

Catalogue of U.S. Geological Survey Strong-Motion Records, 1989

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PREFACE

The first seismic engineering program in the United States was administered by the Seismological Field Survey (SFS) of the Coast and Geodetic Survey. This program was begun in 1931 and essentially remained the responsibility of the SFS until 1973, when the U.S. Geological Survey (USGS) assimilated the program into its National Earthquake Hazards Reduction Program. The current Federal seismic engineering program operates the National Cooperative Strong-Motion Network (NCSMN) with more than 1,000 stations in 40 States and Puerto Rico. This network is administered by the USGS in cooperation with both private industry and numerous Federal, State, and local agencies and organizations. Major contributors include the Army Corps of Engineers, the Veterans Administration, and the Metropolitan Water District of Southern California. Primary objectives of the program are to record strong ground motions and the response of representative engineered structures during moderate to large earthquakes, and to disseminate the resultant data and information about the records, sites, and structures to the earthquake engineering research and design community.

This catalogue continues in a revised format the yearly publication "Strong-Motion Program Report, January-December [year]"; it is a continuation of the table 1 summary of accelerograms recovered at NCSMN stations that had been published in that format since 1974. This report includes all accelerograms recovered during 1989. Unless otherwise noted, event data are from the "Preliminary Determination of Epicenters," published monthly by the U.S. Geological Survey.

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INTRODUCTION

Nearly 400 accelerograph records were recovered from the National Cooperative Strong-Motion Network (NCSMN) during 1989. Stations in California, Hawaii, and Washington recorded eight earthquakes of $M=5.0$ or greater including the $M_L=7.0$ Loma Prieta earthquake in northern California on October 17.

An $M_L=5.0$ earthquake in the Malibu area of southern California triggered 14 accelerographs at 10 stations on January 19. A peak acceleration of $0.15 g$ was recorded at the sixth level of the Wadsworth VA hospital in west Los Angeles (Johnson and Acosta, 1989).

On April 3 an $M_L=4.7$ earthquake triggered five strong-motion stations along the Calaveras Fault zone in northern California. The peak horizontal acceleration recorded was $0.16 g$ at Cherry Flat Reservoir (Salsman and Switzer, 1990).

Two earthquakes on June 12 in southern California, $M_L=4.4$ and 4.1 , produced records at 13 and 8 NCSMN stations, respectively. Maximum ground accelerations of $0.15 g$ were recorded in East Los Angeles and at the abutment of Garvey Reservoir in Monterey Park during the 4.4 event; during the 4.1 event, maximum ground motions at these two stations were $0.08 g$ and $0.05 g$, respectively.

An $M_L=4.8$ earthquake near Eureka in northern California on September 21 produced significant ground motions at two of five stations triggered by this event; peak motions and their locations were $0.16 g$ at Centerville Beach Navy Facility and $0.12 g$ at Ferndale Fire Station.

Accelerographs at 41 NCSMN stations in the San Francisco Bay area were triggered by the October 17 Loma Prieta main shock and produced 59 records; these data include recordings from extensively instrumented structures such as high-rise buildings in San Francisco, Berkeley, Hayward, and Emeryville, and a dam east of Morgan Hill. The closest USGS accelerograph station was Anderson Dam, located at an epicentral distance of 27 km, which produced peak accelerations of 0.08 , 0.23 , and $0.26 g$, at the abutment, toe, and downstream stations, respectively (Maley and others, 1989).

A companion project at the USGS has published a report containing the computer processed results of 17 film records and a digital record recovered from this event (Brady and Mork, 1990). A companion tape containing all processed results is available, together with tapes for the remainder of this event's processed records, from the National Geophysical Data Center, 325 Broadway (Mail E/GC1), Boulder, Colorado 80303; phone (303) 497-6084.

An $M_L=4.2$ earthquake on December 2 triggered seven stations of the Anza strong-motion array in southern California; a peak horizontal ground acceleration of $0.18 g$ was recorded on granitic rock at the Keenwild Forest Station site.

Additionally, six magnitude 5 or greater earthquakes were recorded at NCSMN stations in 1989. The date, location, magnitude, number of records recovered, and maximum recorded ground motion are as follows: June 26, Hawaii, 6.2, 14 records, 0.19 *g*; Aug. 8, central California, 5.4, eight records, 0.08 *g*; Oct. 18, central California, 5.1, three records, less than 0.05 *g*; Oct. 25, central California, 5.0, two records, less than 0.05 *g*; Dec. 24, Washington state, 5.1, one record, 0.08 *g* (on crest of dam); and Dec. 28, Hawaii, 5.0, two records, less than 0.05 *g*.

REFERENCES

- Brady, A.G., and Mork, P.N., 1990, Loma Prieta, California, Earthquake October 18 (GMT), 1989, Processed Strong-Motion Records, Volume I: U.S. Geological Survey Open-File Report 90-247, 274 p.
- Johnson, D.A., and Acosta, A.V., 1989, Strong-motion data from the Malibu, California, earthquake of January 19, 1989: U.S. Geological Survey Open-File Report 89-186, 21 p.
- Maley, R.P., Acosta, A.V., Ellis, F., Etheredge, E.C., Foote, L., Johnson, D.A., Porcella, R.L., Salsman, M., and Switzer, J.C., 1989, U.S. Geological Survey strong-motion records from the northern California (Loma Prieta) earthquake of October 17, 1989: U.S. Geological Survey Open-File Report 89-0568, 85 p.
- Salsman, M.J., and Switzer, J.C., 1990, Strong-motion records from earthquakes of June 13, 1988, November 10, 1988, and April 3, 1989, on the Calaveras Fault, Central California: U.S. Geological Survey Open-File Report 90-481, 36 p.

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989

[Station owners: ACOE, U.S. Army Corps of Engineers; BECH, Bechtel Power Corporation; CDOT, California Department of Transportation; CDWR, California Department of Water Resources; JCG, JCG Finance Corporation of America; MWD, Los Angeles Metropolitan Water District; OWNR, Owner of building; UCB, University of California at Berkeley; USGS, U.S. Geological Survey; VA, U.S. Veterans Administration. Instrument trigger time in seconds after the minute or the following minute listed in earthquake column. S-minus trigger denotes S-wave-arrival-minus-trigger-time (S-t) or S-wave-minus-P-wave-arrival time (S-P, in brackets) interval. Direction is of case acceleration for upward trace deflection on accelerogram; horizontal components are listed as azimuth, and vertical components as "up" or "down." Maximum amplitude is peak acceleration recorded at ground level on one vertical and two orthogonal horizontal components unless otherwise noted. Duration is interval between first and last peaks of acceleration greater than 0.10 g.. Numbers in parentheses refer to footnotes at end of table.]

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|---|--------------------------------|--|-----------------|---------------------------|-------------------|-----------------------------|-----------------|
| 9 January 1989 0803:26.1 G.m.t. Eastern Calif. 37.548N, 118.779W Magnitude 3.2 ML | McGee Creek | 37.550 | (4) | 1.0 | | (1) | |
| | Mammoth Lakes (USGS) SMA-1 | 118.811 | | | | | |
| | McGee Creek | 37.550 | (4) | 1.0 | | | |
| | Mammoth Lakes (USGS) CRA-1 | 118.811 | | | | | |
| | 166 m Downhole | | | | | (1) | |
| | 35 m Downhole | | | | | (1) | |
| | Surface | | | | | (1) | |
| | 1 m Downhole | | | | | (1) | |
| 11 January 1989 2334:26.5 G.m.t. Southern Calif. 33.185N, 115.593W Magnitude 3.2 ML | Salton Sea | 33.178 | 34:25.6 | 1.1 | 315 | .05 | --- |
| | Wildlife Refuge | 115.615 | | | Up | .04 | --- |
| | (USGS) SMA-1 | | | | 225 | .03 | --- |
| 19 January 1989 0653:28.8 G.m.t. Southern Calif. 33.920N, 118.630W Magnitude 5.0 ML | Jensen Filter Plant | 34.312 | (3) | 6.7 | | | |
| | Balboa Ave. (MWD) | 118.496 | | | | | |
| | Basement Admin. Bldg. | | | | | (1) | |
| | Generator Bldg. | | | | | | (1) |
| | Reservoir Roof | | | | | | (1) |
| | Lawndale | 33.895 | (3) | 3.5 | 360 | .10 | 1 peak |
| | 15000 Aviation Blvd. (USGS) | 118.377 | | | Up | .03 | --- |
| | | | | | 270 | .05 | --- |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|--|--|-----------------|---------------------------|-------------------|-----------------------------|-------------------|
| 19 January 1989 0653:28.8 G.m.t. Southern Calif. 33.920N, 118.630W Magnitude 5.0 ML (Continued) | Los Angeles Brentwood VA Hospital (VA) | 34.063 118.462 | (3) | 3.6 | | (1) | |
| | Los Angeles Wadsworth VA Hospital (VA) | 34.053 118.452 | 53:33.8 | 3.8 | | | |
| | Ground Site South | | | | 325 Up 235 | .03 .02 .07 | --- --- --- |
| | Structure Array: | | | | | | |
| | Ch. 1- 6th Floor, North | | | | 235 | .15 | 1.0 |
| | Ch. 2- 6th Floor, North-center | | | | 235 | .11 | 1 peak |
| | Ch. 3- 6th Floor, Center | | | | 235 | .13 | 0.3 |
| | Ch. 4- 6th Floor, Center | | | | 055 | .11 | 0.3 |
| | Ch. 5- 6th Floor, South | | | | 055 | .05 | --- |
| | Ch. 6- 6th Floor, South | | | | 325 | .05 | --- |
| | Ch. 7- Basement, North-center | | | | 325 | .10 | 0.2 |
| | Ch. 8- Basement, North-center | | | | 235 | .07 | --- |
| | Ch. 9- Basement, North-center | | | | Down | .03 | --- |
| | Malibu Kilpatrick School (USGS) | 34.093 118.836 | 53:36.6 | 1.2 | | | (1) |
| | Malibu Canyon Monte Nido Fire Stn (USGS) | 34.078 118.693 | 53:32.8 | 2.5 | 090 Up 360 | .07 .05 .05 | --- --- --- |
| Sepulveda Canyon Control Facility (USGS) | 34.097 118.478 | (3) | 3.3 | | | (1) | |
| Sepulveda Dam San Fernando Valley (ACOE) | 34.167 118.469 | (3) | 4.4 | | | | |
| Crest | | | | | | (1) | |
| Downstream | | | | | | (1) | |
| Sepulveda VA Hospital Bldg. 40 (VA) | 34.249 118.475 | (3) | 5.3 | | | (1) | |
| Topanga Fire Station (USGS) | 34.084 118.600 | 53:32.8 | 2.8 | 270 Up 180 | .10 .09 .06 | 1 peak --- --- | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|--|--|-----------------|---------------------------|-------------------|-----------------------------|----------------------|
| 1 February 1989 0803 G.m.t. Hawaii Epicenter and magnitude unknown | Waimea, Hawaii Fire Station (USGS) | 20.026 155.664 | (4) | (2) | | (1) | |
| 3 February 1989 2348:46.7 G.m.t. Southern Calif. 33.180N, 115.600W Magnitude 3.4 ML | Salton Sea Wildlife Refuge (USGS) SMA-1 | 33.178 115.615 | 48:47.7 | 0.8 | 315 Up 225 | .03 .04 .10 | --- --- 1 peak |
| 7 February 1989 1112 G.m.t. Southern Calif. Epicenter and magnitude unknown | Salton Sea Wildlife Refuge (USGS) SMA-1 | 33.178 115.615 | 12:47.8 | 0.9 | | (1) | |
| 16 February 1989 1917:07.7 G.m.t. Southern Calif. 33.170N, 115.600W Magnitude 3.4 ML | Salton Sea Wildlife Refuge (USGS) SMA-1 Imperial Wildlife Liquefaction Array (USGS) | 33.178 115.615 33.097 115.530 | 17:08.7 | 1.1 1.4 | 315 Up 225 | .08 .06 .17 | --- --- 0.1 |
| 22 February 1989 0419:53.2 G.m.t. Central Calif. 36.907N, 121.363W Magnitude 2.9 ML | Hollister Differential Array (USGS) | 36.88 121.413 | 19:55.2 | 1.9 | | (1) | |
| 27 February 1989 1903:09.4 G.m.t. Eastern Calif. 37.596N, 118.886W Magnitude 3.4 ML | McGee Creek Mammoth Lakes (USGS) SMA-1 McGee Creek Mammoth Lakes (USGS) CRA-1 166 m Downhole 35 m Downhole Surface 1 m Downhole | 37.55 118.811W 37.550 118.811 | (4) | (2) | | (1) | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) | |
|--|--|---|-------------------|---------------------------|-------------------|-----------------------------|-------------------|-------------------|
| 6 March 1989 2216:47.6 G.m.t. Southern Calif. 33.180N, 115.600W Magnitude 4.3 ML | Salton Sea Wildlife Refuge (USGS) SMA-1 | 33.178 115.615 | 16:48.3 | 1.1 | 315 Up 225 | .27 .25 .34 | 1.0 2.1 2.1 | |
| | Imperial Wildlife Liquefaction Array (USGS) | 33.097 115.530 | (3) | 1.8 | | | | |
| | Channel 1- Surface | | | | 360 | .15 | 1 peak | |
| | Channel 2- Surface | | | | Up | .11 | 0.6 | |
| | Channel 3- Surface | | | | 090 | .10 | 1 peak | |
| | Channel 4- 7.5-m Downhole | | | | * | .06 | --- | |
| | Channel 5- 7.5-m Downhole | | | | * | .05 | --- | |
| | Channel 6- 7.5-m Downhole | | | | * | .05 | --- | |
| | * Unknown | | | | | | | |
| | Note: Channels 7-12 non-functional piezometers. | | | | | | | |
| 6 March 1989 2220:38.6 G.m.t. Southern Calif. 33.180N, 115.620W Magnitude 3.3 ML | Salton Sea Wildlife Refuge (USGS) SMA-1 | 33.178 115.615 | 20:39.3 | 1.1 | 315 Up 225 | .05 .03 .09 | --- --- --- | |
| | Imperial Wildlife Liquefaction Array (USGS) | 33.097 115.530 | 20:47.5 | 1.5 | | (1) | | |
| | Note: One additional record ¹ recovered at Salton Sea Wildlife Refuge SMA-1. | | | | | | | |
| 6 March 1989 2245 G.m.t. Southern Calif. Epicenters and magnitudes unknown | Salton Sea Wildlife Refuge (USGS) SMA-1 | 33.178 115.615 | 45:56.4 | 0.4 | | (1) | | |
| | Note: One additional record ¹ recovered at Salton Sea Wildlife Refuge SMA-1. | | | | | | | |
| | Note: One additional record ¹ recovered at Salton Sea Wildlife Refuge SMA-1. | | | | | | | |
| 6 March 1989 2257:34.2 G.m.t. Southern Calif. 33.200N, 115.600W Magnitude 3.2 ML | Salton Sea Wildlife Refuge (USGS) SMA-1 | 33.178 115.615 | 57:34.8 | 1.0 | 315 Up 225 | .16 .20 .15 | 0.2 0.5 0.3 | |
| | 6 March 1989 2258:32.5 G.m.t. Southern Calif. 33.180N, 115.600W Magnitude 3.6 ML | Salton Sea Wildlife Refuge (USGS) SMA-1 | 33.178 115.615 | 58:33.1 | [1.2] | 315 Up 225 | .06 .06 .09 | --- --- --- |
| | | Note: One additional record ¹ recovered at Salton Sea Wildlife Refuge SMA-1. | | | | | | |
| Note: One additional record ¹ recovered at Salton Sea Wildlife Refuge SMA-1. | | | | | | | | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|---|---|--|-----------------|---------------------------|-------------------|-----------------------------|-----------------|
| 7 March 1989 0024:58.1 G.m.t. Southern Calif. 33.180N, 115.610W Magnitude 4.1 ML | Imperial Wildlife Liquefaction Array (USGS) | 33.097 115.530 | 25:02.5 | 1.3 | | (1) | |
| | Channel 1- Surface | | | | 360 | .05 | --- |
| | Channel 2- Surface | | | | Up | .03 | --- |
| | Channel 3- Surface | | | | 090 | .07 | --- |
| | Channel 4- 7.5-m Downhole | | | | * | .03 | --- |
| | Channel 5- 7.5-m Downhole | | | | * | .01 | --- |
| | Channel 6- 7.5-m Downhole | | | | * | .02 | --- |
| * Unknown Note: Channels 7-12 non-functional piezometers. | | | | | | | |
| 7 March 1989 0147:27.5 G.m.t. Southern Calif. 33.180N, 115.610W Magnitude 3.4 ML | Imperial Wildlife Liquefaction Array (USGS) | 33.097 115.530 | 47:31.8 | 1.4 | | (1) | |
| | | | | | | | |
| 7 March 1989 0743:44.1 G.m.t. Southern Calif. 33.180N, 115.590W Magnitude 4.2 ML | Imperial Wildlife Liquefaction Array (USGS) | 33.097 115.530 | 43:48.5 | 1.3 | | (1) | |
| | | | | | | | |
| 27 May 1988- 8 March 1989 Northern Calif. Epicenter and magnitude unknown | Eel River Valley Array Centerville Beach (USGS) | 40.563 124.348 | (3) | 4.5 | | (1) | |
| | Eel River Valley Array Loleta Fire Station (USGS) | 40.644 124.219 | (3) | (2) | | (1) | |
| 25 November 1988- 10 March 1989 Southern Calif. Epicenters and magnitudes unknown | Calipatria Fire Station (USGS) | 33.13 115.52 | (3) | 1.5 | 315 Up 225 | .05 .09 .06 | --- |
| | Note: Two additional records ¹ recovered at Calipatria Fire Station. | | | | | | |
| | | | | | | | |
| 10 March 1989 0140:25.4 G.m.t. Eastern Calif. 37.525N, 118.874W Magnitude 3.3 ML | McGee Creek Mammoth Lakes (USGS) SMA-1 | 37.550 118.811 | (4) | (2) | | (1) | |
| | | | | | | | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|---|--|--|-----------------|---------------------------|-------------------|-----------------------------|-------------------|
| 10 March 1989 0140:25.4 G.m.t. Eastern Calif. 37.525N, 118.874W Magnitude 3.3 ML (Continued) | McGee Creek Mammoth Lakes (USGS) CRA-1 | 37.550 118.811 | (4) | (2) | | | |
| | 166 m Downhole | | | | | (1) | |
| | 35 m Downhole | | | | | (1) | |
| | Surface | | | | | (1) | |
| | 1 m Downhole | | | | | (1) | |
| 10 March 1989 0153:21.1 G.m.t. Eastern Calif. 37.525N, 118.873W Magnitude 3.2 ML | McGee Creek Mammoth Lakes (USGS) SMA-1 | 37.550 118.811 | (4) | (2) | | (1) | |
| | McGee Creek Mammoth Lakes (USGS) CRA-1 | 37.550 118.811 | (4) | (2) | | | |
| | 166 m Downhole | | | | | (1) | |
| | 35 m Downhole | | | | | (1) | |
| | Surface | | | | | (1) | |
| | 1 m Downhole | | | | | (1) | |
| 24 March 1989 2228:10.0 G.m.t. Southern Calif. 33.180N, 115.590W Magnitude 3.2 ML | Salton Sea Wildlife Refuge (USGS) SMA-1 | 33.178 115.615 | 28:11.0 | 1.0 | | (1) | |
| 24 March 1989 2316:48.0 G.m.t. Southern Calif. 33.030N, 115.580W Magnitude 4.0 ML | Calipatria Fire Station (USGS) | 33.13 115.52 | (3) | 1.7 | | (1) | |
| | Salton Sea Wildlife Refuge (USGS) SMA-1 | 33.178 115.615 | 16:49.9 | 1.1 | 315 Up 225 | .08 .16 .08 | --- 0.4 --- |
| 3 April 1989 1746:34.4 G.m.t. Central Calif. 37.422N, 121.795W Magnitude 4.7 ML | Calaveras Array Calaveras Res. South (USGS) | 37.452 121.807 | (3) | 1.2 | 180 Up 090 | .07 .02 .08 | --- --- --- |
| | Calaveras Array Cherry Flat Reservoir (USGS) | 37.396 121.756 | 46:36.8 | 1.3 | 360 Up 270 | .09 .07 .16 | --- --- 0.5 |
| | | | | | | | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|---|--|-----------------|---------------------------|-------------------|-----------------------------|-------------------|
| 3 April 1989 1746:34.4 G.m.t. Central Calif. 37.422N, 121.795W Magnitude 4.7 ML (Continued) | Sunnyvale Colton Avenue (USGS) | 37.402 122.024 | 46:39.3 | 3.2 | | (1) | |
| | Anderson Dam (USGS) | 37.166 121.628 | 46:46.2 | (2) | | | |
| | Crest | | | | | (1) | |
| | Structure Array: Ch. 1-12 | | | | | (1) | |
| | San Jose, 101/280/680 Freeway Interchange (USGS/CDOT) | 37.340 121.851 | (4) | 1.0 | 322 Up 232 | .09 .04 .06 | --- --- --- |
| 7 April 1989 2007:30.2 G.m.t. Southern Calif. 33.620N, 117.900W Magnitude 4.5 ML | Santa Ana 400 Civic Center Dr. (USGS) | 33.7517 117.870W | (3) | 2.4 | 360 Up 270 | .04 .04 .19 | --- --- 0.4 |
| | Newport Beach 840 Newport Center Dr. (USGS) | 33.618 117.878 | (3) | 1.5 | | | |
| | Structure Array | | | | | | |
| | Ch. 1- Tower 2, Level 1, Center | | | | 360 | .43 | 0.5 |
| | Ch. 2- Tower 2, Level 1, Center | | | | Up | .11 | 0.1 |
| | Ch. 3- Tower 2, Level 1, Center | | | | 090 | .30 | 0.3 |
| | Ch. 4- Tower 2, Level 2, West | | | | 360 | * | |
| | Ch. 5- Tower 2, Level 2, Center | | | | 360 | .66 | 0.4 |
| | Ch. 6- Tower 2, Level 2, Center | | | | 090 | .50 | 0.5 |
| | Ch. 7- Tower 2, Level 9, South | | | | 090 | .18 | 0.2 |
| | Ch. 8- Tower 2, Level 10, Center | | | | 360 | * | |
| | Ch. 9- Tower 2, Level 10, Center | | | | 090 | * | |
| | Ch. 10- Tower 1, Level 9, East | | | | 360 | .37 | 0.3 |
| | Ch. 11- Tower 1, Level 10, Center | | | | 270 | .30 | 3.2 |
| | Ch. 12- Tower 1, Level 10, Center | | | | 360 | .67 | 3.6 |
| | * Transducer inoperative | | | | | | |
| 14 April 1989 0645:55.0 G.m.t. Central Calif. 36.563N, 121.202W Magnitude 3.3 ML | Bear Valley Station 10 Webb Residence (USGS) | 36.532 121.143 | 45:57.0 | 1.5 | | (1) | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|---|--|-----------------|---------------------------|-------------------|-----------------------------|-------------------------|
| 27 April 1989 1647:49.8 G.m.t. New Madrid, Mo. 36.006N, 89.768W Magnitude 4.6 MB | Blytheville, Ark. Fire Station (USGS) | 35.92 89.92 | (3) | 0.7 | | (1) | |
| | Hayti, Mo. Pemiscot Co. Hosp. (USGS) | 36.237 89.740 | (3) | 0.5 | 360 Up 270 | .02 .04 .11 | --- --- 1 peak |
| 20 May 1989 0857:26.8 G.m.t. Central Calif. 36.578N, 121.212W Magnitude 2.8 ML | Bear Valley Station 1 CDF Fire Station (USGS) | 36.57 121.18 | 57:27.5 | 0.7 | 310 Up 220 | .07 .02 .07 | --- --- --- |
| | Orange Co. Reservoir (MWD) Abutment | 33.93 117.88 | (3) | (2) | | (1) | |
| 25 May 1989 1240:09.3 G.m.t. Central Calif. 35.862N, 120.398W Magnitude 3.6 ML | Parkfield Liquefaction Array (USGS) | 35.79 120.33 | 40:14.3 | 1.0 | 315 Up 225 | .09 .13 .14 | --- 1 peak 1 peak |
| | Array 1: | | | | | | |
| | 1. AC-1, 38' | | | | | (1) | |
| | 2. AC-1, 38' | | | | | (1) | |
| | 3. AC-1, 38' | | | | | (1) | |
| | 4. AC-4, 9' | | | | | (1) | |
| | 5. AC-4, 9' | | | | | (1) | |
| | 6. AC-4, 9' | | | | | (1) | |
| | 7. Pressure Transducer, A-1, 16.7' | | | | | * | |
| | 8. Pressure Transducer, A-3, 16.9' | | | | | * | |
| | 9. Pressure Transducer, A-4, 13.1' | | | | | * | |
| | 10. Pressure Transducer, B-2, 17' | | | | | * | |
| | 11. Pressure Transducer, B-4, 31.1' | | | | | * | |
| 12. Pressure Transducer, C-3, 20.7' | | | | | * | | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|---|--|-----------------|---------------------------|-------------------|--|-------------------------|
| 25 May 1989 1240:09.3 G.m.t. Central Calif. 35.862N, 120.398 Magnitude 3.6 ML (Continued) | Array 2: 1. AC-3, 96' 2. AC-3, 96' 3. AC-3, 96' 4. AC-2, 13' 5. AC-2, 13' 6. AC-2, 13' 7. Surface 8. Surface 9. Surface 10. Pressure Transducer, D-1, 30.6' 11. Pressure Transducer, D-3, 41.2' 12. Pressure Transducer, C-1, 20' | | | | | (1) (1) (1) (1) (1) (1) .08 .08 .12 * * * | --- --- 1 peak |
| * Piezometer trace. | | | | | | | |
| 12 June 1989 1657:18.4 G.m.t. Southern Calif. 34.030N, 118.180W Magnitude 4.4 ML | Los Angeles Jasper St. (USGS) | 34.081 118.188 | (3) | 1.1 | 130 Up 040 | .15 .08 .08 | 0.1 --- --- |
| | Los Angeles Bulk Mail Facility (USGS) | 33.996 118.162 | (3) | 2.5 | | (1) | |
| | Garvey Reservoir Monterey Park (MWD) | 34.050 118.114 | (3) | 1.6 | | | |
| | Crest | | | | 114 Up 024 | .06 .02 .06 | --- --- --- |
| | Abutment Bldg. | | | | 114 Up 024 | .15 .08 .13 | 1 peak --- 1 peak |
| | Los Angeles 1111 Sunset Blvd. (MWD) | 34.067 118.248 | (3) | (2) | | | |
| | Basement | | | | 348 Up 258 | .07 .03 .18 | --- --- 0.1 |
| | 4th Floor | | | | 348 Up 258 | .06 .06 .15 | --- --- 0.2 |
| | Roof (8th) | | | | 348 Up 258 | .05 .18 .05 | --- 0.8 --- |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) | |
|---|--|--|-----------------|---------------------------|-------------------|-----------------------------|-------------------|--|
| 12 June 1989 1657:18.4 G.m.t. Southern Calif. 34.030N, 118.180W Magnitude 4.4 ML (Continued) | Jensen Filter Plant Balboa Ave. (MWD) | 34.309 118.499 | (3) | 4.0 | | | | |
| | Basement Admin. Bldg. | | | | | (1) | | |
| | Generator Bldg. | | | | | (1) | | |
| | Reservoir Roof | | | | | (1) | | |
| | Los Angeles 1100 Wilshire Blvd. (JCG/USGS) | 34.052 118.263 | 57:21.9 | 2.6 | | | | |
| | Basement 4 NW | | | | | (1) | | |
| | Basement 3 NE | | | | 298 Up 208 | .06 .03 .03 | --- --- --- | |
| | Basement 3 SE | | | | 298 Up 208 | .05 .03 .04 | --- --- --- | |
| | Structure Array: | | | | | | | |
| | Ch. 1- 12th Floor, North | | | | 298 | .05 | --- | |
| | Ch. 2- 12th Floor, North | | | | 208 | .04 | --- | |
| | Ch. 3- 12th Floor, South | | | | 208 | .02 | --- | |
| | Ch. 4- 13th Floor, North | | | | 298 | .04 | --- | |
| | Ch. 5- 13th Floor, North | | | | 208 | .07 | --- | |
| | Ch. 6- 13th Floor, South | | | | 208 | .03 | --- | |
| | Ch. 7- 32nd Floor, North | | | | 298 | .02 | --- | |
| | Ch. 8- 32nd Floor, North | | | | 208 | .04 | --- | |
| | Ch. 9- 32nd Floor, South | | | | 208 | .05 | --- | |
| | Ch. 10- Ground Floor, North | | | | 298 | .05 | --- | |
| | Ch. 11- Ground Floor, North | | | | 208 | .06 | --- | |
| | Ch. 12- Ground Floor, South | | | | 208 | .03 | --- | |
| | Whittier Narrows Dam Pico Rivera (ACOE) | 34.020 118.053 | (3) | 0.9 | | | | |
| | Crest | | | | 028 Up 298 | .08 .05 .07 | --- --- --- | |
| Upstream | | | | 152 Up 062 | .08 .03 .05 | --- --- --- | | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|---|--|--|-----------------|---------------------------|-------------------------|-----------------------------|-------------------|
| 12 June 1989 1657:18.4 G.m.t. Southern Calif. 34.030N, 118.180W Magnitude 4.4 ML (Continued) | Norwalk 12400 Imperial Hwy (USGS/BECH) | 33.92 118.07 | (3) | 0.8 | | | |
| | Basement | | | | | (1) | |
| | 4th Floor | | | | 090 Up 360 | .02 .01 .06 | --- --- --- |
| | Roof (8th Floor) | | | | 090 Up 360 | .02 .02 .06 | --- --- --- |
| | South Ground Site | 33.915 118.067 | (3) | (2) | | (1) | |
| | North Ground Site | 33.917 118.067 | (3) | 3.0 | | (1) | |
| | Prado Dam Corona (ACOE) | 33.890 117.641 | (3) | (2) | | | |
| | Crest | | | | | (1) | |
| | Downstream | | (3) | 0.3 | 090 Up 360 | .08 .03 .08 | --- --- --- |
| | Brea Dam Fullerton (ACOE) | 33.890 117.925 | (3) | 0.8 | | | |
| | Crest | | | | | (1) | |
| | Left Abutment | | | | | (1) | |
| | Alhambra 900 S. Fremont (USGS) | 34.085 118.149 | (3) | | | | |
| | 12th Floor | | | | 2.6 090 Up 360 | .04 .07 .07 | --- --- --- |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) | |
|---|--|---|-------------------|---------------------------|-------------------|-----------------------------|-------------------|-------------------|
| 12 June 1989 1657:18.4 G.m.t. Southern Calif. 34.030N, 118.180W Magnitude 4.4 ML (Continued) | Whittier 7215 Bright Ave. (USGS) | 33.977 118.036 | (3) | 2.9 | | | | |
| | Basement | | | | 180 Up 090 | .03 .02 .06 | --- --- --- | |
| | Carbon Canyon Dam Brea (ACOE) | 33.914 117.839 | (3) | (2) | | | | |
| | Crest | | | | | (1) | | |
| | 12 June 1989 1722:25.5 G.m.t. Southern Calif. 34.020N, 118.180W Magnitude 4.1 ML | Los Angeles 4407 Jasper St. (USGS) | 34.081 118.188 | (3) | 2.3 | 130 Up 040 | .08 .05 .06 | --- --- --- |
| | | Los Angeles Bulk Mail Facility (USGS) | 33.996 118.162 | (3) | 2.4 | | (1) | |
| | | Garvey Reservoir Monterey Park (MWD) | 34.050 118.114 | (3) | 2.4 | | | |
| | | Crest | | | | | (1) | |
| | | Abutment Bldg. | | | | 114 Up 024 | .05 .03 .04 | --- --- --- |
| | | Los Angeles 1111 Sunset Blvd. (MWD) | 34.067 118.248 | (3) | 2.1 | | | |
| Basement | | | | | 348 Up 258 | .05 .02 .09 | --- --- --- | |
| 4th Floor | | | | | 348 Up 258 | .03 .03 .08 | --- --- --- | |
| Roof (8th) | | | | | 348 Up 258 | .05 .18 .05 | --- 0.8 --- | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|--|--|-----------------|---------------------------|-------------------|-----------------------------|-------------------|
| 12 June 1989 1722:25.5 G.m.t. Southern Calif. 34.020N, 118.180 Magnitude 4.1 ML (Continued) | Jensen Filter Plant Balboa Ave. (MWD) | 34.309 118.499 | (3) | (2) | | | |
| | Administration Bldg. Basement | | | | | (1) | |
| | Generator Bldg. | | | | | (1) | |
| | Reservoir Roof | | | | | (1) | |
| | Los Angeles 1100 Wilshire Blvd. (JCG/USGS) | 34.052 118.499 | 22:29.1 | 2.2 | | | |
| | Basement 4 NW | | | | | (1) | |
| | Basement 3 NE | | | | 298 Up 208 | .04 .02 .05 | --- --- --- |
| | Basement 3 SE | | | | | (1) | |
| | Structure Array: | | | | | | |
| | Ch. 1- 12th Floor, North | | | | 298 | .03 | --- |
| | Ch. 2- 12th Floor, North | | | | 208 | .04 | --- |
| | Ch. 3- 12th Floor, South | | | | 208 | .02 | --- |
| | Ch. 4- 13th Floor, North | | | | 298 | .04 | --- |
| | Ch. 5- 13th Floor, North | | | | 208 | .06 | --- |
| | Ch. 6- 13th Floor, South | | | | 208 | .02 | --- |
| | Ch. 7- 32nd Floor, North | | | | 298 | .01 | --- |
| | Ch. 8- 32nd Floor, North | | | | 208 | .02 | --- |
| | Ch. 9- 32nd Floor, South | | | | 208 | .01 | --- |
| | Ch. 10- Ground Floor, North | | | | 298 | .03 | --- |
| | Ch. 11- Ground Floor, North | | | | 208 | .03 | --- |
| | Ch. 12- Ground Floor, South | | | | 208 | .04 | --- |
| | Alhambra 900 S. Fremont (USGS) | 34.085 118.149 | (3) | 2.8 | | | |
| | 12th Floor | | | | | | (1) |
| Whittier Narrows Dam Pico Rivera (ACOE) | 34.031 118.054 | (3) | 2.3 | | | | |
| Upstream | | | | | 152 Up 062 | .05 .02 .03 | --- --- --- |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|---|--|--|-----------------|---------------------------|-------------------|-----------------------------|-----------------------|
| 26 June 1989 0327:03.9 G.m.t. Hawaii 19.362N, 155.083W Magnitude 6.2 Ms | Hawaii National Park HVO Admin. Bldg. (USGS) | 19.423 155.291 | (4) | (2) | | (1) | |
| | Hawaii National Park HVO Warehouse (USGS) | 19.434 155.264 | (4) | (2) | | (1) | |
| | Hilo, Hawaii Hilo Hospital (USGS) | 19.72 155.12 | (4) | 5.7 | 352 Up 262 | .16 .05 .07 | 0.5 --- --- |
| | Hilo, Hawaii Sewage Plant (USGS) | 19.734 155.050 | (4) | (2) | 360 Up 270 | .07 .03 .05 | --- --- --- |
| | Hilo, Hawaii University of Hawaii (USGS) | 19.707 155.083 | (4) | 5.3 | 360 Up 270 | .11 .04 .04 | 2 peaks --- --- |
| | Honokaa, Hawaii Police Station (USGS) | 20.080 155.465 | (4) | (2) | | (1) | |
| | Honomalino, Hawaii Macadamia Orchard (USGS) | 19.169 155.169 | (4) | (2) | | (1) | |
| | Laupahoehoe, Hawaii Post Office (USGS) | 19.987 155.236 | (4) | (2) | | (1) | |
| | Mauna Kea, Hawaii State Park (USGS) | 19.752 155.530 | (4) | (2) | | (1) | |
| | Mauna Kea Summit U.K. Observatory (USGS) | 19.826 155.473 | (4) | (2) | | (1) | |
| | Pahala, Hawaii Kau Hospital (USGS) | 19.20 155.47 | (4) | (2) | 360 Up 270 | .05 .02 .05 | --- --- --- |
| | Pahoa, Hawaii Fire Station (USGS) | 19.498 155.951 | (4) | (2) | 087 Up 357 | .19 .07 .21 | 5.1 --- 4.4 |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|---|--|-----------------|---------------------------|-------------------|-----------------------------|-------------------|
| 26 June 1989 0327:03.9 G.m.t. Hawaii 19.362N, 155.083W Magnitude 6.2 Ms (Continued) | Waimea, Hawaii Fire Station (USGS) | 20.026 155.664 | (4) | (2) | | (1) | |
| | Waiohinu, Hawaii K'au Baseyard (USGS) | 19.070 155.615 | (4) | (2) | | (1) | |
| 30 June 1989 0250:11.5 G.m.t. Central Alaska 64.897N, 147.707W Magnitude 3.6 ML | Fairbanks University Duckering Hall (USGS) | 64.86 147.83 | (3) | (2) | | (1) | |
| | Fairbanks University USGS Observatory (USGS) | 64.86 147.83 | (3) | (2) | | (1) | |
| 11 July 1989 0413:34.2 G.m.t. Eastern Calif. 37.418N, 118.642 Magnitude 4.4 ML | Chalfant Valley Array Fire Station (USGS) | 37.53 118.37 | (4) | 4.1 | | (1) | |
| | Chalfant Valley Array Laws (USGS) | 37.402 118.346 | (4) | 3.7 | | (1) | |
| | McGee Creek Mammoth Lakes (USGS) SMA-1 | 37.550 118.811 | (4) | (2) | 180 Up 090 | .06 .03 .03 | --- --- --- |
| | McGee Creek Mammoth Lakes (USGS) CRA-1 | 37.550 118.811 | (4) | (2) | | | |
| | 166 m Downhole | | | | | (1) | |
| | 35 m Downhole | | | | | (1) | |
| | Surface | | | | | (1) | |
| 1 m Downhole | | | | | (1) | | |
| 11 July 1989 0754:54.2 G.m.t. Eastern Calif. 37.543N, 118.438W Magnitude 3.6 ML | Chalfant Valley Array Fire Station (USGS) | 37.53 118.37 | (4) | 0.9 | | (1) | |
| | Chalfant Valley Array White Mountain Ranch (USGS) | 37.62 118.39 | (4) | 1.1 | 360 Up 270 | .06 .02 .07 | --- --- --- |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|---|--|--|-----------------|---------------------------|-------------------|-----------------------------|-------------------------|
| 18 July 1989 1107:22.1 G.m.t. Central Calif. 36.907N, 121.348W Magnitude 3.7 ML | Hollister Differential Array (USGS) | 36.888 121.413 | 07:24.1 | 2.0 | | (1) | |
| 18 July 1989 1535:36.0 G.m.t. Central Calif. 36.903N, 121.342W Magnitude 2.8 ML | Hollister Differential Array (USGS) | 36.888 121.413 | 35:37.9 | 2.0 | | (1) | |
| 20 July 1989 0558:44.0 G.m.t. Central Calif. 36.898N, 121.343W Magnitude 3.1 ML | Hollister Differential Array (USGS) | 36.888 121.413 | 58:46.0 | 2.0 | | (1) | |
| 2 August 1988- 3 August 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles 3000 Leeward Ave. (OWNR) Roof (13) | 34.06 118.29 | (3) | | | | |
| | | | | 2.3 | 090 Up 360 | .05 .07 .12 | --- --- 1 peak |
| | | | | 2.2 | 090 Up 360 | .14 .06 .11 | 0.4 --- 1 peak |
| | | | | 2.9 | 090 Up 360 | .10 .05 .11 | 1 peak --- 1 peak |
| Note: One additional record ¹ recovered at 3000 Leeward Ave. | | | | | | | |
| 18 August 1988- 4 August 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles 10550 Wilshire Blvd. (OWNR) Roof (14) | 34.063 118.431 | (3) | | | | |
| | | | | 3.8 | 287 Up 197 | .05 .04 .08 | --- --- --- |
| Note: Two additional records ¹ recovered at 10550 Wilshire Boulevard. | | | | | | | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) | |
|--|---|---|-------------------|---------------------------|-------------------|-----------------------------|-------------------|---------------|
| 8 August 1989 0813:27.5 G.m.t. Central Calif. 37.130N, 121.952W Magnitude 5.4 ML | Fremont | 37.535 | (3) | 0.7 | 180 | .06 | --- | |
| | Emerson Court (USGS) | 121.929 | | | Up 090 | .01 .03 | --- | |
| | Milpitas Rivera St. (USGS) | 37.450 121.896 | (3) | 4.9 | | (1) | | |
| | Palo Alto VA Hospital, Bldg. 1 (VA) | 37.400 122.140 | (3) | 4.5 | | | | |
| | Basement | | | | | (1) | | |
| | Roof (7th level) | | | | 302 Up 212 | .15 .06 .16 | 3.6 --- | |
| | Sunnyvale Colton Ave. (USGS) | 37.402 122.024 | (3) | 4.5 | 360 Up 270 | .06 .03 .05 | --- | |
| | Sunnyvale 1111 Lockheed Way (USGS) | 37.418 122.031 | (3) | 4.2 | 090 Up 360 | .05 .02 .05 | --- | |
| | Stanford University SLAC Test Lab. (USGS) | 37.419 122.205 | (4) | 5.4 | 360 Up 270 | .08 .07 .06 | --- | |
| | San Francisco Golden Gate Bridge (USGS) | 37.806 122.472 | (4) | (2) | | (1) | | |
| | Events prior to 9 August 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles 12121 Wilshire Blvd. (OWNR) | 34.044 118.467 | (3) | | | | |
| | Roof (15) | | | | (2) | 225 Up 135 | .05 .11 .07 | --- |
| | | | | | | 225 Up 135 | .05 .05 .08 | 1 peak --- |

Note: Five additional records¹ recovered at 12121 Wilshire Boulevard.

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|---|---|--|-----------------|---------------------------|-------------------|-----------------------------|-----------------|
| 4 June 1988- 21 August 1989 Hawaii Epicenters and magnitudes unknown | Mauna Kea, Hawaii | 19.752 | (3) | (2) | 360 | .06 | --- |
| | State Park (USGS) | 155.530 | | | Up 270 | .05 .05 | --- |
| | Note: One additional record ¹ recovered at Mauna Kea State Park. | | | | | | |
| 2 August 1988- 25 August 1989 Southern Calif. Epicenters and magnitudes unknown | Mauna Loa, Hawaii | 19.539 | (3) | (2) | 360 | .04 | --- |
| | Weather Observatory (USGS) | 155.580 | | | Up 270 | .02 .07 | --- |
| | Note: Three additional records ¹ recovered at 1150 S. Hill St. | | | | | | |
| 2 August 1988- 25 August 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles | 34.039 | (3) | | | | |
| | 1150 S. Hill St. (OWNR) | 118.259 | | | | | |
| | 10th floor | | | 3.5 | 307 Up 217 | .01 .07 .02 | --- |
| Note: Three additional records ¹ recovered at 1150 S. Hill St. | | | | | | | |
| 21 September 1989 1741:18.0 G.m.t. Northern Calif. 40.327N, 124.705W Magnitude 4.8 ML | Eel River Valley Array | 40.498 | 41:26.3 | 5.7 | | (1) | |
| | Bunker Hill FAA (USGS) | 124.294 | | | | | |
| | Eel River Valley Array | 40.563N | 41:26.6 | 6.3 | 360 | .16 | 1 peak |
| | Centerville Beach | 134.348W | | | Up | .03 | --- |
| | Navy Facility (USGS) | | | | 270 | .09 | --- |
| 30 September 1989 2349 G.m.t. Eastern Calif. Epicenter and magnitude unknown | Eel River Valley Array | 40.58 | (4) | 7.1 | 360 | .12 | 1 peak |
| | Ferndale Fire Station (USGS) | 124.26 | | | Up 270 | .03 .08 | --- |
| | Eel River Valley Array | 40.599 | (3) | 7.8 | 360 | .05 | --- |
| | Fortuna Fire Station (USGS) | 124.154 | | | Up 270 | .02 .04 | --- |
| 30 September 1989 2349 G.m.t. Eastern Calif. Epicenter and magnitude unknown | Eel River Valley Array | 40.644 | (3) | 7.7 | 360 | .08 | --- |
| | Loleta Fire Station (USGS) | 124.219 | | | Up 270 | .07 .05 | --- |
| 30 September 1989 2349 G.m.t. Eastern Calif. Epicenter and magnitude unknown | Chalfant Valley Array | 37.402 | (4) | (2) | | (1) | |
| | Laws (USGS) | 118.346 | | | | | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|---|--|--|-----------------|---------------------------|-------------------|-----------------------------|---------------------|
| 1 October 1989 2208:36.0 G.m.t. Central Calif. 36.555N, 121.177W Magnitude 3.1 ML | Bear Valley Station 1 CDF Fire Station (USGS) | 36.573 121.184 | 08:37.1 | 0.7 | | (1) | |
| | Bear Valley Station 10 Webb Residence (USGS) | 36.532 121.143 | 08:37.2 | 1.0 | | (1) | |
| 30 August 1987- 17 October 1989 Central Calif. Epicenters and magnitudes unknown | Bear Valley Station 12 Williams Ranch (USGS) | 36.658 121.249 | (3) | (2) | | (1) | |
| | Note: Seven additional records ¹ recovered at Williams Ranch. | | | | | | |
| 22 February 1988- 17 October 1989 Central Calif. Epicenter and magnitude unknown | Bear Valley Station 5 Callens Ranch (USGS) | 36.673 121.195 | (3) | 2.2 | 310 Up 220 | .09 .03 .05 | --- --- --- |
| | Bear Valley Station 6 James Ranch (USGS) | 36.504 121.101 | (3) | (2) | | (1) | |
| 22 February 1989- 17 October 1989 Central Calif. Epicenter and magnitude unknown | San Francisco VA Hospital (VA) | 37.783 122.504 | (3) | (2) | | | |
| | 7th floor | | | | 185 Up 095 | .09 .03 .06 | --- --- --- |
| 18 October 1989 0004:15.2 G.m.t. Northern Calif. 37.036N, 121.883W Magnitude 7.0 ML | Anderson Dam Morgan Hill (USGS) | 37.166 121.628 | | | | | |
| | Crest | | (3) | 2.0 | 340 Up 250 | .26 .19 .39 | 10.4 6.1 13.2 |
| | Downstream | | 04:22.9 | 3.4 | 340 Up 250 | .25 .17 .26 | 7.3 6.9 8.5 |
| | Left Abutment | | (3) | 2.3 | 340 Up 250 | .08 .05 .07 | --- --- --- |
| | | | | | | | |
| | | | | | | | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|---|--|-----------------|---------------------------|---|--|--|
| 18 October 1989 0004:15.2 G.m.t. Northern Calif. 37.036N, 121.883W Magnitude 7.0 ML (Continued) | Structure Array: Ch. 1- Mid-dam, Center Ch. 2- Mid-dam, Center Ch. 3- Mid-dam, Right Ch. 4- Toe Ch. 5- Toe Ch. 6- Toe Ch. 7- Right Crest Ch. 8- Right Crest Ch. 9- Right Crest Ch. 10- Center Crest Ch. 11- Center Crest Ch. 12- Center Crest | | (4) | 3.3 | 153 243 063 333 Up 063 333 Up 063 333 Up 063 | .11 .14 .14 .18 .16 .23 .32 .16 .43 .32 .23 .38 | 5.9 8.8 6.4 4.7 3.9 5.6 11.6 5.6 12.3 10.6 9.6 12.2 |
| | San Jose, 101/280/680 Freeway Interchange (USGS, CDOT) | 37.340 121.851 | (4) | 3.2 | 322 Up 232 | .18 .08 .13 | 10.5 --- 8.9 |
| | Calaveras Array Cherry Flat Reservoir (USGS) | 37.396 121.756 | (3) | 5.7 | 360 Up 270 | .09 .06 .07 | --- --- --- |
| | Sunnyvale Colton Avenue (USGS) | 37.402 122.024 | 04:24.8 | 5.7 | 360 Up 270 | .22 .10 .19 | 9.8 4.8 9.5 |
| | Hollister Airport Differential Array (USGS) | 36.888 121.413 | 04:26.5 | 5.6 | 255 Up 165 | .29 .16 .27 | 8.0 3.9 4.6 |
| | Palo Alto VA Hospital, Bldg. 1 (VA) | 37.40 122.14 | (3) | 3.5 | | | |
| | Basement | | | | 302 Up 212 | .34 .20 .38 | 2.2 1.4 5.0 |
| | Roof (7th level) | | | | 302 Up 212 | 1.09 .64 .79 | 13.0 12.0 13.0 |
| | Hollister City Hall Annex Basement (USGS) | 36.851 121.402 | 04:27.5 | 5.8 | 180 Up 090 | .23 .22 .25 | 7.7 6.2 6.4 |
| | Calaveras Array Calaveras Res. South (USGS) | 37.452 121.807 | (3) | 6.5 | 180 Up 090 | .13 .07 .08 | 3.5 --- --- |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) | | | | |
|--|-------------------------|--|-----------------|---------------------------|-------------------|-----------------------------|-----------------|-----|-----|-----|-----|
| 18 October 1989 0004:15.2 G.m.t. Northern Calif. 37.036N, 121.883W Magnitude 7.0 ML (Continued) | Hollister | 36.765 | (4) | 3.4 | 360 | .06 | --- | | | | |
| | SAGO Vault | 121.446 | | | Up | .05 | --- | | | | |
| | (USGS) | | | | 270 | .04 | --- | | | | |
| | Bear Valley Station 14 | 36.569 | 04:36.5 | 7.2 | 310 | .10 | 1 peak | | | | |
| | Upper Butts Ranch | 121.431 | | | Up | .08 | --- | | | | |
| | (USGS) | | | | 220 | .10 | 1 peak | | | | |
| | Milpitas | 37.437 | 04:25.0 | 4.6 | 360 | .09 | --- | | | | |
| | Rivera St. | 121.879 | | | Up | .20 | 2.0 | | | | |
| | (USGS) | | | | 270 | .11 | 2 peaks | | | | |
| | Stanford University | 37.419 | (4) | 6.2 | 360 | .29 | 6.7 | | | | |
| | SLAC Test Lab. | 122.205 | | | Up | .10 | 2 peaks | | | | |
| | (USGS) | | | | 270 | .19 | 2.6 | | | | |
| | Menlo Park | 37.468 | (3) | 3.2 | 110 | .12 | 9.5 | | | | |
| | VA Hospital, Bldg. 37 | 122.157 | | | Up | .11 | 0.9 | | | | |
| | (VA) | | | | 020 | .27 | 3.3 | | | | |
| | Fremont | 37.535 | (3) | 7.2 | 180 | .15 | 5.2 | | | | |
| | Emerson Court | 121.929 | | | Up | .07 | --- | | | | |
| | (USGS) | | | | 090 | .20 | 5.1 | | | | |
| | APEEL Array Station 9 | 37.47 | 04:31.1 | 4.7 | 227 | .11 | 1 peak | | | | |
| | Crystal Springs Res. | 122.32 | | | Up | .06 | --- | | | | |
| (USGS) | | 137 | | | .12 | 1 peak | | | | | |
| Calaveras Array | 37.597 | (3) | 5.5 | 180 | .07 | --- | | | | | |
| Sunol Fire Station | 121.880 | | | Up | .03 | --- | | | | | |
| (USGS) | | | | 090 | .10 | 1 peak | | | | | |
| APEEL Array Station 2 | 37.52 | (3) | 3.5 | 133 | .23 | 3.2 | | | | | |
| Redwood City | 122.25 | | | Up | .08 | --- | | | | | |
| (USGS) | | | | 043 | .28 | 4.4 | | | | | |
| Foster City | 37.555 | (3) | 4.8 | 360 | .12 | 3.7 | | | | | |
| Menhaden Court | 122.248 | | | Up | .09 | --- | | | | | |
| (USGS) | | | | 270 | .11 | 0.2 | | | | | |
| Del Valle Dam | 37.615 | (3) | | | | | | | | | |
| (CDWR) | 121.745 | | | | | | | | | | |
| Crest | | | | | | | | 5.4 | 065 | .08 | --- |
| | | | | | | | | | Up | .07 | --- |
| | | | | | | | | | 335 | .08 | --- |
| Toe | | | | | | | | 5.1 | 065 | .06 | --- |
| | | | | | | | | | Up | .03 | --- |
| | | | | | | | | | 335 | .04 | --- |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|--|--|-----------------|---------------------------|-------------------|-----------------------------|----------------------|
| 18 October 1989 0004:15.2 G.m.t. Northern Calif. 37.036N, 121.883W Magnitude 7.0 ML (Continued) | Livermore VA Hospital, Bldg. 62 (VA) | 37.625 121.762 | (3) | 6.7 | | | |
| | Basement | | | | 125 Up 035 | .06 .03 .05 | --- --- --- |
| | Roof (7th) | | | | 125 Up 035 | .08 .03 .15 | --- --- 4.8 |
| | Bear Valley Station 12 Williams Ranch (USGS) | 36.658 121.249 | (3) | 9.3 | 310 Up 220 | .17 .10 .16 | 5.7 1 peak 6.6 |
| | APEEL Array Station 2E Hayward, Muir School (USGS) | 37.66 122.08 | | | 054 Up 324 | .13 .06 .16 | 4.1 --- 4.4 |
| | Bear Valley Station 5 Callens Ranch (USGS) | 36.673 121.195 | 04:33.0 | 6.6 | 310 Up 220 | .07 .04 .07 | --- --- --- |
| | Bear Valley Station 1 CDF Fire Station (USGS) | 36.573 121.184 | 04:36.5 | 3.3 | 310 Up 220 | .08 .05 .08 | --- --- --- |
| | Hayward City Hall (USGS) | 37.679 122.082 | | | | | |
| | Ground Floor | | 04:34.0 | 6.4 | 064 Up 334 | .05 .03 .06 | --- --- --- |
| | Ground Site North | | 04:33.8 | 6.9 | 064 Up 334 | .06 .02 .06 | --- --- --- |
| | Ground Site South | | 04:32.5 | 6.7 | 064 Up 334 | .09 .03 .10 | --- --- 1 peak |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|---|--|-----------------|---------------------------|-------------------|-----------------------------|----------------------|
| 18 October 1989 0004:15.2 G.m.t. Northern Calif. 37.036N, 121.883W Magnitude 7.0 ML (Continued) | Structure Array: | | | | | | |
| | Ch. 1- 12th Floor, West | | | | 334 | .10 | 4.2 |
| | Ch. 2- 12th Floor, Center | | | | 334 | .10 | 1 peak |
| | Ch. 3- 12th Floor, Center | | | | 064 | .13 | 4.5 |
| | Ch. 4- 7th Floor, West | | | | 334 | .09 | --- |
| | Ch. 5- 7th Floor, Center | | | | 334 | .08 | --- |
| | Ch. 6- 7th Floor, Center | | | | 064 | .09 | --- |
| | Ch. 7- 3rd Floor, West | | | | 334 | Inoperative | |
| | Ch. 8- 3rd Floor, Center | | | | 334 | .07 | --- |
| | Ch. 9- 3rd Floor, Center | | | | 064 | .08 | --- |
| | Ch. 10- 3rd Floor, Southwest | | | | Up | .05 | --- |
| | Ch. 11- 3rd Floor, Southwest | | | | Up | .04 | --- |
| | Ch. 12- Ground Floor, West | | | | 334 | .07 | --- |
| | Calaveras Array | 37.709 | (3) | 6.8 | 360 | .08 | --- |
| | Dublin Fire Station (USGS) | 121.932 | | | Up 270 | .03 .09 | --- |
| | Bear Valley Station 10 Webb Residence (USGS) | 36.532 121.143 | 04:34.0 | 8.5 | 310 Up 220 | .10 .05 .13 | 1 peak --- 3.6 |
| | Bear Valley Station 7 Pinnacles Nat'l Mon. (USGS) | 36.483 121.180 | 04:36.4 | 5.1 | 310 Up 220 | .04 .03 .06 | --- --- --- |
| | San Francisco 1295 Shafter St. (USGS) | 37.728 122.385 | (4) | 7.1 | 360 Up 270 | .11 .05 .07 | 1 peak --- --- |
| | San Francisco State U. Thornton Hall (USGS) | 37.724 122.475 | (4) | 8.8 | 270 Up 180 | .14 .04 .11 | 3.3 --- 0.9 |
| | San Francisco 575 Market St. (USGS) | 37.79 122.40 | (3) | 8.5 | | | |
| | Basement | | | | 135 Up 045 | .08 .06 .11 | --- --- 1 peak |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|---|--|-----------------|---------------------------|-------------------|-----------------------------|--------------------|
| 18 October 1989 0004:15.2 G.m.t. Northern Calif. 37.036N, 121.883W Magnitude 7.0 ML (Continued) | Structure Array: | | | | | | |
| | Ch. 1- 42nd Level, Northwest | | | | 045 | .22 | 6.4 |
| | Ch. 2- 42nd Level, Center | | | | 225 | .19 | 6.9 |
| | Ch. 3- 42nd Level, Center | | | | 135 | .14 | 2.3 |
| | Ch. 4- 34th Level, Northwest | | | | 045 | .15 | 6.9 |
| | Ch. 5- 34th Level, Center | | | | 225 | .16 | 7.0 |
| | Ch. 6- 34th Level, Center | | | | 135 | .19 | 5.0 |
| | Ch. 7- 25th Level, Northwest | | | | 045 | .19 | 6.6 |
| | Ch. 8- 25th Level, Center | | | | 225 | .23 | 7.0 |
| | Ch. 9- 25th Level, Center | | | | 135 | .16 | 4.1 |
| | Ch. 10- Ground Level | | | | 045 | .12 | 1.4 |
| Ch. 11- Ground Level | | | | 315 | .13 | 3.9 | |
| | San Francisco 600 Montgomery St. (USGS) | 37.80 122.40 | (4) | 8.7 | | | |
| | Basement | | | | 261 Up 171 | .12 .05 .11 | 0.9 --- 1.2 |
| | 29th Floor | | | | 261 Up 171 | .15 .11 .17 | 4.5 2.1 5.1 |
| | 49th Floor | | | | 261 Up 171 | .31 .14 .29 | 6.4 5.8 11.2 |
| | Structure Array: | | | | | | |
| | Ch. 1- 21st Floor, West Central | | | | 351 | .20 | 7.1 |
| | Ch. 2- 21st Floor, South Central | | | | 351 | .17 | 3.0 |
| | Ch. 3- 21st Floor, South Central | | | | 081 | .22 | 11.8 |
| | Ch. 4- 5th Floor, West Central | | | | 351 | .27 | 7.2 |
| | Ch. 5- 5th Floor, South Central | | | | 351 | .28 | 7.1 |
| | Ch. 6- 5th Floor, South Central | | | | 081 | .24 | 4.6 |
| | Ch. 7- SE Corner, Foundation | | | | Up | .07 | --- |
| | Ch. 8- Ground Level, West Central | | | | 351 | .17 | 3.1 |
| | Ch. 9- Ground Level, Center | | | | 351 | .15 | 3.1 |
| | Ch. 10- Ground Level, Center | | | | 081 | .18 | 2.6 |
| | Ch. 11- Foundation, NW Corner | | | | 351 | .10 | 1 peak |
| | Ch. 12- Foundation, West Side | | | | 351 | .09 | --- |
| | Ch. 13- Foundation, SW Corner | | | | Up | .05 | --- |
| | Emeryville 6363 Christie Ave. (USGS) | 37.844 122.295 | (3) | 9.2 | | | |
| | Ground Site South | | | | 350 Up 260 | .22 .06 .26 | 5.2 --- 5.1 |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|---|--|-----------------|---------------------------|-------------------|-----------------------------|----------------------|
| 18 October 1989 0004:15.2 G.m.t. Northern Calif. 37.036N, 121.883W Magnitude 7.0 ML (Continued) | Structure Array 1: | | | | | | |
| | Ch. 1- Roof (31st), West Wing | | | | 350 | .27 | 9.2 |
| | Ch. 2- Roof (31st), South Wing | | | | 050 | .31 | 11.1 |
| | Ch. 3- Roof (31st), North Wing | | | | 290 | .39 | 19.8 |
| | Ch. 4- Roof (31st), Central Core | | | | 350 | .25 | 11.4 |
| | Ch. 5- Roof (31st), Central Core | | | | 260 | .38 | 16.5 |
| | Ch. 6- 21st Floor, Central Core | | | | 350 | .20 | 4.9 |
| | Ch. 7- 21st Floor, West Wing | | | | 350 | .19 | 1.7 |
| | Ch. 8- 21st Floor, South Wing | | | | 050 | .18 | 3.7 |
| | Ch. 9- 21st Floor, North Wing | | | | 290 | .24 | 6.0 |
| | Ch. 10- 13th Floor, Central Core | | | | 350 | .27 | 5.4 |
| | Ch. 11- 13th Floor, Central Core | | | | 260 | .26 | 7.0 |
| | Ch. 12- 21st Floor, Central Core | | | | 260 | .23 | 5.9 |
| | Structure Array 2: | | | | | | |
| | Ch. 1- 13th Floor, West Wing | | | | 350 | .22 | 4.4 |
| | Ch. 2- 13th Floor, South Wing | | | | 050 | .23 | 4.8 |
| | Ch. 3- 13th Floor, North Wing | | | | 290 | .32 | 7.4 |
| | Ch. 4- Ground Floor, West Wing | | | | Up | .06 | --- |
| | Ch. 5- Ground Floor, South Wing | | | | Up | .06 | --- |
| | Ch. 6- Ground Floor, Central Core | | | | Up | .05 | --- |
| | Ch. 7- Ground Floor, North Wing | | | | 260 | .22 | 1.9 |
| | Ch. 8- Ground Floor, North Wing | | | | Up | .05 | --- |
| | Ch. 9- Ground Floor, North Wing | | | | 350 | .17 | 4.5 |
| | Ch. 10- Ground Site, North | | | | 350 | .20 | 1.7 |
| | Ch. 11- Ground Site, North | | | | Up | .09 | --- |
| | Ch. 12- Ground Site, North | | | | 260 | .22 | 2.7 |
| | Berkeley, U.C. Strawberry Cyn. (UCB) | 37.87 122.24 | 04:38.6 | 9.8 | 135 Up 045 | .04 .02 .08 | --- --- --- |
| | Berkeley, U.C. Haviland Hall Basement (UCB) | 37.87 122.26 | 04:48.2 | (2) | 135 Up 045 | .03 .02 .06 | --- --- --- |
| | Berkeley 2168 Shattuck Ave. (USGS) | 37.87 122.27 | | | | | |
| | Basement, East | | 04:38.3 | 6.9 | 261 Up 171 | .09 .02 .11 | --- --- 1 peak |
| | Basement, West | | 04:38.2 | 6.8 | 261 Up 171 | .10 .03 .09 | 1 peak --- --- |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|---|--|-----------------|---------------------------|--|--|---|
| 18 October 1989 0004:15.2 G.m.t. Northern Calif. 37.036N, 121.883W Magnitude 7.0 ML (Continued) | Structure Array: Ch. 1- 13th Floor, East Core Ch. 2- 13th Floor, East Core Ch. 3- 13th Floor, Center Ch. 4- 13th Floor, Roof West Core Ch. 5- 13th Floor, Roof West Core Ch. 6- 13th Floor, Southwest Ch. 7- 13th Floor, Southwest Ch. 8- 4th Floor, Southwest Ch. 9- 4th Floor, Southwest Ch. 10- 4th Floor, West Core Ch. 11- 4th Floor, West Core Ch. 12- 4th Floor, East Core | | | | 171 261 171 171 081 081 171 171 081 081 171 171 | .13 .23 .13 .19 .21 .23 .16 .23 .11 .08 .11 .08 | 1.1 2.1 2.0 2.0 2.4 2.6 2.0 2.4 0.2 --- 1 peak --- |
| | San Francisco VA Hospital (VA) | 37.783 122.504 | (3) | (2) | | | |
| | Basement | | | | 185 Up 095 | .08 .05 .16 | --- --- 1.8 |
| | 7th Floor | | | | 185 Up 095 | .34 .08 .22 | 14.5 --- 5.6 |
| | San Francisco Golden Gate Bridge Abutment (USGS) | 37.806 122.472 | (4) | 8.5 | 360 Up 270 | .12 .06 .24 | 3.1 --- 2.9 |
| | Richmond Bulk Mail 2501 Rydin Road (USGS) | 37.884 122.302 | (4) | 7.7 | 057 Up 327 | .08 .04 .11 | --- --- 0.3 |
| | Martinez VA Hospital Basement (VA) | 37.993 122.115 | (3) | 8.9 | 020 Up 290 | .07 .03 .05 | --- --- --- |
| | Larkspur Ferry Terminal (USGS) | 37.946 122.508 | (4) | 9.1 | 360 Up 270 | .10 .06 .14 | 2 peaks --- 5.4 |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|---|--|-----------------|---------------------------|-------------------|-----------------------------|-------------------|
| 18 October 1989 0007 G.m.t. Central Calif. Epicenter and magnitude unknown | Anderson Dam Morgan Hill (USGS) SMA-1 | 37.166 121.628 | (4) | (2) | | | |
| | Downstream | | | | 340 Up 250 | .03 .02 .05 | --- --- --- |
| | Structure Array: | | | | | | |
| | Ch. 1- Mid-dam, Center | | | | 153 | .04 | --- |
| | Ch. 2- Mid-dam, Center | | | | 243 | .04 | --- |
| | Ch. 3- Mid-dam, Right | | | | 063 | .05 | --- |
| | Ch. 4- Toe | | | | 333 | .03 | --- |
| | Ch. 5- Toe | | | | Up | .03 | --- |
| | Ch. 6- Toe | | | | 063 | .03 | --- |
| | Ch. 7- Right Crest | | | | 333 | .04 | --- |
| | Ch. 8- Right Crest | | | | Up | .04 | --- |
| | Ch. 9- Right Crest | | | | 063 | .09 | --- |
| | Ch. 10- Center Crest | | | | 333 | .06 | --- |
| | Ch. 11- Center Crest | | | | Up | .04 | --- |
| Ch. 12- Center Crest | | | | 063 | .07 | --- | |
| Note: One additional record ¹ recovered at Anderson Dam Structure Array. | | | | | | | |
| | Hollister City Hall Annex Basement (USGS) | 36.851 121.402 | 07:55.25 | 1.5 | | | (1) |
| | Hollister Airport Differential Array (USGS) | 36.888 121.413 | 07:54.5 | 1.1 | | | (1) |
| 18 October 1989 0008 G.m.t. Central Calif. Epicenter and magnitude unknown | Anderson Dam Morgan Hill (USGS) | 37.166 121.628 | (4) | (2) | | | |
| | Structure Array: Ch. 1-12 | | | | | | (1) |
| 18 October 1989 0041:24.7 G.m.t. Central Calif. 37.198N, 122.105W Magnitude 5.1 ML | Anderson Dam Morgan Hill (USGS) | 37.166 121.628 | (4) | (2) | | | |
| | Downstream | | | | | | (1) |
| | Structure Array: Ch. 1-12 | | | | | | (1) |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|---|--|--|-----------------|---------------------------|-------------------|-----------------------------|-----------------|
| 18 October 1989 0041:24.7 G.m.t. Central Calif. 37.198N, 122.105W Magnitude 5.1 ML (Continued) | Milpitas Rivera St. (USGS) | 37.437 121.879 | 41:31.0 | (2) | | (1) | |
| 18 October 1989 0323:57.0 G.m.t. Central Calif. 37.163N, 121.995W Magnitude 4.0 ML | Anderson Dam Morgan Hill (USGS) Structure Array Ch. 1-12 | 37.166 121.628 | (4) | (2) | | (1) | |
| 18 October 1989 0518:34.1 G.m.t. Central Calif. 36.980N, 121.847W Magnitude 4.2 ML | Anderson Dam Morgan Hill (USGS) Structure Array: Ch. 1-12 | 37.166 121.628 | (4) | (2) | | (1) | |
| 18 October 1989 0639:10.1 G.m.t. Central Calif. 36.932N, 121.712W Magnitude 4.3 ML | Hollister City Hall Annex Basement (USGS) Hollister Airport Differential Array (USGS) | 36.851 121.402 36.888 121.413 | 39:16.6 | 5.3 | | (1) | |
| 18 October 1989- 19 October 1989 Central Calif. Epicenters and magnitudes unknown | Anderson Dam Morgan Hill (USGS) Crest | 37.166 121.628 | (3) | (2) | | (1) | |
| Note: Five additional records ¹ recovered at Anderson Dam Crest. | | | | | | | |
| 19 October 1989 1014:35.1 G.m.t. Central Calif. 36.963N, 121.843W Magnitude 4.6 ML | Bear Valley Station 14 Upper Butts Ranch (USGS) | 36.569 121.043 | 15:04.8 | (2) | | (1) | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|---|--|-----------------|---------------------------|-------------------|-----------------------------|-------------------|
| 21 October 1989 2214:57.0 G.m.t. Central Calif. 37.057N, 121.905W Magnitude 4.9 ML | Anderson Dam Morgan Hill (USGS) | 37.166 121.628 | 15:05.5 | 0.3 | | | |
| | Downstream | | | | | (1) | |
| | Crest | | | | 340 Up 250 | .03 .03 .06 | --- --- --- |
| 25 October 1989 0127:26.6 G.m.t. Central Calif. 37.078N, 121.832W Magnitude 5.0 ML | Anderson Dam Morgan Hill (USGS) | 37.166 121.628 | 27:34.1 | (2) | | | |
| | Downstream | | | | | (1) | |
| | Crest | | | | | (1) | |
| 31 October 1989 1905 G.m.t. Central Calif. Epicenter and magnitude unknown | San Jose, 101/280/680 Freeway Interchange (USGS) | 37.340 121.851 | 05:17.6 | (2) | | (1) | |
| | | | | | | | |
| 3 November 1989 1604:49.2 G.m.t. Central Calif. 36.512N, 121.120W Magnitude 2.5 ML | Bear Valley Station 6 James Ranch (USGS) | 36.504 121.101 | 04:50.7 | (2) | | (1) | |
| | | | | | | | |
| 7 November 1989 2342:37.7 G.m.t. Central Calif. 37.227N, 122.037W Magnitude 4.3 ML | Cupertino Pichetti Winery (USGS) Temporary | 37.294 122.089 | (4) | (2) | | (1) | |
| | Los Gatos, Los Altos Rod & Gun Club (USGS) Temporary | 37.239 122.106 | (4) | 1.6 | | (1) | |
| 10 November 1989 1718 G.m.t. Central Calif. Epicenter and magnitude unknown | San Jose, 101/280/680 Freeway Interchange (USGS/CDOT) | 37.340 121.851 | (4) | (2) | | (1) | |
| | | | | | | | |
| 10 November 1989 2002 G.m.t. Central Calif. Epicenter and magnitude unknown | Cupertino Pichetti Winery (USGS) Temporary | 37.294 122.089 | (4) | (2) | | (1) | |
| | Los Gatos, Los Altos Rod & Gun Club (USGS) Temporary | 37.239 122.106 | (4) | 1.6 | | (1) | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|------------------------------------|--|-----------------|---------------------------|-------------------|-----------------------------|-----------------|
| 18 October 1989- 16 November 1989 Central Calif. Epicenters and magnitudes unknown | Palo Alto | 37.40 | (3) | (2) | | | |
| | VA Hospital Bldg. 1 (VA) | 122.14 | | | | | |
| | Basement | | | | | (1) | |
| | Roof (7th level) | | | | | (1) | |
| Note: Two additional records ¹ recovered at Palo Alto VA Hospital roof level. | | | | | | | |
| 19 November 1989 0128 G.m.t. Central Calif. Epicenter and magnitude unknown | Bear Valley Station 10 | 36.532 | 28:59.7 | 1.5 | | | (1) |
| | Webb Residence (USGS) | 121.143 | | | | | |
| 20 November 1989 1339 G.m.t. Central Calif. Epicenter and magnitude unknown | San Jose, 101/280/680 | 37.340 | (4) | (2) | | | (1) |
| | Freeway Interchange (USGS/CDOT) | 121.851 | | | | | |
| 25 October 1989- 21 November 1989 Central Calif. Epicenters and Magnitudes unknown | Anderson Dam | 37.166 | (3) | (2) | | | |
| | Morgan Hill (USGS) | 121.628 | | | | | |
| | Downstream | | | | | | (1) |
| | Crest | | | | 340 | .02 | --- |
| | | | | Up | .02 | --- | |
| | | | | 250 | .06 | --- | |
| Note: One additional record ¹ recovered at Anderson Dam crest. | | | | | | | |
| Structure Array: | | | | | | | |
| | Ch. 1- Mid-dam, Center | | | | 153 | .03 | --- |
| | Ch. 2- Mid-dam, Center | | | | 243 | .04 | --- |
| | Ch. 3- Mid-dam, Right | | | | 063 | .04 | --- |
| | Ch. 4- Toe | | | | 333 | .03 | --- |
| | Ch. 5- Toe | | | | Up | .02 | --- |
| | Ch. 6- Toe | | | | 063 | .03 | --- |
| | Ch. 7- Right Crest | | | | 333 | .05 | --- |
| | Ch. 8- Right Crest | | | | Up | .04 | --- |
| | Ch. 9- Right Crest | | | | 063 | .06 | --- |
| | Ch. 10- Center Crest | | | | 333 | .03 | --- |
| | Ch. 11- Center Crest | | | | Up | .04 | --- |
| | Ch. 12- Center Crest | | | | 063 | .06 | --- |
| Note: Three additional records ¹ recovered at Anderson Dam structure array. | | | | | | | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|---|---|--|-----------------|---------------------------|-------------------|-----------------------------|----------------------|
| 24 November 1989 1445:14.6 G.m.t. Eastern Calif. 37.402N, 118.630W Magnitude 3.9 ML | Chalfant Valley Array Fire Station (USGS) | 37.53 118.37 | (4) | 0.9 | | (1) | |
| 29 November 1989 1645:13.8 G.m.t. Eastern Calif. 37.520N, 118.768W Magnitude 3.0 ML | McGee Creek Mammoth Lakes (USGS) SMA-1 | 37.550 118.811 | (4) | (2) | | (1) | |
| | McGee Creek Mammoth Lakes (USGS) CRA-1 | 37.550 118.811 | (4) | (2) | | | |
| | 166 m Downhole | | | | | (1) | |
| | 35 m Downhole | | | | | (1) | |
| | Surface | | | | | (1) | |
| | 1 m Downhole | | | | | (1) | |
| 21 October 1988- 1 December 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles 444 S. San Vicente Blvd. (OWNR) | 34.071 118.374 | (3) | | | | |
| | Roof (12th) | | | (2) | | (1) | |
| Note: Three additional records ¹ recovered at 444 S. San Vicente Boulevard roof. | | | | | | | |
| 5 December 1988- 1 December 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles 1526 N. Edgemont St. (OWNR) | 34.098 118.294 | (3) | | | | |
| | Roof (8th) | | | 2.9 | 090 Up 360 | .08 .05 .13 | --- --- 1 peak |
| | | | | 2.9 | 090 Up 360 | .15 .04 .09 | 0.2 --- --- |
| 13 December 1988- 1 December 1989 Eastern Calif. Epicenter and magnitude unknown | Long Valley Dam Crowley Lake (USGS) | 37.588N 118.705W | (3) | (2) | | | |
| | Left abutment | | | | | (1) | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|---|--|---|---|---|--|---|---|
| 14 December 1988- 1 December 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles 2005 N. Highland Ave. (OWNR) Roof (8th) | 34.106N 118.336W | (3) | | | (1) | |
| Note: One additional record ¹ recovered at 2005 N. Highland Avenue roof. | | | | | | | |
| 2 December 1989 2316:47.8 G.m.t. Southern Calif. 33.650N, 116.740W Magnitude 4.2 ML | Anza Array Garner Valley Fire Station (USGS) Anza Array Hurkey Creek Park (USGS) Anza Array Keenwild Forest Sta. (USGS) Anza Array Pinyon Flat Observ. (USGS) Anza Array Red Mountain (USGS) Anza Array Tripp Flats (USGS) Anza Array Pine Meadow Ranch (USGS) | 33.616 116.627 33.676 116.680 33.714 116.711 33.61 116.46 33.630 116.847 33.60 116.74 33.578 116.589 | (3) 16:50.6 (3) (3) 16:53.2 (3) 16:51.5 | 2.0 1.7 1.8 3.2 (2) 1.7 2.6 | 010 Up 280 135 Up 045 180 Up 090 360 Up 270 360 Up 270 360 Up 270 | .05 .05 .04 .07 .07 .08 .16 .19 .18 (1) .08 .02 .06 .07 .03 .04 .05 .03 .05 | --- --- --- --- --- --- 0.2 0.1 0.2 (1) --- --- --- --- --- --- --- --- --- |
| 17 August 1988- 4 December 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles 2049 Century Park E. (OWNR) 43rd floor | 34.058 118.412 | (3) | | | | |
| | | | | 4.9 | 320 Up 230 | .05 .07 .03 | --- --- --- |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) | |
|--|--|--|-----------------|---------------------------|-------------------|-----------------------------|-----------------|-----|
| 17 August 1988- 4 December 1989 Southern Calif. Epicenters and magnitudes unknown (Continued) | Los Angeles 2029 Century Park E. (OWNR) 43rd floor | 34.059 118.413 | (3) | 4.8 | 320 | .06 | --- | |
| | | | | | Up | .09 | --- | |
| | | | | | 230 | .02 | --- | |
| 30 July 1987- 5 December 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles 19191 S. Vermont Ave. (OWNR) 10th floor | 33.855 118.291 | (3) | 4.3 | 360 | .09 | --- | |
| | | | | | Up | .09 | --- | |
| | | | | | 270 | .07 | --- | |
| | | | | | 10.8 | 360 | .06 | --- |
| | | | | | | Up | .03 | --- |
| | | | | | | 270 | .07 | --- |
| Note: Six additional records ¹ recovered at 19191 S. Vermont Avenue 10th floor. | | | | | | | | |
| 3 August 1988- 6 December 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles 5250 Century Blvd. (OWNR) Roof (8th) | 33.945 118.372 | (3) | 2.8 | 090 | .02 | --- | |
| | | | | | Up | .08 | --- | |
| | | | | | 360 | .03 | --- | |
| Note: Four additional records ¹ recovered at 5250 Century Boulevard roof. | | | | | | | | |
| 21 October 1988- 6 December 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles 333 S. Hope St. (OWNR) 55th floor | 34.053 118.252 | (3) | 3.0 | 353 | .03 | --- | |
| | | | | | Up | .10 | 1 peak | |
| | | | | | 083 | .05 | --- | |
| | | | | | 2.8 | 353 | .01 | --- |
| | | | | | | Up | .07 | --- |
| | | | | | | 083 | .02 | --- |
| Note: Two additional records ¹ recovered at 333 S. Hope Street 55th floor. | | | | | | | | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) | |
|---|--|--|-----------------|---------------------------|--|-----------------------------|-----------------|-----|
| 7 July 1988- 12 December 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles 4929 Wilshire Blvd. (OWNR) Roof (11th) | 34.063 118.337 | (3) | 3.6 | 180 | .11 | 1.5 | |
| | | | | | Up | .08 | --- | |
| | | | | | 090 | .07 | --- | |
| | | | | | 3.0 | 180 | .06 | --- |
| | | | | | Up | .08 | --- | |
| | | | | | 090 | .06 | --- | |
| | | | | | 3.1 | 180 | .07 | --- |
| | | | | | Up | .10 | 1 peak | |
| | | | | | 090 | .05 | --- | |
| Note: Two additional records ¹ recovered at 4929 Wilshire Boulevard roof. | | | | | | | | |
| 17 August 1988- 12 December 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles 10100 Santa Monica Blvd. (OWNR) Roof (27th) | 34.061 118.416 | (3) | 4.3 | 140 | .08 | --- | |
| | | | | | Up | .08 | --- | |
| | | | | | 050 | .02 | --- | |
| | | | | | Note: One additional record ¹ recovered at 10100 Santa Monica Boulevard roof. | | | |
| 16 September 1988- 13 December 1989 Southern Calif. Epicenters and magnitudes unknown | Los Angeles 600 S. Commonwealth Ave. (OWNR) 19th floor | 34.063 118.285 | (3) | 3.5 | 028 | .06 | --- | |
| | | | | | Up | .12 | 1 peak | |
| | | | | | 298 | .07 | --- | |
| | | | | | 3.3 | 028 | .04 | --- |
| | | | | | Up | .07 | --- | |
| | | | | | 298 | .03 | --- | |
| Note: Two additional records ¹ recovered at 600 S. Commonwealth Avenue 19th floor. | | | | | | | | |
| 22 December 1989 0303:25.5 G.m.t. Southern Calif. 33.620N, 116.690W Magnitude 3.4 ML | Anza Array Garner Valley Fire Station (USGS) | 33.616 166.627 | (3) | 1.8 | | ((1)) | | |

Table 1. National Cooperative Strong-Motion Network Accelerograph Records Recovered During 1989 - *Continued*

| Earthquake | Station Name (Owner) | Coordinates (Lat. ° N Long. ° W) | Trigger time | S-minus trigger (s) | Direction (az) | Maximum amplitude (g) | Duration (s) |
|--|---|---|-----------------|---------------------------|--------------------------|-----------------------------|-------------------|
| 24 December 1989 0845:58.9 G.m.t. Washington 46.650N, 122.116W Magnitude 5.1 ML | Howard Hanson Dam (ACOE) Crest | 47.282 121.791 | (3) | (2) | 050 Up 320 | .02 .02 .08 | --- --- --- |
| 28 December 1989 0913:17.3 G.m.t. Hawaii 19.333N, 155.212W Magnitude 5.0 ML | Kealakekua, Hawaii Kona Hospital (USGS) Mauna Loa, Hawaii Observatory (USGS) | 19.523 155.879 19.539 155.580 | (4) | (2) | | (1) | |
| 28 December 1989 0941:08.1 G.m.t. Southern Calif. 34.190N, 117.390W Magnitude 4.5 ML | Loma Linda Medical Center (USGS) San Bernardino Array San Bernardino Valley College (USGS) San Bernardino County Government Center (USGS) | 34.050 117.263 34.086 117.309 34.106 117.287 | (3) | (2) | | (1) | |
| | | | (3) | 3.1 | | (1) | |
| | | | 41:12.0 | 2.6 | | (1) | |

¹ Less than 0.05 g at ground-level or less than 0.10 g at non-ground-level stations.

² Questionable or indeterminable.

³ WWVB time code illegible, or instrument not equipped with a radio receiver; correlation of accelerogram with event may be questionable or identity of event unknown.

⁴ Contains internal clock for event correlation only; accuracy is widely variable