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Catalogue of U.S. Geological Survey Strong-Motion Records, 1988

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Catalogue of U.S. Geological Survey Strong-Motion Records, 1988

Compiled by JOSEPHINE C. SWITZER and
RONALD L. PORCELLA

U.S. GEOLOGICAL SURVEY CIRCULAR 1057

U.S. DEPARTMENT OF THE INTERIOR
MANUEL LUJAN, JR., Secretary

U.S. GEOLOGICAL SURVEY
Dallas L. Peck, Director

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1990

For sale by the
Books and Open-File Reports Section
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Denver, CO 80225

Library of Congress Cataloging Card No. 83-600616

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 nearly 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 1988. Unless otherwise noted, event data are from the "Preliminary Determination of Epicenters," published monthly by the USGS.

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Catalogue of U.S. Geological Survey Strong-Motion Records, 1988

Compiled by Josephine C. Switzer *and* Ronald L. Porcella

INTRODUCTION

The National Cooperative Strong-Motion Network (NCSMN), with stations in 40 states and Puerto Rico, produced nearly 300 accelerograph records at recording sites in California, Alaska, and Hawaii during the period January–December 1988; more than 80 percent were recorded in California. The network has produced an annual average of 250 records for the years 1974 through 1987. Although there were no significant strong-motion events recorded during 1988, there were nine notable earthquakes in the magnitude range 4.6 to 5.6 that produced several interesting suites of records at a total of 87 NCSMN stations. Eight of these events occurred in California and one in southern Alaska.

An M_L=4.7 earthquake in the Imperial Valley of California triggered 11 stations on January 28 (G.m.t.); the event was located on the Superstition Hills fault with an epicenter very near the Parachute Test Site recording station, where the maximum horizontal ground acceleration reached 0.17 *g*.

On February 11 an M_L=4.7 aftershock of the October 1, 1987, Whittier Narrows earthquake triggered 19 accelerograph stations in the Los Angeles region. This aftershock was located approximately 3 km northeast of the main shock epicenter and produced strong-motion recordings at eight buildings, nine dam/reservoir facilities, one hospital, and one ground site (Acosta and others, 1988). Peak horizontal motion exceeded 0.2 *g* at three locations: the basement of a 10-story building in Whittier, the upstream station at Whittier Narrows Dam, and the abutment station at Garvey Reservoir.

On February 20, an M_L=5.3 earthquake in central California triggered three accelerographs in the Hollister region (Salsman and Forshee, 1988). Peak recorded ground motion reached 0.21 *g* on one of 13 horizontal components operating at the Hollister Differential Array.

Two earthquakes along the Calaveras fault zone in northern California on June 13 and November 10 each triggered seven strong-motion stations at epicentral distances in the range 8 to 28 km. The M_L=5.4 June 13 event occurred at a depth of 7 km and produced a peak horizontal ground acceleration of 0.11 *g* in Fremont. The M_L=4.8 November 10 event occurred at a 9-km depth and produced a peak horizontal ground acceleration of 0.17 *g* at the Interstate 280/101 Interchange abutment site in San Jose. The epicentral distances for these two peak recordings were 22 and 9 km, respectively (Salsman and Switzer, 1990).

On June 26, a magnitude 4.6 (M_L) earthquake near Upland in southern California produced significant ground motions at three of four stations triggered by this event. Peak motions and their locations were 0.12 *g* at Weymouth Filter Plant, 0.23 *g* at Live Oak Reservoir Abutment, and 0.31 *g* at San Antonio Dam Downstream.

An M_L=4.9 earthquake on December 3 near Pasadena triggered strong-motion instrumentation at 23 stations in the Los Angeles region; epicentral distances were in the range 8 to 42 km (Acosta and Johnson, 1989). Acceleration records were recovered from 45 instruments located at five ground sites, four dams, one reservoir, two filter plants, three hospitals, and eight buildings. Maximum horizontal ground acceleration was 0.12 *g*, recorded at two stations in the vicinity of Los Angeles.

Manuscript approved for publication, September 21, 1990.

On December 16 an M_L=4.8 earthquake in southern California triggered seven stations in the North Palm Springs region. Peak recorded ground acceleration was 0.15 *g* at the Whitewater Trout Farm station, located on rock approximately 5 km north of the San Andreas fault zone.

REFERENCES

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Salsman, M.J., and Forshee, R.D., 1988, Strong-motion data from the Hollister earthquake of February 20, 1988: U.S. Geological Survey Open-File Report 88-565, 12 p.

Salsman, M.J., and Switzer, J.C., in press, Strong-motion records from the Calaveras fault earthquakes of June 13, 1988, November 10, 1988, and April 3, 1989: U.S. Geological Survey Open-File Report 90–481, 36 p.

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988

[Station owners: ACOE, U.S. Army Corps of Engineers; BECH, Bechtel Power Corporation; CLA, City of Los Angeles; GLDN, U.S. Geological Survey, Golden, Colorado; JCG, JCG Finance Corporation of America; MANC, Municipality of Anchorage, Alaska; MWD, Metropolitan Water District of Southern Calif.; OWNR, Owner of building; UCB, University of California at Berkeley; USGS, U.S. Geological Survey; VA, U.S. Veterans Administration. Instrument trigger time in minutes and seconds after the hour listed in earthquake column. Trigger time in brackets is a P-wave arrival time as event occurred while instrument was operating. 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.]

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
7 November 1987 1506:01.2 G.m.t. Central Calif. 36.583N, 121.218W Magnitude 4.0 ML	Bear Valley Station 14 Upper Butts Ranch (USGS)	36.569N 121.043W	06:04.9	2.9		(*1*)	
4 January 1988 1309 G.m.t. Southern Calif. Epicenter and magnitude unknown	Superstition Mountain Camera Site (USGS)	32.955N 115.823W	09:42.6	(*2*)		(*1*)	
	Note: One additional record[1] recovered at Superstition Mountain Camera Site.						
12 January 1988 0444 G.m.t. Central Calif. Epicenter and magnitude unknown	McGee Creek Crowley Lake (USGS) (Triaxial)	37.550N 118.811W	44:20.6[4]	(*2*)		(*1*)	
	McGee Creek Crowley Lake (USGS) (Multi-channel)	37.550N 118.811W	44:20.6[4]				
	166 m Downhole			(*2*)		(*1*)	
	35 m Downhole			(*2*)		(*1*)	
	1 m Downhole			(*2*)		(*1*)	
	Surface			(*2*)		(*1*)	
2 October 1987- 20 January 1988 Southern Calif. Epicenter and magnitude unknown	San Antonio Dam Upland (ACOE)	34.157N 117.676W	(*3*)	(*2*)			
	Crest					(*1*)	
	Downstream					(*1*)	
28 January 1988 0254:02.3 G.m.t. Southern Calif. 32.910N, 115.680W Magnitude 4.7 ML	Brawley Airport Hangar (USGS)	32.991N 115.512W	(*3*)	3.0	315 Up 225	.09 .03 .07	0.0 0.0 0.0

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
28 January 1988 0254:02.3 G.m.t. Southern Calif. 32.910N, 115.680W Magnitude 4.7 ML *(Continued)*	El Centro Parachute Test Site (USGS)	32.929N 115.699W	54:04.1	1.7	315 Up 225	.16 .08 .17	0.5 0.0 0.3
	El Centro Array #5 James Road (USGS)	32.855N 115.466W	54:11.8	(*2*)		(*1*)	
	El Centro Array #9 Commercial Avenue (USGS)	32.794N 115.549W	(*3*)	3.3		(*1*)	
	El Centro Array #10 Community Hospital (USGS)	32.780N 115.567W	(*3*)	(*2*)		(*1*)	
	El Centro Array #11 McCabe School (USGS)	32.752N 115.594W	54:07.7	4.1		(*1*)	
	El Centro Meadows Union School (USGS)	32.800N 115.473W	54:07.2	3.7	230 Up 140	.08 .01 .05	0.0 0.0 0.0
	El Centro Array #8 Cruickshank Road (USGS)	32.811N 115.532W	54:06.2	3.3	230 Up 140	.15 .05 .16	0.1 0.0 0.1
	El Centro Array #6 Huston Road (USGS)	32.839N 115.487W	54:06.9	3.2	230 Up 140	.05 .02 .07	0.0 0.0
	El Centro Differential Array (USGS)	32.796N 115.535W	54:06.7	3.3	360 Up 270	.04 .01 .05	0.0 0.0 0.0
	Note: One additional record[1] recovered at El Centro Differential Array.						
	Calexico Fire Station (USGS)	32.669N 115.492W	54:11.6	(*2*)		(*1*)	
1 February 1988 1142 G.m.t. Hawaii Epicenter and magnitude unknown	Honokaa, Hawaii Police Station (USGS)	20.080N 155.465W	42:26.4[4]	(*2*)		(*1*)	
1 February 1988 1518 G.m.t. Hawaii Epicenter and magnitude unknown	Honokaa, Hawaii Police Station (USGS)	20.080N 155.465W	18:00.2[4]	(*2*)		(*1*)	

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
7 February 1988 0846:58.6 G.m.t. Southern Alaska 60.296N, 152.972W Magnitude 5.6 MB	Anchorage Fire Station #4 (MANC)	61.182N 149.848W	(*3*)	18.6		(*1*)	
	Note: Seven additional records[1] recovered at Anchorage Fire Station #4.						
	Anchorage Fire Station #5 (MANC)	61.186N 149.921W	(*3*)	(*2*)		(*1*)	
	Anchorage New Federal Building (USGS)	61.216N 149.883W	(*3*)	(*2*)		(*1*)	
	Anchorage Lutheran Church (USGS/GLDN)	61.209N 149.891W	47:54.4[4]	(*2*)		(*1*)	
	Homer Airport Fire Station (USGS)	59.64 N 151.50 W	(*3*)	14.2		(*1*)	
	Seward Fire Station #1 (USGS)	60.101N 149.434W	(*3*)	(*2*)			
	Basement				(*1*)		
11 February 1988 1525:55.6 G.m.t. Southern Calif. 34.080N, 118.050WL Magnitude 4.7 ML	Whittier Narrows Dam Pico Rivera (ACOE)	34.020N 118.053W	(*3*)	2.2			
	Crest				033 Up 303	.11 .09 .13	1 peak 0.0 1 peak
	Upstream				152 Up 062	.24 .19 .24	1.2 0.7 0.7
	Garvey Reservoir Monterey Park (MWD)	34.050N 118.114W	(*3*)	2.5			
	Abutment Bldg.				060 Up 330	.22 .11 .15	0.3 1 peak 0.6
	Alhambra 900 S. Fremont (USGS)	34.085N 118.149W	(*3*)	1.1			
	Basement				090 Up 360	.07 .03 .06	0.0 0.0 0.0

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
11 February 1988 1525:55.6 G.m.t. Southern Calif. 34.080N, 118.050W Magnitude 4.7 ML *(Continued)*	Alhambra, 900 S. Fremont *(Continued)*						
	6th Floor				090	.06	0.0
					Up	.03	0.0
					360	.06	0.0
	12th Floor				090	.03	0.0
					Up	.05	0.0
					360	.03	0.0
	Whittier 7215 Bright Ave. (USGS)	33.976N 118.036W	(*3*)	2.1			
	Basement				180	.20	1 peak
					Up	.06	0.0
					090	.12	1 peak
	5th Floor				180	.13	1 peak
					Up	.13	1 peak
					090	.20	0.5
	10th Floor				180	.09	0.0
					Up	.12	1 peak
					090	.15	0.3
	Norwalk 12400 Imperial Highway (USGS/BECH)	33.916N 118.067W	(*3*)				
	Basement					(*1*)	
	4th Floor				090	.03	0.0
					Up	.05	0.0
					360	.08	0.0
	Roof				090	.03	0.0
					Up	.06	0.0
					360	.09	0.0
	South Ground Site				090	.05	0.0
					Up	.04	0.0
					360	.07	0.0
	Norwalk 12440 Imperial Highway (USGS/BECH)	33.916N 118.065W	26:00.4	3.8			
	Basement				090	.05	0.0
					Up	.04	0.0
					360	.06	0.0
	North Ground Site		26:01.7	3.6	090	.07	0.0
					Up	.05	0.0
					360	.09	0.0

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
11 February 1988 1525:55.6 G.m.t. Southern Calif. 34.080N, 118.050W Magnitude 4.7 ML *(Continued)*	Norwalk, 12440 Imperial Highway *(Continued)*						
	South Ground Site		26:01.7	3.6	090	.05	0.0
					Up	.07	0.0
					360	.08	0.0
	Structure Array 1:						
	Ch. 1- 7th Floor, Center				090	.03	0.0
	Ch. 2- 5th Floor, Center				090	.03	0.0
	Ch. 3- 2nd Floor, Center				090	.05	0.0
	Ch. 4- 1st Floor, Center				090	.08	0.0
	Ch. 5- Basement, East				360	.08	0.0
	Ch. 6- 5th Floor, West-Center				360	.11	1 peak
	Ch. 7- Basement, Center				Up	.05	0.0
	Ch. 8- Basement, Center				090	.05	0.0
	Ch. 9- Basement, Center				360	.08	0.0
	Ch. 10- 30 ft. Downhole, Bldg. Center				Up	.04	0.0
	Ch. 11- 30 ft. Downhole, Bldg. Center				090	.03	0.0
	Ch. 12- 30 ft. Downhole, Bldg. Center				360	.05	0.0
	Structure Array 2: (frequent hesitations of approx. 0.1 s on this film)						
	Ch. 13- 7th Floor, East				360	.13	1 peak
	Ch. 14- 5th Floor, East				360	.08	0.0
	Ch. 15- 2nd Floor, East				360	.09	0.0
	Ch. 16- 1st Floor, East				360	.09	0.0
	Ch. 17- 7th Floor, Center				360	.15	2 peaks
	Ch. 18- 5th Floor, Center				360	Inoperative	
	Ch. 19- 2nd Floor, Center				360	.10	1 peak
	Ch. 20- 1st Floor, Center				360	.11	1 peak
	Ch. 21- 7th Floor, West				360	.10	1 peak
	Ch. 22- 5th Floor, West				360	.06	0.0
	Ch. 23- 2nd Floor, West				360	.08	0.0
	Ch. 24- 1st Floor, West				360	.09	0.0
	Los Angeles 4407 Jasper Street (USGS)	34.081N 118.188W	*(3)*	0.3	130	.06	0.0
					Up	.03	0.0
					040	.07	0.0
	Los Angeles Bulk Mail Facility (USGS)	33.996N 118.162W	*(3)*	3.1	010	.14	0.1
					Up	.08	0.0
					280	.11	2 peaks
	Los Angeles 1111 Sunset Blvd. (MWD)	34.067N 118.248W	*(3)*	*(2)*			
	Basement					*(1)*	
	4th Floor					*(1)*	
	Roof level (8th)					*(1)*	

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
11 February 1988 1525:55.6 G.m.t. Southern Calif. 34.080N, 118.050W Magnitude 4.7 ML *(Continued)*	Los Angeles 1100 Wilshire Blvd. (JCG/USGS)	34.052N 118.263W	26:05.0	(*2*)			
	Basement 3 NE					(*1*)	
	Basement 3 SE					(*1*)	
	Basement 4 NW					(*1*)	
	Structure Array:						
	Ch. 1- 12th Floor, North					(*1*)	
	Ch. 2- 12th Floor, North					(*1*)	
	Ch. 3- 12th Floor, South					(*1*)	
	Ch. 4- 13th Floor, North					(*1*)	
	Ch. 5- 13th Floor, North					(*1*)	
	Ch. 6- 13th Floor, South					(*1*)	
	Ch. 7- 32nd Floor, North					(*1*)	
	Ch. 8- 32nd Floor, North					(*1*)	
	Ch. 9- 32nd Floor, South					(*1*)	
	Ch. 10- Ground Floor, North					(*1*)	
	Ch. 11- Ground Floor, North					(*1*)	
	Ch. 12- Ground Floor, South					(*1*)	
	Orange County Reservoir, Brea (MWD)	33.936N 117.884W	(*3*)	(*2*)			
	Abutment					(*1*)	
	Brea Dam Fullerton (ACOE)	33.890N 117.925W	(*3*)	3.9			
	Crest				130 Up 040	.07 .05 .18	0.0 0.0 0.7
	Left Abutment				130 Up 040	.05 .04 .07	0.0 0.0 0.0
	Downstream				130 Up 040	.05 .04 .09	0.0 0.0 0.0
	Carbon Canyon Dam Brea (ACOE)	33.914N 117.839W	(*3*)	2.5			
	Crest				130 Up 040	.05 .02 .05	0.0 0.0 0.0

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
11 February 1988 1525:55.6 G.m.t. Southern Calif. 34.080N, 118.050W Magnitude 4.7 ML *(Continued)*	Diemer Filter Plant Yorba Linda (MWD)	33.913N 117.819W	(*3*)	3.5			
	Admin. Bldg. Basement					(*1*)	
	Reservoir Roof					(*1*)	
	Long Beach, CSULB Humanities Bldg. Basement (USGS)	33.777N 118.112W	(*3*)	2.2		(*1*)	
	Long Beach VA Hospital (VA)	33.778N 118.118W	(*3*)	3.0			
	Basement					(*1*)	
	6th Floor					(*1*)	
	11th Floor					(*1*)	
	San Antonio Dam Upland (ACOE)	34.157N 117.676W	(*3*)	(*2*)			
	Crest				090 Up 360	.02 .02 .06	0.0 0.0 0.0
	Prado Dam Corona (ACOE)	33.890N 117.641W	(*3*)	(*2*)			
	Crest					(*1*)	
	Downstream				090 Up 360	.07 .02 .08	0.0 0.0 0.0
	Jensen Filter Plant Balboa Ave. (MWD)	34.312N 118.496W	(*3*)	(*2*)			
	Administration Bldg.					(*1*)	
	Generator Bldg.					(*1*)	
	Reservoir Roof					(*1*)	
20 February 1988 0447:04.7 G.m.t. Hawaii 19.354N, 155.026W Magnitude 4.1 ML	Hawaii National Park Wahaula Maint. Center (USGS)	19.329N 155.031W	47:05.7[4]	1.4		(*1*)	

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
20 February 1988 0839:57.5 G.m.t. Central Calif. 36.803N, 121.302W Magnitude 5.3 ML	Hollister Damler Residence (UCB)	36.807N 121.408W	(3)	1.6	360 Up 270	.06 .05 .06	0.0 0.0 0.0
	Hollister Sago Vault (UCB)	36.765N 121.446W	40:02.8	0.4	360 Up 270	.06 .02 .05	0.0 0.0 0.0
	Hollister Differential Array, (Triaxial) (USGS)	36.888N 121.413W	(3)	2.9	255 Up 165	.11 .07 .17	0.1 0.0 1 peak
2 March 1988 0841:56.5 G.m.t. Hawaii 19.329N, 155.213W Magnitude 4.9 MB	Kealakekua, Hawaii Kona Hospital (USGS)	19.523N 155.879W	42:16.1[4]	(2)		(1)	
	Pahala, Hawaii Kau Hospital (USGS)	19.20 N 155.47 W	(3)	(2)		(1)	
	Hawaii National Park Volcano Observatory (USGS)	19.423N 155.291W	42:05.3[4]	1.2		(1)	
6 March 1988 2235:38.1 G.m.t. Gulf of Alaska 56.953N, 143.032W Magnitude 7.4 ML	Bancas Point (USGS)	59.953N 139.635W	38:26.6[4]	(2)		(1)	
	Sunshine Point (USGS)	60.180N 142.838W	38:22.9[4]	(2)		(1)	
	Guyot Hills (USGS)	60.146N 141.472W	38:29.3[4]	(2)		(1)	
	Yakutat USGS Building (USGS)	59.543N 139.726W	(3)	(2)		(1)	
13 March 1988 Time incomplete Hawaii Epicenter and magnitude unknown	Hawaii National Park Wahaula Maint. Center (USGS)	19.329N 155.031W	28:48.5[4]	1.5		(1)	
21 March 1988 Time incomplete Central Calif. Epicenter and magnitude unknown	Bear Valley Station 10 Webb Residence (USGS)	36.532N 121.143W	(3)	1.4		(1)	
26 March 1988 1454:20.4 G.m.t. Southern Calif. 34.000N, 118.710W Magnitude 3.7 ML	Malibu Canyon Monte Nido Fire Stn. (USGS)	34.08 N 118.69 W	54:23.2	1.8		(1)	

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
28 March 1988 0333:40.8 G.m.t. Hawaii 19.936N, 156.445W Magnitude 5.6 MB	Kealakekua, Hawaii Kona Hospital (USGS)	19.523N 155.879W	33:57.5[4]	(2)		(1)	
	Waimea, Hawaii Fire Station (USGS)	20.026N 155.664W	34:12.6[4]	(2)		(1)	
4 April 1988 2045:48.7 G.m.t. Central Calif. 36.303N, 120.405W Magnitude 3.5 ML	Coalinga Oil City (USGS)	36.229N 120.360W	45:50.6	2.1		(1)	
21 April 1988 2346 G.m.t. Central Calif. Epicenter and magnitude unknown	Chalfant Valley Array Laws (USGS)	37.402N 118.346W	46:09.4[4]	0.5		(1)	
11 May 1988 2314:17.8 G.m.t. Hawaii 19.797N, 155.518W Magnitude 4.2 ML	Honokaa, Hawaii Police Station (USGS)	20.080N 155.465W	14:37.4[4]	(2)		(1)	
	Waimea, Hawaii Fire Station (USGS)	20.026N 155.664W	14:38.5[4]		360 Up 270	.12 .03 .06	0.1 0.0 0.0
16 May 1988 1740:18.5 G.m.t. Gulf of Alaska 59.378N, 146.338W Magnitude 3.6 ML	Middleton Island FAA TS Bldg. (USGS)	59.443N 146.332W	39:18.8[4]	(2)	(1)		
17 May 1988 1938:37.9 G.m.t. Southern Calif. 33.240N, 116.250W Magnitude 3.8 ML	Borrego Springs Scripps Clinic (USGS)	33.210N 116.330W	38:42.1	(2)		(1)	
28 May 1988 1808:55.5 G.m.t. Eastern Calif. 37.497N, 118.880W Magnitude 4.1 ML	McGee Creek Crowley Lake (USGS) (Triaxial)	37.550N 118.811W	08:58.1	(2)	180 Up 090	.06 .05 .06	0.0 0.0 0.0
	McGee Creek Crowley Lake (USGS) (Multi-channel)	37.550N 118.811W	08:58.1				
	166 m Downhole			(2)		(1)	
	35 m Downhole			(2)		(1)	

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
28 May 1988 1808:55.5 G.m.t. Eastern Calif. 37.497N, 118.880W Magnitude 4.1 ML *(Continued)*	McGee Creek *(Continued)*						
	1 m Downhole			(2)		(1)	
	Surface			(2)	360	.06	0.0
					Up	.05	0.0
					090	.07	0.0
4 February 1987- 4 June 1988 Hawaii Epicenters and magnitudes unknown	Hilo, Hawaii Hilo Hospital (USGS)	19.72 N 155.12 W	(3)	(2)		(1)	
	Honomalino, Hawaii (USGS)	19.169N 155.868W	(3)	(2)		(1)	
	Note: One additional record[1] recovered at Honomalino.						
	Mauna Kea, Hawaii State Park (USGS)	19.752N 155.530W	(3)	(2)		(1)	
	Note: Two additional records[1] recovered at Mauna Kea State Park.						
	Mauna Loa, Hawaii Weather Observatory (USGS)	19.539N 155.580W	(3)	(2)		(1)	
10 June 1988 2306:43.0 G.m.t. Southern Calif. 34.940N, 118.740W Magnitude 5.4 ML	Jensen Filter Plant Balboa Ave. (MWD)	34.312N 118.496W	(3)	(2)			
	Basement					(1)	
	Generator Room					(1)	
	Reservoir Roof					(1)	
	Leona Valley Fire Station (USGS)	34.62 N 118.29 W	07:00.2	(2)		(1)	
11 September 1987- 12 June 1988 Alaska Epicenters and magnitudes unknown	Whittier RR Dock Building (USGS)	60.778N 148.692W	(3)	(2)		(1)	
	Note: One additional record[1] recovered at Whittier RR Dock Building.						
13 June 1988 0145:36.8 G.m.t. Central Calif. 37.385N, 121.772W Magnitude 5.4 ML	Anderson Dam Morgan Hill (USGS)	37.166N 121.626W	45:43.5	3.1			
	Downstream					(1)	

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
13 June 1988 0145:36.8 G.m.t. Central Calif. 37.385N, 121.772W Magnitude 5.4 ML *(Continued)*	Livermore VA Hospital Building 62 (VA)	37.625N 121.762W	(*3*)	3.7			
	Basement					(*1*)	
	Roof (7th Floor)				125	.03	0.0
					Up	.01	0.0
					035	.06	0.0
	Milpitas Rivera Street (USGS)	37.437N 121.879W	(*3*)	2.9	360	.09	0.0
					Up	.02	0.0
					270	.07	0.0
	Calaveras Array Sunol Regional Park (USGS)	37.515N 121.830W	(*3*)	2.1		(*1*)	
	Calaveras Array Calaveras Reserv. So. (USGS)	37.452N 121.807W	(*3*)	1.5	180	.07	0.0
					Up	.03	0.0
					090	.08	0.0
	Calaveras Array Sunol Forest Fire Sta. (USGS)	37.597N 121.880W	(*3*)	(*2*)	180	.06	0.0
					Up	.03	0.0
					090	.06	0.0
	Fremont, Emerson Ct. Mission San Jose (USGS)	37.535N 121.929W	(*3*)	3.5	180	.06	0.0
					Up	.05	0.0
					090	.10	1 peak
21 June 1988 0150:25.1 G.m.t. Hawaii 19.314N, 155.490W Magnitude 4.0 MD	Pahala, Hawaii Kau Hospital (USGS)	19.20 N 155.47 W	50:25.7[4]	(*2*)		(*1*)	
26 June 1988 1504:58.4 G.m.t. Southern Calif. 34.140N, 117.710W Magnitude 4.6 ML	Live Oak Reservoir LaVerne (MWD)	34.137N 117.753W	(*3*)	0.9			
	Abutment				180	.23	0.6
					Up	.08	0.0
					090	.12	0.2

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
26 June 1988 1504:58.4 G.m.t. Southern Calif. 34.140N, 117.710W Magnitude 4.6 ML *(Continued)*	Live Oak Reservoir *(Continued)*						
	Structure Array:						
	Channel 1 - Center Crest				155	.22	0.3
	Channel 2 - Center Crest				Up	.10	1 peak
	Channel 3 - Center Crest				245	.28	0.5
	Channel 4 - Left Crest				155	.21	0.9
	Channel 5 - Left Crest				245	.30	0.6
	Channel 6 - Left Slope				245	.20	0.3
	Channel 7 - Center Slope				155	.16	0.5
	Channel 8 - Center Slope				Up	.05	0.0
	Channel 9 - Center Slope				245	.19	0.4
	Channel 10 - Center Toe				155	.19	0.4
	Channel 11 - Center Toe				Up	.07	0.0
	Channel 12 - Center Toe				245	.16	0.1
	San Antonio Dam Upland (ACOE)	34.157N 117.676W	(*3*)	0.3			
	Right Abutment				090	.19	0.5
					Up	.17	0.3
					360	.13	0.4
	Crest				090	.26	0.7
					Up	.33	1.7
					360	.48	2.2
	Downstream				090	.18	0.7
					Up	.17	1.5
					360	.31	0.7
	Weymouth Filter Plant LaVerne (MWD)	34.115N 117.779W	(*3*)	1.5			
	Ground Site				015	.12	1 peak
					Up	.08	0.0
					285	.06	0.0
	Reservoir Roof				015	.13	1.2
					Up	.16	2.0
					285	.10	1 peak
	Diemer Filter Plant Yorba Linda (MWD)	33.913N 117.819W	(*3*)	3.7			
	Administration Bldg. Basement					(*1*)	
	Reservoir Roof					(*1*)	

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
11 January 1988-29 June 1988 Central Calif. Epicenters and magnitudes unknown	Palo Alto VA Hospital, Bldg. 1 (VA)	37.40 N 122.14 W	(3)	(2)			
	Roof (7th Level)					.04	0.0
						.03	0.0
						.07	0.0
	Note: One additional record[1] recovered at Palo Alto VA Hospital, Building 1 Roof.						
2 July 1988 0026:58.1 G.m.t. Southern Calif. 33.480N, 116.440W Magnitude 4.0 ML	Anza Array Tule Canyon (USGS)	33.47 N 116.64 W	(3)	2.1		(1)	
	Anza Array Pine Meadow Ranch (USGS)	33.578N 116.589W	27:04.5	(2)		(1)	
	Anza Array Rarick Springs (USGS)	33.568N 116.510W	(3)	(2)		(1)	
24 May 1987-3 July 1988 Alaska Epicenters and magnitudes unknown	Talkeetna FAA-VOR (USGS)	62.30 N 150.10 W	(3)	(2)		(1)	
	Note: Two additional records[1] recovered at Talkeetna FAA-VOR.						
4 July 1988 0538:09.3 G.m.t. Hawaii 19.221N, 155.459W Magnitude 5.2 ML	Hawaii National Park Volcano Observatory (USGS)	19.423N 155.291W	38:21.3[4]	(2)		(1)	
	Pahala, Hawaii Kau Hospital (USGS)	19.20 N 155.47 W	38:02.8[4]	0.7	360	.11	0.2
					Up	.09	0.0
					270	.15	0.6
	Waiohinu, Hawaii Kau Baseyard (USGS)	19.070N 155.615W	(3)	(2)	360	.06	0.0
					Up	.06	0.0
					270	.16	0.2
6 July 1988 1055:05.5 G.m.t. Southern Calif. 34.140N, 117.710W Magnitude 3.8 ML	Diemer Filter Plant Yorba Linda (MWD)	33.913N 117.819W	(3)	3.2			
	Administration Bldg. Basement					(1)	
	Reservoir Roof					(1)	

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
6 July 1988 1055:05.5 G.m.t. Southern Calif. 34.140N, 117.710W Magnitude 3.8 ML *(Continued)*	San Antonio Dam Upland (ACOE)	34.157N 117.676W	(3)	(2)			
	Right Abutment					(1)	
	Crest				090	.09	0.0
					Up	.02	0.0
					360	.08	0.0
	Downstream				090	.03	0.0
					Up	.02	0.0
					360	.05	0.0
	Live Oak Reservoir LaVerne (MWD)	34.137N 117.753W	(3)	(2)			
	Abutment				180	.07	0.0
					Up	.03	0.0
					090	.05	0.0
	Structure Array:						
	Channel 1 - Center Crest				155	.06	0.0
	Channel 2 - Center Crest				Up	.03	0.0
	Channel 3 - Center Crest				245	.06	0.0
	Channel 4 - Left Crest				155	.09	0.0
	Channel 5 - Left Crest				245	.07	0.0
	Channel 6 - Left Slope				245	.05	0.0
	Channel 7 - Center Slope				155	.05	0.0
	Channel 8 - Center Slope				Up	.02	0.0
	Channel 9 - Center Slope				245	.01	0.0
	Channel 10 - Center Toe				155	.05	0.0
	Channel 11 - Center Toe				Up	.02	0.0
	Channel 12 - Center Toe				245	.03	0.0
	Weymouth Filter Plant LaVerne (MWD)	34.115N 117.779W	(3)	1.3			
	Ground Site				015	.05	0.0
					Up	.03	0.0
					285	.04	0.0
	Reservoir Roof				015	.06	0.0
					Up	.08	0.0
					285	.05	0.0

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
26 July 1988 0326:55.9 G.m.t. Central Calif. 36.558N, 121.175W Magnitude 4.7 ML	Bear Valley Station 1 CDF Fire Station (USGS)	36.573N 121.184W	26:56.6	0.9	310 Up 220	.14 .08 .31	1.0 0.0 0.4
	Bear Valley Station 7 Pinnacles National Monument (USGS)	36.483N 121.184W	26:58.7	(*2*)		(*1*)	
	Bear Valley Station 10 Webb Residence (USGS)	36.532N 121.143W	(*3*)	1.3	310 Up 220	.14 .08 .15	0.2 0.0 0.3
	Note: One additional record[1] recovered at Webb Residence.						
	Bear Valley Station 14 Upper Butts Ranch (USGS)	36.569N 121.043W	27:01.9	(*2*)	310 Up 220	.04 .03 .06	0.0 0.0 0.0
26 July 1988 0348:36.0 G.m.t. Central Calif. 36.573N, 121.182W Magnitude 3.5 ML	Bear Valley Station 1 CDF Fire Station (USGS)	36.573N 121.184W	48:36.9	0.8		(*1*)	
	Bear Valley Station 10 Webb Residence (USGS)	36.532N 121.143W	48:37.8	0.9	310 Up 220	.04 .03 .05	0.0 0.0 0.0
	Bear Valley Station 14 Upper Butts Ranch (USGS)	36.569N 121.043W	48:41.5	(*2*)		(*1*)	
27 July 1988 0900 G.m.t. Hawaii Epicenter and magnitude unknown	Pahala, Hawaii Kau Hospital (USGS)	19.20 N 155.47 W	00:41.2[4]	(*2*)		(*1*)	
27 July 1988 1657:40.4 G.m.t. Central Calif. 36.568N, 121.180W Magnitude 3.6 ML	Bear Valley Station 14 Upper Butts Ranch (USGS)	36.569N 121.043W	57:45.8	(*2*)		(*1*)	
	Bear Valley Station 10 Webb Residence (USGS)	36.532N 121.143W	57:42.1	1.0		(*1*)	
24 August 1987-21 August 1988 Alaska Epicenter and magnitude unknown	Cape Yakataga Airport (USGS)	60.08 N 142.43 W	(*3*)	10.5	360 Up 270	.07 .02 .11	0.0 0.0 1 peak
	Note: Partial record, film jammed after 27 seconds.						

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
24 August 1988 1601:46.1 G.m.t. Central Calif. 36.553N, 121.180W Magnitude 3.0 ML	Bear Valley Station 1 CDF Fire Station (USGS)	36.573N 121.184W	01:47.0	0.6	310 Up 220	.03 .02 .06	0.0 0.0 0.0
	Bear Valley Station 10 Webb Residence (USGS)	36.532N 121.143W	01:47.2	1.0	310 Up 220	.08 .03 .07	0.0 0.0 0.0
	Note: One additional record[1] recovered at Bear Valley Station 10.						
	Bear Valley Station 14 Upper Butts Ranch (USGS)	36.569N 121.043W	01:52.1	(*2*)		(*1*)	
30 August 1988 1228:25.1 G.m.t. Eastern Calif. 37.512N, 118.407W Magnitude 3.5 MD	Chalfant Valley Array Fire Station (USGS)	37.53 N 118.37 W	28:27.6[4]	1.7	360 Up 270	.09 .03 .06	0.0 0.0 0.0
12 September 1988 1324:34.2 G.m.t. Southern Calif. 33.870N, 118.460W Magnitude 3.9 ML	Lawndale 15000 Aviation Blvd. (USGS)	33.895N 118.377W	(*3*)	2.3		(*1*)	
14 September 1988 2121 G.m.t. Eastern Calif. Epicenter and magnitude unknown	Chalfant Valley Array Fire Station (USGS)	37.53 N 118.37 W	(*3*)	(*2*)		(*1*)	
22 July 1987- 21 September 1988 Southern Alaska Epicenter and magnitude unknown	Thompson Pass Hiway Maint. Station (USGS)	61.138N 145.741W	(*3*)	(*2*)	360 Up 270	.11 .03 .06	0.5 0.0 0.0
3 October 1988 0406:42.8 G.m.t. Hawaii 19.777N, 155.329W Magnitude 4.1 MD	Honokaa, Hawaii Police Station (USGS)	20.080N 155.465W	06:49.3[4]	5.1	110 Up 020	.07 .06 .06	0.0 0.0 0.0
	Laupahoehoe, Hawaii Post Office (USGS)	19.987N 155.236W	06:38.7[4]	4.4	360 Up 270	.05 .02 .03	0.0 0.0 0.0
	Mauna Kea, Hawaii Summit Observatory (USGS)	19.826N 155.473W	07:26.3[4]	(*2*)		(*1*)	
	Waimea, Hawaii Fire Station (USGS)	20.026N 155.664W	05:59.2[4]	(*2*)		(*1*)	

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
6 May 1988- 13 October 1988 Eastern Calif. Epicenter and magnitude unknown	Chalfant Valley Array South Hammil Valley (USGS)	37.62 N 118.39 W	(*3*)	1.5		(*1*)	
15 October 1988 1952 G.m.t. Southern Calif. Epicenter and magnitude unknown	Salton Sea Wildlife Refuge (USGS)	33.18 N 115.62 W	52:06.1	0.4		(*1*)	
19 October 1988 1608:23.8 G.m.t. Eastern Calif. 37.203N, 118.452W Magnitude 4.1 ML	Chalfant Valley Array Laws, Calif. (USGS)	37.402N 118.346W	08:28.1[4]	3.4	360 Up 270	.05 .03 .02	0.0 0.0 0.0
19 October 1988 2247:54.4 G.m.t. Southern Calif. 33.180N, 115.600W Magnitude 3.7 ML	Salton Sea Wildlife Refuge (USGS)	33.18 N 115.62 W	47:54.8	0.9	315 Up 225	.30 .28 .23	0.8 1.0 0.7
			[48:42.3]	[1.1]		(*1*)	
	Imperial Wildlife Liquefaction Array (USGS)	33.097N 115.530W	(*3*)	1.3		(*1*)	
19 October 1988 2251 G.m.t. Southern Calif. Epicenter and magnitude unknown	Salton Sea Wildlife Refuge (USGS)	33.18 N 115.62 W	51:15.35	0.9	315 Up 225	.07 .03 .07	0.0 0.0 0.0
19 October 1988 2255:47.5 G.m.t. Southern Calif. 33.190Nn 115.610W Magnitude 3.4 ML	Salton Sea Wildlife Refuge (USGS)	33.18 N 115.62 W	55:47.7	0.9	315 Up 225	.05 .15 .07	0.0 1 peak 0.0
	Note: One additional record[1] recorded at Salton Sea Wildlife Refuge.						
22 October 1988 0238:18.6 G.m.t. Eastern Calif. 37.398N, 118.411W Magnitude 3.7 MD	Chalfant Valley Array Fire Station (USGS)	37.53 N 118.37 W	38:22.3[4]	2.9		(*1*)	
15 December 1986- 31 October 1988 Central Calif. Epicenter and magnitude unknown	Bear Valley Station 2 Stone Canyon West (USGS)	36.636N 121.234W	(*3*)	(*2*)		(*1*)	

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
1 November 1988 0218:27.2 G.m.t. Central Calif. 36.555N, 121.177W Magnitude 2.6 ML	Bear Valley Station 10 Webb Residence (USGS)	36.532N 121.143W	18:28.3	1.0	310 Up 220	.04 .02 .07	0.0 0.0 0.0
10 November 1988 0508:03.0 G.m.t. Central Calif. 37.373N, 121.757W Magnitude 4.8 ML	Calaveras Array Calaveras Reserv. So. (USGS)	37.452N 121.807W	(*3*)	2.1	180 Up 090	.06 .03 .07	0.0 0.0 0.0
	Milpitas Rivera Street (USGS)	37.437N 121.879W	(*3*)	3.4		(*1*)	
	San Jose Interchange 101/280/680 (USGS)	37.340N 121.851W	(*3*)	(*2*)	322 Up 232	.17 .02 .09	0.1 0.0 0.0
	Calaveras Array Sunol Regional Park (USGS)	37.515N 121.830W	(*3*)	2.6	360 Up 270	.02 .02 .02	0.0 0.0 0.0
	Sunnyvale, Moffett Fld Lockheed Way (USGS)	37.418N 122.031W	(*3*)	3.8	090 Up 360	.03 .02 .03	0.0 0.0 0.0
	Sunnyvale Colton Ave. (USGS)	37.402N 122.024W	08:08.2	4.0	360 Up 270	.07 .03 .03	0.0 0.0 0.0
	Fremont, Emerson Ct. Mission San Jose (USGS)	37.535N 121.929W	(*3*)	3.9	180 Up 090	.02 .02 .02	0.0 0.0 0.0
1 March 1988- 11 November 1988 Southern Calif. Epicenter and magnitude unknown	Prado Dam Corona (ACOE)	33.890N 117.641W	(*3*)	3.9			
	Downstream				090 Up 360	.05 .03 .05	0.0 0.0 0.0
	Brea Dam Fullerton (ACOE)	33.890N 117.925W	(*3*)	(*2*)			
	Crest					(*1*)	

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
20 November 1988 0539:28.6 G.m.t. Southern Calif. 33.510N, 118.070W Magnitude 4.5 ML	Newport Beach 840 Newport Center Dr. (USGS)	33.618N 117.878W	(*3*)	3.3			
	Structure Array						
	Ch. 1- Tower 2, Level 1, Center					(*1*)	
	Ch. 2- Tower 2, Level 1, Center					(*1*)	
	Ch. 3- Tower 2, Level 1, Center					(*1*)	
	Ch. 4- Tower 2, Level 2, West					Inoperative	
	Ch. 5- Tower 2, Level 2, Center					(*1*)	
	Ch. 6- Tower 2, Level 2, Center					(*1*)	
	Ch. 7- Tower 2, Level 9, South					(*1*)	
	Ch. 8- Tower 2, Level 10, Center					Inoperative	
	Ch. 9- Tower 2, Level 10, Center					Inoperative	
	Ch. 10- Tower 1, Level 9, East					(*1*)	
	Ch. 11- Tower 1, Level 10, Center					(*1*)	
	Ch. 12- Tower 1, Level 10, Center					(*1*)	
1 March 1988- 29 November 1988 Southern Calif. Epicenter and magnitude unknown	Carbon Canyon Dam Brea (ACOE)	33.914N 117.839W	(*3*)	(*2*)			
	Crest					(*1*)	
11 September 1985- 2 December 1988 Southern Calif. Epicenters and magnitudes unknown	Los Angeles 1526 N. Edgemont St. (OWNR)	34.098N 118.294W	(*3*)	(*2*)			
	Roof (8th Level)				090	.42	6.6
					Up	.21	6.1
					360	.27	8.1
					090	.11	1 peak
					Up	.05	0.0
					360	.06	0.0
					090	.28	0.3
					Up	.09	0.0
					360	.06	0.0
					090	.07	0.0
					Up	.04	0.0
					360	.03	0.0
					090	.38	3.7
					Up	.19	0.6
					360	.15	0.3

Note: Three additional records[1] recovered at 1526 N. Edgemont Street, Roof.

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
19 February 1987-3 December 1988 Southern Calif. Epicenters and magnitudes unknown	Los Angeles, 2055 Avenue of the Stars (OWNR)	34.056N 118.413W	(3)	(2)			
	Roof (31st level)				320	.07	0.0
					Up	.13	1 peak
					230	.08	0.0
					320	.06	0.0
					Up	.03	0.0
					230	.06	0.0
	Note: Eight additional records[1] recovered at 2055 Avenue of the Stars, 31st Level.						
3 December 1988 1138:26.4 G.m.t. Southern Calif. 34.150N, 118.130W Magnitude 4.9 ML	Brea Dam Fullerton (ACOE)	33.890N 117.925W	(3)	(2)			
	Crest				130	.06	0.0
					Up	.03	0.0
					040	.05	0.0
	Left Abutment					(1)	
	Los Angeles Bulk Mail Facility (USGS)	33.996N 118.162W	(3)	3.3	010	.09	0.0
					Up	.05	0.0
					280	.10	1 peak
	Garvey Reservoir Monterey Park (MWD)	34.050N 118.114W	(3)	1.0			
	Abutment Building				060	.10	1 peak
					Up	.04	0.0
					330	.06	0.0
	Jensen Filter Plant Balboa Ave. (MWD)	34.312N 118.496W	(3)	(2)			
	Administration Bldg. Basement					(1)	
	Generator Building					(1)	
	Reservoir Roof					(1)	
	Note: One each additional record[1] recovered at the Administration Building Basement, Generator Building and Reservoir Roof.						

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
3 December 1988 1138:26.4 G.m.t. Southern Calif. 34.150N, 118.130W Magnitude 4.9 ML *(Continued)*	Long Beach VA Hospital (VA)	33.778N 118.118W	*(3)*	*(2)*			
	Basement					*(1)*	
	6th Floor					*(1)*	
	11th Floor					*(1)*	
	Los Angeles, 2055 Avenue of the Stars (OWNR)	34.056N 118.413W	*(3)*	*(2)*			
	31st level					*(1)*	
	Los Angeles Griffith Park Observ. (USGS)	34.118N 118.299W	*(3)*	2.4	360 Up 270	.04 .05 .08	0.0 0.0 0.0
	Los Angeles 1526 N. Edgemont St. (OWNR)	34.098N 118.294W	*(3)*	*(2)*			
	8th Level					*(1)*	
	Los Angeles, 2005 N. Highland Blvd. (OWNR)	34.106N 118.336W	*(3)*	*(2)*			
	8th Level					*(1)*	
	Los Angeles 4407 Jasper Street (USGS)	34.081N 118.188W	*(3)*	1.4	130 Up 040	.11 .06 .12	0.8 0.0 0.2
	Los Angeles 1111 Sunset Blvd. (MWD)	34.067N 118.248W	*(3)*	1.3			
	Basement				348 Up 258	.08 .04 .12	0.0 0.0 1 peak
	4th Floor				348 Up 258	.08 .04 .09	0.0 0.0 0.0
	Roof Level (8th)				348 Up 258	.04 .19 .03	0.0 0.9 0.0

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
3 December 1988 1138:26.4 G.m.t. Southern Calif. 34.150N, 118.130W Magnitude 4.9 ML *(Continued)*	Los Angeles Wadsworth VA Hospital (USGS)	34.054N 118.453W	38:38.7	(*2*)			
	North ground Site					(*1*)	
	Los Angeles 1100 Wilshire Blvd. (JCG/USGS)	34.052N 118.263W	38:32.9	1.5			
	Basement 3 NE				298	.09	0.0
					Up	.05	0.0
					208	.05	0.0
	Basement 4 NW				298	.08	0.0
					Up	.03	0.0
					208	.06	0.0
	Basement 3 SE				298	.08	0.0
					Up	.04	0.0
					208	.07	0.0
	Structure Array:						
	Ch. 1- 12th Floor, North				298	.04	0.0
	Ch. 2- 12th Floor, North				208	.06	0.0
	Ch. 3- 12th Floor, South				208	.07	0.0
	Ch. 4- 13th Floor, North				298	.06	0.0
	Ch. 5- 13th Floor, North				208	.11	1 peak
	Ch. 6- 13th Floor, South				208	.07	0.0
	Ch. 7- 32nd Floor, North				298	.04	0.0
	Ch. 8- 32nd Floor, North				208	.09	0.0
	Ch. 9- 32nd Floor, South				208	.03	0.0
	Ch. 10- Ground Floor, North				298	.06	0.0
	Ch. 11- Ground Floor, North				208	.09	0.0
	Ch. 12- Ground Floor, South				208	.07	0.0
	Lytle Creek Mann Residence (USGS)	34.26 N 117.50 W	38:54.3	(*2*)		(*1*)	
	Norwalk 12400 Imperial Highway (USGS/BECH)	33.916N 118.067W	(*3*)	0.9			
	Basement					(*1*)	
	4th Floor					(*1*)	
	North Ground Site					(*1*)	
	South Ground Site					(*1*)	

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
3 December 1988 1138:26.4 G.m.t. Southern Calif. 34.150N, 118.130W Magnitude 4.9 ML *(Continued)*	Norwalk 12440 Imperial Highway (USGS/BECH)	33.917N 118.066W	38:37.4	(*2*)			
	Basement					(*1*)	
	North Ground Site					(*1*)	
	South Ground Site					(*1*)	
	Structure Array 1:						
	Ch. 1- 7th Floor, Center					(*1*)	
	Ch. 2- 5th Floor, Center					(*1*)	
	Ch. 3- 2nd Floor, Center					(*1*)	
	Ch. 5- Basement, East					(*1*)	
	Ch. 6- 5th Floor, West-Center					(*1*)	
	Ch. 7- Basement, Center					(*1*)	
	Ch. 8- Basement, Center					(*1*)	
	Ch. 9- Basement, Center					(*1*)	
	Ch. 10- 30 ft. Downhole, Bldg. Center					(*1*)	
	Ch. 11- 30 ft. Downhole, Bldg. Center					(*1*)	
	Ch. 12- 30 ft. Downhole, Bldg. Center					(*1*)	
	Structure Array 2:						
	Ch. 13- 7th Floor, East					(*1*)	
	Ch. 14- 5th Floor, East					(*1*)	
	Ch. 15- 2nd Floor, East					(*1*)	
	Ch. 16- 1st Floor, East					(*1*)	
	Ch. 17- 7th Floor, Center					(*1*)	
	Ch. 18- 5th Floor, Center					(*1*)	
	Ch. 19- 2nd Floor, Center					(*1*)	
	Ch. 20- 1st Floor, Center					(*1*)	
	Ch. 21- 7th Floor, West					(*1*)	
	Ch. 22- 5th Floor, West					(*1*)	
	Ch. 23- 2nd Floor, West					(*1*)	
	Ch. 24- 1st Floor, West					(*1*)	
	San Antonio Dam Upland (ACOE)	34.157N 117.676W	(*3*)	(*2*)			
	Crest				090	.06	0.0
					Up	.05	0.0
					360	.10	2 peaks
	Downstream					(*1*)	
	Right Abutment					(*1*)	

Note: One additional record[1] recovered at San Antonio Dam, Right Abutment.

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
3 December 1988 1138:26.4 G.m.t. Southern Calif. 34.150N, 118.130W Magnitude 4.9 ML *(Continued)*	Weymouth Filter Plant LaVerne (MWD)	34.115N 117.779W	(*3*)	(*2*)			
	Tank Top					(*1*)	
	Ground Site					(*1*)	
	Whittier 7215 Bright Avenue (USGS/CLA)	33.976N 118.036W	(*3*)	0.2			
	Basement				180 Up 090	.08 .04 .06	0.0 0.0 0.0
	5th Floor				180 Up 090	.10 .05 .06	1 peak 0.0 0.0
	10th Floor				180 Up 090	.06 .06 .08	0.0 0.0 0.0
	Whittier Narrows Dam Pico Rivera (ACOE)		(*3*)	(*2*)			
	Crest	34.020N 118.053W			033 Up 303	.07 .03 .06	0.0 0.0 0.0
	Upstream (Baseyard)	34.031N 118.054W			152 Up 062	.07 .03 .06	0.0 0.0 0.0
	Sepulveda Canyon Control Facility (MWD)	34.097N 118.478W	(*3*)	4.0	166 Up 076	.02 .02 .08	0.0 0.0 0.0
	Sepulveda Dam San Fernando Valley (ACOE)	34.167N 118.469W	(*3*)	4.1			
	Crest					(*1*)	
	Downstream					(*1*)	
	Sepulveda VA Hospital Building #40 (VA)	34.249N 118.475W	(*3*)	5.2	360 Up 270	.07 .04 .04	0.0 0.0 0.0

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
14 December 1988 0016:17.3 G.m.t. Eastern Calif. 37.589N, 118.847W Magnitude 2.9 MD	McGee Creek Crowley Lake (USGS) (Triaxial)	37.550N 118.811W	16:19.8[4]	(*2*)		(*1*)	
	McGee Creek Crowley Lake (USGS) (Multi-channel)	37.550N 118.811W	16:19.8[4]	(*2*)			
	166 m Downhole					(*1*)	
	35 m Downhole					(*1*)	
	1 m Downhole					(*1*)	
	Surface					(*1*)	
16 December 1988 0553:04.9 G.m.t. Southern Calif. 33.980N, 116.680W Magnitude 4.8 ML	San Bernardino Array 5931 N. F Street (USGS)	34.183N 117.295W	53:23.7	(*2*)		(*1*)	
	Forest Falls Post Office (USGS)	34.088N 116.919W	53:13.6	(*2*)		(*1*)	
	Morongo Valley Fire Station (USGS)	34.048N 116.577W	(*3*)	2.1	135 Up 045	.05 .07 .11	0.0 0.0 1 peak
	Cabazon Post Office (USGS)	33.918N 116.782W	53:08.0	1.2	270 Up 180	.06 .11 .09	0.0 0.2 0.0
	Whitewater Canyon Trout Farm (USGS)	33.989N 116.655W	(*3*)	(*2*)	270 Up 180	.15 .14 .12	1.0 1.7 0.1
	Anza Array, Garner Valley Fire Station (USGS)	33.616N 116.627W	53:12.3	5.1		(*1*)	
	Anza Array Pine Meadow Ranch (USGS)	33.578N 116.589W	53:13.1	5.5		(*1*)	
4 October 1987-21 December 1988 Southern Calif. Epicenter and magnitude unknown	Valyermo Forest Station (USGS)	34.44 N 117.85 W	(*3*)	5.1		(*1*)	
	Note: Probably southern California event of 3 December 1988.						

Catalogue of National Cooperative Strong-Motion Network accelerograph records recovered during 1988--*Continued*

Earthquake	Station name (owner)	Station location (°)	Trigger time	S-minus trigger (s)	Direction (az)	Maximum amplitude (g)	Duration (s)
29 April 1988- 21 December 1988 Southern Calif. Epicenter and magnitude unknown	Littlerock Post Office (USGS)	34.52 N 117.99 W	(*3*)	5.3		(*1*)	
	Note: Probably southern California event of 3 December 1988.						
22 December 1988 0203:59.5 G.m.t. Southern Calif. 33.190N, 115.590W Magnitude 3.1 ML	Salton Sea Wildlife Refuge (USGS)	33.18 N 115.62 W	04:00.3	1.1		(*1*)	
22 December 1988 0206:55.4 G.m.t. Southern Calif. 32.988N, 115.687W Magnitude unknown	Salton Sea Wildlife Refuge (USGS)	33.18 N 115.62 W	06:58.0	1.2		(*1*)	
29 December 1988 0333:24.9 G.m.t. Southern Calif. 33.180N, 115.590W Magnitude 3.0 ML	Salton Sea Wildlife Refuge (USGS)	33.18 N 115.62 W	33:25.7	1.0		(*1*)	
	Note: One additional record[3] recovered at Salton Sea Wildlife Refuge.						

[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] World Wide Voice Broadcast (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] Internal clock time; accuracy is variable.

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