# REPORT OF GEOTECHNICAL EVALUATION FOR USE IN ENVIRONMENTAL IMPACT REPORT PROPOSED CORBIN-NORDHOFF PROJECT

**NORTHEAST CORNER OF**
**CORBIN AVENUE AND NORDHOFF STREET**
**NORTHRIDGE DISTRICT,**
**LOS ANGELES, CALIFORNIA**

**Prepared for:**

## PLANNING ASSOCIATES, INC.

**Studio City, California**

**June 7, 2002**

**Law/Crandall Project 70131-2-0125**

June 7, 2002

Mr. Dwight Steinert
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4040 Vineland Avenue, Suite 108
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**Subject:** **Geotechnical Evaluation**
**For Use in Environmental Impact Report**
**Proposed Corbin-Nordhoff Project**
**Northeast Corner of Corbin Avenue and Nordhoff Street**
**Northridge District, Los Angeles, California**
**Law/Crandall Project No. 70131-2-0125**

Dear Mr. Steinert:

We are pleased to submit the results of our geotechnical evaluation to be used in the preparation of the Environmental Impact Report for the proposed Corbin-Nordhoff Project in the Northridge district of the City of Los Angeles, California. Our evaluation was performed in accordance with our proposal dated May 10, 2002 (our Proposal No. 70199-0-0000.1970).

Please call if you have any questions or need additional information.

Sincerely,

**LAW/CRANDALL**
**A Division of LAW Engineering and Environmental Services, Inc., A Mactec Company**

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(3 copies submitted)

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## 1.0 SCOPE

This report presents the results of our geotechnical evaluation for the proposed Corbin-Nordhoff Project in the Northridge district of the City of Los Angeles, California. The primary purpose of this evaluation is to provide geotechnical information for preparation of the Environmental Input Report (EIR) for the proposed project. It is our understanding that the Environmental Input Report will be submitted to the City of Los Angeles Department of Planning.

Our evaluation was performed in general accordance with our proposal dated May 10, 2002 and included a review of our previous geotechnical reports for projects at the site and at the adjacent Northridge Fashion Center site. Also, we reviewed available published and unpublished literature pertaining to the site, including the State of California Alquist-Priolo Earthquake Fault Zone Maps and Seismic Hazard Zone Maps, the City of Los Angeles Safety Element (1996), and the County of Los Angeles Seismic Safety Element (1990).

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has been prepared for Planning Associates, Inc. to be used solely in the preparation of the proposed EIR for the Corbin-Nordhoff Project in the Northridge district of the City of Los Angeles, California. This report has not been prepared for use by other parties, and may not contain sufficient information for purposes of other parties or other uses.

## 2.0 PROPOSED PROJECT

The proposed Corbin-Nordhoff Project is located at 19601 Nordhoff Street, at the northeast corner of Corbin Avenue and Nordhoff Street, in the Northridge district of Los Angeles. The project site is part of the Chatsworth Porter Ranch Community Plan area. The project site consists of two parcels and is approximately 47 acres in size. The larger parcel is 40 acres in size, bounded by Prairie and Nordhoff Streets, Shirley Avenue, and Corbin Avenue on the north, south, east and west, respectively. The smaller parcel is 7 acres in size, located north of Prairie Street between Corbin Avenue and Shirley Avenue. The property is currently zoned for industrial use and it is anticipated that the site will be rezoned to allow for commercial use. The specific development scheme for the project site is not known at this time. However, four potential development schemes have been identified. The proposed development schemes are mixed-use projects including retail, office, senior housing, and residential uses. The location of the site is shown in Figure1, Vicinity Map.

## 3.0 GEOLOGY

### 3.1 GEOLOGIC SETTING

The site is located in the north-central portion of the San Fernando Valley. The San Fernando Valley is an elliptical-shaped alluvium-filled basin, approximately 23 miles wide and 12 miles long, formed by deposition from streams and rivers that have transported sediments from the surrounding upland areas. The alluvium is mainly derived from the Santa Monica Mountains to the south, the Santa Susana Mountains to the northwest, the Simi Hills to the west, the San Gabriel Mountains to the northeast, and the Verdugo Mountains to the east.

Regionally, the site is located in the Transverse Ranges geomorphic province. This province is characterized by east-west trending geologic structures that include the east-west trending Santa Monica Mountains and the east-west trending active San Fernando fault zone. The trend of the San Fernando Valley reflects the overall trend of the Transverse Ranges, where major structural features exhibit an east-west orientation in contrast to the northwest-southeast trend that dominates in the rest of California. The San Fernando Valley is an area of compression between the San Gabriel Mountains on the northeast and the Santa Monica Mountains on the south.

The relationship of the site to local geologic features is depicted in Figure 2, Geologic Map, and the surface faults in the vicinity of the site are shown in Figure 3, Regional Faults. Figure 4, Regional Seismicity, shows the locations of major faults and earthquake epicenters in Southern California.

### 3.2 GEOLOGIC MATERIALS

Law/Crandall previously drilled five borings at the site in 1965 and 27 borings at the site in 1965 and 1966 to a maximum depth of 41½ feet beneath the existing ground surface. Additionally, Law/Crandall has drilled over 52 borings on the adjacent site in 1969 to a maximum depth of 71 feet as part of our prior geotechnical investigations for the existing Northridge Fashion Center. The project site is predominantly underlain by Holocene age alluvial fan deposits (Hitchcock and Wills, 2000). As encountered in our borings, the upper 35 feet of alluvial materials consist of predominantly alternating layers of silty sand and sandy silt with localized layers of gravelly sand and cobbles (up to 7-inches maximum dimension). Locally, clayey silt is present in the upper 12 feet. Below a depth of 35 feet, the alluvial materials consist predominantly of alternating layers of clayey silt and silty clay.

The Holocene age alluvial materials and the underlying Pleistocene age materials are approximately 750 feet thick and are underlain by Tertiary age sedimentary rocks (California State Water Rights Board, 1962).

### 3.3 GROUND WATER

The site is located in Section 21 of Township 2 North, Range 16 West within the San Fernando Hydrologic Subarea in the Upper Los Angeles River Hydrologic Unit. The historic high water level in the area occurred in 1944 when water levels were reportedly 35 to 40 feet below the ground surface (California State Water Rights Board, 1962; California Division of Mines and Geology, 2000). Ground-water management practices have resulted in the stabilization of ground-water levels in the 1960's. Based on ground-water level measurements for wells in the site vicinity, water levels have remained the same or steadily lowered since the 1960's (County of Los Angeles Department of Public Works, 2002).

According to the County of Los Angeles Department of Public Works (2002), the nearest ground-water monitoring well is Well No. 4735B, located approximately 0.4 mile west of the site. Ground water level information is available for this well for the 1956 to 2001 monitoring period. The highest ground water level recorded in this well (for the referenced monitoring period) was in 1957 at a depth of 56.4 feet. Since the 1960s, groundwater levels have steadily declined in this well. The lowest ground-water level recorded in this well was a depth of 86 feet in 1996. The most recent water level measurement in this well indicates a depth to ground water of about 84 feet and a corresponding ground-water Elevation of about 789 on April 20, 2001. Based on a site elevation of about 830 to 855 feet, the corresponding depth to ground water beneath the site is estimated to be about 41 to 66 feet.

Ground water was encountered within our previous borings drilled at the site in 1965 and 1966 at depths of 34½ to 38½ feet. Ground water was encountered in our borings drilled on the adjacent site (Northridge Fashion Center site) in 1969 at depths of 37 to 54 feet. Ground-water levels were deeper in the northern portion of the Northridge Fashion Center site.

Based on the historic recorded water levels beneath the site, ground-water levels beneath the site could fluctuate (seasonally and annually) as a result of ground-water management practices. Although water levels have been know to have steadily declined in the area since the 1960s, water levels could reach historic highs in the future. Based on historical ground-water levels as recorded in borings at the site and in nearby wells, there is a potential for shallow ground water to have an adverse impact on the proposed development.

## 3.4 FAULTS

The numerous faults in Southern California include active, potentially active, and inactive faults. The criteria for these major groups are based on criteria developed by the California Division of Mines and Geology (CDMG) for the Alquist-Priolo Earthquake Fault Zoning Program (Hart, 1999). By definition, an active fault is one that has had surface displacement within Holocene time (about the last 11,000 years). A potentially active fault is a fault that has demonstrated surface displacement of Quaternary age deposits (last 1.6 million years). Inactive faults have not moved in the last 1.6 million years. A list of nearby active faults and the distance in miles between the site and the nearest point on the fault, the maximum magnitude, and the slip rate for the fault is given in Table 1. A similar list for potentially active faults is presented in Table 2. The surface faults in the vicinity of the site are shown in Figure 3.

### Active Faults

<u>San Fernando Fault Zone</u>

The closest active fault to the site is the Mission Wells segment of the San Fernando fault zone located approximately 2.1 miles to the north. The San Fernando fault zone comprises one of a number of left lateral/reverse frontal faults bounding the southern margin of the Santa Susana Mountains and the portion of the San Gabriel Mountains west of Big Tujunga Canyon. An earthquake of magnitude 6.6 originated along this fault zone on February 9, 1971. Surface rupture occurred along the Tujunga, Sylmar, and Mission Wells segments of the San Fernando fault zone during this earthquake.

Simi-Santa Rosa Fault Zone

The active Simi fault of the Simi-Santa Rosa fault zone is located approximately 8.2 miles northwest of the site. The Simi-Santa Rosa fault zone is a reverse/oblique fault system that extends over 50 kilometers across Ventura County from the northeastern end of Simi Valley, westward, to the Camarillo Hills on the east margin of the Oxnard Plain. The fault zone consists of a series of north-dipping reverse or oblique slip faults within the hanging-wall of the Oak Ridge fault system. The principal faults of the Simi-Santa Rosa fault zone, from east to west, include the Simi fault in Simi and Tierra Rejada valleys, the Santa Rosa fault in the Santa Rosa Valley, and the Springville and Camarillo faults in the Camarillo Hills area (Blake, 1991).

The Simi fault forms the linear mountain front along the north margin of Simi and Tierra Rejada valleys. The overall north-side up sense of slip is greater than 5,300 feet in the Tierra Rejada Hills west of Simi Valley. The fault exhibits strong geomorphic evidence of Quaternary deformation in western Simi Valley where more than 500 feet of Pleistocene and younger alluvium fills an east-west trending down dropped bedrock trough. Recent studies of the Simi fault by Hitchcock and others (1997, 1998) at Arroyo Simi, have documented Holocene faulting and found slickensides on the near vertical fault plane that reveal a significant lateral component of slip, suggesting that the fault has an overall left-lateral, reverse sense of slip. The timing of the most recent surface-rupturing event at the Arroyo Simi site is constrained between faulted clay deposits yielding a calibrated radiocarbon age of 7,666±50 years BP (before present) and overlying unfaulted colluvial deposits yielding a calibrated radiocarbon age of 1,205±80 years BP (Hitchcock and others, 1998). The California Division of Mines and Geology consider the Simi fault to be active and have established an Alquist-Priolo Earthquake Fault Zone for the Simi fault.

Verdugo Fault

The active Verdugo fault is located approximately 8.4 miles east of the site. The Verdugo fault is a part of the larger Verdugo fault zone that also includes the San Rafael fault and the Eagle Rock fault. The most recent documented activity along this fault occurs in the Holocene age alluvial deposits along the western flank of the Verdugo Mountains in the Burbank area (County of Los Angeles Seismic Safety Element, 1990; Jennings, 1994). An Alquist-Priolo Earthquake Fault Zone has not been established for the Verdugo fault. However, a fault rupture hazard zone has been designated by the City of Burbank for the Verdugo fault. It is our opinion that the Verdugo fault should be considered active for planning purposes.

San Gabriel Fault Zone

The active San Gabriel fault zone is located about 11 miles northeast of the site. The fault zone has an accurate pattern that is convex to the southwest. The fault has a total length of about 80 miles. Estimates of right lateral separation along the fault zone vary from as little as about 2 to 5 miles to greater than 31 miles (Weber, 1982). Numerous geomorphic indicators such as deflected drainages and scarps along the fault zone indicate relatively recent movement. Cotton et al. (1983) demonstrated offset of Holocene units in the Saugus area. Subsequently, the Saugus-Newhall segment of the San Gabriel fault zone is included within an Alquist-Priolo Earthquake Fault Zone.

San Andreas Fault Zone

The active San Andreas fault zone is located about 29 miles northeast of the site. This fault zone, California's most prominent fault, trends generally northwest for almost the entire length of the state. The southern segment, closest to the site, is approximately 280 miles long and extends from the Mexican Border to the Transverse Ranges west of Tejon Pass. Wallace (1968) estimated the recurrence interval for a magnitude 8.0 earthquake along the entire fault zone to be between 50 and 200 years. Sieh (1984) estimated a recurrence interval of 140 to 200 years. The 1857 Fort Tejon earthquake was the last major earthquake along the San Andreas fault zone in Southern California.

**Blind Thrust Fault Zones**

Northridge Thrust

The Northridge Thrust, as defined by Petersen et al. (1996), is an inferred deep thrust fault that is considered the eastern extension of the active Oak Ridge fault. The Northridge Thrust is located beneath the majority of the San Fernando Valley and is believed to be the causative fault of the January 17, 1994 Northridge earthquake. This deep buried thrust fault is located beneath the site. The Northridge Thrust is not exposed at the surface and does not present a potential surface fault rupture hazard. However, this thrust fault is an active feature that can generate future earthquakes. Petersen et al. (1996) estimates an average slip rate of 1.5 mm/yr. and a maximum magnitude of 6.9 for the Northridge Thrust.

Compton-Los Alamitos Thrust

The Compton-Los Alamitos Thrust, as defined by Dolan et al. (1995), is an inferred blind thrust fault located within the south-central portion of the Los Angeles Basin. This deep buried thrust fault is suggested to extend over 50 miles from the Santa Monica Bay coastline southeast into northwestern Orange County. The Compton-Los Alamitos Thrust may connect with the Elysian Park Thrust (to the northeast) along a detachment fault below Los Angeles. The closest edge of the vertical surface projection of this thrust fault is located about 22 miles southeast of the site. Like other blind thrust faults in the Los Angeles area, the Compton-Los Alamitos Thrust is not exposed at the surface and does not present a potential surface rupture hazard. However, the Compton-Los Alamitos Thrust should be considered an active feature capable of generating future earthquakes. An average slip rate of 1.5 mm/yr and a maximum magnitude of 6.8 are estimated by Petersen et al. (1996) for the Compton-Los Alamitos Thrust.

Elysian Park Thrust

The Elysian Park Thrust, previously defined by Hauksson (1990) as the Elysian Park Fold and Thrust Belt, was postulated to extend northwesterly from the Santa Ana Mountains to the Santa Monica Mountains, extending westerly and paralleling the Santa Monica-Hollywood and Malibu Coast faults. The Elysian Park Thrust is now believed to be smaller in size, only underlying the central Los Angeles Basin (Petersen et al., 1996). The vertical surface projection of the Elysian Park Thrust is about 25 miles southeast of the site at its closest point. Like other blind thrust faults in the Los Angeles area, the Elysian Park Thrust is not exposed at the surface and does not present a potential surface rupture hazard; however, the Elysian Park Thrust should be considered an active feature capable of generating future earthquakes. An average slip rate of 1.5 mm/yr and a maximum magnitude of 6.7 are estimated by Petersen et al. (1996) for the Elysian Park Thrust.

**Potentially Active Faults**

Northridge Hills Fault

The closest potentially active fault to the site is the Northridge Hills fault located approximately 1.3 miles to the north-northeast. The Northridge Hills fault is a high-angle fault and its location is based primarily on the numerous petroleum test wells that have been drilled in the Northridge Hills. Logs of these wells indicate that the Modelo Formation has been displaced between 490 to 1,000 feet along the dip of the fault. The apparent movement along the fault has been dip-slip with the north block moving down. The apparent surface trace of the fault can be found in the Cretaceous Chico Formation north of Chatsworth (Weber, 1980). Geomorphic evidence, such as scarps in the Pleistocene age alluvial deposits, have been identified on aerial photographs (Weber, 1980). The fault is considered potentially active by Jennings (1994). However, a recent publication suggests that deformation of young sediments in the area could be related to movement along the Northridge Hills fault (Baldwin et al., 2000).

Santa Susana Fault

The potentially active Santa Susana fault is located approximately 3.8 miles north of the site. This fault extends northeastward from the Santa Susana Mountains across San Fernando Pass and into the San Gabriel Mountains. Maximum offset along the Santa Susana fault has been postulated by Ingram (1959) as 1 mile of vertical displacement and about 1 to 2 miles of horizontal displacement. Saul (1975) suggests that the Santa Susana fault has been inactive since middle Pleistocene time. However, several authors (Bishop, 1950; Jennings, 1957; Slosson and Barnhart, 1967) have suggested late Pleistocene displacement along the Santa Susana fault. There is no evidence that this fault has offset Holocene age alluvial deposits (County of Los Angeles Seismic Safety Element, 1990). Ziony and Jones (1989) indicate that the fault is potentially active (no displacement of Holocene age alluvium). Additionally, Jennings (1994) indicates the fault is potentially active.

Holser Fault

The potentially active Holser fault is located 16 miles north-northwest of the site. This fault is a high-angle reverse fault that offsets Pleistocene age terrace deposits. The Holser fault intersects the San Gabriel fault east of Saugus. There is no evidence that this fault has offset Holocene age alluvial deposits (County of Los Angeles Seismic Safety Element, 1990). Ziony and Jones (1989) indicate that the fault is potentially active (no displacement of Holocene age alluvium). Additionally, Jennings (1994) indicates the fault is potentially active.

# 4.0 GEOLOGIC-SEISMIC HAZARDS

## 4.1 FAULT RUPTURE

The site is not within a currently established Alquist-Priolo Earthquake Fault Zone for surface fault rupture hazards. The closest Alquist-Priolo Earthquake Fault Zone, established for the surface breaks along the Santa Susana fault that are a result of ground motions generated by the San Fernando Earthquake, is located 4.0 miles to the north. Based on the available geologic data, active or potentially active faults with the potential for surface fault rupture are not known to be located directly beneath or projecting toward the site. Therefore, the potential for surface rupture due to fault plane displacement propagating to the surface at the site during the design life of the project is considered low.

## 4.2 SEISMICITY

Earthquake Catalog Data

The seismicity of the region surrounding the site was determined from research of an electronic database of seismic data (Southern California Seismographic Network, 2002). This database includes earthquake data compiled by the California Institute of Technology for 1932 to 2002 and data for 1812 to 1931 compiled by Richter and the U.S. National Oceanic Atmospheric Administration (NOAA). The search for earthquakes that occurred within 100 kilometers of the site indicates that 529 earthquakes of Richter magnitude 4.0 and greater occurred between 1932 and 2002; one earthquake of magnitude 6.0 or greater occurred between 1906 and 1931; and one earthquake of magnitude 7.0 or greater occurred between 1812 and 1905. A list of these earthquakes is presented as Table 3. Epicenters of moderate and major earthquakes (greater than magnitude 6.0) are shown in Figure 4.

The information for each earthquake includes date and time in Greenwich Civil Time (GCT), location of the epicenter in latitude and longitude, quality of epicentral determination (Q), depth in kilometers, distance from the site in kilometers, and magnitude. Where a depth of 0.0 is given, the solution was based on an assumed 16-kilometer focal depth. The explanation of the letter code for the quality factor of the data is presented on the first page of the table.

Historic Earthquakes

A number of earthquakes of moderate to major magnitude have occurred in the Southern California area within the last 69 years. A partial list of these earthquakes is included in the following table.

**List of Historic Earthquakes**

| Earthquake (Oldest to Youngest) | Date of Earthquake | Magnitude | Distance to Epicenter (Miles) | Direction to Epicenter |
|---|---|---|---|---|
| Long Beach | March 10, 1933 | 6.4 | 55 | SE |
| Tehachapi | July 21, 1952 | 7.5 | 59 | NW |
| San Fernando | February 9, 1971 | 6.6 | 15 | NNE |
| Whittier Narrows | October 1, 1987 | 5.9 | 30 | ESE |
| Sierra Madre | June 28, 1991 | 5.8 | 32 | E |
| Landers | June 28, 1992 | 7.3 | 120 | E |
| Big Bear | June 28, 1992 | 6.4 | 102 | E |
| Northridge | January 17, 1994 | 6.7 | 1.8 | S |
| Hector Mine | October 16, 1999 | 7.1 | 136 | NE |

The site could be subjected to strong ground shaking in the event of an earthquake. However, this hazard is common in Southern California and the effects of ground shaking can be mitigated by proper engineering design and construction in conformance with current building codes and engineering practices.

## 4.3 SLOPE STABILITY

The relatively flat-lying topography at the site precludes both stability problems and the potential for lurching (earth movement at right angles to a cliff or steep slope during ground shaking). According to the City of Los Angeles Safety Element (1996) and the County of Los Angeles Seismic Safety Element (1990), the site is not within an area identified as having a potential for slope instability. There are no known landslides near the site, nor is the site in the path of any known or potential landslides. Additionally, the site is not located within an area identified as having a potential for seismic slope instability (California Division of Mines and Geology, 1998).

If basements are planned for the proposed project buildings, excavations will expose alluvial deposits. These deposits are horizontally stratified and lack any well-defined planar features or discontinuities (such as bedding or joints) that would act as planes of weakness and will not adversely affect the proposed basement construction. Also, the geologic conditions at the site will not create an additional surcharge on the proposed basement walls. However, the sandy alluvial deposits could be prone to local raveling or caving and a temporary shoring system with lagging will be required for vertical excavations. Temporary and permanent retaining walls should be designed for the recommended lateral earth pressures and provided with a drainage system, as recommended, to mitigate the potential for instability due to proposed excavation at the site.

### 4.4 LIQUEFACTION AND SEISMICALLY INDUCED SETTLEMENT

Liquefaction potential is greatest where the ground water level is shallow, and submerged loose, fine sands occur within a depth of about 50 feet or less. Liquefaction potential decreases as grain size and clay and gravel content increase. As ground acceleration and shaking duration increase during an earthquake, liquefaction potential increases.

According to the California Division of Mines and Geology (1998), the City of Los Angeles Safety Element (1996), and the County of Los Angeles Seismic Safety Element (1990), the northern portion of the site is not within an area identified as having a potential for liquefaction. However, the southern portion of the project site is within an area identified as having a potential for liquefaction (California Division of Mines and Geology, 1998; City of Los Angeles, 1996; County of Los Angeles, 1990). The site boundaries relative to the state-designated liquefaction hazard zone is shown in Figure 5, Seismic Hazard Zone Map.

Based on ground-water levels in nearby wells, the historical and current ground water levels beneath the northern portion of the site are at depths greater than 50 feet below the existing ground surface. However, historic ground-water levels beneath the southern portion of the site were historically as shallow as about 34 feet beneath the existing ground surface. Therefore, there is a potential for liquefaction and the associated ground deformation at the site, especially beneath the portion of the site that is included in the liquefaction hazard zone. A site-specific liquefaction analysis should be performed as part of the comprehensive geotechnical investigation for the proposed development to evaluate the anticipated magnitude of liquefaction-induced settlement and to provide foundation recommendations to mitigate the potentially adverse effects of liquefaction.

Seismically induced settlement is often caused by loose to medium-dense granular soils densified during ground shaking. Uniform settlement beneath a given structure would cause minimal damage; however, because of variations in distribution, density, and confining conditions of the soils, seismically induced settlement is generally non-uniform and can cause serious structural damage. Dry and partially saturated soils as well as saturated granular soils are subject to seismically induced settlement. Generally, differential settlements induced by ground failures such as liquefaction, flow slides, and surface ruptures would be much more severe than those caused by densification alone. Based on the results of our previous borings at the site and at the adjacent Northridge Fashion Center, the deeper soils (beneath the historic high ground-water level) are predominately clayey, with some thinner layers of sand and silty sand. Therefore, the soils would only be anticipated to have minimal liquefaction, if any, in the sandier layers beneath the depth of the ground water. Seismic settlement due to limited liquefaction of thin layers at this depth would be anticipated to be small and relatively uniform, resulting in little, if any, distress to hardscape, utilities, or structures. Nevertheless, a site-specific liquefaction evaluation will be required during the comprehensive geotechnical investigation for the site liquefaction would not be anticipated in the northern portion of the site where ground water is deeper.

**4.5 TSUNAMIS, INUNDATION, SEICHES, AND FLOODING**

The site is not in a coastal area. Therefore, tsunamis (seismic sea waves) are not considered a significant hazard at the site.

According to the City of Los Angeles Safety Element (1996) and the County of Los Angeles Seismic Safety Element (1990), the site is not located within a potential inundation area for an earthquake-induced dam failure. Therefore, the potential for the site to be inundated as a result of an earthquake-induced dam failure is considered to be low.

The site is not located downslope of any large bodies of water that could adversely affect the site in the event of earthquake-induced seiches (wave oscillations in an enclosed or semi-enclosed body of water).

The site is in an area of minimal flooding potential (Zone C) as defined by the Federal Insurance Administration.

### 4.6 SUBSIDENCE

The site is not within an area of known subsidence associated with fluid withdrawal (ground water or petroleum), peat oxidation, or hydrocompaction.

## 5.0 GEOTECHNICAL CONSIDERATIONS

Based on our previous geotechnical investigations at the site and the adjacent Northridge Fashion Center site, the upper natural soils beneath the site are only soft to moderately firm and adversely affected by water. The use of spread footings for support of proposed buildings would result in large settlements. To provide adequate support for proposed buildings with minimum settlement, drilled cast-in-place concrete piles or driven precast piles could be used. The depth to ground water should be taken into consideration when designing the length of the piles so that drilled piles do not extend below ground water. Some caving would be anticipated in drilled pile excavations; drilling of piles may need to be performed using bucket-type drilling equipment or using either methods to avoid or minimize caving. Pile lengths may need to be increased in the event that significant liquefaction potential is found to be present in the southern portion of the site. Also, it is possible that if artificial fill related to past grading and construction is present at the site, the existing artificial fill soils might not be well compacted and hence would not be suitable for foundation or floor slab support. The clayey soils are slightly expansive.

As an alternative for lightly loaded one-story buildings, it may be possible to support the buildings on spread footings established on a layer of properly compacted fill at least 2 feet thick below the footings.

The actual foundation design should be determined during the comprehensive geotechnical investigation for each proposed structure.

No exceptional difficulties due to soil conditions are anticipated during planned excavations at the site. Shoring would need to be used for vertical excavations at the site. We anticipate the earth materials at the site can be excavated with conventional earth-moving equipment.

## 6.0 CONCLUSIONS

Based on the available geologic data, active or potentially active faults with the potential for surface fault rupture are not known to be located beneath or projecting toward the site. In our opinion, the potential for surface rupture at the site due to fault plane displacement propagating to the ground surface during the design life of the project is considered low. Although the site could be subjected to strong ground shaking in the event of an earthquake, this hazard is common in Southern California and the effects of ground shaking can be mitigated by proper engineering design and construction in conformance with current building codes and engineering practices.

The southern portion of the site is within a liquefaction hazard zone as designated by the state of California, as well as the City of Los Angeles and the County of Los Angeles. Therefore, there is a potential for liquefaction and the associated ground deformation at the site, especially beneath the portion of the site that is included in the liquefaction hazard zone. Nevertheless, the clayey soils at depth beneath the site would not be considered liquefiable; only the sandy and silty layers at the site might be subject to liquefaction. A site-specific liquefaction analysis should be performed as part of the comprehensive geotechnical investigation for the proposed development to evaluate the anticipated magnitude of liquefaction-induced settlement and to provide foundation recommendations to mitigate the potentially adverse effects of liquefaction.

The site is relatively level and the absence of nearby slopes precludes slope stability hazards. The potential for other geologic hazards such as tsunamis, inundation, seiches, flooding, and subsidence affecting the site is considered low.

There are no unusual foundation requirements due to the soil conditions at the site. It is anticipated that the structures proposed as part of the proposed project would need to be supported on deep foundations. Light one-story structures may be able to be supported on spread footing foundations on a layer of properly compacted fill. If subterranean construction is planned, a temporary shoring system for the soil my be required if sufficient room is not available for sloped excavations.

Ground water beneath the site has historically been at a depth of less than 50 feet. However, it is unlikely that the ground-water would have an impact on basements unless they extended below a depth of at least 30 feet. Therefore, there is a potential for ground water to have an adverse impact on proposed subterranean structures.

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**Table 1**
**Major Named Faults Considered to be Active in Southern California**

| Fault (in increasing distance) | Maximum Magnitude | | | Slip Rate (mm/yr.) | Distance From Site (Miles) | Direction From Site |
|---|---|---|---|---|---|---|
| Northridge Thrust | 6.9 | (e) | RO | 1.5 | 0 | --- |
| San Fernando | 6.7 | (e) | RO | 2.0 | 2.1 | N |
| Simi-Santa Rosa | 6.7 | (e) | RO | 1.0 | 8.2 | NW |
| Verdugo | 6.7 | (e) | RO | 0.5 | 8.4 | E |
| San Gabriel | 7.0 | (e) | SS | 1.0 | 11 | NE |
| Hollywood | 6.4 | (e) | RO | 1.0 | 13 | SE |
| Santa Monica | 6.6 | (e) | RO | 1.0 | 13 ½ | SSE |
| Malibu Coast | 6.7 | (e) | RO | 0.3 | 14 | S |
| Oak Ridge | 6.9 | (e) | RO | 4.0 | 15 | NW |
| Sierra Madre | 7.0 | (e) | RO | 3.0 | 15 | E |
| Newport-Inglewood Zone | 6.9 | (e) | SS | 1.0 | 17 | SSE |
| San Cayetano | 6.8 | (e) | RO | 6.0 | 17 ½ | NW |
| Anacapa-Dume | 7.3 | (e) | RO | 3.0 | 18 | SSW |
| Palos Verdes | 7.1 | (e) | SS | 3.0 | 20 | S |
| Raymond | 6.5 | (e) | RO | 0.5 | 21 | ESE |
| Compton-Los Alamitos Thrust | 6.8 | (e) | RO | 1.5 | 22 | SE |
| Elysian Park Thrust | 6.7 | (e) | RO | 1.5 | 25 | SE |
| San Andreas (Southern Segment ) | 7.4 | (e) | SS | 24.0 | 29 | NE |
| Whittier | 6.8 | (e) | SS | 2.5 | 33 | SE |
| Ventura-Pitas Point | 6.8 | (e) | RO | 1.0 | 37 | W |
| Red Mountain | 6.8 | (e) | RO | 2.0 | 43 | W |
| Cucamonga | 7.0 | (e) | RO | 5.0 | 47 | ESE |
| Elsinore (Glen Ivy Segment) | 6.8 | (e) | SS | 5.0 | 58 | SE |

(a) Slemmons, 1979
(b) Mark, 1977
(c) Blake, 1998
(d) Dolan et al., 1995
(e) CDMG, 1996
(f) Anderson, 1984
(g) Wesnousky, 1986
(h) Hummon et al., 1994
SS Strike Slip
NO Normal Oblique
RO Reverse Oblique

**Table 2**
**Major Named Faults Considered to be Potentially Active in Southern California**

| Fault (in increasing distance) | Maximum Magnitude | | | Slip Rate (mm/yr.) | Distance From Site (Miles) | Direction From Site |
|---|---|---|---|---|---|---|
| Northridge Hills | 6.6 | (g) | SS | 1.2 | 1.3 | NNE |
| Santa Susana | 6.6 | (e) | RO | 5.0 | 3.8 | N |
| Holser | 6.5 | (e) | RO | 0.4 | 16 | NNW |
| Overland | 6.0 | (a) | SS | 0.1 | 17 | SSE |
| Charnock | 6.5 | (a) | SS | 0.1 | 18 | SSE |
| MacArthur Park | 5.7 | (h) | RO | 3.0 | 18 | SE |
| Coyote Pass | 6.7 | (b) | RO | 0.1 | 25 | NE |
| Clamshell-Sawpit | 6.5 | (e) | RO | 0.5 | 31 | E |
| Duarte | 6.7 | (a) | RO | 0.1 | 33 | E |
| Lion Canyon | 6.8 | (b) | RO | 0.1 | 35 | WNW |
| Norwalk | 6.7 | (a) | RO | 0.1 | 35 | SE |
| Los Alamitos | 6.2 | (b) | SS | 0.1 | 37 | SE |
| Indian Hill | 6.6 | (b) | RO | 0.1 | 42 | E |
| San Jose | 6.5 | (e) | RO | 0.5 | 44 | ESE |
| El Modeno | 6.5 | (b) | NO | 0.1 | 46 | SE |
| Chino - Central Avenue | 6.7 | (e) | NO | 1.0 | 47 | SE |

(a) Slemmons, 1979
(b) Mark, 1977
(c) Blake, 1998
(d) Dolan et al., 1995
(e) CDMG, 1996
(f) Anderson, 1984
(g) Wesnousky, 1986
(h) Hummon et al., 1994
SS Strike Slip
NO Normal Oblique
RO Reverse Oblique

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 03-11-1933 | 01:54:07 | 33.62 N | 117.97 W | A | 88 | .0 | 6.4 |
| 03-11-1933 | 02:04:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.9 |
| 03-11-1933 | 02:05:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.3 |
| 03-11-1933 | 02:09:00 | 33.75 N | 118.08 W | C | 70 | .0 | 5.0 |
| 03-11-1933 | 02:10:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.6 |
| 03-11-1933 | 02:11:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.4 |
| 03-11-1933 | 02:16:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.8 |
| 03-11-1933 | 02:17:00 | 33.60 N | 118.00 W | E | 87 | .0 | 4.5 |
| 03-11-1933 | 02:22:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 02:27:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.6 |
| 03-11-1933 | 02:30:00 | 33.75 N | 118.08 W | C | 70 | .0 | 5.1 |
| 03-11-1933 | 02:31:00 | 33.60 N | 118.00 W | E | 87 | .0 | 4.4 |
| 03-11-1933 | 02:52:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 02:57:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-11-1933 | 02:58:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 02:59:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.6 |
| 03-11-1933 | 03:05:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-11-1933 | 03:09:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.4 |
| 03-11-1933 | 03:11:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-11-1933 | 03:23:00 | 33.75 N | 118.08 W | C | 70 | .0 | 5.0 |
| 03-11-1933 | 03:36:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 03:39:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 03:47:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-11-1933 | 04:36:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.6 |
| 03-11-1933 | 04:39:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.9 |
| 03-11-1933 | 04:40:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.7 |
| 03-11-1933 | 05:10:22 | 33.70 N | 118.07 W | C | 75 | .0 | 5.1 |
| 03-11-1933 | 05:13:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.7 |
| 03-11-1933 | 05:15:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 05:18:04 | 33.58 N | 117.98 W | C | 91 | .0 | 5.2 |
| 03-11-1933 | 05:21:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.4 |
| 03-11-1933 | 05:24:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-11-1933 | 05:53:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 05:55:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 06:11:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.4 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 03-11-1933 | 06:18:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-11-1933 | 06:29:00 | 33.85 N | 118.27 W | C | 51 | .0 | 4.4 |
| 03-11-1933 | 06:35:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-11-1933 | 06:58:03 | 33.68 N | 118.05 W | C | 77 | .0 | 5.5 |
| 03-11-1933 | 07:51:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-11-1933 | 07:59:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-11-1933 | 08:08:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.5 |
| 03-11-1933 | 08:32:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-11-1933 | 08:37:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 08:54:57 | 33.70 N | 118.07 W | C | 75 | .0 | 5.1 |
| 03-11-1933 | 09:10:00 | 33.75 N | 118.08 W | C | 70 | .0 | 5.1 |
| 03-11-1933 | 09:11:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.4 |
| 03-11-1933 | 09:26:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-11-1933 | 10:25:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 10:45:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 11:00:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 11:04:00 | 33.75 N | 118.13 W | C | 67 | .0 | 4.6 |
| 03-11-1933 | 11:29:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 11:38:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 11:41:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-11-1933 | 11:47:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.4 |
| 03-11-1933 | 12:50:00 | 33.68 N | 118.05 W | C | 77 | .0 | 4.4 |
| 03-11-1933 | 13:50:00 | 33.73 N | 118.10 W | C | 70 | .0 | 4.4 |
| 03-11-1933 | 13:57:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 14:25:00 | 33.85 N | 118.27 W | C | 51 | .0 | 5.0 |
| 03-11-1933 | 14:47:00 | 33.73 N | 118.10 W | C | 70 | .0 | 4.4 |
| 03-11-1933 | 14:57:00 | 33.88 N | 118.32 W | C | 45 | .0 | 4.9 |
| 03-11-1933 | 15:09:00 | 33.73 N | 118.10 W | C | 70 | .0 | 4.4 |
| 03-11-1933 | 15:47:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 16:53:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.8 |
| 03-11-1933 | 19:44:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-11-1933 | 19:56:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-11-1933 | 22:00:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.4 |
| 03-11-1933 | 22:31:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.4 |
| 03-11-1933 | 22:32:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 03-11-1933 | 22:40:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.4 |
| 03-11-1933 | 23:05:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-12-1933 | 00:27:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.4 |
| 03-12-1933 | 00:34:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-12-1933 | 04:48:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-12-1933 | 05:46:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.4 |
| 03-12-1933 | 06:01:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-12-1933 | 06:16:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.6 |
| 03-12-1933 | 07:40:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-12-1933 | 08:35:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-12-1933 | 15:02:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-12-1933 | 16:51:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-12-1933 | 17:38:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.5 |
| 03-12-1933 | 18:25:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-12-1933 | 21:28:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-12-1933 | 23:54:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.5 |
| 03-13-1933 | 03:43:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-13-1933 | 04:32:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.7 |
| 03-13-1933 | 06:17:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-13-1933 | 13:18:28 | 33.75 N | 118.08 W | C | 70 | .0 | 5.3 |
| 03-13-1933 | 15:32:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-13-1933 | 19:29:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-14-1933 | 00:36:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-14-1933 | 12:19:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.5 |
| 03-14-1933 | 19:01:50 | 33.62 N | 118.02 W | C | 85 | .0 | 5.1 |
| 03-14-1933 | 22:42:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-15-1933 | 02:08:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-15-1933 | 04:32:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-15-1933 | 05:40:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-15-1933 | 11:13:32 | 33.62 N | 118.02 W | C | 85 | .0 | 4.9 |
| 03-16-1933 | 14:56:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 03-16-1933 | 15:29:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-16-1933 | 15:30:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-17-1933 | 16:51:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 03-18-1933 | 20:52:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-19-1933 | 21:23:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 03-20-1933 | 13:58:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-21-1933 | 03:26:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-23-1933 | 08:40:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-23-1933 | 18:31:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-25-1933 | 13:46:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 03-30-1933 | 12:25:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.4 |
| 03-31-1933 | 10:49:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.1 |
| 04-01-1933 | 06:42:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.2 |
| 04-02-1933 | 08:00:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 04-02-1933 | 15:36:00 | 33.75 N | 118.08 W | C | 70 | .0 | 4.0 |
| 05-16-1933 | 20:58:55 | 33.75 N | 118.17 W | C | 65 | .0 | 4.0 |
| 08-04-1933 | 04:17:48 | 33.75 N | 118.18 W | C | 64 | .0 | 4.0 |
| 10-02-1933 | 09:10:17 | 33.78 N | 118.13 W | A | 64 | .0 | 5.4 |
| 10-02-1933 | 13:26:01 | 33.62 N | 118.02 W | C | 85 | .0 | 4.0 |
| 10-25-1933 | 07:00:46 | 33.95 N | 118.13 W | C | 51 | .0 | 4.3 |
| 11-13-1933 | 21:28:00 | 33.87 N | 118.20 W | C | 53 | .0 | 4.0 |
| 11-20-1933 | 10:32:00 | 33.78 N | 118.13 W | B | 64 | .0 | 4.0 |
| 01-09-1934 | 14:10:00 | 34.10 N | 117.68 W | A | 82 | .0 | 4.5 |
| 01-18-1934 | 02:14:00 | 34.10 N | 117.68 W | A | 82 | .0 | 4.0 |
| 01-20-1934 | 21:17:00 | 33.62 N | 118.12 W | B | 80 | .0 | 4.5 |
| 04-17-1934 | 18:33:00 | 33.57 N | 117.98 W | C | 91 | .0 | 4.0 |
| 10-17-1934 | 09:38:00 | 33.63 N | 118.40 W | B | 68 | .0 | 4.0 |
| 11-16-1934 | 21:26:00 | 33.75 N | 118.00 W | B | 75 | .0 | 4.0 |
| 06-11-1935 | 18:10:00 | 34.72 N | 118.97 W | B | 65 | .0 | 4.0 |
| 07-13-1935 | 10:54:16 | 34.20 N | 117.90 W | A | 61 | .0 | 4.7 |
| 12-25-1935 | 17:15:00 | 33.60 N | 118.02 W | B | 87 | .0 | 4.5 |
| 08-22-1936 | 05:21:00 | 33.77 N | 117.82 W | B | 86 | .0 | 4.0 |
| 10-29-1936 | 22:35:36 | 34.38 N | 118.62 W | C | 17 | 10.0 | 4.0 |
| 11-29-1936 | 05:54:45 | 34.84 N | 118.99 W | A | 77 | 10.0 | 4.0 |
| 01-15-1937 | 18:35:47 | 33.56 N | 118.06 W | B | 88 | 10.0 | 4.0 |
| 07-07-1937 | 11:12:00 | 33.57 N | 117.98 W | B | 91 | .0 | 4.0 |
| 09-01-1937 | 13:48:08 | 34.21 N | 117.53 W | A | 95 | 10.0 | 4.5 |
| 09-01-1937 | 16:35:33 | 34.18 N | 117.55 W | A | 94 | 10.0 | 4.5 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 05-21-1938 | 09:44:00 | 33.62 N | 118.03 W | B | 84 | .0 | 4.0 |
| 08-31-1938 | 03:18:14 | 33.76 N | 118.25 W | A | 60 | 10.0 | 4.5 |
| 10-02-1938 | 18:45:00 | 34.33 N | 119.58 W | C | 95 | .0 | 4.0 |
| 11-29-1938 | 19:21:15 | 33.90 N | 118.43 W | A | 39 | 10.0 | 4.0 |
| 12-07-1938 | 03:38:00 | 34.00 N | 118.42 W | B | 29 | .0 | 4.0 |
| 12-27-1938 | 10:09:28 | 34.13 N | 117.52 W | B | 97 | 10.0 | 4.0 |
| 02-23-1939 | 08:45:51 | 34.91 N | 118.97 W | A | 84 | 10.0 | 4.5 |
| 02-23-1939 | 09:18:46 | 34.89 N | 119.00 W | A | 83 | 10.0 | 4.5 |
| 03-07-1939 | 19:53:31 | 34.84 N | 119.03 W | A | 80 | 10.0 | 4.0 |
| 05-08-1939 | 02:48:05 | 34.90 N | 119.04 W | A | 86 | 10.0 | 4.5 |
| 11-04-1939 | 21:41:00 | 33.77 N | 118.12 W | B | 66 | .0 | 4.0 |
| 12-27-1939 | 19:28:49 | 33.78 N | 118.20 W | A | 60 | .0 | 4.7 |
| 01-13-1940 | 07:49:07 | 33.78 N | 118.13 W | B | 64 | .0 | 4.0 |
| 02-08-1940 | 16:56:17 | 33.70 N | 118.07 W | B | 75 | .0 | 4.0 |
| 02-11-1940 | 19:24:10 | 33.98 N | 118.30 W | B | 37 | .0 | 4.0 |
| 05-18-1940 | 09:15:12 | 34.60 N | 118.90 W | C | 51 | .0 | 4.0 |
| 07-20-1940 | 04:01:13 | 33.70 N | 118.07 W | B | 75 | .0 | 4.0 |
| 10-11-1940 | 05:57:12 | 33.77 N | 118.45 W | A | 53 | .0 | 4.7 |
| 10-12-1940 | 00:24:00 | 33.78 N | 118.42 W | B | 52 | .0 | 4.0 |
| 10-14-1940 | 20:51:11 | 33.78 N | 118.42 W | B | 52 | .0 | 4.0 |
| 11-01-1940 | 07:25:03 | 33.78 N | 118.42 W | B | 52 | .0 | 4.0 |
| 11-01-1940 | 20:00:46 | 33.63 N | 118.20 W | B | 75 | .0 | 4.0 |
| 11-02-1940 | 02:58:26 | 33.78 N | 118.42 W | B | 52 | .0 | 4.0 |
| 01-30-1941 | 01:34:46 | 33.97 N | 118.05 W | A | 56 | .0 | 4.1 |
| 03-22-1941 | 08:22:40 | 33.52 N | 118.10 W | B | 90 | .0 | 4.0 |
| 04-11-1941 | 01:20:24 | 33.95 N | 117.58 W | B | 95 | .0 | 4.0 |
| 07-01-1941 | 07:50:54 | 34.37 N | 119.58 W | A | 95 | .0 | 5.5 |
| 07-01-1941 | 08:19:00 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 07-01-1941 | 08:21:00 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 07-01-1941 | 08:30:00 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 07-01-1941 | 08:48:00 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 07-01-1941 | 08:58:00 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 07-01-1941 | 09:05:00 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 07-01-1941 | 09:45:00 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 07-01-1941 | 10:25:00 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 07-01-1941 | 18:20:00 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 07-01-1941 | 23:54:00 | 34.33 N | 119.58 W | B | 95 | .0 | 4.5 |
| 07-02-1941 | 22:19:00 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 07-03-1941 | 19:26:00 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 07-12-1941 | 16:18:00 | 34.33 N | 119.58 W | B | 95 | .0 | 4.5 |
| 09-08-1941 | 03:12:45 | 34.33 N | 119.58 W | B | 95 | .0 | 4.5 |
| 09-08-1941 | 03:14:23 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 09-14-1941 | 01:45:18 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 09-15-1941 | 01:37:02 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 09-21-1941 | 19:53:07 | 34.87 N | 118.93 W | A | 78 | .0 | 5.1 |
| 09-25-1941 | 05:12:56 | 34.33 N | 119.58 W | B | 95 | .0 | 4.0 |
| 10-22-1941 | 06:57:18 | 33.82 N | 118.22 W | A | 56 | .0 | 4.8 |
| 11-14-1941 | 08:41:36 | 33.78 N | 118.25 W | A | 58 | .0 | 4.8 |
| 11-18-1941 | 18:08:10 | 34.33 N | 119.58 W | C | 95 | .0 | 4.0 |
| 11-21-1941 | 16:56:03 | 34.33 N | 119.58 W | C | 95 | .0 | 4.0 |
| 09-03-1942 | 14:06:01 | 34.48 N | 118.98 W | C | 48 | .0 | 4.5 |
| 09-04-1942 | 06:34:33 | 34.48 N | 118.98 W | C | 48 | .0 | 4.5 |
| 04-06-1943 | 22:36:24 | 34.68 N | 119.00 W | C | 64 | .0 | 4.0 |
| 04-12-1944 | 15:33:10 | 34.27 N | 119.52 W | C | 88 | .0 | 4.0 |
| 06-19-1944 | 00:03:33 | 33.87 N | 118.22 W | B | 52 | .0 | 4.5 |
| 06-19-1944 | 03:06:07 | 33.87 N | 118.22 W | C | 52 | .0 | 4.4 |
| 02-24-1946 | 06:07:52 | 34.40 N | 117.80 W | C | 72 | .0 | 4.1 |
| 06-01-1946 | 11:06:31 | 34.42 N | 118.83 W | C | 32 | .0 | 4.1 |
| 03-01-1948 | 08:12:13 | 34.17 N | 117.53 W | B | 95 | .0 | 4.7 |
| 04-16-1948 | 22:26:24 | 34.02 N | 118.97 W | B | 45 | .0 | 4.7 |
| 10-03-1948 | 02:46:28 | 34.18 N | 117.58 W | A | 90 | .0 | 4.0 |
| 01-11-1950 | 21:41:35 | 33.94 N | 118.20 W | A | 46 | .4 | 4.1 |
| 01-24-1950 | 21:56:59 | 34.67 N | 118.83 W | C | 54 | .0 | 4.0 |
| 02-26-1950 | 00:06:22 | 34.62 N | 119.08 W | C | 64 | .0 | 4.7 |
| 08-22-1950 | 22:47:58 | 34.15 N | 119.35 W | B | 73 | .0 | 4.2 |
| 02-10-1952 | 13:50:55 | 33.58 N | 119.18 W | C | 92 | .0 | 4.0 |
| 07-21-1952 | 11:52:14 | 35.00 N | 119.02 W | A | 95 | .0 | 7.5 |
| 07-21-1952 | 11:54:00 | 35.00 N | 119.03 W | D | 95 | .0 | 4.5 |
| 07-21-1952 | 11:55:00 | 35.00 N | 119.03 W | D | 95 | .0 | 4.5 |
| 07-21-1952 | 11:57:00 | 35.00 N | 119.03 W | D | 95 | .0 | 4.5 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 07-21-1952 | 11:58:00 | 35.00 N | 119.03 W | D | 95 | .0 | 4.6 |
| 07-21-1952 | 11:59:00 | 35.00 N | 119.03 W | D | 95 | .0 | 4.5 |
| 07-21-1952 | 12:02:00 | 35.00 N | 119.03 W | D | 95 | .0 | 5.6 |
| 07-21-1952 | 12:05:31 | 35.00 N | 119.00 W | D | 94 | .0 | 6.4 |
| 07-21-1952 | 12:06:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.8 |
| 07-21-1952 | 12:07:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.7 |
| 07-21-1952 | 12:10:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.5 |
| 07-21-1952 | 12:12:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.6 |
| 07-21-1952 | 12:18:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.4 |
| 07-21-1952 | 12:19:36 | 34.95 N | 118.87 W | A | 84 | .0 | 5.3 |
| 07-21-1952 | 12:22:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.9 |
| 07-21-1952 | 12:25:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.7 |
| 07-21-1952 | 12:28:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.2 |
| 07-21-1952 | 12:39:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.2 |
| 07-21-1952 | 12:40:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.9 |
| 07-21-1952 | 12:59:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.2 |
| 07-21-1952 | 13:08:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.5 |
| 07-21-1952 | 13:11:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.1 |
| 07-21-1952 | 13:13:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.5 |
| 07-21-1952 | 13:17:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.0 |
| 07-21-1952 | 13:25:12 | 35.00 N | 119.00 W | A | 94 | .0 | 4.5 |
| 07-21-1952 | 13:36:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.1 |
| 07-21-1952 | 13:59:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.6 |
| 07-21-1952 | 14:06:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.2 |
| 07-21-1952 | 14:15:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.4 |
| 07-21-1952 | 14:17:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.1 |
| 07-21-1952 | 14:42:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.2 |
| 07-21-1952 | 14:51:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.2 |
| 07-21-1952 | 15:36:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.2 |
| 07-21-1952 | 15:42:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.2 |
| 07-21-1952 | 15:53:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.5 |
| 07-21-1952 | 16:17:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.1 |
| 07-21-1952 | 16:38:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.5 |
| 07-21-1952 | 18:00:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.5 |
| 07-21-1952 | 21:53:09 | 34.87 N | 119.02 W | A | 82 | .0 | 4.3 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 07-21-1952 | 23:53:28 | 34.98 N | 119.03 W | A | 94 | .0 | 4.5 |
| 07-22-1952 | 01:41:02 | 35.13 N | 118.52 W | A | 100 | .0 | 4.5 |
| 07-22-1952 | 07:44:55 | 34.87 N | 118.87 W | A | 75 | .0 | 4.1 |
| 07-22-1952 | 08:16:24 | 35.08 N | 118.58 W | A | 94 | .0 | 4.4 |
| 07-22-1952 | 08:21:22 | 35.00 N | 119.00 W | A | 94 | .0 | 4.1 |
| 07-22-1952 | 08:47:34 | 35.08 N | 118.75 W | A | 96 | .0 | 4.7 |
| 07-22-1952 | 10:19:39 | 35.03 N | 119.00 W | A | 97 | .0 | 4.1 |
| 07-22-1952 | 13:31:43 | 35.00 N | 119.00 W | A | 94 | .0 | 4.8 |
| 07-22-1952 | 14:30:18 | 34.90 N | 119.05 W | A | 86 | .0 | 4.3 |
| 07-22-1952 | 17:52:36 | 35.00 N | 119.00 W | A | 94 | .0 | 4.1 |
| 07-22-1952 | 19:10:24 | 35.00 N | 119.00 W | D | 94 | .0 | 4.1 |
| 07-22-1952 | 21:02:11 | 35.07 N | 118.77 W | A | 94 | .0 | 4.2 |
| 07-22-1952 | 22:31:33 | 35.03 N | 118.93 W | A | 95 | .0 | 4.7 |
| 07-23-1952 | 00:43:08 | 35.00 N | 119.00 W | A | 94 | .0 | 4.4 |
| 07-23-1952 | 07:53:19 | 35.00 N | 118.83 W | A | 88 | .0 | 5.4 |
| 07-23-1952 | 15:25:24 | 35.13 N | 118.52 W | A | 100 | .0 | 4.0 |
| 07-23-1952 | 18:13:51 | 35.00 N | 118.83 W | A | 88 | .0 | 5.2 |
| 07-23-1952 | 21:16:58 | 35.03 N | 118.92 W | A | 94 | .0 | 4.1 |
| 07-23-1952 | 22:32:20 | 35.07 N | 118.93 W | A | 98 | .0 | 4.1 |
| 07-23-1952 | 23:51:36 | 35.07 N | 118.62 W | A | 92 | .0 | 4.0 |
| 07-24-1952 | 09:50:32 | 34.98 N | 118.90 W | A | 89 | .0 | 4.3 |
| 07-25-1952 | 00:03:00 | 35.00 N | 119.00 W | D | 94 | .0 | 4.0 |
| 07-26-1952 | 15:08:31 | 35.08 N | 118.75 W | A | 96 | .0 | 4.4 |
| 07-26-1952 | 18:02:44 | 35.08 N | 118.75 W | A | 96 | .0 | 4.0 |
| 07-27-1952 | 07:16:11 | 35.03 N | 119.05 W | A | 99 | .0 | 4.1 |
| 07-28-1952 | 05:45:54 | 35.13 N | 118.52 W | A | 100 | .0 | 4.2 |
| 07-30-1952 | 11:02:55 | 34.97 N | 118.95 W | A | 89 | .0 | 4.1 |
| 08-01-1952 | 13:04:30 | 34.90 N | 118.95 W | A | 82 | .0 | 5.1 |
| 08-04-1952 | 05:35:00 | 35.08 N | 118.58 W | A | 94 | .0 | 4.0 |
| 08-07-1952 | 16:31:51 | 35.03 N | 119.05 W | A | 99 | .0 | 4.9 |
| 08-10-1952 | 19:44:24 | 35.00 N | 119.00 W | A | 94 | .0 | 4.1 |
| 08-14-1952 | 07:28:22 | 35.13 N | 118.52 W | A | 100 | .0 | 4.1 |
| 08-14-1952 | 11:41:46 | 35.07 N | 118.88 W | A | 97 | .0 | 4.2 |
| 08-17-1952 | 06:14:04 | 35.05 N | 118.95 W | A | 97 | .0 | 4.0 |
| 08-17-1952 | 09:09:07 | 35.02 N | 118.98 W | A | 95 | .0 | 4.1 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 08-17-1952 | 21:04:42 | 35.07 N | 118.88 W | A | 97 | .0 | 4.3 |
| 08-18-1952 | 04:40:10 | 35.03 N | 119.05 W | A | 99 | .0 | 4.7 |
| 08-20-1952 | 08:47:47 | 34.88 N | 119.03 W | A | 84 | .0 | 4.2 |
| 08-23-1952 | 06:03:03 | 35.00 N | 118.73 W | A | 86 | .0 | 4.3 |
| 08-23-1952 | 10:09:07 | 34.52 N | 118.20 W | A | 46 | 13.1 | 5.1 |
| 08-26-1952 | 20:56:40 | 35.06 N | 118.42 W | A | 93 | -.8 | 4.4 |
| 09-02-1952 | 20:45:56 | 34.97 N | 119.00 W | A | 91 | .0 | 4.7 |
| 09-12-1952 | 10:35:25 | 35.00 N | 119.05 W | A | 96 | .0 | 4.5 |
| 09-25-1952 | 16:21:36 | 35.05 N | 118.90 W | A | 96 | .0 | 4.1 |
| 09-26-1952 | 20:21:20 | 35.10 N | 118.62 W | A | 96 | .0 | 4.0 |
| 10-16-1952 | 12:22:07 | 34.95 N | 118.95 W | A | 87 | .0 | 4.3 |
| 11-07-1952 | 08:55:35 | 35.00 N | 119.08 W | A | 97 | .0 | 4.6 |
| 11-11-1952 | 18:12:25 | 34.95 N | 119.02 W | A | 90 | .0 | 4.1 |
| 11-14-1952 | 23:34:01 | 35.05 N | 118.95 W | | 97 | .0 | 4.0 |
| 11-27-1952 | 15:36:41 | 34.97 N | 118.95 W | A | 89 | .0 | 4.0 |
| 12-01-1952 | 05:26:10 | 35.00 N | 118.83 W | A | 88 | .0 | 4.4 |
| 03-23-1953 | 17:06:37 | 34.98 N | 118.90 W | A | 89 | .0 | 4.0 |
| 04-29-1953 | 12:47:45 | 35.00 N | 118.73 W | A | 86 | .0 | 4.7 |
| 05-01-1953 | 06:48:20 | 35.12 N | 118.48 W | A | 98 | 2.4 | 4.1 |
| 05-25-1953 | 03:24:01 | 35.00 N | 119.02 W | A | 95 | .0 | 4.8 |
| 08-05-1953 | 12:20:59 | 35.02 N | 119.05 W | A | 98 | .0 | 4.3 |
| 10-07-1953 | 14:59:21 | 35.03 N | 118.85 W | A | 92 | .0 | 4.9 |
| 01-12-1954 | 23:33:49 | 35.00 N | 119.02 W | A | 95 | .0 | 5.6 |
| 02-10-1954 | 23:58:38 | 34.93 N | 119.07 W | A | 90 | .0 | 4.5 |
| 05-23-1954 | 23:52:43 | 34.98 N | 118.98 W | A | 92 | .0 | 5.1 |
| 08-26-1954 | 13:48:03 | 33.92 N | 119.50 W | B | 93 | .0 | 4.7 |
| 11-17-1954 | 23:03:51 | 34.50 N | 119.12 W | B | 59 | .0 | 4.4 |
| 01-15-1955 | 01:03:06 | 34.93 N | 118.97 W | A | 85 | 9.1 | 4.3 |
| 05-29-1955 | 16:43:35 | 33.99 N | 119.06 W | B | 53 | 17.4 | 4.1 |
| 02-07-1956 | 02:16:56 | 34.53 N | 118.64 W | B | 33 | 16.0 | 4.2 |
| 02-07-1956 | 03:16:38 | 34.59 N | 118.61 W | A | 39 | 2.6 | 4.6 |
| 03-23-1956 | 21:23:27 | 35.04 N | 119.00 W | A | 99 | 12.1 | 4.3 |
| 03-25-1956 | 03:32:02 | 33.60 N | 119.11 W | A | 86 | 8.2 | 4.2 |
| 03-18-1957 | 18:56:28 | 34.12 N | 119.22 W | B | 62 | 13.8 | 4.7 |
| 01-11-1958 | 23:08:47 | 34.84 N | 119.24 W | A | 92 | 10.8 | 4.0 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 07-14-1958 | 05:25:55 | 34.35 N | 119.49 W | A | 87 | 16.0 | 4.7 |
| 10-04-1961 | 02:21:31 | 33.85 N | 117.75 W | B | 86 | 4.3 | 4.1 |
| 10-20-1961 | 19:49:50 | 33.65 N | 117.99 W | B | 83 | 4.6 | 4.3 |
| 10-20-1961 | 20:07:14 | 33.66 N | 117.98 W | B | 83 | 6.1 | 4.0 |
| 10-20-1961 | 21:42:40 | 33.67 N | 117.98 W | B | 83 | 7.2 | 4.0 |
| 10-20-1961 | 22:35:34 | 33.67 N | 118.01 W | B | 80 | 5.6 | 4.1 |
| 11-15-1961 | 05:38:55 | 34.94 N | 118.99 W | B | 88 | 10.7 | 4.9 |
| 11-20-1961 | 08:53:34 | 33.68 N | 117.99 W | B | 81 | 4.4 | 4.0 |
| 01-09-1963 | 06:04:03 | 34.92 N | 119.10 W | B | 91 | 8.7 | 4.0 |
| 03-01-1963 | 00:25:57 | 34.93 N | 118.98 W | B | 86 | 13.9 | 4.5 |
| 03-04-1963 | 20:10:42 | 34.95 N | 118.97 W | B | 87 | 8.5 | 4.0 |
| 09-14-1963 | 03:51:16 | 33.54 N | 118.34 W | B | 80 | 2.2 | 4.2 |
| 08-30-1964 | 22:57:37 | 34.27 N | 118.44 W | B | 11 | 15.4 | 4.0 |
| 01-01-1965 | 08:04:18 | 34.14 N | 117.52 W | B | 97 | 5.9 | 4.4 |
| 07-16-1965 | 07:46:22 | 34.49 N | 118.52 W | B | 28 | 15.1 | 4.0 |
| 01-08-1967 | 07:37:30 | 33.63 N | 118.47 W | B | 68 | 11.4 | 4.0 |
| 01-08-1967 | 07:38:05 | 33.66 N | 118.41 W | C | 65 | 17.7 | 4.0 |
| 06-15-1967 | 04:58:05 | 34.00 N | 117.97 W | B | 60 | 10.0 | 4.1 |
| 06-29-1968 | 19:13:57 | 34.27 N | 119.57 W | C | 93 | 10.0 | 4.4 |
| 06-29-1968 | 20:36:33 | 34.24 N | 119.59 W | B | 95 | 1.8 | 4.0 |
| 07-08-1968 | 09:18:37 | 34.25 N | 119.63 W | B | 98 | 15.7 | 4.0 |
| 07-31-1968 | 22:44:45 | 34.25 N | 119.61 W | A | 97 | 15.0 | 4.0 |
| 02-28-1969 | 04:56:12 | 34.57 N | 118.11 W | A | 55 | 5.3 | 4.3 |
| 05-05-1969 | 16:02:09 | 34.30 N | 117.57 W | B | 92 | 8.8 | 4.4 |
| 09-12-1970 | 14:10:11 | 34.27 N | 117.52 W | A | 96 | 8.0 | 4.1 |
| 09-12-1970 | 14:30:52 | 34.27 N | 117.54 W | A | 94 | 8.0 | 5.2 |
| 09-13-1970 | 04:47:48 | 34.28 N | 117.55 W | A | 93 | 8.0 | 4.4 |
| 02-09-1971 | 14:00:41 | 34.41 N | 118.40 W | B | 24 | 8.4 | 6.6 |
| 02-09-1971 | 14:01:08 | 34.41 N | 118.40 W | D | 24 | 8.0 | 5.8 |
| 02-09-1971 | 14:01:33 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.2 |
| 02-09-1971 | 14:01:40 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.1 |
| 02-09-1971 | 14:01:50 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.5 |
| 02-09-1971 | 14:01:54 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.2 |
| 02-09-1971 | 14:01:59 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.1 |
| 02-09-1971 | 14:02:03 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.1 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

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B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

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**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 02-09-1971 | 14:02:30 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.3 |
| 02-09-1971 | 14:02:31 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.7 |
| 02-09-1971 | 14:02:44 | 34.41 N | 118.40 W | D | 24 | 8.0 | 5.8 |
| 02-09-1971 | 14:03:25 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.4 |
| 02-09-1971 | 14:03:46 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.1 |
| 02-09-1971 | 14:04:07 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.1 |
| 02-09-1971 | 14:04:34 | 34.41 N | 118.40 W | C | 24 | 8.0 | 4.2 |
| 02-09-1971 | 14:04:39 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.1 |
| 02-09-1971 | 14:04:44 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.1 |
| 02-09-1971 | 14:04:46 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.2 |
| 02-09-1971 | 14:05:41 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.1 |
| 02-09-1971 | 14:05:50 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.1 |
| 02-09-1971 | 14:07:10 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.0 |
| 02-09-1971 | 14:07:30 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.0 |
| 02-09-1971 | 14:07:45 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.5 |
| 02-09-1971 | 14:08:04 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.0 |
| 02-09-1971 | 14:08:07 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.2 |
| 02-09-1971 | 14:08:38 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.5 |
| 02-09-1971 | 14:08:53 | 34.41 N | 118.40 W | D | 24 | 8.0 | 4.6 |
| 02-09-1971 | 14:10:21 | 34.36 N | 118.31 W | B | 27 | 5.0 | 4.7 |
| 02-09-1971 | 14:10:28 | 34.41 N | 118.40 W | D | 24 | 8.0 | 5.3 |
| 02-09-1971 | 14:16:12 | 34.34 N | 118.33 W | C | 24 | 11.1 | 4.1 |
| 02-09-1971 | 14:19:50 | 34.36 N | 118.41 W | B | 20 | 11.8 | 4.0 |
| 02-09-1971 | 14:34:36 | 34.34 N | 118.64 W | C | 14 | -2.0 | 4.9 |
| 02-09-1971 | 14:39:17 | 34.39 N | 118.36 W | C | 25 | -1.6 | 4.0 |
| 02-09-1971 | 14:40:17 | 34.43 N | 118.40 W | C | 27 | -2.0 | 4.1 |
| 02-09-1971 | 14:43:46 | 34.31 N | 118.45 W | B | 13 | 6.2 | 5.2 |
| 02-09-1971 | 15:58:20 | 34.33 N | 118.33 W | B | 24 | 14.2 | 4.8 |
| 02-09-1971 | 16:19:26 | 34.46 N | 118.43 W | B | 27 | -1.0 | 4.2 |
| 02-10-1971 | 03:12:12 | 34.37 N | 118.30 W | B | 28 | .8 | 4.0 |
| 02-10-1971 | 05:06:36 | 34.41 N | 118.33 W | A | 29 | 4.7 | 4.3 |
| 02-10-1971 | 05:18:07 | 34.43 N | 118.41 W | A | 25 | 5.8 | 4.5 |
| 02-10-1971 | 11:31:34 | 34.38 N | 118.46 W | A | 19 | 6.0 | 4.2 |
| 02-10-1971 | 13:49:53 | 34.40 N | 118.42 W | A | 22 | 9.7 | 4.3 |
| 02-10-1971 | 14:35:26 | 34.36 N | 118.49 W | A | 16 | 4.4 | 4.2 |

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C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 02-10-1971 | 17:38:55 | 34.40 N | 118.37 W | A | 25 | 6.2 | 4.2 |
| 02-10-1971 | 18:54:41 | 34.45 N | 118.44 W | A | 26 | 8.1 | 4.2 |
| 02-21-1971 | 05:50:52 | 34.40 N | 118.44 W | A | 21 | 6.9 | 4.7 |
| 02-21-1971 | 07:15:11 | 34.39 N | 118.43 W | A | 21 | 7.2 | 4.5 |
| 03-07-1971 | 01:33:40 | 34.35 N | 118.46 W | A | 16 | 3.3 | 4.5 |
| 03-25-1971 | 22:54:09 | 34.36 N | 118.47 W | A | 16 | 4.6 | 4.2 |
| 03-30-1971 | 08:54:43 | 34.30 N | 118.46 W | A | 11 | 2.6 | 4.1 |
| 03-31-1971 | 14:52:22 | 34.29 N | 118.51 W | A | 7 | 2.1 | 4.6 |
| 04-01-1971 | 15:03:03 | 34.43 N | 118.41 W | A | 25 | 8.0 | 4.1 |
| 04-02-1971 | 05:40:25 | 34.28 N | 118.53 W | A | 6 | 3.0 | 4.0 |
| 04-15-1971 | 11:14:32 | 34.26 N | 118.58 W | B | 4 | 4.2 | 4.2 |
| 04-25-1971 | 14:48:06 | 34.37 N | 118.31 W | B | 27 | -2.0 | 4.0 |
| 06-21-1971 | 16:01:08 | 34.27 N | 118.53 W | B | 5 | 4.1 | 4.0 |
| 07-27-1972 | 00:31:17 | 34.78 N | 118.90 W | A | 68 | 8.0 | 4.4 |
| 02-21-1973 | 14:45:57 | 34.06 N | 119.04 W | B | 48 | 8.0 | 5.3 |
| 08-06-1973 | 23:29:16 | 33.99 N | 119.48 W | A | 89 | 16.9 | 5.0 |
| 03-09-1974 | 00:54:31 | 34.40 N | 118.47 W | C | 20 | 24.4 | 4.7 |
| 08-14-1974 | 14:45:55 | 34.43 N | 118.37 W | A | 28 | 8.2 | 4.2 |
| 05-13-1975 | 00:21:35 | 35.00 N | 119.10 W | A | 98 | 19.1 | 4.5 |
| 06-05-1975 | 14:46:45 | 35.05 N | 119.00 W | B | 99 | 9.0 | 4.1 |
| 01-01-1976 | 17:20:12 | 33.97 N | 117.89 W | A | 69 | 6.2 | 4.2 |
| 04-08-1976 | 15:21:38 | 34.35 N | 118.66 W | A | 15 | 14.5 | 4.6 |
| 08-12-1977 | 02:19:26 | 34.38 N | 118.46 W | B | 19 | 9.5 | 4.5 |
| 09-24-1977 | 21:28:24 | 34.46 N | 118.41 W | C | 29 | 5.0 | 4.2 |
| 05-23-1978 | 09:16:50 | 33.91 N | 119.17 W | C | 67 | 6.0 | 4.0 |
| 01-01-1979 | 23:14:38 | 33.94 N | 118.68 W | B | 34 | 11.3 | 5.2 |
| 10-17-1979 | 20:52:37 | 33.93 N | 118.67 W | C | 35 | 5.5 | 4.2 |
| 10-19-1979 | 12:22:37 | 34.21 N | 117.53 W | B | 95 | 4.9 | 4.1 |
| 06-22-1981 | 04:57:47 | 35.10 N | 118.51 W | A | 96 | 1.6 | 4.0 |
| 09-04-1981 | 15:50:50 | 33.65 N | 119.09 W | C | 81 | 6.0 | 5.5 |
| 10-23-1981 | 17:28:17 | 33.64 N | 119.01 W | C | 78 | 6.0 | 4.6 |
| 10-23-1981 | 19:15:52 | 33.62 N | 119.02 W | A | 80 | 14.8 | 4.6 |
| 11-10-1981 | 22:35:09 | 34.99 N | 119.11 W | D | 98 | 3.0 | 4.4 |
| 04-13-1982 | 11:02:12 | 34.06 N | 118.97 W | A | 42 | 12.1 | 4.0 |
| 05-25-1982 | 13:44:30 | 33.55 N | 118.21 W | A | 83 | 12.6 | 4.3 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 02-27-1984 | 10:18:15 | 33.47 N | 118.06 W | C | 97 | 6.0 | 4.0 |
| 06-12-1984 | 00:27:52 | 34.54 N | 118.99 W | A | 52 | 11.7 | 4.1 |
| 10-26-1984 | 17:20:43 | 34.02 N | 118.99 W | A | 46 | 13.3 | 4.6 |
| 04-03-1985 | 04:04:50 | 34.38 N | 119.04 W | A | 47 | 24.9 | 4.0 |
| 10-01-1987 | 14:42:20 | 34.06 N | 118.08 W | A | 48 | 9.5 | 5.9 |
| 10-01-1987 | 14:45:41 | 34.05 N | 118.10 W | A | 47 | 13.6 | 4.7 |
| 10-01-1987 | 14:48:03 | 34.08 N | 118.09 W | A | 47 | 11.7 | 4.1 |
| 10-01-1987 | 14:49:05 | 34.06 N | 118.10 W | A | 47 | 11.7 | 4.7 |
| 10-01-1987 | 15:12:31 | 34.05 N | 118.09 W | A | 48 | 10.8 | 4.7 |
| 10-01-1987 | 15:59:53 | 34.05 N | 118.09 W | A | 48 | 10.4 | 4.0 |
| 10-04-1987 | 10:59:38 | 34.07 N | 118.10 W | A | 46 | 8.3 | 5.3 |
| 10-24-1987 | 23:58:33 | 33.68 N | 119.06 W | A | 77 | 12.2 | 4.1 |
| 02-11-1988 | 15:25:55 | 34.08 N | 118.05 W | A | 50 | 12.5 | 4.7 |
| 03-23-1988 | 08:42:46 | 34.25 N | 119.62 W | A | 98 | 17.6 | 4.0 |
| 06-10-1988 | 23:06:43 | 34.94 N | 118.74 W | A | 80 | 6.8 | 5.4 |
| 06-26-1988 | 15:04:58 | 34.14 N | 117.71 W | A | 79 | 7.9 | 4.7 |
| 11-20-1988 | 05:39:28 | 33.51 N | 118.07 W | C | 93 | 6.0 | 4.9 |
| 12-03-1988 | 11:38:26 | 34.15 N | 118.13 W | A | 41 | 14.3 | 5.0 |
| 01-19-1989 | 06:53:28 | 33.92 N | 118.63 W | A | 36 | 11.9 | 5.0 |
| 02-18-1989 | 07:17:04 | 34.01 N | 117.74 W | A | 80 | 3.3 | 4.1 |
| 03-29-1989 | 09:29:49 | 34.91 N | 118.99 W | A | 85 | 14.3 | 4.3 |
| 04-07-1989 | 20:07:30 | 33.62 N | 117.90 W | A | 92 | 12.9 | 4.7 |
| 06-12-1989 | 16:57:18 | 34.03 N | 118.18 W | A | 42 | 15.6 | 4.6 |
| 06-12-1989 | 17:22:25 | 34.02 N | 118.18 W | A | 43 | 15.5 | 4.4 |
| 02-28-1990 | 23:43:36 | 34.14 N | 117.70 W | A | 80 | 4.5 | 5.4 |
| 03-01-1990 | 00:34:57 | 34.13 N | 117.70 W | A | 80 | 4.4 | 4.0 |
| 03-01-1990 | 03:23:03 | 34.15 N | 117.72 W | A | 78 | 11.4 | 4.7 |
| 03-02-1990 | 17:26:25 | 34.15 N | 117.69 W | A | 80 | 5.6 | 4.7 |
| 04-17-1990 | 22:32:27 | 34.11 N | 117.72 W | A | 79 | 3.6 | 4.8 |
| 06-28-1991 | 14:43:54 | 34.27 N | 117.99 W | A | 52 | 9.1 | 5.8 |
| 06-28-1991 | 17:00:55 | 34.25 N | 117.99 W | A | 52 | 9.5 | 4.3 |
| 07-05-1991 | 17:41:57 | 34.50 N | 118.56 W | A | 29 | 10.9 | 4.1 |
| 01-17-1994 | 12:30:55 | 34.21 N | 118.54 W | A | 3 | 18.4 | 6.7 |
| 01-17-1994 | 12:30:55 | 34.22 N | 118.54 W | A | 3 | 17.4 | 6.6 |
| 01-17-1994 | 12:31:58 | 34.27 N | 118.49 W | C | 8 | 6.0 | 5.9 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 01-17-1994 | 12:34:18 | 34.31 N | 118.47 W | C | 11 | 6.0 | 4.4 |
| 01-17-1994 | 12:39:39 | 34.26 N | 118.54 W | C | 4 | 6.0 | 4.9 |
| 01-17-1994 | 12:40:09 | 34.32 N | 118.51 W | C | 11 | 6.0 | 4.8 |
| 01-17-1994 | 12:40:36 | 34.34 N | 118.61 W | C | 13 | 6.0 | 5.2 |
| 01-17-1994 | 12:54:33 | 34.31 N | 118.46 W | C | 12 | 6.0 | 4.0 |
| 01-17-1994 | 12:55:46 | 34.28 N | 118.58 W | C | 5 | 6.0 | 4.1 |
| 01-17-1994 | 13:06:28 | 34.25 N | 118.55 W | C | 2 | 6.0 | 4.6 |
| 01-17-1994 | 13:26:45 | 34.32 N | 118.46 W | C | 13 | 6.0 | 4.7 |
| 01-17-1994 | 13:28:13 | 34.27 N | 118.58 W | C | 4 | 6.0 | 4.0 |
| 01-17-1994 | 13:56:02 | 34.29 N | 118.62 W | C | 8 | 6.0 | 4.4 |
| 01-17-1994 | 14:14:30 | 34.33 N | 118.44 W | C | 15 | 6.0 | 4.5 |
| 01-17-1994 | 15:07:03 | 34.30 N | 118.47 W | A | 11 | 2.6 | 4.2 |
| 01-17-1994 | 15:07:35 | 34.31 N | 118.47 W | A | 12 | 1.6 | 4.1 |
| 01-17-1994 | 15:54:10 | 34.38 N | 118.63 W | A | 17 | 13.0 | 4.8 |
| 01-17-1994 | 17:56:08 | 34.23 N | 118.57 W | A | 1 | 19.2 | 4.6 |
| 01-17-1994 | 19:35:34 | 34.31 N | 118.46 W | A | 13 | 2.3 | 4.0 |
| 01-17-1994 | 19:43:53 | 34.37 N | 118.64 W | A | 16 | 13.9 | 4.1 |
| 01-17-1994 | 20:46:02 | 34.30 N | 118.57 W | C | 7 | 6.0 | 4.9 |
| 01-17-1994 | 22:31:53 | 34.34 N | 118.44 W | C | 16 | 6.0 | 4.1 |
| 01-17-1994 | 23:33:30 | 34.33 N | 118.70 W | A | 16 | 9.8 | 5.6 |
| 01-17-1994 | 23:49:25 | 34.34 N | 118.67 W | A | 15 | 8.4 | 4.0 |
| 01-18-1994 | 00:39:35 | 34.38 N | 118.56 W | A | 16 | 7.2 | 4.4 |
| 01-18-1994 | 00:40:04 | 34.39 N | 118.54 W | A | 18 | .0 | 4.2 |
| 01-18-1994 | 00:43:08 | 34.38 N | 118.70 W | A | 20 | 11.3 | 5.2 |
| 01-18-1994 | 04:01:26 | 34.36 N | 118.62 W | A | 15 | .9 | 4.3 |
| 01-18-1994 | 07:23:56 | 34.33 N | 118.62 W | A | 12 | 14.8 | 4.0 |
| 01-18-1994 | 11:35:09 | 34.22 N | 118.61 W | A | 5 | 12.1 | 4.2 |
| 01-18-1994 | 13:24:44 | 34.32 N | 118.56 W | A | 9 | 1.7 | 4.3 |
| 01-18-1994 | 15:23:46 | 34.38 N | 118.56 W | A | 16 | 7.7 | 4.8 |
| 01-19-1994 | 04:40:48 | 34.36 N | 118.57 W | A | 14 | 2.6 | 4.3 |
| 01-19-1994 | 04:43:14 | 34.37 N | 118.71 W | C | 20 | 6.0 | 4.0 |
| 01-19-1994 | 09:13:10 | 34.30 N | 118.74 W | A | 18 | 13.0 | 4.1 |
| 01-19-1994 | 14:09:14 | 34.22 N | 118.51 W | A | 5 | 17.5 | 4.5 |
| 01-19-1994 | 21:09:28 | 34.38 N | 118.71 W | A | 21 | 14.4 | 5.1 |
| 01-19-1994 | 21:11:44 | 34.38 N | 118.62 W | A | 17 | 11.4 | 5.1 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 01-21-1994 | 18:39:15 | 34.30 N | 118.47 W | A | 11 | 10.6 | 4.5 |
| 01-21-1994 | 18:39:47 | 34.30 N | 118.48 W | A | 10 | 11.9 | 4.0 |
| 01-21-1994 | 18:42:28 | 34.31 N | 118.47 W | A | 11 | 7.9 | 4.2 |
| 01-21-1994 | 18:52:44 | 34.30 N | 118.45 W | A | 12 | 7.6 | 4.3 |
| 01-21-1994 | 18:53:44 | 34.30 N | 118.46 W | A | 12 | 7.7 | 4.3 |
| 01-23-1994 | 08:55:08 | 34.30 N | 118.43 W | A | 14 | 6.0 | 4.1 |
| 01-24-1994 | 04:15:18 | 34.35 N | 118.55 W | A | 12 | 6.5 | 4.6 |
| 01-24-1994 | 05:50:24 | 34.36 N | 118.63 W | A | 15 | 12.1 | 4.3 |
| 01-24-1994 | 05:54:21 | 34.36 N | 118.63 W | A | 15 | 10.9 | 4.2 |
| 01-27-1994 | 17:19:58 | 34.27 N | 118.56 W | A | 4 | 14.9 | 4.6 |
| 01-28-1994 | 20:09:53 | 34.38 N | 118.49 W | A | 17 | .7 | 4.2 |
| 01-29-1994 | 11:20:35 | 34.31 N | 118.58 W | A | 8 | 1.1 | 5.1 |
| 01-29-1994 | 12:16:56 | 34.28 N | 118.61 W | A | 7 | 2.7 | 4.3 |
| 02-03-1994 | 16:23:35 | 34.30 N | 118.44 W | A | 13 | 9.0 | 4.0 |
| 02-05-1994 | 08:51:29 | 34.37 N | 118.65 W | A | 17 | 15.4 | 4.0 |
| 02-06-1994 | 13:19:27 | 34.29 N | 118.48 W | A | 10 | 9.3 | 4.1 |
| 02-25-1994 | 12:59:12 | 34.36 N | 118.48 W | A | 15 | 1.2 | 4.0 |
| 03-20-1994 | 21:20:12 | 34.23 N | 118.47 W | A | 8 | 13.1 | 5.2 |
| 05-25-1994 | 12:56:57 | 34.31 N | 118.39 W | A | 18 | 7.0 | 4.4 |
| 06-15-1994 | 05:59:48 | 34.31 N | 118.40 W | A | 17 | 7.4 | 4.1 |
| 12-06-1994 | 03:48:34 | 34.29 N | 118.39 W | A | 17 | 9.0 | 4.5 |
| 02-19-1995 | 21:24:18 | 34.05 N | 118.92 W | A | 39 | 15.6 | 4.3 |
| 06-26-1995 | 08:40:28 | 34.39 N | 118.67 W | A | 20 | 13.3 | 5.0 |
| 12-31-1995 | 21:48:23 | 35.10 N | 118.31 W | A | 98 | 7.9 | 4.0 |
| 03-20-1996 | 07:37:59 | 34.36 N | 118.61 W | A | 15 | 13.0 | 4.1 |
| 05-01-1996 | 19:49:56 | 34.35 N | 118.70 W | A | 19 | 14.4 | 4.1 |
| 10-23-1996 | 22:09:29 | 34.48 N | 119.35 W | A | 78 | 14.5 | 4.2 |
| 04-26-1997 | 10:37:30 | 34.37 N | 118.67 W | A | 18 | 16.5 | 5.1 |
| 04-26-1997 | 10:40:29 | 34.37 N | 118.67 W | A | 18 | 14.6 | 4.0 |
| 04-27-1997 | 11:09:28 | 34.38 N | 118.65 W | A | 18 | 15.2 | 4.8 |
| 01-05-1998 | 18:14:06 | 33.95 N | 117.71 W | A | 85 | 11.5 | 4.3 |
| 08-20-1998 | 23:49:58 | 34.37 N | 117.65 W | A | 85 | 9.0 | 4.4 |
| 07-22-1999 | 09:57:24 | 34.40 N | 118.61 W | A | 18 | 11.6 | 4.0 |
| 03-07-2000 | 00:20:28 | 33.81 N | 117.72 W | A | 91 | 11.3 | 4.0 |
| 12-24-2000 | 01:04:21 | 34.92 N | 119.02 W | A | 87 | 13.9 | 4.4 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 01-14-2001 | 02:26:14 | 34.28 N | 118.40 W | A | 15 | 8.8 | 4.3 |
| 01-14-2001 | 02:50:53 | 34.29 N | 118.40 W | A | 16 | 8.4 | 4.0 |
| 09-09-2001 | 23:59:18 | 34.06 N | 118.39 W | A | 25 | 7.9 | 4.2 |
| 10-28-2001 | 16:27:45 | 33.92 N | 118.27 W | A | 44 | 21.1 | 4.0 |
| 12-14-2001 | 12:01:35 | 33.95 N | 117.75 W | A | 81 | 13.8 | 4.0 |

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

A = +- 1 km horizontal distance; +- 2 km depth
B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(CAL TECH DATA 1932-2002)

S E A R C H   O F   E A R T H Q U A K E   D A T A   F I L E 1

SITE: Corbin-Nordhoff Project

COORDINATES OF SITE ...... 34.2360 N 118.5610 W

DISTANCE PER DEGREE ..... 110.9 KM-N 92.1 KM-W

MAGNITUDE LIMITS .................... 4.0 - 8.5

TEMPORAL LIMITS .................... 1932 - 2002

SEARCH RADIUS (KM) ...................... 100

NUMBER OF YEARS OF DATA ................. 70.00

NUMBER OF EARTHQUAKES IN FILE ........... 4154

NUMBER OF EARTHQUAKES IN AREA ........... 529

L A W / C R A N D A L L

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(RICHTER DATA 1906-1931)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 10-23-1916 | 02:44:00 | 34.90 N | 118.90 W | D | 80 | .0 | 6.0 |

S E A R C H   O F   E A R T H Q U A K E   D A T A   F I L E 2

SITE: Corbin-Nordhoff Project

COORDINATES OF SITE ...... 34.2360 N 118.5610 W

DISTANCE PER DEGREE ..... 110.9 KM-N 92.1 KM-W

MAGNITUDE LIMITS .................... 6.0 - 8.5

TEMPORAL LIMITS ................... 1906 - 1931

SEARCH RADIUS (KM) ...................... 100

NUMBER OF YEARS OF DATA ................. 26.00

NUMBER OF EARTHQUAKES IN FILE ........... 35

NUMBER OF EARTHQUAKES IN AREA ........... 1

L A W / C R A N D A L L

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(NOAA/CDMG DATA 1812-1905)

| DATE | TIME | LATITUDE | LONGITUDE | Q | DIST | DEPTH | MAGNITUDE |
|---|---|---|---|---|---|---|---|
| 01-09-1857 | 16:00:00 | 35.00 N | 119.00 W | D | 94 | .0 | 8.0 |

S E A R C H   O F   E A R T H Q U A K E   D A T A   F I L E  3

SITE:  Corbin-Nordhoff Project

COORDINATES OF SITE ...... 34.2360 N 118.5610 W

DISTANCE PER DEGREE ..... 110.9 KM-N 92.1 KM-W

MAGNITUDE LIMITS .................... 7.0 - 8.5

TEMPORAL LIMITS ................... 1812 - 1905

SEARCH RADIUS (KM) ....................... 100

NUMBER OF YEARS OF DATA ................. 94.00

NUMBER OF EARTHQUAKES IN FILE ........... 9

NUMBER OF EARTHQUAKES IN AREA ........... 1

L A W / C R A N D A L L

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(NOAA/CDMG DATA 1812-1905)

S U M M A R Y   O F   E A R T H Q U A K E   S E A R C H

* * *

NUMBER OF HISTORIC EARTHQUAKES WITHIN 100 KM RADIUS OF SITE

| MAGNITUDE RANGE | NUMBER |
|---|---|
| 4.0 - 4.5 | 347 |
| 4.5 - 5.0 | 128 |
| 5.0 - 5.5 | 37 |
| 5.5 - 6.0 | 11 |
| 6.0 - 6.5 | 3 |
| 6.5 - 7.0 | 3 |
| 7.0 - 7.5 | 0 |
| 7.5 - 8.0 | 1 |
| 8.0 - 8.5 | 1 |

* * *

L A W / C R A N D A L L

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(NOAA/CDMG DATA 1812-1905)

C O M P U T A T I O N   O F   R E C U R R E N C E   C U R V E

L O G   N = A - B M

* * *

| BIN | MAGNITUDE | RANGE | NO/YR (N) |
|---|---|---|---|
| 1 | 4.00 | 4.00 - 8.50 | 7.44 |
| 2 | 4.50 | 4.50 - 8.50 | 2.55 |
| 3 | 5.00 | 5.00 - 8.50 | .748 |
| 4 | 5.50 | 5.50 - 8.50 | .227 |
| 5 | 6.00 | 6.00 - 8.50 | .723E-01 |
| 6 | 6.50 | 6.50 - 8.50 | .414E-01 |
| 7 | 7.00 | 7.00 - 8.50 | .105E-01 NU |
| 8 | 7.50 | 7.50 - 8.50 | .105E-01 NU |
| 9 | 8.00 | 8.00 - 8.50 | .524E-02 NU |

A = 1.177   B = .5460   (NORMALIZED)
A = 4.594   B = .9390   SIGMA = .931E-01

* * *

L A W / C R A N D A L L

**Table 3**
**List Of Historic Earthquakes Of Magnitude 4.0 Or Greater Within 100 Km Of The Site**
(NOAA/CDMG DATA 1812-1905)

C O M P U T A T I O N   O F   D E S I G N   M A G N I T U D E

C O N S T A N T   A R E A

* * *

TABLE OF DESIGN MAGNITUDES

| RISK | | RETURN PERIOD (YEARS) | | | | | DESIGN MAGNITUDE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | DESIGN LIFE (YEARS) | | | | | | | | |
| | | 25 | 50 | 75 | 100 | | 25 | 50 | 75 | 100 |
| .01 | .. | 2487 | 4974 | 7462 | 9949 | .. | 8.19 | 8.33 | 8.38 | 8.41 |
| .05 | .. | 487 | 974 | 1462 | 1949 | .. | 7.68 | 7.93 | 8.06 | 8.13 |
| .10 | .. | 237 | 474 | 711 | 949 | .. | 7.39 | 7.67 | 7.82 | 7.92 |
| .20 | .. | 112 | 224 | 336 | 448 | .. | 7.06 | 7.36 | 7.53 | 7.65 |
| .30 | .. | 70 | 140 | 210 | 280 | .. | 6.85 | 7.16 | 7.34 | 7.46 |
| .50 | .. | 36 | 72 | 108 | 144 | .. | 6.55 | 6.87 | 7.05 | 7.18 |
| .70 | .. | 20 | 41 | 62 | 83 | .. | 6.30 | 6.62 | 6.80 | 6.93 |
| .90 | .. | 10 | 21 | 32 | 43 | .. | 6.00 | 6.32 | 6.51 | 6.64 |

MMIN = 4.00   MMAX = 8.50
MU = 6.89   BETA = 2.162

* * *

L A W / C R A N D A L L