Appendix 2B
Preliminary Geotechnical Engineering Report

Preliminary Geotechnical Engineering Report

Rice Solar Energy Project

Former Rice Airfield

Highway 62, Mile Marker 109

Rice, California

August 5, 2009

Terracon Project No. 60095017

Prepared for:

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c/o

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GEOTECHNICAL ENGINEERING REPORT
RICE SOLAR ENERGY PROJECT
FORMER RICE AIRFIELD
HIGHWAY 62, MILE MARKER 109
RICE, CALIFORNIA

Terracon Project No. 60095017
August 5, 2009

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 Rice Solar Energy Project to be located at the former Rice Airfield located south of Highway 62 near mile marker 109 in Rice, California. Terracon's geotechnical scope of work included the advancement of 8 test borings to approximate depths of 30½ to 86½ feet below existing site grades. Two test pits were also excavated to approximately 10 feet below existing site grades. In addition to the geotechnical explorations, 22 test borings were advanced in performance of a Limited Site Investigation and are included in this report.

The purpose of this report was to evaluate general subsurface conditions and provide feasibility level recommendations for preliminary design of the project. As we understand it, additional geotechnical studies will be undertaken in support of the final design of the project. 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: The site surface soils generally consisted of silty sand and poorly graded sand. The underlying near surface and subsurface soils generally consisted of silty sand, poorly graded sand and poorly graded gravel with a significant amount of caliche cementation. The soils are moderately to strongly cemented with caliche in several locations across the site.

The soils generally had high blow counts; however, the soils exhibited significant tendency for hydro-compaction (collapse) when wetted and subjected to foundation pressures. Groundwater was not encountered in any test boring at the time of drilling. On-site soils are suitable for use as engineered fill beneath foundations and pavements.

Foundations: The tower and related structural elements at the site may be supported by continuous footings or mat foundations bearing on approved undisturbed soils. Pole mounted equipment may be supported by drilled shafts, driven piles, metal fin pipe pile or screw pipe pile foundations. Difficult drilling conditions are anticipated where caliche cementation is moderate to strong. The use of driven pile foundations may also be considered, however, the presence of shallow moderately to strongly cemented soils may make driving pipe or metal fin piles at some locations very difficult or impractical. Difficulty may also be encountered installing the screw pipe piles where moderate to strongly cemented soils are encountered.

Based on the required number of foundations being on the order of 17,000, and the potential difficulty associated with some of the foundation options, we recommend a test pile installation program be implemented for the chosen foundation alternative. The test program should attempt to install the chosen foundation type in the various soil conditions encountered across the site to verify the suitability of the chosen system for installation.

Pavement Sections: Automobile parking areas – 3.0" AC over 6.0" ABC or 5.5" PCC over 6.0" ABC; truck drives and drive lanes – 4.0" AC over 10.0" ABC or 6.0" PCC over 9.0" ABC.

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.

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August 5, 2009

Terracon

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Re: Preliminary Geotechnical Engineering Report
Rice Solar Energy Project
Former Rice Airfield
Highway 62, Mile Marker 109
Rice, California
Terracon Project No. 60095017

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 number D6009010 dated March 5, 2009. This geotechnical engineering report presents the results of the subsurface exploration and provides preliminary geotechnical recommendations concerning earthwork and the design and construction of foundations and pavements for the proposed project.

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.

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PRELIMINARY GEOTECHNICAL ENGINEERING REPORT
RICE SOLAR ENERGY PROJECT
FORMER RICE AIRFIELD
HIGHWAY 62, MILE MARKER 109
RICE, CALIFORNIA

Terracon Project No. 60095017
August 5, 2009

1.0 INTRODUCTION

This report presents our preliminary results based on our geotechnical engineering services performed for the Rice Solar Energy Project to be located at the former Rice Airfield located south of Highway 62, near Mile Marker 109 in Rice, California. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

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

Our geotechnical engineering scope of work for this project was determined by Specification SRRC-0-TS-02010 prepared by Worley Parsons, dated January 13, 2009. The scope of work included the advancement of 8 test borings to approximate depths ranging from 30½ to 86½ feet below existing site grades. Two test pits were also excavated to approximately 10 feet below existing site grades. In addition to the geotechnical explorations, 22 test borings were advanced in performance of a Limited Site Investigation and are included in this report.

Logs of the borings along with a Topographic Map (Plate A-1) and Site Plan and Boring Locations diagram (Plate 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 Locations Diagram (Exhibit 1 in Appendix A)
Structures	• Pipe Racks – supported on isolated square column footings; sizes range from 5'x5', 10'x10', to 25'x25'; • Turbine – supported on a mat foundation that will be approximately 8 feet above finished grade; dynamic loads will be damped by the mass of the concrete foundation; • Water Tanks – 30 feet in height and 80 feet in diameter, tank supported on ringwall foundation at about two feet below finished grade; • Liquid Salt Tank – unit weight is 118 pcf, 40 feet in height and 160 feet in diameter; tank supported on ringwall foundation at about two feet below finished grade; • Heliostats – 17,000 separate structures, foundation could consist of 30-inch drilled shafts, 12-inch pre-drilled driven pipe piles, metal fin pipe piles, and/or screw pipe piles; • Central Tower – 538 feet in height, donut shaped foundation, outer ring is 220 feet in diameter and the inner ring is 80 feet in diameter. The diameter at the base of the tower sitting on the foundation is 115 feet in diameter. The foundation thickness is 20 feet beneath the center of the donut, then thinning to a thickness of 8 feet at the outer edge. The total weight of the tower and equipment supported at the top of the tower is 45,000,000 pounds.
Maximum loads	• Pipe Racks 3,000 psf • Turbine <2,000 psf • Liquid Salt Tank 4,200 psf • Water Tank 1,900 psf • Heliostats 6,700 pounds (lateral) 105 kip-ft (moment) 9,000 pounds (vertical) • Central Tower maximum 6,000 psf
Maximum allowable settlement	Varies – See Text of Report
Maximum allowable differential settlement	Varies – See Text of Report

ITEM	DESCRIPTION*
Grading	Grading plans were not provided prior to preparation of this report. For the purposes of this report, cut and fill depths are assumed to be on the order of zero to eight feet at various locations across the site.
Traffic loading	Assumed Traffic Index = 5.0 for Light Automobile Parking Assumed Traffic Index = 7.0 for Heavy Parking and Drive Areas

*Preliminary/estimated description of item provided by others for the preparation of this report.

2.2 Site Location and Description

ITEM	DESCRIPTION
Location	Former Rice Airfield in Rice, California
Section, Township, Range	S 19, 20, 29 and 30, T 1 S, R 21 E Portions of S 24 and 25, T 1 S, R 20 E (San Bernardino Base Line and Meridian)
Existing site features	Native desert with remnant features from a former airfield including runways, building foundations, drains, septic fields and septic tanks. The septic fields and tanks consist of wood lined and unlined pits. This site was formerly the Rice Army Airfield Site. The potential for unexploded ordinances should be considered.
Surrounding developments	North: Highway 62 followed by undeveloped land East: Undeveloped, vacant land West: Undeveloped, vacant land South: Undeveloped, vacant land
Current ground cover	Moderate to dense growth of creosote.
Existing topography	Gently sloping from the north to the south at approximate gradient of 2%.

3.0 SUBSURFACE CONDITIONS

A cursory review of historical aerial photographs for the site indicates that it has been partially developed as an airfield since at least the 1940s.

3.1 Site Geology

The site is situated within the eastern 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 and the state of Nevada to the east.[1, 2] A detailed discussion of seismicity is included in the **Faulting and Estimated Ground Motions** Section.

Surficial geologic conditions mapped at the site consist of alluvium of Holocene to middle Pleistocene age (10,000 to 1 m.y. ago).[3]

3.2 Soil Conservation Service - Soil Maps

The soils in the vicinity of the site have been surveyed and classified by the U.S. Soil Conservation Service. The soil survey map indicates that the soils in the area of the site consist of the Carrizo extremely gravelly - sandy loam. The soils underlying the site are further described as follows:

> The Carrizo series consists of very deep, excessively drained sands and gravels. Carrizo soils are on floodplains, alluvial fan, fan piedomonts and bolson floors. Slopes range from 0 to 15 percent. The soil is slightly to moderately alkaline and permeability is moderate to moderately rapid. Runoff is very low. However, as outlined within this report, the near surface materials at the site are laden with caliche which creates low permeability characteristics.

3.3 Typical Subsurface Profile

Specific conditions encountered at each boring location are indicated on the individual boring logs. The near surface soils consist of damp, dense silty sand and poorly graded sand. 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.

Laboratory tests were conducted on selected soil samples and the test results are presented in Appendix B. Laboratory test results indicate that the surface and near surface soils exhibit low compressibility potentials at in-situ moisture contents. The near surface soils encountered across the site have a moderate to high tendency for hydro-compaction (collapse) when wetted under foundation loads. The samples tested for collapse potential where the blow counts are above 35 have the potential for sample disturbance. It is our opinion the collapse potential results of samples from Boring No. 20 at a depth of 10 feet, Boring No. 22 at a depth of 7.5 feet, and Boring No. 22 at a depth of 10 feet are artificially higher than what should be expected due to sample disturbance, though some amount of collapse potential is expected form this soil horizon. The collapse potential of the near surface soils should be further explored during the supplemental exploration for the final design phase of this project.

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[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] CDMG, "*Geologic Map of California, Needles Sheet", 1992.*

3.4 Groundwater

Groundwater was not observed in any test boring at the time of field exploration. Based on review of a letter report by AZCA Drilling & Pump, Inc., groundwater was measured approximately 364 feet below ground surface at the site on August 20, 2008. These observations may not be indicative of other times, or at other locations. Groundwater conditions can change with varying seasonal and weather conditions, and other factors.

3.5 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. Using the EQFAULT program [4] faults within 50 miles of the site were not identified.

In order to estimate the seismic ground motions at the subject site, Terracon reviewed seismic hazard map information;[5] and performed a probabilistic analysis using the FRISKSP computer program[6] utilizing the Joyner Boore (1997), Campbell (1997), and Abrahamson and Silva (1997) attenuation curves.[7] Based on these sources the peak ground acceleration at the subject site for a 10% Probability of Exceedance in 50 years is expected to be about 0.14g.

Furthermore, the site is not located within an Alquist-Priolo Earthquake Fault Zone based on our review of the State Fault Hazard Maps.[8]

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

On a preliminary basis, the site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings provided that the findings and recommendations presented herein are incorporated into project design and construction. Supplemental geotechnical studies should be undertaken as part of the final design phase of the project.

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[4] Blake, T. F., "EQFAULT: A Computer Program for the Deterministic Prediction of Peak Horizontal Acceleration from Digitized California Fault", User Manual and Program, 1989, (Updated 1999).

[5] California Geologic Survey (CGS), "The Revised 2002 California Probabilistic Seismic Hazard Maps" June 2003. Note: Supersedes the "Probabilistic Seismic Hazard Assessment for the State of California", Open File Report 96-08 (1996) and 97-706 (1997).

[6] Blake, T. F., "FRISKSP: A Computer Program for the Probabilistic Prediction of Peak Ground Acceleration from Digitized California Faults," ver. 4.00, User Manual and Program, 2000.

[7] Seismological Society of America, "Equations for the Estimating Horizontal Response Spectra and Peak Acceleration from Western North American Earthquakes: A Summary of Recent Work": Seismological Research Letters, Vol. 68, No. 1, pp. 128-153.

[8] 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.

Potentially compressible soils which show tendency for hydro-compaction when elevated in moisture content will require particular attention in the design and construction. Hydro-compactive soils, sometimes referred to as "collapsible" soils, are materials which undergo volume decrease (settlement/consolidation) when subjected to increases in moisture content under constant load.

Based on the geotechnical engineering analyses, subsurface exploration and laboratory test results, we recommend that the larger proposed structures be supported on mat foundations or drilled shafts, as applicable. Due to the potential for hydro-compaction in the near surface soils, shallow mat footings should bear on a blanket of engineered fill.

It appears that the majority of the on-site soils 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.

Preliminary 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 structure should extend a minimum of 5 feet beyond the limits of the proposed structure.

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.

Also, due to the historic use of the site by the United States Army, the potential for unexploded ordnance (UXO) in the near-surface soils and should be monitored for during the earthwork process.

4.2.1 Site Preparation

Strip and remove existing vegetation, debris, and other deleterious materials from proposed structures and pavement 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.

The site should be initially graded to create a relatively level surface to receive fill, and to provide for a relatively uniform thickness of fill beneath proposed structures.

The wood lined and unlined pits located at the site should be excavated down to firm, approved native soils and the resulting voids should be replaced with engineered fill.

4.2.2 Overexcavation of Mat and Shallow Foundations

In areas where shallow or mat foundations are planned and the existing grades are more than one foot below the bottom of the footing, the upper 2 ± feet of existing soils should be overexcavated to expose firm, native soils, prior to placement of engineered fill. In areas where shallow or mat foundations are planned and the existing grades are less than or equal to one foot below the bottom of the footing, overexcavation should be performed so as to provide a minimum of 3 feet of engineered fill below the bottom of the mat. This overexcavation should extend laterally a minimum distance of 5 feet outside the edges of the proposed foundations.

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
- foundation backfill
- pavement areas

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	59 (max)
■ Liquid Limit	30 (max)

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

*ASTM D4829

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 Modified 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:	90	0%	+4%
Beneath asphalt pavements:	90	0%	+4%
Beneath concrete pavements:	90	0%	+4%

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.

4.2.6 Shrinkage

For balancing grading plans, estimated shrink of soils when used as compacted fill following recommendations in this report are as follows:

Estimated Shrink	
Soil Type	**Based on ASTM D1557**
Near-surface alluvium	5 to 10

4.2.7 Corrosion Potential

Results of soluble sulfate testing indicate that ASTM Type I/II Portland cement is suitable for concrete on and below grade. Foundation concrete should be designed for low 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 210 to 1,300 ohm-centimeters, and pH values ranging from 7.3 to 8.6. Chloride content in the soils ranged from 123 to 1,772 ppm. These values should be used to determine potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

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.

4.2.8 Construction Considerations

It is anticipated that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. Excavations penetrating the cemented soils may require the use of specialized heavy-duty equipment to facilitate break-up and removal. Consideration should be given to obtaining a unit price for difficult excavation in the contract documents for the project.

The individual contractor(s) is responsible for designing and constructing stable, temporary excavations as required to maintain stability of the excavation sides and the excavation 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.

Earthwork during wet site conditions may result in the disturbance of the site soils. The ability to use native soils from site excavations as structural fill will depend on their moisture content at the time of earthwork and the prevailing weather conditions when site grading activities take place. Construction traffic should be restricted to dedicated driveway and laydown areas to prevent excessive disturbance of the building pad, parking area and driveway subgrades. Even intermittent wet weather could delay earthwork if soil moisture conditions are elevated above the optimum moisture content. Performing site grading operations during the warmer and drier months would aid in reducing potential need for subgrade stabilization.

During or shortly after periods of rainfall, earthwork operations may have to be temporarily halted should the moisture content of the proposed fill materials and areas planned to receive fill become elevated to levels well above optimum. When excessive moisture contents are created, the soil materials may have to be blended/mixed/aerated to reduce moisture contents to within compactible ranges.

4.3 Foundation Recommendations

Where applicable, structures can be supported by mat foundations, drilled shaft or driven pile foundations. It is our understanding that on a preliminary basis the central tower and turbine structures are planned to be supported on mat foundations, and the heliostats are planned to be supported on drilled shaft or driven pipe pile foundations. The pipe racks are to be founded on isolated shallow foundations. Design recommendations for foundations for the proposed structures and related structural elements are presented in the following paragraphs.

4.3.1 Mat Foundation Design Recommendations

DESCRIPTION	VALUE
Foundation Type	Mat Foundation
Structure	Turbine and Central Tower
Bearing Material	Undisturbed Soils
Allowable Bearing Pressure	4 to 5 ksf at 2 feet bgs for the Turbine; 6 to 8 ksf at 20 feet bgs for the Central Tower
Modulus of Subgrade Reaction (k)[1]	200 pci
Minimum Embedment Depth Below Finished Grade	See Allowable Bearing Pressure above
Total Allowable Settlement	1-inch
Estimated Differential Settlement	½ to ¾ inch over 50 feet

[1]Note: It is common to reduce the k-value to account for dimensional effects of large loaded areas. A commonly used correction is: $k_c=k((b+1)/2b)^2$, where k_c is the corrected or design modulus value and b is the mat width or tributary loaded areas. The reinforced mat should be designed for sufficient rigidity to resist differential movement of ¾-inch acting over about 4 feet.

It is recommended that the shallow mat foundations (less than 4 feet below finished grade) rest on a blanket of engineered fill. For the deeper mat foundations bearing on undisturbed soil, the foundation excavation must be observed by a geotechnical engineer or a qualified representative to evaluate the bearing conditions prior to the placement of the structures. If undesirable (e.g., soft, loose, water softened, low density) materials are encountered at the ground surface, the undesirable bearing materials should be removed and replaced with compacted (engineered) fill as recommended in the Earthwork section of this report.

4.3.2 Shallow Foundation Design Recommendations

DESCRIPTION	VALUE
Foundation Type	Conventional Shallow Spread Footings
Structures	Pipe Racks and Ringwall Foundations for tanks

DESCRIPTION	VALUE
Bearing Material	Undisturbed native soil or engineered fill; Minimum 2 foot thickness of engineered fill where collapse potential soils are encountered
Allowable Bearing Pressure	3,000 psf
Minimum Dimensions	Columns: 24 inches Walls: 16 inches
Minimum Embedment Depth Below Finished Grade	18 inches
Total Estimated Settlement	1 inch
Estimated Differential Settlement	¾ inch between columns for the pipe racks

Finished grade is defined as the lowest adjacent grade within five feet of the foundation for perimeter (or exterior) footings and finished floor level for interior 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 should be proportioned to reduce differential foundation movement. Proportioning on the basis of equal total settlement is recommended; however, proportioning to relative constant dead-load pressure will also reduce differential settlement between adjacent footings. Additional foundation movements could occur if water from any source infiltrates the foundation soils; therefore, proper drainage should be provided in the final design and during construction.

4.3.3 Heliostat Foundation Design Recommendations

Foundations for the heliostats will consist of some type of deep foundation such as drilled shaft, driven pile, screw pipe pile or metal fin pipe pile. The controlling factor to consider during design will be the amount of lateral support the foundation element can transfer to the surrounding soil. It is anticipated any of the above outlined foundation types will need to be advanced to a depth on the order of 10 to 15 feet below finished grade. Preliminary L-Pile analyses were conducted for a 30-inch concrete drilled shaft, 12-inch ⅜-inch wall steel pipe pile, and for a 12-inch ½-inch wall steel pipe pile. The results are provided in the following table. These values are preliminary and will change depending on the diameter of the foundation element, wall thickness for the steel pipe piles and the stiffness of the surrounding soil.

L-PILE ANALYSES RESUTS		
Foundation Element	**Depth of Installation (ft)**	**Pile Head Deflection Required to obtain 105 kip-ft of Moment in the Pile (in)**
30" Concrete Drilled Shaft	10	1½
	12	½
	14	¼
⅜" Wall, 12.75" OD Steel Pipe Pile	10	>1½
	12	1½
	14	1¼
	16	1¼
	18	1¼
½" Wall, 12.75" OD Steel Pipe Pile	12	1¼
	14	1
	16	1

Drilled shaft foundations are anticipated to be applicable under any soil conditions, though some additional effort may be necessary where moderately to strongly cemented soils are encountered. The driven pipe pile and metal fin pipe pile foundation alternatives may have difficulty advancing a pile through the moderately to strongly cemented zones on the site. The cemented zones may also be difficult to advance the screw pipe pile foundation through as well. All three of these foundation types may be assisted by pre-drilling a hole about the size of the pipe portion of the pile. If pre-drilling is determined as the choice for installation, we recommend a lateral load test be conducted to confirm the load carrying capabilities of the installed pipe pile.

Based on the required number of foundations being on the order of 17,000, and the potential difficulty associated with some of the foundation options, we recommend a test pile installation program be implemented for the chosen foundation alternative. The test program should attempt to install the chosen foundation type in the various soil conditions encountered across the site to verify the suitability of the chosen system for installation.

Recommended soil parameters for lateral load analysis of drilled shaft foundations have been developed for use in LPILE computer programs. Engineering properties have been estimated as outlined below:

Lateral and Axial Compression Load Analysis Estimated Engineering Properties of Soils					
Top Depth **Bottom Depth**	**Unit Weight (pcf)**	**USCS Soil Type**	**Internal Friction ϕ**	**Cohesion (psf)**	**Modulus of Subgrade Reaction K_s (pci)[1]**
0 15	115	SP	35°	0	90[2]
15 85	120	SM	35°	0	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.

Lateral load design parameters are valid within the elastic range of the soil. The passive pressure, soil modulus and coefficient of subgrade reaction are ultimate values; therefore, appropriate factors of safety should be applied in the shaft design or deflection limits should be applied to the design.

Drilling to design depth should be possible with conventional single flight power augers on the majority of the site. However, moderate to strongly cemented soils may be encountered and may specialized drilling equipment. Shafts will probably remain open without stabilizing measures. However, pier concrete should be placed soon after completion of drilling and cleaning. Due to potential sloughing and raveling, foundation concrete quantities may exceed calculated geometric volumes. Pier concrete with slump in the range of 4 to 6 inches is recommended.

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

Free-fall concrete placement in drilled shafts will only be acceptable if provisions are taken to avoid striking the concrete on the sides of the hole or reinforcing steel. 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.

Shaft bearing surfaces must be cleaned prior to concrete placement. A representative of the geotechnical engineer should inspect the bearing surface and shaft configuration prior to the placement of reinforcing steel and concrete.

4.4 Seismic Considerations

4.4.1 Seismic Design Parameters

The following site specific seismic design parameters are recommended in accordance with the 2007 California Building Code which is based on the 2006 International Building Code.

DESCRIPTION	VALUE
2006 International Building Code Site Classification (IBC) [1]	D
Site Latitude	N 34° 3' 56.88"
Site Longitude	W 114° 48' 39.24"
S_s Spectral Acceleration for a Short Period	0.32g
S_1 Spectral Acceleration for a 1-Second Period	0.18g
F_a Site Coefficient for a Short Period	1.5
F_v Site Coefficient for a 1-Second Period	2.1

[1] Note: In general accordance with the *2006 International Building Code,* Table 1613.5.2. IBC Site Class is based on the average characteristics of the upper 100 feet of the subsurface profile.

4.4.2 Seismic Induced Settlement

Liquefaction is the phenomenon where saturated soils develop high pore water pressures during seismic shaking and lose their strength characteristics. This phenomenon generally occurs in areas of high seismicity, where ground water is shallow and loose granular soils or hydraulic fill soils are present.

The State of California has not yet mapped the region that the property is located in for Seismic Hazard Zones. Groundwater at the site was measured to be approximately 360 feet below ground surface. Based on the relative densities of the soils encountered in our borings, and the depth of groundwater at the site, the liquefaction potential of site soils is considered to be low.

4.5 Pavements

4.5.1 Design Recommendations

Based on the results of R-Value testing, and consideration of our recommendations for subgrade preparation beneath pavements, a design R-Value of 26 was used to calculate the asphaltic concrete pavement thickness sections. Based on our experience with similar soil conditions a modulus of subgrade reaction value (k) of 150 pounds per cubic inch (pci) was used in calculating the Portland cement concrete pavement sections.

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 (3,500 psi, Air Entrained)	5.5" Concrete 6" Class II Aggregate Base	6" Concrete 9" Class II Aggregate Bas
Section II Asphaltic Concrete	3" Asphaltic Concrete over 6" Class II Aggregate Base	4" Asphaltic Concrete over 10" Class II Aggregate Base

* 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 28-day compressive strength of 4,000 psi (i.e. MAG AA or equivalent), and be placed with a maximum slump of four inches. Although not required for structural support, a minimum four-inch thick base course layer is recommended to help reduce potentials for slab curl, shrinkage cracking, and subgrade "pumping" through joints. 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.

4.5.2 Construction Considerations

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

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.

4.6 Lateral Earth Pressures

ITEM	VALUE[1]
Active Case	30 psf/ft
Passive Case	375 psf/ft
At-Rest Case	50 psf/ft
Coefficient of Base Friction	0.55[2]

[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 0.40 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 Storm Water Infiltration

Given the well cemented nature of the caliche laden soils on site, we believe storm water infiltration is not feasible over most of the project area. Isolated depressions/drainage areas on site containing uncemented sands and gravels may be conducive to accepting and transmitting runoff.

5.0 GENERAL COMMENTS

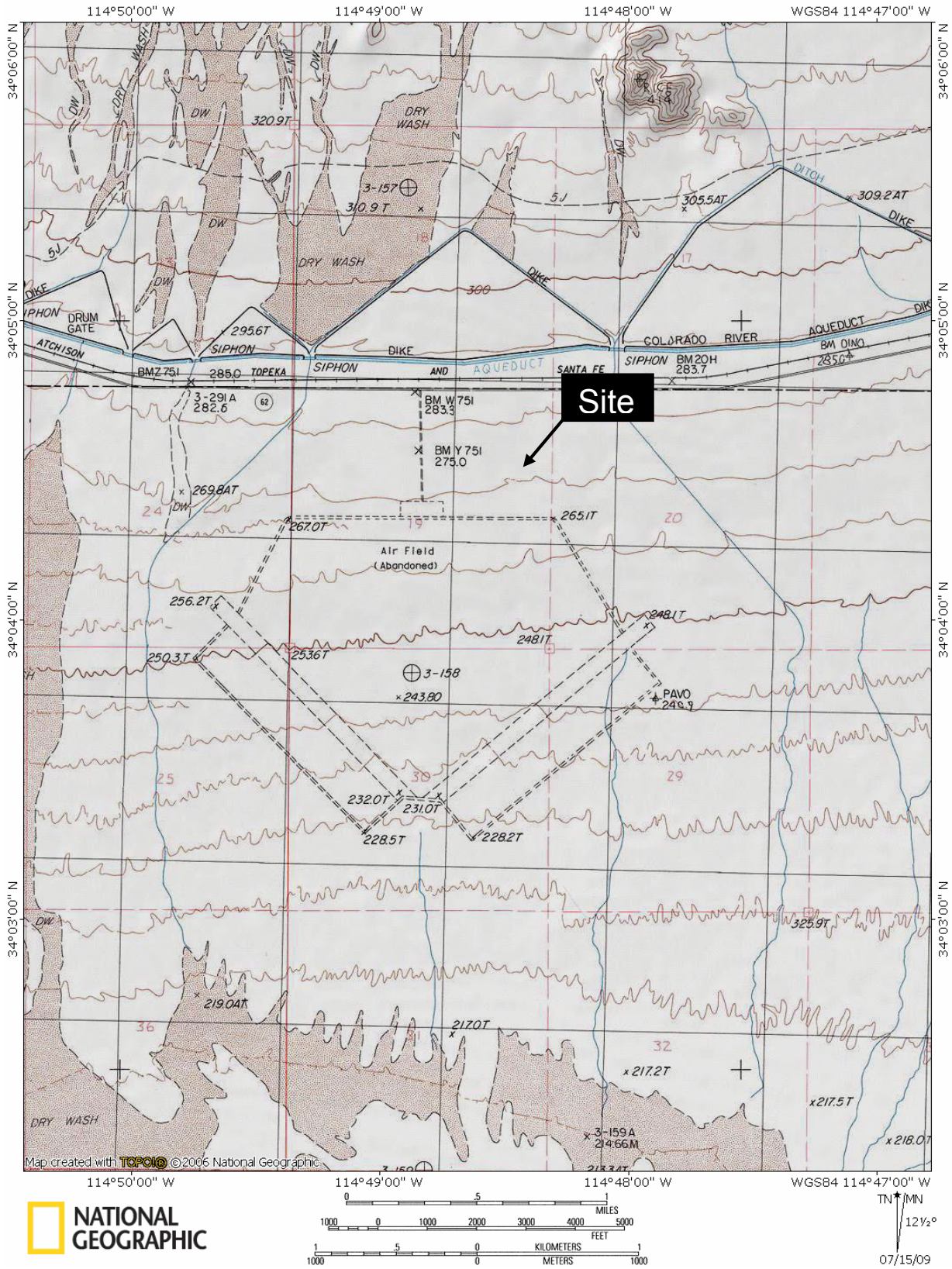
The purpose of this preliminary report was to evaluate a number of the major geotechnical feasibility level issues concerning the proposed development. Supplemental geotechnical studies should be undertaken as part of the final design phase of the project.

The analysis and recommendations presented in this report are based upon the limited 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.



NATIONAL GEOGRAPHIC

Reference: USGS Rice, California,
7.5-minute Quadrangle (Photorevised 1983)

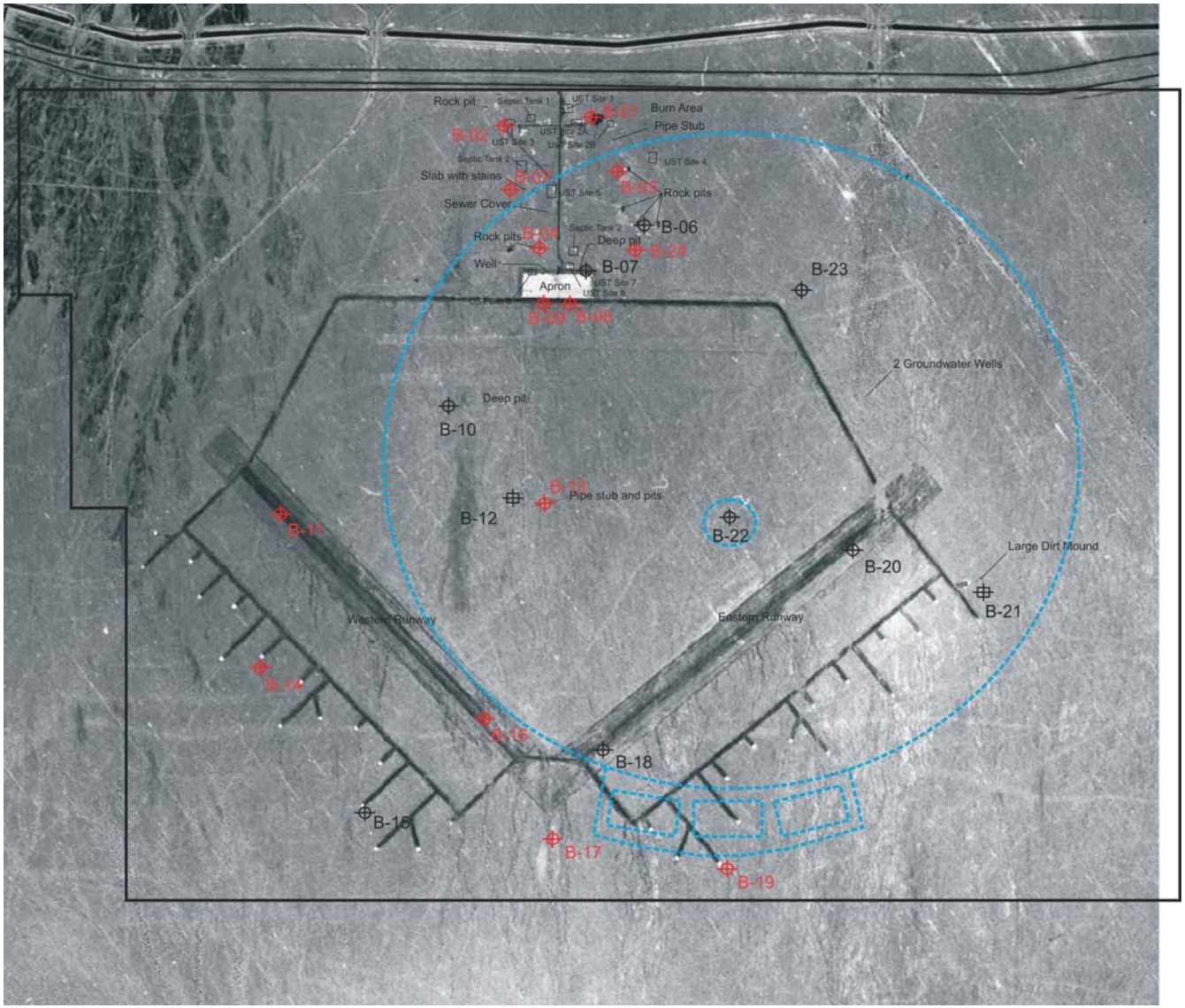
N

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

TOPOGRAPHIC MAP

Former Rice Airfield
Highway 62, Mile Marker 109
Rice, Riverside County, California 92239

Project Mngr: JP	Terracon 16662 Millikan Avenue Irvine, California 92606 949-660-9718 Fax: 949-660-9732	**Project No.** 60095017
Designed By: AW		**Scale:** See scale
Checked By: PJE		**Date:** 07/15/2009
Approved By: SN		**Drawn By:** NA
File Name: 60095017-Former Rice Airfield-Figure 1 Topo		**Figure No.** 1



LEGEND:

B-23 Approximate Boring Locations

B-12 Approximate Test Pit Locations

NOTE:
Borings in red were performed for the Limited Site Investigation and are included.

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

N

BORING LOCATION DIAGRAM
PROPOSED 10 MW SOLAR ENERGY PROJECT
FORMER RICE AIRFIELD
RICE, CALIFORNIA
Prepared for SolarReserve

Project Mngr:	JP	Terracon	Project No.	60095017
Designed By:	JP		Scale:	Not to Scale
Checked By:	PJE	16662 Millikan Avenue Irvine, California 92606	Date:	7/6/2009
Approved By:	PJE		Drawn By:	JP
File Name:	\Plate_2.cdr	L(Layout1)	Plate No.	2

APPENDIX A

FIELD EXPLORATION

Field Exploration Description

A total of 8 test borings and 2 test pits were drilled/excavated at the site the week of June 22, 2009. The borings were drilled to depths ranging from approximately 30½ to 86½ feet bgs at the approximate locations shown on the attached Site Plan and Boring Locations diagram, Exhibit 1. The test pits were excavated to approximately 10 feet bgs.

The test borings were advanced with a truck-mounted CME-75 drill rig utilizing 8-inch diameter hollow-stem augers.

The borings were located in the field by using the proposed site plan, an aerial photograph of the site, and a hand-held GPS unit. The accuracy of boring 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.

An automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A greater efficiency is typically achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. Published correlations between the SPT values and soil properties are based on the lower efficiency cathead and rope method. This higher efficiency affects the standard penetration resistance blow count (N) value by increasing the penetration per hammer blow over what would be obtained using the cathead and rope method. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

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

LOG OF BORING NO. B-01

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	POORLY GRADED SAND - brown, dry, loose, fine gravel, weak cementation.	1, 2									
	- medium dense	3, 4	SP		SPT		17				
	- moderately cemented	5, 6, 7, 8, 9, 10, 11, 12, 13, 14									
	- very dense, moderately to strongly cemented with caliche.	15, 16	SP		SPT		88/9"				
	-Boring terminated at 16.5 feet bgs. -No groundwater encountered. -Hole backfilled with cuttings. -No staining or odors observed during drilling.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-24-09		
BORING COMPLETED	6-24-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	A-1

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-02

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES GRAPHICS	TYPE	RECOVERY, in.	PENETRATION TEST RESULTS BLOWS / ft.	TESTS WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, tsf	LABORATORY TESTS
	POORLY GRADED SAND - brown, dry, dense, fine gravel composed of sub-rounded granitic material.	1									
		2									
		3									
		4									
	- dense.	5	SP								
		6			SPT		49				
		7									
		8									
		9									
		10									
		11									
		12									
		13									
		14									
	- red gray, very dense, increasing fine gravel, moderately to strongly cemented with caliche visible in white bands and very hard nodules.	15	SP								
		16			SPT		50/4"				
	-Boring terminated at 16.0 feet bgs. -No groundwater encountered. -Hole backfilled with cuttings. -No staining or odors observed during drilling.										

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

WATER LEVEL OBSERVATIONS, ft			
WL	None		
WL			
BORING LOCATION	See Boring Location Plan		

Terracon

BORING STARTED			6-24-09
BORING COMPLETED			6-24-09
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-2**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-03

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	POORLY GRADED GRAVEL - brown, dry, loose, fine to coarse sub-rounded gravel consisting of granitic material.										
	SILTY SAND - brown, dry, loose, fines to coarse sand.	1, 2, 3, 4									
	- light brown, medium dense, some fine sub-rounded gravel consisting of granitic material.	5, 6	SM		SPT		28				
		7, 8, 9, 10, 11, 12, 13, 14									
	- very dense, with some fine sub-rounded gravel consisting of granitic materials.	15, 16	SM		SPT		50/5"				
	-Boring terminated at 15.5 feet bgs. -No groundwater encountered. -Hole backfilled with cuttings. -No staining or odors observed during drilling.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-24-09		
BORING COMPLETED	6-24-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	A-3

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-04

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	POORLY GRADED GRAVEL - brown, dry, loose, fine to coarse sub-rounded gravel consisting of granitic material.	1									
	POORLY GRADED SAND - brown, dry, medium dense, fine to coarse sand with weak cementation.	2									
		3									
		4									
		5	SP								
		6			SPT		18				
		7									
		8									
		9									
		10									
		11									
	SILTY SAND - red gray, dry, very dense, fine to coarse sand with some fine gravel consisting of granitic material, strongly cemented.	12									
		13									
		14									
		15	SM								
		16			SPT		50/4"				
	-Boring terminated at 15.5 feet bgs. -No groundwater encountered. -Hole backfilled with cuttings. -No staining or odors observed during drilling.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-24-09		
BORING COMPLETED	6-24-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-4**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-05

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	POORLY GRADED GRAVEL - brown, dry, loose, fine to coarse sub-rounded gravel consisting of granitic material.	1									
	POORLY GRADED SAND - brown, dry, very dense, fine to fine sub-rounded gravel consisting of granitic material, weakly cemented.	2									
		3									
		4									
		5	SP								
		6			SPT		51				
		7									
		8									
		9									
		10									
	SILTY SAND - light brown, dry, very dense, fine to coarse sand with some fine sub-rounded gravel, strongly cemented.	11									
		12									
		13									
		14									
		15	SM								
		16			SPT		50/4"				
	-Boring terminated at 16.0 feet bgs. -No groundwater encountered. -Hole backfilled with cuttings. -No staining or odors observed during drilling.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-24-09		
BORING COMPLETED	6-24-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-5**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-06

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	SILTY SAND - light brown, dry, loose, with fine gravel consisting of completely decomposed granite with angular quartz and feldspar with some subrounded basaltic material.	1–2	SM		BS						
	POORLY GRADED SAND - light brown, dry, dense, fines to fine gravel, fine gravel consists of completely decomposed granite with angular quartz and feldspar, weakly cemented with caliche and visible by bands of white staining.	3–4	SP		RS		50	2	118		
		5–6	SW		RS		50	2	123		
	WELL GRADED SAND - brown, dry, dense, little fines with an even mixture of fine sand to coarse sand with some fine gravel, weakly cemented with caliche.	7–8	SP		RS		48	2	112		
	POORLY GRADED SAND - red gray, dry, dense, fine sand to coarse sand with some fine gravel, weakly cemented with caliche.	9–10	SM		RS		87/11"	4	118		
	SILTY SAND - brown, dry, very dense, fines to coarse sand, moderately to strongly cemented with caliche with gravel-sized caliche nodules.	11–12									
		13–14									
		15–16	SM		RS		71/9"	5	107		
		17–18									
		19–20									
	- no recovery.	21–22	SM		RS		50/5"				
		23–24									
		25–26	SM		SPT		50/3"				
		27–28									
		29–30									
		31	SM		RS		85/11"	5	108		

Continued Next Page

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-24-09		
BORING COMPLETED	6-24-09		
RIG	CME-75	Logged by: MAR	
JOB #	60095017	PLATE	**A-6a**

BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09
BOREHOLE SAMPLE BOTTOM

LOG OF BORING NO. B-06

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	Total depth of 31.5 feet. No groundwater encountered. Backfilled with soil cuttings.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-24-09		
BORING COMPLETED	6-24-09		
RIG	CME-75	Logged by: MAR	
JOB #	60095017	PLATE	**A-6b**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-07

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	TYPE	RECOVERY, in.	PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, tsf	LABORATORY TESTS
	POORLY GRADED SAND - brown, dry, loose, fine to coarse grained sand, some fine gravel consisting of completely decomposed granite.	1–2	SP		BS						
	SILTY SAND - light brown, dry, loose, fine to coarse grained sand.	3–4	SM		RS		9	1	117		
	POORLY GRADED SAND - brown, dry, loose, fine to coarse grained sand with some fine gravel.	5–6	SP		RS		6	1	112		
	- medium dense.	7–8	SP		RS		13	2	109		
		9–10	SP		RS		34	3	109		
	SILTY SAND - light brown, dry, medium dense, fine to coarse grained sand, weakly cemented with caliche.	11–12									
	- very dense.	13–15	SM		RS		50/5"	3	108		
	- with gravel-sized nodules.	16–20	SM		RS		50/4"	4	102		
	- trace clay.	21–25	SM		SPT		50/3"				
		26–30	SM		RS		50/5"	5	107		
		31									
	Continued Next Page										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-24-09		
BORING COMPLETED	6-24-09		
RIG	CME-75	Logged by: MAR	
JOB #	60095017	PLATE	**A-7a**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-07

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	Boring terminated at 31 feet bgs. No groundwater encountered. Hole backfilled with cuttings.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-24-09		
BORING COMPLETED	6-24-09		
RIG	CME-75	Logged by: MAR	
JOB #	60095017	PLATE	**A-7b**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-08

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	ASPHALT - from former pavement, severely weathered and eroded.	1									
	POORLY GRADED SAND - brown, dry, loose, fine to coarse grained sand, some gravel, weakly cemented.	2 3	SP		SPT		13				
		4 5 6 7 8 9									
	- very dense, strongly cemented with caliche.	10 11	SP		SPT		50/5"				
	-Boring terminated at 10.5 feet bgs. -No groundwater encountered. -Hole backfilled with cuttings. -No staining or odors observed during drilling.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-24-09		
BORING COMPLETED	6-24-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-8**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-09

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	POORLY GRADED GRAVEL - brown, dry, loose, fine to coarse sub-rounded gravel consisting of granitic material.	1									
	POORLY GRADED SAND - light brown, dry, medium dense, trace fines with fine sand to coarse sand and some fine sub-rounded gravel consisting of granitic material.	2 3	SP		SPT		13				
		4 5 6									
	SILTY SAND - light brown, dry, very dense, fine to coarse sand, strongly cemented with caliche.	7 8 9 10 11	SM		SPT		50/4"				
	-Boring terminated at 11.0 feet bgs. -No groundwater encountered. -Hole backfilled with cuttings. -No staining or odors observed during drilling.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-24-09		
BORING COMPLETED	6-24-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-9**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-10

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	TYPE	RECOVERY, in.	PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, tsf	LABORATORY TESTS
	SILTY SAND - brown, dry, loose, fine to coarse grained sand, some fine gravel.	1–2	SM		BS						
	POORLY GRADED SAND - brown, dry, very dense, fine to coarse grained sand. Cemented with caliche.	3–4	SP		RS		68/11"	3	119		
	WELL GRADED SAND with SILT - brown, dry, dense, fine to coarse grained sand with some fine gravel, strongly cemented with caliche.	5–7	SW SM		RS		78/10"	2	117		
	POORLY GRADED SAND - brown, dry, very dense, fine sand to fine gravel.	8–9	SP		RS		81	2	122		
	SILTY SAND - brown, dry, very dense, fine to coarse sand, moderately to strongly cemented with caliche.	10–11	SM		RS		78	2	121		
		15–16	SM		RS		50/4"				
		20–21	SM		RS		50/3"				
		25–26	SM		SPT		50/5"				
		30–31	SM		RS		50/3"	2	115		

Continued Next Page

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

WATER LEVEL OBSERVATIONS, ft			
WL	None		
WL			
BORING LOCATION	See Boring Location Plan		

Terracon

BORING STARTED	6-25-09		
BORING COMPLETED	6-25-09		
RIG	CME-75	Logged by: MAR	
JOB #	60095017	PLATE	**A-10a**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-10

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	Boring terminated at 31 feet bgs. No groundwater encountered. Hole backfilled with cuttings.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-25-09		
BORING COMPLETED	6-25-09		
RIG	CME-75	Logged by: MAR	
JOB #	60095017	PLATE	**A-10b**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-11

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	SILTY SAND - brown, damp, very dense, fine to coarse grained sand, some fine gravel.	1 2 3 4									
	- very dense, no recovery.	5 6	SM		SPT		85/11"				
	Boring terminated at 6.5 feet bgs. No groundwater encountered. Hole backfilled with cuttings.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-25-09		
BORING COMPLETED	6-25-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-11**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF TEST PIT NO. B-12

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	POORLY GRADED SAND - brown, damp, fine grained sand. - moderately to strongly cemented.	1 2	SP		BS						
	POORLY GRADED GRAVEL - brown, damp, with granitic and basaltic cobbles.	3 4									
	SILTY SAND - brown to red brown, damp, hard, medium to coarse grained sand, some fine gravel, increasing caliche.	5 6	SM		BS			1			
		7 8	SM		BS						
		9 10	SM		BS						
	Total depth of 10 feet. No groundwater encountered. Backfilled with soil cuttings.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-23-09		
BORING COMPLETED	6-23-09		
RIG	CME-75	Logged by: MAR	
JOB #	60095017	PLATE	**A-12**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-13

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	POORLY GRADED GRAVEL - brown, dry, loose, fine to coarse sub-rounded gravel consisting of granitic material.										
	POORLY GRADED SAND - brown, dry, medium dense, fine to coarse grained sand, some fine sub-rounded gravel, weak cementation with caliche.	1, 2, 3, 4									
		5, 6	SP		SPT		12				
		7, 8, 9									
	- red gray, very dense, fine sand to coarse sand, strongly cemented with caliche.	10, 11	SP		SPT		50/4"				
	-Boring terminated at 11 feet bgs. -No groundwater encountered. -Hole backfilled with cuttings. -No staining or odors observed during drilling.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-24-09		
BORING COMPLETED	6-24-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-13**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-14

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	POORLY GRADED SAND - yellow brown, damp, dense, fine to coarse grained sand.	1 2 3 4									
	- dense, no recovery	5 6	SP		SPT		43				
		7 8 9									
	- very dense, no recovery	10 11	SP		SPT		50/3"				
	Boring terminated at 10.5 feet bgs. No groundwater encountered. Hole backfilled with cuttings.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-25-09		
BORING COMPLETED	6-25-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-14**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-15

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	TYPE	RECOVERY, in.	PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, tsf	LABORATORY TESTS
	POORLY GRADED SAND - brown, dry, loose, fines to coarse grained sand, some fine gravel, some completely decomposed granite.	1–2	SP		BS						
	- very dense, decreasing fine gravels and increasing fine sand, moderately to strongly cemented with caliche with very hard caliche nodules.	3–4	SP		RS		73	3	124		
		5–6	SP		RS		81	6	120		
	- some fine gravel consisting of angular quartz.	7–8	SP		RS		93/7"	6	110		
		9–11	SP		RS		50/4"				
	- light brown, damp, moderately to strongly cemented, stained with white bands of caliche.	12–16	SP		RS		96/10"	5	121		
		17–21	SP		RS		50/3"				
	- brown, dry, fine to coarse grained sand, moderately to strongly cemented with caliche nodules.	22–26	SP		SPT		50/2"	3			
		27–31	SP		RS		50/2"				

Continued Next Page

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-23-09		
BORING COMPLETED	6-23-09		
RIG	CME-75	Logged by: MAR	
JOB #	60095017	PLATE	**A-15a**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-15

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	Boring terminated at 30.5 feet bgs. No groundwater encountered. Hole backfilled with cuttings.										

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

WATER LEVEL OBSERVATIONS, ft			
WL	None		
WL			
BORING LOCATION	See Boring Location Plan		

Terracon

BORING STARTED	6-23-09		
BORING COMPLETED	6-23-09		
RIG	CME-75	Logged by: MAR	
JOB #	60095017	PLATE	**A-15b**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-16

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	SILTY SAND - light brown, damp, fine to coarse grained, some fine to coarse gravel.	1 2 3 4									
	- very dense, no recovery.	5 6	SM		SPT		50/5"				
		7 8 9									
	- no recovery.	10 11	SM		SPT		75/11"				
	Boring terminated at 10.5 feet bgs. No groundwater encountered. Hole backfilled with cuttings.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-25-09		
BORING COMPLETED	6-25-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-16**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-17

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	POORLY GRADED GRAVEL - brown, dry, loose, fine to coarse sub-rounded gravel consisting of granitic material.	1									
	SILTY SAND - light brown, dry, very dense, fine to coarse grained sand, some fine sub-rounded gravel.	2									
		3									
		4									
	- very dense, strongly cemented with caliche.	5	SM								
		6			SPT		89/11"				
		7									
		8									
		9									
		10	SM								
		11			SPT		50/5"				
	-Boring terminated at 10.5 feet bgs. -No groundwater encountered. -Hole backfilled with cuttings.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-23-09		
BORING COMPLETED	6-23-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-17**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-18

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES GRAPHICS	TYPE	RECOVERY, in.	PENETRATION TEST RESULTS BLOWS / ft.	TESTS WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, tsf	LABORATORY TESTS
	SILTY SAND - brown, dry, loose, fine to coarse grained sand, some fine gravel.	1–2	SM		BS						
	- red gray, very dense, bands of soft yellow brown caliche.	3–4	SM		RS		93/9"	4	108		
		5–6	SM		RS		50/5"	4	100		
	- light brown, dry, very dense, fine to coarse grained sand, moderately to strongly cemented with caliche with nodules.	8–9	SM		RS		78/10"	5	103		
	- red gray, dry, very dense, fine to coarse grained sand.	10–11	SM		RS		50/6"	5	104		
	- very dense, fine to coarse grained sand, moderately to strongly cemented with caliche.	15–16	SM		RS		55/6"	3			
		20–21	SM		RS		50/5"	3			
		25–26	SM		SPT		92/11"				
		30–31	SM		RS		50/1"				
	Continued Next Page										

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

WATER LEVEL OBSERVATIONS, ft				
WL	None		BORING STARTED	6-23-09
WL			BORING COMPLETED	6-23-09
BORING LOCATION	See Boring Location Plan		RIG CME-75	Logged by: MAR
			JOB # 60095017	PLATE **A-18a**

Terracon

BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

BOREHOLE SAMPLE BOTTOM

LOG OF BORING NO. B-18

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	Boring terminated at 30 feet bgs. No groundwater encountered. Hole backfilled with cuttings.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-23-09		
BORING COMPLETED	6-23-09		
RIG	CME-75	Logged by: MAR	
JOB #	60095017	PLATE	**A-18b**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-19

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	POORLY GRADED GRAVEL - brown, dry, loose, fine to coarse sub-rounded gravel consisting of granitic material.	1									
	SILTY SAND - red gray, dry, very dense, fines to coarse grained sand, moderately to strongly cemented with caliche visible in white bands and nodules.	2									
		3									
		4									
		5	SM								
		6			SPT		50/6"				
		7									
		8									
		9									
	- variably weakly to strongly cemented with caliche.	10	SM								
		11			SPT		55				
	-Boring terminated at 11.5 feet bgs. -No groundwater encountered. -Hole backfilled with cuttings. -No staining or odors observed during drilling.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-25-09		
BORING COMPLETED	6-25-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-19**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-20

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES GRAPHICS	TYPE	RECOVERY, in.	PENETRATION TEST RESULTS BLOWS / ft.	TESTS WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, tsf	LABORATORY TESTS
	CLAYEY SAND - reddish brown, dry, loose, fine to coarse grained sand, some fine gravel.	1	SC								
		2			BS						
	SILTY SAND - red gray, dry, very dense, fine to medium grained sand, moderately cemented with caliche.	3	SM		RS		88/10"	2	111		
		4									
		5	SM								
		6			RS		43				
		7									
	- fine to coarse grained sand.	8	SM		RS		50/4"	6	105		
		9									
	- fine to medium grained sand.	10	SM		RS		50/5"	6	95		
		11									
		12									
		13									
		14									
		15	SM		RS		50/4"				
		16									
		17									
		18									
		19									
	- fine to coarse grained sand.	20	SM		RS		50/3"	4			
		21									
		22									
		23									
		24									
		25	SM								
		26			SPT		50/5"				
		27									
		28									
		29									
		30	SM								
		31			SPT		50/3"				

Continued Next Page

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

WATER LEVEL OBSERVATIONS, ft			
WL	None		
WL			
BORING LOCATION	See Boring Location Plan		

Terracon

BORING STARTED	6-22-09		
BORING COMPLETED	6-22-09		
RIG	CME-75	Logged by: JP	
JOB #	60095017	PLATE	**A-20a**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-20

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	Boring terminated at 30.5 feet bgs. No groundwater encountered. Hole backfilled with cuttings.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-22-09		
BORING COMPLETED	6-22-09		
RIG	CME-75	Logged by: JP	
JOB #	60095017	PLATE	**A-20b**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF TEST PIT NO. B-21

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	SILTY SAND - brown, damp, fine to coarse grained sand. - red brown, increasing caliche nodules.		SM		BS						
		1	SM		BS						
		2	SM		BS						
		3									
	POORLY GRADED SAND - red brown, damp, fine to coarse grained, some silt and fine gravel.	4	SM		BS						
		5									
	SILTY SAND - brown, damp, fine to coarse grained sand. - moderately cemented with caliche.	6	SM		BS			4			
		7									
		8	SM		BS						
		9	SM		BS						
		10	SM		BS						
	Total depth of 10 feet. No groundwater encountered. Backfilled with soil cuttings.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-23-09		
BORING COMPLETED	6-23-09		
RIG	CME-75	Logged by: MAR	
JOB #	60095017	PLATE	**A-21**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-22

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	TYPE	RECOVERY, in.	PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, tsf	LABORATORY TESTS
	SILTY SAND - brown, dry, medium dense to dense, fine to coarse grained sand, some fine gravel.	1–2	SM		BS						
	- medium grained sand to coarse subrounded gravel.	3–4	SM		RS		79	1	115		
	- medium dense.	5–6	SM		RS		33	1	110		
	- light brown, very dense, fine to medium grained sand, moderately to strongly cemented with caliche, caliche noticeable in white banding.	7–8	SM		RS		50/5"	3	113		
	- POORLY GRADED SAND - brown, very dense, fine to coarse grained sand.	9–11	SP		RS		50/3"	2	111		
	SILTY SAND - light brown, fine to coarse grained sand, moderately to strongly cemented with caliche to 40 feet bgs.	12–16	SM		RS		50/4"	5	103		
		17–21	SM		RS		50/6"	5	101		
		22–26	SM		SPT		50/5"				
		27–31	SM		RS		50/5"				
		32									

Continued Next Page

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

WATER LEVEL OBSERVATIONS, ft			
WL	None		
WL			
BORING LOCATION	See Boring Location Plan		

Terracon

BORING STARTED	6-25-09		
BORING COMPLETED	6-25-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-22a**

BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09
BOREHOLE SAMPLE BOTTOM

LOG OF BORING NO. B-22

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	TYPE	RECOVERY, in.	PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, tsf	LABORATORY TESTS
	SILTY SAND - light brown, fine to coarse grained sand, moderately to strongly cemented with caliche to 40 feet bgs.	33									
	- trace fine gravel.	34									
	- red gray.	35	SM								
		36			SPT		50/3"				
		37									
		38									
		39									
	- trace clay, cementing by caliche decreasing with increasing depth.	40	SM								
		41			SPT		50/3"				
		42									
		43									
		44									
		45	SM								
		46			SPT		50/4"				
		47									
		48									
		49									
		50	SM								
		51			SPT		50/3"	4			
		52									
		53									
		54									
		55	SM								
		56			SPT		50/2"				
		57									
		58									
		59									
		60	SM								
		61			SPT		50/2"				
		62									
		63									
		64									

Continued Next Page

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

WATER LEVEL OBSERVATIONS, ft			
WL	None		
WL			
BORING LOCATION	See Boring Location Plan		

Terracon

BORING STARTED			6-25-09
BORING COMPLETED			6-25-09
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-22b**

BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09
BOREHOLE SAMPLE BOTTOM

LOG OF BORING NO. B-22

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	SILTY SAND - light brown, fine to coarse grained sand, moderately to strongly cemented with caliche to 40 feet bgs.	66 67 68 69 70									
	POORLY GRADED SAND - brown, damp, very dense, medium grained sand, caliche not present.	71	SP		RS		50/5"	1	102		
	- layer of fine gravel. POORLY GRADED SAND - brown, damp, medium grained sand, some angular coarse gravel composed of granitic material.	72 73 74 75 76 77 78 79 80 81 82 83 84									
	SILT - brown, dry, hard, slight plasticity.	85 86	ML		SPT		67				
	Boring terminated at 86.5 feet bgs. No groundwater encountered. Hole backfilled with cuttings.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-25-09		
BORING COMPLETED	6-25-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-22c**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-23

CLIENT	SITE
SolarReserve	**Former Rice Airfield** **Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	TYPE	RECOVERY, in.	PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, tsf	LABORATORY TESTS
	SILTY SAND - brown, damp, very hard, fine to coarse grained sand.	1–2	SM		BS						
		3	SM		RS		50/4"	2			
	- very dense, some fine gravel, moderately cemented.	5–6	SM		RS		79	3	118		
		8	SM		RS		50/5"	2	101		
	- medium dense, weakly cemented.	10–11	SM		RS		57	2	116		
	- very dense, increasing fine gravel.	15–16	SM		RS		88/8"	3	108		
	- light brown, fine to coarse grained sand, some fine gravel.	20–21	SM		RS		50/2"	4	103		
	- brown.	25–26	SM		SPT		50/4"				
	- red gray, trace clay.	30–31	SM		RS		50/4"	4			

Continued Next Page

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

WATER LEVEL OBSERVATIONS, ft			
WL	None		
WL			
BORING LOCATION	See Boring Location Plan		

Terracon

BORING STARTED	6-23-09		
BORING COMPLETED	6-23-09		
RIG	CME-75	Logged by: MAR	
JOB #	60095017	PLATE	**A-23a**

BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09
BOREHOLE SAMPLE BOTTOM

LOG OF BORING NO. B-23

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	Total depth of 30.5 feet. No groundwater encountered. Backfilled with soil cuttings.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-23-09		
BORING COMPLETED	6-23-09		
RIG	CME-75	Logged by: MAR	
JOB #	60095017	PLATE	**A-23b**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

LOG OF BORING NO. B-24

CLIENT	SITE
SolarReserve	**Former Rice Airfield Rice, California**
ELEVATION	PROJECT **Rice Solar Energy Project**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: GRAPHICS	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: PENETRATION TEST RESULTS BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, tsf	TESTS: LABORATORY TESTS
	POORLY GRADED GRAVEL - brown, dry, loose, fine to coarse sub-rounded gravel consisting of granitic material.	1									
	POORLY GRADED SAND - red gray, dry, very dense, fine to coarse grained sand, some fine sub-rounded gravel.	2	SP								
		3			SPT		54				
		4									
		5									
		6									
		7									
		8									
		9									
		10									
		11									
		12									
		13									
		14									
	- strongly cemented with caliche.	15	SP								
		16			SPT		50/3"				
	-Boring terminated at 16.0 feet bgs. -No groundwater encountered. -Hole backfilled with cuttings. -No staining or odors observed during drilling.										

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

WATER LEVEL OBSERVATIONS, ft		
WL	None	
WL		
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	6-24-09		
BORING COMPLETED	6-24-09		
RIG	CME-75	Logged by: TAW	
JOB #	60095017	PLATE	**A-24**

BOREHOLE SAMPLE BOTTOM BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/6/09

APPENDIX B

LABORATORY TESTING

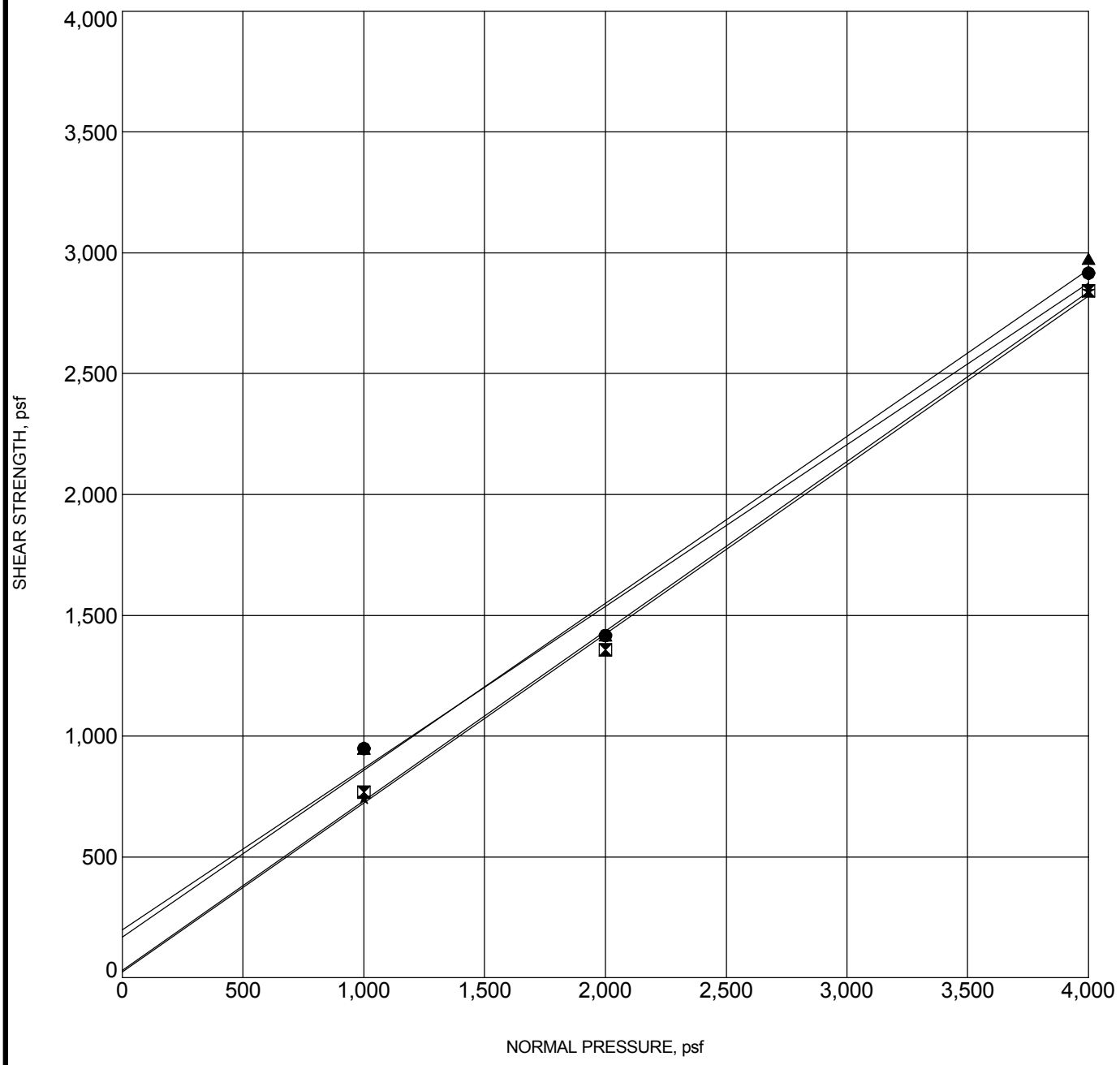
Laboratory Testing

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. Samples obtained during the Limited Site Investigation were for environmental purposes and therefore, no laboratory testing was performed on these samples. At that time, he 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:

- Grain Size & Hydrometer
- R-Value
- Specific Gravity
- Modified Proctor
- Soluble Chlorides
- pH
- In-situ Water Content
- In-situ Dry Density
- Collapse Potential
- Direct Shear
- Soluble Sulfates
- Minimum Resistivity



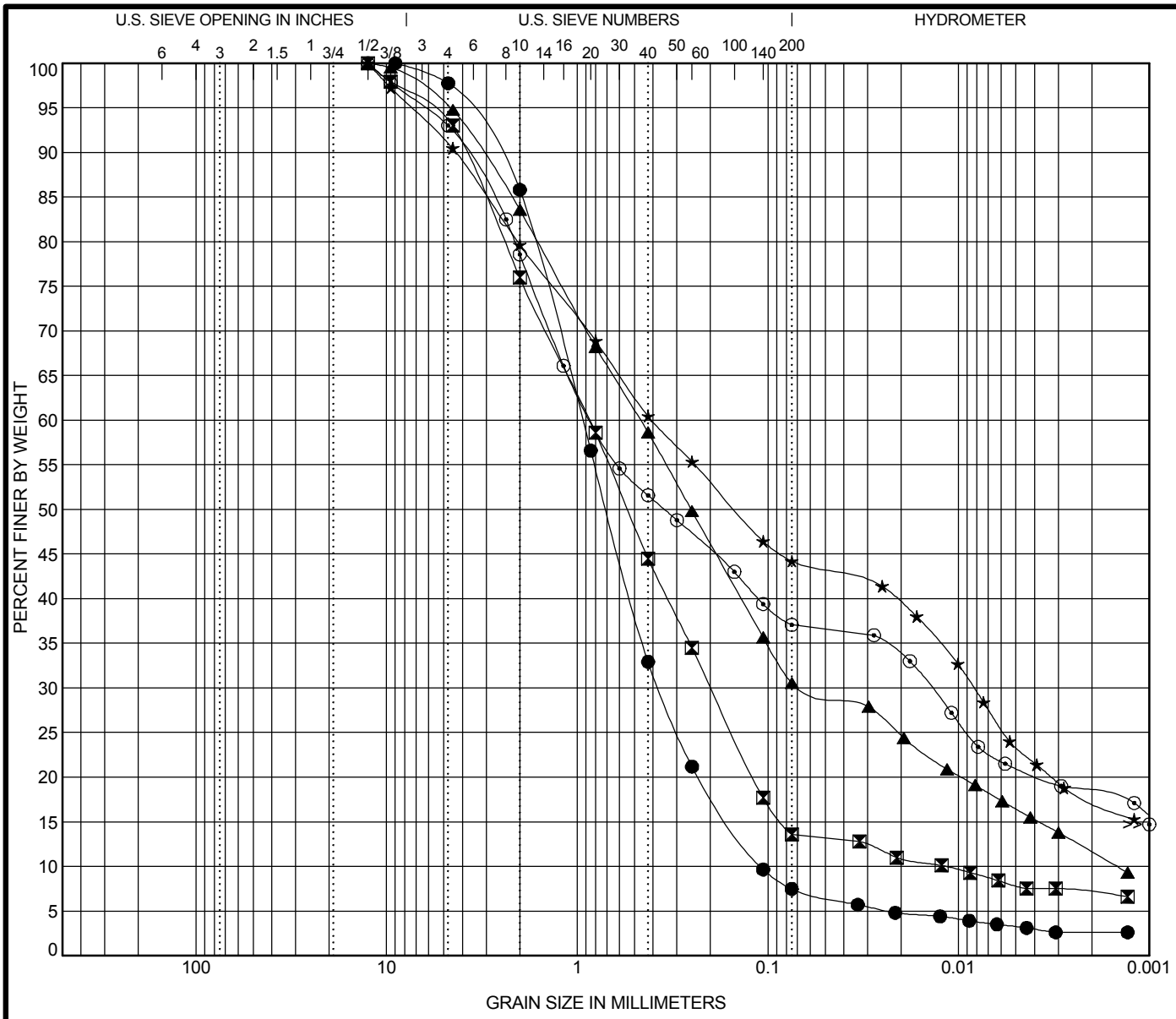
	Specimen Identification		Classification	γ_d, pcf	WC,%	c, psf	ϕ^o
●	**B-06**	**10.0ft**	**SILTY SAND(SM)**	**118**	**4**	**198**	**34**
⊠	**B-18**	**5.0ft**	**SILTY SAND(SM)**	**100**	**4**	**24**	**35**
▲	**B-22**	**15.0ft**	**SILTY SAND(SM)**	**103**	**5**	**168**	**35**
★	**B-23**	**7.5ft**	**SILTY SAND(SM)**	**101**	**2**	**30**	**35**

Terracon

DIRECT SHEAR TEST

Project: Rice Solar Energy Project
Site: Former Rice Airfield Rice, California
Job #: 60095017
Date: 8-5-09

TC_DIRECT_SHEAR_BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/5/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**B-10**	**5.0ft**	**WELL GRADED SAND with SILT(SW-SM)**				**1.36**	**8.63**
⊠	**B-12**	**5.0ft**	**SILTY SAND(SM)**				**3.89**	**73.16**
▲	**B-18**	**10.0ft**	**SILTY SAND(SM)**				**5.58**	**314.18**
★	**B-20**	**10.0ft**	**SILTY SAND(SM)**					
⊙	**B-21**	**6.0ft**	**SILTY SAND(SM)**					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-10**	**5.0ft**	**9**	**0.939**	**0.372**	**0.109**	**2.2**	**90.3**	**4.2**	**3.2**
⊠	**B-12**	**5.0ft**	**12.5**	**0.862**	**0.199**	**0.012**	**6.6**	**79.8**	**5.7**	**7.8**
▲	**B-18**	**10.0ft**	**12.5**	**0.465**	**0.062**	**0.001**	**4.9**	**64.6**	**14.1**	**16.4**
★	**B-20**	**10.0ft**	**12.5**	**0.405**	**0.008**		**9.0**	**46.8**	**20.8**	**23.4**
⊙	**B-21**	**6.0ft**	**12.5**	**0.825**	**0.014**		**7.0**	**55.9**	**16.1**	**21.0**

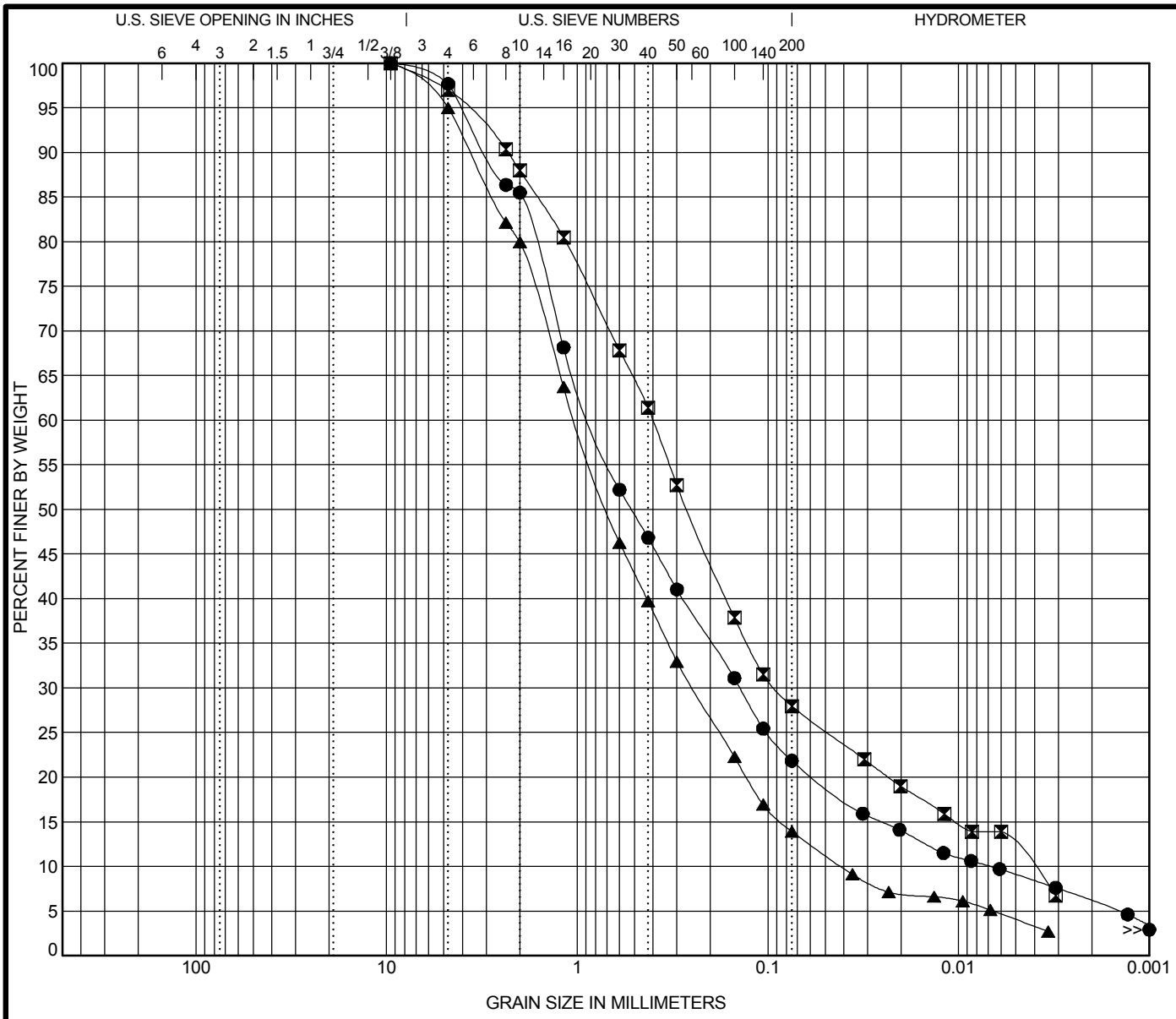
Terracon

GRAIN SIZE DISTRIBUTION

Project: Rice Solar Energy Project
Site: Former Rice Airfield Rice, California
Job #: 60095017
Date: 8-5-09

B-1

TC GRAIN SIZE BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/5/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**B-22**	**2.5ft**	**SILTY SAND(SM)**				**3.44**	**122.09**
⊠	**B-22**	**50.0ft**	**SILTY SAND(SM)**				**4.96**	**95.77**
▲	**B-23**	**15.0ft**	**SILTY SAND(SM)**				**1.45**	**24.68**

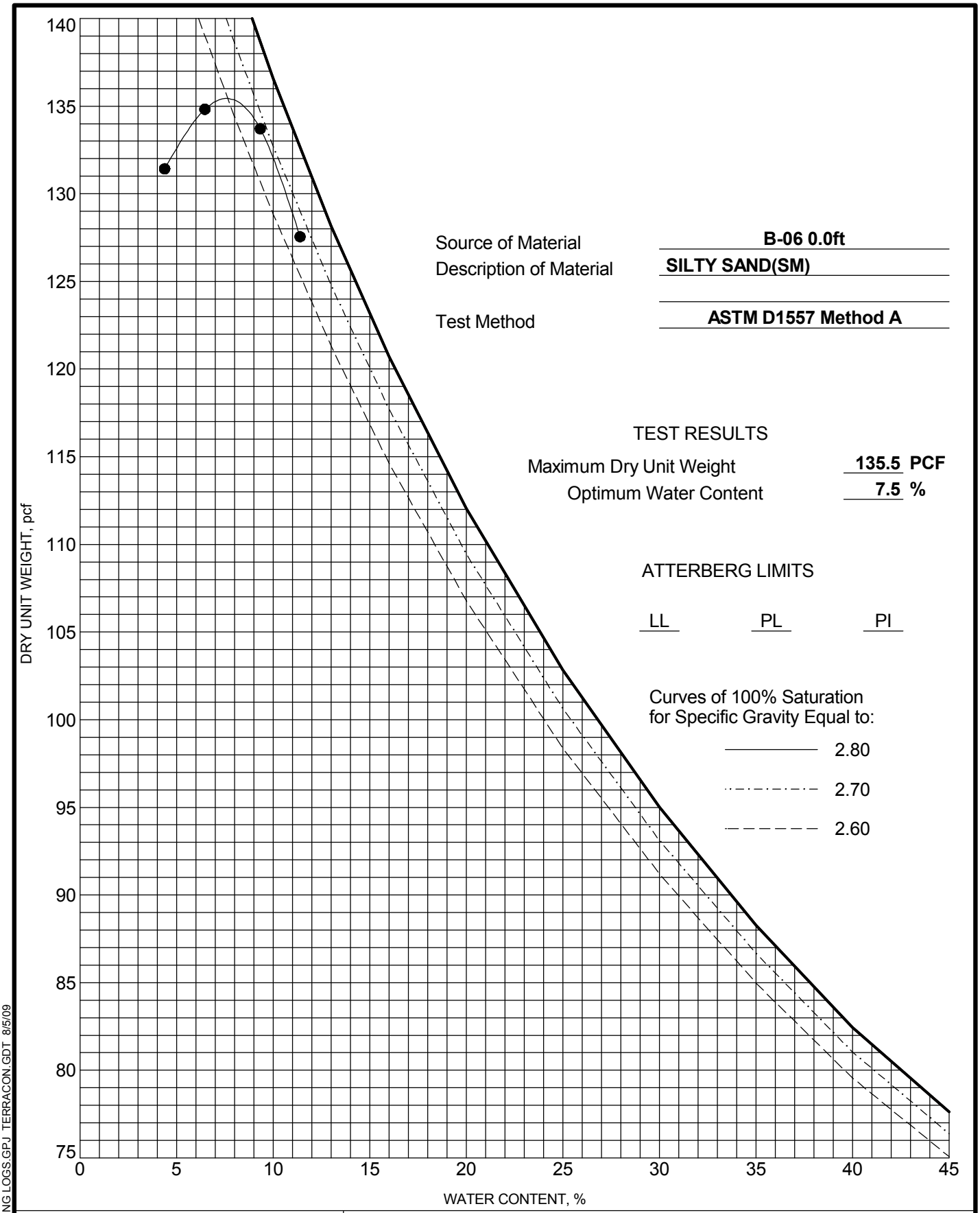
	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-22**	**2.5ft**	**9.5**	**0.835**	**0.14**	**0.007**	**2.3**	**75.9**	**12.8**	**9.1**
⊠	**B-22**	**50.0ft**	**9.5**	**0.402**	**0.091**	**0.004**	**3.0**	**69.1**	**16.1**	**11.9**
▲	**B-23**	**15.0ft**	**9.5**	**1.022**	**0.248**	**0.041**	**5.0**	**81.1**	**9.9**	**4.0**

Terracon

GRAIN SIZE DISTRIBUTION

Project: Rice Solar Energy Project
Site: Former Rice Airfield Rice, California
Job #: 60095017
Date: 8-5-09

TC GRAIN SIZE BORING LOGS FROM AZ.GPJ TERRACON.GDT 8/5/09



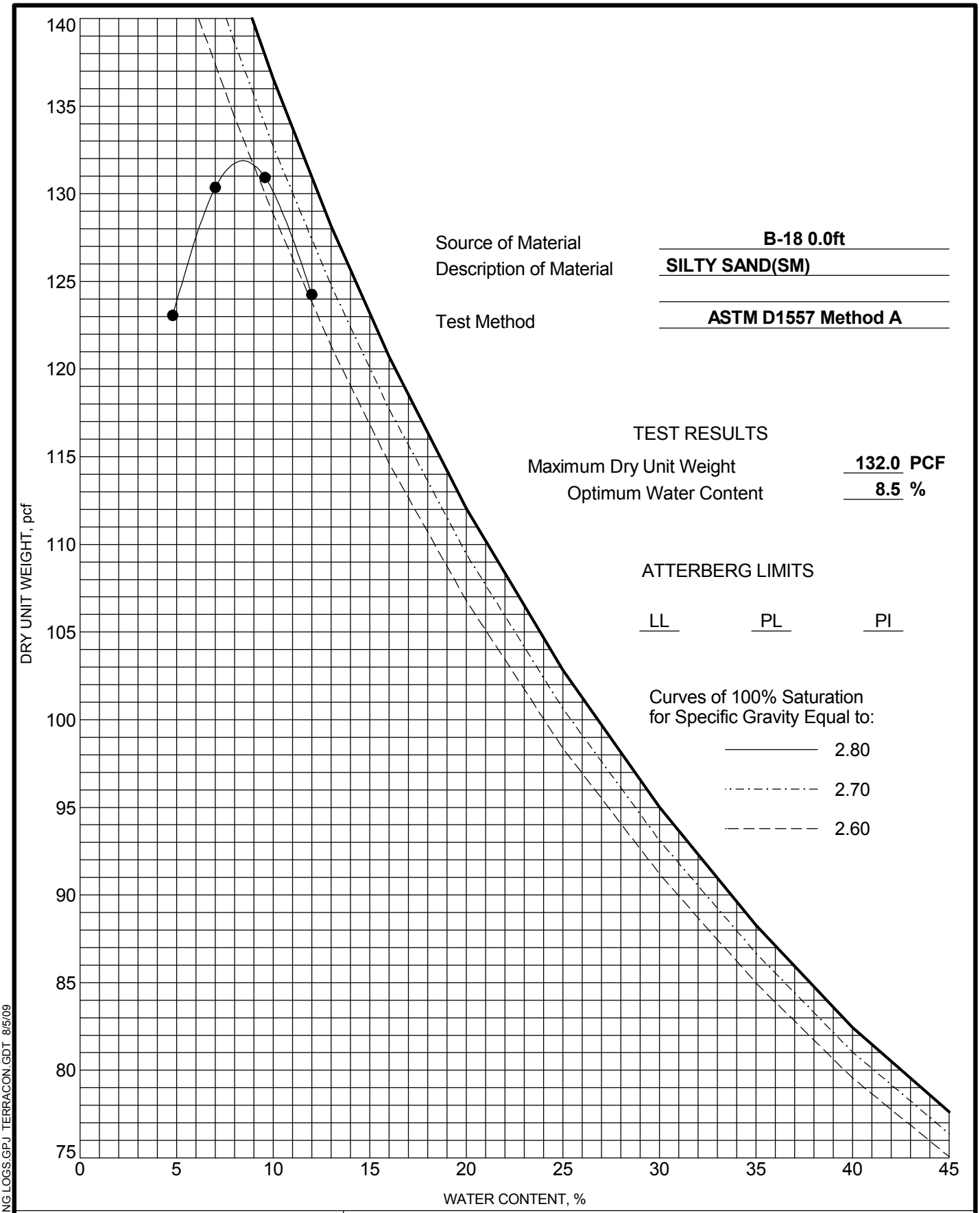
Terracon

MOISTURE-DENSITY RELATIONSHIP

Project: Rice Solar Energy Project
Site: Former Rice Airfield Rice, California
Job #: 60095017
Date: 8-5-09

B-1

TC COMPACTION BORING LOGS.GPJ TERRACON.GDT 8/5/09

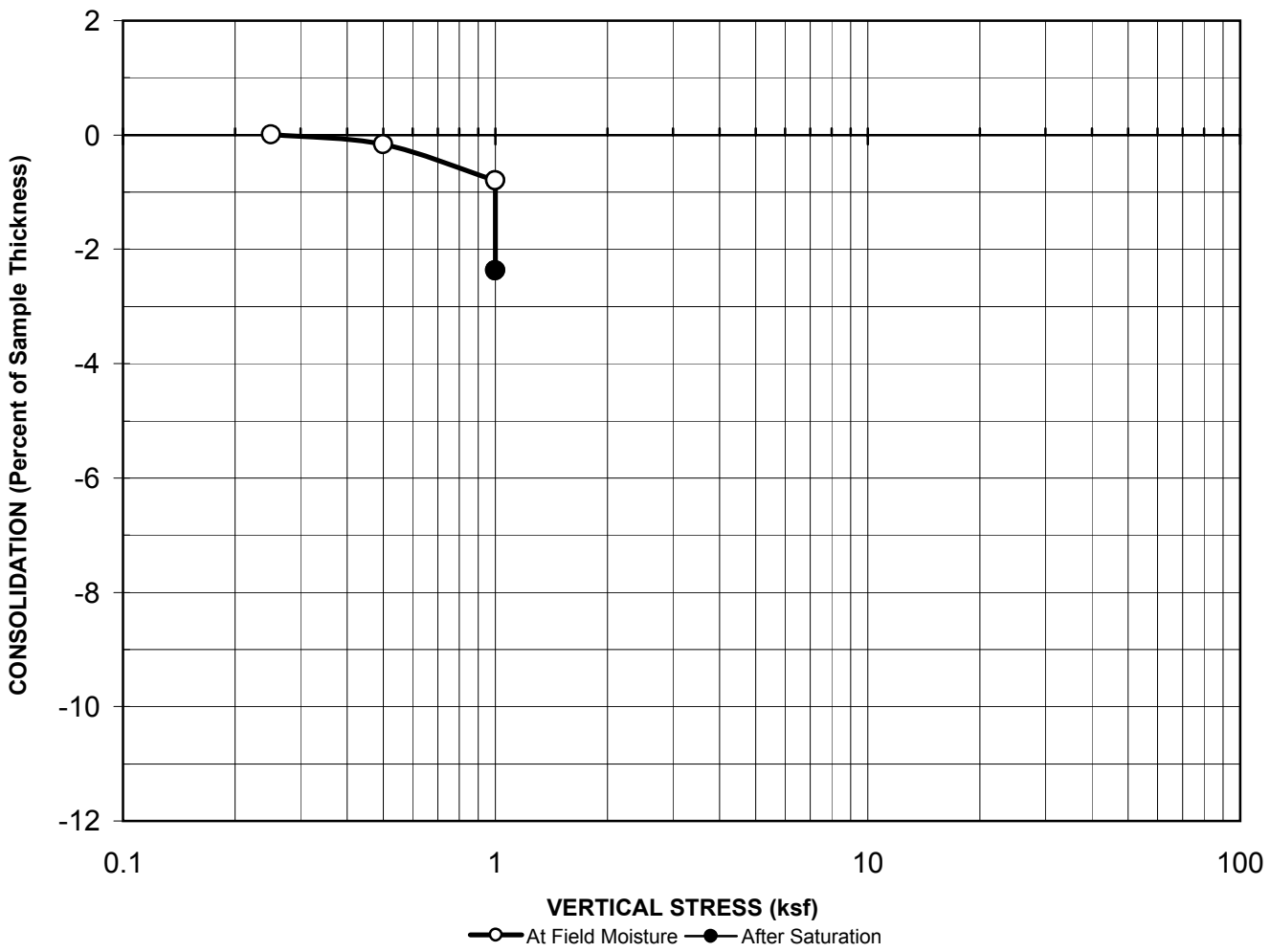


Terracon

MOISTURE-DENSITY RELATIONSHIP

Project: Rice Solar Energy Project
Site: Former Rice Airfield Rice, California
Job #: 60095017
Date: 8-5-09

TC COMPACTION BORING LOGS.GPJ TERRACON.GDT 8/5/09

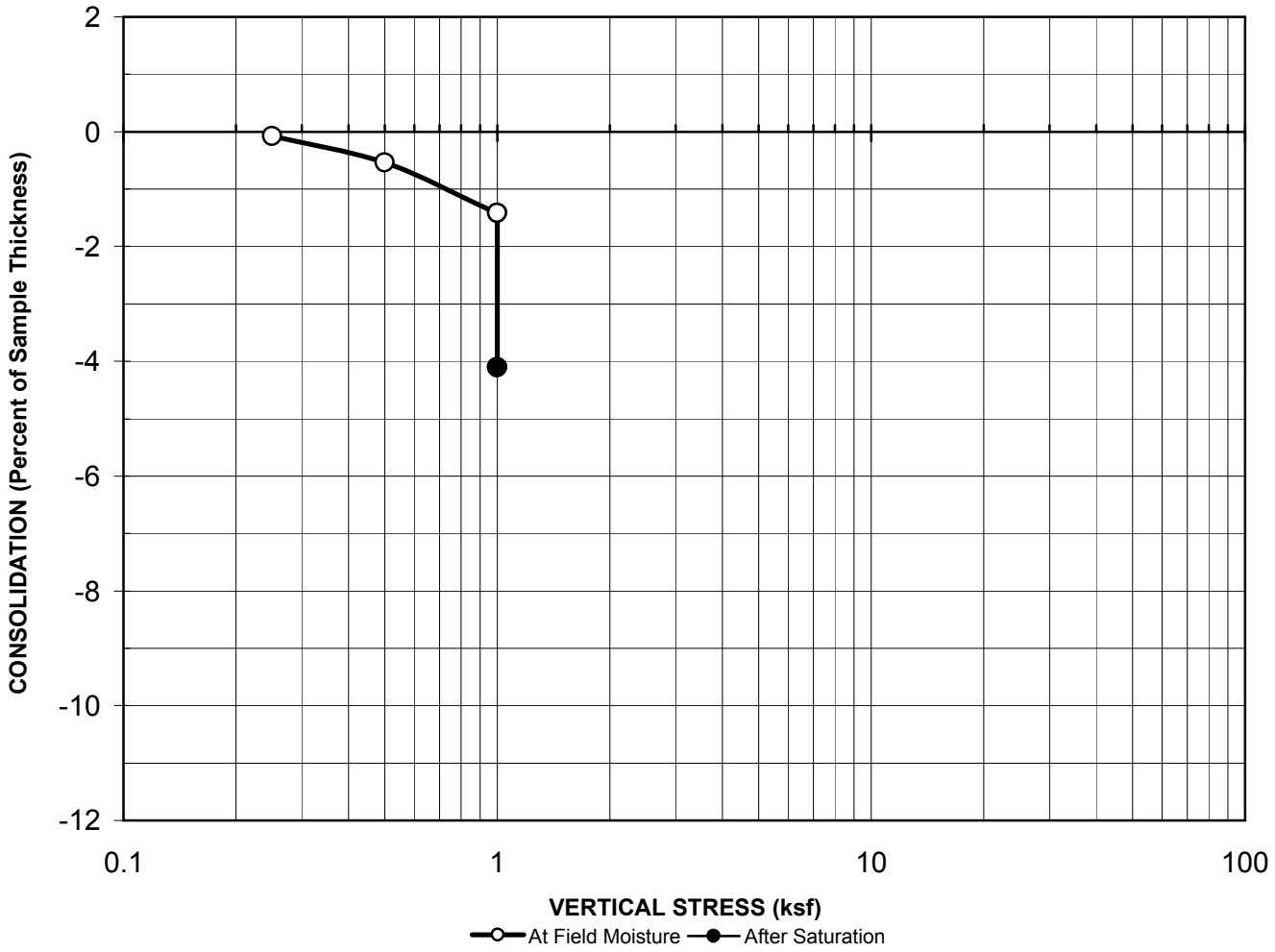


Boring No. :	B-07	Initial Dry Unit Weight (pcf):	116.6
Sample No.:	NA	Initial Moisture Content (%):	1.0
Depth (feet):	2.5	Final Moisture Content (%):	13.1
Sample Type:	Undisturbed	Assumed Specific Gravity:	2.7
Soil Description:	Silty Sand (SM)	Initial Void Ratio:	0.44
		Collapse Potential (%):	1.6

COLLAPSE POTENTIAL
ASTM D 5333

Project Name: Rice Solar Energy Project
Project No.: 60095017
Date: 7/9/2009
Figure No:

Terracon
Consulting Engineers & Scientists

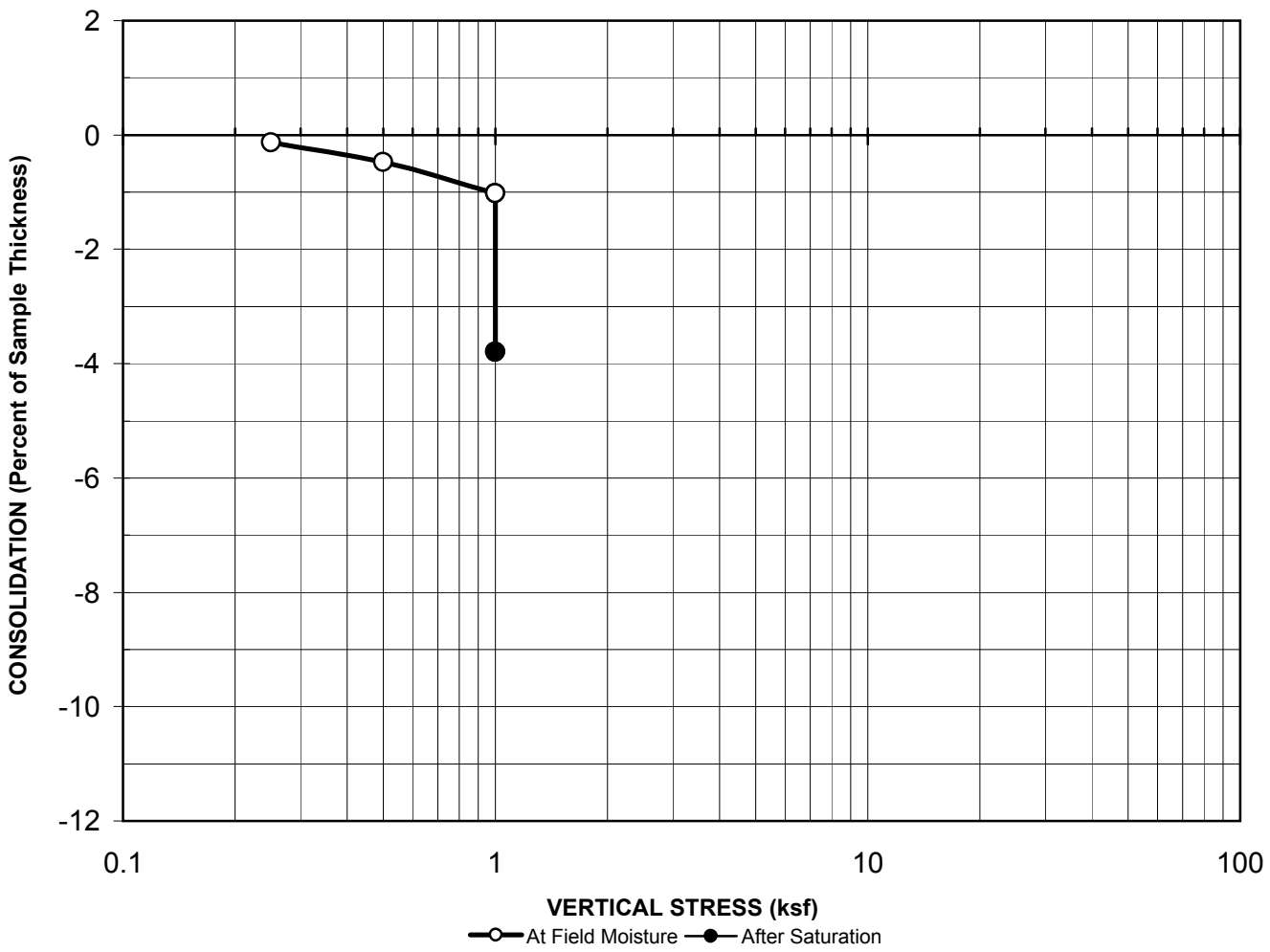


Boring No. :	B-07	Initial Dry Unit Weight (pcf):	112.8
Sample No.:	NA	Initial Moisture Content (%):	1.5
Depth (feet):	5	Final Moisture Content (%):	13.1
Sample Type:	Undisturbed	Assumed Specific Gravity:	2.7
Soil Description:	Poorly Graded Sand (SP)	Initial Void Ratio:	0.49
		Collapse Potential (%):	2.7

COLLAPSE POTENTIAL
ASTM D 5333

Project Name: Rice Solar Energy Project
Project No.: 60095017
Date: 7/9/2009
Figure No:

Terracon
Consulting Engineers & Scientists

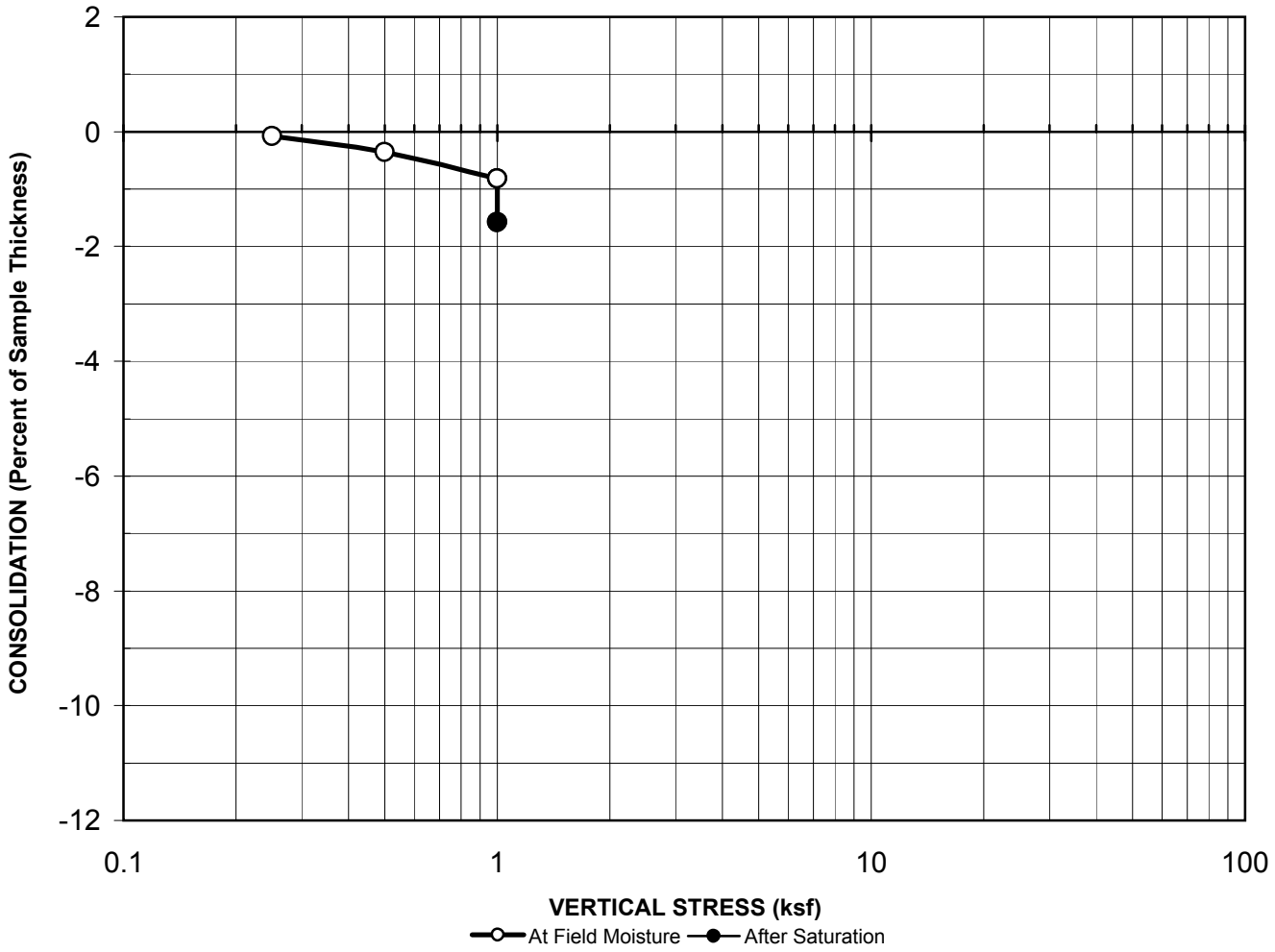


Boring No. :	B-07	Initial Dry Unit Weight (pcf):	112.0
Sample No.:	NA	Initial Moisture Content (%):	2.0
Depth (feet):	7.5	Final Moisture Content (%):	13.5
Sample Type:	Undisturbed	Assumed Specific Gravity:	2.7
Soil Description:	Poorly Graded Sand (SP)	Initial Void Ratio:	0.50
		Collapse Potential (%):	2.8

COLLAPSE POTENTIAL
ASTM D 5333

Project Name: Rice Solar Energy Project
Project No.: 60095017
Date: 7/9/2009
Figure No:

Terracon
Consulting Engineers & Scientists

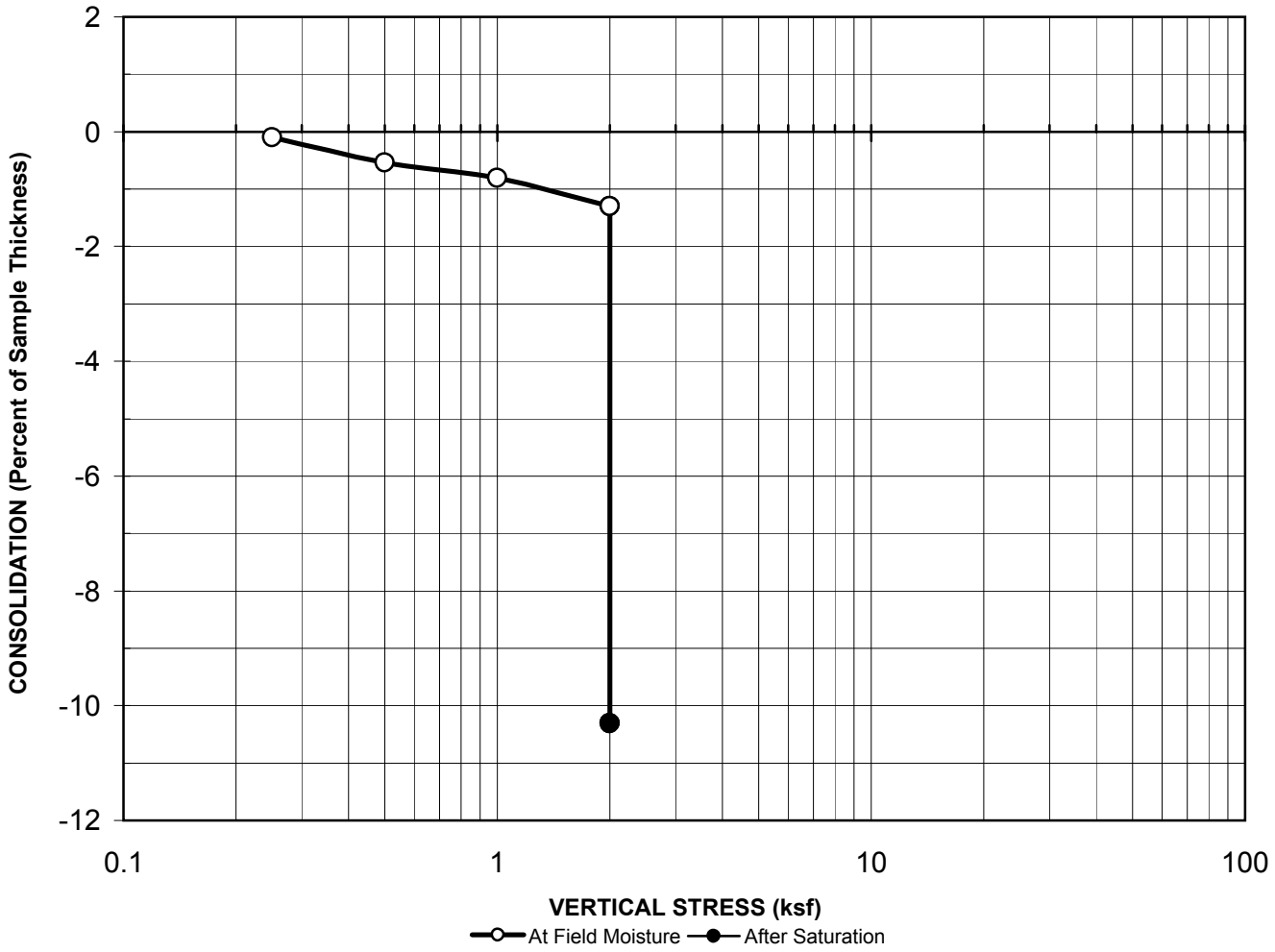


Boring No. :	B-07	Initial Dry Unit Weight (pcf):	109.0
Sample No.:	NA	Initial Moisture Content (%):	3.2
Depth (feet):	10	Final Moisture Content (%):	15.3
Sample Type:	Undisturbed	Assumed Specific Gravity:	2.7
Soil Description:	Poorly Graded Sand (SP)	Initial Void Ratio:	0.55
		Collapse Potential (%):	0.8

COLLAPSE POTENTIAL
ASTM D 5333

Project Name: Rice Solar Energy Project
Project No.: 60095017
Date: 7/9/2009
Figure No:

Terracon
Consulting Engineers & Scientists



Boring No. :	B-20	Initial Dry Unit Weight (pcf):	95.3
Sample No.:	NA	Initial Moisture Content (%):	6.3
Depth (feet):	10	Final Moisture Content (%):	16.5
Sample Type:	Undisturbed	Assumed Specific Gravity:	2.7
Soil Description:	Silty Sand (SM)	Initial Void Ratio:	0.77
		Collapse Potential (%):	9.01

COLLAPSE POTENTIAL
ASTM D 5333

Project Name: Rice Solar Energy Project
Project No.: 60095017
Date: 7/11/2009
Figure No:

Terracon
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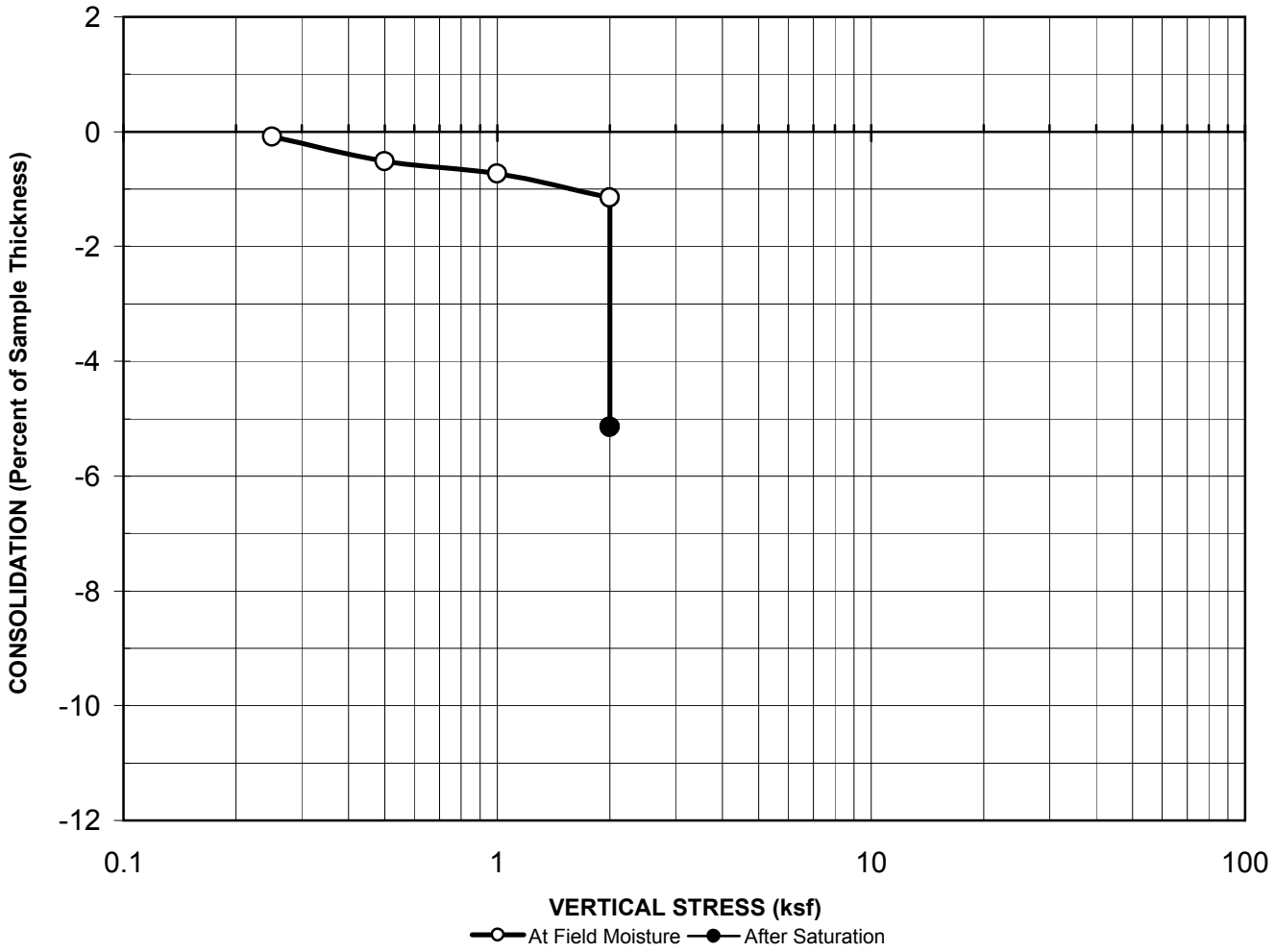

Boring No. :	B-22	Initial Dry Unit Weight (pcf):	114.1
Sample No.:	NA	Initial Moisture Content (%):	3.1
Depth (feet):	7.5	Final Moisture Content (%):	11.6
Sample Type:	Undisturbed	Assumed Specific Gravity:	2.7
Soil Description:	Silty Sand (SM)	Initial Void Ratio:	0.48
		Collapse Potential (%):	3.99

COLLAPSE POTENTIAL
ASTM D 5333

Project Name: Rice Solar Energy Project
Project No.: 60095017
Date: 7/11/2009
Figure No:

Terracon
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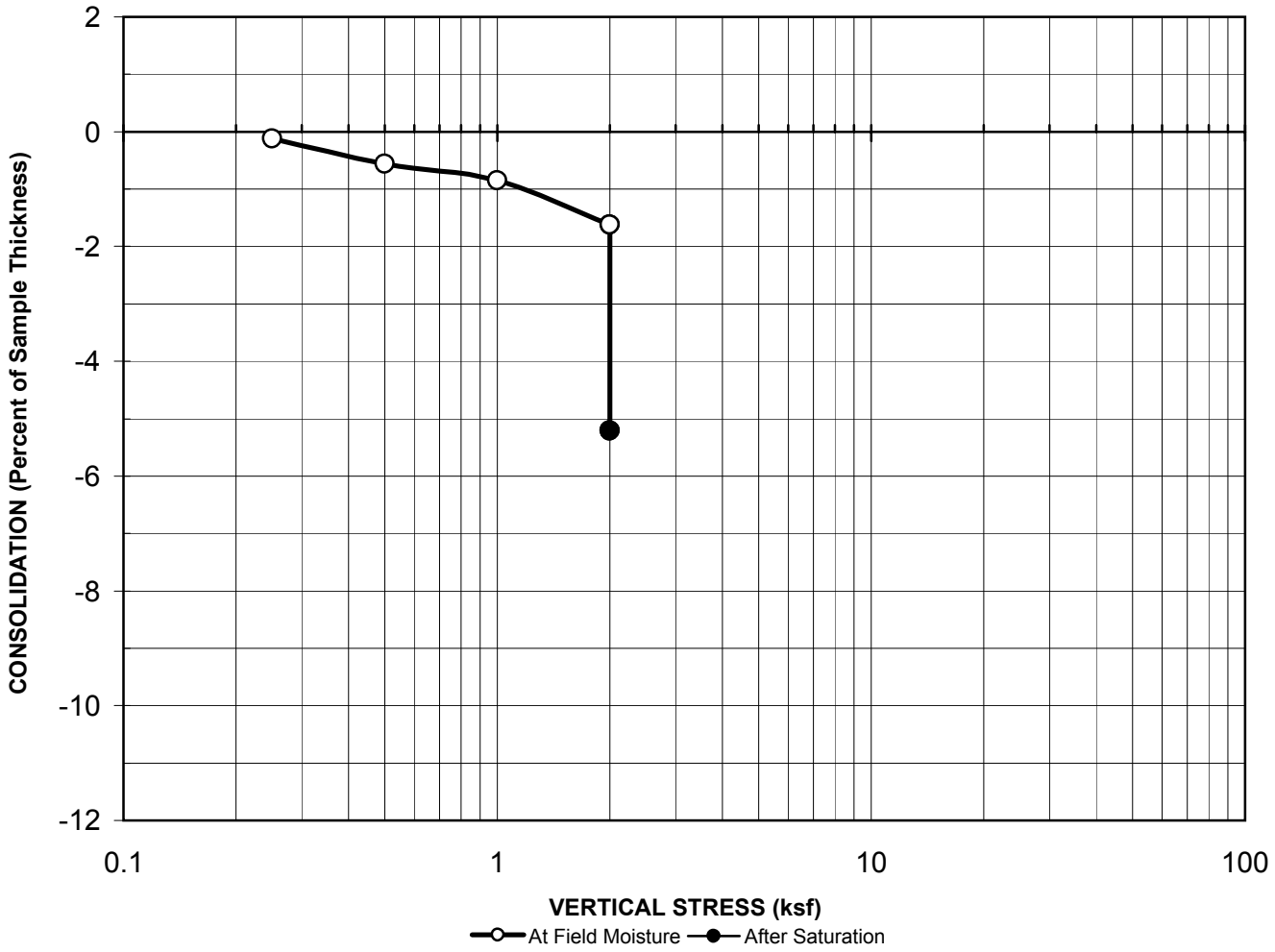

Boring No. :	B-22	Initial Dry Unit Weight (pcf):	110.4
Sample No.:	NA	Initial Moisture Content (%):	2.4
Depth (feet):	10	Final Moisture Content (%):	13.1
Sample Type:	Undisturbed	Assumed Specific Gravity:	2.7
Soil Description:	Poorly Graded Sand (SP)	Initial Void Ratio:	0.53
		Collapse Potential (%):	3.59

COLLAPSE POTENTIAL
ASTM D 5333

Project Name: Rice Solar Energy Project
Project No.: 60095017
Date: 7/11/2009
Figure No:

Terracon
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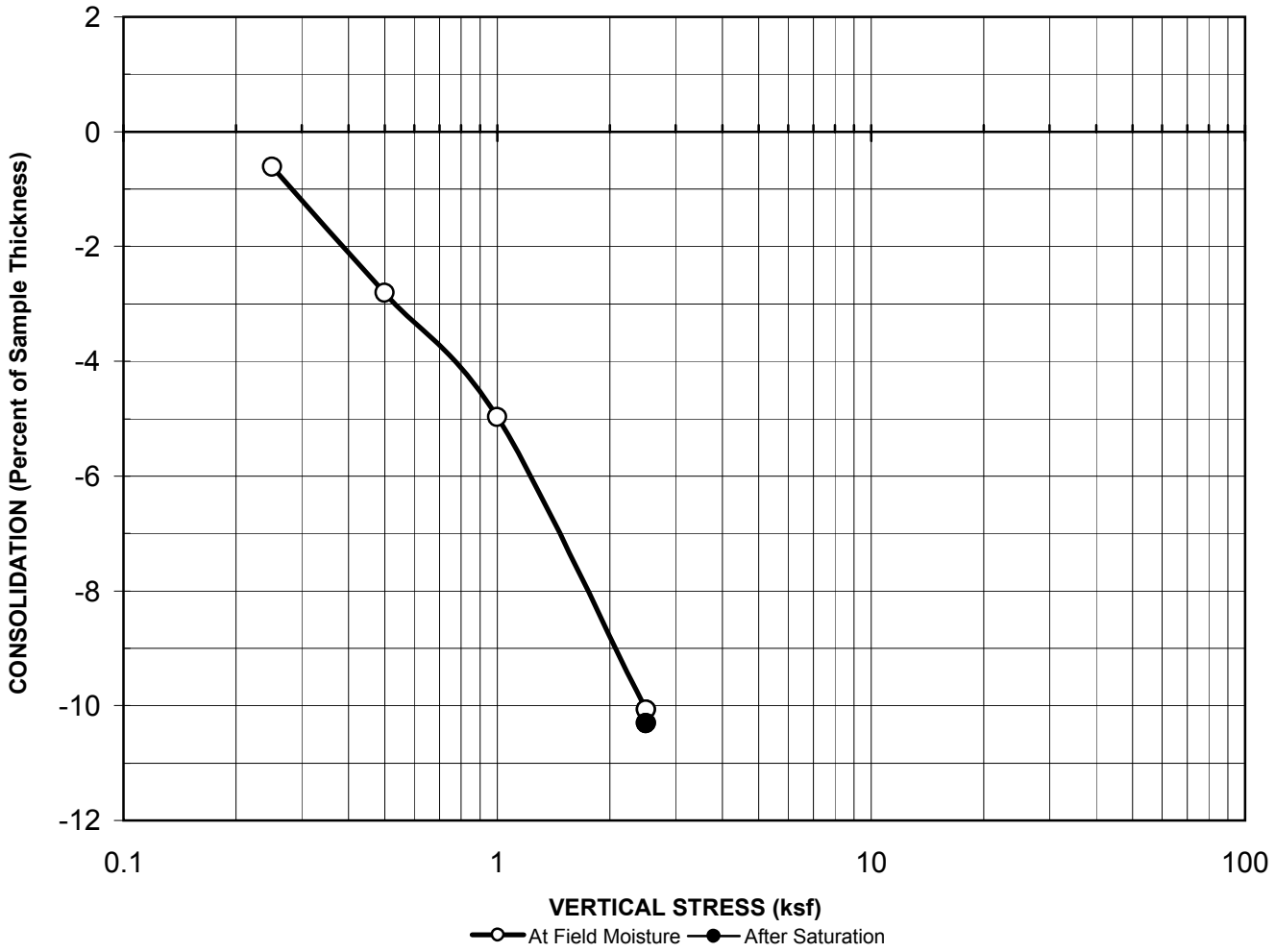

Boring No. :	B-22	Initial Dry Unit Weight (pcf):	98.3
Sample No.:	NA	Initial Moisture Content (%):	4.6
Depth (feet):	20	Final Moisture Content (%):	15.7
Sample Type:	Undisturbed	Assumed Specific Gravity:	2.7
Soil Description:	Silty Sand (SM)	Initial Void Ratio:	0.71
		Collapse Potential (%):	0.24

COLLAPSE POTENTIAL
ASTM D 5333

Project Name: Rice Solar Energy Project
Project No.: 60095017
Date: 7/11/2009
Figure No:

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AP Engineering & Testing, Inc.

R-VALUE TEST DATA

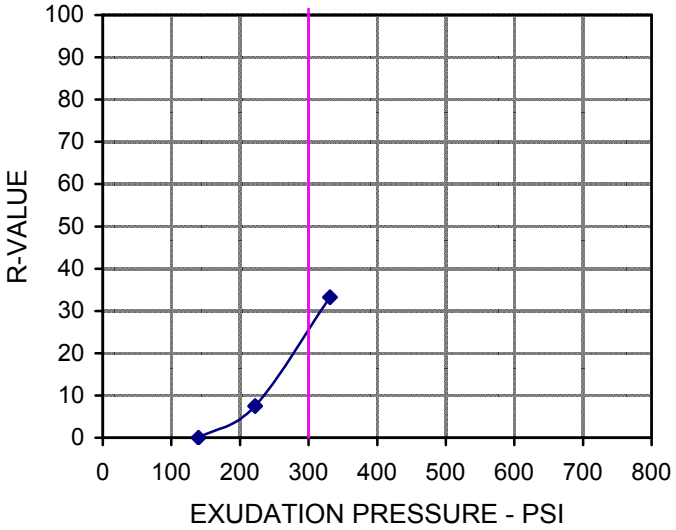
ASTM D2844

Project Name: Rice Solar Energy Project Tested By: ST/KM Date: 07/10/09
Project Number: 60095017 Checked By: AP Date: 07/14/09
Boring No.: B20
Sample No.: Bulk Depth (ft.): 0-2
Location:
Soil Description: Reddish Brown Clayey Sand

Mold Number	A	B	C		
Water Added, g	0	20	10		
Compact Moisture(%)	9.9	11.9	10.9		
Compaction Gage Pressure, psi	300	100	130		
Exudation Pressure, psi	331	139	222		
Sample Height, Inches	2.3	2.4	2.4		
Gross Weight Mold, g	3071	3089	3079		
Tare Weight Mold, g	1971	1968	1970		
Net Sample Weight, g	1100	1121	1109		
Expansion, inches$\times 10^{-4}$	4	1	3		
Stability 2,000 (160 psi)	40/90	70/160	60/142		
Turns Displacement	3.19	3.62	3.44		
R-Value Uncorrected	38	0	8		
R-Value Corrected	33	0	8		
Dry Density, pcf	131.8	126.4	126.2		
Traffic Index	8.0	8.0	8.0		
G.E. by Stability	1.13	1.69	1.57		
G.E. by Expansion	0.13	0.03	0.10		

R-Value by Exudation = 26
R-Value by Expansion = N/A
Equilibrium R-Value = 26
(by Exudation)

Remarks: G_f = 1.5
0.5 % Retained on the ¾"



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