August 23, 2011

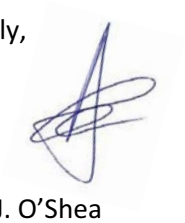
Craig Hoffman
Compliance Project Manager
California Energy Commission
1516 Ninth Street, MS-2000
Sacramento, CA 95814

Subject: Calico Solar 08-AFC-13C
Calico Solar Project Geotechnical Engineering Report

Dear Mr. Hoffman:

Calico Solar, LLC hereby submits the Calico Solar Project Geotechnical Engineering Report dated August 23, 2011. I certify under penalty of perjury that the foregoing is true, correct and complete to the best of my knowledge.

Sincerely,



Daniel J. O'Shea
On behalf of Calico Solar, LLC

Geotechnical Engineering Report

K Road Calico Solar Project

29501 Hector Road

Ludlow, California

August 23, 2011

Terracon Project No. 60095029A

Prepared for:

Calico Solar, LLC
Berkeley, California

Prepared by:

Terracon Consultants, Inc.
Irvine, California

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August 23, 2011

Terracon

Calico Solar, LLC
2600 Tenth Street, Suite 635
Berkeley, California 94710

Attn: Mr. Keith Heffelfinger
P: 480.353.0982
email: keithh@kroadpower.com

Re: Geotechnical Engineering Report
K Road Calico Solar Project
29501 Hector Road
Ludlow, California
Terracon Project No. 60095029A

Dear Mr. Heffelfinger:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. These services were performed in general accordance with our proposal numbers D6009028 and P60110086, dated June 3, 2009 and May 25, 2011 respectively. This geotechnical engineering report presents the results of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of solar field foundations, building foundations, floor slabs, and pavements for the proposed project.

A preliminary report (60095029) was submitted to Tessera Solar dated January 4, 2010. This report includes field exploration and laboratory testing supplementing information used from this study to prepare this report.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,

Terracon Consultants, Inc.

REGISTERED PROFESSIONAL ENGINEER
FOUAD ABUHAMDAN
C 77455
CIVIL
STATE OF CALIFORNIA

(for)

Fouad (Fred) Abuhamdan, P.E.
Senior Project Manager

Scott D. Neely, P.E.
Principal

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Copies to: Addressee (1 via email, 3 via mail)

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GEOTECHNICAL ENGINEERING REPORT
K ROAD CALICO SOLAR PROJECT PROJECT
29501 HECTOR ROAD
LUDLOW, CALIFORNIA

Terracon Project No. 60095029A
August 23, 2011

EXECUTIVE SUMMARY

This geotechnical executive summary should be used in conjunction with the entire report for design and/or construction purposes. It should be recognized that specific details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled General Comments should be read for an understanding of the report limitations.

A geotechnical exploration has been performed for the K Road Calico Solar Project Project located approximately 35 miles east of Barstow on the 29501 Hector Road in the Ludlow area of San Bernardino County, California. Terracon's geotechnical scope of work included the advancement of 41 test borings and 14 test pits to approximate depths of 4 to 51½ feet below existing site grades. It should be noted that the numbering of the test borings and test pits is not necessarily sequential and was based off the BLM permit and included two long trenches across mapped earthquake fault (Alquist Priolo) zones. The fault trenches were not part of this scope of investigation and as such Trench 2 and Trench 22 were not excavated. Two of the test pits were advanced in locations determined by a URS geo-archeologist (TP-050 and TP-051). Proposed boring B-021 was also not advanced as a result of its proposed location between a utility easement and private property without right of entry. Terracon was unable to access proposed borings B-043 and B-57A with a 4x4 rig and, therefore, did not advance a boring at the B-043 location and advanced a hand auger boring at the location of B-57A. B-030 was depicted in the same location as B-031 on the permit and therefore only B-031 was drilled.

Based on the information obtained from our subsurface exploration, the site is suitable for development of the proposed project. The following geotechnical considerations were identified:

Site Soils: Subsurface soils at the project site were generalized into two major "zones". The site surface soils in Zone 1 consisted of silty sands, poorly graded sands with variable amounts of silt and gravel overlying sandstone bedrock to the maximum depth explored, 51½ feet bgs. Zone 2, a smaller area near Hector Road, consisted of silty sand with gravel and clayey sand overlying fat clays to the maximum depth explored, 26½ feet bgs. Groundwater was not encountered in any test boring at the time of drilling. On-site soils (excluding the fat clays) are suitable for use as engineered fill beneath foundations and floor slabs, pavements, and as backfill.

Foundations: Subject to successful pile testing, the project owner is planning to support the proposed SunCatcher™ structures on driven pipe piles. The proposed piles will consist of 3/8" thick hollow steel pipes which will be vibrated into the ground. If the use of driven piles proves not to be commercially feasible, the SunCatcher™ structures should be supported on drilled shaft foundations. The Photovoltaic Modular Arrays will be supported on driven piles. Service

complex building and electrical substation elements will be supported by shallow spread footings and mat foundations bearing on approved compacted soils, or drilled shafts.

Floor Slabs: The on-site surface and near surface soils over most of the site within Zone 1 are expected to exhibit low expansion potentials when compacted and subjected to light loading conditions such as those imposed by floor slabs. Construction of floor slabs directly on compacted fills composed of approved non-expansive on-site soils or approved imported soils are considered acceptable for the project. The fat clays within Zone 2 are not considered suitable for use as engineered fill beneath floor slabs.

Pavement Sections: Automobile parking areas – 3" AC over 4" ABC or 6" PCC over 10" of scarified, moisture conditioned, and compacted soils; truck drives and drive lanes – 4" AC over 4" ABC or 7" PCC over 10" of scarified, moisture conditioned, and compacted soils.

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation bearing soils, and other geotechnical conditions exposed during construction.

GEOTECHNICAL ENGINEERING REPORT
K ROAD CALICO SOLAR PROJECT
29501 HECTOR ROAD
LUDLOW, CALIFORNIA

Terracon Project No. 60095029A
August 23, 2011

1.0 INTRODUCTION

This report presents the results of our geotechnical engineering services performed for the proposed K Road Calico Solar Project to be located approximately 35 miles east of Barstow in the Ludlow area of San Bernardino County, California. The site vicinity map (Exhibit A-1) is included in Appendix A of this report. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- earthwork
- seismic considerations
- lateral earth pressure
- groundwater conditions
- foundation design and construction
- floor slab design and construction
- pavement design and construction

Our geotechnical engineering scope of work for this project included the following field exploration.

SUBSURFACE EXPLORATION		
Exploration Type	**Quantity**	**Depth**
Test Boring	41	4 to 51 feet
Test Pit	14	8 to 14 feet
Field Soil Resistivity Test	9	N/A
Seismic Shear Wave Test	3	N/A

Logs of the borings along with a Site Plan and Boring Location diagram (Exhibit A-2) are included in Appendix A of this report. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included in Appendix B of this report. Descriptions of the field exploration and laboratory testing are included in their respective appendices.

2.0 PROJECT INFORMATION

2.1 Project Description

ITEM	DESCRIPTION
Site layout	Refer to the Site Plan and Boring Location Diagram (Exhibit A-2 in Appendix A).
Structures	■ Photovolatic Modular Arrays: • Single trackers supported on 4.5" and 6" diameter galvanized steel posts that will be hydraulically vibrated to depths of 6 to 10 feet below ground surface. ■ Suncatcher structures: • Structures are planned to be supported on 24 inch diameter driven pipe piles or drilled shafts founded at a depth of 18.5 feet below ground surface. ■ Railroad overpass bridge: This structure is specifically excluded from this report ■ Service complex: • Maintenance and administration building (130'x 140') to be supported on shallow foundation system. • Modular temporary buildings • Pumps, tanks, and other minor site elements. ■ Facility electrical substation: • Large transformers (230 kV - 500 kV) to be supported on 30'x15' concrete pads. • Dead End Transmission line towers within the proposed substation. • Switch gears and other minor site elements. ■ Transmission Line Towers: These structures are specifically excluded from this report
Maximum loads	Suncatchers : Overturning Moment – 250 kip·ft (assumed) Dead Load – 6 to 8 tons (assumed) Single axis trackers: Vertical – 500 to 900 lbs. (assumed) Substation Transformers: 12 to 15 tons (assumed) Substation Dead End Towers: Axial: 20 kips (assumed) Shear: 40 to 50 kips (assumed) Moment: 2000 to 3000 ft-kips (assumed) Maintenance Building: Column Footings: 30 to 60 kips (assumed) Wall Footings: 2 to 4 kips per lineal foot (assumed)

ITEM	DESCRIPTION
Maximum allowable settlement	1-inch (assumed)
Traffic loading	Assumed Traffic Index = 5.0 for Light Automobile Parking Assumed Traffic Index = 7.0 for Heavy Parking and Drive Areas

2.2 Site Location and Description

ITEM	DESCRIPTION
Location	Approximately 35 miles east of Barstow on the 29501 Hector Road in the Ludlow area of San Bernardino County, California
Section, Township, Range	T8N R5E Sections 1,2,8-15; T8N R6E Sections 4-6,7-9,17,18, T9N R5E Sections 35,36; T9N R6E Sections 31-33 (San Bernardino Meridian)
Existing site features	Native desert bisected by an east-west trending railroad line (BNSF), a Southern California Edison (SCE) electrical substation is adjacent to the southeastern portion of the site, two SCE and Southern California Gas Company natural gas substations along the southern boundary of the site, and several natural gas utility lines trending east-west through the southern portion of the site.
Surrounding developments	North: Undeveloped native desert and hills. East: Undeveloped native desert with one apparent residence. West: Undeveloped native desert. South: Interstate 40 and National Trails Highway (Route 66), beyond which is undeveloped native desert.
Current ground cover	Light to moderate growth of grass, weeds, and cacti.
Existing topography	The site slopes gently approximately 1.4% to the southwest north of the existing railroad tracks, and even gentler, roughly 0.3%, to the northwest on the south side of the tracks. The site generally drains to the west.

3.0 SUBSURFACE CONDITIONS

3.1 Site Geology

The site is situated within the south central portion of the Mojave Desert Geomorphic Province in Southern California. Geologic structures within the Mojave Desert tend to consist of isolated mountain ranges separated by vast expanses of desert plains, with a predominate northwest-southeast faulting trend, with a secondary trend of east-west (parallel to the Transverse Ranges

Province). Principal bounding faults include the San Andreas Fault to the southwest and the Garlock Fault to the north.[1, 2]

Surficial geologic units mapped at the site[3] consist mainly of alluvium of Holocene to Pleistocene age. The southeastern portion of the site consists of basalt lava flow deposits from the Ludlow Crater. Rock outcrops in the northern portion of the site consist of Miocene volcanic rock.

Two Alquist-Priolo Earthquake Fault Zones intercept the site, one along the westerly edge of the property, and one in the east-central portion of the site. It should be noted that fault trenches to evaluate the location and activity levels of the faults were not within the scope of this investigation.

3.2 Typical Subsurface Profile

Specific conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the borings can be found on the boring logs included in Appendix A of this report. Based on the results of the borings, subsurface conditions on the project site were generalized into two major "zones" as follows:

Description	Approximate Depth to Bottom of Stratum	Material Encountered	Consistency/Density
Zone 1	4 to 51½ feet	Silty sand and poorly graded sand with variable amounts of silt and gravel.	Loose to medium dense in the upper 5 feet. Dense to very dense below 5 feet
	41½ feet – Maximum depth of exploration	Sedimentary Bedrock – Sandstone*	Moderately hard to hard
Zone 2	0 to 2 feet	Silty sand with gravel	Loose
	2 to 26½ feet	Fat clay	Stiff to Very Stiff

* Only encountered in borings B-50 through B-54

Fill materials were not encountered in our field exploration of subsurface soils. Laboratory tests were conducted on selected soil samples and the test results are presented in Appendix B. Sulfate contents in the soils were found to be low to moderate. Laboratory test results indicate that the subsoils at shallow depth exhibit a slight collapse potential when saturated.

---

1 Harden, D. R., "*California Geology, Second Edition*," Pearson Prentice Hall, 2004.

2 Norris, R. M. and Webb, R. W., *"Geology of California, Second Edition,"* John Wiley & Sons, Inc., 1990.

3 Shawn Biehler, R.W. Tang, D.A. Ponce, H.W. Oliver, 1988, *Bouger Gravity Map of the San Bernadino Quadrangle, California*, California Division of Mines and Geology.

Zone 1 includes over 90 percent of the project site and represents the typical conditions encountered within the project. Zone 2 is a comparatively small area near Hector Road in the southwest corner of the site. The approximate boundaries of Zone 1 and 2 are depicted on Exhibit 2. These boundaries of the zone are estimated and should be verified in the field during construction.

The silty sand and sand with silt soils in Zone 1 were non-plastic. The fat clay soils in Zone 2 had high plasticities with medium to high expansion potentials.

Laboratory tests were conducted on selected soil samples and the test results are presented in Appendix B.

3.3 Field Soil Resistivity Test Results

Field resistivity testing was performed using a Nilsson Model 400 soil resistance meter and in general accordance with ASTM G57-95a. Tests were conducted by driving five test rods up to 12 inches deep into the ground and recording measurements using a uniform distance of 2, 4, 8, 16 and 20 feet in the same line. The testing was performed at nine boring/test pit locations (B-003, B-014, B-025, B-029, B-033, B-043, TP-044, and B-048) around the site. Test results and the field reports are enclosed in Appendix C.

3.4 Thermal Resistivity Test Results

Soil thermal resistivity was determined for selected soils samples. We recommend that the thermal resistivity results be discussed with an electrical design team to determine the influence on cable type and backfill materials. The test results are presented in Appendix B.

3.5 Seismic Shear Wave Results

In order to determine the Site Class of the project site, as outlined in the 2009 International Building Code (IBC), three geophysical surveys were conducted on the project site. Each survey consisted of one 600-foot long seismic line with 24 equally spaced geophones along the line. One line was located in the northwest portion of the project site (near B-005), the second line was located in the south-central portion of the project site (near B-031), and the last line was located in the northeast corner of the project site (near TP-044).

In each survey, seven sets of background micro-tremor data were collected. The data sets were processed using computer program SeisOpt®-Remi™ to determine the shear wave velocity profile of the upper 100 feet of the soil. Based on this profile, the average shear wave velocity of the upper 100-foot soil was calculated and ranged from 1,313 ft/s to 2,018 ft/s. In accordance with Section 1613.5.2, Site Class Definitions of the 2009 IBC, these values classify the project site as Site Class C.
The p-f image with dispersion modeling picks, modeled dispersion curves, and shear wave velocity profiles of the upper 100 feet of soil are shown on Exhibits A-61 through A-66.

3.6 Groundwater

Groundwater was not observed in any test boring or test pit at the time of field exploration. These observations represent groundwater conditions at the time of the field exploration and may not be indicative of other times, or at other locations. Groundwater conditions can change with varying seasonal and weather conditions, and other factors.

Based upon review of State of California's Groundwater Bulletin 118 for the South Lahontan Hydrologic Region, Lower Mojave River Valley Groundwater Basin, regional groundwater predominates in water bearing Pliocene and younger alluvial fan deposits and an overlying Pleistocene and younger river channel and floodplain deposits. According to the bulletin, regional groundwater was encountered at estimated depths ranging from approximately 50 to 80 feet below the existing ground surface.

Zones of perched and/or trapped groundwater may also occur at times in the subsurface soils overlying bedrock, on top of the bedrock surface or within permeable fractures in the bedrock materials. The location and amount of perched water is dependent upon several factors, including hydrologic conditions, type of site development, irrigation demands on or adjacent to the site, fluctuations in water features, seasonal and weather conditions.

3.7 Faulting and Estimated Ground Motions

The subject site is located in Southern California, which is a seismically active area. The type and magnitude of seismic hazards affecting the site are dependent on the distance to causative faults, the intensity, and the magnitude of the seismic event. The table below indicates the distance of the fault zones and the associated maximum credible earthquake that can be produced by nearby seismic events, as calculated using the USGS Earthquake Hazard Program 2002 interactive deaggregations. The cordinates of Boring B-055 which is located within the proposed service complex were used in the analysis. The Ludlow-Bullion Mtn-Mesqite Lk Fault, which is located approximately 4.4 kilometers from the site, is considered to have the most significant effect at the site from a design standpoint.

Characteristics and Estimated Earthquakes for Regional Faults		
Fault Name	**Approximate Distance to Site (kilometers)**	**Maximum Credible Earthquake (MCE) Magnitude**
Ludlow-Bullion Mtn-Mesqite Lk	4.4	7.2
Calico-Hidalgo GR M-distrib	16.9	6.9

Based on these sources the peak ground acceleration at the subject site for a 10% Probability of Exceedance in 50 years (Return period of 475 years) is expected to be about 0.26g.

Based on our review of the State Fault Hazard Maps[4], two Alquist-Priolo Earthquake Fault zones pass through the site. Fault studies and analysis were not performed and are beyond the scope of this report.

The proposed site plan shows that no structures with human occupancy will be located within these zones. Therefore, a seismic fault trench study may not be required.

3.8 Liquefaction Potential

Liquefaction is a mode of ground failure that results from the generation of high pore water pressures during earthquake ground shaking, causing loss of shear strength. Liquefaction is typically a hazard where loose sandy soils exist below groundwater. The CGS has designated certain areas within southern California as potential liquefaction hazard zones. These are areas considered at a risk of liquefaction-related ground failure during a seismic event, based upon mapped surficial deposits and the presence of a relatively shallow water table. The project site location was not mapped for potential liquefaction hazard by the CGS (CDMG, 1999). Based on the CGS information, and the historical depth of ground water, we conclude that the potential for liquefaction at the site is low. Other geologic hazards related to liquefaction, such as lateral spreading, are therefore also low.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings and test pits provided that the findings and recommendations presented herein are incorporated into project design and construction.
The vast majority of the site is underlain by silty sands and poorly graded sand with varying amounts of gravel (Zone 1). However, fat clay soils were encountered in an area in the southwest portion of the site (borings B-005 through B-008) near Hector Road (Zone 2 discussed herein). Foundation design parameters for the Photovoltaic solar arrays have been developed for each of these two major soil types. Foundation design parameters for the SunCatcher structures have been developed for soil types only within Zone 1. Buildings and SunCatcher structures are not planned in the areas underlain by fat clay soils (Zone 2) at this time. If the proposed layout of the solar development changes and lightly loaded buildings or SunCatchers are planned near Hector Road, we would be pleased to discuss other construction alternatives with you upon request.

Due to the slight potential for hydro-compaction in the near surface soils within the proposed service complex and electrical substation areas, spread footings bearing on 10 inches of

[3] California Department of Conservation Division of Mines and Geology (CDMG), *"Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones of California, Southern Region"*, CDMG Compact Disc 2000-003, 2000.
[2] The Riverside County Land Information System, http://www3.tlma.co.riverside.ca.us/pa/rclis/index.html

scarified, moisture conditioned, and compacted native soils are recommended for support of the proposed structures. Estimated movements described in this report are based on effective drainage for the life of each structure and cannot be relied upon if effective drainage is not maintained. Exposed ground, extending at least 10 feet from the perimeter, should be sloped a minimum of 5% away from each building to provide positive drainage away from each structure. Grades around each structure should be periodically inspected and adjusted as part of the structure's maintenance program.

It appears that the majority of the on-site soils except of the fat clays encountered in Zone 2 will be suitable for use as engineered fill beneath foundations, and pavements. Imported soils which may be required for the project must have potential expansion values in the "very low" range and they should satisfy the requirements contained in this report for low volume change soils.

Geotechnical engineering recommendations for foundation systems and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of field and laboratory testing (which are presented in Appendices A and B), engineering analyses, and our current understanding of the proposed project.

4.2 Earthwork

The following presents recommendations for site preparation, excavation, subgrade preparation, and placement of engineered fills on the project. The recommendations presented for design and construction of earth supported elements including foundations, slabs, and pavements are contingent upon following the recommendations outlined in this section. All grading for each building structure should incorporate the limits of the proposed structure plus a minimum of five feet beyond proposed perimeter building walls and any exterior columns.

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation bearing soils, and other geotechnical conditions exposed during the construction of the project.

Grading plans were not reviewed as part of the scope of work for this report. Terracon should be retained to evaluate the grading plans as they are developed, and to provide updated recommendations based on review of those plans.

4.2.1 Site Preparation

Strip and remove existing vegetation, debris, and other deleterious materials from proposed development areas. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction.

Stripped materials consisting of vegetation and organic materials should be wasted from the site, or used to revegetate landscaped areas or exposed slopes after completion of grading operations. If it is necessary to dispose of organic materials on-site, they should be placed in non-structural areas, and in fill sections not exceeding 5 feet in height.

If fill is placed in areas of the site where existing slopes are steeper than 5:1 (horizontal:vertical), the area should be benched to reduce the potential for slippage between existing slopes and fills. Benches should be wide enough to accommodate compaction and earth moving equipment, and to allow placement of horizontal lifts of fill.

4.2.2 Subgrade Preparation

Subsequent to the surface clearing and grubbing efforts, the exposed subgrade soils beneath foundations of proposed structures (not including SunCatcher™ units or Photovoltaic solar arrays), exterior and interior slabs, and pavement areas should be prepared to a minimum depth of 10 inches. Subgrade preparation should generally include some form of scarification (or removal), moisture conditioning, and compaction. The moisture content and compaction of subgrade soils should be maintained until slab or pavement construction.

Exposed areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of ten inches, conditioned to near optimum moisture content, and compacted.

4.2.3 Fill Materials and Placement

All fill materials should be inorganic soils free of vegetation, debris, and fragments larger than six inches in size. Pea gravel or other similar non-cementitious, poorly-graded materials should not be used as fill or backfill without the prior approval of the geotechnical engineer.

Clean on-site soils or approved imported materials may be used as fill material for the following:

- general site grading
- foundation areas
- interior floor slab areas
- exterior slab areas
- pavement areas
- foundation backfill

On site fat clay soils are not suitable for use as engineering fill on site.

Imported soils for use as fill material within proposed building and structure areas should conform to low volume change materials as indicated in the following specifications:

Gradation	Percent Finer by Weight (ASTM C 136)
6"	100
3"	70-100
No. 4 Sieve	50-100
No. 200 Sieve	30 (max)

- Liquid Limit ..... 30 (max)
- Plasticity Index ..... 15 (max)
- Maximum Expansion Index* ..... 20 (max)

*ASTM D 4829

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed ten inches loose thickness.

4.2.4 Compaction Requirements

Recommended compaction and moisture content criteria for engineered fill materials are as follows:

Material Type and Location	Per the Standard Proctor Test (ASTM D 1557)		
	Minimum Compaction Requirement (%)	Range of Moisture Contents for Compaction (% over optimum)	
		Minimum	Maximum
On-site granular or approved imported fill soils:			
Beneath foundations:	95	-3%	+3%
Beneath slabs:	90	-3%	+3%
Beneath asphalt pavements:	95	-3%	+3%
Beneath concrete pavements:	95	-3%	+3%
Aggregate base (beneath slabs)	90	-3%	+3%
Aggregate base (beneath pavements)	95	-3%	+3%
Miscellaneous backfill	90	-3%	+3%

4.2.5 Grading and Drainage

Positive drainage should be provided during construction and maintained throughout the life of the development. Infiltration of water into utility trenches or foundation excavations should be prevented during construction. Planters and other surface features which could retain water in areas adjacent to buildings or pavements should be sealed or eliminated. In areas where

sidewalks or paving do not immediately adjoin a structure, we recommend that protective slopes be provided with a minimum grade of approximately five percent for at least 10 feet from perimeter walls. Backfill against footings, exterior walls, and in utility and sprinkler line trenches should be well compacted and free of all construction debris to reduce the possibility of moisture infiltration.

Downspouts, roof drains or scuppers should discharge into splash blocks or extensions when the ground surface beneath such features is not protected by exterior slabs or paving. Sprinkler systems should not be installed within five feet of foundation walls. Landscaped irrigation adjacent to the foundation systems should be minimized or eliminated.

4.2.6 Corrosion Potential

Results of soluble sulfate testing indicate that ASTM Type II Portland cement is suitable for all concrete on and below grade. Foundation concrete should be designed for low to moderate sulfate exposure in accordance with the provisions of the ACI Design Manual, Section 318, Chapter 4.

Laboratory test results indicate that on-site soils have resistivities ranging from 360 to 8,000 ohm-centimeters, chloride content ranging from 42 to 65 ppm, and pH values ranging from 7.50 to 8.93. These test results are provided to assist in determining the type and degree of corrosion protection that may be required. We recommend that a certified corrosion engineer determine the need for corrosion protection and design appropriate protective measures.

Refer to Summary of Laboratory Results contained in Appendix B for the complete results of the various corrosivity testing conducted on the site soils in conjunction with this geotechnical exploration.

4.2.7 Construction Considerations

It is anticipated that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. Some additional effort may be necessary to excavate through very dense granular soils and to extract cobbles, particularly in deep narrow excavations such as utility trenches. Consideration should be given to obtaining a unit price for difficult excavation in the contract documents for the project.

Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively stable. However, the stability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unstable conditions develop, workability may be improved by scarifying and drying. During and after periods of heavy rain, overexcavation of wet zones and replacement with granular materials may be necessary.

The individual contractor(s) is responsible for designing and constructing stable, temporary excavations as required to maintain stability of both the excavation sides and bottom. Excavations should be sloped or shored in the interest of safety following local, and federal regulations, including current OSHA excavation and trench safety standards.

4.3 Foundations

Where applicable, structures can be supported by driven pile foundations, drilled shafts, mat foundations, or spread footings. It is our understanding that the SunCatcher™ units and Photovoltaic solar arrays are planned to be supported on pile foundations. If the use of driven pipe piles for the SunCatcher structures proves not to be commercially feasible, it is our recommendation that Suncatcher units be supported on drilled shafts. It is our opinion it may not be economically feasible to drive the 24 inch diameter steel pipe piles planned to support the SunCatcher units through the dense to very dense sand soils below a depth of 5 to 10 feet bgs.

Service complex building and electrical substation elements should be supported by shallow foundations. Shallow foundation recommendations pertain to structures to be located within Zone 1. If buildings are planned in the area of Zone 2 (where expansive soils are present), then Terracon should be consulted and modified recommendations should be prepared.

Recommendations for foundations for the bridge crossing the railroad tracks requires further field investigations and will be provided at a later phase. Design recommendations for foundations for the proposed structures and related structural elements are presented in the following paragraphs.

4.3.1 Photovoltaic Solar Arrays and SunCatcher™ Structures Driven Piles Design Recommendations

DESCRIPTION	VALUE
Foundation Type	Driven pipe piles
Structures	Photovoltaic solar arrays with single axis tracker units and SunCatcher Structures
Bearing Material	Undisturbed soils below surface clearing and grubbing efforts

The controlling factor to consider during design will be the amount of lateral support the foundation element can transfer to the surrounding soil. Driven pipe piles design parameters for the proposed structures have been developed for each of these two major soil types.
Recommended soil parameters for lateral load analysis of driven pile foundations have been developed for use in LPILE computer programs. Engineering properties have been estimated as outlined below:

Zone 1:

Lateral Load Analysis Estimated Engineering Properties of Soils					
Top Depth Bottom Depth	Unit Weight (pcf)	L-Pile Soil Type	Internal Friction ϕ	Allowable Skin Friction (psf)	Modulus of Subgrade Reaction K_s (pci)[1]
2 10	116	SAND	29º	300	90[2]
10 15	117	SAND	31º	500	225[2]
15 25	120	SAND	36º	750	225[2]

[1] Note: These values are based upon parameters for LPILE analyses.

[2.] Note: This value increases linearly with depth an amount equal to the modulus and is independent of shaft diameter.

Zone 2 (Photovoltaic Solar Arrays only):

Lateral Load Analysis Estimated Engineering Properties of Soils						
Top Depth Bottom Depth	Unit Weight (pcf)	L-Pile Soil Type	Cohesion (psf)	Allowable Skin Friction (psf)	Modulus of Subgrade Reaction K_s (pci)[1]	ε_{50}
2 15	120	Stiff Clay w/o free water	2000	500	400	0.005

[1] Note: These values are based upon parameters for LPILE analyses.

4.3.2 SunCatcher™ Structures Drilled Shafts Design Recommendations (Zone 1)

If the use of driven pipe piles for the SunCatcher™ structures proves not to be commercially feasible, a straight shaft, drilled into native soils with a minimum diameter of 24 inches is recommended for the support of the proposed SunCatcher structures within Zone 1. No SunCatcher units are planned in the areas underlain by clayey soils in Zone 2 at this time.

Based on our review of the boring log and the Standard Penetration Test (SPT) results, engineering properties have been estimated for the soil conditions as shown in the following table.

Top Depth Bottom Depth	Unit Weight (pcf)	USCS Soil Type	Internal Friction ϕ	Cohesion (psf)	Allowable End Bearing (psf)	Allowable Skin Friction (psf)	Coefficient of Subgrade Reaction Ks[1] (pci)
3 / 10	115	SP-SM	30	---	---	300	90
10 / 30	120	SP-SM/ Bedrock	33	---	12,000	750	225
30 / 40	120	SP-SM/ Bedrock	36	---	20,000	1,000	225

[1] Note: These values are based on parameters for LPILE or COM624P analyses.

4.3.3 Spread Footing Design Recommendations (Zone 1)

DESCRIPTION	VALUE
Foundation Type	Conventional Shallow Spread Footing
Structure	• Maintenance building (100'x 70') • Large transformers (230 kV - 500 kV) • Modular temporary buildings • Pumps, switch gears, tanks, and other minor site elements.
Bearing Material	10 inches of scarified, moisture conditioned, and compacted native soils
Allowable Bearing Pressure	2,500 psf
Minimum Width for Continuous and Column Footings	16 inches and 24 inches, respectively
Minimum Embedment Depth Below Finished Grade	18 inches
Total Allowable Settlement	1-inch (assumed)
Estimated Differential Settlement	½ to ¾ inch over 100 feet

The allowable foundation bearing pressures apply to dead loads plus design live load conditions. The design bearing pressure may be increased by one-third when considering total loads that include wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead load computations.

4.3.4 Mat Foundations Design Recommendations (Zone 1)

For large transformers, tanks, or any other facilities supported on structural mat foundations bearing on a minimum of 10 inches of scarified, moisture conditioned, and compacted native soils, a modulus of subgrade reaction (Kv_1) of 200 pounds per cubic inch (pci) should be used. Other details including treatment of loose foundation soils, superstructure reinforcement and

observation of foundation excavations as outlined in this report are applicable for the design and construction of a mat foundation at the site.

The subgrade modulus (Kv) for the mat is affected by the size of the mat foundation and would vary according the following equation:

$$Kv = Kv_1 \times (B+1)^2 / 4B^2$$

Where: Kv_1 is the modulus of vertical subgrade reaction
B is the width of the mat foundation.

Thus for a footing width of B = 15 ft bearing on the sandy soils, the subgrade modulus would be:

$$Kv = 200 \times (15+1)^2 / (4 \times 15^2) = 57 \text{ pci}$$

4.3.5 Shallow Foundations Construction Considerations

Foundations should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement.

Finished grade is defined as the lowest adjacent grade within five feet of the foundation for perimeter (or exterior) footings. The allowable foundation bearing pressures apply to dead loads plus design live load conditions. The design bearing pressure may be increased by one-third when considering total loads that include wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead load computations.

Footings, foundations, and masonry walls should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

Foundation excavations should be observed by the geotechnical engineer. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

4.3.6 Drilled Shaft Design Recommendations (Proposed Substation Area)

A straight shaft, drilled into native soils with a minimum diameter of 12 inches is recommended for the support of proposed towers or pole shaped structures within the proposed substation. Recommended soil parameters for lateral and axial compression load analysis of drilled shaft foundations have been developed for use in LPILE computer programs.

Based on our review of the boring log and the Standard Penetration Test (SPT) results, engineering properties have been estimated for the soil conditions as shown in the following table.

Top Depth Bottom Depth	Unit Weight (pcf)	USCS Soil Type	Internal Friction ϕ	Cohesion (psf)	Allowable End Bearing (psf)	Allowable Skin Friction (psf)	Coefficient of Subgrade Reaction Ks[1] (pci)
3 / 10	115	SP-SM	30	---	---	300	90
10 / 30	120	SP-SM/ Bedrock	33	---	12,000	750	225
30 / 40	120	SP-SM/ Bedrock	36	---	20,000	1,000	225

[1] Note: These values are based on parameters for LPILE or COM624P analyses.

The above parameters assume the groundwater level is below the maximum depth of the drilled shaft. The load capacities provided are based only on the stresses induced in the supporting soils; the structural capacity of the shafts should be checked to assure that they can safely accommodate the combined stresses induced by axial and lateral forces. The response of the drilled shaft foundations to lateral loads is dependent upon the soil/structure interaction as well as the shaft's actual diameter, length, stiffness, and "fixity" (fixed or free-head condition). When designing to resist uplift forces, the effective weight of the shaft and structure (divided by an appropriate factor of safety) and the allowable skin-friction values provided above should be used.

4.3.7 Drilled Shaft Construction Considerations

Drilling to design depths should be possible with conventional single flight power augers. Temporary steel casing may be required to properly drill and clean drilled shafts or foundation excavations for embedded poles prior to concrete placement. A water and polymer displacement method may also be considered as a means of maintaining shaft integrity during construction. Foundation concrete should be placed immediately after completion of drilling and cleaning. If foundation concrete cannot be placed in dry conditions, a tremie should be used for concrete placement. Due to potential sloughing and raveling, foundation concrete quantities may exceed calculated geometric volumes.

If casing is used for foundation construction, it should be withdrawn in a slow continuous manner maintaining a sufficient head of concrete to prevent caving or the creation of voids in pier concrete. Foundation concrete should have a relatively high fluidity when placed in cased pier holes or through a tremie. Foundation concrete with slump in the range of 6 to 8 inches is recommended.

The use of a bottom-dump hopper, or an elephant's trunk discharging near the bottom of the hole where concrete segregation will be minimized, is recommended.

Foundation bearing surfaces must be cleaned prior to concrete placement. A representative of the geotechnical engineer should inspect the bearing surface and foundation shaft configuration. If the subsurface soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

We recommend that all drilled shaft installations be observed on a full-time basis by an experienced geotechnical engineer in order to evaluate that the soils encountered are consistent with the recommended design parameters.

The contractor should check for gas and/or oxygen deficiency prior to any workers entering the excavation for observation and manual cleanup. All necessary monitoring and safety precautions as required by OSHA, State or local codes should be strictly enforced.

4.4 Seismic Considerations

DESCRIPTION	VALUE
2009 International Building Code Site Classification (IBC) [1]	C
Site Latitude	N 34.79618
Site Longitude	W -116.41931
S_s Spectral Acceleration for a Short Period	1.20
S_s Spectral Acceleration for a 1-Second Period	0.40
F_a Site Coefficient for a Short Period	1.0
F_v Site Coefficient for a 1-Second Period	1.4

[1] Note: In general accordance with the *2009 International Building Code,* Table 1613.5.2. IBC Site Class is based on seismic shear wave tests.

4.5 Floor Slab

4.5.1 Design Recommendations (Zone 1)

DESCRIPTION	VALUE
Interior floor system	Slab-on-grade concrete.
Floor slab support	The existing engineered fill generally has low expansive potential under light loading conditions such as those imposed by floor slabs. Floor slabs and sub-base may bear directly on 10 inches of scarified and re-compacted existing engineered fill.
Subbase	4-inches of Class II Aggregate Base materials

DESCRIPTION	VALUE
Modulus of subgrade reaction	200 pounds per square inch per inch (psi/in) (The modulus was obtained based on our experience with similar subgrade conditions, and estimates obtained from NAVFAC 7.1 design charts)

In areas of exposed concrete, control joints should be saw cut into the slab after concrete placement in accordance with ACI Design Manual, Section 302.1R-37 8.3.12 (tooled control joints are not recommended). Additionally, dowels should be placed at the location of proposed construction joints. To control the width of cracking (should it occur) continuous slab reinforcement should be considered in exposed concrete slabs.

The use of a vapor retarder or barrier should be considered beneath concrete slabs on grade that will be covered with wood, tile, carpet or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer and slab contractor should refer to ACI 302 and ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder/barrier.

The above recommendations pertain to lightly loaded floor slabs in Zone 1. If buildings are planned in the area of Zone 2 (where expansive soils are present) or heavier floor slabs are anticipated, then Terracon should be consulted and modified recommendations should be prepared.

4.6 Lateral Earth Pressures

For soils or fill materials above any free water surface, recommended equivalent fluid pressures for unrestrained foundation elements are:

ITEM	VALUE[1]
Active Case	40 psf/ft
Passive Case	350 psf/ft
At-Rest Case	60 psf/ft
Coefficient of Base Friction or Adhesion at Base of Footing	0.40[2] psf

[1]Note: The values are based on the on-site soils used as backfill.

[2]Note: The coefficient of base friction should be reduced to 0.30 when used in conjunction with passive pressure.

The lateral earth pressures herein do not include any factor of safety and are not applicable for submerged soils/hydrostatic loading. Additional recommendations may be necessary if such conditions are to be included in the design.

Fill against foundation and retaining walls should be compacted to densities specified in the Earthwork section of this report. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors.

4.7 Pavements

4.7.1 Asphalt and Concrete Pavement Design Recommendations

A design R-Value of 55 was used to calculate the asphaltic concrete pavement thickness sections and a modulus of subgrade reaction value (k) of 200 pounds per cubic inch (pci) was used in calculating the Portland cement concrete pavement sections. R-value testing should be completed prior to pavement construction to verify the design R-value.

Assuming the pavement subgrades will be prepared as recommended within this report, the following pavement sections should be considered minimums for this project for the traffic indices assumed in the table below. As more specific traffic information becomes available, we should be contacted to reevaluate the pavement calculations.

	Recommended Pavement Section Thickness (inches)*	
	Light (Automobile) Parking Assumed Traffic Index (TI) = 5.0	**Heavy Parking and Drive Areas Assumed TI = 7.0**
Section I Portland Cement Concrete (600 psi Flexural Strength)	6.0" Concrete over 10" of scarified, moisture conditioned, and compacted soils	7.0" Concrete over 10" of scarified, moisture conditioned, and compacted soils
Section II Asphaltic Concrete	3" Asphaltic Concrete over 4" Class II Aggregate Base over 10" of scarified, moisture conditioned, and compacted soils	4" Asphaltic Concrete over 4" Class II Aggregate Base over 10" of scarified, moisture conditioned, and compacted soils

* All materials should meet the CALTRANS Standard Specifications for Highway Construction.

These pavement sections are considered minimal sections based upon the expected traffic and the existing subgrade conditions. However, they are expected to function with periodic maintenance and overlays if good drainage is provided and maintained.

All concrete for rigid pavements should have a minimum flexural strength of 600 psi, and be placed with a maximum slump of four inches. Proper joint spacing will also be required to prevent excessive slab curling and shrinkage cracking. All joints should be sealed to prevent entry of foreign material and dowelled where necessary for load transfer.

4.7.2 Aggregate Surface Roadways Design Recommendations

Aggregate surface roadway design was conducted in general accordance with the Army Corps of Engineers (Corps), Technical Manual TM-5-822, Design of Aggregate Surface Roads and Airfields (1990).

The design of pavement thickness was based on traffic containing 200 vehicles per day with 25 percent trucks, less than 10 percent of the total traffic composed of trucks having three or more axles, and no tracked vehicles. Terracon should be contacted if significant changes in traffic loads or characteristics are anticipated.

As proposed, aggregate surface course of the secondary site access road should be 6 inches in depth after full compaction, and constructed directly above 10 inches of scarified, moisture conditioned, and compacted native soils. The aggregate surface course should have a plasticity index (PI) between 6 and 12, and meet the following gradation:

Sieve Designation	Percent Passing
1-inch	100
¾-inch	90 – 100
3/8-inch	60 – 80
US No. 4	40 – 60
US No. 8	28 – 48
US No. 16	20 – 36
US No. 30	14 – 26
US No. 50	10 – 22
US No. 100	9 – 17
US No. 200	8 – 15

Aggregate surface course should be compacted to a minimum of 95 percent of the soils maximum dry density as defined by ASTM D-1557. Typically, a minimum of 8 inches of loose aggregate surface course will be required to meet the 6-inch minimum constructed thickness. The surface course should be compacted at a moisture content not more than 4 percent above the optimum moisture content defined by ASTM D-1557.

Regardless of the design, gravel roadways will display varying levels of wear and deterioration. We recommend a system of site inspection at a minimum of once per year to verify the adequacy of the roadway and apply preventative measures as needed for erosion control and regrading. An initial site inspection should be completed approximately three months following construction. Shoulder build-up on both sides of proposed roadways should match the aggregate surface elevation and slope outwards at a minimum grade of 10% for five feet.

4.7.3 Compacted Soils Road Design Recommendations

Based upon the soils conditions encountered in the test borings, the use of on-site soils for construction of onsite is considered acceptable. The use of asphalt concrete or other hardened material to surface the roadways decreases the potential for erosion of the roadway to occur.

If high traffic loading is anticipated during wet seasons or when the upper soils are in saturated conditions, the proposed compacted soils road may experience wheel path rutting and depression up to 3 inches deep.

It is our understanding that un-surfaced access roads, maintenance roads, and the perimeter road will consist of a minimum of 12-inches of compacted on-site soils with soil stabilizer. It is our opinion that un-surfaced roads consisting of 10-inches of compacted on-site granular soils are sufficient for the project site. The upper ten inches of subgrade soils beneath existing grade, and any fill required to raise site grades should be moisture conditioned and compacted to a minimum density of 95 percent of ASTM D-1557.

As proposed, positive drainage should be provided during construction and maintained throughout the life of the roadways. Proposed roadway design should maintain the integrity of the road and eliminate ponding. The un-surfaced roads are expected to function with periodic maintenance. Shoulder build-up on both sides of proposed roadways should match the finish grade elevation and slope outwards at a minimum grade of 10% for five feet.

Un-surfaced roadways will display varying levels of wear and deterioration. The extent of erosion may consist of shallow washboarding or rills that are several inches in depth. We recommend a system of site inspection at a minimum of once per year to verify the adequacy of the roadway and to apply any preventative measures needed for erosion control and possible regrading. An initial site inspection should be completed approximately three months following construction.

Based on the site plans provided by the client and prepared by Westwood Professional Services, Inc., soil stabilizers will be used on the un-surfaced roads. Soil stabilizers are anticipated to reduce the rate of erosion.

4.7.4 Construction Considerations

Materials and construction of pavements for the project should be in accordance with the requirements and specifications of the State of California Department of Transportation, or other approved local governing specifications.

Base course or pavement materials should not be placed when the surface is wet. Surface drainage should be provided away from the edge of paved areas to minimize lateral moisture transmission into the subgrade.

Preventative maintenance should be planned and provided for through an on-going pavement management program in order to enhance future pavement performance. Preventative maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment.

Preventative maintenance consists of both localized maintenance (e.g. crack sealing and patching) and global maintenance (e.g. surface sealing). Preventative maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements.

5.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

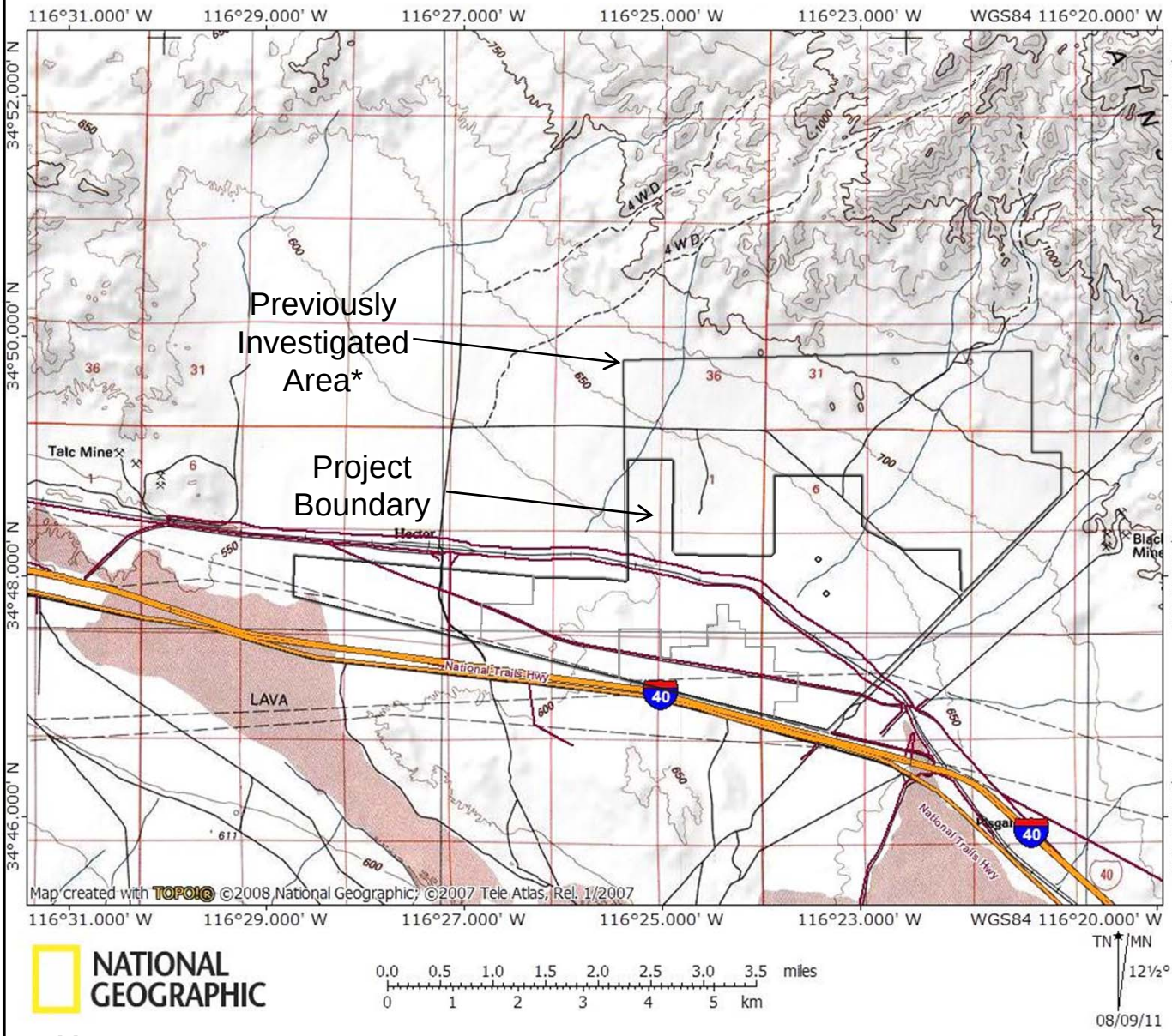
The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A

FIELD EXPLORATION



N

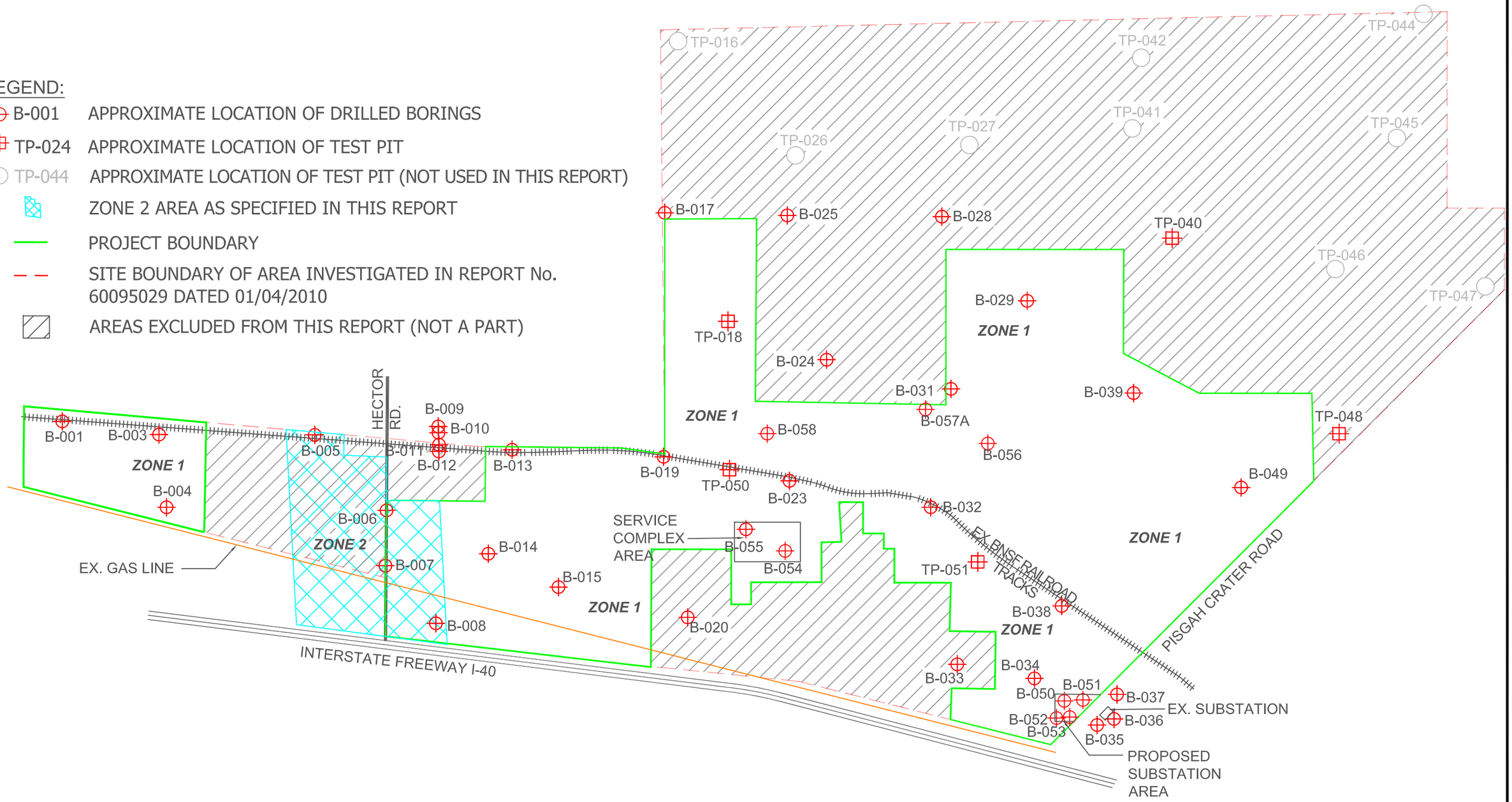
*Project Boundary of area investigated in report No. 60095029 dated 01/04/2010

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: FH	Project No. 60095029A	Terracon Consulting Engineers & Scientists	SITE VICINITY MAP	Exhibit No.
Drawn by: FH	Scale: As Shown		**Calico Solar Farm Project**	
Checked by: FH	File Name: Exhibit A-1		Northwest Corner of Pisgah Crater Road and Needles Freeway (I-40),	A-1
Approved by: SDN	Date: 08/09/2011	16662 Millikan Avenue Irvine, California 92606 PH. (949) 660-9718 FAX. (949) 660-9732	**Pisgah, California**	

LEGEND:

- B-001 APPROXIMATE LOCATION OF DRILLED BORINGS
- TP-024 APPROXIMATE LOCATION OF TEST PIT
- TP-044 APPROXIMATE LOCATION OF TEST PIT (NOT USED IN THIS REPORT)
- ZONE 2 AREA AS SPECIFIED IN THIS REPORT
- PROJECT BOUNDARY
- SITE BOUNDARY OF AREA INVESTIGATED IN REPORT No. 60095029 DATED 01/04/2010
- AREAS EXCLUDED FROM THIS REPORT (NOT A PART)



Project Mngr: FH	Project No. 60095029A	Terracon Consulting Engineers and Scientists	Site Plan and Boring Location Diagram
Drawn By: FH	Scale: AS SHOWN	16662 MILLIKAN AVENUE IRVINE, CA 92606	Calico Solar Farm Project
Checked By: FH	File No. 60095029A.DWG	PH. (949) 660-9718 FAX. (520) 792-3549	Northwest Corner of Pisgah Crater Road and Needles Freeway (I-40) Pisgah, California
Approved By: SDN	Date: 08/09/2011		EXHIBIT A-2

Field Exploration Description

A total of 32 test borings and 14 test pits were drilled/excavated at the site between October 5 and October 22, 2009. The borings were drilled to depths ranging from approximately 12½ to 51 feet below the ground surface and the test pits were excavated to depths ranging from 8 to14 feet bgs. The test borings were advanced with a truck-mounted CME-75 and Mobil B-53 drill rigs utilizing 8-inch diameter hollow-stem augers and the test pits were excavated with a backhoe.

An additional nine test borings were advanced at the site between July 5 and July 22, 2011. Eight borings were drilled to approximate depths of 11 to 41½ feet below the ground surface (bgs) and one hand augur boring was excavated to a depth of 4 feet bgs. The drilled test borings were advanced with a truck-mounted Mobile B-61 drill rig utilizing 8-inch diameter hollow-stem auger. The hand augur boring was advanced with a 4-inch diameter hand augur tool.

It should be noted that the numbering of the test borings and test pits is not necessarily sequential and was based off the BLM permit. Approximate locations for borings and test pits are shown on the attached Site Plan Boring Location Diagram, Exhibit A-2. The borings and test pits were located in the field using the proposed site plan and an aerial photograph of the site, and a handheld gps unit. The accuracy of field exploration locations should only be assumed to the level implied by the method used.

Continuous lithologic logs of each boring were recorded by the field geologist during the drilling operations. At selected intervals, samples of the subsurface materials were taken by driving split-spoon or ring-barrel samplers. Bulk samples of subsurface materials were also obtained.

Penetration resistance measurements were obtained by driving the split-spoon and ring-barrel samplers into the subsurface materials with a 140-pound automatic hammer falling 30 inches. The penetration resistance value is a useful index in estimating the consistency or relative density of materials encountered.

Groundwater conditions were evaluated in each boring at the time of site exploration.

LOG OF BORING NO. B-001

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1807 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
	SM	BS						
2								
	SP-SM	RS		55	3	93		
4								
	SP-SM	RS		79	3	96		
6								
8								
10	SP-SM	RS		73	7	98		
12								
14								
16	SP-SM	RS		65	11	92		
18								
20	SP-SM	RS		79	8	103		
22								
24								
	SP-SM	SPT		50/5"	5			

SILTY SAND Beige, medium dense with fine to medium grained sand, some coarse grained sand, and fine gravel.

3 — 1804

POORLY GRADED SAND WITH SILT
Beige, medium dense to dense, with fine to medium grained sand, some coarse grained sand and trace fine gravel.

26 — 1781

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-5-09		
BORING COMPLETED	10-5-09		
RIG	CME-75	FOREMAN	JP
		JOB #	60095029

LOG OF BORING NO. B-003

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1824 ft

Depth, ft.	Description	Elev.	USCS Symbol	Sample Type	Recovery (in)	Blows/Ft.	Water Content, %	Dry Density pcf	Liquid Limit	Plasticity Index
1.5	**SILTY SAND** Beige, loose with fine to coarse grained sand and some sub-angular fine gravel.	1822.5	SM	SPT		8				
2			SP	RS		34	4	99		
4	**POORLY GRADED SAND** Beige, medium dense to very dense with fine to coarse grained sand.		SP	SPT		65				
			SP	RS		50/5"	2	112		
6			SP	SPT		55				
7.5		1816.5								
8	**SILTY SAND** Beige, dense with fine to coarse grained sand and trace sub-angular fine gravel.		SM	RS		78	10	99		
9.5		1814.5								
10	**SANDY SILT** Beige, hard with fine grained sand.		SM	SPT		23	4	109		
			ML	RS		80				
12			ML	SPT		53				
14			ML	SPT		26				
14.5		1809.5								
16	**POORLY GRADED SAND WITH SILT** Beige, very dense with fine to coarse grained sand.		SP-SM	RS		50/5"	3	112		
18										
20		1804								
20	**SANDY SILT** Beige, hard with fine grained sand.		ML	RS		50/4"	3	107		
22										
24										
26			ML	SPT		54	14			
26.5		1797.5								

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-5-09		
BORING COMPLETED	10-5-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-004

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1830 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
2								
	SM	RS		31	6	115		
4								
6	SP	RS		32	5	113		
8	SP	RS		32	7	117		
10	SM	RS		61	10	113		
12								
14								
16	SP-SM	RS		50/6"	11	101		
18								
20	SP-SM	RS		50/2"	11	108		
22								
24								
	SP-SM	SPT		50/6"				

SILTY SAND WITH GRAVEL Beige, loose with fine to coarse grained sand and some sub-angular fine gravel.

4.5 — 1825.5

POORLY GRADED SAND Beige, medium dense to very dense with fine to coarse grained sand.

Calcium carbonate observed around 8 feet bgs.

10 — 1820

SILTY SAND WITH GRAVEL Beige, dense with fine to coarse grained sand and some sub-angular fine gravel.

11.5 — 1818.5

POORLY GRADED SAND Beige, dense to very dense with fine to coarse grained sand.

14.5 — 1815.5

POORLY GRADED SAND WITH SILT AND GRAVEL Beige, very dense with fine to coarse grained sand and some sub-angular gravel.

25.5 — 1804.5

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-5-09		
BORING COMPLETED	10-5-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-005

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1852 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
	SM	SPT		13				
2	SM	RS		21	22	96		
4	CH	SPT		14				
	CH	RS		32	27	92	58	31
6	CH	SPT		10				
8	CH	RS		38	27	98		
10	CH	SPT		14				
	CH	RS		42	27	96		
12	CH	SPT						
14	CH	SPT						
16	CH	RS		29	26	95		
18								
20	CH	RS		36	28	97		
22								
24								
26	CH	SPT		20	29			

SILTY SAND WITH GRAVEL Beige, loose with fine to coarse grained sand and some sub-angular fine gravel. (2.5 – 1849.5)

FAT CLAY Red-brown, stiff with low to medium plasticity fines.
Calcium Carbonate observed around 3 feet bgs.
Contains fine grained sand and is very stiff.

Trace fine sub-angular gravel observed around 15 feet bgs.

(26.5 – 1825.5)

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-5-09
BORING COMPLETED	10-5-09
RIG CME-75	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-006

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1878 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
	SM	SPT		47				
2	SM	RS		50/5"	4	105		
4	CH	SPT		35				
	CH	RS		38	12			
6	CH	SPT		33				
8	CH	RS		45	23	90		
10	CH	SPT		26				
	CH	RS		65	26	98		
12	CH	SPT		19				
14	CH	SPT		30				
16	CH	RS		54	24	101		
18								
20	CH	RS		42	25	94		
22								
24								
26	CH	BS		22	24			

SILTY SAND WITH GRAVEL Beige, loose with fine to coarse grained sand and some sub-angular fine gravel. (2.5 – 1875.5)

FAT CLAY Red-brown, stiff to very stiff with low to medium plasticity fines. (26.5 – 1851.5)

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-5-09
BORING COMPLETED	10-5-09
RIG CME-75	FOREMAN JP
	JOB # 60095029

LOG OF BORING NO. B-007

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1895 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
	SM	SPT		16				
2	SM	RS		29	3			
4	SC	SPT		25				
	SC	RS		43	24	93		
6	CH	SPT		25				
8	CH	RS		46	29	84		
10	CH	SPT		25				
	CH	RS		50	27	97	69	41
12	CH	SPT		22				
14	CH	SPT		60				
16	CH	RS		50/5"	22	104		
18								
20	CH	RS		73	23	105		
22								
24								
26	CH	SPT		37	26			

SILTY SAND WITH GRAVEL Beige, loose with fine to coarse grained sand and some sub-angular fine gravel.
2.5 — 1892.5

CLAYEY SAND Red-brown, medium dense with fine to medium grained sand. Lightly cemented.
6 — 1889

FAT CLAY Red-brown, stiff to hard with low to medium plasticity fines and trace fine to medium grained sand.

Crystalline mica observed at 10 feet bgs.
Increasingly plastic.

26.5 — 1868.5

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-5-09
BORING COMPLETED	10-5-09
RIG CME-75	FOREMAN JP
	JOB # 60095029

LOG OF BORING NO. B-008

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1921 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	SAMPLE RECOVERY (in)	SAMPLE BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	DESCRIPTION
2.5									**SILTY SAND WITH GRAVEL** Beige, loose with fine to coarse grained sand and some sub-angular fine gravel. 1918.5
2									**FAT CLAY** Red-brown, very stiff to hard with low to medium plasticity fines.
	SM	RS		37	22	95			
4									
	CH	RS		40	22	99	66	38	
6									
8	CH	RS		44	27	96			
10									
	CH	RS		51	30	92			
12									
14									
	CH	RS		47	26	98			
16									
18									
20									
	CH	RS		50/6"	26	100			
22									
24									
	CH	SPT		23	27				
26.5									1894.5

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-6-09		
BORING COMPLETED	10-6-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

BOREHOLE 2000 60095029 BORING LOGS.GPJ TERR2000.GDT 12/11/09

LOG OF BORING NO. B-009

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1882 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
2	SP	BS						
4	SP	RS		28	1	114		
6	SP-SM	RS		71	3	119		
8	SP-SM	RS		50/5"	3	122		
10	SP-SM	RS		71	5	115		
12								
14								
16	SP-SM	RS		90	3	102		
18								
20	SP-SM	RS		50/5"	4	111		
22								
24								
26	SP-SM	RS		70	10			
28								
30	ML	RS		50/6"	13	90		
32								

POORLY GRADED SAND Beige, medium dense with fine to coarse grained sand and some fine sub-angular gravel.

5 — 1877

POORLY GRADED SAND WITH SILT AND GRAVEL Beige to light-brown, dense with fine grained sand and some fine sub-angular gravel.
Very dense with calcium carbonate observed around 8 feet bgs.

Dense with decreased gravel size around 10 feet bgs..

Increased fines around 16 feet bgs.

29 — 1853

SILT Beige, hard with fine grained sand and coarse sub-angular gravel.

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-8-09		
BORING COMPLETED	10-8-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-009

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	SAMPLE RECOVERY (in)	SAMPLE BLOWS/FT.	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX
	SILT Beige, hard with fine grained sand and coarse sub-angular gravel.	34								
	No gravel observed in 35 foot sample.	36	ML	RS		46	13			
	37 1845									
	POORLY GRADED SAND WITH SILT AND GRAVEL Beige to light-brown, dense to very dense with fine grained sand and some fine sub-angular gravel.	38								
		40	SP-SM	RS		50/5"	19	83		
		42								
		44								
		46	SP-SM	RS		56	11			
		48								
	51 1831	50	SP-SM	SPT		50/4"	28	73		
	Bottom of boring. Groundwater not encountered. Boring backfilled with soil cuttings.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-8-09		
BORING COMPLETED	10-8-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-010

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1882 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
2								
4	SP-SM	RS		41	1	95		
6	SP-SM	RS		50/6"	3	113		
8	SP-SM	NR		50/5"				
10	SP-SM	RS		50/2"	5	113		
12								
14								
16	SP-SM	RS		50/3"	2	122		
18								
20	SP-SM	RS		50/6"	4	118		
22								
24								
26	SP-SM	SPT		50/3"	11			

POORLY GRADED SAND WITH SILT AND GRAVEL Beige to light-brown, dense with fine grained sand and some fine sub-angular gravel.

Increased gravel content around 10 feet bgs.

26.5 1855.5

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-8-09		
BORING COMPLETED	10-8-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

BOREHOLE 2000 60095029 BORING LOGS.GPJ TERR2000.GDT 12/11/09

LOG OF BORING NO. B-011

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1883 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
	SP	SPT		14				
2	SP	RS		47	2	115		
	SP	SPT		41				
4	SM	RS		50/4"	4	114		
6	SM	SPT		50/5"				
8	SM	RS		50/5"	4	114		
	SM	SPT		50/3"				
10	SP-SM	RS		50/3"	3	117		
12	SP-SM	SPT		50/6"				
14	SP-SM	SPT		77				
	SP-SM	RS		50/6"	7	114		
16								
18								
20	SP-SM	RS		50/4"	5	107		
22								
24								
	SM	SPT		50/6"	4	99		
26								
28								
30	SM	RS		50/5"	15	94		
32								

GRAPHIC LOG

DESCRIPTION

POORLY GRADED SAND Beige, medium dense with fine to medium grained sand.

Fine to coarse grained sand and trace sub-angular gravel.

4.5 — 1878.5

SILTY SAND Beige to light-brown, very dense with fine to coarse grained sand and trace sub-angular gravel.

No gravel observed at 8 feet bgs.

9.5 — 1873.5

POORLY GRADED SAND WITH SILT AND GRAVEL Beige, very dense with fine to coarse grained sand, some sub-angular gravel, and non-plastic fines.

Calcium carbonate observed at 20 feet bgs.

24 — 1859

SILTY SAND Beige to light-brown, very dense with fine to coarse grained sand and trace sub-angular gravel.

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ NE	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	10-6-09		
BORING COMPLETED	10-6-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-011

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
	SILTY SAND Beige to light-brown, very dense with fine to coarse grained sand and trace sub-angular gravel.	34								
		36	SM	SPT		59	21			
		38								
		40	SM	RS		50/2"	14	103		
		42								
		44								
		46	SM	SPT		69	21			
		48								
		50	SM	RS		75	21	98		
	51.5 1831.5									
	Bottom of boring. Groundwater not encountered. Boring backfilled with soil cuttings.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-6-09		
BORING COMPLETED	10-6-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-012

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1883 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	DESCRIPTION
	SM	SPT		19					**SILTY SAND** Beige to light-brown, very dense with fine to coarse grained sand and trace sub-angular gravel.
2	SM	RS		82	3	119			
4	SM	SPT		35					
	SM	RS		50/4"	4	120			
6	SP-SM	SPT		50/6"					**POORLY GRADED SAND WITH SILT AND GRAVEL** Beige, very dense with fine to coarse grained sand, some sub-angular gravel, and non-plastic fines.
8	SP-SM	RS		50/6"	4	117			
10	SP-SM	SPT		50/6"					
	SP-SM	RS		50/6"	3	114			
12	SP-SM	SPT		72					
14	SP	SPT		77					**POORLY GRADED SAND** Beige, medium dense with fine to coarse grained sand.
	SM	RS		50/6"	3	112			**SILTY SAND** Beige to light-brown, very dense with fine to coarse grained sand and trace sub-angular gravel.
16									
18									
20	SM	RS		50/2"	12	84			
22									
24									
26	SM	SPT		66	8				

GRAPHIC LOG: 6 (1877); 13.5 (1869.5); 15 (1868); 26.5 (1856.5)

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-5-09
BORING COMPLETED	10-5-09
RIG CME-75	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-013

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1903 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
2								
3	SP	RS		58	2	129		
4								
5	SP	RS		87	3	110		
6								
8	SP-SM	RS		50/5"	2	115		
10	SP-SM	RS		50/3"	5	108		
12								
14								
15	SP-SM	RS		50/6"	2	106		
16								
18								
20	SP-SM	RS		50/4"	4	112		
22								
24								
25	SM	SPT		47	4			
26								

POORLY GRADED SAND Beige, medium dense with fine to medium grained sand.

7 — 1896

POORLY GRADED SAND WITH SILT AND GRAVEL Beige, very dense with fine to coarse grained sand, some sub-angular gravel, and non-plastic fines.

22 — 1881

SILTY SAND Beige to light-brown, very dense with fine to coarse grained sand and trace sub-angular gravel.

26.5 — 1876.5

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-5-09
BORING COMPLETED	10-5-09
RIG CME-75	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-014

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1918 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	DESCRIPTION
	SM	BS							**SILTY SAND** Beige to light-brown, medium dense with fine grained sand.
2									
	SM	RS		30	7	107			
4.5 / 1913.5									**POORLY GRADED SAND WITH SILT AND GRAVEL** Beige, medium dense with fine to medium grained sand.
4									
6	SP-SM	RS		82	5	111			
8	SP-SM	RS		84	5	118			Red-brown.
10	SP-SM	RS		50/4"	5	116			Calcium carbonate observed around 11 feet bgs.
12									
14									
16	SP-SM	RS		50/6"	5	112			
18									
20	SP-SM	RS		50/6"	9	105			
22									
24									
26.5 / 1891.5	SP-SM	SPT		85	5				Increased silt content and trace gravel.
									Bottom of boring. Groundwater not encountered. Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-6-09
BORING COMPLETED	10-6-09
RIG CME-75	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-015

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1948 ft

Depth, ft.	USCS Symbol	Sample Type	Recovery (in)	Blows/Ft.	Water Content, %	Dry Density pcf	Liquid Limit	Plasticity Index
2								
	SP	RS		40	4	111		
4								
	SP-SM	RS		50/4"	18	86		
6								
8	SP-SM	RS		50/4"	9	105		
10	SM	RS		50/5"	9	101		
12								
14								
16	SM	RS		50/5"	7	103		
18								
20	SM	RS		50/5"	25	84		
22								
24								
26	SM	SPT		32	18			

DESCRIPTION

POORLY GRADED SAND Beige, medium dense with fine to coarse grained sand.

4.5 — 1943.5

POORLY GRADED SAND WITH SILT Beige, medium dense with fine grained sand.

Trace sub-angular gravel and calcium carbonate observed around 8 feet bgs.

9.5 — 1938.5

SILTY SAND Beige to light-brown, very dense with fine grained sand.

26.5 — 1921.5

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-6-09		
BORING COMPLETED	10-6-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-017

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2122 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	DESCRIPTION
2									**POORLY GRADED SAND WITH SILT AND GRAVEL** Beige, medium dense with fine to medium grained sand.
4	SP-SM	RS		37	1	118			
4.5 / 2117.5									**POORLY GRADED SAND WITH GRAVEL** Beige, dense with fine to coarse grained sand.
6	SP	RS		38	1	114			
8	SP	RS		47	1	112			Decreased gravel content.
10	SP	RS		55	1				
12									
14									
16	SP	RS		50/3"	1	116			Very dense with an increased gravel content.
18									
20	SP	RS		50/6"	1	125			
22									
24 / 2098									
26.5 / 2095.5	SM	SPT		90	1				**SILTY SAND** Beige to light-brown, dense with fine grained sand and trace sub-angular gravel.
									Bottom of boring. Groundwater not encountered. Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-8-09
BORING COMPLETED	10-8-09
RIG CME-75	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-019

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1943 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
2								
	SM	RS		64	9	112		
4								
	SM	RS		54	5	113		
6								
8	SP-SM	RS		43	3	113		
10	SP	RS		50/3"	2	112		
12								
14								
16	SP-SM	RS		50/6"	4	101		
18								
20	SP-SM	RS		50/6"	3	109		
22								
24								
26	SP-SM	NR		50/5"				

SILTY SAND Beige to light-brown, very dense with fine grained sand. (7.5 – 1935.5)

POORLY GRADED SAND WITH SILT Beige, medium dense with fine grained sand. (9.5 – 1933.5)

POORLY GRADED SAND Beige, very dense with fine to coarse grained sand. (11 – 1932)

POORLY GRADED SAND WITH SILT Beige, dense with fine grained sand. (26 – 1917)

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-6-09
BORING COMPLETED	10-6-09
RIG CME-75	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-020

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2039 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	DESCRIPTION
	SM	BS							**SILTY SAND** Beige, medium dense with fine grained sand. (2.5 – 2036.5)
2	SP	RS		52	1	98			**POORLY GRADED SAND WITH GRAVEL** Beige, medium dense with fine to medium grained sand and some sub-angular gravel. (4.5 – 2034.5)
4									
6	SM	RS		49	6	123			**SILTY SAND WITH GRAVEL** Beige to light-brown, dense with fine to coarse grained sand and some sub-angular gravel.
8	SM	RS		55	11	104			
10	SP-SM	RS		50/5"	7	104			
12									(12 – 2027)
14									**POORLY GRADED SAND WITH SILT AND GRAVEL** Red-brown, dense with fine to coarse grained sand.
16	SP-SM	RS		78	7	114			
18									(19 – 2020)
20	SM	RS		50/6"	7	101			**SILTY SAND WITH GRAVEL** Red-brown, very dense with fine grained sand and some sub-angular gravel.
22									
24									
26	SM	SPT		30					No gravel around 25 feet bgs. (26.5 – 2012.5)

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-22-09
BORING COMPLETED	10-22-09
RIG B-53	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-023

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 1986 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
2	SM	RS		42	3	115		
4	SP-SM	RS		74	3	120		
6								
8	SP-SM	RS		41	3	113		
10	SM	RS		62	3	117		
12								
14								
16	SM	RS		50/5"	4	111		
18								
20	SP-SM	RS		50/3"				
22								
24	SP-SM	SPT		50/4"	2			

SILTY SAND Beige, medium dense with fine to coarse grained sand and some sub-angular gravel.

4.5 — 1981.5

POORLY GRADED SAND WITH SILT
Beige, very dense with fine grained sand and some sub-angular gravel.

9.5 — 1976.5

SILTY SAND WITH GRAVEL Beige, very dense with fine grained sand.

Contains some sub-angular gravel.

19 — 1967

POORLY GRADED SAND WITH SILT
Beige, very dense with fine grained sand.

25.5 — 1960.5

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-6-09		
BORING COMPLETED	10-6-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

BOREHOLE 2000 60095029 BORING LOGS.GPJ TERR2000.GDT 12/11/09

LOG OF BORING NO. B-024

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2046 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	DESCRIPTION
									POORLY GRADED SAND WITH GRAVEL Beige to light-brown, dense with fine to medium grained sand.
2									
	SP	RS		56	2	127			
4									
	SP	RS		42	2	117			Less gravel.
6									
									7 — 2039
8	SP-SM	RS		42	1	117			**POORLY GRADED SAND WITH SILT AND GRAVEL** Beige, dense to very dense with fine to coarse grained sand, some sub-angular gravel, and non-plastic fines.
10	SP-SM	RS		56	2	119			Fine to coarse grained sand with increased gravel.
12									
14									
16	SP-SM	RS		50/5"	1	120			
18									
20	SP-SM	RS		50/4"	3	118			Increased silt content.
22									
24									
	SP-SM	SPT		50/5"	1				
									26.5 — 2019.5
									Bottom of boring. Groundwater not encountered. Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-8-09
BORING COMPLETED	10-8-09
RIG CME-75	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-025

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2164 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
2								
	SP	RS		65	2	127		
4								
6	SP-SM	RS		67	1			
8	SP-SM	RS		88	2	127		
10	SP	RS		50	2	119		
12								
14								
16	SP-SM	RS		50/6"	1			
18								
20	SP-SM	RS		50/5"	1	116		
22								
24								
26	SM	SPT		50/6"	2			

POORLY GRADED SAND WITH GRAVEL Beige, dense with fine to coarse grained sand and some sub-angular gravel.

4.5 — 2159.5

POORLY GRADED SAND WITH SILT AND GRAVEL Beige, dense to very dense with fine to coarse grained sand, some sub-angular gravel, and non-plastic fines.

9.5 — 2154.5

POORLY GRADED SAND WITH GRAVEL Beige, very dense with fine to coarse grained sand and some sub-angular gravel.

14 — 2150

POORLY GRADED SAND WITH SILT AND GRAVEL Beige, dense to very dense with fine to coarse grained sand, some sub-angular gravel, and non-plastic fines.

24 — 2140

SILTY SAND WITH GRAVEL Beige, very dense with fine grained sand and some sub-angular gravel.
Increased fines and less gravel.

26 — 2138

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-8-09		
BORING COMPLETED	10-8-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-028

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2209 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
2								
4	SP-SM	RS		44	1	85		
6	SM	RS		37	1			
8	SP	RS		68				
10	SP	RS		71	1	122		
12								
14								
16	SP	RS		61	1	120		
18								
20	SP	RS		67	1	122		
22								
24								
26	SP-SM	SPT		78	1			

POORLY GRADED SAND WITH SILT AND GRAVEL Beige, dense with fine to coarse grained sand.

4.5 — 2204.5

SILTY SAND Beige, dense with fine grained sand and trace sub-angular gravel.

7.5 — 2201.5

POORLY GRADED SAND WITH GRAVEL Beige, very dense with fine to coarse grained sand and some sub-angular gravel.

24 — 2185

POORLY GRADED SAND WITH SILT AND GRAVEL Beige, dense with fine to coarse grained sand, some sub-angular gravel, and non-plastic fines.

26.5 — 2182.5

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-7-09		
BORING COMPLETED	10-7-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-029

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2188 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
2	SP	BS						
4	SP	RS		43	1	122		
6	SP	NR		55	2	100		
8	SP-SM	RS		70	1	117		
10	SP-SM	RS		50/6"	2	124		
16	SP-SM	RS		50/6"	2	147		
20	SP-SM	RS		50/6"	3	117		
26	SM	SPT		50/2"	2			

POORLY GRADED SAND WITH GRAVEL
Beige to light-brown, medium dense with fine to medium grained sand.

7 — 2181

POORLY GRADED SAND WITH SILT AND GRAVEL Beige, dense to very dense with fine to coarse grained sand, some sub-angular gravel, and non-plastic fines.
Fine grained sand and decreased gravel.

25 — 2163

26 — 2162

SILTY SAND Beige, very dense with fine grained sand.

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-7-09
BORING COMPLETED	10-7-09
RIG CME-75	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-031

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2077 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
2								
4	SP	RS		32	1	113		
6	SP	RS		37	2	109		
8	SM	RS		28	3	109		
10	SP	RS		44	2	112		
12								
14								
16	SP	RS		53	2	121		
18								
20	SP	RS		65	1	111		
22								
24								
26	SP	NR		50/6"				
28								
30	SP	NR		50/5"				
32								

POORLY GRADED SAND WITH GRAVEL
Beige to light-brown, medium dense with fine to medium grained sand.

7 Increased fines and gravel size. 2070

SILTY SAND WITH GRAVEL Beige, dense with fine grained sand and some sub-angular gravel.
8.5 2068.5

POORLY GRADED SAND WITH GRAVEL
Beige to light-brown, medium dense to very dense with fine to medium grained sand and sub-angular gravel.

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-22-09
BORING COMPLETED	10-22-09
RIG B-53	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-031

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	SAMPLE RECOVERY (in)	SAMPLE BLOWS/FT.	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	
	POORLY GRADED SAND WITH GRAVEL Beige to light-brown, medium dense to very dense with fine to medium grained sand and sub-angular gravel.	34									
		36	SP	NR		50/5"					
		38									
		40	SP	RS		50/5"	2	123			
		42									
		44									
		46	SP	SPT		50/4"	2	116			
		48									
	51 2026	50	SP	RS		50/6"					
	Bottom of boring. Groundwater not encountered. Boring backfilled with soil cuttings.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-22-09		
BORING COMPLETED	10-22-09		
RIG	B-53	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-032

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2024 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
2	SP	RS		14	1	107		
4								
6	SP-SM	RS		51	2	122		
8	SP-SM	RS		53	3	110		
10	SP-SM	RS		50/5"	3	95		
12								
14								
16	SP-SM	RS		80	2	113		
18								
20	SP-SM	NR		50/5"				

POORLY GRADED SAND Beige, loose with fine grained sand and trace sub-angular gravel.

4.5 — 2019.5

POORLY GRADED SAND WITH SILT AND GRAVEL Beige, medium dense with fine to coarse grained sand, trace sub-angular gravel, and non-plastic fines.

Calcium carbonate observed around 8 feet bgs.

Dense.

21 — 2003

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-22-09
BORING COMPLETED	10-22-09
RIG B-53	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-033

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2040 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	DESCRIPTION
									SILTY SAND Beige, medium dense with fine to coarse grained sand and trace sub-angular gravel.
2									
	SM	RS		47	4	111			
4									
	SM	RS		57	5	105			Some sub-angular gravel.
6									
8	SM	RS		91	4	110			Very dense.
9									2031
									POORLY GRADED SAND WITH SILT AND GRAVEL Beige, very dense with fine to coarse grained sand, some sub-angular gravel, and non-plastic fines.
10	SP-SM	RS		67	3	116			
12									
14									
16	SP-SM	RS		50/6"	3	122			
18									
20	SP-SM	RS		50/4"	5	115			Little to no gravel.
22									
24									
26	SP-SM	SPT		69	3				
26.5									2013.5
									Bottom of boring. Groundwater not encountered. Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-6-09		
BORING COMPLETED	10-6-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-034

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2061 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	DESCRIPTION
2									**POORLY GRADED SAND WITH SILT AND GRAVEL** Beige, dense with fine to coarse grained sand and some sub-angular gravel.
4	SP-SM	RS		65	4	115			
6	SP-SM	RS		58	6	113			Calcium carbonate observed around 5 feet bgs.
8	SP-SM	RS		50/6"	5	119			Decreased gravel size and content.
10	SP-SM	RS		67	4	112			
12									
14									
16	SP-SM	RS		50/5"	4	111			
18									
20	SP-SM	RS		50/5"	3	117			Fine grained sand.
22									
24									
26	SP-SM	SPT		71	3				
28									
30	SP-SM	RS		50/5"	4	116			
32									Beige to light-brown. Calcium carbonate observed around 31 feet bgs.

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-7-09
BORING COMPLETED	10-7-09
RIG CME-75	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-034

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	TESTS WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
	POORLY GRADED SAND WITH SILT AND GRAVEL Beige, dense with fine to coarse grained sand and some sub-angular gravel.	34								
			SP-SM	SPT		50/4"	5			
		36								
		38								
	Increased gravel content.	40	SP-SM	RS		50/5"	4	108		
		42								
		44								
	Decreased gravel content.		SP-SM	SPT		50/4"	5			
		46								
		48								
		50	SP-SM	RS		50/4"	3			
51	2010									
	Bottom of boring. Groundwater not encountered. Boring backfilled with soil cuttings.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-7-09		
BORING COMPLETED	10-7-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-035

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2085 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	DESCRIPTION
	SP-SM	BS							**POORLY GRADED SAND WITH SILT AND GRAVEL** Beige, medium dense with fine to coarse grained sand and some sub-angular gravel.
2									
	SP-SM	RS		40	6	110			
4									
	SP-SM	RS		65	5	106			Dense.
6									
8	SP-SM	RS		79	3	115			
10									
	SP-SM	NR		50/5"					Very dense.
12									
14									
	SP-SM	RS		50/3"	4	118			
16									
18									
20									
	SP-SM	RS		50/5"	5	122			
22									
24									
	SP-SM	SPT		59	4				
26									

26.5 2058.5

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-7-09		
BORING COMPLETED	10-7-09		
RIG	CME-75	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-036

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2090 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
0–26.5		**POORLY GRADED SAND WITH SILT AND GRAVEL** Beige, medium dense with fine to coarse grained sand and some sub-angular gravel.						
2–4	SP-SM	RS		49	2	121		
4–6	SP-SM	RS		47	3	115		
6–8	SP-SM	RS		50/4"	2	129		
8–10	SP-SM	RS		73	3	117		
10–12		Very dense.						
12–14		Dense.						
14–16	SP-SM	RS		74	3	113		
16–18		Light-brown.						
18–20								
20–22	SP-SM	RS		50/5"	4	111		
22–24								
24–26	SP-SM	SPT		75	3			
26.5 (2063.5)		Bottom of boring. Groundwater not encountered. Boring backfilled with soil cuttings.						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-7-09
BORING COMPLETED	10-7-09
RIG CME-75	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-037

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2086 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
	SM	SPT		10				
2	SM	RS		69	4	115		
4	SM	SPT		78				
	SP-SM	RS		50/6"	3	114		
6	SP-SM	SPT		68				
8	SM	RS		50/5"	3	113		
10	SP-SM	SPT		50				
	SP-SM	RS		50/6"	2	122		
12	SP-SM	SPT		28				
14	SP-SM	SPT		59				
16	SP-SM	RS		50/6"	3	117		
18								
20	SP-SM	RS		50/5"	5	111		
22								
24								
26	SP-SM	SPT		50/5"	4			

GRAPHIC LOG

DESCRIPTION

SILTY SAND Beige to light-brown, medium dense to dense with fine grained sand and trace sub-angular gravel.

Calcium carbonate observed around 3 feet bgs.

4.5 — 2081.5

POORLY GRADED SAND WITH SILT AND GRAVEL Beige, very dense with fine to coarse grained sand, sub-angular gravel, and non-plastic fines.

7.5 — 2078.5

SILTY SAND WITH GRAVEL Beige to light-brown, very dense with fine to coarse grained sand and sub-angular gravel.

9 — 2077

POORLY GRADED SAND WITH SILT AND GRAVEL Beige, very dense with fine to coarse grained sand, sub-angular gravel, and non-plastic fines.

26.5 — 2059.5

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-7-09
BORING COMPLETED	10-7-09
RIG CME-75	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-038

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2065 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	SAMPLE RECOVERY (in)	SAMPLE BLOWS/FT.	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	DESCRIPTION
									POORLY GRADED SAND Beige. medium dense with fine to coarse grained sand.
2	SP	RS		47	2	115			
4.5 / 2060.5									**POORLY GRADED SAND WITH SILT AND GRAVEL** Beige, dense with fine to coarse grained sand and sub-angular gravel.
4									
6	SP-SM	RS		64	4	118			
7 / 2058									**POORLY GRADED SAND WITH GRAVEL** Red-brown, very dense with fine to coarse grained sand and sub-angular gravel.
8	SP	RS		50/5"	4	117			
10	SP	RS		92					
12 / 12.5 / 2052.5	SP	SPT		50/3"					

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-22-09		
BORING COMPLETED	10-22-09		
RIG	B-53	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-039

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2178 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	DESCRIPTION
2									**POORLY GRADED SAND WITH SILT** Beige, medium dense with fine to coarse grained sand and trace sub-angular gravel.
4	SP-SM	RS		22	1	106			
6	SP-SM	RS		54	2	122			Increased gravel content. Less fines.
8	SP-SM	RS		48	1	122			Dense with increased coarse sand.
10	SP-SM	RS		69	2	117			Very dense.
12									
14									
16	SP-SM	RS		50/5"	1	118			
18									
20	SP-SM	RS		50/5"	1	125			
22									
24									
25.5 (2152.5)									
26 (2151.5)	SP	SPT		57	2				**POORLY GRADED SAND** Light-brown, medium dense with fine grained sand.

Bottom of boring.
Groundwater not encountered.
Boring backfilled with soil cuttings.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-7-09
BORING COMPLETED	10-7-09
RIG CME-75	FOREMAN MLS
	JOB # 60095029

LOG OF BORING NO. B-049

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

Approx. Surface Elev.: 2514 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	RECOVERY (in)	BLOWS/FT.	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	DESCRIPTION
	SP-SM	RS							**POORLY GRADED SAND WITH SILT AND GRAVEL** Beige, very dense with fine to medium grained sand and sub-angular gravel.
2									
	SP-SM	RS		50/6"	1	125			
4									
	SP-SM	RS		55	0	124			Increased coarse grained sand and fine sub-angular gravel.
6									
8	SP-SM	RS		64	2	117			
10									
	SP-SM	RS		69	2	116			Thin zone of increased fines.
12									
14									
	SP-SM	RS		50/5"	1	111			Increased gravel content.
16									
18									
20	SP-SM	RS		50/3"	3	114			Decreased gravel content.
22									
24									
25.5	SP-SM	NR		50/5"					Bottom of boring. Groundwater not encountered. Boring backfilled with soil cuttings.
26									

2488.5

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

BORING STARTED	10-7-09
BORING COMPLETED	10-7-09
RIG CME-75	FOREMAN MLS
	JOB # 60095029

LOG OF TEST PIT NO. TP-018

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	SAMPLE RECOVERY (in)	SAMPLE BLOWS/FT.	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX
	Approx. Surface Elev.: 2281 ft									
	0.5 **SILTY SAND** Beige with fine grained sand and some sub-angular gravel. 2280.5									
	POORLY GRADED SAND WITH GRAVEL Beige with fine to coarse grained sand and sub-angular gravel and cobble. Intermittent layers of increased fines and increased gravels. Calcium carbonate buildup observed on test pit walls at 5 feet bgs.	2		BS			1			
		4		BS			1			
		6								
		8								
		10								
		12								
	14 2267	14		BS						
	Bottom of test pit. Groundwater not encountered. Test pit backfilled with soil cuttings.						2			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

TEST PIT STARTED	10-21-09		
TEST PIT COMPLETED	10-21-09		
BACKHOE	B-95	FOREMAN	MLS
		JOB #	60095029

LOG OF TEST PIT NO. TP-040

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	SAMPLE RECOVERY (in)	SAMPLE BLOWS/FT.	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	
	Approx. Surface Elev.: 2341 ft										
	POORLY GRADED SAND WITH GRAVEL Beige with fine to coarse grained sand and sub-angular gravel and cobble. Intermittent layers of increased fines and increased gravels. Calcium carbonate buildup observed on test pit walls at 5.5 feet bgs.	2 4									
		6		BS			2				
		8 10 12									
	14 2327	14		BS			2				
	Bottom of test pit. Groundwater not encountered. Test pit backfilled with soil cuttings.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ NE	▼
WL	▼	▼
WL		

Terracon

TEST PIT STARTED	10-19-09		
TEST PIT COMPLETED	10-19-09		
BACKHOE	B-95	FOREMAN	MLS
		JOB #	60095029

LOG OF TEST PIT NO. TP-048

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	SAMPLE RECOVERY (in)	SAMPLE BLOWS/FT.	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	
	Approx. Surface Elev.: 2280 ft										
	POORLY GRADED SAND WITH GRAVEL Beige with fine to coarse grained sand and sub-angular gravel and cobble.	2									
	Calcium carbonate buildup observed on test pit walls at 3 feet bgs.			BS			1				
	Intermittent layers of increased fines and increased gravels.	4 6 8 10 12									
	14 2266	14		BS							
	Bottom of test pit. Groundwater not encountered. Test pit backfilled with soil cuttings.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

TEST PIT STARTED	10-19-09		
TEST PIT COMPLETED	10-19-09		
BACKHOE	B-95	FOREMAN	MLS
		JOB #	60095029

LOG OF TEST PIT NO. TP-050

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	SAMPLE RECOVERY (in)	SAMPLE BLOWS/FT.	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	
	POORLY GRADED SAND WITH GRAVEL Beige with fine to coarse grained sand and sub-angular gravel and cobble.	2									
		4		BS			2				
	Calcium carbonate buildup observed on test pit walls at 4 feet bgs. Intermittent layers of increased fines and increased gravels.	6									
	8	8		BS			2				
	Bottom of test pit. Groundwater not encountered. Test pit backfilled with soil cuttings.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

TEST PIT STARTED	10-19-09		
TEST PIT COMPLETED	10-19-09		
BACKHOE	B-95	FOREMAN	MLS
		JOB #	60095029

LOG OF TEST PIT NO. TP-051

CLIENT
Stirling Energy Systems

SITE
East of Barstow, California

PROJECT
Solar One

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE TYPE	SAMPLE RECOVERY (in)	SAMPLE BLOWS/FT.	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	
	POORLY GRADED SAND WITH GRAVEL Beige with fine to coarse grained sand and sub-angular gravel and cobble.	2									
				BS			1				
		4									
	Intermittent layers of increased fines and increased gravels.			BS			3				
		6									
		8		BS			2				
	Calcium carbonate buildup observed on test pit walls at 9 feet bgs.	10		BS			5				
	Bottom of test pit. Groundwater not encountered. Test pit backfilled with soil cuttings.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	NE	
WL		
WL		

Terracon

TEST PIT STARTED	10-19-09		
TEST PIT COMPLETED	10-19-09		
BACKHOE	B-95	FOREMAN	MLS
		JOB #	60095029

LOG OF BORING NO. B-050

CLIENT
KRoad Solar Power

SITE **NWC of Pisgah Crater Rd and Needles Fwy (I-40)**
Pisgah, California

PROJECT
Calico Solar

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE INTERVAL	SAMPLE TYPE	BLOWS 1st 6"	BLOWS 2nd 6"	BLOWS 3rd 6"	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	TESTS -#200
	SILTY SAND; some gravel, tan, slightly damp.	1, 2	SM		BS								
2.5	**POORLY GRADED SAND WITH SILT AND GRAVEL**; tan, medium dense to dense, slightly damp.	3	SP-SM		RS	16	20	25	3	110			
		4											
		5, 6	SP-SM		SPT	11	14	11					
		7											
		8	SP-SM		RS	10	18	26					
10		9											
	SEDIMENTARY BEDROCK - SANDSTONE; tan, slightly damp.	10, 11			SPT	9	50/3"						
		12, 13, 14											
		15			RS	27	36	50/4.5"					
16.5		16											
	Boring terminated at 16.5'. **Bottom of BORING.**												

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	

Terracon

BORING STARTED	7-6-11		
BORING COMPLETED	7-6-11		
RIG	B-61	FOREMAN	JR
APPROVED	SDN	JOB #	60095029A

LOG OF BORING NO. B-051

CLIENT
KRoad Solar Power

SITE **NWC of Pisgah Crater Rd and Needles Fwy (I-40)**
Pisgah, California

PROJECT
Calico Solar

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE INTERVAL	SAMPLE TYPE	BLOWS 1st 6"	BLOWS 2nd 6"	BLOWS 3rd 6"	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	-#200
	SILTY SAND; some gravel, tan, slightly damp.		SM		BS								19
		1											
		2											
2.5	**POORLY GRADED SAND WITH SILT AND GRAVEL**; tan, dense, slightly damp.	3	SP-SM		RS	24	36	42	3	92			
		4											
		5	SP-SM		SPT	8	16	15					
		6											
		7											
		8	SP-SM		RS	26	30	40	4	116			
		9											
10	**SEDIMENTARY BEDROCK - SANDSTONE**; tan, slightly damp.	10			SPT	30	50/4"						
		11											
		12											
		13											
		14											
		15			RS	44	43	50/5.5"					
		16											
		17											
		18											
		19											
		20			RS	19	21	20	3	119			
21.5		21											
	Boring terminated at 21.5'. **Bottom of BORING.**												

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	

Terracon

BORING STARTED	7-6-11		
BORING COMPLETED	7-6-11		
RIG	B-61	FOREMAN	JR
APPROVED	SDN	JOB #	60095029A

LOG OF BORING NO. B-052

CLIENT
KRoad Solar Power

SITE **NWC of Pisgah Crater Rd and Needles Fwy (I-40)**
Pisgah, California

PROJECT
Calico Solar

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE INTERVAL	SAMPLE TYPE	BLOWS 1st 6"	BLOWS 2nd 6"	BLOWS 3rd 6"	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	TESTS -#200
	SILTY SAND; trace gravel, tan, damp.	1	SM		BS								
		2											
	2.5												
	POORLY GRADED SAND WITH SILT AND GRAVEL; tan, medium dense to very dense, damp.	3	SP-SM		RS	10	13	18	10	112			
		4											
		5	SP-SM		SPT	12	15	17					
		6											
		7											
		8	SP-SM		RS	50/5"							
		9											
	10												
	SEDIMENTARY BEDROCK - SANDSTONE; tan, damp.	10			SPT	16	32	50/4.5"					8
		11											
		12											
		13											
		14											
		15			RS	17	26	28	12	108			
		16											
		17											
		18											
		19											
		20			SPT	13	13	16					
	21.5	21											
	Boring terminated at 21.5'. **Bottom of BORING.**												

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	

Terracon

BORING STARTED	7-6-11		
BORING COMPLETED	7-6-11		
RIG	B-61	FOREMAN	JR
APPROVED	SDN	JOB #	60095029A

LOG OF BORING NO. B-053

CLIENT
KRoad Solar Power

SITE **NWC of Pisgah Crater Rd and Needles Fwy (I-40)**
Pisgah, California

PROJECT
Calico Solar

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE INTERVAL	SAMPLE TYPE	BLOWS 1st 6"	BLOWS 2nd 6"	BLOWS 3rd 6"	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	TESTS -#200
	SILTY SAND; trace gravel, tan, slightly damp.	1	SM		BS								
	2.5	2											
	POORLY GRADED SAND WITH SILT AND GRAVEL; tan, medium dense to very dense, slightly damp.	3	SP-SM		SPT	3	4	9					
		4											
	moderate cementation.	5	SP-SM		RS	24	38	50/5"	6	123			
		6											
		7											
		8	SP-SM		SPT	22	50/5"						
		9											
		10	SP-SM		RS	30	27	40	3	118			
		11											
		12											
		13											
		14											
		15	SP-SM		RS	17	17	17					
		16											
		17											
		18											
		19											
		20	SP-SM		RS	17	30	36	3	123			
		21											
		22											
		23											

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	

Terracon

BORING STARTED	7-6-11		
BORING COMPLETED	7-6-11		
RIG	B-61	FOREMAN	JR
APPROVED	SDN	JOB #	60095029A

LOG OF BORING NO. B-053

CLIENT **KRoad Solar Power**

SITE **NWC of Pisgah Crater Rd and Needles Fwy (I-40) Pisgah, California**

PROJECT **Calico Solar**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE INTERVAL	SAMPLE TYPE	BLOWS 1st 6"	BLOWS 2nd 6"	BLOWS 3rd 6"	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	TESTS -#200
	POORLY GRADED SAND WITH SILT AND GRAVEL; tan, medium dense to very dense, slightly damp.	24											
		25–26	SP-SM		RS	21	24	26	6	116			
		27–29											
		30–31	SP-SM		RS	37	34	50/4"					
		32–34											
	35												
	SEDIMENTARY BEDROCK - SANDSTONE; tan, slightly damp.	35–36			RS	27	50/5"		4	115			
		37–39											
		40–41			RS	44	46	50/4"	4	118			
	41.5												
	Boring terminated at 41.5'. **Bottom of BORING.**												

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	

Terracon

BORING STARTED	7-6-11		
BORING COMPLETED	7-6-11		
RIG	B-61	FOREMAN	JR
APPROVED	SDN	JOB #	60095029A

LOG OF BORING NO. B-054

CLIENT
KRoad Solar Power

SITE **NWC of Pisgah Crater Rd and Needles Fwy (I-40)**
Pisgah, California

PROJECT
Calico Solar

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE INTERVAL	SAMPLE TYPE	BLOWS 1st 6"	BLOWS 2nd 6"	BLOWS 3rd 6"	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	TESTS -#200
	POORLY GRADED SAND WITH SILT; some gravel, tan brown, medium dense, slightly damp.		SP-SM		BS								8
		1	SP-SM		SPT	14	17	13					
		2											
	weak to moderate cementation.	3											
			SP-SM		SPT	7	13	15					
		4											
		5											
			SP-SM		RS	6	14	21	4	113			
		6											
	7.5	7											
	SEDIMENTARY BEDROCK - SANDSTONE; light brown, slightly damp.	8			SPT	10	27	37					
		9											
		10											
					RS	30	50		1	125			
		11											
		12											
	13.5	13			SPT	22	50						
	Refusal was encountered on sedimentary bedrock. Boring terminated at 13.5'. **Bottom of BORING.**												

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	

Terracon

BORING STARTED	7-22-11		
BORING COMPLETED	7-22-11		
RIG	B-61	FOREMAN	JR
APPROVED	SDN	JOB #	60095029A

LOG OF BORING NO. B-055

CLIENT
KRoad Solar Power

SITE **NWC of Pisgah Crater Rd and Needles Fwy (I-40)**
Pisgah, California

PROJECT
Calico Solar

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE INTERVAL	SAMPLE TYPE	BLOWS 1st 6"	BLOWS 2nd 6"	BLOWS 3rd 6"	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	TESTS -#200
	POORLY GRADED SAND WITH SILT; some gravel, tan brown, slightly damp.	1, 2	SP-SM		BS								
2.5	**POORLY GRADED SAND WITH SILT AND GRAVEL**; tan brown, loose to medium dense, slightly damp.	3	SP-SM		SPT	3	4	6	2	110			
		4, 5											
		6	SP-SM		RS	3	5	8					
7.5		7											
	SILTY SAND WITH GRAVEL; light brown, very dense, slightly damp.	8	SP-SM		SPT	50/3"			4	102			
10		9											
11	**POORLY GRADED GRAVEL WITH SAND**; light brown, very dense, slightly damp.	10	GP		RS	12	50						
	Refusal was encountered on very dense gravel. Boring terminated at 11'. **Bottom of BORING.**	11											

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	

Terracon

BORING STARTED	7-22-11		
BORING COMPLETED	7-22-11		
RIG	B-61	FOREMAN	JR
APPROVED	SDN	JOB #	60095029A

LOG OF BORING NO. B-056

CLIENT
KRoad Solar Power

SITE **NWC of Pisgah Crater Rd and Needles Fwy (I-40)**
Pisgah, California

PROJECT
Calico Solar

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE INTERVAL	SAMPLE TYPE	BLOWS 1st 6"	BLOWS 2nd 6"	BLOWS 3rd 6"	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	TESTS -#200
	POORLY GRADED SAND WITH SILT; some gravel, tan, slightly damp.	1	SP-SM		BS								
		2											
	POORLY GRADED SAND WITH SILT AND GRAVEL; tan, medium dense to dense, slightly damp.	3	SP-SM		SPT	5	7	6					
		4											
		5	SP-SM		RS	10	24	22					
		6											
		7											
		8	SP-SM		SPT	7	9	11					
		9											
		10	SP-SM		RS	14	23	27					
		11											
		12											
		13											
		14											
		15	SP-SM		SPT	9	14	16					6
		16											
	2.5												
	16.5												
	Boring terminated at 16.5'. **Bottom of BORING.**												

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	

Terracon

BORING STARTED	7-5-11		
BORING COMPLETED	7-5-11		
RIG	B-61	FOREMAN	JR
APPROVED	SDN	JOB #	60095029A

LOG OF HAND AUGER NO. B-057A

CLIENT
KRoad Solar Power

SITE **NWC of Pisgah Crater Rd and Needles Fwy (I-40)**
Pisgah, California

PROJECT
Calico Solar

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE INTERVAL	SAMPLE TYPE	BLOWS 1st 6"	BLOWS 2nd 6"	BLOWS 3rd 6"	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	TESTS -#200
	POORLY GRADED SAND WITH SILT; some gravel, light brown, slightly damp.	1	SP-SM		BS								10
		2											
		3											
		4											
	Bottom of HAND AUGER.												

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	

Terracon

HAND AUGER STARTED			7-5-11
HAND AUGER COMPLETED			7-5-11
RIG		FOREMAN	JR
APPROVED	SDN	JOB #	60095029A

LOG OF BORING NO. B-058

CLIENT
KRoad Solar Power

SITE **NWC of Pisgah Crater Rd and Needles Fwy (I-40)**
Pisgah, California

PROJECT
Calico Solar

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLE INTERVAL	SAMPLE TYPE	BLOWS 1st 6"	BLOWS 2nd 6"	BLOWS 3rd 6"	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS LIQUID LIMIT	TESTS PLASTICITY INDEX	TESTS -#200
	SILTY SAND; some gravel, tan, slightly damp.	1, 2	SM		BS								
2.5	**POORLY GRADED SAND WITH SILT AND GRAVEL**; tan, medium dense to very dense, slightly damp.	3	SP-SM		SPT	4	11	15					5
		4											
		5, 6	SP-SM		RS	30	36	46	3	120			
		7											
		8	SP-SM		SPT	20	34	36					
		9											
		10, 11	SP-SM		RS	33	35	54	2	128			
		12, 13, 14											
		15, 16	SP-SM		SPT	6	10	16					
16.5	Boring terminated at 16.5'. **Bottom of BORING.**												

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	

Terracon

BORING STARTED	7-5-11		
BORING COMPLETED	7-5-11		
RIG	B-61	FOREMAN	JR
APPROVED	SDN	JOB #	60095029A

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SPT:	Split Spoon - 1-3/8" I.D., 2" O.D., unless otherwise noted	HS:	Hollow Stem Auger
ST:	Thin-Walled Tube - 2" O.D., 3" O.D. unless otherwise noted	PA:	Power Auger
RS:	Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA:	Hand Auger
DB:	Diamond Bit Coring - 4", N, B	RB:	Rock Bit
BS:	Bulk Sample or Auger Sample	WB:	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value". For 3" O.D. ring samplers (RS) the penetration value is reported as the number of blows required to advance the sampler 12 inches using a 140-pound hammer falling 30 inches, reported as "blows per foot," and is not considered equivalent to the "Standard Penetration" or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling	N/E:	Not Encountered
WCI:	Wet Cave in	WD:	While Drilling		
DCI:	Dry Cave in	BCR:	Before Casing Removal		
AB:	After Boring	ACR:	After Casing Removal		

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-value (SS) Blows/Ft.	Consistency
< 500	0 - 1	Very Soft
500 – 1,000	2 - 4	Soft
1,000 – 2,000	4 - 8	Medium Stiff
2,000 – 4,000	8 -15	Stiff
4,000 – 8,000	15 - 30	Very Stiff
8,000+	≥ 30	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Standard Penetration or N-value (SS) Blows/Ft.	Ring Sampler (RS) Blows/Ft.	Relative Density
0 – 3	0-6	Very Loose
4 – 9	7-18	Loose
10 – 29	19-58	Medium Dense
30 – 50	59-98	Dense
≥ 50	≥ 99	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 – 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 – 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1-10
Medium	11-30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]					Soil Classification	
					Group Symbol	Group Name[B]
Coarse Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$[E]		GW	Well-graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3$[E]		GP	Poorly graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH		GM	Silty gravel[F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$[E]		SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3$[E]		SP	Poorly graded sand[I]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH		SM	Silty sand[G,H,I]
			Fines Classify as CL or CH		SC	Clayey sand[G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	$PI > 7$ and plots on or above "A" line[J]		CL	Lean clay[K,L,M]
			$PI < 4$ or plots below "A" line[J]		ML	Silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OL	Organic clay[K,L,M,N] / Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line		CH	Fat clay[K,L,M]
			PI plots below "A" line		MH	Elastic Silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OH	Organic clay[K,L,M,P] / Organic silt[K,L,M,Q]
Highly organic soils	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

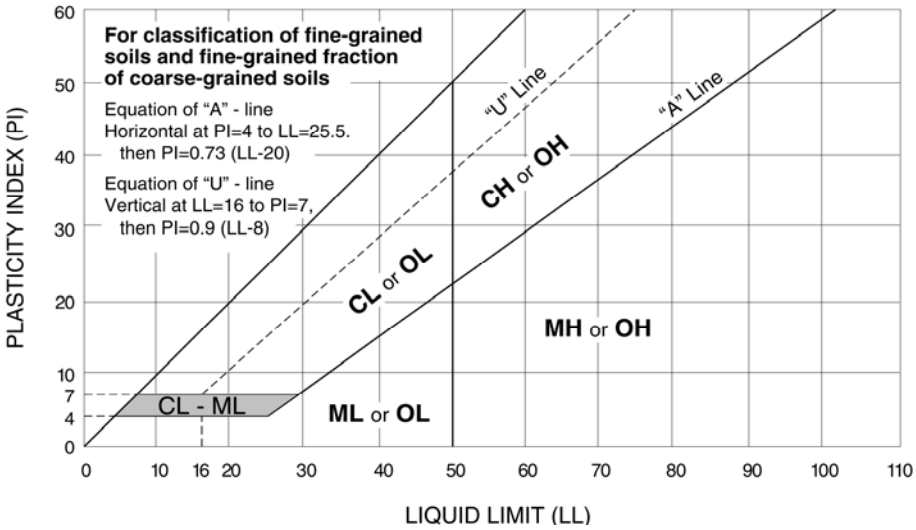
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] $PI \geq 4$ and plots on or above "A" line.

[O] $PI < 4$ or plots below "A" line.

[P] PI plots on or above "A" line.

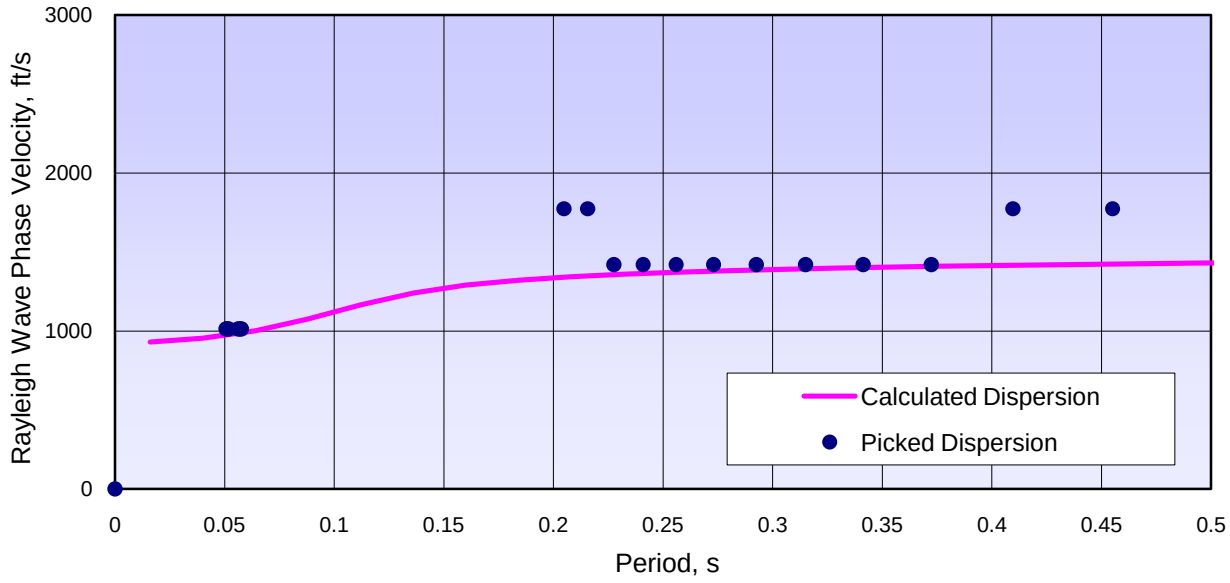
[Q] PI plots below "A" line.



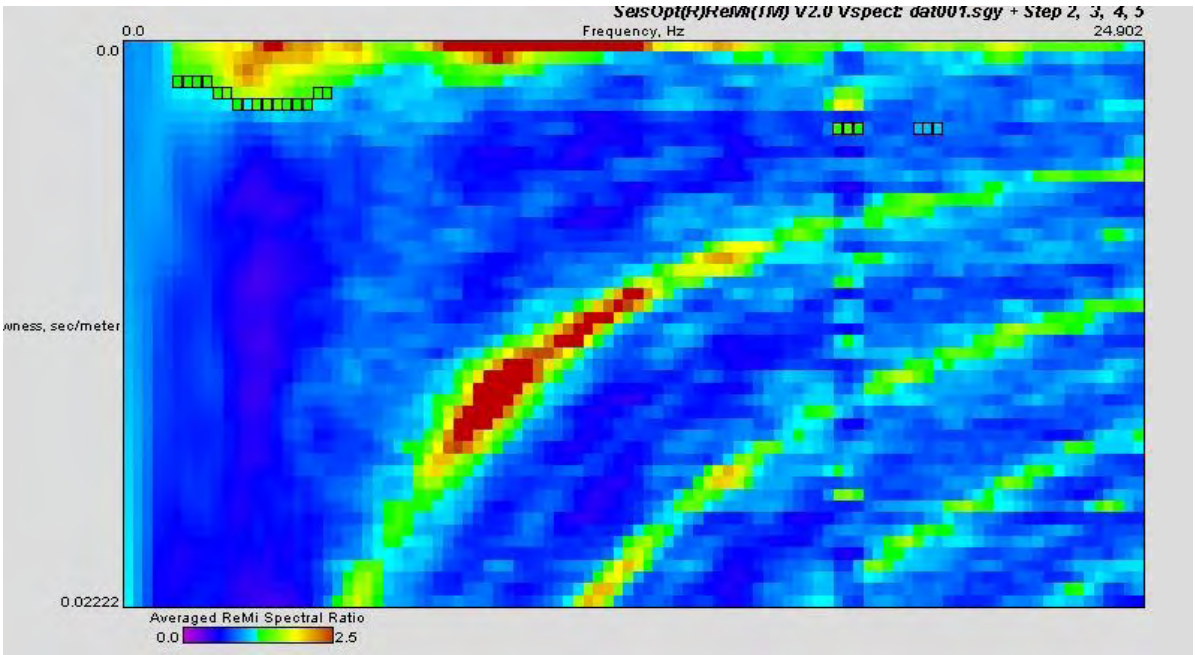
Terracon

Stirling Energy System
Calico - Solar One B-005
Terracon Project No. 60095029

Dispersion Curve Showing Picks and Fit

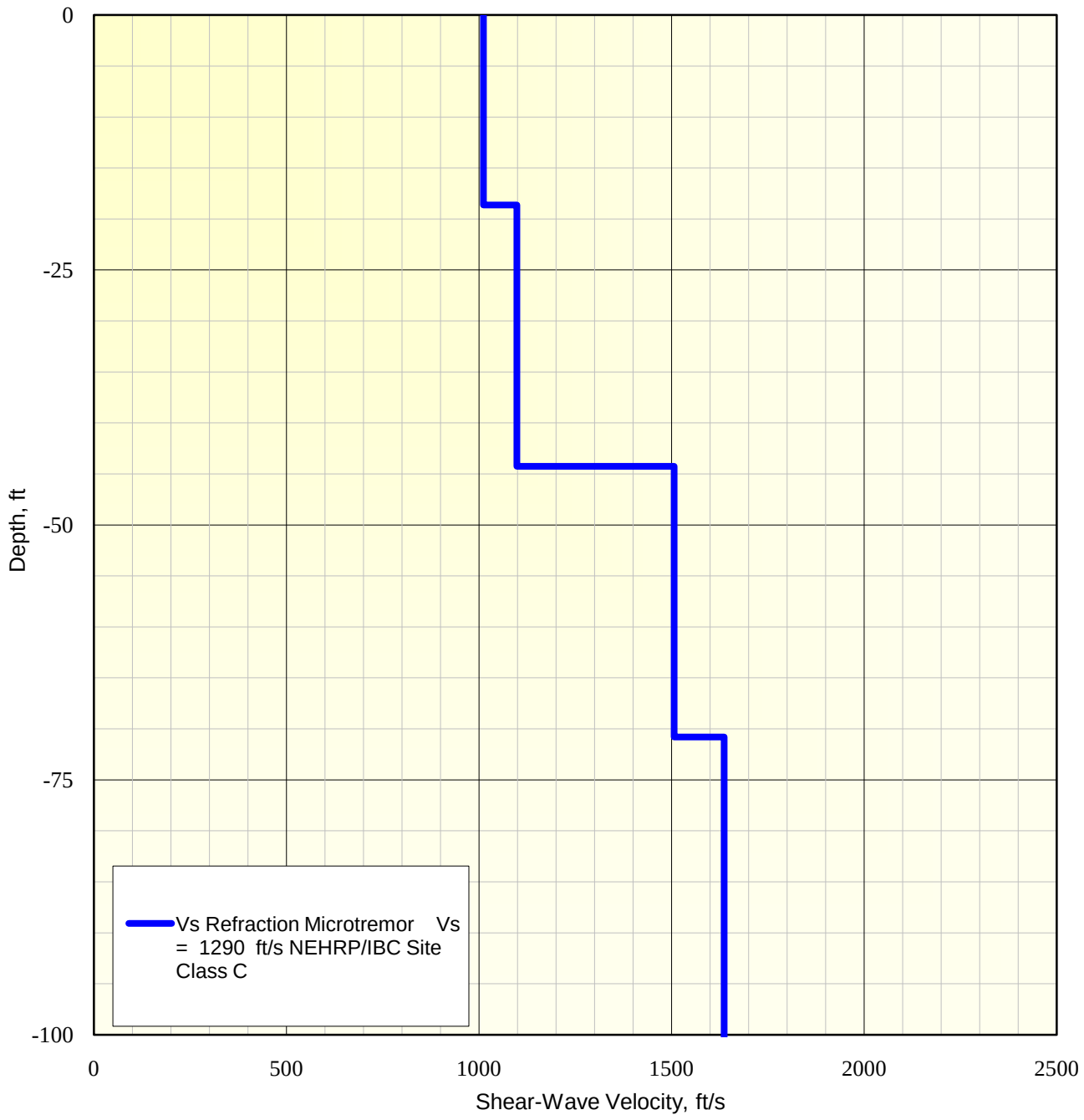


p-f Image with Dispersion Modeling Picks



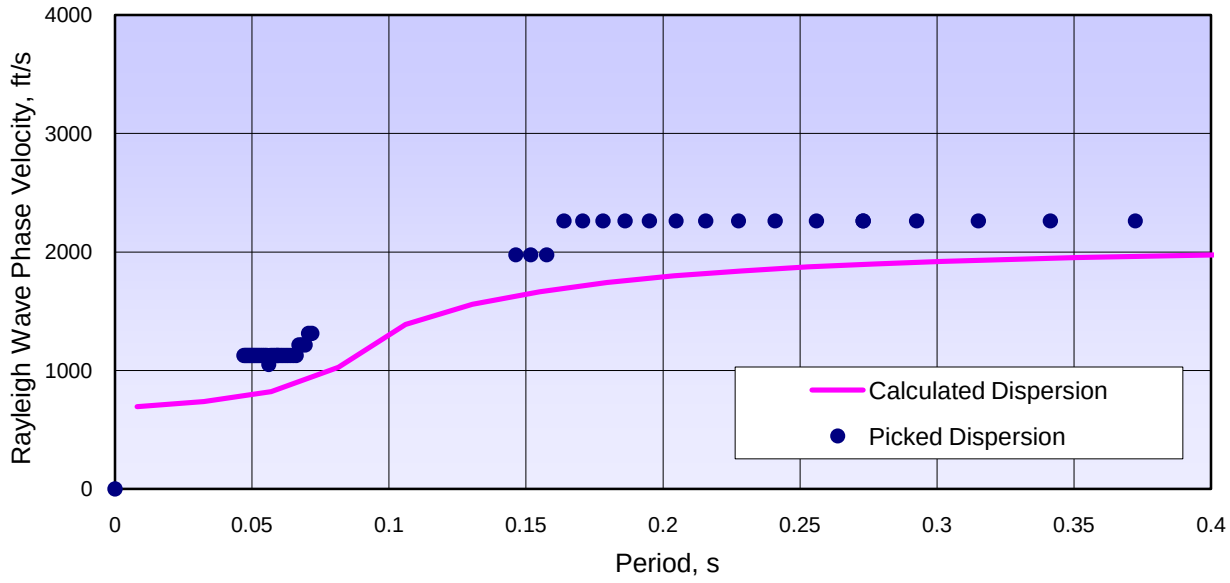
Stirling Energy System
Calico - Solar One B-005
Terracon Project No. 60095029

Shear-Wave Velocity Profile from SeisOpt ReMi Software Analysis

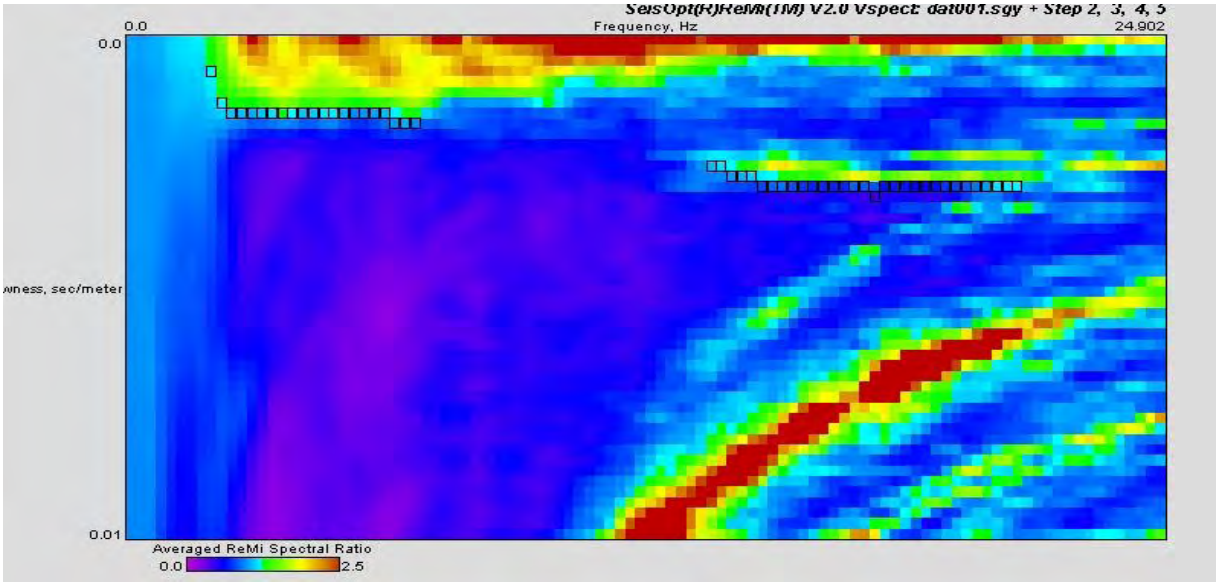


Stirling Energy System
Calico - Solar One B-031
Terracon Project No. 60095029

Dispersion Curve Showing Picks and Fit

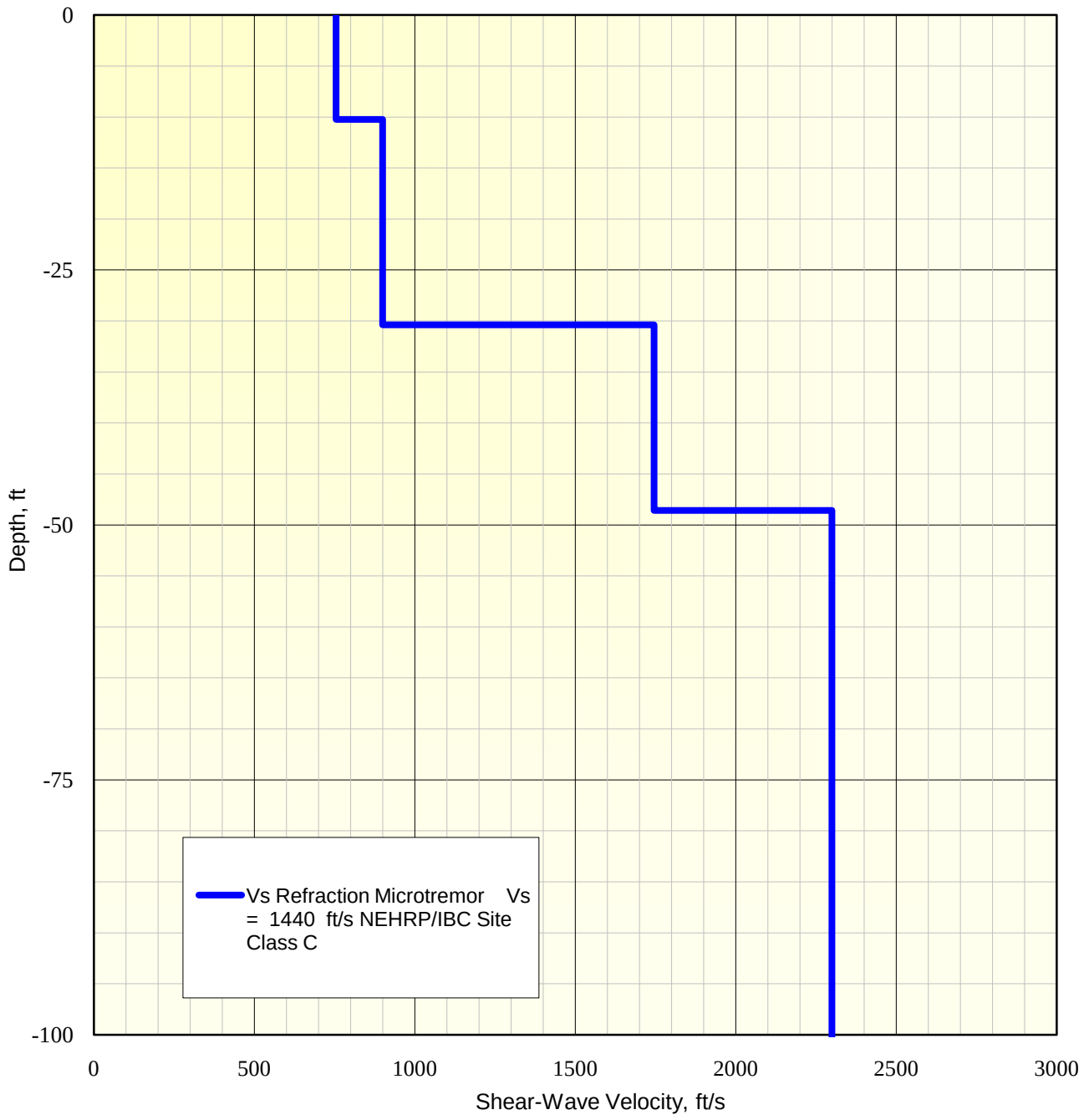


p-f Image with Dispersion Modeling Picks



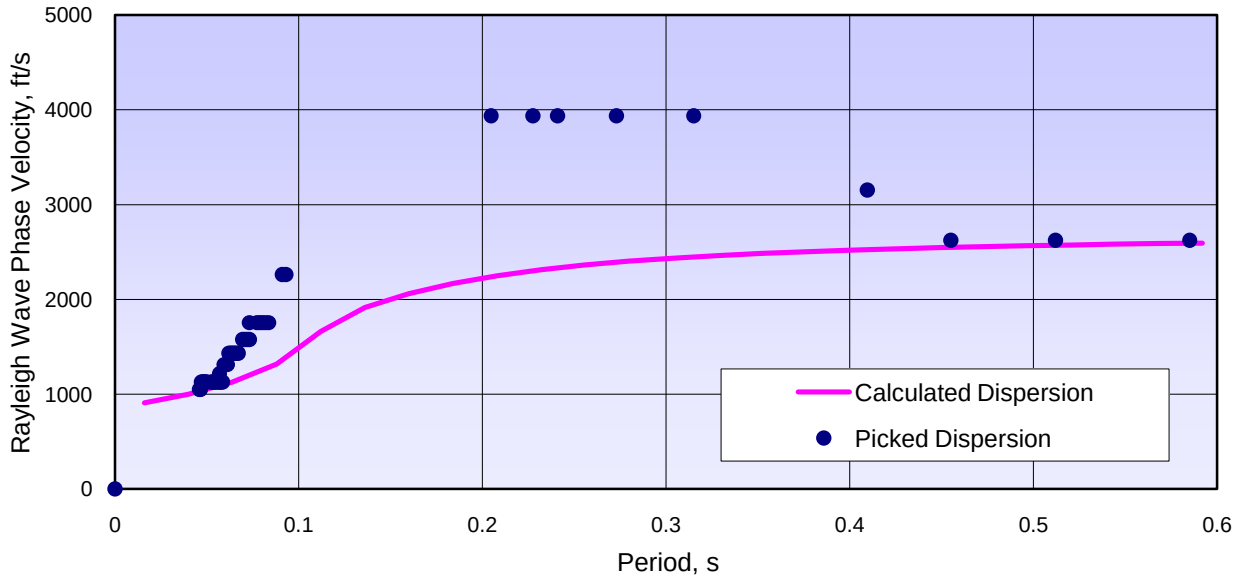
Stirling Energy System
Calico - Solar One B-031
Terracon Project No. 60095029

Shear-Wave Velocity Profile from SeisOpt ReMi Software Analysis

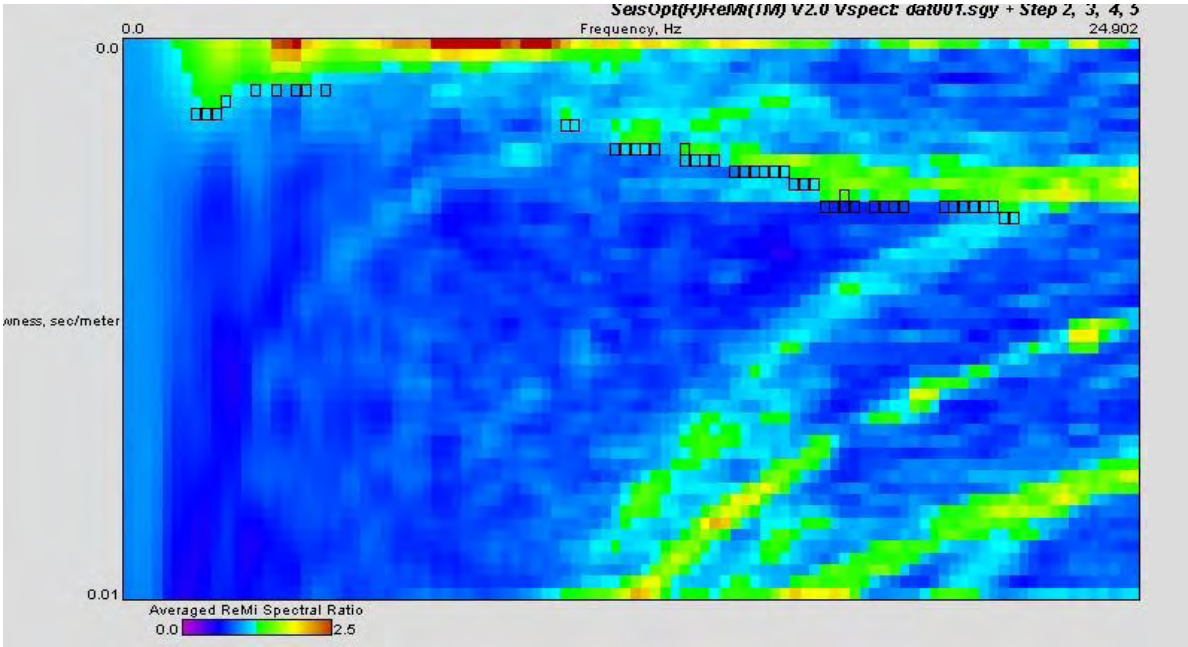


Stirling Energy System
Calico - Solar One T-044
Terracon Project No. 60095029

Dispersion Curve Showing Picks and Fit

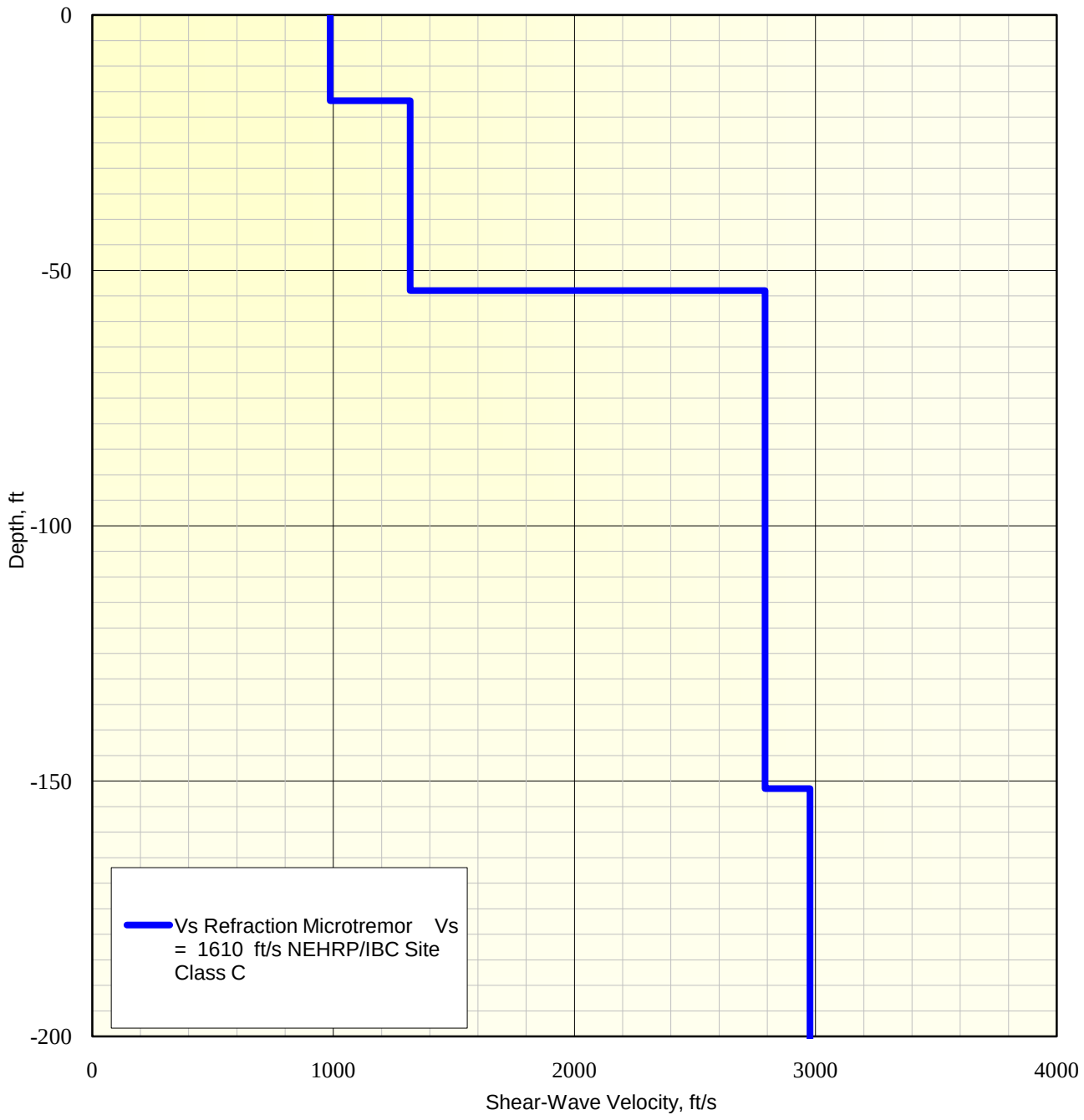


p-f Image with Dispersion Modeling Picks



Stirling Energy System
Calico - Solar One T-044
Terracon Project No. 60095029

Shear-Wave Velocity Profile from SeisOpt ReMi Software Analysis



APPENDIX B

LABORATORY TESTING

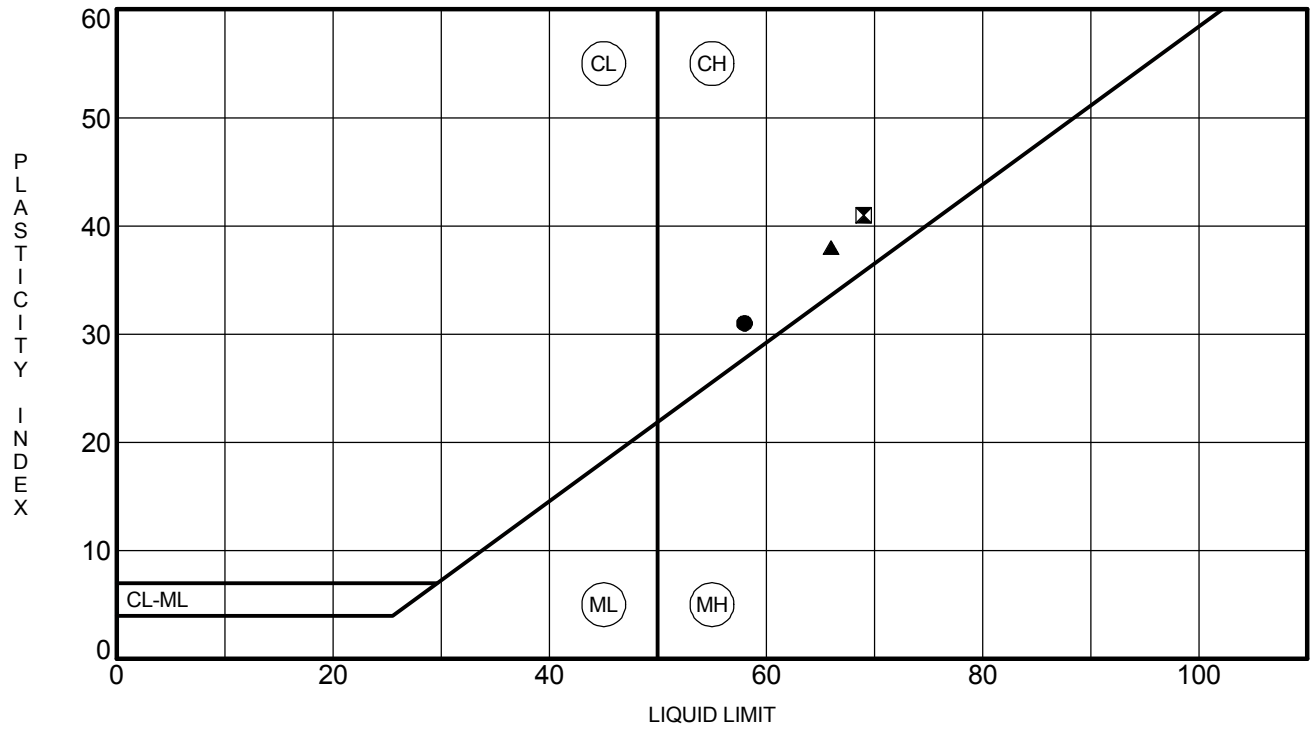
Laboratory Testing

Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and were classified in accordance with the Unified Soil Classification System (USCS) described in Appendix A. At that time, the field descriptions were confirmed or modified as necessary and an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials.

Laboratory tests were conducted on selected soil samples and the test results are presented in this appendix. The laboratory test results were used for the geotechnical engineering analyses, and the development of foundation and earthwork recommendations. Laboratory tests were performed in general accordance with the applicable ASTM, local or other accepted standards.

Selected soil samples obtained from the site were tested for the following engineering properties:

- Consolidation
- Sieve Analysis
- Atterberg Limits
- Direct Shear
- Soluble Chlorides
- pH
- Standard Proctor
- In-situ Water Content
- In-situ Dry Density
- Moisture Density Relationship
- Remolded Expansion/Swell
- Soluble Sulfates
- Minimum Resistivity

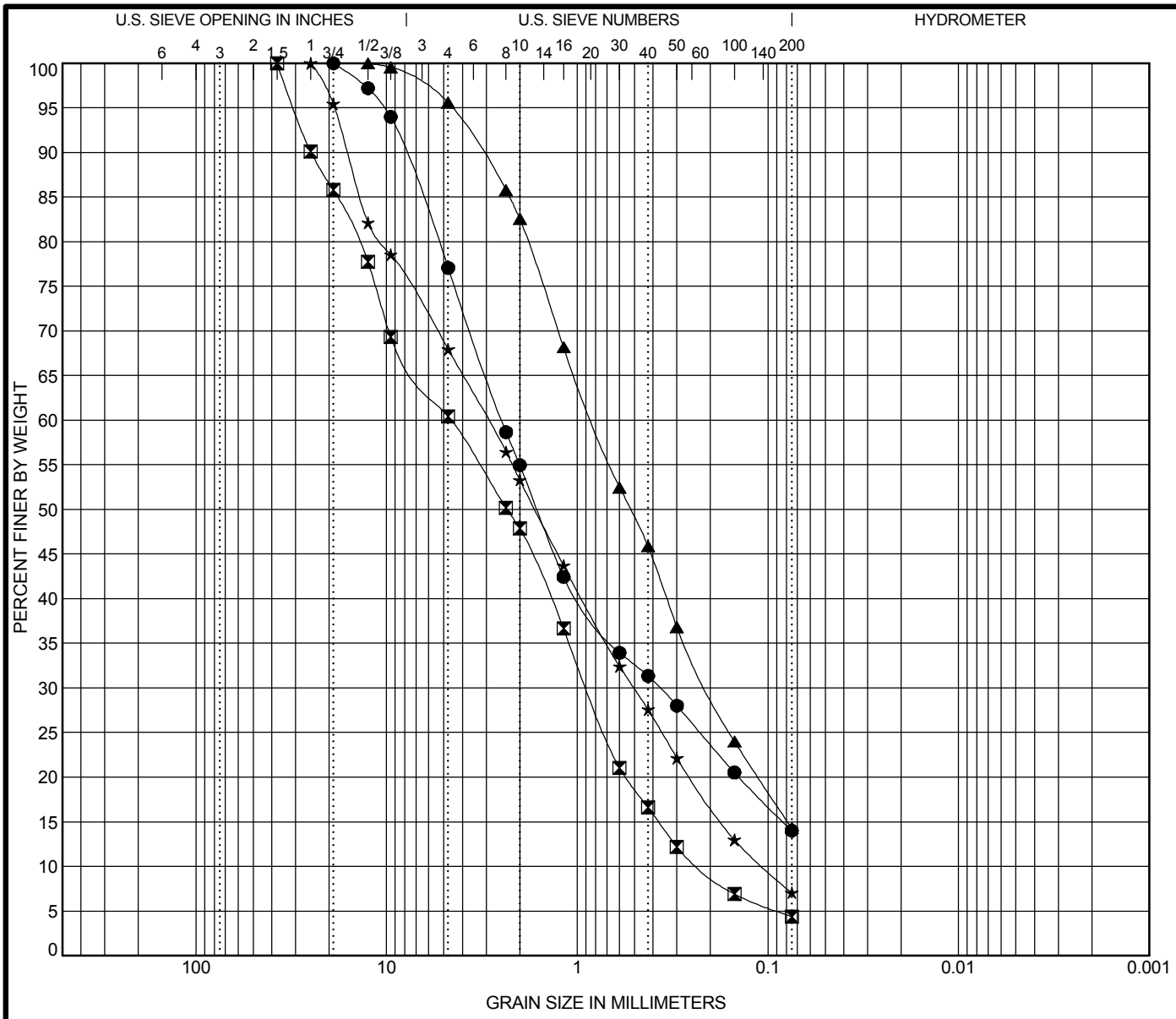


	Specimen Identification		LL	PL	PI	%Fines	Classification
●	**B-005**	**5.0ft**	**58**	**27**	**31**		**FAT CLAY (CH)**
⧗	**B-007**	**10.0ft**	**69**	**28**	**41**		**FAT CLAY (CH)**
▲	**B-008**	**5.0ft**	**66**	**28**	**38**		**FAT CLAY (CH)**

Terracon

ATTERBERG LIMITS RESULTS

Project: Calico - Solar One
Site: East of Barstow, California
Job #: 60095029
Date: 12-9-09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**B-009**	**7.5ft**	**SILTY SAND with GRAVEL (SM)**					
⊠	**B-010**	**5.0ft**	**POORLY GRADED SAND with GRAVEL (SP)**				**0.8**	**20.5**
▲	**B-011**	**20.0ft**	**SILTY SAND (SM)**					
★	**B-036**	**7.5ft**	**POORLY GRADED SAND with SILT and GRAVEL**				**0.8**	**27.7**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-009**	**7.5ft**	**19**	**2.5**	**0.4**		**23**	**63**	**14**	
⊠	**B-010**	**5.0ft**	**37.5**	**4.6**	**0.9**	**0.2**	**40**	**56**	**4**	
▲	**B-011**	**20.0ft**	**12.5**	**0.8**	**0.2**		**4**	**81**	**14**	
★	**B-036**	**7.5ft**	**25**	**2.9**	**0.5**	**0.1**	**32**	**61**	**7**	

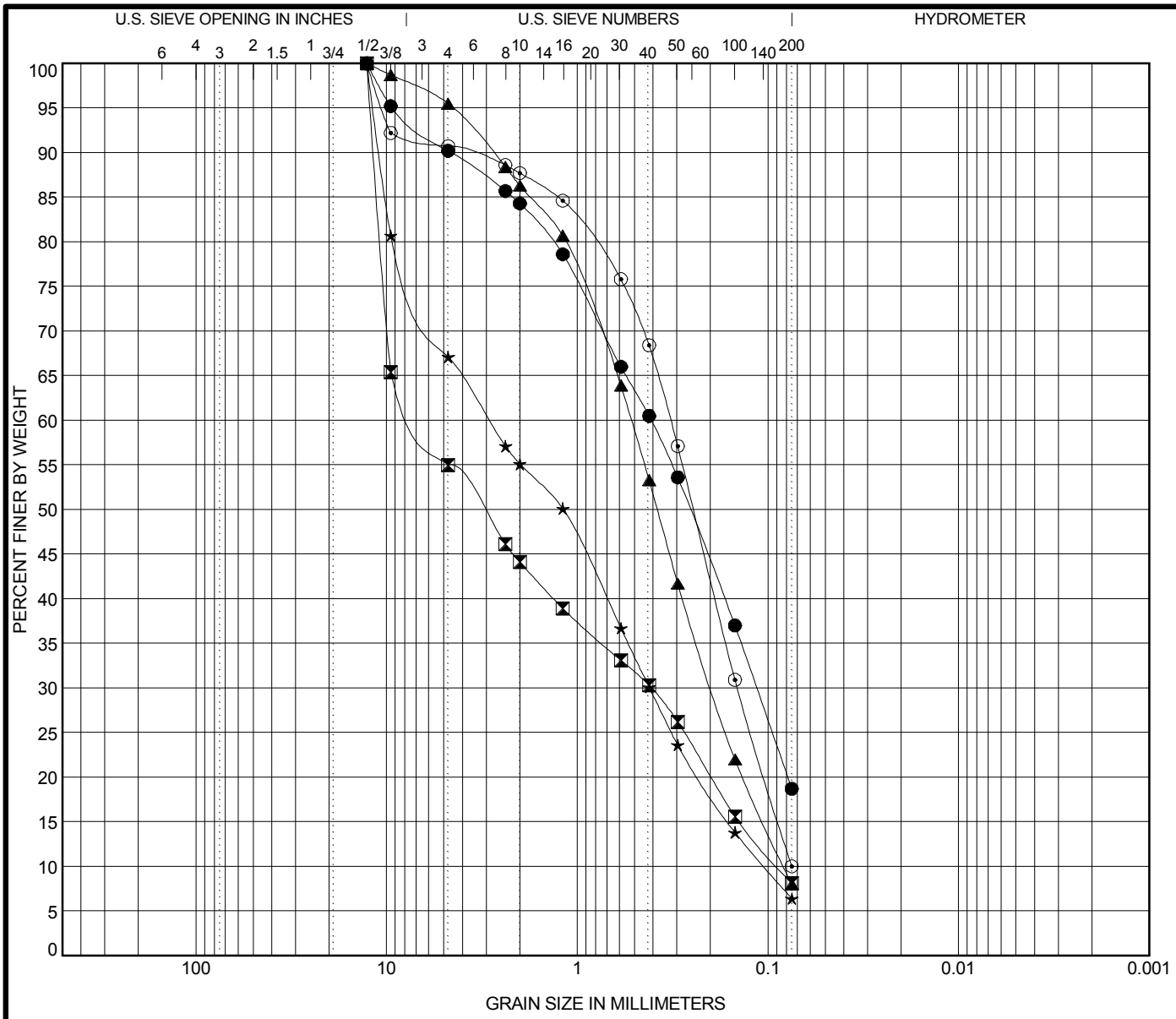
Terracon

GRAIN SIZE DISTRIBUTION

Project: Calico - Solar One
Site: East of Barstow, California
Job #: 60095029
Date: 12-9-09

B-1

TC GRAIN SIZE 60095029 BORING LOGS.GPJ TERRACON COSTA MESA.GDT 12/9/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		USCS Soil Classification	LL	PL	PI	Cc	Cu
●	B-51	0.0 ft	SILTY SAND (SM)					
⊠	B-52	10.0 ft	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)				0.3	74.3
▲	B-54	0.0 ft	POORLY GRADED SAND WITH SILT (SP-SM)				0.9	6.3
★	B-56	15.0 ft	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)				0.6	27.8
⊙	B-57A	1.0 ft	POORLY GRADED SAND WITH SILT (SP-SM)				0.9	4.3

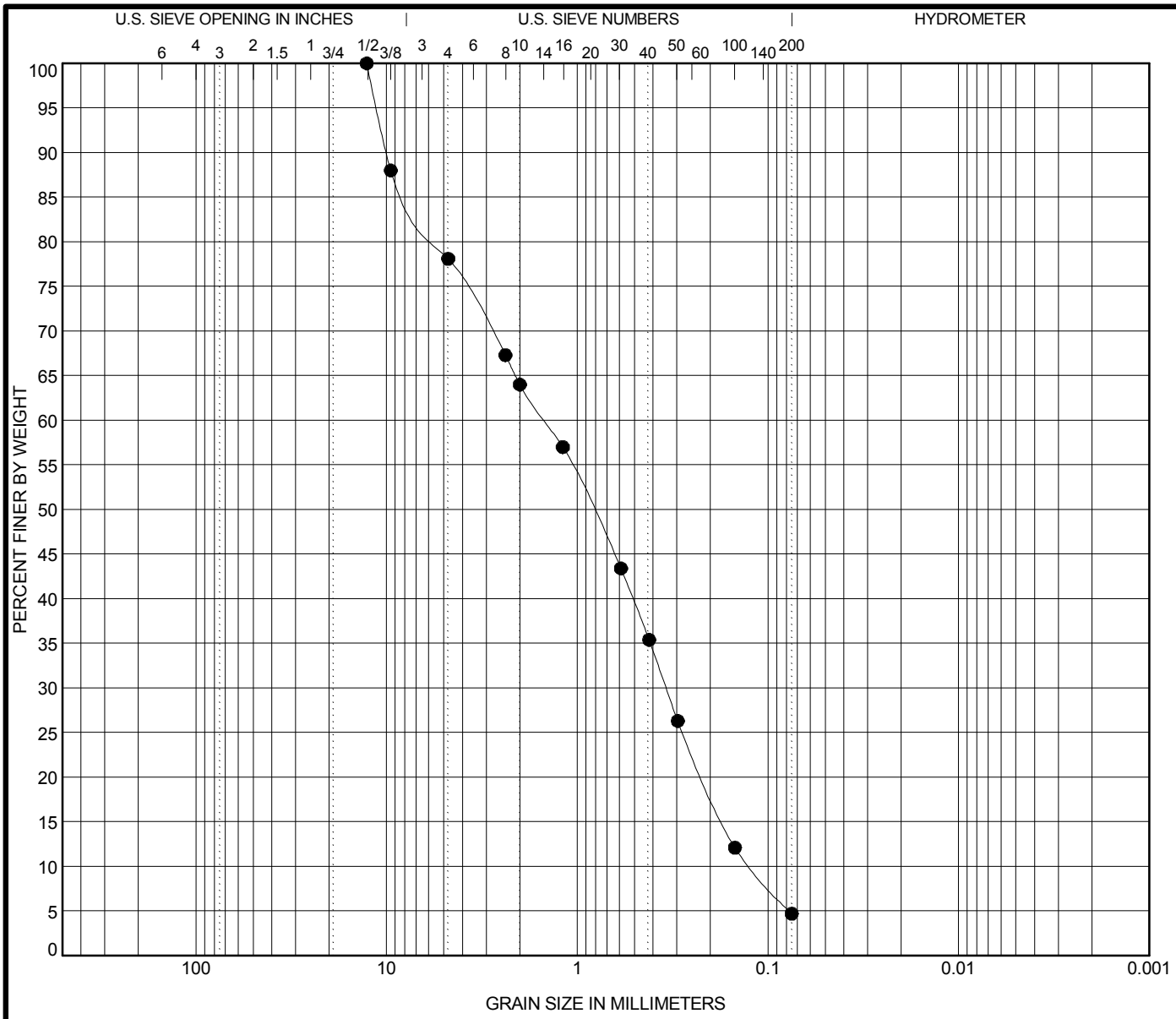
	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-51	0.0 ft	12.7	0.41	0.115		10	71	19	
⊠	B-52	10.0 ft	12.7	6.629	0.409	0.089	45	47	8	
▲	B-54	0.0 ft	12.7	0.521	0.197	0.083	5	88	8	
★	B-56	15.0 ft	12.7	2.908	0.418	0.105	33	61	6	
⊙	B-57A	1.0 ft	12.7	0.325	0.145	0.075	9	81	10	

Terracon

GRAIN SIZE DISTRIBUTION

Project: Calico Solar
Site: Pisgah Road Pisgah, California
Job #: 60095029A
Date: 7-29-11

TC_GRAIN_SIZE_MULTI 60095029A.GPJ TERRACON.GDT 7/29/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		USCS Soil Classification	LL	PL	PI	Cc	Cu
●	**B-58**	**2.5 ft**	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**				**0.6**	**12.1**

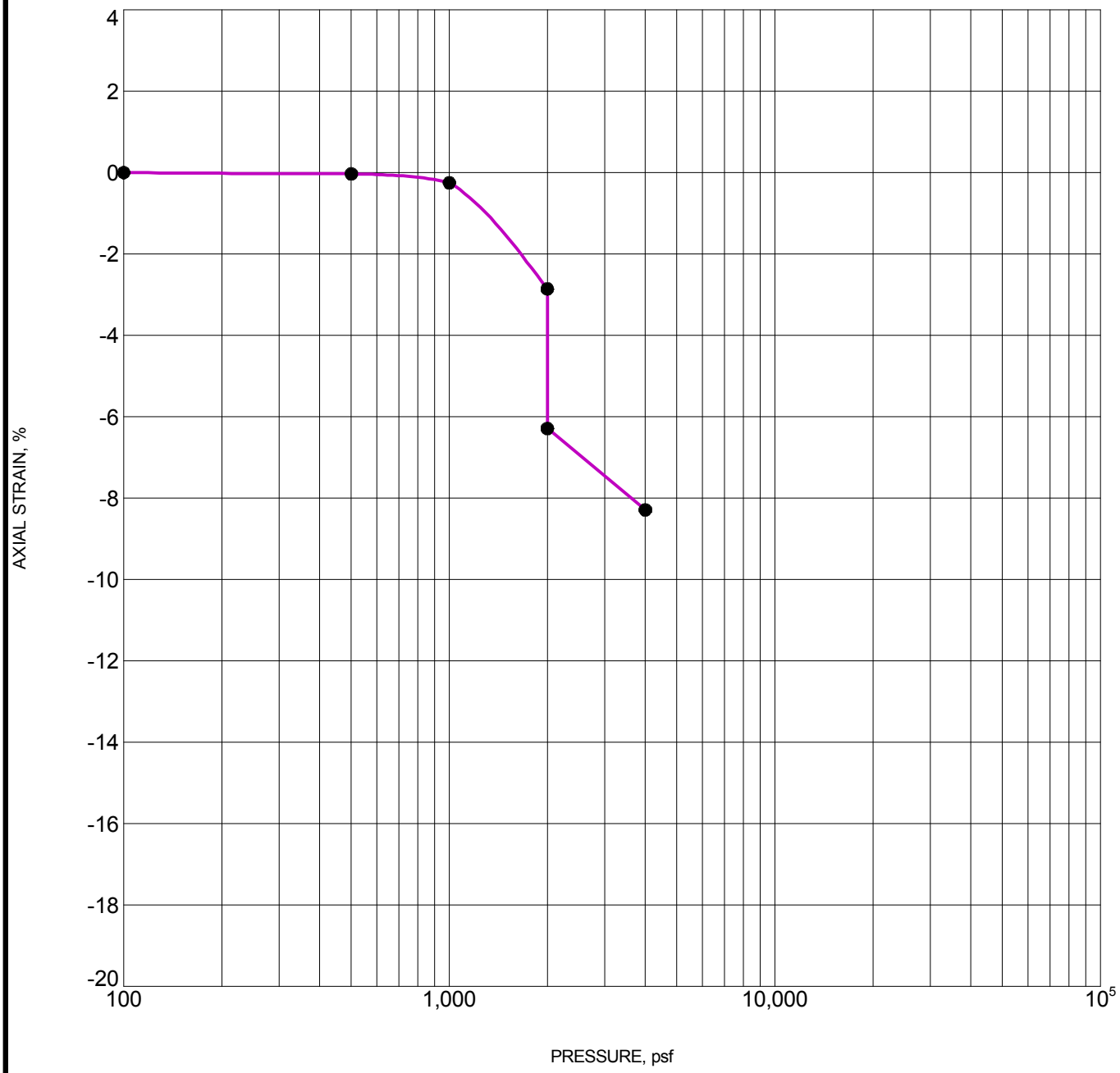
	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-58**	**2.5 ft**	**12.7**	**1.487**	**0.342**	**0.123**	**22**	**73**	**5**	

Terracon

GRAIN SIZE DISTRIBUTION

Project: Calico Solar
Site: Pisgah Road Pisgah, California
Job #: 60095029A
Date: 7-29-11

TC_GRAIN_SIZE_MULTI 60095029A.GPJ TERRACON.GDT 7/29/11



Specimen Identification			Classification	γ_d , pcf	WC,%
●	**B-52**	**2.5ft**	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**	**112**	**10**

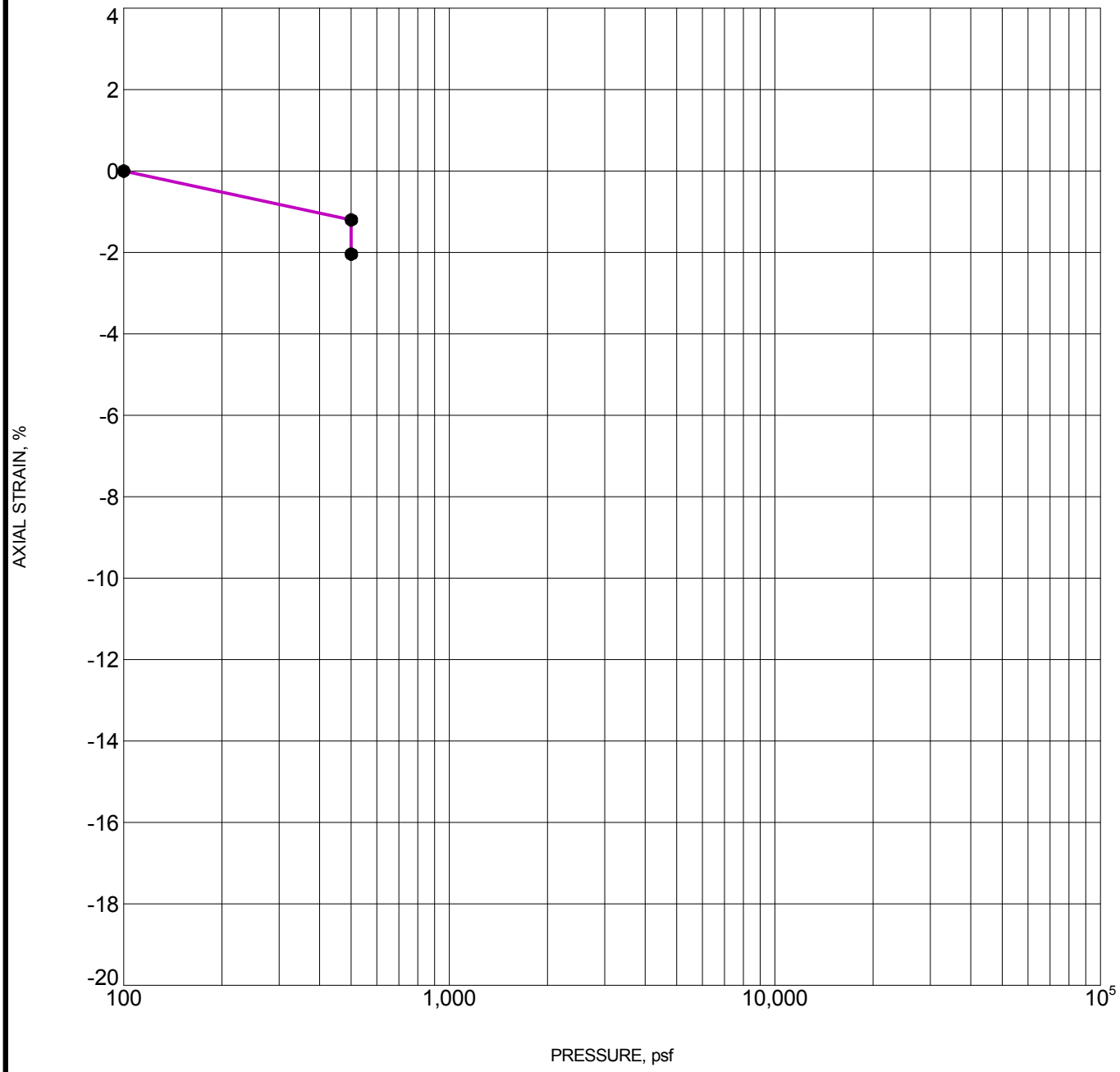
Water added at 2,000 psf

Terracon

CONSOLIDATION TEST RESULTS

Project: Calico Solar
Site: Pisgah Road Pisgah, California
Job #: 60095029A
Date: 7-29-11

TC_CONSOL_STRAIN 60095029A.GPJ TERRACON.GDT 7/29/11



Specimen Identification			Classification	γ_d , pcf	WC,%
●	**B-54**	**5.0ft**	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**	**113**	**4**

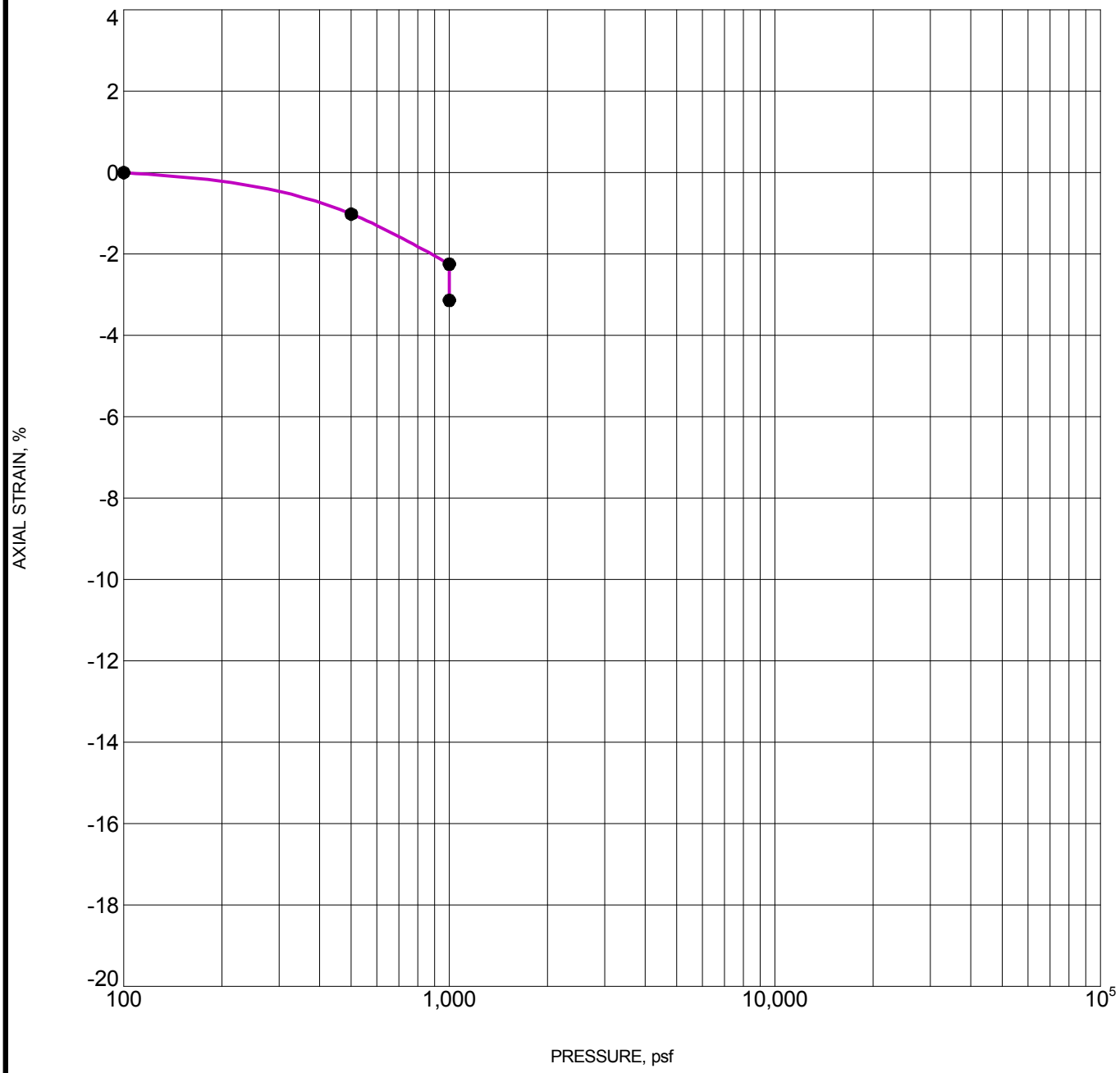
Water added at 500 psf

Terracon

CONSOLIDATION TEST RESULTS

Project: Calico Solar
Site: Pisgah Road Pisgah, California
Job #: 60095029A
Date: 7-29-11

TC_CONSOL_STRAIN 60095029A.GPJ TERRACON.GDT 7/29/11



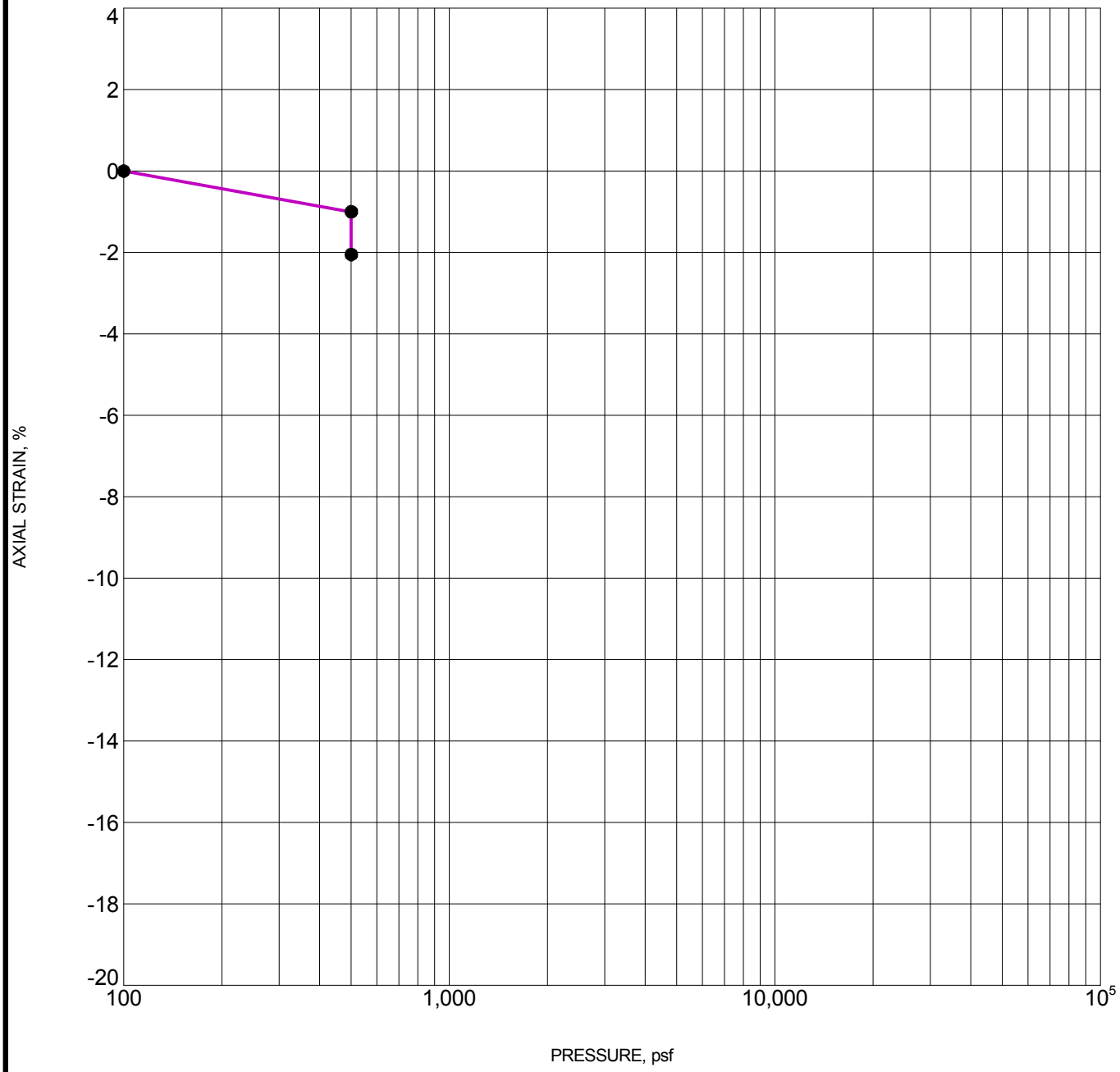
Specimen Identification			Classification	γ_d , pcf	WC,%
●	**B-54**	**10.0ft**	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**	**125**	**1**

Water added at 1,000 psf

Terracon

CONSOLIDATION TEST RESULTS

Project: Calico Solar
Site: Pisgah Road Pisgah, California
Job #: 60095029A
Date: 7-29-11



Specimen Identification			Classification	γ_d , pcf	WC,%
●	**B-55**	**2.5ft**	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**	**110**	**2**

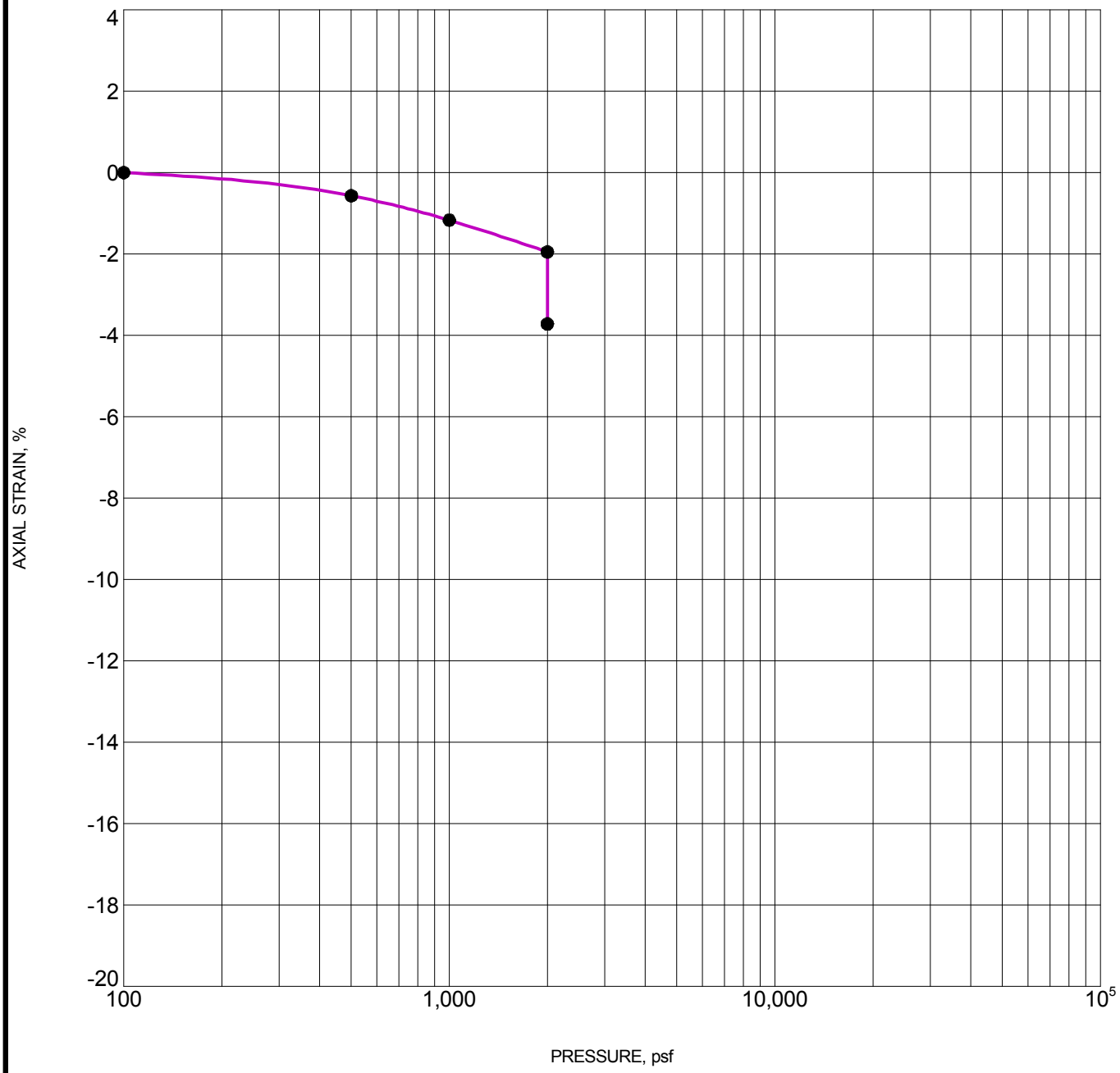
Water added at 500 psf

Terracon

CONSOLIDATION TEST RESULTS

Project: Calico Solar
Site: Pisgah Road Pisgah, California
Job #: 60095029A
Date: 7-29-11

TC_CONSOL_STRAIN 60095029A.GPJ TERRACON.GDT 7/29/11



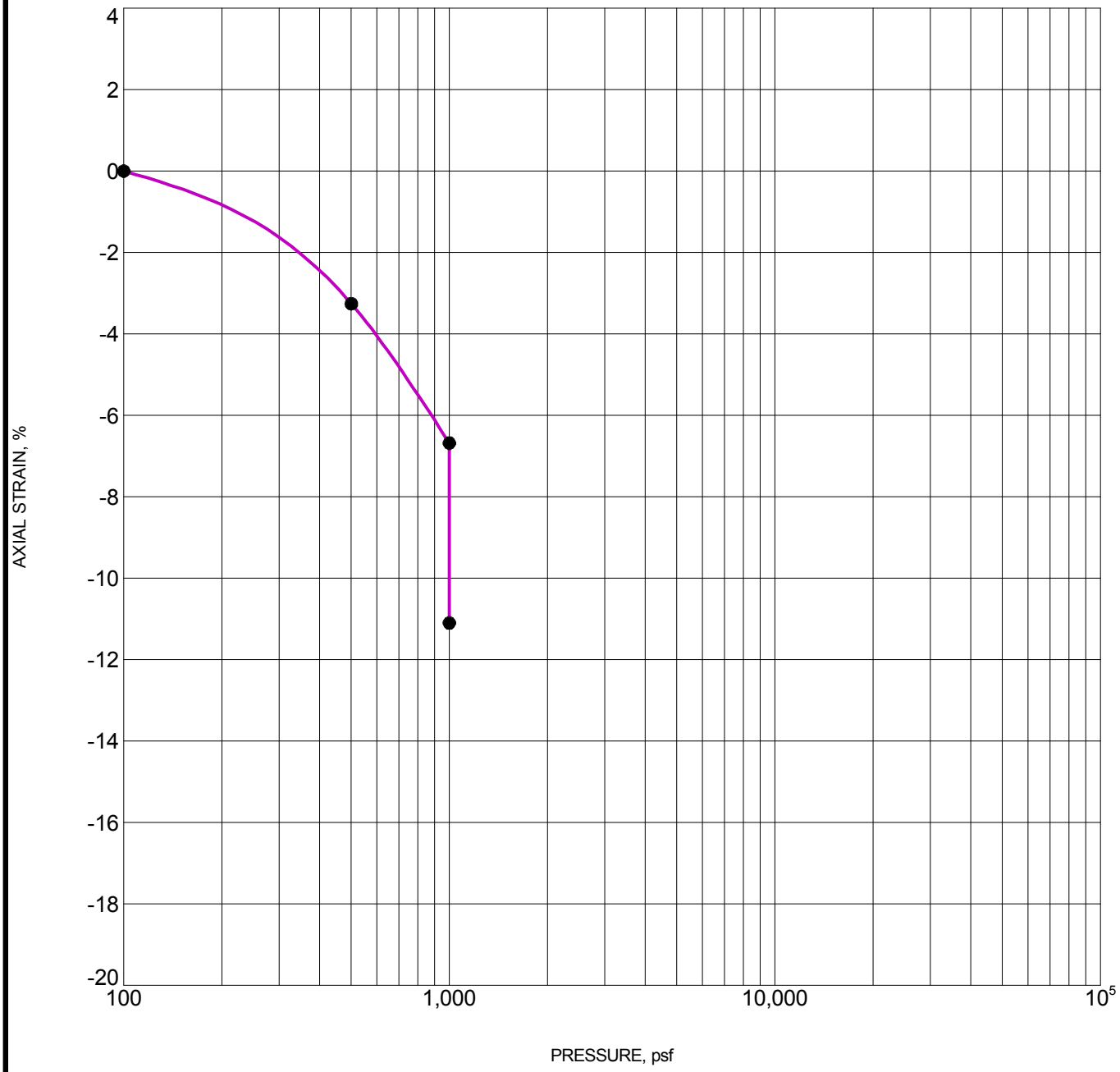
Specimen Identification			Classification	γ_d , pcf	WC,%
●	**B-55**	**2.5ft**	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**	**110**	**2**

Water added at 2,000 psf

Terracon

CONSOLIDATION TEST RESULTS

Project: Calico Solar
Site: Pisgah Road Pisgah, California
Job #: 60095029A
Date: 7-29-11



Specimen Identification			Classification	γ_d , pcf	WC,%
●	**B-55**	**7.5ft**	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**	**102**	**4**

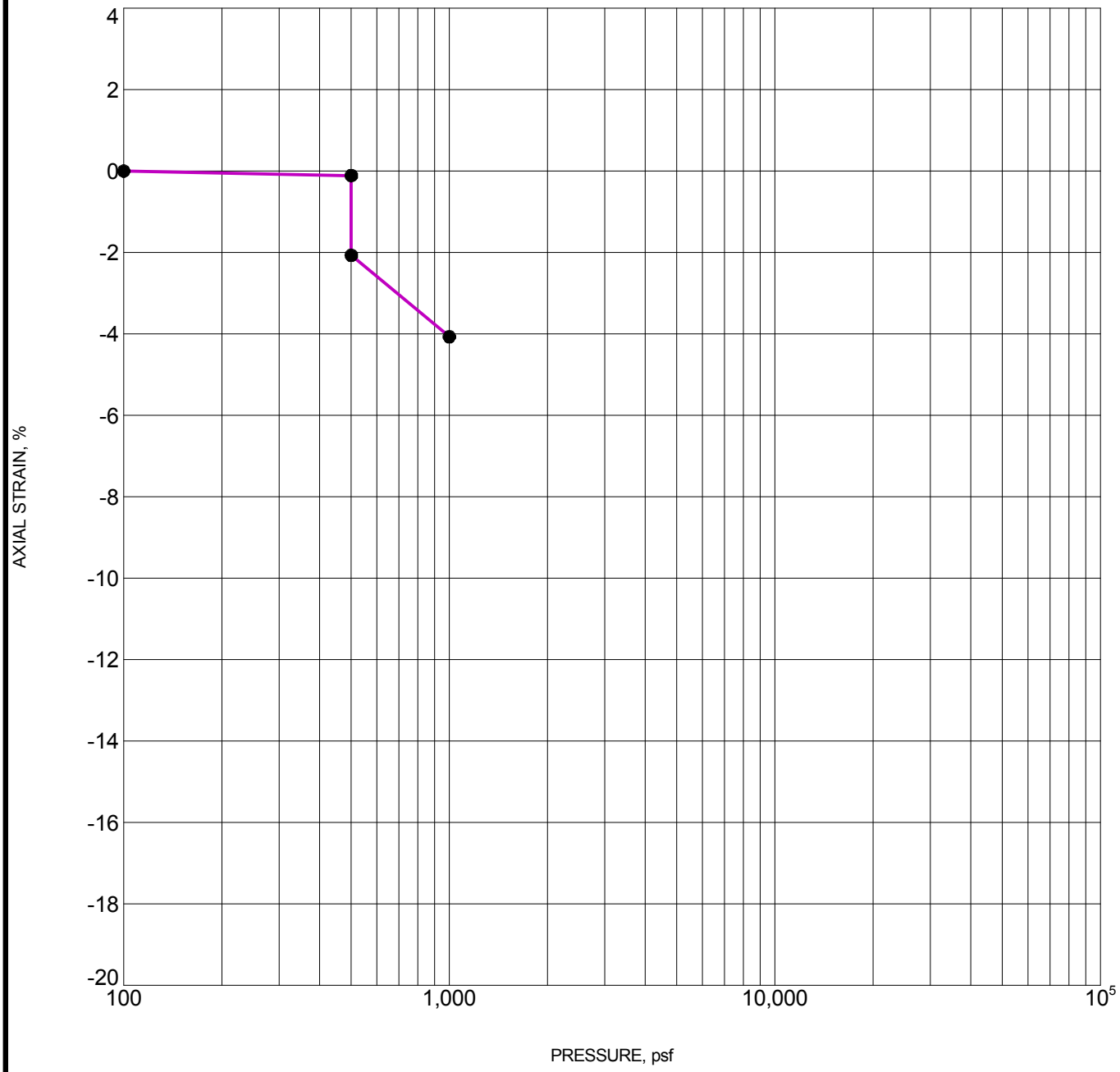
Water added at 1,000 psf

Terracon

CONSOLIDATION TEST RESULTS

Project: Calico Solar
Site: Pisgah Road Pisgah, California
Job #: 60095029A
Date: 7-29-11

TC_CONSOL_STRAIN 60095029A.GPJ TERRACON.GDT 7/29/11



Specimen Identification			Classification	γ_d , pcf	WC,%
●	**B-58**	**5.0ft**	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**	**121**	**3**

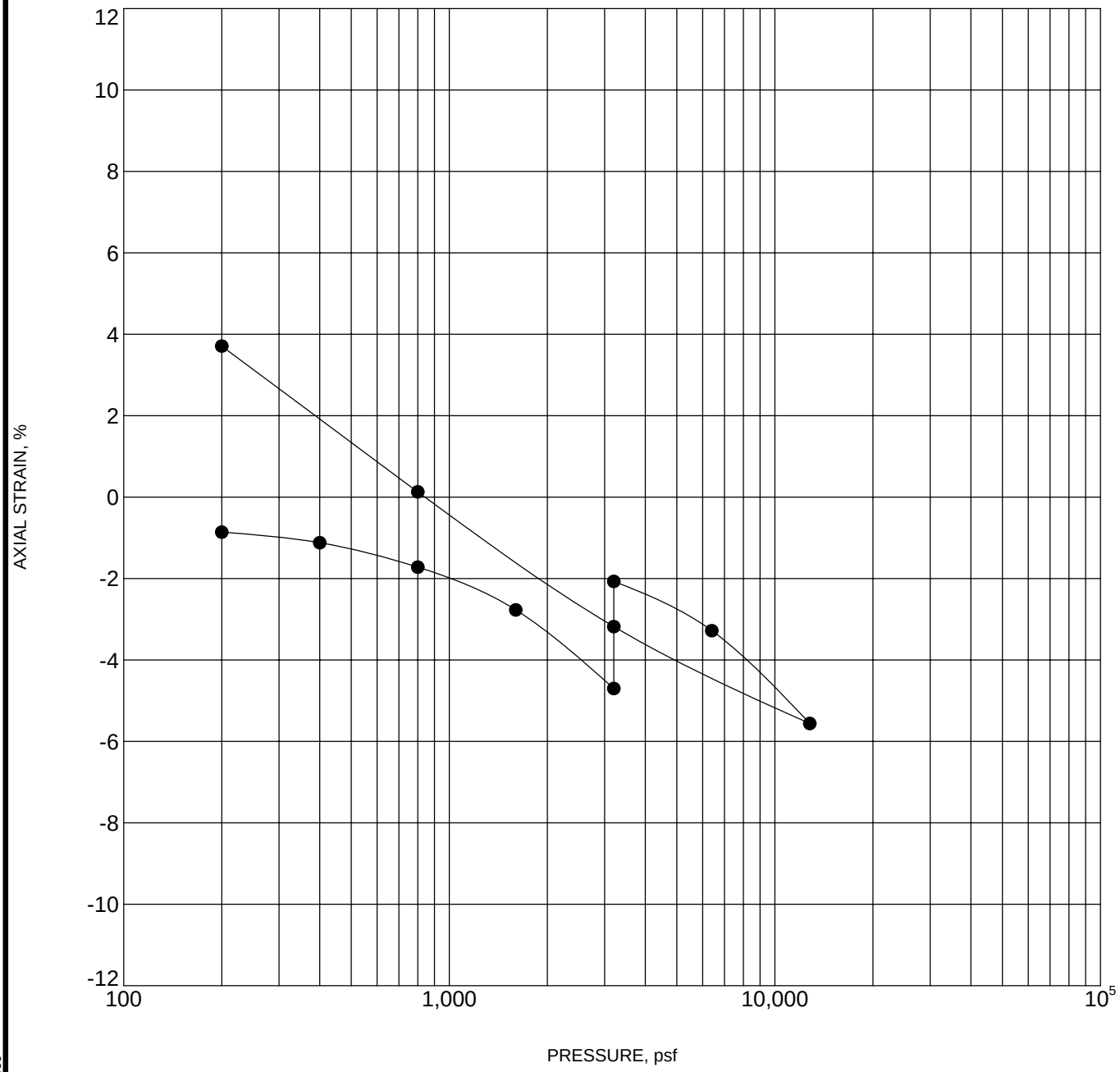
Water added at 500 psf

Terracon

CONSOLIDATION TEST RESULTS

Project: Calico Solar
Site: Pisgah Road Pisgah, California
Job #: 60095029A
Date: 7-29-11

TC_CONSOL_STRAIN 60095029A.GPJ TERRACON.GDT 7/29/11



Specimen Identification			Classification	γ_d , pcf	WC,%
●	**B-006**	**20.0 ft**	**FAT CLAY (CH)**	**94**	**25**

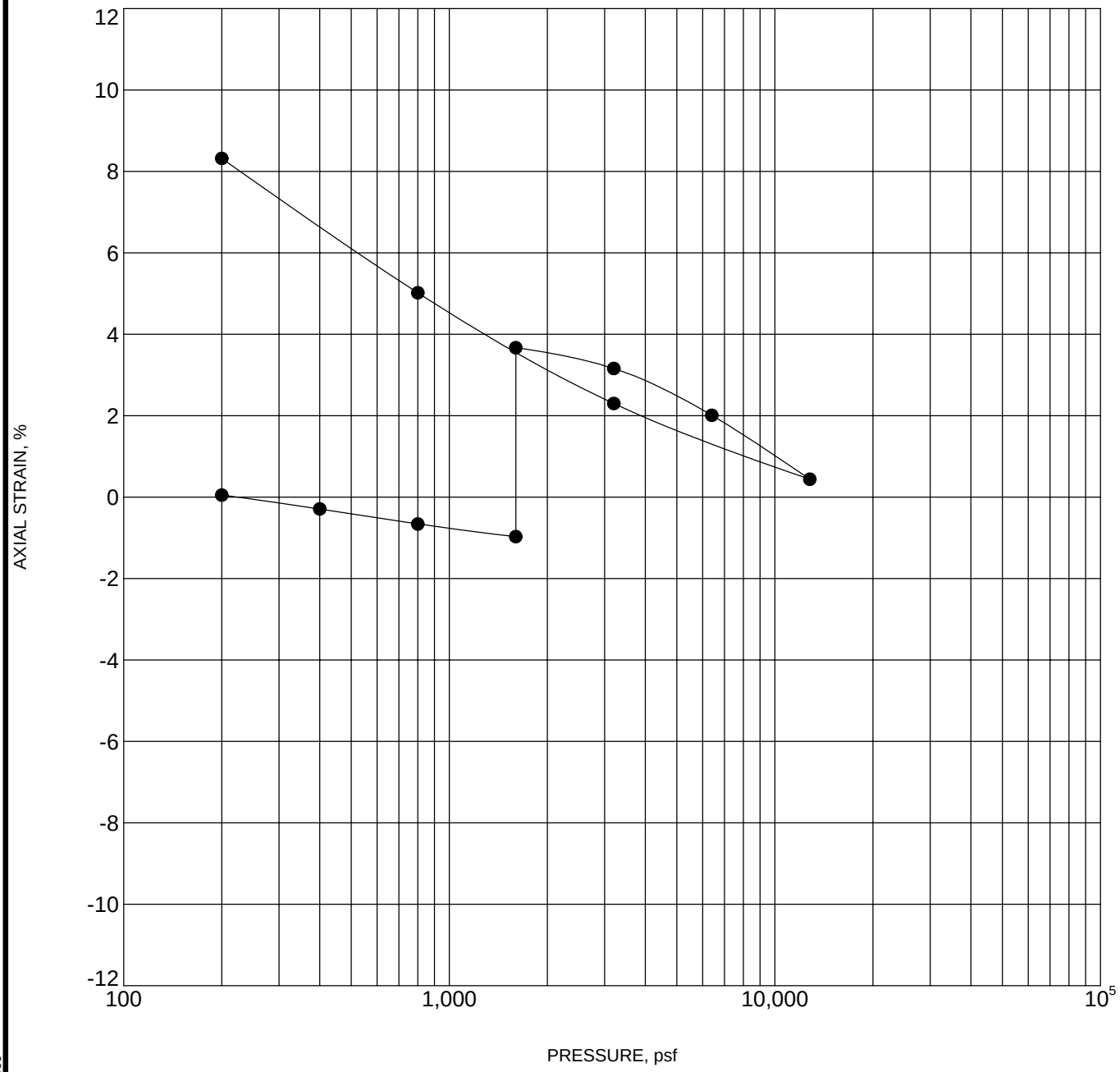
Notes:

Terracon

CONSOLIDATION TEST RESULTS

Project: Calico - Solar One
Site: East of Barstow, California
Job #: 60095029
Date: 12-10-09

TC CONSOL STRAIN 60095029 BORING LOGS.GPJ TERRACON.GDT 12/10/09



Specimen Identification			Classification	γ_d , pcf	WC,%
●	**B-007**	**15.0 ft**	**FAT CLAY (CH)**	**104**	**22**

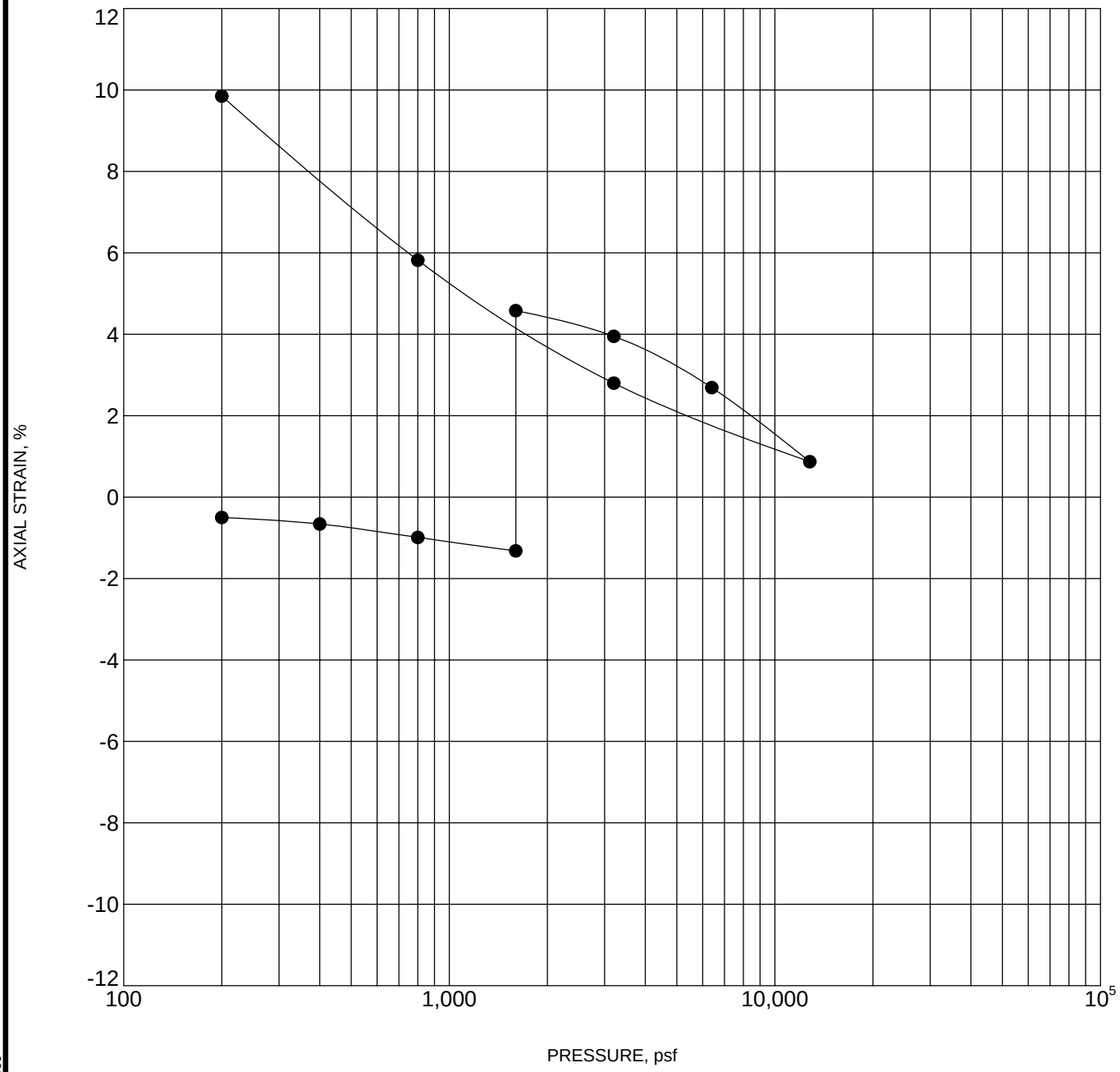
Notes:

Terracon

CONSOLIDATION TEST RESULTS

Project: Calico - Solar One
Site: East of Barstow, California
Job #: 60095029
Date: 12-10-09

TC CONSOL STRAIN 60095029 BORING LOGS.GPJ TERRACON.GDT 12/10/09



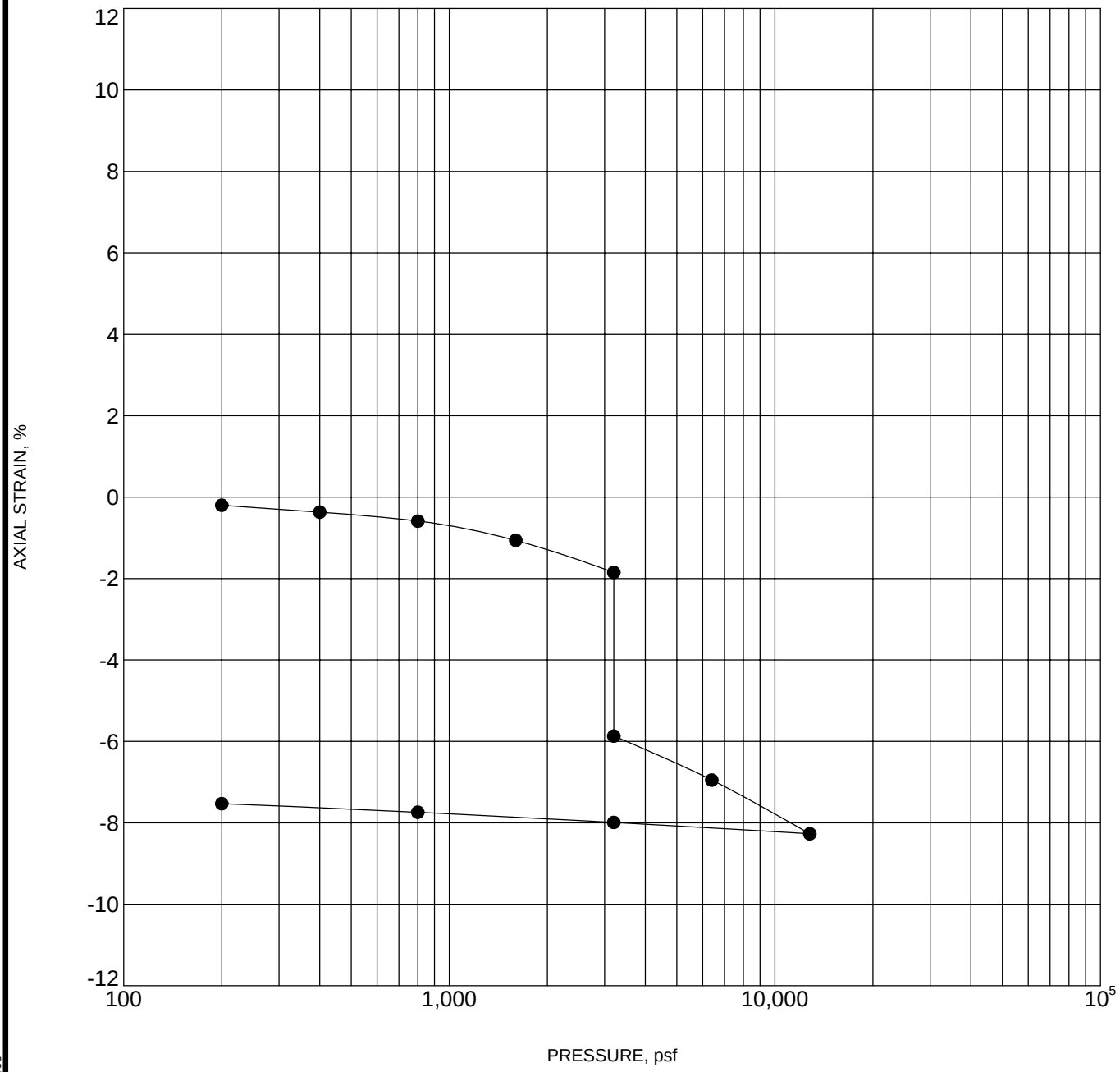
Specimen Identification			Classification	γ_d , pcf	WC,%
●	**B-008**	**7.5 ft**	**FAT CLAY (CH)**	**96**	**27**

Notes:

Terracon

CONSOLIDATION TEST RESULTS

Project: Calico - Solar One
Site: East of Barstow, California
Job #: 60095029
Date: 12-10-09



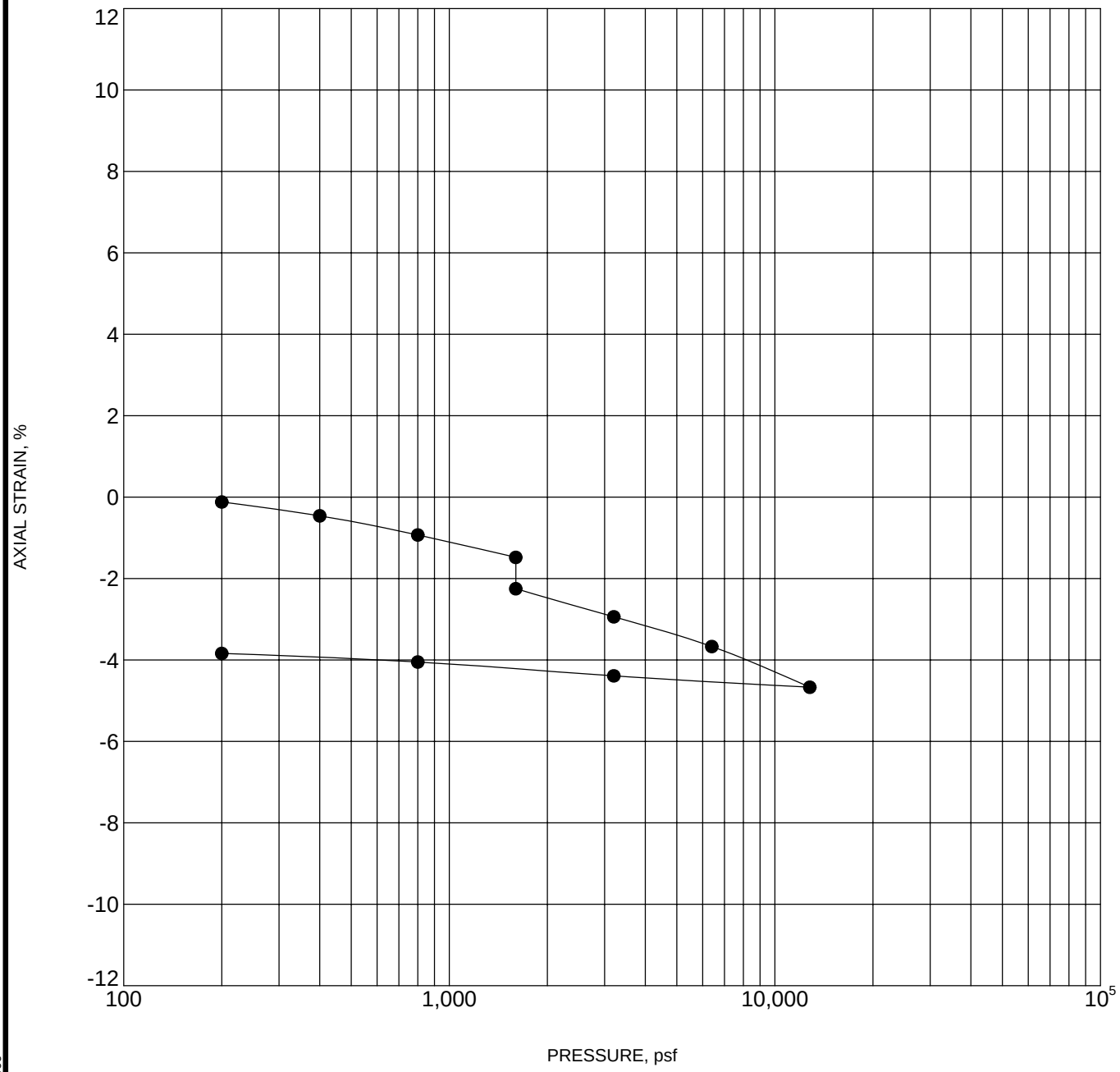
Specimen Identification			Classification	γ_d , pcf	WC,%
●	**B-009**	**20.0 ft**	**SILTY SAND with GRAVEL (SM)**	**111**	**4**

Notes:

Terracon

CONSOLIDATION TEST RESULTS

Project: Calico - Solar One
Site: East of Barstow, California
Job #: 60095029
Date: 12-10-09



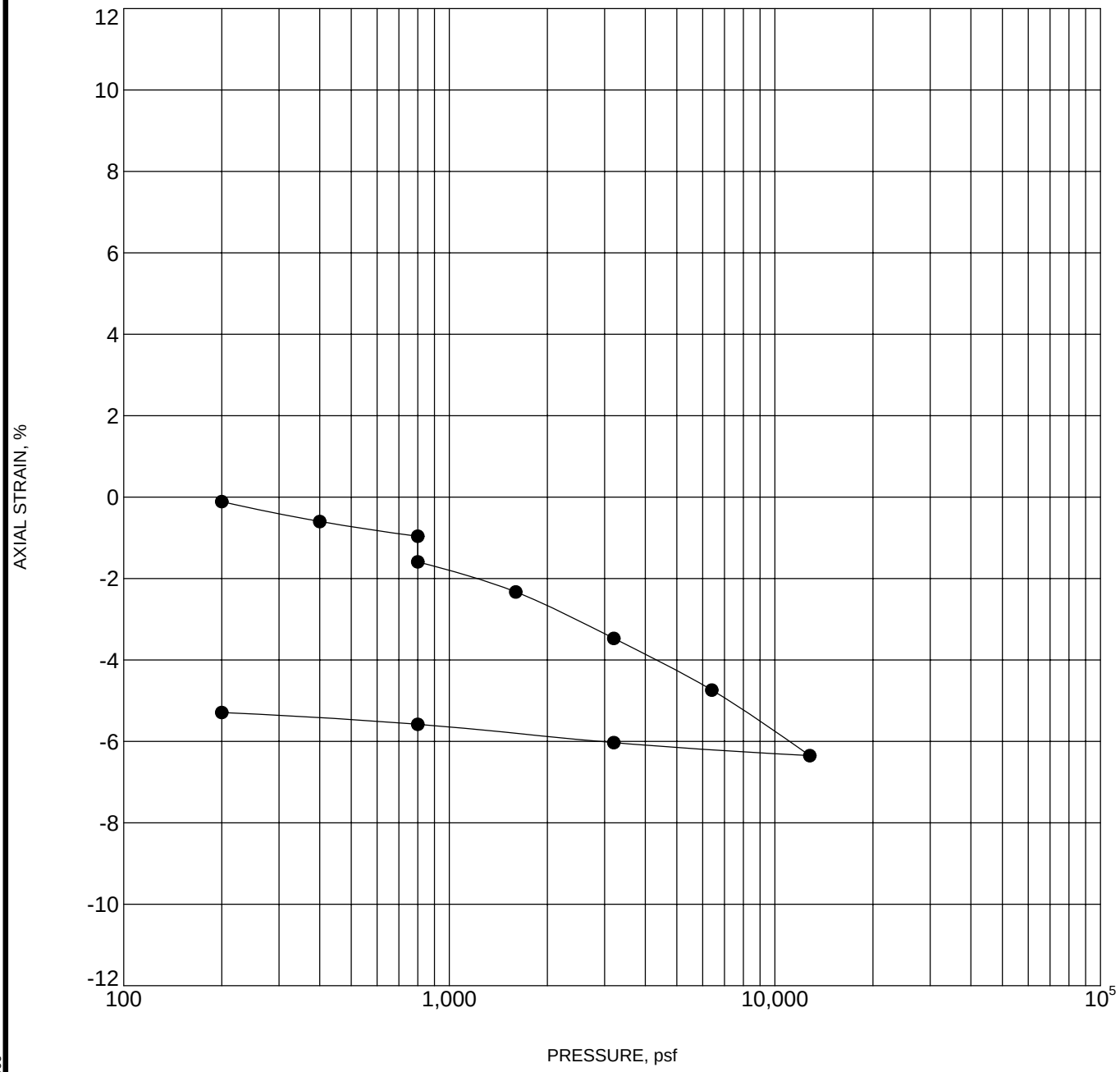
Specimen Identification			Classification	γ_d , pcf	WC,%
●	**B-029**	**10.0 ft**	**POORLY GRADED SAND with SILT and GRAVEL (SP-SM)**	**124**	**2**

Notes:

Terracon

CONSOLIDATION TEST RESULTS

Project: Calico - Solar One
Site: East of Barstow, California
Job #: 60095029
Date: 12-10-09



Specimen Identification			Classification	γ_d , pcf	WC,%
●	**B-033**	**5.0 ft**	**SILTY SAND (SM)**	**105**	**5**

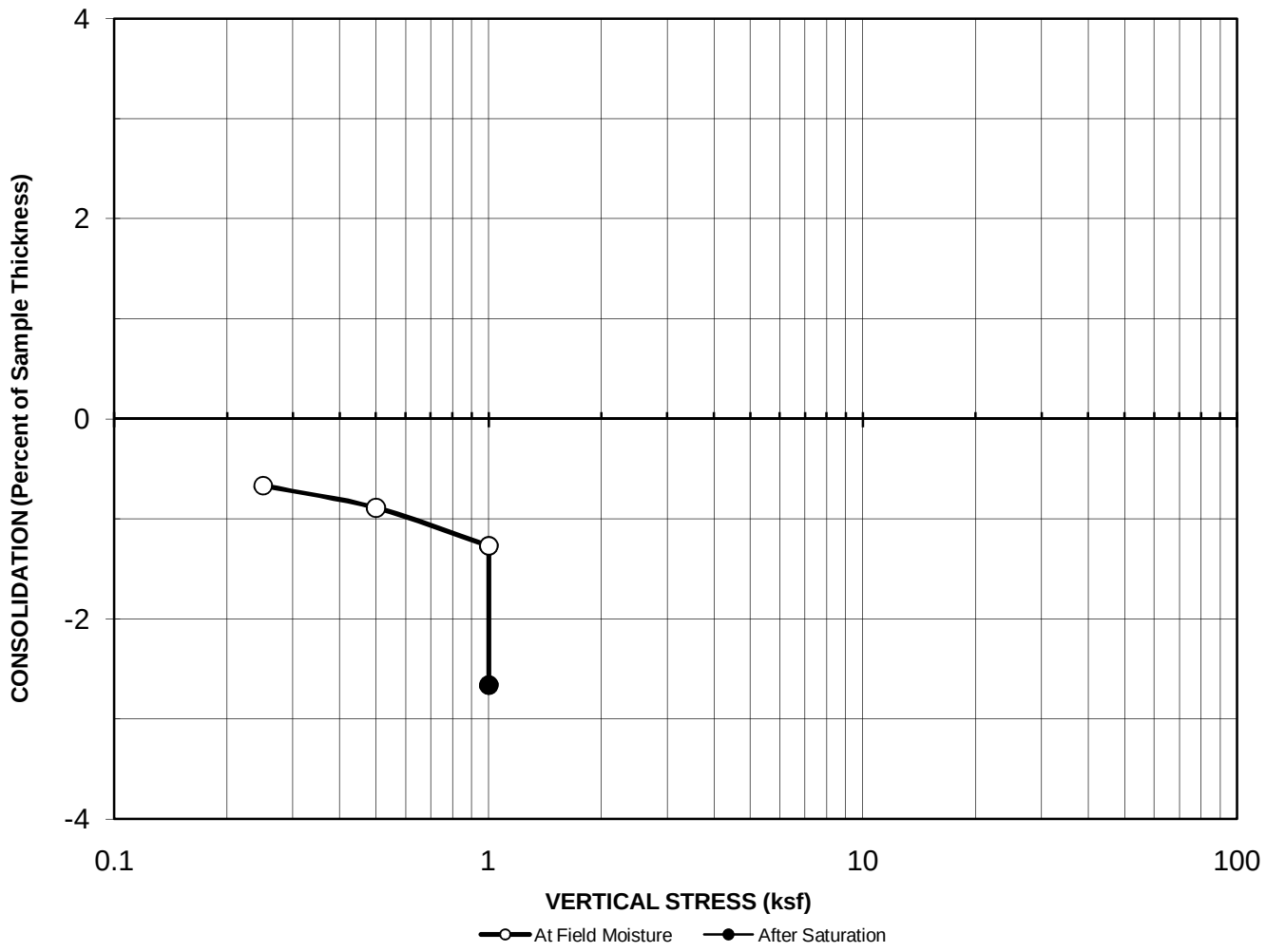
Notes:

Terracon

CONSOLIDATION TEST RESULTS

Project: Calico - Solar One
Site: East of Barstow, California
Job #: 60095029
Date: 12-10-09

TC CONSOL STRAIN 60095029 BORING LOGS.GPJ TERRACON.GDT 12/10/09

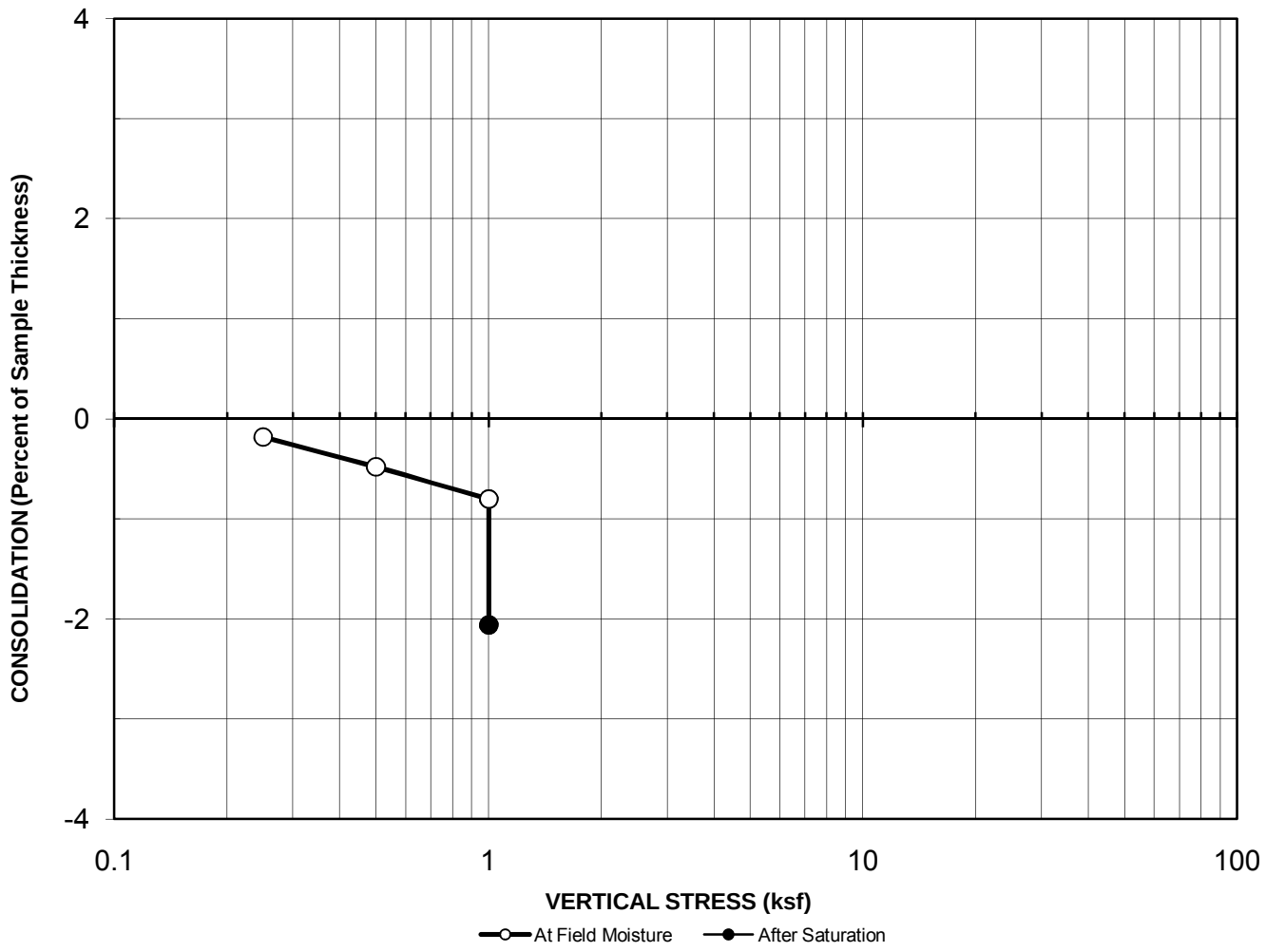


Boring No. :	B-023	Initial Dry Unit Weight (pcf):	112.6
Sample No.:	NA	Initial Moisture Content (%):	3.1
Depth (feet):	7.5	Final Moisture Content (%):	15.2
Sample Type:	Undisturbed	Assumed Specific Gravity:	2.7
Soil Description:	Silty Sand (SM)	Initial Void Ratio:	0.50
		Collapse Potential (%):	1.4

COLLAPSE POTENTIAL
ASTM D 5333

Project Name: Solar One
Project No.: 60095029
Date: 11/3/2009
Figure No:

Terracon
Consulting Engineers & Scientists

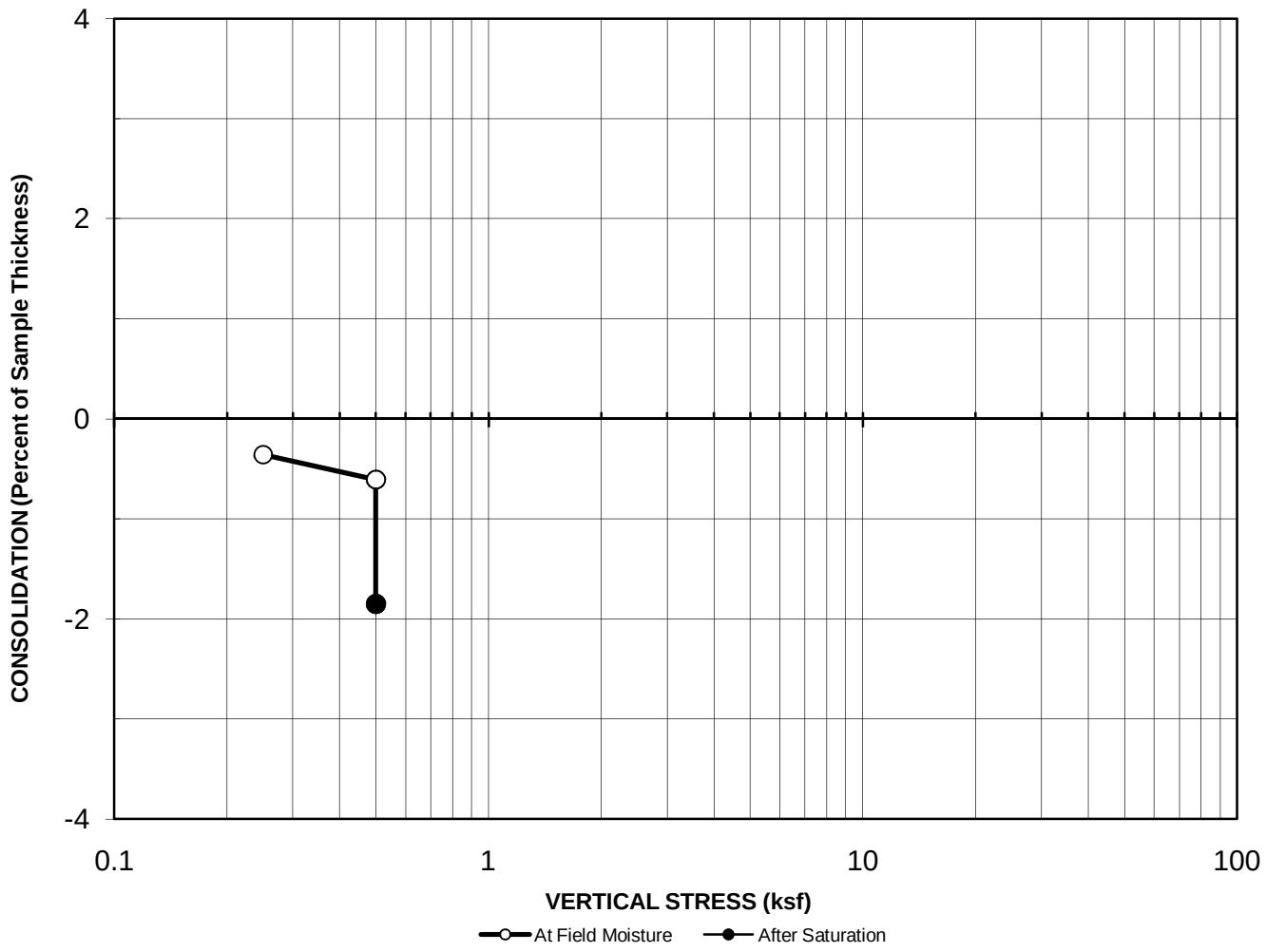


Boring No. :	B-032	Initial Dry Unit Weight (pcf):	111.8
Sample No.:	NA	Initial Moisture Content (%):	2.8
Depth (feet):	7.5	Final Moisture Content (%):	15.1
Sample Type:	Undisturbed	Assumed Specific Gravity:	2.7
Soil Description:	Silty Sand (SM)	Initial Void Ratio:	0.51
		Collapse Potential (%):	1.3

COLLAPSE POTENTIAL
ASTM D 5333

Project Name: Solar One
Project No.: 60095029
Date: 11/11/2009
Figure No:

Terracon
Consulting Engineers & Scientists

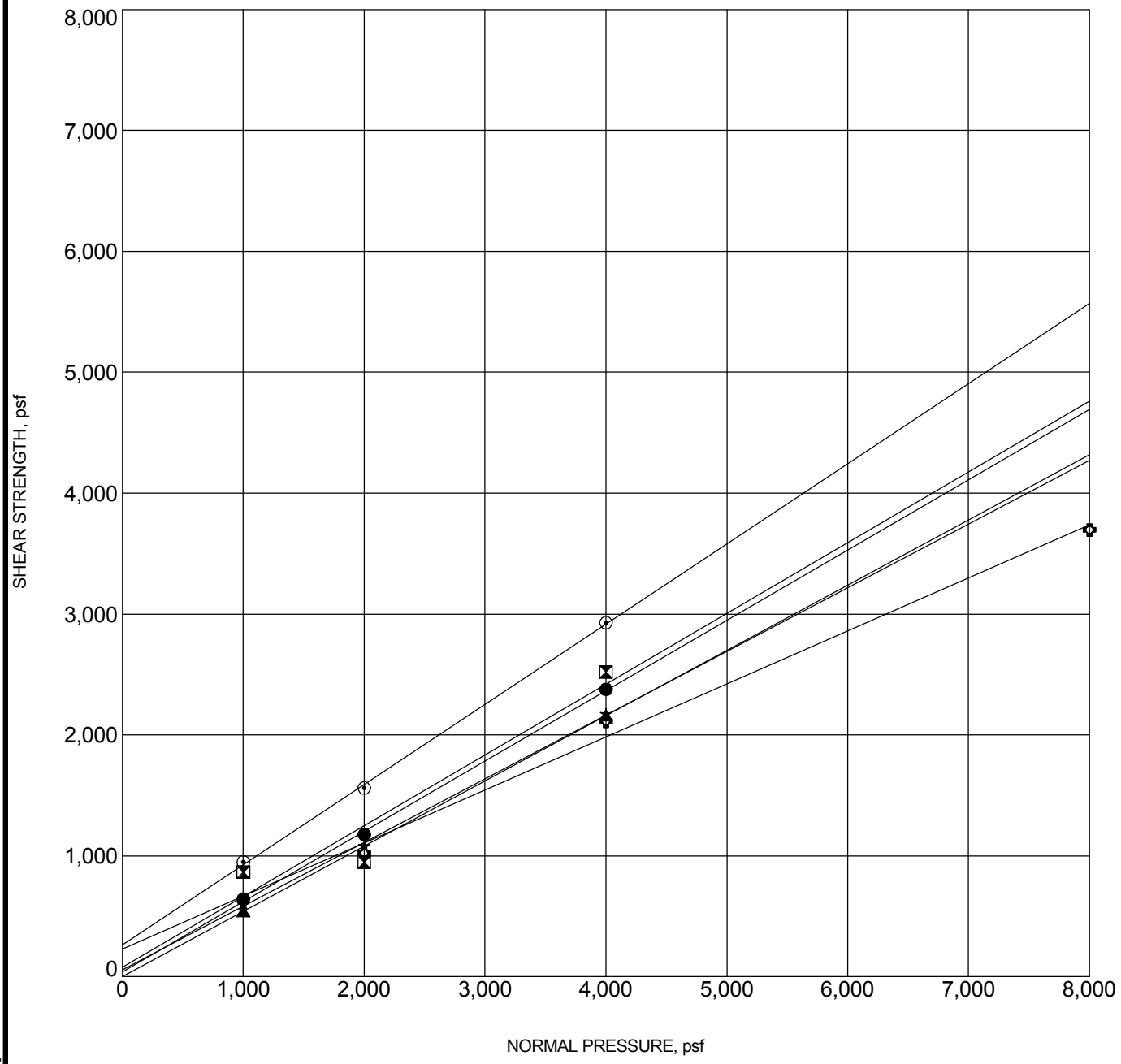


Boring No. :	B-037	Initial Dry Unit Weight (pcf):	114.1
Sample No.:	NA	Initial Moisture Content (%):	3.8
Depth (feet):	2.5	Final Moisture Content (%):	15.4
Sample Type:	Undisturbed	Assumed Specific Gravity:	2.7
Soil Description:	Silty Sand (SM)	Initial Void Ratio:	0.48
		Collapse Potential (%):	1.2

COLLAPSE POTENTIAL
ASTM D 5333

Project Name: Solar One
Project No.: 60095029
Date: 11/3/2009
Figure No:

Terracon
Consulting Engineers & Scientists



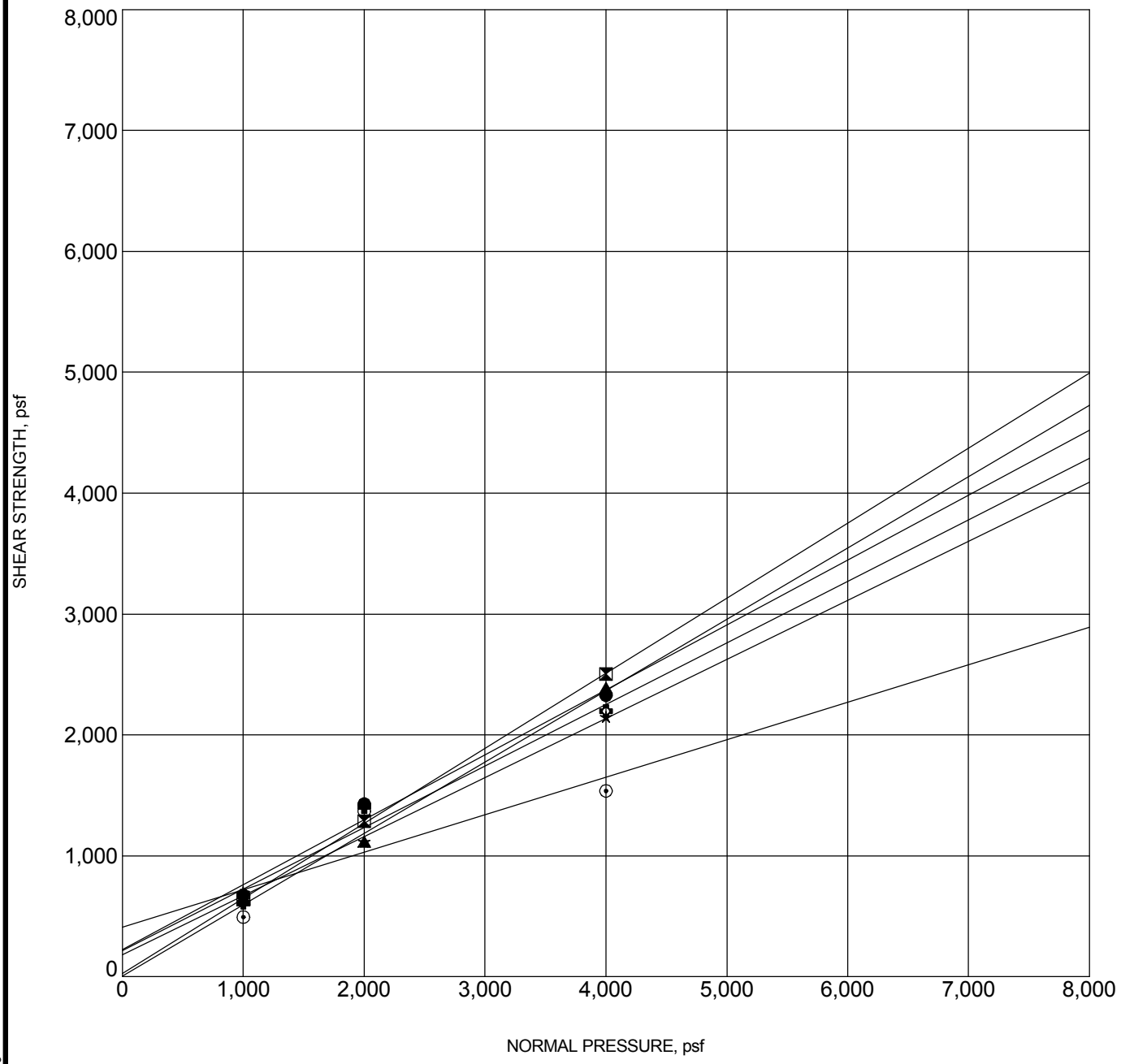
Specimen Identification			Classification	γ_d, pcf	WC,%	c, psf	$\phi°$
●	B-001	5.0ft	POORLY GRADED SAND with SILT (SP-SM)	96	3	40	30
⊠	B-005	20.0ft	FAT CLAY (CH)	97	28	78	30
▲	B-009	2.5ft	POORLY GRADED SAND (SP)	114	1	0	28
★	B-009	5.0ft	SILTY SAND with GRAVEL (SM)	119	3	54	28
⊙	B-009	30.0ft	SILT (ML)	90	13	264	34
✿	B-009	40.0ft	SILTY SAND with GRAVEL (SM)	83	19	228	24

Terracon

DIRECT SHEAR TEST

Project: Calico - Solar One
Site: East of Barstow, California
Job #: 60095029
Date: 12-9-09

TC_DIRECT_SHEAR 60095029 BORING LOGS.GPJ TERRACON.GDT 12/9/09

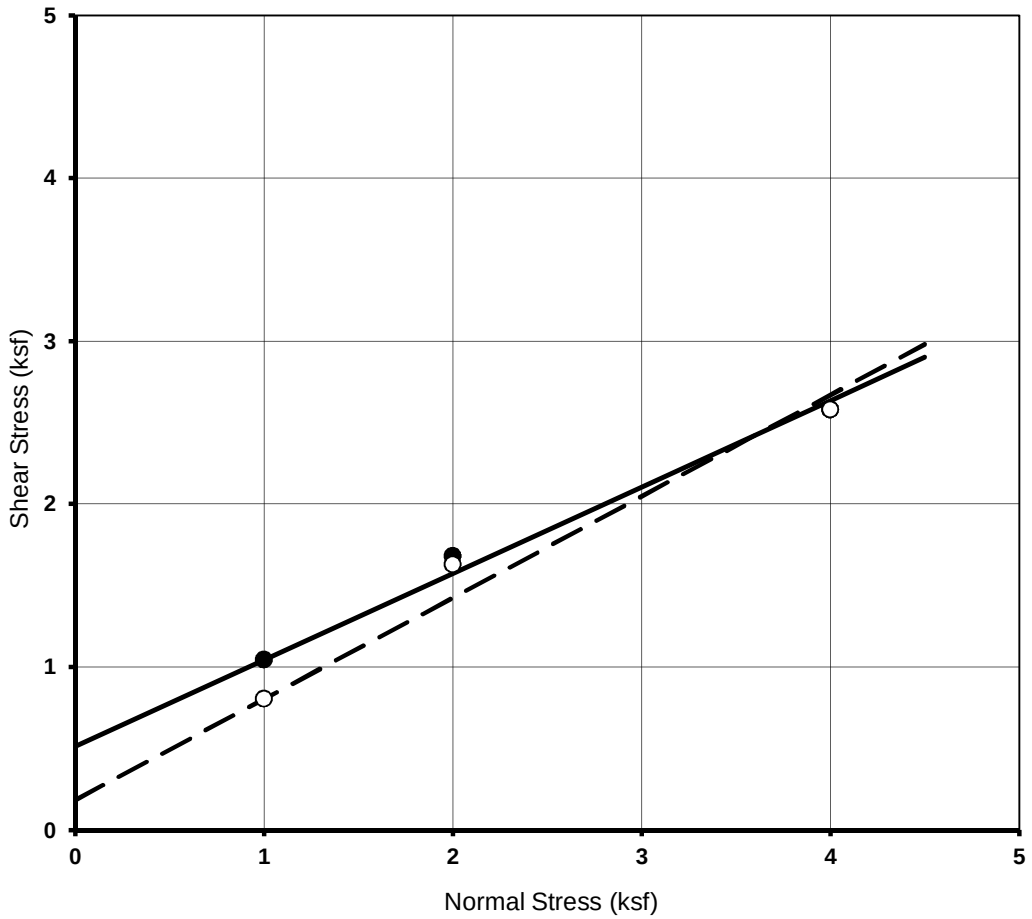


Specimen Identification			Classification	γ_d, pcf	WC,%	c, psf	$\phi°$
●	B-011	10.0ft	SILTY SAND (SM)	117	3	222	28
⊠	B-013	10.0ft	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)	108	5	26	32
▲	B-015	7.5ft	POORLY GRADED SAND with SILT (SP-SM)	105	9	4	31
★	B-031	7.5ft	SILTY SAND with GRAVEL (SM)	109	3	180	26
⊙	B-035	2.5ft	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)	110	6	408	17
✿	B-037	7.5ft	SILTY SAND with GRAVEL (SM)	113	3	216	27

Terracon

DIRECT SHEAR TEST

Project: Calico - Solar One
Site: East of Barstow, California
Job #: 60095029
Date: 12-9-09



INFORMATION OF SOIL SAMPLE		
Project Name	:	Calcio Solar
Project No.	:	60095029A
Boring No.	:	B-58
Sample Type	:	Undisturbed
Depth (ft)	:	5
Soil Type	:	Poorly graded sand with silt
Test Condition	:	Saturated and Consolidated
Int. Dry Density	:	110.0
M.C. (before)	:	7.0 %
M.C. (after)	:	

INTERPRETED STRENGTH DATA		
Notes	**Peak**	**Ultimate**
Cohesion (PSF)	500	200
Friction Angle	28 °	32 °

Notes:

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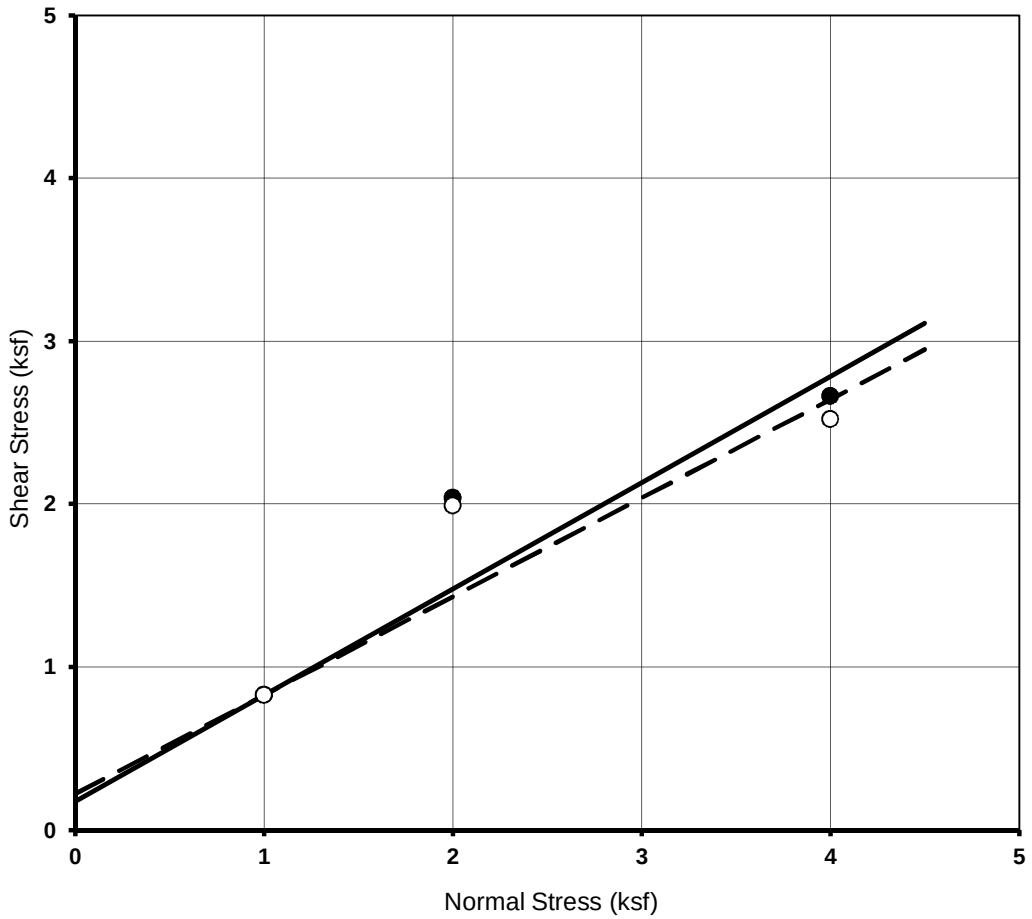
DIRECT SHEAR GRAPH
ASTM D3080 Aug-2011



INFORMATION OF SOIL SAMPLE		
Project Name	:	Calcio Solar
Project No.	:	60095029A
Boring No.	:	B-50
Sample Type	:	Undisturbed
Depth (ft)	:	2.5
Soil Type	:	Poorly Graded Sand with Silt
Test Condition	:	Saturated and Consolidated
Int. Dry Density	:	92.0
M.C. (before)	:	0.0 %
M.C. (after)	:	

INTERPRETED STRENGTH DATA		
Notes	**Peak**	**Ultimate**
Cohesion (PSF)	200	200
Friction Angle	33 °	31 °

Notes:

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DIRECT SHEAR GRAPH
ASTM D3080 Aug-2011

Terracon
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Expansion Index

Project: Solar One
Proj. No.: 60095029
Tested By: CP **Date:** 10/29/2009

Sample and Soil Information	
Boring No.:	B-006
Sample No.:	NA
Sample Depth:	10'
Soil Classification (USCS Symbol):	Fat Clay (CH)

Test Standard Used	
	UBC 18-2
X	ASTM D 4829

Weight Prior to Screening	NA	g
Weight After Screening	NA	g
Percent Retained on #4 Sieve	NA	%

Moisture Determination	Units	Initial	Final
Assumed Moisture Content	%		
Tare Weight	g	214.1	105.3
Weight of Soil (Wet) + Tare	g	281.7	693.5
Weight of Soil (Dry) + Tare	g	270.1	575.3
Moisture Content	%	20.7%	43.1%
Density Determination			
Weight of Soil + Ring (Wet)	g	526.2	588.2
Weight of Ring	g	195.6	195.6
Wet Weight of Soil	g	330.6	392.6
Wet Density	pcf	100.5	
Final Sample Height	in		1.1037
Final Volume	ft^3		0.0080
Final Wet Density	pcf		107.9
Dry Density	pcf	83.3	75.4
Degree of Saturation (G_s = 2.7)	%	54.6	94.2

Initial Dry Density	83.3	pcf
Initial MC	20.7	%
Initial Saturation	**54.6**	%
Final Dry Density	75.4	pcf
Final MC	43.1	%
Final Saturation	**94.2**	%

	Date	Time	Dial Reading	Deflection
Start	10/29/2009	9:50	0.0740	
Add Water (After 10 minutes)	**10/29/2009**	**10:00**	**0.0881**	**0.0141**
				-
				-
				-
				-
				-
				-
24 hours	**10/30/2009**	**18:14**	**0.1777**	**0.0896**

Expansion Index, EI	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
>130	Very High

EI	Measured Expansion Index =	88	Recommend to use EI =	**93**
EI_{50}	Expansion Index =	93		

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Expansion Index

Project: Solar One
Proj. No.: 60095029
Tested By: CP **Date:** 11/12/2009

Sample and Soil Information	
Boring No.:	B-007
Sample No.:	NA
Sample Depth:	7.5'
Soil Classification (USCS Symbol):	Fat Clay (CH)

Test Standard Used	
	UBC 18-2
X	ASTM D 4829

Weight Prior to Screening	NA	g
Weight After Screening	NA	g
Percent Retained on #4 Sieve	NA	%

Moisture Determination	Units	Initial	Final
Assumed Moisture Content	%		
Tare Weight	g	214.1	105.3
Weight of Soil (Wet) + Tare	g	256.0	703.0
Weight of Soil (Dry) + Tare	g	248.7	572.8
Moisture Content	%	21.1%	47.9%
Density Determination			
Weight of Soil + Ring (Wet)	g	525.4	597.7
Weight of Ring	g	195.6	195.6
Wet Weight of Soil	g	329.8	402.1
Wet Density	pcf	100.3	
Final Sample Height	in		1.0890
Final Volume	ft^3		0.0079
Final Wet Density	pcf		112.0
Dry Density	pcf	82.8	75.7
Degree of Saturation (G_s = 2.7)	%	55.0	105.5

Initial Dry Density	82.8	pcf
Initial MC	21.1	%
Initial Saturation	**55.0**	%
Final Dry Density	75.7	pcf
Final MC	47.9	%
Final Saturation	**105.5**	%

	Date	Time	Dial Reading	Deflection
Start	11/5/2009	15:42	0.0311	
Add Water (After 10 minutes)	**11/5/2009**	**15:52**	**0.0300**	**-0.0011**
				-
				-
				-
				-
				-
				-
24 hours	**11/6/2009**	**14:36**	**0.1201**	**0.0901**

Expansion Index, EI	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
>130	Very High

EI	Measured Expansion Index =	90	Recommend to use EI =	**95**
EI_{50}	Expansion Index =	95		

Terracon
Consulting Engineers & Scientists

Expansion Index

Project: Solar One
Proj. No.: 60095029
Tested By: CP **Date:** 11/5/2009

Sample and Soil Information	
Boring No.:	B-008
Sample No.:	NA
Sample Depth:	2.5'
Soil Classification (USCS Symbol):	Fat Clay (CH)

Test Standard Used	
	UBC 18-2
X	ASTM D 4829

Weight Prior to Screening	NA	g
Weight After Screening	NA	g
Percent Retained on #4 Sieve	NA	%

Moisture Determination	Units	Initial	Final
Assumed Moisture Content	%		
Tare Weight	g	214.1	105.3
Weight of Soil (Wet) + Tare	g	289.3	703.0
Weight of Soil (Dry) + Tare	g	278.6	586.2
Moisture Content	%	16.6%	41.0%
Density Determination			
Weight of Soil + Ring (Wet)	g	555.7	597.7
Weight of Ring	g	195.7	195.7
Wet Weight of Soil	g	360.0	402.0
Wet Density	pcf	109.4	
Final Sample Height	in		1.0890
Final Volume	ft^3		0.0079
Final Wet Density	pcf		111.9
Dry Density	pcf	93.9	79.4
Degree of Saturation (G_s = 2.7)	%	56.4	98.6

Initial Dry Density	93.9	pcf
Initial MC	16.6	%
Initial Saturation	**56.4**	%
Final Dry Density	79.4	pcf
Final MC	41.0	%
Final Saturation	**98.6**	%

	Date	Time	Dial Reading	Deflection
Start	11/5/2009	15:42	0.0311	
Add Water (After 10 minutes)	**11/5/2009**	**15:52**	**0.0300**	**-0.0011**
				-
				-
				-
				-
				-
				-
24 hours	**11/6/2009**	**14:36**	**0.1201**	**0.0901**

Expansion Index, EI	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
>130	Very High

EI	Measured Expansion Index =	90	Recommend to use EI =	**96**
EI_{50}	Expansion Index =	96		

COMPACTION TEST

Client Name : Tessera
Project Name: Solar One
Project No. : 60095029
Location:
Sample No. : B-001
Visual Sample Description: Yellowish Brown Sand (SW-SM)

Tested By : ZC — Date: 10/14/09
Calculated By : ZC — Date: 10/14/09
Checked By : CP — Date: 10/14/09
Depth (ft) : 0 to 2.5

Compaction Method
- [X] ASTM D1557
- [ ] ASTM D698

Preparation Method
- [X] Moist
- [ ] Dry

MOLD VOLUME (CU.FT) 0.0333

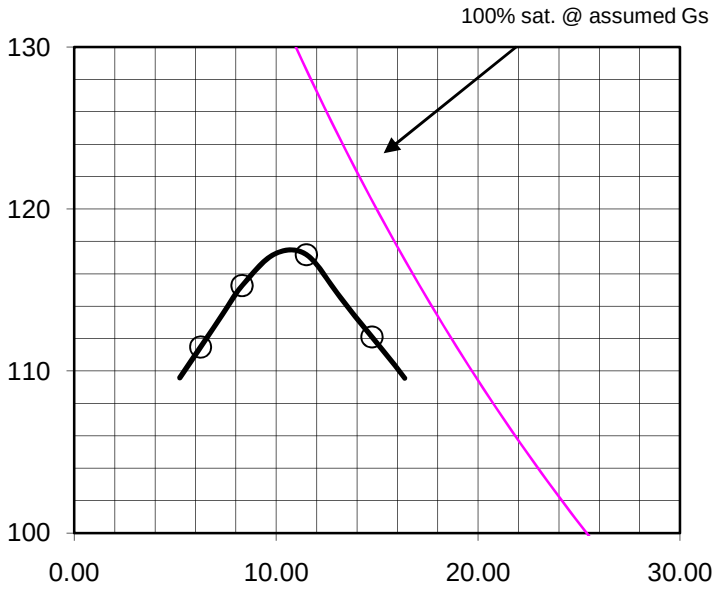
Trail No.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	3651.8	3748.4	3836.0	3805.4		
Wt. of Mold (gm.)	1862.7	1862.7	1862.7	1862.7		
Net Wt. of Soil (gm.)	1789.1	1885.7	1973.3	1942.7		
Container No.						
Wt. of Container (gm.)	214.1	214.1	214.1	214.1		
Wet Wt. of Soil + Cont. (gm.)	431.7	450.1	520.7	527.9		
Dry Wt. of Soil + Cont. (gm.)	418.9	432.0	489.1	487.6		
Moisture Content (%)	6.3	8.3	11.5	14.7		
Wet Density (pcf)	118.4	124.8	130.6	128.6		
Dry Density (pcf)	111.5	115.3	117.2	112.1		

Maximum Dry Density (pcf) **117.5** Optimum Moisture Content (%) **10.0**

Assumed Specific Gravity = 2.70

PROCEDURE USED

- [X] *Method A*
  Soil Passing No. 4 (4.75 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 25 (twenty-five)
  May be used if No.4 retained < 20%
- [ ] *Method B*
  Soil Passing 3/8 in. (9.5 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 25 (twenty-five)
  Use if + No.4 > 20% and - 3/8 " < 20%
- [ ] *Method C*
  Soil Passing 3/4 in. (19.0 mm) Sieve
  Mold : 6 in. (152.4 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 56 (fifty-six)
  Use if + 3/8 in >20% and + in <30%



COMPACTION TEST

Client Name : Tessera
Project Name: Solar One
Project No. : 60095029
Location:
Sample No. : B-007
Visual Sample Description: Light Brown Sand W/ Silt (SP-SM)

Tested By : ZC — Date: 11/26/09
Calculated By : ZC — Date: 11/26/09
Checked By : CP — Date: 11/26/09
Depth (ft) : 0-1

Compaction Method
- [X] ASTM D1557
- [ ] ASTM D698

Preparation Method
- [X] Moist
- [ ] Dry

MOLD VOLUME (CU.FT) 0.0333

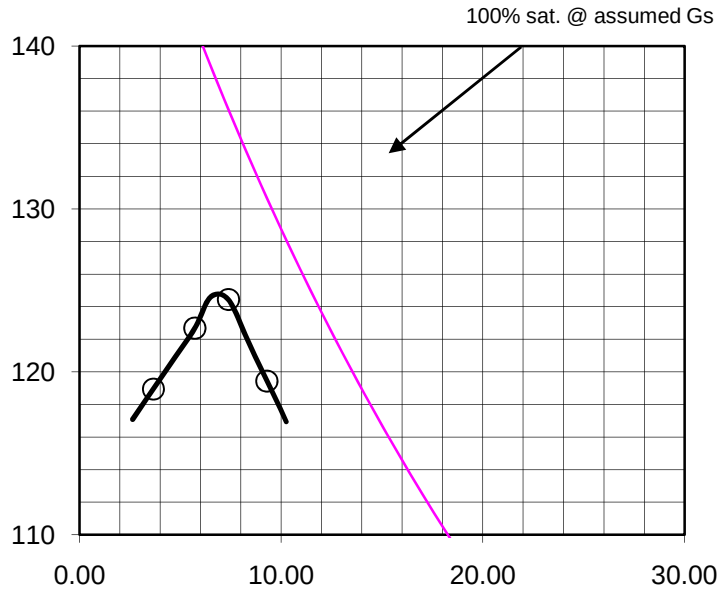
Trail No.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	3725.1	3821.7	3881.1	3834.3		
Wt. of Mold (gm.)	1862.7	1862.7	1862.7	1862.7		
Net Wt. of Soil (gm.)	1862.4	1959.0	2018.4	1971.6		
Container No.						
Wt. of Container (gm.)	214.1	214.1	214.1	214.1		
Wet Wt. of Soil + Cont. (gm.)	420.6	424.9	406.1	412.9		
Dry Wt. of Soil + Cont. (gm.)	413.3	413.5	392.9	396.0		
Moisture Content (%)	3.7	5.7	7.4	9.3		
Wet Density (pcf)	123.3	129.7	133.6	130.5		
Dry Density (pcf)	118.9	122.7	124.4	119.4		

Maximum Dry Density (pcf) **124.6** Optimum Moisture Content (%) **6.5**

Assumed Specific Gravity = 2.60

PROCEDURE USED

- [ ] *Method A*
  Soil Passing No. 4 (4.75 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 25 (twenty-five)
  May be used if No.4 retained < 20%
- [X] *Method B*
  Soil Passing 3/8 in. (9.5 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 25 (twenty-five)
  Use if + No.4 > 20% and - 3/8 " < 20%
- [ ] *Method C*
  Soil Passing 3/4 in. (19.0 mm) Sieve
  Mold : 6 in. (152.4 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 56 (fifty-six)
  Use if + 3/8 in >20% and + in <30%



COMPACTION TEST

Client Name : Tessera
Project Name: Solar One
Project No. : 60095029
Location:
Sample No. : B-013
Visual Sample Description: Reddish Brown Sand Silt Clay (SM-SC)

Tested By : ZC — Date: 10/22/09
Calculated By : ZC — Date: 10/22/09
Checked By : CP — Date: 10/22/09
Depth (ft) : 0-1

Compaction Method
- [X] ASTM D1557
- [ ] ASTM D698

Preparation Method
- [X] Moist
- [ ] Dry

MOLD VOLUME (CU.FT) 0.0333

Trail No.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	3725.9	3840.4	3990.3	3956.8		
Wt. of Mold (gm.)	1862.7	1862.7	1862.7	1862.7		
Net Wt. of Soil (gm.)	1863.2	1977.7	2127.6	2094.1		
Container No.						
Wt. of Container (gm.)	214.1	214.1	214.1	214.1		
Wet Wt. of Soil + Cont. (gm.)	423.8	467.5	427.5	422.5		
Dry Wt. of Soil + Cont. (gm.)	416.2	454.7	412.1	404.1		
Moisture Content (%)	3.8	5.3	7.8	9.7		
Wet Density (pcf)	123.4	130.9	140.9	138.6		
Dry Density (pcf)	118.9	124.3	130.7	126.4		

Maximum Dry Density (pcf) **130.5** Optimum Moisture Content (%) **7.0**

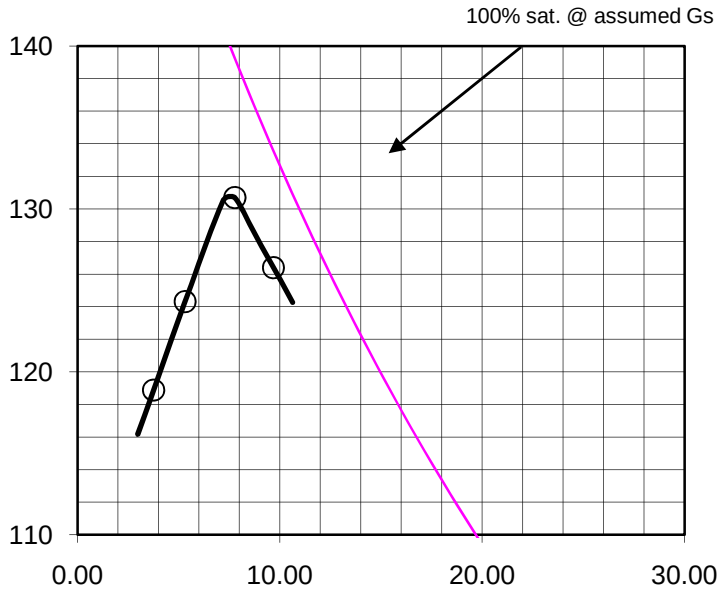
Assumed Specific Gravity = 2.70

PROCEDURE USED

[X] *Method A*
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if No.4 retained < 20%

[ ] *Method B*
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if + No.4 > 20% and - 3/8 " < 20%

[ ] *Method C*
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if + 3/8 in >20% and + in <30%



COMPACTION TEST

Client Name : Tessera
Project Name: Solar One
Project No. : 60095029
Location:
Sample No. : B-017
Visual Sample Description: Brown Sand Silt Clay (SM-SC)

Tested By : ZC — Date: 11/26/09
Calculated By : ZC — Date: 11/26/09
Checked By : CP — Date: 11/26/09
Depth (ft) : 0-1

Compaction Method
- [X] ASTM D1557
- [ ] ASTM D698

Preparation Method
- [X] Moist
- [ ] Dry

MOLD VOLUME (CU.FT) 0.0333

Trail No.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	3794.1	3898.6	3934.2	3895.6		
Wt. of Mold (gm.)	1862.7	1862.7	1862.7	1862.7		
Net Wt. of Soil (gm.)	1931.4	2035.9	2071.5	2032.9		
Container No.						
Wt. of Container (gm.)	214.1	214.1	214.1	214.1		
Wet Wt. of Soil + Cont. (gm.)	387.7	431.5	389.6	423.5		
Dry Wt. of Soil + Cont. (gm.)	375.2	411.4	369.8	396.3		
Moisture Content (%)	7.8	10.2	12.7	14.9		
Wet Density (pcf)	127.9	134.8	137.1	134.6		
Dry Density (pcf)	118.7	122.3	121.7	117.1		

Maximum Dry Density (pcf) **123.2** Optimum Moisture Content (%) **11.5**

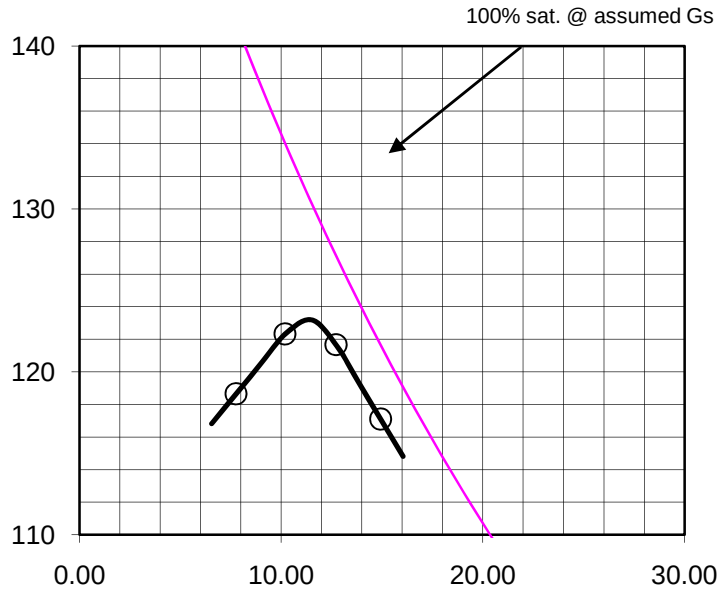
Assumed Specific Gravity = 2.75

PROCEDURE USED

[X] *Method A*
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if No.4 retained < 20%

[ ] *Method B*
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if + No.4 > 20% and - 3/8 " < 20%

[ ] *Method C*
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if + 3/8 in >20% and + in <30%



COMPACTION TEST

Client Name : Tessera
Project Name: Solar One
Project No. : 60095029
Location: B-021
Sample No. :
Visual Sample Description: Silty Sand (SM)

Tested By : CP Date: 11/04/09
Calculated By : CP Date: 11/04/09
Checked By : CP Date: 11/04/09
Depth (ft) : 0 to 1

Compaction Method
- [X] ASTM D1557
- [ ] ASTM D698

Preparation Method
- [X] Moist
- [ ] Dry

MOLD VOLUME (CU.FT) 0.0333

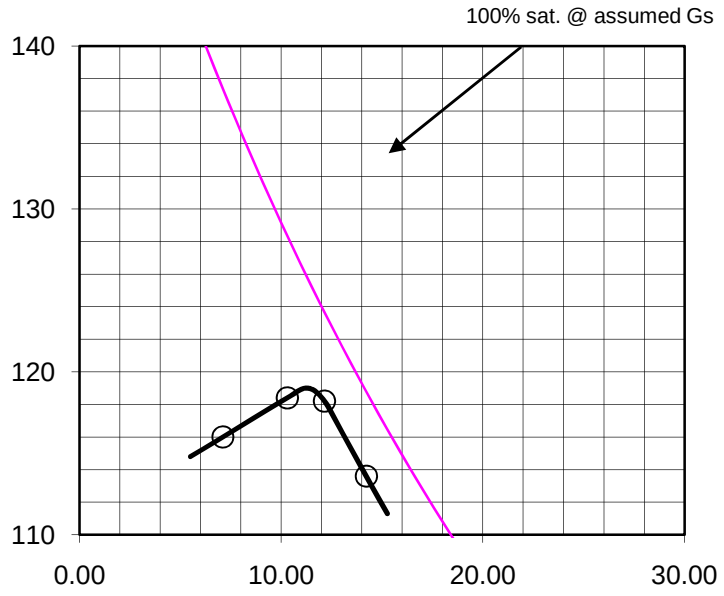
Trail No.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	3738.8	3834.8	3864.4	3822.1		
Wt. of Mold (gm.)	1862.1	1862.1	1862.1	1862.1		
Net Wt. of Soil (gm.)	1876.7	1972.7	2002.3	1960.0		
Container No.						
Wt. of Container (gm.)	214.1	214.1	214.1	214.1		
Wet Wt. of Soil + Cont. (gm.)	382.9	411.1	499.0	483.6		
Dry Wt. of Soil + Cont. (gm.)	371.7	392.7	468.1	450.0		
Moisture Content (%)	7.1	10.3	12.1	14.2		
Wet Density (pcf)	124.2	130.6	132.6	129.8		
Dry Density (pcf)	116.0	118.4	118.2	113.6		

Maximum Dry Density (pcf) **119.0** Optimum Moisture Content (%) **11.0**

Assumed Specific Gravity = 2.61

PROCEDURE USED

- [X] *Method A*
  Soil Passing No. 4 (4.75 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 25 (twenty-five)
  May be used if No.4 retained < 20%
- [ ] *Method B*
  Soil Passing 3/8 in. (9.5 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 25 (twenty-five)
  Use if + No.4 > 20% and - 3/8 " < 20%
- [ ] *Method C*
  Soil Passing 3/4 in. (19.0 mm) Sieve
  Mold : 6 in. (152.4 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 56 (fifty-six)
  Use if + 3/8 in >20% and + in <30%



COMPACTION TEST

Client Name : Tessera
Project Name: Solar One
Project No. : 60095029
Location:
Sample No. : B-031
Visual Sample Description: Yellowish brown Sand Gravel mix (SW)

Tested By : ZC — Date: 11/26/09
Calculated By : ZC — Date: 11/26/09
Checked By : CP — Date: 11/26/09
Depth (ft) : 0-1

Compaction Method
- [X] ASTM D1557
- [ ] ASTM D698

Preparation Method
- [X] Moist
- [ ] Dry

MOLD VOLUME (CU.FT) 0.0333

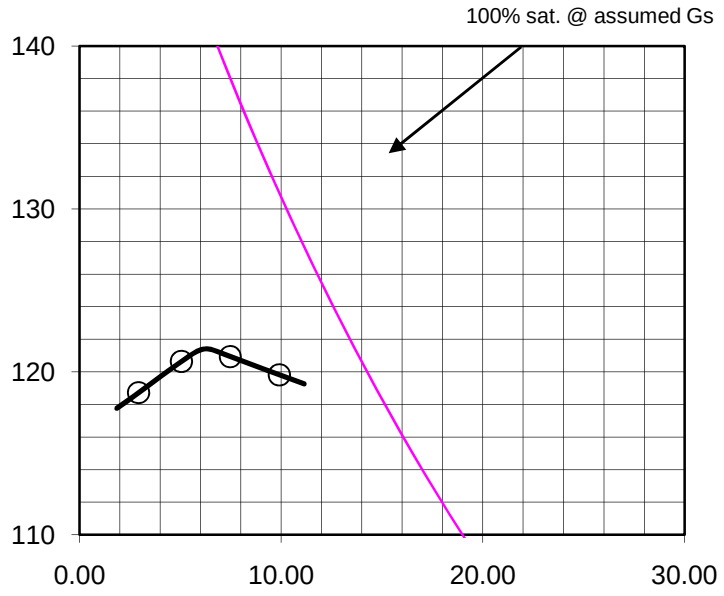
Trail No.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	3708.4	3776.9	3825.9	3851.9		
Wt. of Mold (gm.)	1862.7	1862.7	1862.7	1862.7		
Net Wt. of Soil (gm.)	1845.7	1914.2	1963.2	1989.2		
Container No.						
Wt. of Container (gm.)	214.1	214.1	214.1	214.1		
Wet Wt. of Soil + Cont. (gm.)	386.8	428.4	431.3	449.2		
Dry Wt. of Soil + Cont. (gm.)	381.9	418.1	416.2	428.0		
Moisture Content (%)	2.9	5.0	7.5	9.9		
Wet Density (pcf)	122.2	126.7	130.0	131.7		
Dry Density (pcf)	118.7	120.6	120.9	119.8		

Maximum Dry Density (pcf) **122.4** Optimum Moisture Content (%) **6.0**

Assumed Specific Gravity = 2.65

PROCEDURE USED

- [ ] *Method A*
  Soil Passing No. 4 (4.75 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 25 (twenty-five)
  May be used if No.4 retained < 20%
- [X] *Method B*
  Soil Passing 3/8 in. (9.5 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 25 (twenty-five)
  Use if + No.4 > 20% and - 3/8 " < 20%
- [ ] *Method C*
  Soil Passing 3/4 in. (19.0 mm) Sieve
  Mold : 6 in. (152.4 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 56 (fifty-six)
  Use if + 3/8 in >20% and + in <30%



COMPACTION TEST

Client Name : Tessera
Project Name: Solar One
Project No. : 60095029
Location:
Sample No. : B-0034
Visual Sample Description: Light Brown Silty Sand (SM)

Tested By : ZC — Date: 11/26/09
Calculated By : ZC — Date: 11/26/09
Checked By : CP — Date: 11/26/09
Depth (ft) : 0-1

Compaction Method
- [X] ASTM D1557
- [ ] ASTM D698

Preparation Method
- [X] Moist
- [ ] Dry

MOLD VOLUME (CU.FT) 0.0333

Trail No.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	3827.3	3727.8	3883.1	3872.7		
Wt. of Mold (gm.)	1862.7	1862.7	1862.7	1862.7		
Net Wt. of Soil (gm.)	1964.6	1865.1	2020.4	2010.0		
Container No.						
Wt. of Container (gm.)	214.1	214.1	214.1	214.1		
Wet Wt. of Soil + Cont. (gm.)	431.7	412.1	425.1	409.4		
Dry Wt. of Soil + Cont. (gm.)	404.6	398.4	406.9	389.3		
Moisture Content (%)	14.2	7.4	9.4	11.5		
Wet Density (pcf)	130.1	123.5	133.8	133.1		
Dry Density (pcf)	113.9	114.9	122.2	119.4		

Maximum Dry Density (pcf) **122.0**

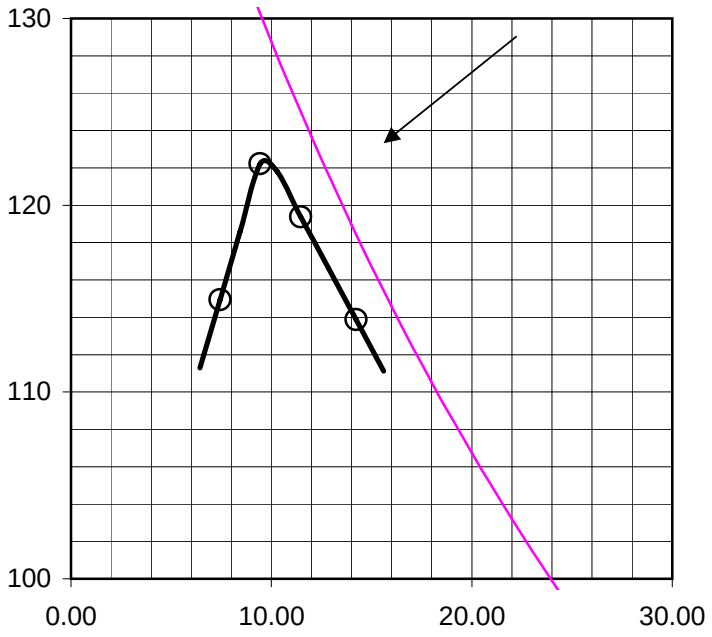
Optimum Moisture Content (%) **9.5**

100% sat. @ assumed Gs

Assumed Specific Gravity = 2.60

PROCEDURE USED

- [ ] *Method A*
  Soil Passing No. 4 (4.75 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 25 (twenty-five)
  May be used if No.4 retained < 20%
- [X] *Method B*
  Soil Passing 3/8 in. (9.5 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 25 (twenty-five)
  Use if + No.4 > 20% and - 3/8 " < 20%
- [ ] *Method C*
  Soil Passing 3/4 in. (19.0 mm) Sieve
  Mold : 6 in. (152.4 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 56 (fifty-six)
  Use if + 3/8 in >20% and + in <30%



COMPACTION TEST

Client Name : Tessera
Project Name: Solar One
Project No. : 60095029
Location: B-035
Sample No. :
Visual Sample Description: Yellow-Brown Silty Sand (SP-SM0

Tested By : ZC — Date: 10/14/09
Calculated By : ZC — Date: 10/14/09
Checked By : CP — Date: 10/14/09
Depth (ft) : 0-5'

Compaction Method
- [X] ASTM D1557
- [ ] ASTM D698

Preparation Method
- [X] Moist
- [ ] Dry

MOLD VOLUME (CU.FT) 0.0333

Trail No.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	3872.6	3959.2	3966.2	3937.3		
Wt. of Mold (gm.)	1862.7	1862.7	1862.7	1862.7		
Net Wt. of Soil (gm.)	2009.9	2096.5	2103.5	2074.6		
Container No.						
Wt. of Container (gm.)	214.1	214.1	214.1	214.1		
Wet Wt. of Soil + Cont. (gm.)	433.1	436.1	436.2	430.4		
Dry Wt. of Soil + Cont. (gm.)	418.9	418.9	415.2	405.8		
Moisture Content (%)	6.9	8.4	10.4	12.8		
Wet Density (pcf)	133.1	138.8	139.3	137.3		
Dry Density (pcf)	124.4	128.0	126.1	121.7		

Maximum Dry Density (pcf) **128.0** Optimum Moisture Content (%) **9.5**

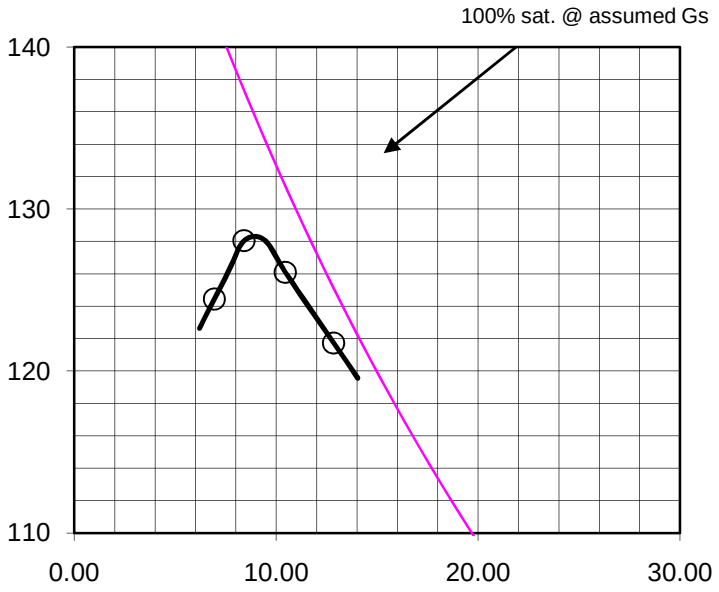
Assumed Specific Gravity = 2.70

PROCEDURE USED

[X] *Method A*
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if No.4 retained < 20%

[ ] *Method B*
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if + No.4 > 20% and - 3/8 " < 20%

[ ] *Method C*
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if + 3/8 in >20% and + in <30%



COMPACTION TEST

Client Name : Tessera
Project Name: Solar One
Project No. : 6005029
Location:
Sample No. : B-043
Visual Sample Description: Gravel W/ Sand (GP)

Tested By : ZC — Date: 11/26/09
Calculated By : ZC — Date: 11/26/09
Checked By : CP — Date: 11/26/09
Depth (ft) : 0-1

Compaction Method
- [X] ASTM D1557
- [ ] ASTM D698

Preparation Method
- [X] Moist
- [ ] Dry

MOLD VOLUME (CU.FT) 0.0333

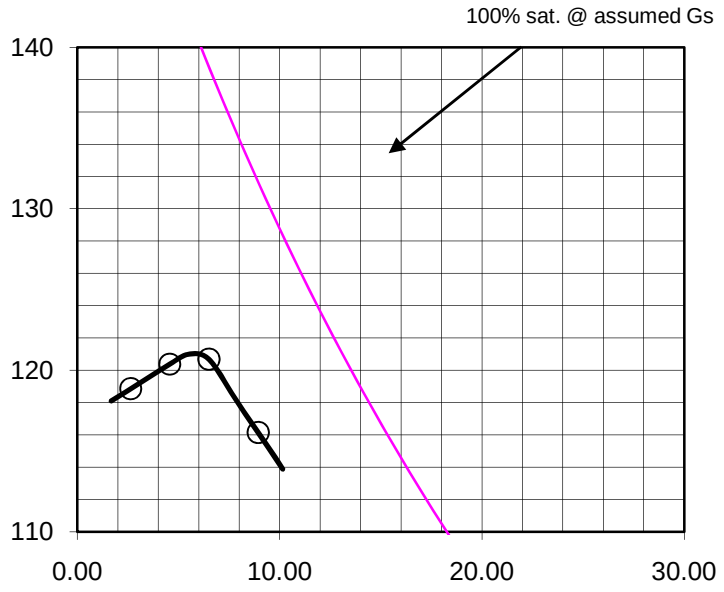
Trail No.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	3705.4	3764.1	3804.1	3774.0		
Wt. of Mold (gm.)	1862.7	1862.7	1862.7	1862.7		
Net Wt. of Soil (gm.)	1842.7	1901.4	1941.4	1911.3		
Container No.						
Wt. of Container (gm.)	214.1	214.1	214.1	214.1		
Wet Wt. of Soil + Cont. (gm.)	412.8	401.8	435.3	418.9		
Dry Wt. of Soil + Cont. (gm.)	407.7	393.6	421.8	402.1		
Moisture Content (%)	2.6	4.6	6.5	8.9		
Wet Density (pcf)	122.0	125.9	128.5	126.5		
Dry Density (pcf)	118.9	120.4	120.7	116.2		

Maximum Dry Density (pcf) **121.0** Optimum Moisture Content (%) **5.5**

Assumed Specific Gravity = 2.60

PROCEDURE USED

- [ ] *Method A*
  Soil Passing No. 4 (4.75 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 25 (twenty-five)
  May be used if No.4 retained < 20%
- [X] *Method B*
  Soil Passing 3/8 in. (9.5 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 25 (twenty-five)
  Use if + No.4 > 20% and - 3/8 " < 20%
- [ ] *Method C*
  Soil Passing 3/4 in. (19.0 mm) Sieve
  Mold : 6 in. (152.4 mm) diameter
  Layers : 5 (Five)
  Blows per layer : 56 (fifty-six)
  Use if + 3/8 in >20% and + in <30%



COMPACTION TEST

Client Name : Tessera
Project Name: Solar One
Project No. : 60095026
Location: B-049
Sample No. :
Visual Sample Description: Gravel W/ Sand (GP)

Tested By : ZC — Date: 07/16/09
Calculated By : ZC — Date: 07/16/09
Checked By : CP — Date: 07/17/09
Depth (ft) : 0-5

Compaction Method
- [ ] ASTM D1557
- [x] ASTM D698

Preparation Method
- [X] Moist
- [ ] Dry

MOLD VOLUME (CU.FT) 0.0333

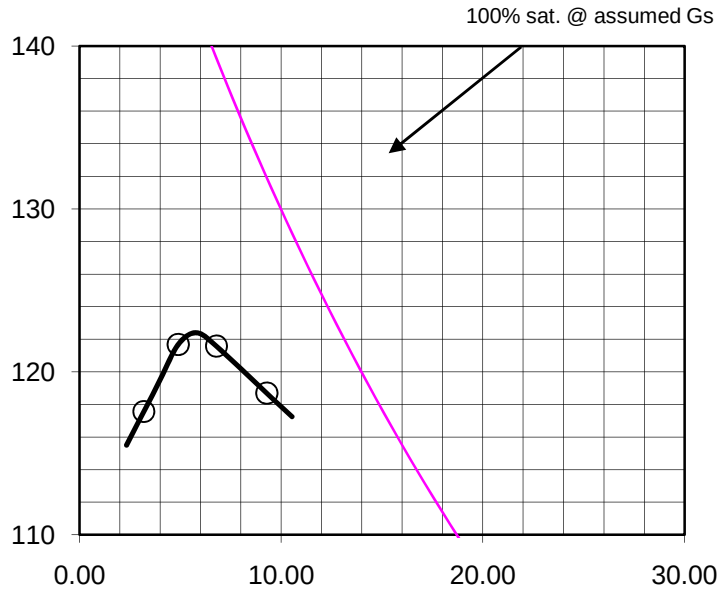
Trail No.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	3695.2	3790.7	3823.8	3822.1		
Wt. of Mold (gm.)	1862.7	1862.7	1862.7	1862.7		
Net Wt. of Soil (gm.)	1832.5	1928.0	1961.1	1959.4		
Container No.						
Wt. of Container (gm.)	214.1	214.1	214.1	214.1		
Wet Wt. of Soil + Cont. (gm.)	434.1	471.2	520.9	483.6		
Dry Wt. of Soil + Cont. (gm.)	427.3	459.2	501.4	460.7		
Moisture Content (%)	3.2	4.9	6.8	9.3		
Wet Density (pcf)	121.3	127.6	129.8	129.7		
Dry Density (pcf)	117.6	121.7	121.6	118.7		

Maximum Dry Density (pcf) **122.5** Optimum Moisture Content (%) **6.0**

Assumed Specific Gravity = 2.63

PROCEDURE USED

- [ ] *Method A*
  Soil Passing No. 4 (4.75 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 3 (Three)
  Blows per layer : 25 (twenty-five)
  May be used if No.4 retained < 20%
- [x] *Method B*
  Soil Passing 3/8 in. (9.5 mm) Sieve
  Mold : 4 in. (101.6 mm) diameter
  Layers : 3 (Three)
  Blows per layer : 25 (twenty-five)
  Use if + No.4 > 20% and - 3/8 " < 20%
- [ ] *Method C*
  Soil Passing 3/4 in. (19.0 mm) Sieve
  Mold : 6 in. (152.4 mm) diameter
  Layers : 3 (Three)
  Blows per layer : 56 (fifty-six)
  Use if + 3/8 in >20% and + in <30%



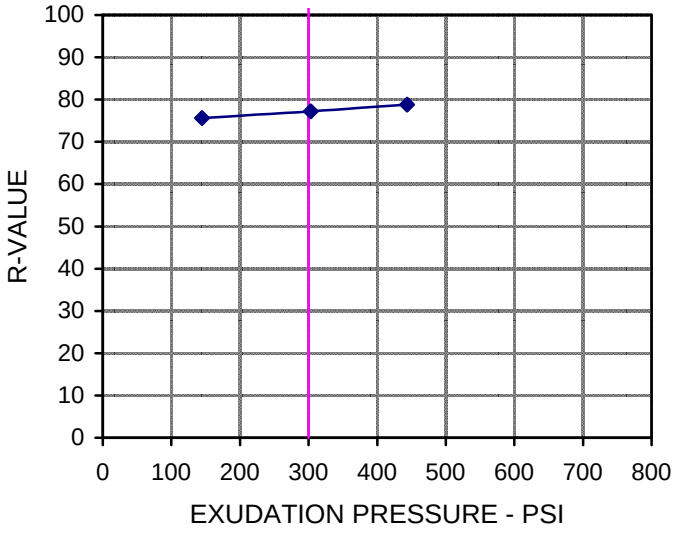
AP Engineering & Testing, Inc.

R-VALUE TEST DATA

ASTM D2844

Project Name:	Solar One	Tested By:	ST/KM	Date:	11/17/09
Project Number:	60095029	Checked By:	AP	Date:	11/18/09
Boring No.:	B-020				
Sample No.:	Bulk	Depth (ft.):	0-5		
Location:	N/A				
Soil Description:	Pale Red Silty Sand				

Mold Number	B	C	D		
Water Added, g	10	107	104		
Compact Moisture(%)	2.3	12.2	11.9		
Compaction Gage Pressure, psi	200	200	200		
Exudation Pressure, psi	443	145	303		
Sample Height, Inches	2.7	2.7	2.7		
Gross Weight Mold, g	3065	3068	3071		
Tare Weight Mold, g	1967	1969	1971		
Net Sample Weight, g	1098	1099	1100		
Expansion, inchesx10^{-4}	0	0	0		
Stability 2,000 (160 psi)	14/25	17/30	16/26		
Turns Displacement	4.25	4.19	4.57		
R-Value Uncorrected	76	72	74		
R-Value Corrected	79	76	77		
Dry Density, pcf	120.4	110.0	110.4		
Traffic Index	8.0	8.0	8.0		
G.E. by Stability	0.36	0.41	0.39		
G.E. by Expansion	0.00	0.00	0.00		



R-Value by Exudation = 77
R-Value by Expansion = N/A
Equilibrium R-Value = 77
(by Exudation)

Remarks: G_f = 1.5
0.0 % Retained on the ¾"

2607 Pomona Blvd, Pomona, CA 91768, Tel (909)869-6316 Fax (909) 869-6318

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CORROSION TEST RESULTS

Client Name: K Road Power
Project Name: Calico Solar
Project No.: 60095029A
Date: 8/9/2011

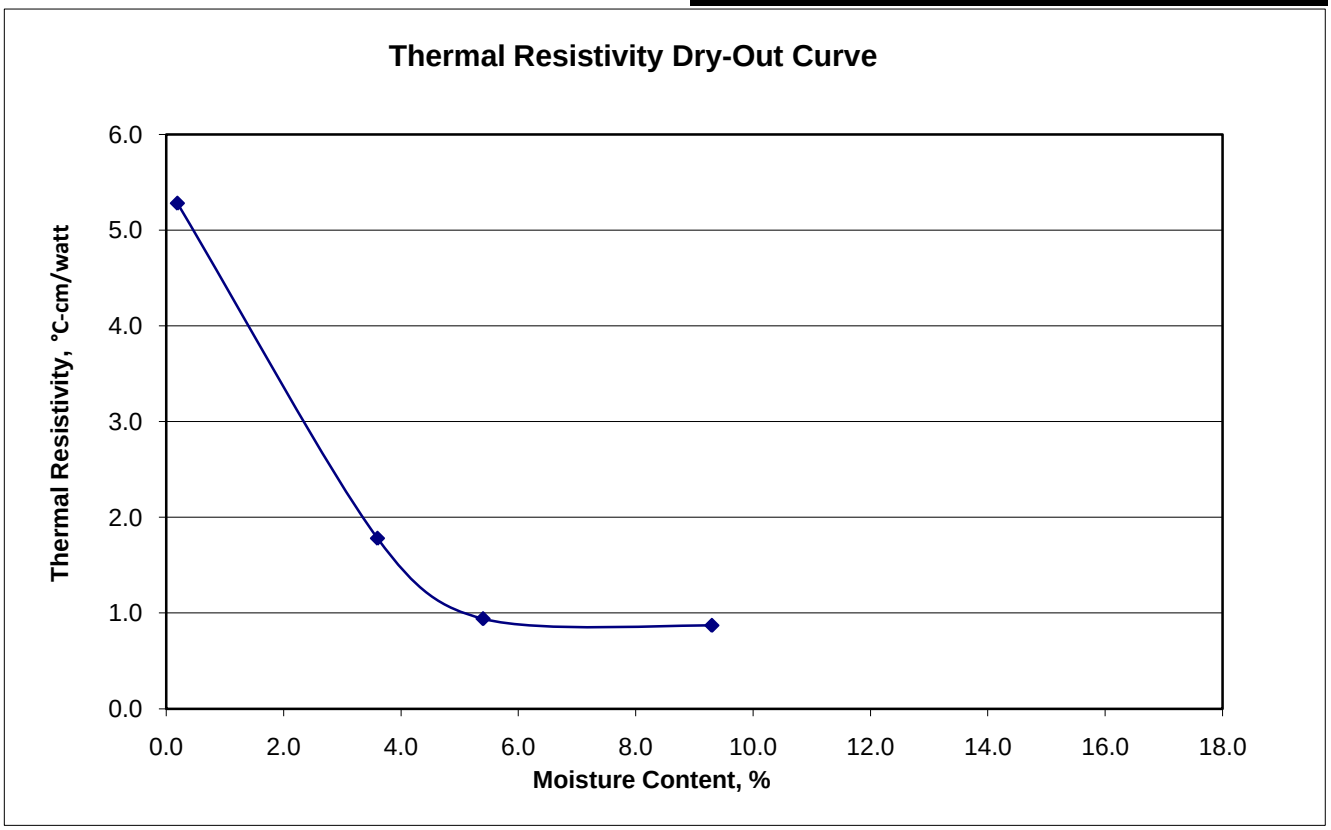
Boring No.	Sample No.	Depth (ft)	Soil Type	Minimum Resistivity (ohm-cm)	pH	Sulfate Content (ppm	Chloride Content (ppm)
B-001	-	0 to 2	SM	1,300	8.93	25	61
B-009	-	0 to 5	SP	5,900	8.18	1	61
B-014	-	0 to 2	SM	360	8.23	715	62
B-035	-	0 to 5	SP-SM	3,900	8.30	6	65
B-049	-	0 to 1	SP-SM	8,000	8.28	2	62
TP-045	-	5	SM	4,000	8.16	20	61
B-051	-	0 to 2	SM	3,100	7.50	34	42

NOTES:
Resistivity Test and pH: California Test Methods 643
Sulfate Content : California Test Method 417
Chloride Content : California Test Method 422
ND = Not Detectable
NA = Not Sufficient Sample
NR = Not Requested

Project Name: Tessera Solar
Project Number: 60095029

Thermal Resistivity Test Results

		Moisture Content (%)	Dry Unit Weight (pcf)	Meter-Degrees (˚C-cm/watt)	Temperature (°C)
Sample ID:	B-01 0'-2.5'	0.2	116.6	5	46.4
Soil Type:		3.6	116.6	2	22.6
Standard/Modified Proctor:	Modified ASTM D-1557	5.4	112.9	1	22.3
Max Dry Density, pcf:	117.5	9.3	113.4	1	22.2
Opt. Moisture Content, %:	10.00%				
Target % Compaction:	95%				
Target Dry Density:	111.63				



Run By:

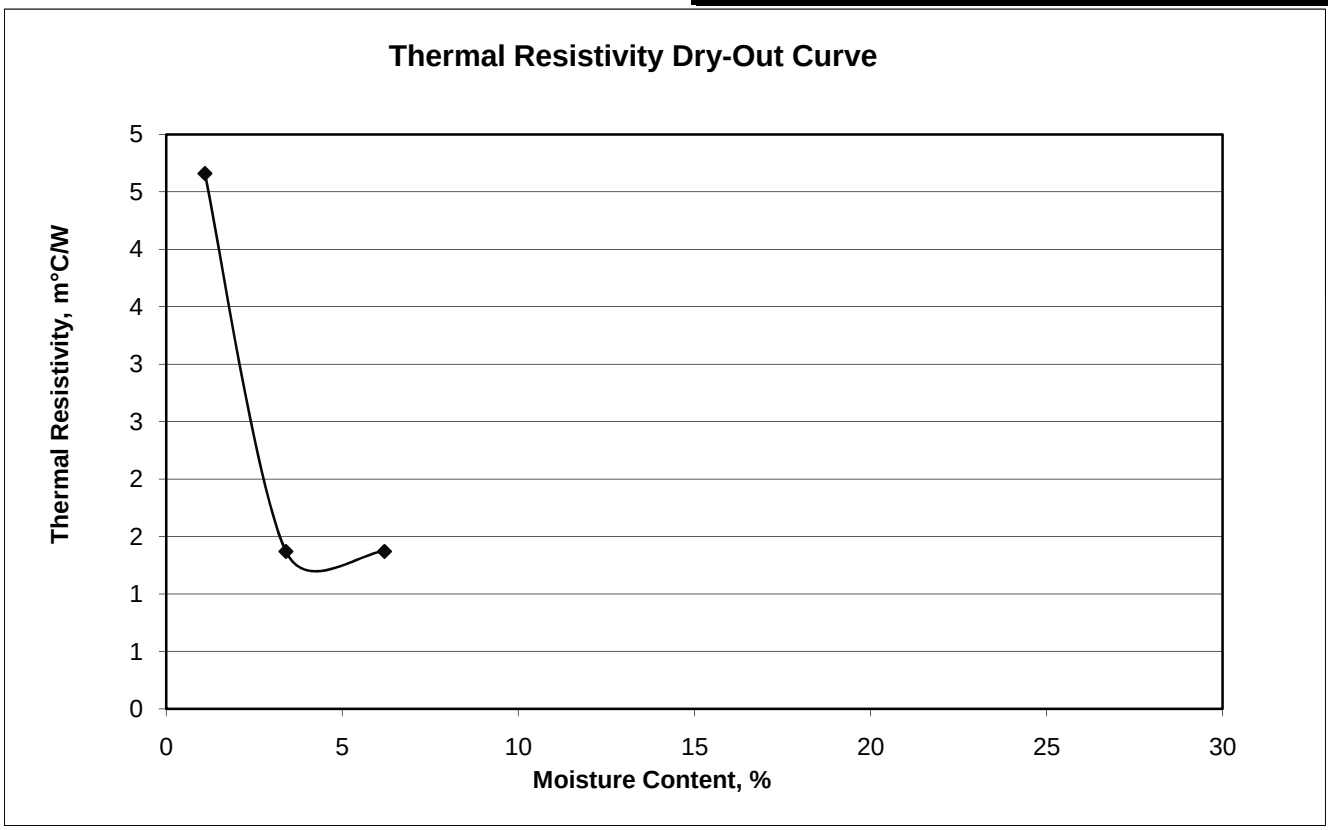
Approved By:

Terracon

Project Name: Solar One
Project Number: 60095029

Thermal Resistivity Test Results

		Average Moisture Content (%)	Compaction (%)	Meter-Degrees (˚C-cm/watt)	Average Temperature (°C)
Sample ID:	B-007, 0,0' to 2.5'	6.2	98.0	1	22.5
Soil Type:	Br. Fat Clay	3.4	93.0	1	23.1
Standard/Modified Proctor:	Modified ASTM D-1557A	1.1	93.0	5	22.7
Max Dry Density, pcf:	124.6				
Opt. Moisture Content, %:	6.50%				
Target % Compaction:	95%				



Run By: GL

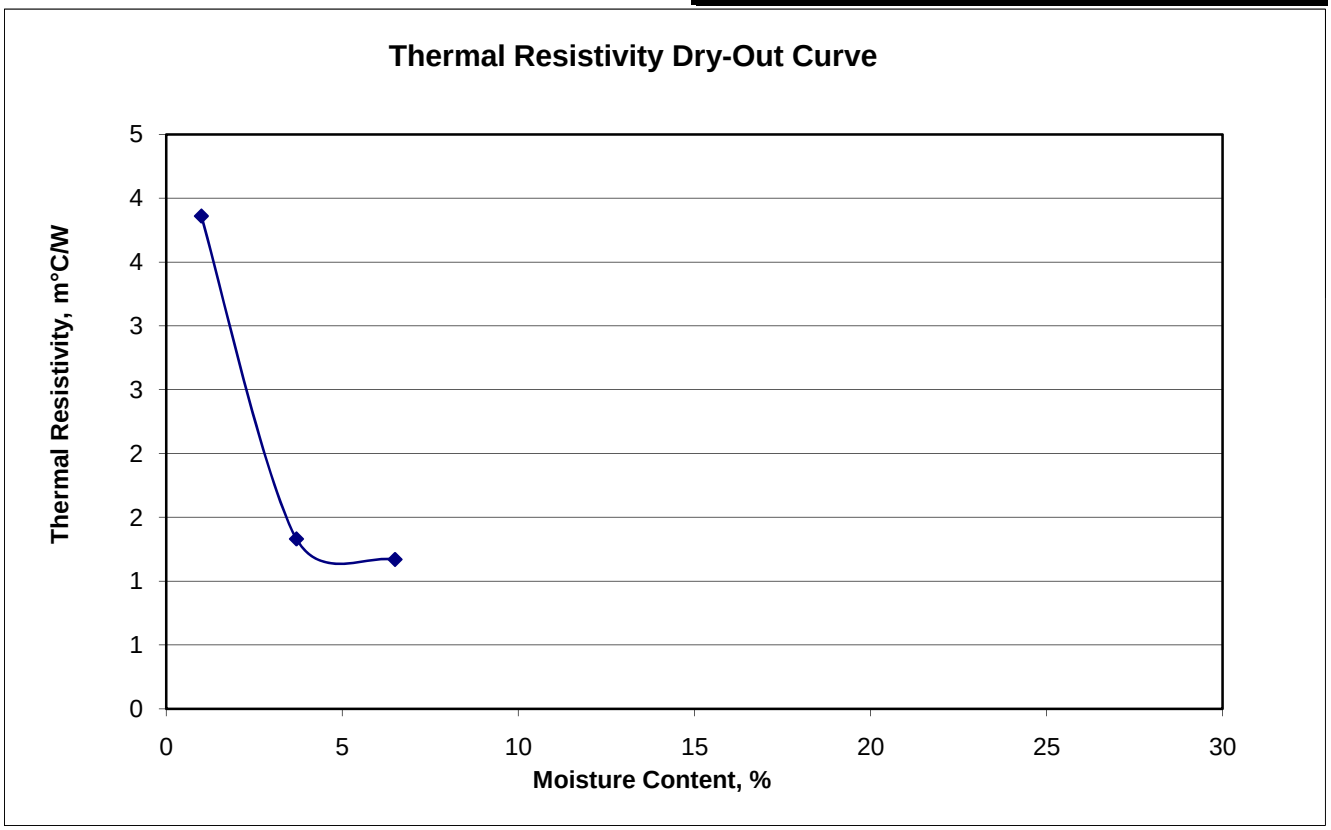
Approved By: MG

Terracon

Project Name: Solar One
Project Number: 60095029

Thermal Resistivity Test Results

		Average Moisture Content (%)	Compaction (%)	Meter-Degrees (˚C-cm/watt)	Average Temperature (°C)
Sample ID:	B-013, 0,0' to 1'	6.5	94.0	1	22.6
Soil Type:	Br. Sand with Gravel	3.7	89.0	1	22.7
Standard/Modified Proctor:	Modified ASTM D-1557A	1.0	97.0	4	22.8
Max Dry Density, pcf:	130.5				
Opt. Moisture Content, %:	7.00%				
Target % Compaction:	95%				



Run By: GL

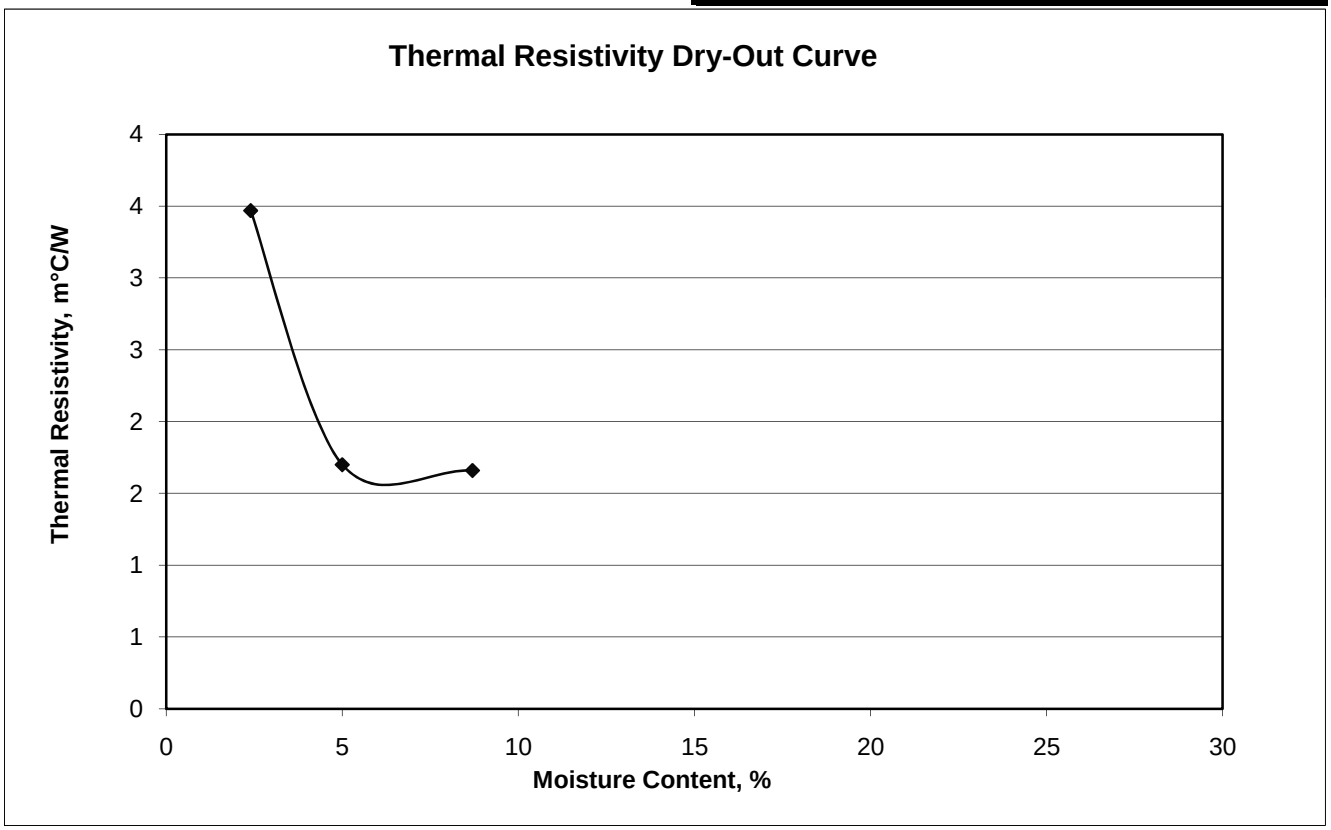
Approved By: MG

Terracon

Project Name: Solar One
Project Number: 60095029

Thermal Resistivity Test Results

		Average Moisture Content (%)	Compaction (%)	Meter-Degrees (˚C-cm/watt)	Average Temperature (°C)
Sample ID:	B-017, 0,0' to 1'	8.7	90.0	2	22.5
Soil Type:	Br. Sand with Gravel	5.0	91.0	2	24.1
Standard/Modified Proctor:	Modified ASTM D-1557A	2.4	96.0	3	23.4
Max Dry Density, pcf:	123.2				
Opt. Moisture Content, %:	11.50%				
Target % Compaction:	95%				



Run By: GL | Approved By: MG

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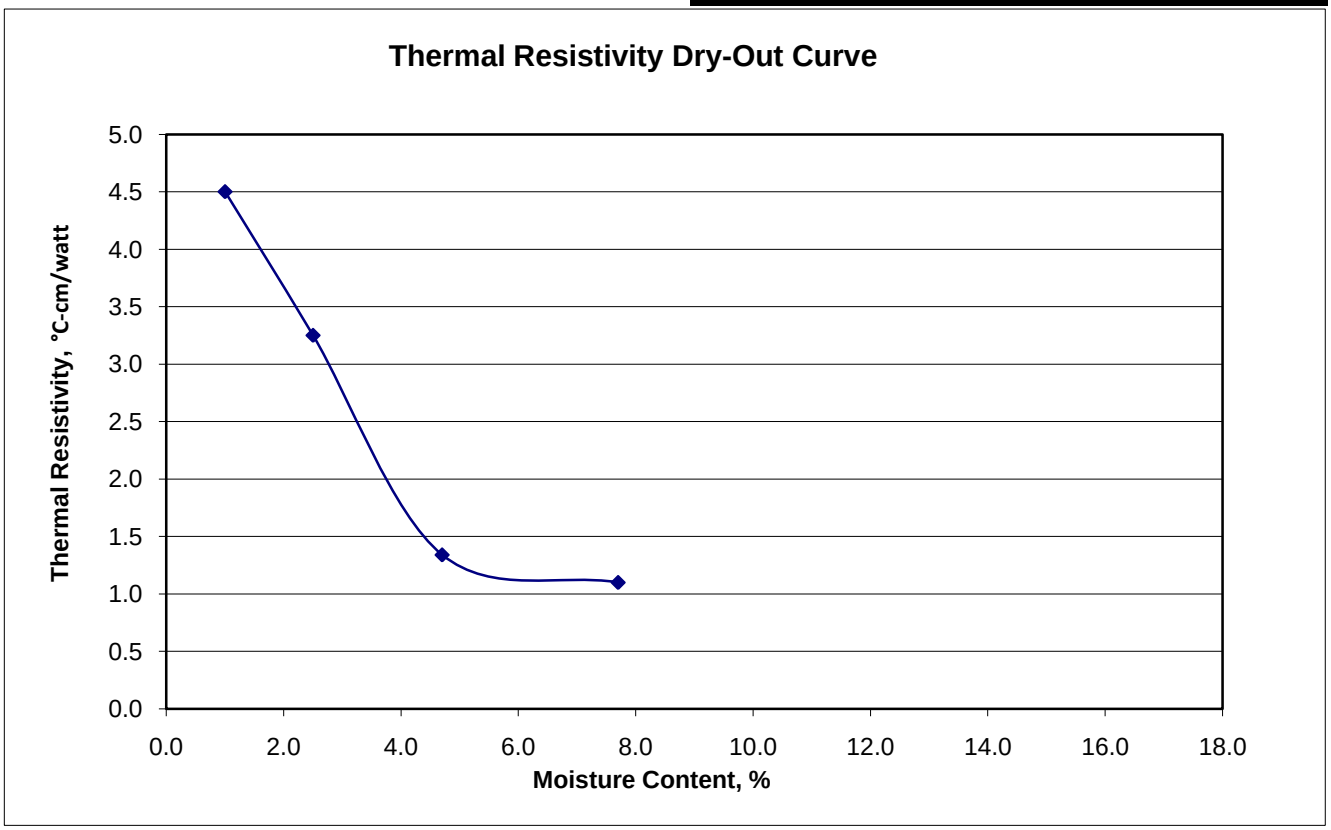
Project Name: Tessera Solar
Project Number: 60095029

Thermal Resistivity Test Results

		Moisture Content (%)	Dry Unit Weight (pcf)	Meter-Degrees (˚C-cm/watt)	Temperature (°C)
Sample ID:	B-021 0'-1'	7.7	108.5	1	20.8
Soil Type:		4.7	109.8	1	20.8
Standard/Modified Proctor:	Modified ASTM D-1557	2.5	109.0	3	20.2
Max Dry Density, pcf:	119	1.0	110.9	5	21.4
Opt. Moisture Content, %:	11.00%				
Target % Compaction:	95%				
Target Dry Density:	113.05				



Run By:

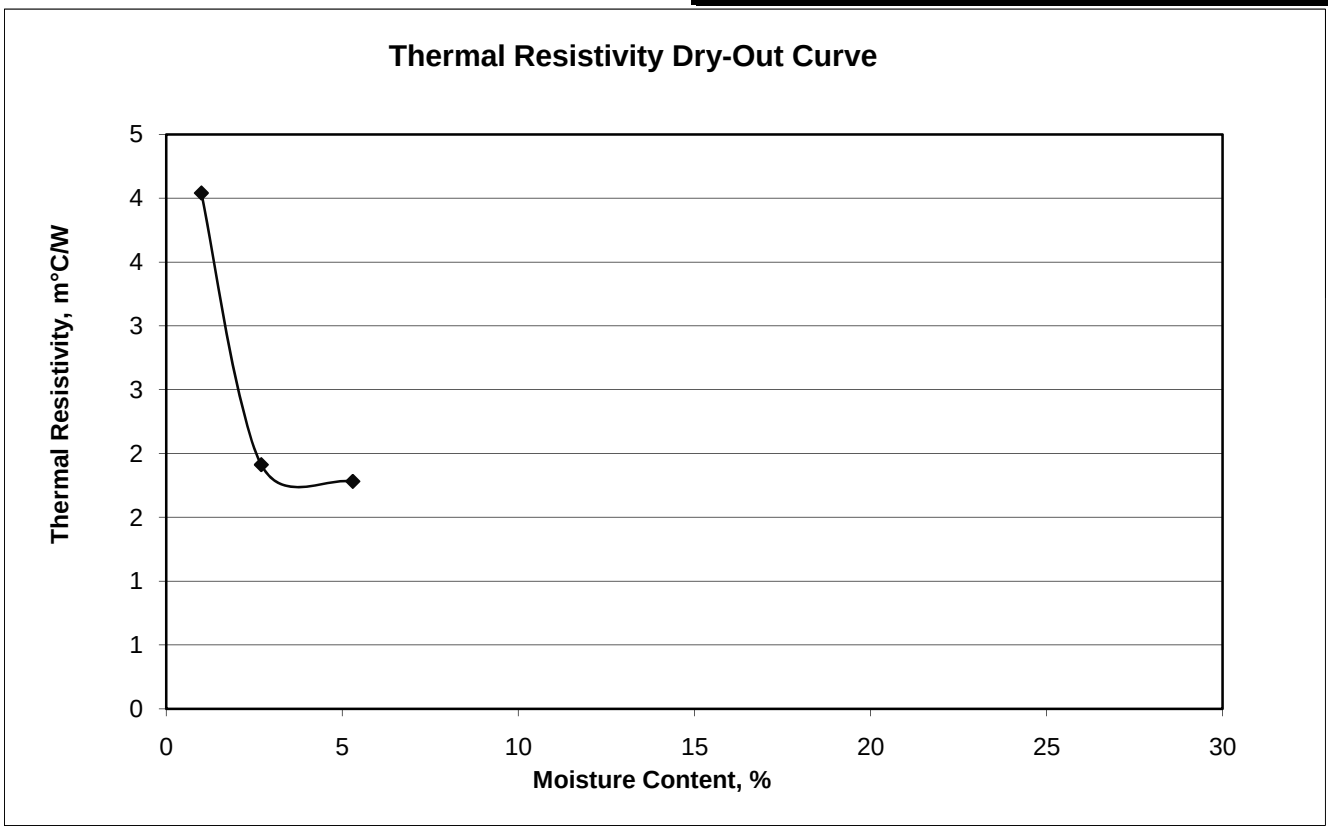
Approved By:

Terracon

Project Name: Solar One
Project Number: 60095029

Thermal Resistivity Test Results

		Average Moisture Content (%)	Compaction (%)	Meter-Degrees (˚C-cm/watt)	Average Temperature (°C)
Sample ID:	B-031, 0,0' to 5'	5.3	96.0	2	22.8
Soil Type:	Br. Sand with Gravel	2.7	96.0	2	22.4
Standard/Modified Proctor:	Modified ASTM D-1557A	1.0	98.0	4	23.0
Max Dry Density, pcf:	122.4				
Opt. Moisture Content, %:	6.00%				
Target % Compaction:	95%				



Run By: GL

Approved By: MG

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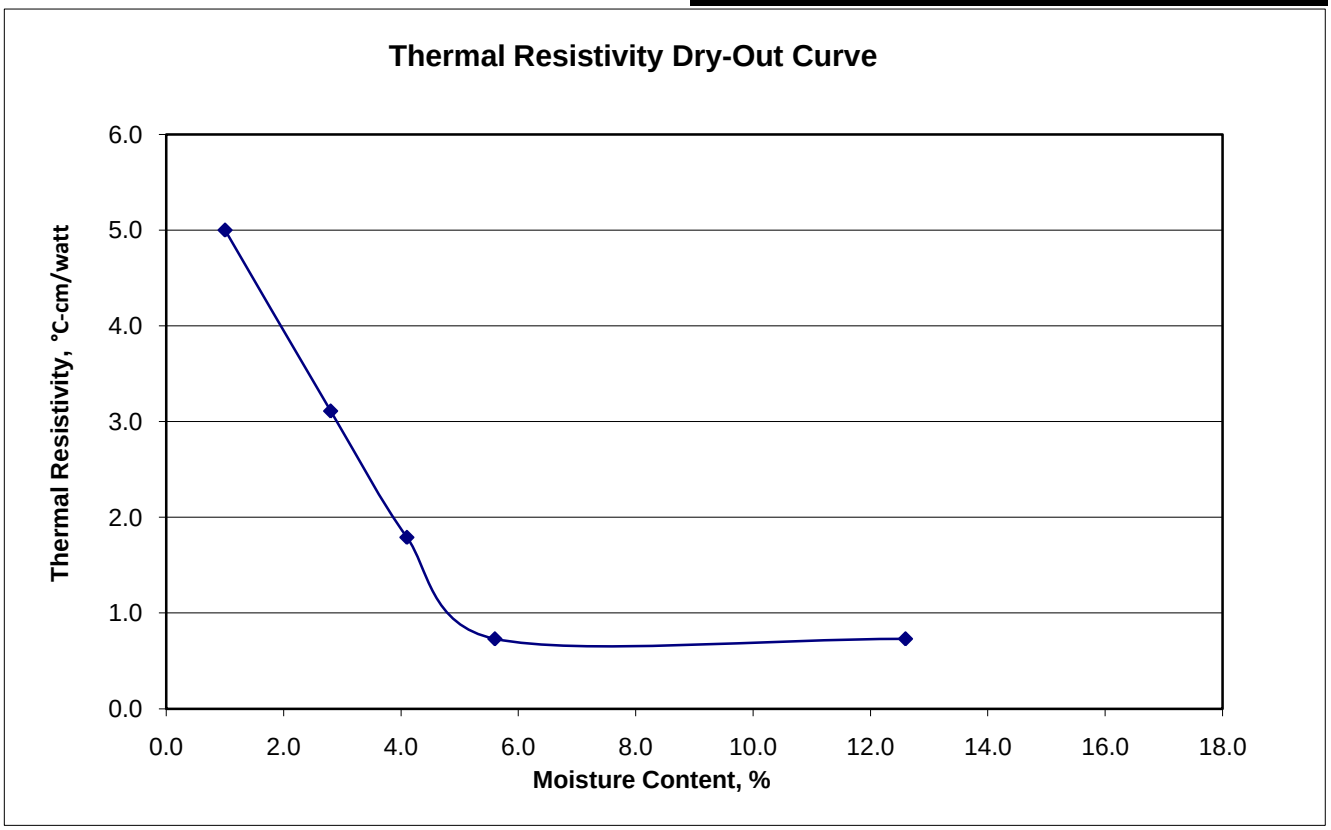
Project Name: Tessera Solar
Project Number: 60095029

Thermal Resistivity Test Results

		Moisture Content (%)	Dry Unit Weight (pcf)	Meter-Degrees (˚C-cm/watt)	Temperature (°C)
Sample ID:	B-034 0'-1'	12.6	120.1	1	22.1
Soil Type:		5.6	115.2	1	24.7
Standard/Modified Proctor:	Modified ASTM D-1557	4.1	114.9	2	24.5
Max Dry Density, pcf:	122	2.8	114.2	3	24.6
Opt. Moisture Content, %:	10.00%	1.0	117.9	5	47.8
Target % Compaction:	95%				
Target Dry Density:	115.9				



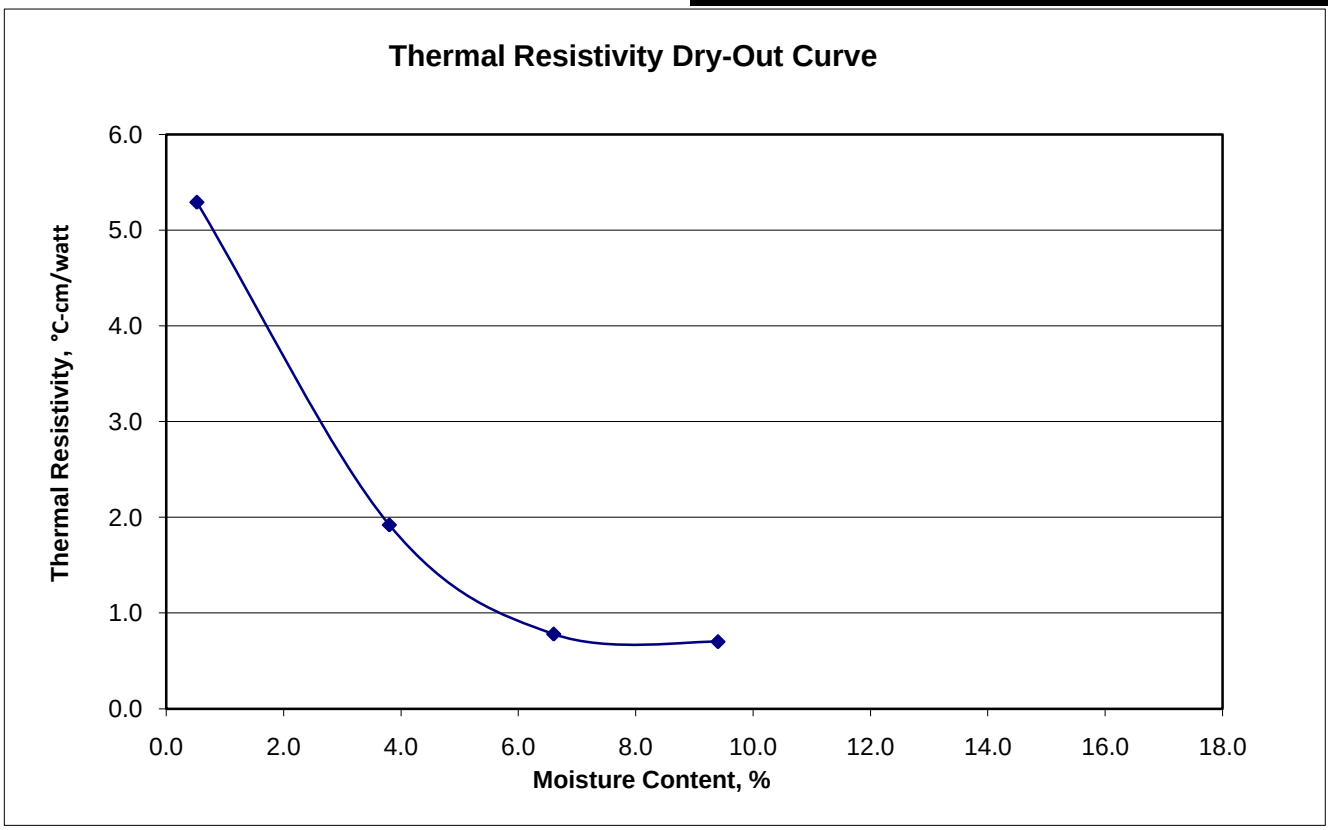
	Run By:	Approved By:

Terracon

Project Name: Tessera Solar
Project Number: 60095029

Thermal Resistivity Test Results

		Moisture Content (%)	Dry Unit Weight (pcf)	Meter-Degrees (˚C-cm/watt)	Temperature (°C)
Sample ID:	B-035 0'-5'	0.5	122.1	5	41.9
Soil Type:		3.8	122.2	2	23.9
Standard/Modified Proctor:	Modified ASTM D-1557	6.6	125.1	1	22.2
Max Dry Density, pcf:	128	9.4	126.1	1	22.2
Opt. Moisture Content, %:	9.50%				
Target % Compaction:	95%				
Target Dry Density:	121.6				



Run By:

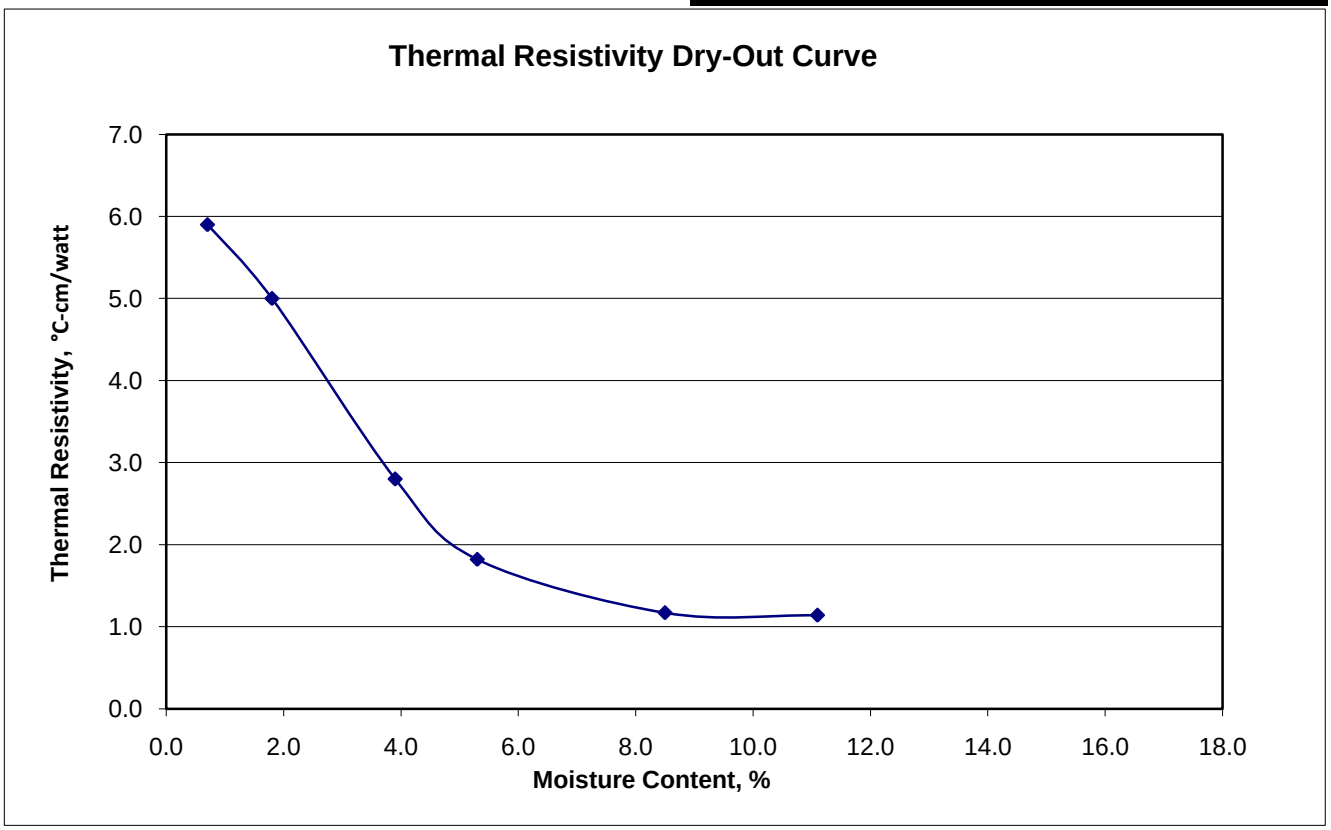
Approved By:

Terracon

Project Name: Tessera Solar
Project Number: 60095029

Thermal Resistivity Test Results

		Moisture Content (%)	Dry Unit Weight (pcf)	Meter-Degrees (˚C-cm/watt)	Temperature (°C)
Sample ID:	B-043 0'-1'	11.1	113.6	1	21.8
Soil Type:		8.5	115.2	1	22.5
Standard/Modified Proctor:	Modified ASTM D-1557	5.3	115.2	2	23.5
Max Dry Density, pcf:	121	3.9	114.3	3	23.5
Opt. Moisture Content, %:	5.50%	1.8	118.6	5	23.4
Target % Compaction:	95%	0.7	124.2	6	47.3
Target Dry Density:	114.95				



Run By:

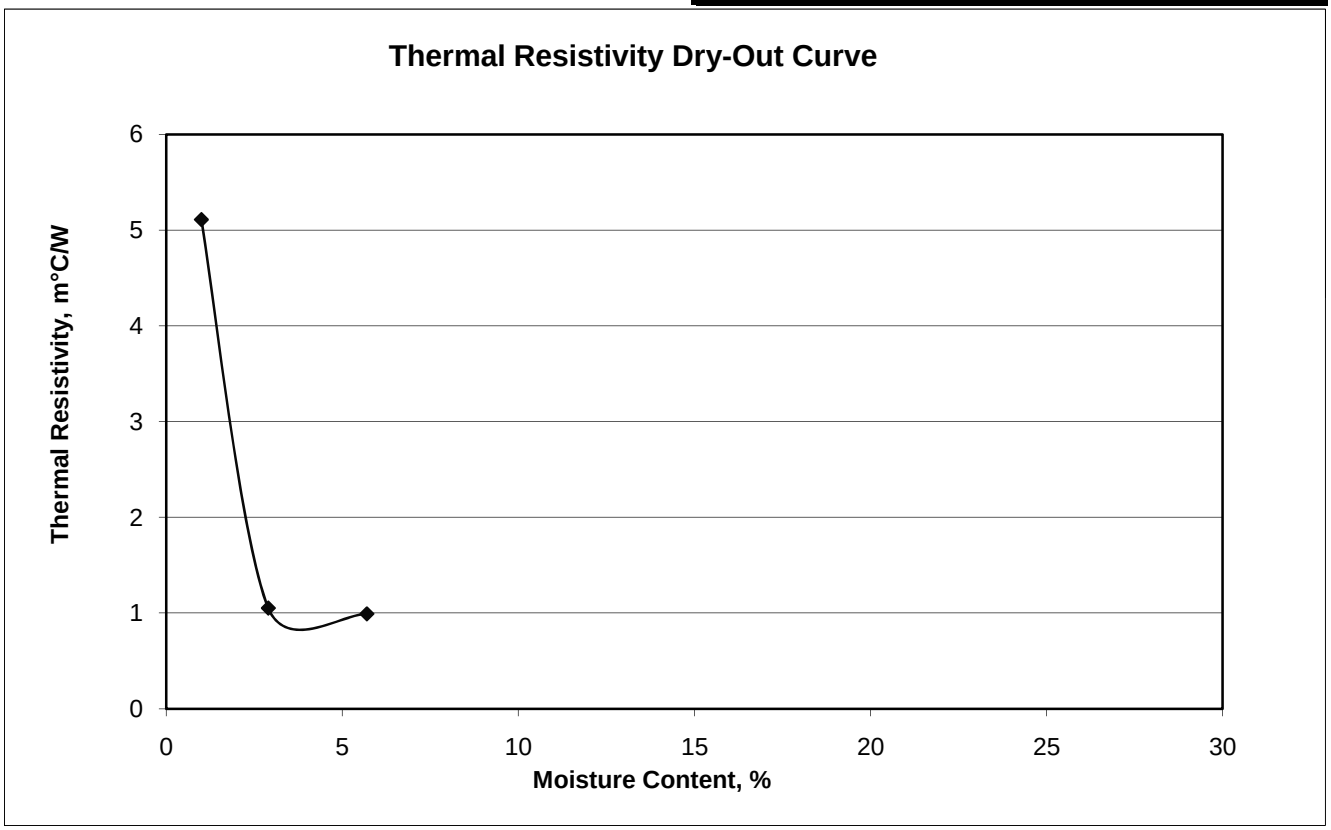
Approved By:

Terracon

Project Name: Solar One
Project Number: 60095029

Thermal Resistivity Test Results

		Average Moisture Content (%)	Compaction (%)	Meter-Degrees (˚C-cm/watt)	Average Temperature (°C)
Sample ID:	B-049 0' to 5'	5.7	96.0	1	22.7
Soil Type:	Br. Sand with Gravel	2.9	99.0	1	22.8
Standard/Modified Proctor:	Modified ASTM D-1557A	1.0	98.0	5	22.8
Max Dry Density, pcf:	122.5				
Opt. Moisture Content, %:	6.00%				
Target % Compaction:	95%				



Run By: GL

Approved By: MG

Terracon

APPENDIX C

FIELD RESISTIVITY TESTING

RESISTIVITY TEST REPORT

Project No: 60095029

Site Name: Solar One **Boring No.:** B-014

Site Address: Hwy 40 and Hector Road, Pisgah, CA

Report Prepared By: CP **Field Test By:** CP

Description of the soil as seen at the site:

Choose from the following descriptions that best describe the earth conditions:

Good clay earth Solid Rock

Sandy Soil High Rise Site

Provide the following information:

Date of resistivity test: 10/21/2009

Weather for the seven days preceding the test: Clear and Sunny
(The last three days must have been clear and sunny.)

Model number of test instrument: Nilsson Model 400

Serial number of test instrument: 4-7530

RESITIVITY TESTING DATA AND RESULTS:

A (ft) =	2	4	8	16	20
FORMULA D= (OHM-CM)	383*R	766*R	1532*R	3064*R	3830*R
AREA 1 MEASURED R	19	5.1	1.7	0.92	0.61
AREA 1 CALC D	7277	3907	2604	2819	2336

RESISTIVITY TEST REPORT

Project No: 60095029

Site Name: Solar One **Boring No.:** B-014

Site Address: Hwy 40 and Hector Road, Pisgah, CA

Report Prepared By: CP **Field Test By:** CP

Description of the soil as seen at the site:

Choose from the following descriptions that best describe the earth conditions:

Good clay earth Solid Rock

Sandy Soil High Rise Site

Provide the following information:

Date of resistivity test: 10/21/2009

Weather for the seven days preceding the test: Clear and Sunny
(The last three days must have been clear and sunny.)

Model number of test instrument: Nilsson Model 400

Serial number of test instrument: 4-7530

RESITIVITY TESTING DATA AND RESULTS:

A (ft) =	2	4	8	16	20
FORMULA D= (OHM-CM)	383*R	766*R	1532*R	3064*R	3830*R
AREA 1 MEASURED R	20	6.7	3.2	3.2	3.2
AREA 1 CALC D	7660	5132	4902	9805	12256

RESISTIVITY TEST REPORT

Project No: 60095029

Site Name: Solar One **Boring No.:** B-033

Site Address: Hwy 40 and Hector Road, Pisgah, CA

Report Prepared By: CP **Field Test By:** CP

Description of the soil as seen at the site:

Choose from the following descriptions that best describe the earth conditions:

Good clay earth Solid Rock

Sandy Soil High Rise Site

Provide the following information:

Date of resistivity test: 10/21/2009

Weather for the seven days preceding the test: Clear and Sunny
(The last three days must have been clear and sunny.)

Model number of test instrument: Nilsson Model 400

Serial number of test instrument: 4-7530

RESITIVITY TESTING DATA AND RESULTS:

A (ft) =	2	4	8	16	20
FORMULA D= (OHM-CM)	383*R	766*R	1532*R	3064*R	3830*R
AREA 1 MEASURED R	660000	410000	740000	560000	200000
AREA 1 CALC D	252780000	314060000	1133680000	1715840000	766000000

RESISTIVITY TEST REPORT

Project No: 60095029

Site Name: Solar One **Boring No.:** B-048

Site Address: Hwy 40 and Hector Road, Pisgah, CA

Report Prepared By: CP **Field Test By:** CP

Description of the soil as seen at the site:

Choose from the following descriptions that best describe the earth conditions:

Good clay earth | Solid Rock

Sandy Soil | High Rise Site

Provide the following information:

Date of resistivity test: 10/21/2009

Weather for the seven days preceding the test: Clear and Sunny
(The last three days must have been clear and sunny.)

Model number of test instrument: Nilsson Model 400

Serial number of test instrument: 4-7530

RESITIVITY TESTING DATA AND RESULTS:

A (ft) =	2	4	8	16	20
FORMULA D= (OHM-CM)	383*R	766*R	1532*R	3064*R	3830*R
AREA 1 MEASURED R	1600	1300	1900	1800	8900
AREA 1 CALC D	612800	995800	2910800	5515200	34087000

RESISTIVITY TEST REPORT

Project No: 60095029

Site Name: Solar One **Boring No.:** B-029

Site Address: Hwy 40 and Hector Road, Pisgah, CA

Report Prepared By: CP **Field Test By:** CP

Description of the soil as seen at the site:

Choose from the following descriptions that best describe the earth conditions:

Good clay earth

Solid Rock

Sandy Soil

High Rise Site

Provide the following information:

Date of resistivity test: 10/21/2009

Weather for the seven days preceding the test: Clear and Sunny

(The last three days must have been clear and sunny.)

Model number of test instrument: Nilsson Model 400

Serial number of test instrument: 4-7530

RESITIVITY TESTING DATA AND RESULTS:

A (ft) =	2	4	8	16	20
FORMULA D= (OHM-CM)	383*R	766*R	1532*R	3064*R	3830*R
AREA 1 MEASURED R	140000	130000	160000	71000	16000
AREA 1 CALC D	53620000	99580000	245120000	217544000	61280000

RESISTIVITY TEST REPORT

Project No: 60095029

Site Name: Solar One **Boring No.:** B-025

Site Address: Hwy 40 and Hector Road, Pisgah, CA

Report Prepared By: CP **Field Test By:** CP

Description of the soil as seen at the site:

Choose from the following descriptions that best describe the earth conditions:

Good clay earth Solid Rock

Sandy Soil High Rise Site

Provide the following information:

Date of resistivity test: 10/21/2009

Weather for the seven days preceding the test: Clear and Sunny
(The last three days must have been clear and sunny.)

Model number of test instrument: Nilsson Model 400

Serial number of test instrument: 4-7530

RESITIVITY TESTING DATA AND RESULTS:

A (ft) =	2	4	8	16	20
FORMULA D= (OHM-CM)	383*R	766*R	1532*R	3064*R	3830*R
AREA 1 MEASURED R	310	300	4700	120	0
AREA 1 CALC D	118730	229800	7200400	367680	0

RESISTIVITY TEST REPORT

Project No: 60095029

Site Name: Solar One **Boring No.:** B-043

Site Address: Hwy 40 and Hector Road, Pisgah, CA

Report Prepared By: CP **Field Test By:** CP

Description of the soil as seen at the site:

Choose from the following descriptions that best describe the earth conditions:

Good clay earth Solid Rock

Sandy Soil High Rise Site

Provide the following information:

Date of resistivity test: 10/21/2009

Weather for the seven days preceding the test: Clear and Sunny
(The last three days must have been clear and sunny.)

Model number of test instrument: Nilsson Model 400

Serial number of test instrument: 4-7530

RESITIVITY TESTING DATA AND RESULTS:

A (ft) =	2	4	8	16	20
FORMULA D= (OHM-CM)	383*R	766*R	1532*R	3064*R	3830*R
AREA 1 MEASURED R	1000	10900	12000	12000	0
AREA 1 CALC D	383000	8349400	18384000	36768000	0

RESISTIVITY TEST REPORT

Project No: 60095029

Site Name: Solar One **Boring No.:** B-032

Site Address: Hwy 40 and Hector Road, Pisgah, CA

Report Prepared By: MLS **Field Test By:** MLS

Description of the soil as seen at the site:

Choose from the following descriptions that best describe the earth conditions:

Good clay earth Solid Rock

Sandy Soil High Rise Site

Provide the following information:

Date of resistivity test: 10/23/2009

Weather for the seven days preceding the test: Clear and Sunny
(The last three days must have been clear and sunny.)

Model number of test instrument: Nilsson Model 400

Serial number of test instrument: 4-7530

RESITIVITY TESTING DATA AND RESULTS:

A (ft) =	2	4	8	16	20
FORMULA D= (OHM-CM)	383*R	766*R	1532*R	3064*R	3830*R
AREA 1 MEASURED R	120	20	400	20	11
AREA 1 CALC D	45960	15320	612800	61280	42130

RESISTIVITY TEST REPORT

Project No: 60095029

Site Name: Solar One **Boring No.:** TP-044

Site Address: Hwy 40 and Hector Road, Pisgah, CA

Report Prepared By: MLS **Field Test By:** MLS

Description of the soil as seen at the site:

Choose from the following descriptions that best describe the earth conditions:

Good clay earth Solid Rock

Sandy Soil High Rise Site

Provide the following information:

Date of resistivity test: 10/30/2009

Weather for the seven days preceding the test: Clear and Sunny
(The last three days must have been clear and sunny.)

Model number of test instrument: Nilsson Model 400

Serial number of test instrument: 4-7530

RESITIVITY TESTING DATA AND RESULTS:

A (ft) =	2	4	8	16	20
FORMULA D= (OHM-CM)	383*R	766*R	1532*R	3064*R	3830*R
AREA 1 MEASURED R	56000	1800	2000	4600	6500
AREA 1 CALC D	21448000	1378800	3064000	14094400	24895000