PROCESSED STRONG-MOTION DATA FROM THE WHITTIER, CALIFORNIA EARTHQUAKE OF 1 OCTOBER 1987

PART I GROUND-RESPONSE RECORDS
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FROM THE
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OF 1 OCTOBER 1987
PART I
GROUND-RESPONSE RECORDS

M.C. Hoang
T.Q. Cao
D.L. Parke
A.F. Shakal

Report No. OSMS 89-03
California Strong Motion Instrumentation Program
California Department of Conservation
Division of Mines and Geology
Office of Strong Motion Studies
630 Bercut Drive, Sacramento, California 95814

July 1989
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INTRODUCTION

Strong-motion records were recovered from 101 stations of the California Strong Motion Instrumentation Program (CSMIP) following the Whittier earthquake of October 1, 1987 (also known as the Whittier Narrows earthquake). Sixty-three of those stations were ground-response stations. This report presents results of the digitization and processing performed on the records obtained from 36 of these stations. The remaining 27 stations typically had maximum accelerations of 5g or less, as shown in the data report by Shakal et al. (1987), and those records were not digitized. The results for the digitization of records obtained at CSMIP structural-response stations are presented in an accompanying Part II report for buildings, and a Part III report covers for bridges and dams (Huang et al., 1989a and b).

EARTHQUAKE CHARACTERISTICS

The Whittier earthquake occurred on October 1, 1987 in the eastern Los Angeles area. Damage was moderate over a broad area and extensive in certain localized areas. Papers considering various aspects of the earthquake and associated damage appear in two issues of Earthquake Spectra (Earthquake Engineering Research Institute, 1988).

The earthquake location and magnitude are (Caltech Seismological Lab.):

- Epicenter: 34.067 N, 118.078 W
- Focal Depth: 14 Km, approximate
- Magnitude: 5.9 ML

1
GSMIP STATIONS AND DATA

The locations of the earthquake epicenter and of the 36 GSMIP ground-response stations for which data are included in this report are shown on the map in Figure 1. The locations of the 18 instrumented buildings for which data are included in the Part II report, and the three instrumented lifeline structures (one bridge and two dams) for which data are included in the Part III report are also shown. The 36 ground-response stations are within a distance range of 7 to 108 km from the epicenter. The stations are listed in order of code number (three-digit code on the map) in Table 1, and in alphabetical order in Table 2. The coordinates, site characteristics and maximum values of ground motion are given for each station in Table 3. Table 3 also lists the distance of the station from the epicenter.

For completeness, records presented in this report for the six stations which are also building reference free-field stations are also included in the Part II report for building records.

ACCELEROMETER DIGITIZATION AND PROCESSING

The digitisation results presented in this report were obtained using the GSMIP computer-driven optical scanning system. This facility is patterned after the system developed at the University of Southern California (Trifunac and Lee, 1979). In this system, a direct photographic negative copy of the film acceleration is mounted on a rotating drum, which is scanned by a photodensitometer. The photodensitometer is mounted on a carriage moving perpendicular to the rotational direction of the drum. The resulting x-y array of optical density values is converted to raw time series through several trace-reconstruction steps. Baseline and other corrections are then
applied to this raw data to obtain the acceleration data for further processing and spectral analysis. The subsequent post-digitization processing is similar to that first developed at the California Institute of Technology (Trifunac and Lee, 1973). As discussed in greater detail below, a change of operators was made to improve the instrument correction procedure at high frequencies. In addition, the results of system noise analyses are used to guide the selection of filter corner frequencies in CSMIP processing.

The accelerograms digitized for this report are from SMA-1 accelerographs having 3 channels of data recorded on a 70 mm (2.75 in) wide film. For each accelerogram, the 70 mm film contains three acceleration traces, one or two straight-line reference traces, and two time-mark traces. For most of the accelerograms presented in this report, one of the time-mark traces contains a WWVB time code and their accelerograph trigger times are included in Table 3.

The sequence of steps in digitizing and processing a record is summarized in the following:

1. The film record, 70 mm wide and about 60 cm (60 seconds) long, is contact-copied onto a 25 cm by 25 cm high-contrast photographic negative; two sections of the record, each approximately 22 cm (22 seconds) in length, are copied onto a single negative. To facilitate subsequent reconstruction of the original record, adjacent sections are copied so that they have an overlap of approximately 2 seconds. For further details, refer to the report by Trifunac and Lee (1979).

2. The negative containing the two sections of the accelerogram is digitized into x and y coordinates by the optical scanner. The scanner sampling rate used for these records is 200 samples per centimeter in x and y. This is nominally equal to a time step of 0.005 second (200 samples/sec) and
Fig. 1. Locations of the epicenter and the CSMIP strong-motion stations for which the records from the Whitnall earthquake of October 1, 1987 are digitized and processed. Solid circles indicate the locations of ground-response stations for which the processed data are presented in this report. These ground-response stations are identified by 3-digit codes which are cross-referenced to station names in Table 1. The solid squares indicate the locations of buildings considered in the Part II report, and the solid triangles indicate the locations of lifeline structures considered in the Part III report.
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an acceleration increment of 0.003 g.

3. The raw x,y data from the individual sections are concatenated to form continuous acceleration traces, straight-line reference traces and timing traces.

4. Phase 1 (Volume 1) Processing. The reference traces are subtracted from the acceleration trace to remove any spurious film-motion effects. The axis of zero acceleration is determined by assuming the entire record has zero mean. The time-mark traces are used to obtain an accurate time scale. The starting times of the acceleration channels are adjusted so any time phasing error from one channel to another is less than 0.02 sec (i.e., less than one time increment in the Phase 2 (Volume 2 data). The instrument sensitivities are used to scale ordinate values to accelerations. The processed record length is 40 seconds for all the records presented in this report.

5. Phase 2 (Volume 2) Processing. The Phase 1 (Volume 1) acceleration data are interpolated to obtain exactly 200 pts/sec sampling (100 Hz Nyquist frequency). The instrumental data are corrected to true acceleration using a simple finite-difference based instrument correction operator. A high-frequency Ormsby filter with a corner frequency of 23 Hz and a roll-off termination frequency of 25 Hz is applied. The data are then decimated to 50 pts/sec (25 Hz Nyquist). As discussed in Shakal and Ragsdale (1984), this order (instrument correction prior decimation) improves the accuracy of the instrument correction procedure at high frequencies while still using the same simple operator used in the original Caltech code (Trifunac and Lee, 1979). The acceleration data are initially corrected for long-period errors by using a low-frequency Ormsby filter with a ramp from 0.05 to 0.07 Hz. Velocity and
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* - Instrument shelter types:
  * Instr. shltr A - small prefabricated metal building
  * Instr. shltr D - small metal box
  * Instr. shltr H - small fiberglass shelter

** - Distance given relative to the epicenter at 34.058N, 118.075W.
### THE WHITTIER EARTHQUAKE OF OCTOBER 1, 1987 (continued)

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- Accelerograph trigger time, when known, in seconds after 16:42 GMT on 1 October 1987.
- Phase I (Volume I) peak acceleration values.
displacement are integrated from acceleration and filtered using the same low-frequency Ormsby filter as for the acceleration. To prevent the introduction of spurious long-period energy through aliasing, an Ormsby filter rather than a running mean filter is used prior to the decimation associated with the long period filtering (Shakal, 1982; Shakal and Hagsdale, 1984).

6. Phase 3 (Volume 3) Processing. The response spectra for periods from 0.04 to 15 seconds and damping values of 0, 2, 4, 10 and 20 per cent of critical are calculated from the accelerations obtained in Step 5. The Fourier amplitude spectral values are also computed for these periods. A preliminary plot of the pseudo-velocity (PSV) response spectrum is generated for use in filter selection.

7. The Phase 2 Processing of Step 5 is repeated, but with a new low-frequency Ormsby filter to remove long-period noise in the record. The corner frequency of the filter used depends on the signal-to-noise ratio in the record and the noise level of the digitizing system. The long-period intersection of the PSV spectrum obtained in Step 6 and the CSMP system average noise spectrum shown in Figure 2 (from Shakal and Hagsdale, 1984) indicates the long-period limit of useful information. An iterative procedure is used, with the filter corner being set at progressively shorter periods in order to remove the long period noise while preserving as much of the signal as possible. The final value of filter bandwidth used is shown on the titles of the plots and explained in Appendix B. The acceleration, velocity and displacement time histories obtained using this filter are the final Phase 2 (Volume 3) data written on a magnetic tape and presented in this report.

8. The final relative velocity response spectrum (SV), relative displacement response spectrum (SD), absolute acceleration response spectrum
(SA), and Fourier amplitude spectrum (FS) are computed using the final filter settings. The pseudo-velocity response spectra (PSV) computed from SD are plotted on tripartite logarithmic paper and presented in this report. In addition, the SA spectra are plotted versus period with a linear scale.

Note that the optimal filter bandwidth is obtained for each accelerogram; all accelerograms from a single earthquake are not restricted to have a single filter corner frequency. However, the same filter corner is used for all channels from a single accelerogram to make channel-to-channel comparisons convenient.

As discussed above, Figure 2 shows the average noise spectrum for the CSMIP digitization system. It is also useful to consider the noise characteristics in terms of actual time-domain amplitudes. Figure 3 shows typical noise amplitudes present in acceleration, in velocity, and in displacement time histories obtained for different long-period filter cutoff settings. For example, Figure 3 indicates that for a filter cutoff near 10 seconds, the expected noise level is near 0.002 g in acceleration, 1 cm/sec in velocity, and 1 cm in displacement.

ADDITIONAL STRONG-MOTION DATA

Several agencies in addition to CSMIP have strong-motion instruments in the Los Angeles area. The network of the University of Southern California recorded the October 1 Whittier earthquake at 68 stations (Trifunac, 1988). The records obtained from 52 stations by the U.S. Geological Survey (USGS) are described in the data report by Etheredge et al. (1987), and the processed data from some of these records are presented in the reports by Brady et al. (1988 and 1989). Records were also recovered from small, specialized network
Fig. 2. Noise-level spectra (PSV, 20% damping) for the CSMIF digitization system (from Shaka and Kegsdale, 1984).
Fig. 3. Processing noise present in a typical acceleration (left), velocity (middle) and displacement (right) record processed with a long-period filter cut-off period ranging from 0.5 sec to 15 secs (from Shakal and Ragsdale, 1984).
maintained by the California Institute of Technology (Levine and others, 1988), Southern California Edison and other agencies.

The Los Angeles City code requires the owners of tall buildings to install and maintain strong-motion accelerographs. CSUH has archived some of the records from these privately owned instruments. It is planned that a report containing copies of these records and their processed results will be prepared in the future.

REFERENCES


DATA AVAILABILITY

The processed data for the CSNIP ground-response records presented in this report are available on two magnetic tapes, one containing Phase 1 (Vol. 1) data (named WHITIERS7-1G) and the other Phases 2 and 3 (Vol. 2 and 3) data (WHITIERS7-3G). They are written in a standard CSNIP format similar to that of the Caltech tapes, documented in Shaka and Huang (1983). These tapes are available in standard ASCII or EBCDIC blocked (unlabeled) coding. In addition, the Phase 2 and 3 data are available on floppy disks for use in personal computers. The data are available on IBM-compatible 5.25" disk of AT (1.2Mb) or XT (360Kb) type, as well as the 3.5" disks (720Kb) used by PS/2 type and laptop computers. These tapes and floppy disks can be obtained at nominal cost from this office:

Office of Strong Motion Studies
Division of Mines and Geology
California Department of Conservation
630 Berceau Drive, Sacramento, California 95814

Phone: (916) 322-3105
DEFINITION OF USABLE DATA BANDWIDTH

The usable data bandwidth for each record is indicated on the plots for the Phase 2 and Phase 3 data. The user should only use these data for analysis within this bandwidth. As described in the section on Accelerogram Digitization and Processing, the digitized data are processed and filtered using Ormsby filters. The data are first low-pass filtered by a high-frequency filter (typically with a corner frequency of 25 Hz and a roll-off termination frequency of 25 Hz), and then high-pass filtered by a low-frequency filter. The corner frequency of the low-frequency filter may be different for different records. Therefore, the Phase 2 data is the result of the digitized data being filtered by the bandpass filter $H(f)$ with ramps as shown in the figure:

![Diagram showing the usable data bandwidth](image)

The usable data bandwidth is defined as the band between frequencies $f_{HL}$ and $f_{LU}$ where $f_{HL}$ and $f_{LU}$ are the -3 dB points on the high-frequency and low-frequency ramps, respectively. The value of $H(f)$ is approximately equal to 0.7 for -3 dB.

The values of $f_L$ and $f_H$ can be calculated from the corner frequencies ($f_{HC}$, $f_{LC}$) and the roll-off termination frequencies ($f_{HL}$, $f_{LU}$) by using the formula $f_H = f_{HC} - 0.3 \times (f_{HC} - f_{LC})$ and $f_L = f_{LU} - 0.3 \times (f_{HC} - f_{LC})$. For example, the usable data bandwidth for data bandpass-filtered with ramps at 0.25 to 0.50 Hz and 23.0 to 25.0 Hz is 0.42 to 23.6 Hz.

* Note on dB: It is common in signal processing to plot $20 \log_{10}[H(f)]$ versus frequency, and express the ordinate value in decibels (abbreviated dB). Accordingly, 0 dB corresponds to a value of $H(f)$ equal to 1; 20 dB is equivalent to $H(f) = 10^2$; -20 dB corresponds to $H(f) = 0.1$; and -3 dB corresponds to $H(f) = 0.7$.  

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APPENDIX A

PLOTS OF PROCESSED DATA

Organization and Order of Ploes

In this appendix, four plots for each record are presented in the following order:

1. Phase 1 (Vol. 1) data: uncorrected accelerations. The three channels of the acceleration for the full processed length (40 seconds) are plotted with a common scaling factor.

2. Phase 2 (Vol. 2) data: instrument and baseline-corrected acceleration, velocity and displacement. The data for the first 30 seconds are plotted with equal scaling for all three channels. The usable data bandwidth, determined during processing, is indicated on the plots.

3. Phase 3 (Vol. 3) data: response spectra. The pseudo-velocity spectra (PSV), the pseudo-acceleration spectra (PSA), and the displacement spectra (SD) are presented on a tripartite logarithmic plot for each channel. The spectra are plotted for periods within the usable data bandwidth.

4. Phase 3 (Vol. 3) data: response spectra. The absolute acceleration spectra (SA) for 0%, 2%, 5%, 10%, and 20% dampings are plotted against period for periods from 0 to 2 seconds with linear-linear scaling.
WHITTIER EARTHQUAKE OCTOBER 1, 1987 07:42 PDT
TARZANA - CEDAR HILL NURSERY: CSMIP S/N 436
PHASE 2 FILTERED DATA: ACCELERATION, VELOCITY AND DISPLACEMENT
USABLE DATA BANDWIDTH: 0.42 TO 15.6 HZ (0.04 TO 2.35 SEC) RECORD ID: 74436-51614-87275.01:1

CHN 1: 90 DEG

MAX = -528.9

CHN 2: UP

MAX = 227.4

CHN 3: N DEG

MAX = -397.5

TIME (SEC)
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.42 TO 23.6 HZ
(0.04 TO 2.35 SEC)
RECORD ID: 24434-S1E14-87275.01.1

RESPONSE SPECTRA: PSV, PIA & SD
DAMPING VALUES: 0, 2, 5, 10, 20%

CHN 1: 90 DEG
FREQUENCY (HZ)

CHN 2: Up
FREQUENCY (HZ)

CHN 3: 0 DEG
FREQUENCY (HZ)

25
CHN 1: 90 DEG
DAMPING VALUES: 0.2, 0.5, 1.0, 2.0x

CHN 2: UP
DAMPING VALUES: 0.2, 0.5, 1.0, 2.0x

CHN 3: 0 DEG
DAMPING VALUES: 0.2, 0.5, 1.0, 2.0x

PERIOD (SEC)

26
WHITTIER EARTHQUAKE OCTOBER 1, 1987 07:42 PDT
ALHAMBRA - FREMONT SCHOOL: CSMP S/N 461
PHASE 2 FILTERED DATA: ACCELERATION, VELOCITY AND DISPLACEMENT
USABLE DATA BANDWIDTH: 0.45 TO 23.8 Hz (0.04 TO 2.35 Sec)  RECORD ID: 24461-S3498-E7274.01.1

CHN 1: 270 DEG
ACCEL (G/SEC/SEC) MAX = -374.3
VELOCITY (G/SEC) 17.0
DISPL. (G) -1.82

CHN 2: UP
ACCEL (G/SEC/SEC) MAX = -172.6
VELOCITY (G/SEC) -5.91
DISPL. (G) 0.75

CHN 3: 180 DEG
ACCEL (G/SEC/SEC) MAX = 288.2
VELOCITY (G/SEC) -21.7
DISPL. (G) -2.44
ALHAMBRA - FREMONT SCHOOL: CSMIP S/N 461

WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.42 TO 23.6 HZ
(0.04 TO 2.35 SEC)

RECORD ID: 24461-53498-87274.01.1

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0.2, 5, 10, 20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT
SAN MARTINO - SOUTHWESTERN ACADEMY: CSWIP S/N 401
PHASE 1 ACCELERATION
RECORD ID: 24401-50760-87271.01.1

CHN 1: 360 DEG
MAX = 0.184 G

ACCELERATION (g)

CHN 2: UP
MAX = -0.137 G

ACCELERATION (g)

CHN 3: 270 DEG
MAX = -0.143 G

ACCELERATION (g)

TIME (SEC)

31
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.42 TO 23.6 HZ
(0.24 TO 2.35 SEC)

RECORD ID: 24401-G0760-87274.01.1

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0.2, 5, 10, 20%
PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.34 TO 23.5 HZ
(0.04 TO 2.94 SEC)
RECORD ID: 24400-51606-87274 01.1

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0.2, 5, 10, 20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.42 TO 23.6 Hz
(0.04 TO 2.35 SEC)

RECORD ID: 24402-00758-87276.01 1

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0.2, 5, 10, 20%

41
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.42 TO 23.6 Hz
(0.04 TO 2.35 sec)

RECORD ID: 14368-51607-47275.01.1

RESPONSE SPECTRA: PSV, PSX & SD
DAMPING VALUES: 0.2, 5, 10, 20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.4 to 23.6 Hz
(0.04 to 2.35 sec)

RECORD ID: 24399-50416-87278.01.1

RESPONSE SPECTRA: PSV, PSA & 50
DAMPING VALUES: 0, 2, 5, 10, 20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0.2, 5, 10, 20%
WHITTIER EARTHQUAKE OCTOBER 1, 1987 07:42 PDT
INGLEWOOD - UNION OIL YARD: CSMIP S/N 196

PHASE 2 FILTERED DATA: ACCELERATION, VELOCITY AND DISPLACEMENT

USABLE DATA BANDWIDTH: 0.34 TO 23.6 HZ (0.04 TO 2.94 SEC) RECORD ID: 14196-51874-87274.01.1

CHN 1: 90 DEG
MAX = 9.98

CHN 2: UP
MAX = 67.2

CHN 3: 0 DEG
MAX = 246.1

TIME (SEC)
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.34 TO 23.6 HZ
(0.04 TO 1.94 SEC)

RECORD ID: 14196-S1874-07274.01.1

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0.2, 5, 10, 20%

CHN 1: 90 DEG
FREQUENCY (HZ)

CHN 2: UP
FREQUENCY (HZ)

CHN 3: 0 DEG
FREQUENCY (HZ)
LONG BEACH – RANCHO LOS CERRITOS: CSMIP S/N 242

WHITTIER EARTHQUAKE
OCTOBER 1, 1997 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.42 TO 23.6 HZ
(0.04 TO 1.35 SEC)

RECORD ID: 14242-52491-07276.01.1

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 2, 5, 10, 20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.42 TO 23.6 Hz
(0.04 TO 2.35 sec)

RECORD ID: 24157-51687-87271.01

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0, 2.5, 10, 20%

CHN 1: 90 DEG
FREQUENCY (Hz)

CHN 2: UP
FREQUENCY (Hz)

CHN 3: 0 DEG
FREQUENCY (Hz)

69
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.51 TO 23.6 Hz
(0.04 TO 1.96 SEC)

RECORD ID: 24380-2772-87216.01

RESPONSE SPECTRA: PSV, PSA & SD Damping Values: 0, 2, 5, 10, 20%
WHITTIER EARTHQUAKE OCTOBER 1, 1987 07:42 PDT
CENTURY CITY - LA COUNTRY CLUB NORTH: LSG/PS S/N 389

PHASE 2 FILTERED DATA: ACCELERATION, VELOCITY AND DISPLACEMENT

USABLE DATA BANDWIDTH: 0.51 TO 23.6 HZ (2.04 TO 1.98 SEC) RECORD ID: 24589-52775-87276.01

CHN 1: 90 DEG

ACCEL (G), MAX = -97.5

VELOCITY (CM/SEC)

DISPL (CM)

CHN 2: UP

ACCEL (G), MAX = -37.5

VELOCITY (CM/SEC)

DISPL (CM)

CHN 3: 0 DEG

ACCEL (G), MAX = -43.4

VELOCITY (CM/SEC)

DISPL (CM)

TIME (SEC)
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.51 TO 23.6 HZ
(0.04 TO 1.98 SEC)

RECORD ID: #4389-52775-87276.01

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0, 2, 5, 10, 20%

CHN 1: 90 Deg
FREQUENCY (Hz)

CHN 2: UP
FREQUENCY (Hz)

CHN 3: 0 Deg
FREQUENCY (Hz)
LONG BEACH - RECREATION PARK: CSMIP S/N 241

WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 1 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 3.42 TO 23.6 Hz
(0.34 TO 2.35 Sec)

RECORD ID: 14241-52613-67275.01

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0, 2.5, 10, 20%

CHN 1: 180 DEG
FREQUENCY (HZ)

CHN 2: UP
FREQUENCY (HZ)

CHN 3: 90 DEG
FREQUENCY (HZ)

81
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.04 TO 23.8 Hz
(B.04 TO 2.35 sec)

RECORD ID: 14395-54777-872/5.01

RESPONSE SPECTRA: PSA, PSI & SD
DAMPING VALUES: 2, 3, 5, 10, 20%
CHN 1: 90 DEG

DAMPING VALUES: 0.2, 0.5, 1.0, 2.0, 5.0

CHN 1: UP

DAMPING VALUES: 0.2, 0.3, 1.0, 2.0, 5.0

CHN 3: 0 DEG

DAMPING VALUES: 0.2, 0.3, 1.0, 2.0, 5.0

PERIOD (SEC)
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA RESPONSE SPECTRA

USABLE DATA BANDWIDTH: 0.42 TO 23.6 HZ
(0.04 TO 2.35 SEC)

RECORD ID: 24088-S161B-87276.01

RESPONSE SPECTRA: PSA, PSA & SD
DAMPING VALUES: 0.25, 0.15, 0.25
APLETA - NORDHOFF AVE FIRE STATION: CSMIP S/N 087

WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 P91

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.42 TO 13.8 HZ
(0.04 TO 2.35 SEC)

RECORD ID: 24087-51594-87274.01

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0, 2, 5, 10, 20%
CHN 1 (STA CHN 14): 90 DEG

CHN 2 (STA CHN 15): UP

CHN 3 (STA CHN 16): 0 DEG

CHN 1 (STA CHN 14): 90 DEG

CHN 2 (STA CHN 15): UP

CHN 3 (STA CHN 16): 0 DEG

TIME (SEC)

0 5 10 15 20 25 30

0.2

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0
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.42 TO 25.8 HZ
(0.04 TO 2.35 SEC)

RECORD ID: 245V-55354-8/278.01

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0, 2, 4, 10, 20%
CHN 1 (STA CHN 14): 90 DEG

DAMPING VALUES: 0.2-5.16.208

CHN 2 (STA CHN 15): UP

DAMPING VALUES: 0.2-5.10.208

CHN 3 (STA CHN 18): 0 DEG

DAMPING VALUES: 0.2-5.10.208
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.88 TO 23.8 HZ
(5.04 TO 1.47 SEC)

RECORD ID: L3525-52785-47274.01

RESPONSE SPECTRA: PSV, PSA & SA
DAMPING VALUES: 0.2, 0.1, 0.20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.88 to 23.6 Hz
(0.04 to 1.47 sec)

RECORD ID: 13122-S1396-87276-01

RESPONSE SPECTRA: V, PSA, & SA
DAMPING VALUES: 0, 3, 5, 10, 0.2%
HUNTINGTON BEACH - LAKE ST. FIRE STATION: CSMP S/N 197

WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA

Usable data bandwidth: 0.51 to 23.6 Hz
(0.01 to 1.06 sec)

Record ID: 13197-S0759-87276.01

Response spectra: PSV, PSA & SD
Damping values: 0, 0.25, 0.25, 0.29

CHAN 1: 360 DEG
FREQUENCY (HZ)

CHAN 2: N-P
FREQUENCY (HZ)

CHAN 3: E-TO
FREQUENCY (HZ)

109
WHITTIER EARTHQUAKE OCTOBER 1, 1987 07:42 PDT
HUNTINGTON BEACH - LAKE ST. FIRE STATION: CSMIP S/N 197
PHASE 3 DATA: RESPONSE SPECTRA RECORD ID: 13197-50759-87276-A1
USABLE DATA BANDWIDTH: 0.51 TO 23.6 Hz (0.24 TO 1.96 SEC)

CHN 1: 360 DEG
DAMPING VALUES: 0.2, 0.5, 0.20%

CHN 2: UP
DAMPING VALUES: 0.2, 0.5, 10.20%

CHN 3: 270 DEG
DAMPING VALUES: 0.2, 0.5, 10.20%

PERIOD (SEC)
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

RANCHO CUCAMONGA - LAW & JUSTICE CENTER: CSMIP S/N 497

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.88 TO 23.8 HZ
(0.04 TO 1.47 SEC)

RECORD ID: 23497-C0118-8774.01

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0.2, 1, 10, 20%

CHN 4 (STA CHN 17): 90 DEG FREE FIELD
FREQUENCY (HZ)

CHN 5 (STA CHN 18): UP FREE FIELD
FREQUENCY (HZ)

CHN 6 (STA CHN 18): J60 DEG FREE FIELD
FREQUENCY (HZ)

113
CHN 4 (STA CHN 17): 90 DEG

FREE FIELD

DAMPING VALUES: 0.2, 5, 10, 20%

CHN 5 (STA CHN 18): 0°

FREE FIELD

DAMPING VALUES: 0.2, 5, 10, 20%

CHN 6 (STA CHN 19): 360 DEG

FREE FIELD

DAMPING VALUES: 0.2, 5, 10, 20%

PERIOD (SIS)
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.85 TO 25.6 Hz
(0.04 TO 1.18 SEC)

RECORD ID: 13123-51503-87278.01

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0, 2, 5, 10, 20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.68 TO 23.6 Hz
(0.04 TO 1.47 SEC)

RECORD ID: 24047-51820-87280-01.1

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0.2, 5, 10, 20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.51 TO 23.6 Hz
(0.04 TO 1.96 SEC)

RECORD ID: 24279-52490-87279.01

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0, 2, 5, 10, 20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.88 TO 23.6 Hz
(0.04 TO 1.47 SEC)

RECORD ID: 24528-51866-87280-14

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0.2, 5, 10, 20%
LEONA VALLEY #5 - RITTER RANCH: CSMIP S/N 055

WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.85 TO 23.6 HZ
(8.04 TO 1.18 SEC)

RECORD ID: 24055-S1853-87280.01

RESPONSE SPECTRA: PSA, PSV & S5
DAMPING VALUES: 0.2, 5, 10, 20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.85 TO 23.6 HZ
(0.04 TO 1.18 SEC)

RECORD ID: 24309-52359-87280.01

RESPONSE SPECTRA PSV, PSA & SD
DAMPING VALUES: 0.2, 3, 10, 20%
WITTIER EARTHQUAKE  OCTOBER 1, 1987  07 42 POT
LEONA VALLEY #6  CSNP  S/N 309
PHASE 3 DATA: RESPONSE SPECTRA  RECORD ID: J4109-52559-87180 01
USABLE DATA BANDWIDTH: 0.05 TO 25.6 HZ (0.24 TO 1.18 SEC)

CHN 1: 90 DEG

DAMPING VALUES: 0.2, 3, 8, 10, 20%

CHN 2: UP

DAMPING VALUES: 0.2, 3, 8, 10, 20%

CHN 3: 0 DEG

DAMPING VALUES: 0.2, 3, 8, 10, 20%

PERIOD (SEC)
WHITTLER EARTHQUAKE   OCTOBER 1, 1987   07:42 PDT
MALIBU - POINT DUME SCHOOL:    CSMIP S/N 396
PHASE 1 ACCELERATION
RECORD ID: 21596-52779-87279.01

CHN 1: 270 DEG

MAX = 0.048 G

CHN 2: UP

MAX = -0.029 G

CHN 3: 180 DEG

MAX = -0.045 G

TIME (SEC)

CHN 1: 270 DEG

TIME (SEC)

CHN 2: UP

TIME (SEC)

CHN 3: 180 DEG

TIME (SEC)

143
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 1 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.68 TO 23.4 HZ
(0.04 TO 1.47 SEC)

RECORD ID: 24316-52779-87279.01

RESPONSE SPECTRA: PSI, PSA & SD
DAMPING VALUES: 0.2, 3, 10, 20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.88 TO 23.6 Hz
(2.04 TO 1.47 SEC)

RECORD ID: 24277-52507-47280.01

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0.2, 5, 10, 20%

CHN 1: 90 DEG FREQUENCY (Hz)

CHN 2: 90 FREQUENCY (Hz)

CHN 3: 0 DEG FREQUENCY (Hz)
LAKE HUGHES #1 - FIRE STATION #78: CSMIP S/N 271

WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.01 TO 23.6 Hz
(0.04 TO 1.47 SEC)

RECORD ID: 24271-52511-AY280.01

RESPONSE SPECTRA: PSA, PSA & DD
DAMPING VALUES: 0.2, 3, 10, 20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
SEISMOGRAM DATA BANDWIDTH: 0.51 TO 23.6 HZ
(0.04 TO 1.96 SEC)
RECORD ID: 24278-51572-87280.01

RESPONSE SPECTRA: PSA, PSA & SD
DAMPING VALUES: 0.2, 5, 10, 20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.68 TO 23.6 Hz
(0.04 TO 1.47 SEC)

RECORD ID: 24283-52309-87279.01

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0, 2, 5, 10, 20%
WHITTIER EARTHQUAKE
OCTOBER 1, 1987 07:42 PDT

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.68 TO 23.6 Hz
(0.04 TO 1.47 SEC)

RECORD TO: 24274-4251-807280 D1

RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0, 2, 5, 10, 20%
**LIST OF CSMIP REPORTS AND DATA TAPES**

California Department of Conservation  
Division of Mines and Geology  
Office of Strong Motion Studies  
California Strong Motion Instrumentation Program (CSMIP)

### AVAILABLE REPORTS:

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Compilation of Strong-Motion Records from the Coyote Lake Earthquake of 6 August 1979

Compilation of Strong-Motion Records Recovered from the Bishop, California Earthquake of 4 October 1979

Compilation of Strong-Motion Records Recovered from the Santa Barbara Earthquake of 13 August 1978

Catalog of Strong Motion Accelerograph Records Recovered by Office of Strong Motion Studies before January 1, 1982

Catalog of Strong Motion Accelerograph Records Recovered by Office of Strong Motion Studies During 1982

II. Processed Data Reports:

The Cero Prieto, Baja California Earthquake of February 6, 1987 and Processed Strong-Motion Data

Processed Strong Motion Data from the Palm Springs Earthquake of 8 July 1986; Part I Ground-Response Records

Processed Strong Motion Data from the San Salvador Earthquake of October 10, 1986

Processed Data from the Strong-Motion Record Obtained at a Base-Isolated Building in Rancho Cucamonga, California during the Redlands Earthquake of 2 October 1985

Processed Data from Strong-Motion Records of the Morgan Hill Earthquake of 24 April 1984: Part I Ground-Response Records

Processed Data from Strong-Motion Records of the Morgan Hill Earthquake of 24 April 1984: Part II Structural-Response Records

Processed Data from the Strong-Motion Records of the Imperial Valley Earthquake of 15 October 1979.

Processed Data from the San Juan Bautista 101/156 Separation Bridge and the San Juan Bautista Freeway Records from the Coyote Lake Earthquake 6 August 1979

Processed Data from the Gilroy Array and Coyote Creek Records, Coyote Lake, California, Earthquake 6 August 1979

Processed Data from the Strong-Motion Records of the Santa Barbara Earthquake of 13 August 1978. (In three volumes)

III. Other Reports:

Standard Tape Format of CSMIP Strong-Motion Data Tapes

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### AVAILABLE STRONG-MOTION DATA TAPES:

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<td>IMPERIAL79</td>
<td>Imperial Valley earthquake of 15 October 1979 (County Services Bldg. and other CSIMP stations).</td>
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<td>COYOTE79A</td>
<td>Coyote Lake earthquake of 6 August 1979, Gilroy Array stations.</td>
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<td>Vol. 2 and 3 data for eight aftershocks of the Coalinga 2 May 1983 earthquake. The aftershocks occurred between 8 May and 11 September 1983, and were of magnitude (ML) 4.3–6.0.</td>
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<td>Vol. 1 data for the Coalinga aftershock records included on the tape COALINGA83AS.</td>
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<td>RIDDEL803</td>
<td>Processed data from the Highway 101 overpass at Rio Dell for the earthquakes of: 8 Nov 1980 (6.9ML Trinidad-Offshore); 16 Dec 1982 (4.4ML Rio Dell) and 24 Aug 1983 (5.5ML Cape Mendicino Offshore).</td>
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<td>MTLEWIS86</td>
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<td>PALMSPRINGS86-IG</td>
<td>Palm Springs earthquake of 8 July 1986; Vol. 1 data from 18 ground-response stations.</td>
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<td>Whittier earthquake of 1 October 1987; Vol. 1, 2 and 3 data from 3 lifeline structures (1 bridge and 2 dams).</td>
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Footnotes:

Each tape contains Vol. 1, 2 and 3 data unless otherwise specified.

- Vol. 1 data: uncorrected accelerations.
- Vol. 2 data: instrument and baseline-corrected acceleration, velocity, and displacement.
- Vol. 3 data: Response and Fourier amplitude spectra.

The magnetic tapes are provided at cost. Included with each tape is a copy of either the processed data report (if available) or the plots of the data.

The Vol. 2 and 3 data are also available on floppy disks for use in personal computers. Requests for the reports, data tapes, data disks and/or for additional information should be addressed to:

Office of Strong Motion Studies  
California Division of Mines and Geology  
630 Eucalyptus Drive  
Sacramento, CA 95814  

Phone: (916) 322-3105

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PROCESSED ACCELEROMETERS ON GSMD DATA TAPES:

**Tape: SANTBAR878**
Santa Barbara Earthquake of 13 Aug 1978, 15:54 PDT, ML=5.1(CIT)
- UCSB College Free Field
- Santa Barbara - UCSB North Hall
- Santa Barbara - Freitas Building
- Ventura - Holiday Inn

**Tape: IMPERIAL79**
Imperial Valley Earthquake of 15 Oct 1979, 16:17 PDT, ML=6.6(CIT)
- Niland
- Westmorland, aftershock record
- El Centro - Imperial County Services Building and Free Field
- El Centro - Highway 8/Holcomb Road Overpass

**Tape: COYOTE79A**
Coyote Lake Earthquake of 6 Aug 1979, 10:05 PDT, ML=5.9(BRK)
- Gilroy #1, #2, #3, #4, #5
- Coyote Lake Dam (San Martin)

**Tape: COYOTE79B**
Coyote Lake Earthquake of 6 Aug 1979, 10:03 PDT, ML=5.9(BRK)
- San Juan Bautista - Fire Station
- San Juan Bautista - Highway 101/156 Overpass

**Tape: COYOTE79C**
Coyote Lake Earthquake of 6 Aug 1979, 10:05 PDT, ML=5.9(BRK)
- Halls Valley

**Tape: MANNOTH80A**
- Convict Creek
- Mammoth Lakes - High School Gym
- Mammoth Lakes - High School Gym, 10 channels

**Tape: MANNOTH80B**
Mammoth Lakes Earthquake of 25 May 1980, 09:49 PDT, ML=6.0(BRK), 5.8(CIT)
- Convict Creek
- Mammoth Lakes - High School Gym
- Mammoth Lakes - High School Gym - Upper Left Abutment

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Mammoth Lakes Earthquake of 25 May 1980, 12:45 PDT, ML=6.1(BRK),6.5(CIT)
Convict Creek Long Valley Dam

Mammoth Lakes Earthquake of 25 May 1980, 13:36 PDT, ML=5.7(BRK),5.5(CIT)
Convict Creek Long Valley Dam

Aftershock approx 58 seconds after 25 May 1980, 13:36 Event, ML=unknown
Convict Creek

Mammoth Lakes Earthquake of 26 May 1980, 11:58 PDT, ML=5.7(BRK),4.9(CIT)
Convict Creek Long Valley Dam

Mammoth Lakes Earthquake of 27 May 1980, 07:51 PDT, ML=6.2(BRK),6.3(CIT)
Convict Creek Bishop - Paradise Lodge Benton

Westmorland Earthquake of 26 Apr 1981, 05:09 PDT, ML=5.7(CIT),6.3(BRK)
Westmorland Niland

Records obtained at Rio Dell - Highway 101/Painter Street Overpass from the following three earthquakes:

Trinidad Offshore Earthquake of 8 Nov 1980, 02:27 PST, ML=6.9(BRK)
Rio Dell Earthquake of 15 Dec 1982, 22:53 PST, ML=4.6(BRK)
Cape Mendocino Offshore Earthquake of 26 Aug 1983, 06:36 PDT, ML=5.5(BRK)

Records obtained at Convict Creek from the following two earthquakes:

Mammoth Lakes Earthquake of 6 Jan 1983, 17:38 PST, ML=5.2(BRK)
Mammoth Lakes Earthquake of 6 Jan 1983, 19:24 PST, ML=5.4(BRK)
Coalinga Earthquake of 2 May 1983, 16:02 PDT, ML=6.5(BRK)

* Vol. 1 data are on tapes COALINGA83-IA and COALINGA83-IB; Vol. 2 and 3 data are on tape COALINGA83.

Tapes: COALINGA83, COALINGA83-IA, COALINGA83-IB *

Cantua Creek School Slack Canyon
Parkfield - Vineyard Canyon 1E, 1E, 1W, 2W, 3W, 4W, 5W, 6W
Parkfield - Gold Hill 2E, 3E, 1W, 2W, 3W, 4W, 5W, 6W
Parkfield - Stone Corral 1E, 2E, 3E, 4E
Parkfield - Cholame 1E, 2E, 3E, 2W, 3W, 4W, 5W, 6W, 7W
Parkfield - Fault Zone 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16

Records from 8 aftershocks of the Coalinga Earthquake of 2 May 1983

Event #2: 8 May 1983, 19:49 PDT, ML=5.1(BRK)

Coalinga - Sulphur Baths
Anticline Ridge - Palmer Ave.

Harris Ranch

Coalinga - CHP
Oil Fields - Skunk Hollow

Event #3: 10 June 1983, 20:10 PDT, ML=5.1(BRK)
Event #4: 9 July 1983, 00:41 PDT, ML=5.3(BRK)
Event #5: 21 July 1983, 19:40 PDT, ML=6.0(BRK)
Event #6: 21 July 1983, 20:43 PDT, ML=5.0(BRK)
Event #7: 25 July 1983, 15:31 PDT, ML=1.1(BRK)
Event #8: 9 Sept 1983, 02:16 PDT, ML=5.3(BRK)
Event #9: 9 Sept 1983, 04:48 PDT, ML=4.3(BRK)

For each of events #3 through #9:

Coalinga - Sulphur Baths

** Vol. 1 data are on tape COALINGA83AS-I; Vol. 2 and 3 data are on tape COALINGA83AS.

Tapes: MORGANHILL84-C, MORGANHILL84-IG **

Morgan Hill Earthquake of 24 Apr 1984, 13:15 PST, ML=6.2(BRK)

Ground-response records

Halls Valley
Gilroy #1, #2, #3, #4, #6, #7
Gilroy - Cavillan College
Capitola
San Juan Bautista - Fire Station
Agnew - State Hospital
San Francisco - International Airport
Fremont - Mission San Jose

Coyote Lake Dam (San Martín)
Corralitos
Santa Cruz
Los Banos
Redwood City - APEEL #1
Hayward - APEEL #1

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Morgan Hill Earthquake of 24 Apr 1984, 13:15 PST, ML=6.2(BRK)

Structural-response records
San Jose-Town Park Towers
San Jose-Santa Clara Co. Bldg.
Watsonville - Telephone Bldg.
South San Francisco - Kaiser Medical Center
San Juan Bautista - Highway 101/156 Overpass

*** Vol. 1 data are on tapes MORGANHILL84-IS and MORGANHILL84-IS; Vol. 2 and 3 data are on tapes MORGANHILL84-G and MORGANHILL84-S.

Tape: REDLANDS85
Redlands Earthquake of 2 Oct 1985, 16:44 PDT, ML=4.8(CIT)
Rancho Cucamonga - Law & Justice Building (base-isolated) and FF

Tape: HOLLISTER86
Hollister Earthquake of 26 January 1986, 11:21 PST, ML=5.5(BRK)
SAGO South - Tunnel
Hollister - Glorietta Warehouse

Tape: MLLEWIS86
Mt. Lewis Earthquake of 31 March 1986, 03:56 PST, ML=5.8(BRK)
Halls Valley
San Jose - Town Park Towers
San Jose - Santa Clara County Bldg.
San Jose-Great Western Savings Bldg.

Tape: SANSALVADOR86
San Salvador Earthquake of 10 October 1986, 17:49 GMT, MS=5.4(CIC)
Natl Geographical Inst. (IGN) Geotech. Investigation Center (CIG)
Inst. Urban Construction (IVU) Hotel Sheraton (ISH)
Hotel Camino Real (CHR) - Basement, 2nd Floor, Roof
Centro Americana University (UCA)

Tapes: PALMSPRINGS86-C, PALMSPRINGS86-IG

Palms Springs Earthquake of 8 July 1986, 02:20 PDT, ML=5.6(CIT)
Ground-response records
Desert Hot Springs
Silent Valley - Poppet Flat
San Jacinto - Valley Cemetery
Winchester - Page Bros. Ranch
Winchester - Bergman Ranch
Landers - Fire Station
Indio - Coachella Canal
Puerto La Cruz
Hesperia
Palm Springs - Airport
San Jacinto - Soboba
Hemet - Stetson Ave Fire Station
Winchester - Hidden Valley Farms
Murrieta Hot Springs - Collins Ranch
Joshua Tree - Fire Station
Temecula - CDF Fire Station
Riverside - Airport
Rancho Cucamonga-Law & Justice Center FF

*** Vol. 1 data are on tape PALMSPRINGS86-IG; Vol. 2 and 3 data are on tape PALMSPRINGS86-C.

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Cerro Prieto, Baja California earthquake of 6 February 1987, 19:45 PST, ML=5.4 (CIGESE)

Whittier Earthquake of 1 October 1987, 07:42 PDT, ML=5.9 (CIT)

Ground-response records

Tasana - Cedar Hill Nursery
San Marino - Southwestern Academy
Altadena - Eaton Canyon Park
Mt. Wilson - Caltech Seismic Station
Los Angeles-Hollywood Storage Bldg. FF
Long Beach - Rancho Los Cerritos
Century City - LA Country Club South
Long Beach - Recreation Park
Pacolina - Kagel Canyon
Sylmar - Olive View Medical Center FF
Fletcher Park - Park Maint. Bldg.
Carmelita - Lucille Southard Bldg.
Hemet - Stetson Ave Fire Station
Nesbitt - LA County Fire Station
Leona Valley #5 - Ritter Ranch
Malibu - Point Dume School
Lake Hughes #1 - Fire Station #78
Nooport-Ventura Co. Fire Dept. Garage

Alhambra - Framont School
Los Angeles - Obregon Park
Downey - County Maint. Bldg.
Los Angeles - 116th St. School
Inglewood - Union Oil Yard
Los Angeles - Baldwin Hills
Century City - LA Country Club North
Long Beach - Harbor Admin. Bldg. FF
Arcadia - Northwood Ave Fire Station
Fountain Valley - 6th & Locust FF
Huntington Beach - Lake St. Fire Station
Riverside - Airport
Vasquez Rocks Park
Lancaster - Medical Office Bldg. FF
Leona Valley #6
Castaic - Hasley Canyon
Castaic - Old Ridge Route
Rosamond - Godde Ranch

# Vol. 1 data are on tape WHITTIER87-10; Vol. 2 and 3 data are on Tape WHITTIER87-0.

Whittier Earthquake of 1 October 1987, 07:42 PDT, ML=5.9 (CIT)

Building records

Los Angeles-CSULA Admin. Building
Los Angeles-Hollywood Storage Bldg. & FF
Burbank-California Fed. Savings Bldg.
Hollywood - shutter Universal Hotel
Long Beach - CSUCLA Eng. Bldg. 1
Los Angeles-UCLA Math-Science Bldg.
Long Beach - Harbor Admin. Bldg. & FF
Sherman Oaks - Union Bank Bldg.
Sylmar - Olive View Medical Center & FF
Fontana - First Federal Savings Bldg. & FF
San Bernardino - Sunwest Office Bldg.
Lancaster-Medical Office Bldg. & FF

Los Angeles - Sears Warehouse
Burbank - Pacific Manor
Los Angeles-Century City Bullock's
Long Beach - City Hall
Van Nuys - Holiday Inn

## Vol. 1 data are on tapes WHITTIER87-1B1 and -1B2; Vol. 2 are on WHITTIER87-118; Vol. 3 data are on Tape WHITTIER87-111B.

Whittier Earthquake of 1 October 1987, 07:42 PDT, ML=5.9 (CIT)

Lifeline structure records

Los Angeles - Vincent Thomas Bridge
Puddingstone Dam

Cogswell Dam

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