwards. Felt by many in post office and frightened few." Ground: Compact.

Red Bluff. Press reported the shock was accompanied by sharp reports that resembled gunfire. Motion rocking and lasted for about 15 seconds. Only damage reported was to a brick chimney atop Elmore's drug store, which was twisted off its base and turned almost 45°. Light fixtures swayed and Christmas trees quivered. Pendulum on clock swayed against face of clock at the Weather Bureau Airport Station and indicated a definite N-S sway. Firemen on duty at the local Forestry Division headquarters just east of town did not feel the shock but employees at the gravel pit felt a strong swaying motion and one man reported his car bounced back and forth.

21 December, 11:56:29*. Intensity VI. (cont.)

Red Bluff (southwest section, Weather Bureau Airport Station). Motion swaying, sort of sliding, N-S, gradual onset. Felt by and alarmed many. Furniture movement observed by many. Many reported that trees swayed. Pendulum on clock and light cords swung N-S. Clock did not stop, although pendulum hit front window of clock. Ground: Made.

Red Bluff. V. Direction NW. Felt by and frightened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Pendulum clock facing NW. stopped. Trees, bushes shaken moderately. Ground: Compact.

Redding. Press reported two windows in the City Hall were cracked, but no other damage was reported. Wind indicator at the Redding Airport was jolted around in a complete circle. Motion slow, lasted 5 seconds.

Sawyers Bar. Motion slow, abrupt, lasted 2-3 minutes. Roaring earth noises heard by many at time of shock. Direction E-W. Windows, doors, and dishes rattled; frame creaked. Hanging objects swung. Plaster cracked. Trees, bushes shaken slightly. Shook canned goods from shelves in store. Damage slight, if any. Ground: Level.

Scotia. Press reported a crack opened in a kiln at the Pacific Lumber Company's mill and a plate-glass window broke.

Scotia. Motion rapid. Felt by all and frightened many in community. Observer ran outdoors; far too frightened to observe details. House creaked. Electric wires swung. Trees, bushes shaken strongly. Pendulum clock facing SSW. stopped. Small objects shifted and overturned; knickknacks fell. Ground: Soil, steep.

Scotia. Motion slow, undulating, lasted 8-10 seconds. Direction N-S. Felt by all and frightened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N. Trees, bushes shaken strongly. Ground: Soil, compact, sloping.

Scotia. Motion rapid, lasted 45 seconds. Direction SW-NE. Felt by all at Scotia Inn; frightened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects shifted and overturned. Windows and chimneys cracked; windows broke. Knickknacks fell. Damage slight.

Scotia. Motion rapid, then slow, lasted about 45 seconds. Direction SW-NE. Felt by all in office, by others outdoors; frightened few in community. Windows, doors, and dishes rattled; building creaked. Hanging objects swung NE. Trees, bushes shaken moderately. Small objects and furnishings shifted; vases and small objects overturned; knickknacks, books, and pictures fell. Windows and chimneys cracked; windows broke. Damage slight to considerable. "Shock felt about half hour later. Motion slow, lasted 5 seconds. Direction W-E. Felt by many." Ground: Soil, sloping.

Showers Pass (43 miles east of Eureka). Motion slow, lasted about 10 seconds. Felt by several. House creaked. Hanging objects swung E. Trees, bushes shaken strongly.

South Fork (South Fork High School). "The main building is a pre-Field Act wood structure and has many old cracks in the interior plaster. They are principally shrinkage cracks and the assistant superintendent said no new cracks had been noticed. He said the

21 December, 11:56:29*. Intensity VI. (cont.)

same about a new classroom wing which was built about three years ago but close inspection revealed the typical earthquake crack pattern of vertical resisting elements. Some of these cracks were so pronounced I thought they must have been due, at least partly, to shrinkage but the assistant superintendent was quite certain they had not been there before the earthquake."

Trinidad area. Press reported State Highway Patrol officers said they noticed a few minor slides south of Trinidad and south of Big Lagoon Bridge.

Trinidad. Abrupt onset, lasted about 1 minute. Direction E-W. Felt by all and frightened few. Windows rattled; frame creaked. Hanging objects swung E-W. Pendulum clock facing S. stopped. Small and large objects shifted; vases and small objects overturned. Plaster cracked; knickknacks fell. Dishes broke. Trees, bushes shaken strongly. Damage slight.

Trinidad. V. Motion rapid. Direction W-E. Frightened many in community. Windows rattled. Cabinet doors swung. Small objects shifted. Ground: Soil, sloping and steep.

Waddington. Motion rapid, lasted 2 minutes. Felt by all in community; frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken strongly. Small objects shifted; vases overturned. Damage slight. Ground: Soil, level.

Weaverville. Press reported the courthouse swayed and "danced." Cracks appeared in numerous places in the courthouse, but none serious. Most stores were emptied of customers. Old antique clock, which had not run in many years, began ticking again. Frightened many.

Weaverville. V. Motion slow, beginning gradual, lasted a few seconds. Felt by all and frightened many. House creaked. Hanging objects and doors swung. Trees, bushes shaken slightly.

Weott. Motion rapid, lasted 20 seconds. Direction N. Frightened all in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Pendulum clock stopped. Trees, bushes shaken strongly. Furnishings shifted. Ground: Soil, level.

Willits. Motion rapid, lasted 30 seconds. Direction N-S. Felt by all in community; frightened many. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Small objects shifted. Plaster cracked. Damage slight. "Nearly all shocks felt in this area have an E-W movement; this one definitely N-S." Ground: Soil, compact.

Willow Creek (on bank of Trinity River, rocky bluff). Motion rapid, lasted 2 minutes. Direction E-W. Felt by all in home and outside in yard; frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung E-W. Station wagon moved. Man was concerned for safety when he noticed he was standing under electrical wires. Ground: Rocky, sandy.

Willow Creek (Trinity Valley School). Built April 7, 1952 (completed). Many small plaster and stucco cracks primarily over doorways and at corners of rooms; some cracks in ceramic tile in the toilet rooms at corners and near openings; two fairly large cracks in stucco finish, one where stucco joins concrete boiler

21 December, 11:56:29*. Intensity VI. (cont.)

room wall (believed largely the result of stucco shrinkage), the other a lower outside corner over fill dirt where a small crack was already present. Some minor cracks in concrete corridors extending a few inches up into the stucco wall (believed due to shrinkage). All damage is of a minor nature.

Intensity VI in Oregon:

Brookings. Motion slow, lasted 10 seconds. Felt by several, some outdoors (quiet). Faint earth noises heard. House creaked. Trees, bushes shaken slightly. Plaster and concrete walls cracked. Damage slight. Ground: Compact, sloping.

Intensity V:

Alderpoint. Motion rapid, momentary duration. Felt by all in area and frightened many in community. Windows, doors, and dishes rattled; house creaked. Ground: Compact, level, sloping and steep.

Alderpoint. IV. Motion rocking and swaying, mostly N-S, rapid onset. Felt by many. Buildings creaked; loose objects rattled. Ground: Rocky.

Bell Springs. Motion rapid, lasted 10 seconds. Direction N-S. Felt by several; frightened few. Trees, bushes shaken moderately. Small objects and furnishings shifted. "Hardest shock since 1906." Ground: Rocky.

Butte Valley (Siskiyou County). Press reported the shock was felt by many in Dorris and Macdoel. The rolling waves swung light fixtures and pictures; door chimes swung; and objects nearly fell from shelves. Accelerated movement of woman sitting in swing. Power wires and trees swayed.

Cecilville. Felt by all, but no damage.

Cecilville. IV. Two shocks, lasted 30 seconds. Direction N-S. Felt by several. Windows rattled. Trees shaken moderately. Ground: Rocky, level.

Corning. Momentary duration. Felt by several. Windows, doors, and dishes rattled; walls creaked. Pendulum clock stopped. Press reported a rack of fenders hanging in garage swung.

Corning. IV. Motion trembling and rocking. Felt by many; many became nauseated. Christmas trees and lighting fixtures swayed.

Cottonwood. Motion slow, lasted 15 seconds. Felt by many in office; frightened many. Moderately loud earth noises heard by many. Windows, doors, and dishes rattled; frame creaked. Hanging objects swung. Trees, bushes shaken slightly. Small objects shifted. Ground: Compact, level.

Covelo. Gradual onset, lasted about 30 seconds. Direction N-S. Felt by all. Windows, doors, and dishes rattled; house creaked. Hanging objects swung N-S. Small objects shifted; knickknacks fell. Trees, bushes shaken strongly. Ground: Compact.

Crescent City. Press reported the shock was strong enough to jiggle Christmas tree ornaments and swing pictures on walls. Rolling motion made people dizzy.

Crescent City. IV. Felt by many, some outdoors. Hanging objects swung. Ground: Rocky, marshy, level.

Cummings. Motion rolling, lasted about 30 seconds. Felt by all; frightened few. Windows rattled; entire building creaked.

21 December, 11:56:29*. Intensity V. (cont.)

Hanging objects swung NE. Christmas tree shifted. Ground: Rocky, soil, compact, steep.

Eel Rock. "Very severe." One continuous motion, lasted a very short time. House shook W-E.

Elk Valley Weather Observation Station (1/2 mile south of Oregon-California border). Distinct shock, abrupt onset. Direction S-N. Felt by and alarmed many. Creaking of buildings and rattling of loose objects heard by several. Light fixtures swayed at O'Brien school. Jar fell off table in observer's home. Ground: Filled in.

Ettersburg. Motion rapid, lasted 4 seconds. Felt by all in community. Walls creaked. Ground: Soil.

Fort Jones. Motion swaying, abrupt onset, lasted 2 minutes. Felt by nearly all; few alarmed. Buildings creaked; loose objects rattled. Disturbed objects observed by many. Chandeliers, Christmas tree ornaments, and plates on shelves rattled. Ground: Soil.

Garberville. Paint cracked on old plaster cracks. Man at gas station reported shock was not very strong.

Garberville. Motion rapid, very sharp, lasted about 1 minute. Direction E-W, then N-S. Felt by all in home; frightened many in community. Windows, doors, and dishes rattled. Hanging objects swung. Trees, bushes shaken moderately. Ground: Compact.

Hat Creek Powerhouse No. 1 (Cassel). Motion swaying, gradual onset. Felt by nearly everyone in vicinity. Houses creaked; loose objects rattled. Chains and hook on overhead crane in powerhouse swung N-S. Ground: Rocky.

Hat Creek. III. Felt by several in community. Some rattling of windows, doors, and dishes. Ground: Rocky.

Junction City. Abrupt onset, momentary duration. Felt by all; frightened few. Trees, bushes shaken slightly. Small objects shifted. Ground: Filled in; level.

Lake Mountain. Motion swaying, abrupt onset. Felt by several. Hanging lamp swung E-W for 5 minutes. "Felt like floor moved back and forth about a foot. Four persons in house and all had the same sensation. Large oak trees swayed as if by strong wind."

Laytonville. Motion rapid, abrupt onset, lasted about 3 seconds. Direction S-N. Felt like a truck hit the side of building. Felt by and frightened many. Trees, bushes shaken strongly. Lights swung. House creaked. Ground: Soil, level.

Macdoel. Felt by several in community. Faint earth noises heard. Windows and dishes rattled. One pendulum clock stopped. Trees, bushes shaken very slightly. "Made waves and cracked all ice on lake 6 miles west of here."

Mineral. Motion rapid, then rolling, lasted 5 seconds. Direction N-S. Felt by many in community. Small objects and furnishings shifted. Ground: Level.

Nubieber. Motion slow, lasted 1 minute. Direction N. Felt by and frightened all in community. Windows, doors, and dishes rattled; walls creaked. Hanging objects swung N. Trees, bushes shaken moderately. "Several people told me they were sitting in cars and that cars rocked violently. All complained of nausea." Ground: Soil, compact, level.

21 December, 11:56:29*. Intensity V. (cont.)

Phillippsville. Motion rocking and swaying, abrupt onset. Felt by 3 in home. House creaked; loose objects rattled. Visible swaying of buildings and trees. Hanging flower pot swung back and forth. Ground: Rocky.

Requa. Gradual onset, lasted 2 seconds. Felt by all. Trees, bushes shaken moderately. Windows, doors, and dishes rattled; house creaked. Ground: Soil, sloping.

Richardson Grove (8 miles south of Garberville). Motion slow, lasted 30 seconds. Felt by many in home. Windows, doors, and dishes rattled. Hanging objects swung. Trees, bushes shaken moderately. Ground: Soil.

Rockport. Lasted 2-3 minutes. Felt by several, some outdoors (active). Dishes rattled. Hanging objects swung. Small objects shifted. Trees, bushes shaken strongly. Ground: Soil.

Round Mountain. Motion slow. Direction NE. Felt by all in community. Faint earth noises heard by few. House creaked. Trees, bushes shaken moderately. "More severe above 2000 feet than on the valley floor." Ground: Rocky soil, compact.

Sawyers Mountain View Ranch (about 7 miles east of Cecilville). Motion bumping and jerking, abrupt onset. Felt by several. House creaked; loose objects rattled. Loud, roaring earth noises heard by several before shock. "Two and one-half miles upriver a bell, used for calling people to meals, rang. Visible swaying of buildings and trees. Hanging objects swung. No one but myself seemed to feel any alarm." Ground: Rocky.

Scott Bar. Motion rapid, lasted 8 seconds. Felt by several, some outdoors (active). Windows rattled; houses creaked. Small objects shifted. "Very windy." Ground: Compact.

Tehama. Motion slow, lasted 5 seconds. Felt by many in home and post office; by some outdoors. Direction NE. Faint earth noises from NE. heard by many. Windows rattled. Hanging objects swung. Pendulum clock stopped. Trees, bushes shaken slightly.

Trinity Center. Motion rapid, abrupt onset, lasted 5 seconds. Felt by and frightened many. Windows and doors rattled; house creaked. Hanging objects swung E-W. Trees, bushes shaken slightly to moderately. Ground: Compact, sloping.

Tulelake. Motion slow, lasted 1 minute. Direction N. Felt by and frightened many. Moderate earth noises heard by many. Hanging objects swung N. Ground: Marshy.

Weed. Motion slow, lasted 1 minute. Direction NE. Felt by and frightened many in community. Windows and dishes rattled. Hanging objects swung NE. Trees, bushes shaken moderately. Small objects and furnishings shifted. Ground: Rocky.

Woodland. Motion slow. Direction NE. Felt by many in post office; frightened few. Faint earth noises heard by few. Hanging objects swung NE. Plaster in some homes cracked slightly. Lights hanging on 6-foot chains (west side of building) swung E-W; those on E. side of building swung more or less in a circular motion. Lights swung for a considerable time. Ground: Soil, level, compact.

21 December, 11:56:29*. Intensity V. (cont.)

- Yreka.** Felt by many in town and surrounding areas; frightened many. Cars shook. Windows, doors, and dishes rattled. Hanging objects swung. Pendulum clocks facing N-S and E-W stopped. Small objects shifted. Ground: Soil, loose, compact, level and sloping; filled in.
- Yreka.** IV. Motion rapid, brief. Felt by many (some outdoors, active) and frightened few in community. Ground: Compact soil.

Intensity V in Oregon:

- Klamath Falls.** Press reported the 3-foot pendulum on clock at the airport stopped. Residents of the south suburban areas saw doors swing, wall pictures move, and light fixtures sway. Motion varied from a rolling, dizzy swaying to sharp jolts. No severe damage reported.
- Merrill.** Slight, but noticeable shock, lasted few seconds. Motion slow, gradual onset. Felt by few. Windows rattled; frame creaked. Hanging objects swung. Small objects shifted; knickknacks fell. Trees, bushes shaken slightly. Ground: Compact, level.

Intensity IV:

- Auburn.** Awakened few in home. Windows rattled.
- Bieber.** Motion slow, lasted 30 seconds. Direction NE. Felt by several in community. House creaked. Hanging objects swung NE. Ground: Rocky, compact, level.
- Brooks.** Felt by several in home. Windows rattled.
- Capay.** Motion rapid, lasted 1 minute. Rumble heard. Felt by one in observer's home. House creaked. "Several others felt it but they didn't realize what it was."
- Colusa.** Felt by many in community.
- Davis Creek (Modoc County).** Felt by several in home; by some outdoors, quiet; awakened few in community. Faint earth noises from S. heard by few. Dishes rattled; walls creaked. Ground: Rocky, compact.
- Etna.** Motion slow, lasted about 2 minutes. Felt by many in school; by some outdoors; frightened few. Hanging objects swung. Ground: Level, compact.
- Gazelle.** Motion slow. Felt by many in community. Hanging objects swung N-S. Ground: Soil, level.
- Grenada.** Motion slow. Felt by several in community, some outdoors.
- Happy Camp.** Motion rapid, rolling, abrupt onset, lasted about 10 seconds. Direction N-S. Low, rumbling earth noises heard. Windows rattled; frame creaked. Hanging objects swung N-S. Felt by several, some outdoors (quiet). Small objects shifted; floor lamp swayed. Trees, bushes shaken slightly. Ground: Soil, compact, sloping.
- Honeydew and Upper Mattole.** Lasted 5-6 seconds. Felt by several at school. Hanging objects swung NE-SW. Electric clock facing N. stopped. Trees, bushes shaken slightly. Ground: Loose, level.
- Island Mountain.** Lasted about 1 minute. Felt by many; frightened few. Windows, doors, and dishes rattled. Hanging objects swung.

21 December, 11:56:29*. Intensity IV. (cont.)

Las Plumas. Felt by several; awakened and frightened few in community. Windows and doors rattled; house creaked.

Lewiston. Motion slow, lasted 2 minutes. Felt by many in post office, by others outdoors; frightened few. Windows, doors, and dishes rattled; walls creaked. Hanging objects swung. Ground: Soil, level, compact.

Los Molinos. Motion slow, lasted 40 seconds. Felt by many in community. Trees, bushes shaken slightly.

McArthur. Felt by several in community. Several felt dizziness. Water in fishbowl splashed.

Manton. Motion slow, lasted 30 seconds. Felt by several in community, some outdoors. Moderately loud earth noises heard by few about 1 minute before shock. Windows and dishes rattled. Ornaments shaken from Christmas tree. Trees, bushes shaken slightly. Ground: Rocky, sloping.

Mount Hebron. Motion rapid, lasted 3-4 seconds. Direction N-S. Felt by several and frightened few in community. Hanging objects swung. "Felt by three different families in a direct N-S line." Ground: Rocky, soil.

Mount Shasta. Motion rapid, lasted 20 seconds. Felt by many in home; frightened few. Dishes rattled. Ground: Rocky, soil, sloping; filled in.

O'Brien (3 or 4 miles north of, Salt Creek District). "Not felt in O'Brien but people in Salt Creek District said it was quite a shock."

Ono. Motion slow, lasted few seconds. Direction E-W. Felt by several in community; frightened few. Trees, bushes shaken slightly. "Seemed to be felt more by people in the hills around here."

Platina. Felt by several. Direction E. Bushes shaken moderately. Ground: Rocky.

Ruth. Felt by many, some outdoors (active); frightened few. Windows, doors, and dishes rattled. Trees, bushes shaken slightly. Ground: Rocky, sloping.

Smith River (5 miles north of, on Old U.S. Highway 101). Felt by many in community, some outdoors (quiet and active). Not felt by observer's family, one inside and one outside. Felt by two families about 800 feet south of observer. Ground: Soil, sloping.

Vina. Motion rapid. Direction NW. Felt by several in community, some outdoors (active); frightened few. Some people felt nauseated. Windows rattled. Hanging objects swung NW. Trees, bushes shaken slightly. Ground: Soil, compact, level.

Washington. Motion rapid. Felt by many in community; frightened few. Loud earth noises heard by many. Windows rattled. "Two shocks felt, one hard, one light."

Westport. Motion rapid. Felt by several in community; frightened few. Dishes rattled; frame creaked. Hanging objects swung. Trees, bushes shaken slightly. Ground: Soil, loose.

Intensity IV in Oregon:

Cave Junction. Very slight shock. Motion slow, lasted 5 seconds. Felt by several in community (some outdoors; quiet); frightened few.

21 December, 11:56:29*. Intensity IV in Oregon. (cont.)

Cocos Bay. Motion slow, lasted 1-2 minutes. Direction N-S. Felt by many at work; frightened few in community. Windows, doors, and dishes rattled. Hanging objects swung N-S. Ground: Marshy, level; filled in.

Gold Beach. Motion slow. Felt by many, some outdoors. Faint earth noises heard by many. Windows, doors, and dishes rattled. Hanging objects swung. Ground: Soil, compact.

Harbor. Motion slow, lasted 30 seconds. Felt by several in community (some outdoors; quiet). Hanging objects swung. Ground: Soil.

Holland. "Only report was from a man sitting in parked truck. He said it felt like someone jarred truck a couple of times." Ground: Soil.

Medford. Motion slow. Felt by many. Windows and dishes rattled. Hanging objects swung. "Operator felt elevator move. Pictures in third floor offices moved; suspended light fixtures swayed in workroom on first floor. Motion felt in most office buildings in city. No damage reported." Ground: Rocky.

Medford (Weather Bureau Airport Station). Gentle, swaying motion, rapid onset. Felt by several. Disturbed objects observed by several. Hanging light fixtures swayed. Minor excitement by those observing lights swaying. Ground: Gravelly clay.

Modoc Point. Motion slow. Direction S-N. Windows rattled; frame creaked.

O'Brien. Motion slow. Felt by many in community. Hanging objects swung.

Pistol River. Motion rapid, lasted few seconds. Direction S. Felt by several in community (some outdoors; active). Ground: Compact.

Selma. Motion slow, lasted 30 seconds. Felt by several in school-house. Windows and dishes rattled; walls creaked. Ground: Rocky, level.

Intensity I to III:

Alturas. Felt slightly by very few.

Big Bend. Motion slow, lasted 1-2 seconds. Light shock. Hanging objects swung at some places. "Felt by persons sitting or lying down in widely scattered areas in the Big Bend country, but not felt by many." Ground: Soil, loose, mountainous.

Calpella. Very light, if any.

Chico. Felt by several in home. Slight tremor.

Clements. Felt by several in community. Hanging objects swung.

Finley. Felt slightly by few.

Flournoy. Very slightly felt.

Gridley. Motion slow. Felt by observer in home. Hanging objects swung. Ground: Soil, level.

Hartsook. Motion slow, lasted about 1 minute. Felt by few. Hanging objects swung. Ground: Soil.

Lake City. "Some reports of people feeling the shock, but nothing definite."

Lakeport. Felt slightly by very few.

Pondosa. Felt very slightly.

Project City. Felt by several.

Richfield. Motion slow. Felt by several in community. Ground: Compact.

- 21 December, 11:56:29*. Intensity I to III. (cont.)
San Francisco (65 Market St.). Motion slow, easy rolling, lasted about 1 minute. Direction NW-SE. Felt by all on 10th floor of Southern Pacific Building. Lights and curtains awayed. Ground: Level; filled in; building on piles.
South San Francisco. "Only one employee's wife reported feeling the shock."
Tionesta. "Reports of minor shock in district."
Ukiah (post office). Hanging objects swung N. Ground: Soil, level, compact.
Upper Lake. "Felt by one or two persons. Very light."

Intensity I to III in Oregon:

- Bonanza. "Some reports of slight earth noises and failure of electric service for a few minutes."
Coquille. Felt by some.
Denmark. "Not felt in the immediate vicinity, but was felt north and south of us."
Fort Klamath (3 miles south of). Motion slow, lasted 1 second. Felt by observer in home. Moderately loud rumbling earth noises from S. heard. Ground: Soil, compact, level.
Ophir. "Several persons reported feeling a slight tremor. Some thought it was highway construction crew dynamiting which caused the slight jarring motion in homes. Felt very slightly southeast of Ophir in the logging camp."
Sitkum. Felt by several in community. Moderately loud earth noises heard by few. Ground: Soil, sloping.
Sprague River. Motion rapid, lasted 1 second. Very slight; gave feeling of dizziness. Hanging objects swung. Ground: Soil, level.
Takilma. Felt by several. Lasted 1 minute. Trees, bushes shaken slightly. Ground: Soil, compact.

Reported not felt: Adin, Altamont, Belden, Boonville, Bray, Calistoga, Canyon, Chester, Cloverdale, College City, Comptche, Cromberg, Daly City, Doyle, Downieville, Elk, Fairfield, Floriston, Fort Bidwell, Fort Bragg, Greenville, Gualala, Half Moon Bay, Hornbrook, Jackson, Janesville, Jenner, Likely, Litchfield, Little Valley, Longvale, Lower Lake, Madeline, Markleeville, Marshall, Marysville, Mendocino, Middletown, Monticello, Napa, Norden, Omo Ranch, Paradise, Paskenta, Paynes Creek, Petaluma, Philo, Point Arena, Point Reyes, Potter Valley, Pulga, Ravendale, Richmond, Santa Rosa, Sierraville, Sonora, Stewarts Point, Stirling City, Stockton, Storrie, Strawberry, Susanville, Taylorsville, Tennant, Termo, Trowbridge, Vinton, and Westwood.

Reported not felt in Oregon: Adel, Alsea, Applegate, Ashland, Bandon, Beatty, Bend, Blackbutte, Bly, Brothers, Bullards, Camas Valley, Camp Sherman, Cascade Summit, Charleston, Chemult, Cottage Grove, Crescent, Curtin, Days Creek, Dorena, Drain, Drew, Dryden, Elkton, Eugene, Finn Rock, Florence, Four Mile, Gardiner, Glide, Greenleaf, Harlan, Hauser, Holley, Horton, Hugo, Junction City, Lakeview, La Pine, McKenzie Bridge, Malin, Myrtle Creek, Oakland, Oakridge, Olene, Paisley, Post, Prinville, Prospect, Remote, Rogue River, Roseburg, Saginaw, Shevlin, Summer Lake, Tiller, Toledo, Trail, Vida, Waldport, Wonder, and Yachats.

- 21 December, 12:30, and about midnight. Eureka aftershocks.
Arcata (817 Fickle Hill Road). "Shock at 12:30 felt slightly by most, but not strong enough to frighten anyone or disturb furniture. Shock around midnight felt by some persons in town, but not felt here."
- 22 December, 10:33.
Arcata (817 Fickle Hill Road). III. Felt slightly. Dishes and doors rattled slightly.
- 22 December, 13:12:24*.
Epicenter 36.0° north, 121.0° west, near San Ardo. B.
King City. III. Motion trembling, SW, abrupt onset. Felt by several. Ground: Sandy.
Mee Ranch (Intersection of Highway 198 and Lonoak-Hollister Road). III. Short jolt, motion rapid. Felt in office and home. Ground: Adobe.
- 23 December, 11:04:59*.
Epicenter $36^{\circ}47'$ north, $121^{\circ}26'$ west, south of Hollister. B.
Hollister (7 miles south of). IV. Motion rapid and slow. Felt by many in community. Windows, doors, and dishes rattled; house creaked. Ground: Soil.
Hollister. Shook strongly for 3-4 seconds, then tapered off. Lasted about 20 seconds.
- 24 December, 01:10:11*. Aftershock of 21 December.
Epicenter $40^{\circ}44'$ north, $124^{\circ}04'$ west. B.
Eureka (3126 Montgomery St.). V. Motion rapid, lasted 1 minute. Direction E-W. Felt by, awakened, and frightened all in home. Windows, doors, and dishes rattled. "Felt tremors between 21st and 24th." Ground: Level.
Eureka (1529 P St.). V. West-east rapid motion, then north-south slow motion, lasted several seconds. Felt by, awakened, and frightened all in home. Windows, doors, and dishes rattled. Ground: Level.
Eureka (PG&E). IV. Motion jarring, lasted few seconds. Windows, doors, and dishes rattled.
Pigeon Point Road (halfway between Ryan Slough and Freshwater Corners on south side of Lower Pigeon Point Road). Hard shock. Motion twisting.
- 29 December, 02:49:32*.
Epicenter $38^{\circ}59'$ north, $119^{\circ}54'$ west, northwest of Minden, Nev. B.
Markleesville. II. Slight tremor. Felt by few.
- 30 December, 01:16:13*. Aftershock of 21 December.
Epicenter $40^{\circ}47'$ north, $123^{\circ}52'$ west, east of Eureka. B.
Intensity VI:
Arcata. Press reported seven plate-glass windows broke and some merchandise fell from shelves.
Arcata. Motion rapid, lasted 30 seconds. Direction N-S. Felt by some outdoors; awakened many in home; frightened few in community. Small objects shifted and overturned. Windows cracked. Some knickknacks, books, and pictures fell. Some dishes and windows broke. Ground: Soil, compact.

30 December, 01:16:13*. Intensity VI. (cont.)

Arcata (Westhaven). Motion slow, strong. Direction seemed N-S. Felt by and awakened all; frightened many. Dishes rattled. Damage slight.

Arcata (Humboldt Clay Craft Co.). One rapid jolt, followed by trembling. Direction N-S. Felt by, awakened, and frightened all in home. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Small objects shifted and overturned; knickknacks fell. "This shock finished my tall ceramic greenware." Ground: Level, compact.

Arcata (Glendale District). Motion rapid, lasted about 20 seconds. Felt by, awakened, and frightened many in community. Windows rattled; frame creaked. Damage slight. "This shock seemed as strong as the shock on 21 December, but didn't last as long." Ground: Soil, compact.

Arcata (5 miles north of, 1/10 mile east of U.S. Highway 101). IV. Noise like distant thunder heard; seemed to trail off toward SW. House pushed from W.

Blue Lake. Felt by all in home; awakened and frightened many in community. Damage slight. Ground: Soil.

Blue Lake. V. Motion rapid, lasted several seconds. Direction seemed SW-NE. Felt by, awakened, and frightened all in home. Windows, doors, and dishes rattled. Observer held floor lamp to keep it from falling. Ground: Soil, loose, level.

Cutten (southeast suburb of Eureka). Lasted about 10 seconds. Direction seemed NNW-ESE. Felt by, awakened, and frightened many in community. House creaked. Hanging objects swung on second floor. Small objects shifted; overturned one table. One small article fell. "Several minor tremors have been felt since 21 December. All of NNW-ESE direction, rolling, rocking motion, like waves." Ground: Soil, compact, level.

Eureka. Press reported there were new breaks in Eureka's main water transmission line, according to the city water department. Largest of the breaks occurred near the Dolly Varden Lumber Company, where the wooden line was pulled loose during the 21 December shock. Two other breaks occurred, one at the Ryan Slough crossing and one at Gannon Slough.

Eureka (Eureka Inn). Motion slow, lasted 30 seconds. Direction NE-SW. Awakened and frightened many in community. Plaster cracked. Damage slight. "Was awakened out of sound sleep. Jumped out of bed and felt sideways motion of floor as if the floor was moving from side to side. In Eureka some glass windows in old buildings were broken and old cracks 'worked' again."

Eureka. Motion rapid, lasted 1 second. Direction N-S. Felt by, awakened, and frightened many in community. Windows, doors, and dishes rattled; house creaked. Small objects shifted. Plaster cracked. Damage slight. Ground: Soil, compact.

Eureka (1481 Myrtle Ave.). Lasted 10 seconds. Direction E-W. Felt by, awakened, and frightened many in home (some children were not awakened). Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Small objects shifted. Cracked windows and chimney. Damage slight. Ground: Compact, level.

30 December, 01:16:13*. Intensity VI. (cont.)

- Eureka (1529 P St.).** V. Motion rapid, W-E, then slow, N-S, lasted several seconds. Awakened and frightened two out of four in home. Windows and doors rattled. Hanging objects swung N-S. Furnishings shifted to W.; knickknacks fell. Ground: Filled.
- Eureka (Weather Bureau Office).** V. Clock with 24-inch pendulum facing S. stopped; same type of clock facing W. did not stop. "Many in Eureka felt the shock, but only very few alarmed."
- Ferndale.** Motion rapid, lasted 5 seconds. Awakened all and frightened many in community. Windows rattled; walls creaked. Pendulum clock facing E. stopped. Ground: Soil.
- Ferndale.** V. Motion slow, lasted 5 seconds. Felt by, awakened, and frightened many in community. Ground: Soil.
- Fields Landing.** Motion rapid, lasted 10 seconds. Direction E-W. Awakened all and frightened many in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung E-W. Ground: Marshy.
- Kneeland.** Motion rapid, lasted about 15 seconds. Felt by and awakened all in community; frightened few. Walls creaked. Hanging objects swung N. Ground: Rocky.
- Korbel.** Heavy shock. Awakened all in home.

Intensity V:

- Alton.** Motion slow. Felt by all and awakened many in community. Windows and doors rattled.
- Bridgeville.** Motion rapid. Felt by, awakened, and frightened many in community. House creaked. Ground: Soil, compact, level.
- Burnt Ranch.** Motion rapid, lasted few seconds. Direction E-W. Felt by several and awakened few in homes. Windows and doors rattled; walls creaked. Hanging objects swung. Small objects shifted; books fell. Ground: Soil, compact.
- Fortuna.** Brief duration. Felt by many (some outdoors; quiet and active), awakened many, and frightened few in community. Windows, doors, and dishes rattled; house creaked. Hanging objects swung. Trees, bushes shaken moderately. Ground: Soil.
- Hoopla.** Felt by, awakened, and frightened many in community. Windows, doors, and dishes rattled; house creaked.
- Loleta.** Awakened all in home; many in community; frightened few. Ground: Compact.
- Orick.** Motion rapid, lasted several seconds. Awakened all in home; many in community; frightened few. Windows, doors, and dishes rattled slightly. Ground: Compact.
- Orleans.** Felt by and awakened many. Windows, doors, and dishes rattled; house creaked.
- Pepperwood.** Motion slow, lasted 30 seconds. Felt by and awakened many in community.
- Rio Dell.** Felt by and awakened many in community; frightened few. Windows rattled. Ground: Soil, compact, level.
- Scotia.** Motion slow, lasted about 15 seconds. Direction W-E. Awakened many in community. Windows rattled. Ground: Soil, sloping.
- South Fork.** Motion rapid. Felt by, awakened, and frightened many in community. Walls creaked. Ground: Soil, compact.
- Trinidad.** Motion rapid, lasted 20 seconds. Awakened many; frightened few. Windows, doors, and dishes rattled; walls creaked. Pendulum clock stopped. Ground: Soil, level.

30 December, 01:16:13*. (cont.)

Intensity IV:

Hayfork. Motion rapid. Felt by and awakened few. House creaked.

Honeydew. Motion slow, lasted 3 seconds. Felt by several in home; awakened few in community. Ground: Rocky, level.

Somesbar. Motion rapid, lasted 1 minute. Felt by several and awakened few in community. Windows, doors, and dishes rattled; house creaked.

Intensity I to III:

Scott Valley. Shock reported felt on ground underlain by quicksand.

Smith River. Slight tremor.

Weott. Felt by very few.

Reported not felt: Alderpoint, Cecilville, Crescent City, Etnersburg, Fort Bragg, Garberville, Island Mountain, Laytonville, Piercy, Requa, Rockport, Ruth, Sawyers Bar, Weaverville, Westport, Willits, and Yreka.

31 December, 08:56:53*.

Epicenter 37.6° north, 118.5° west, northern Owens Valley. P.

Bigpine. "Although Bigpine, 15 miles south of Bishop, felt the shock, neither Independence nor Lone Pine noticed it." (SSA Bulletin, April 1955.)

Bishop. IV. Motion rapid, lasted 3-4 seconds. Direction E. Felt by many, some outdoors; frightened few. Building creaked slightly. Ground: Soil, compact.

Laws. V. Motion rapid, abrupt onset, resembled a large blast. Everything rocked in all directions. "People, especially children, were frightened, even the animals. Loud earth noises heard by many. Windows, doors, and dishes rattled; walls creaked. Doors swung. Pendulum clock stopped. Slight tremble felt around 09:00. Ground: Rocky, compact.

WASHINGTON AND OREGON

(120th Meridian or Pacific Standard Time)

— October.

No earthquakes were reported felt during the month of October at the following places:

Weather Bureau Stations:

Washington: Seattle.

Oregon: Portland.

8 November, 22:06.

Raymond, Wash. Weak shock recorded at Seattle was not felt at Raymond.

11 November, between 14:15 and 14:30.

Raymond, Wash. III. Felt by several in home. Also reported felt, according to press, halfway between Raymond and Aberdeen. Weak record at Seattle. Epicenter approximately 125 miles distant.

-- November, December.

No earthquakes were reported felt during these months at the following places:

Weather Bureau Stations:

Washington: Seattle.

Oregon: Portland.

WESTERN MOUNTAIN REGION

(105th Meridian or Mountain Standard Time)

28 October, 06:09:18*. State of Montana.

Hungry Horse. Reported felt.

Kalispell. IV. One hard shock, abrupt onset. Felt by many. Creaking of buildings and rattling of loose objects heard by many. Entire house shook strongly. No earth noises heard. One woman, who lives 11 miles from Kalispell on the Old No. 2 highway, said the noise sounded like a heavy truck on the road, and lasted about 1 minute.

30 October, 19:50.

Georgetown, Idaho. IV. "Most people in Georgetown and Bennington felt the shock. Windows, doors, and dishes rattled, and seemed to be about the average observation of other residents. Averaging all the reports and allowing for people's imagination as best I can, it seems that the shock was probably a little stronger in Bennington, 7 miles to the south, than here and was only slight in Montpelier, 12 miles to the south. Reported not felt in Soda Springs and Paris."

-- October.

No earthquakes were reported felt during the month of October at the following places:

Weather Bureau Stations:

Arizona: None.

New Mexico: "

1 November, 00:45 (about). State of Utah:

Logan and vicinity. IV. Felt in the eastern part of Logan and at the Zanavoo Lodge, about 2.8 miles from the front of the Bear River Range, as well as at a few intervening points. The known east-west extent of the area in which people were awakened is about five miles. In the eastern part of Logan many people were awakened although most of them did not recognize an earthquake. Loose knobs on a dresser rattled and a slow vertical movement was reported by a person awakened in bed. Near the mouth of Logan Canyon, at the residences near a power station, windows rattled and one man thought that someone was shaking his bed. Another man, in a near-by house, was awake and reported that dishes and windows rattled. At the

1 November, 00:45 (about). State of Utah. (cont.)

Zanavoo Lodge the sudden shaking greatly disturbed a lady who was sleeping in bed. She reported that the rafters of the frame building squeaked. The manager of the lodge, however, was seated in a restaurant booth talking and said he heard a sound which lead him to think that the furnace had exploded but he reported no vibration. Nevertheless, he insists that a light 8-inch carving knife was thrown vertically out of a rack at the edge of a table. Only the blade extended below the surface of the table and the lower end of the wooden handle rested on the edge of the table in a vertical position. The knife was found on the table about 5 inches west of the edge of the table. He said he distinctly remembers placing the knife in the rack because he dropped it while doing so. After the initial shock he went down to the basement and felt another about 3 minutes after the first. This is definitely confirmed by his wife, mentioned above, who stated that the strongest shock was the second one. Other less certain reports of two shocks were also received from the eastern part of Logan. In spite of the disturbance of the knife, it seems reasonable to associate these shocks with the fault or faults which certainly parallel the front of the Bear River Range near the power station mentioned above. Later telephone inquiries have indicated that the earthquake was not felt in Hyde Park nor in Smithfield, about 4 and 7 miles north of Logan, respectively; felt distinctly by one lady in Providence, 2 miles south of Logan, who reported two shocks of nearly equal intensity which rattled dishes in the cupboard and made a rumbling sound. The second shock came a minute or two after the first. Other individuals in Providence also felt the earthquake. In Millville, about 4 miles south of Logan, a lady reported that the rocking chair in which she was sitting moved. Dishes rattled in at least one house in Hyrum, about 7 miles south of Logan. Apparently the earthquake was not felt in Paradise, about 11-1/2 miles south of Logan. This data suggests a linear trend along the front of the Bear River Range. (The foregoing report was received from Professor J. Stewart Williams, Collaborator in Seismology for the State of Utah.)

2 November, 10:00 (about). State of New Mexico.

Epicenter between Albuquerque and Bernalillo (the latter about 18 miles north of Albuquerque) and possibly to west of Rio Grande, according to Professor Stuart A. Northrop, Collaborator in Seismology for the State of New Mexico. Professor Northrop reported the extreme length of the felt area was about 20 miles north-south; width more difficult to ascertain, but probably only a few miles east-west.

Albuquerque. III. Press reported employees of Stanolind Oil and Gas Company felt it on the third floor of building; building rocked slightly N-S. Many in Albuquerque did not feel the shock.

Albuquerque (3 miles north of center of town). III. Motion rather slow. Felt strongly, but no rattling of objects or creaking of house.

Bernalillo. IV. Press reported service station was shaken and doors rattled considerably. Felt by postmaster at Bernalillo who

2 November, 10:00 (about). State of New Mexico. (cont.)

reported it was also felt at Sandia Pueblo (an Indian pueblo a few miles south of Bernalillo).

Sandoval (a village about halfway between Albuquerque and Bernalillo).

II. Lasted 3-4 seconds. Observer in adobe house (sitting).

Reported not felt: Algodones (a few miles north of Bernalillo), Armijo (on southwest edge of Albuquerque), Isleta Pueblo (south of Albuquerque), and Los Lunas (south of Isleta).

3 November, 13:40 (about). State of New Mexico.

Epicenter in same locality as the shock of 2 November. More severe than shock of preceding day, but felt area was not much larger, if at all.

Albuquerque. V. Press reported the shock was felt by many. Only damage reported was minor cracking of plaster on third floor of the First National Bank Building, where it was felt by many on west side of building but few on east side. At 4409 Ninth St. NW, a desk shook and television set swayed.

Albuquerque (University of New Mexico). IV. Persons on the third floor of the Geology Building reported it was felt strongly. Windows and doors rattled. Drafting table shifted slightly. Lamps swung either W-E or SW-NE. Some reported the direction of motion as W-E, others NW-SE, and two said it felt like a push from the S. Not felt in the basement nor on the first floor of the Geology Building; two persons (out of several dozen) felt it on the second floor. Several persons on first and second floor of Hodgkin Hall (an old brick building) on the Campus felt it.

Albuquerque (Valley High School). III. In the northwest part of Albuquerque, at the new Valley High School, students and science instructor reported a rapid motion of very short duration. Desk creaked on second floor of brick building. No one was frightened.

Albuquerque (3 miles north of). III. Felt strongly by woman lying down. No rattling of objects or creaking of building.

Albuquerque (6 miles north of Central Ave.). III. Lasted 8-10 seconds. Felt by observer lying down, also felt by several neighbors.

Bernalillo (18 miles north of Albuquerque). V. Felt by several in community, in post office, on first and second floors; and frightened many others in community. Windows, doors, and weighing scales rattled. Hanging objects swung W-E. Small objects shifted. Also felt at Sandia Pueblo, a few miles south of Bernalillo.

Sandoval. V. Press reported furniture shook in the 2-story courthouse and filing cabinets "danced."

Sandoval. III. Observer felt two shocks close together while sitting. Perfume bottles on dresser rattled. Kerosene swished in lamps standing on window ledge. Another person ironing (standing) did not feel the shock.

Reported not felt: Algodones, Armijo, Isleta Pueblo, and Los Lunas.

-- November.

No earthquakes were reported felt during the month of November at the following places:

Weather Bureau Stations:

Colorado: None.

Idaho: "

Montana: "

Nevada: Winnemucca.

-- December.

No earthquakes were reported felt during the month of December at the following places:

Weather Bureau Stations:

Colorado: None.

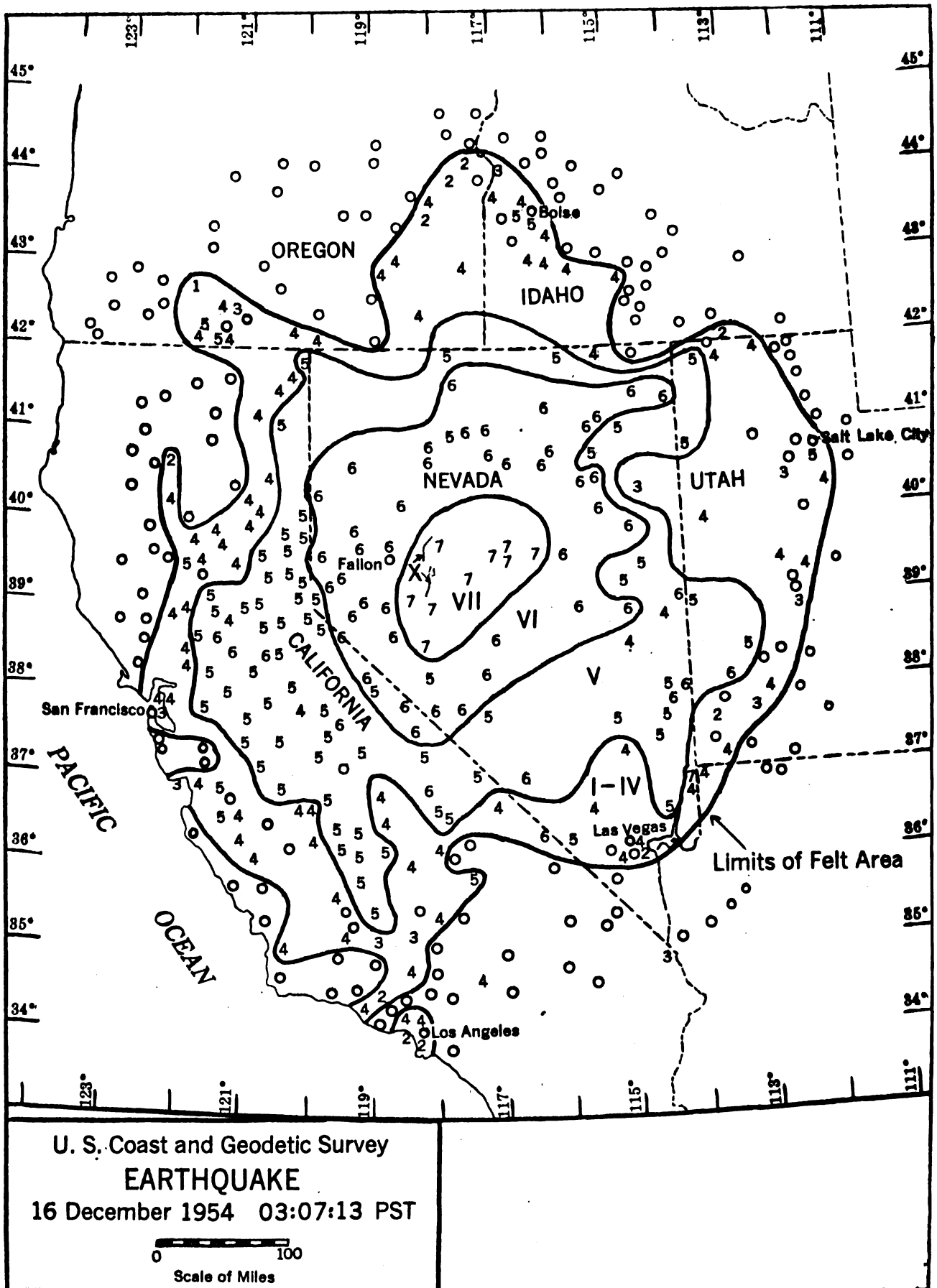
New Mexico: "

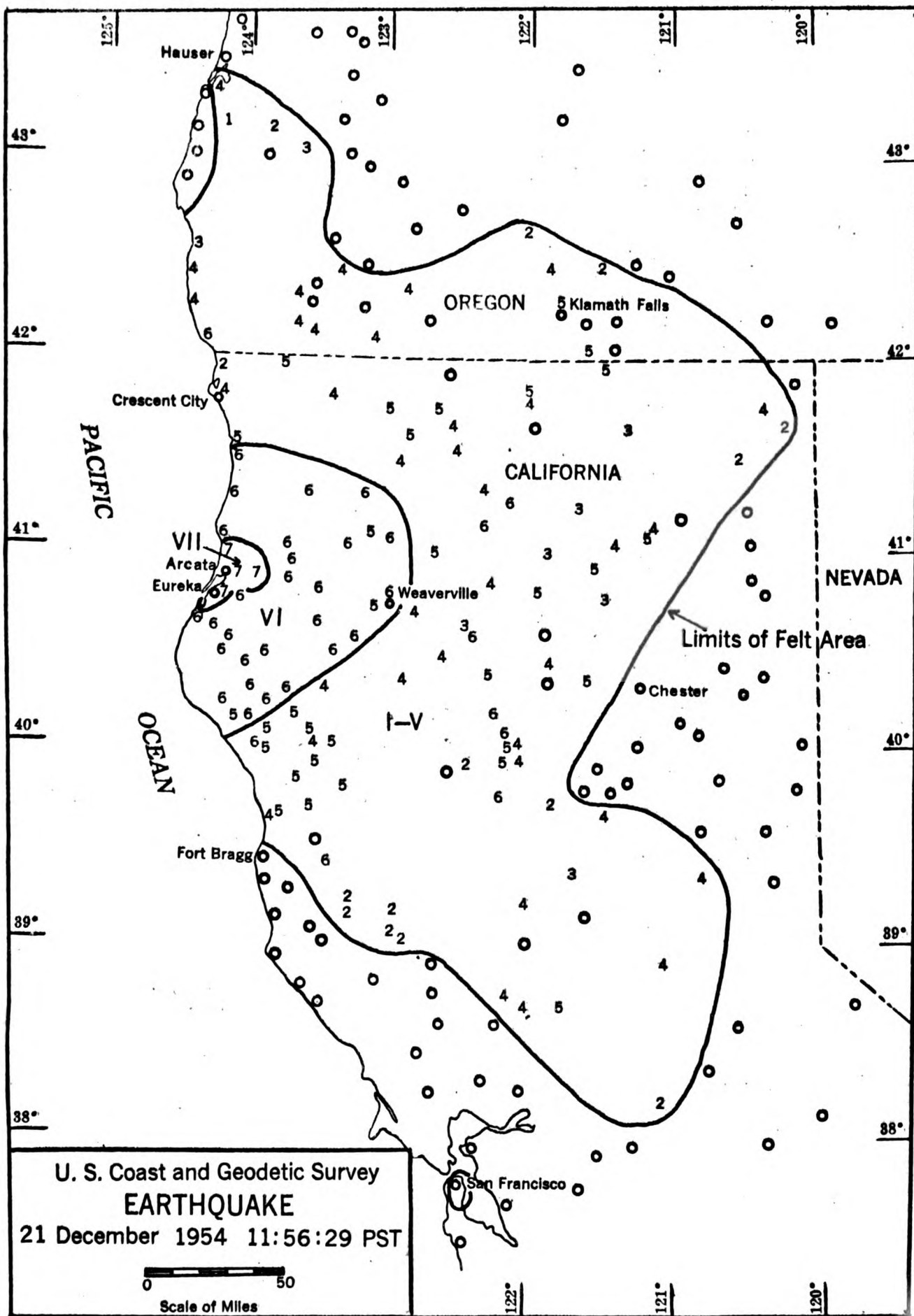
BOULDER CITY

(120th Meridian or Pacific Standard Time)

-- October, November, December.

No earthquakes were reported felt during these months at Boulder City or Hoover Dam, Nevada, excepting the major Nevada earthquake of 16 December which was felt slightly at Boulder City.





MODIFIED MERCALLI INTENSITY SCALE OF 1931
(Abridged)

- I. Not felt except by a very few under especially favorable circumstances. (I Rossi-Forel Scale)
- II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (I to II Rossi-Forel Scale)
- III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing truck. Duration estimated. (III Rossi-Forel Scale)
- IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls made creaking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably. (IV to V Rossi-Forel Scale)
- V. Felt by nearly everyone; many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel Scale)
- VI. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight. (VI to VII Rossi-Forel Scale)
- VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motorcars. (VIII Rossi-Forel Scale)
- VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Disturbed persons driving motorcars. (VIII+ to IX Rossi-Forel Scale)
- IX. Damage considerable in specially designed structures; well designed frame structures thrown out of plumb; great in substantial buildings with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX+ Rossi-Forel Scale)
- X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks. (X Rossi-Forel Scale)
- XI. Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
- XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

