THE TWINING LABORATORIES, INC.
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ANALYTICAL CHEMISTRY · ENVIRONMENTAL SERVICES
GEOTECHNICAL ENGINEERING · SAMPLING SERVICES
CONSTRUCTION INSPECTION & MATERIALS TESTING

# GEOTECHNICAL ENGINEERING INVESTIGATION

# PROPOSED FRESNO FIRE STATION NO. 15

# SEC CLOVIS AVENUE AND PARK CIRCLE DRIVE

# FRESNO, CALIFORNIA

**Project Number: A25515.01-01**

For:

The City Of Fresno
2600 Fresno Street, 4th floor
Fresno, California 93721

September 16, 2003

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September 16, 2003 A25515.01-01

The City Of Fresno
2600 Fresno Street, 4th floor
Fresno, California 93721

Attention: Mr. Bob Kishi

Subject: Geotechnical Engineering Investigation
Proposed Fresno Fire Station No. 15
At Clovis Avenue and Park Circle Drive
Fresno, California

Dear Mr. Kishi:

We are pleased to submit this geotechnical engineering investigation report prepared for the Fresno Fire Station No. 15 to be located southeast of the intersection of South Clovis Avenue and East Park Circle Drive in Fresno, California. The contents of this report include the purpose of the investigation, scope of services, background information, investigative procedures, our findings, evaluation, conclusions, and recommendations.

We recommend that those portions of the plans and specifications that pertain to earthwork, pavements, and foundations be reviewed by The Twining Laboratories, Inc. (Twining) to determine if they are consistent with our recommendations. This service is a part of this current contractual agreement. The client should provide these documents for our review prior to their issuance for construction bidding purposes.

In addition, it is recommended that Twining be retained to provide inspection and testing services for the excavation, earthwork, pavement, and foundation phases of construction. These services are necessary to determine if the subsurface conditions are consistent with those used in the analysis and formulation of recommendations for this investigation, and if the construction complies with our recommendations. These services are not, however, part of this current contractual agreement. We would appreciate the opportunity to provide a proposal for this additional service after construction documents are completed. Mr. Harry Moore with our firm (559-268-7021) will contact you in the near future regarding these services.

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We appreciate the opportunity to be of service to the City Of Fresno. If you have any questions regarding this report, or if we can be of further assistance, please contact us at your convenience.

Sincerely,

**THE TWINING LABORATORIES, INC.**

Vasiliy V. Parfenov
Project Geologist
Geotechnical Engineering Division

VVP/id

## EXECUTIVE SUMMARY

The Twining Laboratories, Inc. (Twining) was authorized by The City Of Fresno purchase order number 0689 to conduct this geotechnical investigation.

The purpose of our investigation was to provide geotechnical engineering parameters for use in design of foundations, pavement sections, slabs-on-grade, and preparation of related construction documents, and an provide evaluation of potential geologic and seismic hazards.

We understand that the proposed Fresno Fire Station No. 15 will consist of a single story structure comprising 9,286 square feet in plan dimensions. The project will also include asphaltic concrete parking and drive areas and underground utilities.

During the geotechnical field investigation conducted on July 11, 2003, three (3) test borings were drilled in the area proposed for the structure. Soil samples were collected and returned to our laboratory for classification and testing.

In general, the soils encountered consist predominantly of loose to dense silty sands to a depths of between 13 and 14 feet BSG underlain by very stiff to hard sandy silts to depths of between 18 and 29 feet BSG. The sandy silts were underlain by dense silty sands to a depth of approximately 39 feet BSG. These strata were underlain by hard sandy lean clays and sandy silts to the maximum depth explored, 50¾ feet BSG

No groundwater was identified in the test borings drilled at the time of the field investigation (July 11, 2003). Maps depicting lines of equal elevation of water in wells, produced by the Department of Water Resources, indicate groundwater depths varied over the past decade from approximately 58 feet BSG to approximately 88 feet BSG.

From a geotechnical standpoint, the site is suitable for the proposed construction with regard to support of shallow spread foundations and concrete slabs-on-grade, provided the recommendations contained in this report are followed. The primary geotechnical concerns at the site are: 1) loose near surface silty sands; and, 2) potential for water induced collapse in the near surface silty sands.

To reduce total and differential static settlements to within 1 inch and ½-inch, respectively, the foundations should be placed on a minimum of 12 inches of engineered fill, or engineered fill, which extends to a depth of 2 feet below preconstruction site grades, whichever is deeper. The engineered fill section below foundations should be achieved by a combination of over-excavation, scarification, moisture-conditioning, and compaction. The base of the excavation should be observed by Twining and any organic rich or soft soil areas should be removed and recompacted and then the building pad should be backfilled to grade with engineered fill.

The interior slab-on-grade and exterior slabs adjacent to buildings should be supported on engineered fill which extends to the depth of engineered fill recommended below the foundations. The slab subgrade section should include at least 4 inches of Class 2 aggregate base (AB) directly

## EXECUTIVE SUMMARY (Continued)

below the proposed slab. The 4 inches of Class 2 AB material is recommended for structural purposes and to provide a working surface during construction.

The analyses indicate that liquefaction would not occur as a result of the Upper Bounds Earthquake (design level seismic event). The site is not located in a Liquefaction Hazard Zone delineated in response to the Seismic Hazards Mapping Act (1990).

The potential for flooding as a result of a seismically induced dam breach, landslides, seiches, tsunamis, and volcanic activity at the project site is low. Based on the Flood Insurance Rate Maps, distributed by the Federal Emergency Management Agency, the site is located in Zone B. Zone B denotes; "Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood."

Based on Title 24 (California Building Code, 2001), the site lies within Seismic Zone 3. An upper bounds maximum peak horizontal seismic ground motion acceleration of 0.21g and a design basis ground motion maximum peak horizontal acceleration of 0.19g are estimated for the proposed site.

The site does not lie within known currently published Earthquake Fault Zones for ground surface rupture (Alquist-Priolo Fault Zoning Act). The potential for ground rupture associated with any known fault is very low.

Asphaltic concrete (AC) pavement sections are presented in this report based on an R-value of 50 and traffic index values ranging from 5.0 to 8.0. Design pavement sections range from 2.5 inches of AC pavement over 4 inches of aggregate base (AB) for a traffic index of 5.0, to 4.5 inches of AC pavement over 5.5 inches of AB for a traffic index of 8.0

A design professional should select the appropriate pavement section based on the anticipated truck traffic expected for the site. It should be noted that if pavements are constructed prior to the building construction, the selected traffic index values may be too low and need to be increased. If the pavements are placed prior to construction, or if more frequent truck traffic is anticipated the design professional who selected the pavement sections and Twining should be contacted to re-evaluate the traffic index values.

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**GEOTECHNICAL ENGINEERING INVESTIGATION**

**PROPOSED FRESNO FIRE STATION NO. 15**

**CLOVIS AVENUE AND PARK CIRCLE DRIVE**

**FRESNO, CALIFORNIA**

**Project Number: A25515.01-01**

## 1.0 INTRODUCTION

This report presents the results of a geotechnical engineering investigation for the proposed Fresno Fire Station No. 15 to be located southeast of the intersection of South Clovis Avenue and East Park Circle Drive in Fresno, California. The Twining Laboratories, Inc. (Twining) was authorized by the City Of Fresno Notice to Proceed, dated July 31, 2003, to conduct this geotechnical investigation.

The contents of this report include the purpose of the investigation and the scope of services provided. The site history, previous studies, existing site features, and anticipated construction are discussed. In addition, a description of the investigative procedures used and the subsequent findings obtained are presented. Finally, the report provides an evaluation of the findings, general conclusions, and related recommendations. The four report appendices contain the drawings (Appendix A), the logs of borings (Appendix B), the results of laboratory tests (Appendix C), and the results of seismic and seismic settlement analyses (Appendix D).

The Geotechnical Engineering Division of Twining, headquartered in Fresno, California, performed the investigation.

## 2.0 PURPOSE AND SCOPE OF INVESTIGATION

**2.1 Purpose:** The purpose of the investigation was to conduct a field exploration and laboratory testing program, evaluate the data collected during the field and laboratory portions of the investigation, and provide the following:

2.1.1 Geotechnical parameters for use in design of foundations and slabs-on-grade, and development of lateral resistance;

2.1.2 Recommendations for site preparation including placement, moisture conditioning, and compaction of engineered fill soils;

2.1.3 Recommendations for the design and construction of asphaltic concrete (AC) and Portland cement concrete (PCC) pavements;

2.1.4 Recommendations for temporary excavations and trench backfill;

2.1.5 Conclusions regarding soil corrosion potential;

2.1.6 A groundshaking evaluation using probabilistic methods to obtain a design level peak horizontal ground acceleration;

2.1.7 Evaluation of the potential for liquefaction and seismically induced settlement related to the proposed structure; and

2.1.8 Evaluation of the potential for geologic hazards such as flooding, landslides, seiches, and volcanic activity.

This report is provided specifically for Fresno Fire Station No. 15 to be located southeast of the intersection of South Clovis Avenue and East Park Circle Drive in Fresno, as referenced in the Anticipated Construction section of this report.

This investigation did not include a floodplain investigation, compaction tests, environmental investigation, or environmental audit.

**2.2** **Scope:** Our proposal, dated June 20, 2003, outlined the scope of our services. The actions undertaken during the investigation are summarized as follows.

2.2.1 A site plan for the proposed project prepared by RRM Design Group, dated November 20, 2003, was reviewed.

2.2.2 A Request for Proposal, prepared by the City Of Fresno, dated June 12, 2003, was reviewed.

2.2.3 The proposed boring locations were marked and cleared with Underground Service Alert.

2.2.4 Site reconnaissance and subsurface exploration were conducted.

2.2.5 Laboratory tests were conducted to determine selected physical and engineering properties of the subsurface soils.

2.2.6 Mr. Bob Kishi (Architect, City of Fresno) and Mr. Chad Ahnis (Hanif Engineers) were consulted during the investigation.

2.2.7 The data obtained from the investigation were evaluated to develop an understanding of the subsurface conditions and engineering properties of the subsurface soils.

2.2.8 This report was prepared to present the purpose and scope, background information, field exploration procedures, findings, evaluation, conclusions, and recommendations.

## 3.0 BACKGROUND INFORMATION

The site history, previous studies, existing site features, and the anticipated construction are summarized in the following subsections.

**3.1 Site Description:** The project site is located southeast of the intersection of South Clovis Avenue and East Park Circle Drive in Fresno, Fresno County, California. A site location map is presented on Drawing Number 1 in Appendix A. The site is bound to the north by East Park Circle Drive; to the east and south by single family residences; and to the west by South Clovis Avenue.

According to the 7 ½ minute series topographic map (Malaga, California), produced by the United States Geological Survey (USGS), the site is located at 119.69 degrees west longitude and 36.73 degrees north latitude, and the elevation of the site is approximately 318 feet above mean sea level (AMSL).

At the time of the field investigation, the project site was relatively level. The majority of the site was a cleared field, with the exception of the areas along the northern and eastern site boundaries which were covered by tall brush and trees. Two debris piles ranging in length from five to fifteen feet, approximately three feet wide, and three feet tall were noted on site. These piles contained soils and construction debris, consisting of concrete, asphalt, and rebar. Underground utilities were noted along South Clovis Avenue and East Park Circle Drive.

**3.2 Previous Studies:** Previous engineering, geological, or environmental studies conducted for this site were not provided for review during this investigation. If available, these reports should be provided for review and consideration for this project.

**3.3 Site History**: The history of this site was unknown at the time of this investigation.

**3.4 Anticipated Construction:** It is our understanding that the preliminary plans for the Fresno Fire Station No. 15 have been determined; however, final structural details have not been determined. It is anticipated that the proposed construction will include a 9,286 square foot fire station. Mr. Bob Kishi (City of Fresno) reported that the proposed construction will consist of a single story structure with masonry walls, a wood frame roof with a concrete slab-on-grade floor.

Basements are not anticipated. Mr. Chad Ahnis (Hanif Engineers) reported that the maximum anticipated wall and column loads would be about 4.5 kips per lineal foot and 15 kips, respectively. Tolerable total and differential settlements (static and seismic) of 1-inch and ¾ inch in 40 linear feet, respectively, were assumed for the purpose of design. A Portland cement concrete (PCC) pavements with maximum anticipated wheel load of 16,000 pounds are proposed in apparatus bays. The project will include asphaltic concrete parking and drive areas.

Grading plans were not available at the time this report was prepared; however, as the site topography is essentially level, earthwork cuts and fills up to 2 feet are expected to achieve level building pads and provide positive site drainage.

## 4.0 INVESTIGATIVE PROCEDURES

The field exploration and laboratory testing programs conducted for this investigation are summarized in the following subsections.

**4.1 Field Exploration:** The field exploration consisted of site reconnaissance, drilling test borings, soil sampling, and standard penetration tests.

**4.1.1 Site Reconnaissance:** The site reconnaissance consisted of walking the site and noting visible surface features and was conducted by Mr. Dean Ledgerwood on July 11, 2003. The features noted are described in the background information.

**4.1.2 Drilling Test Borings:** The locations and depths of the test borings were selected based on requirements of the Essential Services Act and our understanding of the location of the proposed building as indicated on the site plan provided.

On July 11, 2003, a total of three (3) test borings were drilled. Two (2) test borings were drilled to depths of 25 and 26½ feet below site grade (BSG) within the area of the proposed fire station building, and one (1) test boring was drilled to a depth of 50¾ feet BSG within the area of the proposed hose tower. In addition, three (3) bulk samples of soil were obtained for Resistance (R)-value and moisture-density relationship tests. The test boring and bulk sample locations are shown on Drawing Number 2 in Appendix A.

Under the direction of a Twining staff geologist, test borings were drilled to depths of 25 and 50.7 feet BSG using a CME-75 drill rig equipped with 6⅝ inch outside diameter (O.D.) hollow-stem augers.

The soils encountered in the test borings were logged. The field soil classification was in accordance with the Unified Soil Classification System and consisted of particle size, color, and other distinguishing features of the soil. The presence and elevation of free water in the hollow-stem auger borings were noted and recorded during drilling and immediately following completion of borings.

Test boring locations were determined by pacing with reference to the northwest site corner. The locations, as described, should be considered accurate to within 10 feet. Elevations of the test borings were not measured as a part of the investigation. The locations of the test borings are described on the boring logs in Appendix B. The test borings were loosely backfilled with material excavated during the drilling operations; thus, some settlement should be anticipated.

**4.1.3 Soil Sampling:** Standard penetration tests were conducted, and both disturbed and undisturbed soil samples were obtained.

The standard penetration resistance, N-value, is defined as the number of blows required to drive a standard split barrel sampler into the soil. The standard split barrel sampler has a 2-inch O.D. and a 1⅜ inch inside diameter (I.D.). The sampler is driven by a 140-pound weight free falling 30 inches. The sampler is lowered to the bottom of the bore hole and set by driving it an initial 6 inches. It is then driven an additional 12 inches and the number of blows required to advance the sampler the additional 12 inches is recorded as the N-value.

Relatively undisturbed soil samples for laboratory tests were obtained by pushing a California modified split barrel ring sampler into the soil. The soil was retained in brass rings, 2.5 inches O.D. and 1 inch in height. The lower 6-inch portion of the samples were placed in close-fitting, plastic, airtight containers which, in turn, were placed in cushioned boxes for transport to the laboratory.

Soil samples obtained were taken to Twining's laboratory for classification and testing.

**4.2 Laboratory Testing:** The laboratory testing was programmed to determine selected physical and engineering properties of the soils underlying the site. The tests were conducted on disturbed and undisturbed samples representative of the subsurface material.

The results of laboratory tests are summarized on Figure Numbers 1 through 10 in Appendix C. These data, along with the field observations, were used to prepare the final test boring logs in Appendix B.

## 5.0 FINDINGS AND RESULTS

The findings and results of the field exploration and laboratory testing are summarized in the following subsections.

**5.1 Soil Profile:** The soils encountered consisted predominantly of silty sands to depths of between 13 and 14 feet BSG underlain by sandy silts to depths of between 18 and 29 feet BSG. The sandy silts were underlain by silty sands to a depth of approximately 39 feet BSG. These strata were underlain by sandy lean clays and sandy silts to the maximum depth explored, 50¾ feet BSG.

The foregoing is a general summary of the soil conditions encountered in the test borings drilled for this investigation. Detailed descriptions of the soils encountered at each test boring are presented on the logs of borings in Appendix B. The stratification lines shown on the logs represent the approximate boundary between soil types; the actual in-situ transition may be gradual.

**5.2** **Soil Engineering Properties:** The silty sands encountered from the ground surface to depths of between 13 and 14 feet BSG were loose to dense as indicated by standard penetration resistance, N-values, ranging from 6 to 45 blows per foot. The natural moisture contents of the soils ranged from 1 to 7 percent. Two (2) in-place density tests revealed dry densities of 105 and 106 pounds per cubic foot. A maximum density/optimum moisture determination performed on one (1) near-surface soil sample indicated a maximum dry density of 112.9 pounds per cubic foot at an optimum moisture content of 11.4 percent. A direct shear test performed on (1) one soil sample indicated an angle of internal friction of 32.0 degrees, with a cohesion value of 125 pounds per square foot, respectively. The soils exhibited low to high compressibility characteristics with the addition of moisture as indicated by three (3) consolidation tests (about 2.8, 6.5, and 11.4 percent consolidation under a load of 8 kips per square foot). Upon inundation, the soils exhibited low to moderate collapse potential (about 0.4, 0.9, and 3.0 percent collapse under a load of 2 kips per square foot).

The sandy silts encountered are very stiff to hard as indicated by N-values ranging from 17 to more than 100 blows per foot. The natural moisture contents of the soils ranged from 9 to 19 percent.

The silty sands encountered at the depth interval of 24 and 39 feet BSG were dense as indicated by N-values ranging from 34 to 41 blows per foot. The natural moisture contents of the soils ranged from 4 to 11 percent.

The sandy lean clays were hard as indicated by N-values ranging from 31 to 51 blows per foot. The natural moisture contents of the soils ranged from 15 to 18 percent.

Three (3) R-value tests were conducted on silty sand samples collected from between depths of ½ and 2½ feet BSG. The results of the tests indicate R-values ranging from 73 to 75.

Chemical tests performed on two (2) soil samples collected between ground surface and a depth of approximately 1½ feet BSG, and from between depths of 1½ and 3 feet BSG indicated pH values of 7.6 and 7.0, minimum resistivity values of 11,000 and 21,000 ohm-centimeters, and none detected concentrations of sulfate (detection limit of 0.01 percent by weight) and chloride (detection limit of 0.001 percent by weight).

**5.3** **Groundwater Conditions:** Groundwater was not encountered in the test borings drilled at the time of the field investigation (July 11, 2003) to a maximum depth of exploration of approximately 50¾ feet BSG.

Maps depicting lines of equal elevation of water in wells, produced by the Department of Water Resources, were reviewed to investigate the fluctuation of the groundwater levels at the site. A summary of the groundwater elevation data, interpreted from the maps for the site vicinity, is included in Table 1. Since the values in the table are based on interpolation of mapped data, the values should be considered accurate to about 10 feet.

**Table Number 1**
**Range of Groundwater Elevations from Spring 1991 to Spring 2001**
**Proposed Fresno Fire Station No. 15 at South Clovis Avenue and East Park Circle Drive**

| Map Date | Groundwater Elevation; Feet Above Mean Sea Level | Groundwater Depth; Feet Below Site Grade* |
|---|---|---|
| Spring 1991 | 240 | 78 |
| Spring 1992 | 230 | 88 |
| Spring 1994 | 250 | 68 |
| Spring 1995 | 245 | 73 |
| Spring 1996 | 250 | 68 |
| Spring 1997 | 260 | 58 |
| Spring 1998 | 260 | 58 |
| Spring 1999 | 255 | 63 |
| Spring 2000 | 250 | 68 |
| Spring 2001 | 260 | 58 |

* Elevation of the site taken as 318 feet above MSL

Based on the historical data, groundwater depths estimated for the site varied over the past decade from a high of approximately 58 feet BSG in the years of 1997, 1998, and 2001 to a low of approximately 88 feet BSG in the year 1992.

It should be recognized, however, that water table elevations fluctuate with time, since they are dependent upon seasonal precipitation, irrigation, land use, and climatic conditions as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered both during the construction phase and the design life of the project. The evaluation of such factors was beyond the scope of this investigation and report.

## 6.0 GEOLOGIC SETTING

Fresno County is located in the central portion of California in the San Joaquin Valley (valley), bordered by two mountain ranges. To the east lie the Sierra Nevada Range consisting chiefly of crystalline rocks, and to the west the Diablo Range tier of the Coast Ranges consisting of sedimentary and metamorphosed sedimentary rocks. Small intermittent streams enter the valley from the semi-arid mountains of the Diablo Range, but soon are lost on alluvial fans, while perennial rivers flow from the more humid and larger drainage areas of the Sierra Nevada Range. Large coalescing alluvial fans have developed along each side of the valley. The larger and more gently sloping fans to the east side are built up principally by deposits from granitic rock sources, whereas the smaller and more steeply sloping fans on the west are built up by the material originating as sedimentary rocks of the Coast Range. As a result, the valley floor consists mainly of two kinds of alluvial materials that differ widely in provenance and their respective engineering properties.

The Coast Ranges, forming a barrier between the Great Valley and the Pacific Ocean, evolved as a result of folding, faulting, and accretion of diverse geologic terrains, and are composed chiefly of sedimentary and metamorphic rocks that are sharply deformed into complex structures. They are broken by numerous faults, the San Andreas Fault being the most notable structural feature.

The Sierra Nevada block has been tilted westward, caused by faulting and uplifting of the eastern edge. The western portion of the block is depressed and overlain by the sedimentary deposits of the valley.

The City of Fresno is located on Recent fan deposits originating from the Sierra Nevada Range.

## 7.0 TECTONICS AND SEISMICITY

The Sierra Nevada and Coast Ranges possess active and potentially active fault zones. Major active faults occur to the east, west, south, and north of the site. To the east, the Sierra Nevada/Owens Valley Fault Zones bound the eastern edge of the Sierra Nevada block and comprise a complex of both active and potentially active fault segments. West of the site, within the Coast Ranges, the San Andreas Fault Zone, and San Juan faults predominantly accommodate right-lateral strike-slip displacement across the Pacific and North American tectonic plate junction. Also to the west, the convergent, compressional component of plate interaction occurring north of the Transverse Ranges appears to be largely accommodated along the Great Valley Fault Zone. Other potentially active faults also occur in the eastern and central Coast Range. Portions of the Ortigalita-Tesla, Calaveras, Hayward, and Rinconada Faults are considered active or potentially active.

Near the southern border of the San Joaquin Valley, the White Wolf Fault, which forms the northern boundary of the Tehachapi Mountains, exhibits evidence of left-lateral and high angle reverse fault displacement. These displacements have resulted from predominantly compressional tectonics occurring near the westward change in orientation of the strike of the San Andreas Fault Zone ("big bend").

An "active fault" is defined, for the purpose of this evaluation, as a fault that has had displacement within Holocene time (about the last 11,000 years).

A widely accepted definition of "potentially active" is a fault showing evidence of displacement older than 11,000 years and younger than 1.6 million years (Pleistocene). Faults showing evidence of displacement older than 1.6 million years are usually classified as "inactive." The following subsections briefly describe the major fault systems and seismic source areas located within approximately 100 miles (160 kilometers) of the site that are considered "active" or "potentially active."

7.1 **Eastern San Joaquin Valley Fault System**: The eastern border of the southern San Joaquin Valley is cut by a series of en-echelon range-front faults. They are dominantly northwest trending normal faults, downdropped to the west, with near vertical dip. The activity of these faults is unknown, however, they are probably related to the continued uplift of the Sierra Nevada Range and relative lowering of the valley floor. A U.S. Geological Survey report (Page and LeBlanc, 1969) indicates that this system of northwest trending en-echelon range front faults parallels the Sierra Nevada Front from Terra Bella to Chowchilla. The ridges that face the valley are interpreted as having been carved from the uplifted block. Inliers of basement complex do not occur west of the inferred fault zones. The activities of these faults are uncertain; however, a September 4, 1973 earthquake, assigned a Richter Magnitude of 4.2 with the epicenter near Orange Cove, has been ascribed to the fault system.

The Clovis Fault, approximately 10 miles (16 km) northeast of the site, is the range-front fault closest to the site (Page and LeBlanc, 1969). There is little known or published information concerning this fault, although there are certain natural features such as water level changes, aligned offsets in stream courses, differences in depth to basement complex on opposite sides of the fault, and topographic lineaments which tend to confirm its presence. Page and LeBlanc (1969) reported that the Clovis Fault cuts Pleistocene alluvial sediments, indicating that the fault is at least potentially active. Based on the rupture length versus magnitude relationship (Wells and Coppersmith, 1984), we have estimated an upper bound earthquake magnitude of 5.5 for the Clovis Fault.

Another range front fault is the Monson Fault which lies approximately 26 miles (42 km) north of the site. Considering an estimated fault rupture length of about 12 miles (20 km), and using the subsurface rupture length versus magnitude relationship (Wells and Coppersmith, 1994), we have estimated an upper bound earthquake magnitude of 6.0 for the Monson Fault.

7.2 **Foothills Fault System:** The term "Foothills Fault System" has been used for the major fault zones in the western Sierra Nevada. The Melones and Bear Mountain faults zones are the most important components of this system south of the Consumnes River. The faults of this system generally consist of vertical to steeply east-dipping zones of sheared rock with linear mapped traces. Many of the faults are delineated wholly or in part by lenses of sheared serpentine or schist.

The fault system is located approximately 43 miles (68 km) northeast of the site.

Prior to the Oroville earthquake (Magnitude 5.7) of August 1, 1975, the Foothills Fault System was regarded as seismically inactive. This earthquake occurred within the northern extension of the Bear Mountain Fault zone and suggested the possibility of reservoir (Oroville Dam) induced seismicity. Micro-earthquake data and geodetic surveys show that the two main branches of the Foothills Fault System (Bear Mountain and Melones Fault Zones) display active movement, at least in the area between Oroville and Folsom.

7.3 **Great Valley Boundary Zone:** In the western portion of the San Joaquin Valley, a series of events referred to as the Coalinga Earthquake Sequence was initiated on May 2, 1983 with a 6.7 magnitude earthquake centered in Coalinga. In an event that is probably related, a 5.5 magnitude earthquake was generated near Avenal on August 15, 1985. The main shocks for both earthquakes occurred in close proximity to late-Cenozoic crustal folds and have similar hypocenter depths and fault-plane solutions (California Department of Conservation, Division of Mines and Geology, Special Publications 66). The Great Valley Fault System (GVFS) is a topic of ongoing research which primarily commenced with the Coalinga Earthquake of 1983, attributed to the zone. The GVFS, formerly termed the Coast Range-Sierra Nevada boundary zone and the Coast Range - Central Valley boundary zone, is believed to be a fundamental tectonic boundary between the Coast Range province and Sierran block. Fault plane solutions for the Coalinga Earthquake sequence suggest a northwest strike with either a steep northwest dip or shallow northwest dip (Eaton et al., 1983). Eaton (1985c) proposed that the main Coalinga earthquake as well as the 1985 North Kettleman Hills earthquake (Eaton, 1985b) occurred on a shallow westward dipping thrust fault and slip was induced on northwest and southwest dipping reverse faults in the plate overlying the thrust fault. Namson and Davis (1988) interpreted an approximately 125 mile (200 km) long zone of folds (anticlines and synclines) along the southwest margin of the San Joaquin Valley as an actively developing fold thrust belt. Namson and Davis (1988) attributed the seismically active Coalinga and Kettleman Hills North Dome anticlines to fault-bend folding above a thrust, which does not reach the surface (blind thrust).

The aforementioned fault plane solutions and tectonic interpretations of Namson and Davis are generally consistent with solutions for a number of earthquake events occurring along the GVFS boundary zone between the San Luis Reservoir and Willows, California (Wong et al. 1988). Wong et al. (1988) indicated that geologic evidence suggests that the boundary zone is not a single fault but a complex zone of faulting with the potential of generating large earthquakes (such as the Richter Magnitude 6.7 Coalinga earthquake) over most of its length. Wakabayashi and Smith (1994) postulated that the GVFS may comprise 18 to 25 segments from 12 to 57 kilometers in length, and that the characteristic earthquake for the average length segment may be a magnitude 6.3 to 6.4.

The CGS California Fault Parameter database lists eight (8) Great Valley Fault System segments within approximately 100 miles (160 km) of the site. It is estimated that the closest segment (Segment Number 12) lies approximately 44 miles (71 km) west of the site. The individual segments

were assigned magnitudes of 6.3 to 6.7 and a slip rate of 1.5 millimeters per year (mm/yr) was used for all segments, as indicated in the CGS database (Wakabayashi and Smith, 1994).

7.4 **Ortigalita Fault:** The Ortigalita Fault is located approximately 68 miles (108 km) west and southwest of the site. According to the Merced County General Plan, this fault has not been active in modern times (i.e., no recorded slippage in modern time). However, this fault is indicated as geologically active (Jennings, 1994). A magnitude of 6.9 and a slip rate of 1.0 mm/yr were used in the analyses.

7.5 **San Andreas Fault:** The San Andreas Fault is associated with two of the largest earthquakes that have occurred in California during historic time: the 1857 Fort Tejon earthquake (magnitude 8.3) on the south-central portion of the fault and the 1906 San Francisco earthquake (magnitude 8.3) on the northern portion of the fault. The nearest segment of the San Andreas Fault is located approximately 64 miles (103 km) southwest of the site. Due in part to the length of the fault, approximately 625 miles (1,000 km), various portions of the San Andreas Fault can be characterized by distinctly different seismic behavior related to rupture location, length, and expected repeat time (e.g., Wallace, 1970; Allen, 1968; Sieh and Jahns, 1984). Relatively high slip rates of 14 to 34 mm/yr for the individual segments indicate the San Andreas Fault segments contribute more to the probabilistic ground motion estimate than closer, less active faults.

## 8.0 EVALUATION

This section presents the details of the evaluation to develop conclusions and recommendations for use in the project design and preparation of construction specifications. In addition, data regarding potential geologic and seismic hazards are presented. The evaluation was based upon the subsurface conditions determined from this investigation and the details provided regarding the proposed construction.

8.1 **Geologic Hazards:** The potential geologic hazards of flooding, landslides, seiche, tsunamis, and volcanic activity are evaluated in the following subsections.

8.1.1 **Flooding:** Based on the Flood Insurance Rate Maps (Community - Panel Number 065029 0895 C), distributed by the Federal Emergency Management Agency the proposed site area is in Zone B. Zone B denotes "Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood."

Flood inundation maps produced by United States Department of the Interior Bureau of Reclamation indicate that a breach of the dams at Pine Flat Lake, Big Dry Creek detention facility, and Millerton Lake would not impact the subject site

**8.1.2 Landslides:** Due to the relatively flat relief at the site, the potential for landslides on this site is considered to be low.

**8.1.3 Seiches and Tsunamis:** A seiche is a wave generated by the periodic oscillation of a body of water whose period is a function of the resonant characteristics of the containing basin as controlled by its physical dimensions. These periods generally range from a few minutes to an hour or more. Since no bodies of water are located near the site, seiches are not considered a potential hazard at the site.

Tsunamis are waves generated in oceans from seismic activity. Due to the inland location of the site, tsunamis are not considered a potential hazard.

**8.1.4 Volcanic Activity:** The closest areas of Quaternary volcanism are the Mono Lake and Mammoth Mountain area (including Sadler Peak) located approximately 64 miles (102km) norteast of the site, the South of Big Pine area located approximately 78 miles (125km) east of the site, and the Long Canyon area located approximately 82 miles (131 km) southeast of the site, (Jennings, 1994). These areas contain cinder cones and volcanic flows dated as young as approximately 100 to 200 years before present (Jennings, 1994). No other areas of volcanism are located within 100 miles (160 km) of the site (Jennings, 1994). Based on the distance of the aforementioned volcanic areas from the site and age of activity, the prospect for lava flows or significant ash falls at the site during the design life of the structure is considered low.

**8.2 Seismic Hazards:** The potential seismic hazards of groundshaking, ground rupture, liquefaction and seismic settlement are evaluated in the following subsections.

**8.2.1 Groundshaking:** For any given earthquake, seismic waves propagate away from the focal point. These seismic waves have a certain maximum acceleration and a predominant period that depends on the nature of the rock and on the source mechanism. Away from the focus of the earthquake, the seismic waves begin to attenuate. The way in which the earthquake wave is altered depends to a great degree on source characteristics and to a lesser degree on the travel path.

Title 24, Part 2, California Building Code (CBC), Figure Number 16A-2, "Seismic Hazard Zone Map for Hospitals and Public Schools in California" indicate that the site is in Zone 3. Therefore, the structure should be designed using a Z factor of 0.3 for determining the minimum lateral forces using the static force procedure.

More detailed analysis indicates that groundshaking at the site is directly related to seismicity in the immediate area. This detailed seismic analysis was conducted using two different methods, historic and probabilistic. Discussion of the analyses and the results are presented in the following subsections.

**8.2.2 Historic Seismic Activity:** The general area of the site has experienced recurring seismic activity. Based on historical earthquake catalogs published by the California Geological Survey, supplemental data from Townley and Allen (1939), and the U.S. Geological Survey's earthquake data base system (data base updated through 2001), approximately 877 historical earthquakes with magnitude 4.0 or greater were recorded from 1900 through 2001 within a 100-mile radius of the site. The location of the project site with relation to the approximate historical earthquake epicenter locations is presented on Drawing Number 3 in Appendix A.

The peak horizontal ground acceleration that may have occurred at the site from each of the historical earthquakes within the 100-mile search radius was estimated using an attenuation relationship developed by Boore et al. (1993). The source data presented includes: latitude, longitude, date, time, depth, Richter Magnitude, computed site acceleration, computed site Modified Mercalli intensity, and the approximate earthquake-to-site distance in miles and kilometers. This analysis was performed by a computer program titled EQSEARCH (1989). Input and output data are summarized in tabular form in Appendix D.

The seismic event with the nearest epicenter found during the search occurred in 1973 approximately 20 miles (32 km) southeast of the site (Magnitude 4.1; peak site acceleration 0.048g). The largest magnitude earthquake identified in the search was the Magnitude 6.7 Coalinga earthquake that occurred in 1983, approximately 48 miles (77½ km) southwest of the site. The analysis indicates that the 1983 Coalinga event also produced the highest acceleration since 1900 (estimated to be about 0.082g).

**8.2.3 Probabilistic Seismic Analysis:** Section 1627 of the California Building Code (CBC) defines the "Upper Bounds Earthquake" and the "Design Basis Ground Motion" for design criteria. The "Upper Bounds Earthquake" is defined as the seismic ground motion having a 10 percent probability of being exceeded in a 100-year period. The "Design Basis Ground Motion" is defined as the seismic ground motion having a 10 percent probability of being exceeded in a 50-year period. Determination of the Upper Bounds Earthquake and Design Basis Ground Motion requires probabilistic methods.

The computation of attenuated ground motion is based on the closest distance between the site and various measures of potential fault-plane ruptures along selected faults. The thirty-four (34) faults and fault segments selected for this analysis are illustrated on Drawing Number 4 in Appendix A, and listed in Table Number 2. These selected faults comprise the local potentially active faults and large regional faults with higher activity and magnitudes, located within approximately 100 miles (160 km) of the site. The computations were conducted using FRISK (McGuire, 1978). The computer program FRISKSP version 3.01B program (Blake, 1998 in references) was used to set up the input data files and generate the output.

The location and fault parameters (such as fault length, magnitude and rupture area) of faults capable of impacting the site were determined from published geologic papers and corresponds with those

listed in the CGS database entitled "California Fault Parameters." Due to the relative age of the faults and the paucity of historic event data, probabilities were estimated based on empirically derived relationships which include slip rates. The slip rates and maximum magnitudes for each fault used in the analysis are included in Table Number 2.

**Table Number 2**
**Summary of Fault Source-Model Parameters**
**Proposed Fresno Fire Station No. 15 at Clovis Avenue and Park Circle Drive.**

| FAULT NAME | SLIP RATE (millimeters per year) | Design Level Magnitude | Site to Fault Distance, km |
|---|---|---|---|
| Clovis | 0.01 | 5.5 | 16 |
| Monson | 0.05 | 6.0 | 42 |
| Foothill Fault System | 0.05 | 6.5 | 68 |
| Great Valley 12 | 1.5 | 6.3 | 71 |
| Great Valley 11 | 1.5 | 6.4 | 72 |
| Great Valley 13 | 1.5 | 6.5 | 74 |
| Great Valley 14 | 1.5 | 6.4 | 78 |
| Great Valley 10 | 1.5 | 6.4 | 85 |
| Great Valley 9 | 1.5 | 6.6 | 94 |
| Great Valley 8 | 1.5 | 6.6 | 122 |
| Great Valley 7 | 1.5 | 6.7 | 153 |
| Ortigalita | 1.0 | 6.9 | 108 |
| San Andreas: | | | |
| Creeping | 34 | 6.5 | 111 |
| 1857 Rupture | 34 | 7.8 | 111 |
| Parkfield Segment | 24 | 6.7 | 112 |
| Cholame | 34 | 6.9 | 121 |
| Carrizo | 34 | 7.2 | 158 |
| Round Valley | 1.0 | 6.8 | 112 |
| Hilton Creek | 2.5 | 6.7 | 118 |
| Hartley Springs | 0.5 | 6.6 | 119 |
| Birch Creek | 0.7 | 6.4 | 121 |
| Independence | 0.2 | 6.9 | 123 |
| San Juan | 1.0 | 7.0 | 128 |
| Fish Slough | 0.2 | 6.6 | 130 |
| Calaveras (So. of Calaveras Res) | 15 | 6.2 | 132 |
| Owens Valley | 1.5 | 7.6 | 134 |
| Quien Sabe | 1.0 | 6.4 | 135 |

| FAULT NAME | SLIP RATE (millimeters per year) | Design Level Magnitude | Site to Fault Distance, km |
|---|---|---|---|
| White Mountains | 1.0 | 7.1 | 140 |
| Mono Lake | 2.5 | 6.6 | 144 |
| Rinconada | 1.0 | 7.3 | 145 |
| Deep Springs | 0.8 | 6.6 | 153 |
| Sargent | 3.0 | 6.8 | 156 |
| Hunter Mountain- Saline Valley | 2.5 | 7.0 | 157 |
| Zayante-Vergeles | 0.1 | 6.8 | 157 |

The ground motion attenuation relationship used in the analysis to estimate site response values was developed by Boore et al. (1997). The relationship for a random component plus one standard deviation (as opposed to mean) was used. Boore et al. (1997) defines a class for each site based on the soil properties. The analysis was conducted using a Type $S_D$ soil.

The design basis horizontal site acceleration that has a 10% probability of being exceeded in 50 years was determined to be 0.19g. The Upper Bounds Earthquake ground motion that has a 10% probability of being exceeded in 100 years was determined to be 0.21g. The Probability of Exceedance vs. Acceleration for exposure periods of 25, 50, 75, and 100 years is presented on Drawing Number 5 in Appendix A. In addition, the average return periods versus ground accelerations are charted on Drawing Number 6 in Appendix A.

**8.2.4** **Site Coefficients and Near Source Factors:** Static and dynamic methods of estimating lateral forces due to seismic events are outlined in the CBC. The static method incorporates a site soil profile type defined in the CBC (section 1636). Based on the 2001 California Building Code (CBC) Table 16-J, the site is classified as a stiff soil $S_D$ site with standard penetration resistance N-values generally between 15 and 50 blows per foot in the upper 100 feet. The site does not require near-source corrections (CBC Tables 16-S and 16-T) since no faults were identified within 15 km of the site. Therefore, the values of the near-source acceleration factor, Na, and the near-source velocity factor, Nv, may be taken as 1.0. Based on these values, the seismic acceleration coefficient, Ca (Table 16-Q), would be 0.36, and the seismic velocity coefficient, Cv (Table 16-R), would be 0.54.

**8.2.5** **Ground Rupture:** Earthquakes are caused by the sudden displacement of earth along faults with a consequent release of stored strain energy. The fault slippage can often extend to the ground surface where it is manifested by sudden and abrupt relative ground displacement. Damage resulting from fault rupture occurs only where structure are located astride

the fault traces that move. The site is not located in an earthquake fault zone designated pursuant to the Alquist-Priolo Earthquake Fault Zoning Act (1972). The potential for surface rupture at the site is considered low.

**8.2.6 Liquefaction:** The site is not in an area of potential liquefaction hazard currently mapped under the Seismic Hazards Mapping Program (1990). Considering that groundwater in the vicinity of the site is over 50 feet deep, liquefaction is not expected to significantly impact the proposed project.

**8.2.7 Seismic Settlement:** Seismic settlement can occur in both saturated and unsaturated granular soils. Seismic settlement occurs as saturated and unsaturated granular soils rearrange resulting in a volume reduction. Seismic settlement is a function of the relative density of the soil, grain size distribution, and the magnitude of cyclic shear stresses caused by seismic ground motion.

Hazard deaggregation was conducted using the FRISKSP computer program. The results indicate that an earthquake magnitude of 6.5 represents the predominant earthquake magnitude for the site. An upper bounds earthquake ground motion (peak horizontal acceleration) of 0.21g and an earthquake magnitude of 6.5 were used for the analysis.

The seismic settlement for unsaturated conditions (above groundwater) was considered in the analysis. A spread sheet based on the computer program LIQUEFY2 was used to estimate seismic settlement in the unsaturated zone (upper 50 feet). The soil conditions used for the analysis were estimated based on the field and laboratory data presented in this investigation. The results of the analysis are included in Appendix D of this report.

Based on the analysis, total seismic settlement induced by the upper bounds earthquake of approximately ¼ inch was estimated. Based on the liquefaction analyses, and considering the relatively consistent soil profile in the three borings drilled, a differential seismic settlement (distortion) of ¼ inch in 40 feet is estimated for design. This magnitude of differential seismic settlement can typically be designed for in the foundation design of the building types proposed.

**8.3 Geotechnical Engineering:** The data and methodology used to develop conclusions and recommendations for project design and preparation of construction specifications are summarized in the following subsections.

**8.3.1 Soil Conditions:** In general, the soils encountered consist predominantly of loose to dense silty sands to a depths of between 13 and 14 feet BSG underlain by very stiff to hard sandy silts to depths of between 18 and 29 feet BSG. The sandy silts were underlain by dense silty sands to a depth of approximately 39 feet BSG. These strata were underlain by hard sandy lean clays and sandy silts to the maximum depth explored, 50¾ feet BSG.

The near surface silty sand soils are loose, potentially collapsible, and will not provide direct support for foundations and slab-on-grade.

The primary geotechnical concerns at the site are: 1) loose near surface silty sands; and, 2) potential for water induced collapse in the near surface silty sands.

**8.3.2 Site Preparation:** No structures were noted on the site at the time of our field investigation. However, two debris piles ranging in length from five to fifteen feet, approximately three feet wide, and three feet high were noted on site. These piles contained fill soils and construction debris, consisting of concrete, asphalt, and rebar. The piles should be entirely removed from site prior conducting stripping or tree removal.

Tall bushes and trees were noted along eastern and northern site borders. The existing trees/bushes and root systems should be completely removed from all areas of the site that are planned for development. The tree removal process is critical and should be properly planned and monitored, and the tree locations should be surveyed prior to removal. The depth of excavation should be sufficient to remove tree roots larger than ¼ inch in diameter. It is anticipated that roots and root balls will extend to depths of between 2 and 4 feet BSG. Limbs, tree branches, roots, etc. should not be disced into the near-surface soils. These materials should be raked and hand-picked, as necessary, to ensure proper removal. Excavations resulting from tree removal should be cleaned of all loose or organic material, over-excavated to a minimum depth of 12 inches, and the exposed native soils should be scarified to a depth of at least 8-inches then compacted as engineered fill and the excavation backfilled with engineered fill.

Stripping should be conducted to remove the organic rich root zones of grasses and other vegetation. The stripping depths should be sufficient to remove existing vegetation, residual limbs, organic matter, etc., those soils containing more than 3 percent by weight organic material as determined by a loss-on-ignition test (ASTM D2974-87). For estimate purposes, a minimum stripping depth of 4 inches should be used. The actual depth of stripping should be reviewed by our firm at the time of construction.

After stripping and tree removal, the building areas should be over-excavated to at least 5 feet beyond the building perimeters, or to the edge of adjacent perimeter walkway slabs, whichever is further. Over-excavation should be conducted beneath the entire building areas to provide a minimum of 12 inches engineered fill below foundations, or engineered fill to a depth of 24 inches below preconstruction site grade, whichever is deeper. The engineered fill section below foundations should be achieved by a combination of over-excavation, scarification, moisture-conditioning, and compaction. The base of the excavation should be observed by Twining and any roots larger than ¼ inch in diameter or concentrations of fine roots (root clumps) should be excavated and removed. The exposed subgrade at the bottom of the excavation (below root removal areas and throughout the entire building area) should be scarified to a depth of 8 inches, moisture

conditioned and compacted as engineered fill. Any soft soil areas should be removed and recompacted and then the building pad should be backfilled to grade with engineered fill.

In the areas to receive pavements and exterior slabs-on-grade, after stripping and tree removal, the exposed native soils to a minimum depth of 12 inches below the bottom of the proposed pavement section or slab should be scarified, moisture conditioned, and compacted to a minimum relative compaction of 95 percent.

**8.3.3 Foundations and Slabs-On-Grade:** The near surface loose and potentially collapsible silty sand soils will not provide adequate direct support for foundations and slabs-on-grade. To reduce total and differential static settlements (static and collapse) to 1 inch and ½-inch, the foundations should be placed on a minimum of 12 inches of engineered fill or engineered fill, which extends to depth of 2 feet below preconstruction site grade, whichever is deeper.

Settlement estimates and site preparation recommendations are based on a net allowable soil bearing pressure of 2,500 pounds per square foot. Net allowable soil bearing pressure is the additional contact pressure at the base of the foundations caused by the structure. The weight of the soil backfill may be neglected and the weight of concrete in the footings may be assumed to be 50 pounds per cubic foot. The net allowable soil bearing pressure presented was selected to satisfy both the settlement criteria and Terzaghi bearing capacity equations for spread foundations. A factor of safety of 3 was used to determine the allowable bearing capacity based on Terzaghi equations. Schmertmann's method was used to estimate foundation settlements.

The foundation bearing capacity may be increased by one-third for short duration wind or seismic loads. Total and differential static settlements of 1-inch and ½-inch, respectively, should be anticipated for design.

Interior slabs-on-grade and exterior slabs-on-grade adjacent to buildings should be supported on engineered fill which extends to the depth of engineered fill recommended below the foundations. It is recommended to include a minimum of 4 inches of Class 2 aggregate base directly below the slab-on-grade. Aggregate base sections below interior slabs are recommended for constructability and to provide a stable working surface.

The slab-on-grade in the apparatus bay should be design by a project structural engineered based on k-value of native soil or engineered fill of 200 psi/inch.

Exterior slabs-on-grade not adjacent to the building should be supported on a minimum of 12 inches of scarified, moisture-conditioned, and compacted native soil.

**8.3.4 Asphaltic Concrete Pavements:** Asphaltic concrete pavement structural sections are presented in the recommendations section of this report. The structural sections were designed using the gravel equivalent method in accordance with Chapter 600 of the California

Department of Transportation Highways Design Manual (fourth edition). The structural vehicle loadings were based on typical traffic loadings for this type and size of facility. The analysis was based on traffic index values ranging from 5.0 to 8.0 for pavements. The project Civil Engineer should determine appropriate traffic index values. It should be noted that if pavements are constructed prior to the building construction, the expected traffic should be considered in the design. If the pavements are placed prior to construction, or if more frequent truck traffic is anticipated than assumed in this report, Twining should be contacted to re-evaluate the range of traffic index values.

The anticipated subgrade soils are silty sands. The subgrade support characteristics of the native soils were evaluated by Resistance (R)-value test. The results of three (3) test, obtained between depths of ½ and 2½ feet BSG, indicate R-values ranging from 73 to 75. For the purpose of design, an R-value of 50 was utilized, since utilizing of an R-value higher than 50 will not reduce minimum recommended thickness of aggregate base.

**8.3.5** **Corrosion Protection:** The risk of corrosion of construction materials relates to the potential for soil-induced chemical reaction. The rate of deterioration depends on soil resistivity, texture, acidity, and chemical concentration. The evaluation was based on the results of analyses of two soil samples collected between the ground surface and a depth of approximately 1½ feet BSG, and from between depths of 1½ and 3 feet BSG. The chemical analyses results indicate resistivity values of 11,000 and 21,000 ohm-cm and pH values of 7.6 and 7.0, respectively. Based on the resistivity values, the soils exhibit a "mildly corrosive" corrosion potential. In addition, the results of a soil samples analyses indicate "none detected" concentration of sulfate and chloride in the two samples tested. Based on these concentrations, the soils exhibit a low potential for sulfate exposure to concrete. If piping or concrete are placed in contact with deeper soils or engineered fill, these soils should be analyzed to evaluate the corrosion potential of these soils.

These soil corrosion data should be provided to the manufacturers or suppliers of materials that will be in contact with soils (pipes or ferrous metal objects, etc.) to provide assistance in selecting the protection and materials for the proposed products or materials. If the manufacturers or suppliers cannot determine if materials are compatible with the soil corrosion conditions, a professional consultant, i.e., a corrosion engineer, with experience in corrosion protection should be consulted to provide design parameters.

## 9.0 CONCLUSIONS

Based on the data collected during the field and laboratory investigations, our geotechnical experience in the vicinity of the project site, and our understanding of the anticipated construction, we present the following general conclusions.

**POTENTIAL GEOLOGIC HAZARDS**

9.1 The potential for flooding at the project site is low.

9.2 The potential for seiches and/or tsunamis at the project site is low.

9.3 The potential for landslides at the project site is low.

9.4 The potential for volcanic activity to impact the project site is low.

9.5 Based on the Flood Insurance Rate Maps, distributed by the Federal Emergency Management Agency, the site is located in Zone B. Zone B denotes "Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood."

9.6 An upper bounds maximum peak horizontal acceleration of 0.21g and a design basis ground motion maximum peak horizontal acceleration of 0.19g are estimated for the proposed site.

9.7 Based on Title 24 (California Building Code, 2001), the site lies within Seismic Zone 3.

9.8 Based on the 2001 California Building Code (CBC) Table 16-J, the site is classified as a stiff soil profile $S_D$ site. Based on the logs of soil borings, standard penetration resistance N-values appear to average between 15 to 50 blows per foot from the ground surface to the maximum depth explored, 50¾ feet BSG.

9.9 The site does not lie within known currently published Earthquake Fault Zones for ground surface rupture (Alquist-Priolo Fault Zoning Act). The potential for ground rupture associated with any known fault is low.

9.10 Based on the anticipated structural loads, soil profile encountered in the test borings drilled, and historic groundwater data, the potential for loss of bearing strength for foundations, or surface manifestations due to liquefaction, is low. A total seismic settlement of ¼ inch and a differential seismic settlement (distortion) of ¼ inch in 40 feet should be anticipated for design.

**ENGINEERING**

9.11 The site is suitable for the proposed construction with regard to support of foundations and concrete slabs-on-grade, provided the recommendations contained in this report are followed. It should be noted that the recommended design consultation and construction monitoring by Twining are integral to this conclusion.

9.12 In general, the soils encountered consist predominantly of loose to dense silty sands to a depths of between 13 and 14 feet BSG underlain by very stiff to hard sandy silts to depths of between 18 and 29 feet BSG. The sandy silts were underlain by dense silty sands to depth of approximately 39 feet BSG. These strata were underlain by hard sandy lean clays and sandy silts to the maximum depth explored, 50¾ feet BSG.

9.13 Shallow spread footings placed entirely on a minimum of 12 inches of engineered fill, or engineered fill which extends to a depth of 24 inches below preconstruction site grade, whichever is deeper, can provide adequate support for the proposed structure.

9.14 Total and differential static settlements for the proposed structure are estimated to be 1 inch and ½ inch in 40 feet, respectively.

9.15 Interior slabs-on-grade and exterior slabs-on-grade adjacent to buildings should be supported on engineered fill which extends to the depth of engineered fill recommended below the foundations. It is recommended to include a minimum of 4 inches of Class 2 aggregate base directly below the slab-on-grade.

9.16 Exterior slabs-on-grade not adjacent to the building pad can be supported on a minimum of 12 inches of scarified, moisture-conditioned, and compacted native soils.

9.17 The analytical results of soil sample analyses indicate that the near-surface soils exhibit a "mildly corrosive" corrosion potential to buried metal objects.

9.18 The analytical results of soil sample analyses indicate "none detected" sulfate and chloride concentrations in the two soil samples tested. Therefore, a low potential for sulfate attack on reinforced concrete placed in the near-surface soils is anticipated.

9.19 The near-surface soils exhibit good support characteristics for pavements.

9.20 Groundwater was not identified in the test borings drilled at the time of the field investigation (July 11, 2003). Based on the historical data, groundwater depths

varied over the past decade from a high of approximately 58 feet BSG in the years of 1997, 1998, and 2001 to a low of approximately 88 feet BSG in the year 1992.

## 10.0 RECOMMENDATIONS

Based on the evaluation of the field and laboratory data and our geotechnical experience in the vicinity of the project, we present the following recommendations for use in the project design and construction. However, this report should be considered in its entirety. When applying the recommendations for design, the background information, procedures used, findings, evaluation, and conclusions should be considered. The recommended design consultation and construction monitoring by Twining are integral to the proper application of the recommendations.

### 10.1 General

10.1.1 A tree removal plan should be developed to ensure proper tree removal and site preparation are achieved for the project. Twining should be provided a copy of the plan for review.

10.1.2 A preconstruction meeting including, as a minimum, the owner, general contractor, foundation contractor, civil engineer, and Twining should be scheduled by the general contractor at least one week prior to the start of clearing and grubbing. The purpose of the meeting should be to discuss critical project issues, concerns and scheduling.

10.1.3 If any city, county, and/or state standards are cited on the plans or specifications, these standards should be in addition to the recommendations in this report.

10.1.4 A grading plan was not provided to our firm. The grading plan should be provided to our firm for review prior to final permitting and release for bidding.

### 10.2 Site Grading and Drainage

10.2.1 Develop and maintain site grades which will drain surface and roof runoff away from foundations and floor slabs - both during and after construction. Adjacent exterior finished grades should be sloped a minimum of two percent for a distance of at least five feet away from the structure to preclude ponding of water adjacent to foundations.

10.2.2 Landscaping after construction should direct rainfall and irrigation runoff away from the structure and not promote ponding of water adjacent to the structure. Care should be taken to maintain a leak-free sprinkler system.

10.2.3 Rain gutters and roof drains should be provided, and connected directly to the site storm drain system. As an alternative, the roof drains should extend a minimum of 5 feet away from the structure and the resulting runoff directed away from the structure.

## 10.3 Site Preparation

10.3.1 All topsoil, vegetation, organics, and debris should be removed from the proposed building and pavement areas. The general depth of stripping should be sufficiently deep to remove the root systems and organic topsoils. For estimate purposes, a minimum stripping depth of 4 inches should be used. The actual depth of stripping should be reviewed by our firm at the time of construction. Deeper stripping may be required in localized areas. Stripping should extend laterally a minimum of 10 feet outside the building and pavement perimeters. These materials will not be suitable for use as engineered fill; however, stripped topsoil may be stockpiled and reused in landscape areas at the discretion of the owner. It should be anticipated that topsoil will settle about 1 inch per foot of thickness as a result of decay of organic material.

10.3.2 Two debris piles ranging in length from five to fifteen feet, approximately three feet wide, and three feet high were noted on site. These piles contained fill soils and construction debris, consisting of concrete, asphalt, and rebar. These piles should be entirely removed prior conducting stripping operations.

10.3.3 The contractor should locate all foundations, floor slabs, utility lines, irrigation lines, debris pits, uncontrolled fills, and subsurface structure. These soils or structure should be entirely removed. Utility lines, irrigation lines, foundations and floor slabs may **not** be crushed and left in-place. The resulting excavations should be cleaned of all loose or organic material, the exposed native soils should be scarified to a depth of 8-inches then compacted as engineered fill and the excavation backfilled with engineered fill. The contractor should consult with the City and County regarding abandonment permits for removal of septic tanks (if revealed).

10.3.4 All trees in the areas proposed for development (paved areas, sidewalks, etc.) should be surveyed and removed in their entirety. All roots larger than ¼ inch in diameter or any accumulation of organic matter that will result in an

organic content more than 3 percent should be removed and not used as engineered fill. The areas occupied by trees should be excavated to a minimum depth of 12 inches below the excavations required to remove the tree, root ball, and roots. It has been our experience that this depth ranges from 2 to 4 feet depending on the type of tree, etc. The bottom of the excavation should be scarified to a minimum depth of 8 inches and compacted as engineered fill prior to backfilling operations. If grinding operations are conducted on the site, these areas need to be cleaned of all organic matter and not used as engineered fill. Tree removal operations and site preparation related to tree removal should be observed by Twining.

10.3.5 Debris pits and uncontrolled fills (if encountered during grading) should be entirely removed. The resulting excavations should be cleaned of all loose or organic material, the exposed native soils should be scarified to a depth of 8-inches then compacted as engineered fill and the excavation backfilled with engineered fill.

10.3.6 After all stripping and tree removal, the building area (including slabs-on-grade adjacent to the building pad) should be over-excavated to a depth of 24 inches below preconstruction site grade, or to provide at least 12 inches of engineered fill below foundations, whichever is deeper. The zone of over-excavation should extend throughout the building (including the slab areas), to at least 5 feet beyond the perimeter foundations, or to the edge of perimeter walkways, whichever is further.

10.3.7 The engineered fill section below foundations should be achieved by combination of over-excavation, scarification, moisture-conditioning, and compaction. The base of the excavation should be observed by Twining and any roots larger than ¼ inch in diameter or concentrations of fine roots (root clumps) should be excavated and removed. The exposed subgrade at the bottom of the excavation (below root removal areas) should be scarified to a depth of 8 inches, moisture conditioned and compacted as engineered fill. Any soft soil areas should be removed and recompacted and then the building pad should be backfilled to grade with engineered fill (including imported non-expansive fill, see below).

10.3.8 It is recommended that care be taken by the contractor to ensure that the actual over-excavation depths and lateral extent are sufficient enough to conform to the site preparation recommendations presented in this report. Twining is not responsible for measuring and verifying lateral extent and depth of over-excavation or subgrade compaction. In addition, the contractor should verify in writing to the owner and to Twining that the horizontal and

vertical over-excavation limits were completed in conformance with the recommendations of this report and/or the project plans and specifications. This verification may be an as-built drawing of the earthwork limits produced by the construction surveyor. This verification should be provided prior to requesting pad certification from Twining or excavating for foundations.

10.3.9 All fills required to bring the site to final grades should be placed as engineered fill. In addition, all native soils over-excavated should be compacted as engineered fill.

## 10.4 Engineered Fill

10.4.1 The on-site soils encountered are predominantly silty sands. These materials will be suitable for use as fill material, provided they are free of organics and debris and the moisture content of the soil is within optimum to two percent above optimum moisture content at the time of placement. If soils other than those considered in this report are encountered, Twining should be notified to provide alternate recommendations.

10.4.2 The compactibility of the native soils is dependent upon the moisture contents, subgrade conditions, degree of mixing, type of equipment, as well as other factors. The evaluation of such factors was beyond the scope of this report; therefore, we recommend that they be evaluated by the contractor during preparation of bids and construction of the project.

10.4.3 Import fill soil should be non-expansive, non-corrosive, and granular in nature with the following acceptance criteria recommended.

| | |
|---|---|
| Percent Passing 3-Inch Sieve | 100 |
| Percent Passing Number 4 Sieve | 50 - 100 |
| Percent Passing No. 200 Sieve | 10 - 30 |
| Plasticity Index | Less than 10 |
| Expansion Index (UBC 29-2) | Less than 10 |
| R-Value | Minimum 50 |
| Soil Resistivity | >25,000 ohms/cm |
| Sulfate | <150 ppm |

Prior to being transported to the site, the import fill material should be tested and approved by Twining. The imported soils shall be free of contamination (constituents that are regulated by local, state or federal agencies). The contractor shall provide evidence that the soils are not contaminated to the satisfaction of the Owner and Twining.

10.4.4 On-site and import soils should be placed as engineered fill in loose lifts approximately 8 inches thick, moisture-conditioned to optimum to three (3) percent above the optimum moisture content, and compacted to a dry density of at least 92 percent of the maximum dry density as determined by ASTM Test Method D1557. For mass fills, or trenches backfilled deeper or thicker than 5 feet, the soils below 5 feet from finished grades should be compacted to a dry density of at least 95 percent of the maximum dry density as determined by ASTM Test Method D1557. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.

## 10.5 Foundations

10.5.1 Structural loads may be supported on spread or continuous footings placed on a minimum of 12 inches of engineered fill, or on engineered fill which extends to a depth of 24 inches below preconstruction site grade, whichever is deeper. Spread and continuous footings may be designed for a maximum net allowable soil bearing pressure of 2,500 pounds per square foot for dead-plus-live loads. This value may be increased by one-third for short duration wind or seismic loads.

10.5.2 Shallow spread footings should have a minimum depth of 12 inches below rough pad grades or adjacent exterior grades, whichever is lower, and extend around the entire perimeter of the building. Footings should have a minimum width of 12 inches (15 inches for 2-story), regardless of the load.

10.5.3 Total and differential static settlements for the proposed structure are estimated to be 1 inch and ½ inch in 40 feet, respectively.

10.5.4 Total and differential seismic settlements for the proposed structure are estimated to be ¼ inch and ¼ inch in 40 feet, respectively.

10.5.5 The foundations should be designed and reinforced for the anticipated differential settlements. A structural engineer experienced in foundation design should recommend the thickness, design details and concrete specifications for the foundations based on: 1) a total static settlement of 1 inch, 2) a differential static settlement of ½ inch in 40 linear feet of continuous footings; 3) a total seismic settlement of ¼ inch; 4) a differential seismic settlement of ¼ inch in 40 feet; and 5) a differential settlement of ½ inch between isolated column footings.

10.5.6 The following factors were developed based on the tables in Chapter 16 of the 2001 California Building Code (CBC) and the California Fault Parameters database (California Geological Survey).

| Seismic Factor | CBC Value |
|---|---|
| Soil Type | $S_D$ |
| Near Source Acceleration Factor, Na | 1.0 |
| Near Source Velocity Factor, Nv | 1.0 |
| Seismic Acceleration Coefficient, Ca | 0.36 |
| Seismic Velocity Coefficient, Cv | 0.54 |

## 10.6 Frictional Coefficient and Earth Pressures

10.6.1 The bottom surface area of concrete footings or concrete slabs in direct contact with engineered fill can be used to resist lateral loads (areas of slabs underlain by a synthetic moisture barrier cannot be considered). An ultimate coefficient of friction of 0.62, reduced by an appropriate factor of safety, can be used for design.

10.6.2 The ultimate passive resistance of the native soils and engineered fill may be assumed to be equal to the pressure developed by a fluid with a density of 325 pounds per cubic foot. An appropriate factor of safety should be applied.

10.6.3 The passive pressure was calculated based on a minimum soil unit weight of 100 pounds per cubic foot. The soils within the passive zone at the foot of retaining walls (one footing width in front of the wall to a depth equal to the footing depth) should be tested to verify that the soils have the minimum unit weight of 100 pounds per cubic foot (with moisture). If the soils have a unit weight of less than 100 pounds per cubic foot, the soils within this zone should be over-excavated and replaced as engineered fill. These soils should be tested prior to backfilling behind the wall.

10.6.4 A minimum factor of safety of 1.5 should be used for the lateral resistance, or as required by the governing building codes. A minimum factor of safety of 2.0 should be used when combining the frictional and passive resistance of the soil to determine the total lateral resistance. The upper 12 inches of subgrade should be neglected in determining the total passive resistance.

10.6.5 The active and at-rest pressures of the native soils and engineered fill may be assumed to be equal to the pressures developed by a fluid with a density of 40 and 61 pounds per cubic foot, respectively. These pressures assume level ground surface and do not include the surcharge effects of construction equipment, loads imposed by nearby foundations and roadways and hydrostatic water pressure.

10.6.6 The active and at-rest pressures were calculated based on a maximum soil unit weight of 130 pounds per cubic foot. The compacted soils behind the retaining walls (including pool walls) should not have a compacted unit weight above 130 pounds per cubic foot (with moisture). If the soils have a unit weight of greater than 130 pounds per cubic foot, the soils should be over-excavated and replaced at a lower degree of compaction. If the backfill soils must be placed at a unit weight of over 130 pounds per cubic foot to achieve minimum compaction requirements, the material should not be used as backfill behind retaining walls.

10.6.7 The at-rest pressure should be used in determining lateral earth pressures against walls which are not free to deflect. For walls which are free to deflect at least one percent of the wall height at the top, the active earth pressure may be used.

10.6.8 Retaining walls should be designed with a drain system including permeable backfill and drain pipes near the wall to adequately reduce the potential for hydrostatic pressures behind the wall. The design values presented in this report assume a drained condition. Drainage should be directed to pipes which gravity drain to closed pipes of the storm drain or sub-drain system. Drain pipe outlet invert elevations should be sufficient (a bypass should be constructed if necessary) to preclude hydrostatic surcharge to the wall in the event the storm drain system do not function properly. Clean out and inspection points should be incorporated into the drain system.

10.6.9 Segmented wall design (if utilized) should be conducted by a California licensed geotechnical engineer familiar with segmented wall design and having successfully designed at least three walls at sites with similar soil conditions. None of the data included in this report should be used for segmented wall design without the expressed written consent of Twining. If the designer uses the data in this report for segmental wall design, the design assumes the sole risk for this data.

10.6.10 As a minimum, where stand alone retaining structure provide more than 6 feet of support, or for structure where the exterior grades on opposite sides

differ by more than 6 feet, seismic factors or increments need to be included in the retaining system design. If seismic increments are required, contact Twining for recommendations for seismic geotechnical design considerations for the retaining structure which meet the above criteria or where required by the governing authority or building owner. The determination to incorporate seismic increments in the wall design is the responsibility of the design engineer.

10.6.11 To avoid excessive surcharge and damage to walls, the contractor should use light compaction equipment behind retaining walls and pool walls, such as hand operated (walk-behind) compactors. Light compaction equipment should be used within a 1H to 1V zone extending out from the base of the wall.

## 10.7 Interior Slabs-on-Grade

10.7.1 The floor slabs should be reinforced for the anticipated temperature and shrinkage stresses. A structural engineer experienced in slab-on-grade design should recommend the thickness, design details and concrete specifications for the proposed slabs-on-grade for a differential vertical movement between the exterior walls and interior footings, and the adjacent floor slabs of ½ inch.

10.7.2 Interior floor slabs and slabs adjacent to the building should be placed on engineered fill which extends to the depth of engineered fill recommended below the foundations. The slab subgrade section should include at least 4 inches of Class 2 aggregate base (AB) directly below the proposed slabs.

10.7.3 In areas where concrete slabs-on-grade are anticipated, the site should be prepared by over-excavating to the depths and limits indicated under section 10.3.

10.7.4 To aid in uniform curing of the slabs, a minimum of 2 inches of moist concrete sand (ASTM C-33) should be placed directly beneath all slabs-on-grade.

10.7.5 An impermeable membrane such as Stegowrap 15, Vapor Block 15 (Raven Industries, P.O. Box 5107, Sioux Falls, SD 57117-5107, Phone: 1-800-635-3456), or equivalent, should be placed below the aggregate base section beneath all interior floor slabs where floor coverings, such as carpet and tile, are anticipated or where moisture could permeate into the interior and create problems. The underslab membrane should have a high puncture resistance, high abrasion resistance, rot resistant, and mildew resistant. We recommend

the membrane be selected in accordance with ASTM C755-85, Standard Practice For Selection of Vapor Retarder For Thermal Insulation and conform to ASTM E154-99 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Waters, or as Ground Cover. It is recommended that the vapor barrier selection and installation conform to the ACI Manual of Concrete Practice, Guide for Concrete Floor and Slab Construction (302.1R-96), Addendum, Vapor Retarder Location and ASTM E 1643 - 98, Standard Practice for Installation of Water Vapor Retarders Used In Contact with Earth or Granular Fill Under Concrete Slabs. In addition, it is recommended that the manufacturer of the floor covering and floor covering adhesive be consulted to determine if these manufacturers have additional recommendations regarding the design and construction of the slab-on-grade, testing of the slab-on-grade, slab preparation, application of the adhesive, installation of the floor covering and maintenance requirements.

10.7.6 The impermeable membrane is not required beneath exposed concrete floors, such as garages, provided that moisture intrusions into the structure are permissible for the design life of the structure.

10.7.7 The membrane should be installed so that there are no holes or uncovered areas. All seams should be overlapped and sealed with manufacturer approved tape continuous at the laps so they are vapor tight. All perimeter edges of the membrane, such as pipe penetrations, interior and exterior footings, joints, etc.) should be caulked per manufacturer's recommendations.

10.7.8 Tears or punctures that may occur in the membrane should be repaired prior to placement of concrete per manufacturer's recommendations. Once repaired, the membrane should be inspected by the contractor and the owner to verify adequate compliance with manufacture's recommendations.

10.7.9 The manufacturer's requirements vary regarding the surface and cover material around the placed membrane. Typical installation requires a 2-inch sand section above and below the membrane for protection. As an alternative, to 2 inches of sand below the membrane, an 8-ounce non-woven geotextile fabric can be placed between the subgrade and the membrane for protection. Consult the manufacturer for additional alternatives.

10.7.10 A design modulus of subgrade reaction of 200 psi/in should be used for slabs supported on native soils (R-value 70).

10.7.11 Additional measures to reduce moisture migration should be implemented if moisture sensitive floor coverings (such as wood or vinyl) are used. These include: 1) constructing a less pervious concrete floor slab by maintaining a water-cement ratio of 0.45 lb./lb. or less in the concrete for slabs-on-grade, 2) moist cure the slab for at least 7 days), 3) ensuring that all seams and utility protrusions are sealed with tape to create a "water tight" moisture barrier, 4) placing concrete walkways or pavements adjacent to the structure, 5) providing adequate drainage away from the structure, and 6) locating lawns and flower beds away from the structure.

10.7.12 The moisture vapor transmission through the slab should be tested at a frequency and method as specified by the flooring manufacturer. Vapor transmission results should be within floor manufacturer's specifications prior to placing flooring.

10.7.13 Backfill the zone above the top of footings at interior column locations, building perimeters, and below the bottom of slabs with an approved backfill and/or an aggregate base section as recommended herein for the area below interior slabs-on-grade. This procedure should provide more uniform support for the slabs which may reduce the potential for cracking.

## 10.8 Exterior Slabs-On-Grade

The recommendations for exterior slabs provided below are not intended for use for slabs subjected to vehicular traffic, rather lightly loaded sidewalks, curbs, and planters, etc. Recommendations for Portland cement concrete slabs subjected to vehicular traffic are included in Section 10.10 of this report.

10.8.1 In areas where exterior concrete slabs-on-grade are to be constructed not adjacent to the building, the exposed ground surface to receive the slabs should be scarified to a depth of 12 inches, moisture conditioned, and compacted to a minimum of 92 percent of the maximum dry density as determined by ASTM Test Method D1557. Section 10.3 should be consulted for exterior slabs adjacent to buildings.

10.8.2 If the subgrade is prepared, and then disturbed by equipment workers, weather or other source, we recommend that the exposed subgrade to receive slabs be tested to verify adequate compaction. If adequate compaction is not verified, the disturbed subgrade should be over-excavated, scarified, and compacted in accordance with Section 10. This condition should be verified prior to installation of plumbing, footing excavation, and construction of the slabs-on-grade.

## 10.9 Asphaltic Concrete Pavements

10.9.1 The upper 12 inches of subgrade beneath aggregate base or sub-base should be scarified, moisture-conditioned as necessary and compacted to at least 95 percent of the maximum dry density as determined by ASTM Test Method D1557. These recommendations assume that the site preparation for tree removal has been properly completed.

10.9.2 The following pavement sections are based on an R-value of 50 and traffic index values ranging from 5.0 to 8.0. A design professional should select the appropriate pavement section based on the anticipated truck and/or bus traffic expected for the site. It should be noted that if pavements are constructed prior to the building construction, the selected traffic index values may be too low and need to be increased. If the pavements are placed prior to construction, or if more frequent truck traffic is anticipated the design professional who selected the pavement sections and Twining should be contacted to re-evaluate the traffic index values.

The following table provides two-layer (AC and AB) sections.

| Traffic Index | AC thickness, inches | AB thickness, inches | Compacted Subgrade, inches |
|---|---|---|---|
| 5.0 | 2.5 | 4.0 | 12.0 |
| 5.5 | 3.0 | 4.0 | 12.0 |
| 6.0 | 3.0 | 4.0 | 12.0 |
| 6.5 | 3.5 | 4.5 | 12.0 |
| 7.0 | 3.5 | 5.5 | 12.0 |
| 7.5 | 4.0 | 6.0 | 12.0 |
| 8.0 | 4.5 | 6.5 | 12.0 |

AC - Asphaltic Concrete
AB - Aggregate Base compacted to at least 95 percent relative compaction (CAL test 216)
Subgrade - Subgrade soils compacted to at least 95 percent relative compaction (ASTM D-1557)

10.9.3 The curbs where pavements meet irrigated landscape areas or uncovered open areas should be extended below the aggregate base section at least 4 inches into native subgrade soils. This should reduce subgrade moisture from irrigation and runoff from migrating into the base section and reducing the life of the pavements.

10.9.4 Alternative pavement sections, such as equivalent asphaltic concrete sections may be used. Twining should be contacted for adjusted AC sections and AB sections, if needed.

10.9.5 If actual pavement subgrade materials are significantly different from those tested for this study due to unanticipated grading or soil importing, the pavement section should be re-evaluated for the changed subgrade conditions.

10.9.6 If the paved areas are to be used during construction, or if the type and frequency of traffic is greater than assumed in design, the pavement section should be re-evaluated for the anticipated traffic.

10.9.7 Pavement section design assumes that proper maintenance, such as sealing and repair of localized distress, will be performed on an as needed basis for longevity and safety.

10.9.8 Pavement materials and construction method should conform to Sections 25, 26, and 39 of the State of California Standard Specification Requirements.

10.9.9 The asphaltic-concrete should be compacted to an average relative compaction of 97 percent, with no single test value being below a relative compaction of 95 percent based on a 50-blow Marshall maximum density. The joint density should be a minimum of 95 percent.

10.9.10 The asphalt concrete should comply with Type "B" asphalt concrete as described in Section 39 of the State of California Standard Specification Requirements. We recommend that an asphalt concrete mix design be prepared and approved prior to construction.

## 10.10 Portland Cement Concrete (PCC) Pavements

Recommendations for Portland Cement Concrete pavement structural sections are presented in the following subsections for PCC slabs to receive traffic loads (not for lightly loaded sidewalks). The PCC pavement design assumes a minimum modulus of rupture of 550 psi.

10.10.1 The following pavement section was designed based on traffic of up to 25 trucks per day (both ways). The section was designed based on the recommended 4-inch layer of Class 2 aggregate base material (R-value of 78) over the native compacted soils (the k-value of the native soils is estimated to be approximately 200 psi/in).

| Pavement Component | Thickness, Inches |
|---|---|
| Portland Cement Concrete | 6.0 |
| Class 2 Aggregate Base (95% Minimum Relative Compaction) | 6.0 |
| Compacted Subgrade (95% Relative Compaction) | 12.0 |

10.10.2 The pavement section should be used for PCC pavements with a traffic load of not more than 50 three-axle trucks per day (both ways).

| Pavement Component | Thickness, Inches |
|---|---|
| Portland Cement Concrete | 6.5 |
| Class 2 Aggregate Base (95% Minimum Relative Compaction) | 6.0 |
| Compacted Subgrade (95% Relative Compaction) | 12.0 |

10.10.3 If the pavements are placed prior to construction or if more frequent truck traffic is anticipated than assumed in our analysis, Twining should be contacted to re-evaluate the traffic values and pavement section thicknesses.

10.10.4 Stresses are anticipated to be greater at the edges and construction joints of the pavement section. A thickened edge is recommended on the outside of slabs subjected to wheel loads.

10.10.5 Joint spacing in feet should not exceed twice the slab thickness in inches, e.g., 12 feet by 12 feet for a 6-inch slab thickness. Regardless of slab thickness, joint spacing should not exceed 15 feet.

10.10.6 Lay out joints to form square panels. When this is not practical, rectangular panels can be used if the long dimension is no more than 1.5 times the short.

10.10.7 Control joints should have a depth of at least one-fourth the slab thickness, e.g., 1 inch for a 4-inch slab.

10.10.8 Isolation (expansion) joints should extend the full depth and should be used only to isolate fixed objects abutting or within paved areas. Construction joint location should be determined by the contractor's equipment and procedures.

10.10.9 Pavement section design assumes that proper maintenance such as sealing and repair of localized distress will be performed on a periodic basis.

## 10.11 Temporary Excavations

10.11.1 It is the responsibility of the contractor to provide safe working conditions with respect to excavation slope stability.

10.11.2 Temporary excavations should be constructed in accordance with CAL OSHA requirements. Temporary cut slopes should not be steeper than 1.5:1, horizontal to vertical, and flatter if possible. If excavations cannot meet these criteria, the temporary excavations should be shored.

10.11.3 Shoring systems, if used, should be designed by an engineer with experience in designing shoring systems and registered in the State of California.

## 10.12 Utility Trenches

10.12.1 The trench width, type of pipe bedding, the type of initial backfill, and the compaction requirements of bedding and initial backfill material should be specified by the project Civil Engineer in compliance with the manufacturer's requirements, governing requirements and this report. For flexible polyvinylchloride (PVC) pipes, these requirements should be in accordance with the manufacturer's requirements or ASTM D-2321, whichever is more stringent. As a minimum, the pipe bedding should consist of 4 inches of compacted (92 percent relative compaction) ASTM C-33 sand. The haunches and initial backfill (12 inches above the top of pipe) should consist of ASTM C-33 sand that is placed in maximum 6 inch thick lifts compacted to a minimum relative compaction of 92 percent using hand equipment. The final fill (12 inches above the pipe to the surface) should be non-expansive material compacted to a minimum of 92 percent relative compaction. All materials should be placed at optimum moisture content to 3 percent above

optimum moisture content. The project civil engineer should incorporate measures to control migration of moisture in the trenches such as slurry collars, etc. in the project design.

10.12.2 If the pipe is ribbed or corrugated then the granular backfill should extend to at least 1 foot above the top of pipe. If gravel is used, it should be entirely encased in an approved geotextile fabric. However, a geotextile fabric would not be required if the granular materials consist of Caltrans Class 2 Permeable material. In either case, the sand, gravel, and/or Class 2 Permeable material should be densified using both vibratory and compaction equipment to achieve a non-yielding condition and a minimum relative compaction of 92 percent. The haunches should be hand tamped to achieve the required relative compaction.

10.12.3 Utility trench backfill placed in or adjacent to building areas, exterior slabs or pavements should be moisture conditioned to within optimum to 3 percent above the optimum moisture content and compacted to at least 92 percent of the maximum dry density as determined by ASTM Test Method D1557. The contractor should use appropriate equipment and methods to avoid damage to utilities and/or structure during placement and compaction of the backfill materials.

10.12.4 When utility trench backfills are determined (by a qualified geotechnical engineer) to be nonstructural backfills, they should be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method D1557.

10.12.5 Trench backfill should be placed in 8 inch lifts, moisture conditioned to within optimum to 3 percent above optimum and compacted to achieve the minimum relative compaction. Lift thickness can be increased if the contractor can demonstrate the minimum compaction requirements can be achieved.

10.12.6 On-site soils and approved imported engineered fill may be used as final backfill in trenches.

10.12.7 Jetting of trench backfill is not recommended to compact the backfill soils.

10.12.8 Where utility trenches extend from the exterior to the interior limits of a building, lean concrete should be used as backfill material for a minimum distance of 2 feet laterally on each side of the exterior building line to prevent the trench from acting as a conduit to exterior surface water.

10.12.9 Storm drains and/or utility lines should be designed to be "watertight." If encountered, leaks should be immediately repaired. Leaking storm drain and/or utility lines could result in trench failure, sloughing and/or soil heave causing damage to surface and subsurface structure, pavements, flatwork, etc. In addition, landscaping irrigation systems should be monitored for leaks. It is recommended that the pipelines be inspected prior to pavement of slabs-on-grade or pavements to verify that the pipelines are constructed properly and are "watertight."

10.12.10 Where corrugated pipes are used, the backfill within the pipe zone should be a gravel material to fill the irregular exterior surface of the pipe. The gravel backfill should extend at least 1 foot above the pipe. The gravel should be either Class 2 permeable material, or ½ or ¾ inch crushed gravel completely enclosed in a geotextile filter fabric. The gravel should be compacted to a non-yielding condition under the observation of a qualified geotechnical engineer representative.

10.12.11 The plans should note that utility trenches for electrical lines, irrigation lines, etc. should be compacted to a minimum relative compaction of either 92 or 95 percent per ASTM D-1557, as required.

10.12.12 Utility trenches should not be constructed within a zone defined by a line that extends at an inclination of 2 horizontal to 1 vertical downward from the bottom of building foundations.

10.12.13 The project Civil Engineer should incorporate slurry type cutoff collars in the design of utility trenches at critical locations to prevent the migration of surface water into the trench and along the trench backfill material.

10.12.14 Granular soils and approved imported engineered fill may be used as final backfill in trenches provided they meet the Standard Plans and Specifications of the City of Fresno and the approved project plans and specifications, whichever is more stringent.

## 10.13 Corrosion Protection

10.13.1 Based on the ASTM Special Technical Publication 741 and the analytical results of two soil sample analyses, the soils exhibit "mildly corrosive" corrosion potential to ferrous alloy pipes, as indicated by resistivity values of 11,000 and 21,000 ohm-cm and pH values of 7.6 and 7.0, respectively. Buried metal objects should be protected in accordance with the manufacturer's recommendations based on the "mildly corrosive" corrosion

potential of the soil. The evaluation was limited to the effects of soils to metal objects; corrosion due to other potential sources, such as stray currents and groundwater, was not evaluated.

10.13.2 Corrosion of concrete due to sulfate attack is not anticipated based on a none detected concentration of sulfates determined for the near-surface soils. According to Table 19-A-4 of the 2001 California Building Code, this concentration of sulfates falls in the negligible classification (0.00 to 0.10 percent by weight) for concrete. Therefore, no restrictions are required regarding the type, water-to-cement ratio, or strength of the concrete used for foundation and slabs are needed due to the sulphate content.

10.13.3 These soil corrosion data should be provided to the manufacturers or suppliers of materials that will be in contact with soils (pipes or ferrous metal objects, etc.) to provide assistance in selecting the protection and materials for the proposed products or materials. If the manufacturers or suppliers cannot determine if materials are compatible with the soil corrosion conditions, a professional consultant, i.e., a corrosion engineer, with experience in corrosion protection should be consulted to design parameters.

## 11.0 DESIGN CONSULTATION

11.1 Twining should be provided the opportunity to review those portions of the contract drawings and specifications that pertain to earthwork operations and foundations prior to finalization to determine whether they are consistent with our recommendations. However, this service is not a part of this current contractual agreement.

11.2 It is the client's responsibility to provide plans and specification documents for our review prior to their issuance for construction bidding purposes.

11.3 If Twining is not afforded the opportunity for review, we assume no liability for the misinterpretation of our conclusions and recommendations. This review is documented by a formal plan/specification review report provided by Twining.

## 12.0 CONSTRUCTION MONITORING

12.1 It is recommended that Twining be retained to observe the excavation, earthwork, and foundation phases of work to determine that the subsurface conditions are compatible with those used in the analysis and design.

12.2 Twining can conduct the necessary observation and field testing to provide results so that action necessary to remedy indicated deficiencies can be taken in accordance with the plans and specifications. Upon completion of the work, we will provide a written summary of our observations, field testing and conclusions regarding the conformance of the completed work to the intent of the plans and specifications. This service is not, however, part of this current contractual agreement.

12.3 Compaction tests should be conducted at a frequency of at least:

| Area | Minimum Test Frequency |
|---|---|
| Mass Fills or Subgrade | 1 test per 2,000 square feet per compacted 6-inch lift |
| Pavement Subgrade | 1 test per 5,000 square feet per compacted 6-inch lift |
| Utility Lines | 1 test per 150 feet per 6-inch lift |

The above testing frequencies are suggested rates for tests. Testing frequency should be adjusted by the field technician and the engineer as needed based on continuous earthwork observation considering the methods used for compaction and the soil conditions.

12.4 In the event that the earthwork operations for this project are conducted such that the construction sequence is not continuous, (or if construction operations disturb the surface soils) we recommend that the exposed subgrade to receive floor slabs be tested to verify adequate compaction and/or moisture conditioning. If adequate compaction or moisture contents are not verified, the fill soils should be over-excavated, scarified, moisture conditioned and compacted are recommended in the Recommendations of this report.

12.5 The construction monitoring is an integral part of this investigation. This phase of the work provides Twining the opportunity to verify the subsurface conditions interpolated from the soil borings and make alternative recommendations if the conditions differ from those anticipated.

12.6 If Twining is not afforded the opportunity to provide engineering observation and field-testing services during construction activities related to earthwork, foundations, pavements and trenches; then, Twining will not be responsible for compliance of any aspect of the construction with our recommendations or performance of the structure or improvements if the recommendations of this report are not followed. We recommend that if a firm other than Twining is selected to conduct these services that they provide evidence of professional liability insurance of at least $1,000,000 and

review this report. After their review, the firm should, in writing, state that they understand and agree with the conclusions and recommendations of this report and agree to conduct sufficient observations and testing to ensure the construction complies with this report's recommendations. Twining should be notified, in writing, if another firm is selected to conduct observations and field-testing services prior to construction.

12.7 Upon the completion of work, a final report should be prepared by Twining per the requirements of the California Building Code, Chapter 33A, "Excavation and Grading," Section 3318.1, "Final Reports". This report is essential to ensure that the recommendations presented are incorporated into the project construction, and to note any deviations from the project plans and specifications. The client should notify Twining upon the completion of work to provide this report. This service is not, however, part of this current contractual agreement.

## 13.0 NOTIFICATION AND LIMITATIONS

13.1 The conclusions and recommendations presented in this report are based on the information provided regarding the proposed construction, and the results of the field and laboratory investigation, combined with interpolation of the subsurface conditions between boring locations.

13.2 The nature and extent of subsurface variations between borings may not become evident until construction.

13.3 If variations or undesirable conditions are encountered during construction, Twining should be notified promptly so that these conditions can be reviewed and our recommendations reconsidered where necessary. It should be noted that unexpected conditions frequently require additional expenditures for proper construction of the project.

13.4 If the proposed construction is relocated or redesigned, or if there is a substantial lapse of time between the submission of our report and the start of work (over 12 months) at the site, or if conditions have changed due to natural cause or construction operations at or adjacent to the site, the conclusions and recommendations contained in this report should be considered invalid unless the changes are reviewed and our conclusions and recommendations modified or approved in writing.

13.5 Changed site conditions, or relocation of proposed structure, may require additional field and laboratory investigations to determine if our conclusions and recommendations are applicable considering the changed conditions or time lapse.

13.6 The conclusions and recommendations contained in this report are valid only for the project discussed in Section 3.4, Anticipated Construction. The use of the information and recommendations contained in this report for structure on this site not discussed herein or for structure on other sites not discussed in Section 3.3, Site Description is not recommended. The entity or entities that use or cause to use this report or any portion thereof for another structure or site not covered by this report shall hold Twining, its officers and employees harmless from any and all claims and provide Twining's defense in the event of a claim.

13.7 This report is issued with the understanding that it is the responsibility of the client to transmit the information and recommendations of this report to developers, owners, buyers, architects, engineers, designers, contractors, subcontractors, and other parties having interest in the project so that the steps necessary to carry out these recommendations in the design, construction and maintenance of the project are taken by the appropriate party.

13.8 This report presents the results of a geotechnical engineering investigation only and should not be construed as an environmental audit or study.

13.9 Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally-accepted engineering principles and practices in Fresno County as of September, 2003. This warranty is in lieu of all other warranties either expressed or implied.

13.10 This investigation report should not be used in the preparation of a Storm Water Pollution Prevention Plan (SWPPP). Use of this report or any data included in the report in preparation of a SWPPP would be at the owner's sole risk.

13.11 Reliance on this report by a third party (i.e., that is not a party to our written agreement) is at the party's sole risk. If the project and/or site is purchased by another party, the purchaser must obtain written authorization and sign an agreement with Twining in order to rely upon the information provided in this report for design or construction of the project.

We appreciate the opportunity to be of service to the City Of Fresno. If you have any questions regarding this report, or if we can be of further assistance, please contact us at your convenience.

Sincerely,

**THE TWINING LABORATORIES, INC.**

Vasiliy V. Parfenov
Project Geologist
Geotechnical Engineering Division

Kenneth J. Clark, CEG
Engineering Geologist
Geotechnical Engineering Division

REGISTERED GEOLOGIST
KENNETH JAMES CLARK
No. EG 1864
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA
5-31-05

James M. Kellogg, RCE
Manager
Geotechnical Engineering Division

REGISTERED PROFESSIONAL ENGINEER
JAMES M. KELLOGG
NO. C 65092
Exp. 9/30/03
CIVIL
STATE OF CALIFORNIA

VVP/KJC/JMK/id

Distribution:
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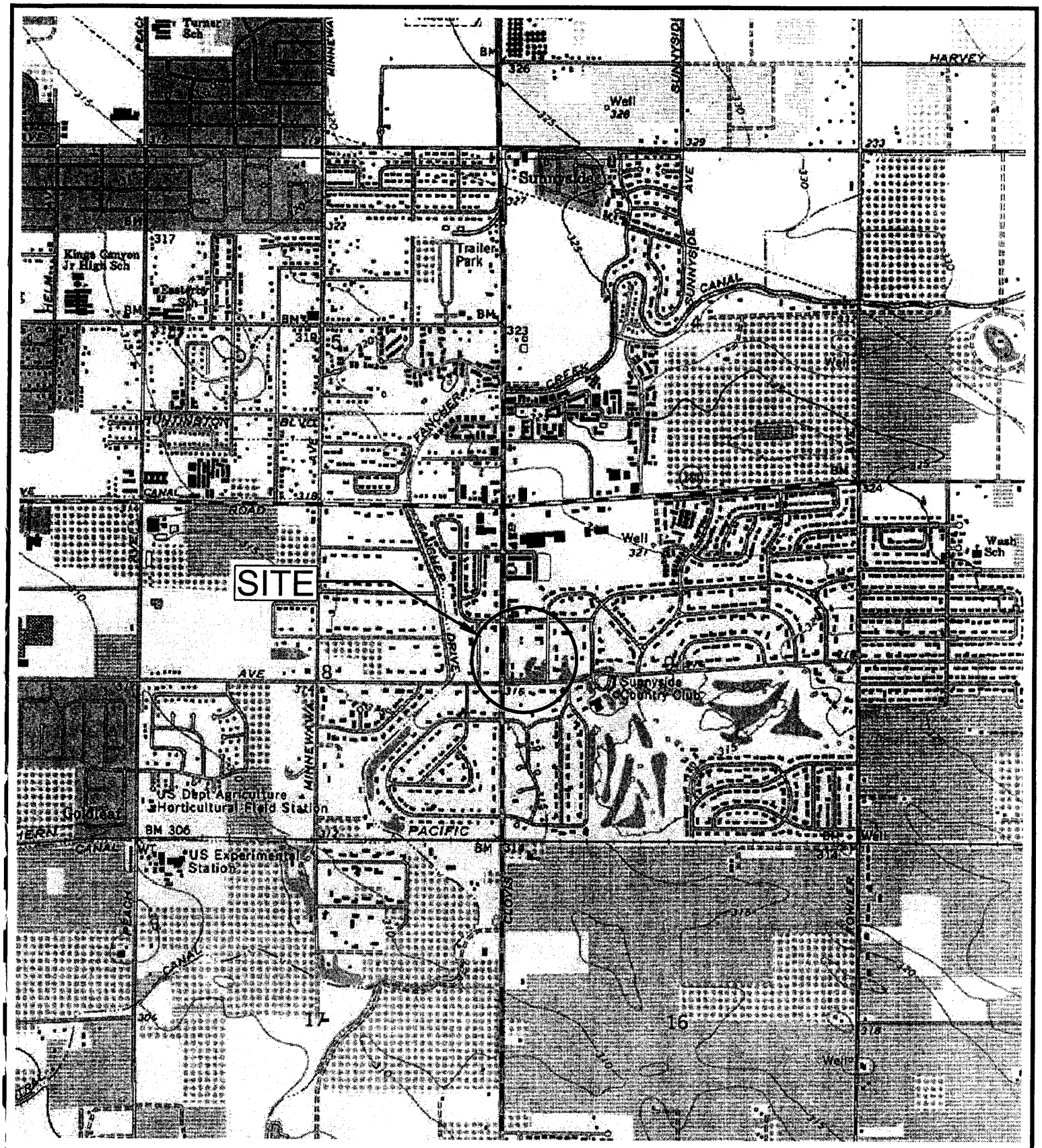
# APPENDIX A

## DRAWINGS

| | |
|---|---|
| Drawing No. 1 - | Site Location Map |
| Drawing No. 2 - | Test Boring Location Map |
| Drawing No. 3 - | Historical Earthquake Epicenter Locations |
| Drawing No. 4 - | Map of Faults Relative to the Site |
| Drawing No. 5 - | Probability of Exceedance versus Acceleration for Exposure Periods of 25, 50, 75, and 100 Years |
| Drawing No. 6 - | Average Return Period versus Ground Acceleration |
| Drawing No. 7 - | Illustration of the proposed over-excavation depths and limits below structures |




SOURCE: U.S.G.S. TOPOGRAPHIC MAP, 7 ½ MINUTE SERIES
MALAGA, CALIFORNIA QUADRANGLE, PHOTOREVISED 1981

0 2000
APPROXIMATE SCALE IN FEET

SITE LOCATION MAP
FIRE STATION #15
SEC OF S. CLOVIS AVENUE AND E. PARK CIRCLE DRIVE
FRESNO, CALIFORNIA

| | |
|---|---|
| FILE NO.: 25515-01 | DATE: 08/19/03 |
| DRAWN BY: WME | APPROVED BY: |
| PROJECT NO. 25515.01 | DRAWING NO. 1 |

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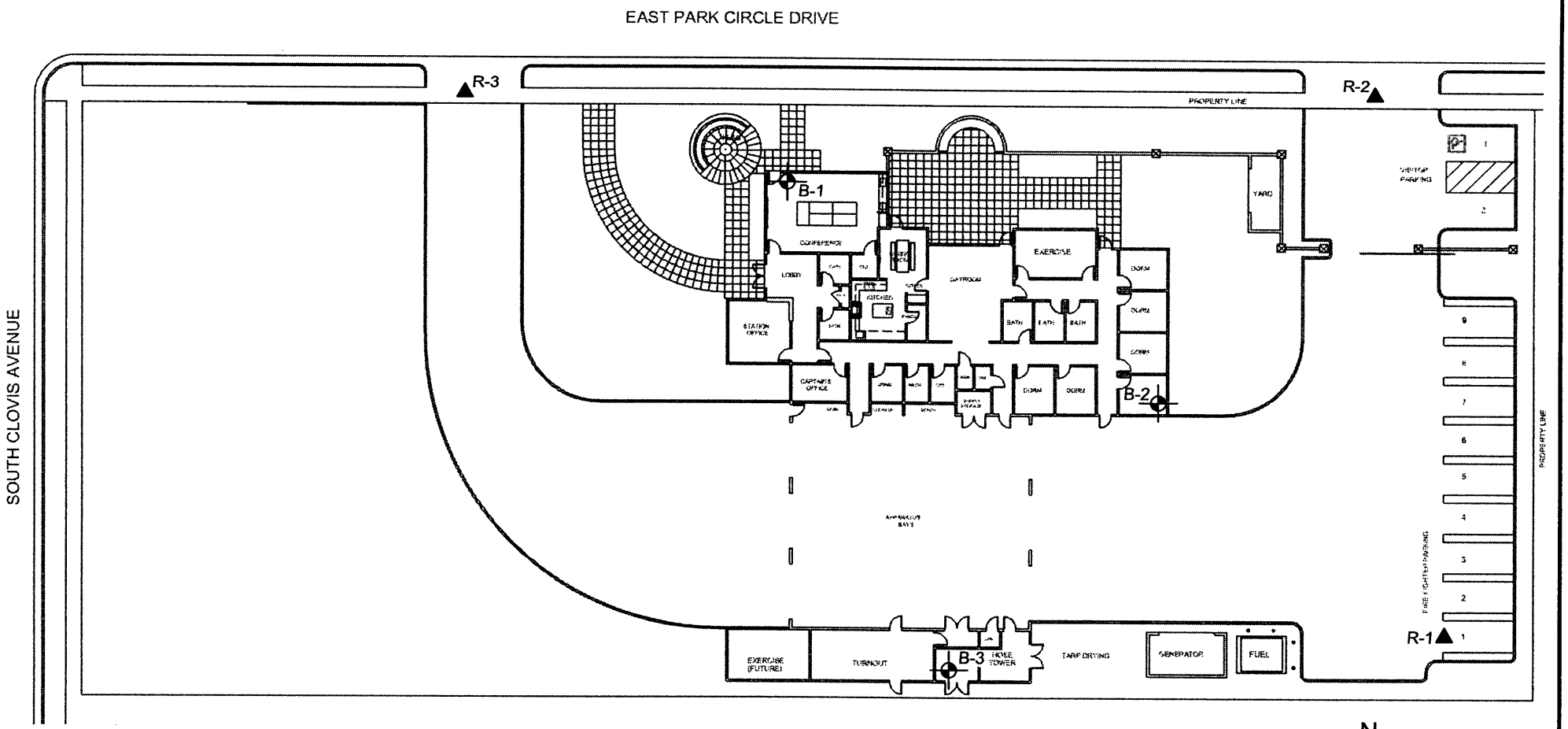
FRESNO/MODESTO/VISALIA/BAKERSFIELD/MONTEREY




N

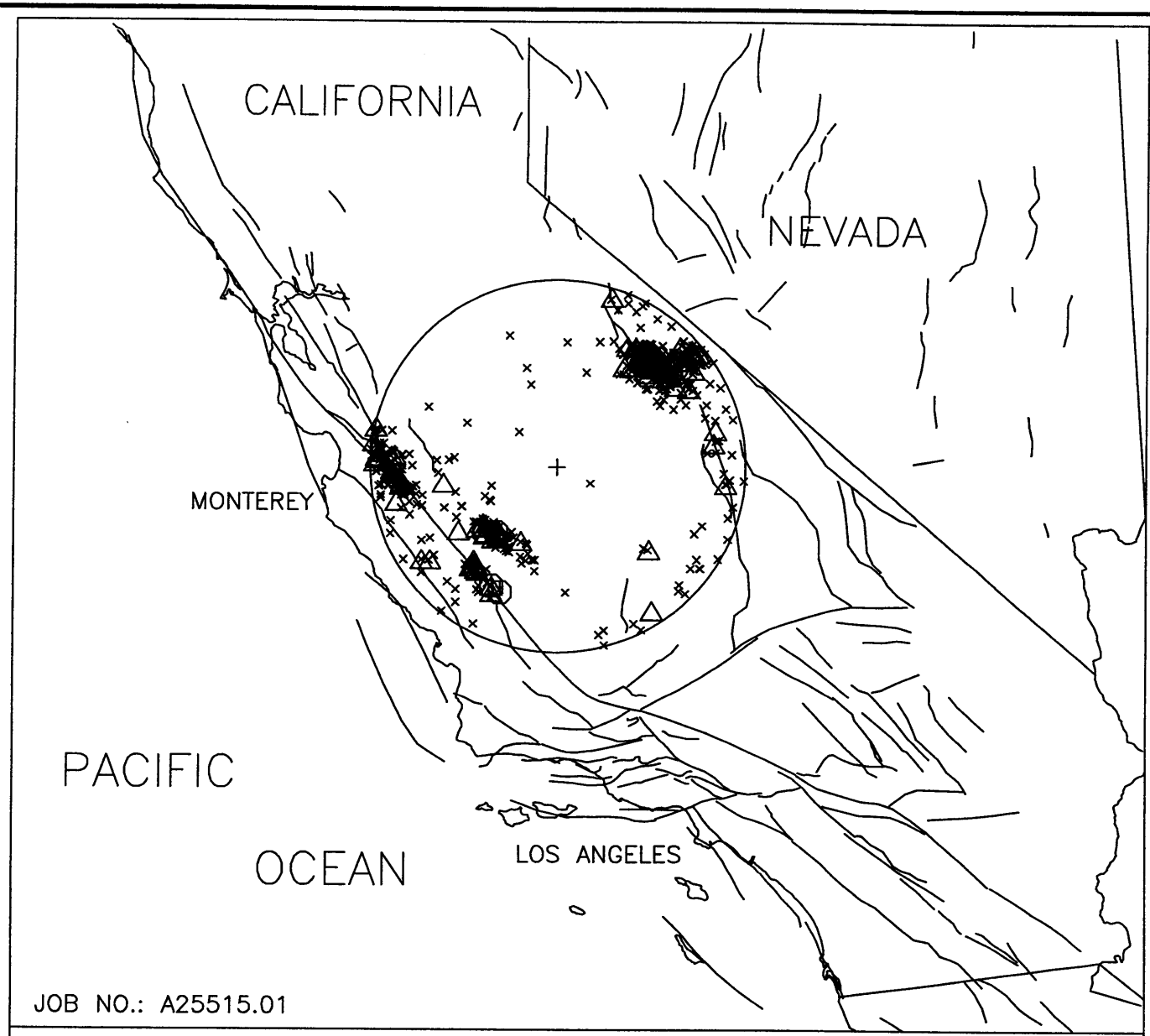
0 40

APPROXIMATE SCALE IN FEET

TEST BORING LOCATIONS

R-VALUE LOCATIONS

| | | | |
|---|---|---|---|
| TEST BORING AND R-VALUE LOCATION MAP<br>FIRE STATION #15<br>SEC OF SOUTH CLOVIS AVENUE AND EAST PARK CIRCLE DRIVE<br>FRESNO, CALIFORNIA | FILE NO.<br>25515-01 | DATE DRAWN:<br>08/19/03 | THE TWINING LABORATORIES, INC.<br>EST.1898<br>FRESNO/MODESTO/VISALIA/BAKERSFIELD/MONTEREY |
| | DRAWN BY:<br>WME | APPROVED BY:<br>VP | |
| | PROJECT NO.<br>A25515.01 | DRAWING NO.<br>2 | |




JOB NO.: A25515.01

HISTORICAL EARTHQUAKES 1900 TO 2003

N

0 50 100

SCALE
(Miles)

EXPLANATION

- M = 8.0 +
- M = 7.0–7.9
- M = 6.0–6.9
- M = 5.0–5.9
- × M = 4.0–4.9

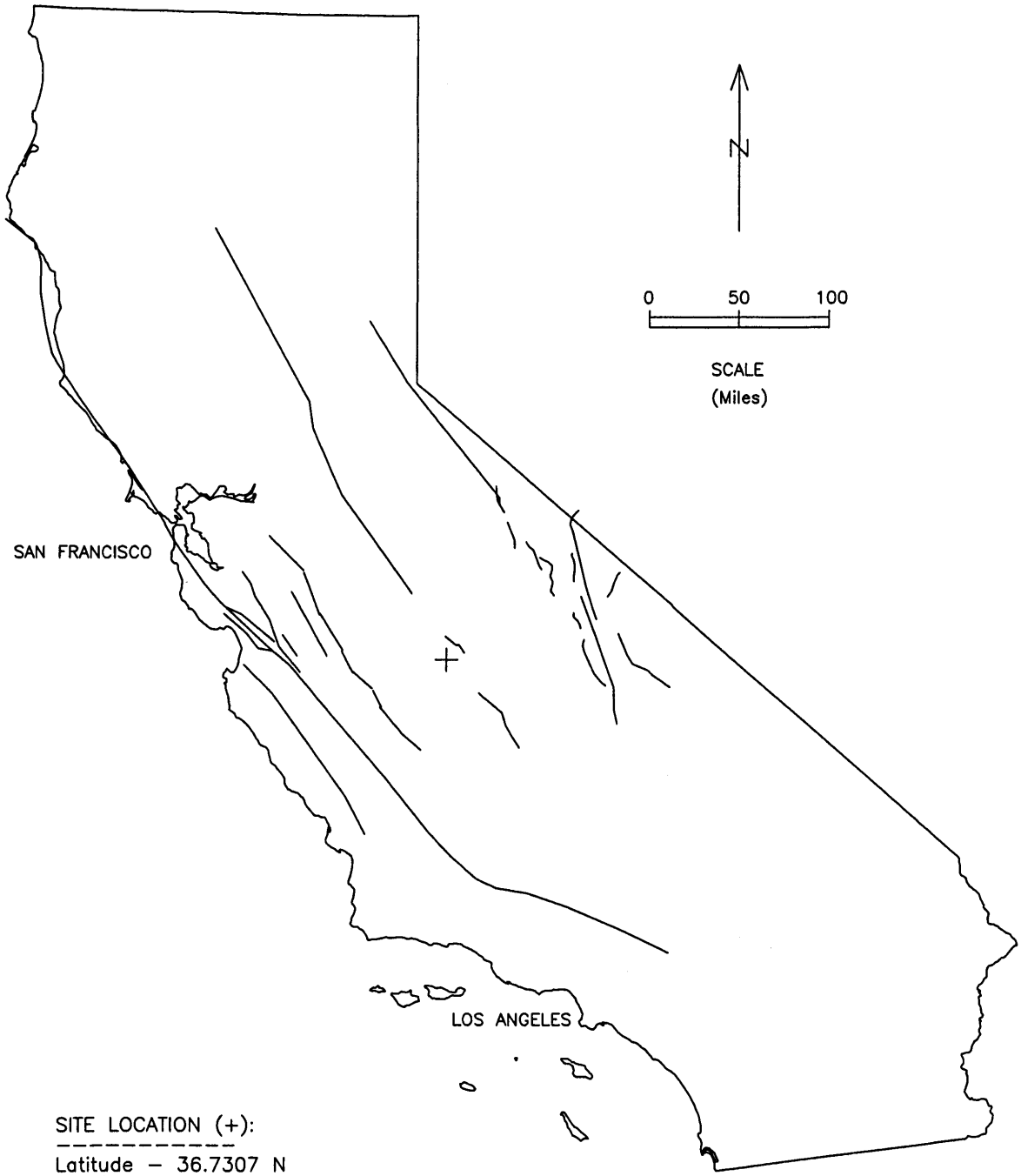
SITE LOCATION (+):

Latitude – 36.7307 N
Longitude – 119.6996 W

HISTORICAL EARTHQUAKE EPICENTER LOCATIONS
PROPOSED FRESNO FIRE STATION #15
CITY OF FRESNO
SEC OF SOUTH CLOVIS AVE AND EAST PARK CIRCLE DR
FRESNO, CALIFORNIA

| | |
|---|---|
| FILE NO. 25515-MP | DATE DRAWN: 07/02/03 |
| DRAWN BY: WME | APPROVED BY: |
| PROJECT NO. A25515.01 | DRAWING NO. 3 |

THE TWINING LABORATORIES, INC.
EST. 1898
FRESNO/MODESTO/VISALIA/BAKERSFIELD/MONTEREY



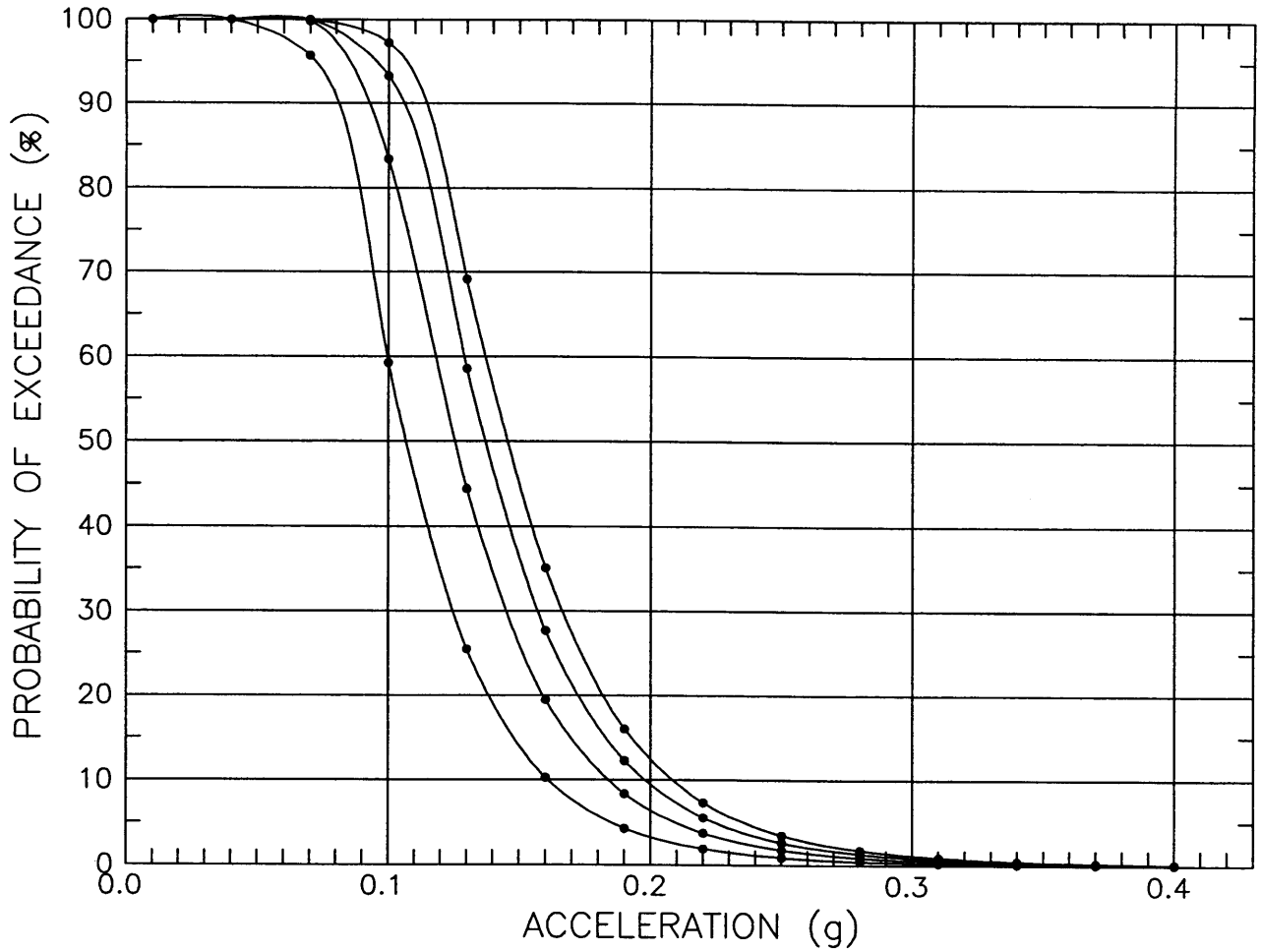

SITE LOCATION (+):

Latitude – 36.7307 N
Longitude – 119.6996 W
City Of Fresno Fire Station #15

# FRISKSP FAULT MAP

JOB No.: A25515.01

| | | | |
|---|---|---|---|
| MAP OF FAULTS RELATIVE TO THE SITE<br>PROPOSED FRESNO FIRE STATION #15<br>CITY OF FRESNO<br>SEC OF SOUTH CLOVIS AVE AND EAST PARK CIRCLE DR<br>FRESNO, CALIFORNIA | FILE NO.<br>25515-MF | DATE DRAWN:<br>07/02/03 | THE TWINING LABORATORIES, INC.<br>EST.1898<br>FRESNO/MODESTO/VISALIA/BAKERSFIELD/MONTEREY |
| | DRAWN BY:<br>WME | APPROVED BY:<br>WR | |
| | PROJECT NO.<br>A25515.01 | DRAWING NO.<br>4 | |

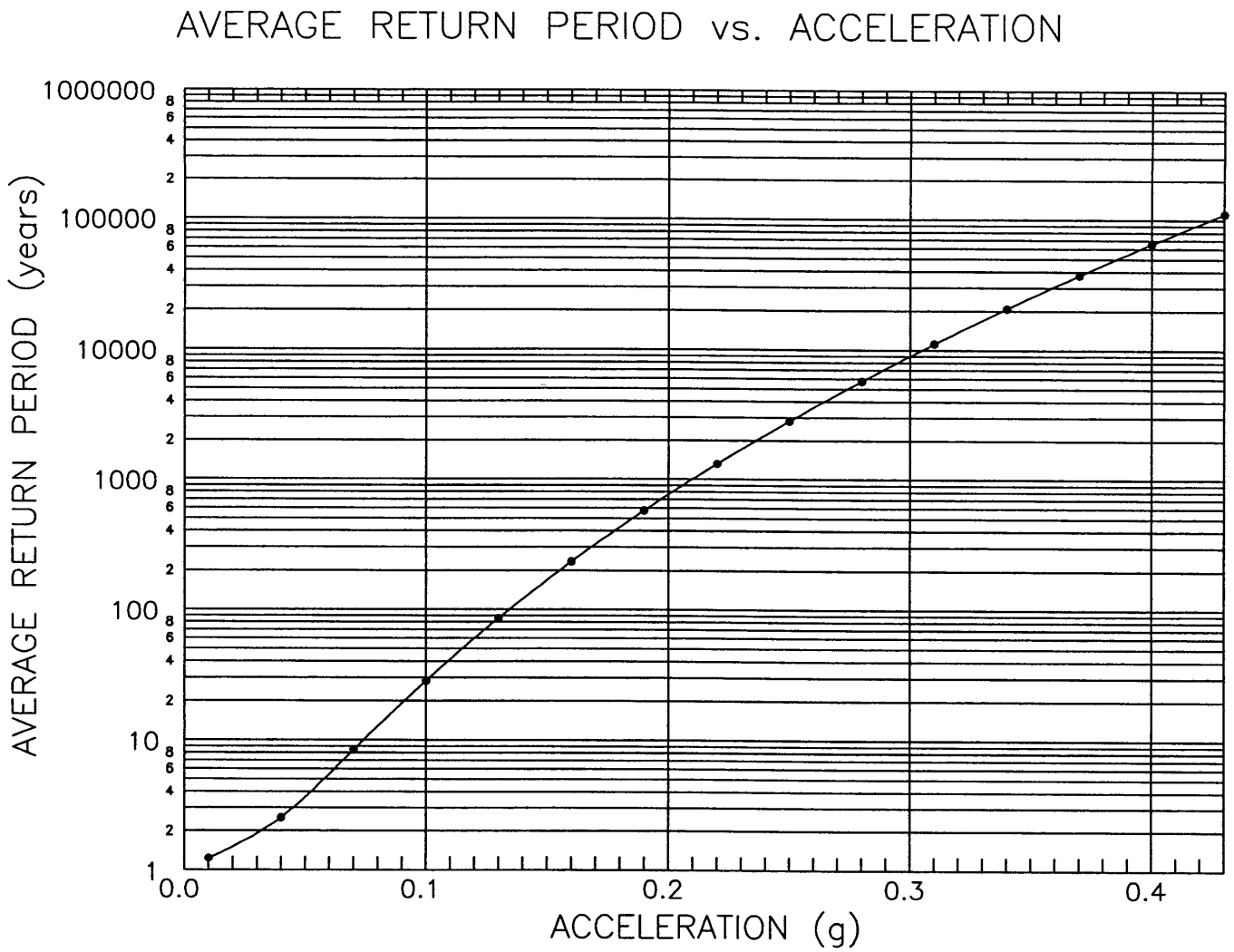



EXPOSURE PERIODS:
25 years 75 years
50 years 100 years

BOORE ET AL(1997) NEHRP D (250)

JOB No.: A25515.01

| | | | |
|---|---|---|---|
| PROBABILITY OF EXCEEDANCE VERSUS ACCELERATION FOR EXPOSURE PERIODS OF 25, 50, 75, AND 100 YEARS<br>PROPOSED FRESNO FIRE STATION #15<br>CITY OF FRESNO<br>SEC OF SOUTH CLOVIS AVE AND EAST PARK CIRCLE DR<br>FRESNO, CALIFORNIA | FILE NO.<br>25515-P | DATE DRAWN:<br>07/02/03 | THE TWINING LABORATORIES, INC.<br>EST.1898<br>FRESNO/MODESTO/VISALIA/BAKERSFIELD/MONTEREY |
| | DRAWN BY:<br>WME | APPROVED BY:<br>VP | |
| | PROJECT NO.<br>A25515.01 | DRAWING NO.<br>5 | |




Fire Station # 15, Fresno

BOORE ET AL(1997) NEHRP D (250)

JOB No.: A25515.01

AVERAGE RETURN PERIOD VERSUS GROUND ACCELERATION
PROPOSPED FRESNO FIRE STATION #15
CITY OF FRESNO
SEC OF SOUTH CLOVIS AVE AND EAST PARK CIRCLE DR
FRESNO, CALIFORNIA

| | |
|---|---|
| FILE NO. 25515-R | DATE DRAWN: 07/02/03 |
| DRAWN BY: WME | APPROVED BY: VP |
| PROJECT NO. A25515.01 | DRAWING NO. 6 |

THE TWINING LABORATORIES, INC.
EST.1898
FRESNO/MODESTO/VISALIA/BAKERSFIELD/MONTEREY

# APPENDIX B

## LOG OF BORINGS

This appendix contains the final logs of borings. These logs represent our interpretation of the contents of the field logs and the results of the field and laboratory tests.

The boring logs and related information depict subsurface conditions only at these locations and at the particular time designated on the logs. Soil conditions at other locations may differ from conditions occurring at these test boring locations. Also, the passage of time may result in changes in the soil conditions at these test boring locations.

In addition, an explanation of the abbreviations used in the preparation of the logs and a description of the Unified Soil Classification System are provided at the end of Appendix B.

THE TWINING LABORATORIES, INC. EST. 1898

# SOIL TEST BORING SYMBOLIC LOG

*BORING B-1*

**Project:** City of Fresno, Fire Station #15

**Project Number: TL** A25515.01

**Location:** Fresno, CA

**Date:** 7/11/03

**Logged By:** D. Ledgerwood

**Elevation:** N/A

**Drilled By:** T. Conley

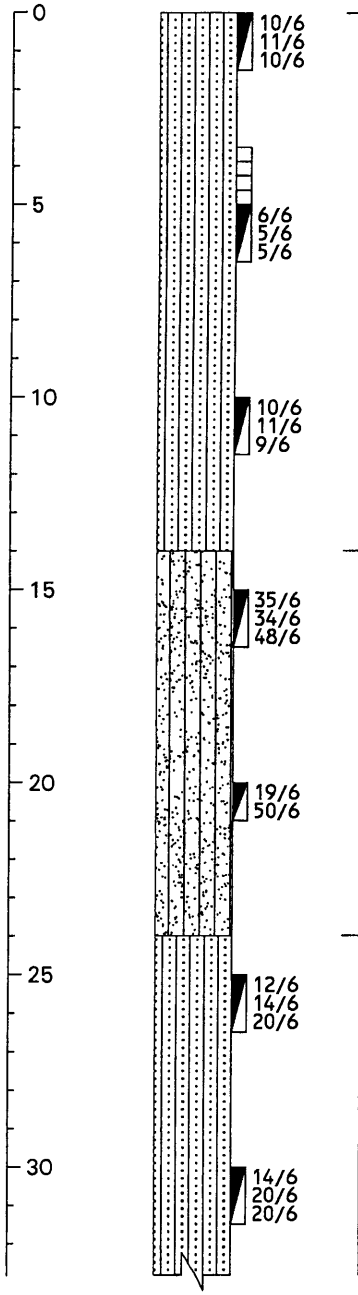
**Depth to Groundwater:** N/E

**Drill Type:** CME 75

**Cased to Depth:** N/A

**Auger Type:** 6-5/8" OD Hollow Stem Auger

**Hammer Type:** TRIP




| ELEVATION/ DEPTH (feet) | SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA | USCS | Soil Description | Remarks | N-value | Moisture Content % |
|---|---|---|---|---|---|---|
| | | SM | SAND, Silty; medium dense, dry, fine to medium, brown | pH = 7.6<br>SR = 11,000 ohms/cm<br>Cl = ND<br>SS = ND<br>DD = 105 pcf<br>-200 = 18% | 21 | 2 |
| | | | Damp, increase in grain size, decrease in percent silt, brown to light brown | | -- | 3 |
| | | | Loose | | 10 | 3 |
| | | | Medium dense, slight decrease in grain size | | 20 | 3 |
| | | ML | SILT, Sandy; hard, damp, slightly plastic, light brown | | 82 | 9 |
| | | | Decrease in percent sand, light gray-brown | | >100 | 14 |
| | | SM | SAND, Silty; dense, damp, fine to medium, brown | | 34 | 4 |
| | | | Some clay, brown to reddish--brown | | 40 | 11 |

**Notes:** *Boring located 189 feet east by 32 feet south of the northwest site corner.*

**Figure Number B-1**

THE TWINING LABORATORIES, INC. EST. 1898

# SOIL TEST BORING SYMBOLIC LOG

*BORING B-1*

**Project:** City of Fresno, Fire Station #15

**Project Number: TL** A25515.01

**Location:** Fresno, CA

**Date:** 7/11/03

**Logged By:** D. Ledgerwood

**Elevation:** N/A

**Drilled By:** T. Conley

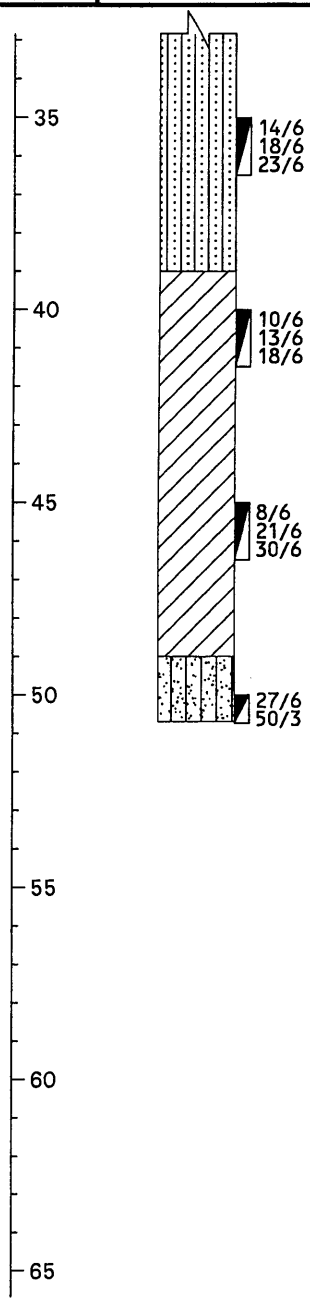
**Depth to Groundwater:** N/E

**Drill Type:** CME 75

**Cased to Depth:** N/A

**Auger Type:** 6-5/8" OD Hollow Stem Auger

**Hammer Type:** TRIP




| ELEVATION/ DEPTH (feet) | SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA | USCS | Soil Description | Remarks | N-value | Moisture Content % |
|---|---|---|---|---|---|---|
| | | | Increase in grain size, fine to coarse, some calcification | | 41 | 7 |
| | | CL | LEAN CLAY, Sandy; hard, damp to moist, low plasticity, reddish-brown | | 31 | 18 |
| | | | Increase in percent sand, reddish-brown | | 51 | 15 |
| | | ML | SILT, Sandy; hard, damp, non-plastic, brown, some weak cementation | | >100 | 13 |
| | | | Bottom of Boring | | | |

**Notes:** *Boring located 189 feet east by 32 feet south of the northwest site corner.*

**Figure Number B-1**

THE TWINING LABORATORIES, INC. EST. 1898

# SOIL TEST BORING SYMBOLIC LOG

*BORING B-2*

**Project:** City of Fresno, Fire Station #15

**Project Number: TL** A25515.01

**Location:** Fresno, CA

**Date:** 7/11/03

**Logged By:** D. Ledgerwood

**Elevation:** N/A

**Drilled By:** T. Conley

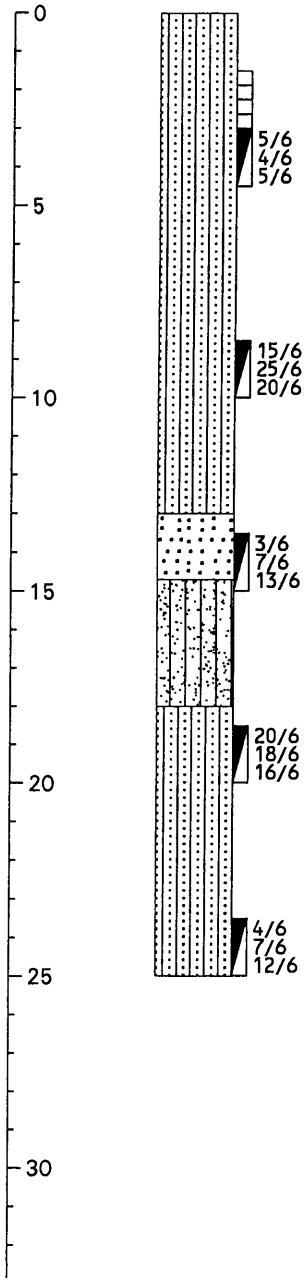
**Depth to Groundwater:** N/E

**Drill Type:** CME 75

**Cased to Depth:** N/A

**Auger Type:** 6-5/8" OD Hollow Stem Auger

**Hammer Type:** TRIP




| ELEVATION/ DEPTH (feet) | SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA | USCS | Soil Description | Remarks | N-value | Moisture Content % |
|---|---|---|---|---|---|---|
| | | SM | SAND, Silty; loose, dry, fine to medium, brown | | | |
| | | | Damp, slight increase in grain size | DD = 106 pcf<br>-200 = 18%<br>$\phi$ = 32°<br>c = 125 psf | -- | 1 |
| | 5/6 4/6 5/6 | | | | 9 | 3 |
| | 15/6 25/6 20/6 | | Dense, slight increase in percent silt | | 45 | 7 |
| | 3/6 7/6 13/6 | SP | SAND, Poorly Graded; medium dense, dry, fine to coarse, light brown | | 20 | 3 |
| | | ML | SILT, Sandy; stiff, moist, slight plasticity, gray-brown | | | |
| | 20/6 18/6 16/6 | SM | SAND, Silty; dense, damp, fine to medium, brown | | 34 | 9 |
| | 4/6 7/6 12/6 | | Medium dense, decrease in percent silt | | 19 | 5 |
| | | | Bottom of Boring | | | |

**Notes:** *Boring located 283 feet east by 88 feet south of northwest site corner.*

**Figure Number B-2**

THE TWINING LABORATORIES, INC. EST. 1898

# SOIL TEST BORING SYMBOLIC LOG

*BORING B-3*

**Project:** City of Fresno, Fire Station #15

**Project Number: TL** A25515.01

**Location:** Fresno, CA

**Date:** 7/11/03

**Logged By:** D. Ledgerwood

**Elevation:** N/A

**Drilled By:** T. Conley

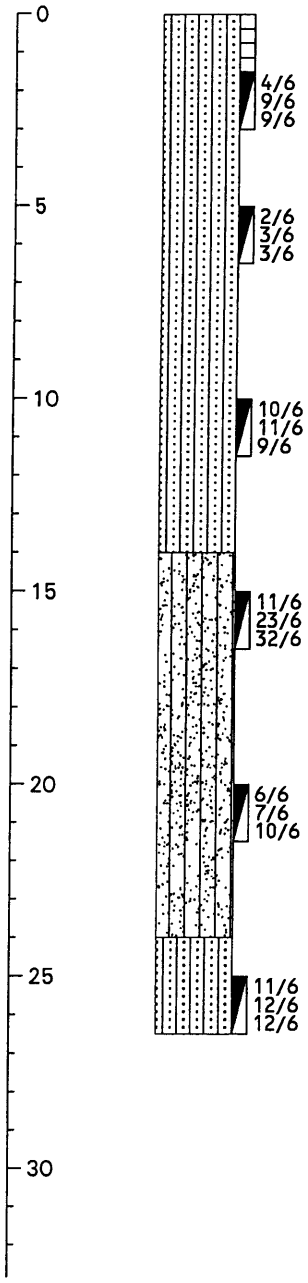
**Depth to Groundwater:** N/E

**Drill Type:** CME 75

**Cased to Depth:** N/A

**Auger Type:** 6-5/8" OD Hollow Stem Auger

**Hammer Type:** TRIP




| ELEVATION/ DEPTH (feet) | SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA | USCS | Soil Description | Remarks | N-value | Moisture Content % |
|---|---|---|---|---|---|---|
| | | SM | SAND, Silty; medium dense, dry, fine to medium, brown | -200 = 22% | -- | 2 |
| | | | Damp | pH = 7.0<br>SR = 21,000 ohms/cm<br>Cl = ND<br>SS = ND | 18 | 2 |
| | | | Loose, damp to moist, brown to reddish brown | | 6 | 5 |
| | | | Medium dense, some weak cementation | | 20 | 6 |
| | | ML | SILT, Sandy; hard, moist, slightly plastic, gray-brown | | 55 | 13 |
| | | | Very stiff, slight increase in percent sand | | 17 | 19 |
| | | SM | SAND, Silty; medium dense, moist, fine, brown | | 24 | 5 |
| | | | Bottom of Boring | | | |

**Notes:** *Boring located 230 feet east by 207 feet south of northwest site corner.*

**Figure Number B-3**

# KEY TO SYMBOLS

| Symbol | Description |
|---|---|
| **Strata symbols** | |
| | SAND, Silty (SM) |
| | SILT, Sandy (ML) |
| | LEAN CLAY (CL) |
| | SAND, Poorly Graded (SP) |
| **Misc. Symbols** | |
| | Boring continues |
| **Soil Samplers** | |
| | Standard penetration test |
| | California Modified split barrel ring sampler |

Notes:

1. Test borings were drilled on 7/11/03 using a CME 75 equipped with 6-5/8" OD Hollow Stem Auger.
2. Groundwater was not encountered during drilling operations.
3. Boring locations were located by measuring wheel with reference to the northwest site corner.
4. These logs are subject to the limitations, conclusions, and recommendations in this report.
5. Results of tests conducted on samples recovered are reported on the logs. Abbreviations used are:

DD = Natural dry density
UC = Unconfined compression (psf)
-4 = Percent passing #4 sieve (%)
-200 = Percent passing #200 sieve (%)
SR = Soil resistivity (ohm-cm)
c = Cohesion (psf)
TS = Field Torvane Shear Strength test (tsf)
ND = None Detected

LL = Liquid limit (%)
PI = Plasticity index (%)
pH = Soil pH
SS = Soluble sulfates (%)
Cl = Soluble chlorides (%)
$\phi$ = Angle of internal friction (degrees)
N/A = Not applicable
N/E = None encountered

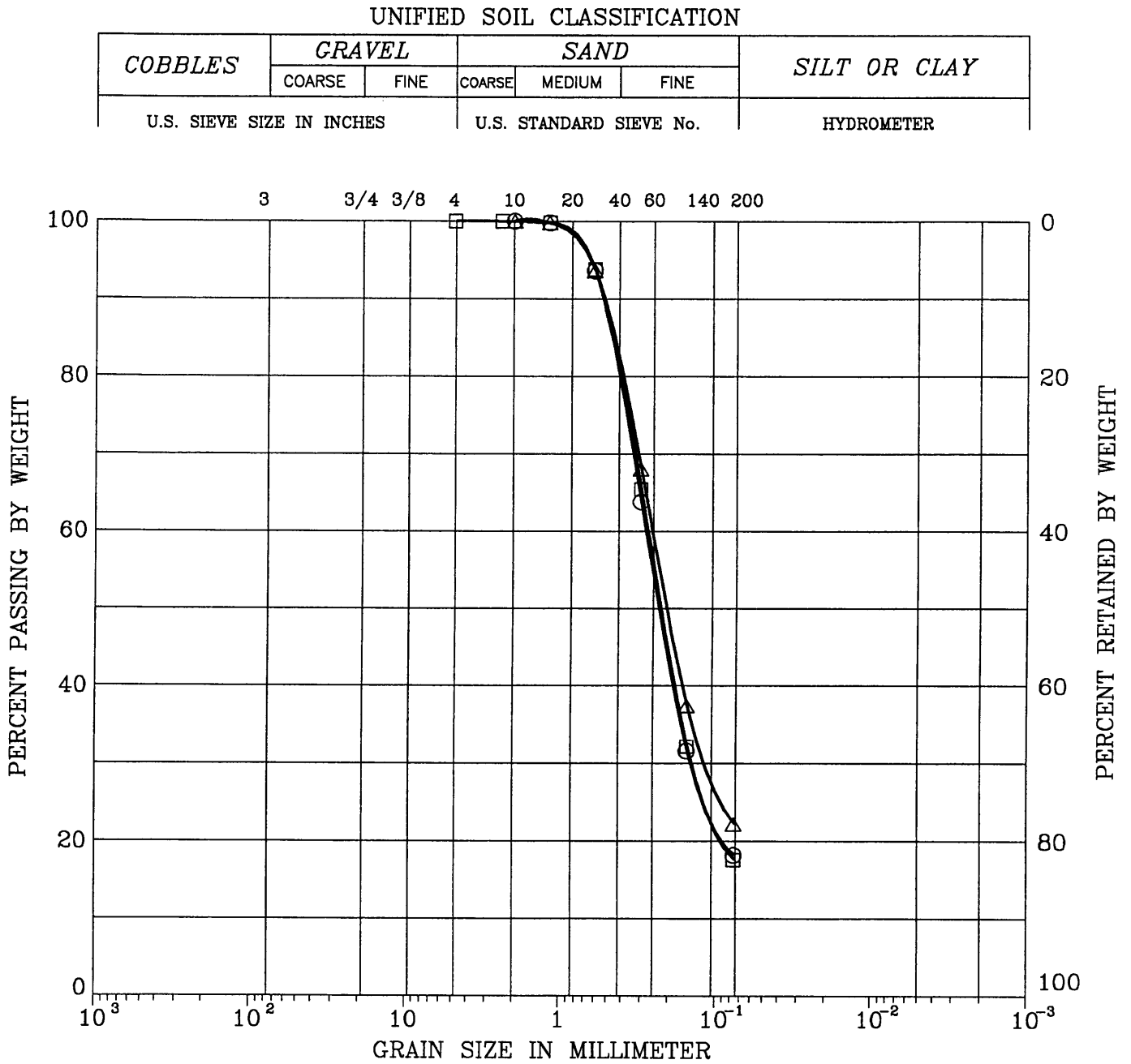
# APPENDIX C

## RESULTS OF LABORATORY TESTS

This appendix contains the individual results of the following tests. The results of the moisture content and dry density tests are included on the test boring logs in Appendix B. These data, along with the field observations, were used to prepare the final test boring logs in Appendix B.

| These Included: | Number of Tests: | To Determine: |
|---|---|---|
| Natural Moisture (ASTM D2216) | 25 | Moisture contents representative of field conditions at the time the sample was taken. |
| Natural Density (ASTM D2216) | 2 | Dry unit weight of sample representative of in-situ or in-place undisturbed condition. |
| Grain-Size Distribution (ASTM D422) | 3 | Size and distribution of soil particles, i.e., clay, silt, sand, and gravel. |
| Direct Shear (ASTM D3080) | 1 | Soil shearing strength under varying loads and/or moisture conditions. |
| Consolidation (ASTM D2435) | 3 | The amount and rate at which a soil sample compresses when loaded, and the influence of saturation on its behavior. |
| Moisture-Density Relationship (ASTM D1557) | 1 | The optimum (best) moisture content for compacting soil and the maximum dry unit weight (density) for a given compactive effort. |
| R-Value (ASTM D2844) | 3 | The capacity of a subgrade or subbase to support a pavement section designed to carry a specified traffic load. |

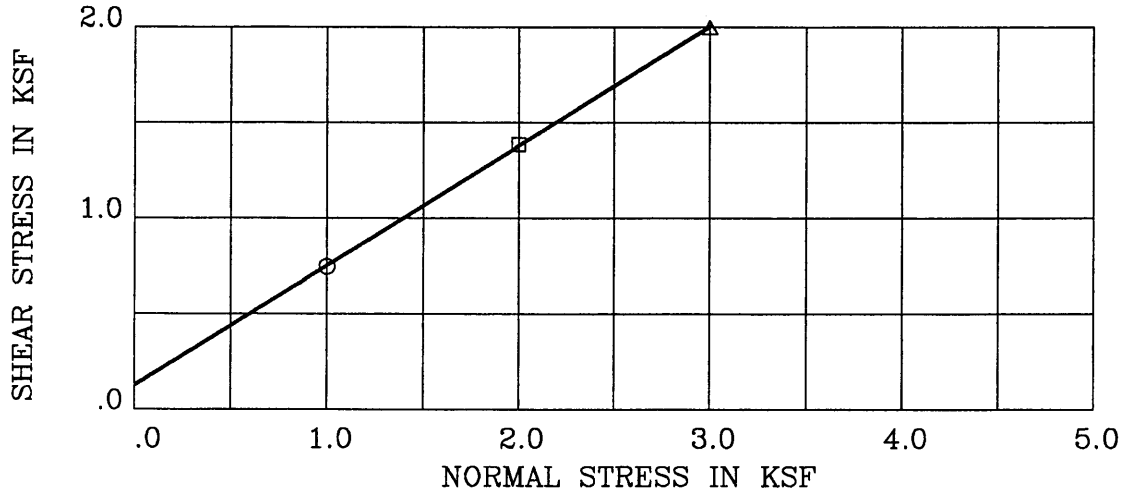
| These Included: | Number of Tests: | To Determine: |
|---|---|---|
| Sulfate Content (ASTM D4327) | 2 | Percentage of water-soluble sulfate as (SO4) in soil samples. Used as an indication of the relative degree of sulfate attack on concrete and for selecting the cement type. |
| Chloride Content (ASTM D4327) | 2 | Percentage of soluble chloride in soil. Used to evaluate the potential attack on encased reinforcing steel. |
| Resistivity (ASTM D1125) | 2 | The potential of the soil to corrode metal. |
| pH (ASTM D4972) | 2 | The acidity or alkalinity of subgrade material. |

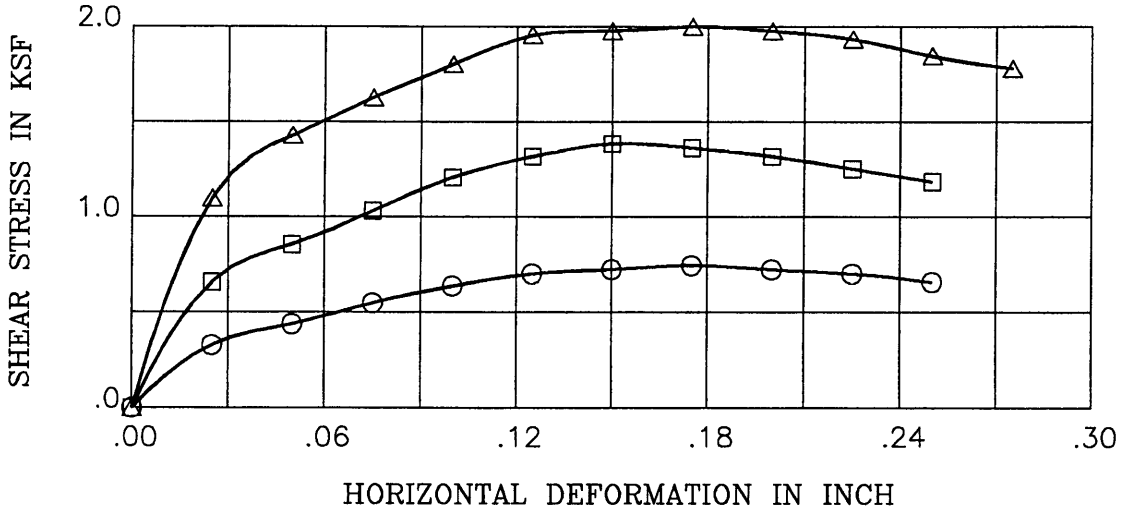



| SYMBOL | BORING | DEPTH (ft) | LL (%) | PI (%) | DESCRIPTION |
|---|---|---|---|---|---|
| ○ | B-1 | 3.5-5.0 | | | SAND, Silty (SM) |
| □ | B-2 | 1.5-3.0 | | | SAND, Silty (SM) |
| △ | B-3 | 0.0-1.5 | | | SAND, Silty (SM) |

**Remark :** ASTM TEST METHOD D422

| | |
|---|---|
| A25515.01 | CITY OF FRESNO FIRE STATION No.15 |
| The Twining Labs Inc. Fresno, CA | GRAIN SIZE DISTRIBUTION Figure No. 1 |



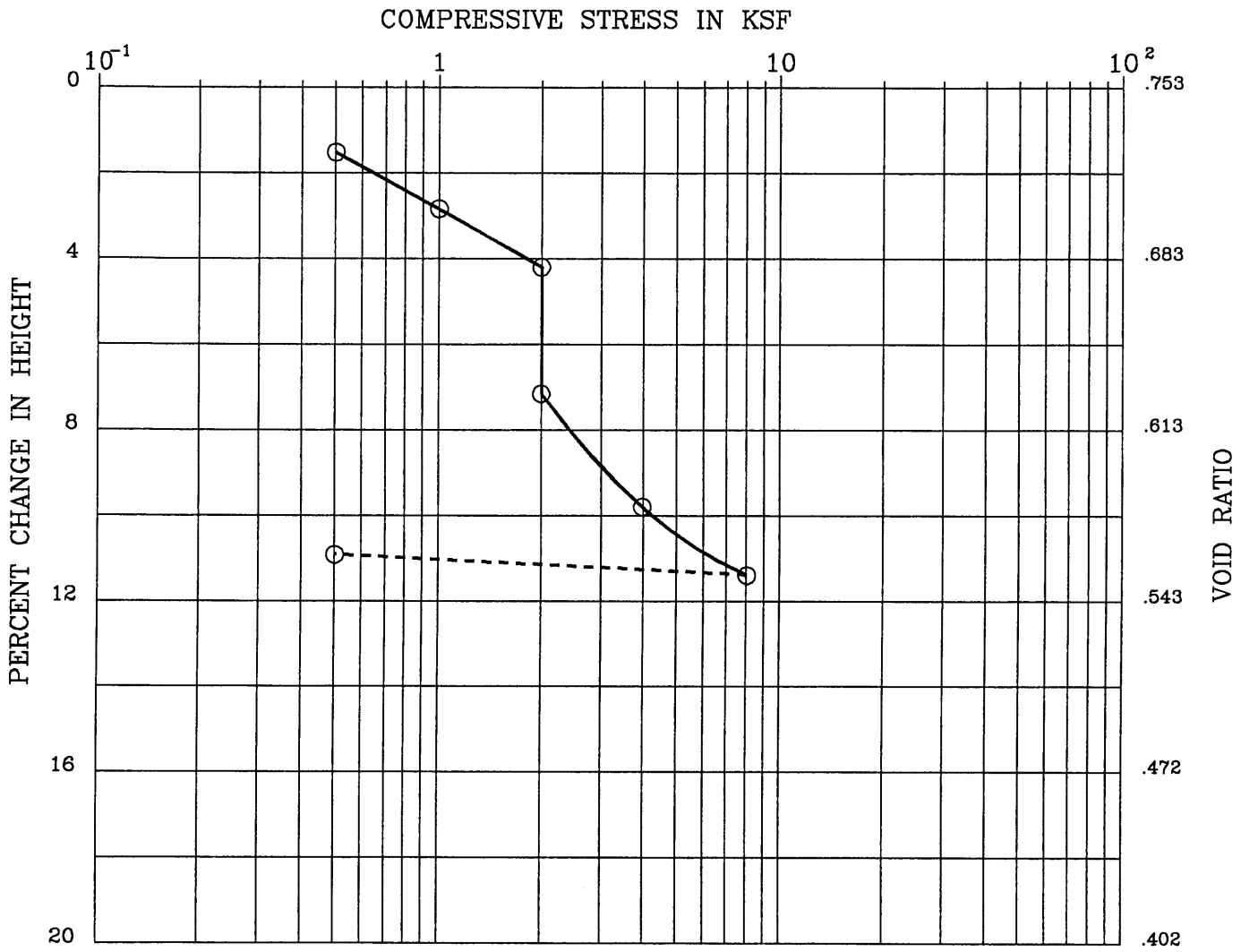




BORING/SAMPLE : B-2 DEPTH (ft) : 1.5-3.0
DESCRIPTION : SAND, Silty (SM)
STRENGTH INTERCEPT (C) : .125 KSF
FRICTION ANGLE (PHI) : 32.0 DEG
(PEAK STRENGTH)

| SYMBOL | MOISTURE CONTENT (%) | DRY DENSITY (pcf) | VOID RATIO | NORMAL STRESS (ksf) | PEAK SHEAR (ksf) | RESIDUAL SHEAR (ksf) |
|---|---|---|---|---|---|---|
| ○ | 20.5 | 103.5 | .628 | 1.00 | .75 | .66 |
| □ | 20.1 | 105.2 | .602 | 2.00 | 1.38 | 1.19 |
| △ | 19.4 | 104.6 | .611 | 3.00 | 2.00 | 1.78 |

Remark : ASTM TEST METHOD D3080

| | |
|---|---|
| A25515.01 | CITY OF FRESNO FIRE STATION No. 15 |
| The Twining Labs Inc. Fresno, CA | DIRECT SHEAR TEST Figure No. 2 |

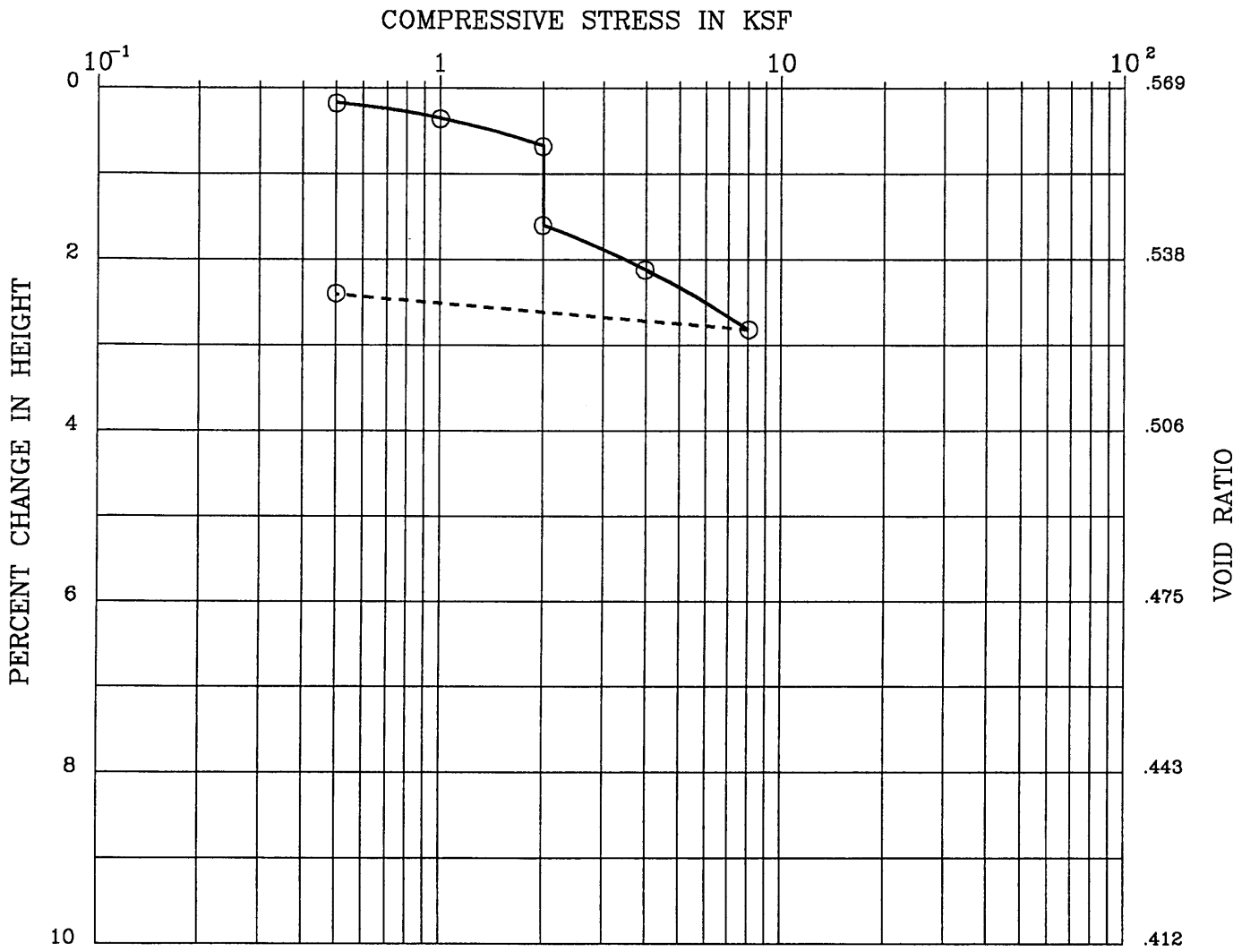



| | | | |
|---|---|---|---|
| BORING | : B-1 | DESCRIPTION | : SAND, Silty (SM) |
| DEPTH (ft) | : 3.5-5.0 | LIQUID LIMIT | : |
| SPEC. GRAVITY | : 2.70 | PLASTIC LIMIT | : |

| | MOISTURE CONTENT (%) | DRY DENSITY (pcf) | PERCENT SATURATION | VOID RATIO |
|---|---|---|---|---|
| INITIAL | 2.8 | 96.2 | 10 | .753 |
| FINAL | 17.3 | 108.0 | 83 | .562 |

**Remark :** ASTM TEST METHOD D2435-SATURATED AT 2.0ksf

| | |
|---|---|
| A25515.01 | CITY OF FRESNO FIRE STATION 15 |
| The Twining Labs Inc. Fresno, CA | CONSOLIDATION TEST — Figure No. 3 |

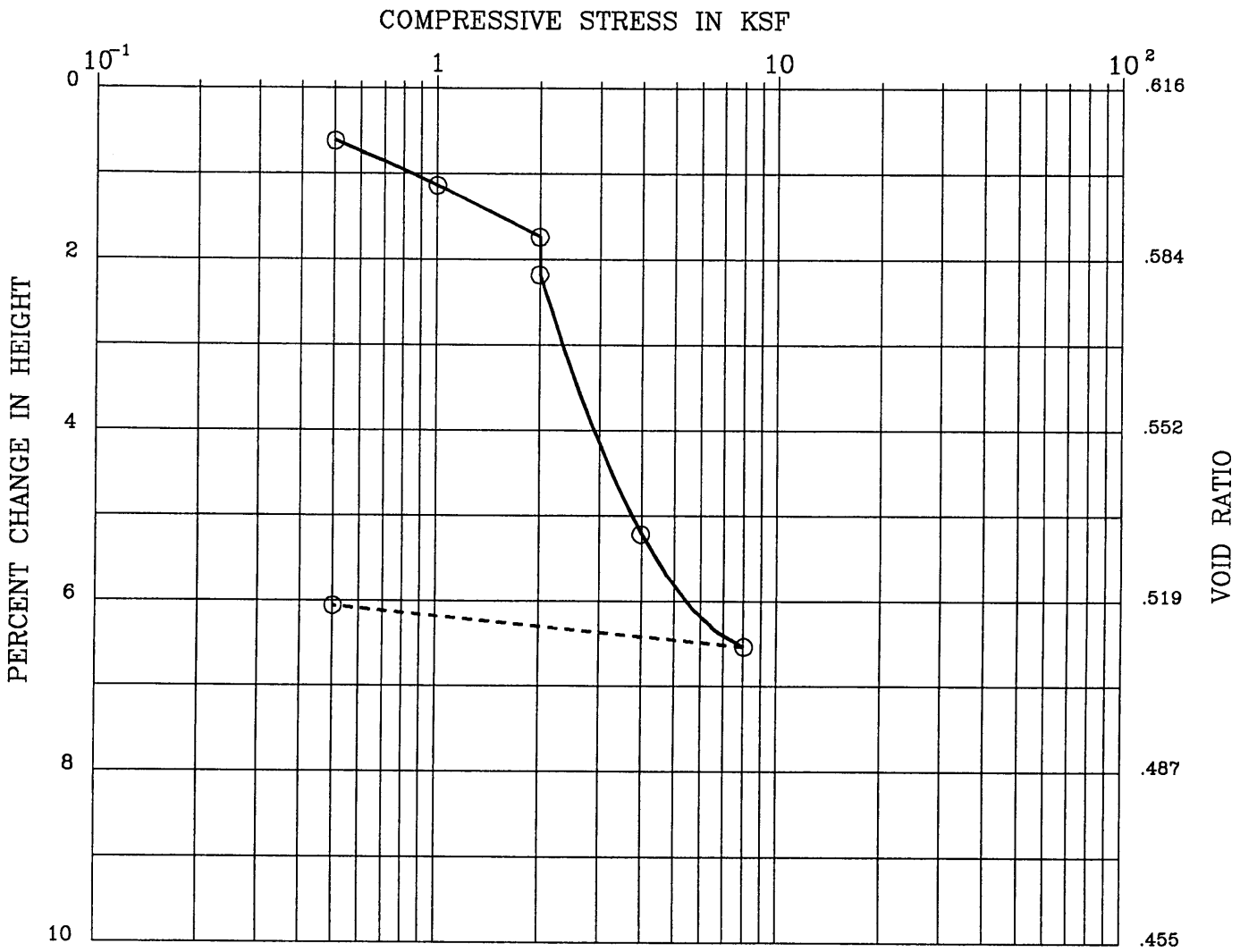



| | | | |
|---|---|---|---|
| BORING | : B-2 | DESCRIPTION | : SAND, Silty (SM) |
| DEPTH (ft) | : 1.5-3.0 | LIQUID LIMIT | : |
| SPEC. GRAVITY | : 2.70 | PLASTIC LIMIT | : |

| | MOISTURE CONTENT (%) | DRY DENSITY (pcf) | PERCENT SATURATION | VOID RATIO |
|---|---|---|---|---|
| INITIAL | 1.8 | 107.5 | 9 | .569 |
| FINAL | 9.5 | 110.2 | 49 | .531 |

**Remark :** ASTM TEST METHOD D2435-SATURATED AT 2.0ksf

| | |
|---|---|
| A25515.01 | CITY OF FRESNO FIRE STATION 15 |
| The Twining Labs Inc. Fresno, CA | CONSOLIDATION TEST — Figure No. 4 |

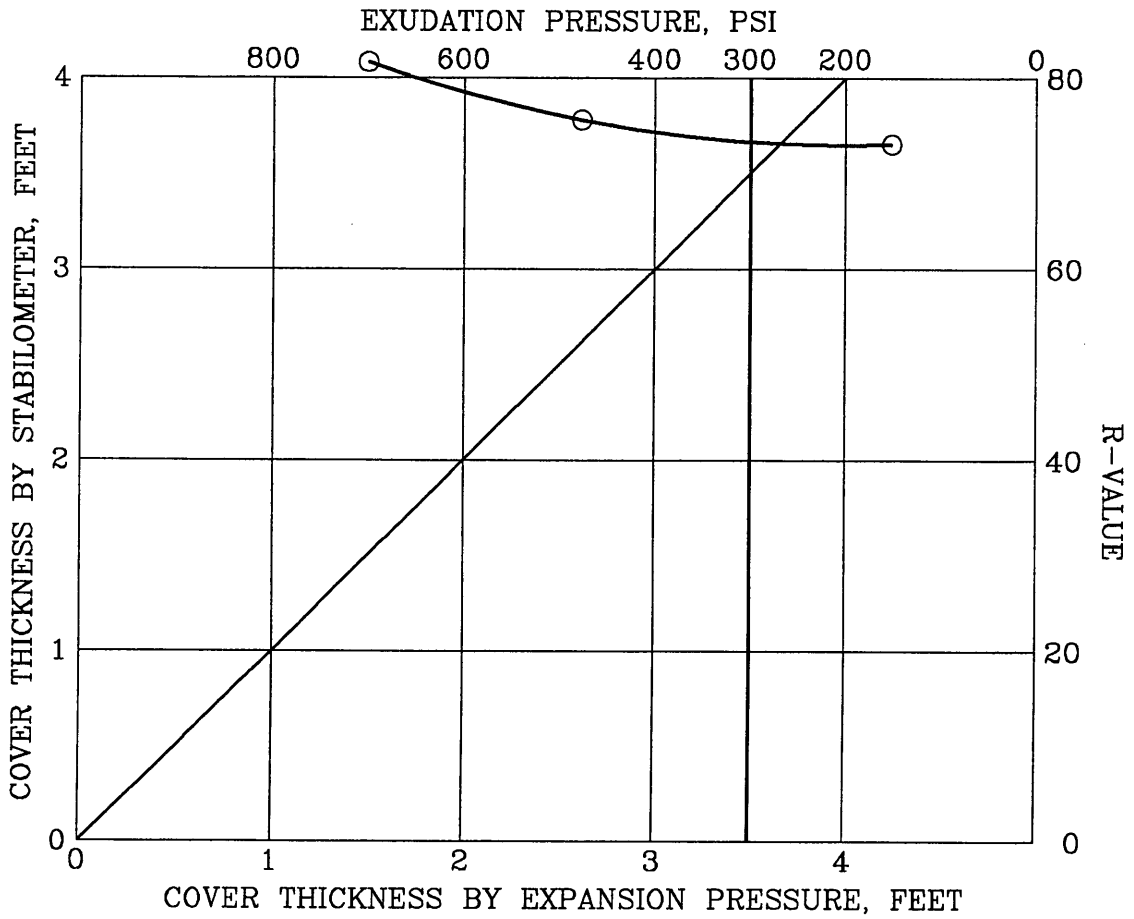



| | | | |
|---|---|---|---|
| BORING | : B-3 | DESCRIPTION | : SAND, Silty (SM) |
| DEPTH (ft) | : 0.0-1.5 | LIQUID LIMIT | : |
| SPEC. GRAVITY | : 2.70 | PLASTIC LIMIT | : |

| | MOISTURE CONTENT (%) | DRY DENSITY (pcf) | PERCENT SATURATION | VOID RATIO |
|---|---|---|---|---|
| INITIAL | 2.8 | 104.4 | 12 | .616 |
| FINAL | 7.6 | 111.1 | 40 | .518 |

**Remark :** ASTM TEST METHOD D2435-SATURATED AT 2.0ksf

| | |
|---|---|
| A25515.01 | CITY OF FRESNO FIRE STATION 15 |
| The Twining Labs Inc. Fresno, CA | CONSOLIDATION TEST — Figure No. 5 |



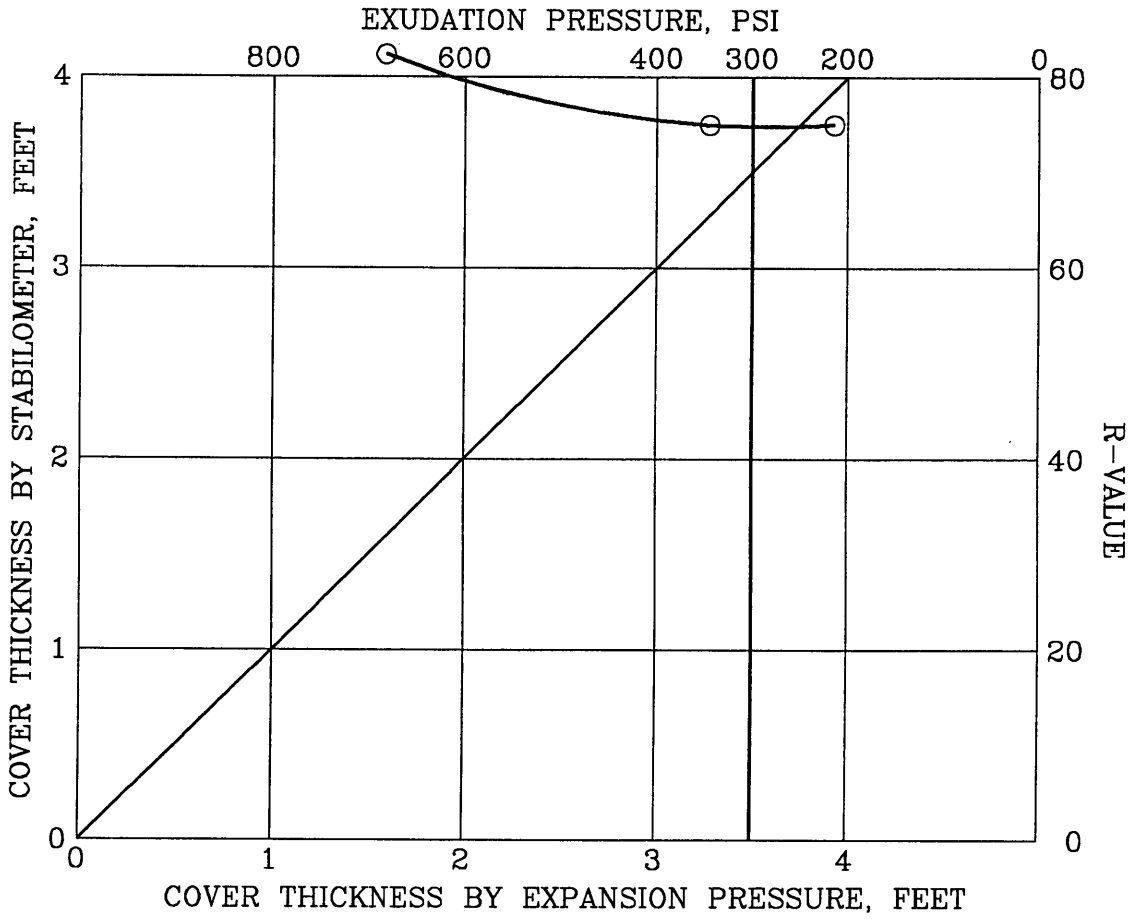

SAMPLE LOCATION : BULK SAMPLE R-1; 0.5'-3.0'
SOIL DESCRIPTION : SAND, Silty (SM)
LIQUID LIMIT : SPECIFIC GRAVITY : 2.70
PLASTIC LIMIT : DATE : 07/26/03

| TEST NUMBER | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| COMPACTION PRESSURE, PSI | 350.0 | 350.0 | 350.0 | | |
| INITIAL MOISTURE, | 1.1 | 1.1 | 1.1 | | |
| MOISTURE AT COMPACTION, | 10.4 | 11.2 | 12.5 | | |
| DRY DENSITY, PCF | 119.0 | 119.3 | 117.8 | | |
| EXUDATION PRESSURE, PSI | 700.3 | 476.7 | 151.2 | | |
| G.E. (STABILITY), FT | .18 | .23 | .26 | | |
| G.E. (EXPANSION), FT | .00 | .00 | .00 | | |

R-VALUE BY STABILITY : 73.3

TEST METHOD NO. CAL 301

| A25515.01 | CITY OF FRESNO FIRE STATION No. 15 |
|---|---|
| Twining Labs, Inc. | R-VALUE TEST Figure No. 6 |



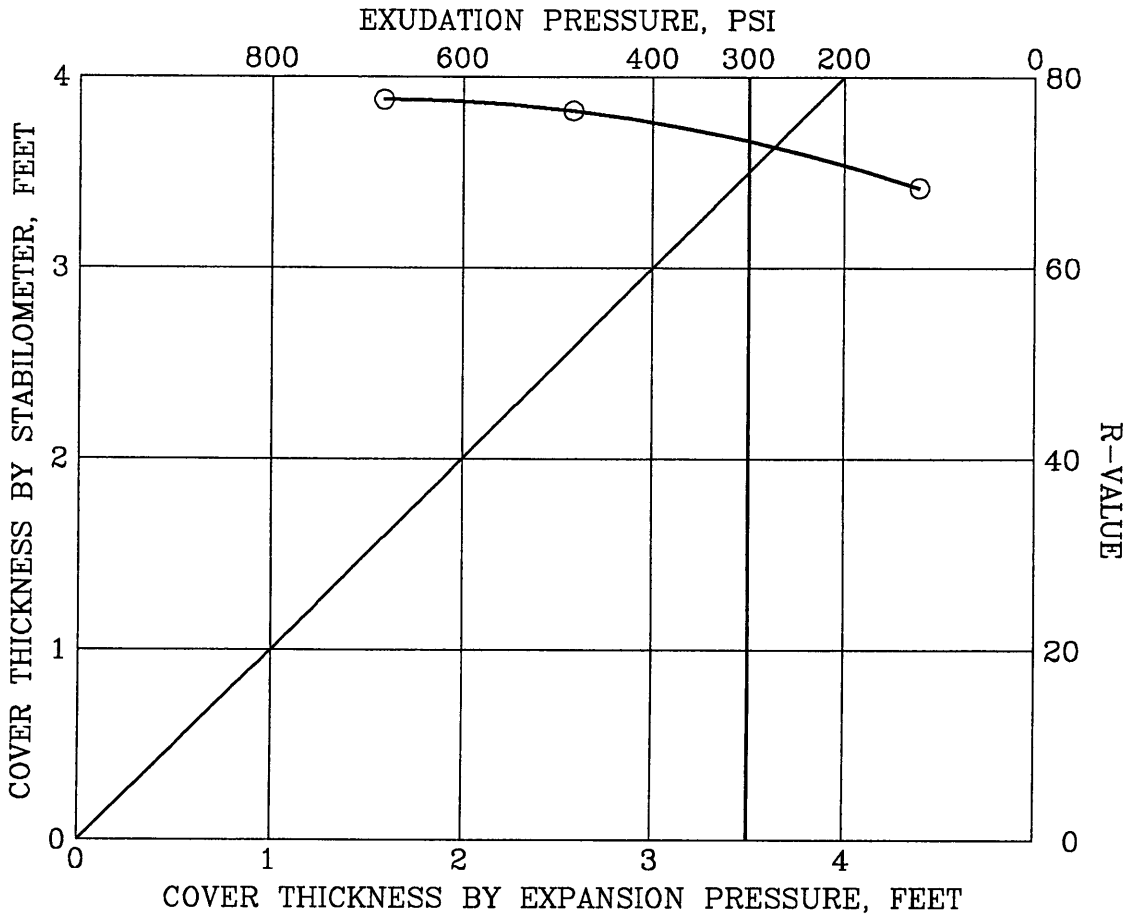

SAMPLE LOCATION : BULK SAMPLE R-2; 0.5'-2.0'
SOIL DESCRIPTION : SAND, Silty (SM)
LIQUID LIMIT : SPECIFIC GRAVITY : 2.70
PLASTIC LIMIT : DATE : 07/21/03

| TEST NUMBER | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| COMPACTION PRESSURE, PSI | 350.0 | 350.0 | 350.0 | | |
| INITIAL MOISTURE, | 1.3 | 1.3 | 1.3 | | |
| MOISTURE AT COMPACTION, | 11.0 | 12.3 | 13.1 | | |
| DRY DENSITY, PCF | 112.4 | 115.0 | 114.6 | | |
| EXUDATION PRESSURE, PSI | 682.8 | 344.6 | 214.1 | | |
| G.E. (STABILITY), FT | .19 | .25 | .25 | | |
| G.E. (EXPANSION), FT | .00 | .00 | .00 | | |

R-VALUE BY STABILITY : 74.8

TEST METHOD NO. CAL 301

| A25515.01 | CITY OF FRESNO FIRE STATION No. 15 |
|---|---|
| Twining Labs, Inc. | R-VALUE TEST Figure No. 7 |




SAMPLE LOCATION : BULK SAMPLE R-3; 0.5'-2.0'
SOIL DESCRIPTION : SAND, Silty (SM)
LIQUID LIMIT : SPECIFIC GRAVITY : 2.70
PLASTIC LIMIT : DATE : 07/21/03

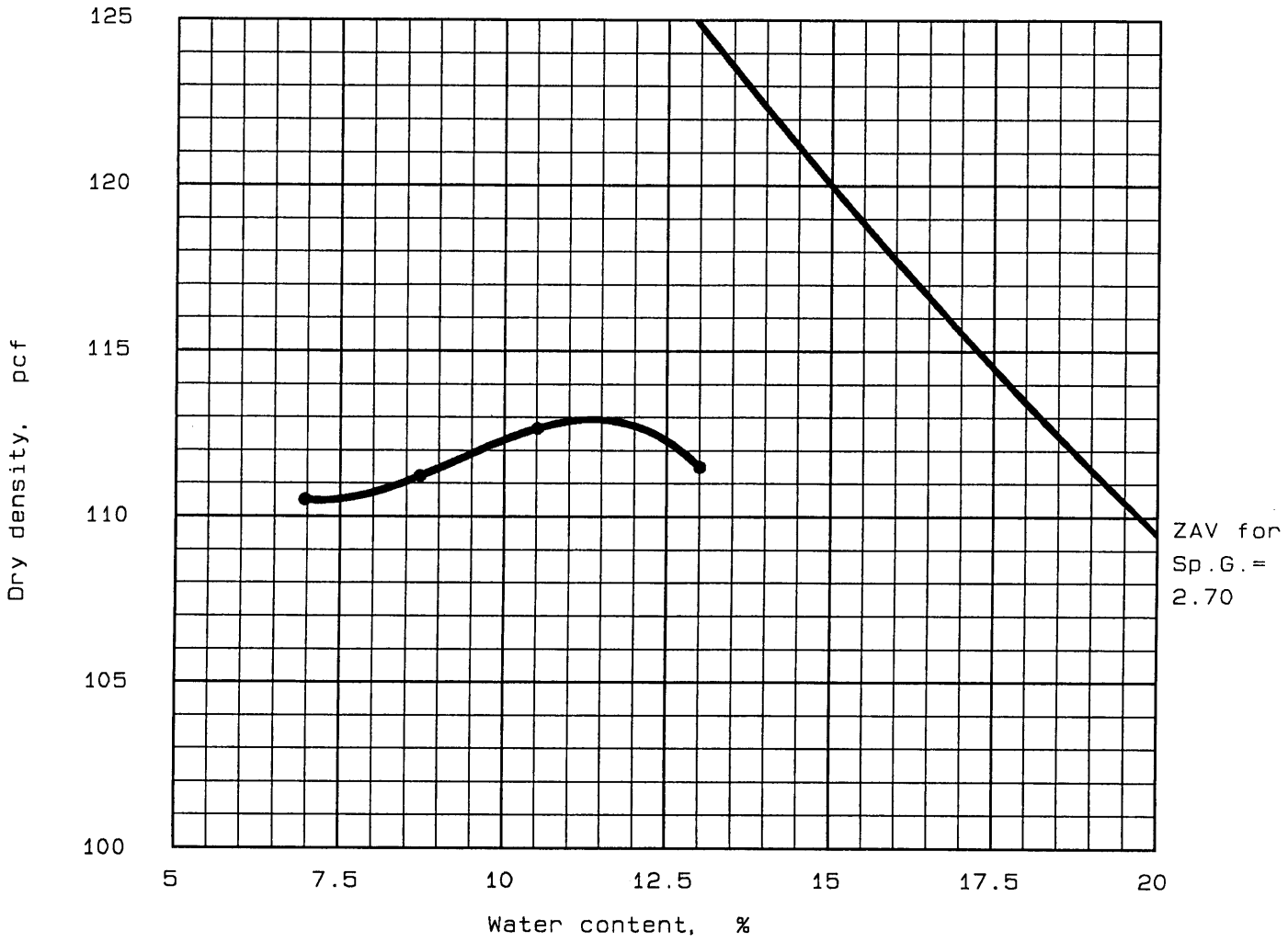
| TEST NUMBER | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| COMPACTION PRESSURE, PSI | 350.0 | 350.0 | 350.0 | | |
| INITIAL MOISTURE, | 1.4 | 1.4 | 1.4 | | |
| MOISTURE AT COMPACTION, | 10.7 | 12.0 | 11.1 | | |
| DRY DENSITY, PCF | 121.5 | 119.7 | 120.5 | | |
| EXUDATION PRESSURE, PSI | 682.8 | 121.8 | 483.8 | | |
| G.E. (STABILITY), FT | .22 | .30 | .23 | | |
| G.E. (EXPANSION), FT | .00 | .00 | .00 | | |

R-VALUE BY STABILITY : 73.3

TEST METHOD NO. CAL 301

| A25515.01 | CITY OF FRESNO FIRE STATION No. 15 |
|---|---|
| Twining Labs, Inc. | R-VALUE TEST Figure No. 8 |

# PROCTOR TEST REPORT




"Modified" Proctor, ASTM D 1557, Method A

| Elev/ Depth | Classification | | Nat. Moist. | Sp.G. | LL | PI | % > No.4 | % < No.200 |
|---|---|---|---|---|---|---|---|---|
| | USCS | AASHTO | | | | | | |
| .5'-2' | SM | | | | | | | |

| TEST RESULTS | MATERIAL DESCRIPTION |
|---|---|
| Optimum moisture = 11.4 %<br>Maximum dry density = 112.9 pcf | SAND, Silty |

Project No.: A25515.01

Project: CITY OF FRESNO FIRE STATION No. 15

Location: FRESNO, CALIFORNIA

Date: AUGUST 8, 2003

Remarks:

BULK SAMPLE R-2

PROCTOR TEST REPORT

**THE TWINING LABORATORIES, INC.**

Figure No. 9

THE TWINING LABORATORIES, INC.
EST. 1898
ANALYTICAL CHEMISTRY • ENVIRONMENTAL SERVICES
GEOTECHNICAL SERVICES • SAMPLING SERVICES
CONSTRUCTION INSPECTION & MATERIALS TESTING

# ANALYTICAL CHEMISTRY DIVISION
# PROJECT COVER SHEET

REPORT DATE : August 12, 2003 INVOICE # 70303775
LABORATORY ID : 703-3775.1-2 **PROJECT MANAGER: Mr. V. P. / Mr. K. C.**

ATTENTION : Mr. V. Parfenov / Mr. K. Clark
CLIENT City of Fresno Public Works Department
2600 Fresno Street, 4th Floor
Fresno, CA 93721

**PROJECT INFO : City of Fresno Fire Station #15**
**PROJECT # : A25515.01**

Please find enclosed the analytical results of your samples. In accordance with your instructions, the samples were analyzed for the components specified.

The Twining Laboratories is accredited by the State of California Department of Health Services for the analysis of Drinking Water, Wastewater and Hazardous Waste under Certificate No. 1371.

Please feel free to contact us if you have any questions or comments regarding the analyses or results. Thank you for allowing us to serve your analytical needs.

elw

Ronald J. Boquist
Director of Analytical Chemistry

Figure No. 10

Rev. 4 06/03 jau (COVER)

REPORT DATE : August 12, 2003
LABORATORY ID : 703-3775.1

**THE TWINING LABORATORIES, INC.**


DATE SAMPLED : 07/11/03 by Dean Ledgerwood
DATE RECEIVED : 07/24/03 at 1328 from Joe Santellano

CLIENT : Geotech / City of Fresno Public Works Department

PROJECT INFO : City of Fresno Fire Station #15
PROJECT# : A25515.01

ANALYZED BY : N. Tyler
REVIEWED BY : J. Ureno

DATE PREPARED : 08/07/03
DATE ANALYZED : 08/07/03

SAMPLE TYPE : Soil

CLIENT SAMPLE ID : B-1 0-1.5

| CORROSION | RESULT | UNITS | DLR | METHOD |
|---|---|---|---|---|
| pH | 7.6 | pH | N/A | ASTM D4972-89 Mod.[1] |
| Resistivity | 11000 | ohms/cm | N/A | CAL Test 424/ASTM D1125-82[2] |
| Chloride (Cl) | ND | % by weight | 0.001 | CAL Test 422/ASTM D4327-84[2] |
| Sulfate ($SO_4$) | ND | % by weight | 0.01 | CAL Test 417/ASTM D4327-84[2] |
| Sulfate ($SO_4$)* | ND | mg/L | 2.0 | CAL Test 417/ASTM D4327-84 |

[1]: pH Determination performed on reagent-water leachate. [2]: Leachate preparation as per CAL Test reference; quantitative analysis as per ASTM reference.
% by weight: Percent by weight ohms/cm: ohms per centimeter @ 25°C N/A: Not Applicable
ASTM: American Society for Testing and Materials ND: None Detected CAL Test: Department of Transportation
DLR: Detection Limit for Reporting purposes mg/L: Milligrams per Liter (ppm)

*extraction ratio of Solid: Water = 1:3

REPORT DATE : August 12, 2003
LABORATORY ID : 703-3775.2

**THE TWINING LABORATORIES, INC.**


DATE SAMPLED : 07/11/03 by Dean Ledgerwood
DATE RECEIVED : 07/24/03 at 1328 from Joe Santellano

CLIENT : Geotech / City of Fresno Public Works Department

PROJECT INFO : City of Fresno Fire Station #15
PROJECT# : A25515.01

ANALYZED BY : N. Tyler
REVIEWED BY : J. Ureno

DATE PREPARED : 08/07/03
DATE ANALYZED : 08/07/03

SAMPLE TYPE : Soil

CLIENT SAMPLE ID : B-3 1.5-3

| CORROSION | RESULT | UNITS | DLR | METHOD |
|---|---|---|---|---|
| pH | 7.0 | pH | N/A | ASTM D4972-89 Mod.[1] |
| Resistivity | 21000 | ohms/cm | N/A | CAL Test 424/ASTM D1125-82[2] |
| Chloride (Cl) | ND | % by weight | 0.001 | CAL Test 422/ASTM D4327-84[2] |
| Sulfate ($SO_4$) | ND | % by weight | 0.01 | CAL Test 417/ASTM D4327-84[2] |
| Sulfate ($SO_4$)* | ND | mg/L | 2.0 | CAL Test 417/ASTM D4327-84 |

[1]: pH Determination performed on reagent-water leachate. [2]: Leachate preparation as per CAL Test reference; quantitative analysis as per ASTM reference.
% by weight: Percent by weight ohms/cm: ohms per centimeter @ 25°C N/A: Not Applicable
ASTM: American Society for Testing and Materials ND: None Detected CAL Test: Department of Transportation
DLR: Detection Limit for Reporting purposes mg/L: Milligrams per Liter (ppm)

*extraction ratio of Solid: Water = 1:3

# APPENDIX D

## RESULTS OF SEISMIC, LIQUEFACTION AND SEISMIC SETTLEMENT ANALYSES

The data contained within Appendix D were compiled by computer programs titled EQSEARCH and FRISKSP by Thomas F. Blake. The data files for these programs were recently updated in 1999 and 1998, respectively.

The source data presented includes: the latitude and longitude, date, time, depth, Richter Magnitude, computed site acceleration, computed site Modified Mercalli intensity, and the approximate earthquake-to-site distance in miles and kilometers.

The spreadsheet provided in the computer program LIQUEFY2 (Blake), was used to conduct the liquefaction and seismic settlement analyses.

# EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL

By Thomas F. Blake (1994)

LIQUEFY2.WQ1

EARTHQUAKE INFORMATION:

| | |
|---|---|
| Earthquake Magnitude: | 6.5 |
| Peak Horiz. Acceleration (g): | 0.23 |

ENERGY & ROD CORRECTIONS:

| | | | |
|---|---|---|---|
| Energy Correction (CE) for N60: | 1.0 | | |
| Short Drive Rod Corr. (0 or 1): | 1 | | |
| Use Ksigma (0 or 1): | 1 | | |
| CN (L&W=1, PHT=2, Skemp=3): | 1 | | |

LIQUEFACTION CALCULATIONS: City Of Fresno, Fire Station #15, Fresno, B-1

Unit Wt. Water (pcf): 62.4

| Depth to Base (ft) | Total Unit Wt. (pcf) | Water (0 or 1) | FIELD SPT (N) | Depth of SPT (ft) | Liq.Sus. (0 or 1) | -200 (%) | Est. Dr (%) | CN Factor | Corrected (N1)60 | Eff. Unit Wt. (psf) | CSR pre Ksigma | Needed CSR | rd Factor | Induced CSR | Norm.Con Sett. (ft) | Over.Con. Sett. (ft) | Liquefac. Safe.Fact. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 130.0 | 0 | 21.0 | 1.0 | 0 | 18.0 | | 2.000 | 31.5 | 130.000 | Infin. | Infin. | 0.999 | 0.149 | 1.271 | ERR | Non-Liq. |
| 2.0 | 130.0 | 0 | 21.0 | 2.0 | 0 | 18.0 | | 2.000 | 31.5 | 130.000 | Infin. | Infin. | 0.997 | 0.149 | 1.271 | ERR | Non-Liq. |
| 3.0 | 130.0 | 0 | 21.0 | 2.0 | 0 | 18.0 | | 2.000 | 31.5 | 130.000 | Infin. | Infin. | 0.995 | 0.149 | 1.271 | ERR | Non-Liq. |
| 4.0 | 130.0 | 0 | 21.0 | 2.0 | 0 | 18.0 | | 2.000 | 31.5 | 130.000 | Infin. | Infin. | 0.993 | 0.148 | 1.271 | ERR | Non-Liq. |
| 5.0 | 130.0 | 0 | 10.0 | 6.0 | 0 | 18.0 | | 1.672 | 12.5 | 130.000 | 0.228 | 0.228 | 0.991 | 0.148 | 0.605 | ERR | Non-Liq. |
| 6.0 | 130.0 | 0 | 10.0 | 6.0 | 0 | 18.0 | | 1.672 | 12.5 | 130.000 | 0.228 | 0.228 | 0.989 | 0.148 | 0.605 | ERR | Non-Liq. |
| 7.0 | 130.0 | 0 | 10.0 | 6.0 | 0 | 18.0 | | 1.672 | 12.5 | 130.000 | 0.228 | 0.228 | 0.987 | 0.148 | 0.605 | ERR | Non-Liq. |
| 8.0 | 130.0 | 0 | 10.0 | 6.0 | 0 | 18.0 | | 1.672 | 12.5 | 130.000 | 0.228 | 0.228 | 0.985 | 0.147 | 0.605 | ERR | Non-Liq. |
| 9.0 | 130.0 | 0 | 20.0 | 11.0 | 0 | 18.0 | | 1.210 | 18.2 | 130.000 | 0.325 | 0.325 | 0.983 | 0.147 | 1.210 | ERR | Non-Liq. |
| 10.0 | 130.0 | 0 | 20.0 | 11.0 | 0 | 18.0 | | 1.210 | 18.2 | 130.000 | 0.325 | 0.325 | 0.981 | 0.147 | 1.210 | ERR | Non-Liq. |
| 11.0 | 130.0 | 0 | 20.0 | 11.0 | 0 | 18.0 | | 1.210 | 24.2 | 130.000 | Infin. | Infin. | 0.978 | 0.146 | 1.210 | ERR | Non-Liq. |
| 12.0 | 130.0 | 0 | 20.0 | 11.0 | 0 | 18.0 | | 1.210 | 24.2 | 130.000 | Infin. | Infin. | 0.976 | 0.146 | 1.210 | ERR | Non-Liq. |
| 13.0 | 130.0 | 0 | 20.0 | 11.0 | 0 | 18.0 | | 1.210 | 24.2 | 130.000 | Infin. | Infin. | 0.974 | 0.146 | 1.210 | ERR | Non-Liq. |
| 14.0 | 130.0 | 0 | 82.0 | 16.0 | 0 | 18.0 | | 0.996 | 81.7 | 130.000 | Infin. | Infin. | 0.972 | 0.145 | 4.962 | ERR | Non-Liq. |
| 15.0 | 130.0 | 0 | 82.0 | 16.0 | 1 | 14.0 | 141 | 0.996 | 81.7 | 130.000 | Infin. | Infin. | 0.970 | 0.145 | 4.962 | 0.061 | Non-Liq. |
| 16.0 | 130.0 | 0 | 82.0 | 16.0 | 1 | 14.0 | 141 | 0.996 | 81.7 | 130.000 | Infin. | Infin. | 0.967 | 0.145 | 4.962 | 0.061 | Non-Liq. |
| 17.0 | 130.0 | 0 | 82.0 | 16.0 | 1 | 14.0 | 141 | 0.996 | 81.7 | 130.000 | Infin. | Infin. | 0.965 | 0.144 | 4.962 | 0.061 | Non-Liq. |
| 18.0 | 130.0 | 0 | 82.0 | 16.0 | 1 | 14.0 | 141 | 0.996 | 81.7 | 130.000 | Infin. | Infin. | 0.963 | 0.144 | 4.962 | 0.061 | Non-Liq. |
| 19.0 | 130.0 | 0 | 100.0 | 21.0 | 1 | 14.0 | 144 | 0.866 | 86.6 | 130.000 | Infin. | Infin. | 0.961 | 0.144 | 6.051 | 0.061 | Non-Liq. |
| 20.0 | 130.0 | 0 | 100.0 | 21.0 | 1 | 14.0 | 144 | 0.866 | 86.6 | 130.000 | Infin. | Infin. | 0.959 | 0.143 | 6.051 | 0.061 | Non-Liq. |
| 21.0 | 130.0 | 0 | 100.0 | 21.0 | 1 | 14.0 | 144 | 0.866 | 86.6 | 130.000 | Infin. | Infin. | 0.956 | 0.143 | 6.051 | 0.061 | Non-Liq. |
| 22.0 | 130.0 | 0 | 100.0 | 21.0 | 1 | 14.0 | 144 | 0.866 | 86.6 | 130.000 | Infin. | Infin. | 0.953 | 0.142 | 6.051 | 0.061 | Non-Liq. |
| 23.0 | 130.0 | 0 | 100.0 | 21.0 | 0 | 14.0 | | 0.866 | 86.6 | 130.000 | Infin. | Infin. | 0.950 | 0.142 | 6.051 | ERR | Non-Liq. |
| 24.0 | 130.0 | 0 | 34.0 | 26.0 | 0 | 60.0 | | 0.777 | 26.4 | 130.000 | Infin. | Infin. | 0.947 | 0.142 | 2.057 | ERR | Non-Liq. |
| 25.0 | 130.0 | 0 | 34.0 | 26.0 | 0 | 60.0 | | 0.777 | 26.4 | 130.000 | Infin. | Infin. | 0.944 | 0.141 | 2.057 | ERR | Non-Liq. |
| 26.0 | 130.0 | 0 | 34.0 | 26.0 | 0 | 60.0 | | 0.777 | 26.4 | 130.000 | Infin. | Infin. | 0.940 | 0.141 | 2.057 | ERR | Non-Liq. |
| 27.0 | 130.0 | 0 | 34.0 | 26.0 | 0 | 60.0 | | 0.777 | 26.4 | 130.000 | Infin. | Infin. | 0.935 | 0.140 | 2.057 | ERR | Non-Liq. |
| 28.0 | 130.0 | 0 | 34.0 | 26.0 | 0 | 60.0 | | 0.777 | 26.4 | 130.000 | Infin. | Infin. | 0.931 | 0.139 | 2.057 | ERR | Non-Liq. |
| 29.0 | 130.0 | 0 | 40.0 | 31.0 | 0 | 9.0 | | 0.710 | 28.4 | 130.000 | Infin. | Infin. | 0.927 | 0.139 | 2.420 | ERR | Non-Liq. |
| 30.0 | 130.0 | 0 | 40.0 | 31.0 | 0 | 9.0 | | 0.710 | 28.4 | 130.000 | Infin. | Infin. | 0.922 | 0.138 | 2.420 | ERR | Non-Liq. |
| 31.0 | 130.0 | 0 | 40.0 | 31.0 | 0 | 9.0 | | 0.710 | 28.4 | 130.000 | Infin. | Infin. | 0.917 | 0.137 | 2.420 | ERR | Non-Liq. |
| 32.0 | 130.0 | 0 | 40.0 | 31.0 | 0 | 9.0 | | 0.710 | 28.4 | 130.000 | Infin. | Infin. | 0.911 | 0.136 | 2.420 | ERR | Non-Liq. |
| 33.0 | 130.0 | 0 | 40.0 | 31.0 | 0 | 9.0 | | 0.710 | 28.4 | 130.000 | Infin. | Infin. | 0.906 | 0.135 | 2.420 | ERR | Non-Liq. |
| 34.0 | 130.0 | 0 | 41.0 | 36.0 | 0 | 9.0 | | 0.658 | 27.0 | 130.000 | Infin. | Infin. | 0.900 | 0.135 | 2.481 | ERR | Non-Liq. |
| 35.0 | 130.0 | 0 | 41.0 | 36.0 | 0 | 1.0 | | 0.658 | 27.0 | 130.000 | 0.391 | 0.366 | 0.894 | 0.134 | 2.481 | ERR | Non-Liq. |
| 36.0 | 130.0 | 0 | 41.0 | 36.0 | 0 | 1.0 | | 0.658 | 27.0 | 130.000 | 0.391 | 0.365 | 0.888 | 0.133 | 2.481 | ERR | Non-Liq. |
| 37.0 | 130.0 | 0 | 41.0 | 36.0 | 0 | 1.0 | | 0.658 | 27.0 | 130.000 | 0.391 | 0.363 | 0.880 | 0.132 | 2.481 | ERR | Non-Liq. |
| 38.0 | 130.0 | 0 | 41.0 | 36.0 | 0 | 1.0 | | 0.658 | 27.0 | 130.000 | 0.391 | 0.361 | 0.872 | 0.130 | 2.481 | ERR | Non-Liq. |
| 39.0 | 130.0 | 0 | 31.0 | 41.0 | 1 | 60.0 | 64 | 0.616 | 19.1 | 130.000 | 0.415 | 0.381 | 0.864 | 0.129 | 1.876 | 0.061 | Non-Liq. |
| 40.0 | 130.0 | 0 | 31.0 | 41.0 | 1 | 60.0 | 64 | 0.616 | 19.1 | 130.000 | 0.415 | 0.379 | 0.856 | 0.128 | 1.876 | 0.061 | Non-Liq. |
| 41.0 | 130.0 | 0 | 31.0 | 41.0 | 1 | 60.0 | 64 | 0.616 | 19.1 | 130.000 | 0.415 | 0.377 | 0.848 | 0.127 | 1.876 | 0.061 | Non-Liq. |
| 42.0 | 130.0 | 0 | 31.0 | 41.0 | 1 | 60.0 | 64 | 0.616 | 19.1 | 130.000 | 0.415 | 0.376 | 0.838 | 0.125 | 1.876 | 0.061 | Non-Liq. |
| 43.0 | 130.0 | 0 | 31.0 | 41.0 | 1 | 60.0 | 64 | 0.616 | 19.1 | 130.000 | 0.415 | 0.374 | 0.828 | 0.124 | 1.876 | 0.061 | Non-Liq. |
| 44.0 | 130.0 | 0 | 31.0 | 41.0 | 1 | 60.0 | 64 | 0.616 | 19.1 | 130.000 | 0.415 | 0.372 | 0.819 | 0.122 | 1.876 | 0.061 | Non-Liq. |
| 45.0 | 130.0 | 0 | 51.0 | 46.0 | 1 | 60.0 | 79 | 0.581 | 29.7 | 130.000 | Infin. | Infin. | 0.809 | 0.121 | 3.086 | 0.061 | Non-Liq. |
| 46.0 | 130.0 | 0 | 51.0 | 46.0 | 1 | 60.0 | 79 | 0.581 | 29.7 | 130.000 | Infin. | Infin. | 0.799 | 0.119 | 3.086 | 0.061 | Non-Liq. |
| 47.0 | 130.0 | 0 | 51.0 | 46.0 | 1 | 60.0 | 79 | 0.581 | 29.7 | 130.000 | Infin. | Infin. | 0.789 | 0.118 | 3.086 | 0.061 | Non-Liq. |
| 48.0 | 130.0 | 0 | 51.0 | 46.0 | 0 | 60.0 | | 0.581 | 29.7 | 130.000 | Infin. | Infin. | 0.778 | 0.116 | 3.086 | ERR | Non-Liq. |
| 49.0 | 130.0 | 0 | 51.0 | 46.0 | 0 | 60.0 | | 0.581 | 29.7 | 130.000 | Infin. | Infin. | 0.768 | 0.115 | 3.086 | ERR | Non-Liq. |
| 50.0 | 130.0 | 0 | 100.0 | 51.0 | 0 | 18.0 | | 0.552 | 55.2 | 130.000 | Infin. | Infin. | 0.758 | 0.113 | 6.051 | ERR | Non-Liq. |
| 51.0 | 130.0 | 0 | 100.0 | 51.0 | 0 | 18.0 | | 0.552 | 55.2 | 130.000 | Infin. | Infin. | 0.748 | 0.112 | 6.051 | ERR | Non-Liq. |
| 52.0 | 130.0 | 0 | 100.0 | 51.0 | 0 | 18.0 | | 0.552 | 55.2 | 130.000 | Infin. | Infin. | 0.738 | 0.110 | 6.051 | ERR | Non-Liq. |

Proposed Fire Station # 15, Fresno, B-1

MAG = 6.5
ACC = 0.23

| % fines | p29&30 SCEC N-value fines corrected | Liquefac. Safe.Fact | DEPTH feet | OVER BURDEN | CSR | Corrected VALUE (colm J) | VERTICAL STRAIN % | CM | Co | SETTLE INCHES |
|---|---|---|---|---|---|---|---|---|---|---|
| 18 | 60 | Non-Liq. | 1 | 130 | 0.149351 | 31.5 | 0 | 0.726851 | 0.259521 | 0.000 |
| 18 | 60 | Non-Liq. | 2 | 260 | 0.149052 | 31.5 | 0 | 0.726851 | 0.342588 | 0.000 |
| 18 | 60 | Non-Liq. | 3 | 390 | 0.148753 | 31.5 | 0 | 0.726851 | 0.425655 | 0.000 |
| 18 | 66 | Non-Liq. | 4 | 520 | 0.148454 | 31.5 | 0.001 | 0.726851 | 0.508722 | 0.000 |
| 18 | 66 | Non-Liq. | 5 | 650 | 0.148155 | 12.5 | 0.001 | 0.726851 | 0.553965 | 0.000 |
| 18 | 66 | Non-Liq. | 6 | 780 | 0.147848 | 12.5 | 0.001 | 0.726851 | 0.608748 | 0.000 |
| 18 | 66 | Non-Liq. | 7 | 910 | 0.147534 | 12.5 | 0.001 | 0.726851 | 0.663531 | 0.000 |
| 18 | 66 | Non-Liq. | 8 | 1040 | 0.14722 | 12.5 | 0.001 | 0.726851 | 0.718314 | 0.000 |
| 18 | 66 | Non-Liq. | 9 | 1170 | 0.146906 | 18.2 | 0.001 | 0.726851 | 0.773097 | 0.000 |
| 18 | 48 | Non-Liq. | 10 | 1300 | 0.146592 | 18.2 | 0.001 | 0.726851 | 0.82788 | 0.000 |
| 18 | 62 | Non-Liq. | 11 | 1430 | 0.146271 | 24.2 | 0.001 | 0.726851 | 0.882663 | 0.000 |
| 18 | 62 | Non-Liq. | 12 | 1560 | 0.145942 | 24.2 | 0.001 | 0.726851 | 0.888391 | 0.000 |
| 18 | 62 | Non-Liq. | 13 | 1690 | 0.145613 | 24.2 | 0.001 | 0.726851 | 0.913262 | 0.000 |
| 18 | 62 | Non-Liq. | 14 | 1820 | 0.145284 | 81.7 | 0.001 | 0.726851 | 0.938133 | 0.000 |
| 14 | 14 | Non-Liq. | 15 | 1950 | 0.144955 | 81.7 | 0.08 | 0.726851 | 0.973004 | 0.007 |
| 14 | 14 | Non-Liq. | 16 | 2080 | 0.144626 | 81.7 | 0.08 | 0.726851 | 1.007876 | 0.007 |
| 14 | 14 | Non-Liq. | 17 | 2210 | 0.144297 | 81.7 | 0.08 | 0.726851 | 1.030116 | 0.007 |
| 14 | 14 | Non-Liq. | 18 | 2340 | 0.143969 | 81.7 | 0.08 | 0.726851 | 1.062207 | 0.007 |
| 14 | 14 | Non-Liq. | 19 | 2470 | 0.14364 | 86.6 | 0.08 | 0.726851 | 1.094298 | 0.008 |
| 14 | 23 | Non-Liq. | 20 | 2600 | 0.143311 | 86.6 | 0.04 | 0.726851 | 1.126389 | 0.004 |
| 14 | 23 | Non-Liq. | 21 | 2730 | 0.142915 | 86.6 | 0.04 | 0.726851 | 1.158479 | 0.004 |
| 14 | 23 | Non-Liq. | 22 | 2860 | 0.142451 | 86.6 | 0.04 | 0.726851 | 1.19057 | 0.004 |
| 14 | 23 | Non-Liq. | 23 | 2990 | 0.141988 | 86.6 | 0.04 | 0.726851 | 1.222661 | 0.004 |
| 60 | 50 | Non-Liq. | 24 | 3120 | 0.141524 | 26.4 | 0.001 | 0.726851 | 1.254752 | 0.000 |
| 60 | 50 | Non-Liq. | 25 | 3250 | 0.141061 | 26.4 | 0.001 | 0.726851 | 1.233738 | 0.000 |
| 60 | 50 | Non-Liq. | 26 | 3380 | 0.1405 | 26.4 | 0.001 | 0.726851 | 1.259889 | 0.000 |
| 60 | 50 | Non-Liq. | 27 | 3510 | 0.139842 | 26.4 | 0.001 | 0.726851 | 1.286041 | 0.000 |
| 60 | 50 | Non-Liq. | 28 | 3640 | 0.139185 | 26.4 | 0.001 | 0.726851 | 1.312193 | 0.000 |
| 9 | 10 | Non-Liq. | 29 | 3770 | 0.138527 | 28.4 | 0.14 | 0.726851 | 1.338326 | 0.016 |
| 9 | 10 | Non-Liq. | 30 | 3900 | 0.137869 | 28.4 | 0.14 | 0.726851 | 1.447297 | 0.018 |
| 9 | 10 | Non-Liq. | 31 | 4030 | 0.137114 | 28.4 | 0.14 | 0.726851 | 1.479388 | 0.018 |
| 9 | 10 | Non-Liq. | 32 | 4160 | 0.136262 | 28.4 | 0.14 | 0.726851 | 1.511479 | 0.018 |
| 9 | 10 | Non-Liq. | 33 | 4290 | 0.13541 | 28.4 | 0.14 | 0.726851 | 1.543569 | 0.019 |
| 9 | 13 | Non-Liq. | 34 | 4420 | 0.134557 | 27.0 | 0.1 | 0.726851 | 1.57566 | 0.014 |
| 1 | 13 | Non-Liq. | 35 | 4550 | 0.133705 | 27.0 | 0.1 | 0.726851 | 1.495236 | 0.013 |
| 1 | 13 | Non-Liq. | 36 | 4680 | 0.132696 | 27.0 | 0.1 | 0.726851 | 1.521388 | 0.013 |
| 1 | 13 | Non-Liq. | 37 | 4810 | 0.13153 | 27.0 | 0.1 | 0.726851 | 1.54754 | 0.013 |
| 1 | 13 | Non-Liq. | 38 | 4940 | 0.130364 | 27.0 | 0.1 | 0.726851 | 1.573691 | 0.014 |
| 60 | 20 | Non-Liq. | 39 | 5070 | 0.129198 | 19.1 | 0 | 0.726851 | 1.599843 | 0.000 |
| 60 | 20 | Non-Liq. | 40 | 5200 | 0.128032 | 19.1 | 0 | 0.726851 | 1.625995 | 0.000 |
| 60 | 20 | Non-Liq. | 41 | 5330 | 0.126724 | 19.1 | 0 | 0.726851 | 1.652146 | 0.000 |
| 60 | 20 | Non-Liq. | 42 | 5460 | 0.125274 | 19.1 | 0 | 0.726851 | 1.678298 | 0.000 |
| 60 | 20 | Non-Liq. | 43 | 5590 | 0.123823 | 19.1 | 0 | 0.726851 | 1.70445 | 0.000 |
| 60 | 20 | Non-Liq. | 44 | 5720 | 0.122373 | 19.1 | 0 | 0.726851 | 1.730601 | 0.000 |
| 60 | 32 | Non-Liq. | 45 | 5850 | 0.120923 | 29.7 | 0 | 0.726851 | 1.756753 | 0.000 |
| 60 | 32 | Non-Liq. | 46 | 5980 | 0.119428 | 29.7 | 0 | 0.726851 | 1.782905 | 0.000 |
| 60 | 32 | Non-Liq. | 47 | 6110 | 0.117888 | 29.7 | 0 | 0.726851 | 1.809057 | 0.000 |
| 60 | 32 | Non-Liq. | 48 | 6240 | 0.116348 | 29.7 | 0 | 0.726851 | 1.835208 | 0.000 |
| 60 | 32 | Non-Liq. | 49 | 6370 | 0.114809 | 29.7 | 0 | 0.726851 | 1.86136 | 0.000 |
| 18 | 65 | Non-Liq. | 50 | 6500 | 0.113269 | 55.2 | 0 | 0.726851 | 1.887512 | 0.000 |
| | | | | | | | Total Seismic settlement | | | 0.210389 |

Per page 29 SC/EC multiply dry settlement by 2 for multidirectional shaking

```
*****************************************
*                                       *
*        FRISKSP - IBM-PC VERSION       *
*                                       *
*  Modified from *FRISK* (McGuire 1978) *
*   To Perform Probabilistic Earthquake *
*  Hazard Analyses Using Multiple Forms *
* of Ground-Motion-Attenuation Relations *
*                                       *
*   Modifications by:  Thomas F. Blake  *
*             - 1988-2000 -             *
*                                       *
*              VERSION 4.00             *
*             (Visual Fortran)          *
*****************************************
```

TITLE: City of Fresno, Fire Station # 15

IPR_FILE
0

IPLOT
0

SITE CONDITION
0.00

BASEMENT DEPTH (km)
5.00

RHGA FACTOR RHGA DIST (km)
1.000 0.000

| NFLT | NSITE | NPROB | NATT | LCD |
|---|---|---|---|---|
| 34 | 1 | 2 | 6 | 1 |

| ATT | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.3130 | 0.5270 | 0.0000 | -0.7780 | -0.3710 | 1396.0000 | 5.5700 | 250.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| ATT | C15 | C16 | C17 | C18 | C19 | C20 | C21 | C22 | C23 | PER | DSMIN | SIGA | IRELAF | ICHK |
| 1 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.5200 | 35 | 0 |

| ATT | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | -0.1170 | 0.5270 | 0.0000 | -0.7780 | -0.3710 | 1396.0000 | 5.5700 | 250.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| ATT | C15 | C16 | C17 | C18 | C19 | C20 | C21 | C22 | C23 | PER | DSMIN | SIGA | IRELAF | ICHK |
| 2 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.5200 | 35 | 0 |

| ATT | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | -0.3130 | 0.5270 | 0.0000 | -0.7780 | -0.3710 | 1396.0000 | 5.5700 | 250.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| ATT | C15 | C16 | C17 | C18 | C19 | C20 | C21 | C22 | C23 | PER | DSMIN | SIGA | IRELAF | ICHK |
| 3 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.5200 | 35 | 0 |

| ATT | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | -0.1170 | 0.5270 | 0.0000 | -0.7780 | -0.3710 | 1396.0000 | 5.5700 | 250.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| ATT | C15 | C16 | C17 | C18 | C19 | C20 | C21 | C22 | C23 | PER | DSMIN | SIGA | IRELAF | ICHK |
| 4 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.5200 | 35 | 0 |

| ATT | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | -0.1170 | 0.5270 | 0.0000 | -0.7780 | -0.3710 | 1396.0000 | 5.5700 | 250.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| ATT | C15 | C16 | C17 | C18 | C19 | C20 | C21 | C22 | C23 | PER | DSMIN | SIGA | IRELAF | ICHK |
| 5 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.5200 | 35 | 0 |

| ATT | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | -0.1170 | 0.5270 | 0.0000 | -0.7780 | -0.3710 | 1396.0000 | 5.5700 | 250.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| ATT | C15 | C16 | C17 | C18 | C19 | C20 | C21 | C22 | C23 | PER | DSMIN | SIGA | IRELAF | ICHK |
| 6 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.5200 | 35 | 0 |

PROBLEM DATA:

BOORE ET AL(1997) NEHRP D (250)1 AMPLITUDES:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 0.010 | 0.040 | 0.070 | 0.100 | 0.130 | 0.160 | 0.190 | 0.220 | 0.250 | 0.280 |
| | 0.310 | 0.340 | 0.370 | 0.400 | 0.430 | | | | | |

MAGNITUDE WEIGHTING FACTORS: MWF: 0 MWF MAGNITUDE: 0.00

BOORE ET AL(1997) NEHRP D (250)2 AMPLITUDES:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 0.010 | 0.040 | 0.070 | 0.100 | 0.130 | 0.160 | 0.190 | 0.220 | 0.250 | 0.280 |
| | 0.310 | 0.340 | 0.370 | 0.400 | 0.430 | | | | | |

MAGNITUDE WEIGHTING FACTORS: MWF: 3 MWF MAGNITUDE: 7.50

RISKS SPECIFIED:

| | | | | | |
|---|---|---|---|---|---|
| 5 | 0.013900 | 0.010000 | 0.005000 | 0.002105 | 0.001000 |

SITE COORDINATES:

| | | |
|---|---|---|
| 1 | -119.6996 | 36.7307 |

```
-----------------------------------------------------------------------------

 FAULT  3

 FAULT NAME:  FOOTHILLS FAULT SYSTEM


 NFP    NRL   ATTENUATION CODES:
  5     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  0.0500  2.072 18.000  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.50  1.00


   dmchar ampchar dmpchar
     0.50    6.00    1.00

 Slip Rate (  0.0500 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.432E+14
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.5000  1.0000   0.00410   0.00187   0.00222


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -120.0500   37.2750
  2    -120.7800   38.0800
  3    -121.0850   38.6200
  4    -121.1300   38.8400
  5    -122.1600   40.2400

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2      20.0000   11.6000

 Computed Total Fault Area = 0.88E+04
```

```
-----------------------------------------------------------------------------

 FAULT  4

 FAULT NAME:  GREAT VALLEY 12


 NFP    NRL   ATTENUATION CODES:
  2     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.5000  2.072  0.800  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.30  1.00


   dmchar ampchar dmpchar
     0.50    5.80    1.00

 Slip Rate (  1.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.170E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.3000  1.0000   0.00793   0.00270   0.00523


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -120.4383   36.4794
  2    -120.3491   36.3398

 NDP
   3
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    6.9900
  2       0.0000    7.0000
  3       9.7000    9.6000

 Computed Total Fault Area = 0.18E+03
```

```
-----------------------------------------------------------------------------

 FAULT  5

 FAULT NAME:  GREAT VALLEY 11


 NFP    NRL   ATTENUATION CODES:
  2     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.5000  2.072  1.200  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.40  1.00


   dmchar ampchar dmpchar
     0.50    5.90    1.00

 Slip Rate (  1.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.250E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.4000  1.0000   0.00906   0.00361   0.00545


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -120.6530   36.6409
  2    -120.4476   36.4951

 NDP
   3
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    6.9900
  2       0.0000    7.0000
  3       9.7000    9.6000

 Computed Total Fault Area = 0.25E+03
```

```
-----------------------------------------------------------------------------

 FAULT  6

 FAULT NAME:  GREAT VALLEY 13


 NFP    NRL   ATTENUATION CODES:
  2     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.5000  2.072  1.500  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.50  1.00


   dmchar ampchar dmpchar
     0.50    6.00    1.00

 Slip Rate (  1.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.300E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.5000  1.0000   0.00853   0.00391   0.00463


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -120.3672   36.3441
  2    -120.1536   36.1363

 NDP
   3
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    6.9900
  2       0.0000    7.0000
  3       9.7000    9.6000

 Computed Total Fault Area = 0.30E+03
```

```
-----------------------------------------------------------------------------

 FAULT  7

 FAULT NAME:  GREAT VALLEY 14


 NFP    NRL   ATTENUATION CODES:
  2     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.5000  2.072  1.200  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.40  1.00


   dmchar ampchar dmpchar
     0.50    5.90    1.00

 Slip Rate (  1.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.240E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.4000  1.0000   0.00870   0.00347   0.00523


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -120.1553   36.1359
  2    -119.9545   35.9950

 NDP
   3
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    6.9900
  2       0.0000    7.0000
  3       9.7000    9.6000

 Computed Total Fault Area = 0.24E+03
```

```
-----------------------------------------------------------------------------

 FAULT  8

 FAULT NAME:  GREAT VALLEY 10


 NFP    NRL   ATTENUATION CODES:
  2     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.5000  2.072  1.100  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.40  1.00


   dmchar ampchar dmpchar
     0.50    5.90    1.00

 Slip Rate (  1.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.220E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.4000  1.0000   0.00797   0.00318   0.00479


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -120.7585   36.7995
  2    -120.6451   36.6280

 NDP
   3
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    6.9900
  2       0.0000    7.0000
  3       9.7000    9.6000

 Computed Total Fault Area = 0.22E+03
```

```
-----------------------------------------------------------------------------

 FAULT  9

 FAULT NAME:  GREAT VALLEY 9


 NFP    NRL   ATTENUATION CODES:
  2     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.5000  2.072  1.900  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.60  1.00


   dmchar ampchar dmpchar
     0.50    6.10    1.00

 Slip Rate (  1.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.390E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.6000  1.0000   0.00880   0.00454   0.00426


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -120.9867   37.1031
  2    -120.7489   36.8083

 NDP
   3
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    6.9900
  2       0.0000    7.0000
  3       9.7000    9.6000

 Computed Total Fault Area = 0.39E+03
```

```
-----------------------------------------------------------------------------

FAULT 11

FAULT NAME:  SAN ANDREAS (Creeping)


NFP    NRL   ATTENUATION CODES:
 4     10      1  3

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1 34.0000  2.072  6.200  2.000  1.000

NMAX AMMAX  PMAX
 1    6.50  1.00


  dmchar ampchar dmpchar
    0.50    6.00    1.00

Slip Rate ( 34.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area    - cm**2
0.150E+14
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.5000  1.0000   0.96713   0.44257   0.52456


IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

FAULT SEGMENT COORDINATES
 1    -121.5062   36.8237
 2    -121.2890   36.6829
 3    -120.8724   36.2939
 4    -120.5605   36.0019

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2       0.0000   12.0000

Computed Total Fault Area = 0.15E+04
```

```
-----------------------------------------------------------------------------

FAULT 12

FAULT NAME:  SAN ANDREAS - 1857 Rupture


NFP    NRL   ATTENUATION CODES:
12     10      1  3

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1 34.0000  2.072 17.200  2.000  0.500

NMAX AMMAX  PMAX
 1    7.80  1.00


  dmchar ampchar dmpchar
    0.50    7.30    1.00

Slip Rate ( 34.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.300E+12
Input Fault Area    - cm**2
0.414E+14
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  7.8000  1.0000   0.22372   0.20895   0.01477


IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

FAULT SEGMENT COORDINATES
 1    -120.5605   36.0019
 2    -120.2928   35.7488
 3    -119.8632   35.3106
 4    -119.8598   35.3072
 5    -119.6673   35.1336
 6    -119.4061   34.9395
 7    -119.2103   34.8639
 8    -118.9010   34.8175
 9    -118.5075   34.7006
10    -118.5024   34.6989
11    -118.0075   34.5116
12    -117.5298   34.3106

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2       0.0000   12.0000

Computed Total Fault Area = 0.41E+04
```

```
-----------------------------------------------------------------------------

FAULT 13

FAULT NAME:  SAN ANDREAS - Parkfield Segment


NFP    NRL   ATTENUATION CODES:
 2     10      1  3

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1 34.0000  2.072  1.800  2.000  0.500

NMAX AMMAX  PMAX
 1    6.70  1.00


  dmchar ampchar dmpchar
    0.50    6.20    1.00

Slip Rate ( 34.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.300E+12
Input Fault Area    - cm**2
0.444E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.7000  1.0000   0.16549   0.09475   0.07074


IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

FAULT SEGMENT COORDINATES
 1    -120.2928   35.7488
 2    -120.5605   36.0019

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2       0.0000   12.0000

Computed Total Fault Area = 0.44E+03
```

```
-----------------------------------------------------------------------------

 FAULT 14

 FAULT NAME:  ROUND VALLEY


 NFP    NRL   ATTENUATION CODES:
  9     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.0000  2.072  2.100  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.80  1.00


   dmchar ampchar dmpchar
     0.50    6.30    1.00

 Slip Rate (  1.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.630E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.8000  1.0000   0.00615   0.00385   0.00230


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -118.6041   37.2465
  2    -118.6397   37.2839
  3    -118.6166   37.3550
  4    -118.6415   37.4047
  5    -118.6219   37.4563
  6    -118.6255   37.4937
  7    -118.6593   37.5203
  8    -118.7091   37.5399
  9    -118.7446   37.5594

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       7.5000   13.0000

 Computed Total Fault Area = 0.65E+03
```

```
-----------------------------------------------------------------------------

 FAULT 15

 FAULT NAME:  HILTON CREEK


 NFP    NRL   ATTENUATION CODES:
  5     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  2.5000  2.072  1.400  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.70  1.00


   dmchar ampchar dmpchar
     0.50    6.20    1.00

 Slip Rate (  2.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.435E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.7000  1.0000   0.01311   0.00751   0.00561


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -118.7286   37.4616
  2    -118.7535   37.4901
  3    -118.8086   37.6199
  4    -118.8566   37.6537
  5    -118.8833   37.6892

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       7.5000   13.0000

 Computed Total Fault Area = 0.44E+03
```

```
-----------------------------------------------------------------------------

 FAULT 16

 FAULT NAME:  HARTLEY SPRINGS


 NFP    NRL   ATTENUATION CODES:
  4     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  0.5000  2.072  1.200  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.60  1.00


   dmchar ampchar dmpchar
     0.50    6.10    1.00

 Slip Rate (  0.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.375E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.6000  1.0000   0.00282   0.00146   0.00137


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -118.9971   37.6394
  2    -118.9971   37.6981
  3    -119.0255   37.7568
  4    -119.0753   37.8492

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       7.5000   13.0000

 Computed Total Fault Area = 0.39E+03
```

```
-----------------------------------------------------------------------------

 FAULT 17

 FAULT NAME:  SAN ANDREAS - Cholame


 NFP    NRL   ATTENUATION CODES:
  2     10      1  3

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1 34.0000  2.072  3.100  2.000  0.500

 NMAX AMMAX  PMAX
  1    6.90  1.00


   dmchar ampchar dmpchar
     0.50    6.40    1.00

 Slip Rate ( 34.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.300E+12
 Input Fault Area    - cm**2
0.744E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.9000  1.0000   0.18355   0.12414   0.05941


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -120.2928   35.7488
  2    -119.8632   35.3106

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       0.0000   12.0000

 Computed Total Fault Area = 0.74E+03
```

```
-----------------------------------------------------------------------------

 FAULT 18

 FAULT NAME:  BIRCH CREEK


 NFP    NRL   ATTENUATION CODES:
  5     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  0.7000  2.072  0.700  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.40  1.00


   dmchar ampchar dmpchar
     0.50    5.90    1.00

 Slip Rate (  0.7000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.225E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.4000  1.0000   0.00381   0.00152   0.00229


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -118.3365   36.9762
  2    -118.3453   37.0038
  3    -118.3666   37.0363
  4    -118.4020   37.0670
  5    -118.4041   37.0988

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       7.5000   13.0000

 Computed Total Fault Area = 0.22E+03
```

```
-----------------------------------------------------------------------------

 FAULT 19

 FAULT NAME:  GREAT VALLEY 8


 NFP    NRL   ATTENUATION CODES:
  2     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.5000  2.072  2.000  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.60  1.00


   dmchar ampchar dmpchar
     0.50    6.10    1.00

 Slip Rate (  1.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.410E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.6000  1.0000   0.00925   0.00477   0.00448


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -121.1580   37.4340
  2    -120.9894   37.0923

 NDP
   3
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    6.9900
  2       0.0000    7.0000
  3       9.7000    9.6000

 Computed Total Fault Area = 0.41E+03
```

```
-----------------------------------------------------------------------------

 FAULT 20

 FAULT NAME:  INDEPENDENCE


 NFP    NRL   ATTENUATION CODES:
  6     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  0.2000  2.072  2.400  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.90  1.00


   dmchar ampchar dmpchar
     0.50    6.40    1.00

 Slip Rate (  0.2000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.735E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.9000  1.0000   0.00117   0.00079   0.00038


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -118.0921   36.5016
  2    -118.1437   36.5354
  3    -118.2023   36.5976
  4    -118.3019   36.7754
  5    -118.3197   36.8305
  6    -118.3037   36.8820

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       7.5000   13.0000

 Computed Total Fault Area = 0.66E+03
```

```
-----------------------------------------------------------------------------

FAULT 21

FAULT NAME:  SAN JUAN


NFP    NRL   ATTENUATION CODES:
 5     10      1  3

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1  1.0000  2.072  3.400  2.000  1.000

NMAX AMMAX  PMAX
 1    7.00  1.00


  dmchar ampchar dmpchar
    0.50    6.50    1.00

Slip Rate (  1.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area    - cm**2
0.884E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  7.0000  1.0000   0.00582   0.00420   0.00162


IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

FAULT SEGMENT COORDINATES
 1    -120.2954   35.6797
 2    -120.2292   35.5019
 3    -120.1249   35.3045
 4    -120.0820   35.2825
 5    -119.9607   35.1476

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2       0.0000   13.0000

Computed Total Fault Area = 0.88E+03
```

```
-----------------------------------------------------------------------------

 FAULT 22

 FAULT NAME:  CALAVERAS (So.of Calaveras Res)


 NFP    NRL   ATTENUATION CODES:
  6     10      1  3

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1 15.0000  2.072  5.300  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.20  1.00


   dmchar ampchar dmpchar
     0.50    5.70    1.00

 Slip Rate ( 15.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.530E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.2000  1.0000   0.32192   0.09146   0.23046


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -121.1798   36.6241
  2    -121.3974   36.8267
  3    -121.4998   37.0444
  4    -121.6577   37.2364
  5    -121.7046   37.3387
  6    -121.7921   37.4348

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       0.0000    5.0000

 Computed Total Fault Area = 0.53E+03
```

```
-----------------------------------------------------------------------------

FAULT 23

FAULT NAME:  OWENS VALLEY


NFP    NRL   ATTENUATION CODES:
 5     10      1  3

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1  1.5000  2.072  6.000  2.000  1.000

NMAX AMMAX  PMAX
 1    7.60  1.00


  dmchar ampchar dmpchar
    0.50    7.10    1.00

Slip Rate (  1.5000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area    - cm**2
0.157E+14
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  7.6000  1.0000   0.00559   0.00505   0.00054


IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

FAULT SEGMENT COORDINATES
 1    -117.9854   36.1904
 2    -118.0139   36.2971
 3    -118.0121   36.4873
 4    -118.1988   36.9354
 5    -118.3286   37.2358

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2       0.0000   13.0000

Computed Total Fault Area = 0.16E+04
```

```
-----------------------------------------------------------------------------

 FAULT 24

 FAULT NAME:  QUIEN SABE


 NFP    NRL   ATTENUATION CODES:
  2     10      1  3

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.0000  2.072  1.100  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.40  1.00


   dmchar ampchar dmpchar
     0.50    5.90    1.00

 Slip Rate (  1.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.230E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.4000  1.0000   0.00556   0.00222   0.00334


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -121.2139   36.7590
  2    -121.3644   36.9256

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       0.0000   10.0000

 Computed Total Fault Area = 0.23E+03
```

```
-----------------------------------------------------------------------------

 FAULT 25

 FAULT NAME:  FISH SLOUGH


 NFP    NRL   ATTENUATION CODES:
  6     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  0.2000  2.072  1.300  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.60  1.00


   dmchar ampchar dmpchar
     0.50    6.10    1.00

 Slip Rate (  0.2000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.390E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.6000  1.0000   0.00117   0.00061   0.00057


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -118.4121   37.5897
  2    -118.4192   37.5701
  3    -118.3961   37.5345
  4    -118.3872   37.4759
  5    -118.3961   37.4101
  6    -118.3961   37.3603

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       7.5000   13.0000

 Computed Total Fault Area = 0.41E+03
```

```
-----------------------------------------------------------------------------

 FAULT 26

 FAULT NAME:  WHITE MOUNTAINS


 NFP    NRL   ATTENUATION CODES:
  7     10      1  3

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.0000  2.072  5.250  2.000  1.000

 NMAX AMMAX  PMAX
  1    7.10  1.00


   dmchar ampchar dmpchar
     0.50    6.60    1.00

 Slip Rate (  1.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.136E+14
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  7.1000  1.0000   0.00744   0.00568   0.00176


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -118.1739   37.0456
  2    -118.1846   37.0634
  3    -118.2770   37.3105
  4    -118.4032   37.7710
  5    -118.4299   37.8261
  6    -118.4121   37.8812
  7    -118.3428   37.9417

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       0.0000   13.0000

 Computed Total Fault Area = 0.14E+04
```

```
-----------------------------------------------------------------------------

 FAULT 27

 FAULT NAME:  MONO LAKE


 NFP    NRL   ATTENUATION CODES:
  5     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  2.5000  2.072  1.300  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.60  1.00


   dmchar ampchar dmpchar
     0.50    6.10    1.00

 Slip Rate (  2.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.390E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.6000  1.0000   0.01467   0.00757   0.00710


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -119.1037   37.9346
  2    -119.1731   38.0270
  3    -119.1820   38.0626
  4    -119.1802   38.1017
  5    -119.1891   38.1497

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       7.5000   13.0000

 Computed Total Fault Area = 0.36E+03
```

```
--------------------------------------------------------------------------------

 FAULT 28

 FAULT NAME:  RINCONADA


 NFP    NRL   ATTENUATION CODES:
  4     10      1  3

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.0000  2.072  9.400  2.000  1.000

 NMAX AMMAX  PMAX
  1    7.30  1.00


   dmchar ampchar dmpchar
     0.50    6.80    1.00

 Slip Rate (  1.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.189E+14
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  7.3000  1.0000   0.00729   0.00606   0.00123


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -120.5096   35.3071
  2    -120.7024   35.6109
  3    -121.4629   36.4520
  4    -121.7565   36.6752

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       0.0000   10.0000

 Computed Total Fault Area = 0.19E+04
```

```
-----------------------------------------------------------------------------

 FAULT 29

 FAULT NAME:  GREAT VALLEY 7


 NFP    NRL   ATTENUATION CODES:
  2     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  1.5000  2.072  2.200  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.70  1.00


   dmchar ampchar dmpchar
     0.50    6.20    1.00

 Slip Rate (  1.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.450E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.7000  1.0000   0.00814   0.00466   0.00348


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -121.5241   37.7344
  2    -121.1614   37.4544

 NDP
   3
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    6.9900
  2       0.0000    7.0000
  3       9.7000    9.6000

 Computed Total Fault Area = 0.45E+03
```

```
-----------------------------------------------------------------------------

 FAULT 30

 FAULT NAME:  DEEP SPRINGS


 NFP    NRL   ATTENUATION CODES:
  5     10      2  4

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  0.8000  2.072  1.200  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.60  1.00


   dmchar ampchar dmpchar
     0.50    6.10    1.00

 Slip Rate (  0.8000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.375E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.6000  1.0000   0.00451   0.00233   0.00218


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -117.9285   37.4225
  2    -117.9517   37.4047
  3    -117.9890   37.3407
  4    -118.0192   37.2696
  5    -118.0583   37.2305

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       7.5000   13.0000

 Computed Total Fault Area = 0.38E+03
```

```
-----------------------------------------------------------------------------

 FAULT 31

 FAULT NAME:  SARGENT


 NFP    NRL   ATTENUATION CODES:
  3     10      1  3

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  3.0000  2.072  2.600  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.80  1.00


   dmchar ampchar dmpchar
     0.50    6.30    1.00

 Slip Rate (  3.0000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.636E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.8000  1.0000   0.01863   0.01167   0.00696


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -121.4486   36.8701
  2    -121.7909   37.0887
  3    -121.9414   37.1388

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       0.0000   12.0000

 Computed Total Fault Area = 0.64E+03
```

```
-----------------------------------------------------------------------------

 FAULT 32

 FAULT NAME:  HUNTER MTN. - SALINE VALLEY


 NFP    NRL   ATTENUATION CODES:
  6     10      1  3

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  2.5000  2.072  3.500  2.000  1.000

 NMAX AMMAX  PMAX
  1    7.00  1.00


   dmchar ampchar dmpchar
     0.50    6.50    1.00

 Slip Rate (  2.5000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.923E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  7.0000  1.0000   0.01519   0.01097   0.00422


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -117.4414   36.4767
  2    -117.6121   36.5763
  3    -117.6619   36.6189
  4    -117.8148   36.6722
  5    -117.8752   36.7540
  6    -117.9517   36.9247

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       0.0000   13.0000

 Computed Total Fault Area = 0.92E+03
```

```
-----------------------------------------------------------------------------

 FAULT 33

 FAULT NAME:  ZAYANTE-VERGELES


 NFP    NRL   ATTENUATION CODES:
  4     10      1  3

 AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
 5.000   0.1000      1  0.1000  2.072  2.800  2.000  1.000

 NMAX AMMAX  PMAX
  1    6.80  1.00


   dmchar ampchar dmpchar
     0.50    6.30    1.00

 Slip Rate (  0.1000 mm/yr) Converted to Activity Rate:
 Input Shear Modulus - dyne/cm**2
0.330E+12
 Input Fault Area    - cm**2
0.672E+13
 LOG10[Mo(m)]        = (1.50)m + (16.05)
   IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
      1  6.8000  1.0000   0.00066   0.00041   0.00025


 IND_RL
      2

 RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

 FAULT SEGMENT COORDINATES
  1    -121.4638   36.7927
  2    -121.6096   36.8129
  3    -121.7419   36.9378
  4    -121.9734   37.0887

 NDP
   2
 ORIGINAL FAULT CROSS SECTION
  1       0.0000    0.0000
  2       0.0000   12.0000

 Computed Total Fault Area = 0.70E+03
```

```
-----------------------------------------------------------------------------

FAULT 34

FAULT NAME:  SAN ANDREAS - Carrizo


NFP    NRL   ATTENUATION CODES:
 6     10      1  3

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000   0.1000      1 34.0000  2.072  7.200  2.000  0.500

NMAX AMMAX  PMAX
 1    7.20  1.00


  dmchar ampchar dmpchar
    0.50    6.70    1.00

Slip Rate ( 34.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.300E+12
Input Fault Area    - cm**2
0.174E+14
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  7.2000  1.0000   0.24626   0.19696   0.04930


IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490     0.910
0.240

FAULT SEGMENT COORDINATES
 1    -119.8598   35.3072
 2    -119.6673   35.1336
 3    -119.4061   34.9395
 4    -119.2103   34.8639
 5    -118.9010   34.8175
 6    -118.5075   34.7006

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1       0.0000    0.0000
 2       0.0000   12.0000

Computed Total Fault Area = 0.17E+04
```

---

SITE 1 COORDINATES: -119.6996  36.7307

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| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AMPLITUDES (g): | | 0.1000E-01 | 0.4000E-01 | 0.7000E-01 | 0.1000E+00 | 0.1300E+00 | 0.1600E+00 | 0.1900E+00 | 0.2200E+00 | 0.2500E+00 | 0.2800E+00 |
| LN (AMPLITUDE): | | -4.61 | -3.22 | -2.66 | -2.30 | -2.04 | -1.83 | -1.66 | -1.51 | -1.39 | -1.27 |
| FAULT 1 | E(NO/YR) | 0.1799E-03 | 0.1676E-03 | 0.1276E-03 | 0.8662E-04 | 0.5613E-04 | 0.3578E-04 | 0.2277E-04 | 0.1457E-04 | 0.9406E-05 | 0.6137E-05 |
| FAULT 2 | E(NO/YR) | 0.6039E-03 | 0.2366E-03 | 0.8279E-04 | 0.3164E-04 | 0.1306E-04 | 0.5750E-05 | 0.2677E-05 | 0.1308E-05 | 0.6661E-06 | 0.3519E-06 |
| FAULT 3 | E(NO/YR) | 0.3593E-02 | 0.8851E-03 | 0.2556E-03 | 0.8817E-04 | 0.3414E-04 | 0.1437E-04 | 0.6468E-05 | 0.3073E-05 | 0.1529E-05 | 0.7916E-06 |
| FAULT 4 | E(NO/YR) | 0.7922E-02 | 0.5562E-02 | 0.2559E-02 | 0.1076E-02 | 0.4566E-03 | 0.2008E-03 | 0.9209E-04 | 0.4400E-04 | 0.2184E-04 | 0.1122E-04 |
| FAULT 5 | E(NO/YR) | 0.9040E-02 | 0.6166E-02 | 0.2831E-02 | 0.1205E-02 | 0.5188E-03 | 0.2316E-03 | 0.1076E-03 | 0.5206E-04 | 0.2613E-04 | 0.1357E-04 |
| FAULT 6 | E(NO/YR) | 0.8515E-02 | 0.5890E-02 | 0.2807E-02 | 0.1244E-02 | 0.5563E-03 | 0.2566E-03 | 0.1227E-03 | 0.6089E-04 | 0.3126E-04 | 0.1657E-04 |
| FAULT 7 | E(NO/YR) | 0.8675E-02 | 0.5710E-02 | 0.2497E-02 | 0.1019E-02 | 0.4239E-03 | 0.1837E-03 | 0.8319E-04 | 0.3934E-04 | 0.1935E-04 | 0.9867E-05 |
| FAULT 8 | E(NO/YR) | 0.7942E-02 | 0.4852E-02 | 0.1950E-02 | 0.7435E-03 | 0.2925E-03 | 0.1210E-03 | 0.5268E-04 | 0.2406E-04 | 0.1148E-04 | 0.5695E-05 |
| FAULT 9 | E(NO/YR) | 0.8722E-02 | 0.4662E-02 | 0.1770E-02 | 0.6636E-03 | 0.2598E-03 | 0.1074E-03 | 0.4679E-04 | 0.2141E-04 | 0.1024E-04 | 0.5091E-05 |
| FAULT 10 | E(NO/YR) | 0.5548E-02 | 0.1840E-02 | 0.5407E-03 | 0.1721E-03 | 0.5960E-04 | 0.2230E-04 | 0.8940E-05 | 0.3806E-05 | 0.1708E-05 | 0.8022E-06 |
| FAULT 11 | E(NO/YR) | 0.9351E+00 | 0.3043E+00 | 0.7190E-01 | 0.1851E-01 | 0.5355E-02 | 0.1723E-02 | 0.6072E-03 | 0.2310E-03 | 0.9386E-04 | 0.4034E-04 |
| FAULT 12 | E(NO/YR) | 0.9169E-01 | 0.1563E-01 | 0.4909E-02 | 0.2025E-02 | 0.9179E-03 | 0.4389E-03 | 0.2190E-03 | 0.1133E-03 | 0.6061E-04 | 0.3339E-04 |
| FAULT 13 | E(NO/YR) | 0.8046E-01 | 0.2943E-01 | 0.8166E-02 | 0.2406E-02 | 0.7766E-03 | 0.2734E-03 | 0.1039E-03 | 0.4218E-04 | 0.1814E-04 | 0.8200E-05 |
| FAULT 14 | E(NO/YR) | 0.6049E-02 | 0.2721E-02 | 0.9467E-03 | 0.3400E-03 | 0.1296E-03 | 0.5248E-04 | 0.2251E-04 | 0.1016E-04 | 0.4799E-05 | 0.2361E-05 |
| FAULT 15 | E(NO/YR) | 0.1290E-01 | 0.5756E-02 | 0.1900E-02 | 0.6424E-03 | 0.2318E-03 | 0.8956E-04 | 0.3684E-04 | 0.1603E-04 | 0.7328E-05 | 0.3500E-05 |
| FAULT 16 | E(NO/YR) | 0.2775E-02 | 0.1220E-02 | 0.3821E-03 | 0.1224E-03 | 0.4215E-04 | 0.1564E-04 | 0.6215E-05 | 0.2623E-05 | 0.1167E-05 | 0.5441E-06 |
| FAULT 17 | E(NO/YR) | 0.8702E-01 | 0.2593E-01 | 0.6956E-02 | 0.2053E-02 | 0.6677E-03 | 0.2370E-03 | 0.9080E-04 | 0.3715E-04 | 0.1609E-04 | 0.7323E-05 |
| FAULT 18 | E(NO/YR) | 0.3754E-02 | 0.1637E-02 | 0.4685E-03 | 0.1371E-03 | 0.4367E-04 | 0.1516E-04 | 0.5685E-05 | 0.2281E-05 | 0.9704E-06 | 0.4344E-06 |
| FAULT 19 | E(NO/YR) | 0.9066E-02 | 0.3770E-02 | 0.1137E-02 | 0.3544E-03 | 0.1194E-03 | 0.4355E-04 | 0.1705E-04 | 0.7105E-05 | 0.3127E-05 | 0.1443E-05 |
| FAULT 20 | E(NO/YR) | 0.1148E-02 | 0.4747E-03 | 0.1606E-03 | 0.5724E-04 | 0.2175E-04 | 0.8798E-05 | 0.3769E-05 | 0.1700E-05 | 0.8023E-06 | 0.3944E-06 |
| FAULT 21 | E(NO/YR) | 0.5401E-02 | 0.1402E-02 | 0.3645E-03 | 0.1064E-03 | 0.3440E-04 | 0.1217E-04 | 0.4648E-05 | 0.1898E-05 | 0.8208E-06 | 0.3731E-06 |
| FAULT 22 | E(NO/YR) | 0.3012E+00 | 0.5580E-01 | 0.8104E-02 | 0.1455E-02 | 0.3181E-03 | 0.8149E-04 | 0.2369E-04 | 0.7640E-05 | 0.2684E-05 | 0.1014E-05 |
| FAULT 23 | E(NO/YR) | 0.5175E-02 | 0.1156E-02 | 0.3361E-03 | 0.1232E-03 | 0.4979E-04 | 0.2145E-04 | 0.9734E-05 | 0.4625E-05 | 0.2288E-05 | 0.1174E-05 |
| FAULT 24 | E(NO/YR) | 0.5319E-02 | 0.1387E-02 | 0.2631E-03 | 0.5698E-04 | 0.1435E-04 | 0.4112E-05 | 0.1312E-05 | 0.4577E-06 | 0.1722E-06 | 0.6907E-07 |
| FAULT 25 | E(NO/YR) | 0.1149E-02 | 0.4633E-03 | 0.1345E-03 | 0.4061E-04 | 0.1333E-04 | 0.4755E-05 | 0.1827E-05 | 0.7487E-06 | 0.3247E-06 | 0.1479E-06 |
| FAULT 26 | E(NO/YR) | 0.6889E-02 | 0.1714E-02 | 0.4464E-03 | 0.1322E-03 | 0.4331E-04 | 0.1550E-04 | 0.5977E-05 | 0.2461E-05 | 0.1071E-05 | 0.4899E-06 |
| FAULT 27 | E(NO/YR) | 0.1425E-01 | 0.5064E-02 | 0.1326E-02 | 0.3698E-03 | 0.1139E-03 | 0.3856E-04 | 0.1416E-04 | 0.5584E-05 | 0.2339E-05 | 0.1033E-05 |
| FAULT 28 | E(NO/YR) | 0.6668E-02 | 0.1510E-02 | 0.4108E-03 | 0.1305E-03 | 0.4563E-04 | 0.1725E-04 | 0.6981E-05 | 0.2995E-05 | 0.1353E-05 | 0.6394E-06 |
| FAULT 29 | E(NO/YR) | 0.7781E-02 | 0.2413E-02 | 0.6033E-03 | 0.1646E-03 | 0.4998E-04 | 0.1674E-04 | 0.6097E-05 | 0.2387E-05 | 0.9945E-06 | 0.4371E-06 |
| FAULT 30 | E(NO/YR) | 0.4359E-02 | 0.1433E-02 | 0.3520E-03 | 0.9355E-04 | 0.2774E-04 | 0.9099E-05 | 0.3255E-05 | 0.1254E-05 | 0.5147E-06 | 0.2232E-06 |
| FAULT 31 | E(NO/YR) | 0.1687E-01 | 0.3525E-02 | 0.6949E-03 | 0.1596E-03 | 0.4240E-04 | 0.1272E-04 | 0.4227E-05 | 0.1528E-05 | 0.5932E-06 | 0.2448E-06 |
| FAULT 32 | E(NO/YR) | 0.1369E-01 | 0.2931E-02 | 0.6575E-03 | 0.1699E-03 | 0.4966E-04 | 0.1614E-04 | 0.5734E-05 | 0.2197E-05 | 0.8980E-06 | 0.3880E-06 |
| FAULT 33 | E(NO/YR) | 0.5921E-03 | 0.1208E-03 | 0.2341E-04 | 0.5309E-05 | 0.1396E-05 | 0.4157E-06 | 0.1372E-06 | 0.4931E-07 | 0.1905E-07 | 0.7829E-08 |
| FAULT 34 | E(NO/YR) | 0.1044E+00 | 0.1790E-01 | 0.4021E-02 | 0.1069E-02 | 0.3220E-03 | 0.1076E-03 | 0.3923E-04 | 0.1539E-04 | 0.6426E-05 | 0.2833E-05 |
| TOTAL | E(NO/YR) | 0.1784E+01 | 0.5237E+00 | 0.1301E+00 | 0.3705E-01 | 0.1210E-01 | 0.4435E-02 | 0.1786E-02 | 0.7773E-03 | 0.3610E-03 | 0.1771E-03 |
| TOTAL RISK | | 0.8321E+00 | 0.4077E+00 | 0.1220E+00 | 0.3637E-01 | 0.1203E-01 | 0.4425E-02 | 0.1784E-02 | 0.7770E-03 | 0.3609E-03 | 0.1771E-03 |

| | | | | | |
|---|---|---|---|---|---|
| AMPLITUDES (g): | 0.3100E+00 | 0.3400E+00 | 0.3700E+00 | 0.4000E+00 | 0.4300E+00 |
| LN (AMPLITUDE): | -1.17 | -1.08 | -0.99 | -0.92 | -0.84 |
| FAULT 1 E(NO/YR) | 0.4050E-05 | 0.2703E-05 | 0.1825E-05 | 0.1246E-05 | 0.8591E-06 |
| FAULT 2 E(NO/YR) | 0.1921E-06 | 0.1079E-06 | 0.6218E-07 | 0.3669E-07 | 0.2211E-07 |
| FAULT 3 E(NO/YR) | 0.4242E-06 | 0.2344E-06 | 0.1331E-06 | 0.7744E-07 | 0.4606E-07 |
| FAULT 4 E(NO/YR) | 0.5953E-05 | 0.3250E-05 | 0.1821E-05 | 0.1045E-05 | 0.6130E-06 |
| FAULT 5 E(NO/YR) | 0.7269E-05 | 0.4004E-05 | 0.2263E-05 | 0.1309E-05 | 0.7732E-06 |
| FAULT 6 E(NO/YR) | 0.9041E-05 | 0.5066E-05 | 0.2907E-05 | 0.1706E-05 | 0.1022E-05 |
| FAULT 7 E(NO/YR) | 0.5198E-05 | 0.2820E-05 | 0.1571E-05 | 0.8967E-06 | 0.5233E-06 |
| FAULT 8 E(NO/YR) | 0.2926E-05 | 0.1552E-05 | 0.8466E-06 | 0.4740E-06 | 0.2717E-06 |
| FAULT 9 E(NO/YR) | 0.2622E-05 | 0.1394E-05 | 0.7621E-06 | 0.4276E-06 | 0.2456E-06 |
| FAULT 10 E(NO/YR) | 0.3925E-06 | 0.1991E-06 | 0.1043E-06 | 0.5623E-07 | 0.3112E-07 |
| FAULT 11 E(NO/YR) | 0.1821E-04 | 0.8585E-05 | 0.4204E-05 | 0.2130E-05 | 0.1112E-05 |
| FAULT 12 E(NO/YR) | 0.1890E-04 | 0.1096E-04 | 0.6499E-05 | 0.3933E-05 | 0.2425E-05 |
| FAULT 13 E(NO/YR) | 0.3874E-05 | 0.1903E-05 | 0.9675E-06 | 0.5074E-06 | 0.2737E-06 |
| FAULT 14 E(NO/YR) | 0.1204E-05 | 0.6346E-06 | 0.3443E-06 | 0.1917E-06 | 0.1094E-06 |
| FAULT 15 E(NO/YR) | 0.1738E-05 | 0.8930E-06 | 0.4734E-06 | 0.2581E-06 | 0.1443E-06 |
| FAULT 16 E(NO/YR) | 0.2643E-06 | 0.1331E-06 | 0.6928E-07 | 0.3713E-07 | 0.2043E-07 |
| FAULT 17 E(NO/YR) | 0.3481E-05 | 0.1720E-05 | 0.8791E-06 | 0.4634E-06 | 0.2512E-06 |
| FAULT 18 E(NO/YR) | 0.2034E-06 | 0.9907E-07 | 0.4999E-07 | 0.2603E-07 | 0.1395E-07 |
| FAULT 19 E(NO/YR) | 0.6948E-06 | 0.3472E-06 | 0.1794E-06 | 0.9550E-07 | 0.5223E-07 |
| FAULT 20 E(NO/YR) | 0.2010E-06 | 0.1058E-06 | 0.5736E-07 | 0.3192E-07 | 0.1820E-07 |
| FAULT 21 E(NO/YR) | 0.1772E-06 | 0.8746E-07 | 0.4468E-07 | 0.2354E-07 | 0.1275E-07 |
| FAULT 22 E(NO/YR) | 0.4072E-06 | 0.1726E-06 | 0.7665E-07 | 0.3548E-07 | 0.1703E-07 |
| FAULT 23 E(NO/YR) | 0.6218E-06 | 0.3392E-06 | 0.1900E-06 | 0.1090E-06 | 0.6391E-07 |
| FAULT 24 E(NO/YR) | 0.2928E-07 | 0.1303E-07 | 0.6051E-08 | 0.2918E-08 | 0.1455E-08 |
| FAULT 25 E(NO/YR) | 0.7033E-07 | 0.3475E-07 | 0.1777E-07 | 0.9369E-08 | 0.5078E-08 |
| FAULT 26 E(NO/YR) | 0.2339E-06 | 0.1160E-06 | 0.5950E-07 | 0.3147E-07 | 0.1710E-07 |
| FAULT 27 E(NO/YR) | 0.4779E-06 | 0.2302E-06 | 0.1150E-06 | 0.5933E-07 | 0.3151E-07 |
| FAULT 28 E(NO/YR) | 0.3144E-06 | 0.1602E-06 | 0.8425E-07 | 0.4559E-07 | 0.2531E-07 |
| FAULT 29 E(NO/YR) | 0.2013E-06 | 0.9660E-07 | 0.4809E-07 | 0.2473E-07 | 0.1310E-07 |
| FAULT 30 E(NO/YR) | 0.1016E-06 | 0.4820E-07 | 0.2374E-07 | 0.1209E-07 | 0.6348E-08 |
| FAULT 31 E(NO/YR) | 0.1065E-06 | 0.4855E-07 | 0.2305E-07 | 0.1134E-07 | 0.5766E-08 |
| FAULT 32 E(NO/YR) | 0.1759E-06 | 0.8325E-07 | 0.4090E-07 | 0.2078E-07 | 0.1088E-07 |
| FAULT 33 E(NO/YR) | 0.3394E-08 | 0.1541E-08 | 0.7292E-09 | 0.3578E-09 | 0.1814E-09 |
| FAULT 34 E(NO/YR) | 0.1309E-05 | 0.6301E-06 | 0.3147E-06 | 0.1624E-06 | 0.8628E-07 |
| TOTAL E(NO/YR) | 0.9107E-04 | 0.4877E-04 | 0.2706E-04 | 0.1550E-04 | 0.9124E-05 |
| TOTAL RISK | 0.9107E-04 | 0.4877E-04 | 0.2706E-04 | 0.1550E-04 | 0.9124E-05 |

| | | | | | |
|---|---|---|---|---|---|
| SPECIFIED RISKS: | 0.013900 | 0.010000 | 0.005000 | 0.002105 | 0.001000 |
| ESTIMATED LN AMP. : | -2.074 | -2.002 | -1.858 | -1.692 | -1.559 |
| ESTIMATED AMP. (g): | 0.12562 | 0.13509 | 0.15600 | 0.18415 | 0.21043 |

| | | | | | |
|---|---|---|---|---|---|
| AMPLITUDES (g): | 0.3100E+00 | 0.3400E+00 | 0.3700E+00 | 0.4000E+00 | 0.4300E+00 |
| LN (AMPLITUDE): | -1.17 | -1.08 | -0.99 | -0.92 | -0.84 |
| FAULT 1 E(NO/YR) | 0.3353E-06 | 0.1936E-06 | 0.1142E-06 | 0.6877E-07 | 0.4219E-07 |
| FAULT 2 E(NO/YR) | 0.9016E-08 | 0.4478E-08 | 0.2305E-08 | 0.1224E-08 | 0.6688E-09 |
| FAULT 3 E(NO/YR) | 0.5269E-07 | 0.2690E-07 | 0.1419E-07 | 0.7713E-08 | 0.4305E-08 |
| FAULT 4 E(NO/YR) | 0.4627E-06 | 0.2276E-06 | 0.1159E-06 | 0.6090E-07 | 0.3290E-07 |
| FAULT 5 E(NO/YR) | 0.7287E-06 | 0.3653E-06 | 0.1893E-06 | 0.1010E-06 | 0.5542E-07 |
| FAULT 6 E(NO/YR) | 0.1165E-05 | 0.5990E-06 | 0.3178E-06 | 0.1734E-06 | 0.9705E-07 |
| FAULT 7 E(NO/YR) | 0.4927E-06 | 0.2431E-06 | 0.1241E-06 | 0.6539E-07 | 0.3541E-07 |
| FAULT 8 E(NO/YR) | 0.2574E-06 | 0.1241E-06 | 0.6208E-07 | 0.3206E-07 | 0.1705E-07 |
| FAULT 9 E(NO/YR) | 0.3614E-06 | 0.1779E-06 | 0.9070E-07 | 0.4769E-07 | 0.2579E-07 |
| FAULT 10 E(NO/YR) | 0.9157E-07 | 0.4412E-07 | 0.2205E-07 | 0.1139E-07 | 0.6053E-08 |
| FAULT 11 E(NO/YR) | 0.1405E-05 | 0.6074E-06 | 0.2748E-06 | 0.1294E-06 | 0.6316E-07 |
| FAULT 12 E(NO/YR) | 0.2203E-04 | 0.1299E-04 | 0.7825E-05 | 0.4804E-05 | 0.3002E-05 |
| FAULT 13 E(NO/YR) | 0.5371E-06 | 0.2462E-06 | 0.1175E-06 | 0.5813E-07 | 0.2970E-07 |
| FAULT 14 E(NO/YR) | 0.2446E-06 | 0.1214E-06 | 0.6236E-07 | 0.3302E-07 | 0.1797E-07 |
| FAULT 15 E(NO/YR) | 0.2695E-06 | 0.1293E-06 | 0.6437E-07 | 0.3311E-07 | 0.1754E-07 |
| FAULT 16 E(NO/YR) | 0.3129E-07 | 0.1459E-07 | 0.7074E-08 | 0.3551E-08 | 0.1838E-08 |
| FAULT 17 E(NO/YR) | 0.7711E-06 | 0.3618E-06 | 0.1764E-06 | 0.8903E-07 | 0.4634E-07 |
| FAULT 18 E(NO/YR) | 0.1346E-07 | 0.5956E-08 | 0.2752E-08 | 0.1321E-08 | 0.6564E-09 |
| FAULT 19 E(NO/YR) | 0.8103E-07 | 0.3749E-07 | 0.1804E-07 | 0.8997E-08 | 0.4630E-08 |
| FAULT 20 E(NO/YR) | 0.4950E-07 | 0.2475E-07 | 0.1280E-07 | 0.6817E-08 | 0.3730E-08 |
| FAULT 21 E(NO/YR) | 0.4873E-07 | 0.2304E-07 | 0.1131E-07 | 0.5748E-08 | 0.3010E-08 |
| FAULT 22 E(NO/YR) | 0.9494E-08 | 0.3573E-08 | 0.1407E-08 | 0.5658E-09 | 0.2262E-09 |
| FAULT 23 E(NO/YR) | 0.5371E-06 | 0.2939E-06 | 0.1651E-06 | 0.9499E-07 | 0.5584E-07 |
| FAULT 24 E(NO/YR) | 0.1444E-08 | 0.5834E-09 | 0.2479E-09 | 0.1102E-09 | 0.5072E-10 |
| FAULT 25 E(NO/YR) | 0.7906E-08 | 0.3616E-08 | 0.1722E-08 | 0.8501E-09 | 0.4335E-09 |
| FAULT 26 E(NO/YR) | 0.7879E-07 | 0.3772E-07 | 0.1873E-07 | 0.9616E-08 | 0.5084E-08 |
| FAULT 27 E(NO/YR) | 0.5012E-07 | 0.2234E-07 | 0.1039E-07 | 0.5018E-08 | 0.2507E-08 |
| FAULT 28 E(NO/YR) | 0.1597E-06 | 0.7979E-07 | 0.4121E-07 | 0.2193E-07 | 0.1199E-07 |
| FAULT 29 E(NO/YR) | 0.2678E-07 | 0.1200E-07 | 0.5608E-08 | 0.2722E-08 | 0.1366E-08 |
| FAULT 30 E(NO/YR) | 0.1023E-07 | 0.4491E-08 | 0.2060E-08 | 0.9823E-09 | 0.4849E-09 |
| FAULT 31 E(NO/YR) | 0.1609E-07 | 0.6905E-08 | 0.3102E-08 | 0.1451E-08 | 0.7035E-09 |
| FAULT 32 E(NO/YR) | 0.4506E-07 | 0.2041E-07 | 0.9636E-08 | 0.4719E-08 | 0.2388E-08 |
| FAULT 33 E(NO/YR) | 0.5090E-09 | 0.2177E-09 | 0.9747E-10 | 0.4546E-10 | 0.2198E-10 |
| FAULT 34 E(NO/YR) | 0.5333E-06 | 0.2500E-06 | 0.1219E-06 | 0.6148E-07 | 0.3199E-07 |
| TOTAL E(NO/YR) | 0.3092E-04 | 0.1731E-04 | 0.1001E-04 | 0.5947E-05 | 0.3621E-05 |
| TOTAL RISK | 0.3092E-04 | 0.1731E-04 | 0.1001E-04 | 0.5947E-05 | 0.3621E-05 |

| | | | | | |
|---|---|---|---|---|---|
| SPECIFIED RISKS: | 0.013900 | 0.010000 | 0.005000 | 0.002105 | 0.001000 |
| ESTIMATED LN AMP. : | -2.360 | -2.279 | -2.124 | -1.940 | -1.791 |
| ESTIMATED AMP. (g): | 0.09444 | 0.10243 | 0.11954 | 0.14365 | 0.16684 |

CLOSEST DISTANCES BETWEEN SITE AND FAULT RUPTURES

| NO. | FAULT NAME | CD_1DRP | CD_2DRP | CDIST | CLODIS | CD_EPI | CD_HYPO |
|---|---|---|---|---|---|---|---|
| 1 | CLOVIS | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 km |
| 2 | MONSON | 42.0 | 42.0 | 42.0 | 42.0 | 42.3 | 42.3 km |
| 3 | FOOTHILLS FAULT SYSTEM | 68.1 | 68.1 | 68.1 | 68.1 | 69.3 | 69.3 km |
| 4 | GREAT VALLEY 12 | 71.3 | 71.3 | 71.7 | 71.7 | 72.4 | 72.7 km |
| 5 | GREAT VALLEY 11 | 71.6 | 71.6 | 72.0 | 72.0 | 73.0 | 73.4 km |
| 6 | GREAT VALLEY 13 | 73.3 | 73.3 | 73.6 | 73.6 | 74.3 | 74.7 km |
| 7 | GREAT VALLEY 14 | 77.6 | 77.6 | 77.9 | 77.9 | 78.8 | 79.2 km |
| 8 | GREAT VALLEY 10 | 85.0 | 85.0 | 85.3 | 85.3 | 86.4 | 86.7 km |
| 9 | GREAT VALLEY 9 | 93.9 | 93.9 | 94.2 | 94.2 | 95.4 | 95.7 km |
| 10 | ORTIGALITA | 107.7 | 107.7 | 107.7 | 107.7 | 108.3 | 108.3 km |
| 11 | SAN ANDREAS (Creeping) | 111.0 | 111.0 | 111.0 | 111.0 | 111.0 | 111.0 km |
| 12 | SAN ANDREAS - 1857 Rupture | 111.6 | 111.6 | 111.6 | 111.6 | 111.7 | 111.7 km |
| 13 | SAN ANDREAS - Parkfield Segment | 111.6 | 111.6 | 111.6 | 111.6 | 111.7 | 111.7 km |
| 14 | ROUND VALLEY | 112.7 | 112.7 | 112.7 | 112.7 | 113.4 | 113.4 km |
| 15 | HILTON CREEK | 118.7 | 118.7 | 118.7 | 118.7 | 119.4 | 119.4 km |
| 16 | HARTLEY SPRINGS | 118.9 | 118.9 | 118.9 | 118.9 | 120.1 | 120.1 km |
| 17 | SAN ANDREAS - Cholame | 121.3 | 121.3 | 121.3 | 121.3 | 121.8 | 121.8 km |
| 18 | BIRCH CREEK | 121.5 | 121.5 | 121.5 | 121.5 | 122.2 | 122.2 km |
| 19 | GREAT VALLEY 8 | 121.8 | 121.8 | 122.0 | 122.0 | 123.3 | 123.5 km |
| 20 | INDEPENDENCE | 123.5 | 123.5 | 123.5 | 123.5 | 124.1 | 124.1 km |
| 21 | SAN JUAN | 128.4 | 128.4 | 128.4 | 128.4 | 129.2 | 129.2 km |
| 22 | CALAVERAS (So.of Calaveras Res) | 132.4 | 132.4 | 132.4 | 132.4 | 133.1 | 133.1 km |
| 23 | OWENS VALLEY | 133.8 | 133.8 | 133.8 | 133.8 | 133.8 | 133.8 km |
| 24 | QUIEN SABE | 135.0 | 135.0 | 135.0 | 135.0 | 135.6 | 135.7 km |
| 25 | FISH SLOUGH | 135.6 | 129.3 | 129.9 | 129.9 | 130.3 | 130.9 km |
| 26 | WHITE MOUNTAINS | 140.0 | 140.0 | 140.0 | 140.0 | 140.0 | 140.0 km |
| 27 | MONO LAKE | 144.0 | 144.0 | 144.0 | 144.0 | 145.1 | 145.1 km |
| 28 | RINCONADA | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 km |
| 29 | GREAT VALLEY 7 | 153.1 | 153.1 | 153.3 | 153.3 | 154.4 | 154.6 km |
| 30 | DEEP SPRINGS | 156.5 | 152.8 | 153.4 | 153.4 | 154.0 | 154.5 km |
| 31 | SARGENT | 156.6 | 156.6 | 156.6 | 156.6 | 157.6 | 157.6 km |
| 32 | HUNTER MTN. - SALINE VALLEY | 157.3 | 157.3 | 157.3 | 157.3 | 157.5 | 157.5 km |
| 33 | ZAYANTE-VERGELES | 157.4 | 157.4 | 157.4 | 157.4 | 158.5 | 158.5 km |
| 34 | SAN ANDREAS - Carrizo | 158.9 | 158.9 | 158.9 | 158.9 | 159.7 | 159.7 km |

EXPLANATION

CD_1DRP = Closest distance to projection of rupture area along fault trace.
CD_2DRP = Closest distance to surface projection of the rupture area.
CDIST = Closest distance to seismogenic rupture.
CLODIS = Closest distance to subsurface rupture.
CD_EPI = Closest epicentral distance.
CD_HYPO = Closest hypocentral distance.

DATE: Monday, June 30, 2003

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*          E Q S E A R C H          *
*                                   *
*             Ver. 2.01             *
*                                   *
*                                   *
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(Estimation of Peak Horizontal Acceleration
From California Earthquake Catalogs)

SEARCH PERFORMED FOR: City of Fresno

JOB NUMBER: A25515.01

JOB NAME: City Of Fresno Fire Station #15

SITE COORDINATES:
LATITUDE: 36.7307 N
LONGITUDE: 119.6996 W

TYPE OF SEARCH: RADIUS
SEARCH RADIUS: 100 mi

SEARCH MAGNITUDES: 4.0 TO 9.0

SEARCH DATES: 1900 TO 2003

ATTENUATION RELATION: 22) Boore et al. (1993) Horiz. - Random - Site Class C

UNCERTAINTY (M=Mean, S=Mean+1-Sigma): M

SCOND: 0

FAULT TYPE ASSUMED (DS=Reverse, SS=Strike-Slip): DS

COMPUTE PEAK HORIZONTAL ACCELERATION

EARTHQUAKE-DATA FILE USED: ALLQUAKE.DAT

TIME PERIOD OF EXPOSURE FOR STATISTICAL COMPARISON: 25 years

SOURCE OF DEPTH VALUES (A=Attenuation File, E=Earthquake Catalog): A

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| DMG | 36.000 | 120.500 | 3/ 3/1901 | 745 0.0 | 5.6 | 5.50 | 0.028 | V | 67 [ 108] |
| MGI | 37.700 | 119.600 | 5/26/1905 | 250 0.0 | 5.6 | 4.00 | 0.013 | III | 67 [ 108] |
| MGI | 36.800 | 121.400 | 10/18/1908 | 821 0.0 | 5.6 | 4.60 | 0.013 | III | 94 [ 152] |
| DMG | 36.700 | 121.400 | 11/22/1909 | 1521 0.0 | 5.6 | 4.50 | 0.013 | III | 94 [ 152] |
| DMG | 37.330 | 118.420 | 5/ 6/1910 | 1640 0.0 | 5.6 | 5.50 | 0.024 | V | 82 [ 132] |
| DMG | 36.830 | 121.420 | 12/31/1910 | 1211 0.0 | 5.6 | 5.00 | 0.016 | IV | 95 [ 154] |
| DMG | 36.830 | 121.420 | 3/11/1911 | 2130 0.0 | 5.6 | 4.50 | 0.013 | III | 95 [ 154] |
| DMG | 37.330 | 118.420 | 1/ 5/1912 | 354 0.0 | 5.6 | 5.50 | 0.024 | V | 82 [ 132] |
| MGI | 36.830 | 121.420 | 10/25/1912 | 316 0.0 | 5.6 | 4.00 | 0.010 | III | 95 [ 154] |
| DMG | 36.080 | 118.820 | 5/29/1915 | 646 0.0 | 5.6 | 5.00 | 0.022 | IV | 66 [ 107] |
| DMG | 36.080 | 118.830 | 5/29/1915 | 830 0.0 | 5.6 | 4.50 | 0.017 | IV | 66 [ 106] |
| MGI | 35.670 | 120.670 | 9/ 8/1915 | 1245 0.0 | 5.6 | 4.00 | 0.010 | III | 91 [ 147] |
| DMG | 36.830 | 121.420 | 12/27/1915 | 723 0.0 | 5.6 | 4.00 | 0.010 | III | 95 [ 154] |
| DMG | 36.670 | 121.250 | 6/27/1916 | 1343 0.0 | 5.6 | 4.00 | 0.011 | III | 86 [ 138] |
| DMG | 36.670 | 121.250 | 8/ 6/1916 | 1938 0.0 | 5.6 | 5.50 | 0.023 | IV | 86 [ 138] |
| DMG | 36.000 | 121.170 | 10/24/1916 | 1330 0.0 | 5.6 | 4.00 | 0.010 | III | 96 [ 155] |
| MGI | 36.580 | 118.070 | 3/19/1917 | 850 0.0 | 5.6 | 4.00 | 0.010 | III | 91 [ 146] |
| DMG | 36.580 | 121.330 | 6/ 9/1917 | 334 0.0 | 5.6 | 4.00 | 0.010 | III | 91 [ 146] |
| MGI | 36.830 | 118.170 | 6/21/1917 | 1920 0.0 | 5.6 | 4.00 | 0.011 | III | 85 [ 137] |
| MGI | 36.580 | 118.080 | 7/ 6/1917 | 11 1 0.0 | 5.6 | 5.70 | 0.025 | V | 90 [ 145] |
| MGI | 37.330 | 118.420 | 8/28/1917 | 040 0.0 | 5.6 | 4.00 | 0.011 | III | 82 [ 132] |
| DMG | 36.830 | 121.420 | 9/24/1917 | 2121 0.0 | 5.6 | 4.00 | 0.010 | III | 95 [ 154] |
| MGI | 37.330 | 118.420 | 2/11/1918 | 2245 0.0 | 5.6 | 4.00 | 0.011 | III | 82 [ 132] |
| MGI | 37.170 | 118.570 | 6/ 3/1918 | 16 5 0.0 | 5.6 | 4.00 | 0.012 | III | 69 [ 112] |
| MGI | 37.750 | 120.170 | 8/12/1918 | 1630 0.0 | 5.6 | 4.00 | 0.012 | III | 75 [ 121] |
| MGI | 36.580 | 118.080 | 6/21/1919 | 1958 0.0 | 5.6 | 4.00 | 0.010 | III | 90 [ 145] |
| MGI | 36.580 | 118.080 | 6/24/1919 | 2324 0.0 | 5.6 | 4.00 | 0.010 | III | 90 [ 145] |
| MGI | 36.330 | 120.670 | 7/31/1919 | 2131 0.0 | 5.6 | 4.00 | 0.014 | IV | 61 [ 97] |
| MGI | 36.580 | 118.080 | 1/14/1921 | 1350 0.0 | 5.6 | 4.00 | 0.010 | III | 90 [ 145] |
| DMG | 35.750 | 120.250 | 3/10/1922 | 112120.0 | 5.6 | 6.50 | 0.044 | VI | 74 [ 120] |
| DMG | 35.750 | 120.330 | 3/16/1922 | 2310 0.0 | 5.6 | 4.50 | 0.015 | IV | 76 [ 123] |
| DMG | 35.750 | 120.330 | 8/18/1922 | 512 0.0 | 5.6 | 5.00 | 0.020 | IV | 76 [ 123] |
| MGI | 36.830 | 121.420 | 10/17/1922 | 530 0.0 | 5.6 | 4.00 | 0.010 | III | 95 [ 154] |
| DMG | 35.600 | 118.800 | 6/30/1926 | 1331 0.0 | 5.6 | 5.00 | 0.017 | IV | 93 [ 149] |
| DMG | 36.600 | 120.800 | 7/25/1926 | 175749.0 | 5.6 | 5.00 | 0.023 | IV | 62 [ 99] |
| DMG | 36.170 | 120.320 | 12/27/1926 | 919 0.0 | 5.6 | 5.00 | 0.026 | V | 52 [ 83] |
| DMG | 37.500 | 118.750 | 9/18/1927 | 2 7 7.0 | 5.6 | 6.00 | 0.034 | V | 75 [ 120] |
| MGI | 37.000 | 120.070 | 9/12/1928 | 120 0.0 | 5.6 | 4.60 | 0.035 | V | 28 [ 44] |
| DMG | 35.770 | 120.470 | 11/ 9/1929 | 23042.1 | 5.6 | 4.40 | 0.014 | IV | 79 [ 127] |
| DMG | 36.420 | 121.000 | 11/26/1929 | 8 5 0.0 | 5.6 | 4.50 | 0.015 | IV | 75 [ 121] |
| DMG | 36.900 | 118.190 | 11/28/1929 | 1949 0.0 | 5.6 | 5.50 | 0.024 | IV | 84 [ 136] |
| MGI | 37.000 | 118.170 | 12/ 2/1929 | 7 0 0.0 | 5.6 | 5.30 | 0.021 | IV | 87 [ 139] |
| MGI | 37.000 | 118.170 | 12/ 8/1929 | 1245 0.0 | 5.6 | 5.30 | 0.021 | IV | 87 [ 139] |
| DMG | 36.800 | 121.500 | 1/ 9/1930 | 8 6 0.0 | 5.6 | 4.50 | 0.012 | III | 100 [ 160] |
| DMG | 36.800 | 121.500 | 1/ 9/1930 | 816 0.0 | 5.6 | 4.50 | 0.012 | III | 100 [ 160] |
| DMG | 36.800 | 121.500 | 1/ 9/1930 | 956 0.0 | 5.6 | 4.00 | 0.009 | III | 100 [ 160] |
| DMG | 36.830 | 118.250 | 4/ 6/1930 | 423 0.0 | 5.6 | 4.50 | 0.014 | IV | 80 [ 129] |
| DMG | 36.580 | 118.070 | 8/11/1930 | 13 0 0.0 | 5.6 | 4.00 | 0.010 | III | 91 [ 146] |
| MGI | 36.920 | 118.170 | 11/10/1930 | 511 0.0 | 5.6 | 4.00 | 0.011 | III | 86 [ 138] |
| DMG | 36.500 | 121.400 | 1/ 6/1931 | 232840.0 | 5.6 | 4.00 | 0.010 | III | 96 [ 154] |
| DMG | 35.770 | 120.670 | 2/23/1931 | 10 039.4 | 5.6 | 4.10 | 0.011 | III | 86 [ 138] |
| DMG | 35.770 | 120.670 | 2/23/1931 | 1033 0.0 | 5.6 | 4.50 | 0.014 | III | 86 [ 138] |
| DMG | 37.080 | 118.170 | 9/23/1931 | 825 0.0 | 5.6 | 4.50 | 0.013 | III | 88 [ 141] |
| DMG | 37.200 | 118.250 | 11/25/1931 | 1218 0.0 | 5.6 | 4.00 | 0.010 | III | 86 [ 139] |
| DMG | 36.670 | 121.330 | 1/ 8/1932 | 181659.0 | 5.6 | 4.00 | 0.010 | III | 90 [ 145] |
| DMG | 36.000 | 121.000 | 2/26/1932 | 1658 0.0 | 5.6 | 5.00 | 0.017 | IV | 88 [ 142] |
| DMG | 36.670 | 121.220 | 4/16/1932 | 184810.0 | 5.6 | 4.50 | 0.014 | IV | 84 [ 136] |
| DMG | 36.780 | 120.750 | 4/22/1932 | 0 816.0 | 5.6 | 4.00 | 0.014 | IV | 58 [ 94] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| DMG | 35.800 | 118.533 | 7/26/1932 | 65158.3 | 5.6 | 4.50 | 0.013 | III | 91 [ 147] |
| DMG | 37.330 | 118.820 | 8/24/1932 | 9 838.0 | 5.6 | 4.00 | 0.013 | III | 64 [ 103] |
| DMG | 37.333 | 118.817 | 8/24/1932 | 9 838.3 | 5.6 | 4.00 | 0.013 | III | 64 [ 103] |
| DMG | 37.333 | 118.667 | 10/25/1932 | 328 0.0 | 5.6 | 4.50 | 0.016 | IV | 70 [ 113] |
| DMG | 37.333 | 118.833 | 2/ 3/1933 | 148 0.0 | 5.6 | 4.00 | 0.013 | III | 63 [ 102] |
| DMG | 36.000 | 118.167 | 2/26/1933 | 655 0.0 | 5.6 | 4.00 | 0.009 | III | 99 [ 159] |
| DMG | 37.583 | 118.800 | 6/22/1933 | 123628.0 | 5.6 | 4.90 | 0.018 | IV | 77 [ 124] |
| DMG | 37.583 | 118.800 | 6/22/1933 | 1241 2.0 | 5.6 | 4.90 | 0.018 | IV | 77 [ 124] |
| MGI | 37.450 | 119.050 | 1/31/1934 | 1945 0.0 | 5.6 | 4.30 | 0.016 | IV | 61 [ 99] |
| MGI | 35.800 | 120.330 | 6/ 5/1934 | 2130 0.0 | 5.6 | 4.30 | 0.014 | IV | 73 [ 118] |
| DMG | 35.800 | 120.330 | 6/ 5/1934 | 2148 0.0 | 5.6 | 5.00 | 0.020 | IV | 73 [ 118] |
| DMG | 35.800 | 120.330 | 6/ 5/1934 | 2252 0.0 | 5.6 | 4.00 | 0.012 | III | 73 [ 118] |
| MGI | 35.800 | 120.330 | 6/ 5/1934 | 2330 0.0 | 5.6 | 4.30 | 0.014 | IV | 73 [ 118] |
| DMG | 35.800 | 120.330 | 6/ 8/1934 | 430 0.0 | 5.6 | 5.00 | 0.020 | IV | 73 [ 118] |
| DMG | 35.800 | 120.330 | 6/ 8/1934 | 447 0.0 | 5.6 | 6.00 | 0.034 | V | 73 [ 118] |
| DMG | 35.800 | 120.330 | 6/ 8/1934 | 542 0.0 | 5.6 | 4.50 | 0.016 | IV | 73 [ 118] |
| DMG | 35.800 | 120.330 | 6/ 8/1934 | 930 0.0 | 5.6 | 4.00 | 0.012 | III | 73 [ 118] |
| DMG | 35.800 | 120.330 | 6/ 8/1934 | 2323 0.0 | 5.6 | 4.00 | 0.012 | III | 73 [ 118] |
| DMG | 35.800 | 120.330 | 6/10/1934 | 8 3 0.0 | 5.6 | 4.50 | 0.016 | IV | 73 [ 118] |
| DMG | 35.800 | 120.330 | 6/14/1934 | 1455 0.0 | 5.6 | 4.00 | 0.012 | III | 73 [ 118] |
| DMG | 35.800 | 120.330 | 6/14/1934 | 1554 0.0 | 5.6 | 4.00 | 0.012 | III | 73 [ 118] |
| DMG | 35.800 | 120.330 | 6/14/1934 | 1926 0.0 | 5.6 | 4.50 | 0.016 | IV | 73 [ 118] |
| DMG | 36.500 | 121.000 | 6/16/1934 | 23 3 0.0 | 5.6 | 4.00 | 0.012 | III | 74 [ 119] |
| DMG | 35.970 | 120.580 | 12/ 2/1934 | 16 7 0.0 | 5.6 | 4.00 | 0.012 | III | 72 [ 116] |
| DMG | 35.930 | 120.480 | 12/24/1934 | 1626 0.0 | 5.6 | 5.00 | 0.021 | IV | 70 [ 113] |
| DMG | 35.930 | 120.480 | 1/ 6/1935 | 4 4 0.0 | 5.6 | 4.00 | 0.012 | III | 70 [ 113] |
| DMG | 35.930 | 120.480 | 1/ 6/1935 | 440 0.0 | 5.6 | 4.00 | 0.012 | III | 70 [ 113] |
| DMG | 35.450 | 119.250 | 1/23/1935 | 1352 0.0 | 5.6 | 4.00 | 0.010 | III | 92 [ 148] |
| DMG | 37.383 | 118.917 | 5/16/1935 | 325 0.0 | 5.6 | 4.50 | 0.018 | IV | 62 [ 100] |
| DMG | 37.000 | 121.400 | 6/18/1935 | 415 0.0 | 5.6 | 4.00 | 0.010 | III | 96 [ 154] |
| DMG | 37.250 | 118.500 | 6/19/1935 | 955 0.0 | 5.6 | 4.50 | 0.015 | IV | 75 [ 121] |
| DMG | 37.250 | 118.500 | 6/19/1935 | 10 7 0.0 | 5.6 | 4.00 | 0.012 | III | 75 [ 121] |
| DMG | 36.000 | 121.000 | 6/30/1935 | 2328 0.0 | 5.6 | 4.00 | 0.010 | III | 88 [ 142] |
| DMG | 35.930 | 120.480 | 10/22/1935 | 1837 0.0 | 5.6 | 4.00 | 0.012 | III | 70 [ 113] |
| DMG | 36.600 | 121.200 | 3/17/1936 | 155 0.0 | 5.6 | 4.00 | 0.011 | III | 84 [ 135] |
| DMG | 37.610 | 118.368 | 5/10/1936 | 174013.2 | 5.6 | 5.00 | 0.016 | IV | 95 [ 153] |
| DMG | 37.500 | 118.533 | 5/15/1936 | 434 0.0 | 5.6 | 4.00 | 0.011 | III | 83 [ 134] |
| DMG | 36.170 | 120.920 | 5/23/1936 | 441 0.0 | 5.6 | 4.00 | 0.011 | III | 78 [ 126] |
| DMG | 36.500 | 121.170 | 5/27/1936 | 1955 0.0 | 5.6 | 4.50 | 0.014 | IV | 83 [ 134] |
| DMG | 36.667 | 118.100 | 7/11/1936 | 347 0.0 | 5.6 | 4.00 | 0.010 | III | 89 [ 143] |
| DMG | 37.250 | 118.667 | 10/ 6/1936 | 1233 0.0 | 5.6 | 4.00 | 0.013 | III | 67 [ 108] |
| DMG | 37.250 | 118.667 | 10/ 7/1936 | 3 1 0.0 | 5.6 | 4.00 | 0.013 | III | 67 [ 108] |
| DMG | 37.527 | 118.183 | 2/12/1937 | 222657.1 | 5.6 | 4.00 | 0.009 | III | 100 [ 161] |
| DMG | 36.700 | 121.200 | 2/17/1937 | 333 0.0 | 5.6 | 4.50 | 0.014 | IV | 83 [ 134] |
| DMG | 35.930 | 120.480 | 2/20/1937 | 958 0.0 | 5.6 | 4.00 | 0.012 | III | 70 [ 113] |
| DMG | 37.876 | 118.715 | 3/ 9/1937 | 154137.9 | 5.6 | 4.00 | 0.010 | III | 96 [ 154] |
| DMG | 37.600 | 118.267 | 6/27/1937 | 426 0.0 | 5.6 | 4.00 | 0.009 | III | 99 [ 159] |
| DMG | 37.500 | 120.000 | 8/23/1937 | 032 0.0 | 5.6 | 4.00 | 0.015 | IV | 56 [ 90] |
| DMG | 36.500 | 121.200 | 9/18/1937 | 1329 0.0 | 5.6 | 4.00 | 0.011 | III | 85 [ 136] |
| DMG | 37.700 | 118.467 | 9/25/1937 | 1220 0.0 | 5.6 | 4.00 | 0.010 | III | 95 [ 153] |
| MGI | 36.150 | 121.000 | 11/ 3/1937 | 10 0 0.0 | 5.6 | 4.30 | 0.013 | III | 83 [ 133] |
| DMG | 36.800 | 120.700 | 12/ 5/1937 | 137 0.0 | 5.6 | 4.00 | 0.015 | IV | 56 [ 89] |
| DMG | 36.200 | 121.300 | 5/10/1938 | 1032 0.0 | 5.6 | 4.50 | 0.013 | III | 96 [ 155] |
| DMG | 36.200 | 121.300 | 5/10/1938 | 1041 0.0 | 5.6 | 4.00 | 0.010 | III | 96 [ 155] |
| DMG | 36.200 | 121.300 | 5/13/1938 | 1934 0.0 | 5.6 | 4.00 | 0.010 | III | 96 [ 155] |
| DMG | 36.400 | 121.200 | 9/16/1938 | 611 0.0 | 5.6 | 4.00 | 0.010 | III | 86 [ 139] |
| DMG | 36.450 | 121.250 | 9/27/1938 | 1223 0.0 | 5.6 | 5.00 | 0.017 | IV | 88 [ 142] |
| DMG | 36.580 | 121.400 | 10/14/1938 | 1531 0.0 | 5.6 | 4.00 | 0.010 | III | 95 [ 153] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| DMG | 35.930 | 120.480 | 11/22/1938 | 1530 0.0 | 5.6 | 4.50 | 0.016 | IV | 70 [ 113] |
| DMG | 37.453 | 118.604 | 12/ 3/1938 | 174252.6 | 5.6 | 5.70 | 0.028 | V | 78 [ 126] |
| DMG | 37.500 | 118.767 | 12/ 3/1938 | 1745 0.0 | 5.6 | 4.00 | 0.012 | III | 74 [ 119] |
| DMG | 37.500 | 118.767 | 12/ 3/1938 | 1757 0.0 | 5.6 | 4.00 | 0.012 | III | 74 [ 119] |
| DMG | 37.500 | 118.767 | 12/ 3/1938 | 2217 0.0 | 5.6 | 4.00 | 0.012 | III | 74 [ 119] |
| DMG | 37.500 | 118.767 | 12/ 3/1938 | 2220 0.0 | 5.6 | 4.00 | 0.012 | III | 74 [ 119] |
| DMG | 37.500 | 118.767 | 12/ 4/1938 | 1849 0.0 | 5.6 | 4.00 | 0.012 | III | 74 [ 119] |
| DMG | 37.667 | 118.417 | 12/16/1938 | 1048 0.0 | 5.6 | 4.00 | 0.010 | III | 96 [ 154] |
| DMG | 37.450 | 119.000 | 4/ 3/1939 | 710 0.0 | 5.6 | 4.00 | 0.013 | III | 63 [ 101] |
| DMG | 35.930 | 120.480 | 5/ 2/1939 | 1849 0.0 | 5.6 | 4.00 | 0.012 | III | 70 [ 113] |
| DMG | 37.500 | 118.533 | 5/17/1939 | 342 0.0 | 5.6 | 4.00 | 0.011 | III | 83 [ 134] |
| DMG | 37.500 | 118.533 | 5/21/1939 | 1959 0.0 | 5.6 | 4.00 | 0.011 | III | 83 [ 134] |
| DMG | 36.800 | 121.450 | 6/24/1939 | 13 2 0.0 | 5.6 | 5.50 | 0.021 | IV | 97 [ 156] |
| DMG | 36.850 | 121.400 | 7/ 4/1939 | 1049 0.0 | 5.6 | 4.00 | 0.010 | III | 94 [ 152] |
| DMG | 35.800 | 120.330 | 12/28/1939 | 121538.0 | 5.6 | 5.00 | 0.020 | IV | 73 [ 118] |
| DMG | 37.500 | 118.533 | 2/24/1940 | 938 0.0 | 5.6 | 4.50 | 0.014 | IV | 83 [ 134] |
| DMG | 36.800 | 121.450 | 3/ 2/1940 | 1327 0.0 | 5.6 | 4.00 | 0.010 | III | 97 [ 156] |
| DMG | 37.583 | 118.417 | 4/ 8/1940 | 133439.0 | 5.6 | 4.00 | 0.010 | III | 92 [ 148] |
| DMG | 37.617 | 118.800 | 7/ 8/1940 | 105736.5 | 5.6 | 4.80 | 0.017 | IV | 79 [ 127] |
| DMG | 37.633 | 118.767 | 7/22/1940 | 23 032.9 | 5.6 | 4.60 | 0.015 | IV | 81 [ 130] |
| DMG | 36.230 | 120.320 | 8/13/1940 | 22 729.0 | 5.6 | 4.00 | 0.016 | IV | 49 [ 79] |
| DMG | 35.333 | 119.250 | 1/20/1941 | 135816.0 | 5.6 | 4.00 | 0.009 | III | 100 [ 160] |
| DMG | 37.500 | 118.533 | 5/ 8/1941 | 145340.0 | 5.6 | 4.00 | 0.011 | III | 83 [ 134] |
| DMG | 35.417 | 119.300 | 6/ 4/1941 | 84719.0 | 5.6 | 4.00 | 0.010 | III | 93 [ 150] |
| DMG | 37.567 | 118.733 | 9/14/1941 | 164331.8 | 5.6 | 5.80 | 0.029 | V | 79 [ 126] |
| DMG | 37.567 | 118.733 | 9/14/1941 | 165458.0 | 5.6 | 4.50 | 0.015 | IV | 79 [ 126] |
| DMG | 37.567 | 118.733 | 9/14/1941 | 182118.7 | 5.6 | 5.50 | 0.025 | V | 79 [ 126] |
| DMG | 37.567 | 118.733 | 9/14/1941 | 183911.9 | 5.6 | 6.00 | 0.032 | V | 79 [ 126] |
| DMG | 37.567 | 118.733 | 9/14/1941 | 185418.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 9/14/1941 | 2116 1.0 | 5.6 | 5.00 | 0.019 | IV | 79 [ 126] |
| DMG | 37.567 | 118.733 | 9/27/1941 | 194837.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 9/28/1941 | 15 514.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 10/23/1941 | 204431.0 | 5.6 | 4.50 | 0.015 | IV | 79 [ 126] |
| DMG | 37.567 | 118.733 | 10/24/1941 | 174857.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 11/ 4/1941 | 2 928.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 11/15/1941 | 1643 5.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 12/18/1941 | 2059 0.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 35.930 | 120.480 | 12/22/1941 | 054 9.0 | 5.6 | 4.00 | 0.012 | III | 70 [ 113] |
| DMG | 37.567 | 118.733 | 12/31/1941 | 64844.0 | 5.6 | 5.40 | 0.024 | IV | 79 [ 126] |
| DMG | 37.567 | 118.733 | 12/31/1941 | 8 815.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 12/31/1941 | 11 225.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 12/31/1941 | 111457.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 12/31/1941 | 122015.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 12/31/1941 | 18 544.0 | 5.6 | 4.50 | 0.015 | IV | 79 [ 126] |
| DMG | 37.567 | 118.733 | 1/ 1/1942 | 341 1.0 | 5.6 | 4.50 | 0.015 | IV | 79 [ 126] |
| DMG | 36.650 | 121.220 | 1/14/1942 | 94440.0 | 5.6 | 4.20 | 0.012 | III | 84 [ 136] |
| DMG | 37.567 | 118.733 | 2/ 4/1942 | 32115.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 2/ 4/1942 | 32526.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 2/ 4/1942 | 332 3.0 | 5.6 | 4.50 | 0.015 | IV | 79 [ 126] |
| DMG | 37.000 | 121.300 | 2/ 4/1942 | 9 824.0 | 5.6 | 4.00 | 0.010 | III | 90 [ 145] |
| DMG | 37.567 | 118.733 | 2/26/1942 | 183239.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 2/27/1942 | 12250.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 36.600 | 121.300 | 4/ 8/1942 | 142014.0 | 5.6 | 4.00 | 0.010 | III | 89 [ 143] |
| DMG | 36.750 | 121.320 | 4/11/1942 | 84059.0 | 5.6 | 4.00 | 0.010 | III | 90 [ 144] |
| DMG | 37.567 | 118.733 | 6/ 5/1942 | 31938.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 35.600 | 120.800 | 6/29/1942 | 21 730.0 | 5.6 | 4.00 | 0.009 | III | 99 [ 160] |
| DMG | 37.567 | 118.733 | 7/ 6/1942 | 211140.0 | 5.6 | 4.50 | 0.015 | IV | 79 [ 126] |
| DMG | 37.567 | 118.733 | 7/ 8/1942 | 10 547.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| DMG | 37.567 | 118.733 | 8/20/1942 | 111148.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 8/20/1942 | 12 938.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 8/20/1942 | 152631.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 8/21/1942 | 233641.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 9/ 7/1942 | 195011.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 36.480 | 121.400 | 10/15/1942 | 135356.0 | 5.6 | 4.30 | 0.011 | III | 96 [ 154] |
| MGI | 36.000 | 121.000 | 10/18/1942 | 12 142.0 | 5.6 | 4.30 | 0.012 | III | 88 [ 142] |
| MGI | 36.000 | 121.000 | 10/20/1942 | 1025 0.0 | 5.6 | 4.30 | 0.012 | III | 88 [ 142] |
| DMG | 37.567 | 118.733 | 10/30/1942 | 05518.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 35.770 | 120.250 | 10/31/1942 | 105113.0 | 5.6 | 4.00 | 0.012 | III | 73 [ 118] |
| DMG | 37.567 | 118.733 | 12/ 5/1942 | 1852 7.0 | 5.6 | 4.50 | 0.015 | IV | 79 [ 126] |
| DMG | 37.567 | 118.733 | 1/ 1/1943 | 222417.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.567 | 118.733 | 2/18/1943 | 145319.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 37.383 | 118.600 | 5/31/1943 | 201653.0 | 5.6 | 4.50 | 0.015 | IV | 75 [ 121] |
| DMG | 37.533 | 118.667 | 6/22/1943 | 153121.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 128] |
| DMG | 37.567 | 118.733 | 11/ 3/1943 | 42339.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| DMG | 36.300 | 120.500 | 11/30/1943 | 215718.0 | 5.6 | 4.00 | 0.015 | IV | 53 [ 86] |
| DMG | 37.100 | 118.267 | 12/17/1943 | 01925.0 | 5.6 | 4.00 | 0.011 | III | 83 [ 134] |
| DMG | 37.100 | 118.267 | 12/17/1943 | 438 0.0 | 5.6 | 4.00 | 0.011 | III | 83 [ 134] |
| DMG | 36.580 | 121.280 | 6/ 7/1944 | 123538.0 | 5.6 | 4.00 | 0.010 | III | 88 [ 142] |
| DMG | 37.533 | 118.667 | 6/ 8/1944 | 11155.0 | 5.6 | 4.00 | 0.011 | III | 79 [ 128] |
| DMG | 37.317 | 118.383 | 11/17/1944 | 03249.0 | 5.6 | 4.20 | 0.012 | III | 83 [ 134] |
| DMG | 36.730 | 121.200 | 1/ 7/1945 | 222533.0 | 5.6 | 4.70 | 0.016 | IV | 83 [ 134] |
| DMG | 37.500 | 118.567 | 5/ 8/1945 | 18 846.0 | 5.6 | 4.40 | 0.013 | III | 82 [ 132] |
| DMG | 36.820 | 121.370 | 5/17/1945 | 15 647.0 | 5.6 | 4.60 | 0.014 | III | 93 [ 149] |
| DMG | 36.200 | 118.383 | 5/18/1945 | 94440.0 | 5.6 | 4.00 | 0.011 | III | 82 [ 132] |
| DMG | 37.167 | 118.067 | 7/30/1945 | 6 610.0 | 5.6 | 4.10 | 0.010 | III | 95 [ 153] |
| DMG | 37.417 | 118.583 | 8/17/1945 | 202114.0 | 5.6 | 4.20 | 0.013 | III | 78 [ 125] |
| DMG | 37.333 | 118.117 | 9/ 4/1945 | 111356.0 | 5.6 | 4.20 | 0.011 | III | 97 [ 156] |
| DMG | 35.830 | 120.750 | 9/ 7/1945 | 113420.0 | 5.6 | 4.20 | 0.012 | III | 85 [ 137] |
| DMG | 36.630 | 121.250 | 11/ 3/1945 | 155022.0 | 5.6 | 4.20 | 0.012 | III | 86 [ 139] |
| DMG | 37.317 | 118.650 | 1/13/1946 | 163115.0 | 5.6 | 4.70 | 0.018 | IV | 71 [ 114] |
| DMG | 36.500 | 121.000 | 2/10/1946 | 11 119.0 | 5.6 | 4.20 | 0.013 | III | 74 [ 119] |
| DMG | 37.083 | 118.000 | 5/ 1/1946 | 173010.0 | 5.6 | 4.00 | 0.010 | III | 97 [ 156] |
| DMG | 37.367 | 118.833 | 5/18/1946 | 355 0.0 | 5.6 | 4.10 | 0.014 | IV | 65 [ 104] |
| DMG | 37.367 | 118.833 | 5/18/1946 | 64548.0 | 5.6 | 4.00 | 0.013 | III | 65 [ 104] |
| DMG | 36.770 | 121.420 | 5/29/1946 | 1751 3.0 | 5.6 | 4.50 | 0.013 | III | 95 [ 153] |
| DMG | 37.600 | 118.433 | 1/11/1947 | 115748.0 | 5.6 | 4.40 | 0.012 | III | 92 [ 148] |
| DMG | 36.230 | 120.650 | 2/ 5/1947 | 614 0.0 | 5.6 | 5.00 | 0.023 | IV | 63 [ 102] |
| DMG | 36.200 | 120.500 | 2/25/1947 | 114518.0 | 5.6 | 4.20 | 0.016 | IV | 58 [ 93] |
| DMG | 36.770 | 121.420 | 7/ 7/1947 | 440 0.0 | 5.6 | 4.30 | 0.011 | III | 95 [ 153] |
| DMG | 35.917 | 119.917 | 7/14/1947 | 540 6.0 | 5.6 | 4.00 | 0.014 | IV | 57 [ 92] |
| DMG | 36.880 | 121.420 | 8/10/1947 | 2158 0.0 | 5.6 | 4.40 | 0.012 | III | 96 [ 154] |
| DMG | 36.090 | 118.870 | 2/11/1948 | 32928.3 | 5.6 | 4.60 | 0.018 | IV | 64 [ 103] |
| DMG | 36.770 | 121.270 | 4/27/1948 | 1641 8.0 | 5.6 | 4.00 | 0.010 | III | 87 [ 140] |
| DMG | 36.770 | 121.270 | 4/27/1948 | 202225.0 | 5.6 | 4.40 | 0.013 | III | 87 [ 140] |
| MGI | 36.750 | 121.400 | 4/28/1948 | 730 0.0 | 5.6 | 4.30 | 0.011 | III | 94 [ 151] |
| MGI | 36.780 | 121.400 | 5/11/1948 | 1045 0.0 | 5.6 | 4.30 | 0.011 | III | 94 [ 151] |
| DMG | 37.200 | 118.700 | 6/ 7/1948 | 15 522.0 | 5.6 | 4.20 | 0.015 | IV | 64 [ 103] |
| DMG | 36.600 | 121.200 | 6/11/1948 | 82811.0 | 5.6 | 4.00 | 0.011 | III | 84 [ 135] |
| DMG | 37.450 | 118.583 | 8/ 6/1948 | 42257.0 | 5.6 | 4.30 | 0.013 | III | 79 [ 127] |
| DMG | 35.500 | 118.967 | 9/29/1948 | 4 648.0 | 5.6 | 4.20 | 0.011 | III | 94 [ 152] |
| DMG | 37.667 | 118.383 | 4/13/1949 | 75826.0 | 5.6 | 4.50 | 0.012 | III | 97 [ 156] |
| DMG | 36.580 | 121.170 | 10/22/1949 | 214520.0 | 5.6 | 4.70 | 0.016 | IV | 82 [ 132] |
| DMG | 37.467 | 118.367 | 12/ 9/1949 | 84118.0 | 5.6 | 4.10 | 0.011 | III | 89 [ 144] |
| DMG | 37.467 | 118.367 | 12/ 9/1949 | 1239 2.0 | 5.6 | 4.60 | 0.014 | IV | 89 [ 144] |
| DMG | 35.750 | 119.617 | 4/15/1950 | 115632.0 | 5.6 | 4.60 | 0.017 | IV | 68 [ 109] |
| DMG | 37.483 | 118.583 | 9/28/1950 | 11 322.0 | 5.6 | 4.10 | 0.012 | III | 80 [ 130] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| DMG | 36.900 | 121.380 | 9/30/1950 | 212633.0 | 5.6 | 4.10 | 0.010 | III | 94 [ 151] |
| DMG | 36.580 | 121.180 | 7/29/1951 | 105345.0 | 5.6 | 5.00 | 0.018 | IV | 83 [ 133] |
| DMG | 36.620 | 121.220 | 8/ 6/1951 | 9 5 2.0 | 5.6 | 4.90 | 0.017 | IV | 85 [ 136] |
| DMG | 38.000 | 118.833 | 10/ 1/1951 | 181959.0 | 5.6 | 4.00 | 0.009 | III | 100 [ 160] |
| DMG | 36.900 | 121.420 | 10/30/1951 | 195514.0 | 5.6 | 4.00 | 0.010 | III | 96 [ 154] |
| DMG | 36.900 | 121.420 | 10/30/1951 | 195918.0 | 5.6 | 4.20 | 0.011 | III | 96 [ 154] |
| DMG | 36.900 | 121.420 | 10/31/1951 | 205819.0 | 5.6 | 4.80 | 0.015 | IV | 96 [ 154] |
| DMG | 38.000 | 119.000 | 11/28/1951 | 44950.0 | 5.6 | 4.00 | 0.010 | III | 96 [ 154] |
| DMG | 37.567 | 118.583 | 12/28/1951 | 24927.0 | 5.6 | 5.20 | 0.020 | IV | 84 [ 136] |
| DMG | 36.607 | 117.905 | 2/ 9/1952 | 84330.9 | 5.6 | 4.10 | 0.010 | III | 100 [ 161] |
| MGI | 37.950 | 119.100 | 8/22/1952 | 1230 0.0 | 5.6 | 4.30 | 0.012 | III | 90 [ 145] |
| MGI | 35.900 | 121.000 | 3/ 1/1953 | 1853 0.0 | 5.6 | 4.30 | 0.012 | III | 92 [ 149] |
| DMG | 36.820 | 121.470 | 5/25/1953 | 02330.0 | 5.6 | 4.00 | 0.009 | III | 98 [ 158] |
| DMG | 35.880 | 120.500 | 5/28/1953 | 35113.0 | 5.6 | 4.30 | 0.014 | IV | 74 [ 119] |
| MGI | 35.500 | 120.500 | 6/ 4/1953 | 1140 0.0 | 5.6 | 4.30 | 0.011 | III | 96 [ 154] |
| DMG | 35.930 | 120.380 | 6/22/1953 | 152235.0 | 5.6 | 4.30 | 0.015 | IV | 67 [ 108] |
| DMG | 37.633 | 118.300 | 10/30/1953 | 73545.0 | 5.6 | 4.40 | 0.012 | III | 99 [ 159] |
| DMG | 36.520 | 121.170 | 3/27/1954 | 154331.0 | 5.6 | 4.40 | 0.013 | III | 83 [ 133] |
| DMG | 36.570 | 121.420 | 6/22/1954 | 114929.0 | 5.6 | 4.40 | 0.012 | III | 96 [ 154] |
| DMG | 36.570 | 121.420 | 6/22/1954 | 1250 4.0 | 5.6 | 4.30 | 0.011 | III | 96 [ 154] |
| DMG | 37.667 | 118.667 | 8/20/1954 | 8 145.0 | 5.6 | 4.40 | 0.013 | III | 86 [ 138] |
| DMG | 37.667 | 118.667 | 9/22/1954 | 7 155.0 | 5.6 | 4.10 | 0.011 | III | 86 [ 138] |
| DMG | 37.070 | 120.580 | 11/ 1/1954 | 64240.0 | 5.6 | 4.00 | 0.015 | IV | 54 [ 87] |
| DMG | 37.600 | 118.500 | 12/31/1954 | 165653.0 | 5.6 | 4.00 | 0.010 | III | 89 [ 144] |
| DMG | 36.814 | 118.015 | 1/21/1955 | 1221 1.6 | 5.6 | 4.00 | 0.010 | III | 93 [ 150] |
| DMG | 36.924 | 118.138 | 2/13/1955 | 023 3.4 | 5.6 | 4.10 | 0.011 | III | 87 [ 141] |
| DMG | 36.000 | 120.930 | 3/ 2/1955 | 1559 1.0 | 5.6 | 4.80 | 0.016 | IV | 85 [ 137] |
| DMG | 37.500 | 118.683 | 6/10/1955 | 182637.0 | 5.6 | 4.00 | 0.011 | III | 77 [ 124] |
| DMG | 36.220 | 120.330 | 10/22/1955 | 7 413.0 | 5.6 | 4.20 | 0.018 | IV | 50 [ 80] |
| DMG | 36.000 | 120.920 | 11/ 2/1955 | 1940 6.0 | 5.6 | 5.20 | 0.020 | IV | 85 [ 136] |
| DMG | 37.500 | 118.800 | 11/ 8/1955 | 24052.0 | 5.6 | 4.20 | 0.013 | III | 73 [ 117] |
| DMG | 36.670 | 121.320 | 2/18/1956 | 235830.0 | 5.6 | 4.20 | 0.011 | III | 90 [ 145] |
| DMG | 36.300 | 121.300 | 7/23/1956 | 8 348.0 | 5.6 | 4.70 | 0.014 | IV | 94 [ 151] |
| DMG | 38.000 | 119.000 | 8/12/1956 | 4 412.0 | 5.6 | 4.00 | 0.010 | III | 96 [ 154] |
| DMG | 36.650 | 121.230 | 10/19/1956 | 1232 3.0 | 5.6 | 4.10 | 0.011 | III | 85 [ 137] |
| DMG | 35.950 | 120.470 | 11/16/1956 | 323 9.0 | 5.6 | 5.00 | 0.021 | IV | 69 [ 111] |
| DMG | 36.600 | 121.300 | 11/22/1956 | 164358.0 | 5.6 | 4.20 | 0.011 | III | 89 [ 143] |
| DMG | 35.880 | 120.470 | 12/11/1956 | 105653.0 | 5.6 | 4.10 | 0.013 | III | 73 [ 117] |
| DMG | 37.700 | 119.280 | 6/21/1957 | 04125.0 | 5.6 | 4.60 | 0.017 | IV | 71 [ 114] |
| MGI | 36.850 | 121.500 | 8/16/1957 | 18 2 0.0 | 5.6 | 4.30 | 0.011 | III | 100 [ 161] |
| DMG | 36.600 | 121.230 | 9/28/1957 | 21 439.0 | 5.6 | 4.50 | 0.014 | IV | 85 [ 137] |
| DMG | 37.817 | 118.583 | 4/ 2/1958 | 215437.0 | 5.6 | 4.20 | 0.011 | III | 97 [ 156] |
| DMG | 37.583 | 118.467 | 8/22/1958 | 2342 2.0 | 5.6 | 4.00 | 0.010 | III | 90 [ 145] |
| DMG | 36.350 | 121.120 | 9/21/1958 | 72455.0 | 5.6 | 4.60 | 0.015 | IV | 83 [ 134] |
| DMG | 35.930 | 120.500 | 10/10/1958 | 13 516.0 | 5.6 | 4.50 | 0.016 | IV | 71 [ 114] |
| DMG | 36.152 | 118.067 | 1/19/1959 | 2146 0.1 | 5.6 | 4.10 | 0.010 | III | 99 [ 159] |
| DMG | 37.333 | 118.633 | 6/ 6/1959 | 163046.0 | 5.6 | 4.00 | 0.012 | III | 72 [ 116] |
| DMG | 37.550 | 118.567 | 6/18/1959 | 02940.0 | 5.6 | 4.70 | 0.015 | IV | 84 [ 135] |
| DMG | 37.350 | 118.550 | 8/ 4/1959 | 73659.0 | 5.6 | 5.20 | 0.022 | IV | 76 [ 123] |
| DMG | 37.350 | 118.650 | 8/ 4/1959 | 74133.0 | 5.6 | 4.20 | 0.013 | III | 72 [ 116] |
| DMG | 37.467 | 118.650 | 8/ 4/1959 | 191235.0 | 5.6 | 4.00 | 0.011 | III | 77 [ 124] |
| DMG | 36.700 | 121.300 | 9/11/1959 | 18 5 3.0 | 5.6 | 4.00 | 0.010 | III | 89 [ 143] |
| DMG | 36.450 | 121.120 | 10/11/1959 | 2 3 9.0 | 5.6 | 4.10 | 0.012 | III | 81 [ 131] |
| DMG | 36.900 | 121.480 | 12/29/1959 | 23253.0 | 5.6 | 4.70 | 0.014 | III | 99 [ 159] |
| DMG | 36.780 | 121.430 | 1/20/1960 | 32553.0 | 5.6 | 5.00 | 0.016 | IV | 96 [ 154] |
| DMG | 37.517 | 118.733 | 6/ 5/1960 | 747 7.0 | 5.6 | 5.20 | 0.022 | IV | 76 [ 122] |
| DMG | 37.500 | 118.683 | 9/ 8/1960 | 184136.0 | 5.6 | 4.00 | 0.011 | III | 77 [ 124] |
| DMG | 36.530 | 121.130 | 11/ 3/1960 | 65024.0 | 5.6 | 4.10 | 0.012 | III | 80 [ 129] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| DMG | 37.450 | 118.633 | 2/ 2/1961 | 0 416.0 | 5.6 | 5.30 | 0.023 | IV | 77 [ 124] |
| DMG | 37.417 | 118.667 | 2/ 2/1961 | 0 742.0 | 5.6 | 5.10 | 0.021 | IV | 74 [ 119] |
| DMG | 36.680 | 121.300 | 4/ 9/1961 | 72316.0 | 5.6 | 5.60 | 0.024 | IV | 89 [ 143] |
| DMG | 36.700 | 121.300 | 4/ 9/1961 | 72541.0 | 5.6 | 5.50 | 0.023 | IV | 89 [ 143] |
| DMG | 36.600 | 121.370 | 4/28/1961 | 1 252.0 | 5.6 | 4.20 | 0.011 | III | 93 [ 150] |
| DMG | 36.400 | 121.200 | 7/22/1961 | 18 155.0 | 5.6 | 4.00 | 0.010 | III | 86 [ 139] |
| DMG | 35.820 | 120.370 | 7/31/1961 | 0 7 8.0 | 5.6 | 4.70 | 0.017 | IV | 73 [ 118] |
| DMG | 36.000 | 120.500 | 12/14/1961 | 115115.0 | 5.6 | 4.00 | 0.013 | III | 67 [ 108] |
| DMG | 36.420 | 120.620 | 4/15/1962 | 841 2.3 | 5.6 | 4.70 | 0.021 | IV | 55 [ 89] |
| DMG | 37.500 | 119.000 | 11/ 6/1962 | 115717.0 | 5.6 | 4.10 | 0.014 | III | 66 [ 106] |
| DMG | 36.417 | 120.617 | 4/15/1963 | 841 2.3 | 5.6 | 4.70 | 0.021 | IV | 55 [ 89] |
| DMG | 37.612 | 118.893 | 5/ 3/1963 | 21444.1 | 5.6 | 4.20 | 0.013 | III | 75 [ 121] |
| DMG | 37.517 | 119.017 | 11/ 6/1963 | 115720.4 | 5.6 | 4.00 | 0.013 | III | 66 [ 106] |
| DMG | 36.583 | 120.333 | 11/30/1963 | 225548.0 | 5.6 | 4.50 | 0.027 | V | 37 [ 59] |
| DMG | 37.648 | 118.396 | 12/ 6/1963 | 83421.5 | 5.6 | 4.70 | 0.014 | IV | 96 [ 154] |
| DMG | 37.600 | 118.400 | 3/ 9/1964 | 2 631.0 | 5.6 | 4.00 | 0.010 | III | 93 [ 150] |
| DMG | 36.550 | 121.160 | 5/13/1964 | 121837.2 | 5.6 | 4.00 | 0.011 | III | 82 [ 132] |
| DMG | 37.400 | 118.600 | 9/ 4/1964 | 202024.8 | 5.6 | 4.10 | 0.012 | III | 76 [ 123] |
| DMG | 36.000 | 120.000 | 11/ 8/1964 | 11919.0 | 5.6 | 4.00 | 0.015 | IV | 53 [ 86] |
| DMG | 36.630 | 121.360 | 9/14/1965 | 9 924.2 | 5.6 | 4.00 | 0.010 | III | 92 [ 148] |
| DMG | 35.980 | 120.040 | 9/19/1965 | 1542 7.8 | 5.6 | 4.80 | 0.023 | IV | 55 [ 89] |
| DMG | 37.416 | 118.479 | 9/22/1965 | 214925.9 | 5.6 | 4.50 | 0.014 | IV | 82 [ 132] |
| DMG | 37.300 | 118.500 | 11/ 1/1965 | 171016.3 | 5.6 | 4.10 | 0.012 | III | 77 [ 124] |
| DMG | 37.237 | 118.732 | 4/17/1966 | 7 419.1 | 5.6 | 4.00 | 0.013 | III | 64 [ 103] |
| DMG | 35.970 | 120.500 | 6/28/1966 | 4 856.2 | 5.6 | 5.10 | 0.022 | IV | 69 [ 111] |
| DMG | 35.950 | 120.500 | 6/28/1966 | 42613.4 | 5.6 | 5.50 | 0.027 | V | 70 [ 113] |
| DMG | 35.950 | 120.500 | 6/28/1966 | 42836.0 | 5.6 | 4.50 | 0.016 | IV | 70 [ 113] |
| DMG | 35.705 | 120.335 | 6/28/1966 | 43522.0 | 5.6 | 4.10 | 0.012 | III | 79 [ 127] |
| DMG | 35.950 | 120.530 | 6/29/1966 | 195325.9 | 5.6 | 5.00 | 0.021 | IV | 71 [ 114] |
| DMG | 35.860 | 120.450 | 6/30/1966 | 11736.1 | 5.6 | 4.10 | 0.013 | III | 73 [ 118] |
| DMG | 36.580 | 121.220 | 10/10/1966 | 65346.0 | 5.6 | 4.10 | 0.011 | III | 85 [ 137] |
| DMG | 35.800 | 120.450 | 8/12/1967 | 185740.4 | 5.6 | 4.10 | 0.012 | III | 77 [ 123] |
| DMG | 37.475 | 118.596 | 11/21/1967 | 53020.9 | 5.6 | 4.40 | 0.014 | IV | 80 [ 128] |
| DMG | 35.750 | 120.450 | 12/31/1967 | 234813.5 | 5.6 | 4.30 | 0.013 | III | 80 [ 128] |
| DMG | 37.625 | 118.926 | 10/ 3/1969 | 131010.3 | 5.6 | 4.90 | 0.019 | IV | 75 [ 121] |
| DMG | 36.260 | 118.310 | 10/ 3/1969 | 233227.1 | 5.6 | 4.00 | 0.011 | III | 84 [ 135] |
| DMG | 36.790 | 121.390 | 10/27/1969 | 105942.8 | 5.6 | 4.60 | 0.014 | III | 94 [ 151] |
| DMG | 36.750 | 121.410 | 11/15/1969 | 2058 3.6 | 5.6 | 4.20 | 0.011 | III | 95 [ 152] |
| DMG | 36.430 | 121.050 | 11/17/1969 | 204919.5 | 5.6 | 4.40 | 0.014 | IV | 78 [ 125] |
| DMG | 36.868 | 121.408 | 3/31/1970 | 7 228.3 | 5.6 | 4.54 | 0.013 | III | 95 [ 153] |
| DMG | 37.520 | 118.415 | 2/17/1972 | 11 959.5 | 5.6 | 4.00 | 0.010 | III | 89 [ 144] |
| DMG | 36.578 | 121.209 | 2/24/1972 | 155651.0 | 5.6 | 5.10 | 0.019 | IV | 84 [ 136] |
| DMG | 36.529 | 121.103 | 2/27/1972 | 2213 8.4 | 5.6 | 4.62 | 0.016 | IV | 79 [ 127] |
| DMG | 36.625 | 121.274 | 9/ 4/1972 | 18 440.8 | 5.6 | 4.63 | 0.014 | IV | 87 [ 141] |
| DMG | 36.672 | 121.334 | 1/15/1973 | 94329.9 | 5.6 | 4.07 | 0.010 | III | 91 [ 146] |
| DMG | 37.520 | 118.415 | 2/17/1973 | 11 959.5 | 5.6 | 4.00 | 0.010 | III | 89 [ 144] |
| DMG | 36.563 | 121.205 | 6/22/1973 | 12912.2 | 5.6 | 4.16 | 0.012 | III | 84 [ 135] |
| DMG | 36.602 | 119.375 | 9/15/1973 | 1 315.4 | 5.6 | 4.40 | 0.040 | V | 20 [ 32] |
| DMG | 37.593 | 118.982 | 10/ 7/1973 | 173053.4 | 5.6 | 4.00 | 0.012 | III | 71 [ 115] |
| DMG | 36.530 | 120.680 | 8/19/1974 | 124719.1 | 5.6 | 4.40 | 0.018 | IV | 56 [ 90] |
| DMG | 36.910 | 121.480 | 11/28/1974 | 23 124.7 | 5.6 | 5.20 | 0.018 | IV | 99 [ 160] |
| DMG | 36.920 | 121.480 | 11/29/1974 | 1 4 7.0 | 5.6 | 4.00 | 0.009 | III | 99 [ 160] |
| DMG | 36.920 | 121.470 | 12/31/1974 | 2022 1.1 | 5.6 | 4.30 | 0.011 | III | 99 [ 159] |
| BRK | 35.960 | 120.520 | 1/ 6/1975 | 111712.0 | 5.6 | 4.40 | 0.015 | IV | 70 [ 113] |
| BRK | 36.930 | 121.480 | 3/ 3/1975 | 113455.0 | 5.6 | 4.20 | 0.010 | III | 99 [ 160] |
| PAS | 35.755 | 118.542 | 4/17/1975 | 91833.8 | 5.6 | 4.00 | 0.010 | III | 93 [ 150] |
| BRK | 37.190 | 120.950 | 6/18/1975 | 175019.0 | 5.6 | 4.10 | 0.012 | III | 76 [ 122] |
| BRK | 36.470 | 120.350 | 8/ 3/1975 | 55717.0 | 5.6 | 4.00 | 0.019 | IV | 40 [ 65] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| BRK | 36.460 | 120.340 | 8/ 3/1975 | 63516.0 | 5.6 | 4.90 | 0.031 | V | 40 [ 65] |
| BRK | 36.460 | 120.340 | 8/ 3/1975 | 638 0.0 | 5.6 | 4.40 | 0.023 | IV | 40 [ 65] |
| UNR | 37.373 | 119.956 | 8/10/1975 | 51640.5 | 5.6 | 4.40 | 0.021 | IV | 47 [ 75] |
| BRK | 36.500 | 120.400 | 8/15/1975 | 222751.0 | 5.6 | 4.60 | 0.025 | V | 42 [ 68] |
| PAS | 37.567 | 118.845 | 8/17/1975 | 02426.9 | 5.6 | 4.10 | 0.012 | III | 74 [ 120] |
| BRK | 36.000 | 120.560 | 9/13/1975 | 212059.0 | 5.6 | 4.80 | 0.019 | IV | 70 [ 112] |
| PAS | 37.632 | 118.848 | 10/ 7/1975 | 211245.4 | 5.6 | 4.00 | 0.011 | III | 78 [ 125] |
| UNR | 37.499 | 118.418 | 12/10/1975 | 191924.4 | 5.6 | 4.50 | 0.013 | III | 88 [ 142] |
| PAS | 36.062 | 120.163 | 1/14/1976 | 214259.4 | 5.6 | 4.70 | 0.022 | IV | 53 [ 85] |
| BRK | 36.110 | 120.160 | 1/14/1976 | 214359.0 | 5.6 | 4.90 | 0.026 | V | 50 [ 80] |
| BRK | 36.820 | 121.130 | 3/17/1976 | 4 152.0 | 5.6 | 4.30 | 0.013 | III | 79 [ 128] |
| UNR | 37.388 | 118.466 | 4/23/1976 | 037 2.2 | 5.6 | 4.00 | 0.011 | III | 82 [ 132] |
| UNR | 37.433 | 118.550 | 7/ 7/1976 | 182738.0 | 5.6 | 4.60 | 0.015 | IV | 80 [ 128] |
| UNR | 37.582 | 118.521 | 10/21/1976 | 040 4.4 | 5.6 | 4.10 | 0.011 | III | 88 [ 141] |
| UNR | 37.366 | 118.402 | 11/26/1976 | 0 947.8 | 5.6 | 4.10 | 0.011 | III | 84 [ 135] |
| BRK | 36.580 | 121.220 | 12/15/1977 | 111528.0 | 5.6 | 4.20 | 0.012 | III | 85 [ 137] |
| PAS | 37.514 | 118.683 | 10/ 4/1978 | 164248.7 | 5.6 | 5.80 | 0.029 | V | 78 [ 125] |
| PAS | 37.540 | 118.651 | 10/ 4/1978 | 1659 4.5 | 5.6 | 4.40 | 0.014 | III | 80 [ 129] |
| PAS | 37.528 | 118.668 | 10/ 4/1978 | 173131.1 | 5.6 | 4.30 | 0.013 | III | 79 [ 127] |
| PAS | 37.538 | 118.675 | 10/ 4/1978 | 1739 3.3 | 5.6 | 5.30 | 0.022 | IV | 79 [ 128] |
| PAS | 37.550 | 118.380 | 10/ 4/1978 | 174648.7 | 5.6 | 4.30 | 0.012 | III | 92 [ 148] |
| PAS | 37.520 | 118.691 | 10/ 4/1978 | 18 153.4 | 5.6 | 4.10 | 0.012 | III | 78 [ 125] |
| PAS | 37.500 | 118.677 | 10/ 4/1978 | 182241.4 | 5.6 | 4.30 | 0.013 | III | 77 [ 125] |
| PAS | 37.507 | 118.672 | 10/ 5/1978 | 11746.9 | 5.6 | 4.40 | 0.014 | IV | 78 [ 125] |
| PAS | 37.486 | 118.665 | 10/ 5/1978 | 64130.1 | 5.6 | 4.40 | 0.014 | IV | 77 [ 124] |
| UNR | 37.320 | 118.704 | 10/26/1978 | 19038.1 | 5.6 | 4.10 | 0.013 | III | 68 [ 110] |
| UNR | 37.516 | 118.795 | 12/26/1978 | 8 8 4.3 | 5.6 | 4.20 | 0.013 | III | 74 [ 118] |
| PAS | 37.534 | 118.643 | 1/19/1979 | 181042.4 | 5.6 | 4.30 | 0.013 | III | 80 [ 129] |
| PAS | 37.521 | 118.604 | 1/24/1979 | 211426.9 | 5.6 | 4.40 | 0.014 | III | 81 [ 131] |
| PAS | 37.679 | 118.775 | 6/16/1979 | 224459.2 | 5.6 | 4.30 | 0.013 | III | 83 [ 133] |
| BRK | 37.000 | 121.470 | 8/ 6/1979 | 223355.0 | 5.6 | 4.30 | 0.011 | III | 100 [ 160] |
| BRK | 37.010 | 121.450 | 8/ 9/1979 | 7 320.0 | 5.6 | 4.20 | 0.011 | III | 99 [ 159] |
| PAS | 37.636 | 118.916 | 9/ 7/1979 | 94348.5 | 5.6 | 4.40 | 0.014 | IV | 76 [ 122] |
| UNR | 37.630 | 118.904 | 9/23/1979 | 13 5 4.9 | 5.6 | 4.10 | 0.012 | III | 76 [ 122] |
| PAS | 37.635 | 118.917 | 9/24/1979 | 13 5 4.8 | 5.6 | 4.30 | 0.014 | III | 76 [ 122] |
| PAS | 37.684 | 118.790 | 9/24/1979 | 142620.6 | 5.6 | 4.00 | 0.011 | III | 83 [ 133] |
| UNR | 37.610 | 118.854 | 11/ 7/1979 | 62723.9 | 5.6 | 4.10 | 0.012 | III | 76 [ 123] |
| UNR | 37.652 | 118.853 | 11/ 9/1979 | 101155.5 | 5.6 | 4.20 | 0.013 | III | 79 [ 127] |
| PAS | 37.570 | 118.793 | 11/ 9/1979 | 101256.6 | 5.6 | 4.00 | 0.012 | III | 76 [ 123] |
| UNR | 37.655 | 118.818 | 11/ 9/1979 | 174558.9 | 5.6 | 4.10 | 0.012 | III | 80 [ 129] |
| PAS | 37.499 | 118.804 | 11/ 9/1979 | 1747 0.4 | 5.6 | 4.10 | 0.013 | III | 72 [ 117] |
| PAS | 37.623 | 118.852 | 11/ 9/1979 | 175415.3 | 5.6 | 4.40 | 0.014 | IV | 77 [ 124] |
| PAS | 37.548 | 118.812 | 11/10/1979 | 94510.7 | 5.6 | 4.20 | 0.013 | III | 75 [ 120] |
| PAS | 37.594 | 118.750 | 11/20/1979 | 1724 0.1 | 5.6 | 4.20 | 0.012 | III | 79 [ 128] |
| PAS | 37.493 | 118.731 | 12/ 6/1979 | 193241.4 | 5.6 | 4.30 | 0.014 | III | 75 [ 121] |
| PAS | 37.523 | 118.856 | 12/ 8/1979 | 213853.8 | 5.6 | 4.30 | 0.014 | IV | 72 [ 115] |
| PAS | 37.415 | 118.732 | 12/26/1979 | 8 9 6.6 | 5.6 | 4.10 | 0.013 | III | 71 [ 115] |
| PAS | 37.528 | 118.716 | 1/14/1980 | 235156.8 | 5.6 | 4.20 | 0.013 | III | 77 [ 124] |
| BRK | 36.660 | 121.360 | 3/ 6/1980 | 11 5 9.0 | 5.6 | 4.00 | 0.010 | III | 92 [ 148] |
| USG | 37.590 | 118.929 | 3/15/1980 | 153048.0 | 5.6 | 4.31 | 0.014 | IV | 73 [ 117] |
| PAS | 37.556 | 118.855 | 3/20/1980 | 11 544.0 | 5.6 | 4.00 | 0.012 | III | 74 [ 118] |
| USG | 37.619 | 118.911 | 3/20/1980 | 164248.8 | 5.6 | 4.12 | 0.012 | III | 75 [ 121] |
| PAS | 37.572 | 118.836 | 3/27/1980 | 226 5.9 | 5.6 | 4.40 | 0.014 | IV | 75 [ 121] |
| UNR | 37.611 | 118.796 | 5/14/1980 | 08232.1 | 5.6 | 4.00 | 0.011 | III | 79 [ 126] |
| PAS | 37.528 | 118.430 | 5/17/1980 | 0 117.0 | 5.6 | 4.50 | 0.013 | III | 89 [ 143] |
| PAS | 37.517 | 118.540 | 5/18/1980 | 124733.5 | 5.6 | 4.10 | 0.011 | III | 84 [ 135] |
| PAS | 37.451 | 119.088 | 5/25/1980 | 44938.0 | 5.6 | 4.00 | 0.014 | IV | 60 [ 97] |
| PAS | 37.608 | 118.821 | 5/25/1980 | 163344.8 | 5.6 | 6.40 | 0.040 | V | 77 [ 125] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| PAS | 37.600 | 118.817 | 5/25/1980 | 163649.2 | 5.6 | 4.30 | 0.013 | III | 77 [ 124] |
| PAS | 37.600 | 118.817 | 5/25/1980 | 1637 1.0 | 5.6 | 4.00 | 0.011 | III | 77 [ 124] |
| PAS | 37.600 | 118.817 | 5/25/1980 | 163721.3 | 5.6 | 4.00 | 0.011 | III | 77 [ 124] |
| PAS | 37.600 | 118.817 | 5/25/1980 | 163756.9 | 5.6 | 4.00 | 0.011 | III | 77 [ 124] |
| PAS | 37.600 | 118.817 | 5/25/1980 | 163846.8 | 5.6 | 4.20 | 0.013 | III | 77 [ 124] |
| PAS | 37.527 | 118.739 | 5/25/1980 | 163942.9 | 5.6 | 4.00 | 0.012 | III | 76 [ 123] |
| PAS | 37.455 | 118.810 | 5/25/1980 | 164159.0 | 5.6 | 4.20 | 0.014 | III | 70 [ 113] |
| PAS | 37.494 | 118.845 | 5/25/1980 | 164528.7 | 5.6 | 4.00 | 0.012 | III | 71 [ 114] |
| PAS | 37.486 | 118.783 | 5/25/1980 | 164930.3 | 5.6 | 5.80 | 0.031 | V | 73 [ 117] |
| PAS | 37.621 | 118.726 | 5/25/1980 | 165229.2 | 5.6 | 4.60 | 0.015 | IV | 82 [ 131] |
| PAS | 37.600 | 118.817 | 5/25/1980 | 165251.6 | 5.6 | 4.10 | 0.012 | III | 77 [ 124] |
| PAS | 37.600 | 118.817 | 5/25/1980 | 165347.3 | 5.6 | 4.00 | 0.011 | III | 77 [ 124] |
| PAS | 37.606 | 118.915 | 5/25/1980 | 165613.3 | 5.6 | 4.20 | 0.013 | III | 74 [ 120] |
| PAS | 37.550 | 118.829 | 5/25/1980 | 165950.2 | 5.6 | 4.00 | 0.012 | III | 74 [ 119] |
| PAS | 37.474 | 118.849 | 5/25/1980 | 17 627.2 | 5.6 | 4.90 | 0.020 | IV | 69 [ 112] |
| PAS | 37.513 | 118.732 | 5/25/1980 | 17 830.6 | 5.6 | 4.60 | 0.016 | IV | 76 [ 122] |
| PAS | 37.672 | 118.952 | 5/25/1980 | 171212.6 | 5.6 | 4.00 | 0.011 | III | 77 [ 124] |
| PAS | 37.493 | 118.807 | 5/25/1980 | 171731.7 | 5.6 | 4.00 | 0.012 | III | 72 [ 116] |
| PAS | 37.496 | 118.792 | 5/25/1980 | 174833.8 | 5.6 | 4.60 | 0.016 | IV | 73 [ 117] |
| PAS | 37.489 | 118.801 | 5/25/1980 | 181359.9 | 5.6 | 4.00 | 0.012 | III | 72 [ 116] |
| UNR | 37.536 | 118.861 | 5/25/1980 | 183415.0 | 5.6 | 4.60 | 0.017 | IV | 72 [ 116] |
| PAS | 37.452 | 118.750 | 5/25/1980 | 19 437.4 | 5.6 | 4.30 | 0.014 | IV | 72 [ 116] |
| PAS | 37.522 | 118.823 | 5/25/1980 | 194125.1 | 5.6 | 4.50 | 0.016 | IV | 73 [ 117] |
| PAS | 37.556 | 118.791 | 5/25/1980 | 194452.2 | 5.6 | 6.50 | 0.043 | VI | 76 [ 122] |
| PAS | 37.538 | 118.820 | 5/25/1980 | 195153.3 | 5.6 | 4.00 | 0.012 | III | 74 [ 119] |
| UNR | 37.639 | 118.762 | 5/25/1980 | 195255.2 | 5.6 | 4.00 | 0.011 | III | 81 [ 131] |
| PAS | 37.601 | 118.817 | 5/25/1980 | 202327.1 | 5.6 | 4.70 | 0.017 | IV | 77 [ 124] |
| PAS | 37.537 | 118.713 | 5/25/1980 | 203551.0 | 5.6 | 5.50 | 0.025 | V | 78 [ 125] |
| PAS | 37.572 | 118.684 | 5/25/1980 | 203841.3 | 5.6 | 4.30 | 0.013 | III | 81 [ 130] |
| PAS | 37.481 | 118.794 | 5/25/1980 | 205924.9 | 5.6 | 4.90 | 0.019 | IV | 72 [ 116] |
| PAS | 37.418 | 118.758 | 5/25/1980 | 221036.6 | 5.6 | 4.10 | 0.013 | III | 70 [ 113] |
| PAS | 37.600 | 118.817 | 5/25/1980 | 2356 3.6 | 5.6 | 4.00 | 0.011 | III | 77 [ 124] |
| PAS | 37.561 | 118.894 | 5/26/1980 | 057 4.2 | 5.6 | 4.40 | 0.015 | IV | 72 [ 117] |
| PAS | 37.553 | 118.733 | 5/26/1980 | 119 4.8 | 5.6 | 4.70 | 0.016 | IV | 78 [ 125] |
| PAS | 37.517 | 118.657 | 5/26/1980 | 34910.7 | 5.6 | 4.00 | 0.011 | III | 79 [ 127] |
| PAS | 37.604 | 118.739 | 5/26/1980 | 43655.2 | 5.6 | 4.00 | 0.011 | III | 80 [ 129] |
| PAS | 37.543 | 118.837 | 5/26/1980 | 55628.1 | 5.6 | 4.60 | 0.016 | IV | 73 [ 118] |
| PAS | 37.497 | 118.839 | 5/26/1980 | 64347.9 | 5.6 | 4.10 | 0.013 | III | 71 [ 114] |
| PAS | 37.512 | 118.749 | 5/26/1980 | 102032.8 | 5.6 | 4.10 | 0.012 | III | 75 [ 121] |
| UNR | 37.590 | 118.789 | 5/26/1980 | 103929.7 | 5.6 | 4.10 | 0.012 | III | 78 [ 125] |
| UNR | 37.513 | 118.959 | 5/26/1980 | 103953.0 | 5.6 | 4.10 | 0.013 | III | 68 [ 109] |
| PAS | 37.535 | 118.696 | 5/26/1980 | 11 4 5.8 | 5.6 | 4.00 | 0.011 | III | 78 [ 126] |
| PAS | 37.517 | 118.743 | 5/26/1980 | 122427.3 | 5.6 | 5.20 | 0.022 | IV | 76 [ 122] |
| PAS | 37.508 | 118.812 | 5/26/1980 | 13 420.6 | 5.6 | 4.10 | 0.013 | III | 73 [ 117] |
| PAS | 37.478 | 118.816 | 5/26/1980 | 143732.4 | 5.6 | 4.20 | 0.014 | III | 71 [ 114] |
| PAS | 37.676 | 118.809 | 5/26/1980 | 162021.7 | 5.6 | 4.50 | 0.014 | IV | 82 [ 131] |
| PAS | 37.544 | 118.861 | 5/26/1980 | 185756.3 | 5.6 | 4.90 | 0.019 | IV | 73 [ 117] |
| PAS | 37.530 | 118.860 | 5/26/1980 | 1924 9.9 | 5.6 | 4.20 | 0.013 | III | 72 [ 116] |
| UNR | 37.543 | 118.840 | 5/27/1980 | 63654.4 | 5.6 | 4.00 | 0.012 | III | 73 [ 118] |
| UNR | 37.593 | 118.932 | 5/27/1980 | 64642.0 | 5.6 | 4.00 | 0.012 | III | 73 [ 117] |
| PAS | 37.608 | 118.846 | 5/27/1980 | 9 931.3 | 5.6 | 4.10 | 0.012 | III | 77 [ 123] |
| UNR | 37.530 | 118.852 | 5/27/1980 | 1327 8.0 | 5.6 | 4.30 | 0.014 | IV | 72 [ 116] |
| PAS | 37.464 | 118.823 | 5/27/1980 | 145057.1 | 5.6 | 6.30 | 0.042 | V | 70 [ 113] |
| PAS | 37.508 | 118.816 | 5/27/1980 | 151346.8 | 5.6 | 4.10 | 0.013 | III | 72 [ 117] |
| PAS | 37.478 | 118.819 | 5/27/1980 | 154146.9 | 5.6 | 4.10 | 0.013 | III | 71 [ 114] |
| PAS | 37.491 | 118.816 | 5/27/1980 | 17 958.6 | 5.6 | 4.30 | 0.014 | IV | 72 [ 115] |
| PAS | 37.604 | 118.770 | 5/27/1980 | 19 1 8.3 | 5.6 | 5.00 | 0.019 | IV | 79 [ 127] |
| PAS | 37.496 | 118.820 | 5/27/1980 | 213454.3 | 5.6 | 4.50 | 0.016 | IV | 72 [ 115] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| PAS | 37.559 | 118.854 | 5/27/1980 | 2341 3.9 | 5.6 | 4.00 | 0.012 | III | 74 [ 119] |
| UNR | 37.561 | 118.790 | 5/28/1980 | 32636.4 | 5.6 | 4.00 | 0.012 | III | 76 [ 122] |
| UNR | 37.546 | 118.918 | 5/28/1980 | 42211.3 | 5.6 | 4.30 | 0.014 | IV | 71 [ 114] |
| PAS | 37.580 | 118.886 | 5/28/1980 | 51623.4 | 5.6 | 4.80 | 0.018 | IV | 74 [ 119] |
| PAS | 37.704 | 119.145 | 5/28/1980 | 54827.9 | 5.6 | 4.80 | 0.018 | IV | 74 [ 119] |
| UNR | 37.582 | 118.909 | 5/28/1980 | 6 743.4 | 5.6 | 4.50 | 0.016 | IV | 73 [ 118] |
| UNR | 37.639 | 118.867 | 5/28/1980 | 613 5.9 | 5.6 | 4.20 | 0.013 | III | 78 [ 125] |
| UNR | 37.640 | 118.862 | 5/28/1980 | 64919.6 | 5.6 | 4.30 | 0.013 | III | 78 [ 125] |
| UNR | 37.559 | 118.776 | 5/28/1980 | 92030.6 | 5.6 | 4.10 | 0.012 | III | 77 [ 123] |
| UNR | 37.478 | 118.827 | 5/28/1980 | 1013 2.5 | 5.6 | 4.20 | 0.014 | III | 71 [ 113] |
| PAS | 37.470 | 118.812 | 5/28/1980 | 115437.9 | 5.6 | 4.20 | 0.014 | III | 71 [ 114] |
| UNR | 37.522 | 118.784 | 5/28/1980 | 14 630.2 | 5.6 | 4.30 | 0.014 | IV | 74 [ 120] |
| UNR | 37.463 | 118.845 | 5/28/1980 | 141822.3 | 5.6 | 4.30 | 0.015 | IV | 69 [ 111] |
| UNR | 37.543 | 118.816 | 5/29/1980 | 41852.5 | 5.6 | 4.20 | 0.013 | III | 74 [ 119] |
| UNR | 37.502 | 118.878 | 5/29/1980 | 55543.9 | 5.6 | 4.00 | 0.012 | III | 70 [ 112] |
| UNR | 37.504 | 118.871 | 5/29/1980 | 165656.7 | 5.6 | 4.00 | 0.012 | III | 70 [ 113] |
| PAS | 37.514 | 118.836 | 5/29/1980 | 1721 1.3 | 5.6 | 4.00 | 0.012 | III | 72 [ 116] |
| UNR | 37.567 | 118.893 | 5/30/1980 | 154158.1 | 5.6 | 4.50 | 0.016 | IV | 73 [ 117] |
| UNR | 37.530 | 118.783 | 5/30/1980 | 1549 2.3 | 5.6 | 4.30 | 0.014 | III | 75 [ 120] |
| UNR | 37.572 | 118.878 | 5/30/1980 | 1949 2.5 | 5.6 | 4.30 | 0.014 | IV | 74 [ 118] |
| UNR | 37.542 | 118.825 | 5/30/1980 | 23 232.4 | 5.6 | 4.00 | 0.012 | III | 74 [ 119] |
| PAS | 37.634 | 118.721 | 5/31/1980 | 05817.4 | 5.6 | 4.60 | 0.015 | IV | 82 [ 133] |
| PAS | 37.556 | 118.848 | 5/31/1980 | 8 520.1 | 5.6 | 4.10 | 0.012 | III | 74 [ 119] |
| PAS | 37.572 | 118.846 | 5/31/1980 | 101131.7 | 5.6 | 4.00 | 0.012 | III | 75 [ 120] |
| UNR | 37.589 | 118.812 | 5/31/1980 | 101431.1 | 5.6 | 4.10 | 0.012 | III | 77 [ 124] |
| UNR | 37.584 | 118.817 | 5/31/1980 | 131340.5 | 5.6 | 4.10 | 0.012 | III | 76 [ 123] |
| UNR | 37.602 | 118.927 | 5/31/1980 | 142050.7 | 5.6 | 4.20 | 0.013 | III | 74 [ 119] |
| PAS | 37.636 | 118.795 | 5/31/1980 | 151611.7 | 5.6 | 4.90 | 0.018 | IV | 80 [ 129] |
| UNR | 37.595 | 118.779 | 5/31/1980 | 152019.6 | 5.6 | 4.00 | 0.011 | III | 78 [ 126] |
| UNR | 37.568 | 118.799 | 6/ 1/1980 | 31743.9 | 5.6 | 4.00 | 0.012 | III | 76 [ 123] |
| PAS | 37.462 | 118.866 | 6/ 1/1980 | 64736.9 | 5.6 | 4.20 | 0.014 | IV | 68 [ 110] |
| UNR | 37.625 | 118.897 | 6/ 1/1980 | 1459 5.3 | 5.6 | 4.10 | 0.012 | III | 76 [ 122] |
| UNR | 37.581 | 118.765 | 6/ 1/1980 | 172725.0 | 5.6 | 4.40 | 0.014 | IV | 78 [ 126] |
| UNR | 37.628 | 118.871 | 6/ 1/1980 | 223022.4 | 5.6 | 4.30 | 0.013 | III | 77 [ 124] |
| UNR | 37.557 | 118.851 | 6/ 2/1980 | 63947.7 | 5.6 | 4.10 | 0.012 | III | 74 [ 119] |
| PAS | 37.602 | 118.936 | 6/ 2/1980 | 102221.1 | 5.6 | 4.10 | 0.013 | III | 73 [ 118] |
| UNR | 37.571 | 118.863 | 6/ 2/1980 | 203413.8 | 5.6 | 4.60 | 0.016 | IV | 74 [ 119] |
| UNR | 37.533 | 118.806 | 6/ 3/1980 | 173412.0 | 5.6 | 4.00 | 0.012 | III | 74 [ 119] |
| UNR | 37.497 | 118.880 | 6/ 4/1980 | 545 4.6 | 5.6 | 4.10 | 0.013 | III | 70 [ 112] |
| UNR | 37.477 | 118.807 | 6/ 4/1980 | 83420.1 | 5.6 | 4.10 | 0.013 | III | 71 [ 115] |
| UNR | 37.533 | 118.878 | 6/ 4/1980 | 19 921.5 | 5.6 | 4.10 | 0.013 | III | 72 [ 115] |
| PAS | 37.577 | 118.897 | 6/ 5/1980 | 1941 2.1 | 5.6 | 4.00 | 0.012 | III | 73 [ 118] |
| USG | 37.542 | 118.883 | 6/ 5/1980 | 20 452.3 | 5.6 | 5.05 | 0.021 | IV | 72 [ 116] |
| USG | 37.498 | 118.838 | 6/ 6/1980 | 141817.2 | 5.6 | 5.27 | 0.024 | IV | 71 [ 114] |
| UNR | 37.461 | 118.806 | 6/ 6/1980 | 171615.2 | 5.6 | 4.20 | 0.014 | III | 70 [ 113] |
| UNR | 37.628 | 118.897 | 6/ 7/1980 | 13145.5 | 5.6 | 4.40 | 0.014 | IV | 76 [ 122] |
| UNR | 37.633 | 118.894 | 6/ 7/1980 | 13158.0 | 5.6 | 4.40 | 0.014 | IV | 76 [ 123] |
| PAS | 37.688 | 118.892 | 6/ 7/1980 | 231752.3 | 5.6 | 4.30 | 0.013 | III | 80 [ 128] |
| USG | 37.527 | 118.759 | 6/ 8/1980 | 61139.6 | 5.6 | 5.12 | 0.021 | IV | 76 [ 122] |
| UNR | 37.544 | 118.857 | 6/ 8/1980 | 62527.4 | 5.6 | 4.00 | 0.012 | III | 73 [ 117] |
| PAS | 37.485 | 118.843 | 6/ 8/1980 | 232220.7 | 5.6 | 4.20 | 0.014 | III | 70 [ 113] |
| UNR | 37.575 | 118.795 | 6/10/1980 | 152135.7 | 5.6 | 4.10 | 0.012 | III | 77 [ 123] |
| PAS | 37.509 | 119.043 | 6/11/1980 | 441 1.1 | 5.6 | 5.00 | 0.022 | IV | 65 [ 104] |
| PAS | 37.608 | 118.983 | 6/11/1980 | 171024.7 | 5.6 | 4.00 | 0.012 | III | 72 [ 116] |
| PAS | 37.412 | 118.994 | 6/13/1980 | 1457 3.6 | 5.6 | 4.00 | 0.014 | III | 61 [ 98] |
| PAS | 37.497 | 118.853 | 6/13/1980 | 232320.6 | 5.6 | 4.30 | 0.014 | IV | 71 [ 113] |
| UNR | 37.628 | 118.891 | 6/14/1980 | 54747.8 | 5.6 | 4.10 | 0.012 | III | 76 [ 123] |
| UNR | 37.518 | 118.888 | 6/17/1980 | 122639.5 | 5.6 | 4.60 | 0.017 | IV | 70 [ 113] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| UNR | 37.473 | 118.860 | 6/18/1980 | 115820.8 | 5.6 | 4.90 | 0.020 | IV | 69 [ 111] |
| USG | 37.522 | 118.865 | 6/18/1980 | 131515.0 | 5.6 | 4.29 | 0.014 | IV | 71 [ 115] |
| UNR | 37.516 | 118.837 | 6/18/1980 | 185537.7 | 5.6 | 5.30 | 0.024 | V | 72 [ 116] |
| UNR | 37.529 | 118.876 | 6/19/1980 | 44532.1 | 5.6 | 4.90 | 0.020 | IV | 71 [ 115] |
| UNR | 37.558 | 118.911 | 6/19/1980 | 71931.5 | 5.6 | 5.00 | 0.021 | IV | 72 [ 115] |
| UNR | 37.560 | 118.906 | 6/19/1980 | 72226.1 | 5.6 | 4.80 | 0.018 | IV | 72 [ 116] |
| UNR | 37.636 | 118.847 | 6/19/1980 | 14430.2 | 5.6 | 5.20 | 0.021 | IV | 78 [ 126] |
| UNR | 37.536 | 118.851 | 6/20/1980 | 152459.6 | 5.6 | 5.30 | 0.024 | IV | 73 [ 117] |
| UNR | 37.546 | 118.902 | 6/20/1980 | 1724 7.6 | 5.6 | 4.20 | 0.014 | III | 71 [ 115] |
| UNR | 37.581 | 118.817 | 6/28/1980 | 05734.0 | 5.6 | 4.00 | 0.012 | III | 76 [ 123] |
| PAS | 37.556 | 118.863 | 6/28/1980 | 05843.1 | 5.6 | 4.10 | 0.013 | III | 73 [ 118] |
| UNR | 37.586 | 118.815 | 6/28/1980 | 353 1.6 | 5.6 | 4.10 | 0.012 | III | 77 [ 123] |
| UNR | 37.613 | 118.914 | 6/30/1980 | 14914.6 | 5.6 | 4.00 | 0.012 | III | 75 [ 120] |
| UNR | 37.464 | 118.808 | 6/30/1980 | 2 943.6 | 5.6 | 4.00 | 0.012 | III | 71 [ 114] |
| UNR | 37.583 | 118.817 | 7/ 1/1980 | 63813.6 | 5.6 | 4.30 | 0.014 | III | 76 [ 123] |
| UNR | 37.620 | 118.909 | 7/ 1/1980 | 142512.4 | 5.6 | 4.20 | 0.013 | III | 75 [ 121] |
| UNR | 37.525 | 118.838 | 7/ 2/1980 | 41352.7 | 5.6 | 4.30 | 0.014 | IV | 73 [ 117] |
| PAS | 37.604 | 119.053 | 7/ 3/1980 | 21933.5 | 5.6 | 4.40 | 0.015 | IV | 70 [ 113] |
| PAS | 37.809 | 118.883 | 7/ 3/1980 | 23956.2 | 5.6 | 4.50 | 0.014 | III | 87 [ 140] |
| PAS | 37.592 | 118.842 | 7/ 5/1980 | 115859.7 | 5.6 | 4.50 | 0.015 | IV | 76 [ 122] |
| PAS | 37.933 | 118.922 | 7/ 7/1980 | 213440.1 | 5.6 | 4.00 | 0.010 | III | 93 [ 150] |
| USG | 37.518 | 118.826 | 7/10/1980 | 143053.9 | 5.6 | 4.93 | 0.020 | IV | 73 [ 117] |
| UNR | 37.498 | 118.804 | 7/13/1980 | 105536.0 | 5.6 | 4.00 | 0.012 | III | 72 [ 116] |
| UNR | 37.519 | 118.822 | 7/15/1980 | 71611.8 | 5.6 | 4.00 | 0.012 | III | 73 [ 117] |
| UNR | 37.548 | 118.788 | 7/16/1980 | 91111.1 | 5.6 | 4.20 | 0.013 | III | 76 [ 122] |
| USG | 37.497 | 118.871 | 7/16/1980 | 1125 3.1 | 5.6 | 4.26 | 0.014 | IV | 70 [ 112] |
| UNR | 37.587 | 118.879 | 7/25/1980 | 64419.2 | 5.6 | 4.10 | 0.012 | III | 74 [ 120] |
| UNR | 37.550 | 118.878 | 7/26/1980 | 172247.0 | 5.6 | 4.20 | 0.013 | III | 72 [ 117] |
| UNR | 37.638 | 118.909 | 7/26/1980 | 2143 1.5 | 5.6 | 4.10 | 0.012 | III | 76 [ 123] |
| UNR | 37.497 | 118.727 | 7/27/1980 | 165531.2 | 5.6 | 4.10 | 0.012 | III | 75 [ 121] |
| UNR | 37.478 | 118.900 | 7/29/1980 | 191714.0 | 5.6 | 4.10 | 0.013 | III | 68 [ 109] |
| PAS | 37.554 | 118.897 | 8/ 1/1980 | 163856.3 | 5.6 | 5.40 | 0.025 | V | 72 [ 116] |
| USG | 37.532 | 118.876 | 8/ 1/1980 | 164254.6 | 5.6 | 4.10 | 0.013 | III | 72 [ 115] |
| USG | 37.561 | 118.874 | 8/ 1/1980 | 164745.9 | 5.6 | 5.15 | 0.022 | IV | 73 [ 118] |
| PAS | 37.505 | 118.809 | 8/ 1/1980 | 164856.0 | 5.6 | 4.40 | 0.015 | IV | 73 [ 117] |
| PAS | 37.554 | 118.866 | 8/ 1/1980 | 17 917.3 | 5.6 | 4.10 | 0.013 | III | 73 [ 118] |
| USG | 37.556 | 118.882 | 8/ 1/1980 | 172821.4 | 5.6 | 4.79 | 0.018 | IV | 73 [ 117] |
| USG | 37.560 | 118.866 | 8/ 1/1980 | 173153.5 | 5.6 | 4.99 | 0.020 | IV | 73 [ 118] |
| UNR | 37.539 | 118.828 | 8/ 2/1980 | 17917.4 | 5.6 | 4.00 | 0.012 | III | 74 [ 118] |
| PAS | 37.635 | 118.876 | 8/19/1980 | 64526.8 | 5.6 | 4.10 | 0.012 | III | 77 [ 124] |
| PAS | 36.220 | 120.136 | 9/24/1980 | 8 839.1 | 5.6 | 4.40 | 0.022 | IV | 43 [ 69] |
| PAS | 37.658 | 118.908 | 9/27/1980 | 191624.5 | 5.6 | 4.20 | 0.013 | III | 77 [ 125] |
| PAS | 37.552 | 118.833 | 10/ 4/1980 | 163822.4 | 5.6 | 4.20 | 0.013 | III | 74 [ 119] |
| UNR | 37.486 | 118.785 | 10/ 4/1980 | 164217.9 | 5.6 | 4.00 | 0.012 | III | 72 [ 117] |
| BRK | 36.570 | 121.090 | 10/13/1980 | 24654.0 | 5.6 | 4.00 | 0.011 | III | 78 [ 125] |
| PAS | 37.506 | 118.864 | 10/18/1980 | 1649 5.6 | 5.6 | 4.10 | 0.013 | III | 71 [ 114] |
| PAS | 37.522 | 118.631 | 10/23/1980 | 214011.3 | 5.6 | 4.00 | 0.011 | III | 80 [ 129] |
| PAS | 37.593 | 118.567 | 10/25/1980 | 52646.4 | 5.6 | 4.50 | 0.014 | III | 86 [ 139] |
| PAS | 37.586 | 118.556 | 10/25/1980 | 53525.6 | 5.6 | 4.10 | 0.011 | III | 86 [ 139] |
| PAS | 37.556 | 118.789 | 10/30/1980 | 34524.6 | 5.6 | 4.30 | 0.014 | III | 76 [ 122] |
| PAS | 37.583 | 118.868 | 11/11/1980 | 53012.5 | 5.6 | 4.00 | 0.012 | III | 75 [ 120] |
| UNR | 37.508 | 118.845 | 11/21/1980 | 231042.7 | 5.6 | 4.10 | 0.013 | III | 71 [ 115] |
| PAS | 37.571 | 118.884 | 11/22/1980 | 02116.8 | 5.6 | 4.00 | 0.012 | III | 73 [ 118] |
| PAS | 37.673 | 118.967 | 11/25/1980 | 05949.5 | 5.6 | 4.10 | 0.012 | III | 77 [ 123] |
| PAS | 37.594 | 118.892 | 12/24/1980 | 154833.8 | 5.6 | 4.70 | 0.017 | IV | 74 [ 120] |
| BRK | 36.740 | 121.360 | 6/ 8/1981 | 3 9 5.0 | 5.6 | 4.30 | 0.012 | III | 92 [ 148] |
| BRK | 36.780 | 121.280 | 8/14/1981 | 124959.0 | 5.6 | 4.20 | 0.012 | III | 87 [ 141] |
| PAS | 37.647 | 118.887 | 8/24/1981 | 45218.0 | 5.6 | 4.10 | 0.012 | III | 77 [ 125] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| PAS | 37.622 | 118.881 | 9/30/1981 | 115327.0 | 5.6 | 5.80 | 0.030 | V | 76 [ 123] |
| PAS | 37.662 | 118.859 | 9/30/1981 | 13 548.2 | 5.6 | 4.60 | 0.015 | IV | 79 [ 127] |
| USG | 37.644 | 118.862 | 9/30/1981 | 143914.7 | 5.6 | 4.16 | 0.012 | III | 78 [ 126] |
| PAS | 37.610 | 118.907 | 9/30/1981 | 1450 7.0 | 5.6 | 4.00 | 0.012 | III | 75 [ 120] |
| UNR | 37.483 | 118.900 | 10/ 1/1981 | 071 4.7 | 5.6 | 4.30 | 0.015 | IV | 68 [ 110] |
| UNR | 37.488 | 118.881 | 10/ 1/1981 | 225 7.8 | 5.6 | 4.00 | 0.012 | III | 69 [ 111] |
| UNR | 37.625 | 118.853 | 10/ 2/1981 | 73722.3 | 5.6 | 4.20 | 0.013 | III | 77 [ 124] |
| UNR | 37.586 | 118.834 | 10/ 3/1981 | 12037.3 | 5.6 | 4.20 | 0.013 | III | 76 [ 122] |
| UNR | 37.629 | 118.865 | 10/ 9/1981 | 11060.0 | 5.6 | 4.10 | 0.012 | III | 77 [ 124] |
| UNR | 37.619 | 118.931 | 11/13/1981 | 030 0.0 | 5.6 | 4.00 | 0.012 | III | 74 [ 120] |
| UNR | 37.619 | 118.930 | 11/13/1981 | 03747.6 | 5.6 | 4.20 | 0.013 | III | 75 [ 120] |
| UNR | 37.465 | 119.412 | 11/18/1981 | 161548.5 | 5.6 | 4.20 | 0.017 | IV | 53 [ 85] |
| PAS | 37.553 | 118.810 | 5/ 8/1982 | 35715.2 | 5.6 | 4.00 | 0.012 | III | 75 [ 121] |
| PAS | 37.468 | 118.353 | 6/ 4/1982 | 164148.3 | 5.6 | 4.20 | 0.011 | III | 90 [ 145] |
| BRK | 36.510 | 121.060 | 6/19/1982 | 101733.0 | 5.6 | 4.10 | 0.012 | III | 77 [ 124] |
| PAS | 35.962 | 120.500 | 6/25/1982 | 35823.8 | 5.6 | 4.10 | 0.013 | III | 69 [ 111] |
| BRK | 36.590 | 121.240 | 8/10/1982 | 21129.0 | 5.6 | 4.50 | 0.014 | III | 86 [ 138] |
| BRK | 36.630 | 121.300 | 8/11/1982 | 74643.0 | 5.6 | 4.60 | 0.014 | IV | 89 [ 143] |
| UNR | 37.594 | 118.784 | 8/26/1982 | 1939 7.9 | 5.6 | 4.22 | 0.013 | III | 78 [ 126] |
| BRK | 36.640 | 121.330 | 8/31/1982 | 311 7.0 | 5.6 | 4.00 | 0.010 | III | 90 [ 146] |
| PAS | 37.509 | 118.859 | 9/ 8/1982 | 184218.7 | 5.6 | 4.00 | 0.012 | III | 71 [ 114] |
| PAS | 37.497 | 118.833 | 9/23/1982 | 328 0.3 | 5.6 | 4.20 | 0.014 | III | 71 [ 115] |
| BRK | 36.660 | 121.340 | 9/24/1982 | 8 555.0 | 5.6 | 4.00 | 0.010 | III | 91 [ 146] |
| PAS | 37.495 | 118.825 | 9/28/1982 | 04149.9 | 5.6 | 4.10 | 0.013 | III | 71 [ 115] |
| PAS | 37.516 | 118.850 | 10/16/1982 | 125413.7 | 5.6 | 4.00 | 0.012 | III | 72 [ 115] |
| PAS | 36.286 | 120.413 | 10/25/1982 | 2226 4.0 | 5.6 | 5.60 | 0.037 | V | 50 [ 81] |
| PAS | 36.313 | 120.396 | 10/25/1982 | 231217.8 | 5.6 | 4.30 | 0.019 | IV | 48 [ 78] |
| PAS | 36.321 | 120.416 | 10/25/1982 | 231554.2 | 5.6 | 4.00 | 0.016 | IV | 49 [ 79] |
| UNR | 37.536 | 118.788 | 12/12/1982 | 2059 8.5 | 5.6 | 4.00 | 0.012 | III | 75 [ 121] |
| PAS | 37.672 | 118.868 | 1/ 7/1983 | 13126.1 | 5.6 | 4.50 | 0.015 | IV | 79 [ 128] |
| PAS | 37.565 | 118.702 | 1/ 7/1983 | 13639.8 | 5.6 | 4.30 | 0.013 | III | 80 [ 128] |
| PAS | 37.656 | 118.929 | 1/ 7/1983 | 13810.6 | 5.6 | 5.70 | 0.028 | V | 77 [ 123] |
| PAS | 37.535 | 118.900 | 1/ 7/1983 | 14541.0 | 5.6 | 4.10 | 0.013 | III | 71 [ 114] |
| PAS | 37.664 | 119.008 | 1/ 7/1983 | 32419.1 | 5.6 | 5.60 | 0.027 | V | 75 [ 120] |
| PAS | 37.625 | 118.953 | 1/ 7/1983 | 33023.8 | 5.6 | 4.50 | 0.015 | IV | 74 [ 119] |
| UNR | 37.620 | 118.853 | 1/ 7/1983 | 511 3.1 | 5.6 | 4.03 | 0.012 | III | 77 [ 124] |
| PAS | 37.667 | 118.985 | 1/ 7/1983 | 63825.8 | 5.6 | 4.10 | 0.012 | III | 76 [ 122] |
| PAS | 37.555 | 118.909 | 1/25/1983 | 101041.5 | 5.6 | 4.70 | 0.018 | IV | 72 [ 115] |
| PAS | 37.680 | 118.974 | 1/29/1983 | 15 6 1.8 | 5.6 | 4.10 | 0.012 | III | 77 [ 123] |
| PAS | 37.540 | 118.915 | 1/31/1983 | 101341.5 | 5.6 | 4.00 | 0.012 | III | 71 [ 114] |
| PAS | 37.647 | 118.968 | 2/ 4/1983 | 71510.6 | 5.6 | 4.40 | 0.014 | IV | 75 [ 121] |
| BRK | 36.680 | 120.850 | 2/ 5/1983 | 12 127.0 | 5.6 | 4.20 | 0.015 | IV | 64 [ 103] |
| UNR | 37.633 | 118.929 | 2/24/1983 | 1951 0.7 | 5.6 | 4.25 | 0.013 | III | 75 [ 121] |
| UNR | 37.516 | 118.853 | 3/16/1983 | 152528.2 | 5.6 | 4.13 | 0.013 | III | 72 [ 115] |
| BRK | 36.220 | 120.290 | 5/ 2/1983 | 234239.0 | 5.6 | 6.70 | 0.068 | VI | 48 [ 77] |
| BRK | 36.220 | 120.290 | 5/ 2/1983 | 2346 6.0 | 5.6 | 5.60 | 0.038 | V | 48 [ 77] |
| USG | 36.154 | 120.232 | 5/ 2/1983 | 235529.1 | 5.6 | 4.24 | 0.018 | IV | 50 [ 80] |
| PAS | 36.205 | 120.176 | 5/ 3/1983 | 0 022.1 | 5.6 | 4.00 | 0.017 | IV | 45 [ 72] |
| BRK | 36.140 | 120.280 | 5/ 3/1983 | 0 924.0 | 5.6 | 4.00 | 0.016 | IV | 52 [ 84] |
| BRK | 36.100 | 120.180 | 5/ 3/1983 | 01537.0 | 5.6 | 4.20 | 0.018 | IV | 51 [ 82] |
| BRK | 36.100 | 120.180 | 5/ 3/1983 | 01557.0 | 5.6 | 4.00 | 0.016 | IV | 51 [ 82] |
| PAS | 36.250 | 120.267 | 5/ 3/1983 | 01629.1 | 5.6 | 4.50 | 0.022 | IV | 46 [ 74] |
| BRK | 36.250 | 120.280 | 5/ 3/1983 | 018 1.0 | 5.6 | 4.40 | 0.021 | IV | 46 [ 74] |
| BRK | 36.210 | 120.350 | 5/ 3/1983 | 03947.0 | 5.6 | 4.20 | 0.018 | IV | 51 [ 82] |
| BRK | 36.240 | 120.280 | 5/ 3/1983 | 05034.0 | 5.6 | 4.00 | 0.017 | IV | 47 [ 75] |
| BRK | 36.270 | 120.330 | 5/ 3/1983 | 05745.0 | 5.6 | 4.80 | 0.026 | V | 47 [ 76] |
| BRK | 36.130 | 120.190 | 5/ 3/1983 | 14147.0 | 5.6 | 4.50 | 0.021 | IV | 50 [ 80] |
| USG | 36.232 | 120.299 | 5/ 3/1983 | 15546.4 | 5.6 | 4.00 | 0.017 | IV | 48 [ 77] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| USG | 36.238 | 120.285 | 5/ 3/1983 | 21514.9 | 5.6 | 4.08 | 0.018 | IV | 47 [ 76] |
| BRK | 36.260 | 120.330 | 5/ 3/1983 | 43233.0 | 5.6 | 4.30 | 0.019 | IV | 48 [ 77] |
| BRK | 36.250 | 120.400 | 5/ 3/1983 | 6 447.0 | 5.6 | 4.30 | 0.018 | IV | 51 [ 82] |
| PAS | 36.076 | 120.182 | 5/ 3/1983 | 6 456.2 | 5.6 | 4.10 | 0.016 | IV | 53 [ 85] |
| PAS | 36.177 | 120.175 | 5/ 3/1983 | 635 3.1 | 5.6 | 4.00 | 0.017 | IV | 46 [ 75] |
| BRK | 36.130 | 120.250 | 5/ 3/1983 | 855 3.0 | 5.6 | 4.50 | 0.020 | IV | 52 [ 83] |
| BRK | 36.300 | 120.310 | 5/ 3/1983 | 93947.0 | 5.6 | 4.00 | 0.017 | IV | 45 [ 73] |
| USG | 36.180 | 120.260 | 5/ 3/1983 | 13 914.6 | 5.6 | 4.04 | 0.017 | IV | 49 [ 79] |
| BRK | 36.250 | 120.290 | 5/ 3/1983 | 154142.0 | 5.6 | 4.80 | 0.026 | V | 47 [ 75] |
| PAS | 36.260 | 120.259 | 5/ 3/1983 | 142656.0 | 5.6 | 4.10 | 0.018 | IV | 45 [ 72] |
| BRK | 36.260 | 120.330 | 5/ 4/1983 | 72840.0 | 5.6 | 4.70 | 0.024 | V | 48 [ 77] |
| BRK | 36.280 | 120.340 | 5/ 4/1983 | 161120.0 | 5.6 | 4.30 | 0.020 | IV | 47 [ 76] |
| USG | 36.134 | 120.204 | 5/ 5/1983 | 43748.6 | 5.6 | 4.01 | 0.016 | IV | 50 [ 80] |
| BRK | 36.280 | 120.360 | 5/ 5/1983 | 102045.0 | 5.6 | 4.60 | 0.023 | IV | 48 [ 77] |
| BRK | 36.240 | 120.290 | 5/ 9/1983 | 24912.0 | 5.6 | 5.20 | 0.032 | V | 47 [ 76] |
| BRK | 36.220 | 120.300 | 5/ 9/1983 | 32638.0 | 5.6 | 4.40 | 0.020 | IV | 49 [ 78] |
| BRK | 36.150 | 120.250 | 5/12/1983 | 1341 8.0 | 5.6 | 4.50 | 0.021 | IV | 50 [ 81] |
| USG | 36.230 | 120.271 | 5/19/1983 | 11 530.1 | 5.6 | 4.16 | 0.018 | IV | 47 [ 76] |
| BRK | 36.140 | 120.190 | 5/22/1983 | 83923.0 | 5.6 | 4.00 | 0.016 | IV | 49 [ 79] |
| BRK | 36.250 | 120.310 | 5/24/1983 | 9 219.0 | 5.6 | 4.60 | 0.023 | IV | 47 [ 76] |
| BRK | 36.140 | 120.210 | 6/ 7/1983 | 51839.0 | 5.6 | 4.00 | 0.016 | IV | 50 [ 80] |
| BRK | 36.250 | 120.470 | 6/11/1983 | 3 954.0 | 5.6 | 5.10 | 0.027 | V | 54 [ 87] |
| BRK | 36.100 | 120.290 | 6/12/1983 | 13128.0 | 5.6 | 4.00 | 0.015 | IV | 55 [ 88] |
| USG | 37.548 | 118.845 | 7/ 3/1983 | 1840 7.7 | 5.6 | 4.25 | 0.014 | III | 73 [ 118] |
| USG | 38.068 | 119.002 | 7/ 5/1983 | 142725.9 | 5.6 | 4.60 | 0.013 | III | 100 [ 161] |
| BRK | 36.260 | 120.400 | 7/ 9/1983 | 74052.0 | 5.6 | 5.30 | 0.031 | V | 51 [ 82] |
| PAS | 37.567 | 118.883 | 7/12/1983 | 1839 6.0 | 5.6 | 4.00 | 0.012 | III | 73 [ 118] |
| USG | 36.180 | 120.280 | 7/18/1983 | 1928 5.4 | 5.6 | 4.16 | 0.017 | IV | 50 [ 80] |
| BRK | 36.220 | 120.400 | 7/22/1983 | 23955.0 | 5.6 | 6.00 | 0.044 | VI | 52 [ 84] |
| PAS | 36.240 | 120.390 | 7/22/1983 | 24910.7 | 5.6 | 4.20 | 0.017 | IV | 51 [ 82] |
| PAS | 36.245 | 120.431 | 7/22/1983 | 329 2.3 | 5.6 | 4.10 | 0.016 | IV | 53 [ 85] |
| BRK | 36.200 | 120.400 | 7/22/1983 | 343 2.0 | 5.6 | 5.00 | 0.026 | V | 53 [ 86] |
| BRK | 36.210 | 120.380 | 7/25/1983 | 223140.0 | 5.6 | 5.10 | 0.028 | V | 52 [ 84] |
| PAS | 37.603 | 118.808 | 7/30/1983 | 12616.6 | 5.6 | 4.20 | 0.013 | III | 78 [ 125] |
| UNR | 37.591 | 118.745 | 7/30/1983 | 41639.6 | 5.6 | 4.03 | 0.011 | III | 79 [ 128] |
| PAS | 36.240 | 120.390 | 7/22/1983 | 24910.7 | 5.6 | 4.20 | 0.017 | IV | 51 [ 82] |
| PAS | 36.245 | 120.431 | 7/22/1983 | 329 2.3 | 5.6 | 4.10 | 0.016 | IV | 53 [ 85] |
| BRK | 36.580 | 121.060 | 8/ 8/1983 | 1313 9.0 | 5.6 | 4.00 | 0.012 | III | 76 [ 122] |
| USG | 36.291 | 120.401 | 8/12/1983 | 11441.1 | 5.6 | 4.04 | 0.017 | IV | 49 [ 79] |
| BRK | 36.180 | 120.120 | 8/12/1983 | 22 236.0 | 5.6 | 4.00 | 0.017 | IV | 45 [ 72] |
| BRK | 36.290 | 120.410 | 8/14/1983 | 124337.0 | 5.6 | 4.20 | 0.018 | IV | 50 [ 80] |
| BRK | 36.300 | 120.480 | 8/26/1983 | 32118.0 | 5.6 | 4.00 | 0.015 | IV | 53 [ 85] |
| BRK | 36.220 | 120.260 | 9/ 9/1983 | 91614.0 | 5.6 | 5.40 | 0.035 | V | 47 [ 76] |
| BRK | 36.230 | 120.280 | 9/ 9/1983 | 92133.0 | 5.6 | 4.00 | 0.017 | IV | 47 [ 76] |
| BRK | 36.230 | 120.380 | 9/11/1983 | 1148 7.0 | 5.6 | 4.30 | 0.018 | IV | 51 [ 82] |
| PAS | 37.558 | 118.836 | 9/30/1983 | 1614 0.9 | 5.6 | 4.50 | 0.015 | IV | 74 [ 120] |
| PAS | 35.930 | 118.341 | 10/19/1983 | 14 037.2 | 5.6 | 4.00 | 0.010 | III | 94 [ 151] |
| PAS | 35.926 | 118.334 | 10/21/1983 | 224413.3 | 5.6 | 4.50 | 0.013 | III | 94 [ 151] |
| UNR | 37.522 | 118.858 | 11/23/1983 | 63958.1 | 5.6 | 4.05 | 0.012 | III | 72 [ 115] |
| PAS | 37.978 | 118.859 | 12/ 7/1983 | 221558.2 | 5.6 | 4.10 | 0.010 | III | 98 [ 157] |
| BRK | 36.070 | 120.190 | 12/21/1983 | 18 4 9.0 | 5.6 | 4.20 | 0.017 | IV | 53 [ 86] |
| PAS | 37.563 | 118.876 | 12/31/1983 | 223940.6 | 5.6 | 4.10 | 0.013 | III | 73 [ 118] |
| PAS | 37.395 | 118.559 | 1/14/1984 | 04223.4 | 5.6 | 4.00 | 0.011 | III | 78 [ 125] |
| PAS | 37.459 | 118.553 | 1/14/1984 | 31114.2 | 5.6 | 4.00 | 0.011 | III | 81 [ 130] |
| PAS | 37.649 | 119.089 | 2/ 5/1984 | 105846.9 | 5.6 | 4.10 | 0.013 | III | 72 [ 115] |
| PAS | 36.274 | 120.331 | 2/19/1984 | 94310.6 | 5.6 | 4.40 | 0.021 | IV | 47 [ 76] |
| PAS | 37.392 | 118.577 | 2/27/1984 | 13621.3 | 5.6 | 4.10 | 0.012 | III | 77 [ 124] |
| GSB | 36.163 | 120.287 | 4/24/1984 | 045251.5 | 5.6 | 4.00 | 0.016 | IV | 51 [ 82] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| PAS | 37.630 | 118.892 | 4/28/1984 | 224821.3 | 5.6 | 4.80 | 0.018 | IV | 76 [ 123] |
| PAS | 36.219 | 120.264 | 5/ 8/1984 | 192113.1 | 5.6 | 4.20 | 0.019 | IV | 47 [ 76] |
| PAS | 37.585 | 118.950 | 7/16/1984 | 101423.2 | 5.6 | 4.20 | 0.013 | III | 72 [ 116] |
| GSB | 36.573 | 121.203 | 10/ 5/1984 | 161630.0 | 5.6 | 4.00 | 0.011 | III | 84 [ 135] |
| PAS | 36.684 | 121.448 | 10/22/1984 | 4 628.6 | 5.6 | 4.00 | 0.010 | III | 97 [ 156] |
| PAS | 37.470 | 118.597 | 11/23/1984 | 18 825.6 | 5.6 | 6.20 | 0.036 | V | 79 [ 128] |
| UNR | 37.428 | 118.605 | 11/23/1984 | 183855.7 | 5.6 | 4.40 | 0.014 | IV | 77 [ 124] |
| PAS | 37.423 | 118.608 | 11/23/1984 | 191235.3 | 5.6 | 5.40 | 0.024 | V | 77 [ 124] |
| PAS | 37.473 | 118.602 | 11/24/1984 | 92117.9 | 5.6 | 4.10 | 0.012 | III | 79 [ 128] |
| PAS | 37.420 | 118.660 | 11/24/1984 | 202533.1 | 5.6 | 4.10 | 0.012 | III | 74 [ 120] |
| PAS | 37.455 | 118.687 | 11/25/1984 | 161520.3 | 5.6 | 4.10 | 0.012 | III | 75 [ 121] |
| PAS | 37.451 | 118.620 | 11/25/1984 | 2310 9.6 | 5.6 | 4.70 | 0.016 | IV | 78 [ 125] |
| PAS | 37.449 | 118.653 | 11/26/1984 | 162141.4 | 5.6 | 5.50 | 0.026 | V | 76 [ 122] |
| PAS | 37.381 | 118.705 | 11/26/1984 | 163122.5 | 5.6 | 4.40 | 0.015 | IV | 71 [ 114] |
| PAS | 37.454 | 118.661 | 11/27/1984 | 14152.9 | 5.6 | 4.40 | 0.014 | IV | 76 [ 122] |
| UNR | 37.463 | 118.592 | 11/27/1984 | 71915.8 | 5.6 | 4.20 | 0.012 | III | 79 [ 128] |
| PAS | 37.455 | 118.638 | 11/27/1984 | 173123.3 | 5.6 | 4.00 | 0.011 | III | 77 [ 124] |
| PAS | 37.350 | 118.598 | 11/28/1984 | 64436.0 | 5.6 | 4.00 | 0.012 | III | 74 [ 120] |
| PAS | 37.350 | 118.603 | 11/28/1984 | 162326.7 | 5.6 | 4.70 | 0.017 | IV | 74 [ 119] |
| GSB | 37.487 | 118.635 | 11/28/1984 | 165738.1 | 5.6 | 4.60 | 0.015 | IV | 79 [ 126] |
| UNR | 37.430 | 118.612 | 11/29/1984 | 104227.7 | 5.6 | 4.10 | 0.012 | III | 77 [ 124] |
| PAS | 37.425 | 118.615 | 12/17/1984 | 211723.6 | 5.6 | 4.00 | 0.012 | III | 77 [ 123] |
| PAS | 37.400 | 118.653 | 12/20/1984 | 8 3 6.9 | 5.6 | 4.00 | 0.012 | III | 74 [ 119] |
| PAS | 37.622 | 118.892 | 12/24/1984 | 192229.9 | 5.6 | 4.30 | 0.014 | III | 76 [ 122] |
| PAS | 36.176 | 120.337 | 1/ 3/1985 | 104522.8 | 5.6 | 4.10 | 0.016 | IV | 52 [ 84] |
| PAS | 36.176 | 120.322 | 1/ 3/1985 | 112228.0 | 5.6 | 4.30 | 0.018 | IV | 52 [ 83] |
| PAS | 35.452 | 118.899 | 2/ 8/1985 | 65816.9 | 5.6 | 4.60 | 0.013 | III | 99 [ 159] |
| PAS | 37.575 | 118.822 | 3/18/1985 | 183231.3 | 5.6 | 4.10 | 0.012 | III | 76 [ 122] |
| PAS | 37.448 | 118.545 | 3/25/1985 | 16 513.6 | 5.6 | 5.00 | 0.019 | IV | 81 [ 130] |
| PAS | 37.431 | 118.622 | 4/26/1985 | 4 3 7.7 | 5.6 | 4.20 | 0.013 | III | 77 [ 123] |
| PAS | 37.469 | 118.598 | 5/ 4/1985 | 32246.2 | 5.6 | 4.70 | 0.016 | IV | 79 [ 128] |
| GSB | 36.158 | 120.280 | 5/11/1985 | 085923.8 | 5.6 | 4.00 | 0.016 | IV | 51 [ 82] |
| PAS | 36.145 | 120.052 | 8/ 4/1985 | 112915.4 | 5.6 | 4.30 | 0.020 | IV | 45 [ 72] |
| PAS | 36.091 | 120.208 | 8/ 4/1985 | 112924.5 | 5.6 | 4.30 | 0.018 | IV | 52 [ 84] |
| PAS | 36.151 | 120.049 | 8/ 4/1985 | 12 156.0 | 5.6 | 5.80 | 0.045 | VI | 44 [ 72] |
| PAS | 36.119 | 119.989 | 8/ 4/1985 | 12 841.8 | 5.6 | 4.10 | 0.018 | IV | 45 [ 73] |
| PAS | 36.052 | 119.978 | 8/ 4/1985 | 151539.5 | 5.6 | 4.40 | 0.020 | IV | 49 [ 79] |
| PAS | 36.131 | 119.997 | 8/ 5/1985 | 144538.3 | 5.6 | 4.30 | 0.021 | IV | 45 [ 72] |
| PAS | 36.027 | 120.056 | 8/ 7/1985 | 016 3.5 | 5.6 | 4.40 | 0.019 | IV | 52 [ 84] |
| PAS | 37.423 | 118.615 | 8/27/1985 | 3 4 6.8 | 5.6 | 4.50 | 0.015 | IV | 77 [ 123] |
| PAS | 36.036 | 120.881 | 11/24/1985 | 192139.8 | 5.6 | 4.40 | 0.014 | III | 81 [ 131] |
| PAS | 36.733 | 121.102 | 11/28/1985 | 151354.7 | 5.6 | 4.90 | 0.018 | IV | 78 [ 125] |
| GSB | 36.572 | 121.205 | 1/14/1986 | 030936.3 | 5.6 | 4.70 | 0.015 | IV | 84 [ 135] |
| GSB | 36.810 | 121.275 | 1/26/1986 | 192051.2 | 5.6 | 5.50 | 0.023 | IV | 87 [ 141] |
| USG | 36.823 | 121.290 | 1/26/1986 | 234654.5 | 5.6 | 4.20 | 0.011 | III | 88 [ 142] |
| GSB | 36.570 | 121.327 | 5/31/1986 | 084756.1 | 5.6 | 4.80 | 0.015 | IV | 91 [ 146] |
| USG | 37.564 | 118.485 | 7/18/1986 | 16 049.5 | 5.6 | 4.35 | 0.012 | III | 88 [ 142] |
| PAS | 37.583 | 118.450 | 7/20/1986 | 142946.3 | 5.6 | 5.90 | 0.028 | V | 91 [ 146] |
| PAS | 37.642 | 118.373 | 7/20/1986 | 183851.9 | 5.6 | 4.80 | 0.015 | IV | 96 [ 155] |
| PAS | 37.580 | 118.468 | 7/21/1986 | 111522.0 | 5.6 | 4.60 | 0.014 | IV | 90 [ 144] |
| PAS | 37.542 | 118.444 | 7/21/1986 | 144226.7 | 5.6 | 5.90 | 0.028 | V | 89 [ 143] |
| PAS | 37.583 | 118.417 | 7/21/1986 | 144521.0 | 5.6 | 4.60 | 0.014 | III | 92 [ 148] |
| PAS | 37.599 | 118.320 | 7/21/1986 | 1451 8.8 | 5.6 | 5.40 | 0.020 | IV | 97 [ 156] |
| PAS | 37.583 | 118.583 | 7/21/1986 | 145358.1 | 5.6 | 4.90 | 0.017 | IV | 85 [ 137] |
| PAS | 37.583 | 118.417 | 7/21/1986 | 145439.2 | 5.6 | 4.50 | 0.013 | III | 92 [ 148] |
| PAS | 37.607 | 118.666 | 7/21/1986 | 145750.2 | 5.6 | 4.70 | 0.016 | IV | 83 [ 134] |
| PAS | 37.583 | 118.417 | 7/21/1986 | 145858.2 | 5.6 | 4.00 | 0.010 | III | 92 [ 148] |
| PAS | 37.597 | 118.486 | 7/21/1986 | 151130.8 | 5.6 | 4.70 | 0.015 | IV | 90 [ 144] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| PAS | 37.586 | 118.457 | 7/21/1986 | 151935.7 | 5.6 | 4.50 | 0.013 | III | 90 [ 145] |
| GSB | 37.547 | 118.503 | 7/21/1986 | 152649.3 | 5.6 | 4.60 | 0.014 | IV | 87 [ 140] |
| GSB | 37.665 | 118.487 | 7/21/1986 | 154624.8 | 5.6 | 4.50 | 0.013 | III | 93 [ 149] |
| GSP | 37.514 | 118.307 | 7/21/1986 | 162644.3 | 5.6 | 4.30 | 0.012 | III | 94 [ 151] |
| PAS | 37.655 | 118.398 | 7/21/1986 | 17 532.3 | 5.6 | 4.60 | 0.013 | III | 96 [ 154] |
| USG | 37.602 | 118.419 | 7/21/1986 | 171958.5 | 5.6 | 4.09 | 0.010 | III | 93 [ 149] |
| GSP | 37.597 | 118.354 | 7/21/1986 | 174855.9 | 5.6 | 4.20 | 0.011 | III | 95 [ 153] |
| PAS | 37.647 | 118.502 | 7/21/1986 | 22 718.7 | 5.6 | 5.40 | 0.021 | IV | 91 [ 147] |
| PAS | 37.613 | 118.569 | 7/21/1986 | 22 922.1 | 5.6 | 4.70 | 0.015 | IV | 87 [ 140] |
| GSB | 37.519 | 118.257 | 7/21/1986 | 234304.8 | 5.6 | 4.10 | 0.010 | III | 96 [ 155] |
| GSP | 37.606 | 118.409 | 7/22/1986 | 000953.6 | 5.6 | 4.60 | 0.014 | III | 93 [ 150] |
| USG | 37.551 | 118.431 | 7/22/1986 | 54044.3 | 5.6 | 4.00 | 0.010 | III | 90 [ 145] |
| PAS | 37.445 | 118.381 | 7/22/1986 | 62153.0 | 5.6 | 4.10 | 0.011 | III | 88 [ 141] |
| PAS | 37.534 | 118.481 | 7/22/1986 | 122450.3 | 5.6 | 4.60 | 0.014 | IV | 87 [ 140] |
| PAS | 37.583 | 118.417 | 7/22/1986 | 122615.5 | 5.6 | 4.00 | 0.010 | III | 92 [ 148] |
| PAS | 37.627 | 118.386 | 7/22/1986 | 133358.9 | 5.6 | 5.00 | 0.016 | IV | 95 [ 153] |
| PAS | 37.620 | 118.398 | 7/22/1986 | 134859.0 | 5.6 | 5.20 | 0.018 | IV | 94 [ 152] |
| PAS | 37.518 | 118.399 | 7/22/1986 | 182944.3 | 5.6 | 4.40 | 0.013 | III | 90 [ 145] |
| GSB | 37.513 | 118.294 | 7/22/1986 | 220641.8 | 5.6 | 4.20 | 0.011 | III | 94 [ 152] |
| USG | 37.599 | 118.466 | 7/24/1986 | 24310.3 | 5.6 | 4.05 | 0.010 | III | 91 [ 146] |
| USG | 37.477 | 118.379 | 7/24/1986 | 19 325.3 | 5.6 | 4.06 | 0.011 | III | 89 [ 143] |
| USG | 37.530 | 118.476 | 7/26/1986 | 143940.3 | 5.6 | 4.06 | 0.011 | III | 87 [ 140] |
| GSB | 37.367 | 118.217 | 7/27/1986 | 034940.5 | 5.6 | 4.20 | 0.011 | III | 93 [ 149] |
| USG | 37.544 | 118.442 | 7/29/1986 | 71158.1 | 5.6 | 4.01 | 0.010 | III | 89 [ 143] |
| PAS | 37.612 | 118.474 | 7/29/1986 | 95757.4 | 5.6 | 4.60 | 0.014 | IV | 91 [ 146] |
| PAS | 37.589 | 118.462 | 7/30/1986 | 64153.0 | 5.6 | 4.80 | 0.015 | IV | 90 [ 145] |
| PAS | 37.473 | 118.372 | 7/31/1986 | 72240.5 | 5.6 | 5.90 | 0.028 | V | 89 [ 144] |
| PAS | 37.533 | 118.417 | 7/31/1986 | 728 3.8 | 5.6 | 4.40 | 0.013 | III | 90 [ 144] |
| GSB | 37.501 | 118.352 | 8/ 1/1986 | 142716.0 | 5.6 | 4.30 | 0.012 | III | 91 [ 147] |
| GSB | 37.375 | 118.442 | 8/ 1/1986 | 142818.0 | 5.6 | 4.70 | 0.016 | IV | 82 [ 133] |
| GSB | 37.615 | 118.410 | 8/ 3/1986 | 103304.5 | 5.6 | 4.00 | 0.010 | III | 94 [ 151] |
| PAS | 37.619 | 118.430 | 9/18/1986 | 75947.9 | 5.6 | 4.20 | 0.011 | III | 93 [ 150] |
| PAS | 37.369 | 118.412 | 10/ 9/1986 | 53726.1 | 5.6 | 4.30 | 0.013 | III | 84 [ 134] |
| USG | 37.475 | 118.514 | 11/13/1986 | 165537.8 | 5.6 | 4.20 | 0.012 | III | 83 [ 134] |
| PAS | 36.182 | 120.268 | 2/14/1987 | 72650.8 | 5.6 | 5.10 | 0.029 | V | 49 [ 79] |
| GSB | 36.840 | 121.283 | 4/30/1987 | 192422.2 | 5.6 | 4.10 | 0.011 | III | 88 [ 141] |
| GSB | 36.583 | 121.218 | 11/ 7/1987 | 150601.2 | 5.6 | 4.00 | 0.011 | III | 85 [ 136] |
| GSB | 36.777 | 120.867 | 1/ 6/1988 | 224948.3 | 5.6 | 4.20 | 0.015 | IV | 65 [ 104] |
| GSB | 36.803 | 121.302 | 2/20/1988 | 083957.5 | 5.6 | 5.30 | 0.020 | IV | 89 [ 143] |
| PAS | 36.404 | 118.015 | 7/ 5/1988 | 181848.3 | 5.6 | 4.00 | 0.010 | III | 96 [ 155] |
| GSB | 36.558 | 121.175 | 7/26/1988 | 032655.9 | 5.6 | 4.70 | 0.016 | IV | 83 [ 133] |
| GSB | 37.203 | 118.452 | 10/19/1988 | 160823.8 | 5.6 | 4.10 | 0.012 | III | 76 [ 123] |
| PAS | 37.390 | 118.565 | 11/22/1988 | 75739.7 | 5.6 | 4.10 | 0.012 | III | 77 [ 124] |
| GSB | 37.418 | 118.642 | 7/11/1989 | 041334.2 | 5.6 | 4.40 | 0.014 | IV | 75 [ 121] |
| GSB | 36.677 | 121.350 | 12/ 1/1989 | 123743.5 | 5.6 | 4.40 | 0.012 | III | 91 [ 147] |
| GSB | 36.405 | 120.788 | 1/12/1990 | 091023.1 | 5.6 | 4.20 | 0.015 | IV | 64 [ 104] |
| GSB | 37.468 | 118.620 | 3/ 7/1990 | 071636.7 | 5.6 | 4.00 | 0.011 | III | 78 [ 126] |
| GSB | 36.665 | 121.335 | 9/ 8/1990 | 124822.3 | 5.6 | 4.00 | 0.010 | III | 91 [ 146] |
| GSB | 38.047 | 119.157 | 10/24/1990 | 061520.7 | 5.6 | 5.70 | 0.024 | IV | 96 [ 154] |
| GSB | 38.033 | 119.168 | 11/ 5/1990 | 071652.4 | 5.6 | 4.20 | 0.011 | III | 95 [ 152] |
| GSB | 37.552 | 118.432 | 5/ 4/1991 | 182819.8 | 5.6 | 4.10 | 0.011 | III | 90 [ 145] |
| GSB | 36.616 | 118.041 | 7/ 6/1992 | 194911.2 | 5.6 | 4.10 | 0.011 | III | 92 [ 148] |
| GSG | 35.928 | 118.428 | 7/13/1992 | 095305.9 | 5.6 | 4.00 | 0.010 | III | 90 [ 145] |
| GSB | 36.003 | 119.916 | 9/16/1992 | 061433.4 | 5.6 | 4.30 | 0.018 | IV | 52 [ 83] |
| GSB | 36.007 | 119.940 | 9/27/1992 | 165914.1 | 5.6 | 4.00 | 0.016 | IV | 52 [ 83] |
| GSB | 35.928 | 120.473 | 10/20/1992 | 052808.9 | 5.6 | 4.30 | 0.014 | IV | 70 [ 113] |
| GSB | 37.025 | 121.458 | 1/16/1993 | 062934.9 | 5.6 | 5.30 | 0.019 | IV | 99 [ 160] |
| GSB | 35.940 | 120.494 | 4/ 4/1993 | 052125.3 | 5.6 | 4.30 | 0.014 | IV | 70 [ 113] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| GSB | 37.527 | 118.885 | 8/11/1993 | 054821.0 | 5.6 | 4.70 | 0.018 | IV | 71 [ 114] |
| GSB | 35.996 | 118.369 | 9/ 6/1993 | 103233.0 | 5.6 | 4.00 | 0.010 | III | 90 [ 144] |
| GSB | 37.429 | 118.621 | 9/25/1993 | 022655.9 | 5.6 | 4.10 | 0.012 | III | 77 [ 123] |
| GSB | 36.584 | 121.174 | 10/11/1993 | 071945.2 | 5.6 | 4.10 | 0.011 | III | 82 [ 132] |
| GSB | 35.953 | 120.494 | 11/14/1993 | 122534.9 | 5.6 | 4.90 | 0.020 | IV | 70 [ 112] |
| GSB | 37.282 | 118.345 | 2/ 1/1994 | 080151.2 | 5.6 | 4.20 | 0.012 | III | 84 [ 135] |
| GSP | 36.181 | 120.301 | 3/31/1994 | 195959.7 | 5.6 | 4.40 | 0.020 | IV | 51 [ 81] |
| GSB | 36.172 | 120.288 | 3/31/1994 | 200229.7 | 5.6 | 4.20 | 0.018 | IV | 51 [ 81] |
| GSB | 36.300 | 120.427 | 4/21/1994 | 163715.3 | 5.6 | 4.50 | 0.021 | IV | 50 [ 81] |
| GSB | 36.810 | 121.203 | 8/28/1994 | 012236.7 | 5.6 | 4.00 | 0.011 | III | 83 [ 134] |
| GSB | 35.917 | 120.465 | 12/20/1994 | 102747.2 | 5.6 | 5.00 | 0.021 | IV | 70 [ 113] |
| GSB | 37.597 | 118.836 | 3/ 5/1995 | 000703.1 | 5.6 | 4.50 | 0.015 | IV | 76 [ 123] |
| GSB | 37.591 | 118.836 | 3/ 5/1995 | 024847.4 | 5.6 | 4.40 | 0.014 | IV | 76 [ 122] |
| GSB | 36.603 | 121.201 | 4/23/1995 | 084136.6 | 5.6 | 5.00 | 0.018 | IV | 84 [ 135] |
| GSG | 36.753 | 121.371 | 6/16/1995 | 042036.2 | 5.6 | 4.10 | 0.010 | III | 92 [ 149] |
| GSB | 36.593 | 121.196 | 7/12/1995 | 215800.5 | 5.6 | 4.00 | 0.011 | III | 83 [ 134] |
| GSB | 36.815 | 121.203 | 9/22/1995 | 160618.1 | 5.6 | 4.30 | 0.013 | III | 83 [ 134] |
| GSB | 36.577 | 121.175 | 9/27/1995 | 164442.3 | 5.6 | 4.20 | 0.012 | III | 82 [ 133] |
| GSB | 36.976 | 121.475 | 12/13/1995 | 054512.8 | 5.6 | 4.00 | 0.009 | III | 100 [ 160] |
| GSB | 36.981 | 121.472 | 12/13/1995 | 062554.2 | 5.6 | 4.10 | 0.010 | III | 99 [ 160] |
| GSB | 37.624 | 118.860 | 3/30/1996 | 152223.8 | 5.6 | 4.10 | 0.012 | III | 77 [ 124] |
| GSB | 37.627 | 118.865 | 3/30/1996 | 231518.5 | 5.6 | 4.20 | 0.013 | III | 77 [ 124] |
| GSB | 37.615 | 118.859 | 4/ 1/1996 | 041336.5 | 5.6 | 4.10 | 0.012 | III | 77 [ 123] |
| GSB | 37.625 | 118.858 | 4/ 2/1996 | 015007.7 | 5.6 | 4.40 | 0.014 | IV | 77 [ 124] |
| GSB | 36.192 | 120.293 | 2/ 2/1997 | 022020.3 | 5.6 | 4.10 | 0.017 | IV | 50 [ 80] |
| GSB | 37.565 | 118.861 | 2/10/1997 | 232628.9 | 5.6 | 4.60 | 0.016 | IV | 74 [ 119] |
| GSB | 37.571 | 118.852 | 2/24/1997 | 181325.5 | 5.6 | 4.00 | 0.012 | III | 74 [ 120] |
| GSB | 36.838 | 121.409 | 3/22/1997 | 113149.3 | 5.6 | 4.20 | 0.011 | III | 95 [ 153] |
| GSB | 36.979 | 121.467 | 8/ 6/1997 | 110437.3 | 5.6 | 4.00 | 0.009 | III | 99 [ 160] |
| GSB | 37.646 | 118.899 | 11/13/1997 | 194222.1 | 5.6 | 4.10 | 0.012 | III | 77 [ 124] |
| GSB | 37.635 | 118.917 | 11/22/1997 | 120656.0 | 5.6 | 4.60 | 0.016 | IV | 76 [ 122] |
| GSB | 37.638 | 118.934 | 11/22/1997 | 172035.2 | 5.6 | 4.90 | 0.019 | IV | 75 [ 121] |
| GSB | 37.636 | 118.949 | 11/22/1997 | 181059.4 | 5.6 | 4.80 | 0.018 | IV | 75 [ 121] |
| GSB | 37.634 | 118.946 | 11/30/1997 | 211705.4 | 5.6 | 4.90 | 0.019 | IV | 75 [ 121] |
| GSB | 37.600 | 118.915 | 12/29/1997 | 200232.7 | 5.6 | 4.10 | 0.012 | III | 74 [ 119] |
| GSB | 37.631 | 118.870 | 12/31/1997 | 203647.3 | 5.6 | 4.80 | 0.017 | IV | 77 [ 124] |
| GSB | 37.634 | 118.871 | 1/ 5/1998 | 141112.9 | 5.6 | 4.20 | 0.013 | III | 77 [ 124] |
| PDB | 37.589 | 118.795 | 6/ 9/1998 | 052440.2 | 5.6 | 5.20 | 0.021 | IV | 77 [ 125] |
| PDB | 37.585 | 118.784 | 6/11/1998 | 063329.1 | 5.6 | 4.20 | 0.013 | III | 78 [ 125] |
| PDB | 37.574 | 118.771 | 6/21/1998 | 153250.4 | 5.6 | 4.00 | 0.011 | III | 77 [ 125] |
| PDB | 37.593 | 118.807 | 6/26/1998 | 200741.9 | 5.6 | 4.00 | 0.011 | III | 77 [ 124] |
| PDB | 37.564 | 118.805 | 7/15/1998 | 045319.2 | 5.6 | 5.00 | 0.020 | IV | 76 [ 122] |
| PDB | 37.570 | 118.794 | 8/ 1/1998 | 060144.0 | 5.6 | 4.10 | 0.012 | III | 76 [ 123] |
| PDB | 37.573 | 118.797 | 8/ 2/1998 | 144545.5 | 5.6 | 4.00 | 0.012 | III | 76 [ 123] |
| PDG | 37.582 | 118.790 | 8/ 5/1998 | 134428.7 | 5.6 | 4.10 | 0.012 | III | 77 [ 124] |
| PDG | 36.755 | 121.464 | 8/12/1998 | 141025.1 | 5.6 | 5.30 | 0.019 | IV | 98 [ 157] |
| PDB | 36.839 | 121.298 | 9/ 2/1998 | 112407.2 | 5.6 | 4.00 | 0.010 | III | 89 [ 143] |
| PDB | 37.527 | 118.797 | 12/14/1998 | 041403.0 | 5.6 | 4.00 | 0.012 | III | 74 [ 119] |
| GSB | 36.647 | 121.268 | 1/18/1999 | 084836.7 | 5.6 | 4.30 | 0.012 | III | 87 [ 140] |
| GSB | 35.946 | 120.490 | 2/26/1999 | 152556.7 | 5.6 | 4.10 | 0.013 | III | 70 [ 112] |
| GSB | 36.676 | 121.299 | 3/23/1999 | 183640.4 | 5.6 | 4.20 | 0.011 | III | 89 [ 143] |
| GSG | 37.529 | 118.817 | 5/15/1999 | 132210.7 | 5.6 | 5.60 | 0.028 | V | 73 [ 118] |
| GSB | 37.508 | 118.833 | 5/15/1999 | 133806.2 | 5.6 | 4.40 | 0.015 | IV | 72 [ 116] |
| GSB | 37.507 | 118.833 | 5/15/1999 | 175408.8 | 5.6 | 4.60 | 0.017 | IV | 72 [ 115] |
| GSB | 37.490 | 118.848 | 5/15/1999 | 214010.5 | 5.6 | 4.00 | 0.012 | III | 70 [ 113] |
| GSB | 37.511 | 118.826 | 5/17/1999 | 063719.1 | 5.6 | 4.00 | 0.012 | III | 72 [ 116] |
| GSB | 37.556 | 118.803 | 5/26/1999 | 035353.4 | 5.6 | 4.40 | 0.014 | IV | 75 [ 121] |
| GSB | 37.537 | 118.805 | 6/ 3/1999 | 213627.7 | 5.6 | 4.30 | 0.014 | IV | 74 [ 120] |

| FILE CODE | LAT. NORTH | LONG. WEST | DATE | TIME (GMT) H M Sec | DEPTH (km) | QUAKE MAG. | SITE ACC. g | SITE MM INT. | APPROX. DISTANCE mi [km] |
|---|---|---|---|---|---|---|---|---|---|
| GSP | 35.731 | 118.479 | 7/11/1999 | 182046.8 | 5.6 | 4.40 | 0.012 | III | 97 [ 156] |
| GDP | 36.318 | 118.065 | 5/23/2000 | 044243.9 | 5.6 | 4.00 | 0.010 | III | 95 [ 153] |
| GSB | 36.778 | 121.379 | 12/ 5/2000 | 225454.5 | 5.6 | 4.00 | 0.010 | III | 93 [ 150] |
| PDG | 36.696 | 121.328 | 7/ 2/2001 | 173353.7 | 5.6 | 4.10 | 0.011 | III | 90 [ 145] |
| PDB | 36.695 | 121.328 | 7/ 3/2001 | 190250.8 | 5.6 | 4.20 | 0.011 | III | 90 [ 145] |
| PDB | 36.692 | 121.323 | 7/ 3/2001 | 190716.3 | 5.6 | 4.00 | 0.010 | III | 90 [ 145] |
| PDB | 36.641 | 121.251 | 12/28/2001 | 211402.0 | 5.6 | 4.60 | 0.014 | IV | 86 [ 139] |

**********

-END OF SEARCH- 877 RECORDS FOUND

COMPUTER TIME REQUIRED FOR EARTHQUAKE SEARCH: 0.2 minutes

MAXIMUM SITE ACCELERATION DURING TIME PERIOD 1900 TO 2003: 0.068g

MAXIMUM SITE INTENSITY (MM) DURING TIME PERIOD 1900 TO 2003: VI

MAXIMUM MAGNITUDE ENCOUNTERED IN SEARCH: 6.70

NEAREST HISTORICAL EARTHQUAKE WAS ABOUT 20 MILES AWAY FROM SITE.

NUMBER OF YEARS REPRESENTED BY SEARCH: 104 years

RESULTS OF PROBABILITY ANALYSES

TIME PERIOD OF SEARCH: 1900 TO 2003
LENGTH OF SEARCH TIME: 104 years
ATTENUATION RELATION: 22) Boore et al. (1993) Horiz. - Random - Site Class C
*** TIME PERIOD OF EXPOSURE FOR PROBABILITY: 25 years

PROBABILITY OF EXCEEDANCE FOR ACCELERATION

| ACC. g | NO.OF TIMES EXCED | AVE. OCCUR. #/yr | RECURR. INTERV. years | COMPUTED PROBABILITY OF EXCEEDANCE in 0.5 yr | in 1 yr | in 10 yr | in 50 yr | in 75 yr | in 100 yr | in *** yr |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.01 | 827 | 7.952 | 0.126 | 0.9812 | 0.9996 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 0.02 | 114 | 1.096 | 0.912 | 0.4219 | 0.6658 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 0.03 | 20 | 0.192 | 5.200 | 0.0917 | 0.1749 | 0.8538 | 0.9999 | 1.0000 | 1.0000 | 0.9918 |
| 0.04 | 7 | 0.067 | 14.857 | 0.0331 | 0.0651 | 0.4899 | 0.9655 | 0.9936 | 0.9988 | 0.8141 |
| 0.05 | 1 | 0.010 | 104.000 | 0.0048 | 0.0096 | 0.0917 | 0.3817 | 0.5138 | 0.6177 | 0.2137 |
| 0.06 | 1 | 0.010 | 104.000 | 0.0048 | 0.0096 | 0.0917 | 0.3817 | 0.5138 | 0.6177 | 0.2137 |

PROBABILITY OF EXCEEDANCE FOR MAGNITUDE

| MAG. | NO.OF TIMES EXCED | AVE. OCCUR. #/yr | RECURR. INTERV. years | COMPUTED PROBABILITY OF EXCEEDANCE in 0.5 yr | in 1 yr | in 10 yr | in 50 yr | in 75 yr | in 100 yr | in *** yr |
|---|---|---|---|---|---|---|---|---|---|---|
| 4.00 | 877 | 8.433 | 0.119 | 0.9852 | 0.9998 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 4.50 | 269 | 2.587 | 0.387 | 0.7256 | 0.9247 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 5.00 | 103 | 0.990 | 1.010 | 0.3905 | 0.6286 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 5.50 | 39 | 0.375 | 2.667 | 0.1710 | 0.3127 | 0.9765 | 1.0000 | 1.0000 | 1.0000 | 0.9999 |
| 6.00 | 10 | 0.096 | 10.400 | 0.0469 | 0.0917 | 0.6177 | 0.9918 | 0.9993 | 0.9999 | 0.9096 |
| 6.50 | 3 | 0.029 | 34.667 | 0.0143 | 0.0284 | 0.2506 | 0.7636 | 0.8851 | 0.9441 | 0.5138 |

GUTENBERG & RICHTER RECURRENCE RELATIONSHIP:

a-value= 4.703
b-value= 0.945

beta-value= 2.176