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Subject:

Use of the Existing Geotechnical Report and Geological Hazards Report for the Remodeling of Buildings 1700 and 1800 at Chabot College, Hayward, California

Dear Mr. Hart:

As of January 1, 2010 LFR Inc. became ARCADIS. LFR, Inc. prepared the Geotechnical Investigation and Design Report for the Student Access Center and Instructional Office Building (dated August 11, 2006) at Chabot College located at 25555 Hesperian Boulevard in Hayward, California, and remains the geotechnical engineer of record for those buildings.

I have reviewed the boring logs for two borings installed by Woodward Clyde Sherard in 1963 (Appendix B of the 2006 Report) at the locations of Buildings 1700 and 1800 at Chabot College. The borings, Holes 6 and 14, indicate that the soils present in the vicinity of Buildings 1700 and 1800 are similar (and not worse) than the soils that underlie the new Student Access Center and the new Instructional Office Building. Hence the conclusions contained in LFR's August 11, 2006 Geotechnical Investigation and Design Report for allowable bearing pressures and footing depths are applicable to Buildings 1700 and 1800. Soils at Chabot College have a medium potential for expansion. Please follow the recommendations contained in Sections 7.1, 7.2, 7.8 and 7.14 when opening footing excavations and pouring concrete. If you require recommendations for deep foundations, please call me to discuss.

The applicable seismic design parameters and a discussion of geologic hazards applicable to the Site are contained in LFR's May 18, 2009 Geologic Hazards Evaluation Report for the Chabot College Physical Education Building. The seismic design parameters are in Appendix A. The eastern end of Building 1700 is 40 meters further away from the Hayward Fault than the new PE Building and Building 1800 is 130 meters further away, so the seismic design parameters contained in our 2009 Geologic Hazards report are slightly conservative. Fault distances are based on the 2008 USGS Fault Model for California as implemented in EZ-Frisk v. 7.37.

Imagine the result

Date:
November 16, 2010

Contact:
Michael Dukes

Phone:
(510) 652-4500

Email:
Michael.dukes@arcadis-us.com

Our ref:
RV0091760018

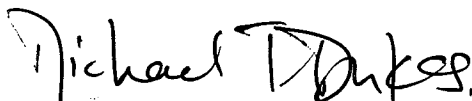
There were no strata indicated on the boring log for Hole 6 that are likely to liquefy. In Hole 14 the only stratum where significant liquefaction strains could occur was a 2-foot thick stratum of "Medium Dense, Grey-Brown Sand and Gravel" at 30 feet below the ground surface. However, given the stratum's thickness and the 30-feet of stiff clays overlying it, it is unlikely that there would be any surface expression of liquefaction settlement in this stratum even if it were to liquefy, which is unlikely.

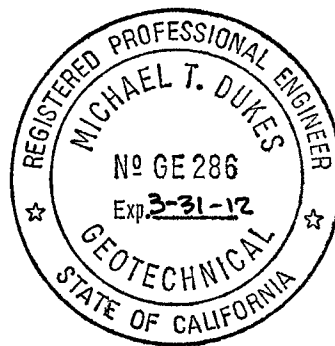
To verify that our recommendations are applicable, please allow us the opportunity to inspect any footing excavations that are opened up during the retrofits of Building 1700 and 1800.

Please call me at (510) 652-4500 if you need any further information.

Sincerely,

ARCADIS U.S., Inc.


Michael Dukes, P.E. (26179) G.E. (286)
Principal Geotechnical Engineer



Copies:

Douglas Horner A.I.A., Chabot Las Positas Community College District
Steve Beadle, P.E. C.E.G. Ph.D., ARCADIS



ENVIRONMENTAL MANAGEMENT & CONSULTING ENGINEERING

August 11 2006

003-09176-9,10

Mr. Craig Fernandez
DMJM Management
6601 Owens Drive, Suite 238
Pleasanton, California 94588

Subject: Geotechnical Investigation and Design Report, Chabot College, New Instructional Office Building, Student Access Center, P.E. Facility, Maintenance Facility, Parking Lot Improvements and Athletic Facilities, Hayward, California

Dear Craig:

LFR Inc. (LFR) is pleased to present the attached Geotechnical Investigation and Design Report for the above-referenced project at Chabot College (“the Campus”) located in Hayward, California. Design recommendations for building foundations and site grading are presented, along with other pertinent findings and conclusions.

We appreciate the opportunity to provide this service for DMJM Management, and look forward to being of further assistance as the project proceeds. If you have any questions concerning the contents of the attached report, please feel free to call Jeff Raines at (510) 596-9580 at any time.

Sincerely,

Jeff Raines, P.E. (C51120)
Senior Associate Engineer

John Sturman P.E. (C49765), G.E. (2684)
Senior Associate Engineer
(Schnabel Engineering)

Attachment

**Geotechnical Investigation
and Design Report
Chabot College Expansion
Hayward, California**

**August 11, 2006
003-09176-9,10**

Prepared for
DMJM Management
6601 Owens Drive, Suite 238
Pleasanton, California 94588





ENVIRONMENTAL MANAGEMENT & CONSULTING ENGINEERING

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Jeff Raines, P.E. (C51120)
Senior Associate Engineer

John Sturman P.E. (C49765), G.E. (2684)
Senior Associate Engineer
(Schnabel Engineering)

Attachment

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APPENDICES

A CPT Logs from Recent Investigation

B Boring and CPT Logs from Previous Investigations

C Geotechnical Laboratory Results

D NRCS Soil Data

E FRISKSP Output

1.0 INTRODUCTION

LFR Inc. (LFR) has prepared this report to present the results of our geotechnical engineering and design study for the proposed Chabot College infrastructures improvement and building project at the Chabot College campus in Hayward, California (“the Campus”; Figure 1-1). This geotechnical investigation report is based on the authorized proposals for Chabot-Las Positas Community College District prepared by LFR, and dated March 27, 2006.

2.0 PROJECT DESCRIPTION

Based on the information provided to LFR, the proposed project at the Campus consists of:

- construction of a new Student Access Center (2-story, 64,000 sf)
- construction of a proposed Instructional Office Building (2-story, 34,000 sf)
- construction of a new Physical Education (“P.E.”) Building (1-story, 8,500 sf)
- construction of a new Maintenance Facility (Note: This building is for storage only; no students, faculty, or maintenance personnel will use the facility on a continuous basis, it does not require Division of the State Architect review.)
- realignment of the student parking lots (does not include new parking lots, but may require new light poles)
- replacement of the football field’s natural grass surface with an artificial surface
- realignment of the tennis courts

Column loads in the new buildings are not expected to exceed 100 kips and exterior wall loads are not expected to exceed 5 kips per foot. LFR should be notified as soon as possible if building loads exceed these values.

Additional details of the project are not known at this time

3.0 SCOPE OF STUDY

Based on our understanding of the development, the following scope of services was formulated and completed:

- LFR supervised the installation of 14 cone penetration test (CPT) probes to maximum depths between 15 and 50 feet below ground surface (bgs). CPT logs are presented in Appendix A.

- LFR installed seven hand-auger borings to depths between 5 and 14 feet bgs. Two (2) hand auger borings were installed at Building 400, one (1) at Building 700 and four (4) in the football field endzones. The purpose of the hand-auger borings was to collect near-surface soils for geotechnical laboratory investigation and to verify that the CPT soil correlations used were appropriate for the Campus soils.
- LFR supervised the installation of core holes through the Campus parking lots in two locations to assess the as-built parking lot design and through one location in the tennis courts to assess the as-built construction details of the tennis courts.
- Soil samples collected from the borings were analyzed to provide soil characteristics for geotechnical engineering analyses.
- The following engineering analyses were performed using the laboratory data to develop geotechnical engineering criteria for the proposed project:
 - allowable bearing capacity of foundation systems
 - settlement of the proposed foundation systems
 - allowable passive resistance and base friction to resist wind and seismic lateral loads
- Recommendations were developed for:
 - site preparation and grading
 - California Building Code Seismic Design Parameters
 - site drainage
 - design of slabs-on-grade
 - parking lot light poles

4.0 PREVIOUS GEOTECHNICAL INVESTIGATIONS AT NEIGHBORING SITES

LFR was able to obtain and review at least portions of the following geotechnical reports:

- The Chabot College Chemistry/Computer Science Building (Consolidated Engineering Laboratories 1996)
- Chabot College Ceramic/Sculpture Addition to Building 1000 (Geolabs 2000)
- A residential subdivision to be constructed on Mohr Drive (Terrasearch 1998). The closest boring to Campus installed for this investigation was approximately 600 feet southwest of the football field's south end zone.
- The original report (Woodward-Clyde Associates [Woodward-Clyde] 1963) for the initial construction of the Campus.

In addition, boring logs from a Woodward-Clyde report documenting the investigation for the Campus Bookstore were located. The boring log indicates that boring B2 from this investigation was installed at the corner of Building 200, about 400 feet east-northeast of the northern corner of the proposed Instructional Office Building.

Boring and CPT logs for the available borings are presented in Appendix B. Holes 1 and 9 described in the original Woodward-Clyde report are located in the vicinity of the new Student Access Center. Hole 10 described in the original Woodward-Clyde report is located in the vicinity of the new Instructional Office Building. Holes 7 and 18 described in the original Woodward-Clyde report are located in the football field. Hole 20 described in the original Woodward-Clyde report is located in the vicinity of the new P.E. Building. The original pilot test boring described in the original Woodward-Clyde report is located in the vicinity of the new Student Access Center.

In general, the subsurface in the Campus vicinity consists of approximately 10 feet of stiff, overconsolidated clay over interbedded strata of silts, sands, and clays, predominately silty-clay. An 8-foot-thick stratum of silty-sand to sand was encountered at the location of the Campus Bookstore.

At the housing development west of the Campus, a layer of slightly overconsolidated clay was encountered near the groundwater table (approximately 7 feet bgs; (Terrasearch 1998). This clay, between 2 and 5 feet thick, was described as “soft to medium stiff.” The blow counts in this stratum (2.4-inch-outside-diameter split spoon) ranged from 4 to 7 blows per foot. Therefore, it appears that the near-surface clay soils become less overconsolidated to the west. This is not surprising given that the ground surface is closer to sea level and therefore the drawdown of the groundwater table (which causes overconsolidation of clay soils) is likely to have been less to the west. This stratum was not found in any of the 21 borings installed by Woodward-Clyde during the original geotechnical investigation (including the two borings installed into the football field).

5.0 SUBSURFACE EXPLORATION AND LABORATORY TESTING

5.1 Field Work

LFR supervised the installation of 14 CPT probes to depths between 15 and 50 feet bgs. The CPT probe locations are shown on Figures 5-1 (Instructional Office Building and Student Access Center) and 5-3 (P.E. Building and Maintenance Facility). Subsurface profiles showing the interpreted subsurfaces are presented in Figures 5-2 and 5-4. Additional subsurface profiles, from the original Woodward-Clyde report (1963) are presented in Appendix B. Table 5-1 presents the coordinates of all probe and boring locations at the Campus, surveyed with a handheld global positioning satellite receiver accurate to between 20 and 30 feet.

Gregg Drilling (“Gregg”) of Martinez, California, was the CPT subcontractor. Gregg used both a 5-ton, limited-access, track-mounted CPT rig (a modified direct-push rig) and a standard 30-ton CPT rig for the work. The work was conducted in general accordance with the methodology presented in American Society for Testing and Materials (ASTM) D3441.

Cone penetration testing consists of pushing a steel cone into the ground. Sensors on the tip of the cone detect the amount of force being applied to both the tip of the cone (tip resistance) and the side of the cone (side friction). Numerous correlations have been developed between the two types of cone resistance and material types (sands, silts, clays) and to the material properties of these soils. In addition, the cone type used at the Campus includes a pressure meter in its tip for assessing porewater pressures. Once the excess porewater pressures generated by installing the cone have dissipated, the porewater pressure at depth determines the depth of the groundwater table reported (for unconfined aquifers).

The advantages of CPT testing include the following:

- Soil data are essentially continuous.
- Higher quality data are obtained due to reduced equipment and operator error, which produces less scatter in the data.
- No spoils requiring characterization and disposal are produced.

CPT probe logs for this investigation are presented in Appendix A.

A disadvantage of CPT testing is that no soil samples are recovered for laboratory testing. For this reason, LFR advanced seven hand-auger borings to depths between 5 and 14 feet bgs at the locations shown on Figures 5-1 and 5-3. Soil samples were collected from these borings for laboratory testing. Geotechnical laboratory results are presented in Appendix C.

The hand-auger borings also provided verification that the CPT soil type-tip resistance/side friction correlations derived at other sites are appropriate for the Campus.

5.2 Geotechnical Laboratory Analyses

Soil samples collected during the effort were analyzed for the following:

- Atterberg Limits (ASTM D-4318)
- Expansivity (ASTM D4829; UBC 29-2)
- Corrosion Potential (pH, sulfate, sulfide, redox, chloride, and resistivity)
- Modified Proctor Compaction (ASTM D 1557)
- R-Value (Caltrans 301)

Table 5-1: CPT Probe and Hand-Auger Boring Locations

	Latitude				Longitude				State Plane Coordinate System		Type
	degrees	minutes	seconds	Decimal	degrees	minutes	seconds	Decimal	Northing	Easting	
Bldg 400 # 1	37	38	32.94	37.64248	122	6	16.68	122.10463	2,060,387	6,097,090	Probe
Bldg 400 # 2	37	38	32.7	37.64242	122	6	16.5	122.10458	2,060,365	6,097,104	Probe
Bldg 400 # 3	37	38	32.52	37.64237	122	6	16.32	122.10453	2,060,345	6,097,117	Probe
Bldg 400 # 4	37	38	32.04	37.64223	122	6	16.08	122.10447	2,060,296	6,097,135	Probe
Bldg 400 Hand Auger 1	37	38	32.85	37.64246	122	6	17.56	122.10488	2,060,381	6,097,018	Hand auger
Bldg 700 #1	37	38	29.76	37.6416	122	6	15.36	122.10427	2,060,065	6,097,189	Probe
Bldg 700 #2	37	38	29.82	37.64162	122	6	14.82	122.10412	2,060,070	6,097,233	Probe
Bldg 700 #3	37	38	27.27	37.64091	122	6	15.18	122.10422	2,059,812	6,097,199	Probe
Bldg 700 #4	37	38	27	37.64083	122	6	15.3	122.10425	2,059,786	6,097,189	Probe
Bldg 700 #5	37	38	27.6	37.641	122	6	16.2	122.1045	2,059,848	6,097,118	Probe
Bldg 700 #6	37	38	27.72	37.64103	122	6	16.08	122.10447	2,059,860	6,097,128	Probe
Bldg 700 #7	37	38	28.08	37.64113	122	6	16.14	122.10448	2,059,896	6,097,124	Probe
Bldg 700 #8	37	38	29.16	37.64143	122	6	16.32	122.10453	2,060,005	6,097,111	Probe
P.E. Bldg #1	37	38	36.12	37.64337	122	6	29.4	122.10817	2,060,727	6,096,071	Probe
P.E. Bldg #2	37	38	35.82	37.64328	122	6	29.52	122.1082	2,060,697	6,096,061	Probe
Maintenance Facility	37	38	33.48	37.64263	122	6	32.58	122.10905	2,060,465	6,095,811	Probe
Football Field	37	38	37.033	37.64362	122	6	35.36	122.10982	2,060,828	6,095,594	Hand auger
	37	38	37.06	37.64363	122	6	33.727	122.10937	2,060,828	6,095,725	Hand auger
	37	38	40.265	37.64452	122	6	35.426	122.10984	2,061,155	6,095,594	Hand auger
	37	38	40.288	37.64452	122	6	33.797	122.10939	2,061,155	6,095,725	Hand auger
Bldg 400 Hand Auger 2	37	38	31.31	37.64203	122	6	15.98	122.10444	2,060,222	6,097,145	Hand auger
Bldg 700 Hand Auger 1	37	38	27.15	37.64088	122	6	15.35	122.10428	2,059,794	6,097,189	Hand auger

6.0 GEOLOGY

This section documents the Campus geology based on published geologic reports and maps. This section also assesses potential impacts from strong ground shaking, liquefaction, and differential settlement that could result from seismic activity.

6.1 Topography

The Campus is essentially flat. The Campus is shown on the U.S. Geological Survey (USGS) Topographic 7.5-Minute Quadrangle Sheet to have an elevation difference of approximately 10 feet from the southwest (about 36 feet above mean sea level [msl]) to the northeast (45 feet above msl). The Campus slopes at approximately 0.5% down to the southwest (toward San Francisco Bay).

6.2 Regional Geology

Graymer (2000) maps the Campus as being underlain by alluvial fan and fluvial deposits (Holocene) and floodplain deposits (Holocene). Graymer describes the alluvial fan and fluvial deposits as brown or tan, medium dense to dense gravelly sand or sandy gravel generally grading upward to sandy or silty clay. At the distal fan edge, Graymer describes the fluvial deposits as brown, never reddish, medium dense sand that fines upward to sandy or silty clay. The floodplain deposits are described as medium to dark gray, dense sandy to silty clay with lenses of coarser material locally present. The floodplain deposits are reported to usually occur between natural levee deposits¹ and basin deposits. The geologic map included in the Seismic Hazard Zone Report for the Hayward 7.5-Minute Quadrangle (California Geological Survey [CGS] 2003) depicts the Campus as being underlain by alluvial fan and alluvial fan levee deposits.

6.3 Soils

Borings and CPT probes installed as part of this effort and review of previous subsurface investigations (Appendix B) indicate that sediments beneath the Campus consist of interbedded layers of silty to sandy clay, sandy silt, and silty sand. The consistency of the clay soils is medium stiff to stiff and the relative density of the sand and silt mixtures is loose to medium dense. The clay soils are moderately expansive.

¹ During high flow events when rivers overflow their banks, they deposit coarse materials (sands and gravels) adjacent to their banks while fine materials (silts and clays) flow further away. Over time, the sands and gravels build up natural levees adjacent to the riverbed, so that the riverbed becomes elevated above the flood plain. Eventually, the river seeks the lower elevations of the floodplain, and the old natural levees along the previous riverbed are buried in fine overbank deposits from the new river channel. It appears that there is a buried natural levee directly under the proposed location of the new Instructional Office Building.

The Natural Resources Conservation Service (NRCS) maps the majority of the Campus as being underlain by Botella loam, with 0 to 2% slopes. Most of the football field is underlain by Danville silty clay loam, with 0 to 2% slopes. The two soils are similar silty clays. The football field soils (Danville) are more plastic with a higher shrink swell potential. NRCS data and a soil map are presented in Appendix D.

6.4 Groundwater and Surface Water

Groundwater was encountered in the deep hand-auger boring and in the deep CPT probes between 12 and 15 feet bgs. The nearest significant surface-water body to the Campus is San Francisco Bay, located approximately 3 miles west of the Campus. This water body is not expected to affect the Campus.

6.5 Seismicity

6.5.1 Seismic Setting

According to the Fault Activity Map of California and Adjacent Areas (California Division of Mines and Geology [CDMG] 1994), the Campus is located approximately 3.9 kilometers southwest of the Hayward Fault.

Other regionally active faults capable of producing significant ground shaking at the Campus are shown in Table 6-1 (Blake, 2003a). These faults include the Calaveras, Concord/Green Valley, and San Andreas Faults. The distance from the Campus to these faults ranges from 10 to 18.9 miles.

Table 6-1: Active and Potentially Active Faults near the Campus

Fault	Distance Miles (km)	Magnitude	Accel. (g)	Modified Mercalli Intensity
Hayward	2.4 (3.9)	7.3	1.018	XI
Calaveras	10.1 (16.2)	6.9	0.417	X
Mount Diablo	14.7 (23.6)	6.7	0.334	IX
San Andreas	16.0 (25.7)	7.9	0.498	X
Monte Vista - Shannon	16.2 (26.1)	6.7	0.318	IX
Concord/Green Valley	18.9 (30.4)	6.7	0.235	IX
Calaveras	21.3 (34.2)	6.4	0.178	VIII
San Gregorio	23.2 (37.4)	7.4	0.295	IX
Greenville	24.2 (39.0)	6.9	0.219	IX

Fault	Distance Miles (km)	Magnitude	Accel. (g)	Modified Mercalli Intensity
Great Valley 7	27.7 (44.5)	6.7	0.212	VIII
Great Valley 5	30.9 (49.7)	6.5	0.176	VIII
West Napa	36.8 (59.3)	6.5	0.126	VIII
Zayante-Vergeles	39.0 (62.7)	7	0.157	VIII
Great Valley 4	43.6 (70.1)	6.6	0.142	VIII
Point Reyes	45.0 (72.4)	7	0.171	VIII
Great Valley 8	49.1 (79.0)	6.6	0.129	VIII
Monterey Bay - Tularcitos	49.8 (80.2)	7.3	0.185	VIII

Notes:

- (1) Maximum Moment Magnitude based on CGS fault parameters updated in 2002 (CAO, et al. 2003).
- (2) Modified Mercalli Intensity (MMI) is estimated for the site resulting from an earthquake with the estimated magnitude at the listed fault.

6.5.2 Expected Peak Ground Acceleration

Ground motions with a 10% probability of being exceeded in 50 years) are presented in Table 6-2 as fractions of the acceleration due to gravity (g). Three values of ground motion are shown: peak ground acceleration (PGA), and spectral acceleration (Sa) at short (0.2-second) and moderately long (1.0-second) periods. The accelerations shown are for buildings founded on alluvium.

Table 6-2: Expected Ground Accelerations (475-year Return Period)

Ground Motion	Acceleration (g)
PGA	0.602
Sa 0.2 sec	1.413
Sa 1.0 sec	0.548

Note:

- Values in percentage of the Earth's acceleration (g) at sea level.
- Values are for alluvium sites

These accelerations were obtained from the California Geologic Survey Probabilistic Seismic Hazard Assessment web page at <http://www.consrv.ca.gov/CGS/rghm/pshamap/pshamain.html>. The PGA calculated above is considerably less than the PGA

as calculated by FRISKSP (Blake 2003b), presented in Appendix E. The points used by CGS to interpolate the accelerations at the Campus are shown on Figure 6-1. As shown on the figure, accelerations vary rapidly in the vicinity of the Hayward Fault. The FRISKSP results are very close to the CGS results for locations immediately above the Hayward Fault.

Liquefaction analysis requires the use of the Upper Bound Earthquake (UBE = 10% chance of exceedance in 100 years). For the Campus, the UBE is 0.96 g, as calculated by FRISKSP (Appendix E).

6.5.3 Surface Rupture

Surface rupture occurs when the ground surface is broken due to the surface expression of fault movement. The location of surface rupture generally can be assumed to be along an active or potentially active major fault trace. No active faults have been mapped for the Campus. Therefore, potential for fault rupture at the Campus is negligible, and no portion of the project area is located within an Alquist-Priolo Special Study Zone (CDMG 1997).

6.5.4 Earthquake Intensity

Earthquake intensity is a subjective measure of the perceptible effects of earthquakes at a given point. The MMI scale is the most commonly used scale for measurement of the subjective effects of earthquake intensity. As shown in Table 6-1, the expected MMIs for the Campus range up to IX, X, and XI. These intensities are defined as:

IX. General panic. Even reinforced masonry buildings seriously damaged. (General damage to foundations.) Frame structures, if not bolted, shifted off foundations. Frames racked. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluvial areas sand and mud ejected, earthquake fountains, sand craters.

X. Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.

XI. Rails bent greatly. Underground pipelines completely out of service.

6.6 Liquefaction

6.6.1 General

Liquefaction is the complete, temporary loss of shear strength in saturated granular soils caused by ground shaking. Liquefaction commonly causes ground displacement or ground failure to occur, either as large lateral shifts (lateral spreading) or as vertical settlement. The entire Campus has been mapped by the CGS (2003) as being within a “liquefaction zone.” These zones are characterized as areas “where historic occurrence of liquefaction or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.”

6.6.2 Instructional Office Building

A layer of cohesionless silty sand was found between 12 and 20 feet bgs at all of the CPT probes advanced at the proposed Instructional Office Building location. At least the upper 3-foot portion of this layer, between 12 and 15 feet bgs, was found by the probes that were advanced only to 15 feet bgs. This layer was also shown in a boring log for the Campus Bookstore (Appendix B), at a location approximately 400 feet east-northeast of the northern corner of the proposed Instructional Office Building. This stratum, which pinches out to the south, likely represents the overbank deposits of a buried stream channel, which was likely created by a former stream that flowed from east to west from the foothills to the bay. This buried stream channel probably underlies a large portion of the northern half of the Campus. None of the existing campus buildings that overlie the stratum were likely designed to accommodate large liquefaction-induced settlements.

The 8-foot-thick stratum of silty sand beneath the proposed Instructional Office Building is likely to liquefy under the dynamic loads expected from the UBE. The methodology of Seed et al. (2003) was incorporated into a spreadsheet as shown in Table 6-3. Based on the Seed et al. methodology, the entire 8-foot-thick stratum will liquefy when subjected to the UBE of 0.96 g. The estimated maximum settlement due to the liquefaction is 2.5 inches. The Southern California Earthquake Center (1999) recommends that the maximum differential settlement due to liquefaction-induced settlements be taken as one half of the total settlement, or 1.25 inches. Therefore, if the soil is not to be improved to reduce liquefaction settlements, the new Instructional Office Building should be designed to withstand 1.25 inches of differential settlement.

If the foundation elements cannot be designed to accept 1.25 inches of differential settlement between column lines, potential mitigation techniques that might be acceptable for the building include compaction grouting and founding the building on drilled piers or geopiers installed through the liquefiable stratum, or designing a foundation sufficiently rigid that the expected settlement would not damage the superstructure. Excavation of the liquefiable stratum would be possible if the stratum could be dewatered.

If the liquefiable soil stratum is not improved, all utilities entering the proposed Instructional Office Building should be designed to absorb at least 1.25 inches of differential settlement.

Table 6-3: Liquefaction Analysis

Depth (ft)	Total Stress (psf)	Effctv Stress (psf)	r sub d Note 6	CSR peak Mag=7.5	.65*CSR peak	K_sigma (Seed et al. 2003) Note 1	Adjusted CSR 0.65*CSR peak/ K_sigma	Mag Wghng Factor Note 3	Final CSR	N1(60)	N1(60)cf Note 4	Fines %	Vol Strain Note 2
12.1	1471	1468	0.88	0.85	0.55	1.13	0.49	1.04	0.47	12.7	14.92	22	3
12.5	1534	1500	0.87	0.86	0.56	1.12	0.50	1.04	0.48	14.6	16.05	13.4	2.9
13.0	1597	1532	0.87	0.87	0.56	1.10	0.51	1.04	0.49	21.7	22.81	8.1	2
13.5	1660	1565	0.86	0.88	0.57	1.09	0.52	1.04	0.50	20.8	21.47	5	2
14.0	1723	1597	0.85	0.88	0.57	1.08	0.53	1.04	0.51	24.3	25.46	7.9	1.8
14.5	1786	1629	0.85	0.89	0.58	1.08	0.54	1.04	0.52	23.3	24.57	8.9	1.8
15.0	1849	1661	0.84	0.90	0.58	1.07	0.55	1.04	0.53	27.6	28.64	6.5	1.4
15.5	1912	1694	0.83	0.90	0.58	1.07	0.55	1.04	0.52	18.2	19.61	11.5	2.2
16.0	1975	1726	0.82	0.90	0.59	1.07	0.55	1.04	0.53	11	13.29	24.4	3.1
16.5	2038	1758	0.81	0.91	0.59	1.06	0.55	1.04	0.53	12.5	14.44	19.4	3.1
17.0	2101	1791	0.81	0.91	0.59	1.06	0.56	1.04	0.54	13.2	15.71	24.4	2.9
17.5	2164	1823	0.80	0.91	0.59	1.05	0.56	1.04	0.54	16.7	18.77	17.7	2.4
18.0	2227	1855	0.79	0.91	0.59	1.04	0.57	1.04	0.55	17.8	18.41	5	2.5
18.5	2290	1887	0.78	0.91	0.59	1.04	0.57	1.04	0.55	15.3	16.82	13.7	2.8
18.9	2353	1920	0.77	0.91	0.59	1.03	0.57	1.04	0.55	14.1	17.23	29.4	2.8
19.4	2416	1952	0.76	0.91	0.59	1.03	0.57	1.04	0.55	14.3	15.77	13.7	2.9
19.9	2479	1984	0.75	0.90	0.59	1.02	0.58	1.04	0.55	15	16.90	17.3	2.8

Total settlement = 2.5 inches

Notes:

psf = pounds per square foot

1. The K_{σ} factor is for blow counts between 1 and 40, above 40 use $K_{\sigma} = 1$. K_{σ} can be no greater than 1.5. If effective vertical stress greater than 4200 psf, use Figure 14 from Seed et al. (2003) to calculate K_{σ} .
2. Volumetric strain is interpolated from Figure 53a in Seed et al. (2003).
3. Magnitude weighting uses the Idriss (1998) factors: for $M > 5.7$, $MWF = 1/(37.9 * M^{(-1.81)})$; for $M < 5.7$, $MWF = 1/(1.625)$.
4. SPT blow counts are adjusted for fines by multiplying by $(1 + 0.004 * FC + 0.05 * FC / N1(60))$ where FC is the percentage of fines times 100.
5. Probability of Liquefaction given by Equation 11 in Seed et al. (2003).
6. r_d is Equation 2 in Seed et al. (2003).
7. Unit weights assumed to be 128 pounds per cubic foot (pcf) saturated, 122 pcf moist.
8. Groundwater table assumed to be 12 feet bgs.
9. Peak Ground Acceleration determined from Probabilistic Site Hazard Assessment - UBE, 975-year return period.

6.6.3 Student Access Center

The liquefiable layer pinched out prior to reaching the location of the proposed Student Access Center. The only cohesionless materials encountered in the Student Access Center probes (B700-1 through B700-8) are shallow, are present above the water table, and probably represent fill materials. Therefore, significant liquefaction-induced settlement is not expected at the location of the proposed Student Access Center.

6.6.4 P.E. Building and Maintenance Facility

Two cohesionless strata present under the proposed P.E. Building and the proposed Maintenance Facility will likely liquefy under the UBE scenario. Their total depth is approximately 3 feet. The expected total liquefaction-induced settlement of these strata is less than 1 inch, with less than 0.5 inch of differential settlement expected.

6.7 Slope Stability

The Campus and its surroundings are on level ground and would not be expected to be susceptible to slope instability hazards.

6.8 Settlement

Static elastic settlement under a 6-foot-square spread footing loaded to 3,000 psf was calculated to be less than 1 inch; this is believed to be the worst case representative of an interior footing designed for a vertical load of 100 kips. The estimated settlement is based on using the CPT correlation for undrained shear strength (approximately 3,000 psf) divided by a factor of safety of three. The undrained shear strength was converted to a Young's modulus by multiplying it by 300 (Coduto 2001). Differential settlements between typical foundation elements are expected to be less than 0.5 inch.

The loading stress used in the above calculation is the same as that used in the design of the existing Campus buildings. The proposed new buildings to be constructed on the Campus will have two stories, except for the new one-story P.E. Building, and the existing buildings have only one story. Therefore, the footings on most of the new buildings will be larger to carry the additional weight. Larger footings influence soil to greater depths. However, the material below the surficial stiff clays is a medium dense sand (with average SPT blow counts of 18) and is likely to settle less than the overlying clays.

These settlements are in addition to the liquefaction-induced settlements referenced above.

7.0 RECOMMENDATIONS

7.1 Footings

The allowable bearing pressures for continuous or spread footings is shown in Table 7-1.

Table 7-1: Bearing Pressures for New Structures

Loading	Allowable Bearing Pressure
Dead	2000 psf
Dead + Live	3000 psf
Dead + Live + Seismic or Wind	4000 psf

Dead load uses a factor of safety of 3. Dead load plus live load uses a factor of safety of 2. Allowable bearing pressure is increased by 1/3 for seismic or wind loads.

The top 3 feet below grade at the proposed location of the new Maintenance Facility are likely representative of poorly compacted fill. Regardless of their actual origin, the

top 3 feet of soil beneath the new Maintenance Building should be removed and be replaced with imported fill (see Section 7.8).

The bearing surface for the footings should be at least 2 feet below the bottom of the adjacent soil surface. All footings should be a minimum of 18 inches wide.

Footing concrete should be poured neat against undisturbed native soil. Any disturbed or softened material encountered at the bottom of the footing excavations should be removed to expose firm bearing material. Overexcavated areas should be backfilled with imported fill (see Section 7.8). The imported fill should be placed in lifts no thicker than 8 inches loose. The loose lifts should then be compacted to 95% of the maximum dry density as determined from the Modified Proctor Test (ASTM D 1557 latest version) at $\pm 2\%$ of the optimum water content. Footing excavations should be kept moist before concrete placement.

7.2 Slabs

Following excavation to the required grades, soil subgrades in areas to receive slabs should be scarified to a depth of at least 6 inches, all lumps greater than 3 inches in any dimension removed, moisture conditioned to slightly above optimum moisture content, and compacted to minimum 90% relative compaction². For slabs less than 6 inches thick, the subgrade should be compacted to a minimum of 95% relative compaction. The compacted surface should be firm and unyielding and should be protected from damage caused by traffic or weather. Soil subgrades should be kept moist during construction. If the subgrade is allowed to become dry, it should be moisture conditioned to eliminate shrinkage cracks and recompacted. In order to achieve satisfactory compaction of the subgrade and fill materials, it may be necessary to adjust the water content at the time of construction. This may require that water be added to soils that are too dry, or that scarification and aeration be performed in any soils that are too wet.

Where slab floors may not tolerate total or differential settlements exceeding 1 inch, structural slabs supported by grade beams should be considered by the structural engineer.

7.3 Moisture Barrier: Capillary Break/Vapor Retarder

We recommend that moisture-sensitive foundations in direct contact with the subsurface be underlain by a moisture barrier. A typical moisture barrier should include a capillary moisture break consisting of at least 4 inches of clean, free-draining gravel or crushed rock (1/2- to 3/4-inch gradation) overlain by a moisture-proof membrane (the

² Optimum moisture content determined using the methodology documented in the latest version of ASTM Method D-1557.

vapor retarder) at least 10 mils thick. The vapor retarder should be covered with 2 inches of sand to aid in curing the concrete and to protect the vapor retarder during slab construction. Water should not be allowed to accumulate in the capillary break or sand before the slab is cast.

The vapor retarder should meet the requirements for Class C vapor retarders as given in ASTM Standard E1745-97. The vapor retarder should be installed in general accordance with the methodology documented in ASTM Standard E1643-98. These requirements include overlapping seams by at least 6 inches, taping seams, and sealing any penetrations through the vapor barrier. The particle size of the gravel/crushed rock and sand should meet the gradation requirements presented in Table 7-2.

Table 7-2: Gradation Requirements of Capillary Moisture Break

Sieve Size	Percentage Passing Sieve
Gravel or Crushed Rock	
1 inch	90-100
¾ inch	30-100
½ inch	5-25
3/8 inch	0-6
Sand	
No. 4	100
No. 200	0-5

The sand overlying the membrane should be moist at the time when the concrete is placed. There should be no free liquid in the sand. If the sand has been placed and there is a possibility of precipitation, the sand should be covered with plastic and measures be made available to collect the precipitation and remove it from the excavation.

7.4 Lateral Loads

Lateral loads can be resisted by a combination of passive resistance against the vertical faces of foundation elements and cohesion against the base of the foundation elements. Resistance against vertical faces can be modeled using an equivalent fluid weight of 300 pcf (for short-term loads due to wind or earthquake, resistance to sustained lateral loads should be based on 100 pcf equivalent unit weight) if bearing against native soil and 500 pcf if bearing against compacted permeable backfill. The above values do not include any hydraulic loads because all groundwater should be drained away from walls. The resistance of the top 1 foot of soil should be neglected unless the soil is constrained by an overlying slab. A base friction coefficient of 0.3 can be used to

calculate friction between slabs and Caltrans Class II aggregate. A base friction coefficient of 0.15 can be used to calculate the lateral resistance of slabs poured directly on native soils. These factors have a minimum factor of safety of 2.

7.5 California Building Code Seismic Design Factors

As defined in the 2002 California Building Code, the following criteria are appropriate for the Campus:

Seismic Zone Factor	$Z = 0.4$
Soil Profile Type	SD
Near Source Factor	$N_a = 1.2$
Seismic Coefficient	$C_a = (0.44)N_a = 0.53$
Near Source Factor	$N_v = 1.6$
Seismic Coefficient	$C_v = (0.64)N_v = 1.02$

The Hayward fault is an “A-Fault” located 3.9 kilometers from the Campus.

7.6 Clearing and Grubbing

All surface and subsurface deleterious materials should be removed and disposed of off site, although excavated materials that meet the requirements for imported fill given below can be reused. These materials include, but are not limited to, any buried utility lines, loose/undocumented fills, septic systems, debris, building materials, and any other surface and subsurface structures within proposed building areas. Objectionable material, including concrete and masonry rubble, should be removed to a depth at least 6 feet below the base of all foundation elements. Voids left from site clearing should be cleaned and backfilled as recommended for structural fill [please see Section 7.8].

Once the Campus has been cleared, the exposed ground surface should be stripped to remove surface vegetation and organic soil. The surface may be disced, rather than stripped, if the organic content of the soil is not more than 3% by weight. If stripping is required, depths should be determined by a qualified geotechnical engineer or technician at the time of stripping. Strippings may be either disposed of off site or stockpiled for future use in landscape areas, if approved by the landscape architect.

7.7 Drainage

The clay soils of the Campus are moderately expansive. Thus, efforts should be made to prevent water from infiltrating the subsurface next to the buildings. Precipitation

onto the buildings must be collected and channeled from the buildings to storm drains. Any landscaping areas adjacent to the buildings should be sloped at least 2% away from the buildings (2.5 inches in 10 feet).

7.8 Excavation and Fill

7.8.1 General

Structural fill using on-site inorganic soil or approved import should be placed in layers, each not exceeding 8 inches in thickness before compaction. On-site inorganic soil should be conditioned with water, or allowed to dry, to produce a soil water content approximately 1 to 2% above the optimum water content³, all lumps greater than 3 inches in any dimension removed, and the soil should be compacted to at least 90% relative compaction. Compaction wet of optimum is necessary to mitigate the native soil's expansive characteristics.

Imported fill should be non-corrosive, non-hazardous, free of organic matter, contain no rocks or lumps larger than 3 inches in its largest dimension, have an Atterberg Liquid Limit less than 40 and a Plasticity Index less than 12. A qualified geotechnical engineer should approve all imported fill.

On-site soils free of organic and deleterious material are suitable for use as structural fill. Structural fill should not contain rocks larger than 3 inches in greatest dimension, and should have no more than 15% by volume larger than 2.5 inches in greatest dimension.

7.8.2 Trenches

The selected contractor for the work will be solely responsible for construction site safety. The contractor will select the means, methods, and sequencing of construction operations. The contractor should be aware that slope height, slope inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, and/or federal safety regulations (Occupational Safety and Health Administration [OSHA] or California OSHA [Cal-OSHA]). Heavy construction equipment, building materials, excavated soil, and vehicular traffic should not be allowed within a lateral distance equal to one-third the slope height from the top of any excavation. During wet weather, runoff water should be prevented from entering all excavations. All runoff water, seepage, and/or groundwater encountered within excavations should be collected and disposed of outside the construction limits (groundwater is not expected, though zones of perched groundwater may be encountered during the work).

³ Maximum dry density and optimum water content to be determined using the methodology of ASTM D-1557.

Utility trenches should be excavated to a depth at least 4 inches below the design bottom of any pipes. Trenches should allow for at least 4 inches of clearance between any pipes and the trench side walls. If required by OSHA or Cal-OSHA regulations, trenches may have to be sloped or shored for worker protection.

All utilities should be placed on a minimum of 4 inches of sand or gravel. After testing of the utilities, and building department inspection if required, the utilities should be covered with at least 6 inches of sand and gravel and the cover soils should be mechanically tamped.

Utility trenches should be backfilled with materials satisfying the criteria described in Section 7.8.1 for structural fill. The fill should be placed in lifts of approximately 8 inches in thickness (uncompacted). On-site soil used for trench backfill should be compacted to at least 90% relative compaction by mechanical means only (jetting is not permitted). Sand may be used for trench backfill if it is compacted to at least 95% relative compaction and sufficient water is added during backfilling operations to prevent bulking. The upper 3 feet of trench backfill below slab and pavements should be compacted to at least 95% relative compaction.

All utility trenches that extend below building slabs should be backfilled with a low permeability plug of clay to reduce the chances of the utility backfill channeling water under the building. The clay plugs can be composed of compacted clayey soil, compacted bentonite, or a bentonite-cement or sand-cement slurry mixture. Each plug should be at least 2 feet thick and should extend at least 2 feet beyond the edges and bottom of the trench to “key in.” The plugs should also extend to within 1 foot of the lowest adjacent grade and should extend below the curb and gutter.

Trenches to be installed adjacent to existing footings should not cross over an imaginary line drawn down at a 45 degree angle from the bottom edges of the footings. Trenches to be installed in an area that will later contain a footing should be backfilled with flowable fill (two sacks of cement per cubic yard of concrete, no aggregate more than 3/4 inch in diameter).

These trench backfill recommendations are minimum requirements. More stringent requirements may apply to specific types of pipe. The project Civil Engineer should develop these material specifications based on planned pipe types, bedding conditions, and any other applicable factors.

7.9 Parking Lots

In realigning the student and faculty parking lots, it may be necessary to relocate their traffic islands. These islands are likely underlain by the same foundation materials as the rest of the parking lots. However, if during the relocation of the parking lot traffic islands it is discovered that they are not underlain by 12 inches of Caltrans Class Aggregate base (or equivalent), these portions of the parking lots should be constructed by:

- scarifying the native soils to a depth of 6 inches below grade, moisture conditioning as needed, and recompacting the soils to 95% of the Modified Proctor maximum density at a water content near the optimum water content
- placing Caltrans Class II aggregate base in loose lifts and compacting the aggregate to at least 95% of the Modified Proctor maximum density to a total thickness of 12 inches
- placing 4 inches of compacted asphalt over the Class II aggregate base

For areas where heavy equipment is likely to operate (e.g., garbage truck dumpster loading areas), the pavement sections should consist of a reinforced concrete pad. The foundation for the concrete pad should be designed in accordance with Section 7.2.

7.10 Tennis Courts

The tennis court foundations were found to consist of 12 inches of compacted base rock and 4 inches of asphalt overlying compacted native soils. Because this design appears to have worked well for the existing tennis courts, it should be used for any realigned tennis courts. The recommendations presented above for the parking lot foundations should also be used for the tennis courts.

7.11 Pedestrian Pathways

Asphalt pedestrian pathways should be constructed by:

- scarifying the native soils to a depth of 6 inches below grade, moisture conditioning as needed, and recompacting the soils to 90% of the Modified Proctor maximum density at a water content near the optimum water content
- placing Caltrans Class II aggregate base in loose lifts and compacting the aggregate to at least 95% of the Modified Proctor maximum density to a total thickness of 6 inches
- placing 2 inches of compacted asphalt over the Class II aggregate base

If the pathways cross roads used by Campus vehicles (except golf carts), the pavement section should match the pavement section for parking lots given above.

7.12 Football Field Foundation

The artificial surface subgrade and foundation should be installed in accordance with the manufacturer's recommendations. A subdrainage system should be installed per the manufacturer's recommendations. A layer of crushed stone (AASHTO No. 57 or equivalent) at least 6 inches thick should be placed below the artificial turf layers and compacted. If a permeable closed cell pad is selected instead of crushed rock, we should be asked to review the permeable closed cell pad specifications.

The R-values for the north and south end zones of the existing football field were found to be 10 and 18, respectively. Based on the Atterberg Limit results, the soils should be classified as low plasticity clays (CL) in accordance with the Unified Soil Classification System. The soils were tested and found to be moderately expansive, with expansion indices of 64 and 70 for the north and south end zones, respectively. Other material properties for the football field subgrade (dry density, in situ water content, unconfined shear strength) are shown on the boring logs from the original Woodward-Clyde report, presented in Appendix B.

Before the artificial surface foundation is installed, the existing soils should be scarified to a depth of 6 inches and then be recompacted to a density between 90 and 95% of the Modified Proctor maximum density (ASTM D-1557) at a water content between 0 and 2% above the optimum water content.

Water should not be allowed to pond on the interface between the artificial turf foundation and native soils.

Changes in the existing grade should be avoided to the extent possible. If the existing grade is to be changed by more than 12 inches (upward or downward), we should be consulted.

7.13 Parking Lot Light Poles

Parking lot light poles should be supported on drilled piers. The drilled piers should be a minimum of 18 inches in diameter. The resistance of parking lot pole foundations can be calculated using an equivalent fluid weight of 300 pcf for short-term loads and 100 pcf for sustained lateral loads. The lateral resistance of the top 1 foot of soil should be neglected.

7.14 Other Recommendations

Any areas of non-native soils (e.g., backfill for former buildings, underground storage tank excavations, utility backfill) or significantly disturbed soils (e.g., the root zones of large trees) should be overexcavated and backfilled using the procedures listed in Section 7.8.

A qualified geotechnical firm should be retained to perform inspections during the construction phases of the project to verify that the soils are consistent with those found during the Campus investigation, to which the recommendations of this report apply, and to verify that the construction is conducted in accordance with the recommendations contained in this report.

8.0 SOIL CORROSIVITY

Three samples of surficial soils, one from each of the proposed building sites, were analyzed for the Caltrans suite of corrosion indicators (pH, sulfate, resistivity, and chloride). The results of this test are presented in Table 8-1.

Table 8-1: Soil Corrosivity Results

Sample	Resistivity (ohm-cm)		pH	Sulfates (ppm)	Chlorides (ppm)	% Moisture	Soil Description
	As Received	Saturated (min)					
Bldg. 400	1,642	1,642	7.52	220	169	14.16%	Moist brown clayey silt
Bldg. 700	1,437	1,081	7.81	430	185	15.35%	Moist dark brown clayey silt
P.E. Bldg.	1,602	1,248	7.22	270	40	17.58%	Moist dark brown clayey silt

The resistivity values are representative of a moderately corrosive environment. In general, Caltrans does not require sulfate and chloride analysis if the minimum resistivity is greater than 1000 ohm-cm. (Caltrans 2003).

Soil pH is in the neutral range, which should not present a corrosion problem for buried steel objects.

The sulfate concentration is well below 0.1%, which the United States Bureau of Reclamation (1987) classifies as negligible. Special concrete is not required at the Campus.

The soil chloride concentration is not sufficient to pose a threat to buried steel objects.

As the soils are moderately corrosive, all buried iron, steel, cast iron, ductile iron, galvanized steel, and dielectric coated steel or iron should be properly protected against corrosion. The California Plumbing Code requires corrosion protection of ferrous water and natural gas pipes (Sections 609.3.1 and 1211.6).

9.0 SHORING

The design and maintenance of all necessary shoring and temporary excavation slopes is the responsibility of the contractor. Excavations may be required to construct spread footings, mats, and to install utilities. All excavations that will be deeper than 5 feet

and will be entered by workers should be shored or sloped for safety in accordance with OSHA standards.

10.0 LIMITATIONS

10.1 Standard of Care

LFR, Inc. (LFR) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the geotechnical engineering profession currently practicing in California, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

10.2 Use of the Report

This report has been prepared for the specific site and the proposed development described to LFR by the Chabot Las Positas Community College District (the Client). The data, interpretations and recommendations contained in this report apply to the proposed development described in this report and are not applicable to any other project. Any change of site conditions or proposed plans may alter the validity of the report. In the event that conditions change, LFR can not be responsible for the use of the design recommendations contained in this report, or portions thereof, unless LFR is requested to review and, if necessary, revise the report.

The recommendations given in this report are intended only for the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs, techniques and equipment choice, scheduling and sequence of operations would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work.

In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. LFR can not be responsible for use by any party of portions of the report without reference to the entire report.

The recommendations in this report are for the sole benefit of the Client and other parties designated by the Client. No other party may use or rely on this report or any portion thereof without LFR's express written consent. The report, all plans, data, drawings and other documents as well as all electronic media prepared by LFR are considered its professional work product and shall remain the property of LFR, who authorizes only the Client and parties directly authorized by the Client, to make copies of the report, and only in such quantities as are reasonably necessary for the use of the report by those parties. Electronic media is susceptible to unauthorized modification, deterioration. Hence, we request that electronic versions of this report not be transmitted to other parties.

10.3 Underground Conditions

Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geology and geotechnical engineering. Classification and identification of the type and condition of these materials or units involves judgment. Transitions between geologic units may be graded rather than abrupt. Accordingly, LFR does not warrant or guarantee the exactness of the descriptions. Special risks occur whenever sampling methods are used to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect certain conditions. The geologic and geotechnical conditions that LFR interprets to exist between sampling points may differ from those that actually exist.

10.4 Construction Services

All details of the design and proposed construction were not known at the time of submission of LFR's report. A qualified geotechnical engineering firm should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of LFR's report. During construction, a qualified geotechnical engineering firm should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of LFR's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in LFR's report. Adequate field review, observation and testing during construction is necessary for LFR to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

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Appendix A

CPT Logs from Recent investigation

Appendix B

Boring and CPT Logs from Previous Investigations

Appendix C

Geotechnical Laboratory Results

Appendix D

NRCS Soil Data

Appendix E

FRISKSP Output

```

*****
*
*           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: Chabot College Probabilistic Hazard Assessment

IPR_FILE
0

IPLLOT
0

SITE CONDITION
0.00

BASEMENT DEPTH (km)
5.00

RHGA FACTOR RHGA DIST (km)
1.000 0.000

NFLT NSITE NPROB NATT LCD
52 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	ICLK					
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	ICLK					
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	ICLK					

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 0.100 0.200 0.300 0.400 0.500 0.600 0.700 0.800 0.900
 1.000
 1.100 1.200 1.300 1.400 1.500

MAGNITUDE WEIGHTING FACTORS: MWF: 0 MWF MAGNITUDE: 0.00

BOORE ET AL(1997) NEHRP D (250)2 AMPLITUDES:
 15 0.100 0.200 0.300 0.400 0.500 0.600 0.700 0.800 0.900
 1.000
 1.100 1.200 1.300 1.400 1.500

MAGNITUDE WEIGHTING FACTORS: MWF: 0 MWF MAGNITUDE: 0.00

RISKS SPECIFIED:

5 0.013900 0.010000 0.005000 0.002105 0.001000

SITE COORDINATES:

1 -122.1046 37.6425

FAULT INFORMATION:

 FAULT 1

FAULT NAME: HAYWARD (FLOATING)

NFP NRL ATTENUATION CODES:

7 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
 6.800 0.1000 1 9.0000 1.842 7.600 2.000 0.053

NMAX AMMAX PMAX

1 6.90 1.00

```

dmchar ampchar dmpchar
0.50 6.40 1.00

Slip Rate ( 9.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.180E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.9000 1.0000 0.03791 -0.00374 0.04164

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -121.8490 37.4540
2 -122.0824 37.6760
3 -122.1284 37.7299
4 -122.2128 37.8273
5 -122.4342 38.0875
6 -122.6136 38.3315
7 -122.7883 38.5752

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

Computed Total Fault Area = 0.18E+04
-----

FAULT 2
FAULT NAME: HAYWARD (HS)

NFP NRL ATTENUATION CODES:
4 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 9.0000 1.842 2.700 2.000 0.569

NMAX AMMAX PMAX
1 6.67 1.00

dmchar ampchar dmpchar
0.50 6.17 1.00

Slip Rate ( 9.0000 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 6.6700 1.0000 0.07532 0.04275 0.03256

IND_RL
2

```

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

FAULT SEGMENT COORDINATES
1 -121.8490 37.4540
2 -122.0824 37.6760
3 -122.1284 37.7299
4 -122.2128 37.8273

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 12.0000

Computed Total Fault Area = 0.63E+03

FAULT 3

FAULT NAME: HAYWARD (HS+HN)

NFP NRL ATTENUATION CODES:
5 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 9.0000 1.842 4.500 2.000 0.323

NMAX AMMAX PMAX
1 6.91 1.00

dmchar ampchar dmpchar
0.50 6.41 1.00

Slip Rate (9.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.106E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.9100 1.0000 0.07436 0.05066 0.02369

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -121.8490 37.4540
2 -122.0824 37.6760
3 -122.1284 37.7299
4 -122.2128 37.8273
5 -122.4342 38.0875

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 12.0000

Computed Total Fault Area = 0.10E+04

FAULT 4

FAULT NAME: HAYWARD (HS+HN+RC)

NFP NRL ATTENUATION CODES:
7 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 9.0000 1.842 7.600 2.000 0.055

NMAX AMMAX PMAX
1 7.26 1.00

dmchar ampchar dmpchar
0.50 6.76 1.00

Slip Rate (9.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.180E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 7.2600 1.0000 0.06282 0.05081 0.01201

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -121.8490 37.4540
2 -122.0824 37.6760
3 -122.1284 37.7299
4 -122.2128 37.8273
5 -122.4342 38.0875
6 -122.6136 38.3315
7 -122.7883 38.5752

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 12.0000

Computed Total Fault Area = 0.18E+04

FAULT 5

FAULT NAME: CALAVERAS (CN)

NFP NRL ATTENUATION CODES:
8 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 6.0000 1.842 2.300 2.000 0.870

NMAX AMMAX PMAX
1 6.78 1.00

dmchar ampchar dmpchar
0.50 6.28 1.00

Slip Rate (6.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2

```

0.330E+12
Input Fault Area      - cm**2
0.585E+13
LOG10[Mo(m)]         = (1.50)m + (16.05)
  IMAX  AMMAX  PMAX  ARATE = EX-RATE + CH-RATE
    1   6.7800  1.0000  0.03614  0.02249  0.01366

IND_RL
  2

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

FAULT SEGMENT COORDINATES
  1  -122.0094  37.8173
  2  -121.9379  37.7149
  3  -121.9327  37.6939
  4  -121.8620  37.5675
  5  -121.8511  37.5385
  6  -121.8349  37.5101
  7  -121.8235  37.4888
  8  -121.8071  37.4450

NDP
  2

ORIGINAL FAULT CROSS SECTION
  1      0.0000  0.0000
  2      0.0000  13.0000

Computed Total Fault Area = 0.59E+03
-----

FAULT 6

FAULT NAME:  CALAVERAS (CS+CC+CN)

NFP  NRL  ATTENUATION CODES:
15   10   1 3

AMMIN  AMSTEP  IRATE  RATE  BETA  ECTR  ECDP  COEF
5.000  0.1000  1 11.0000  1.842  6.300  2.000  0.025

NMAX  AMMAX  PMAX
  1    6.93  1.00

dmchar ampchar dmpchar
  0.50  6.43  1.00

Slip Rate ( 11.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area      - cm**2
0.144E+14
LOG10[Mo(m)]         = (1.50)m + (16.05)
  IMAX  AMMAX  PMAX  ARATE = EX-RATE + CH-RATE
    1   6.9300  1.0000  0.11840  0.08169  0.03671

IND_RL
  2

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

FAULT SEGMENT COORDINATES
  1  -122.0094  37.8173
  2  -121.9379  37.7149
  3  -121.9327  37.6939

```

4	-121.8620	37.5675
5	-121.8511	37.5385
6	-121.8349	37.5101
7	-121.8235	37.4888
8	-121.8071	37.4450
9	-121.7618	37.3996
10	-121.7149	37.3430
11	-121.6483	37.2481
12	-121.5801	37.1523
13	-121.5424	37.0958
14	-121.4678	36.9898
15	-121.3956	36.8257

NDP
2

ORIGINAL FAULT CROSS SECTION

1	0.0000	0.0000
2	0.0000	12.0000

Computed Total Fault Area = 0.15E+04

FAULT 7

FAULT NAME: CALAVERAS (FLOATING)

NFP NRL ATTENUATION CODES:
15 10 1 3

AMMIN	AMSTEP	IRATE	RATE	BETA	ECTR	ECDP	COEF
6.100	0.1000	1	11.0000	1.842	6.300	2.000	0.080

NMAX	AMMAX	PMAX
1	6.20	1.00

dmchar	ampchar	dmpchar
0.50	5.70	1.00

Slip Rate (11.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.144E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.2000 1.0000 0.41588 -0.04099 0.45688

IND_RL
2

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

FAULT SEGMENT COORDINATES

1	-122.0094	37.8173
2	-121.9379	37.7149
3	-121.9327	37.6939
4	-121.8620	37.5675
5	-121.8511	37.5385
6	-121.8349	37.5101
7	-121.8235	37.4888
8	-121.8071	37.4450
9	-121.7618	37.3996
10	-121.7149	37.3430
11	-121.6483	37.2481
12	-121.5801	37.1523
13	-121.5424	37.0958

14 -121.4678 36.9898
15 -121.3956 36.8257

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 12.0000

Computed Total Fault Area = 0.15E+04

FAULT 8

FAULT NAME: CALAVERAS (CC+CN)

NFP NRL ATTENUATION CODES:
14 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 11.0000 1.842 5.300 2.000 0.025

NMAX AMMAX PMAX
1 6.23 1.00

dmchar ampchar dmpchar
0.50 5.73 1.00

Slip Rate (11.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.123E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.2300 1.0000 0.52361 0.17177 0.35184

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -122.0094 37.8173
2 -121.9379 37.7149
3 -121.9327 37.6939
4 -121.8620 37.5675
5 -121.8511 37.5385
6 -121.8349 37.5101
7 -121.8235 37.4888
8 -121.8071 37.4450
9 -121.7618 37.3996
10 -121.7149 37.3430
11 -121.6483 37.2481
12 -121.5801 37.1523
13 -121.5424 37.0958
14 -121.4678 36.9898

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 12.0000

Computed Total Fault Area = 0.12E+04

FAULT 9

FAULT NAME: HAYWARD (HN)

NFP NRL ATTENUATION CODES:
2 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 9.0000 1.842 1.800 2.000 0.477

NMAX AMMAX PMAX
1 6.49 1.00

dmchar ampchar dmpchar
0.50 5.99 1.00

Slip Rate (9.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.420E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.4900 1.0000 0.07584 0.03579 0.04004

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -122.2128 37.8273
2 -122.4342 38.0875

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 12.0000

Computed Total Fault Area = 0.42E+03

FAULT 10

FAULT NAME: HAYWARD (HN+RC)

NFP NRL ATTENUATION CODES:
4 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 9.0000 1.842 4.900 2.000 0.093

NMAX AMMAX PMAX
1 7.11 1.00

dmchar ampchar dmpchar
0.50 6.61 1.00

Slip Rate (9.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12

```

Input Fault Area      - cm**2
0.116E+14
LOG10[Mo(m)]         = (1.50)m + (16.05)
  IMAX   AMMAX   PMAX   ARATE = EX-RATE + CH-RATE
    1    7.1100  1.0000  0.05416  0.04116  0.01299

IND_RL
  2

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

FAULT SEGMENT COORDINATES
  1    -122.2128  37.8273
  2    -122.4342  38.0875
  3    -122.6136  38.3315
  4    -122.7883  38.5752

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

Computed Total Fault Area = 0.12E+04

-----

FAULT 11

FAULT NAME:  MOUNT DIABLO (MTD)

NFP   NRL   ATTENUATION CODES:
  2     10     5  6

AMMIN  AMSTEP  IRATE   RATE   BETA   ECTR   ECDP   COEF
5.000  0.1000   1  2.0000  1.842  1.300  2.000  1.000

NMAX  AMMAX  PMAX
  1    6.65  1.00

dmchar ampchar dmpchar
  0.50   6.15   1.00

Slip Rate ( 2.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area      - cm**2
0.350E+13
LOG10[Mo(m)]         = (1.50)m + (16.05)
  IMAX   AMMAX   PMAX   ARATE = EX-RATE + CH-RATE
    1    6.6500  1.0000  0.00964  0.00537  0.00427

IND_RL
  2

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

FAULT SEGMENT COORDINATES
  1    -122.0388  37.8771
  2    -121.8229  37.7301

NDP
  3
ORIGINAL FAULT CROSS SECTION
  1      0.0000   7.9900
  2      0.0000   8.0000

```

3 -10.2400 16.0000

Computed Total Fault Area = 0.33E+03

FAULT 12

FAULT NAME: SAN ANDREAS (SAS+SAP)

NFP NRL ATTENUATION CODES:
11 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 17.0000 1.842 7.400 2.000 0.179

NMAX AMMAX PMAX
1 7.42 1.00

dmchar ampchar dmpchar
0.50 6.92 1.00

Slip Rate (17.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.203E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 7.4200 1.0000 0.09923 0.08450 0.01472

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -121.4816 36.8059
2 -121.5645 36.8701
3 -121.6520 36.9260
4 -121.7330 36.9890
5 -121.8120 37.0530
6 -121.9070 37.1040
7 -122.0036 37.1762
8 -122.1400 37.2970
9 -122.2100 37.3670
10 -122.2830 37.4380
11 -122.5741 37.7856

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 14.0000

Computed Total Fault Area = 0.20E+04

FAULT 13

FAULT NAME: SAN ANDREAS (SAP)

NFP NRL ATTENUATION CODES:
5 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 17.0000 1.842 4.300 2.000 0.099

NMAX AMMAX PMAX
1 7.15 1.00

dmchar ampchar dmpchar
0.50 6.65 1.00

Slip Rate (17.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.110E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 7.1500 1.0000 0.08966 0.06939 0.02027

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -122.0036 37.1762
2 -122.1400 37.2970
3 -122.2100 37.3670
4 -122.2830 37.4380
5 -122.5741 37.7856

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 13.0000

Computed Total Fault Area = 0.11E+04

FAULT 14

FAULT NAME: SAN ANDREAS (SAS+SAP+SAN+SAO)

NFP NRL ATTENUATION CODES:
20 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 20.0000 1.842 23.700 2.000 0.523

NMAX AMMAX PMAX
1 7.90 1.00

dmchar ampchar dmpchar
0.50 7.40 1.00

Slip Rate (20.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.581E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 7.9000 1.0000 0.14301 0.13357 0.00945

IND_RL
2

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

FAULT SEGMENT COORDINATES

1	-121.4816	36.8059
2	-121.5645	36.8701
3	-121.6520	36.9260
4	-121.7330	36.9890
5	-121.8120	37.0530
6	-121.9070	37.1040
7	-122.0036	37.1762
8	-122.1400	37.2970
9	-122.2830	37.4380
10	-122.5741	37.7856
11	-122.7225	37.9617
12	-122.9170	38.1810
13	-123.1144	38.4080
14	-123.7894	39.1014
15	-123.8407	39.1706
16	-123.9224	39.3965
17	-124.0067	39.9135
18	-124.0635	40.0506
19	-124.1381	40.0965
20	-124.4032	40.2440

NDP
2

ORIGINAL FAULT CROSS SECTION

1	0.0000	0.0000
2	0.0000	13.0000

Computed Total Fault Area = 0.62E+04

FAULT 15

FAULT NAME: SAN ANDREAS (SAP+SAN)

NFP NRL ATTENUATION CODES:
11 10 1 3

AMMIN	AMSTEP	IRATE	RATE	BETA	ECTR	ECDP	COEF
5.000	0.1000	1	21.0000	1.842	13.800	2.000	0.000

NMAX	AMMAX	PMAX
1	7.65	1.00

dmchar	ampchar	dmpchar
0.50	7.15	1.00

Slip Rate (21.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.338E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 7.6500 1.0000 0.13489 0.12121 0.01368

IND_RL
2

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

FAULT SEGMENT COORDINATES

1	-122.0036	37.1762
2	-122.1400	37.2970
3	-122.2100	37.3670
4	-122.2830	37.4380
5	-122.5741	37.7856
6	-122.7225	37.9617
7	-122.9170	38.1810
8	-123.0419	38.3290
9	-123.1144	38.4080
10	-123.7894	39.1014
11	-123.8407	39.1706

NDP

2

ORIGINAL FAULT CROSS SECTION

1	0.0000	0.0000
2	0.0000	12.0000

Computed Total Fault Area = 0.33E+04

 FAULT 16

FAULT NAME: SAN ANDREAS (FLOATING)

NFP NRL ATTENUATION CODES:

20	10	1	3
----	----	---	---

AMMIN	AMSTEP	IRATE	RATE	BETA	ECTR	ECDP	COEF
6.800	0.1000	1	0.0600	1.842	23.700	2.000	0.166

NMAX	AMMAX	PMAX
1	6.90	1.00

dmchar	ampchar	dmpchar
0.50	6.40	1.00

Slip Rate (0.0600 mm/yr) Converted to Activity Rate:

Input Shear Modulus - dyne/cm**2

0.330E+12

Input Fault Area - cm**2

0.581E+14

LOG10[Mo(m)] = (1.50)m + (16.05)

IMAX	AMMAX	PMAX	ARATE	EX-RATE	CH-RATE
1	6.9000	1.0000	0.00082	-0.00008	0.00090

IND_RL

2

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

FAULT SEGMENT COORDINATES

1	-121.4816	36.8059
2	-121.5645	36.8701
3	-121.6520	36.9260
4	-121.7330	36.9890
5	-121.8120	37.0530
6	-121.9070	37.1040
7	-122.0036	37.1762
8	-122.1400	37.2970
9	-122.2830	37.4380
10	-122.5741	37.7856
11	-122.7225	37.9617
12	-122.9170	38.1810
13	-123.1144	38.4080

14	-123.7894	39.1014
15	-123.8407	39.1706
16	-123.9224	39.3965
17	-124.0067	39.9135
18	-124.0635	40.0506
19	-124.1381	40.0965
20	-124.4032	40.2440

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 13.0000

Computed Total Fault Area = 0.62E+04

FAULT 17

FAULT NAME: SAN ANDREAS (SAP+SAN+SAO)

NFP NRL ATTENUATION CODES:
19 10 1 3

AMMIN	AMSTEP	IRATE	RATE	BETA	ECTR	ECDP	COEF
5.000	0.1000	1	22.0000	1.842	20.600	2.000	0.025

NMAX	AMMAX	PMAX
1	7.83	1.00

dmchar	ampchar	dmpchar
0.50	7.33	1.00

Slip Rate (22.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.488E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 7.8300 1.0000 0.14903 0.13791 0.01111

IND_RL
2

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

FAULT SEGMENT COORDINATES		
1	-122.0036	37.1762
2	-122.1400	37.2970
3	-122.2100	37.3670
4	-122.2830	37.4380
5	-122.5741	37.7856
6	-122.7225	37.9617
7	-122.9170	38.1810
8	-123.0419	38.3290
9	-123.1144	38.4080
10	-123.7894	39.1014
11	-123.8407	39.1706
12	-123.8726	39.2589
13	-123.9224	39.3965
14	-123.9953	39.6730
15	-124.0067	39.9135
16	-124.0490	40.0259
17	-124.0635	40.0506
18	-124.1381	40.0965

19 -124.4032 40.2440

NDP

2

ORIGINAL FAULT CROSS SECTION

1	0.0000	0.0000
2	0.0000	12.0000

Computed Total Fault Area = 0.49E+04

FAULT 18

FAULT NAME: SAN ANDREAS (SAS+SAP+SAN)

NFP NRL ATTENUATION CODES:

17 10 1 3

AMMIN	AMSTEP	IRATE	RATE	BETA	ECTR	ECDP	COEF
5.000	0.1000	1	20.0000	1.842	16.900	2.000	0.009

NMAX AMMAX PMAX

1 7.76 1.00

dmchar	ampchar	dmpchar
0.50	7.26	1.00

Slip Rate (20.0000 mm/yr) Converted to Activity Rate:

Input Shear Modulus - dyne/cm**2

0.330E+12

Input Fault Area - cm**2

0.431E+14

LOG10[Mo(m)] = (1.50)m + (16.05)

IMAX	AMMAX	PMAX	ARATE	EX-RATE	CH-RATE
1	7.7600	1.0000	0.13508	0.12372	0.01136

IND_RL

2

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

FAULT SEGMENT COORDINATES

1	-121.4816	36.8059
2	-121.5645	36.8701
3	-121.6520	36.9260
4	-121.7330	36.9890
5	-121.8120	37.0530
6	-121.9070	37.1040
7	-122.0036	37.1762
8	-122.1400	37.2970
9	-122.2100	37.3670
10	-122.2830	37.4380
11	-122.5741	37.7856
12	-122.7225	37.9617
13	-122.9170	38.1810
14	-123.0419	38.3290
15	-123.1144	38.4080
16	-123.7894	39.1014
17	-123.8407	39.1706

NDP

2

ORIGINAL FAULT CROSS SECTION

1	0.0000	0.0000
2	0.0000	13.0000

Computed Total Fault Area = 0.44E+04

FAULT 19

FAULT NAME: MONTE VISTA - SHANNON

NFP NRL ATTENUATION CODES:
5 10 2 4

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 0.4000 1.842 2.300 2.000 1.000

NMAX AMMAX PMAX
1 6.70 1.00

dmchar ampchar dmpchar
0.50 6.20 1.00

Slip Rate (0.4000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.468E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.7000 1.0000 0.00230 0.00134 0.00096

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -122.2500 37.4375
2 -122.0650 37.3050
3 -122.0000 37.2650
4 -121.9275 37.2275
5 -121.8375 37.2100

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 5.2000 9.0000

Computed Total Fault Area = 0.48E+03

FAULT 20

FAULT NAME: CONCORD/GV (CON)

NFP NRL ATTENUATION CODES:
2 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 4.0000 1.842 0.900 2.000 0.244

NMAX AMMAX PMAX
1 6.25 1.00

dmchar ampchar dmpchar

```

0.50    5.75    1.00

Slip Rate ( 4.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.272E+13
LOG10[Mo(m)]      = (1.50)m + (16.05)
  IMAX  AMMAX    PMAX    ARATE = EX-RATE + CH-RATE
    1   6.2500  1.0000  0.03995  0.01355  0.02640

IND_RL
  2

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

FAULT SEGMENT COORDINATES
  1  -121.9896  37.9003
  2  -122.0766  38.0389

NDP
  2
ORIGINAL FAULT CROSS SECTION
  1      0.0000  0.0000
  2      0.0000  16.0000

Computed Total Fault Area = 0.28E+03
-----

FAULT 21

FAULT NAME:  CONCORD/GV (CON+GVS)

NFP    NRL    ATTENUATION CODES:
  3     10     1  3

AMMIN  AMSTEP  IRATE    RATE  BETA  ECTR  ECDP  COEF
5.000  0.1000   1  4.5000  1.842  2.200  2.000  0.122

NMAX  AMMAX  PMAX
  1    6.58  1.00

dmchar ampchar dmpchar
  0.50   6.08   1.00

Slip Rate ( 4.5000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.622E+13
LOG10[Mo(m)]      = (1.50)m + (16.05)
  IMAX  AMMAX    PMAX    ARATE = EX-RATE + CH-RATE
    1   6.5800  1.0000  0.04533  0.02360  0.02173

IND_RL
  2

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

FAULT SEGMENT COORDINATES
  1  -121.9896  37.9003
  2  -122.0766  38.0389
  3  -122.1459  38.2587

NDP

```

2
ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 15.0000
Computed Total Fault Area = 0.64E+03

FAULT 22
FAULT NAME: CONCORD/GV (FLOATING)

NFP NRL ATTENUATION CODES:
4 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
6.100 0.1000 1 4.7000 1.842 3.600 2.000 0.265

NMAX AMMAX PMAX
1 6.20 1.00

dmchar ampchar dmpchar
0.50 5.70 1.00

Slip Rate (4.7000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.818E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.2000 1.0000 0.10094 -0.00995 0.11089

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -121.9896 37.9003
2 -122.0766 38.0389
3 -122.1459 38.2587
4 -122.1789 38.3825

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 15.0000
Computed Total Fault Area = 0.85E+03

FAULT 23
FAULT NAME: CONCORD/GV (CON+GVS+GVN)

NFP NRL ATTENUATION CODES:
4 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 4.7000 1.842 3.600 2.000 0.370

NMAX AMMAX PMAX

1 6.71 1.00

dmchar ampchar dmpchar
0.50 6.21 1.00

Slip Rate (4.7000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.818E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.7100 1.0000 0.04622 0.02717 0.01905

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -121.9896 37.9003
2 -122.0766 38.0389
3 -122.1459 38.2587
4 -122.1789 38.3825

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 15.0000

Computed Total Fault Area = 0.85E+03

FAULT 24

FAULT NAME: CALAVERAS (CS+CC)

NFP NRL ATTENUATION CODES:
8 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 15.0000 1.842 4.000 2.000 0.045

NMAX AMMAX PMAX
1 6.36 1.00

dmchar ampchar dmpchar
0.50 5.86 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
0.858E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.3600 1.0000 0.35606 0.14245 0.21361

IND_RL
2

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

FAULT SEGMENT COORDINATES

1	-121.8071	37.4450
2	-121.7618	37.3996
3	-121.7149	37.3430
4	-121.6483	37.2481
5	-121.5801	37.1523
6	-121.5424	37.0958
7	-121.4678	36.9898
8	-121.3956	36.8257

NDP

2

ORIGINAL FAULT CROSS SECTION

1	0.0000	0.0000
2	0.0000	11.0000

Computed Total Fault Area = 0.86E+03

 FAULT 25

FAULT NAME: CALAVERAS (CS+CC FLOATING)

NFP NRL ATTENUATION CODES:

8	10	1	3
---	----	---	---

AMMIN	AMSTEP	IRATE	RATE	BETA	ECTR	ECDP	COEF
6.100	0.1000	1	15.0000	1.842	4.000	2.000	0.505

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

0.858E+13

LOG10[Mo(m)] = (1.50)m + (16.05)

IMAX	AMMAX	PMAX	ARATE	EX-RATE	CH-RATE
1	6.2000	1.0000	0.33791	-0.03331	0.37121

IND_RL

2

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

FAULT SEGMENT COORDINATES

1	-121.8071	37.4450
2	-121.7618	37.3996
3	-121.7149	37.3430
4	-121.6483	37.2481
5	-121.5801	37.1523
6	-121.5424	37.0958
7	-121.4678	36.9898
8	-121.3956	36.8257

NDP

2

ORIGINAL FAULT CROSS SECTION

1	0.0000	0.0000
2	0.0000	11.0000

Computed Total Fault Area = 0.86E+03

FAULT 26

FAULT NAME: CALAVERAS (CC)

NFP NRL ATTENUATION CODES:
7 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 15.0000 1.842 3.000 2.000 0.320

NMAX AMMAX PMAX
1 6.23 1.00

dmchar ampchar dmpchar
0.50 5.73 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
0.649E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.2300 1.0000 0.37674 0.12359 0.25315

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -121.8071 37.4450
2 -121.7618 37.3996
3 -121.7149 37.3430
4 -121.6483 37.2481
5 -121.5801 37.1523
6 -121.5424 37.0958
7 -121.4678 36.9898

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 11.0000

Computed Total Fault Area = 0.65E+03

FAULT 27

FAULT NAME: GREENVILLE (GN)

NFP NRL ATTENUATION CODES:
4 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 2.0000 1.842 1.400 2.000 0.350

NMAX AMMAX PMAX
1 6.66 1.00

```

dmchar ampchar dmpchar
  0.50    6.16    1.00

Slip Rate ( 2.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.405E+13
LOG10[Mo(m)]      = (1.50)m + (16.05)
  IMAX  AMMAX  PMAX  ARATE = EX-RATE + CH-RATE
    1   6.6600  1.0000  0.01090  0.00613  0.00477

IND_RL
  2

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

FAULT SEGMENT COORDINATES
  1   -121.8328  37.8839
  2   -121.7630  37.7930
  3   -121.6997  37.7219
  4   -121.6647  37.6858

NDP
  2
ORIGINAL FAULT CROSS SECTION
  1   0.0000  0.0000
  2   0.0000  15.0000

Computed Total Fault Area = 0.40E+03

-----

FAULT 28
FAULT NAME:  SAN GREGORIO (SGS+SGN)

NFP  NRL  ATTENUATION CODES:
  11   10    1  3

AMMIN  AMSTEP  IRATE  RATE  BETA  ECTR  ECDP  COEF
  5.000  0.1000    1  6.0000  1.842  8.800  2.000  0.350

NMAX  AMMAX  PMAX
  1    7.44  1.00

dmchar ampchar dmpchar
  0.50    6.94    1.00

Slip Rate ( 6.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.222E+14
LOG10[Mo(m)]      = (1.50)m + (16.05)
  IMAX  AMMAX  PMAX  ARATE = EX-RATE + CH-RATE
    1   7.4400  1.0000  0.03692  0.03162  0.00530

IND_RL
  2

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

FAULT SEGMENT COORDINATES
  1   -121.8593  36.3131
  2   -121.9000  36.3590

```

3	-121.9351	36.4194
4	-121.9538	36.4669
5	-121.9803	36.5172
6	-122.0212	36.5561
7	-122.0945	36.6696
8	-122.1295	36.7496
9	-122.1555	36.8528
10	-122.3936	37.2906
11	-122.6166	37.7682

NDP
2

ORIGINAL FAULT CROSS SECTION

1	0.0000	0.0000
2	0.0000	13.0000

Computed Total Fault Area = 0.23E+04

FAULT 29

FAULT NAME: SAN GREGORIO (FLOATING)

NFP NRL ATTENUATION CODES:
11 10 1 3

AMMIN	AMSTEP	IRATE	RATE	BETA	ECTR	ECDP	COEF
6.800	0.1000	1	6.0000	1.842	8.800	2.000	0.300

NMAX	AMMAX	PMAX
1	6.90	1.00

dmchar	ampchar	dmpchar
0.50	6.40	1.00

Slip Rate (6.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.222E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.9000 1.0000 0.03117 -0.00307 0.03424

IND_RL
2

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

FAULT SEGMENT COORDINATES

1	-121.8593	36.3131
2	-121.9000	36.3590
3	-121.9351	36.4194
4	-121.9538	36.4669
5	-121.9803	36.5172
6	-122.0212	36.5561
7	-122.0945	36.6696
8	-122.1295	36.7496
9	-122.1555	36.8528
10	-122.3936	37.2906
11	-122.6166	37.7682

NDP
2

ORIGINAL FAULT CROSS SECTION

1	0.0000	0.0000
---	--------	--------

2 0.0000 13.0000

Computed Total Fault Area = 0.23E+04

FAULT 30

FAULT NAME: SAN GREGORIO (SGN)

NFP NRL ATTENUATION CODES:
3 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 7.0000 1.842 5.500 2.000 0.350

NMAX AMMAX PMAX
1 7.23 1.00

dmchar ampchar dmpchar
0.50 6.73 1.00

Slip Rate (7.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.143E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 7.2300 1.0000 0.04111 0.03288 0.00823

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -122.6166 37.7682
2 -122.3936 37.2906
3 -122.1555 36.8528

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 13.0000

Computed Total Fault Area = 0.14E+04

FAULT 31

FAULT NAME: GREENVILLE (GS+GN)

NFP NRL ATTENUATION CODES:
5 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 2.0000 1.842 2.600 2.000 0.350

NMAX AMMAX PMAX
1 6.94 1.00

dmchar ampchar dmpchar

0.50 6.44 1.00

Slip Rate (2.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.765E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.9400 1.0000 0.01120 0.00778 0.00343

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -121.6647 37.6858
2 -121.6438 37.6439
3 -121.5808 37.5754
4 -121.5539 37.5256
5 -121.5408 37.4994

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 15.0000

Computed Total Fault Area = 0.35E+03

FAULT 32

FAULT NAME: GREENVILLE (GS)

NFP NRL ATTENUATION CODES:
5 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 2.0000 1.842 1.200 2.000 0.350

NMAX AMMAX PMAX
1 6.60 1.00

dmchar ampchar dmpchar
0.50 6.10 1.00

Slip Rate (2.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.360E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.6000 1.0000 0.01113 0.00591 0.00522

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -121.6647 37.6858
2 -121.6438 37.6439

3 -121.5808 37.5754
4 -121.5539 37.5256
5 -121.5408 37.4994

NDP

2

ORIGINAL FAULT CROSS SECTION

1 0.0000 0.0000
2 0.0000 15.0000

Computed Total Fault Area = 0.35E+03

FAULT 33

FAULT NAME: GREENVILLE (FLOATING)

NFP NRL ATTENUATION CODES:

5 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
6.100 0.1000 1 2.0000 1.842 2.600 2.000 0.300

NMAX AMMAX PMAX

1 6.20 1.00

dmchar ampchar dmpchar
0.50 5.70 1.00

Slip Rate (2.0000 mm/yr) Converted to Activity Rate:

Input Shear Modulus - dyne/cm**2

0.330E+12

Input Fault Area - cm**2

0.765E+13

LOG10[Mo(m)] = (1.50)m + (16.05)

IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.2000 1.0000 0.04017 -0.00396 0.04413

IND_RL

2

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

FAULT SEGMENT COORDINATES

1 -121.6647 37.6858
2 -121.6438 37.6439
3 -121.5808 37.5754
4 -121.5539 37.5256
5 -121.5408 37.4994

NDP

2

ORIGINAL FAULT CROSS SECTION

1 0.0000 0.0000
2 0.0000 15.0000

Computed Total Fault Area = 0.35E+03

FAULT 34

FAULT NAME: CONCORD/GV (GVS+GVN)

NFP NRL ATTENUATION CODES:

```

3      10      1  3

AMMIN  AMSTEP  IRATE   RATE   BETA   ECTR   ECDP   COEF
5.0000  0.1000      1  5.0000  1.842  2.700  2.000  0.122

NMAX  AMMAX  PMAX
1     6.48  1.00

dmchar ampchar dmpchar
0.50   5.98   1.00

Slip Rate ( 5.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.546E+13
LOG10[Mo(m)]      = (1.50)m + (16.05)
  IMAX  AMMAX  PMAX  ARATE = EX-RATE + CH-RATE
    1   6.4800  1.0000  0.05611  0.02618  0.02994

IND_RL
  2

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

FAULT SEGMENT COORDINATES
1   -122.0766   38.0389
2   -122.1459   38.2587
3   -122.1789   38.3825

NDP
  2
ORIGINAL FAULT CROSS SECTION
1   0.0000   0.0000
2   0.0000  14.0000

Computed Total Fault Area = 0.55E+03

-----

FAULT 35
FAULT NAME:  CONCORD/GV (GVS)

NFP   NRL   ATTENUATION CODES:
  2    10     1  3

AMMIN  AMSTEP  IRATE   RATE   BETA   ECTR   ECDP   COEF
5.0000  0.1000      1  5.0000  1.842  1.300  2.000  0.122

NMAX  AMMAX  PMAX
1     6.24  1.00

dmchar ampchar dmpchar
0.50   5.74   1.00

Slip Rate ( 5.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.350E+13
LOG10[Mo(m)]      = (1.50)m + (16.05)
  IMAX  AMMAX  PMAX  ARATE = EX-RATE + CH-RATE
    1   6.2400  1.0000  0.06597  0.02200  0.04396

```

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -122.0766 38.0389
2 -122.1459 38.2587

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 14.0000

Computed Total Fault Area = 0.35E+03

FAULT 36

FAULT NAME: SAN ANDREAS (SAN+SAO)

NFP NRL ATTENUATION CODES:
15 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 24.0000 1.842 16.300 2.000 0.251

NMAX AMMAX PMAX
1 7.70 1.00

dmchar ampchar dmpchar
0.50 7.20 1.00

Slip Rate (24.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.378E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 7.7000 1.0000 0.15788 0.14316 0.01471

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -122.5741 37.7856
2 -122.7225 37.9617
3 -122.9170 38.1810
4 -123.0419 38.3290
5 -123.1144 38.4080
6 -123.7894 39.1014
7 -123.8407 39.1706
8 -123.8726 39.2589
9 -123.9224 39.3965
10 -123.9953 39.6730
11 -124.0067 39.9135
12 -124.0490 40.0259
13 -124.0635 40.0506
14 -124.1381 40.0965
15 -124.4032 40.2440

NDP

2
ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 11.5000
Computed Total Fault Area = 0.38E+04

FAULT 37
FAULT NAME: SAN ANDREAS (SAN)

NFP NRL ATTENUATION CODES:
7 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 24.0000 1.842 9.500 2.000 0.027

NMAX AMMAX PMAX
1 7.45 1.00

dmchar ampchar dmpchar
0.50 6.95 1.00

Slip Rate (24.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.228E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 7.4500 1.0000 0.14892 0.12787 0.02105

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -122.5741 37.7856
2 -122.7225 37.9617
3 -122.9170 38.1810
4 -123.0419 38.3290
5 -123.1144 38.4080
6 -123.7894 39.1014
7 -123.8407 39.1706

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

Computed Total Fault Area = 0.23E+04

FAULT 38
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 1.842 2.300 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
0.452E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.7000 1.0000 0.00834 0.00486 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 39

FAULT NAME: SAN ANDREAS (SAS)

NFP NRL ATTENUATION CODES:
7 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 17.0000 1.842 3.100 2.000 0.123

NMAX AMMAX PMAX
1 7.03 1.00

dmchar ampchar dmpchar
0.50 6.53 1.00

Slip Rate (17.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.930E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 7.0300 1.0000 0.09624 0.07030 0.02594

IND_RL
2

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

FAULT SEGMENT COORDINATES

1 -121.4816 36.8059
2 -121.5645 36.8701
3 -121.6520 36.9260
4 -121.7330 36.9890
5 -121.8120 37.0530
6 -121.9070 37.1040
7 -122.0036 37.1762

NDP

2

ORIGINAL FAULT CROSS SECTION

1 0.0000 0.0000
2 0.0000 15.0000

Computed Total Fault Area = 0.93E+03

FAULT 40

FAULT NAME: HAYWARD (RC)

NFP NRL ATTENUATION CODES:

3 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 9.0000 1.842 3.100 2.000 0.799

NMAX AMMAX PMAX

1 7.00 1.00

dmchar ampchar dmpchar
0.50 6.50 1.00

Slip Rate (9.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2

0.330E+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 7.0000 1.0000 0.04332 0.03114 0.01219

IND_RL

2

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

FAULT SEGMENT COORDINATES

1 -122.4342 38.0875
2 -122.6136 38.3315
3 -122.7883 38.5752

NDP

2

ORIGINAL FAULT CROSS SECTION

1 0.0000 0.0000
2 0.0000 12.0000

Computed Total Fault Area = 0.75E+03

FAULT 41

FAULT NAME: GREAT VALLEY 5

NFP NRL ATTENUATION CODES:
2 10 2 4

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 1.5000 1.842 1.400 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
0.281E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.5000 1.0000 0.00825 0.00394 0.00431

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -121.8987 38.3033
2 -121.7483 38.0809

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 = 0.28E+03

FAULT 42

FAULT NAME: WEST NAPA

NFP NRL ATTENUATION CODES:
3 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 1.0000 1.842 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 (1.0000 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 0.00588 0.00281 0.00307

IND_RL
 2

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

FAULT SEGMENT COORDINATES
 1 -122.2445 38.1644
 2 -122.2890 38.2340
 3 -122.3686 38.4116

NDP
 2

ORIGINAL FAULT CROSS SECTION
 1 0.0000 0.0000
 2 0.0000 10.0000

Computed Total Fault Area = 0.30E+03

 FAULT 43

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 1.842 2.900 2.000 1.000

NMAX AMMAX PMAX
 1 7.00 1.00

dmchar ampchar dmpchar
 0.50 6.50 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
 0.696E+13
 LOG10[Mo(m)] = (1.50)m + (16.05)
 IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
 1 7.0000 1.0000 0.00045 0.00032 0.00013

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 = 0.69E+03

FAULT 44

FAULT NAME: CONCORD/GV (GVN)

NFP NRL ATTENUATION CODES:
2 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 5.0000 1.842 1.400 2.000 0.244

NMAX AMMAX PMAX
1 6.02 1.00

dmchar ampchar dmpchar
0.50 5.52 1.00

Slip Rate (5.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.196E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.0200 1.0000 0.06718 0.01455 0.05263

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -122.1459 38.2587
2 -122.1789 38.3825

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 14.0000

Computed Total Fault Area = 0.20E+03

FAULT 45

FAULT NAME: POINT REYES

NFP NRL ATTENUATION CODES:
3 10 2 4

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 0.3000 1.842 2.400 2.000 1.000

NMAX AMMAX PMAX
1 7.00 1.00

dmchar ampchar dmpchar
0.50 6.50 1.00

Slip Rate (0.3000 mm/yr) Converted to Activity Rate:

```

Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.552E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
  IMAX  AMMAX  PMAX  ARATE = EX-RATE + CH-RATE
    1  7.0000  1.0000  0.00107  0.00077  0.00030

IND_RL
  2

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

FAULT SEGMENT COORDINATES
  1  -122.8337  37.9433
  2  -123.0664  37.9908
  3  -123.2410  38.1843

NDP
  2
ORIGINAL FAULT CROSS SECTION
  1  0.0000  0.0000
  2  7.5500  9.0000

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

FAULT 46
FAULT NAME:  GREAT VALLEY 4

NFP  NRL  ATTENUATION CODES:
  2  10  2  4

AMMIN  AMSTEP  IRATE  RATE  BETA  ECTR  ECDP  COEF
5.000  0.1000  1  1.5000  1.842  2.100  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
0.422E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
  IMAX  AMMAX  PMAX  ARATE = EX-RATE + CH-RATE
    1  6.6000  1.0000  0.00978  0.00520  0.00459

IND_RL
  2

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

FAULT SEGMENT COORDINATES
  1  -122.0511  38.6520
  2  -121.8929  38.2958

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 = 0.42E+03

FAULT 47

FAULT NAME: MONTEREY BAY - TULARCITOS

NFP NRL ATTENUATION CODES:
7 10 2 4

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 0.5000 1.842 4.200 2.000 1.000

NMAX AMMAX PMAX
1 7.30 1.00

dmchar ampchar dmpchar
0.50 6.80 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
0.118E+14
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 7.3000 1.0000 0.00212 0.00174 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 -121.5253 36.3683
2 -121.5957 36.4002
3 -121.6489 36.4387
4 -121.7353 36.4693
5 -121.8656 36.5849
6 -122.0105 36.8136
7 -122.1222 36.9213

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 14.0000

Computed Total Fault Area = 0.12E+04

FAULT 48

FAULT NAME: ORTIGALITA

NFP NRL ATTENUATION CODES:
7 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 1.0000 1.842 3.500 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
0.770E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 7.1000 1.0000 0.00407 0.00308 0.00099

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -121.2806 37.2705
2 -121.2248 37.1920
3 -121.1512 37.1176
4 -121.1259 37.0381
5 -121.0114 36.9071
6 -120.9036 36.7940
7 -120.8954 36.7322

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 11.0000

Computed Total Fault Area = 0.77E+03

FAULT 49

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 1.842 2.100 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
0.412E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.6000 1.0000 0.00955 0.00507 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 50

FAULT NAME: SAN GREGORIO (SGS)

NFP NRL ATTENUATION CODES:
9 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 3.0000 1.842 3.300 2.000 0.350

NMAX AMMAX PMAX
1 6.96 1.00

dmchar ampchar dmpchar
0.50 6.46 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
0.792E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 6.9600 1.0000 0.01669 0.01172 0.00496

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -121.8593 36.3131
2 -121.9000 36.3590
3 -121.9351 36.4194
4 -121.9538 36.4669
5 -121.9803 36.5172
6 -122.0212 36.5561
7 -122.0945 36.6696
8 -122.1295 36.7496
9 -122.1555 36.8528

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 12.0000

Computed Total Fault Area = 0.79E+03

FAULT 51

FAULT NAME: HUNTING CREEK - BERRYESSA

NFP NRL ATTENUATION CODES:
2 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 6.0000 1.842 3.000 2.000 1.000

NMAX AMMAX PMAX
1 7.10 1.00

dmchar ampchar dmpchar
0.50 6.60 1.00

Slip Rate (6.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
0.330E+12
Input Fault Area - cm**2
0.720E+13
LOG10[Mo(m)] = (1.50)m + (16.05)
IMAX AMMAX PMAX ARATE = EX-RATE + CH-RATE
1 7.1000 1.0000 0.02286 0.01729 0.00557

IND_RL
2

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

FAULT SEGMENT COORDINATES
1 -122.1970 38.4530
2 -122.5041 38.9334

NDP
2

ORIGINAL FAULT CROSS SECTION
1 0.0000 0.0000
2 0.0000 12.0000

Computed Total Fault Area = 0.72E+03

FAULT 52

FAULT NAME: CALAVERAS (CS)

NFP NRL ATTENUATION CODES:
2 10 1 3

AMMIN AMSTEP IRATE RATE BETA ECTR ECDP COEF
5.000 0.1000 1 15.0000 1.842 1.000 2.000 0.345

NMAX AMMAX PMAX
1 5.79 1.00

dmchar ampchar dmpchar
0.50 5.29 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
0.209E+13
LOG10[Mo(m)]         = (1.50)m + (16.05)
  IMAX  AMMAX  PMAX  ARATE = EX-RATE + CH-RATE
    1   5.7900  1.0000  0.41791  0.04528  0.37263

IND_RL
  2

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

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FAULT SEGMENT COORDINATES
  1  -121.3956  36.8257
  2  -121.4678  36.9898

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NDP
  2

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ORIGINAL FAULT CROSS SECTION
  1      0.0000  0.0000
  2      0.0000  11.0000

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Computed Total Fault Area = 0.21E+03

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SITE 1 COORDINATES: -122.1046  37.6425

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  AMPLITUDES (g):
0.1000E+000.2000E+000.3000E+000.4000E+000.5000E+000.6000E+000.7000E+000.8000E+000.9000E+000.1
000E+01
  LN (AMPLITUDE):      -2.30      -1.61      -1.20      -0.92      -0.69      -0.51      -0.36
-0.22      -0.11      0.00
  FAULT  1 E(NO/YR)      0.1584E-020.1119E-020.8286E-030.6016E-030.4259E-030.2966E-
030.2050E-030.1414E-030.9777E-040.6789E-04
  FAULT  2 E(NO/YR)      0.3292E-010.2063E-010.1250E-010.7504E-020.4509E-020.2731E-
020.1674E-020.1040E-020.6549E-030.4186E-03
  FAULT  3 E(NO/YR)      0.1559E-010.9223E-020.5843E-020.3772E-020.2447E-020.1594E-
020.1045E-020.6900E-030.4599E-030.3095E-03
  FAULT  4 E(NO/YR)      0.1394E-020.7371E-030.4582E-030.3044E-030.2074E-030.1429E-
030.9910E-040.6912E-040.4851E-040.3427E-04
  FAULT  5 E(NO/YR)      0.1828E-010.6657E-020.2424E-020.9288E-030.3773E-030.1621E-
030.7325E-040.3465E-040.1707E-040.8717E-05
  FAULT  6 E(NO/YR)      0.1008E-020.3269E-030.1195E-030.4734E-040.2000E-040.8930E-
050.4187E-050.2050E-050.1043E-050.5485E-06
  FAULT  7 E(NO/YR)      0.1352E-010.3939E-020.1197E-020.3919E-030.1389E-030.5295E-
040.2154E-040.9274E-050.4197E-050.1984E-05
  FAULT  8 E(NO/YR)      0.4317E-020.1035E-020.2751E-030.8208E-040.2716E-040.9823E-
050.3828E-050.1591E-050.6984E-060.3217E-06
  FAULT  9 E(NO/YR)      0.1116E-010.2030E-020.4317E-030.1087E-030.3142E-040.1017E-
040.3609E-050.1383E-050.5655E-060.2445E-06
  FAULT 10 E(NO/YR)      0.1077E-020.2641E-030.7921E-040.2690E-040.1005E-040.4057E-
050.1747E-050.7946E-060.3790E-060.1883E-06
  FAULT 11 E(NO/YR)      0.5636E-020.1901E-020.6302E-030.2215E-030.8335E-040.3349E-
040.1427E-040.6402E-050.3007E-050.1471E-05
  FAULT 12 E(NO/YR)      0.4846E-020.1460E-020.5312E-030.2081E-030.8645E-040.3789E-
040.1743E-040.8373E-050.4182E-050.2163E-05
  FAULT 13 E(NO/YR)      0.3346E-020.9370E-030.3002E-030.1048E-030.3943E-040.1586E-
040.6772E-050.3045E-050.1433E-050.7024E-06
  FAULT 14 E(NO/YR)      0.8672E-020.3084E-020.1433E-020.6961E-030.3467E-030.1774E-
030.9330E-040.5045E-040.2800E-040.1593E-04
  FAULT 15 E(NO/YR)
0.0000E+000.0000E+000.0000E+000.0000E+000.0000E+000.0000E+000.0000E+000.0000E+000.0000E+000.0
000E+00
  FAULT 16 E(NO/YR)      0.4229E-040.1335E-040.4276E-050.1455E-050.5317E-060.2080E-
060.8653E-070.3799E-070.1749E-070.8398E-08

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FAULT 17 E(NO/YR) 0.4189E-030.1301E-030.5464E-040.2482E-040.1177E-040.5789E-050.2949E-050.1551E-050.8404E-060.4680E-06
 FAULT 18 E(NO/YR) 0.1852E-030.6201E-040.2656E-040.1198E-040.5597E-050.2709E-050.1357E-050.7026E-060.3751E-060.2060E-06
 FAULT 19 E(NO/YR) 0.1110E-020.3179E-030.9501E-040.3095E-040.1098E-040.4208E-050.1723E-050.7475E-060.3410E-060.1626E-06
 FAULT 20 E(NO/YR) 0.2924E-020.3962E-030.6468E-040.1306E-040.3132E-050.8625E-060.2656E-060.8967E-070.3271E-070.1274E-07
 FAULT 21 E(NO/YR) 0.1277E-020.1792E-030.3173E-040.6930E-050.1786E-050.5242E-060.1710E-060.6082E-070.2327E-070.9472E-08
 FAULT 22 E(NO/YR) 0.7768E-020.9783E-030.1559E-030.3127E-040.7502E-050.2073E-050.6413E-060.2177E-060.7985E-070.3128E-07
 FAULT 23 E(NO/YR) 0.4046E-020.6356E-030.1248E-030.2971E-040.8225E-050.2567E-050.8835E-060.3295E-060.1316E-060.5566E-07
 FAULT 24 E(NO/YR) 0.1740E-020.1495E-030.1975E-040.3513E-050.7733E-060.1999E-060.5858E-070.1901E-070.6706E-080.2539E-08
 FAULT 25 E(NO/YR) 0.3176E-010.3099E-020.4303E-030.7857E-040.1756E-040.4583E-050.1352E-050.4403E-060.1558E-060.5908E-07
 FAULT 26 E(NO/YR) 0.1567E-010.1287E-020.1608E-030.2726E-040.5761E-050.1438E-050.4088E-060.1291E-060.4446E-070.1647E-07
 FAULT 27 E(NO/YR) 0.1224E-020.2051E-030.4007E-040.9313E-050.2505E-050.7586E-060.2534E-060.9187E-070.3569E-070.1471E-07
 FAULT 28 E(NO/YR) 0.2114E-020.4698E-030.1293E-030.4008E-040.1370E-040.5084E-050.2026E-050.8575E-060.3826E-060.1787E-06
 FAULT 29 E(NO/YR) 0.4440E-020.1007E-020.2369E-030.6292E-040.1877E-040.6187E-050.2220E-050.8560E-060.3511E-060.1519E-06
 FAULT 30 E(NO/YR) 0.3314E-020.6950E-030.1751E-030.5014E-040.1602E-040.5609E-050.2124E-050.8595E-060.3683E-060.1659E-06
 FAULT 31 E(NO/YR) 0.1014E-020.1717E-030.3506E-040.8475E-050.2355E-050.7335E-060.2510E-060.9293E-070.3679E-070.1543E-07
 FAULT 32 E(NO/YR) 0.1051E-020.1447E-030.2449E-040.5097E-050.1254E-050.3529E-060.1107E-060.3798E-070.1405E-070.5545E-08
 FAULT 33 E(NO/YR) 0.4229E-020.5242E-030.7724E-040.1424E-040.3158E-050.8116E-060.2351E-060.7511E-070.2606E-070.9698E-08
 FAULT 34 E(NO/YR) 0.8540E-030.6854E-040.8206E-050.1332E-050.2702E-060.6497E-070.1786E-070.5467E-080.1830E-080.6603E-09
 FAULT 35 E(NO/YR) 0.1115E-020.8028E-040.8724E-050.1307E-050.2482E-060.5636E-070.1473E-070.4315E-080.1388E-080.4827E-09
 FAULT 36 E(NO/YR) 0.2021E-020.3765E-030.9489E-040.2805E-040.9324E-050.3404E-050.1342E-050.5647E-060.2510E-060.1170E-06
 FAULT 37 E(NO/YR) 0.2862E-030.4551E-040.9848E-050.2563E-050.7660E-060.2552E-060.9293E-070.3643E-070.1520E-070.6690E-08
 FAULT 38 E(NO/YR) 0.2239E-020.3577E-030.6857E-040.1578E-040.4218E-050.1273E-050.4247E-060.1539E-060.5979E-070.2466E-07
 FAULT 39 E(NO/YR) 0.1376E-020.1530E-030.2344E-040.4579E-050.1077E-050.2925E-060.8917E-070.2988E-070.1083E-070.4201E-08
 FAULT 40 E(NO/YR) 0.3613E-020.3663E-030.5221E-040.9647E-050.2169E-050.5673E-060.1675E-060.5456E-070.1929E-070.7314E-08
 FAULT 41 E(NO/YR) 0.2090E-020.2635E-030.4174E-040.8267E-050.1956E-050.5326E-060.1625E-060.5441E-070.1971E-070.7630E-08
 FAULT 42 E(NO/YR) 0.6122E-030.3951E-040.4034E-050.5778E-060.1058E-060.2331E-070.5938E-080.1699E-080.5353E-090.1828E-09
 FAULT 43 E(NO/YR) 0.4465E-040.4168E-050.5566E-060.9760E-070.2100E-070.5292E-080.1512E-080.4783E-090.1648E-090.6099E-10
 FAULT 44 E(NO/YR) 0.7769E-030.2500E-040.1613E-050.1645E-060.2300E-070.4053E-080.8523E-090.2058E-090.5440E-100.1370E-10
 FAULT 45 E(NO/YR) 0.1414E-030.1575E-040.2373E-050.4548E-060.1050E-060.2802E-070.8408E-080.2776E-080.9930E-090.3802E-09
 FAULT 46 E(NO/YR) 0.1236E-020.9834E-040.1159E-040.1848E-050.3687E-060.8725E-070.2362E-070.7133E-080.2357E-080.8404E-09
 FAULT 47 E(NO/YR) 0.2000E-030.2421E-040.3953E-050.8081E-060.1967E-060.5491E-070.1713E-070.5853E-080.2159E-080.8498E-09
 FAULT 48 E(NO/YR) 0.2243E-030.1546E-040.1681E-050.2530E-060.4821E-070.1099E-070.2880E-080.8455E-090.2725E-090.9498E-10
 FAULT 49 E(NO/YR) 0.1014E-020.6984E-040.7455E-050.1103E-050.2071E-060.4660E-070.1208E-070.3510E-080.1121E-080.3873E-09
 FAULT 50 E(NO/YR) 0.2229E-030.1117E-040.9899E-060.1283E-060.2176E-070.4503E-080.1088E-080.2972E-090.8988E-100.2951E-10
 FAULT 51 E(NO/YR) 0.1100E-020.6806E-040.6872E-050.9777E-060.1781E-060.3909E-070.9922E-080.2831E-080.8896E-090.3030E-09

FAULT 52 E(NO/YR)	0.1186E-020.1591E-040.5984E-060.4128E-070.4248E-080.5717E-090.6598E-100.0000E+000.0000E+000.0000E+00
TOTAL E(NO/YR)	0.2280E+000.6591E-010.2929E-010.1553E-010.8904E-020.5329E-020.3282E-020.2066E-020.1325E-020.8642E-03
TOTAL RISK	0.2039E+000.6379E-010.2886E-010.1541E-010.8864E-020.5315E-020.3277E-020.2064E-020.1324E-020.8638E-03

AMPLITUDES (g):	0.1100E+010.1200E+010.1300E+010.1400E+010.1500E+01
LN (AMPLITUDE):	0.10 0.18 0.26 0.34 0.41
FAULT 1 E(NO/YR)	0.4743E-040.3336E-040.2363E-040.1686E-040.1212E-04
FAULT 2 E(NO/YR)	0.2713E-030.1782E-030.1186E-030.7985E-040.5440E-04
FAULT 3 E(NO/YR)	0.2103E-030.1444E-030.1001E-030.7005E-040.4947E-04
FAULT 4 E(NO/YR)	0.2438E-040.1747E-040.1260E-040.9161E-050.6705E-05
FAULT 5 E(NO/YR)	0.4599E-050.2499E-050.1394E-050.7962E-060.4649E-06
FAULT 6 E(NO/YR)	0.2976E-060.1659E-060.9481E-070.5542E-070.3307E-07
FAULT 7 E(NO/YR)	0.9753E-060.4963E-060.2605E-060.1406E-060.7784E-07
FAULT 8 E(NO/YR)	0.1545E-060.7703E-070.3969E-070.2107E-070.1149E-07
FAULT 9 E(NO/YR)	0.1109E-060.5250E-070.2580E-070.1311E-070.6863E-08
FAULT 10 E(NO/YR)	0.9704E-070.5164E-070.2828E-070.1590E-070.9148E-08
FAULT 11 E(NO/YR)	0.7460E-060.3907E-060.2107E-060.1166E-060.6613E-07
FAULT 12 E(NO/YR)	0.1154E-050.6337E-060.3569E-060.2058E-060.1212E-06
FAULT 13 E(NO/YR)	0.3568E-060.1872E-060.1011E-060.5604E-070.3182E-07
FAULT 14 E(NO/YR)	0.9273E-050.5513E-050.3342E-050.2063E-050.1295E-05
FAULT 15 E(NO/YR)	0.0000E+000.0000E+000.0000E+000.0000E+000.0000E+00
FAULT 16 E(NO/YR)	0.4186E-080.2158E-080.1146E-080.6255E-090.3499E-09
FAULT 17 E(NO/YR)	0.2672E-060.1561E-060.9310E-070.5662E-070.3505E-07
FAULT 18 E(NO/YR)	0.1161E-060.6698E-070.3949E-070.2376E-070.1456E-07
FAULT 19 E(NO/YR)	0.8057E-070.4133E-070.2187E-070.1190E-070.6641E-08
FAULT 20 E(NO/YR)	0.5255E-080.2277E-080.1030E-080.4844E-090.2358E-09
FAULT 21 E(NO/YR)	0.4068E-080.1831E-080.8584E-090.4174E-090.2097E-09
FAULT 22 E(NO/YR)	0.1297E-070.5651E-080.2570E-080.1213E-080.5925E-09
FAULT 23 E(NO/YR)	0.2476E-070.1151E-070.5561E-080.2782E-080.1435E-08
FAULT 24 E(NO/YR)	0.1021E-080.4322E-090.1914E-090.8784E-100.4173E-10
FAULT 25 E(NO/YR)	0.2378E-070.1008E-070.4466E-080.2052E-080.9781E-09
FAULT 26 E(NO/YR)	0.6490E-080.2695E-080.1170E-080.5271E-090.2440E-09
FAULT 27 E(NO/YR)	0.6384E-080.2898E-080.1369E-080.6704E-090.3388E-09
FAULT 28 E(NO/YR)	0.8693E-070.4383E-070.2282E-070.1223E-070.6724E-08
FAULT 29 E(NO/YR)	0.6889E-070.3255E-070.1596E-070.8083E-080.4217E-08
FAULT 30 E(NO/YR)	0.7802E-070.3814E-070.1930E-070.1007E-070.5402E-08
FAULT 31 E(NO/YR)	0.6800E-080.3132E-080.1500E-080.7433E-090.3801E-09
FAULT 32 E(NO/YR)	0.2313E-080.1013E-080.4627E-090.2196E-090.1078E-09
FAULT 33 E(NO/YR)	0.3834E-080.1597E-080.6970E-090.3169E-090.1495E-09
FAULT 34 E(NO/YR)	0.2540E-090.1031E-090.4377E-100.1918E-100.8551E-11
FAULT 35 E(NO/YR)	0.1795E-090.7050E-100.2873E-100.1181E-100.4604E-11
FAULT 36 E(NO/YR)	0.5689E-070.2869E-070.1495E-070.8019E-080.4417E-08
FAULT 37 E(NO/YR)	0.3085E-080.1482E-080.7381E-090.3797E-090.2011E-09
FAULT 38 E(NO/YR)	0.1071E-070.4871E-080.2305E-080.1130E-080.5724E-09
FAULT 39 E(NO/YR)	0.1725E-080.7450E-090.3362E-090.1577E-090.7648E-10
FAULT 40 E(NO/YR)	0.2943E-080.1247E-080.5529E-090.2548E-090.1214E-09
FAULT 41 E(NO/YR)	0.3128E-080.1348E-080.6072E-090.2843E-090.1378E-09
FAULT 42 E(NO/YR)	0.6676E-100.2568E-100.1011E-100.3877E-110.1278E-11
FAULT 43 E(NO/YR)	0.2401E-100.9967E-110.4334E-110.1960E-110.9134E-12
FAULT 44 E(NO/YR)	0.2022E-110.0000E+000.0000E+000.0000E+000.0000E+00
FAULT 45 E(NO/YR)	0.1543E-090.6590E-100.2943E-100.1367E-100.6572E-11
FAULT 46 E(NO/YR)	0.3197E-090.1285E-090.5407E-100.2339E-100.1017E-10
FAULT 47 E(NO/YR)	0.3538E-090.1547E-090.7061E-100.3348E-100.1642E-10
FAULT 48 E(NO/YR)	0.3537E-100.1392E-100.5700E-110.2361E-110.9195E-12
FAULT 49 E(NO/YR)	0.1432E-090.5593E-100.2264E-100.9104E-110.3450E-11
FAULT 50 E(NO/YR)	0.1028E-100.3666E-110.1229E-110.3386E-120.5427E-13
FAULT 51 E(NO/YR)	0.1104E-090.4235E-100.1661E-100.6250E-110.2093E-11
FAULT 52 E(NO/YR)	0.0000E+000.0000E+000.0000E+000.0000E+000.0000E+00
TOTAL E(NO/YR)	0.5721E-030.3839E-030.2610E-030.1795E-030.1249E-03
TOTAL RISK	0.5719E-030.3839E-030.2610E-030.1795E-030.1249E-03

SPECIFIED RISKS:	0.013900	0.010000	0.005000	0.002105	0.001000
ESTIMATED LN AMP. :	-0.875	-0.742	-0.491	-0.229	-0.036
ESTIMATED AMP. (g):	0.41697	0.47625	0.61179	0.79547	0.96456

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AMPLITUDES (g):
0.1000E+000.2000E+000.3000E+000.4000E+000.5000E+000.6000E+000.7000E+000.8000E+000.9000E+000.1
000E+01
LN (AMPLITUDE): -2.30 -1.61 -1.20 -0.92 -0.69 -0.51 -0.36
-0.22 -0.11 0.00
FAULT 1 E(NO/YR) 0.1584E-020.1119E-020.8286E-030.6016E-030.4259E-030.2966E-
030.2050E-030.1414E-030.9777E-040.6789E-04
FAULT 2 E(NO/YR) 0.3292E-010.2063E-010.1250E-010.7504E-020.4509E-020.2731E-
020.1674E-020.1040E-020.6549E-030.4186E-03
FAULT 3 E(NO/YR) 0.1559E-010.9223E-020.5843E-020.3772E-020.2447E-020.1594E-
020.1045E-020.6900E-030.4599E-030.3095E-03
FAULT 4 E(NO/YR) 0.1394E-020.7371E-030.4582E-030.3044E-030.2074E-030.1429E-
030.9910E-040.6912E-040.4851E-040.3427E-04
FAULT 5 E(NO/YR) 0.1828E-010.6657E-020.2424E-020.9288E-030.3773E-030.1621E-
030.7325E-040.3465E-040.1707E-040.8717E-05
FAULT 6 E(NO/YR) 0.1008E-020.3269E-030.1195E-030.4734E-040.2000E-040.8930E-
050.4187E-050.2050E-050.1043E-050.5485E-06
FAULT 7 E(NO/YR) 0.1352E-010.3939E-020.1197E-020.3919E-030.1389E-030.5295E-
040.2154E-040.9274E-050.4197E-050.1984E-05
FAULT 8 E(NO/YR) 0.4317E-020.1035E-020.2751E-030.8208E-040.2716E-040.9823E-
050.3828E-050.1591E-050.6984E-060.3217E-06
FAULT 9 E(NO/YR) 0.1116E-010.2030E-020.4317E-030.1087E-030.3142E-040.1017E-
040.3609E-050.1383E-050.5655E-060.2445E-06
FAULT 10 E(NO/YR) 0.1077E-020.2641E-030.7921E-040.2690E-040.1005E-040.4057E-
050.1747E-050.7946E-060.3790E-060.1883E-06
FAULT 11 E(NO/YR) 0.5636E-020.1901E-020.6302E-030.2215E-030.8335E-040.3349E-
040.1427E-040.6402E-050.3007E-050.1471E-05
FAULT 12 E(NO/YR) 0.4846E-020.1460E-020.5312E-030.2081E-030.8645E-040.3789E-
040.1743E-040.8373E-050.4182E-050.2163E-05
FAULT 13 E(NO/YR) 0.3346E-020.9370E-030.3002E-030.1048E-030.3943E-040.1586E-
040.6772E-050.3045E-050.1433E-050.7024E-06
FAULT 14 E(NO/YR) 0.8672E-020.3084E-020.1433E-020.6961E-030.3467E-030.1774E-
030.9330E-040.5045E-040.2800E-040.1593E-04
FAULT 15 E(NO/YR)
0.0000E+000.0000E+000.0000E+000.0000E+000.0000E+000.0000E+000.0000E+000.0000E+000.0000E+000.0
000E+00
FAULT 16 E(NO/YR) 0.4229E-040.1335E-040.4276E-050.1455E-050.5317E-060.2080E-
060.8653E-070.3799E-070.1749E-070.8398E-08
FAULT 17 E(NO/YR) 0.4189E-030.1301E-030.5464E-040.2482E-040.1177E-040.5789E-
050.2949E-050.1551E-050.8404E-060.4680E-06
FAULT 18 E(NO/YR) 0.1852E-030.6201E-040.2656E-040.1198E-040.5597E-050.2709E-
050.1357E-050.7026E-060.3751E-060.2060E-06
FAULT 19 E(NO/YR) 0.1110E-020.3179E-030.9501E-040.3095E-040.1098E-040.4208E-
050.1723E-050.7475E-060.3410E-060.1626E-06
FAULT 20 E(NO/YR) 0.2924E-020.3962E-030.6468E-040.1306E-040.3132E-050.8625E-
060.2656E-060.8967E-070.3271E-070.1274E-07
FAULT 21 E(NO/YR) 0.1277E-020.1792E-030.3173E-040.6930E-050.1786E-050.5242E-
060.1710E-060.6082E-070.2327E-070.9472E-08
FAULT 22 E(NO/YR) 0.7768E-020.9783E-030.1559E-030.3127E-040.7502E-050.2073E-
050.6413E-060.2177E-060.7985E-070.3128E-07
FAULT 23 E(NO/YR) 0.4046E-020.6356E-030.1248E-030.2971E-040.8225E-050.2567E-
050.8835E-060.3295E-060.1316E-060.5566E-07
FAULT 24 E(NO/YR) 0.1740E-020.1495E-030.1975E-040.3513E-050.7733E-060.1999E-
060.5858E-070.1901E-070.6706E-080.2539E-08
FAULT 25 E(NO/YR) 0.3176E-010.3099E-020.4303E-030.7857E-040.1756E-040.4583E-
050.1352E-050.4403E-060.1558E-060.5908E-07
FAULT 26 E(NO/YR) 0.1567E-010.1287E-020.1608E-030.2726E-040.5761E-050.1438E-
050.4088E-060.1291E-060.4446E-070.1647E-07
FAULT 27 E(NO/YR) 0.1224E-020.2051E-030.4007E-040.9313E-050.2505E-050.7586E-
060.2534E-060.9187E-070.3569E-070.1471E-07
FAULT 28 E(NO/YR) 0.2114E-020.4698E-030.1293E-030.4008E-040.1370E-040.5084E-
050.2026E-050.8575E-060.3826E-060.1787E-06
FAULT 29 E(NO/YR) 0.4440E-020.1007E-020.2369E-030.6292E-040.1877E-040.6187E-
050.2220E-050.8560E-060.3511E-060.1519E-06
FAULT 30 E(NO/YR) 0.3314E-020.6950E-030.1751E-030.5014E-040.1602E-040.5609E-
050.2124E-050.8595E-060.3683E-060.1659E-06
FAULT 31 E(NO/YR) 0.1014E-020.1717E-030.3506E-040.8475E-050.2355E-050.7335E-
060.2510E-060.9293E-070.3679E-070.1543E-07
FAULT 32 E(NO/YR) 0.1051E-020.1447E-030.2449E-040.5097E-050.1254E-050.3529E-
060.1107E-060.3798E-070.1405E-070.5545E-08

FAULT 33 E(NO/YR)	0.4229E-020.5242E-030.7724E-040.1424E-040.3158E-050.8116E-060.2351E-060.7511E-070.2606E-070.9698E-08
FAULT 34 E(NO/YR)	0.8540E-030.6854E-040.8206E-050.1332E-050.2702E-060.6497E-070.1786E-070.5467E-080.1830E-080.6603E-09
FAULT 35 E(NO/YR)	0.1115E-020.8028E-040.8724E-050.1307E-050.2482E-060.5636E-070.1473E-070.4315E-080.1388E-080.4827E-09
FAULT 36 E(NO/YR)	0.2021E-020.3765E-030.9489E-040.2805E-040.9324E-050.3404E-050.1342E-050.5647E-060.2510E-060.1170E-06
FAULT 37 E(NO/YR)	0.2862E-030.4551E-040.9848E-050.2563E-050.7660E-060.2552E-060.9293E-070.3643E-070.1520E-070.6690E-08
FAULT 38 E(NO/YR)	0.2239E-020.3577E-030.6857E-040.1578E-040.4218E-050.1273E-050.4247E-060.1539E-060.5979E-070.2466E-07
FAULT 39 E(NO/YR)	0.1376E-020.1530E-030.2344E-040.4579E-050.1077E-050.2925E-060.8917E-070.2988E-070.1083E-070.4201E-08
FAULT 40 E(NO/YR)	0.3613E-020.3663E-030.5221E-040.9647E-050.2169E-050.5673E-060.1675E-060.5456E-070.1929E-070.7314E-08
FAULT 41 E(NO/YR)	0.2090E-020.2635E-030.4174E-040.8267E-050.1956E-050.5326E-060.1625E-060.5441E-070.1971E-070.7630E-08
FAULT 42 E(NO/YR)	0.6122E-030.3951E-040.4034E-050.5778E-060.1058E-060.2331E-070.5938E-080.1699E-080.5353E-090.1828E-09
FAULT 43 E(NO/YR)	0.4465E-040.4168E-050.5566E-060.9760E-070.2100E-070.5292E-080.1512E-080.4783E-090.1648E-090.6099E-10
FAULT 44 E(NO/YR)	0.7769E-030.2500E-040.1613E-050.1645E-060.2300E-070.4053E-080.8523E-090.2058E-090.5440E-100.1370E-10
FAULT 45 E(NO/YR)	0.1414E-030.1575E-040.2373E-050.4548E-060.1050E-060.2802E-070.8408E-080.2776E-080.9930E-090.3802E-09
FAULT 46 E(NO/YR)	0.1236E-020.9834E-040.1159E-040.1848E-050.3687E-060.8725E-070.2362E-070.7133E-080.2357E-080.8404E-09
FAULT 47 E(NO/YR)	0.2000E-030.2421E-040.3953E-050.8081E-060.1967E-060.5491E-070.1713E-070.5853E-080.2159E-080.8498E-09
FAULT 48 E(NO/YR)	0.2243E-030.1546E-040.1681E-050.2530E-060.4821E-070.1099E-070.2880E-080.8455E-090.2725E-090.9498E-10
FAULT 49 E(NO/YR)	0.1014E-020.6984E-040.7455E-050.1103E-050.2071E-060.4660E-070.1208E-070.3510E-080.1121E-080.3873E-09
FAULT 50 E(NO/YR)	0.2229E-030.1117E-040.9899E-060.1283E-060.2176E-070.4503E-080.1088E-080.2972E-090.8988E-100.2951E-10
FAULT 51 E(NO/YR)	0.1100E-020.6806E-040.6872E-050.9777E-060.1781E-060.3909E-070.9922E-080.2831E-080.8896E-090.3030E-09
FAULT 52 E(NO/YR)	0.1186E-020.1591E-040.5984E-060.4128E-070.4248E-080.5717E-090.6598E-100.0000E+000.0000E+000.0000E+00
TOTAL E(NO/YR)	0.2280E+000.6591E-010.2929E-010.1553E-010.8904E-020.5329E-020.3282E-020.2066E-020.1325E-020.8642E-03
TOTAL RISK	0.2039E+000.6379E-010.2886E-010.1541E-010.8864E-020.5315E-020.3277E-020.2064E-020.1324E-020.8638E-03

AMPLITUDES (g):	0.1100E+010.1200E+010.1300E+010.1400E+010.1500E+01
LN (AMPLITUDE):	0.10 0.18 0.26 0.34 0.41
FAULT 1 E(NO/YR)	0.4743E-040.3336E-040.2363E-040.1686E-040.1212E-04
FAULT 2 E(NO/YR)	0.2713E-030.1782E-030.1186E-030.7985E-040.5440E-04
FAULT 3 E(NO/YR)	0.2103E-030.1444E-030.1001E-030.7005E-040.4947E-04
FAULT 4 E(NO/YR)	0.2438E-040.1747E-040.1260E-040.9161E-050.6705E-05
FAULT 5 E(NO/YR)	0.4599E-050.2499E-050.1394E-050.7962E-060.4649E-06
FAULT 6 E(NO/YR)	0.2976E-060.1659E-060.9481E-070.5542E-070.3307E-07
FAULT 7 E(NO/YR)	0.9753E-060.4963E-060.2605E-060.1406E-060.7784E-07
FAULT 8 E(NO/YR)	0.1545E-060.7703E-070.3969E-070.2107E-070.1149E-07
FAULT 9 E(NO/YR)	0.1109E-060.5250E-070.2580E-070.1311E-070.6863E-08
FAULT 10 E(NO/YR)	0.9704E-070.5164E-070.2828E-070.1590E-070.9148E-08
FAULT 11 E(NO/YR)	0.7460E-060.3907E-060.2107E-060.1166E-060.6613E-07
FAULT 12 E(NO/YR)	0.1154E-050.6337E-060.3569E-060.2058E-060.1212E-06
FAULT 13 E(NO/YR)	0.3568E-060.1872E-060.1011E-060.5604E-070.3182E-07
FAULT 14 E(NO/YR)	0.9273E-050.5513E-050.3342E-050.2063E-050.1295E-05
FAULT 15 E(NO/YR)	0.0000E+000.0000E+000.0000E+000.0000E+000.0000E+00
FAULT 16 E(NO/YR)	0.4186E-080.2158E-080.1146E-080.6255E-090.3499E-09
FAULT 17 E(NO/YR)	0.2672E-060.1561E-060.9310E-070.5662E-070.3505E-07
FAULT 18 E(NO/YR)	0.1161E-060.6698E-070.3949E-070.2376E-070.1456E-07
FAULT 19 E(NO/YR)	0.8057E-070.4133E-070.2187E-070.1190E-070.6641E-08
FAULT 20 E(NO/YR)	0.5255E-080.2277E-080.1030E-080.4844E-090.2358E-09
FAULT 21 E(NO/YR)	0.4068E-080.1831E-080.8584E-090.4174E-090.2097E-09
FAULT 22 E(NO/YR)	0.1297E-070.5651E-080.2570E-080.1213E-080.5925E-09
FAULT 23 E(NO/YR)	0.2476E-070.1151E-070.5561E-080.2782E-080.1435E-08

FAULT 24	E(NO/YR)	0.1021E-080.4322E-090.1914E-090.8784E-100.4173E-10
FAULT 25	E(NO/YR)	0.2378E-070.1008E-070.4466E-080.2052E-080.9781E-09
FAULT 26	E(NO/YR)	0.6490E-080.2695E-080.1170E-080.5271E-090.2440E-09
FAULT 27	E(NO/YR)	0.6384E-080.2898E-080.1369E-080.6704E-090.3388E-09
FAULT 28	E(NO/YR)	0.8693E-070.4383E-070.2282E-070.1223E-070.6724E-08
FAULT 29	E(NO/YR)	0.6889E-070.3255E-070.1596E-070.8083E-080.4217E-08
FAULT 30	E(NO/YR)	0.7802E-070.3814E-070.1930E-070.1007E-070.5402E-08
FAULT 31	E(NO/YR)	0.6800E-080.3132E-080.1500E-080.7433E-090.3801E-09
FAULT 32	E(NO/YR)	0.2313E-080.1013E-080.4627E-090.2196E-090.1078E-09
FAULT 33	E(NO/YR)	0.3834E-080.1597E-080.6970E-090.3169E-090.1495E-09
FAULT 34	E(NO/YR)	0.2540E-090.1031E-090.4377E-100.1918E-100.8551E-11
FAULT 35	E(NO/YR)	0.1795E-090.7050E-100.2873E-100.1181E-100.4604E-11
FAULT 36	E(NO/YR)	0.5689E-070.2869E-070.1495E-070.8019E-080.4417E-08
FAULT 37	E(NO/YR)	0.3085E-080.1482E-080.7381E-090.3797E-090.2011E-09
FAULT 38	E(NO/YR)	0.1071E-070.4871E-080.2305E-080.1130E-080.5724E-09
FAULT 39	E(NO/YR)	0.1725E-080.7450E-090.3362E-090.1577E-090.7648E-10
FAULT 40	E(NO/YR)	0.2943E-080.1247E-080.5529E-090.2548E-090.1214E-09
FAULT 41	E(NO/YR)	0.3128E-080.1348E-080.6072E-090.2843E-090.1378E-09
FAULT 42	E(NO/YR)	0.6676E-100.2568E-100.1011E-100.3877E-110.1278E-11
FAULT 43	E(NO/YR)	0.2401E-100.9967E-110.4334E-110.1960E-110.9134E-12
FAULT 44	E(NO/YR)	0.2022E-110.0000E+000.0000E+000.0000E+000.0000E+00
FAULT 45	E(NO/YR)	0.1543E-090.6590E-100.2943E-100.1367E-100.6572E-11
FAULT 46	E(NO/YR)	0.3197E-090.1285E-090.5407E-100.2339E-100.1017E-10
FAULT 47	E(NO/YR)	0.3538E-090.1547E-090.7061E-100.3348E-100.1642E-10
FAULT 48	E(NO/YR)	0.3537E-100.1392E-100.5700E-110.2361E-110.9195E-12
FAULT 49	E(NO/YR)	0.1432E-090.5593E-100.2264E-100.9104E-110.3450E-11
FAULT 50	E(NO/YR)	0.1028E-100.3666E-110.1229E-110.3386E-120.5427E-13
FAULT 51	E(NO/YR)	0.1104E-090.4235E-100.1661E-100.6250E-110.2093E-11
FAULT 52	E(NO/YR)	0.0000E+000.0000E+000.0000E+000.0000E+000.0000E+00
TOTAL	E(NO/YR)	0.5721E-030.3839E-030.2610E-030.1795E-030.1249E-03
TOTAL RISK		0.5719E-030.3839E-030.2610E-030.1795E-030.1249E-03

SPECIFIED RISKS:	0.013900	0.010000	0.005000	0.002105	0.001000
ESTIMATED LN AMP. :	-0.875	-0.742	-0.491	-0.229	-0.036
ESTIMATED AMP. (g):	0.41697	0.47625	0.61179	0.79547	0.96456

 CLOSEST DISTANCES BETWEEN SITE AND FAULT RUPTURES

NO.	FAULT NAME	CD_1DRP	CD_2DRP	CDIST	CLODIS	CD_EPI	CD_HYPO
1	HAYWARD (FLOATING)	3.9	3.9	3.9	3.9	3.9	7.2
km							
2	HAYWARD (HS)	3.9	3.9	3.9	3.9	3.9	4.0
km							
3	HAYWARD (HS+HN)	3.9	3.9	3.9	3.9	3.9	4.5
km							
4	HAYWARD (HS+HN+RC)	3.9	3.9	3.9	3.9	3.9	4.0
km							
5	CALAVERAS (CN)	16.2	16.2	16.2	16.2	16.2	16.3
km							
6	CALAVERAS (CS+CC+CN)	16.2	16.2	16.2	16.2	16.2	16.4
km							
7	CALAVERAS (FLOATING)	16.2	16.2	16.2	16.2	16.2	16.6
km							
8	CALAVERAS (CC+CN)	16.2	16.2	16.2	16.2	16.2	16.3
km							
9	HAYWARD (HN)	22.6	22.6	22.6	22.6	23.7	23.7
km							
10	HAYWARD (HN+RC)	22.6	22.6	22.6	22.6	23.7	23.7
km							
11	MOUNT DIABLO (MTD)	23.6	23.6	24.9	24.9	24.4	25.9
km							
12	SAN ANDREAS (SAS+SAP)	25.7	25.7	25.7	25.7	25.7	25.7
km							

13	SAN ANDREAS (SAP)	25.7	25.7	25.7	25.7	25.7	25.7
km							
14	SAN ANDREAS (SAS+SAP+SAN+SAO)	25.7	25.7	25.7	25.7	25.7	26.5
km							
15	SAN ANDREAS (SAP+SAN)	25.7	25.7	25.7	25.7	25.7	26.3
km							
16	SAN ANDREAS (FLOATING)	25.7	25.7	25.7	25.7	25.7	26.5
km							
17	SAN ANDREAS (SAP+SAN+SAO)	25.7	25.7	25.7	25.7	25.7	26.3
km							
18	SAN ANDREAS (SAS+SAP+SAN)	25.7	25.7	25.7	25.7	25.7	26.5
km							
19	MONTE VISTA - SHANNON	26.1	26.1	26.1	26.1	26.9	26.9
km							
20	CONCORD/GV (CON)	30.4	30.4	30.4	30.4	31.2	31.2
km							
21	CONCORD/GV (CON+GVS)	30.4	30.4	30.4	30.4	31.2	31.2
km							
22	CONCORD/GV (FLOATING)	30.4	30.4	30.4	30.4	32.9	33.1
km							
23	CONCORD/GV (CON+GVS+GVN)	30.4	30.4	30.4	30.4	31.2	31.2
km							
24	CALAVERAS (CS+CC)	34.2	34.2	34.2	34.2	35.2	35.3
km							
25	CALAVERAS (CS+CC FLOATING)	34.2	34.2	34.2	34.2	37.6	37.7
km							
26	CALAVERAS (CC)	34.2	34.2	34.2	34.2	35.2	35.3
km							
27	GREENVILLE (GN)	34.4	34.4	34.4	34.4	34.4	34.4
km							
28	SAN GREGORIO (SGS+SGN)	37.4	37.4	37.4	37.4	37.4	37.5
km							
29	SAN GREGORIO (FLOATING)	37.4	37.4	37.4	37.4	37.4	38.0
km							
30	SAN GREGORIO (SGN)	37.4	37.4	37.4	37.4	37.4	37.5
km							
31	GREENVILLE (GS+GN)	39.0	39.0	39.0	39.0	39.3	39.3
km							
32	GREENVILLE (GS)	39.0	39.0	39.0	39.0	39.3	39.3
km							
33	GREENVILLE (FLOATING)	39.0	39.0	39.0	39.0	40.0	40.2
km							
34	CONCORD/GV (GVS+GVN)	44.1	44.1	44.1	44.1	45.2	45.2
km							
35	CONCORD/GV (GVS)	44.1	44.1	44.1	44.1	45.2	45.2
km							
36	SAN ANDREAS (SAN+SAO)	44.3	44.3	44.3	44.3	45.2	45.2
km							
37	SAN ANDREAS (SAN)	44.3	44.3	44.3	44.3	45.2	45.2
km							
38	GREAT VALLEY 7	52.1	44.5	45.5	45.5	46.0	46.9
km							
39	SAN ANDREAS (SAS)	52.6	52.6	52.6	52.6	53.5	53.5
km							
40	HAYWARD (RC)	57.4	57.4	57.4	57.4	58.4	58.5
km							
41	GREAT VALLEY 5	58.0	49.7	50.6	50.6	51.2	52.0
km							
42	WEST NAPA	59.3	59.3	59.3	59.3	60.4	60.4
km							
43	ZAYANTE-VERGELES	62.7	62.7	62.7	62.7	63.5	63.5
km							
44	CONCORD/GV (GVN)	68.6	68.6	68.6	68.6	69.7	69.7
km							
45	POINT REYES	72.4	72.4	72.4	72.4	73.6	73.6
km							
46	GREAT VALLEY 4	75.0	70.1	70.7	70.7	71.5	72.1
km							
47	MONTEREY BAY - TULARCITOS	80.2	80.2	80.2	80.2	81.0	81.0
km							

48	ORTIGALITA	83.5	83.5	83.5	83.5	84.4	84.5
km							
49	GREAT VALLEY 8	86.5	79.0	79.5	79.5	80.5	81.0
km							
50	SAN GREGORIO (SGS)	87.9	87.9	87.9	87.9	89.0	89.0
km							
51	HUNTING CREEK - BERRYESSA	90.5	90.5	90.5	90.5	91.5	91.5
km							
52	CALAVERAS (CS)	91.7	91.7	91.7	91.7	92.7	92.7
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.