URS

DOCKET
08-AFC-12
DATE JUN 01 2009
RECD. JUN 02 2009

June 1, 2009

Ms. Melissa Jones
Executive Director
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: San Joaquin Solar 1 LLC and San Joaquin Solar 2 LLC
Fresno County, California 08-AFC-12

Dear Ms. Jones:

In accordance with the provisions of Title 20, California Code of Regulations, URS Corporation (URS), on behalf of San Joaquin Solar 1 LLC and San Joaquin Solar 2 LLC, hereby submits this Second Response to AFC 08-AFC-12 CEC Staff Data Request Set #1.

Submitted under this cover are responses to 62 data requests from the CEC Staff Data Request Set #1. The applicant respectfully requests additional time, beyond the 30-day period from when the CEC Staff Data Request Set #1 was docketed, to respond to the remaining data requests. We request an extension until July 15, 2009 to respond to all of the CEC Staff Data Request Set #1. The applicant will make every possible effort to submit these responses as soon as possible. The attached table presents the requested schedule of data response.

I hereby attest, under penalty of perjury, that the contents of this Supplemental Information are truthful and accurate to the best of my knowledge.

Dated June 1, 2009.

Sincerely,

URS CORPORATION

Anne Runnalls

Anne Runnalls
Project Manager

AR:ml

URS Corporation
1615 Murray Canyon Road, Suite 1000
San Diego, CA 92108
Tel: 619.294.9400
Fax: 619.293.7920

Data Response Submittal Date	Data request number from Set #1
May 20, 2009	7, 37, 38, 39, 40, 52, 75, 84, 89, 91, 93-96, 100, 105, 114-118, 126-130, 132, 141, 142
May 20, 2009	Objections to 8-13, 24, 143, 144
June 1, 2009	17, 21-23, 25-27, 29-31, 36, 39, 42, 43, 53-71, 76, 77, 83, 85, 86, 90, 92, 97, 101, 119-125, 131, 133-140, 145-148
July 15, 2009	1-6, 14-16, 18-20, 28, 32-35, 41, 44-51, 72-74, 78-82, 87, 88, 98, 99, 102-104, 106-113

JUNE 1, 2009

San Joaquin Solar 1 & 2 Hybrid Project

2nd Response to CEC Data Request Set #1, 08-AFC-12

Submitted to:
California Energy Commission

Submitted by:

MARTIFER
RENEWABLES SOLAR THERMAL

With Support from:

URS BETHELENERGY

San Joaquin Solar 1 & 2 Hybrid Project
Supplemental Information
In Response to CEC Data Request Set #1
08-AFC-12

TECHNICAL AREA: AIR QUALITY

Data Request 17: Please confirm whether wet-surface air coolers would be included in the project description, and, if so, describe the equipment, the potential emissions, and air quality impacts.

Response: A wet surface air cooler (WSAC) condenser combines a conventional cooling tower and turbine condenser in one unit (cell). Two cells will be required for each steam turbine at the project. Therefore, in total there will be 4 two-cell WSACs for the entire SJS 1&2 project. The total emissions from the 4 two-cell WSACs remains the same as the emissions presented in the AFC for the cooling towers. In the AFC the cooling emissions were released from 4 one-cell cooling towers, thus the only difference is that the WSAC emissions will be released from 8 cells versus the 4 cells presented in the AFC. Since the total emissions are the same, the air quality impacts from WSACs will be approximately the same as those predicted in the AFC from the cooling towers.

Data Request 21: Please verify that all emissions from pumps and mechanical drives for the solar system are included in the onsite emissions totals.

Response: All pumps and mechanical drives in the solar field are either electric or hydraulic and have no emissions.

Data Request 22: Please provide an update on the progress to procure ERCs to satisfy SJVAPCD permitting requirements.

Response: The applicant has retained the services of an ERC broker and is progressing in ERC procurement process. The following letter details the progress to date.

Data Request 23: Please identify the specific proposed ERCs that would be used for offsets and mitigation.

Response: The project will identify the specific ERCs to be used for offsets and mitigation upon execution of purchase agreements. This information cannot be released sooner as it may jeopardize ERC procurement negotiations.

ELEMENT MARKETS

May 27th, 2009

California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

To Whom It May Concern:

Element Markets has been engaged by Martifer Renewables Solar Thermal to facilitate the San Joaquin ERC procurement process for San Joaquin Solar 1 & 2 hybrid power plant project. Element Markets is actively in discussions with sellers and we have determined that there is enough supply to fulfill the project's offset requirements. Element Markets expects to wrap up negotiations in order to establish control of the offsets required in the near term. Once the ERC contracts are executed by the buyer and seller, the contracts and the certificate numbers will be provided to San Joaquin Valley Air Pollution Control District and The California Energy Commission to facilitate the issuance of the PDOC and FDOC. Should you have any questions or concerns, please do not hesitate to contact me.

Kindest Regards,

Randall Lack, Managing Director
Element Markets LLC
281-207-7213
rlack@elementmarkets.com

Data Request 25: Please provide a discussion of Best Available Control Technology (BACT) that identifies the available control technologies and achievable emission rates, based on a review of relevant databases and guidelines maintained by the U.S. EPA, CARB, and SJVAPCD. This response should include citations to relevant databases or references.

Response: Table DR-25a summarizes the available control technologies and emission rates that have been achieved in practice for industrial biomass, wood and wood waste combustion boilers. They were identified based on a review of the U.S. EPA RACT/BACT/LAER Clearinghouse, the CARB BACT Clearinghouse and the SJVAPCD BACT clearinghouse for comparable processes, for the past ten (10) years. It should be noted that a query of the CARB database did not produce any records for wood-fired boilers.

A top-down analysis of the available control technologies lead to the selection of the lowest achievable emission rates in terms of mass per energy throughput (lb/MMBtu) listed in Table DR-25b. Table DR-25b also shows the control technologies associated with these emission rates as well as the proposed SJS 1&2 BACT emission levels and control technologies.

The achieved-in-practice BACT are good combustion practices for VOC, regenerative selective catalytic reduction (RSCR) for NOx, oxidation catalyst for CO, electrostatic precipitation (ESP) for PM_{10} and lime injection for SO_2. The SJS 1&2 proposed BACT are selective non catalytic reduction (SNCR) and selective catalytic reduction (SCR) for NOx, mulit-cyclone, baghouse and wet scrubber for PM_{10}, and limestone injection for SO_2 in addition to wet and dry scrubbers for further emission reductions. The SJS 1&2 proposed BACT are the same or more stringent than those presently achieved in practice.

It should be noted that the PM_{10} emission limit of 0.020 lb/MMBtu presented in the U.S. EPA database for a wood waste boiler in the State of Washington was for filterable PM_{10}, not total PM_{10}. SJS 1&2 proposed an emission limit of 0.010 lb/MMBtu for filterable PM_{10} and 0.025 lb/MMBtu for total PM_{10}. Thus the PM_{10} emission controls from the SJS 1&2 project would reduce emissions to a level lower than presently achieved BACT.

Table DR-25a
BACT Clearinghouse Review For Boilers Burning Wood or Biomass

Facility	Location	Description	Permit Date	Fuel	Throughput (MMBtu/hr)	Pollutant										Source
						VOC		NO_x		CO		Filterable PM_{10}		SO_2		
						Emission Limit (lb/MMBtu)	Control	Emission Limit (lb/MMBtu)	Control	Emission Limit (lb/MMBtu)	Control	Emission Limit (lb/MMBtu)	Control	Emission Limit (lb/MMBtu)	Control	
Concord Steam Corporation	NH	10.7 MW biomass power plant	Feb-09	Biomass	305	NA	NA	0.065	RSCR	NA	NA	NA	NA	NA	NA	EPA RACT/BACT/LAER Clearinghouse
Koda Energy	MN	Sugar mill and refinery	Aug-07	Biomass (bagasse)	308	NA	NA	0.25	SNCR	NA	NA	0.03	Cyclone & ESP	NA	NA	EPA RACT/BACT/LAER Clearinghouse
Simpson Tacoma Kraft Company	WA	Kraft pulp and and lineboard manufacturing	May-07	Wood waste	595	NA	NA	0.2	Combustion controls with overfire air	0.35	Combustion controls with overfire air	0.02	ESP	NA	NA	EPA RACT/BACT/LAER Clearinghouse
Grays Harbor Paper	WA	Paper mill	Nov-06	Wood waste	379	NA	NA	NA	NA	NA	NA	52.5 lb/hr	Multiclones; 2 parallel impringement wet scrubber	NA	NA	EPA RACT/BACT/LAER Clearinghouse
Grays Harbor Paper	WA	Paper mill	Nov-06	Wood waste	227	NA	NA	NA	NA	NA	NA	78.4 lb/hr	Multiclones; secondary multiclones; secondary scrubber packed wet ventury	NA	NA	EPA RACT/BACT/LAER Clearinghouse
Stevenson Mill	AL	Pulp and paper mill	Jul-06	Biomass	620	NA	NA	NA	NA	NA	NA	NA	NA	93 lb/hr	NA	EPA RACT/BACT/LAER Clearinghouse
Northern Sun	ND	Vegetable oil plant and refinery	May-06	Biomass (hulls and wood)	NA	NA	NA	0.2	Combustion controls	0.63	Good combustion practices	0.08	ESP	0.47	NA	EPA RACT/BACT/LAER Clearinghouse
South Point Biomass Generation	OH	Biomass power plant	Apr-06	Wood	318	0.013	Good combustion practice and use of oxidation catalyst	0.44	SCR	0.1	Oxidation catalyst	3.97 lb/hr	Pulse jet baghouse	0.087	Spray dryer adsorber or dry sodium bicarbonate injection system	EPA RACT/BACT/LAER Clearinghouse
Boise White Paper	WA	Pulp and paper mill	Feb-06	Wood/Bark	343	NA	NA	0.3	Combustion controls with overfire air; ESP	500 ppmvd	Combustion controls with overfire air	NA	NA	NA	NA	EPA RACT/BACT/LAER Clearinghouse

Table DR-25a
BACT Clearinghouse Review For Boilers Burning Wood or Biomass
(Continued)

Facility	Location	Description	Permit Date	Fuel	Throughput (MMBtu/hr)	Pollutant										Source
						VOC		NO_x		CO		Filterable PM_{10}		SO_2		
						Emission Limit (lb/MMBtu)	Control	Emission Limit (lb/MMBtu)	Control	Emission Limit (lb/MMBtu)	Control	Emission Limit (lb/MMBtu)	Control	Emission Limit (lb/MMBtu)	Control	
Skagit County Lumber Mill	WA	Lumber mill	Jan-06	Bark/Wood waste	430	0.019	NA	0.13	SNCR	0.35	NA	0.02	ESP	0.025	NA	EPA RACT/BACT/LAER Clearinghouse
Potlatch Corporation	AR	Sawmill	Jul-05	Wood chips	110,000 lb/hr of steam production	0.034	Good combustion practices	NA	NA	NA	NA	NA	NA	NA	NA	EPA RACT/BACT/LAER Clearinghouse
Darrington Energy Cogeneration Power plant	WA	Cogeneration facility	Feb-05	Wood waste	403	NA	NA	0.12	SNCR	0.35	Good combustion practices	0.02	ESP	NA	NA	EPA RACT/BACT/LAER Clearinghouse
Bogalusa Mill	LA	Pulp and paper mill	Nov-04	Bark	787.5	NA	NA	0.45	Good combustion pratices; overfire air system with low NOx burners	0.6	Good combustion pratices; overfire air system	0.15	Wet scrubber	1.54	Limit annual fuel oil capacity to <= 10%	EPA RACT/BACT/LAER Clearinghouse
Schiller Station	NH	Power plant	Oct-04	Biomass	720	0.005	Good combustion practices	0.075	SNCR	0.1	Good combustion practices with the fluidized bed design	0.025	Fabric filter	0.02	Lime injection	EPA RACT/BACT/LAER Clearinghouse
Inland Paperboard	GA	Kraft lineboard manufacturing	Oct-04	Bark	856	0.05	Stage combustion and good combustion practices	NA	NA	368 ppm @ 3% O2	Stage combustion and good combustion practices	0.025	ESP	NA	NA	EPA RACT/BACT/LAER Clearinghouse
Clewiston Sugar Mill and Refinery	FL	Sugar mill and refinery	Nov-03	Bagasse	936	0.05	Good combustion and operating practices	0.14	SNCR	0.38	Good combustion and operating practices	0.026	Wet cyclone; ESP	0.06	Fuel specification < 0.05% S wt	EPA RACT/BACT/LAER Clearinghouse
Deridder Paper Mill	LA	Pulp and paper mill	Nov-03	Bark	454.29	0.034	Good equipment design and proper combustion techniques	NA	NA	0.33	Good equipment design and proper combustion techniques	NA	NA	NA	NA	EPA RACT/BACT/LAER Clearinghouse

Table DR-25a
BACT Clearinghouse Review For Boilers Burning Wood or Biomass
(Continued)

Facility	Location	Description	Permit Date	Fuel	Throughput (MMBtu/hr)	Pollutant										Source
						VOC		NO_x		CO		Filterable PM_{10}		SO_2		
						Emission Limit (lb/MMBtu)	Control	Emission Limit (lb/MMBtu)	Control	Emission Limit (lb/MMBtu)	Control	Emission Limit (lb/MMBtu)	Control	Emission Limit (lb/MMBtu)	Control	
Aberdeen Division	WA	Lumber mill	Oct-02	Wood waste	310	NA	NA	0.15	SNCR	0.35	Good combustion	0.02	ESP	NA	NA	EPA RACT/BACT/LAER Clearinghouse
Meadwestvaco	KY	Pulp and paper mill	Feb-02	Bark	631	NA	NA	0.4	NA	NA	NA	0.1	ESP	0.8	NA	EPA RACT/BACT/LAER Clearinghouse
S.D. Warren Co	ME	Kraft pulp mill	Nov-01	Wood waste	1300	0.007	Good boiler design and combustion practices	0.2	SNCR	0.4	Good boiler design and combustion practices	0.03	Mechanical dust collector; ESP	0.27	Sodium-based wet scrubber	EPA RACT/BACT/LAER Clearinghouse
District Energy St. Paul	MN	District heating and electricity cogeneration	Nov-01	Wood	550	NA	NA	0.15	SNCR	0.3	Good combustion	0.03	Cyclone; ESP	NA	NA	EPA RACT/BACT/LAER Clearinghouse
Tri-Gen Biopower	GA	Biomass power plant	May-01	Wood waste/Papermill sludge	302.2	NA	NA	NA	NA	0.3	Good design and combustion principles	0.026	ESP; wet scrubber	NA	NA	EPA RACT/BACT/LAER Clearinghouse
US Sugar Corporation	FL	Sugar mill and refinery	Nov-99	Bagasse	633	0.5	Good combustion practices	0.2	Good combustion practices	6.5	Good combustion practices	0.15	Good combustion practices; scrubber; wet impingement	0.06	Low sulfur fuel <= 0.7% S wt	EPA RACT/BACT/LAER Clearinghouse
Wheelabrator Sherman Energy Company	ME	Electric generating facility	Apr-99	Wood	315	0.03	Good combustion practices	0.25	Good combustion practices	0.45	Good combustion practices	0.036	ESP; cyclone	0.12	NA	EPA RACT/BACT/LAER Clearinghouse
Thermal Energy Development Corp	CA	Power production	Sep-04	Biomass	259	NA	NA	NA	NA	400 ppmvd @ 3% O2	NA	NA	NA	NA	NA	SJVAPCD BACT Determination Clearinghouse
AES Delano	CA	Power plant	Nov-02	Biomass	315	0.02	NA	0.1	Amonia injection	0.14	NA	0.045	Baghouse	23 ppmvd @ 3% O2	Limestone injection	SJVAPCD BACT Determination Clearinghouse
Minimum Emission Limit (lb/MMBtu)						0.005		0.065		0.1		0.02		0.02		

Table DR-25b
Available BACT and Proposed SJS 1&2 BACT for Boilers Burning Wood or Biomass

Pollutant	Available BACT		SJS 1& 2 Proposed BACT	
	Lowest Achievable Emission Rate (lb/MMBtu)	Control Technology	Lowest Achievable Emission Rate (lb/MMBtu)	Control Technology
VOC	0.005	Good combustion practices	0.005	Good combustion practices with fluidized bed technology
NO_x	0.065	Regenerative Selective Catalytic Reduction (RSCR)	0.012	Selective Non-Catalytic Reduction (SNCR) and Selective Catalytic Reduction (SCR)
CO	0.1	Oxidation catalyst or good combustion practices with fluidized bed technology	0.039	Good combustion practices with fluidized bed technology
Filterable PM_{10}	0.02	Electrostatic Precipitator (ESP)	0.01	Multi-cyclone, Baghouse and Wet Scrubber
SO_2	0.02	Lime injection	0.012	Limestone injection and Wet Scrubber

Data Request 26: Please confirm that the analysis of control technologies considers all available technologies for reducing emissions during startup and partial-load modes of operation.

Response: The SJS 1&2 biomass combustor proposes the installation of four natural gas burners in each of the biomass combustors that will be used only during combustor cold startup. Only two cold startups per year per combustor are anticipated lasting a total of 8 hours each startup. The natural gas burners and combustor exhaust emissions will be vented out of the combustor stack and will be controlled by the primary combustor controls listed in Data Request Response 25, which will become partially functional by hour eight of the startup sequence and fully functional the following hour. Startup emissions and controls are presented in Table DR-29.

Emission controls will be fully functional during partial-load operations for NOx, SO_2 and particulate emissions. Emissions for partial load operations are presented in Tables DR-30a and 30b.

The CO and VOC emission rates are estimated to be higher at 50% load (0.039 lb/MMBtu and 0.005 lb/MMBtu, respectively) than at 75% or 100% load (0.020 lb/MMBtu and 0.003 lb/MMBtu, respectively). The reason is that

there will be some heat transfer surface (boiler steaming) located in the vessel, that will be removing heat all of the time regardless of the capacity level. As a result, this heat removal needs to be compensated for by reducing the excess air into the furnace so that the furnace temperatures can be maintained. When the capacity is 50%, the surface duty is significant, and even though the excess air levels are reduced to 35%, the furnace temperature is reduced down to approximately 1600 F. At lower excess air and lower furnace temperatures, potential CO and VOC levels increase. Since CO and VOC emissions are fairly low for full load operations, it is likely that the 50% load emissions could rise significant, hence until testing is conducted on the combustors at the SJS 1&2 project for operations at 50% load, the combustor engineers estimate the CO and VOC emissions to be 0.039 lb/MMBtu and 0.005 lb/MMBtu, respectively, for a 50% load capacity.

Data Request 27: Please identify the lowest achievable emission rates identified in the review of BACT for the startup and partial-load modes of operation.

Response: Many of the combustors listed in Table DR-25a are equipped with auxiliary fossil-fuel burners that can be used for combustor startup, backup systems, and/or to augment the combustion capacity when running at partial-load mode. These combustors used oil, #2 fuel oil, diesel or natural gas for startup. The proposed combustors at SJS 1&2 will use natural gas burners to warm up the fluidized bed in the combustors during startup.

In general, emissions from the auxiliary burners are vented out of the main combustor stacks and are controlled with the primary combustor controls. However, the information included in the three databases that were reviewed does not allow for the identification of the lowest achievable emission rates of BACT for the startup and partial load modes of operation. Therefore, the specific emission rate achieved by BACT for the startup and partial load modes alone are not available. Section 5.3 of the SJVAPCD Rule 4352 allows Tier 2 emission limits of 115 ppmvd and 400 ppmvd @ 3% O_2 for NO_x and CO respectively for a solid-fired boiler if the startup duration does not exceed 96 hours. The proposed SJS 1&2 startup burners will be operated up to 8 hours per event, for 2 events per year, emissions will be substantially below the SJVAPCD thresholds.

Data Request 29: Please provide technical information, including vendor specifications, that expands on AFC Appendix B-3 “Table #-#” and characterizes the proposed emissions during startups as a function of time. This should show how exhaust concentrations would vary during startups and how electrical output would vary, as the biomass combustors and emission control devices come online.

Response: Vendor specifications for a cold startup sequence are shown below in Table DR-29, this table updates and expands the old Table #-# in AFC Appendix B-3. It

provides stack parameters for each hour in the startup sequence. By hour eight of the cold start sequence the natural gas heaters would be off, the combustor would be operating at full capacity and emissions would be partially controlled. By hour nine all control devices would be operating with maximum controlling efficiencies.

Table DR-29
Start Up Emissions for One Biomass Combustor

Table 1587 BFB Cold Start-up Sequence

Startup time (hrs)	1	2	3	4	5	6	7	8	NOTES
Parameters									
Main steam flow (%MCR)	16%	24%	29%	39%	44%	48%	77%	100%	Ratio calculated based on total heat input.
Wood flow (pph)	0	0	0	0	0	0	13,028	53,847	Maximum wood firing rate from short-term emission calcs.
Gas heat (MMBtu/hr) (HHV) max 165 M Btu/hr	50	75	90	120	135	150	165	0	3 x 50 M Btu/hr overbed and 1 x 15 M btu/hr underbed.
Wood heat input (MMBtu/hr) (HHV)	0	0	0	0	0	0	75	310	
Total heat input (MMBtu/hr) (HHV)	50	75	90	120	135	150	240	310	Calculated as the sum of nat gas startup and wood MMBtu.
Bed temperature (degrees F)	100	300	500	650	725	725	1,200	1,300	
vapor temp	450	600	750	950	1200	1200	1500	1700	
gas flow	308,704	362,051	336,057	322,391	248,592	294,449	302,398	363,716	
stack temp	100	120	150	200	230	230	230	230	
Stack exit flow (scfm) approx	68,601	80,456	74,679	71,642	55,243	65,433	67,199	80,826	
Controls:									
NOx Removal Efficiency - (%)	0	0	0	0	0	0	0	77	Not until SNCR is activated
SO2 Removal Efficiency - (%)	0	0	0	0	0	0	0	71	No acid gas scrubbing till hour 7
HCL Removal Efficiency (%)	0	0	0	0	0	0	0	96	No acid gas scrubbing till hour 7
Emission Factors	B-100	(B-100 & Wood Blends) (weighted average for now)						Wood	
NOx Emissions (lb/MMBtu)	0.062	0.062	0.062	0.062	0.062	0.062	0.157	0.084	0.02 after SCR @ 9 hr
SO2 Emissions (lb/MMBtu)	0.000	0.000	0.000	0.000	0.000	0.000	0.159	0.190	0.012 after wet scrub @ 9 hr
PM/PM10 Emissions (lb/MMBtu)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0141	0.045	0.025 after wet scrub @ 9 hr
CO Emissions (lb/MMBtu)	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.050	0.02 after 9 hr
VOC Emissions (lb/MMBtu)	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0047	0.012	0.003 after 9 hr
HCl Emissions (lb/MMBtu)	0	0.000	0.000	0.000	0.000	0.000	0.039	0.005	after scrubber @ hr 7
Emission Rates									
NOx Emissions (lb/hr)	3.10	4.65	5.58	7.44	8.37	9.30	37.62	26.04	
SO2 Emissions (lb/hr)	0.00	0.00	0.00	0.00	0.00	0.00	38.14	46.50	
PM/PM10 Emissions (lb/hr)	0.00	0.00	0.00	0.00	0.00	0.00	3.38	13.95	
CO Emissions (lb/hr)	2.50	3.75	4.50	6.00	6.75	7.50	12.00	15.50	
VOC Emissions (lb/hr)	0.07	0.11	0.13	0.17	0.19	0.21	1.14	3.72	
HCl Emissions (lb/hr)	0.00	0.00	0.00	0.00	0.00	0.00	9.37	1.55	

Data Request 30: Please provide information that characterizes how biomass combustor emission rates and exhaust concentrations vary at load-settings above and below 50 percent. Ideally, this information would show how emission rates and exhaust concentrations would ramp with increasing load from zero to 100 percent.

Response: The lowest load at which each combustor will operate is 50%. The biomass combustor emission rates and exhaust parameters vary with load. Tables DR-30a, 30b and 30c show the vendor provided emission rates and exhaust parameters for the 50%, 75% and 100% load scenarios, respectively. It should be noted that the annual emissions estimates for the 50% and 75% load scenarios are not the total annual emissions anticipated for the SJS 1&2 project, the annual emissions anticipated from the project are presented in Table DR-30c.

Table DR-30a
Combustor Emissions and Stack Parameters for 50% Load Scenario
(One Combustor)

EMISSIONS AT STACK

EPI Reference Number	1587	Performed by:	mlm
Customer	Spinnaker - Steam cycle -004-C	Date:	27-May-09
Project Name	San Juaquin, ca	Revision:	4
50%		Filename:	permit info 5 21 09
emissions per boiler		Page	1a

Flue Gas @ ID Fan Outlet							
	Mass Flow	188,130	lbs/hr		O2	5.48	% vol.(dry)
	Vol. Flow	56,735	acfm	56735	CO2	14.95	% vol.(dry)
	Temp.	230	deg. F		N2	79.56	% vol.(dry)
	Dry MW	30.63	moles/lb		density	0.055	lb/ft3
	Wet MW	27.84	moles/lb				
	Std. Vol.	43,579	scfm		Moisture	14.30	% by wt.
	Std. Dry Vol.	33,944	sdcfm		Moisture	22.11	% by vol.

Flue Gas @ Stack				%of Total
	Mass Flow	188,130	lbs/hr	100.00%
	Vol. Flow	56,735	acfm	100.00%
	Temp.	230	deg. F	
	Std. Vol.	43,579	scfm	100.00%
	Std. Dry Vol.	33,944	sdcfm	100.00%

capacity factor 75.00%

Emissions @ Stack		Potential Unabated Emissions			Abated Emissions @ Stack			
Pollutant	mole. wt.	ppmdv	lbs/hr	lbs/MBtu	ppmdv	lbs/hr	lbs/MBtu	Ton/yr
CO	28.01				40.0	5.90	0.039	19.38
SO2	64.07	115	38.84	0.254	4.3	1.46	0.010	4.79
NOx	46.01	269	65.09	0.425	7.3	1.77	0.012	5.82
HCl	36.47	91	17.48	0.114	3.6	0.70	0.005	2.30
VOC	44.09				3.0	0.70	0.005	2.29
NH3	17.03				*5.0*	0.45	0.003	

Particulate -Front Half Catch

	Potential From FBI	Loading To Cleanup	Abated @ Stack
gr/SDCF	4.44	1.15	0.005
lbs/hr	1,292	333	1.50
lbs/day	31,013	7,996	35.99
tons/yr	4,245	1,094	4.93
lbs/MMBTU	8.437	2.175	0.010

Particulate Back Half Catch - Only

abatement efficier 80.00%	Potential From FBI	Loading To Stack	Abated @ Stack	Total Particulate Abated @ Stack
gr/SDCF	0.035	0.035	0.007	0.012
lbs/hr	10	10	2	3.536
lbs/day	244	244	49	84.875
tons/yr	33	33	7	11.617
lbs/MBTU	0.066	0.066	0.013	0.023

TABLE DR-30B
COMBUSTOR EMISSIONS AND STACK PARAMETERS FOR 75% LOAD SCENARIO (ONE COMBUSTOR)

EMISSIONS AT STACK

EPI Reference Number	1587	Performed by:	mlm
Customer	Spinnaker - Steam cycle -004-C	Date:	28-May-09
Project Name	San Juaquin, ca	Revision:	4
75%		Filename:	permit info 5 21 09
emissions per boiler		Page	1a

Flue Gas @ ID Fan Outlet							
	Mass Flow	294,977	lbs/hr		O2	6.04	% vol.(dry)
	Vol. Flow	89,118	acfm	89118	CO2	14.41	% vol.(dry)
	Temp.	230	deg. F		N2	79.54	% vol.(dry)
	Dry MW	30.57	moles/lb		density	0.055	lb/ft3
	Wet MW	27.79	moles/lb				
	Std. Vol.	68,453	scfm		Moisture	14.32	% by wt.
	Std. Dry Vol.	53,316	sdcfm		Moisture	22.11	% by vol.

Flue Gas @ Stack				%of Total
	Mass Flow	294,977	lbs/hr	100.00%
	Vol. Flow	89,118	acfm	100.00%
	Temp.	230	deg. F	
	Std. Vol.	68,453	scfm	100.00%
	Std. Dry Vol.	53,316	sdcfm	100.00%

capacity factor 75.00%

Emissions @ Stack		Potential Unabated Emissions			Abated Emissions @ Stack			
Pollutant	mole. wt.	ppmdv	lbs/hr	lbs/MBtu	ppmdv	lbs/hr	lbs/MBtu	Ton/yr
CO	28.01				20.0	4.63	0.020	15.22
SO2	64.07	111	58.82	0.254	4.4	2.35	0.010	7.73
NOx	46.01	259	98.57	0.425	7.1	2.71	0.012	8.90
HCl	36.47	88	26.47	0.114	3.5	1.06	0.005	3.48
VOC	44.09				2.0	0.73	0.003	2.40
NH3	17.03				*5.0*	0.70	0.003	

Particulate -Front Half Catch

	Potential From FBI	Loading To Cleanup	Abated @ Stack
gr/SDCF	4.28	1.10	0.005
lbs/hr	1,957	504	2.27
lbs/day	46,963	12,104	54.48
tons/yr	6,428	1,657	7.46
lbs/MMBTU	8.437	2.174	0.010

Particulate Back Half Catch - Only

abatement efficier 60.00%

	Potential From FBI	Loading To Stack	Abated @ Stack
gr/SDCF	0.035	0.035	0.007
lbs/hr	16	16	3
lbs/day	384	384	77
tons/yr	53	53	11
lbs/MBTU	0.069	0.069	0.014

Total Particulate
Abated @ Stack
0.012
5.469
131.263
17.967
0.024

TABLE DR-30C
COMBUSTOR EMISSIONS AND STACK PARAMETERS FOR 100% LOAD SCENARIO (ONE COMBUSTOR)

EMISSIONS AT STACK

EPI Reference Number	1587	Performed by:	mlm
Customer	Spinnaker - Steam cycle -004-C	Date:	27-May-09
Project Name	San Juaquin, Ca	Revision:	5
100%		Filename:	permit info 5 21 09
emissions per boiler		Page	1a

Flue Gas @ ID Fan Outlet							
	Mass Flow	395,963	lbs/hr		O2	6.04	% vol.(dry)
	Vol. Flow	119,784	acfm	119784	CO2	14.41	% vol.(dry)
	Temp.	230	deg. F		N2	79.54	% vol.(dry)
	Dry MW	30.57	moles/lb		density	0.065	lb/ft3
	Wet MW	27.75	moles/lb				
	Std. Vol.	92,008	scfm		Moisture	14.53	% by wt.
	Std. Dry Vol.	71,398	sdcfm		Moisture	22.40	% by vol.

Flue Gas @ Stack				%of Total
	Mass Flow	395,963	lbs/hr	100.00%
	Vol. Flow	119,784	acfm	100.00%
	Temp.	230	deg. F	
	Std. Vol.	92,008	scfm	100.00%
	Std. Dry Vol.	71,398	sdcfm	100.00%

capacity factor 75.00%

Emissions @ Stack		Potential Unabated Emissions			Abated Emissions @ Stack			
Pollutant	mole. wt.	ppmdv	lbs/hr	lbs/MBtu	ppmdv	lbs/hr	lbs/MBtu	Ton/yr
CO	28.01				20.0	6.20	0.020	20.38
SO2	64.07	111	78.77	0.254	5.3	3.74	0.012	12.29
NOx	46.01	259	131.99	0.425	7.1	3.63	0.012	11.92
HCl	36.47	88	35.45	0.114	3.5	1.42	0.005	4.66
VOC	44.09				2.0	0.98	0.003	3.21
NH3	17.03				*5.0*	0.94	0.003	

Particulate -Front Half Catch

	Potential From FBI	Loading To Cleanup	Abated @ Stack
gr/SDCF	4.28	1.10	0.005
lbs/hr	2,620	675	3.04
lbs/day	62,890	16,191	72.87
tons/yr	8,608	2,216	9.97
lbs/MMBTU	8.437	2.172	0.010

Particulate Back Half Catch - Only

abatement efficier 80.00%

	Potential From FBI	Loading To Stack	Abated @ Stack
gr/SDCF	0.035	0.035	0.007
lbs/hr	21	21	4
lbs/day	514	514	103
tons/yr	70	70	14
lbs/MBTU	0.069	0.069	0.014

Total Particulate
Abated @ Stack
0.012
7.321
175.701
24.049
0.024

Data Request 31: Please describe the lowest load (or turndown ratio) for the biomass combustors that would be compliant with the applicant's proposed emission limits.

Response: The lowest load each combustor would operate at is 50%. The proposed emissions associated with the 50% load scenario are presented in Table DR-30a. The annual emissions presented in Table DR-30a are not the annual emission limits requested for the SJS 1&2 project, those are presented in Table DR-30c, the 100% load scenario.

Data Request 36: Please provide the list of cumulative sources to be considered, the cumulative analysis of ambient air quality impacts, and the date when the cumulative impacts analysis will be filed with the Commission.

Response: Table DR-36a presents a list of new sources (constructed after 2005) that were considered for inclusion in the cumulative analysis for CEC. None of the sources outlined in Table DR-36a meet the requirements for inclusion in a cumulative analysis for CEC. The rationale for exclusion for each source is provided in Table DR-26a. Table 36b shows the existing sources (constructed before 2005) at the adjacent Coalinga State Hospital and Pleasant Valley State Prison. None of these sources will be included in the cumulative analysis since these sources have been operating since before 2005 and their emissions would be represented in the background air quality data. Thus no cumulative analysis will be conducted for the SJS 1&2 project.

Table DR-36a
New Sources (constructed after 2005) that were Considered for Cumulative Analysis

Facility	Equipment	Year	Emissions	Reasons to Eliminate from Analysis
Coalinga State Hospital (24511 W Jayne Ave, Coalinga, CA)	One transportable 60 bhp John Deere model 4024TF270A tier 2 diesel-fired IC engine powering an air compressor	2009	NO_x 124 lb/yr, SO_2 5 lb/yr, PM_{10} 8 lb/yr, CO 37 lb/yr, VOC 11 lb/yr	It is transportable engine and the emissions associated with the engine are negligible.
	One transportable 115 bhp John Deere model 4045TF2758.C tier 2 diesel-fired IC engine powering a water pump	2009	NO_x 198 lb/yr, SO_2 9 lb/yr, PM_{10} 10 lb/yr, CO 46 lb/yr, VOC 15 lb/yr	It is transportable engine and the emissions associated with the engine are negligible.

Table DR-36a
New Sources (constructed after 2005) that were Considered for Cumulative Analysis (Continued)

Facility	Equipment	Year	Emissions	Reasons to Eliminate from Analysis
California State Prison – Coalinga (24863 W Jayne Ave, Coalinga, CA)	Coating operation/ spray booth	2007	-	VOC source, thus not included in the cumulative modeling analysis.
	Gasoline dispensing facility	2008	-	VOC source, thus not included in the cumulative modeling analysis.
Concrete Batch Plant (301 Enterprise Parkway) [4.5 mile west of the project site]	-	Possibly 2009	-	This project is under CEQA process. The California Air Resource Board has not approved the project so the CEQA analysis has not been conducted yet. Thus, there are no data to be reviewed or included in the cumulative analysis.

Table DR-36b
Existing Sources (constructed before 2005) at the Coalinga State Hospital and Pleasant Valley State Prison

Facility	Equipment	Emissions from SJVAPCD Permit
Coalinga State Hospital (24511 W Jayne Ave, Coalinga, CA)	Natural Gas Boiler #1, 19.9 MMBtu/hr with diesel fuel as backup	Emissions from this boiler when combusting natural gas shall not exceed any of the following limits: 9 ppmvd NO_x @ 3% O_2 (0.011 lb-NO_x/MMBtu), 0.00285 lb-SOx/MMBtu, 0.0076 lb-PM10/MMBtu, 100 ppmvd CO @ 3% O_2 (0.08 lb-CO/MMBtu), or 0.0055 lb-VOC/MMBtu. Emissions from this boiler when combusting low sulfur diesel fuel shall not exceed any of the following limits: 40 ppmvd NOx @ 3% O_2 (0.05 lb-NOx/MMBtu), 0.053 lb-SOx/MMBtu, 0.015 lb-PM10/MMBtu, 400 ppmvd CO @ 3% O_2 (0.10 lb-CO/MMBtu), or 0.0025 lb-VOC/MMBtu.

Table DR-36b
Existing Sources (constructed before 2005) at the Coalinga State Hospital and Pleasant Valley State Prison
(Continued)

Facility	Equipment	Emissions from SJVAPCD Permit
Coalinga State Hospital (24511 W Jayne Ave, Coalinga, CA) (Continued)	Natural Gas Boiler #2, 19.9 MMBtu/hr with diesel fuel as backup	Emissions from this boiler when combusting natural gas shall not exceed any of the following limits: 9 ppmvd NOx @ 3% O_2 (0.011 lb-NO_x/MMBtu), 0.00285 lb-SOx/MMBtu, 0.0076 lb-PM10/MMBtu, 100 ppmvd CO @ 3% O_2 (0.08 lb-CO/MMBtu), or 0.0055 lb-VOC/MMBtu. Emissions from this boiler when combusting low sulfur diesel fuel shall not exceed any of the following limits: 40 ppmvd NOx @ 3% O_2 (0.05 lb-NOx/MMBtu), 0.053 lb-SOx/MMBtu, 0.015 lb-PM10/MMBtu, 400 ppmvd CO @ 3% O_2 (0.10 lb-CO/MMBtu), or 0.0025 lb-VOC/MMBtu.
	Natural Gas Boiler #3, 19.9 MMBtu/hr with diesel fuel as backup	Emissions from this boiler when combusting natural gas shall not exceed any of the following limits: 9 ppmvd NOx @ 3% O_2 (0.011 lb-NOx/MMBtu), 0.00285 lb-SOx/MMBtu, 0.0076 lb-PM10/MMBtu, 100 ppmvd CO @ 3% O_2 (0.08 lb-CO/MMBtu), or 0.0055 lb-VOC/MMBtu. Emissions from this boiler when combusting low sulfur diesel fuel shall not exceed any of the following limits: 40 ppmvd NOx @ 3% O_2 (0.05 lb-NOx/MMBtu), 0.053 lb-SOx/MMBtu, 0.015 lb-PM10/MMBtu, 400 ppmvd CO @ 3% O_2 (0.10 lb-CO/MMBtu), or 0.0025 lb-VOC/MMBtu.
	2,885 HP Caterpillar model #3516 diesel-fired emergency standby IC engine #1 powering an electrical generator	Emissions from this engine shall not exceed any of the following limits: 6.9 g-NOx/hp-hr, 0.36 g-CO/hp-hr, or 0.13 g-VOC/hp-hr. The PM_{10} emissions rate shall not exceed 0.10 g/hp-hr
	2,885 HP Caterpillar model #3516 diesel-fired emergency standby IC engine #2 powering an electrical generator	Emissions from this engine shall not exceed any of the following limits: 6.9 g-NOx/hp-hr, 0.36 g-CO/hp-hr, or 0.13 g-VOC/hp-hr. The PM_{10} emissions rate shall not exceed 0.10 g/hp-hr
	2,885 HP Caterpillar model #3516 diesel-fired emergency standby IC engine #3 powering an electrical generator	Emissions from this engine shall not exceed any of the following limits: 6.9 g-NOx/hp-hr, 0.36 g-CO/hp-hr, or 0.13 g-VOC/hp-hr. The PM_{10} emissions rate shall not exceed 0.10 g/hp-hr
	2,885 HP Caterpillar model #3516 diesel-fired emergency standby IC engine #4 powering an electrical generator.	Emissions from this engine shall not exceed any of the following limits: 6.9 g-NOx/hp-hr, 0.36 g-CO/hp-hr, or 0.13 g-VOC/hp-hr. The PM_{10} emissions rate shall not exceed 0.10 g/hp-hr.

Table DR-36b
Existing Sources (constructed before 2005) at the Coalinga State Hospital and Pleasant Valley State Prison
(Continued)

Facility	Equipment	Emissions from SJVAPCD Permit
Coalinga State Hospital (24511 W Jayne Ave, Coalinga, CA) (Continued)	Gasoline dispensing operation with one 8,000 gallon underground storage tank.	VOC emissions only.
	Wood, metal parts and products coating and powder coating operation with HVLP spray gun(s), electrostatic applicator, an open face paint spray booth with dry exhaust filters, and an electric bake oven.	VOC emissions only.
California State Prison – Coalinga (24863 W Jayne Ave, Coalinga, CA)	587 BHP Caterpillar model 3406 DITA diesel-fired emergency standby IC engine powering an electrical generator (building 623 - water booster station)	Emissions from the engine shall not exceed of the following limits: 29.8 lb-PM_{10}/day, 28.8 lb-SOx/day, 223.2 lb-NO_x/day, 33.6 lb-CO/day, or 2.4 lb-VOC/day.
	2,847 BHP Caterpillar model 3516 DITA diesel-fired emergency standby IC engine powering an electrical generator (area 600) #1	Emissions from the engine shall not exceed of the following limits: 144.0 lb-PM_{10}/day, 139.9 lb-SO_x/day, 1,219.2 lb-NOx/day, 348.0 lb-CO/day, or 12.5 lb-VOC/day.
	2,847 BHP Caterpillar model 3516 DITA diesel-fired emergency standby IC engine powering an electrical generator (area 600) #2	Emissions from the engine shall not exceed of the following limits: 144.0 lb-PM_{10}/day, 139.9 lb-SO_x/day, 1,219.2 lb-NO_x/day, 348.0 lb-CO/day, or 12.5 lb-VOC/day.
	Woodworking operation #1 including: one table saw, one band saw, one disc and belt sanding station, one radial arm saw, one planer/jointer, one compound miter saw, one shaper, and one drum sander	PM_{10} emissions from the dust collector shall not exceed 0.004 gr/dscf.
	Woodworking operation #2 including: one table saw, one band saw, one disc and belt sanding station, one radial arm saw, one planer/jointer, one compound miter saw, one shaper, and one drum sander	PM_{10} emissions from the dust collector shall not exceed 0.004 gr/dscf.

Table DR-36b
Existing Sources (constructed before 2005) at the Coalinga State Hospital and Pleasant Valley State Prison
(Continued)

Facility	Equipment	Emissions from SJVAPCD Permit
California State Prison – Coalinga (24863 W Jayne Ave, Coalinga, CA) (Continued)	Woodworking operation #3 including: one table saw, one band saw, one disc and belt sanding station, one radial arm saw, one planer/jointer, one compound miter saw, one shaper, and one drum sander	PM_{10} emissions from the dust collector shall not exceed 0.004 gr/dscf.
	Woodworking operation #4 including: one table saw, one band saw, one disc and belt sanding station, one radial arm saw, one planer/jointer, one compound miter saw, one shaper, and one drum sander	PM_{10} emissions from the dust collector shall not exceed 0.004 gr/dscf.
	motor vehicle, mobile equipment, metal parts and products coating operation with hvlp spray gun, paint spray booth with dry exhaust filters, and an enclosed spray gun cleaner (building 527)	VOC emissions only.
	Metal parts and products and wood products coating operation with HVLP spray gun, a paint spray booth with dry exhaust filters, and an enclosed spray gun cleaner (building 551)	VOC emissions only.
	3.0 bhp offset lithographic printing operation (building 521)	VOC emissions only.
	1.5 bhp offset lithographic printing operation including an A.B. dick model 9810xc duplicator #1 (building 521)	VOC emissions only.
	1.5 bhp offset lithographic printing operation (building 521)	VOC emissions only.
	1.5 bhp offset lithographic printing operation (building 521)	VOC emissions only.
	82.6 mmbtu/hr propane system calibration flare used to incinerate the propane/air mixture created during the venturi calibration procedure for the propane system to be used as a backup for the natural gas system	-
	1.5 bhp offset lithographic printing operation (building 521)	VOC emissions only.

Table DR-36b
Existing Sources (constructed before 2005) at the Coalinga State Hospital and Pleasant Valley State Prison
(Continued)

Facility	Equipment	Emissions from SJVAPCD Permit
California State Prison – Coalinga (24863 W Jayne Ave, Coalinga, CA) (Continued)	gasoline dispensing operation with one 10,000 gallon underground storage tank	VOC emissions only.
	5 bhp offset printing press (building 521)	VOC emissions only.
	wood products coating operation with HVLP	VOC emissions only.
	guns, roll coat, brush application equipment, a paint spray booth with dry exhaust filters and spray gun cleaner	VOC emissions only.
	woodworking operation including: one combo sander, one table saw, and one band saw	Negligible particulate emissions
	2.0 bhp offset lithographic printing	VOC emissions only.

San Joaquin Solar 1 & 2 Hybrid Project
Supplemental Information
In Response to CEC Data Request Set #1
08-AFC-12

TECHNICAL AREA: BIOLOGY

Data Request 39: Please provide any supporting documents (letter or record of conversation) that result from communication with USFWS and CDFG regarding potential impacts to state and/or federally protected species. Communication should be focused on:

A. Permits required for the project (*i.e.,* Incidental Take Permits), the steps the applicant has taken, a description of the process (*i.e.,* Section 7 or Section 10), and the schedule for obtaining the permits.

B. Any measures likely to be included in the Incidental Take Permits, including offsite habitat compensation and the contacts for purchase of mitigation credits/acreage.

Response: All records of conversation that have occurred to date have been provided to CEC at this time, and will continue to be provided as they occur. CEC staff is also included in all email correspondence regarding Project related permits and mitigation.

Data Request 42: Please identify any groundwater-dependent plant species or sensitive plant communities in the Pleasant Valley Groundwater Sub-basin.

Response: No plants that are dependent upon groundwater lower than 200 feet below the surface were identified on the SJS 1&2 Project site or within 2,000 feet of the boundary. Also, none have been identified within the Pleasant Valley Groundwater Sub-basin.

Data Request 43: Should such species or plant communities be identified, please provide an analysis of potential impacts and mitigation options for biological resources resulting from groundwater usage in the Pleasant Valley Groundwater Sub-basin.

Response: Groundwater levels vary depending upon the amount of overall pumping and recharge in the groundwater basin. At the time of the SJS 1&2 onsite well testing in February 2009, groundwater depths on and near the site were approximately 321-327 feet below ground surface. With the anticipated pumping rate (680 gpm) for the project, there would be only 10 feet of drawdown within 2,000 feet of the existing onsite well location (southwestern corner of the site). This decrease in water level would cause less than significant impacts to sensitive plants or plant communities in the vicinity of the Project area.

San Joaquin Solar 1 & 2 Hybrid Project
Supplemental Information
In Response to CEC Data Request Set #1
08-AFC-12

TECHNICAL AREA: CULTURAL

Data Request 53: Please provide the depths of the excavations required for the following features and foundations for proposed equipment

Response:

A.	biomass combuster and boiler trains	3.0 Ft.
B.	stream turbine generators	8.0 Ft.
C.	air cooling units	2.0 Ft.
D.	transformers	2.0 Ft.
E.	water treatment piping system	4.0 Ft. *
F.	service water piping system	4.0 Ft. *
G.	fire protection piping system	6.0 Ft.
H.	potable water piping system	4.0 Ft. *
I.	water treatment buildings	2.0 Ft.
J.	treated reclaimed water tank	2.0 Ft.
K.	raw reclaimed water tank	2.0 Ft.
L.	raw well water and fire water tank	2.0 Ft.
M.	demineralized water tanks (4)	2.0 Ft.
N.	potable water tanks (2)	2.0 Ft.
O.	ammonia storage tanks (4)	3.0 Ft.
P.	construction assembly building	2.0 Ft.
Q.	warehouses	2.0 Ft.
R.	biomass unloading buildings	3.0 Ft.
S.	control buildings	2.0 Ft.
T.	solar collector assemblies	6.0 Ft.
U.	stormwater evaporation pond	10.0 Ft. - 12 Ft
V.	stormwater drainage collection system (infiltration basins)	10.0 Ft. - 12 Ft
W.	poles for the on-site 230-kV overhead transmission line	22.0 Ft.
X.	poles for the off-site 230-kV overhead interconnection to the Gates Substation	22.0 Ft.
Y.	off-site reclaimed water pipeline between the plant and the City of Coalinga's future Waste Water Treatment Facility	6.0 Ft.
Z.	off-site steam pipeline between SJS 1 and Coalinga State Hospital	There is no offsite steam line. Offsite hot water line will not be buried

* If buried.

Data Request 54: Please provide a project site plan showing the locations where excavation would exceed three feet below the surface by shading or other such convention.

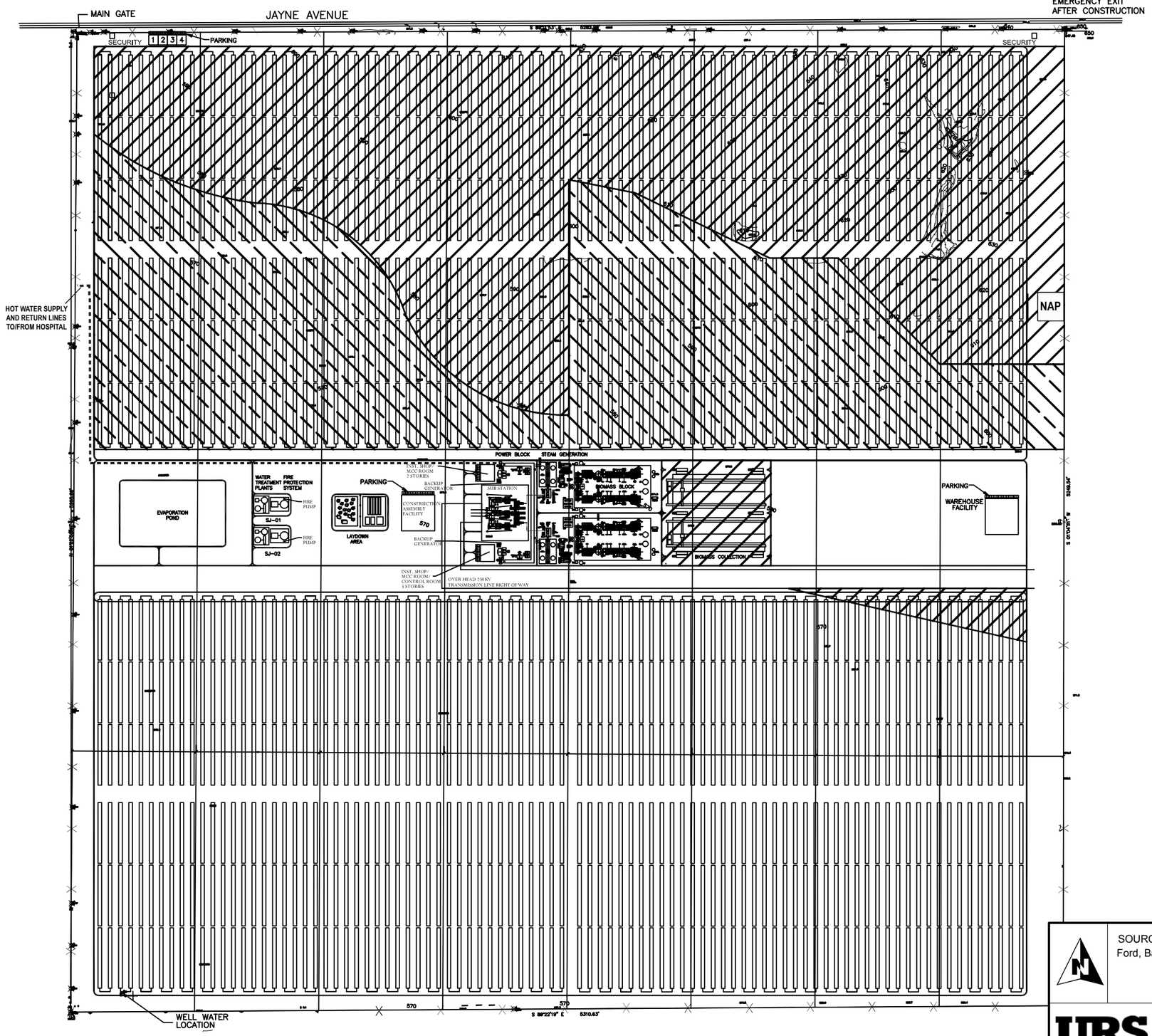
Response: Please see the attached Figure DR-54 (next page), which details the locations where excavation activities would exceed three feet below the surface.

Data Request 55: Please identify the structures in the described location as to function, age, and potential status as historical resources.

Response: The "large, elongated white structures" which appear in the Google Earth imagery are loosely stacked piles of irrigation pipe, which are presently stockpiled in the southwest portion of the southeast corner of the proposed plant site. This stockpile area is used for temporary outdoor storage for some of the irrigation equipment that is used in the nearby fields and farms. The pipes are metal, cylindrical, approximately twenty-feet long, and feature approximately six- to eighteen-inch diameter openings. In addition to the irrigation pipes, there are four cylindrical storage tanks, used primarily for fertilizer storage. The storage tanks sit on graded earth, and do not rest on a foundation, piers, or other type of substructure. Photographs of this area, as it appeared in May 2009, are presented below.

The actual tanks and pipes in the stockpile area to do not appear to be from the historic-period. They appear to be less than 45 years old. They are examples of common, mundane agricultural equipment from the late 20th century which are present throughout agricultural and rural properties in the west and United States. Of note, a review of historic-period aerial photographs from 1957, 1965, 1981, 2002, and 2005 indicates that the southwest portion of the southeast corner of the proposed plant site has not been used consistently for stockpile purposes. Based on these photographs, it appears the stockpiling activities are recent, and that this portion of the proposed plant site has been historically vacant. Beginning in the 1950s, none of the photographs depict similar concentrations or clusters of agricultural or irrigation equipment in this portion of the proposed plant site.

The pipes and storage tanks do not appear to be CRHR- or Fresno County List of Historic Places-eligible or considered historical resources for purposes of CEQA. The pipes and storage tanks do not appear to be visible in the 1965 aerial photograph and, accordingly, are less than 45 years old and do not meet the general age requirements for eligibility. As a property that is less than 50 years old, to be a significant historical resource, the pipes and storage tanks would have to possess *exceptional importance* (per NRHP Criterion Consideration G). However, they are not considered exceptional, since they are not representative of a fragile resource type (where surviving property of any age is unusual) or associated with an extraordinary important event or person. According to the Caltrans and JRP statewide historic context *Water Conveyance Systems in California*, irrigation agriculture has existed in the San Joaquin Valley since the 1860s (peaking between the 1870s and the 1910s). Therefore, irrigation and agricultural activities from the last half of the 20th century would not be representative or associated with these locally significant developments.



LEGEND

BUILDING 1– VISITOR'S CENTER
BUILDING 2– GENERAL OFFICES
BUILDING 3– ADMINISTRATIVE OFFICES
BUILDING 4– TECHNICAL TRAINING BUILDING

FENCE LINE

UTILITY ROAD

NAP — NOT PART OF THIS PROJECT

WELL WATER/ DIESEL ENGINE LOCATION

DIESEL FUEL TANK LOCATION

GREATER THAN 3'–0" CUT

GREATER THAN 3'–0" FILL

SOURCES:
Ford, Bacon, & Davis; 10/24/2008.

PRELIMINARY CUT AND FILL PLAN
SAN JOAQUIN SOLAR 1 & 2

URS

Not to Scale

CREATED BY: JS | DATE: 5-29-09

PM: AR | PROJ. NO: 27658033.00200

FIG. NO: **DR-54**

G:\gis\projects\157\27658031\support\Data_Requests_0509\AllFigDR-54_Cut_Fill_Plan

View to the North

View to the West

PHOTOS OF STRUCTURES IN SE CORNER OF PROJECT SITE

URS	NO SCALE	CREATED BY: JH	DATE: 05-28-09
		PM: AR	PROJ. NO: 27658033.00200

FIG. NO: DR-55

Data Request 56: Please provide copies of any letters received from Fresno County, or from local historical and archaeological societies, or from contacted Native Americans in response to the applicant's inquiries about local cultural resources.

Response:

As part of preparation of the AFC and technical report, URS Corporation Architectural Historian, Mr. Jeremy Hollins contacted the County of Fresno Public Works and Planning Departments and Fresno Historical Society on July 3, 2008 and October 27, 2008 to identify cultural resources within a 1-mile radius around the Project footprint and for a ¼-mile on either side of the transmission line corridors, pursuant to ordinance or recognized by a local historical society or museum. To date, no written responses have been received from the local agency and historical society. Copies of correspondence with the local agency and historical society were included in Confidential Appendix G-3, Cultural Resources.

Additionally, on October 30, 2008, Mr. Bill Morris, of the RC Baker Memorial Museum in Coalinga, visited two of the historic-period properties (MRS-7, MRS-9) with URS Corporation Architectural Historian, Mr. Brian Shaw. Mr. Morris previously worked in the Fresno County oil fields for more than 30 years, and potentially had insight regarding the history and development of APE environs. While Mr. Morris provided insight regarding the operations of the area, he did not identify cultural resources recognized by the RC Baker Memorial Museum. He sent a brief undated memorandum to URS Corporation, which was received on December 10, 2008, that explained the purpose and function of a Trap Setting associated with MRS-9. A copy of the memorandum is presented below.

Lastly, The Native American Heritage Commission (NAHC) was contacted on May 8, 2008 to request a search of the Native American Sacred Lands File (SLF) as an aid in determining the presence of Native American sacred sites within the Project Area. A list of Native American contacts that may have knowledge of known cultural resources or sacred sites within the Project Area was also requested. The NAHC responded on May 12, 2008 and indicated a records search of the SLF failed to indicate the presence of Native American cultural resources in the immediate Project Area. Each Native American contact on the list was sent a notification of the proposed undertaking by mail on June 17, 2008, with a request that they respond with information regarding any known cultural resources or sacred sites within the Project Area. Follow-up phone calls were made on June 30 and July 2, 2008. To date, no written responses have been received regarding the Project.

Bill, here are those pictures. Hopefully you can see them.
R.C. Baker Museum
Coalinga, Ca.

The photos are the Poluadero Unit trap setting. This is where the liquid and gas come from each well and is separated in the large vessels. The Oil and water go out the bottom the gas out the top. the gas was sent to the compressor plant where it was pressured up and pumped back into the wells. (Compressor Plant was east of Traps) the liquid was sent to a wash Tank where the water went off the bottom and the oil off the top. the compressor plant was shut down in 1969. The last well 5-51H stopped producting in 2002 I think.

Bill Morris

Union Oil operated Field from 1955 until 1996.

Data Request 57: Please provide a copy of the project's geotechnical study when it is available.

Response: A copy of the project's geotechnical study is presented in Appendix A.

Data Request 58: Please provide a map showing the detailed routes of the reclaimed water pipeline to the water treatment facility and of the steam pipeline to the hospital, including the routes within the plant boundaries and the site plan.

Response: Heat transfer to the hospital will be achieved by a pipeline of hot condensate from SJS 1 to an exchanger located near the project's western border. Please see Figure DR-54 for the condensate pipeline route. Recycled water from the city's waste water treatment plant (WWTP) will enter the project site in the southwestern corner. Please see Figure DR-58 (next page), which details the route of the reclaimed water pipeline to the water treatment facility.

Data Request 59: If the reclaimed water pipeline route and the steam pipeline route have not been surveyed for cultural resources, please have a qualified archaeologist survey these routes and record on Department of Parks and Recreation (DPR) 523 forms any cultural resources that are identified.

Response: As part of preparation of the AFC and technical report, the route of the water and condensate pipelines within the proposed plant site boundaries were surveyed for cultural resources and reported in accordance with the CEC Rules of Practice and Procedure and Power Plant Site Regulations Revisions, Appendix B (g)(2). The route of the reclaimed water pipeline outside of the proposed plant site's boundaries will be surveyed for cultural resources and results will be submitted to the CEC by July15, 2009.

OVERVIEW MAP

LEGEND

- San Joaquin Solar 1 & 2
- City of Coalinga Waste Water Treatment Facility
- Proposed Waste Water Pipeline

W Jayne Ave

S Alpine Ave

W Firestone Ave

W Jayne Ave

S El Dorado Ave

San Joaquin Solar 1 & 2

S Sutter Ave

W Cohn Ave

Alpine Ave

W Lost Hills Rd

SOURCES:
USDA FSA Aerial Photography Field Office (aerial 2005); CNDDB (Mar. 2008); ESRI (roads).

PROPOSED WASTE WATER PIPELINE ROUTE
SAN JOAQUIN SOLAR 1 & 2

URS

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SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: JS	DATE: 5-29-09	FIG. NO:
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Data Request 60: Please submit to staff a report, under confidential cover, on the methods and results of these surveys, with recommendations for the treatment of any cultural resources identified in the surveys, and copies of any completed DPR 523 forms.

Response: The methodology and results of the cultural resources surveys for the water and compensate pipelines within the proposed plant site boundaries were previously addressed within Sections 6.1 and 6.2 of the *Cultural Resources Assessment Report for the San Joaquin Solar Hybrid Power Station, Fresno County, California* as part of the archaeological and historic architecture field survey methodologies and results. The methodology and results for the water and steam pipelines outside of the proposed plant side boundaries will be addressed and submitted to the CEC by July 15, 2009.

Data Request 61: Please describe the process that is proposed for constructing the underground transmission line under I-5, with an emphasis on ground disturbance and provide the horizontal and vertical dimensions of the disturbed area.

Response: There would be no tunneling or ground disturbance associated with constructing the transmission line near Interstate-5. The transmission line would be constructed using "aerial freeway crossing," which means that the transmission line will be suspended above the ground, and no tunneling would be required for the area near Interstate-5.

Data Request 62: Please provide a scaled plan figure and a scaled profile figure that shows the area that would be subject to ground disturbance from the construction of the underground transmission line.

Response: There would be no ground disturbance associated with the construction of the transmission line and, therefore, a scaled figure and profile were not prepared.

Data Request 63: Please clarify whether the cultural resources survey already completed in support of the AFC covered the entire area that the transmission line tunneling would affect. If it did not, please have a qualified archaeologist survey the additional area and record on Department of Parks and Recreation (DPR) 523 forms any cultural resources that are identified; and

Response: The cultural resources surveys completed as part of the AFC and technical report included all areas that may involve any type of ground disturbance associated with the transmission lines (e.g., pole locations). As detailed in Section 1.1 of *Cultural Resources Assessment Report for the San Joaquin Solar Hybrid Power Station, Fresno County, California*, the cultural resources surveys for the two transmission line corridors (i.e., the northern and southern route) had an archaeological area of potential effect (or survey area) that extended 50' on either side of the 100' wide transmission line corridor right-of-way. Therefore, the archaeological survey areas for the transmission line corridors encompassed an area 200' feet wide, which included all areas that may involve any type of ground disturbance associated with the transmission lines.

Data Request 64: Please submit to staff a report, under confidential cover, on the methods and results of this additional survey, with recommendations for the treatment of any cultural resources identified in the survey, and copies of any completed DPR 523 forms.

Response: The cultural resources surveys completed as part of the AFC and technical report included all areas that may involve any type of ground disturbance associated with the transmission lines and, accordingly, additional surveys did not occur.

Data Request 65: Please indicate whether the proposed project may use any non-licensed, non-commercial soil borrow or disposal sites.

Response: There would be no non-licensed, non-commercial soil borrow or disposal sites used as part of the project. The soil used for cut and fill activities will be balanced, and no soil borrow or disposal sites will be required.

Data Request 66: Please obtain the services of a professional in geoarchaeology: a person who, at a minimum, meets the U.S. Secretary of the Interior's Professional Qualifications Standards for archaeology and is able to demonstrate the completion of graduate-level coursework in geoarchaeology or Quaternary science, or has a level of experience that staff determines is equivalent. Please submit the resume of the proposed geoarchaeologist for staff review and approval.

Response: Mr. Jay Rehor (M.A., RPA) researched and conducted the geoarchaeological analysis for the project. Mr. Rehor's resume was previously included as part of Appendix G-1 of the *Cultural Resources Assessment Report for the San Joaquin Solar Hybrid Power Station, Fresno County, California*. Additionally, Mr. Rehor was previously approved as a qualified geoarchaeologist by the CEC as part of the March 2009, CEC/BLM Data Requests for the Solar II Project.

Data Request 67: Please have the approved geoarchaeologist provide a discussion, based on the available Quaternary science and geoarchaeological literature, of the historical geomorphology of the proposed plant site and the tunneling location proposed for the undergrounding of the transmission line beneath I-5. The discussion should describe the development of the landforms on which the plant site and tunneling location are proposed, with a focus on the character of the depositional regime of each landform since the Late Pleistocene epoch. The discussion should include data on the geomorphology, sedimentology, pedology, hydrology, and stratigraphy of the plant site and tunneling location, and the near vicinity. The discussion should relate landform development to the potential at the plant site and the tunneling location for buried archaeological deposits. The discussion should include maps overlaying the above data on the plant site and tunneling location.

Response: Background and Purpose

The purpose of the following discussion is to identify those portions of the project area that have the potential for containing buried archaeological deposits with no surface manifestation. Although no archaeological resources were identified in the proposed project area during the cultural resources survey, given the subsurface impacts of the project (*i.e.*, foundations, utilities, etc.) and the depositional environment in which the project is located, there is a possibility of encountering subsurface deposits with archaeological sensitivity. The purpose of this geoarchaeological study is to assess that potential– and identify specific areas within the project area that have geoarchaeological sensitivity– based on the existing geological, geomorphological, and archaeological literature and data.

The problem of buried archaeological sites within the San Joaquin Valley and, more generally, the Central Valley as a whole, was recently adeptly summarized as such:

> [T]he Central Valley's archaeological record, as we know it today, is biased by natural processes of landscape evolution. Surface sites are embedded in young sediments set within a massive and dynamic alluvial basin, while most older archaeological deposits have been obliterated or buried by ongoing alluvial processes. Consequently archaeologists have had to struggle to identify and explain culture change in portions of the Central Valley where available evidence spans only the past 2,500 years or in rare cases 5,500 years. (Rosenthal, White, and Sutton 2007:150)

While the assumption that surface sites exist only in younger sediments is not necessarily accurate (as we will see) the general problem of site visibility, in a region that has been geomorphically dynamic over the past 13,500 years– roughly the period of human occupation in California– is highly relevant to the project area.

Geomorphic processes have played a major role in the differential preservation of archaeological sites in the San Joaquin Valley. Paleo-Indian sites (ca. 13,500

– 10,500 before present [B.P.]) and Lower Archaic sites (ca. 10,500 – 7,500 B.P.) are extremely rare throughout the Central Valley (including the more northerly Sacramento Valley). These early sites are typified by sparse lithic remains, often around the edges of late Pleistocene–early Holocene lakes, including nearby Tulare Lake. The end of each of these periods was marked by significant episodes of deposition (at ca. 11,000 and 7,500 B.P.) which covered and/or eroded the existing landforms (Rosenthal, White, and Sutton 2007). Studies throughout Northern California suggest that a period of relative landscape stability was followed by another episode of deposition ca. 2,500 B.P. However, there are also indications that late Holocene landscape changes tend to be more localized, dependent upon local variability in climate and precipitation, than the more regional depositional trends documented for the earlier Holocene and Pleistocene (Meyer and Rosenthal 2007:7-8). Geomorphic studies within the Coalinga area have documented this more localized timing of mid- to late-Holocene depositional events (Rymer and Elsworth 1990; Meyer and Rosenthal 2009); these studies are discussed below.

Geomorphic Setting

The San Joaquin Solar 1 & 2 project (Project) area is located on the western edge of the central San Joaquin Valley. The area is a transitional zone between the deep alluvial plain of the valley and the uplifted Coast Range. This geomorphic contact is a geologically and seismically active area. This activity has had a direct effect on surface geomorphology, deposition, and soils.

The San Joaquin Valley is a deep structural trough that was a large marine embayment (*i.e.*, open to the ocean) during much of its geologic history. The trough became progressively closed off during Pliocene times (ca. 5 MYA) due to uplift and movement along the San Andreas Fault zone, causing a transition from a marine to terrestrial depositional environment. This continued until the Pleistocene, when the valley was finally completely closed off from its outlet through Priest Valley (near Coalinga) and alluvial fan deposits (the Tulare Formation, see below) completed the infilling of the valley. Episodic alluvial sedimentation in the San Joaquin Valley throughout the Quaternary probably has been controlled more by climatic fluctuations than by tectonic activity, though both have played a role (Bartow 1990:7-9).

Tectonic influence on the landscape is evident even within the Project area. The Guijarral Hills, bounding the Project area to the northeast, represent the most southerly surface expression of the Coalinga Anticline (Figure 1) – a large structural feature associated with faulting and folding along the eastern margin of the Coast Ranges. The Coalinga Anticline is oriented northwest-southeast, consisting of the larger Anticline Ridge and the Guijarral Hills to the south, where the anticline dips subsurface. The Guijarral Hills, as with other portions of the Coalinga Anticline and the Kettleman Hills Anticline, are part of the Tulare Formation. The formation has been described as Pliocene to Pleistocene (2 to 0.5 MYA) primarily terrestrial deposits over 1000 feet thick. The oldest portions of the formation are exposed along the ridge of the Kettleman Hills, with the more recent (*i.e.* Pleistocene) unconsolidated deposits flanking the western and eastern edges of the hills.

The Guijarral Hills are separated from the remainder of the Coalinga Anticline by Los Gatos Creek, which has incised and buried the structural feature with recent

alluvium. Zapato Chino Creek passes over the anticline through Polvadero Gap, just southeast of the project area. These two intermittent watercourses join east of the anticline and their maximum combined floodwaters disperse on the valley floor near Huron (approximately 8 miles northeast of the Project area; USDA 1952).

The Coast Ranges flank the west side of the San Joaquin Valley, several miles west of the project area. They form a natural barrier to coastal moisture and winds, creating a rain shadow on the eastern side of the range that encompasses the current project area. Because of the arid nature of this portion of the Coast Range–Great Valley interface, only a handful of intermittent creeks drain the nearby slopes, including Zapato Chino (which crosses to the southeast of the project area) and Los Gatos (several miles north of the project area). These small intermittent drainages have apparently maintained a low but fluctuating discharge for much of the Late Pleistocene and Holocene, gradually building a series of large gently sloping alluvial fans (USDA 1952:3-5).

This semiarid to arid environment has had a direct effect on the formation of the local geomorphology as well as, likely, on the local archaeological record. Without a steady year-round water source, it is unlikely that any significant long-term settlements are present within the project area. If buried archaeological sites are present within the project vicinity, they will probably be representative of seasonal winter camps, when the vast majority of the annual average 6 inches of rainfall occurs (Rantz 1969). The pollen record from nearby Tulare Lake indicates several periods of cooler wetter climate, particularly during the early Holocene and again between 4,000–2,000 B.P. (Davis 1999). While more water would have been available throughout the southern San Joaquin Valley during these periods (as much as a 100% increase during the early Holocene; Davis 1999:255), the rain shadow effect would still have minimized the suitability of the Project area for year-round habitation.

Throughout the late Pleistocene and Holocene, several large lakes occupied the southern San Joaquin Valley. The largest of these lakes was Tulare Lake. The Tulare Basin is dammed by the coalescent alluvial fans of the Kings River, draining the Sierra Nevada and feeding the basin, and Los Gatos Creek, draining the Coast Ranges and feeding the San Joaquin River aquifer (draining to the north into the Delta). The lake declined rapidly after 1850, when the Kings River (and other tributary streams) began to be diverted for irrigation. At its maximum historic extent, Tulare Lake covered an area of approximately 2,000 square kilometers and had a maximum depth of 10 meters (Davis 1999). The Holocene lakes (Tulare, Buena Vista, etc.) and their shorelines would have provided a rich and diversified ecosystem for prehistoric peoples. However, even at its maximal Holocene extent, Tulare Lake was over 20 km southeast of the current Project area and, thus, likely did not significantly influence permanent settlement directly within the Project area.

Project Area Soils and Geoarchaeology

Four dominant soil series are present in the proposed Project area and transmission line corridor: Kettleman, Lost Hills, Levis (Lethent), and Panoche (see Figure 1). The Kettleman series consists of moderately deep well drained soils on hills and uplands, with very well-developed cambic (Bw) and calcic (Bk) horizons with distinct carbonate threads (Soil Survey Staff 2009). Within the

Project vicinity, Kettleman soils are formed on the pedimented Coalinga (Guijarral Hills) and Kettleman Hills anticlines. These are actually soils developed in place on poorly consolidated, uplifted, and deformed terrestrial sediments of the Tulare Formation which date to the late Pleistocene and Pleiocene (ca. 0.5 to 2 million years old; Lettis 1982; Stein and King 1984). Given the erosional nature of the anticline pediment and the very old age of the Kettleman soils, there is no potential for buried archaeological deposits (without surface manifestation) within this portion of the Project area (Figure 1).
The Lost Hills soil series consist of soils developed on very old alluvial fan remnants (EPA 1946:24). Within the Project vicinity, these alluvial remnants are generally exposed along the eastern margin of the uplifted anticlines and the base of the Coast Ranges (to the west), and inset and/or mantled by younger alluvial fan deposits. The Lost Hills soils have been dated to the early to middle Pleistocene (Meyer and Rosenthal 2009, Meyer 2009). The age of the Lost Hill soil series indicates that there is no potential for buried archaeological deposits (without surface manifestation) within those portions of the Project area (Figure 1).

The Levis soil series– renamed “Lethent” more recently– consists of very deep, moderately well drained soils on low-lying alluvial fans, fan remnants, basins and basin rims (Soil Survey Staff 2009). The soils are typified by well-developed calcic horizons with pedogenic clay, gypsum, and sodium accumulations (Btkny). Within the Project area, these soils are exposed on the western side of the Coalinga Anticline, at the base of the Guijarral Hills. Given the gradient of the anticline at nearby Los Gatos Creek (Figure 3) and, presumably, Zapato Chino Creek, Levis soils likely represent the pooling of fine alluvial sediments behind the anticline apex. Such a depositional environment would be ideal for burial of paleosols. Originally it was thought that these soils were similar in age to the Panhill soil series (see below; USDA 1952:20), however, Lethent/Levis soils have been recently dated within the Coalinga area to between approximately 14,000 and 13,500 years before present (*i.e.*, latest Pleistocene; Meyer and Rosenthal 2009, Meyer 2009). These dates are consistent and/or slightly older than the earliest accepted dates for human occupation of western North America and, as such, suggest that there is little to no potential for buried archaeological deposits (without surface manifestation) within those portions of the Project area (Figure 1).

The Panoche soil series– and related Panhill series– consists of very deep, well drained soils on recent alluvial fans and flood plains (Soil Survey Staff 2009). The soils are generally less well-developed than other soils in the project area, with a weak blocky structure and less well defined subsurface horizons. Within the Project area, these soils are found as fan and levee/overbank deposits within the Pleasant Valley Syncline (to the west) and as fan deposits to the east of the Coalinga Anticline. The contour lines on Figure 2 indicate that there may be a low natural levee formed along Zapato Chino Creek on the west side of the anticline; suggesting that surface sediments in this area are likely fine overbank deposits (silty clays and clay loams; Figure 2) that are conducive to the burial and preservation of paleosols. To the east of the anticline, sediments are deposited as a fan, merging with the much larger Los Gatos Creek Fan. There is a large meander in Zapato Chino Creek near the anticline apex. In this area, there appears to be several small remnants of paleo-channels which have gotten in-filled to the west and covered by more recent Panoche series soils (Figures 1

and 2). These possible paleo-channel features would indicate that Zapato Chino Creek has migrated northward during the period of deposition of the sediments that Panoche soils are formed on. The Panoche series soils represent the youngest soils in the Project area, having been dated to less than 2000 years B.P. (Atwater *et al*., 1990, Meyer and Rosenthal 2009, Meyer 2009).

Areas mapped as Panoche soils along Los Gatos Creek, north of the Project area (Figures 1and 2), were studied in depth after the 1983 Coalinga Earthquake (Atwater *et al*., 1990). Multiple buried soils were identified in the stream cuts of Los Gatos Creek, some of which extend to over 10 meters below surface (Figure 3). Many of these buried surfaces were associated with a distinct red layer of burned sediments and charcoal which the authors attributed to both natural fires and those intentionally set by prehistoric people (Atwater *et al*., 1990:273-4). Over 70 ^{14}C dates were obtained from these charcoal deposits. Based on this extensive dating effort at least four major periods of geomorphic stability (with associated paleosols) were identified at approximately 1,000, 2,000, 2,500, and 5,750 cal. years B.P. (Atwater *et al*., 1990:292). Depending on the location along the stream gradient, these buried surfaces were found from 1 meter to over 10 meters below surface.

In addition to the buried surfaces, the authors identified at least two distinct buried cultural deposits in the bank of Los Gatos Creek, in areas mapped as Panoche surface soils. One chert flake was found in a burned silt lense, believed to be a hearth feature, approximately 2 meters below surface (see Figures 2 and 3; Atwater *et al.,* 1990:284-290). Approximately 700 meters east of this buried feature, a second larger buried cultural deposit was recorded at approximately 7 meters below surface. This burned layer contained midden consisting of numerous chert flakes, faunal bone fragments, and marine bivalve shells, dated to 5,300 cal. years B.P. (approximately 4,600 ^{14}C years B.P.). This cultural deposit likely represents an early Middle Archaic site, which is a very poorly represented period in the archaeological record of the Central Valley (Rosenthal, White, and Sutton 2007:153).

Given its smaller size and the lower sediment load carried by Zapato Chino Creek, it is likely that any paleosols buried below the Panoche soils near the Project area are separated by less sediment (*i.e.*, less depth) and/or fewer in number than those observed in the Los Gatos Creek cutbanks.

Interestingly, the one prehistoric archaeological site identified within the one-mile project search radius (P-10-80) sits on a small remnant area of Levis/Lethent alluvium (Figure 1). The site was recorded in 1950, and reported simply as a "habitation site," and apparently never studied or assigned to a period of occupation. While it is highly doubtful that the site is as old as the Levis deposit (*i.e.*, latest Pleistocene), it does indicate that sites are present on remnant landforms in the Project vicinity, and that they *may* be buried under the younger Panoche alluvium where it has mantled and preserved those older landsurfaces.

Table 1
Geoarchaeological Sensitivity of Major Soil Series
Mapped within the San Joaquin Solar Project Area

Mapped Soil Series	Geoarchaeological Sensitivity
Kettleman	None
Lost Hills	None
Levis	None to Very Low
Panoche/Panhill	Moderate to High (depending on proximity to watercourse)

Conclusions

The vast majority of the 640 acre section for the proposed San Joaquin Solar Project is composed of Kettleman and Levis alluvial sediments that are too old to contain buried archaeological materials. The exception is the Panoche series soils that have been mapped within the southeast quarter-section (Section 3, Township 21 South, Range 16 East). Within the Project vicinity, these soils have been consistently dated to younger than 2000 years B.P., with multiple buried paleosols documented at depth. Along Los Gatos Creek, north of the Project area, these buried soils appear to correspond to at least four major periods of geomorphic stability at approximately 1,000, 2,000, 2,500, and 5,750 cal. years B.P. (Atwater *et al*., 1990:292). Depth to paleosols varied across the stream gradient between 1 and 10 meters below surface. It is likely that depth to these paleosols (if present) in the project area will be slightly less, given the smaller sediment load of Zapato Chino Creek. Based on current Project plans (see Data Responses 53 and 54), it appears that the only planned facilities within the area mapped as Panoche soils are the Solar Collector Assemblies. As such, the chance of encountering buried soils and associated archaeological deposits within this southeast quarter of the Project area is reduced by the fact that associated impacts will not exceed 6 feet below surface (approximately 1.8 meters).

With regards to the transmission line options, impacts greater than one meter appear to be limited to the auguring/excavation of post holes for the overhead transmission poles (see Data Responses 53 and 54) which will be set up to 22 feet below surface (approximately 6.7 meters). While the proposed depth is significant enough to potentially encounter multiple paleosols, the relatively small size of each hole reduces the chance of encountering cultural deposits (compared to, for example, a continuous trench for underground utilities).

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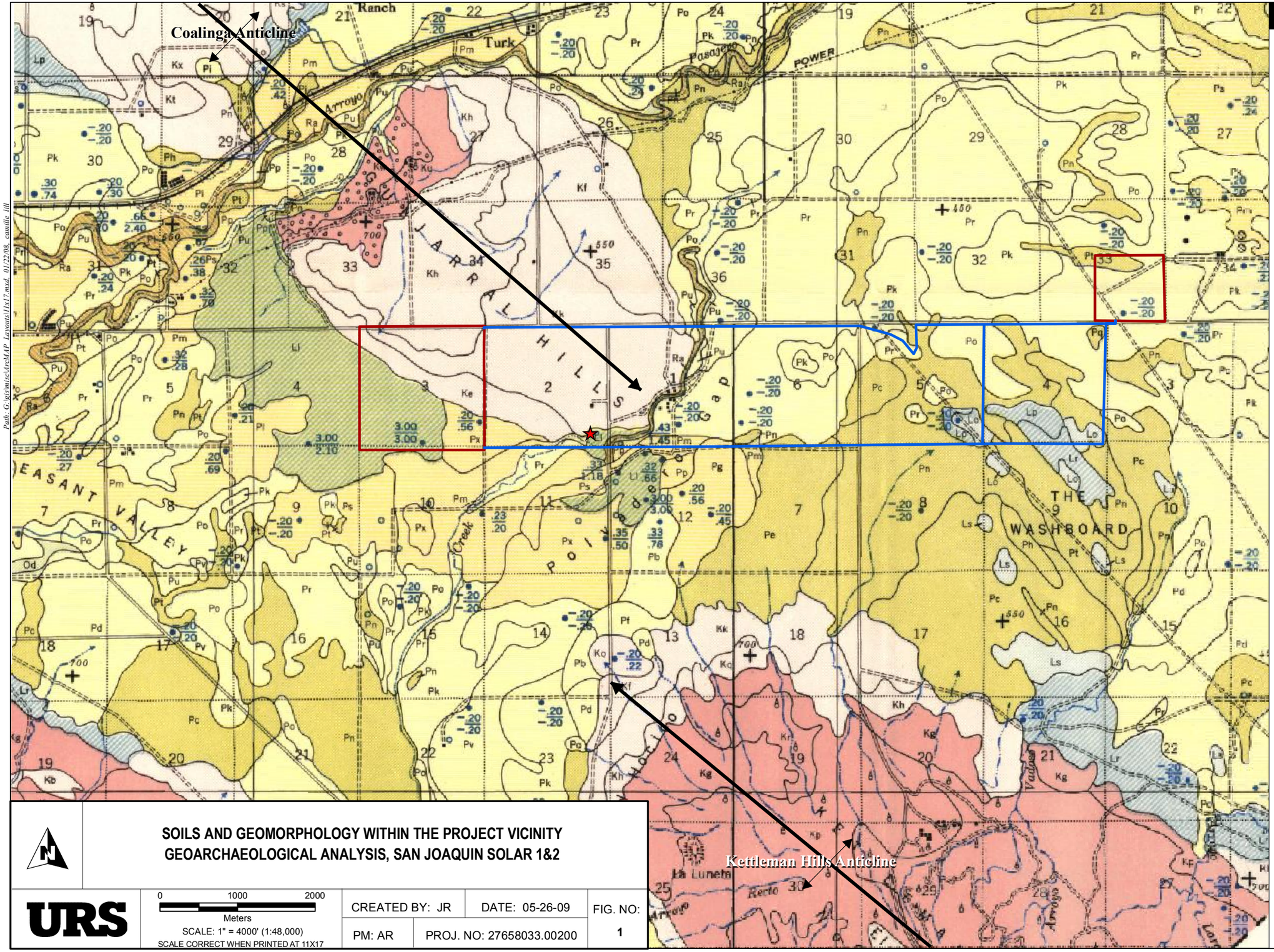

LEGEND

SOIL SERIES

KETTLEMAN

Kg - Kettleman fine sandy loam - hilly, eroded (15-30 percent slope)
Kp - Kettleman loam - hilly, eroded (15-30 percent slope)
Kr - Kettleman loam - steep, eroded (30+ percent slope)
Ku - Ketleman sandy loam - hilly, eroded (15-30 percent slope)
Kw - Kettleman sandle loam - steep, eroded (30+ percent slope)

Kb - clay loam - rolling (7-15 percent slope)
Ke - fine sandy loam - genly sloping (3-7 percent slope)
Kf - fine sandy loam - gently undulating (1-3 percent slope)
Kh - fine sandy loam - rolling (7-15 percent slope)
Kk - fine sandy loam - undulating (3-7 percent slope)
Ko - loam - gently undulating (1-3 percent slope)
Kq - loam - rolling (7-15 percent slope)
Ks - loam - undulating (3-7 percent slope)
Kt - sandy loam - genly undulating (1-3 percent slope)
Kv - sandy loam - rolling (7-15 percent slope)
Kx - sandy loam - undulating (3-7 percent slope)

LOST HILLS

Lp - fine sandy loam - genly undulating (1-3 percent slope)
Lr- fine sandy loam - undulating (3-7 percent slope)

Lo - caly loam - very genly sloping (0-3 percent slope)
Ls - fine sandy loam - very genly sloping (0-3 percent slope)

LEVIS

Ll - silty clay - nearly level, strong alkali (0-1 percent slope)

PANOCHE

Pn - fine sandy loam - genly undulating (1-3 percent slope)
Pq - loam - genly undulating (1-3 percent slope)
Pt - sandy loam - genly undulating (1-3 percent slope)

Pk - clay loam - very genly sloping (0-3 percent slope)
Po - fine sandy loam - very genly sloping (0-3 percent slope)
Pr - loam - very genly sloping (0-3 percent slope)
Pu - sandy loam - very genly sloping (0-3 percent slope)
Pv - silty clay - very genly sloping (0-3 percent slope)

Pl - clay loam - very genly sloping, moderate alkali (0-3 percent slope)
Pm - clay loam - very genly sloping, slight alkali (0-3 percent slope)
Pp - fine sandy loam - very genly sloping, slight alkali (0-3 percent slope)
Ps - loam - very genly sloping, spotted alkali (0-3 percent slope)
Px - silty clay - very genly sloping, slight alkali (0-3 percent slope)

PANHILL

Pc - fine sandy loam - genly undulating (1-3 percent slope)
Pe - loam - genly undulating (1-3 percent slope)
Ph - sandy loam - genly undulating (1-3 percent slope)
Pn - fine sandy loam - genly undulating (1-3 percent slope)

Pb - clay loam - very genly sloping (0-3 percent slope)
Pd - fine sandy loam - very genly sloping (0-3 percent slope)
Pf - loam - very genly sloping (0-3 percent slope)

Pg - loam - very genly sloping, slight alkali (0-3 percent slope)

RIVERWASH

OTHER FEATURES

Approximate location of CA-FRe-80
T-line alternatives (linear APE)
Project boundary and existing transfer station

SOILS AND GEOMORPHOLOGY WITHIN THE PROJECT VICINITY
GEOARCHAEOLOGICAL ANALYSIS, SAN JOAQUIN SOLAR 1&2

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SOURCES: F.F. Harradine, et al. (1944) *Soil map: Coalinga area, California*. U.S. Department of Agriculture.

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Coalinga Anticline

Approximate location of ethnographic village Oudjiu (CA-FRe-49)

Approximate location of buried hearth feature and chert flake (Atwater et al. 1990)

Approximate location of buried midden deposit (Atwater et al. 1990)

Alluvial fan of Los Gatos Creek

Possible paleo-channel remnant features

Natural levee features

Kettleman Hills Anticline

GEOMORPHOLOGICAL FEATURES AND STUDIES WITHIN THE PROJECT VICINITY
GEOARCHAEOLOGICAL ANALYSIS, SAN JOAQUIN SOLAR 1&2

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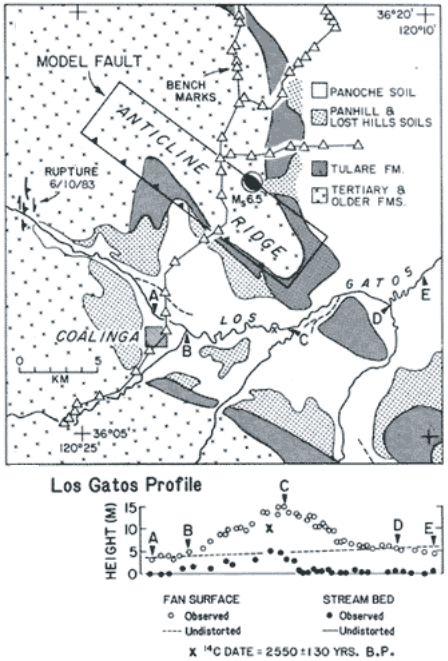
LEGEND

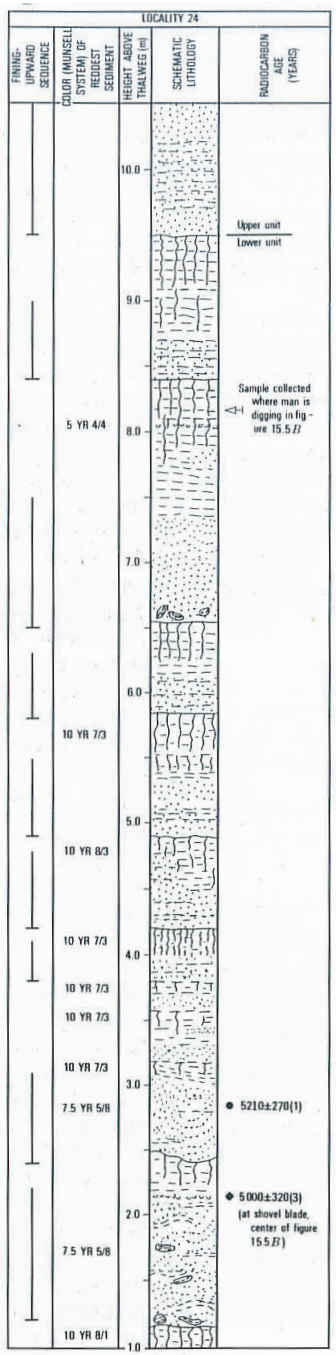
- Approximate area of Atwater et al. (1990) study
- Approximate location of CA-FRe-80
- T-line alternatives (linear APE)
- Project boundary (solar facility and existing transfer station)

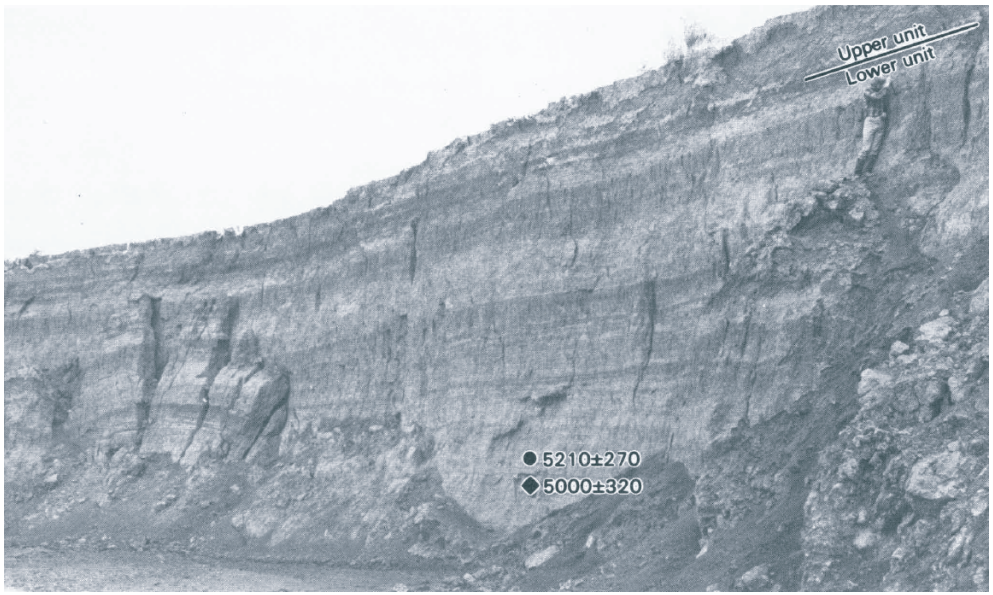
SOURCES: USGS Avenal, Coalinga, Guijarral Hills, Huron, Kreyenhagen Hills, and La Cima 7.5' quadrangles, 1:24,000; Atwater et al. (1990)

A.



B.





(A) Coalinga vicinity geologic setting and profile cross-section across Los Gatos Creek; (B) photo of Los Gatos Creek stream-cut showing paleosols (chert flake and hearth feature identified near man in upper right-hand corner) and generalized profile drawing of location in photo. (from Atwater et al. 1990).

GEOMORPHOLOGY AND PALEOSOL FORMATION
ALONG LOS GATOS CREEK
GEOARCHAEOLOGICAL ANALYSIS, SAN JOAQUIN SOLAR 1&2

URS	Not to Scale	CREATED BY: JR	DATE: 05-26-09	FIG. NO: 3
		PM: AR	PROJ. NO: 27658033.00200	

SOURCES: Atwater et al. (1990) Alluvial Plains and Earthquake Recurrence at the Coalinga Anticline. In *The Coalinga Earthquakeof May 2, 1983,* edited by Michael Rymer and William Ellsworth, pp. 273-297. U.S. Geological Survey Professional Paper 1487.

Data Request 68: In the absence of sufficient extant Quaternary science and/or geoarchaeological literature pertinent to the reconstruction of the historical geomorphology of the project area, please have the approved geoarchaeologist design a primary geoarchaeological field study of the plant site and tunneling location, submit a research plan for staff approval, and conduct the approved research. The purpose of the study is to facilitate staff's assessment of the likelihood of the presence of archaeological deposits buried deeper than 3 feet on the plant site and tunneling location.

Response: Sufficient extant Quaternary science and geoarchaeological literature pertinent to the reconstruction of the historical geomorphology of the project area are presented in Data Response #67 and, therefore, a primary geoarchaeological field study and research plan is not required.

Data Request 69: Please have the approved geoarchaeologist prepare a report of the primary field study and submit it to staff under confidential cover.

Response: A report of the primary field study is not necessary due to sufficient extant Quaternary science and geoarchaeological literature pertinent to the reconstruction of the historical geomorphology of the project area.

Data Request 70: Please have a qualified historical archaeologist and a qualified architectural historian collaborate on recording this site on Department of Parks and Recreation (DPR) 523 forms and on conducting historical research to establish a historic context as the basis for a determination of the resources eligibility or non-eligibility for the CRHR.

Response: DPR 523 forms have been prepared and submitted under separate confidential cover.

Data Request 71: Please provide to staff, under confidential cover (because this is a potential historical archaeological site), completed DPR 523 forms for this resource, with recommendations on its CRHR eligibility, as both a historic-period archaeological site and as a historic property, and recommendations for appropriate mitigation for its destruction.

Response: DPR 523 forms have been prepared and submitted under separate confidential cover.

TECHNICAL AREA: HAZARDOUS MATERIAL HANDLING

Data Request 76: Please identify a contractor who will be used to contain and clean-up hazardous materials spills that might occur at the project.

Response: The project has identified several emergency spill response contractors that would be available to respond to a hazardous material spill at the project site. These contractors include:

- Double Barrel Environmental Services (12420A Jomani Drive, Bakersfield, 661-587-5000),
- PARC Environmental (2706 South Railroad Avenue, Fresno, 559-233-4284),
- Bowen Engineering (4664 S Cedar Avenue, Fresno, 559-233-7464), and
- Eagle SWS (Visalia, 886-465-9829).

These companies and others will be evaluated and a spill response contractor will be in place prior to construction of the proposed project.

TECHNICAL AREA: NOISE

Data Request 77: Please conduct 25-hour ambient noise surveys at noise monitoring locations ST6, ST7, SR1, H2, and P1 as identified in the AFC. These surveys should be conducted during calm weather conditions.

Please provide the resultant noise levels in terms of L_{eq}, L_{min}, L_{max}, $L_{10,}$ L_{50}, and L_{90}.

Response: During a field survey performed from May 13th through May 15th, 2009, the Applicant conducted long-term noise monitoring during periods of calm weather conditions at the following locations:

"SR1" – A currently unoccupied residence known as 23436 W. Jayne Avenue. The monitor was secured to outdoor furniture approximately 45' south of the southern-most mobile home. This position is approximately 4,600' from the center of the Applicant's proposed Project site. Please see photographs 1-4, attached.

"ST6" – An occupied residence known as 40445 S. El Dorado Avenue. The monitor was secured to a fence post approximately 40' west of the residential structure. This position is approximately 7,000' from the center of the Applicant's proposed Project site. Please see photographs 5-8, attached.

"P1" – A location on the Coalinga State Hospital (CSH) grounds, along the eastern fence line of two that separate the CSH facility from the adjacent Pleasant Valley State Prison (PVSP) property. The monitor was secured to the fence, approximately 400' west of the H2 measurement position, and intended to represent the ambient noise conditions for the modeled "P1" as appearing in the AFC. This position is approximately 5,200' from the center of the Applicant's proposed Project site.

"ST7" – An occupied residence known as 41360 Sutter Avenue. The monitor was secured to a fence post approximately 75' north of the residential structure, the closest point at which access was granted by the adjacent property owner. This position is approximately 8,000' from the center of the Applicant's proposed Project site. Please see photographs 9-10, attached.

"H2" – A location on the Coalinga State Hospital (CSH) grounds, external to and immediately west of the secured hospital areas. The monitor was secured to a light post and positioned within approximately 100' of a secured hospital building. The location is approximately 1000' west of, and intended to represent the ambient noise conditions for, the modeled "H2" position appearing in the AFC. This position is approximately 4,800' from the center of the Applicant's proposed Project site.

"GCR" – An occupied residential unit on the Polvadero Community Golf Course accessed from Sutter Avenue. The noise monitor was secured to a telephone pole (used as a fence element) approximately 120' south of the residence. This position is approximately 7,500' from the center of the Applicant's proposed Project site. Please see photographs 11-12, attached.

The Applicant applied reasonable judgment in the selection of the above measurement positions on the basis of a number of factors including as follows: proximity to the modeled positions as appearing in the AFC, logistical consideration such as security and right-of-entry, proximity to the actual or

potentially occupied residential structure, and distance to likely nearby producers of sound such as trees and mechanical equipment. In all cases, measured noise levels were considered to be accurate characterizations o the ambient noise environment.

Hourly noise levels for periods of twenty-five (25) continuous hours for each of these locations are shown in the following tables.

Table DR-77a
SR1: 25-Hour Noise Measurement Results (dBA)

Date	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$
5/14/2009	5:00 a.m.	6:00 a.m.	46	33	56	47	43	40
	6:00 a.m.	7:00 a.m.	44	33	72	46	41	37
	7:00 a.m.	8:00 a.m.	44	35	60	45	41	38
	8:00 a.m.	9:00 a.m.	40	33	57	43	37	35
	9:00 a.m.	10:00 a.m.	39	32	58	41	36	34
	10:00 a.m.	11:00 a.m.	40	33	59	41	37	34
	11:00 a.m.	12:00 p.m.	39	32	53	41	36	34
	12:00 p.m.	1:00 p.m.	45	33	61	48	41	37
	1:00 p.m.	2:00 p.m.	46	34	62	49	43	39
	2:00 p.m.	3:00 p.m.	47	36	66	50	44	40
	3:00 p.m.	4:00 p.m.	48	39	62	51	45	41
	4:00 p.m.	5:00 p.m.	47	34	64	49	44	39
	5:00 p.m.	6:00 p.m.	47	34	69	48	42	39
	6:00 p.m.	7:00 p.m.	44	34	61	46	40	37
	7:00 p.m.	8:00 p.m.	42	33	60	45	39	36
	8:00 p.m.	9:00 p.m.	37	33	56	39	35	34
	9:00 p.m.	10:00 p.m.	36	33	49	38	35	33
	10:00 p.m.	11:00 p.m.	35	32	55	37	34	33
	11:00 p.m.	12:00 a.m.	37	32	49	38	35	33
5/15/2009	12:00 a.m.	1:00 a.m.	39	32	56	41	35	33
	1:00 a.m.	2:00 a.m.	39	32	68	39	35	33
	2:00 a.m.	3:00 a.m.	37	33	53	39	36	35
	3:00 a.m.	4:00 a.m.	36	33	47	38	35	34
	4:00 a.m.	5:00 a.m.	38	33	51	41	36	34
	5:00 a.m.	6:00 a.m.	42	33	53	44	40	37

Notes:

a.m.	=	morning	L_{eq}	=	equivalent sound energy level
dBA	=	"A-weighted" decibels	L_{max}	=	maximum sound level
$L_{(10)}$	=	sound level exceeded 10 percent of time	L_{min}	=	minimum sound level
$L_{(50)}$	=	sound level exceeded 50 percent of time	p.m.	=	afternoon, evening, or nighttime
$L_{(90)}$	=	sound level exceeded 90 percent of time			

33 = Quietest nighttime L_{90} (arithmetic average of quietest four consecutive nighttime hours, 10:00 p.m. through 2:00 a.m., as shaded above).

35 = Quietest nighttime hourly L_{eq}.

48 = Community Noise Equivalent Level (CNEL).

48 = Day-night Level (L_{dn}).

Source: URS 2009.

Table DR-77b
ST6: 25-Hour Noise Measurement Results (dBA)

Date	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$
5/14/2009	5:00 a.m.	6:00 a.m.	44	28	59	46	41	37
	6:00 a.m.	7:00 a.m.	43	30	58	46	38	34
	7:00 a.m.	8:00 a.m.	38	30	53	40	35	33
	8:00 a.m.	9:00 a.m.	39	29	56	41	35	32
	9:00 a.m.	10:00 a.m.	41	29	64	42	35	32
	10:00 a.m.	11:00 a.m.	39	28	59	40	34	31
	11:00 a.m.	12:00 p.m.	43	29	63	44	39	35
	12:00 p.m.	1:00 p.m.	49	38	60	51	47	43
	1:00 p.m.	2:00 p.m.	50	38	64	53	48	44
	2:00 p.m.	3:00 p.m.	51	40	63	54	50	45
	3:00 p.m.	4:00 p.m.	51	40	64	54	50	46
	4:00 p.m.	5:00 p.m.	50	39	61	53	48	45
	5:00 p.m.	6:00 p.m.	49	38	63	51	48	44
	6:00 p.m.	7:00 p.m.	48	36	62	51	46	43
	7:00 p.m.	8:00 p.m.	45	33	56	47	44	40
	8:00 p.m.	9:00 p.m.	41	28	55	45	38	34
	9:00 p.m.	10:00 p.m.	39	29	59	42	36	33
	10:00 p.m.	11:00 p.m.	41	28	62	43	36	32
	11:00 p.m.	12:00 a.m.	39	28	64	39	35	32
5/15/2009	12:00 a.m.	1:00 a.m.	37	28	60	40	34	31
	1:00 a.m.	2:00 a.m.	38	28	61	37	32	31
	2:00 a.m.	3:00 a.m.	37	29	64	37	33	31
	3:00 a.m.	4:00 a.m.	35	27	55	35	30	29
	4:00 a.m.	5:00 a.m.	40	26	63	39	31	29
	5:00 a.m.	6:00 a.m.	44	29	62	48	39	34

Notes:

a.m.	=	morning	L_{eq}	=	equivalent sound energy level
dBA	=	"A-weighted" decibels	L_{max}	=	maximum sound level
$L_{(10)}$	=	sound level exceeded 10 percent of time	L_{min}	=	minimum sound level
$L_{(50)}$	=	sound level exceeded 50 percent of time	p.m.	=	afternoon, evening, or nighttime
$L_{(90)}$	=	sound level exceeded 90 percent of time			

30 = Quietest nighttime L_{90} (arithmetic average of quietest four consecutive nighttime hours, 1:00 a.m. through 5:00 a.m., as shaded above).
35 = Quietest nighttime hourly L_{eq}.
49 = Community Noise Equivalent Level (CNEL).
49 = Day-night Level (L_{dn}).

Source: URS 2009.

Table DR-77c
P1: 25-Hour Noise Measurement Results (dBA)

Date	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$
5/13/2009	2:00 p.m.	3:00 p.m.	59	46	70	62	57	52
	3:00 p.m.	4:00 p.m.	55	45	68	58	53	49
	4:00 p.m.	5:00 p.m.	56	45	69	59	53	49
	5:00 p.m.	6:00 p.m.	54	45	67	57	51	48
	6:00 p.m.	7:00 p.m.	53	45	66	56	52	48
	7:00 p.m.	8:00 p.m.	51	44	65	54	49	46
	8:00 p.m.	9:00 p.m.	49	44	60	51	48	46
	9:00 p.m.	10:00 p.m.	47	45	57	48	47	46
	10:00 p.m.	11:00 p.m.	48	44	61	49	47	46
	11:00 p.m.	12:00 a.m.	47	45	53	48	47	46
5/14/2009	12:00 a.m.	1:00 a.m.	45	39	59	46	44	42
	1:00 a.m.	2:00 a.m.	45	39	67	47	44	42
	2:00 a.m.	3:00 a.m.	44	40	52	46	44	42
	3:00 a.m.	4:00 a.m.	44	39	53	46	44	42
	4:00 a.m.	5:00 a.m.	43	39	54	44	42	41
	5:00 a.m.	6:00 a.m.	45	39	56	47	44	41
	6:00 a.m.	7:00 a.m.	45	39	55	47	44	42
	7:00 a.m.	8:00 a.m.	42	37	52	43	41	39
	8:00 a.m.	9:00 a.m.	46	36	68	45	42	40
	9:00 a.m.	10:00 a.m.	41	36	54	43	40	39
	10:00 a.m.	11:00 a.m.	43	36	59	45	42	40
	11:00 a.m.	12:00 p.m.	45	41	61	47	44	43
	12:00 p.m.	1:00 p.m.	52	42	67	54	50	46
	1:00 p.m.	2:00 p.m.	55	45	69	58	53	49
	2:00 p.m.	3:00 p.m.	58	45	70	61	56	51

Notes:

a.m.	=	morning	L_{eq}	=	equivalent sound energy level
dBA	=	"A-weighted" decibels	L_{max}	=	maximum sound level
$L_{(10)}$	=	sound level exceeded 10 percent of time	L_{min}	=	minimum sound level
$L_{(50)}$	=	sound level exceeded 50 percent of time	p.m.	=	afternoon, evening, or nighttime
$L_{(90)}$	=	sound level exceeded 90 percent of time			

41.5 = Quietest nighttime L_{90} (arithmetic average of quietest four consecutive nighttime hours, 2:00 a.m. through 6:00 a.m., as shaded above).

43 = Quietest nighttime hourly L_{eq}.

54 = Community Noise Equivalent Level (CNEL).

54 = Day-night Level (L_{dn}).

Source: URS 2009.

Although the quietest four consecutive nighttime hours are highlighted in Table DR-77c, the four quietest consecutive hours for the entire 25-hour monitoring period occurred from 7:00 a.m. through 11:00 a.m. and have an average L_{90} of 39.5 dBA.

Table DR-77d
ST7: 25-Hour Noise Measurement Results (dBA)

Date	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$
5/13/2009	3:00 p.m.	4:00 p.m.	59	49	71	61	58	54
	4:00 p.m.	5:00 p.m.	59	50	78	62	58	54
	5:00 p.m.	6:00 p.m.	58	48	67	60	57	54
	6:00 p.m.	7:00 p.m.	57	46	72	59	56	53
	7:00 p.m.	8:00 p.m.	54	41	72	57	52	48
	8:00 p.m.	9:00 p.m.	54	44	69	55	52	49
	9:00 p.m.	10:00 p.m.	49	41	70	50	46	43
	10:00 p.m.	11:00 p.m.	48	39	66	49	45	42
	11:00 p.m.	12:00 a.m.	46	39	64	48	43	41
5/14/2009	12:00 a.m.	1:00 a.m.	48	39	71	47	43	41
	1:00 a.m.	2:00 a.m.	46	39	68	46	41	39
	2:00 a.m.	3:00 a.m.	47	39	74	50	45	42
	3:00 a.m.	4:00 a.m.	45	39	67	46	42	40
	4:00 a.m.	5:00 a.m.	46	39	65	47	41	40
	5:00 a.m.	6:00 a.m.	50	41	70	52	46	44
	6:00 a.m.	7:00 a.m.	53	40	69	55	49	44
	7:00 a.m.	8:00 a.m.	50	40	72	50	43	41
	8:00 a.m.	9:00 a.m.	49	39	75	46	41	40
	9:00 a.m.	10:00 a.m.	49	39	69	47	42	40
	10:00 a.m.	11:00 a.m.	49	39	71	48	42	40
	11:00 a.m.	12:00 p.m.	51	39	70	52	46	42
	12:00 p.m.	1:00 p.m.	56	42	70	58	55	51
	1:00 p.m.	2:00 p.m.	58	47	69	60	57	53
	2:00 p.m.	3:00 p.m.	59	48	78	61	57	54
	3:00 p.m.	4:00 p.m.	58	39	74	54	51	48

Notes:

a.m.	=	morning	L_{eq}	=	equivalent sound energy level
dBA	=	"A-weighted" decibels	L_{max}	=	maximum sound level
$L_{(10)}$	=	sound level exceeded 10 percent of time	L_{min}	=	minimum sound level
$L_{(50)}$	=	sound level exceeded 50 percent of time	p.m.	=	afternoon, evening, or nighttime
$L_{(90)}$	=	sound level exceeded 90 percent of time			

40.3 = Quietest nighttime L_{90} (arithmetic average of quietest four consecutive nighttime hours, 1:00 a.m. through 5:00 a.m., as shaded above).

45 = Quietest nighttime hourly L_{eq}.

57 = Community Noise Equivalent Level (CNEL).

57 = Day-night Level (L_{dn}).

Source: URS 2009.

Although the quietest four consecutive nighttime hours are highlighted in Table DR-77d, the four quietest consecutive hours for the entire 25-hour monitoring period occurred from 7:00 a.m. through 11:00 a.m. and also have an average L90 of 39.5 dBA.

Table DR-77e
H2: 25-Hour Noise Measurement Results (dBA)

Date	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$
5/13/2009	2:00 p.m.	3:00 p.m.	52	44	72	54	49	47
	3:00 p.m.	4:00 p.m.	52	43	77	53	48	46
	4:00 p.m.	5:00 p.m.	53	44	68	56	49	46
	5:00 p.m.	6:00 p.m.	53	43	77	53	48	46
	6:00 p.m.	7:00 p.m.	52	44	69	54	50	47
	7:00 p.m.	8:00 p.m.	51	43	68	53	48	46
	8:00 p.m.	9:00 p.m.	50	44	70	52	47	45
	9:00 p.m.	10:00 p.m.	47	44	66	48	46	45
	10:00 p.m.	11:00 p.m.	48	43	63	50	47	45
	11:00 p.m.	12:00 a.m.	45	42	52	46	45	44
5/14/2009	12:00 a.m.	1:00 a.m.	45	41	60	46	44	43
	1:00 a.m.	2:00 a.m.	46	42	76	46	44	43
	2:00 a.m.	3:00 a.m.	43	41	53	44	43	42
	3:00 a.m.	4:00 a.m.	43	41	49	44	43	42
	4:00 a.m.	5:00 a.m.	43	40	64	44	42	41
	5:00 a.m.	6:00 a.m.	46	40	67	44	42	41
	6:00 a.m.	7:00 a.m.	46	40	68	46	42	41
	7:00 a.m.	8:00 a.m.	49	40	73	46	42	40
	8:00 a.m.	9:00 a.m.	50	40	70	48	42	40
	9:00 a.m.	10:00 a.m.	52	39	77	48	42	40
	10:00 a.m.	11:00 a.m.	50	40	72	48	42	40
	11:00 a.m.	12:00 p.m.	50	40	76	47	42	41
	12:00 p.m.	1:00 p.m.	50	41	74	50	45	43
	1:00 p.m.	2:00 p.m.	52	43	71	53	47	45
	2:00 p.m.	3:00 p.m.	54	44	79	53	47	45

Notes:

a.m.	=	morning	Leq	=	equivalent sound energy level
dBA	=	"A-weighted" decibels	Lmax	=	maximum sound level
L(10)	=	sound level exceeded 10 percent of time	Lmin	=	minimum sound level
L(50)	=	sound level exceeded 50 percent of time	p.m.	=	afternoon, evening, or nighttime
L(90)	=	sound level exceeded 90 percent of time			

41.3 = Quietest nighttime L_{90} (arithmetic average of quietest four consecutive nighttime hours, 3:00 a.m. through 7:00 a.m., as shaded above).

43 = Quietest nighttime hourly L_{eq}.

54 = Community Noise Equivalent Level (CNEL).

54 = Day-night Level (L_{dn}).

Source: URS 2009.

Although the quietest four consecutive nighttime hours are highlighted in Table DR-77e, the four quietest consecutive hours for the entire 25-hour monitoring period occurred from 7:00 a.m. through 11:00 a.m. and have an average L_{90} of 40 dBA.

Table DR-77f
GCR: 25-Hour Noise Measurement Results (dBA)

Date	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$
5/13/2009	2:00 p.m.	3:00 p.m.	56	44	74	59	52	48
	3:00 p.m.	4:00 p.m.	54	43	69	57	50	47
	4:00 p.m.	5:00 p.m.	53	43	69	56	49	46
	5:00 p.m.	6:00 p.m.	50	42	74	52	48	45
	6:00 p.m.	7:00 p.m.	50	41	78	49	46	43
	7:00 p.m.	8:00 p.m.	46	38	65	46	43	41
	8:00 p.m.	9:00 p.m.	46	39	66	47	44	42
	9:00 p.m.	10:00 p.m.	43	37	59	45	40	38
	10:00 p.m.	11:00 p.m.	42	37	58	43	40	38
	11:00 p.m.	12:00 a.m.	40	36	53	41	38	37
5/14/2009	12:00 a.m.	1:00 a.m.	41	36	62	42	38	37
	1:00 a.m.	2:00 a.m.	47	36	77	42	38	37
	2:00 a.m.	3:00 a.m.	39	36	68	41	38	37
	3:00 a.m.	4:00 a.m.	41	36	58	42	39	38
	4:00 a.m.	5:00 a.m.	42	36	59	42	39	37
	5:00 a.m.	6:00 a.m.	48	37	63	50	44	42
	6:00 a.m.	7:00 a.m.	49	38	64	52	45	41
	7:00 a.m.	8:00 a.m.	44	37	62	45	41	39
	8:00 a.m.	9:00 a.m.	42	37	63	44	39	38
	9:00 a.m.	10:00 a.m.	43	37	60	45	40	38
	10:00 a.m.	11:00 a.m.	44	37	70	44	40	38
	11:00 a.m.	12:00 a.m.	48	37	75	48	41	39
	12:00 p.m.	1:00 p.m.	52	40	71	55	48	44
	1:00 p.m.	2:00 p.m.	54	41	79	57	50	46
	2:00 p.m.	3:00 p.m.	55	44	71	58	51	47

Notes:

a.m.	=	morning	Leq	=	equivalent sound energy level
dBA	=	"A-weighted" decibels	Lmax	=	maximum sound level
L(10)	=	sound level exceeded 10 percent of time	Lmin	=	minimum sound level
L(50)	=	sound level exceeded 50 percent of time	p.m.	=	afternoon, evening, or nighttime
L(90)	=	sound level exceeded 90 percent of time			

37 = Quietest nighttime L_{90} (arithmetic average of quietest four consecutive nighttime hours, 11:00 p.m. through 3:00 a.m., as shaded above).
39 = Quietest nighttime hourly L_{eq}.
53 = Community Noise Equivalent Level (CNEL).
53 = Day-night Level (L_{dn}).

Source: URS 2009.

Given these new ambient noise measurement results, Table DR-77g summarizes a revised impact assessment.

Table DR-77g
Revised Noise Impact Assessment Summary

Location	Predicted Project Operations Noise (L_{eq}, dBA)	Average of Four Consecutive Quietest Nighttime Measured Ambient Hours (L_{90}, dBA)	Predicted Cumulative Exterior Noise (L_{90}, dBA)	Difference Between Predicted Cumulative and Average Ambient (L_{90}, dBA)
SR1	39.7	33	40.5	7.5
ST6	33.5	30	35.1	5.1
P1	38.4	41.5	43.2	1.7
ST7	31.7	40.3	40.9	0.6
H2	41	41.3	44.2	2.9
GCR	33.5	37	38.6	1.6

The summarized impact assessment involves conservatively comparing the predicted cumulative exterior L_{90} noise level (i.e., the logarithmic sum of predicted Project operation noise levels and an average of the measured nighttime ambient L_{90} statistical levels) with the average of the four consecutive quietest nighttime hours of measured ambient noise (L_{90}). Increases above ambient at the other four locations are considered less than 5 dBA.

The Applicant believes the noise impacts at SR1 and ST6 would not be significant for the following reasons:

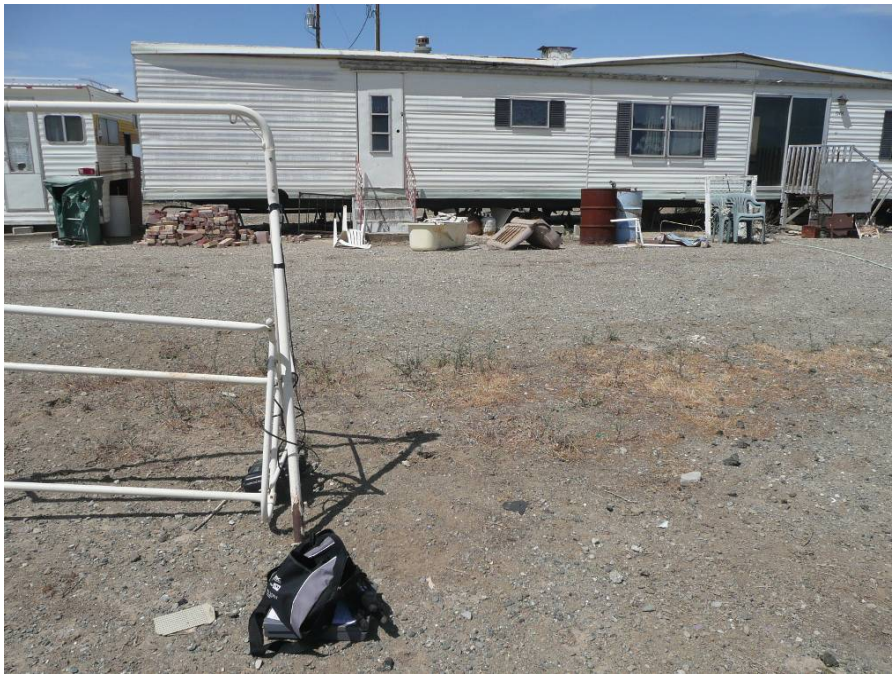
- The operational noise model prepared for the AFC considered a worst-case condition with the facility systems operating at full plant capacity (106 MW). But at night, there is no solar energy input and hence the plant can only operate up to 80 MW. With the majority of predicted Project operation noise sources involving rotating machinery (fans, turbines, etc.), acoustic principles suggest that on the basis of this reduced power output, predicted aggregate noise might be less by about 1-2 dBA, which would have the effect of rendering the differences for SR1 and ST6 in Table DR-77g to less than 7 dBA and less than 5 dBA, respectively.
- The residential structure associated with SR1 is currently unoccupied and apparently in no condition to house residents in the near future.
- The predicted cumulative levels are nearly 5 dBA less than the 45 dBA threshold as described by both the Fresno County Ordinance and the General Plan Noise Element.
- For SR1, the quietest measured nighttime hourly Leq is quite close (i.e., only 2 dBA different) to the average of the four consecutive quietest nighttime L90 hourly values. If one were to make a substitution, so that Leq values are used consistently in the assessment, Table DR-77h shows that the anticipated increase over ambient is only 6 dBA.

Table DR-77h
SR1 Noise Impact Assessment Using L_{eq} Consistently

Location	Predicted Project Operations Noise (L_{eq}, dBA)	Quietest Nighttime Measured Ambient Hourly (L_{eq}, dBA)	Predicted Cumulative Exterior Noise (L_{eq}, dBA)	Difference Between Predicted Cumulative and Average Ambient (L_{eq}, dBA)
SR1	39.7	35	41	6

Alternately, if the Project operational noise prediction was presented in terms of L_{90}, there is a possibility that it might be 1-2 dBA less than the presented L_{eq} value and would thus also result in an increase over ambient of only 6 dBA. This does not include the potential influence of the aforementioned 1-2 dBA predicted operation noise reduction due to biomass-only operation at night, which if true would help reduce the increase over ambient to less than 5 dBA.

- The predicted cumulative noise level is very nearly or below 40 dBA, which is consistent with the noise limit recommended by the California Model Community Noise Control Ordinance for rural environments such as the vicinity of the proposed Project site.

	**Photograph 1** **Date:** 05/13/09 **Comments:** SR1: Long-term noise monitoring locations, looking North.
	**Photograph 2** **Date:** 05/13/09 **Comments:** SR1: Long-term noise monitoring locations, looking West.

	**Photograph 3** **Date:** 05/13/09 **Comments:** SR1: Long-term noise monitoring locations, looking South.
	**Photograph 4** **Date:** 05/13/09 **Comments:** SR1: Long-term noise monitoring locations, looking East.

	**Photograph 5** **Date:** 05/13/09 **Comments:** ST6: Long-term noise monitoring location, looking North.
	**Photograph 6** **Date:** 05/13/09 **Comments:** ST6: Long-term noise monitoring location, looking West.

	**Photograph 7** **Date:** 05/13/09 **Comments:** ST6: Long-term noise monitoring location, looking South.
	**Photograph 8** **Date:** 05/13/09 **Comments:** ST6: Long-term noise monitoring location, looking East.

	**Photograph 9** **Date:** 05/13/09 **Comments:** ST7: Long-term noise monitoring location, looking South.
	**Photograph 10** **Date:** 05/13/09 **Comments:** ST7: Long-term noise monitoring location, looking East.

	**Photograph 11** **Date:** 05/13/09 **Comments:** GCR: View of residence at Polvadero Community Golf Course, looking Southwest.
	**Photograph 12** **Date:** 05/13/09 **Comments:** GCR: Long-term noise monitoring location, looking South. .

TECHNICAL AREA: RELIABILITY

Data Request 83: Please describe how the biomass fuel would be protected from rain and wind.

Response: Approximately three weeks of biomass fuel inventory will be maintained on site. The biomass (wood chips) will be stored in large piles (potentially 20 feet tall and 100 feet long). The biomass fuel will not need to be protected from the wind and rain. The biomass chips will be too large to be displaced by wind. Rain in the area is minimal which makes the location a good site for a solar energy plant. If rain falls on the piles, rain water will not penetrate the biomass pile more than a few inches. In fact, any rain will help to reduce any potential dust from the piles. The minimal amount of biomass that may get damp from rain will not affect the performance of the biomass boilers. The design of the biomass boilers allows for small variations in fuel moisture.

TECHNICAL AREA: SOCIO-ECONOMICS

Data Request 85: Please provide an estimate of expected credit for the sales and use tax paid or incurred on the purchase of qualified machinery.

Response: SJS expects to have over $250 million of qualified property subject to a sales and use tax. As of April 1, 2009, the sales & use tax rate for Fresno County is 8.975%. However, a number of items in the California tax code will affect the EZ credit for sales & use tax:

- Section 3500 of the California Franchise Tax Board's Economic Development Areas Manual, "in any year…limited liability companies (LLCs) taxed as partnerships may claim a credit on the sales and use tax paid or incurred to purchase up to $1 million of qualified property."
- Section 3530 limits the amount of sales or use tax credit and the hiring credit to an amount less than or equal to the amount of tax on the taxpayer's EZ business income in any year.
- Section 3800 notes: "the portion of the credit that exceeds the net tax/tax for the taxable year may be carried over and added to the credit, if any, in the following year. The credit may be carried over to succeeding years until it is exhausted…In the event that a credit carryover is allowable for any taxable year after the EZ designation has expired, the EZ will be deemed to remain in existence for the purpose of computing the business income limitation."
- Section 3830 notes: "there are no recapture provisions for the EZ sales and use tax credit."

Based on the items above and the fact that the project is legally structured using LLCs, SJS expects to recognize an annual EZ sales & use tax credit of $89,750 on its state business income taxes. Any unrecognized basis for qualified property will carry forward to future tax years until the basis is exhausted.

Data Request 86: Please provide an estimate of expected hiring credit for wages paid to qualified employees.

Response: The applicant's preliminary engineering firm currently estimates that SJS will require approximately 1,585,830 manhours during construction and 70 full-time employees during operation (or 145,600 operational manhours/year). The Enterprise Zone hiring credit is subject to the following items:

- Section 2000: "The California Revenue & Taxation Code provides a hiring credit for qualified taxpayers who employ qualified employees within a designated Enterprise Zone and pay qualified wages to these employees…The EZ hiring credit applies to those employees hired after the designation date of the EZ."
- Section 2300: "Qualified wages are wages paid or incurred to qualified employees during the consecutive 60-month period beginning with the first day the employee commences with the taxpayer."
- Section 2330 specifies the maximum hourly wage credit currently in effect as $12/hour.
- Section 2400 defines a qualified employee as an individual who satisfies all of the following:
  - At least 90% of the individual's work for the taxpayer, during the taxable year, is directly related to the conduct of the taxpayer's trade or business located within the EZ
  - At least 50% of the individual's services for the taxpayer, during the taxable year, are performed within the boundaries of the EZ
  - The individual is hired after the area was designated as an EZ (or after the expansion date of an area of an EZ)
  - Immediately prior to commencement of employment with the taxpayer, the individual is…a resident of a Targeted Employment Area (TEA), as defined in Section 7072 of the Government Code.

- Section 2500 defines the credit computation as follows: "For each taxable year a hiring credit is allowed to a qualified taxpayer for hiring a qualified employee for employment within an EZ. The credit is equal to the sum of each of the following:

  - 50% of qualified wages during the first year of employment
  - 40% of qualified wages during the second year of employment
  - 30% of qualified wages during the third year of employment
  - 20% of qualified wages during the fourth year of employment
  - 10% of qualified wages during the fifth year of employment

- Section 2530 notes: "The amount of the hiring credit or the sales or use tax credit claimed, including any credit carryover from prior years, may not exceed the amount of the tax on the taxpayer's EZ business income in any tax year."

- Section 2600 notes: "The portion of the credit that exceeds the net tax/tax for the taxable year may be carried over and added to the credit, if any, in the following year. The credit may be carried over to succeeding years until it is exhausted."

- Section 2621 notes that for non-seasonal employees: "Recapture of the hiring credit is required if the employee is terminated before the end of the longer of the following two periods (unless an exception is met):

  - The first 270 days of employment (whether or not consecutive)
  - Ninety (90) days of employment plus 270 calendar days

Based on the items above, the following calculations were made for the hiring credit. During construction, we assume 60% of total manhours will be from qualified employees. This assumption is based on the number of employees coming from a Target Employment Zone and the 270 day work requirement in Section 2621.

Year	Credit	Calculation Explanation
1 (construction)	$3,805,992	=1,057,220 (1,585,830 total construction manhours*66%)*60% (qualified employee/total employee rate)*$12/hr (maximum credit)*50% (per credit calculation formula)
2 (6 months construction/6 months operation)	$1,959,197	= [528,610 (1,585,830 total construction manhours*33%)*60% (qualified employee/total employee rate)*$12/hr (maximum credit)*40% (per credit calculation formula)] + [72,800 (145,600 operational manhours/year * 0.5)*(100% qualified employee/total employee rate)*($12/hr maximum credit*50% (per credit calculation formula)]
3 (12 months of commercial operation)	$786,240	= [72,800 (145,600 operational manhours/year * 0.5)*(100% qualified employee/total employee rate)*($12/hr maximum credit*50% (per credit calculation formula)] + [72,800 (145,600 operational manhours/year * 0.5)*(100% qualified employee/total employee rate)*($12/hr maximum credit*40% (per credit calculation formula)]
4 (12 months of commercial operation)	$611,520	= [72,800 (145,600 operational manhours/year * 0.5)*(100% qualified employee/total employee rate)*($12/hr maximum credit*40% (per credit calculation formula)] + [72,800 (145,600 operational manhours/year * 0.5)*(100% qualified employee/total employee rate)*($12/hr maximum credit*30% (per credit calculation formula)]
5 (12 months of commercial operation)	$436,800	= [72,800 (145,600 operational manhours/year * 0.5)*(100% qualified employee/total employee rate)*($12/hr maximum credit*30% (per credit calculation formula)] + [72,800 (145,600 operational manhours/year * 0.5)*(100% qualified employee/total employee rate)*($12/hr maximum credit*20% (per credit calculation formula)]

Year	Credit	Calculation Explanation
6 (12 months of commercial operation)	$262,080	= [72,800 (145,600 operational manhours/year * 0.5)*(100% qualified employee/total employee rate)*($12/hr maximum credit*20% (per credit calculation formula)] + [72,800 (145,600 operational manhours/year * 0.5)*(100% qualified employee/total employee rate)*($12/hr maximum credit*10% (per credit calculation formula)]
7 (commercial operation – only 6 months allowable under credit)	$87,360	= [72,800 (145,600 operational manhours/year * 0.5)*(100% qualified employee/total employee rate)*($12/hr maximum credit*10% (per credit calculation formula)]

San Joaquin Solar 1 & 2 Hybrid Project
Supplemental Information
In Response to CEC Data Request Set #1
08-AFC-12

TECHNICAL AREA: WATER AND SOILS

Data Request 90: Please provide the long-term maintenance requirements for access roads, reapplication requirements of herbicides, dust suppressants, and soil stabilizers, and the expected number and size of the maintenance equipment that would be used for all maintenance activities in the facility.

Response: The only road that will be concrete is the access road to deliver biofuel to the truck unloading zone of the fuel storage area, the perimeter road will be asphalt, access between SCAs/mirrors will be dirt, permanent access roads in the center of the facility are asphalt, and access areas between equipment in the power block/biomass facilities will be covered with gravel.

Long Term Maintenance Requirements for Access Roads

The main access roads will be concrete with a life expectancy of approximately twenty years. An herbicide application will be applied annually on the shoulders. Roadway shoulder maintenance will consists of grooming and filling the gravel on shoulders every two years.

The asphalt service roads and parking lots have a life expectancy of approximately ten years. Long term maintenance will consist of asphalt cap and gravel every ten years and cracks will be filled and sealed every five years. Roadway shoulder maintenance will consist of grooming and filling gravel every two years. An herbicide application will be applied annually to the shoulders.

Non-Paved access roads have an approximate life expectancy of six years. Initial construction will consist of approximately 10-inches of well compacted, well-graded crusher run aggregate. Maintenance will consist of yearly spot repair of thin spots, with grading and rolling compaction every other year. Herbicide will be applied approximately twice a year. Dust control will be applied as necessary.

Maintenance Equipment

Maintenance equipment will consist of approximately three to four pick-up trucks, one backhoe, one tractor with a scraper blade, one water truck, one bucket truck, and one portable welder/generator. Front end loaders will also be used for the biomass handling.

Data Request 92: Please describe in detail the method by which the mirrors would be washed and the volume of water that would run off the mirrors and onto the soil below the mirrors.

Response: Mirror washing will occur nightly, five days per week. Each truck will operate 12 hours using 2500 gallons per day, for a total of 5,000 gallons per day. Routine mirror washing will consist of application of high-pressure demineralized water sprayed onto the mirror surfaces. The Applicant will utilize several mirror washing methods on a rotating basis –once each month the mirrors will be washed with a high pressure method; once a month the mirrors will be washed with a high volume method. Details of the methods include:

- High-pressure rig consisting of a tractor-pulled trailer that contains a water tank and hand-held spray nozzles;
- Rotating-head rig consisting of a tractor pulling a wheeled tank-and-pump unit. The tractor is mounted with a controllable arm mounted in the front. The arm, with five movement articulated control from within the tractor cab, supports a configuration of spray arms that are fed by high-pressure water from the tank unit, and,.
- High-volume method using a large-capacity water truck driven with fixed nozzles on each side of the truck to spray the rows of mirrors simultaneously with a “deluge-type” stream of water.

It takes approximately two weeks to complete the washing of one solar field. Therefore, each solar field has one washing crew using either the high pressure or high deluge. After completing the solar field in two weeks, they begin washing the solar field again with the alternate method, so each mirror is cleaned twice each month. See the attached photos for the typical mirror washing methods.

It is expected that most of the washwater will evaporate from the reflector surface upon application with only a fraction falling to the ground surface where it will evaporate. It is not anticipated that the incidental amount of mirror washwater that falls to the ground will reach the groundwater based on the minimal volume, high evaporation rate, and the depth to groundwater.

High Pressure (twister) method.

High Pressure (hand held) method

High Volume (deluge) Method

Data Request 97: Please discuss and quantify the buildup of the mirror wash water, herbicides, dust suppressor, and soil stabilizer chemicals in the soil over the life of the project.

Response: The mirror wash water will consist solely of demineralized water with no added chemical constituents. It is not anticipated that dust suppressor and soil stabilizer chemical will be used.

Herbicides will be applied to control vegetation and weed growth. At this time the specific herbicide product that will be applied has not been determined. Persistence of various herbicides in the soil is discussed in the response to Data Request 96. Dinitroaniline type herbicides can persist in the soil for several months. Dithiopyr type herbicide is lost from soil by chemical and microbial degradation. Glyphosphate type herbicides are considered to be immobile in soil and readily degraded by soil microbes to the metabolite aminomethyl phosphonic acid and then to carbon dioxide. It is not anticipated that their will be a significant buildup of herbicides that will not be degraded by the soil over the life of the project.

Data Request 101: If groundwater would be used for both phases, please discuss pump test results and whether the onsite well can yield a sufficient water volume to supply the entire project (SJS1 and SJS2).

Response: An onsite well testing program and drawdown analysis was performed in February, 2009. A summary of the well testing program, methodology, results and drawdown analysis were provided in a technical memorandum dated February 19, 2009, and docketed on March 20, 2009. Based upon the results of this analysis, the project can support the proposed groundwater use assuming a worse case scenario of no supply from the future City Wastewater Treatment Plant (WWTP) through use of multiple onsite wells (at minimum one primary well and one or more backup wells).

The drawdown analysis evaluated both the expected onsite annual average groundwater use of approximately 680 gpm, as well as a more conservative assumption of 1,750 gpm. The greater number is a conservative maximum pumping rate over the life of the project assuming no supply from the recycled water from the future Coalinga WWTP. Based upon results of the drawdown analysis, a continuous pumping rate of 650 gpm would result in approximately 10 feet of drawdown approximately 2,000 feet from the location of the existing onsite well over the duration of the project. Based on drawdown analysis results, an assumed continuous pumping rate of 1,750 gpm over the life of the project would result in approximately 30-35 ft of drawdown approximately 2,000 ft from the existing onsite well location. In both cases, greater drawdown would be anticipated within a 2,000 ft radius of the pumping well, and lesser drawdown would be expected outside of that area. Drawdown in this range is similar to drawdown expected for agricultural use of the well under comparable conditions.

Based upon information provided by the owner of the existing onsite well, the well produces up to 1,400 gpm as it is currently configured. The property owner applies about 1,410 afy of groundwater produced by the well to a mixture of agricultural uses (160 acres of pistachios at about 560 afy; 200 acres of wheat at about 400 afy; and 150 acres of cotton at about 450 afy). Proposed groundwater use assuming a rate of 650 gpm annually would be approximately 1,050 afy. Proposed project use assuming no water supply from the future City WWTP would require approximately 2,057 afy.

Although the conservative maximum average annual use assuming no recycled water supply from the future City WWTP is greater than the current onsite well groundwater production of approximately 1,410 afy, it is within the normal range of agricultural irrigation usage for a 640 acre parcel in the area. As a point of comparison, almond trees would require between 1-4 acre feet of water (irrigation and/or rainfall) in a year. If almonds were planted on the entire 640 acres, a farmer would need to apply between 640 afy of water just to keep the trees alive, and up to 2,560 afy of water to support a large crop of almonds on mature trees. These comparisons indicate that the proposed groundwater water use of approximately 1,050 afy (with recycled water supply from the future City WWTP) would be approximately 26% lower than the current agricultural irrigation usage of water from the existing onsite well; and that the maximum water use of approximately 2,057 afy (no recycled water supply from the future City WWTP) would be approximately 20% lower than the maximum annual agricultural water use per year for a typical crop (i.e., almonds) at the project site.

TECHNICAL AREA: TRANSMISSION

Data Request 119: Power flow analysis for normal (N-0) system conditions with all facilities in service, and for Category B (N-1, L-1 & G-1) and Category C (N-2 or more) contingencies. Provide a mitigation plan for any identified reliability criteria violations in the PG&E grid. Provide a list of contingencies studied and the study results of the analysis in a table format with pre and post-project(s) data. In the report list all major assumptions in the base case including major path flows, major generators including generators in the California ISO queue & hydroelectric generators and loads in the area systems. Also identify the reliability and planning criteria utilized to determine the reliability criteria violations.

Response: The San Joaquin Solar 1 & 2 Hybrid Project (referred to in CAISO records as "Bethel 7 & 8 Solar Hybrid Project") originally filed its Interconnection Request with CAISO on December 12, 2007. An Interconnection Feasibility Study was executed on March 3, 2008 for the request. Before the IFS results were released, CAISO revised their interconnection process to the FERC-approved GIPR guidelines. Under the new GIPR process, the project was placed in the Transition Cluster: Queue # 283. A Large Generation Interconnection Study Agreement was executed on October 24, 2008 for the Phase One Study process of CAISO's Transition Cluster. The Phase One Study commenced officially on December 1, 2008. Per FERC regulations, the study results must be released by July 31, 2009. MRST met with CAISO staff at their headquarters in Folsom on April 22, 2009. While CAISO was unable to provide any results of the Phase One study at that time, CAISO staff did confirm that the Phase One Study is proceeding on schedule to be completed on or before the statutory deadline of July 31, 2009.

An email reply from CAISO regarding the Phase One study is attached (next page). MRST will forward results of the Phase One CAISO study to CEC staff as soon as they are available. The Phase One Study results should provide information to address Data Requests #119-125.

Data Request 120: Provide power flow diagrams (units in MW, percentage loading and per unit voltage) with and without the SJS 1 & 2 and other queue project generations (as applicable) for the base cases. Power flow diagrams should also be provided for all overloads or voltage criteria violations under normal system (N-0) or contingency (N-1 & N-2) conditions.

Response: See Response to Data Request 119.

Elizabeth Ingram
<Elizabeth.Ingram@spinnakerenergy.net>
05/27/2009 11:11 AM

To "Anne_Runnalls@URSCorp.com" <Anne_Runnalls@URSCorp.com>
cc "Kent A. Larsen" <Kent.Larsen@spinnakerenergy.net>, "Greggory L. Wheatland" <glw@eslawfirm.com>, Chris Ellison <ChrisE@eslawfirm.com>
bcc
Subject SJS Data Responses #119-125 (Transmission)

History: This message has been replied to.

Anne,

Attached is the response we just got from CAISO. Please add this to the response I drafted last week for the transmission questions.

Thanks,

Elizabeth Ingram | Business Development | Spinnaker Energy, Inc.
12555 High Bluff Drive Suite 100 San Diego CA 92130 | T 858.427.6536 F 858.513.1205

----- Message from "Fishback, Edward" <EFishback@caiso.com> on Wed, 27 May 2009 11:01:05 -0700 -----

To: Elizabeth Ingram <Elizabeth.Ingram@spinnakerenergy.net>
cc: "Kent A. Larsen" <Kent.Larsen@spinnakerenergy.net>, "Wong, Albert" <ayw1@pge.com>, "Didsayabutra, Paul" <PDidsayabutra@caiso.com>, "Wright, Linda" <LWright@caiso.com>
Subject: RE: Bethel 7&8 - information for CEC

Elizabeth,
Here are the responses for the questions with input from CAISO and PG&E Engineering.

For question #1: The CAISO believes we will provide a public version of the Phase 1 report and a confidential version to each developer. The confidential version should document all of the work that we have done. We will definitely have short circuit analysis, and we should have post-transient voltage

analysis. Stability analysis was only done if the ISO or PG&E expected a stability problem. These reports should be available according to the GIPR timeline.

For question #2: Yes

Ed Fishback
Project Manager
California ISO
151 Blue Ravine Road
Folsom, CA 95630
Phone (916) 608-5836
Cell (916) 802-6401
Fax (916) 351-2264

From: Elizabeth Ingram [mailto:Elizabeth.Ingram@spinnakerenergy.net]
Sent: Monday, May 18, 2009 3:23 PM
To: Fishback, Edward; Wright, Linda
Cc: Kent A. Larsen
Subject: Bethel 7&8 - information for CEC

Linda and Ed,

The San Joaquin Solar project (known to CAISO as "Bethel 7&8") is continuing through the CEC's permitting process. The project was deemed "Data Adequate" by CEC on March 11, 2009. We have received the first set of CEC data requests as part of the Discovery Phase of the permitting process. Some of the requests relate to transmission and anticipate the results of the Transition Cluster's Phase One Study underway at CAISO. The Transmission-related requests are listed in the chart below. There is also more detail in the attached document.

In order to respond to CEC, could you please answer the following questions:

(1) Will the information requested below be included in the Phase One results package released by CAISO in July for the Transition Cluster?

(2) Is the Phase One Study process on schedule to be completed no later than July 31, 2009?

TRANSMISSION REQUESTS:

119	Power flow analysis for normal (N-0) system conditions with all facilities in service, and for Category B (N-1, L-1 & G-1) and Category C (N-2 or more) contingencies. Provide a mitigation plan for any identified reliability criteria violations in the PG&E grid. Provide a list of contingencies studied and the study results of the analysis in a table format with pre and post-project(s) data. In the report list all major assumptions in the base case including major path flows, major generators including generators in the California ISO queue & hydroelectric generators and loads in the area systems. Also identify the reliability and planning criteria utilized to determine the reliability criteria violations.
120	Provide power flow diagrams (units in MW, percentage loading and per unit voltage) with and without the SJS 1 & 2 and other queue project generations (as applicable) for the base cases. Power flow diagrams should also be provided for all overloads or

	voltage criteria violations under normal system (N-0) or contingency (N-1 & N-2) conditions
121	Transient stability analysis for critical Category B (N-1) and Category C (N-2) contingencies of the PG&E bulk power (230 & 500 kV) transmission lines/transformers and for full load rejection of the proposed SJS 1 & 2 and other queue project generators (as applicable) with monitoring of voltages, frequencies and generator rotor angles.
122	Short circuit analysis for three line-to-ground faults. Analysis for single line-to-ground faults should be performed, if necessary data is available.
123	Post-transient voltage analysis with governor power flow for selected single and double contingencies.
124	Reactive power deficiency analysis with reactive MVAR output for selected single and double contingencies.
125	Provide electronic copies of *.sav,*.drw. *.dyd and *.swt GE PSLF files and EPCL contingency files in a CD, if available.

Let me know if you have any questions.

Thank you for your assistance,

Elizabeth Ingram | Business Development | Spinnaker Energy, Inc.
12555 High Bluff Drive Suite 100 San Diego CA 92130 | T 858.427.6536 F 858.513.1205

Data Request 121: Transient stability analysis for critical Category B (N-1) and Category C (N-2) contingencies of the PG&E bulk power (230 & 500 kV) transmission lines/transformers and for full load rejection of the proposed SJS 1 & 2 and other queue project generators (as applicable) with monitoring of voltages, frequencies and generator rotor angles.

Response: See Response to Data Request 119.

Data Request 122: Short circuit analysis for three line-to-ground faults. Analysis for single line-to-ground faults should be performed, if necessary data is available.

Response: See Response to Data Request 119.

Data Request 123: Post-transient voltage analysis with governor power flow for selected single and double contingencies.

Response: See Response to Data Request 119.

Data Request 124: Reactive power deficiency analysis with reactive MVAR output for selected single and double contingencies.

Response: See Response to Data Request 119.

Data Request 125: Provide electronic copies of *.sav,*.drw. *.dyd and *.swt GE PSLF files and EPCL contingency files in a CD, if available.

Response: See Response to Data Request 119.

TECHNICAL AREA: VISUAL

Data Request 131: Please describe, using text and drawings of the fence, SCAs, and the nearest buildings to the east and west of the project site (such as the hospital, prison and residences) the effectiveness of the fence in blocking potentially harmful beams.

Response: Beyond the focal length of the SCA, beam intensity decreases and by 10' from the SCA, beam intensity is the equivalent of the incident solar intensity. The 10 foot high perimeter fence with privacy slats will block wind and effectively 95% of glare.

Data Request 133: Please describe the lighting needs for the two work crews that will be cleaning the SCAs at night, and identify the number of 30-foot lights that will be needed for biomass operation.

Response: Portable lighting is attached to the SCA cleaning crew's vehicle. There will be approximately 88 30-foot lights in the biomass block.

Data Request 134: Please explain how exhaust conditions and stack parameters would change corresponding to the composition of production base as shown in Figure 3.7-1 and the Table 5.2-23 in the AFC.

Response: Tables DR-30a, DR-30b, and DR-30c outline the different exhaust conditions and stack parameter that correspond to 50%, 75% and 100% combustor loads. The plant will operate at a combination of loads for each combustor to produce the required power as outlined in Table 5.2-23 in the AFC.

Data Request 135: Please summarize for the biomass combustor the exhaust conditions to complete the table below, and additional data as necessary, for staff to be able to determine how the biomass combustor operating conditions/exhaust parameters will vary with solar generation.

Response: The exhaust conditions and the stack parameters for the 100% biomass combustor load at different ambient temperatures are shown in the following Table DR-135.

Table DR-135

Parameter	Combustor Exhausts (each)		
Stack Height	30.48 m (100 ft)		
Stack Diameter	2.083 m (6.83 ft)		
Stack Separation	16.4 m (53.8 ft) within each set of two,		
	70.0 m (229.5 ft) between each set of two		
Ambient Temperature	30 °F	60 °F	90 °F
Ambient Relative Humidity	90%	60%	20%
Production base	100 % Biomass Combustor Load		
Exhaust Temperature (°F)	230	230	230
Exhaust Flow Rate (1000 lbs/hr)	416.37	405.90	398.47
Exhaust Moisture Content (Wt %)	13.4	18.6	18.0

Data Request 136: Please explain how the heat rejection and resulting exhaust conditions (including the number of cooling tower cells in operation) would change corresponding to the composition of production base as shown in Figure 3.7-1 and the Table 5.2-23 in AFC, and as ambient conditions vary.

Response: The SJS1 Solar Boiler for the power plant operates at full capacity to generate 60 MW (gross) during the time shown in yellow on Fig. No. 3.7.1 for daylight operation (0% biomass operation). During this time, the heat rejection from the condenser will be 355.8 MM BTU/Hr. All four fans on each wet surface air cooled (WSAC) condenser will operate at this time. (SJS2 will duplicate these operating conditions).

Both the SJS1 solar Boiler and SJS1 biomass boiler will operate together to generate 60.4 MW (gross) during the time shown in orange on Fig No. 3.7.1 for daylight operation (but with reduced sunlight conditions). The heat rejection from the condenser will be 355.8 MM BTU/Hr. All four fans on each WSAC condenser will operate at this time. (SJS2 will duplicate these operating conditions.)

The SJS1 biomass boiler will operate at full capacity to generate 49.24 MW (gross) during the time shown in green on Fig. No. 3.7.1 for night time operation (0% solar operation). During this time the heat rejection from the condenser will be 292.5 MM BTU/HR. All four fans on each WSAC condenser will operate at this time at approximately 80% of capacity using the variable speed fans. (SJS2 will duplicate these operating conditions.)

Data Request 137: Please summarize for the cooling tower the conditions that affect vapor plume formation including cooling tower heat rejection, exhaust temperature, and exhaust mass flow rate. Please provide values to complete the table, and additional data as necessary for staff to be able to determine how the heat rejection load varies with ambient conditions and also determine at what operating and ambient conditions cooling tower cells may be shut down.

Response: Table DR-137 presents the exhaust data for the WSAC units at SJS 1. SJS2 will duplicate these operating conditions.

Table DR-137

Parameter	WSAC Tower Exhausts for SJS 1*		
Number of Cells	4 cells (two 2-cell WSAC)		
Cell Height	10.97m (36 ft)		
Cell Diameter	7.93m (26 ft)		
Tower Housing Length	48.8m (160 ft)		
Tower Housing Width	22.26 meters (73 feet) total two cells		
Ambient Temperature	30 °F	60 °F	90 °F
Ambient Relative Humidity	90%	60%	20%
Production base	100 % Biomass Combustor Load (0% Solar)		
Number of Cells in Operation	4	4	4
Heat Rejection (MM Btu/hr)	355.8	355.8	355.8
Exhaust Temperature (°F)	80.1	81.2	84.8
Exhaust Flow Rate (lb/hr)	14,649,518	15,542,233	17,471,053
Production base	50 % Biomass Combustor Load (50% Solar)		
Number of Cells in Operation	4	4	4
Heat Rejection (MM Btu/hr)	355.8	355.8	355.8
Exhaust Temperature (°F)	80.1	81.2	84.8
Exhaust Flow Rate (lb/hr)	14,649,518	15,542,233	17,471,053
Production base	0 % Biomass Combustor Load (100% Solar)		
Number of Cells in Operation	4	4	4
Heat Rejection (MM Btu/hr)	273.9	284.5	282.6
Exhaust Temperature (°F)	72.9	77.1	94.2
Exhaust Flow Rate (lb/hr)	15,765,140	15,252,110	8,860,113

Note:
* Exhausts for WSAC units at SJS 2 are equal. WSAC diagram is presented as Figure DR-140

Data Request 138: Please provide the cooling tower manufacturer and model number information and a fogging frequency curve from the cooling tower vendor, if available.

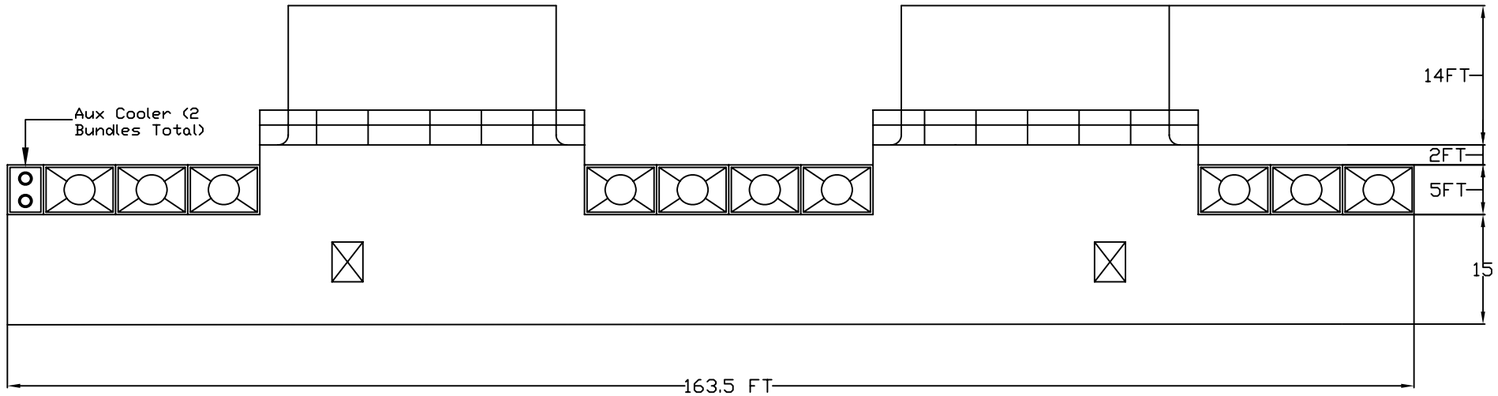
Response: WSAC Unit is a 2 cell Niagara unit, model No. RVC 89833-2F26. Each steam turbine requires one 2 cell WSAC unit, each cell has two fans. A fogging frequency curve is not available.

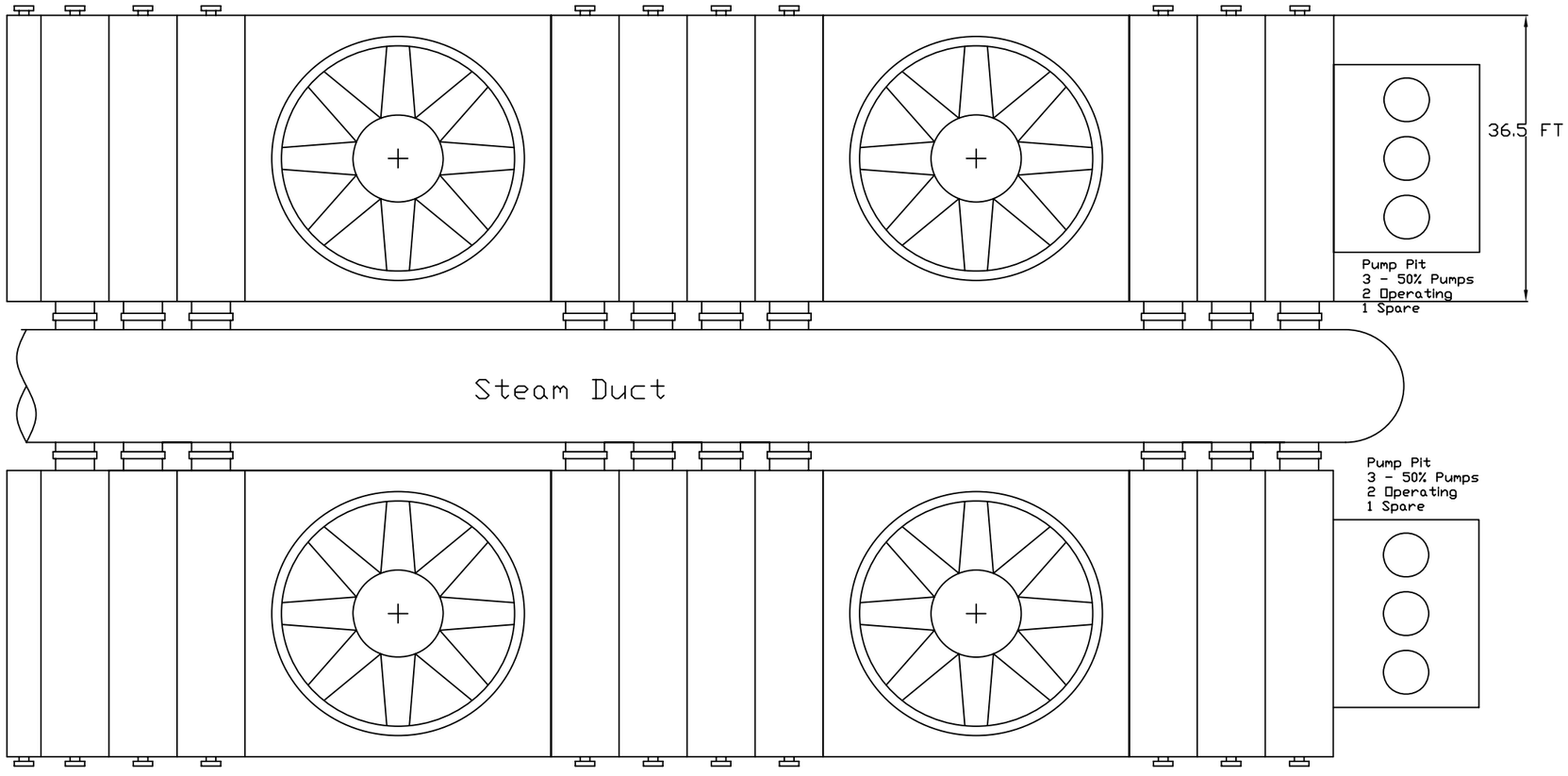
Data Request 139: Please confirm that the cooling tower fan motors will not have dual speed or variable speed/flow controllers. If the cooling tower will have a dual speed or variable speed option, then the exhaust flow rate data given for the cooling tower to complete the exhaust condition table data request should both reflect this assumption and note the specific fan speed(s) assumed.

Response: The WSAC units will have variable speed fans. Exhaust conditions presented in Table DR-137 reflect expected operating conditions.

Data Request 140: Please describe why the cooling towers, as depicted in the project description with very small exhaust diameters compared to their width and length, do not have the appearance of typical power plant cooling towers.

Response: Process cooling at SJS 1&2 will be achieved using a wet surface air cooler (WSAC) condenser. A WSAC combines a conventional cooling tower and turbine condenser in one unit (cell). Two cells will be required for each steam turbine in San Joaquin I & II. Attached is a layout diagram (Figure DR-140) supplied by the WSAC manufacturer, Niagra Blower Company.





SOURCES:
Niagra Blower Company; May 2009.

WSAC LAYOUT DIAGRAM
SAN JOAQUIN SOLAR 1 & 2

URS

Not to Scale

CREATED BY: JS	DATE: 5-29-09	FIG. NO:
PM: AR	PROJ. NO: 27658033.00200	**DR-140**

G:\gis\projects\1577\27658031\support\Data_Requests_0509\AllFigDR-140_WSAC_Layout.ai

San Joaquin Solar 1 & 2 Hybrid Project
Supplemental Information
In Response to CEC Data Request Set #1
08-AFC-12

TECHNICAL AREA: WASTE MANAGEMENT

Data Request 145: Please provide a summary table of information on proposed businesses that would purchase fly ash from the project. At a minimum, please include the following information for each facility: facility location, distance from project site, capacity, materials accepted, acceptance limits (if any), volume they would purchase or accept, and terms of agreement under which they would purchase or accept fly ash from the project.

Response: The project has not yet obtained site specific information regarding the physical, chemical, and micro-structural properties of the fly ash. The ash is expected to contain several beneficial nutrients (10% P_2O_5, 12% K_2O, 13.5% Ca, and 5% Mg).

Potential uses for fly ash include:

- Cement-based materials including CLSM (Controlled Low Strength Materials), low- and, medium-strength concrete, cast-concrete products, RCCP (Roller Compacted Concrete Pavements), road base-course materials, and blended cements.
- Raw materials for agricultural use as a soil amendment or fertilizer
- Bedding material for livestock pens
- Sanitary landfill cover

Several companies that may potentially use the project fly ash were identified and include:

- Vulcan Materials (Bakersfield, 661-835-4809), potential usage as concrete aggregate in construction materials.
- Granite Construction (Santa Clara, 408-327-7000), potential usage in concrete mix.
- Cemex (Modesto, 209-529-4115), potential usage as aggregate materials.
- California Portland Cement Company (Glendora, 626-852-6200), potential use as aggregate in concrete production.

Additional evaluation is currently being conducted to find potential uses for the fly ash for agricultural use as a soil amendment or fertilizer or as bedding material for livestock pens.

Data Request 146: Please provide results of field sampling and analysis that adequately characterize the presence of harmful chemicals or conditions and whether there will be any risk to construction or plant personnel due to the presence of these chemicals. The project owner should determine if there is any analytical characterization data for the agricultural chemicals that were applied to the land. Samples should be assessed for persistent agricultural chemicals, such as organochlorine pesticides that were applied to the project property.

Response: Appendix B, Report of Phase II Environmental Investigation dated May 28, 2009, addresses this data request.

Data Request 147: Please provide information on when, and how the oil tanks, excess aboveground piping and waste oil was or will be cleaned up and disposed of prior to construction at the project site.

Response: The existing aboveground storage tanks (ASTs) and piping in the southwestern portion of the site will be removed from the site and either recycled or properly disposed at a permitted facility prior to construction. Prior to removal, the contents of the diesel fuel AST will be emptied and the product contained either used or recycled. Each of the tanks will be rinsed and the rinsate will be properly disposed/treated. A composite sample of surface soil collected in this area where soil is visibly stained with hydrocarbons was analyzed as part of the Phase II Environmental Investigation as requested by the CEC. The composite sample contained 23,000 ug/kg TPH quantified as diesel fuel (TPH-d). The concentration of TPH-d detected is not a potential human health risk or concern; however, soil that is visibly stained with petroleum hydrocarbons on the ground surface in this area will be excavated and properly disposed/recycled prior to construction.

Data Request 148: Please provide information showing the abandoned oil wells have been abandoned in accordance with applicable LORS and do not present a safety concern.

Response: It was noted in the Phase I ESA prepared for the AFC that information was available for two of the six wells on the California Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR) website. The Phase I ESA included the DOGGR Map 503 showing that each of the wells have been abandoned. URS has obtained Reports of Well Abandonment for these two wells that indicate that the abandonments were completed in accordance with DOGGR requirements thereby meeting the LORS. Copies of these reports are attached. URS contacted DOGGR to review available files for the four additional abandoned wells to confirm that the abandonments were completed in accordance with the LORS. Copies of the Reports of Well Abandonment are attached.

RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS

REPORT OF WELL ABANDONMENT

Coalinga, Caliifornia

October 5, 1979

Mr. J. L. Rowland, Agent
CHEVRON U.S.A. INC.
P.O. Box 5355
Oildale, Calif 93308

DEAR SIR:

Your report of abandonment of Well No. 73 (019-04736), Sec. 3, T. 21S, R. 16E, M.D. B. & M., Guijarral Hills field, Fresno County, dated 10/27/78, received 11/1/78, has been examined in conjunction with records filed in this office.

A review of the reports and records shows that the requirements of this Division, which are based on all information filed with it, have been fulfilled.

Blanket Bond
ERF/jp
cc: Company, Coalinga
Conservation Committee

M. G. MEFFERD
State Oil and Gas Supervisor

By F. L. Hill
Deputy Supervisor

OG159 (2-75 OSP 1-8M)

RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS

REPORT OF WELL ABANDONMENT

Coalinga, California

December 12, 1990

R. H. Elliott, Agent
CHEVRON U.S.A. INC.
Route 1, Box 25
Coalinga, CA. 93210

Your report of abandonment of well 81 (Name and number),
A.P.I. No. 019-04737, Section 3, T. 21S, R. 16E, MD B. & M.,
Guijarral Hills field, Fresno County,
dated December 3, 1990, received December 4, 1990, has been examined in conjunction with records filed in this office, and we have determined that all of the requirements of this Division have been fulfilled.

Effective date November 26, 1990.
MW/kt
CC: Conservation Committee
Petroleum Information
Well file

M. G. MEFFERD
State Oil and Gas Supervisor
By Richard F. Curtin
Deputy Supervisor
RICHARD F. CURTIN

OG159 (4/88/DWRR/2M)

RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS

REPORT OF WELL ABANDONMENT

K. O. Rice
CHEVRON U.S.A., INC.
Route 1, Box 25
Coalinga, CA 93210

Coalinga, California
April 6, 1992

Your report of abandonment of well **82**, A.P.I. No. **019-04738**, Section **3**, T. **21S**, R. **16E**, M.D.B. & M., **Guijarral Hills** field, **Fresno** County, dated **December 7, 1991**, received **December 10, 1990**, has been examined in conjunction with records filed in this office, and we have determined that all of the requirements of this Division have been fulfilled.

SURFACED PLUG WITNESSED: **November 30, 1990**

GWM/kt

cc: Conservation Committee
P.I.
Well File

K. P. HENDERSON
ACTING CHIEF

By Richard F. Curtin
Deputy Supervisor

RICHARD F. CURTIN

OG159

RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS

REPORT OF WELL ABANDONMENT

Coalinga, California
December 4, 1990

R. H. Elliott, Agent
CHEVRON U.S.A. INC.
Route 1, Box 25
Coalinga, CA 93210

Your report of abandonment of well 84 (Name and number),
A.P.I. No. 019-04739, Section 3, T. 21S, R. 16E, MD B. & M.,
Guijarral Hills field, Fresno County,
dated November 27, 1990, received November 30, 1990, has been examined in conjunction with records filed in this office, and we have determined that all of the requirements of this Division have been fulfilled.

Effective date November 20, 1990
CP/kt
CC: Conservation Committee
Petroleum Information
Well file

M. G. MEFFERD
State Oil and Gas Supervisor
By Richard F. Curtin
Deputy Supervisor
RICHARD F. CURTIN

OG159 (4/88/DWRR/2M)

RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS

REPORT OF WELL ABANDONMENT

Coalinga, Caliifornia

October 5, 1979

Mr. J. L. Rowland, Agent
CHEVRON U.S.A. INC.
P.O. Box 5355
Oildale, Calif 93308

DEAR SIR:

Your report of abandonment of Well No. 71 (019-04735), Sec. 3, T. 21S, R. 16E, M.D. B. & M., Guijarral Hills field, Fresno County, dated 10/27/78, received 11/1/78, has been examined in conjunction with records filed in this office.

A review of the reports and records shows that the requirements of this Division, which are based on all information filed with it, have been fulfilled.

Blanket Bond
ERF/jp
cc: Company, Coalinga
Conservation Committee

M. G. MEFFERD
State Oil and Gas Supervisor

By F. L. Hill
Deputy Supervisor

OG159 (2-75-GSR 1-8M)

RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS

REPORT OF WELL ABANDONMENT

Coalinga, California

December 5, 1990

R. H. Elliott, Agent
Chevron U.S.A. Inc.
Route 1, Box 25
Coalinga, CA. 93210

Your report of abandonment of well 62 (Name and number),
A.P.I. No. 019-04734, Section 3, T. 21S, R. 16E, MD B. & M.,
Guijarral Hills field, Fresno County,
dated December 3, 1990, received December 4, 1990, has been examined in conjunction with records filed in this office, and we have determined that all of the requirements of this Division have been fulfilled.

Effective date November 26, 1990.
CP/kt
CC: Conservation Committee
Petroleum Information
Well file

M. G. MEFFERD
State Oil and Gas Supervisor

By V. E. Van Matre
Deputy Supervisor

(For) RICHARD F. CURTIN

OG159 (4/88/DWRR/2M)

APPENDIX A – GEOTECHNICAL INVESTIGATION

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED SAN JOAQUIN SOLAR PLANTS
1 & 2 PROJECTS
JAYNE AVENUE
COALINGA, CALIFORNIA

Krazan & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED SAN JOAQUIN SOLAR PLANTS
1 & 2 PROJECTS
JAYNE AVENUE
COALINGA, CALIFORNIA

KA PROJECT NO. 012-08068
FEBRUARY 20, 2009

Prepared for:

MR. KENT LARSEN
SPINNAKER ENERGY, INC.
12555 HIGH BLUFF DRIVE, SUITE 100
SAN DIEGO, CALIFORNIA 92130

Prepared by:

KRAZAN & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING DIVISION
215 WEST DAKOTA AVENUE
CLOVIS, CALIFORNIA 95652
(348) 348 -2200

REGISTERED PROFESSIONAL ENGINEER
DAVID R. JAROSZ, II
No. 2698
Expires June 30, 2010
GEOTECHNICAL
STATE OF CALIFORNIA

Krazan & Associates, Inc.
SITE DEVELOPMENT ENGINEERS

Krazan & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

February 20, 2009

KA Project No. 012-08068

Mr. Kent Larsen
Spinnaker Energy, Inc.
12555 High Bluff Drive, Suite 100
San Diego, California 92130

RE: Geotechnical Engineering Investigation
Proposed San Joaquin Solar Plants 1 & 2 Projects
Jayne Avenue
Coalinga, California

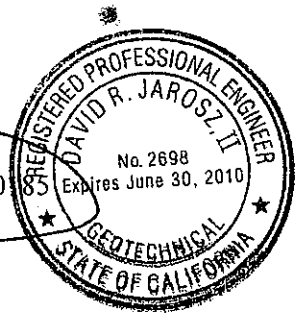
Dear Mr. Larsen:

In accordance your request, we have conducted a Geotechnical Engineering Investigation for the above-referenced site. The results of our investigation are presented in the attached report.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (559) 348-2200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

David R. Jarosz, II
Managing Engineer
RGE No. 2698/RCE No. 60185



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February 20, 2009 KA Project No. 012-08068

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED SAN JOAQUIN SOLAR PLANTS 1 & 2 PROJECTS
JAYNE AVENUE
COALINGA, CALIFORNIA

INTRODUCTION

This report presents the results of our Geotechnical Engineering Investigation for the proposed San Joaquin Solar Plants 1 & 2 Projects, to be located in Coalinga, California. Discussions regarding site conditions are presented herein, together with conclusions and recommendations pertaining to site preparation, Engineered Fill, utility trench backfill, drainage and landscaping, foundations, concrete floor slabs, and exterior flatwork, retaining walls, slopes, soil cement reactivity, and excavation stability.

A site plan showing the approximate boring locations is presented following the text of this report. A description of the field investigation, boring logs, and the boring log legend are presented in Appendix A. Appendix A also contains a description of the laboratory testing phase of this study along with the laboratory test results. Appendix B contains a guide to earthwork specifications. When conflicts in the text of the report occur with the general specifications in the appendices, the recommendations in the text of the report have precedence.

PURPOSE AND SCOPE

This investigation was conducted to evaluate the soil and groundwater conditions at the site, to make geotechnical engineering recommendations for use in design of specific construction elements, and to provide criteria for site preparation and Engineered Fill construction.

Our scope of services was outlined in our proposal dated July 7, 2008 (KA Proposal No. P313-08) and included the following:

- A site reconnaissance by a member of our engineering staff to evaluate the surface conditions at the project site.
- A field investigation consisting of drilling a total of 36 borings to depths ranging from approximately 12½ to 60 feet for evaluation of the subsurface conditions at the project site.
- Performing laboratory tests on representative soil samples obtained from the borings to evaluate the physical and index properties of the subsurface soils.

- Evaluation of the data obtained from the investigation and an engineering analysis to provide recommendations for use in the project design and preparation of construction specifications.

- Preparation of this report summarizing the results, conclusions, recommendations, and findings of our investigation.

PROPOSED CONSTRUCTION

We understand that design of the proposed development is currently underway; structural load information and other final details pertaining to the structures are unavailable. On a preliminary basis, it is understood that the development will consist of a new solar plant facility encompassing approximately 640 acres. The southern and northern portions of the project will consist of solar collector arrays that are planned to be supported on drilled caissons. The central portion of the site from east to west will consist of equipment, evaporation ponds, and warehouse facilities associated with the solar power plants. It is anticipated that these structures will be supported on shallow conventional or mat foundations.

The north-northeastern portion of the site consists of uphill slopes with surface elevations ranging approximately 570 to 650 feet above mean sea level and with a relief of between 40 to 80 feet across the site. Based on the preliminary information provided to us, it is understood that massive site grading will include cuts by as much as 20 feet below existing grade within the northeast portion and fill of up to 20 feet into the lower area within the central and northwestern portions of the site. The southern portion will be graded approximately 2 to 3 feet below existing site grade.

In the event these structural or grading details are inconsistent with the final design criteria, the Soils Engineer should be notified so that we may update this writing as applicable.

SITE LOCATION AND SITE DESCRIPTION

The site is roughly square in shape and encompasses approximately 640 acres. The site is located along the south side of Jayne Avenue approximately 2 miles east of Highway 33 in Coalinga, California. The site is located to the east of the California State Hospital facility and extends one mile to the east toward Sutter Avenue. The site is predominately surrounded by vacant/raw land to the north and east. Agricultural land is located south of the site. A series of retention basins associated with a sewage plant are located south of the hospital facility to the west.

Presently, the north-northeastern portion of the site consists of uphill slopes with relief ranging from 40 to 80 feet across the site. This portion of the site is predominately vacant and utilized as grazing land. An east-west trending dirt access road is located across the north-central portion of the site. A fence is located alongside the access road. A dry creek or gully trends southwest across the east-central portion of the site. Two dry sumps are located to the east of the creek or gully. A fenced corral and another sump approximately 5 to 7 feet deep are located near the toe of the slope within the eastern portion of the project site.

The southern portion of the project site is relatively level and utilized for agricultural purposes. The southeastern portion is utilized for wheat production. The remainder of the southern portion is occupied by an orchard and divided by dirt access roads and fences. An irrigation well is located in the southwest corner of the project site. An oil pipeline trends across the southwestern corner of the site near the well.

GEOLOGIC SETTING

The San Joaquin Valley, which includes the Coalinga area, is a topographic and structural basin that is bounded on the east by the Sierra Nevada Mountains and on the west by the Coast Ranges. The Sierra Nevadas, a fault block dipping gently southwestward, is made up of igneous and metamorphic rocks of pre-Tertiary age that comprise the basement complex beneath the Valley. The Coast Ranges contain folded and faulted sedimentary rocks of Mesozoic and Cenozoic age, which are similar to those rocks that underlie the Valley at depth and non-conformably overlie the basement complex; gently dipping to nearly horizontal sedimentary rocks of Tertiary and Quaternary age overlie the older rocks. These younger rocks are mostly of continental origin and in the Coalinga area, they were derived from the Sierra Nevadas.

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

Both the Sierra Nevada and Coast Range are geologically young mountain ranges and possess active and potentially active fault zones. Major active faults and fault zones occur at some distance to the east, west and south of the Coalinga area. The Owens Valley Fault Zone bounds the eastern edge of the Sierra Nevada block and contains both active and potentially active faults.

Portions of the Ortigalita, Calaveras, Hayward and Rinconada Faults, which are to the west, are considered potentially active. The San Andreas Fault is possibly the best known fault and is located about 15 to 20 miles to the west.

Coalinga residents could feel the affects of a large seismic event on one of the nearby active or potentially active fault zones. Coalinga has experienced ground shaking from earthquakes in the historical past. In 1983, ground shaking of an intensity of VIII (Modified Mercali Scale) was felt in Coalinga from the 1983 Coalinga Earthquake.

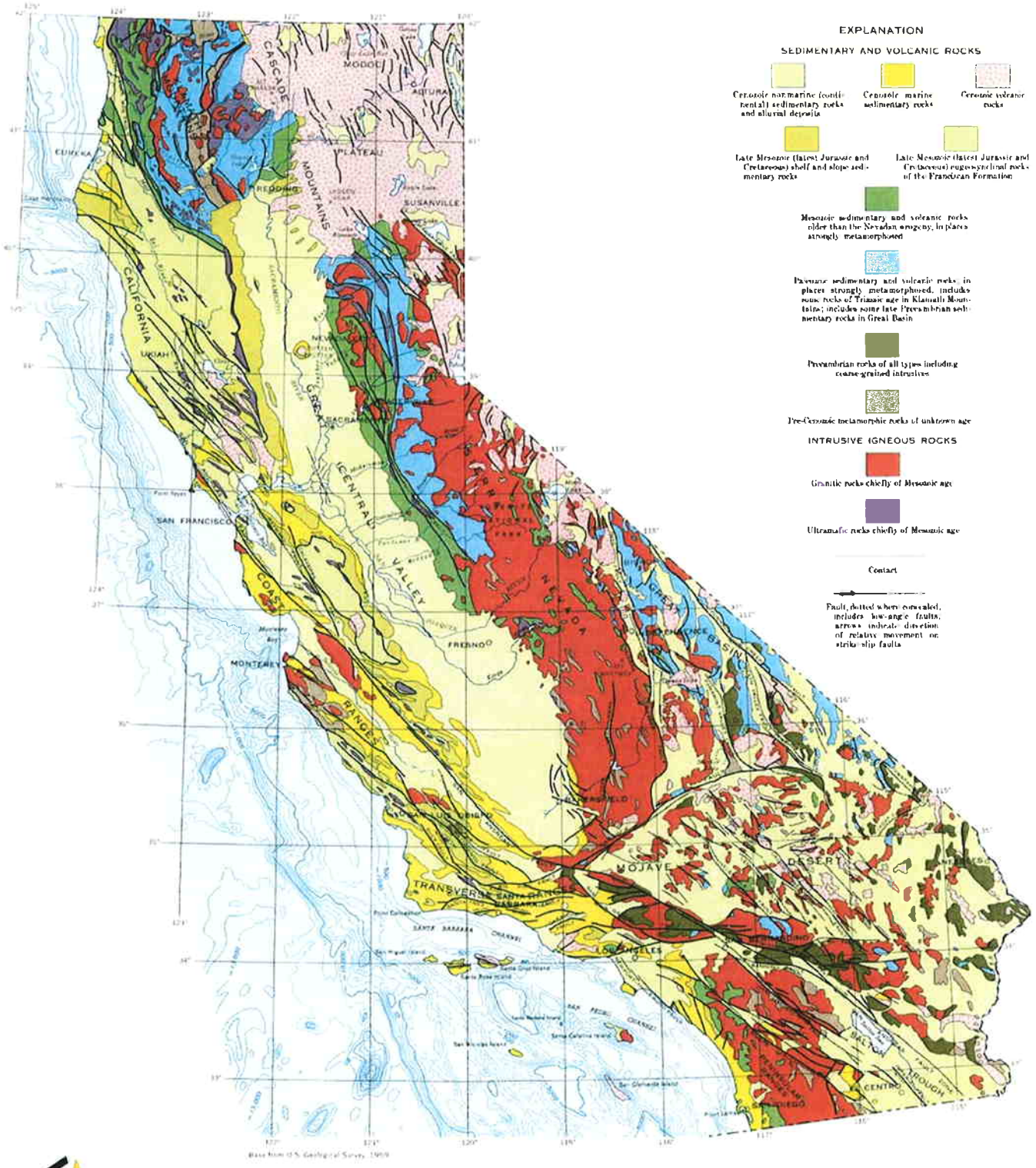
There are no active fault traces in the project vicinity. Accordingly, the project area is not within an Earthquake Fault Zone (Special Studies Zone).

FIELD AND LABORATORY INVESTIGATIONS

Subsurface soil conditions were initially explored within the southern half of the project site by drilling 24 borings to depths ranging from approximately 20 to 50 feet below existing site grade using a truck-mounted drill rig. After the preliminary site grading plan was provided, the remaining 12 borings were

CALIFORNIA GEOLOGICAL SURVEY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA - GRAY DAVIS, GOVERNOR
THE RESOURCES AGENCY - MARY D. NICHOLS, SECRETARY
CALIFORNIA DEPARTMENT OF CONSERVATION - DARRYL YOUNG, DIRECTOR



GEOLOGIC MAP OF CALIFORNIA

CALIFORNIA GEOLOGICAL SURVEY
CALIFORNIA CONSERVATION

later advanced within the northern portion to depths ranging from approximately 12½ to 60 feet below existing site grade. Boring B33 was terminated at a shallow depth due to auger refusal in very dense or weakly cemented silty sandy gravel with traces of cobbles. During drilling operations, penetration tests were performed at regular intervals to evaluate the soil consistency and to obtain information regarding the engineering properties of the subsoils. Soil samples were retained for laboratory testing. The soils encountered were continuously examined and visually classified in accordance with the Unified Soil Classification System. A more detailed description of the field investigation is presented in Appendix A.

Laboratory tests were performed on selected soil samples to evaluate their physical characteristics and engineering properties. The laboratory testing program was formulated with emphasis on the evaluation of natural moisture, density, gradation, shear strength, consolidation potential, expansion potential, atterberg limits, and moisture density relationships of the materials encountered. In addition, chemical tests were performed to evaluate the corrosivity of the soils to buried concrete and metal. Details of the laboratory test program and results of the laboratory tests are summarized in Appendix A. This information, along with the field observations, was used to prepare the final boring logs in Appendix A.

SOIL PROFILE AND SUBSURFACE CONDITIONS

Based on our findings, the subsurface conditions encountered appear typical of those found in the geologic region of the site. In general, the surface soils consist of approximately 6 to 12 inches of predominately very loose silty clay, sandy silty clay, clayey silt/silty clay, silty clayey sand, clayey sand, silty sand/sandy silt with clay, and silty sand with clay. These soils are disturbed, have low strength characteristics, and are highly compressible when saturated.

Below the very loose surface soils, approximately 2 to 3 feet of stiff to hard silty clay, sandy silty clay, silty sandy clay, or sandy clayey silt and loose to dense silty clayey sand, clayey sand, silty sand/sandy silt, and silty sand were encountered. The stiff to hard silty clay soil layers were encountered predominately within the southern and central portions of the site near and/or along the hill slopes. The clayey sand soils were predominately encountered within the hilly terrains to the north and northeast. Field and laboratory tests suggest that these soils are moderately strong, slightly to moderately compressible, and had a low to very high shrink/swell potential. Penetration resistance ranged from 8 to 62 blows per foot. Dry densities ranged from 80 to 118 pcf. Representative soil samples consolidated approximately 1 to 5½ percent under a 2 ksf load when saturated. Representative samples of the clayey soils had angles of internal friction ranging from 20 to 21 degrees, and cohesion of 0.4 ksf to 0.5 ksf. A representative sample of the clayey sand soils had an angle of internal friction of 30 degrees. The clay soils had Uniform Building Code Expansion Indices ranging from 145 to 178, and plasticity indices of 28 to 40. A representative sample of the silty sand with clay soil had a Uniform Building Code Expansion Index of 23.

Below 3 to 4 feet, approximately 2 to 6 feet of stiff to hard silty clay, sandy silty clay, and clayey silt or loose to very dense clayey sand, clayey silty sand, silty clayey sand, silty sand, silty sand/sandy silt, and silty gravelly sand were encountered. Field and laboratory tests suggest that these soils are moderately

strong, slightly compressible, and had a moderate to very high shrink/swell potential. Penetration resistance ranged from 13 blows per foot to over 50 blows per 6 inches. Dry densities ranged from 81 to 124 pcf. Representative soil samples consolidated approximately ½ to 3½ percent under a 2 ksf load when saturated. One of the clayey soil samples swelled approximately 1½ percent under a 2 ksf load when saturated. Representative soil samples had angles of internal friction ranging from 20 to 43 degrees.

Below approximately 4 to 10 feet, layers of predominately very stiff to hard silty clay, sandy silty clay, clayey silt, and dense to very dense silty clayey sand, clayey sand, silty sand with clay, silty sand, gravelly silty sand, silty sand/sand and silty sandy gravel with traces of cobbles were encountered. Field and laboratory tests suggest that these soils are moderately strong and slightly compressible. These soils have similar strength characteristics as the upper soils and extended to the termination depth of our borings.

For additional information about the soils encountered, please refer to the logs of borings in Appendix A.

GROUNDWATER

Test boring locations were checked for the presence of groundwater during and immediately following the drilling operations. Free groundwater was not encountered. Groundwater in the vicinity of the project site is typically encountered at depths greater than 50 feet below site grade.

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

SOIL LIQUEFACTION

Soil liquefaction is a state of soil particle suspension, caused by a complete loss of strength when the effective stress drops to zero. Liquefaction normally occurs in soils, such as sands, in which the strength is purely frictional. However, liquefaction has occurred in soils other than clean sands. Liquefaction usually occurs under vibratory conditions, such as those induced by seismic events.

To evaluate the liquefaction potential of the site, the following items were evaluated:

1) Soil type
2) Groundwater depth
3) Relative density
4) Initial confining pressure
5) Intensity and duration of groundshaking

The soils within the project site predominately consisted of stiff to hard silty clay, sandy silty clay, sandy silt/silty clay, clayey silt, clayey sand/sandy clay, and dense to very dense silty clayey sand, silty sand with clay, silty sand, gravelly silty sand, silty sand/sand, and silty sandy gravel with traces of cobbles. Groundwater was not encountered during our recent exploratory drilling. Groundwater in the vicinity of the project site is typically encountered at depths greater than 50 feet below site grade.

Based on our analysis, the potential for soil liquefaction within the project site is very low due to predominately very stiff to hard and/or dense to very dense conditions of the subsoils underlying the site. Therefore, mitigation measures to mitigate seismic-induced liquefaction are not necessary.

SEISMIC SETTLEMENT

One of the most common phenomena during seismic shaking accompanying any earthquake is the induced settlement of loose unconsolidated soils. Based on site subsurface conditions, and the moderate seismicity of the region, any loose materials at the site could be vulnerable to this potential hazard. However, this hazard can be mitigated by following the design and construction recommendations of our Geotechnical Engineering Investigation (over-excavation and rework of the loose soils and/or fill, or deep foundations). Therefore, after the recommended over-excavation and recompaction of the upper loose surface soils and new fill, the native deposits underlying the site do not appear to be subject to significant seismic settlement.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of our field and laboratory investigations, along with previous geotechnical experience in the project area, the following is a summary of our evaluations, conclusions, and recommendations.

Administrative Summary

In brief, the subject site and soil conditions, with the exception of the disturbed near surface soils, moderately compressible upper soils, expansive nature of the clayey soils, and existing development, appear to be conducive to the development of the project. The surface soils have a loose consistency. Accordingly, it is recommended that the surface soils be recompacted. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation.

Of primary importance in the development of this site is the removal and/or replacement of upper moisture sensitive clayey soils, particularly within the southern half of the site which is generally flat and with relatively minor cuts or fills to be involved. These clayey soils have a moderate to very high shrink/swell potential. These clayey soils can shrink when dry or swell when saturated and may cause minor movement affecting the structural foundations and concrete slabs. Accordingly, mitigation measures are recommended to reduce the potential for excessive total and differential soil movements. It is recommended that following stripping operations, within the vicinity of the structures to be supported on shallow foundations, the upper 3 feet of native soils within the proposed structural areas

be over excavated. Over-excavation should extend to a minimum of 5 feet beyond proposed footing lines. Prior to backfilling, the exposed subgrade soils should be scarified to a depth of 12 inches, moisture-conditioned to a minimum of 2 percent above optimum moisture-content, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. The resulting excavation should be backfilled with Engineered Fill, compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. In addition, shallow foundations should be supported by a minimum of 24 inches of Engineered Fill. Prior to fill placement Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal will be required. If the structures will be supported on foundations extending below 6 feet from original grade, over excavation of the upper native soils will not be required.

In addition, it is recommended the upper 36 inches of soil within building pad and slab-on-grade areas consist of non-expansive Engineered Fill. However, in hilly areas, thick cuts will expose relatively cohesionless silty sand or silty sandy gravel soils. In this case, if 36 inches of non-expansive soil is already in place, no additional non-expansive fill placement will be required. The intent is to support the building pad, concrete slab-on-grade and exterior flatwork areas with 36 inches of non-expansive fill. The fill placement serves two functions: 1) it provides a uniform amount of soil which will more evenly distribute the soil pressures and 2) it reduces moisture content fluctuation in the clayey material beneath the building area. The non-expansive fill material should be a well-graded silty sand or sandy silt soil. A clean sand or very sandy soil is not acceptable for this purpose. A sandy soil will allow the surface water to drain into the expansive clayey soil below, which may result in soil swelling. Imported Fill should be approved by the Soils Engineer prior to placement. The fill should be placed as specified as Engineered Fill.

As an alternative to the use of non-expansive soils, the upper 36 inches of soil supporting the building pad, exterior flatwork and slab-on-grade areas can consist of lime-treated clayey soils. The lime-treated soils should be recompacted to a minimum of 90 percent of maximum density. Preliminary application rate of lime should be 5 percent by dry weight. The lime material should be calcium oxide, commonly known as quick-lime. The clayey soils should be at or near optimum moisture during the mixing operations.

The site is fairly large and encompasses approximately 640 acres. Based on the preliminary information provided to us, it is understood that massive site grading will include cuts by as much as 20 feet below existing grade within the northeast portion and fill of up to 20 feet into the lower area within the central and northwestern portions of the site. The southern portion will be graded approximately 2 to 3 feet below existing site grade. Based on the subsurface soils encountered from the borings, it is anticipated that cohesionless sandy soils will be excavated in deep cuts in some areas within the northern portion of the site. Therefore, it is recommended that during mass grading, a representative of our firm be present at the site to delineate cut areas where the excavated soils are suitable for use as Engineered Fill and can be stockpiled separately and reused for backfill within structural areas.

The site is utilized for agricultural purposes. Associated with this development are buried structures such as irrigation lines or loosely backfilled excavations that may extend into the project site. Any buried structures, including pipelines or loosely backfilled excavations, encountered during construction should be properly removed and/or relocated. It is suspected demolition of the existing structures may disturb the upper soils. The resulting excavations should be cleaned to firm native ground and backfilled with Engineered Fill. Disturbed areas caused by demolition activities should be removed and/or recompacted. If not utilized for the new development, the water well should be abandoned in accordance with the county, state, and/or federal standards.

Drainage sumps are located within the eastern portion of the site. If these sumps will be backfilled during construction, all deleterious materials should be removed from the drainage sumps prior to backfilling. The resulting excavations should be cleaned to firm native ground and backfilled with Engineered Fill, compacted to a minimum of 90 percent of its maximum density based on ASTM Test Method D1557.

The site topography consists of relatively flat to gently sloping terrains with maximum relief of approximately 40 to 80 feet across the site. It is recommended that cut and fill slopes be constructed 2:1 (horizontal to vertical) or flatter. In lieu of these slopes, retaining walls may be used. In addition, it is recommended that the structures have a minimum setback of at least 10 feet away from the edge of the slopes or ⅓ the height of the slope, whichever is greater. Cut and fill slopes may be revised as recommended by the Soils Engineer, upon his review of a more definitive site plan.

After completion of the recommended site preparation, the site should be suitable for shallow footing support. The proposed structure footings may be designed utilizing conventional spread footings or mat foundations with allowable bearing pressures of 2,500 and 1,800 psf, respectively, for dead-plus-live loads. Spread or continuous footings, if utilized, should have a minimum embedment of 18 inches. The proposed solar collector arrays may be supported by drilled caissons. If drilled piers or caissons extending below 6 feet will be utilized, no over-excavation of the native soils for recompaction or replacement will be required.

Groundwater Influence on Structures/Construction

Test boring locations were checked for the presence of groundwater during and immediately following the drilling operations. Free groundwater was not encountered. Groundwater in the vicinity of the project site is typically encountered at depths greater than 50 feet below site grade.

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

Site Preparation

General site clearing should include removal of vegetation; existing utilities; structures including foundations, basement walls and floors; trees and associated root systems; rubble; rubbish; and any loose and/or saturated materials. Site stripping should extend to a minimum depth of 2 to 4 inches, or until all organics in excess of 3 percent by volume are removed. Deeper stripping may be required in localized areas. These materials will not be suitable for use as Engineered Fill. However, stripped topsoil may be stockpiled and reused in landscape or non-structural areas.

The site is utilized for agricultural purposes. Associated with this development are buried structures such as irrigation lines or loosely backfilled excavations that may extend into the project site. Any surface and buried structures, pipelines, or loosely backfilled excavations encountered during construction should be properly removed and/or relocated. It is suspected demolition of the existing structures may disturb the upper soils. The resulting excavations should be cleaned to firm native ground and backfilled with Engineered Fill. Excavations, depressions, or soft and pliant areas extending below planned finish subgrade level should be cleaned to firm undisturbed soil, and backfilled with Engineered Fill. In general, any septic tanks, debris pits, cesspools, or similar structures should be entirely removed. Concrete footings should be removed to an equivalent depth of at least 3 feet below proposed footing elevations or as recommended by the Soils Engineer. If not utilized for the new development, the water well should be abandoned in accordance with the county, state, and/or federal standards. Any other buried structures should be removed in accordance with the recommendations of the Soils Engineer. The resulting excavations should be backfilled with Engineered Fill.

Drainage sumps are located within the eastern portion of the site. If these sumps will be backfilled during construction, all deleterious materials should be removed from the drainage sumps prior to backfilling. The resulting excavations should be cleaned to firm native ground and backfilled with Engineered Fill, compacted to a minimum of 90 percent of its maximum density based on ASTM Test Method D1557.

The site topography consists of relatively flat to gently sloping terrains with maximum relief of approximately 40 to 80 feet across the site. It is recommended that cut and fill slopes be constructed 2:1 (horizontal to vertical) or flatter.

Site grading near slopes and the embankments, including retaining walls and wing walls, should be accomplished such that excessive sheet run-off is prevented. The completed slopes should be seeded or otherwise vegetated to protect from erosion. Well-vegetated slopes, at the recommended configuration, should be reasonably protected from typical erosional effects. However, vegetated slopes may not be protected from unusual flow conditions, such as a flood event. If erosion control from unusual flow conditions is desired, more substantial erosion protection measures, such as grouted cobble slope facing or manufactured slope protection products, should be considered.

Temporary and permanent excavations of the proposed construction should be made in accordance with the recommendations presented in this report. Temporary excavations should be left open for as short of time as possible and should be protected from run-off. The bottom of the excavations should be cleaned of loose materials, scarified to a depth of 6 inches, worked until uniform and free from large clods, moisture-conditioned to a minimum of 2 percent above optimum moisture-content, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Following stripping operations, demolition activities, and prior to fill placement, the exposed subgrade in exterior flatwork and pavement areas should be excavated/scarified to a depth of at least 12 inches, worked until uniform and free from large clods, moisture-conditioned to a minimum of 2 percent above optimum moisture content, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

In order to reduce the potential for excessive total and differential soil movements associated with the on-site upper soils, particularly within the southern half of the site which is generally flat and with relatively minor cuts or fills to be involved, it is recommended that following stripping operations, within the vicinity of the structures to be supported on shallow foundations, the upper 3 feet of native soils be over-excavated. Over-excavation should extend to a minimum of 5 feet beyond proposed footing lines. Prior to backfilling, the exposed subgrade soils should be scarified to a depth of 12 inches, moisture-conditioned to a minimum of 2 percent above optimum moisture-content, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. The excavation should be backfilled with Engineered Fill, compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Prior to fill placement Krazan & Associates, Inc. should inspect the bottom of the excavations to verify no additional removal will be required. If the structures will be supported on foundations extending below 6 feet from original grade, over excavation of the upper native soils will not be required.

In addition, it is recommended the upper 36 inches of soil within building pad, exterior flatwork and slab-on-grade areas consist of non-expansive or lime-treated Engineered Fill. However, in hilly areas, thick cuts will expose relatively cohesionless silty sand or silty sandy gravel soils. In this case, if 36 inches of non-expansive soil is already in place, no additional non-expansive fill placement will be required. The intent is to support the building pad and concrete slab-on-grade areas with 36 inches of non-expansive or lime-treated fill. The fill placement serves two functions: 1) it provides a uniform amount of soil which will more evenly distribute the soil pressures and 2) it reduces moisture content fluctuation in the clayey material beneath the building area. The non-expansive fill material should be a well-graded silty sand or sandy silt soil. A clean sand or very sandy soil is not acceptable for this purpose. A sandy soil will allow the surface water to drain into the expansive clayey soil below, which may result in soil swelling. Imported Fill should be approved by the Soils Engineer prior to placement. The fill should be placed as specified as Engineered Fill.

The site is fairly large and encompasses approximately 640 acres. Based on the preliminary information provided to us, it is understood that massive site grading will include cuts by as much as 20 feet below existing grade within the northeast portion and fill of up to 20 feet into the lower area within the central

and northwestern portions of the site. The southern portion will be graded approximately 2 to 3 feet below existing site grade. Based on the subsurface soils encountered from the borings, it is anticipated that cohesionless sandy soils will be excavated in deep cuts in some areas within the northern portion of the site. Therefore, it is recommended that during mass grading, a representative of our firm be present at the site to delineate cut areas where the excavated soils are suitable for use as Engineered Fill, and can be stockpiled separately and reused for backfill within structural areas.

The upper soils, during wet winter months, become very moist due to the absorptive characteristics of the soil. Earthwork operations performed during winter months may encounter very moist unstable soils, which may require removal to grade a stable building foundation. Project site winterization consisting of placement of aggregate base and protecting exposed soils during the construction phase should be performed.

A representative of our firm should be present during all site clearing and grading operations to test and observe earthwork construction. This testing and observation is an integral part of our service as acceptance of earthwork construction is dependent upon compaction of the material and the stability of the material. The Soils Engineer may reject any material that does not meet compaction and stability requirements. Further recommendations of this report are predicated upon the assumption that earthwork construction will conform to recommendations set forth in this section and the Engineered Fill section.

Slope Construction/Reconstruction

Slopes can be constructed/reconstructed by placement of Engineered Fill utilizing a keying and benching procedure as described below. Reconstructed slopes should be constructed at an inclination not exceeding 2:1 (horizontal to vertical). Krazan and Associates, Inc. should be retained to review all slope reconstruction plans and specifications prior to initiating the repair work.

General site clearing should include removal of vegetation, any loose and/or saturated materials. Excavations or depressions extending below subgrade levels should be cleaned to firm, undisturbed soil and backfilled with Engineered Fill, placed and recompacted in accordance with the recommendations stated herein.

Where fills greater than 8 feet are to be constructed on original ground that slopes at inclinations steeper than 6:1 (horizontal to vertical), benches should be cut into the existing slope as the filling operations proceed. Each bench should consist of a level terrace a minimum of 8 feet wide, with the rise to the next bench held to 4 feet or less. Where fills of comparable height will be constructed on ground that slopes at an inclination steeper than 4:1 (horizontal to vertical), a keyway should be provided in addition to the benches. Each keyway should consist of a level trench at least 8 feet wide and at least 2 feet deep, with side slopes not exceeding 1:1 (horizontal to vertical), cut into the existing slope. Where fills of comparable height will be constructed on ground that slopes at an inclination steeper than 2:1 (horizontal to vertical), geotextile fabric and retaining structures should be utilized in slope construction where subsequent specific building site investigations warrant.

Site grading near the crowns of the reconstructed slopes should be accomplished such that excessive sheet run-off is prevented.

The completed slopes should be seeded or otherwise vegetated to protect from future erosion. Well vegetated slopes at the recommended configuration should be reasonably protected from typical erosional effects. However, vegetated slopes may not be protected from unusual flow conditions, such as flood events or over-topping of the development's storm drainage system. If erosion control from unusual flow conditions is desired, more substantial erosion protection measures, such as grouted cobble slope facing or manufactured slope protection products should be considered.

Slope Protection

Site grading near slopes and the embankments, including retaining walls and wing walls, should be accomplished such that excessive sheet run-off is prevented. The completed slopes should be seeded or otherwise vegetated to protect from erosion. Well-vegetated slopes, at the recommended configuration, should be reasonably protected from typical erosional effects. However, vegetated slopes may not be protected from unusual slope conditions, such as a flood event. If erosion control from unusual flow condition is desired, more substantial erosion protection measures, such as grouted cobble slope facing or manufactured slope protection products, should be considered.

If grass and forb cover is desired, mowing or spraying with approved chemicals may be necessary to control woody growth. If woody cover is desired, seeding a suitable cover crop first, such as small grain or grass, helps control erosion; then trees and shrubs can be planted or native woody plants allowed to invade the site. Vegetation can be established on embankments using conventional form machinery, hydraulic seeders, and other kinds of equipment. Steepness of slopes determines which kind of machine is most suitable. Seeding failures may be caused by poor weather, droughtness, erosion, and other adverse site conditions. Maintaining a dense plant over is difficult on slopes steeper than 2:1 (horizontal to vertical). On steep slopes, it may be necessary to plant by hand or use sod, rip rap, or other materials for adequate protection. Irrigation may be needed to establish vegetation in areas of low rainfall.

Within the side of embankments facing water flow, it is recommended that rock rip rap or concrete paving be used to prevent erosion. Rip rap or paving should be inspected regularly, to be sure that they are not dislodged or damaged. Eroded areas should be promptly repaired and reseeded or protected by rip rap or paving. As an alternative to the rip rap or paving, erosion control geotextile material, such as Mirafi 700X or similar, may be installed for erosion control. This geotextile protection system is often used to guard against erosion.

Engineered Fill

The upper, on-site, native soils predominately consisted of silty clay, sandy silty clay, clayey silt/silty clay, clayey silt, silty clayey sand, silty sand with clay, gravelly silty sand, and silty sandy gravel with traces of cobbles. The clayey soils will not be suitable for reuse as non-expansive Engineered Fill. The clayey soils may be used within the upper 36 inches of slab-on-grade and exterior flatwork areas

provided they are lime-treated. The preliminary application rate of lime should be 5 percent by dry weight. The lime material should be calcium oxide, commonly known as quick-lime. The clayey soils should be at or near optimum moisture-condition during mixing operations. Additional testing is recommended to determine the appropriate application rate of lime prior to placement. These clayey soils will be suitable for use as General Engineered Fill within pavement areas and below 36 inches from finished pad grade in slab-on-grade areas, provided they are cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum size, moisture-conditioned to 2 to 5 percent above optimum moisture, and compacted to between 90 and 93 percent of maximum density based on ASTM Test Method D1557. The on-site soils that do not contain clay will be suitable for reuse as non-expansive Engineered Fill, provided they are cleansed of excessive organics and debris. Due to the large extent of the site, it is recommended that additional testing be performed on the on-site soils to evaluate the physical and index properties prior to reuse as Engineered Fill.

The preferred materials specified for Engineered Fill are suitable for most applications with the exception of exposure to erosion. Project site winterization and protection of exposed soils during the construction phase should be the sole responsibility of the Contractor since he has complete control of the project site at that time.

Imported non-expansive Fill should consist of a well-graded, slightly cohesive, fine silty sand or sandy silt soil, with relatively impervious characteristics when compacted. This material should be approved by the Soils Engineer prior to use and should typically possess the following characteristics:

Percent Passing No. 200 Sieve	20 to 50
Plasticity Index	10 maximum
UBC Standard 29-2 Expansion Index	15 maximum

Fill soils should be placed in lifts approximately 6 inches thick, moisture-conditioned as necessary, and compacted to achieve at least 90 percent of maximum density based on ASTM Test Method D1557. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.

Excavation Stability

Temporary excavations planned for the construction of the proposed structures and any other associated underground structures should be excavated according to the accepted engineering practice following Occupational Safety and Health Administration (OSHA) standards by a Contractor experienced in such work. Open, unbraced excavations in undisturbed soils should be made according to the table below.

Recommended Excavation Slopes	
Depth of Excavation (ft)	Slope (Horizontal:Vertical)
	Temporary
0-5	1:1
5-10	1¼:1
10-15	1½:1
15-20	1¾ :1
20 +	2: 1

If, due to space limitation, excavation near existing structures or roads is performed in a vertical position, braced shorings or shields may be used for supporting vertical excavations. Therefore, in order to comply with the local and state safety regulations, a properly designed and installed shoring system would be required to accomplish planned excavation and installation. A specialty Shoring Contractor should be responsible for the design and installation of such a shoring system during construction. The lateral pressures provided below may be used in the design of a braced-type shoring system.

Recommended Lateral Earth Pressure for Braced Shoring	
Depth of Excavation Below Ground Surface (feet)	Lateral Soil Pressure (psf)
0	0 H
0.25 H	50 H
H	50 H
Where H is the total depth of the excavation in feet.	

The foregoing does not include excess hydrostatic pressure or surcharge loading. Fifty percent of any surcharge load, such as construction equipment weight, should be added to the lateral load given above.

Since the Contractor has the ultimate responsibility for excavation stability, he may design a different shoring system for the excavation.

The excavation/shoring recommendations provided herein are based on soil characteristics derived from limited test borings drilled within the area. Variations in soil conditions will likely be encountered during the excavations. Krazan & Associates, Inc. should be afforded the opportunity to provide field review to evaluate the actual conditions and account for field condition variations not otherwise anticipated in the preparation of this recommendation.

Slope height, slope inclination, or excavation depth should in no case exceed those specified in local, state, or federal safety regulation, (e.g. OSHA) standards for excavations, 29 CFR part 1926, or Assessor's regulations.

Drainage and Landscaping

The ground surface should slope away from building pad and pavement areas toward appropriate drop inlets or other surface drainage devices. In accordance with Section 1803 of the 2007 California Building Code, it is recommended that the ground surface adjacent to foundations be sloped a minimum of 5 percent for a minimum distance of 10 feet away from structures, or to an approved alternative means of drainage conveyance. Swales used for conveyance of drainage and located within 10 feet of foundations should be sloped a minimum of 2 percent. Impervious surfaces, such as pavement and exterior concrete flatwork, within 10 feet of building foundations should be sloped a minimum of 2 percent away from the structure. Drainage gradients should be maintained to carry all surface water to collection facilities and off-site. These grades should be maintained for the life of the project.

Grade the site to prevent water/run-off flow over the face of cut and fill slopes. To accomplish this, use asphalt berms, brow ditches, or other measures to intercept and slowly redirect flow. Plant all disturbed areas with erosion-resistant vegetation suited to the area. As an alternative, jute netting or geotextile erosion control mats may be considered for control of erosion. Slopes should be inspected periodically for erosion and repaired immediately if detected. Where only 1 drainage terrace is necessary, it should be located at mid-height of the slope. Brow ditches and drainage terraces should be cleaned before the start of each rainy season and, if necessary, after each rainstorm.

Slots or weep holes should be placed in drop inlets or other surface drainage devices in pavement areas to allow free drainage of adjoining base course materials. Cutoff walls should be installed at pavement edges adjacent to vehicular traffic areas, these walls should extend to a minimum depth of 6 inches below pavement subgrades to limit the amount of seepage water that can infiltrate the pavements. Where cutoff walls are undesirable subgrade drains can be constructed to transport excess water away from planters to drainage interceptors. If cutoff walls can be successfully used at the site, construction of subgrade drains is considered unnecessary.

Utility Trench Backfill

Utility trenches should be excavated according to accepted engineering practices following OSHA (Occupational Safety and Health Administration) standards by a Contractor experienced in such work. The responsibility for the safety of open trenches should be borne by the Contractor. Traffic and vibration adjacent to trench walls should be minimized; cyclic wetting and drying of excavation side slopes should be avoided. Depending upon the location and depth of some utility trenches, groundwater flow into open excavations could be experienced, especially during or shortly following periods of precipitation.

Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 90 percent of the maximum density based on ASTM Test Method D1557. Utility trench backfill placed in pavement areas should be compacted to at least 90 percent of the maximum density based on ASTM Test Method D1557. Pipe bedding should be a minimum of 4 inches of clean sand compacted to a minimum of 90 percent of maximum density based ASTM Test Method D1557 or be in accordance with pipe manufacturer's recommendations, whichever has the stricter requirements.

The Contractor is responsible for removing all water-sensitive soils from the trench regardless of the backfill location and compaction requirements. The Contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction.

Foundations - Conventional

After completion of the recommended site preparation, the site should be suitable for shallow footing support. The proposed the equipment, warehouse facilities and other associated structures may be supported on a shallow foundation system bearing on a minimum of 24 inches of Engineered Fill. Spread and continuous footings can be designed for the following maximum allowable soil bearing pressures:

Load	Allowable Loading
Dead Load Only	1,875 psf
Dead-Plus-Live Load	2,500 psf
Total Load, Including Wind or Seismic Loads	3,325 psf

The footings should have a minimum embedment depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Footings should have a minimum width of 12 inches, regardless of load. Ultimate design of foundations and reinforcement should be performed by the project Structural Engineer.

The total movement is not expected to exceed 1 inch. Differential movement should be less than 1 inch. Most of the movement is expected to occur during construction as the loads are applied. However, additional post-construction movement may occur if the foundation soils are flooded or saturated.

Resistance to lateral footing displacement can be computed using an allowable friction factor of 0.30 acting between the base of foundations and the supporting subgrade. Lateral resistance for footings can alternatively be developed using an allowable equivalent fluid passive pressure of 250 pounds per cubic foot acting against the appropriate vertical footing faces. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. A ⅓ increase in the above value may be used for short duration, wind, or seismic loads. All of the above earth pressures are unfactored and are, therefore, not inclusive of factors of safety.

Foundations-Mat Foundations

After completion of the recommended site preparation, the site should be suitable for shallow footing support. The proposed equipment may be supported on a thick mat foundation system, bearing on a minimum of 24 inches of Engineered Fill. The mat foundations may be designed for the following maximum allowable soil bearing pressures:

Load	Allowable Loading
Dead Load Only	1,350 psf
Dead-Plus-Live Load	1,800 psf
Total Load, including wind or seismic loads	2,400 psf

The total movement of the foundation is not expected to exceed 2 inches. The differential movement should be less than 1 inch. The mat should have a minimum thickness of 12 inches. The mat should be reinforced at a minimum with No. 4 reinforcement bars at 18 inches, on-center both ways. Ultimate design of foundations and reinforcement should be performed by the project's Structural Engineer.

Resistance to lateral footing displacement can be computed using an allowable friction factor of 0.30 acting between the base of foundations and the supporting subgrade. Lateral resistance for footings can alternatively be developed using an allowable equivalent fluid passive pressure of 250 pounds per cubic foot acting against the appropriate vertical footing faces. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. A ⅓ increase in the above value may be used for short duration, wind, or seismic loads. All of the above earth pressures are unfactored and are, therefore, not inclusive of factors of safety.

Foundations—Drilled Caissons

The proposed solar collector arrays can be supported on caissons using an allowable sidewall friction of 350 psf. This value is for dead-plus-live loads. This value may be increased $^1/_3$ for short duration loads, such as wind or seismic. Uplift loads can be resisted by caissons using an allowable sidewall friction of 200 psf of the surface area and the weight of the pier. Caissons should have a minimum embedment depth of 6 feet. The upper 2 feet should be neglected from friction calculations. The total and differential settlement should be less than 1 inch. Most of the settlement is expected to occur during construction as the loads are applied.

Lateral loads for caissons may be designed using the CBC flagpole formula with a lateral bearing capacity of 200 psf/ft. The lateral loading criteria is based on the assumption that the load application is applied at the ground level and flexible cap conditions apply. Ultimate design of caissons/piers and reinforcement should be performed by the project Structural Engineer.

Lateral Earth Pressures and Retaining Walls

Walls retaining horizontal backfill and capable of deflecting a minimum of 0.1 percent of its height at the top may be designed using an equivalent fluid active pressure of 50 pounds per square foot per foot of depth. Walls that are incapable of this deflection or walls that are fully constrained against deflection may be designed for an equivalent fluid at-rest pressure of 70 pounds per square foot per foot per depth. Expansive soils should not be used for backfill against walls. The wedge of non-expansive backfill material should extend from the bottom of each retaining wall outward and upward at a slope of 2:1

(horizontal to vertical) or flatter. The stated lateral earth pressures do not include the effects of hydrostatic water pressures generated by infiltrating surface water that may accumulate behind the retaining walls; or loads imposed by construction equipment, foundations, or roadways. All of the above earth pressures are unfactored and are, therefore, not inclusive of factors of safety.

During grading and backfilling operations adjacent to any walls, heavy equipment should not be allowed to operate within a lateral distance of 5 feet from the wall, or within a lateral distance equal to the wall height, whichever is greater, to avoid developing excessive lateral pressures. Within this zone, only hand operated equipment ("whackers," vibratory plates, or pneumatic compactors) should be used to compact the backfill soils.

Retaining and/or below grade walls should be drained with either perforated pipe encased in free-draining gravel or a prefabricated drainage system. The gravel zone should have minimum width of 12 inches and should extend upward to within 12 inches of the top of the wall. The upper 12 inches of backfill should consist of native soils, concrete, asphaltic concrete, or other suitable backfill material to minimize surface drainage into the wall drain system. The aggregate should conform to Class II permeable materials graded in accordance with the CalTrans Standard Specifications (May 2006). Prefabricated drainage systems, such as Miradrain®, Enkadrain®, or equivalent substitute, are acceptable alternatives in lieu of gravel provided that they are installed in accordance with the manufacturer's recommendations. If a prefabricated drainage system is proposed, our firm should review the system for final acceptance prior to installation.

Drainage pipes should be placed with the perforations down and should discharge in a non-erosive manner away from foundations and other improvements. The pipes should be placed no higher than 6 inches above the heel of the wall in the center of the drainage blanket and should have a minimum diameter of 4 inches. Drain collector pipes may be either slotted of perforated. Slots should be no wider than 1/8-inch in width, while perforations should be no more than ¼-inch in diameter. If retaining walls are less than 6 feet high, the perforated pipe may be omitted in lieu of weep holes on 4 feet maximum spacing. The weep holes should consist of 4-inch diameter holes (concrete wall) or unmortared head joints (masonry walls) and not be higher than 18 inches above the lowest adjacent grade. Two 8-inch square overlapping patches of geotextile fabric (conforming to the CalTrans Standard Specifications for "edge drains") should be affixed to the rear wall opening of each weep-hole to retard soil piping.

Seismic Parameters – 2007 California Building Code

The Site Class, per Table 1613.5.2 of the 2007 California Building Code, is based upon the site soil conditions. It is our opinion that a Site Class D is appropriate for building design at this site. For seismic design of the structures, in accordance with the seismic provisions of the 2007 CBC, we recommend the following parameters:

Seismic Item	VALUE	CBC REFERENCE
Site Class	D	Table 1613.5.2
Site Coefficient F_a	1.000	Table 1613.5.3 (1)
S_S	1.795	Figure 1613.5 (3)
S_{MS}	1.795	Section 1613.5.3
S_{DS}	1.197	Section 1613.5.4
Site Coefficient Fv	1.500	Table 1613.5.3 (2)
S_1	0.600	Figure 1613.5 (4)
S_{M1}	0.900	Section 1613.5.3
S_{D1}	0.600	Section 1613.5.4

Soil Cement Reactivity

Excessive sulfate in either the soil or native water may result in an adverse reaction between the cement in concrete (or stucco) and the soil. HUD/FHA and CBC have developed criteria for evaluation of sulfate levels and how they relate to cement reactivity with soil and/or water.

Soil samples were obtained from the site and tested in accordance with State of California Materials Manual Test Designation 417. The sulfate concentrations detected from these soil samples were greater than 1000 ppm and are above the maximum allowable values established by HUD/FHA and CBC. Therefore, it is recommended that a Type V cement be used within the concrete to compensate for sulfate reactivity with the cement.

Chemical tests were performed on a near-surface soil sample. The test results indicate that the soils are moderately to highly corrosive to buried metal objects. Therefore, buried metal should be protected using either non-corrosive backfill, protective coatings, wrappings, sacrificial anodes, or a combination of these methods in accordance with the manufacturer's recommendations.

Compacted Material Acceptance

Compaction specifications are not the only criteria for acceptance of the site grading or other such activities. However, the compaction test is the most universally recognized test method for assessing the performance of the Grading Contractor. The numerical test results from the compaction test cannot be used to predict the engineering performance of the compacted material. Therefore, the acceptance of compacted materials will also be dependent on the stability of that material. The Soils Engineer has the option of rejecting any compacted material regardless of the degree of compaction if that material is considered to be unstable or if future instability is suspected. A specific example of rejection of fill material passing the required percent compaction is a fill which has been compacted with an in situ moisture content significantly less than optimum moisture. This type of dry fill (brittle fill) is susceptible to future settlement if it becomes saturated or flooded.

Testing and Inspection

A representative of Krazan & Associates, Inc., should be present at the site during the earthwork activities to confirm that actual subsurface conditions are consistent with the exploratory fieldwork. This activity is an integral part of our service, as acceptance of earthwork construction is dependent upon compaction testing and stability of the material. This representative can also verify that the intent of these recommendations is incorporated into the project design and construction. Krazan & Associates, Inc., will not be responsible for grades or staking, since this is the responsibility of the Prime Contractor.

LIMITATIONS

Soils Engineering is one of the newest divisions of Civil Engineering. This branch of Civil Engineering is constantly improving as new technologies and understanding of earth sciences advance. Although your site was analyzed using the most appropriate and most current techniques and methods, undoubtedly there will be substantial future improvements in this branch of engineering. In addition to advancements in the field of Soils Engineering, physical changes in the site, either due to excavation or fill placement, new agency regulations, or possible changes in the proposed structure after the soils report is completed may require the soils report to be professionally reviewed. In light of this, the Owner should be aware that there is a practical limit to the usefulness of this report without critical review. Although the time limit for this review is strictly arbitrary, it is suggested that 2 years be considered a reasonable time for the usefulness of this report.

Foundation and earthwork construction is characterized by the presence of a calculated risk that soil and groundwater conditions have been fully revealed by the original foundation investigation. This risk is derived from the practical necessity of basing interpretations and design conclusions on limited sampling of the earth. The recommendations made in this report are based on the assumption that soil conditions do not vary significantly from those disclosed during our field investigation. If any variations or undesirable conditions are encountered during construction, the Soils Engineer should be notified so that supplemental recommendations may be made.

The conclusions of this report are based on the information provided regarding the proposed construction. If the proposed construction is relocated or redesigned, the conclusions in this report may not be valid. The Soils Engineer should be notified of any changes so the recommendations may be reviewed and re-evaluated.

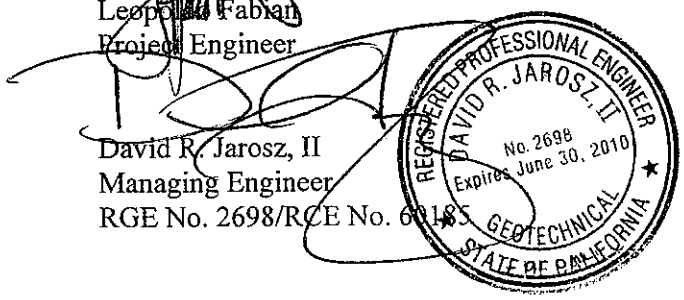
This report is a Geotechnical Engineering Investigation with the purpose of evaluating the soil conditions in terms of foundation design. The scope of our services did not include any Environmental Site Assessment for the presence or absence of hazardous and/or toxic materials in the soil, groundwater, or atmosphere; or the presence of wetlands. Any statements, or absence of statements, in this report or on any boring log regarding odors, unusual or suspicious items, or conditions observed, are strictly for descriptive purposes and are not intended to convey engineering judgment regarding potential hazardous and/or toxic assessment.

The geotechnical engineering information presented herein is based upon professional interpretation utilizing standard engineering practices and a degree of conservatism deemed proper for this project. It is not warranted that such information and interpretation cannot be superseded by future geotechnical engineering developments. We emphasize that this report is valid for the project outlined above and should not be used for any other sites.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (559) 348-2200.

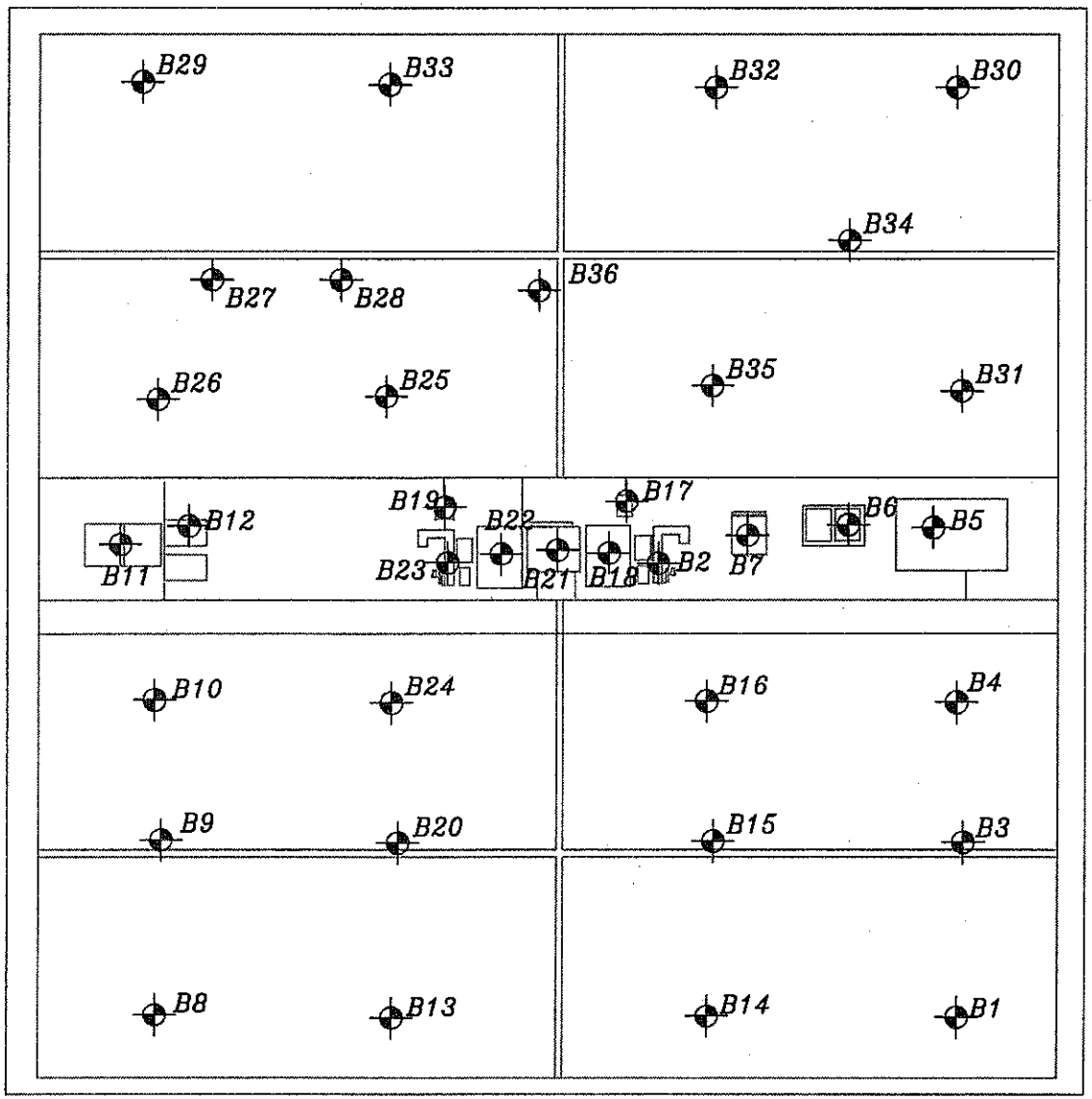
Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

Leopoldo Fabian
Project Engineer



David R. Jarosz, II
Managing Engineer
RGE No. 2698/RCE No. 60185

LF/DRJ:ch



APPROXIMATE BORING LOCATION

NORTH

NOT TO SCALE

PROPOSED SAN JOAQUIN SOLAR 1 & 2 PROJECTS

JAYNE AVENUE

COALINGA, CA

Scale: AS SHOWN	Date: 2/09
Drawn by: MN	Approved by: DJ
Project No. 01208068	Figure No.

Krazan

SITE DEVELOPMENT ENGINEERS

Offices Serving the Western United States

Appendix A

Log of Borings & Laboratory Testing

APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

Field Investigation

The field investigation consisted of a surface reconnaissance and a subsurface exploratory program. Thirty six 4½-inch diameter exploratory borings were advanced. The boring locations are shown on the site plan.

The soils encountered were logged in the field during the exploration and, with supplementary laboratory test data, are described in accordance with the Unified Soil Classification System.

Modified standard penetration tests and standard penetration tests were performed at selected depths. This test represents the resistance to driving a 2½-inch and 1½-inch diameter split barrel sampler, respectively. The driving energy was provided by a hammer weighing 140 pounds falling 30 inches. Relatively undisturbed soil samples were obtained while performing this test. Bag samples of the disturbed soil were obtained from the auger cuttings. The modified standard penetration tests are identified in the sample type on the boring logs with a full shaded in block. The standard penetration tests are identified in the sample type on the boring logs with one-half of the block shaded. All samples were returned to our Clovis laboratory for evaluation.

Laboratory Investigation

The laboratory investigation was programmed to determine the physical and mechanical properties of the foundation soil underlying the site. Test results were used as criteria for determining the engineering suitability of the surface and subsurface materials encountered.

In-situ moisture content, dry density, consolidation, direct shear, and sieve analysis tests were completed for the undisturbed samples representative of the subsurface material. Expansion index and R-value tests were completed for select bag samples obtained from the auger cuttings. These tests, supplemented by visual observation, comprised the basis for our evaluation of the site material.

The logs of the exploratory borings and laboratory determinations are presented in this Appendix.

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)			
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)			
SILTS AND CLAYS Liquid limit less than 50%		ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils

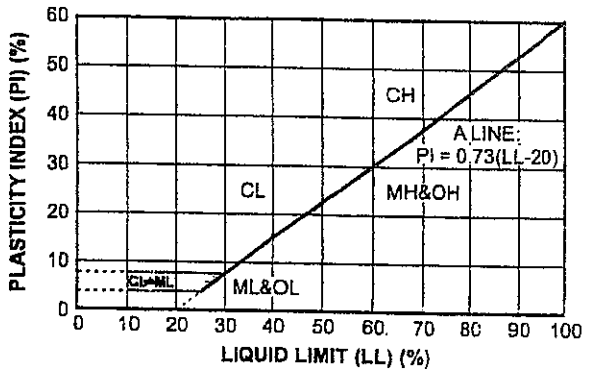
CONSISTENCY CLASSIFICATION

Description	Blows per Foot
Granular Soils	
Very Loose	< 5
Loose	5 – 15
Medium Dense	16 – 40
Dense	41 – 65
Very Dense	> 65
Cohesive Soils	
Very Soft	< 3
Soft	3 – 5
Firm	6 – 10
Stiff	11 – 20
Very Stiff	21 – 40
Hard	> 40

GRAIN SIZE CLASSIFICATION

Grain Type	*Standard Sieve Size*	*Grain Size in Millimeters*
Boulders	Above 12 inches	Above 305
Cobbles	3 to 12 inches	305 to 76.2
Gravel	3 inches to No. 4	76.2 to 4.76
Coarse-grained	3 to ¾ inches	76.2 to 19.1
Fine-grained	¾ inches to No. 4	19.1 to 4.76
Sand	No. 4 to No. 200	4.76 to 0.074
Coarse-grained	No. 4 to No. 10	4.76 to 2.00
Medium-grained	No. 10 to No. 40	2.00 to 0.042
Fine-grained	No. 40 to No. 200	0.042 to 0.074
Silt and Clay	Below No. 200	Below 0.074

PLASTICITY CHART



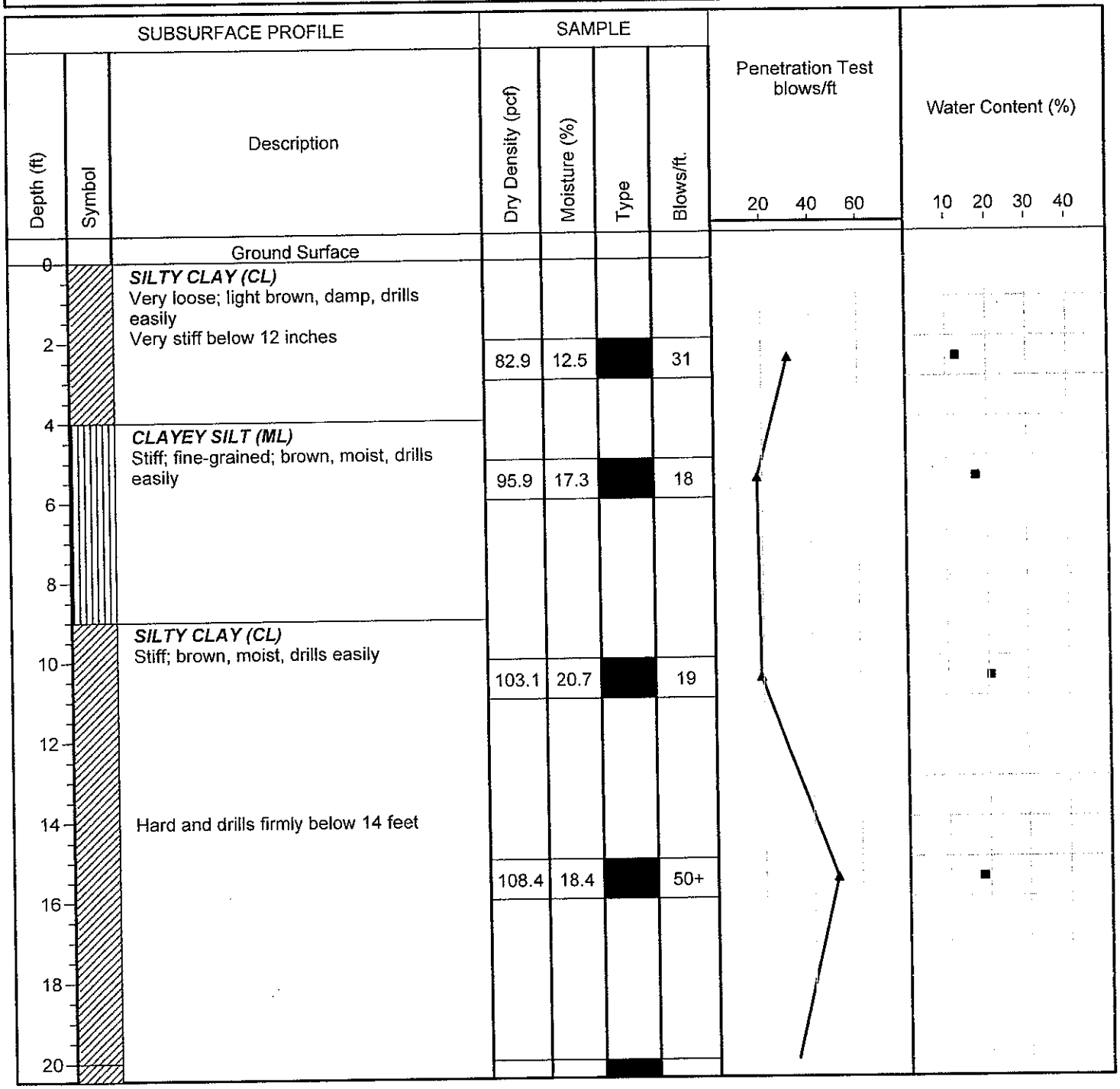
Log of Drill Hole B1

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-1

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 50 Feet

Krazan and Associates

Log of Drill Hole B1

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-1

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
22		***SILTY CLAY (CL)*** Very stiff; brown, moist, drills easily	108.0	17.2		31
24						
26			104.8	22.0		37
28						
30			103.9	23.4		36
32						
34						
36			93.9	31.7		29
38		Hard and drills firmly below 39 feet				
40						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 50 Feet

Krazan and Associates

Log of Drill Hole B1

Project: San Joaquin Solor Plants 1 & 2

Project No: 012-08068

Client: Spinnaker Energy, Inc.

Figure No.: A-1

Location: Jayne Avenue, Coalinga, California

Logged By: Wayne Andrade

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft	Water Content (%)
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	20 40 60	10 20 30 40
42			106.8	21.8		44		
44		***SANDY CLAYEY SILT (ML)*** Medium dense, fine-grained; light brown, moist, drills easily	106.6	21.2		23		
46								
48								
50		End of Borehole						
52								
54								
56								
58								
60								

Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

Drill Date: 7-31-08 to 8-21-08

Hole Size: 4½ Inches

Elevation: 50 Feet

Sheet: 3 of 3

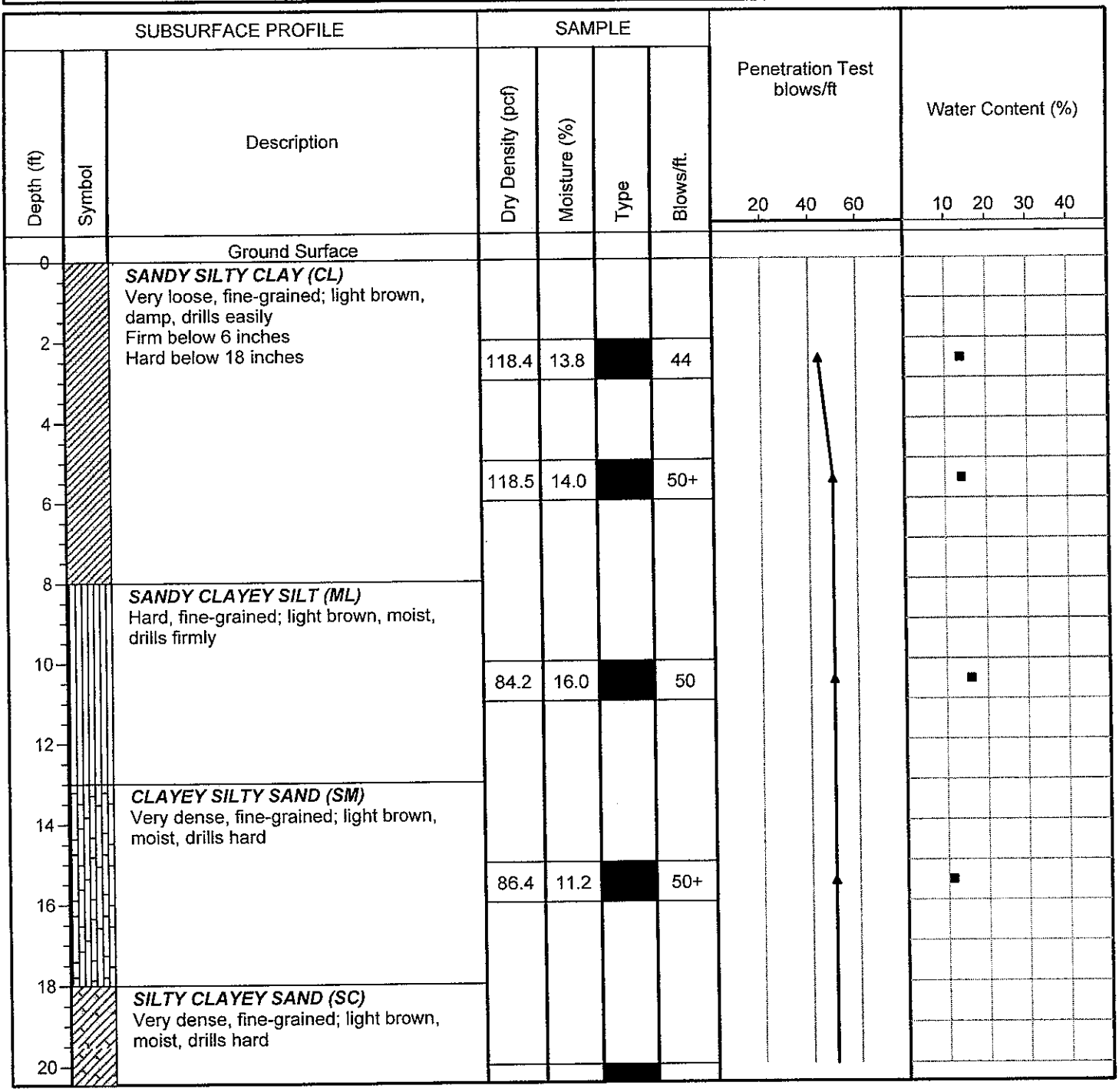
Log of Drill Hole B2

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-2

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 50 Feet

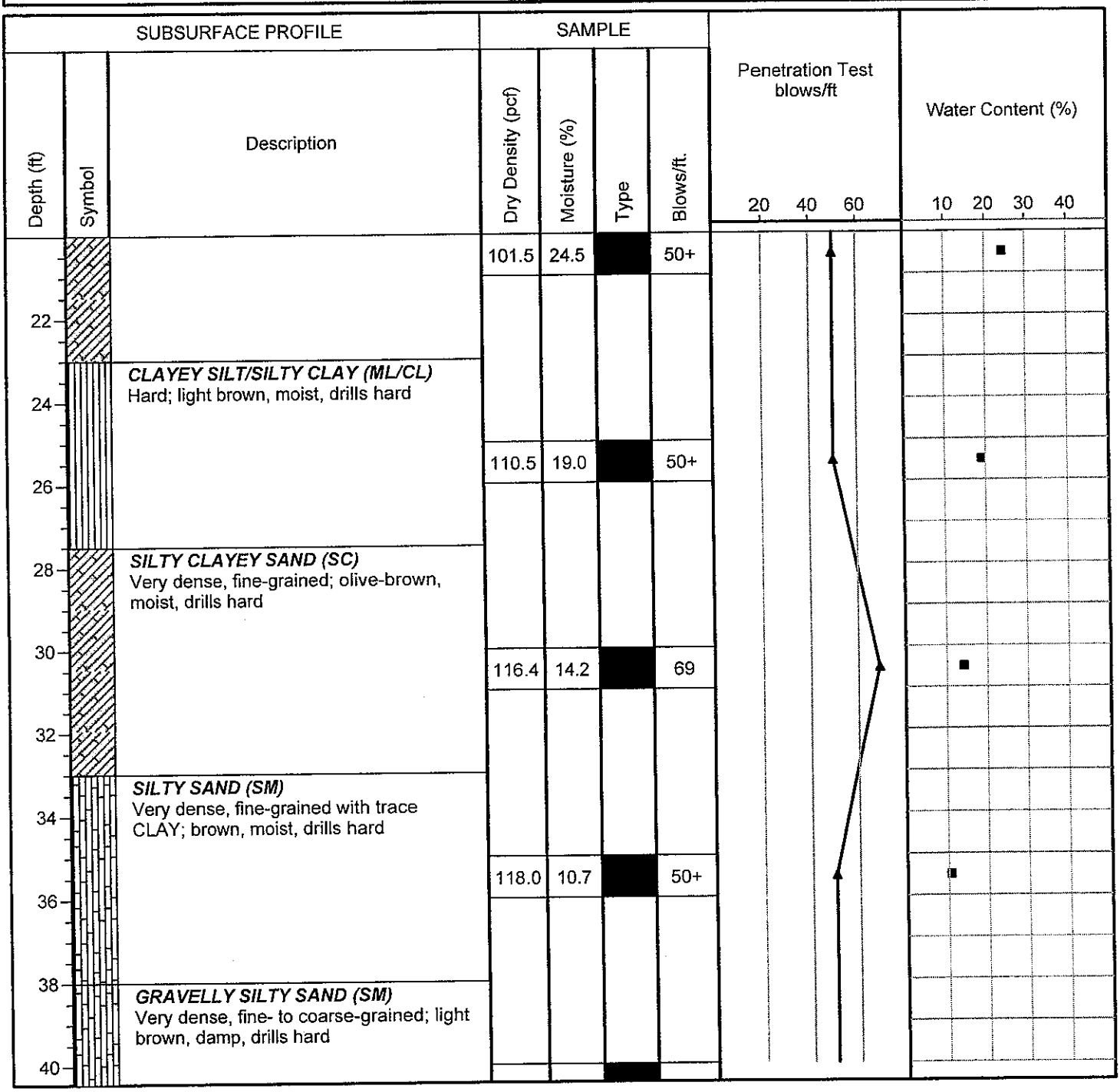
Log of Drill Hole B2

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-2

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 50 Feet

Log of Drill Hole B2

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-2

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft	Water Content (%)
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	20 40 60	10 20 30 40
42			118.3	4.7		50+		
44		***CLAYEY SANDY SILT (ML)*** Very dense, fine-grained; light brown, moist, drills hard						
46			119.7	13.2		50+		
48								
50		End of Borehole						
52								
54								
56								
58								
60								

Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

Drill Date: 7-31-08 to 8-21-08

Hole Size: 4½ Inches

Elevation: 50 Feet

Log of Drill Hole B3

Project: San Joaquin Solor Plants 1 & 2

Project No: 012-08068

Client: Spinnaker Energy, Inc.

Figure No.: A-3

Location: Jayne Avenue, Coalinga, California

Logged By: Wayne Andrade

Depth to Water>

Initial: None

At Completion: None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY SANDY CLAY (CL)*** Very loose, fine-grained; light brown, damp, drills easily				
2		Firm below 12 inches Hard and drills firmly below 18 inches	94.9	12.3	■	45
4		***SILTY CLAY (CL)*** Very stiff; light brown, moist, drills firmly				
6			93.9	11.6	■	30
8		Hard and drills hard below 9 feet				
10			112.3	21.2	■	45
12						
14						
16			108.9	20.9	■	55
18						
20						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

Drill Date: 7-31-08 to 8-21-08

Hole Size: 4½ Inches

Elevation: 20 Feet

Sheet: 1 of 1

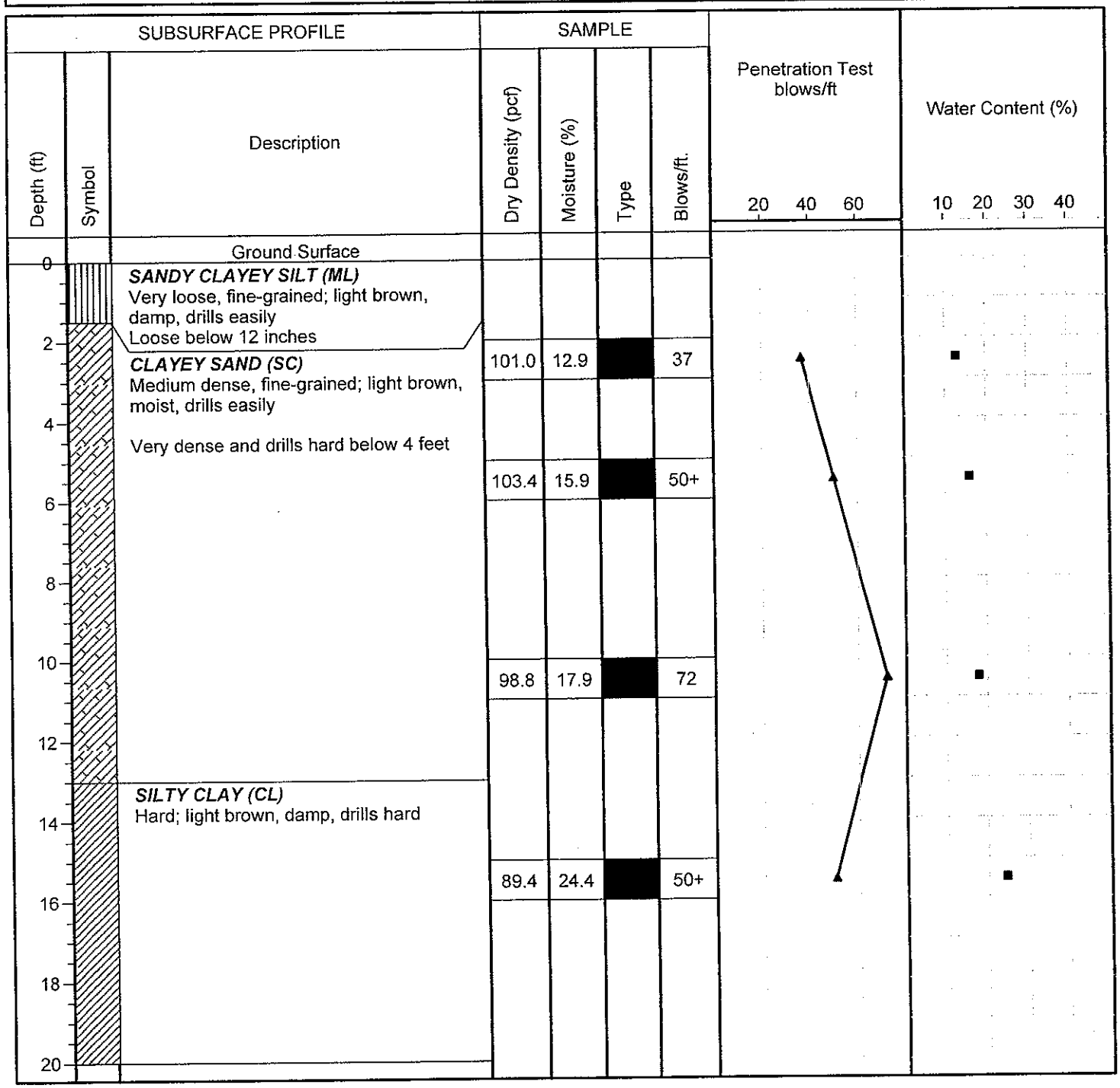
Log of Drill Hole B4

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-4

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Krazan and Associates

Sheet: 1 of 1

Log of Drill Hole B5

Project: San Joaquin Solor Plants 1 & 2

Project No: 012-08068

Client: Spinnaker Energy, Inc.

Figure No.: A-5

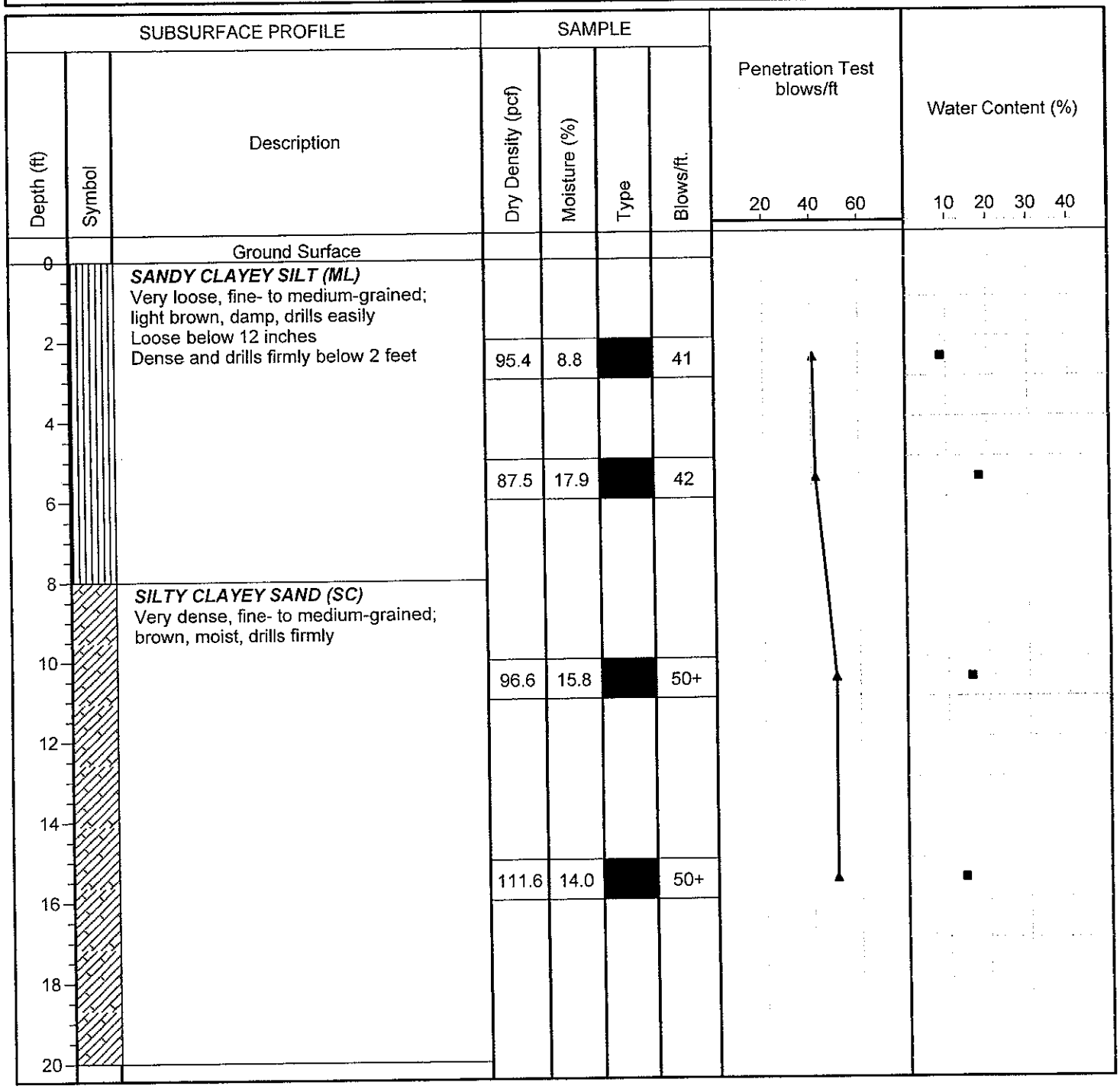
Location: Jayne Avenue, Coalinga, California

Logged By: Wayne Andrade

Depth to Water>

Initial: None

At Completion: None



Drill Method: Solid Flight

Drill Date: 7-31-08 to 8-21-08

Drill Rig: CME 55

Krazan and Associates

Hole Size: 4½ Inches

Driller: Todd Seaman

Elevation: 20 Feet

Sheet: 1 of 1

Log of Drill Hole B6

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-6

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SANDY CLAYEY SILT (ML)*** Very loose, fine-grained; light brown, damp, drills easily				
2		Loose below 12 inches Dense and drills firmly below 18 inches	88.4	8.9	■	62
4		Very dense and drills hard below 4 feet				
6			89.9	8.9	■	50+
8						
10			99.9	12.8	■	50+
12						
14		***CLAYEY SAND (SC)*** Very dense, fine-grained; brown, moist, drills hard				
16			110.2	10.0	■	50+
18						
20						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Krazan and Associates

Log of Drill Hole B7

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-7

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SANDY CLAYEY SILT (ML)*** Very loose, fine-grained; light brown, damp, drills easily Loose below 6 inches Medium dense below 18 inches				
2			117.7	4.2		38
4		***SILTY CLAYEY SAND (SC)*** Very dense, fine- to coarse-grained with trace GRAVEL; light brown, moist, drills hard				
6			105.5	12.5		50+
10			106.9	13.7		50+
14			102.1	15.9		50+
20						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

Drill Date: 7-31-08 to 8-21-08

Hole Size: 4½ Inches

Elevation: 20 Feet

Sheet: 1 of 1

Log of Drill Hole B8

Project: San Joaquin Solor Plants 1 & 2

Project No: 012-08068

Client: Spinnaker Energy, Inc.

Figure No.: A-8

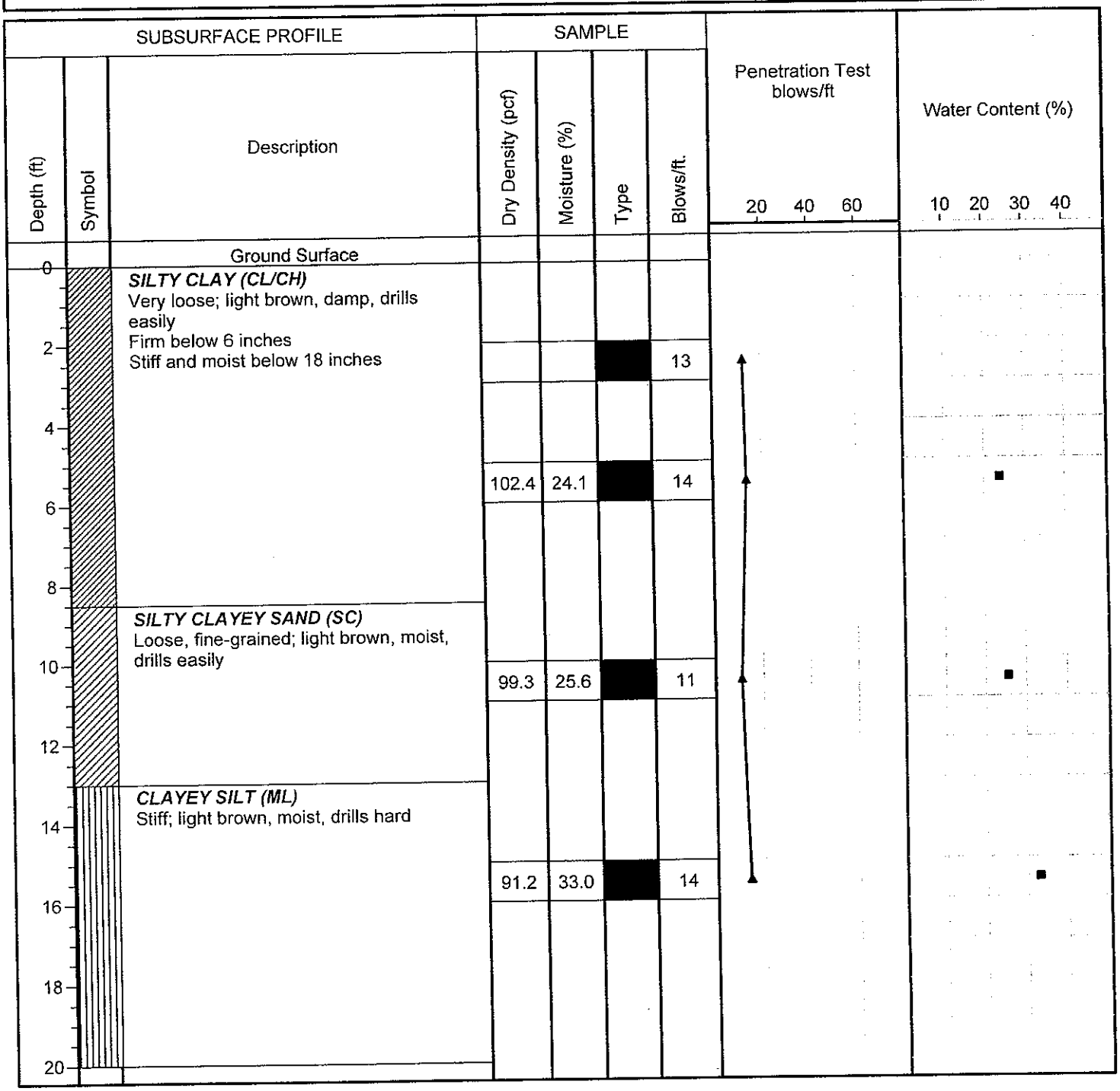
Location: Jayne Avenue, Coalinga, California

Logged By: Wayne Andrade

Depth to Water>

Initial: None

At Completion: None



Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

Drill Date: 7-31-08 to 8-21-08

Hole Size: 4½ Inches

Elevation: 20 Feet

Sheet: 1 of 1

Log of Drill Hole B9

Project: San Joaquin Solor Plants 1 & 2

Project No: 012-08068

Client: Spinnaker Energy, Inc.

Figure No.: A-9

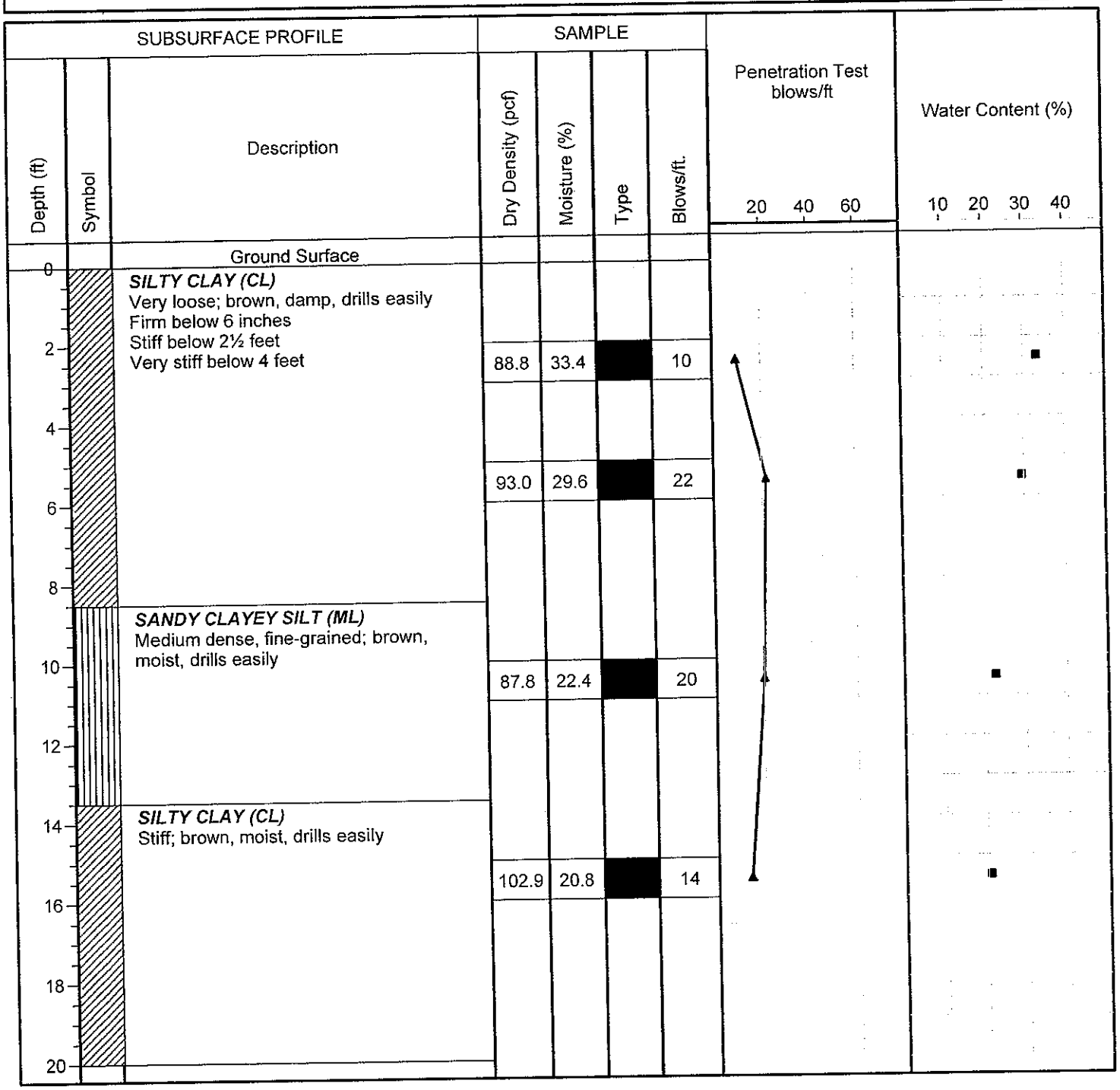
Location: Jayne Avenue, Coalinga, California

Logged By: Wayne Andrade

Depth to Water>

Initial: None

At Completion: None



Drill Method: Solid Flight

Drill Date: 7-31-08 to 8-21-08

Drill Rig: CME 55

Krazan and Associates

Hole Size: 4½ Inches

Driller: Todd Seaman

Elevation: 20 Feet

Sheet: 1 of 1

Log of Drill Hole B10

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-10

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY CLAY (CL)*** Very loose, brown, moist, drills easily Firm below 6 inches Hard and drills firmly below 2 feet				
2			104.3	21.4		41
4		Very stiff below 4 feet				
6			101.4	23.2		32
8		***SILTY SANDY CLAY (CL)*** Stiff; fine-grained; brown, moist, drills easily				
10			104.5	24.8		18
12						
14		Very stiff below 15 feet				
16			96.2	25.6		21
18						
20						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Krazan and Associates

Log of Drill Hole B11

Project: San Joaquin Solor Plants 1 & 2

Project No: 012-08068

Client: Spinnaker Energy, Inc.

Figure No.: A-11

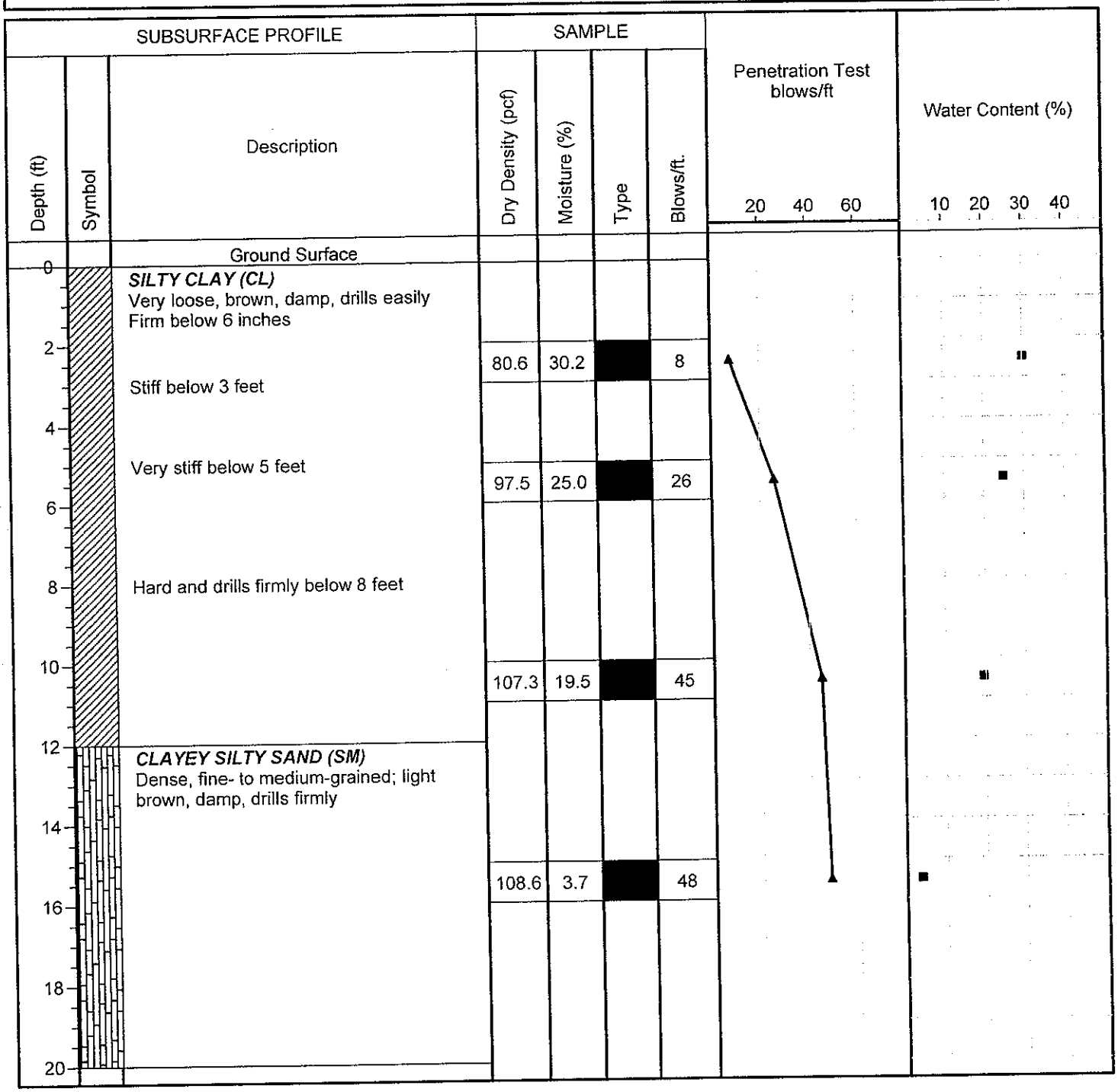
Location: Jayne Avenue, Coalinga, California

Logged By: Wayne Andrade

Depth to Water>

Initial: None

At Completion: None



Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

Drill Date: 7-31-08 to 8-21-08

Hole Size: 4½ Inches

Elevation: 20 Feet

Sheet: 1 of 1

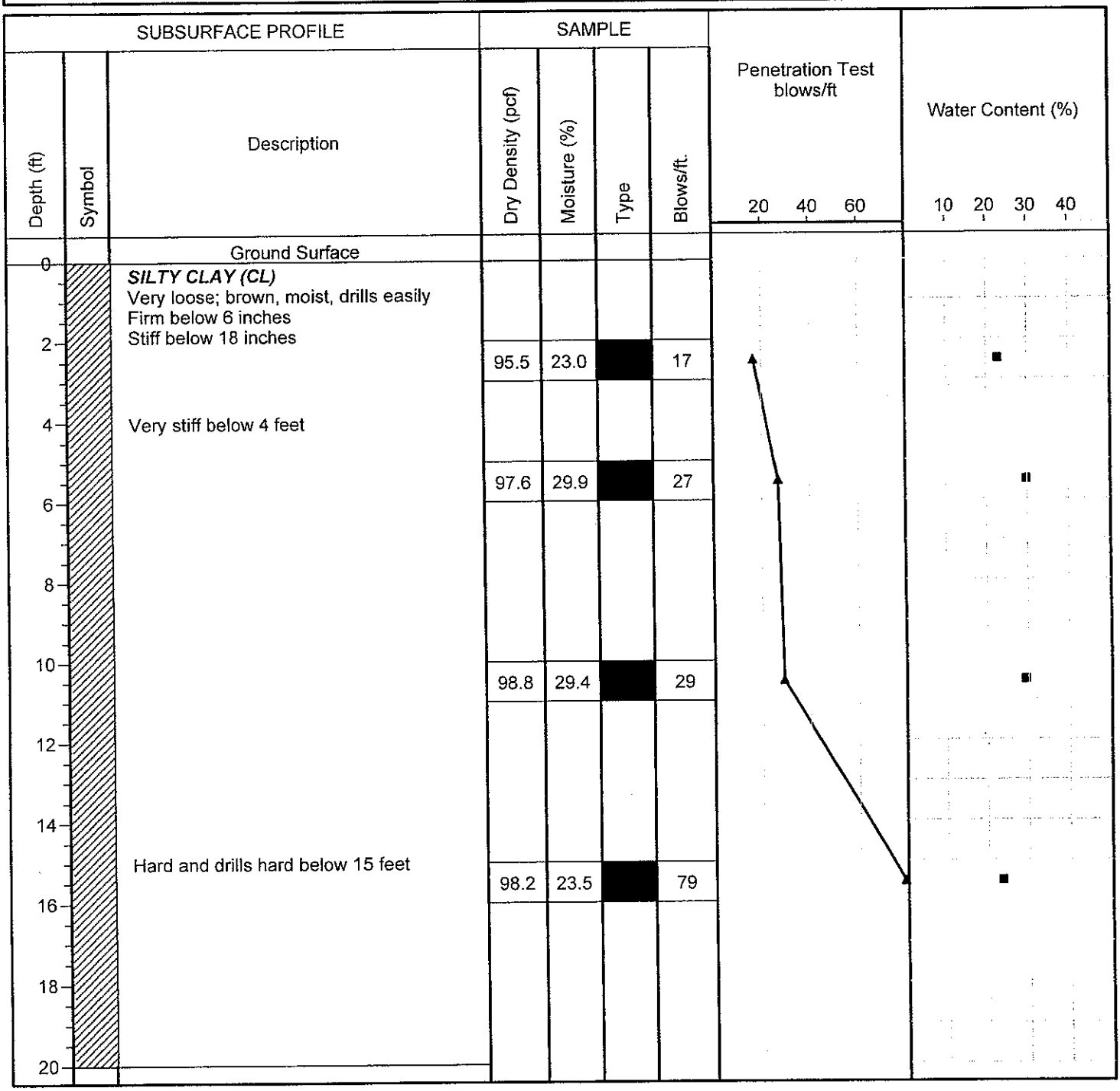
Log of Drill Hole B12

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-12

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Krazan and Associates

Log of Drill Hole B13

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-13

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY CLAY (CL)*** Very loose; light brown, damp, drills easily Firm below 6 inches Stiff below 18 inches				
2			99.1	16.6	■	16
4		***CLAYEY SAND (SC)*** Medium dense, fine-grained; brown, damp, drills easily				
6			105.9	21.0	■	16
8						
10			105.3	13.6	■	30
12		***CLAYEY SILTY SAND (SM)*** Medium dense, fine- to medium-grained; light brown, damp, drills easily				
14			99.7	5.2	■	23
16						
18						
20						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Krazan and Associates

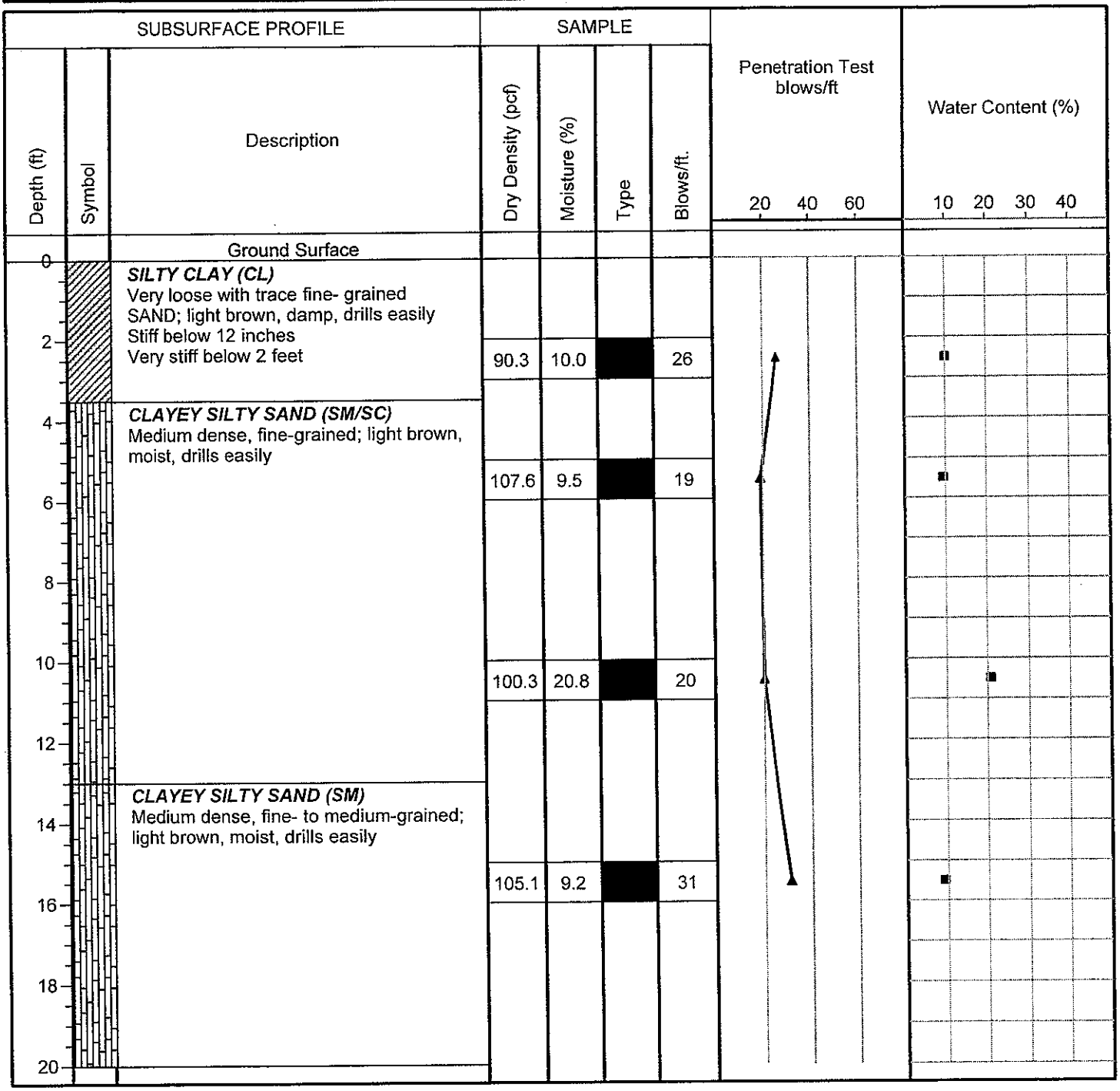
Log of Drill Hole B14

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-14

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Sheet: 1 of 1

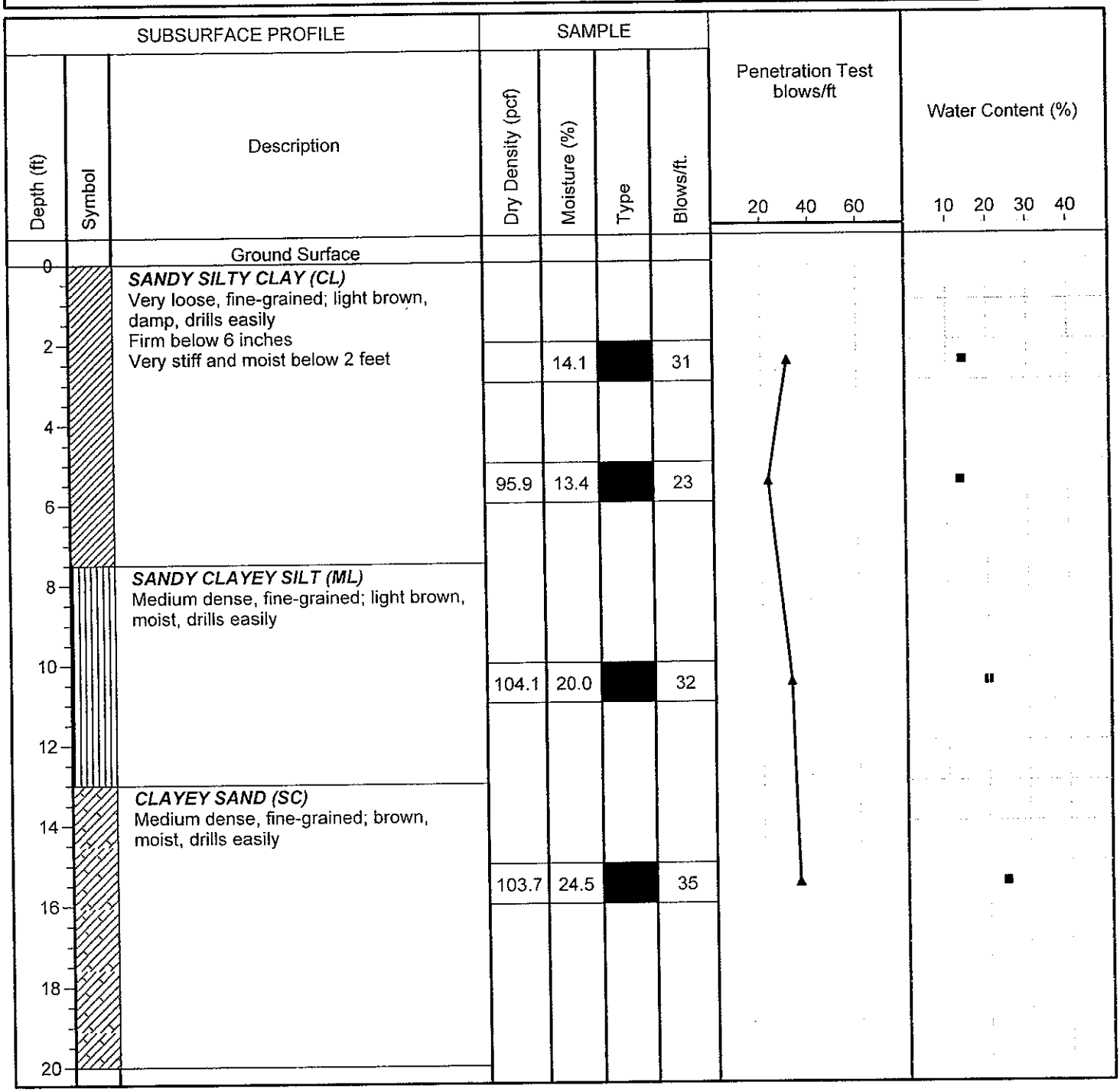
Log of Drill Hole B15

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-15

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Krazan and Associates

Sheet: 1 of 1

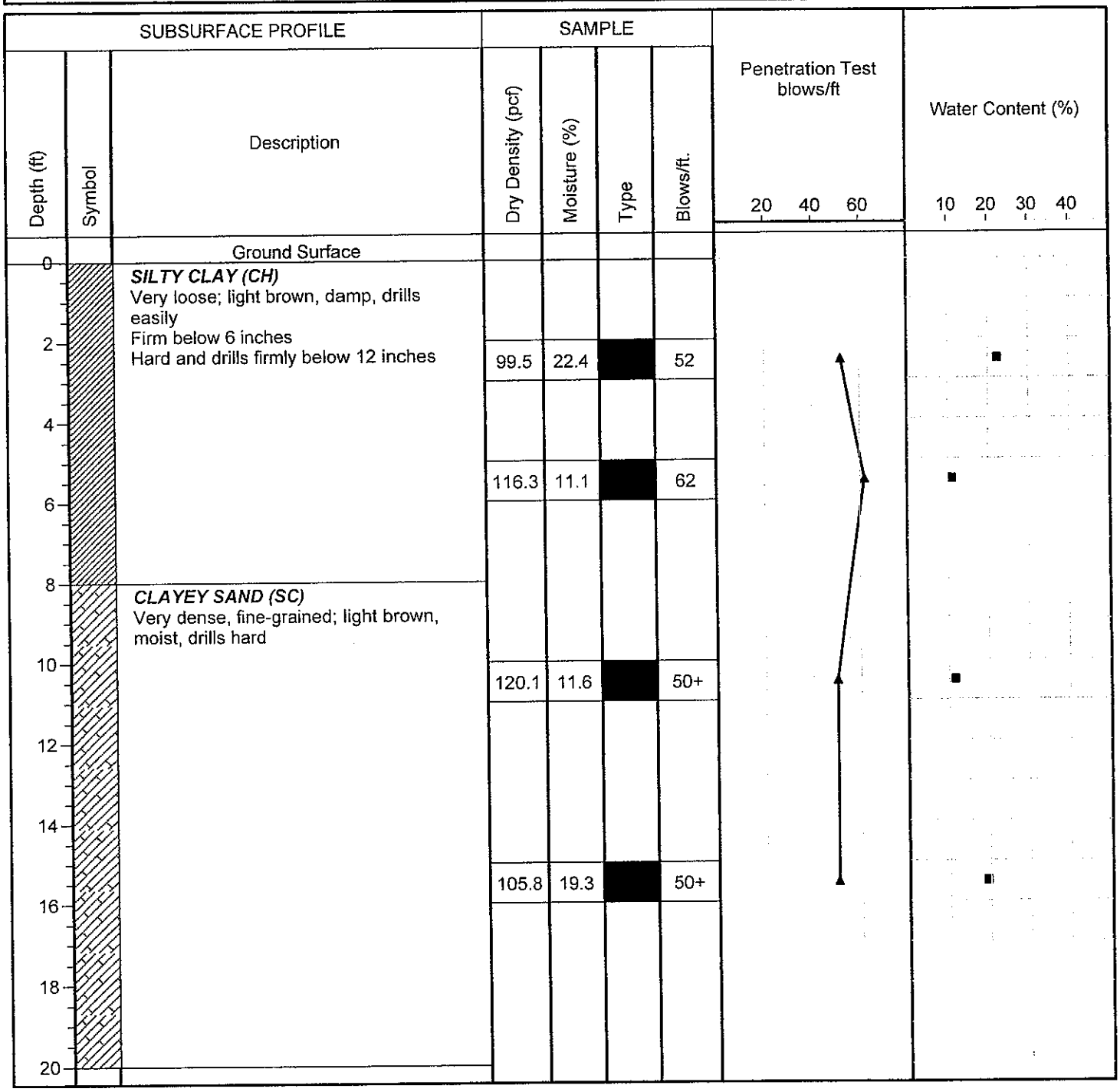
Log of Drill Hole B16

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-16

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Krazan and Associates

Log of Drill Hole B17

Project: San Joaquin Solor Plants 1 & 2

Project No: 012-08068

Client: Spinnaker Energy, Inc.

Figure No.: A-17

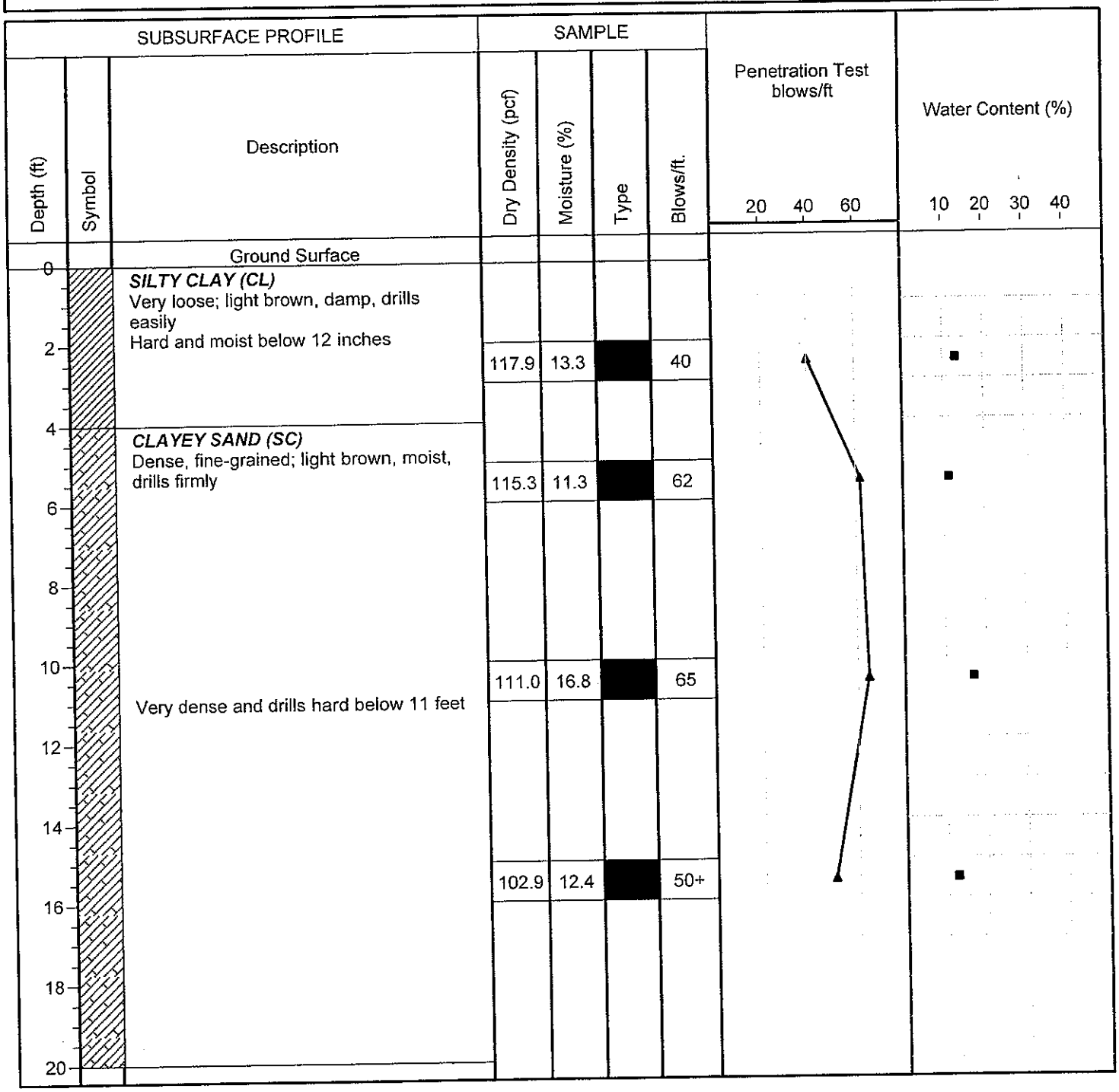
Location: Jayne Avenue, Coalinga, California

Logged By: Wayne Andrade

Depth to Water>

Initial: None

At Completion: None



Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

Drill Date: 7-31-08 to 8-21-08

Hole Size: 4½ Inches

Elevation: 20 Feet

Sheet: 1 of 1

Log of Drill Hole B18

Project: San Joaquin Solor Plants 1 & 2

Project No: 012-08068

Client: Spinnaker Energy, Inc.

Figure No.: A-18

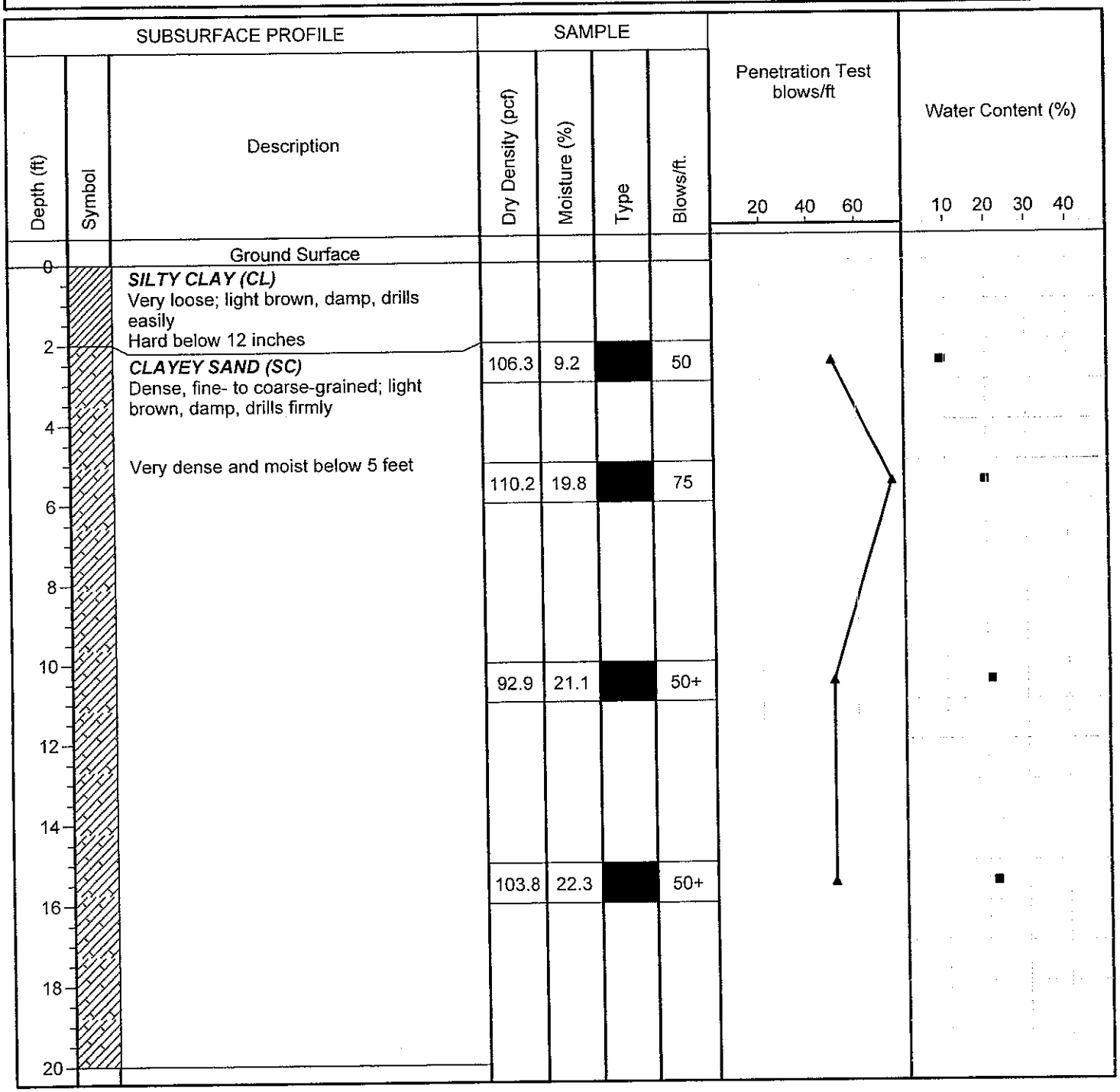
Location: Jayne Avenue, Coalinga, California

Logged By: Wayne Andrade

Depth to Water>

Initial: None

At Completion: None



Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

Drill Date: 7-31-08 to 8-21-08

Hole Size: 4½ Inches

Elevation: 20 Feet

Sheet: 1 of 1

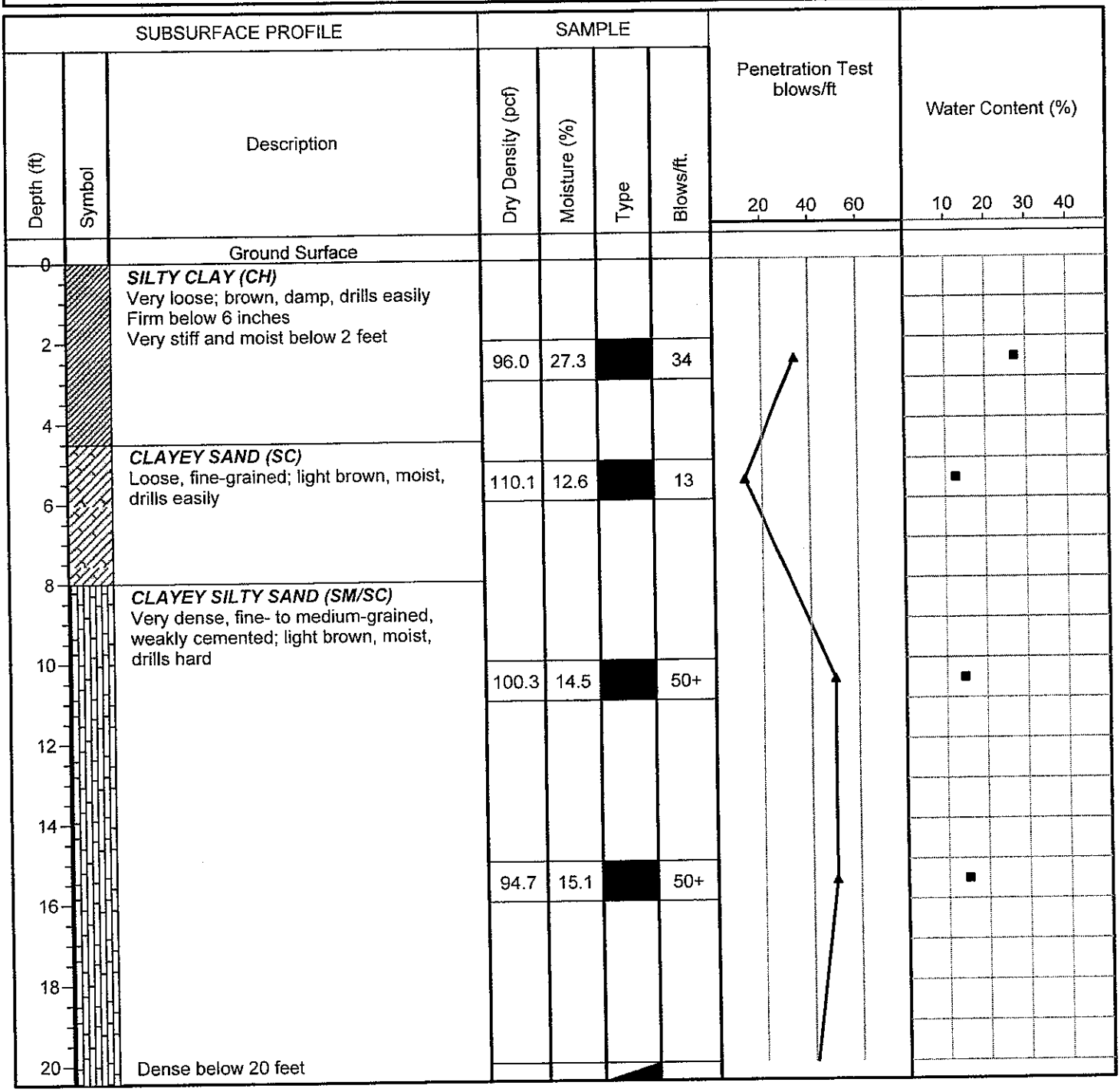
Log of Drill Hole B19

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-19

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 50 Feet

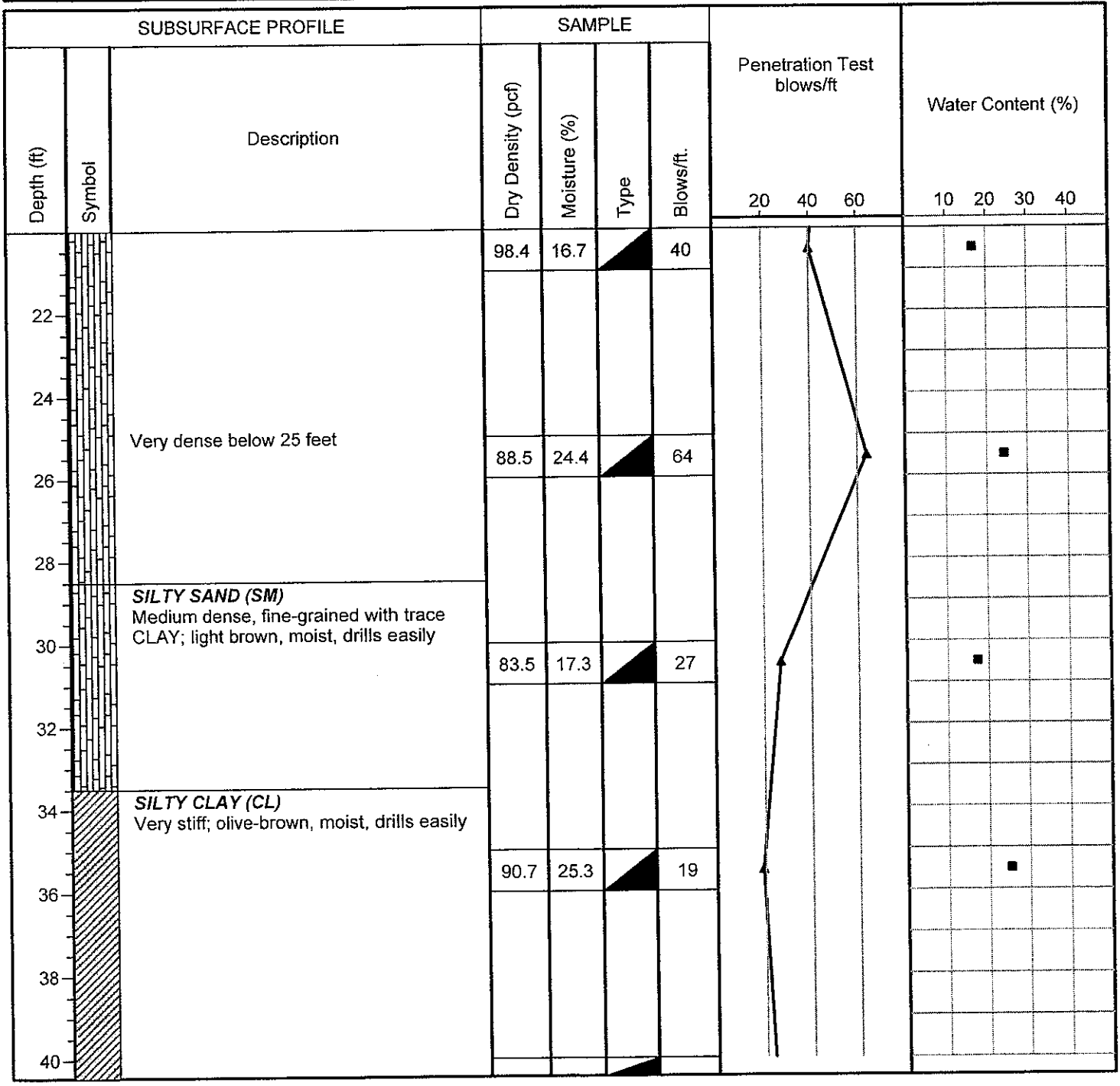
Log of Drill Hole B19

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-19

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 50 Feet

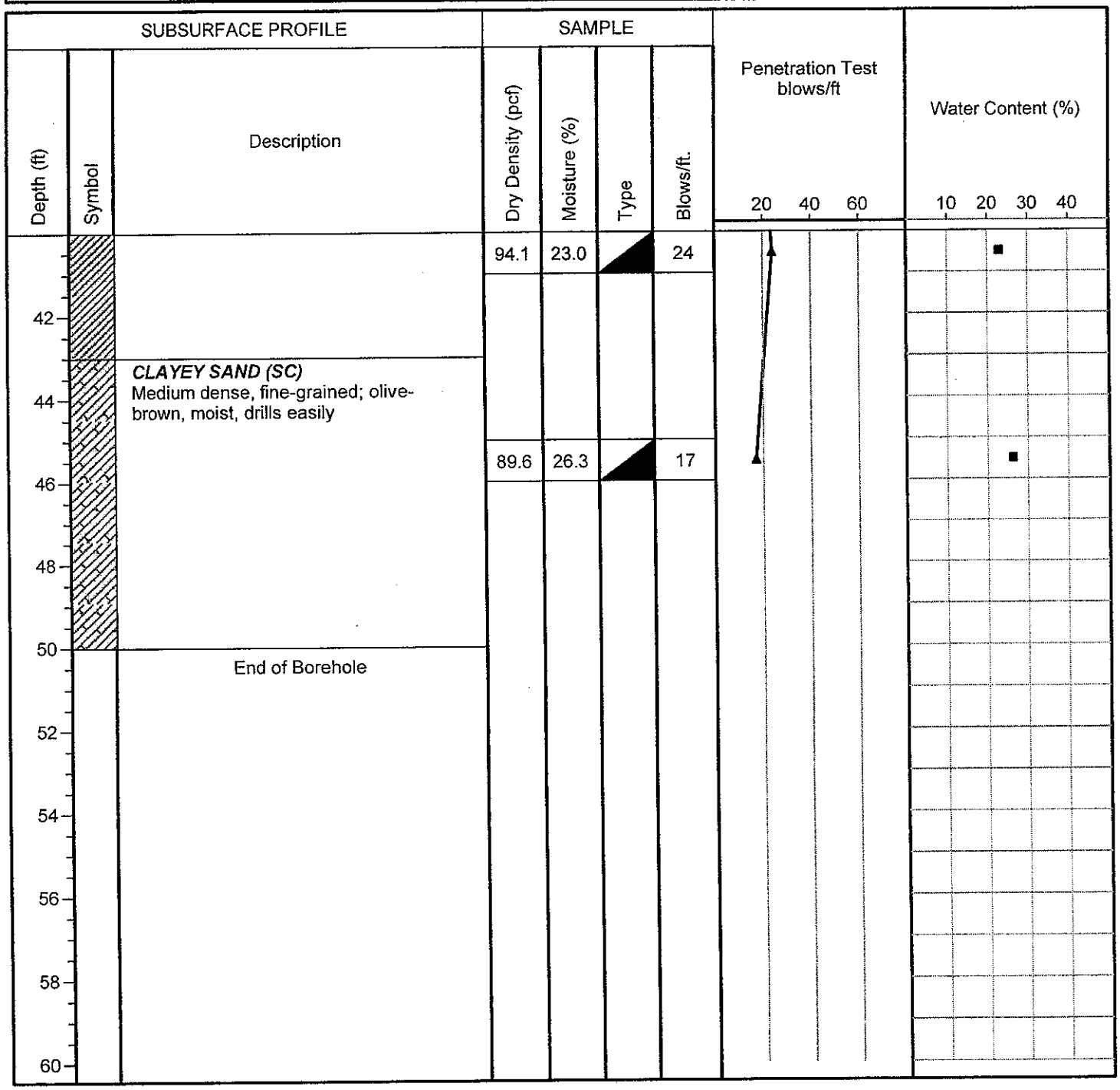
Log of Drill Hole B19

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-19

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 50 Feet

Krazan and Associates

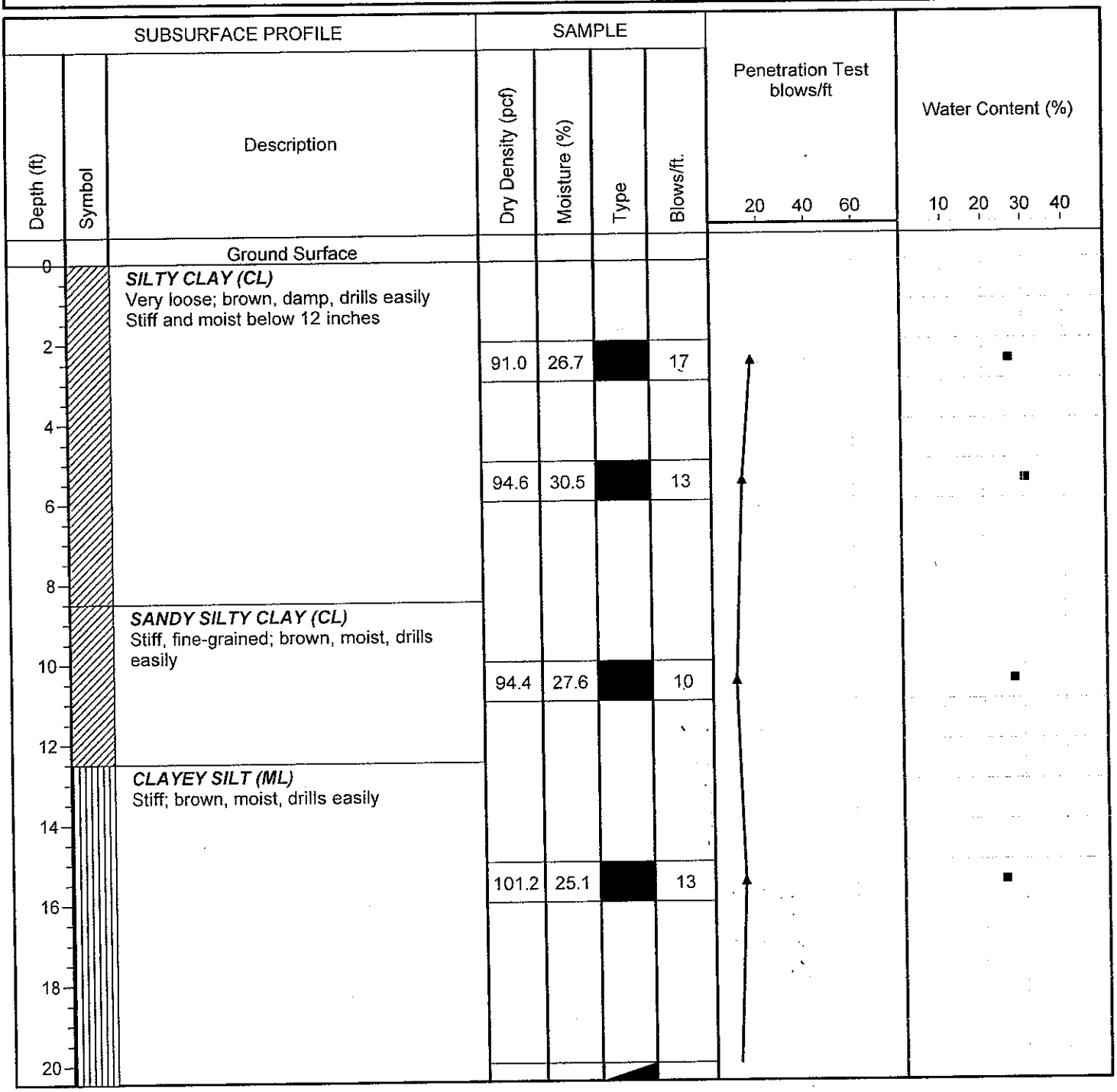
Log of Drill Hole B20

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-20

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 50 Feet

Log of Drill Hole B20

Project: San Joaquin Solor Plants 1 & 2

Project No: 012-08068

Client: Spinnaker Energy, Inc.

Figure No.: A-20

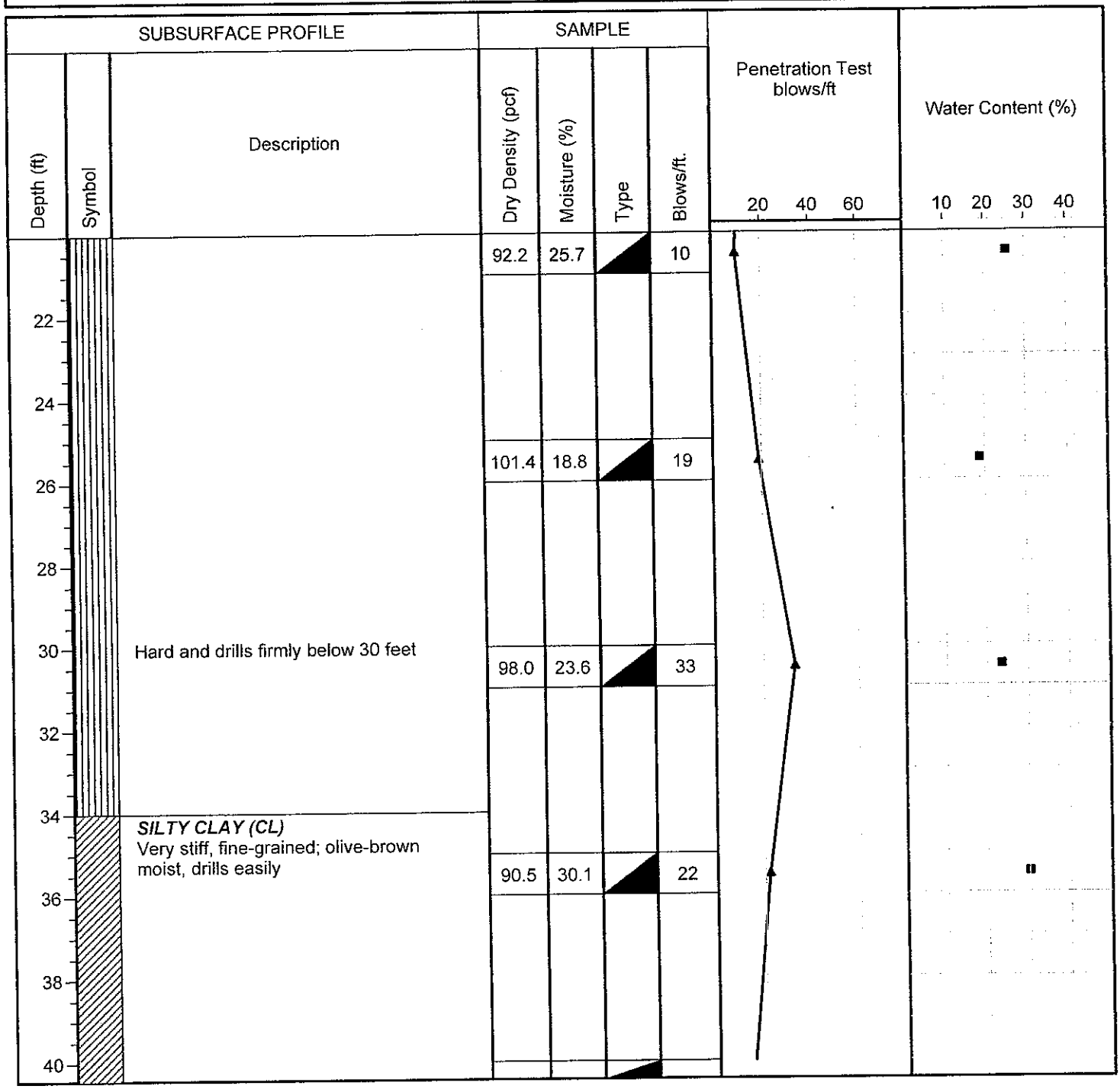
Location: Jayne Avenue, Coalinga, California

Logged By: Wayne Andrade

Depth to Water>

Initial: None

At Completion: None



Drill Method: Solid Flight

Drill Date: 7-31-08 to 8-21-08

Drill Rig: CME 55

Krazan and Associates

Hole Size: 4½ Inches

Driller: Todd Seaman

Elevation: 50 Feet

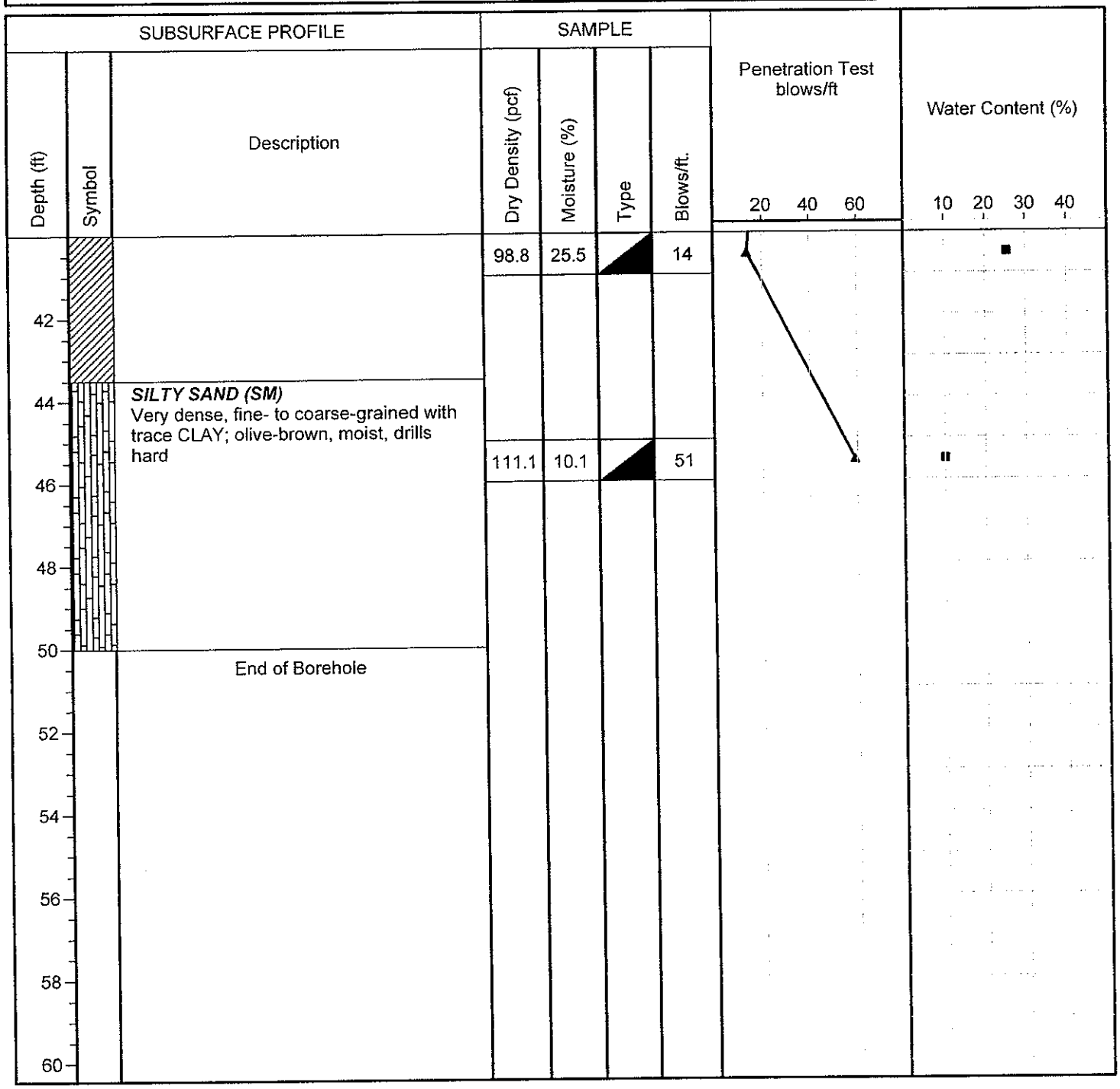
Log of Drill Hole B20

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-20

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 50 Feet

Sheet: 3 of 3

Log of Drill Hole B21

Project: San Joaquin Solor Plants 1 & 2 — **Project No:** 012-08068

Client: Spinnaker Energy, Inc. — **Figure No.:** A-21

Location: Jayne Avenue, Coalinga, California — **Logged By:** Wayne Andrade

Depth to Water> — **Initial:** None — **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY CLAY (CL)*** Very loose; brown, damp, drills easily Stiff below 12 inches				
2		***CLAYEY SAND (SC)*** Dense, fine- to coarse-grained; light brown, moist, drills firmly	93.6	10.1		41
4						
6			111.0	18.6		62
8						
10		***CLAYEY SAND (SC)*** Very dense, fine-grained, weakly cemented; light brown, moist, drills hard	106.9	19.4		50+
12						
14						
16			76.2	17.8		50+
18						
20						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight — **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 — **Hole Size:** 4½ Inches

Driller: Todd Seaman — **Elevation:** 20 Feet

Krazan and Associates

Sheet: 1 of 1

Log of Drill Hole B22

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-22

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0	Ground Surface				
0–4	***SILTY CLAY (CL)*** Very loose; light brown, damp, drills easily. Firm below 6 inches. Very stiff and moist below 2½ feet	104.4	20.2		31
4–10	***CLAYEY SAND (SC)*** Dense, fine-grained; light brown, moist, drills firmly. Very dense and drills hard below 9 feet	123.8	8.2		49
10					50+
16					50+

Penetration Test blows/ft: 20, 40, 60

Water Content (%): 10, 20, 30, 40

Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

Drill Date: 7-31-08 to 8-21-08

Hole Size: 4½ Inches

Elevation: 20 Feet

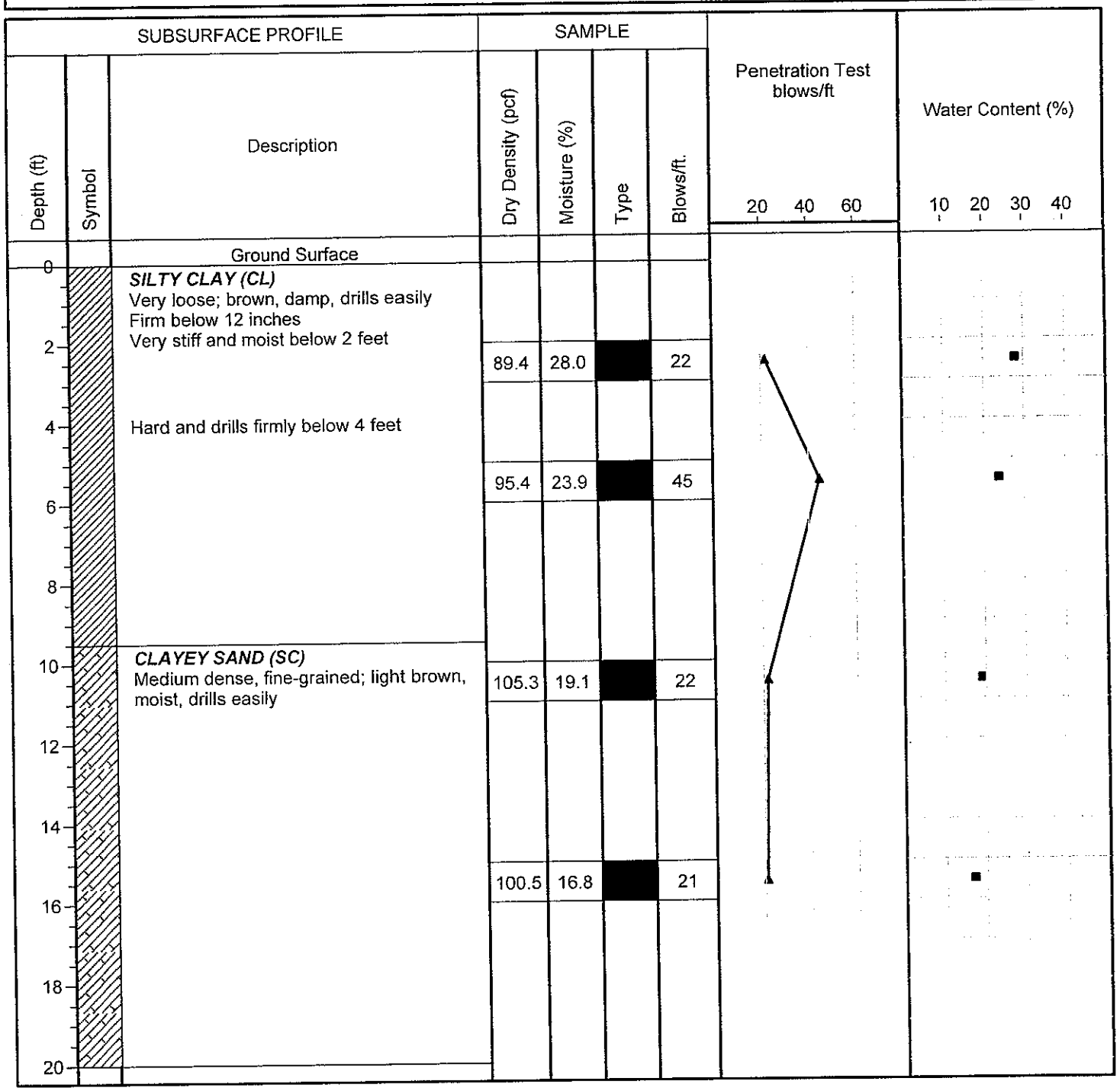
Log of Drill Hole B23

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-23

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Sheet: 1 of 1

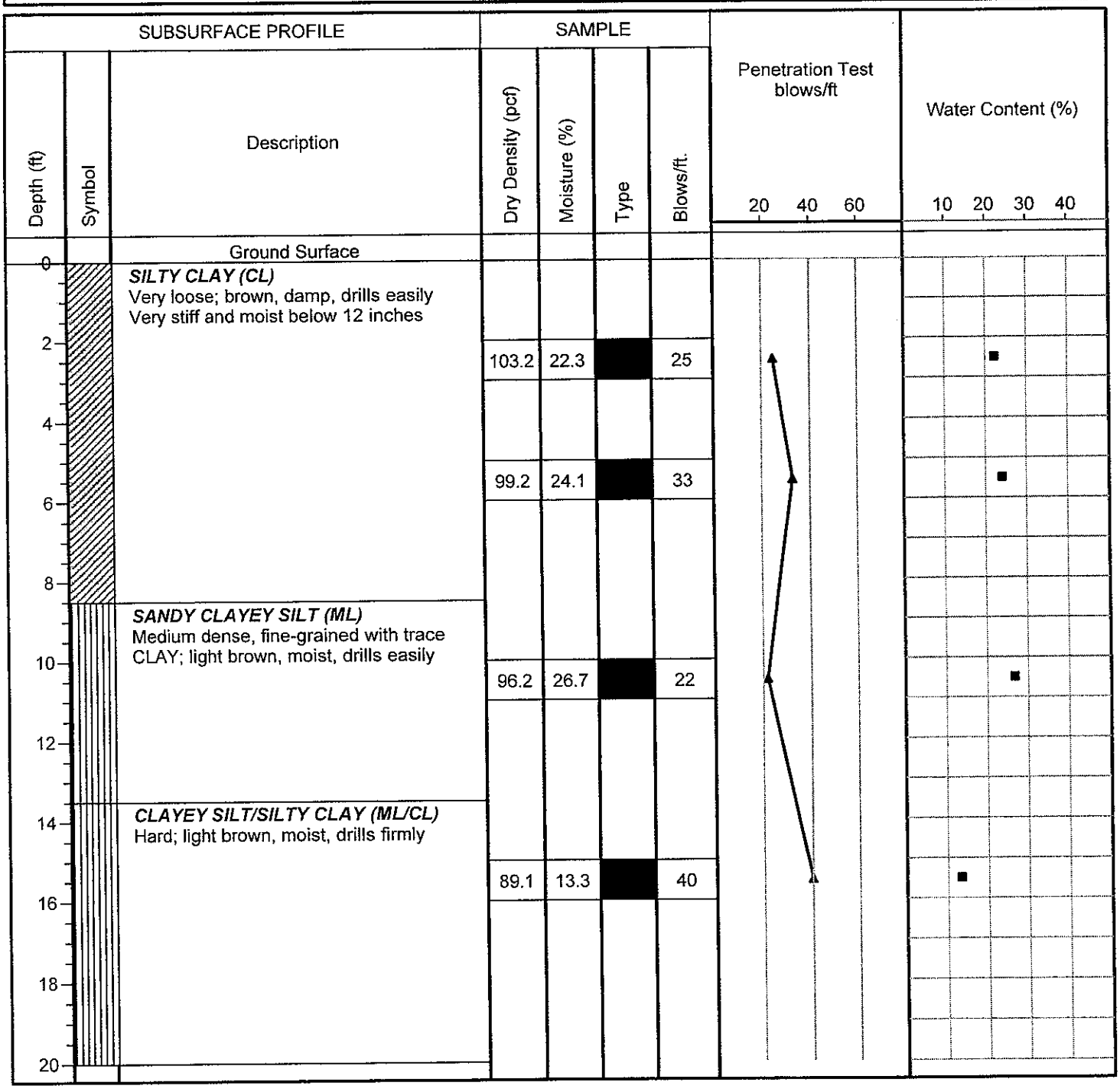
Log of Drill Hole B24

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-24

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 7-31-08 to 8-21-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Sheet: 1 of 1

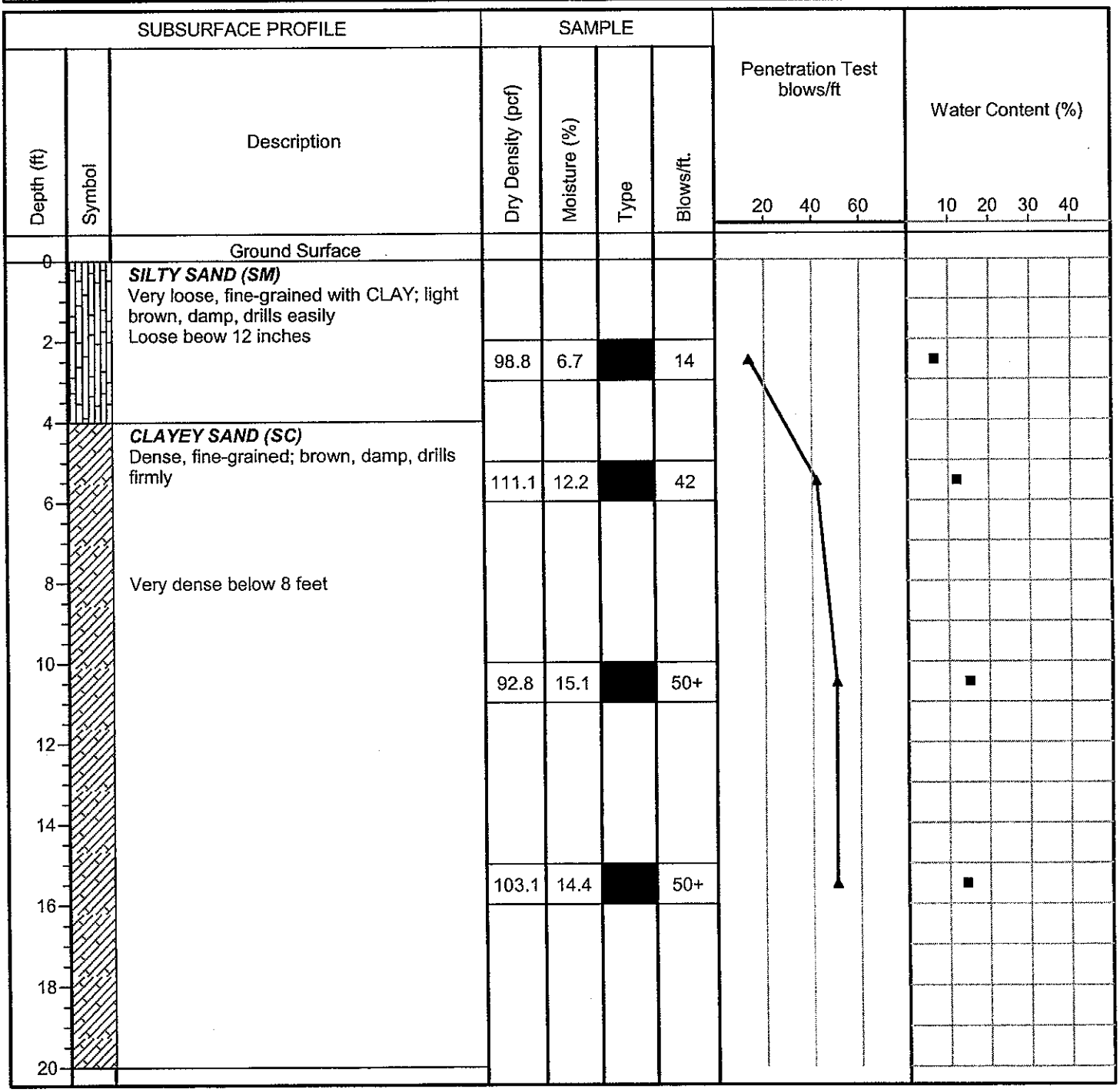
Log of Drill Hole B25

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-25

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Krazan and Associates

Log of Drill Hole B26

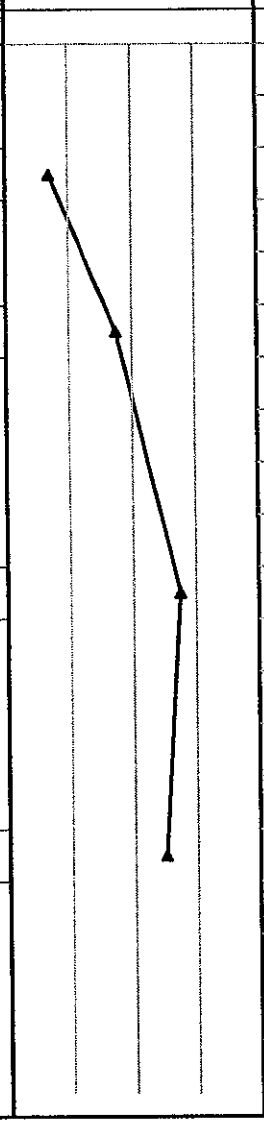
Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

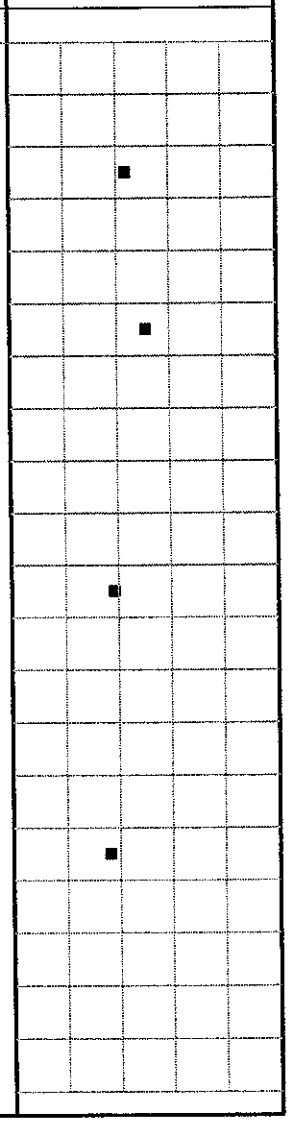
Client: Spinnaker Energy, Inc. | **Figure No.:** A-26

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY CLAY (CH)*** Soft; light brown, damp, drills easily Firm below 6 inches Stiff below 18 inches				
2			97.2	21.8	■	14
4						
6		***SILTY CLAY (CL)*** Very stiff; light brown, damp, drills firmly	99.7	25.6	■	35
8		Hard below 9 feet				
10			102.5	19.2	■	55
12						
14			104.0	18.1	■	50+
16						
18						
20						





Drill Method: Solid Flight | **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Sheet: 1 of 1

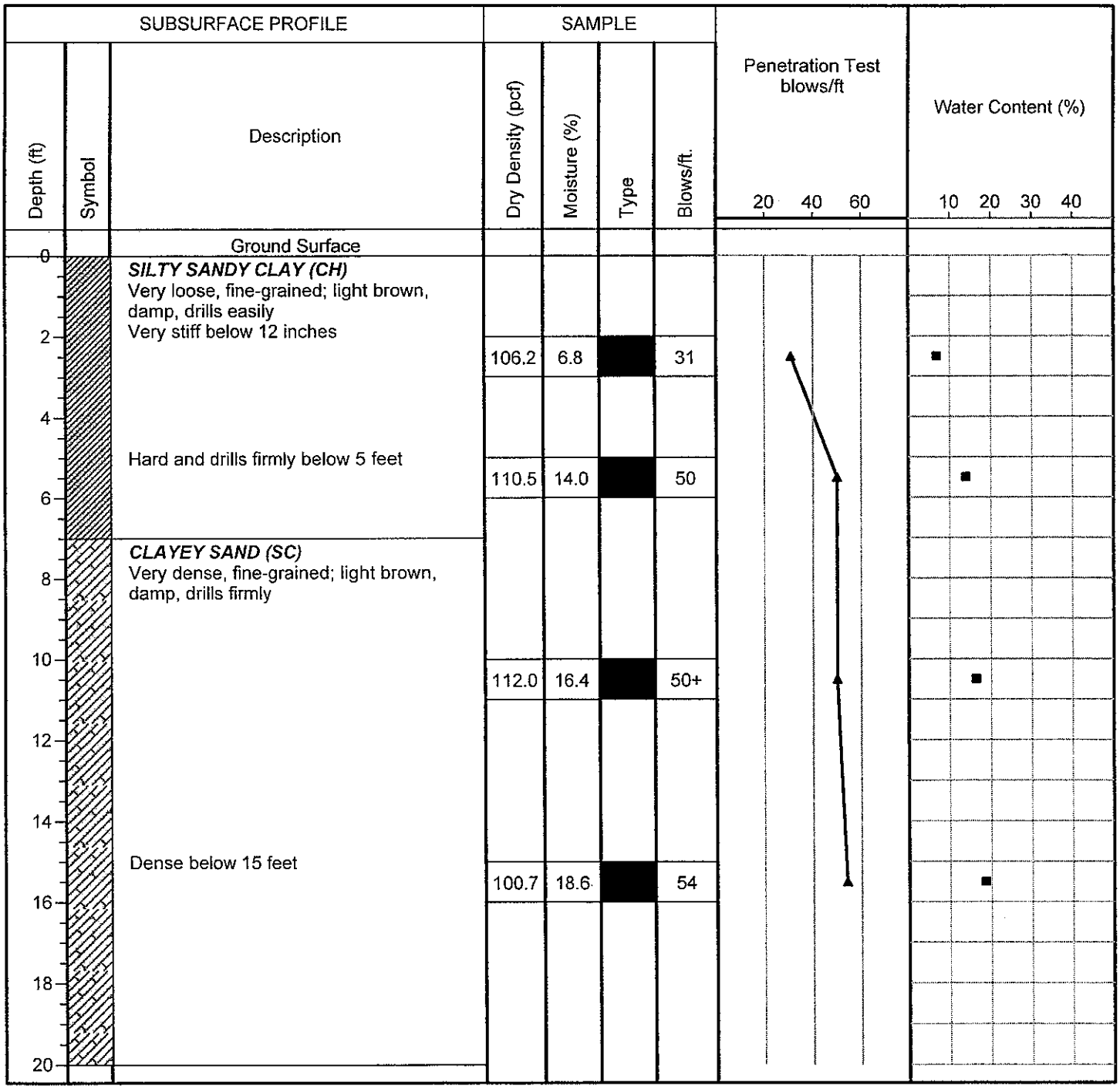
Log of Drill Hole B27

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-27

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Sheet: 1 of 1

Log of Drill Hole B28

Project: San Joaquin Solor Plants 1 & 2 — **Project No:** 012-08068

Client: Spinnaker Energy, Inc. — **Figure No.:** A-28

Location: Jayne Avenue, Coalinga, California — **Logged By:** Wayne Andrade

Depth to Water> — **Initial:** None — **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY CLAYEY SAND (SC)*** Very loose, fine-grained; light brown, damp, drills easily Medium dense below 12 inches				
2			103.9	7.0		30
4		Dense and drills firmly below 4 feet				
6			105.2	14.7		60
8		Very dense and hard below 9 feet				
10			82.0	17.9		50+
12						
14		Weakly cemented below 15½ feet	98.9	11.9		50+
16						
18						
20						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight — **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 — **Krazan and Associates** — **Hole Size:** 4½ Inches

Driller: Todd Seaman — **Elevation:** 20 Feet

Sheet: 1 of 1

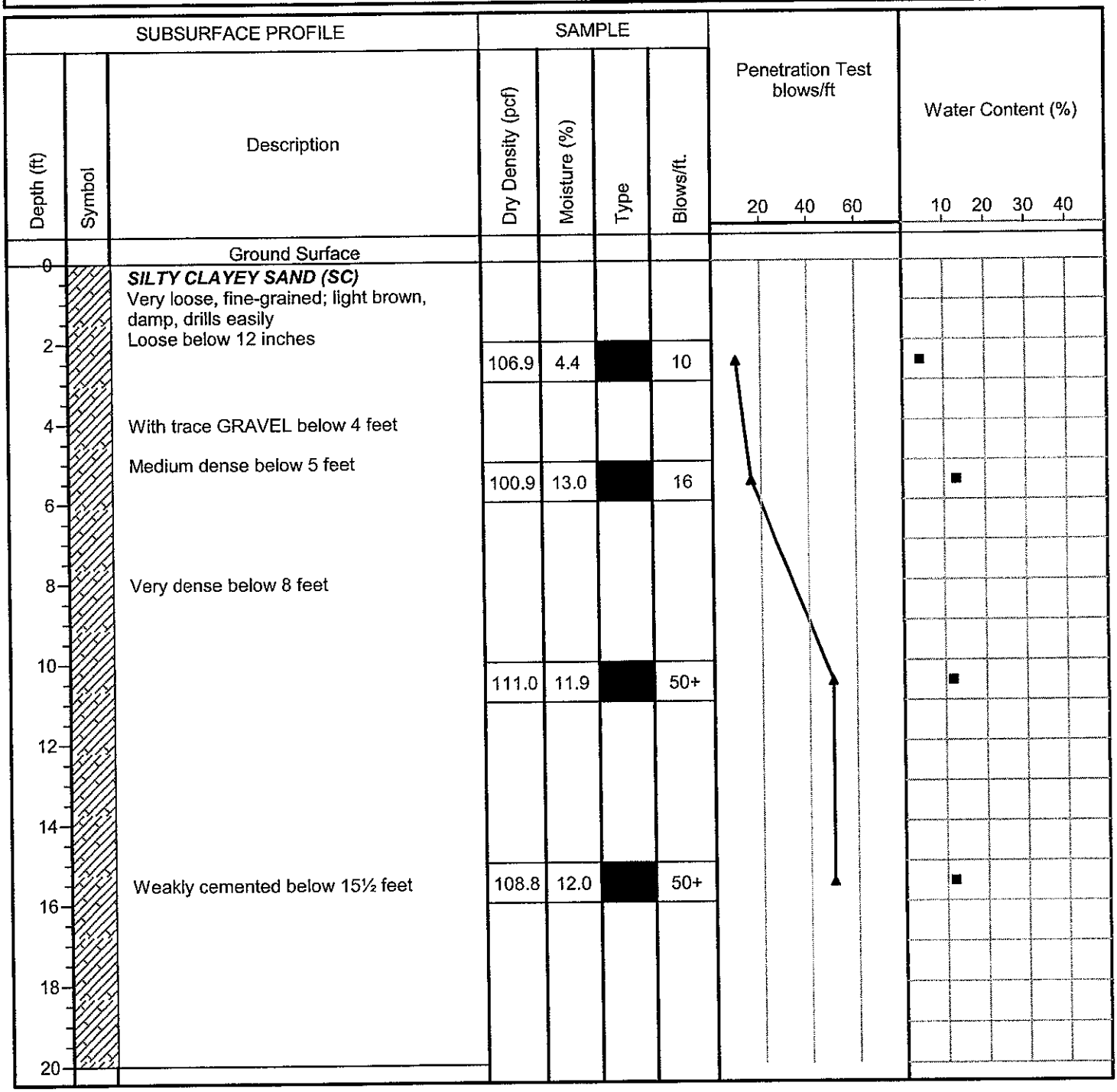
Log of Drill Hole B29

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-29

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 20 Feet

Sheet: 1 of 1

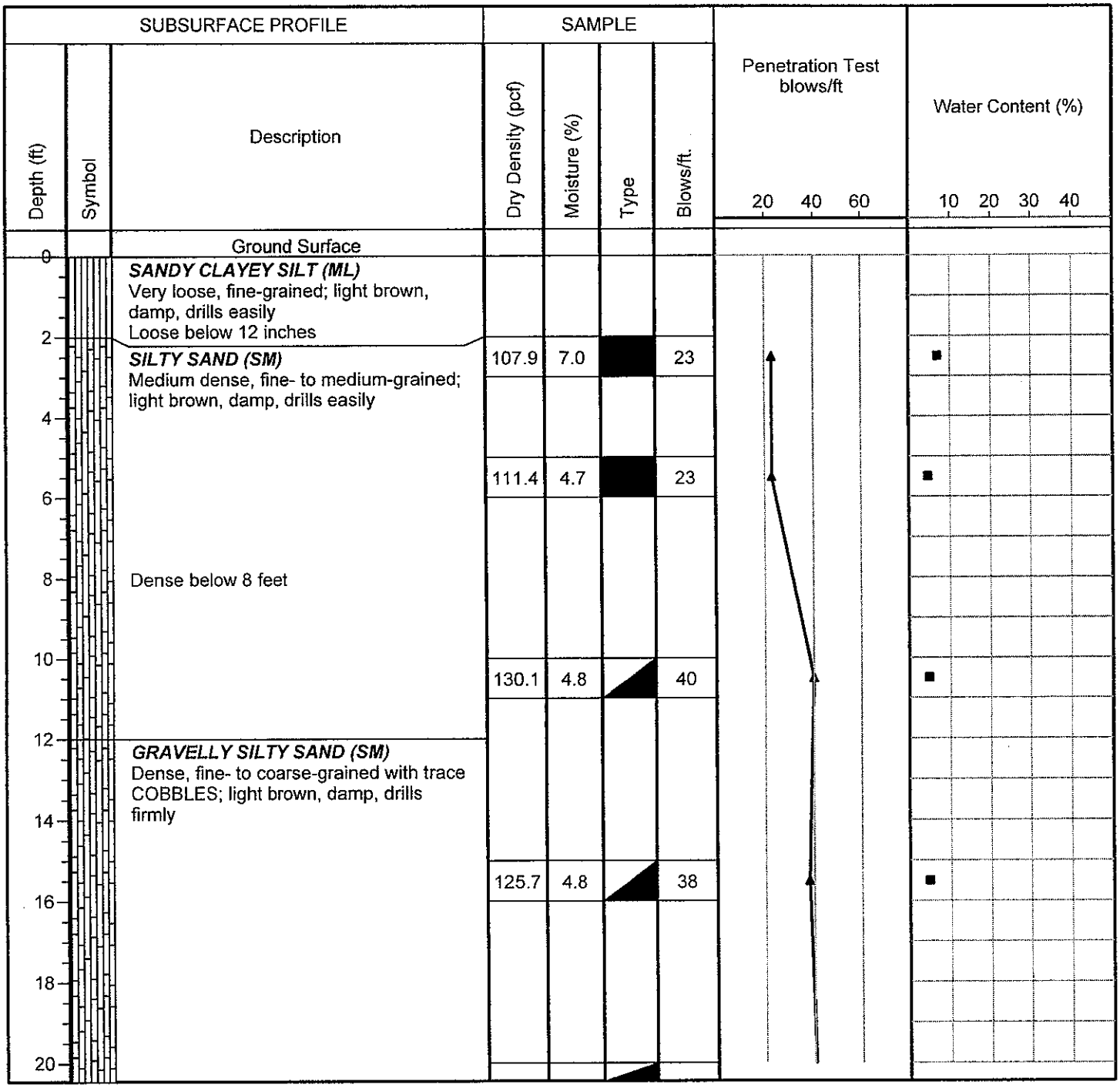
Log of Drill Hole B30

Project: San Joaquin Solor Plants 1 & 2 — **Project No:** 012-08068

Client: Spinnaker Energy, Inc. — **Figure No.:** A-30

Location: Jayne Avenue, Coalinga, California — **Logged By:** Wayne Andrade

Depth to Water> — **Initial:** None — **At Completion:** None



Drill Method: Solid Flight — **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 — **Krazan and Associates** — **Hole Size:** 4½ Inches

Driller: Todd Seaman — **Elevation:** 60 Feet

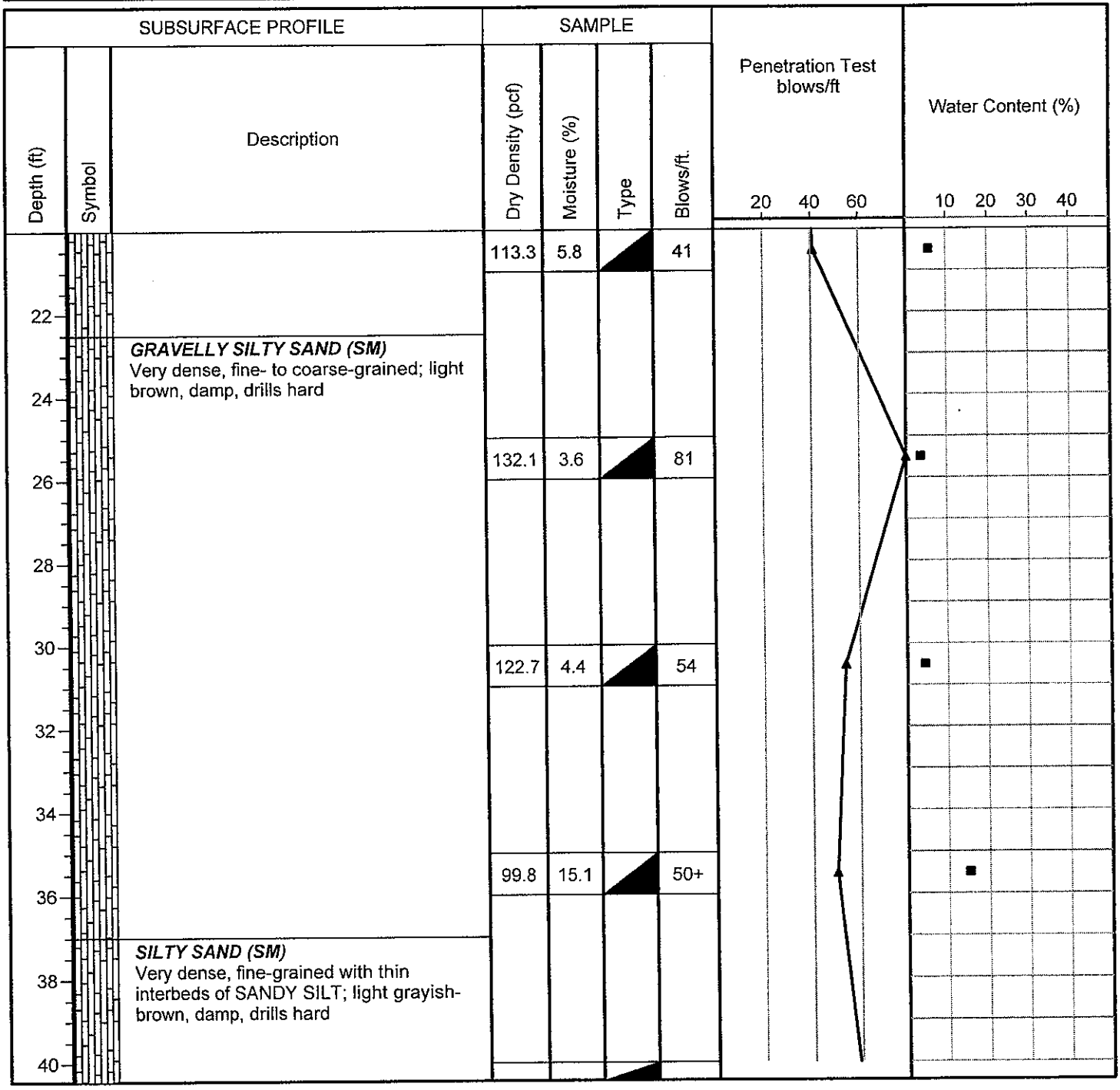
Log of Drill Hole B30

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-30

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 60 Feet

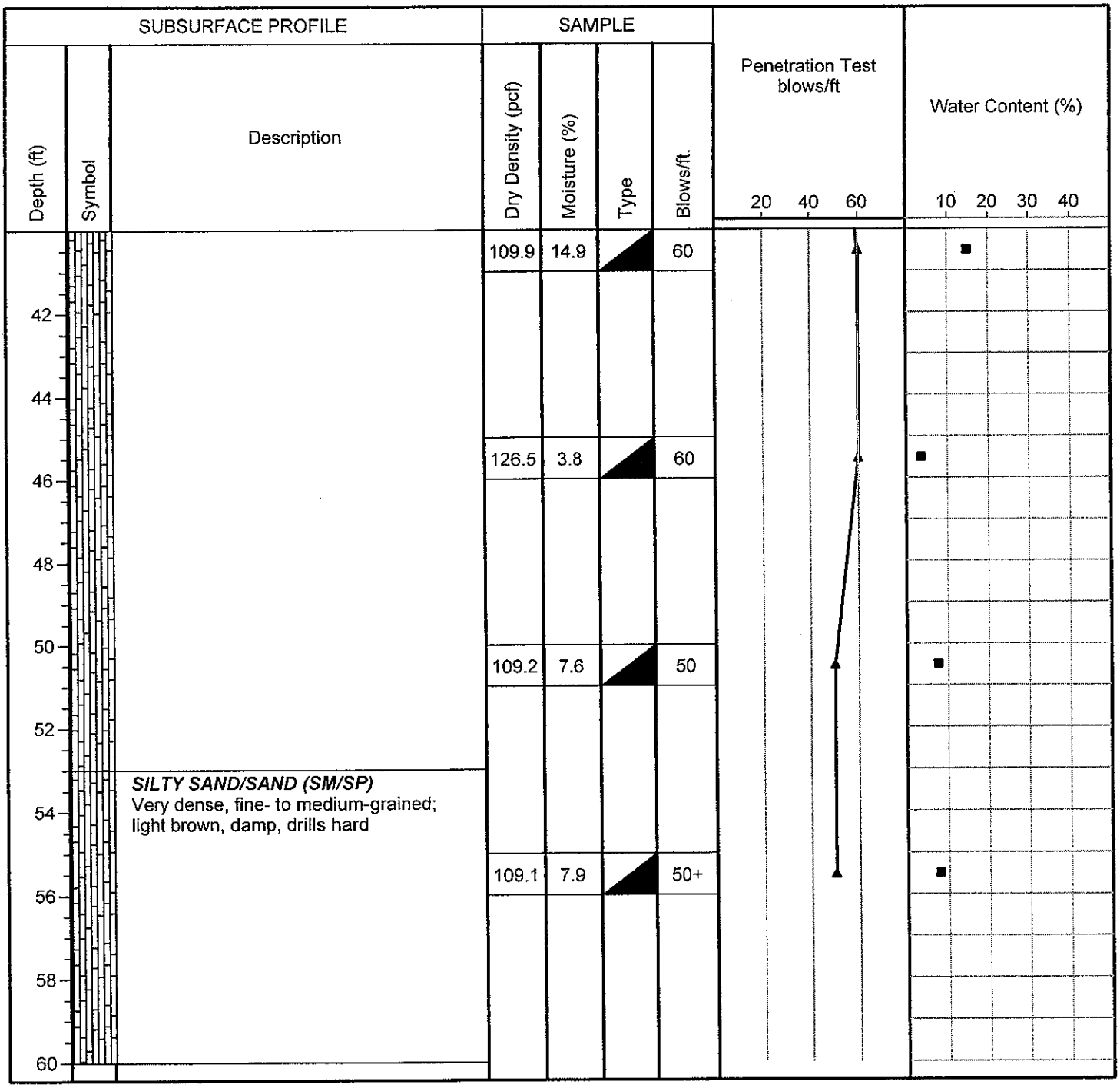
Log of Drill Hole B30

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-30

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 60 Feet

Krazan and Associates

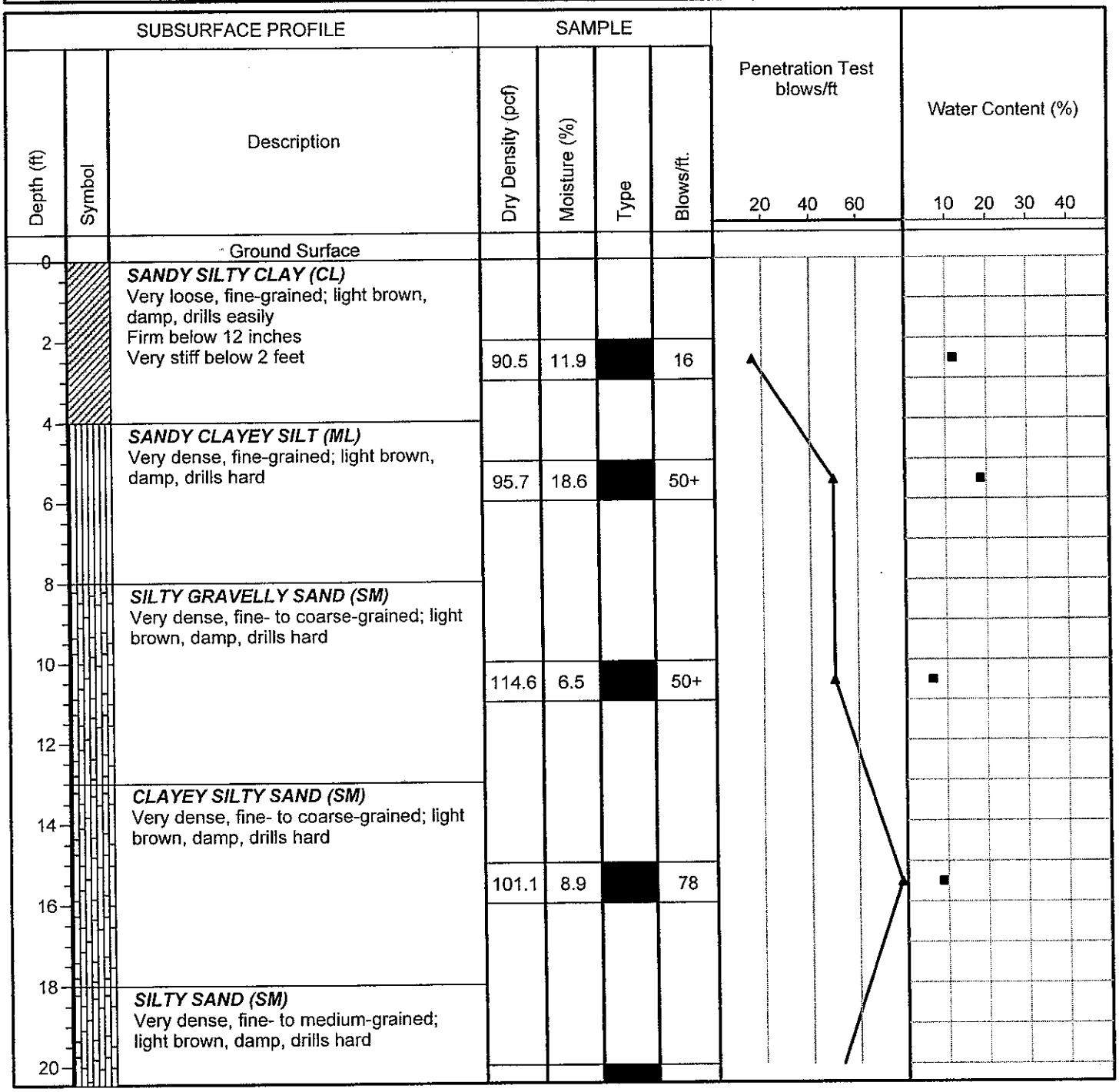
Log of Drill Hole B31

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-31

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 40 Feet

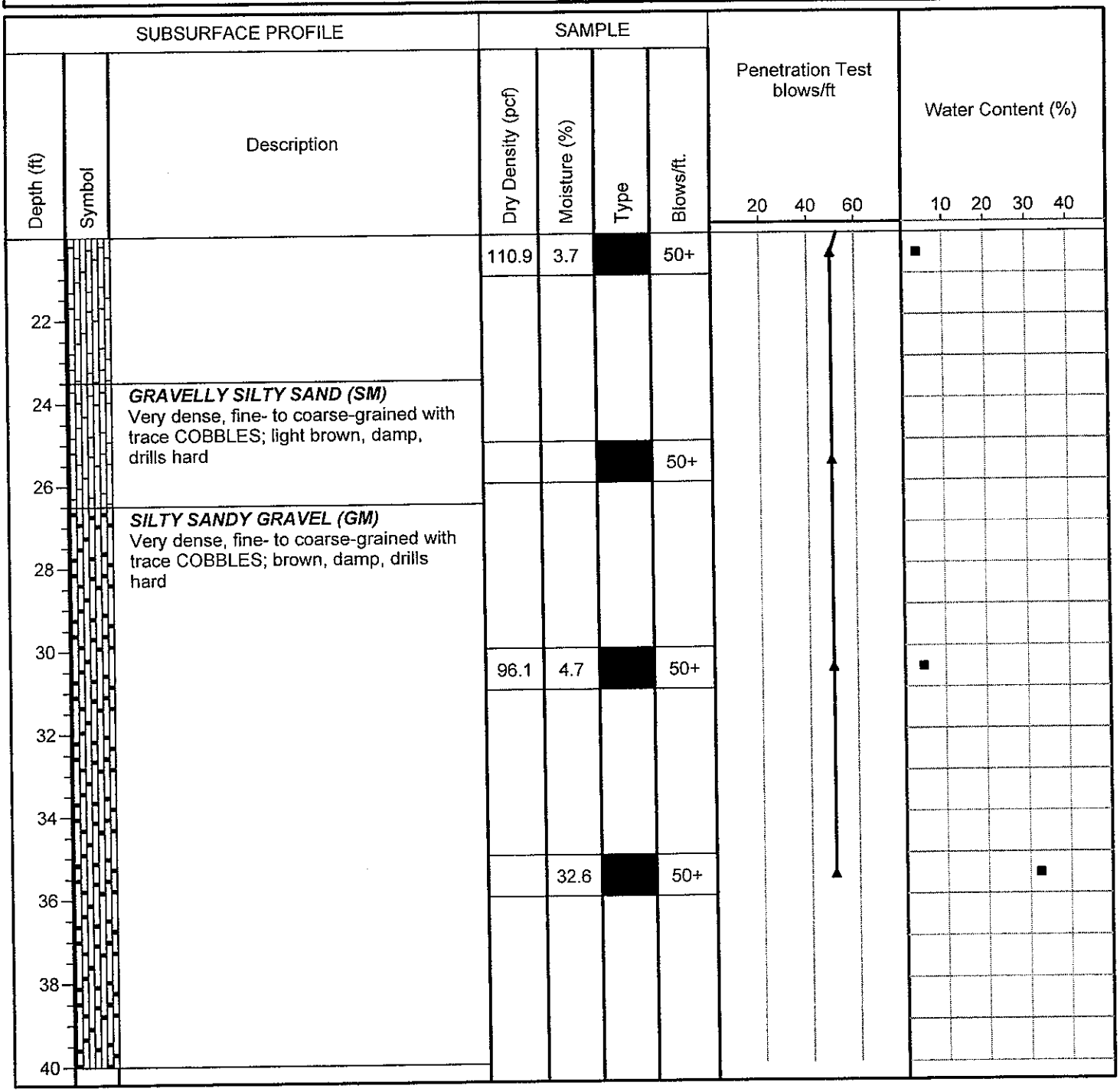
Log of Drill Hole B31

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-31

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 40 Feet

Sheet: 2 of 2

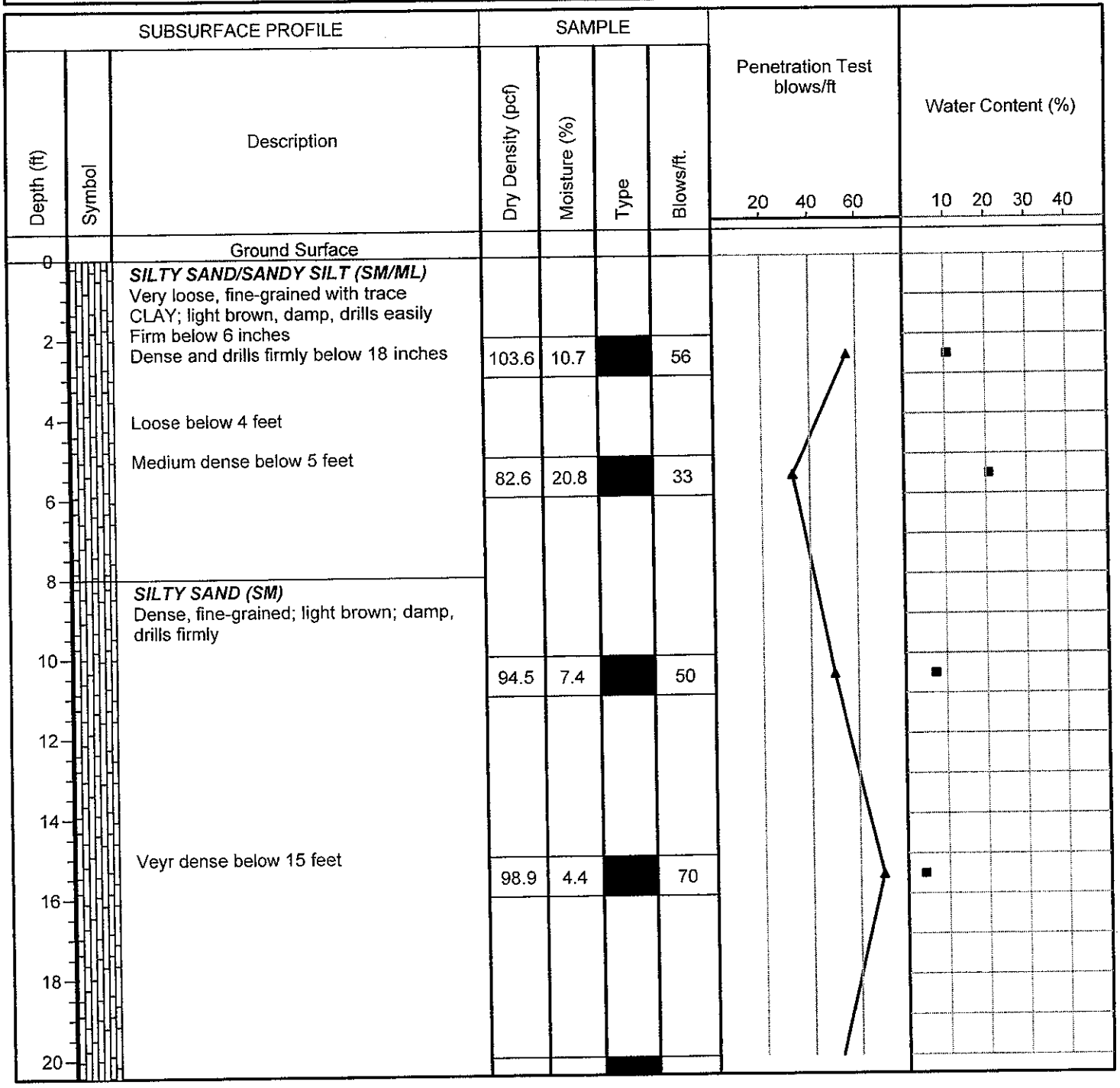
Log of Drill Hole B32

Project: San Joaquin Solor Plants 1 & 2 — **Project No:** 012-08068

Client: Spinnaker Energy, Inc. — **Figure No.:** A-32

Location: Jayne Avenue, Coalinga, California — **Logged By:** Wayne Andrade

Depth to Water> — **Initial:** None — **At Completion:** None



Drill Method: Solid Flight — **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 — **Hole Size:** 4½ Inches

Driller: Todd Seaman — **Elevation:** 60 Feet

Krazan and Associates

Log of Drill Hole B32

Project: San Joaquin Solor Plants 1 & 2 — **Project No:** 012-08068

Client: Spinnaker Energy, Inc. — **Figure No.:** A-32

Location: Jayne Avenue, Coalinga, California — **Logged By:** Wayne Andrade

Depth to Water> — **Initial:** None — **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
22			109.0	4.1		50+
24						
26			103.6	8.6		50+
28						
30			112.8	2.5		50+
32		***GRAVELLY SILTY SAND (SM)*** Very dense, fine- to coarse-grained; light brown, damp, drills hard				
34		***SILTY SAND/SANDY SILT (SM/ML)*** Very dense, fine-grained with trace GRAVEL and CLAY; light brown, damp, drills hard				
36			95.5	7.8		50+
38						
40						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight — **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 — **Krazan and Associates** — **Hole Size:** 4½ Inches

Driller: Todd Seaman — **Elevation:** 60 Feet

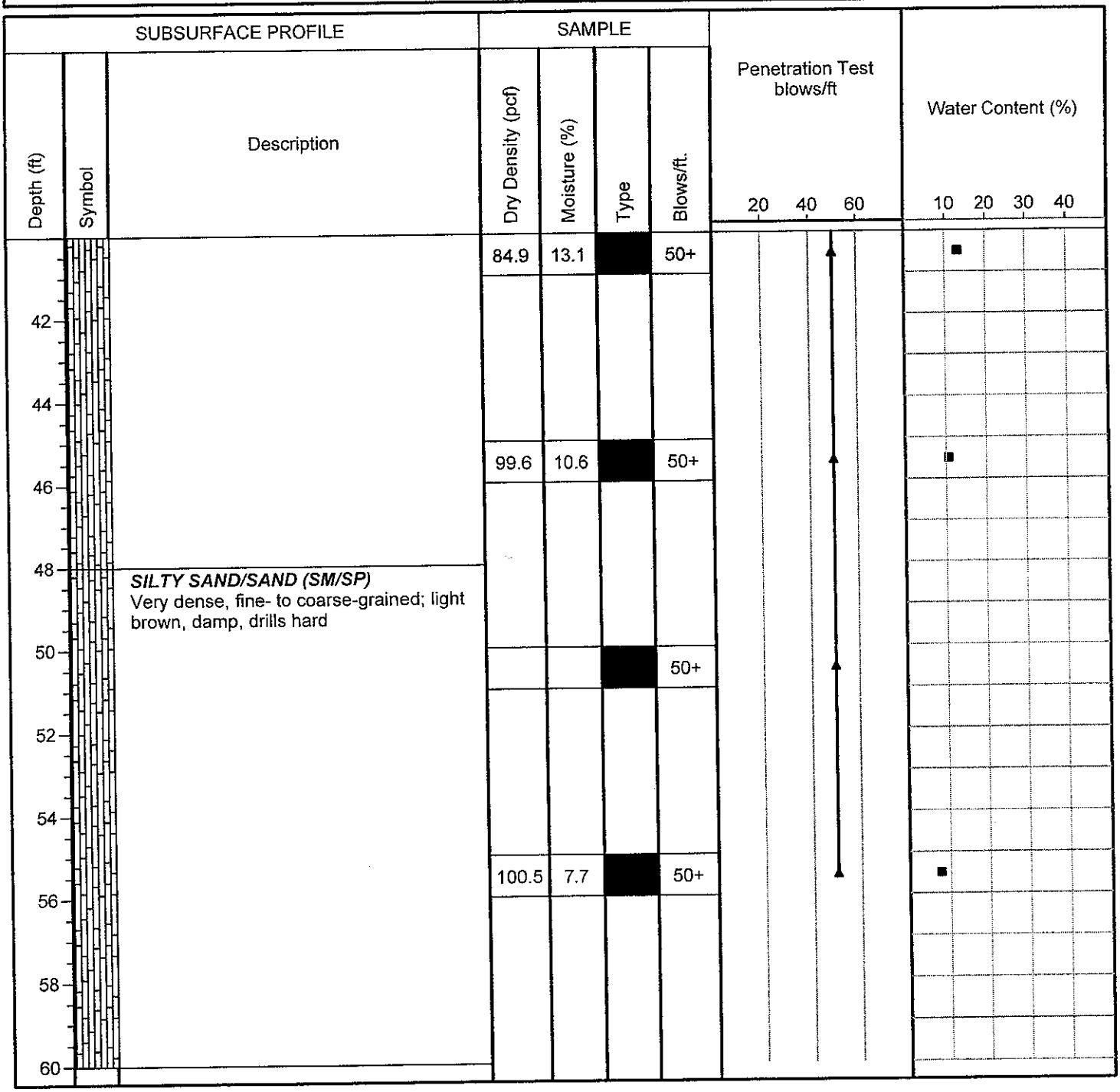
Log of Drill Hole B32

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-32

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 60 Feet

Krazan and Associates

Log of Drill Hole B33

Project: San Joaquin Solor Plants 1 & 2

Project No: 012-08068

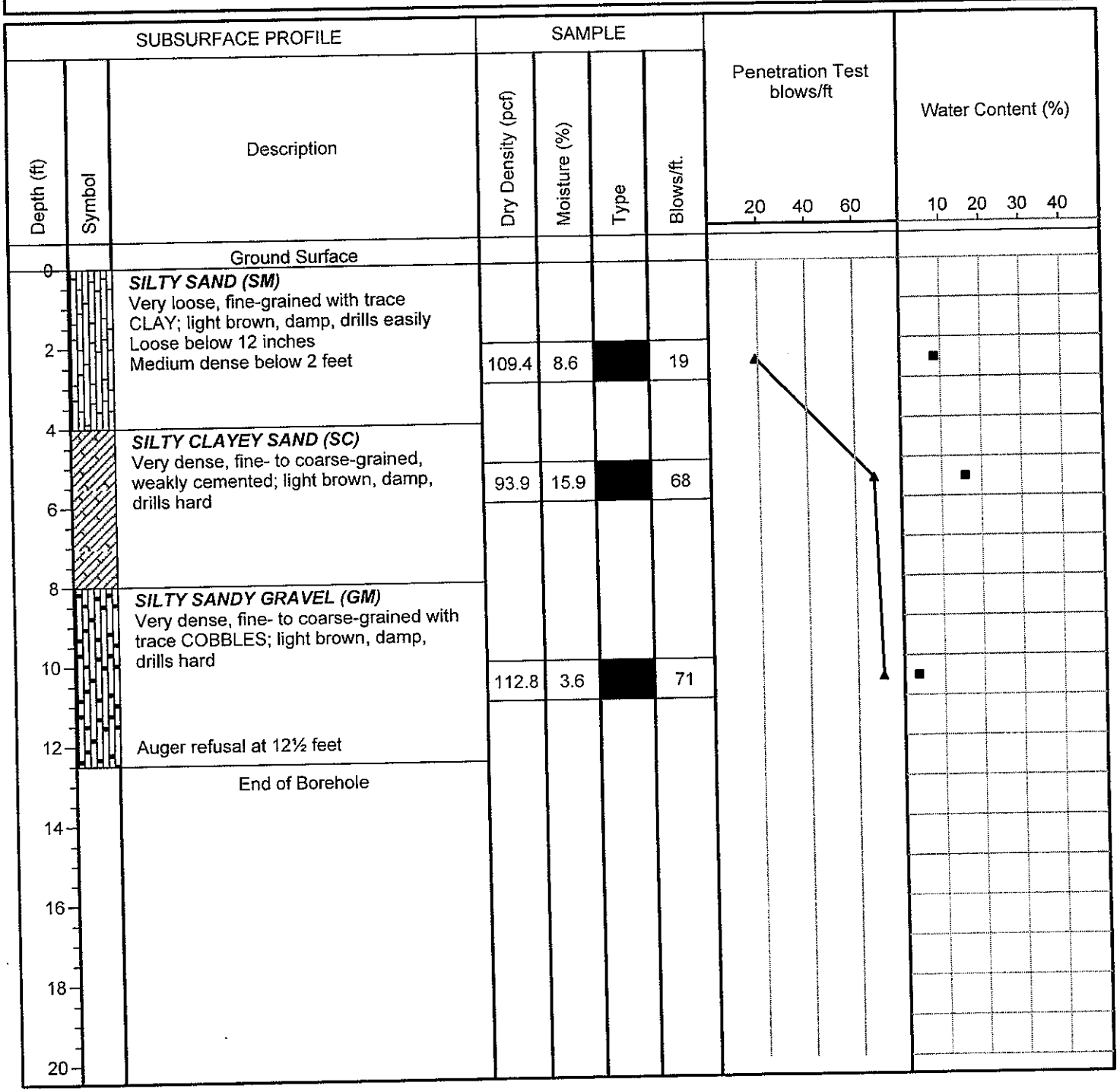
Client: Spinnaker Energy, Inc.

Figure No.: A-33

Location: Jayne Avenue, Coalinga, California

Logged By: Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None



Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

Drill Date: 9-17-08 to 10-3-08

Hole Size: 4½ Inches

Elevation: 12½ Feet

Sheet: 1 of 1

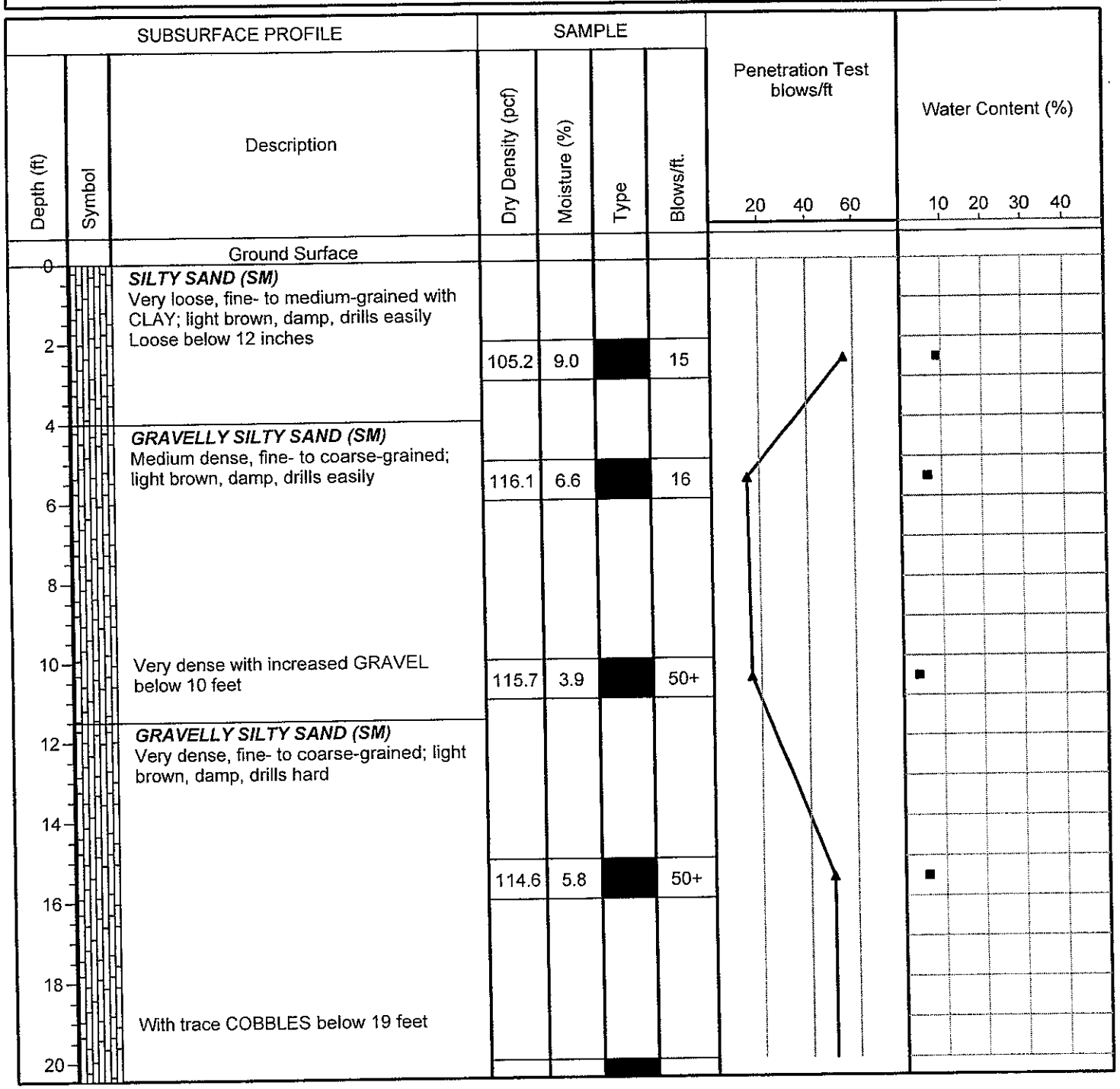
Log of Drill Hole B34

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-34

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 60 Feet

Log of Drill Hole B34

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-34

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
						50+
22		***SILTY SAND (SM)*** Very dense, fine- to coarse-grained with trace GRAVEL; light brown, damp, drills hard				
24			98.4	5.0		50+
26		With increased GRAVEL below 27 feet				
28						
30			108.3	3.1		50+
32						
34						
						50+
36						
38						
40						

Penetration Test blows/ft: 20, 40, 60

Water Content (%): 10, 20, 30, 40

Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

Drill Date: 9-17-08 to 10-3-08

Hole Size: 4½ Inches

Elevation: 60 Feet

Log of Drill Hole B34

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-34

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft	Water Content (%)
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	20 40 60	10 20 30 40
42			123.8	2.8		50+		
44		***GRAVELLY SILTY SAND (SM)*** Very dense, fine- to coarse-grained; light brown, damp, drills hard						
46			113.7	3.9		50+		
48								
50			120.3	3.0		50+		
52								
54								
56			106.8	4.2		50+		
58								
60								

Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

Drill Date: 9-17-08 to 10-3-08

Hole Size: 4½ Inches

Elevation: 60 Feet

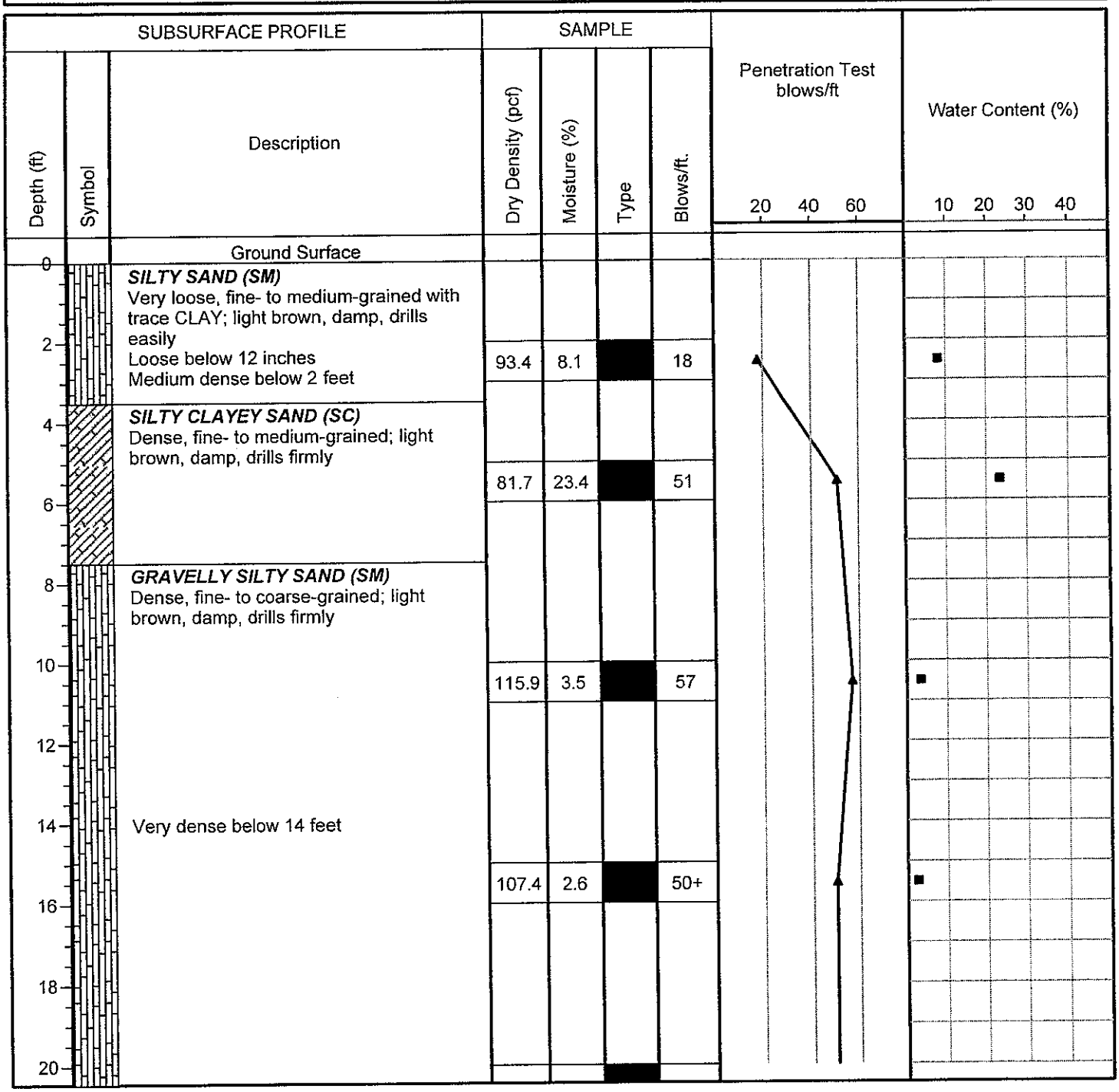
Log of Drill Hole B35

Project: San Joaquin Solor Plants 1 & 2 — **Project No:** 012-08068

Client: Spinnaker Energy, Inc. — **Figure No.:** A-35

Location: Jayne Avenue, Coalinga, California — **Logged By:** Wayne Andrade

Depth to Water> — **Initial:** None — **At Completion:** None



Drill Method: Solid Flight — **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 — **Krazan and Associates** — **Hole Size:** 4½ Inches

Driller: Todd Seaman — **Elevation:** 30 Feet

Log of Drill Hole B35

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-35

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
22			118.5	7.1		50+
24		***SILTY SAND (SM)*** Very dense, fine- to medium-grained, weakly cemented; light brown, damp, drills hard	90.7	13.1		50+
26		***SILTY SAND (SM)*** Very dense, fine- to coarse-grained with GRAVEL; light brown, damp, drills hard				
28						
30		End of Borehole				
32						
34						
36						
38						
40						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

Drill Date: 9-17-08 to 10-3-08

Hole Size: 4½ Inches

Elevation: 30 Feet

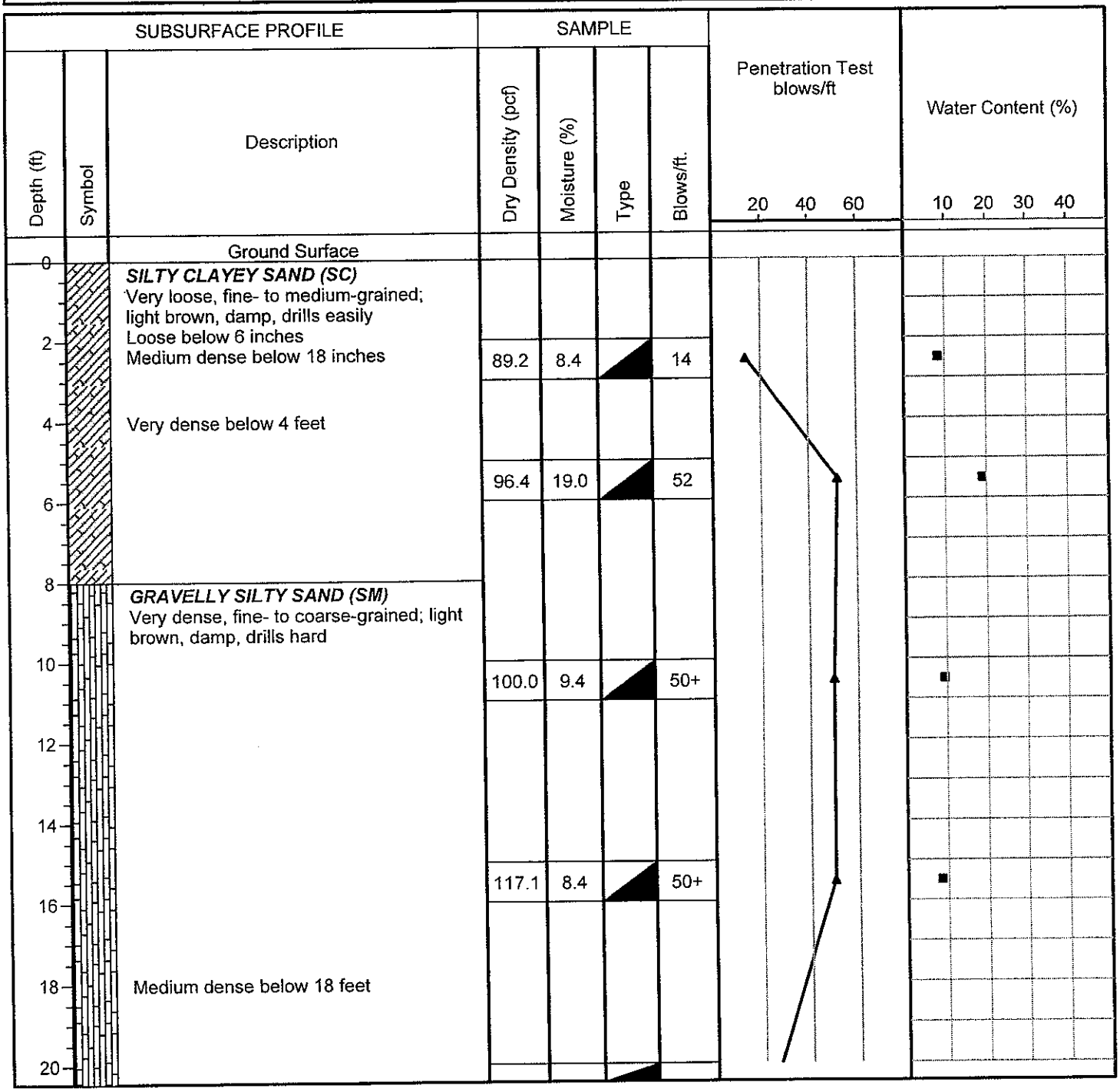
Log of Drill Hole B36

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-36

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None



Drill Method: Solid Flight | **Drill Date:** 9-17-08 to 10-3-08

Drill Rig: CME 55 | **Hole Size:** 4½ Inches

Driller: Todd Seaman | **Elevation:** 30 Feet

Krazan and Associates

Log of Drill Hole B36

Project: San Joaquin Solor Plants 1 & 2 | **Project No:** 012-08068

Client: Spinnaker Energy, Inc. | **Figure No.:** A-36

Location: Jayne Avenue, Coalinga, California | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
22			117.1	5.0		24
24		***SILTY SAND (SM)*** Very dense, fine- to medium-grained; light brown, damp, drills hard	80.6	12.9		50+
26						
28						
30		End of Borehole				
32						
34						
36						
38						
40						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Solid Flight

Drill Rig: CME 55

Driller: Todd Seaman

Krazan and Associates

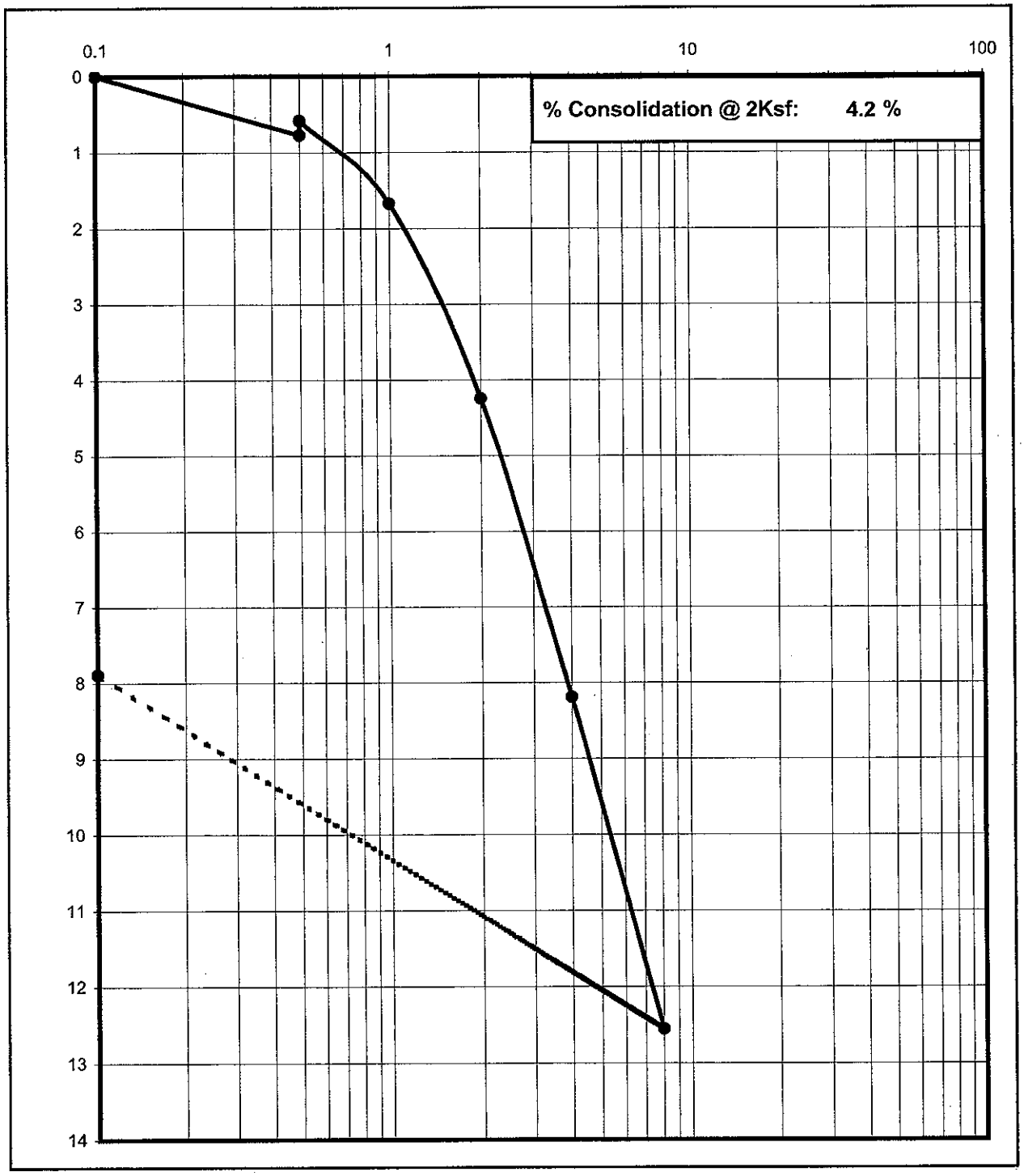
Drill Date: 9-17-08 to 10-3-08

Hole Size: 4½ Inches

Elevation: 30 Feet

Consolidation Test

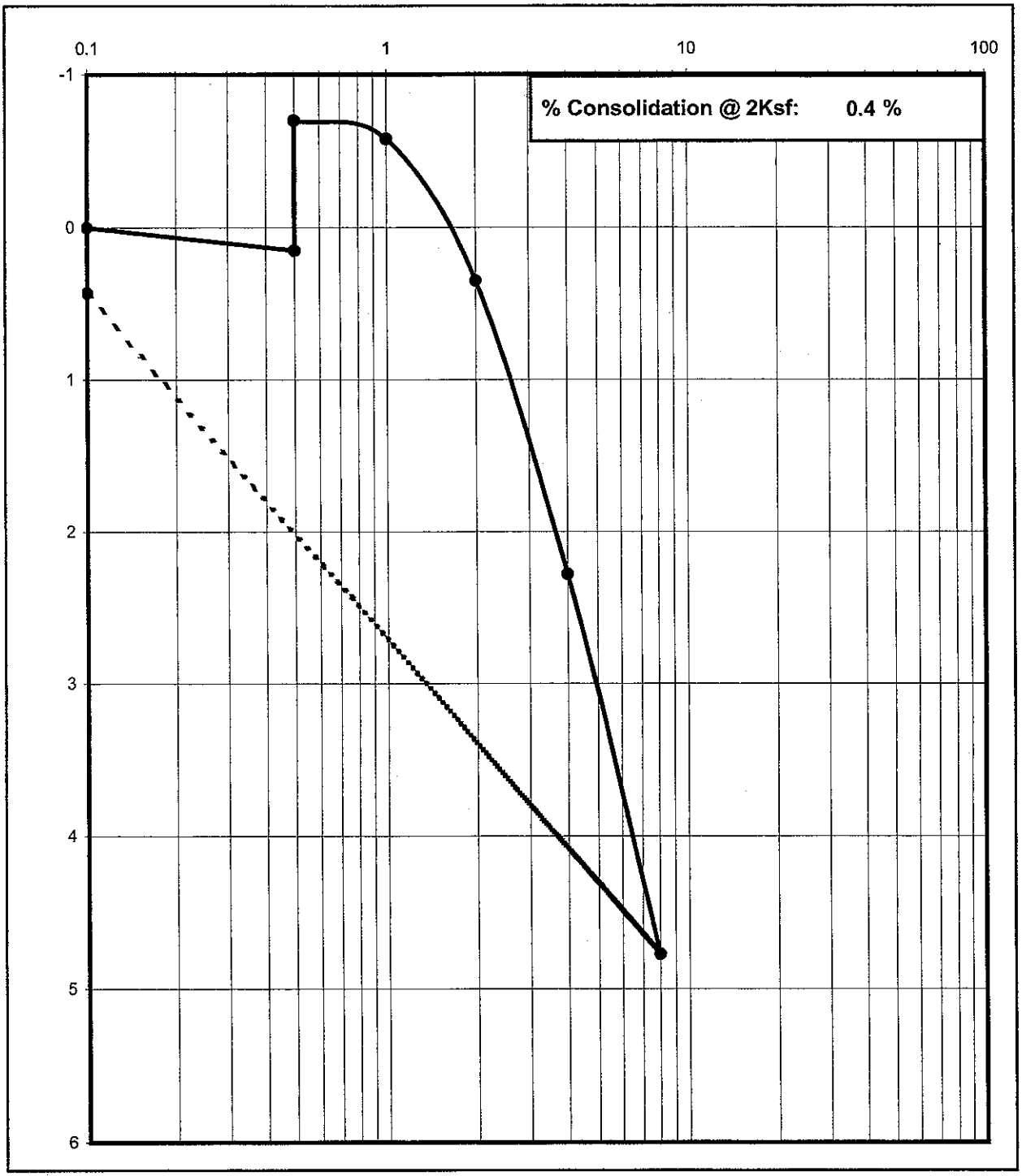
Project No	Boring No. & Depth	Date	Soil Classification
1208068	B11 @ 2-3'	9/5/2008	CL



Krazan Testing Laboratory

Consolidation Test

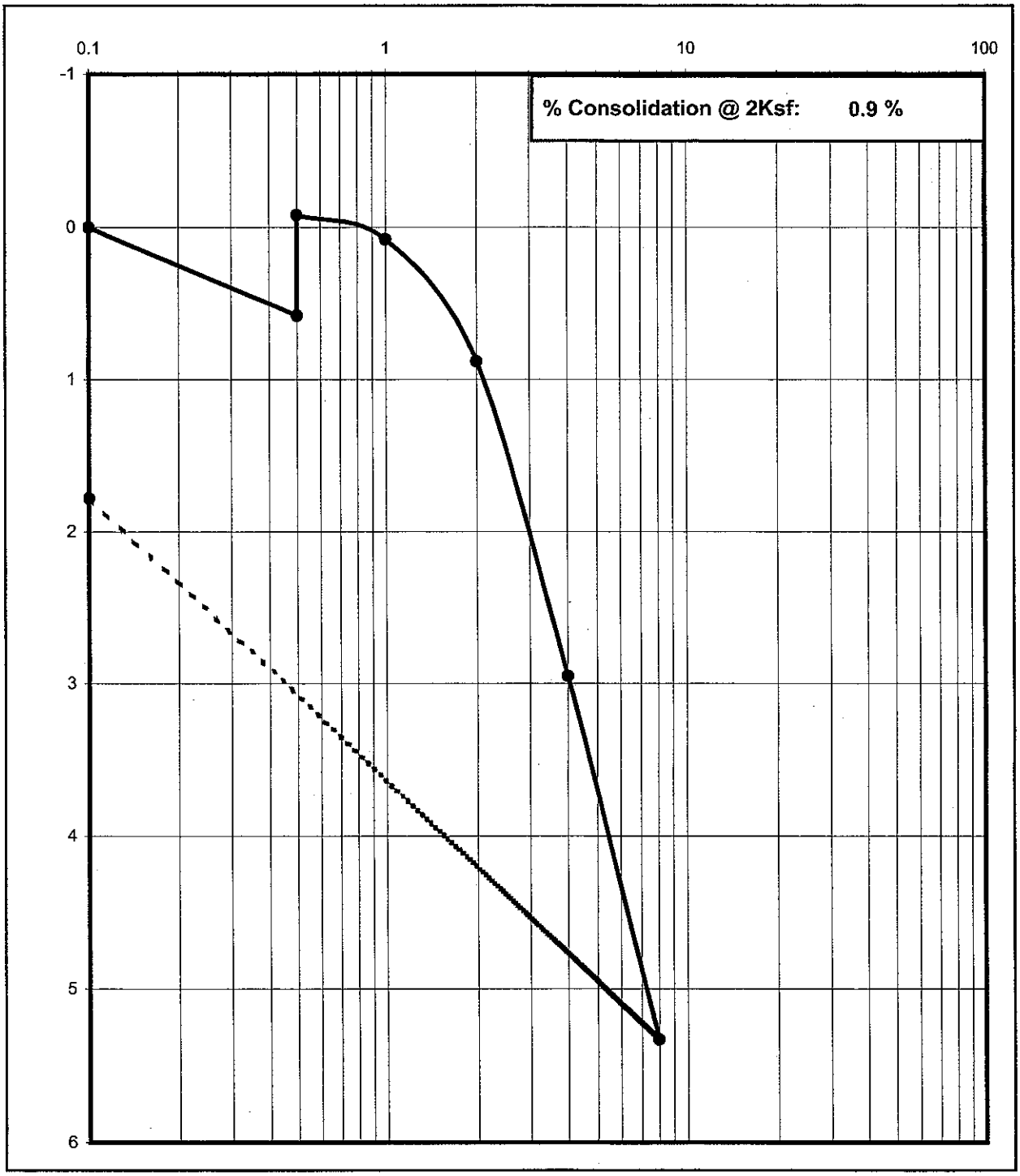
Project No	Boring No. & Depth	Date	Soil Classification
1208068	B11 @ 5-6'	9/5/2008	CL



Krazan Testing Laboratory

Consolidation Test

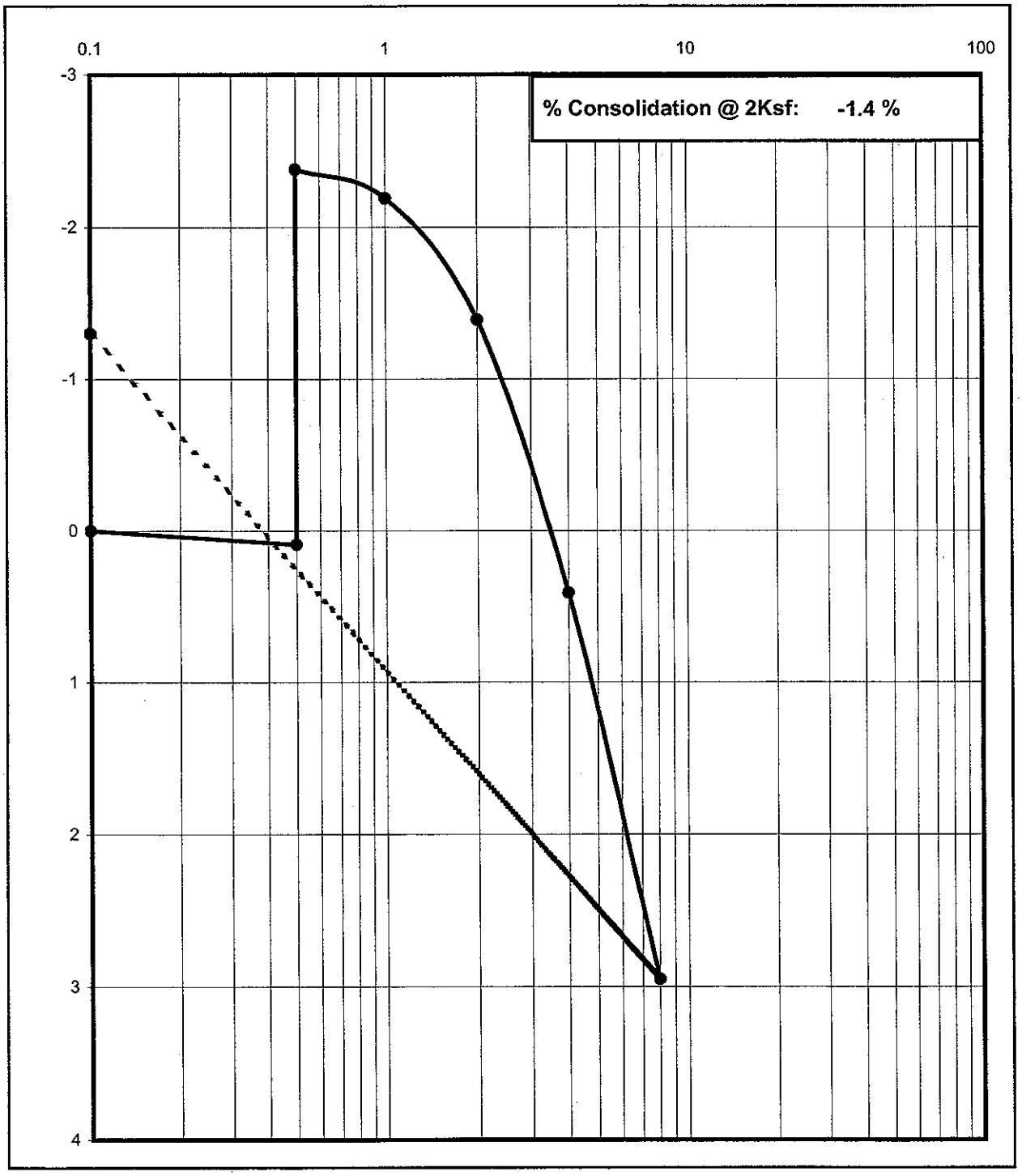
Project No	Boring No. & Depth	Date	Soil Classification
1208068	B23 @ 2-3'	9/5/2008	CL



Krazan Testing Laboratory

Consolidation Test

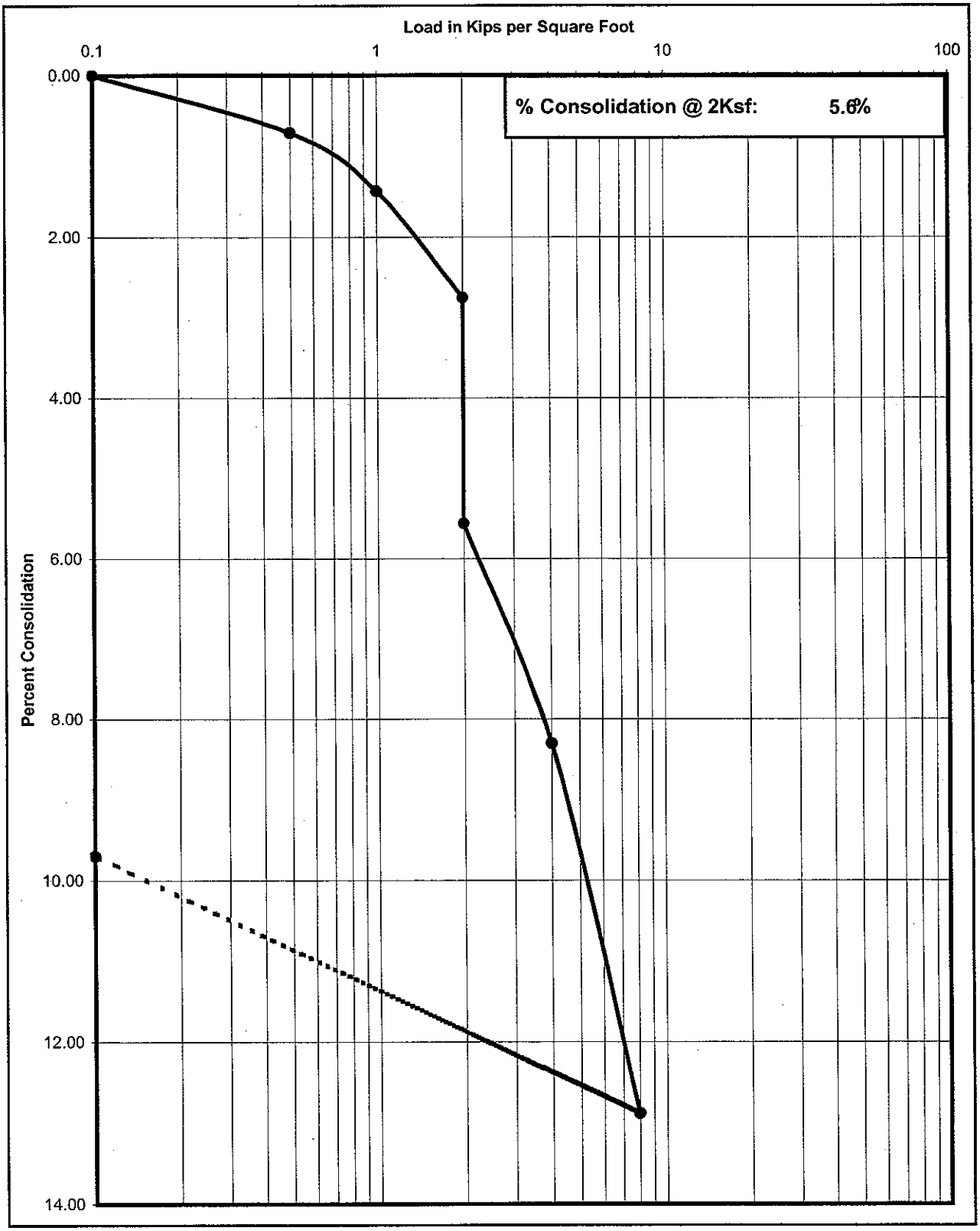
Project No	Boring No. & Depth	Date	Soil Classification
1208068	B23 @ 5-6'	9/5/2008	CL



Krazan Testing Laboratory

Consolidation Test

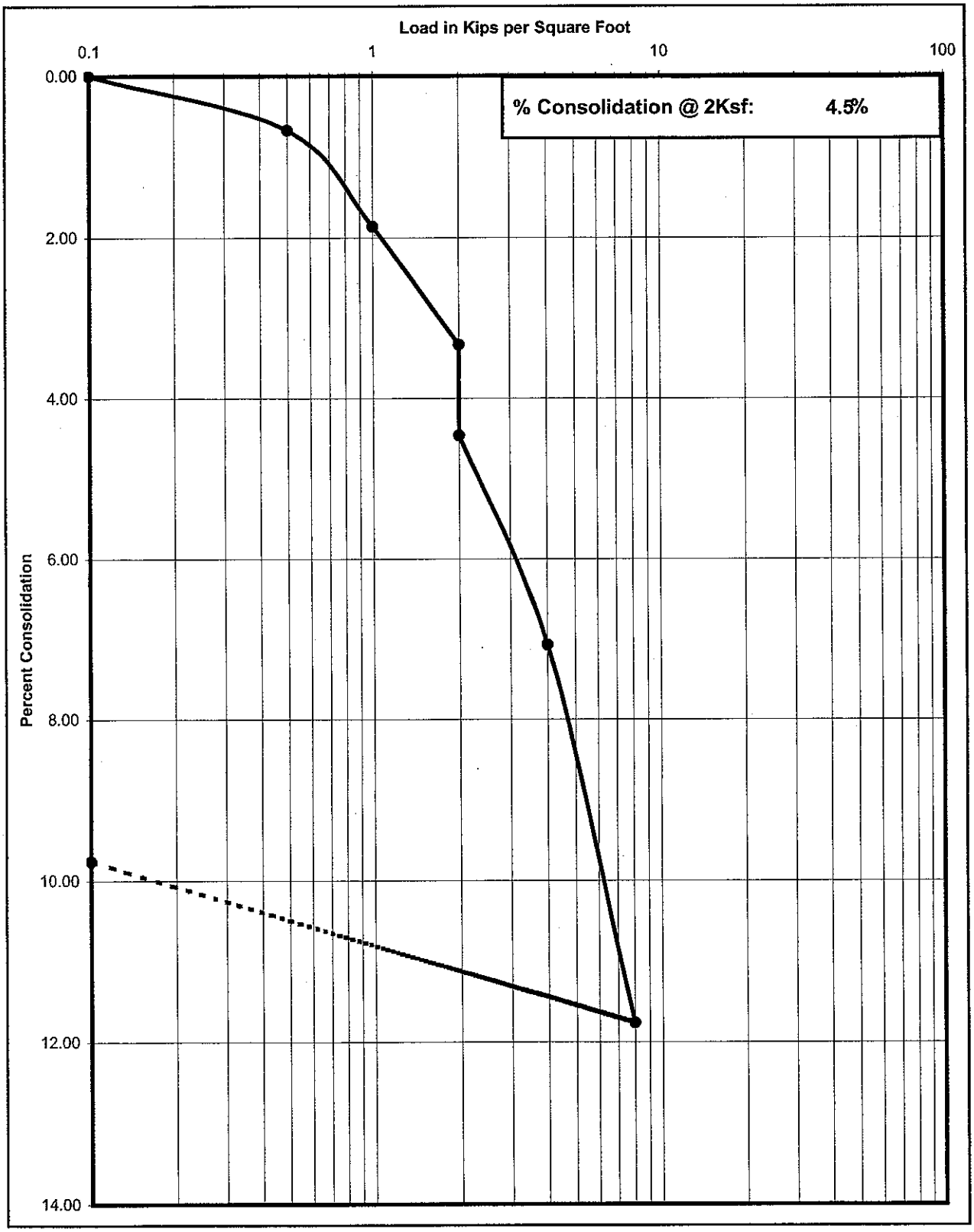
Project No	Boring No. & Depth	Date	Soil Classification
1208068	B25 @ 2-3'	9/29/2008	SM w/ clay



Krazan Testing Laboratory

Consolidation Test

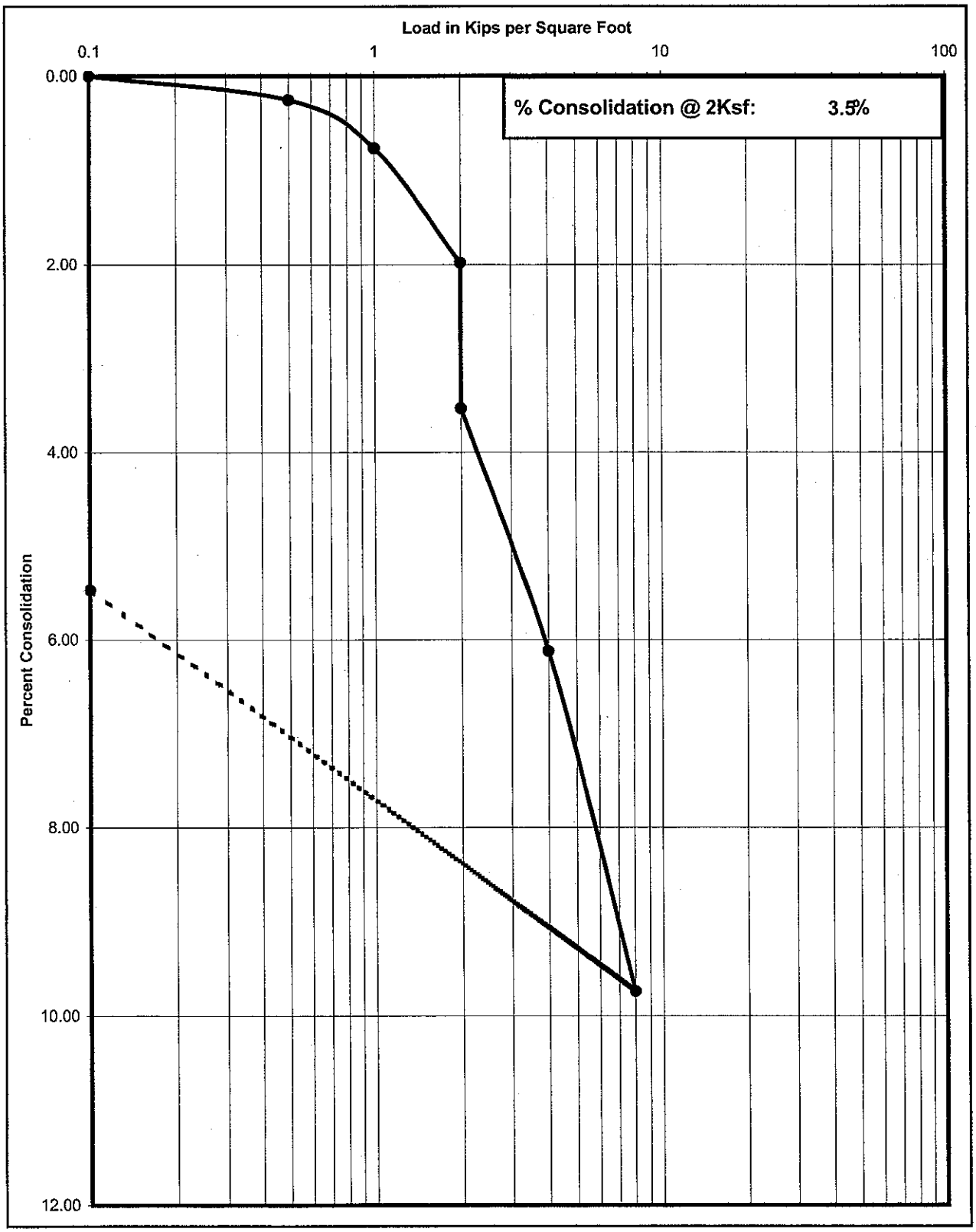
Project No	Boring No. & Depth	Date	Soil Classification
1208068	B29 @ 2-3'	9/29/2008	SC



Krazan Testing Laboratory

Consolidation Test

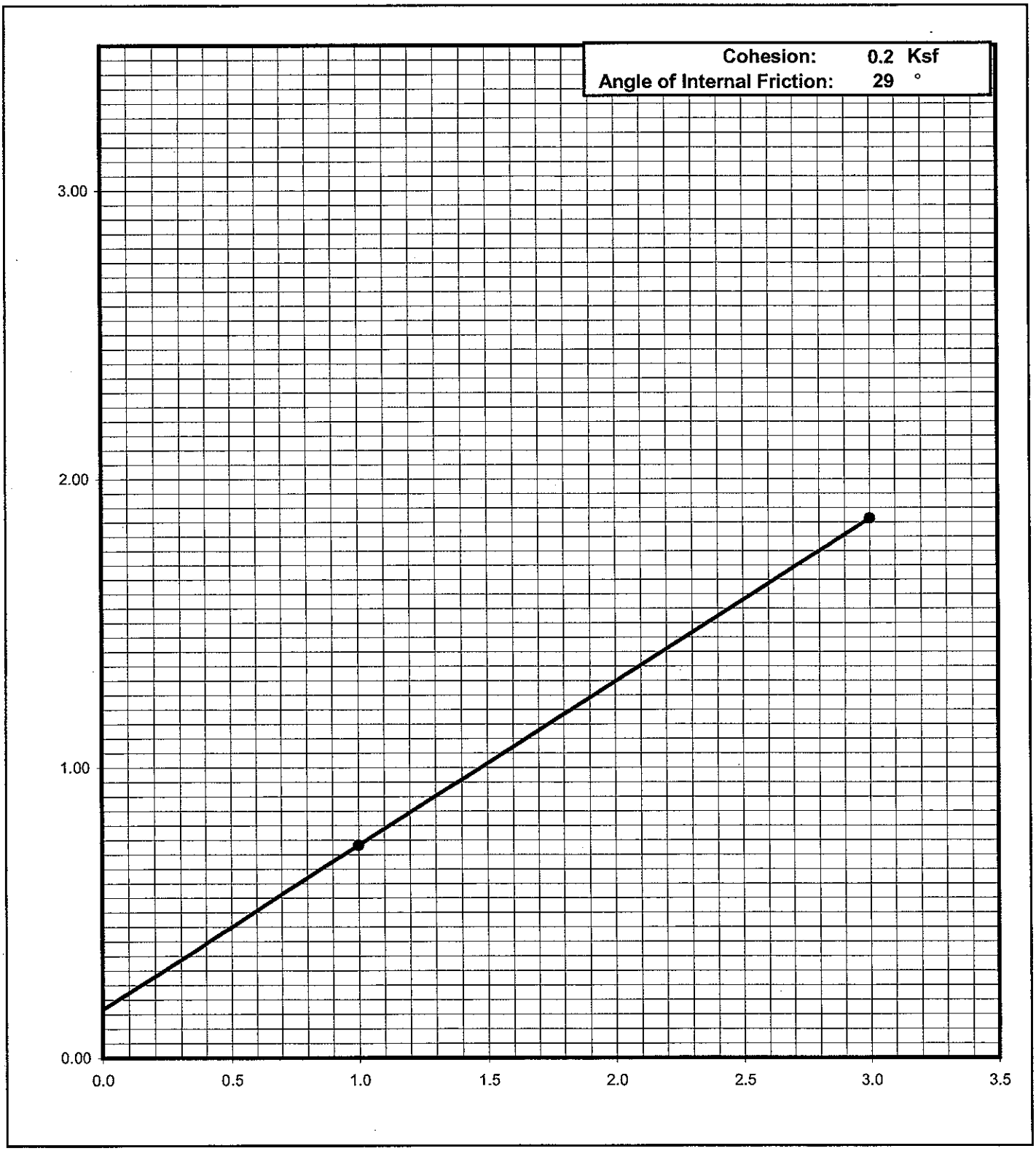
Project No	Boring No. & Depth	Date	Soil Classification
1208068	B29 @ 5-6'	9/29/2008	SC



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

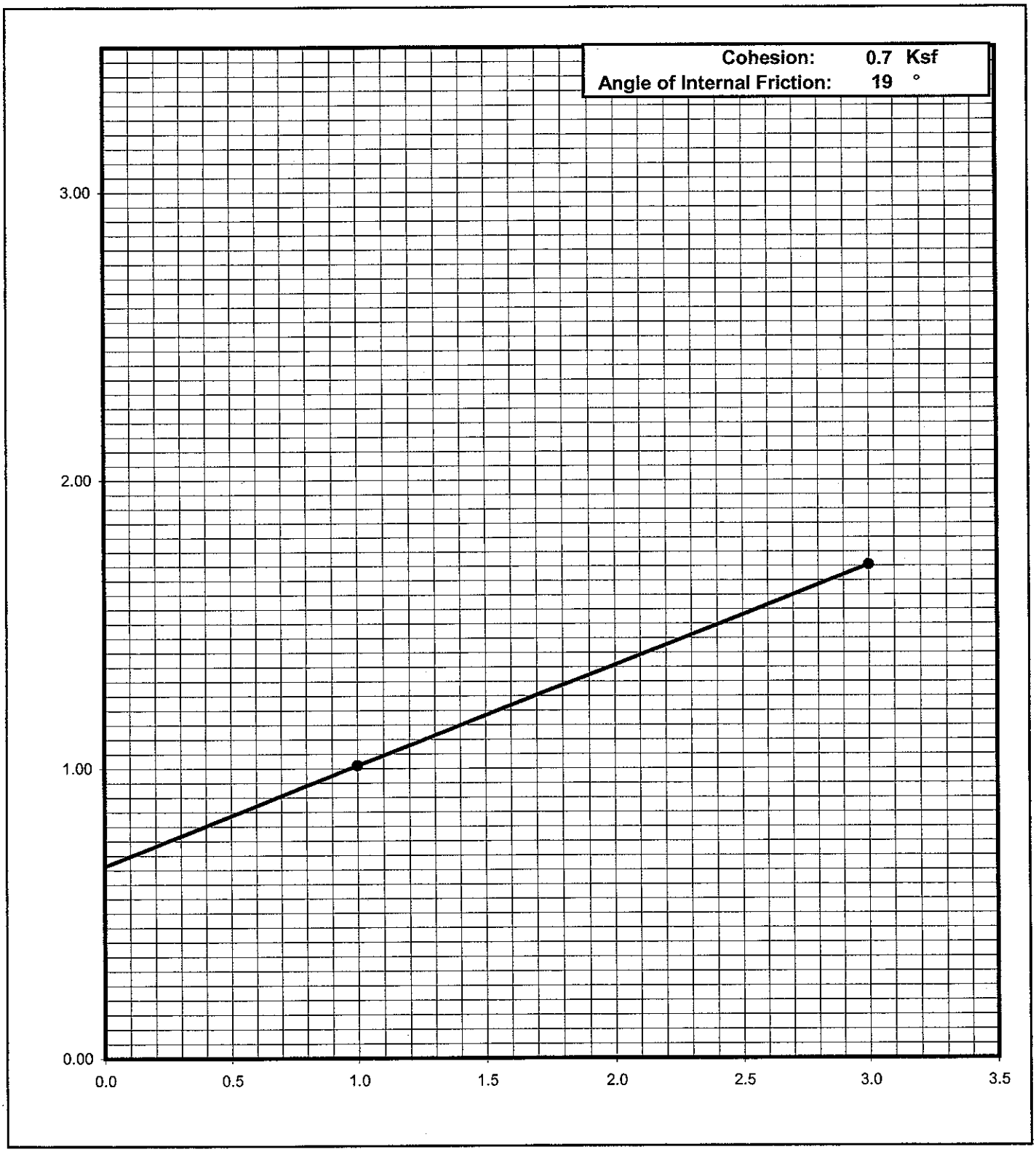
Project Number	Boring No. & Depth	Soil Type	Date
1208068	B1 @ 5-6'	ML	8/27/2008



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

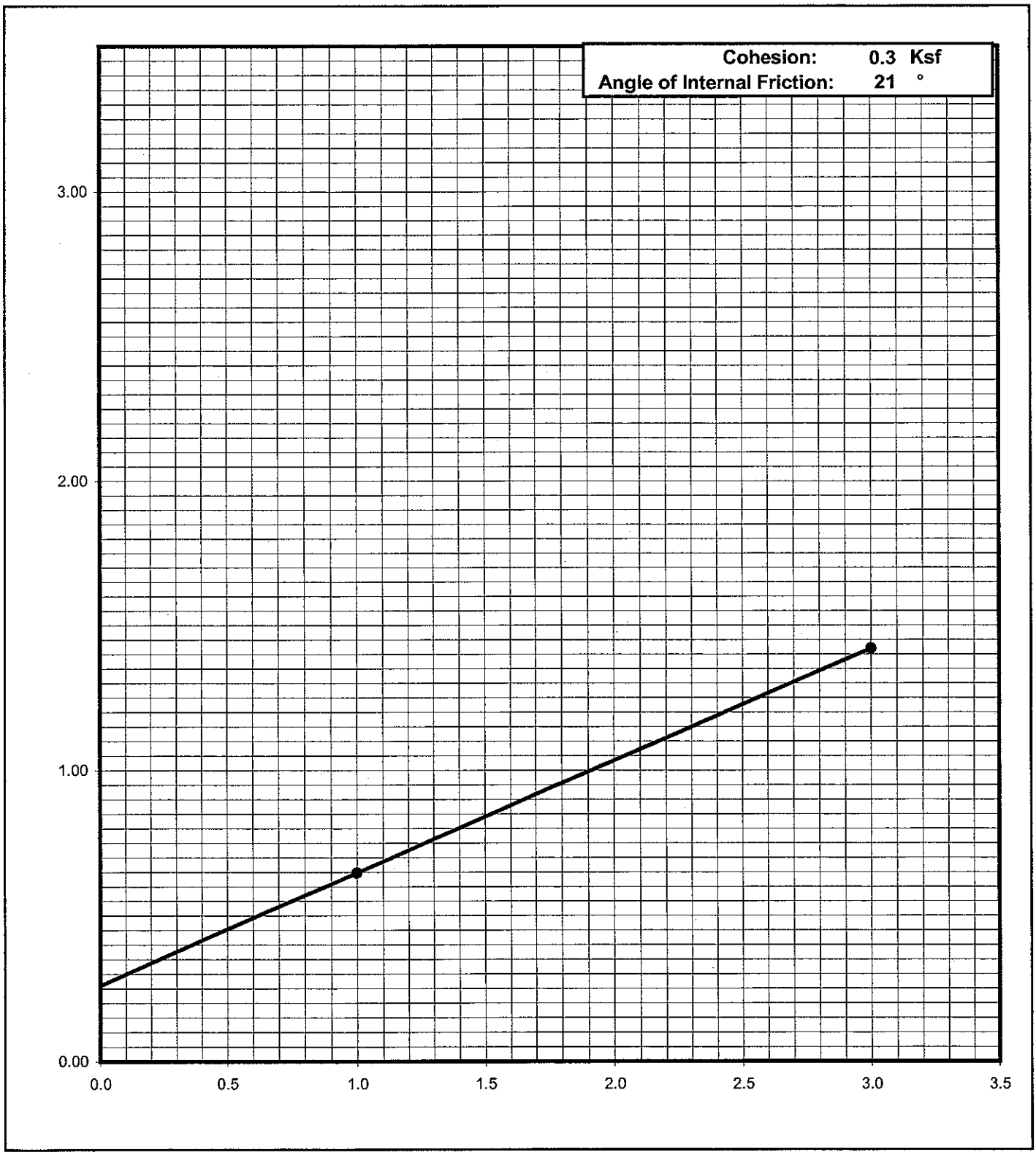
Project Number	Boring No. & Depth	Soil Type	Date
1208068	B1 @ 10-11'	CL	8/27/2008



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

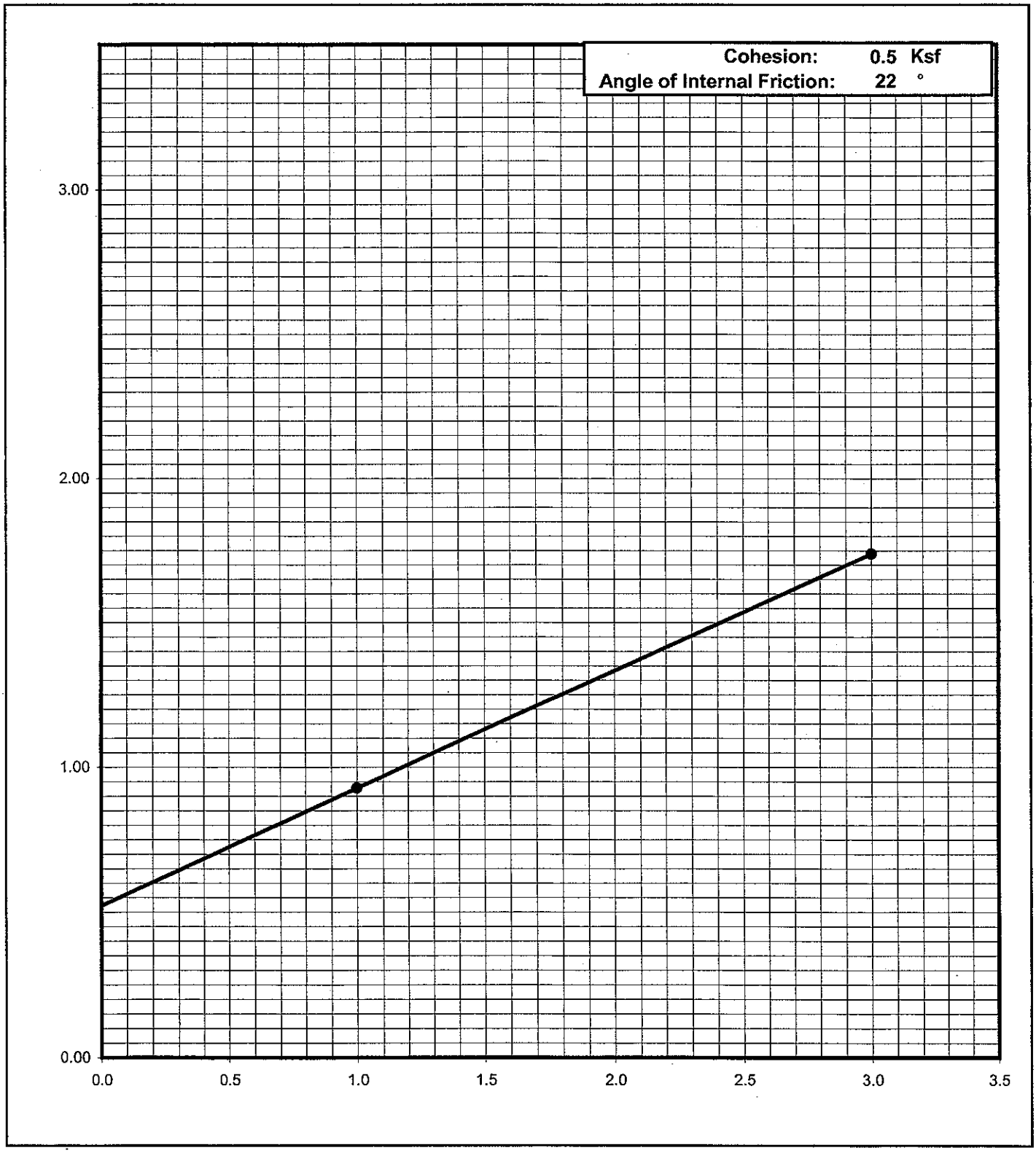
Project Number	Boring No. & Depth	Soil Type	Date
1208068	B8 @ 5-6'	CL/CH	9/5/2008



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

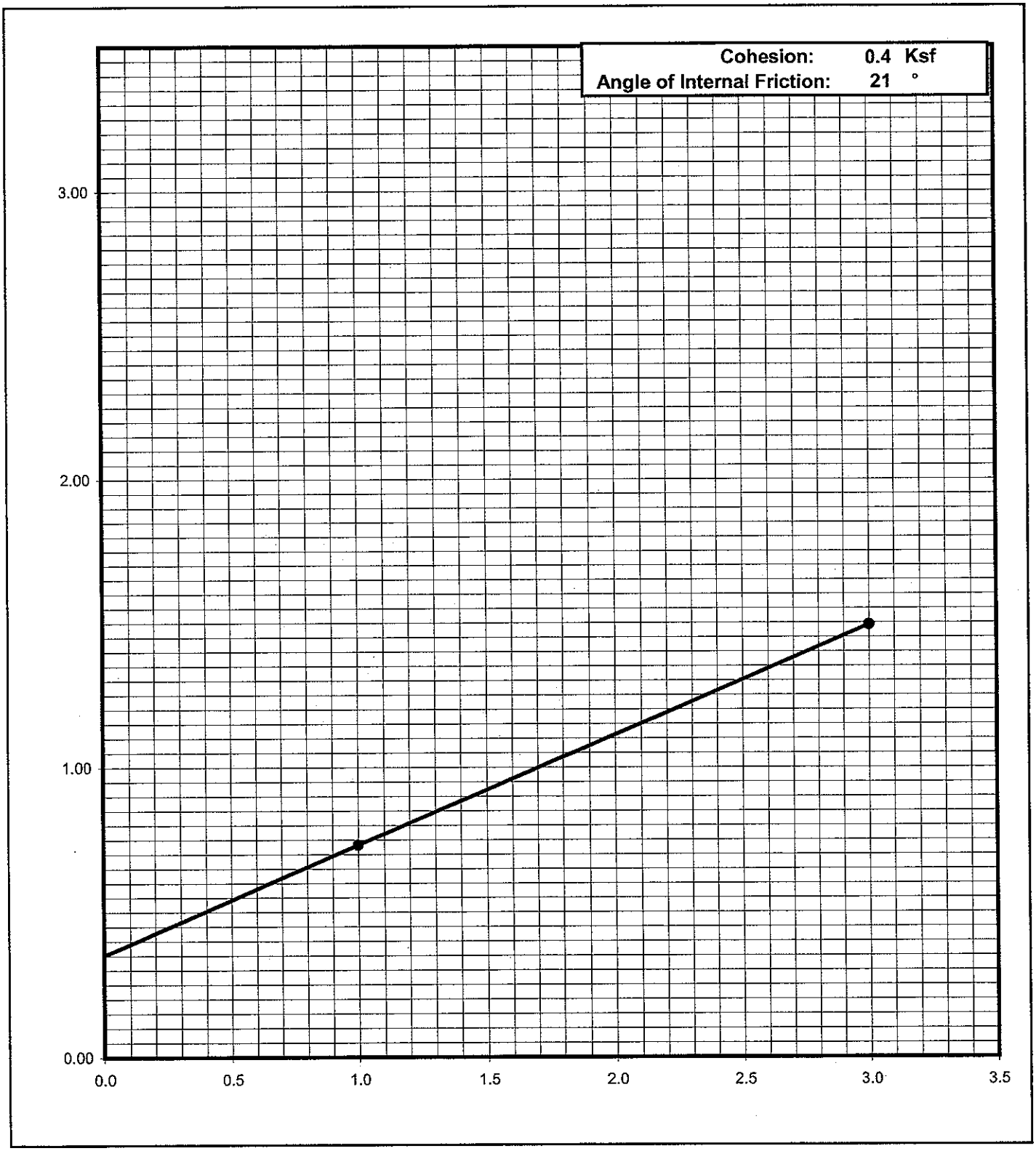
Project Number	Boring No. & Depth	Soil Type	Date
1208068	B10 @ 10-11'	CL	9/5/2008



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

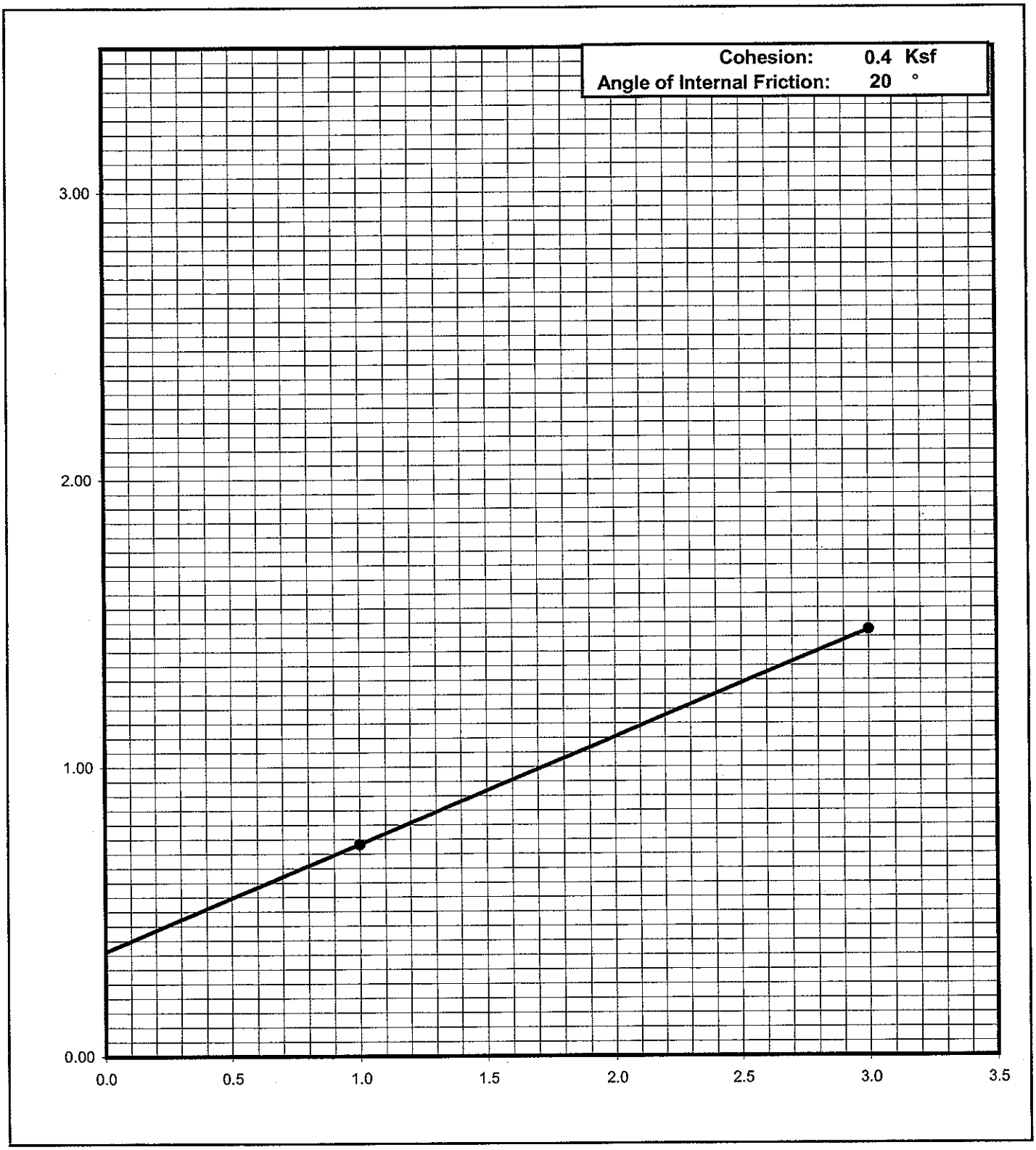
Project Number	Boring No. & Depth	Soil Type	Date
1208068	B12 @ 2-3'	CL	9/5/2008



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

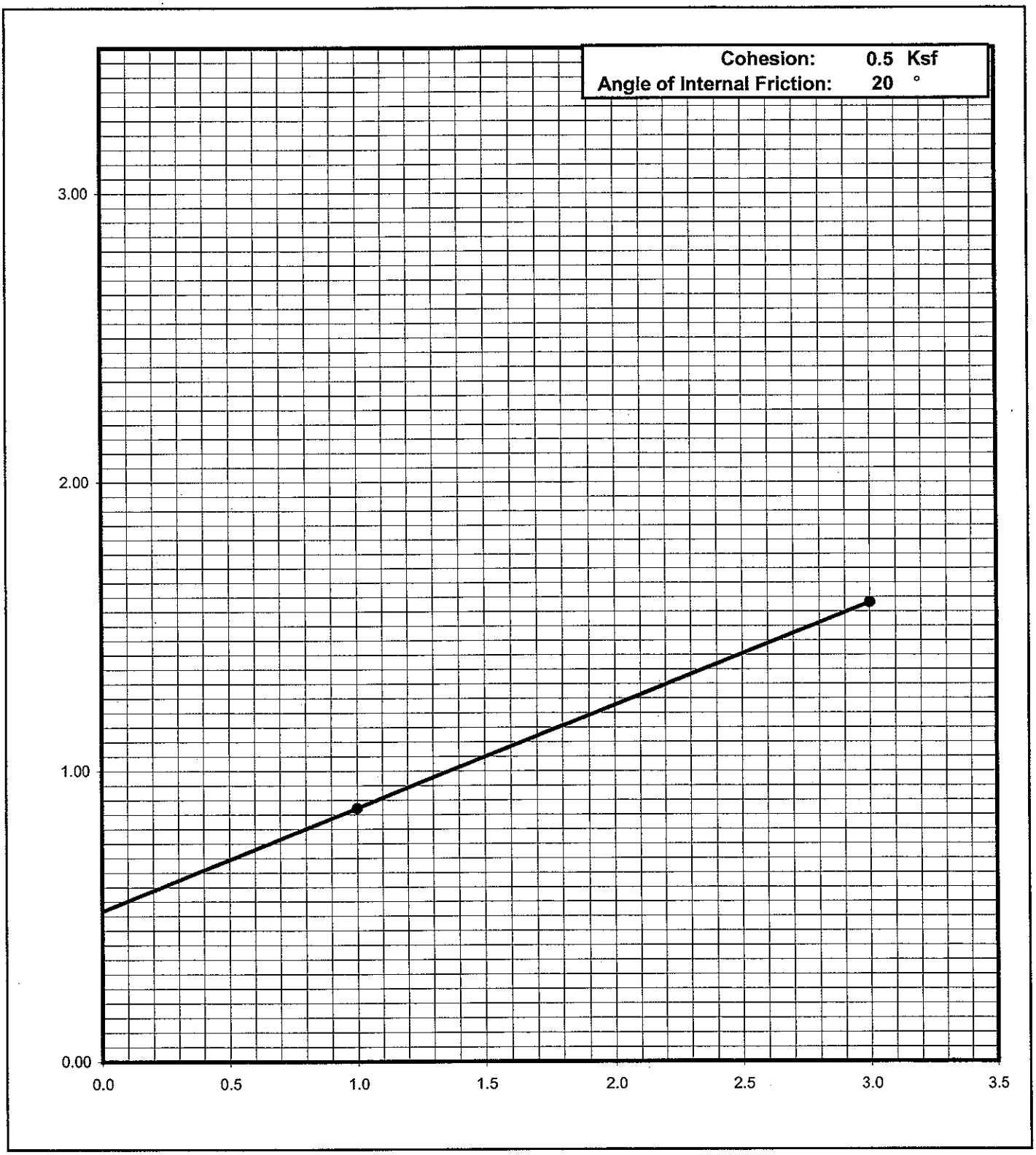
Project Number	Boring No. & Depth	Soil Type	Date
1208068	B20 @ 5-6'	CL	9/5/2008



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

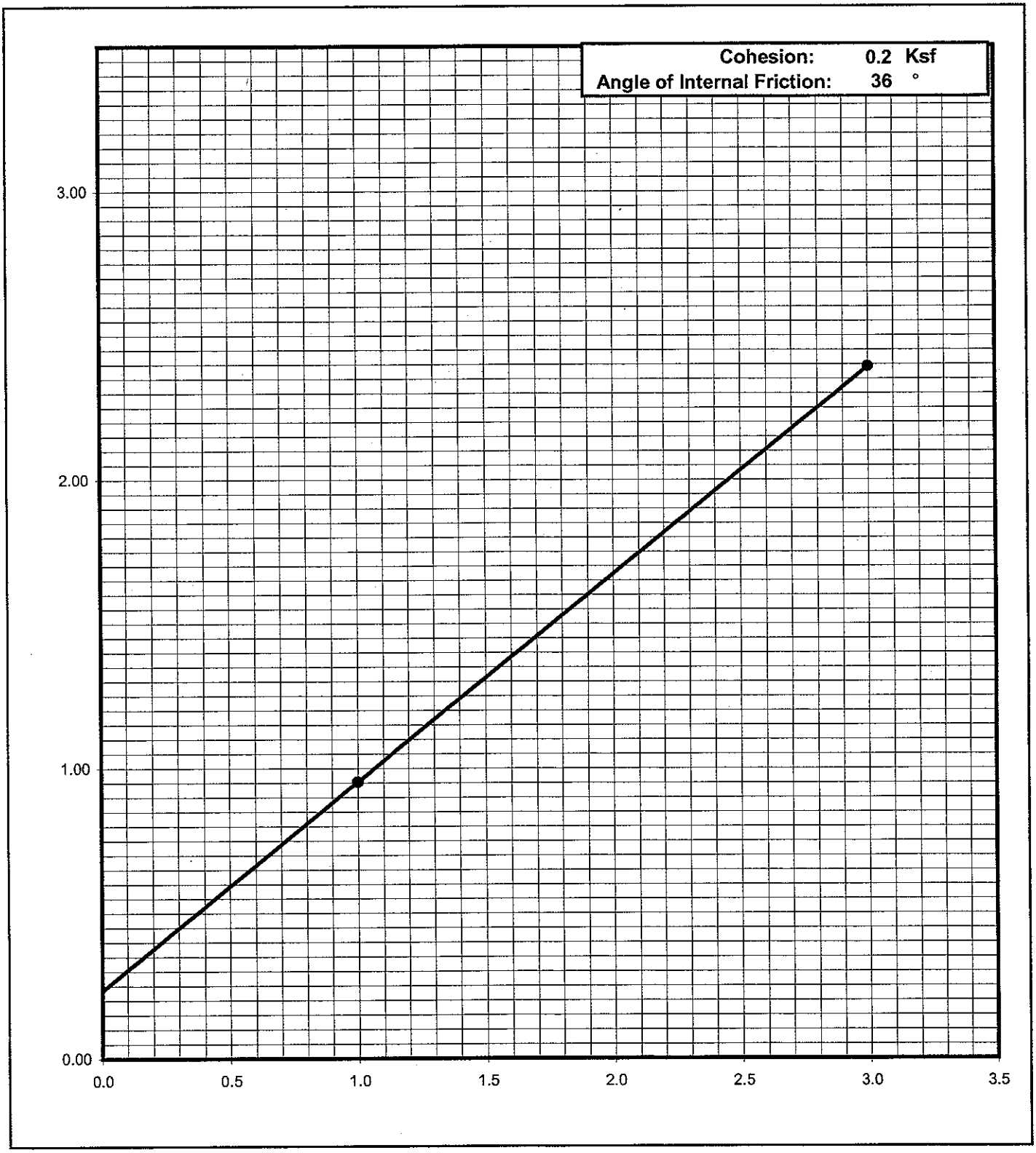
Project Number	Boring No. & Depth	Soil Type	Date
1208068	B22 @ 2-3'	CL	9/5/2008



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

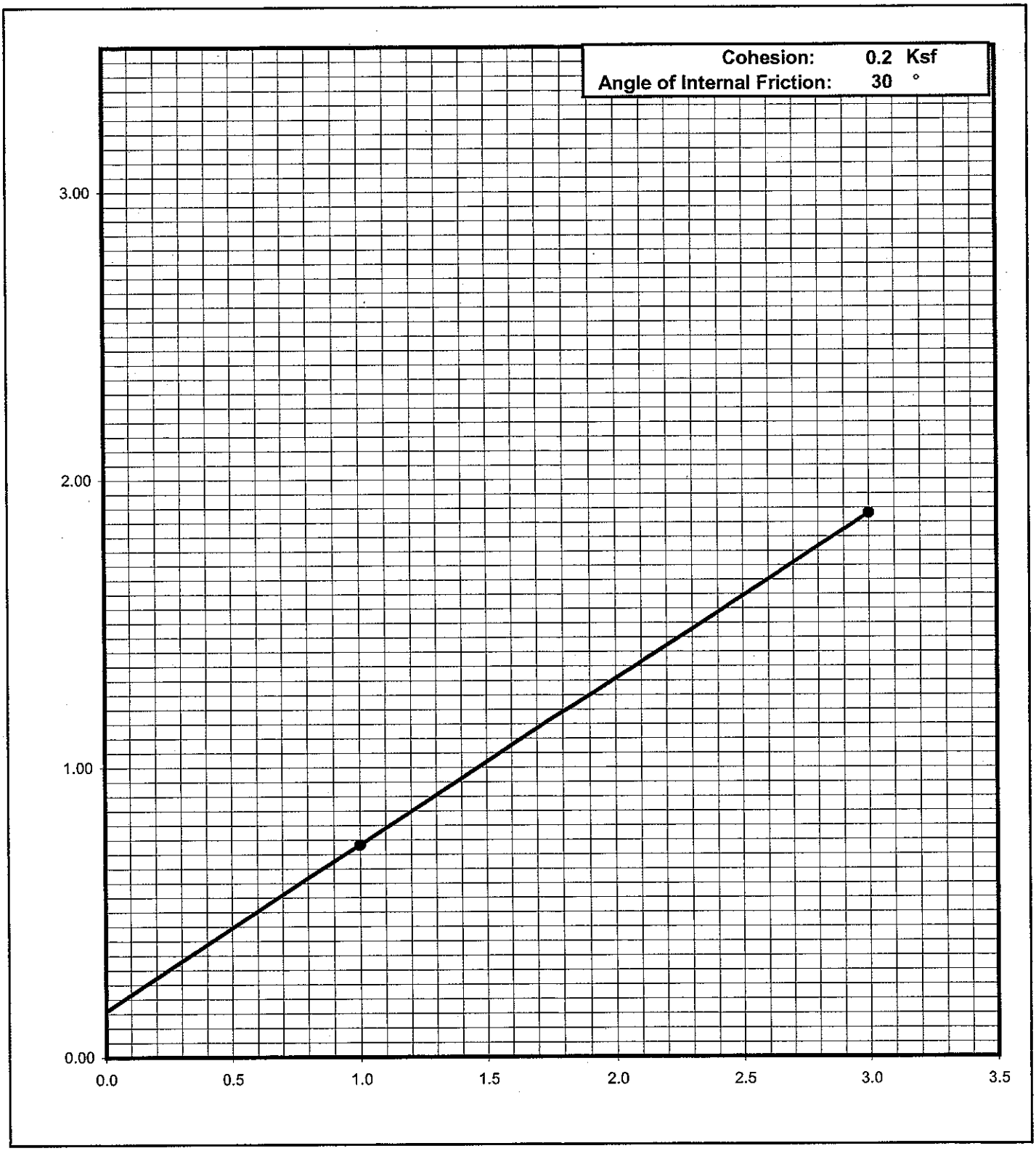
Project Number	Boring No. & Depth	Soil Type	Date
1208068	B27 @ 5-6'	SC	9/29/2008



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

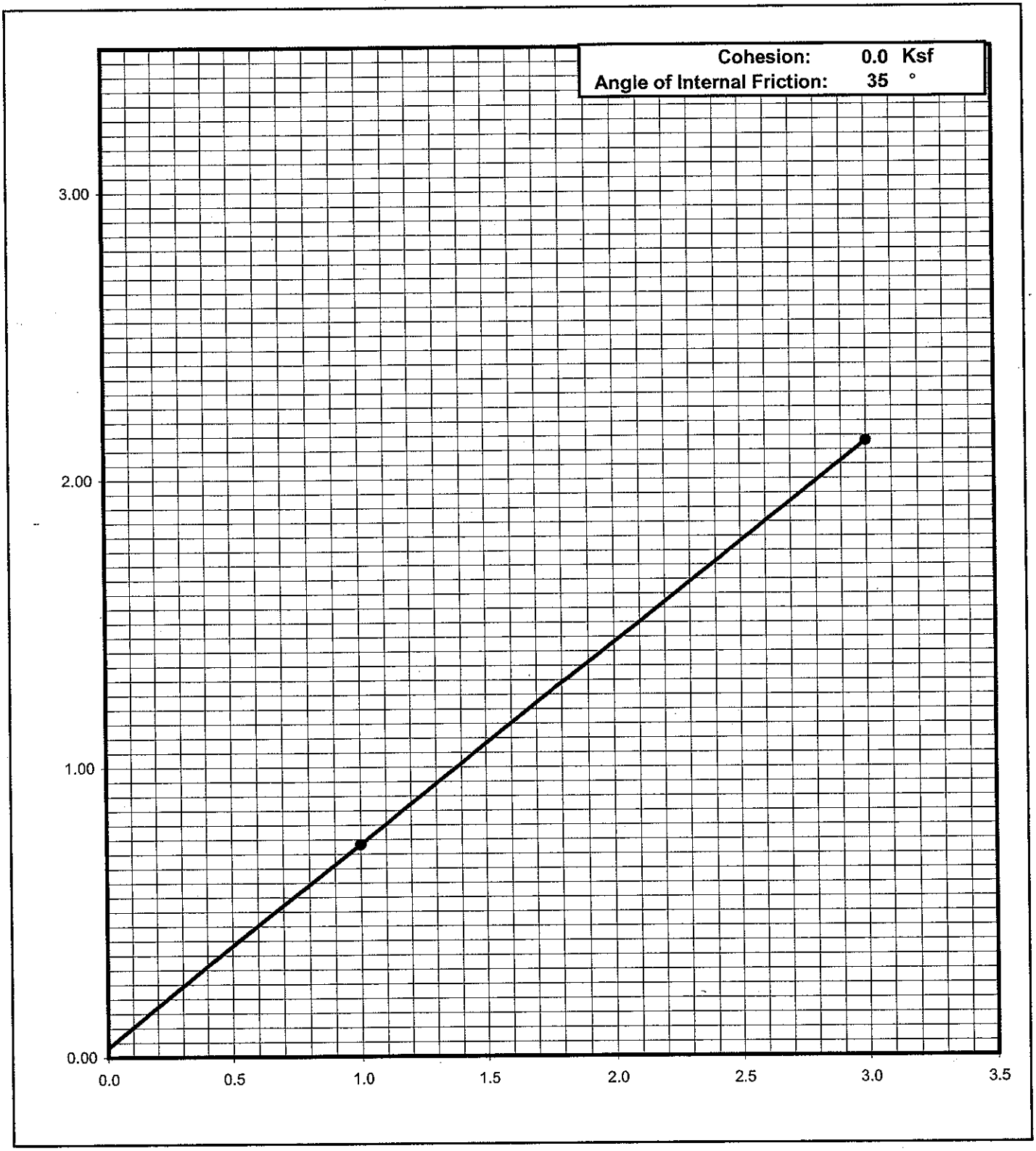
Project Number	Boring No. & Depth	Soil Type	Date
1208068	B28 @ 2-3'	SC	9/29/2008



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

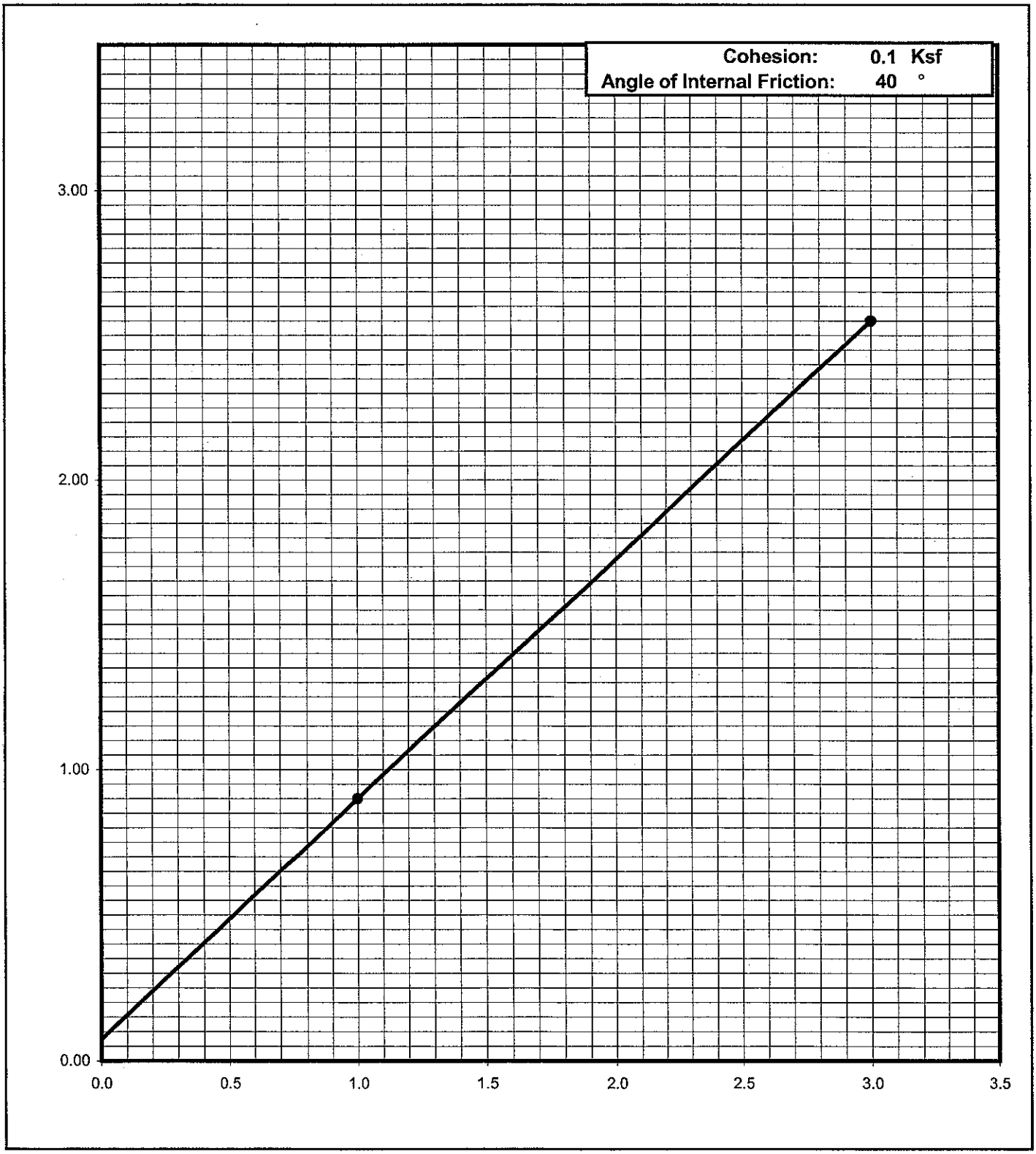
Project Number	Boring No. & Depth	Soil Type	Date
1208068	B31 @ 15-16	SM	10/7/2008



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

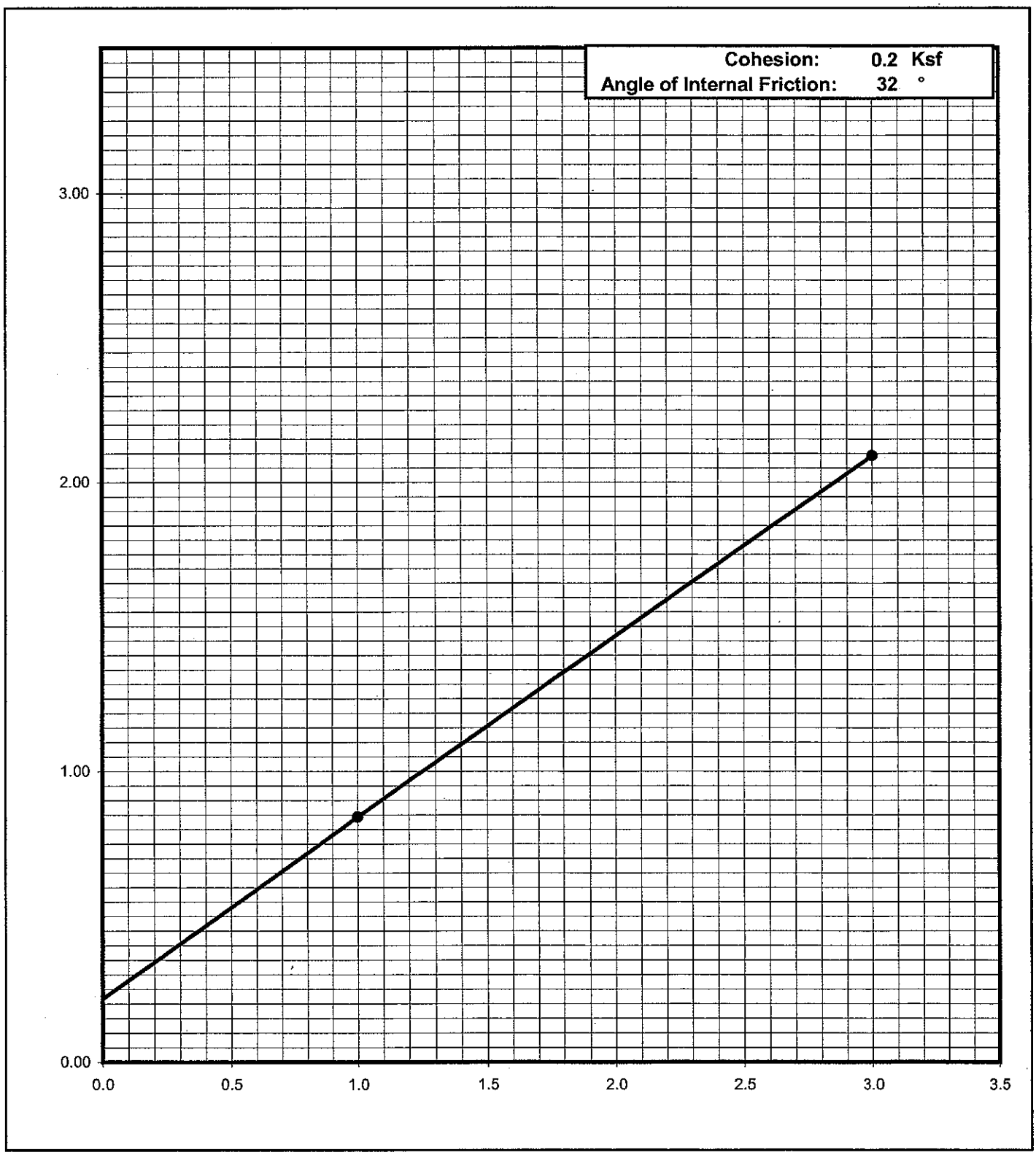
Project Number	Boring No. & Depth	Soil Type	Date
1208068	B32 @ 25-26'	SM	10/7/2008



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

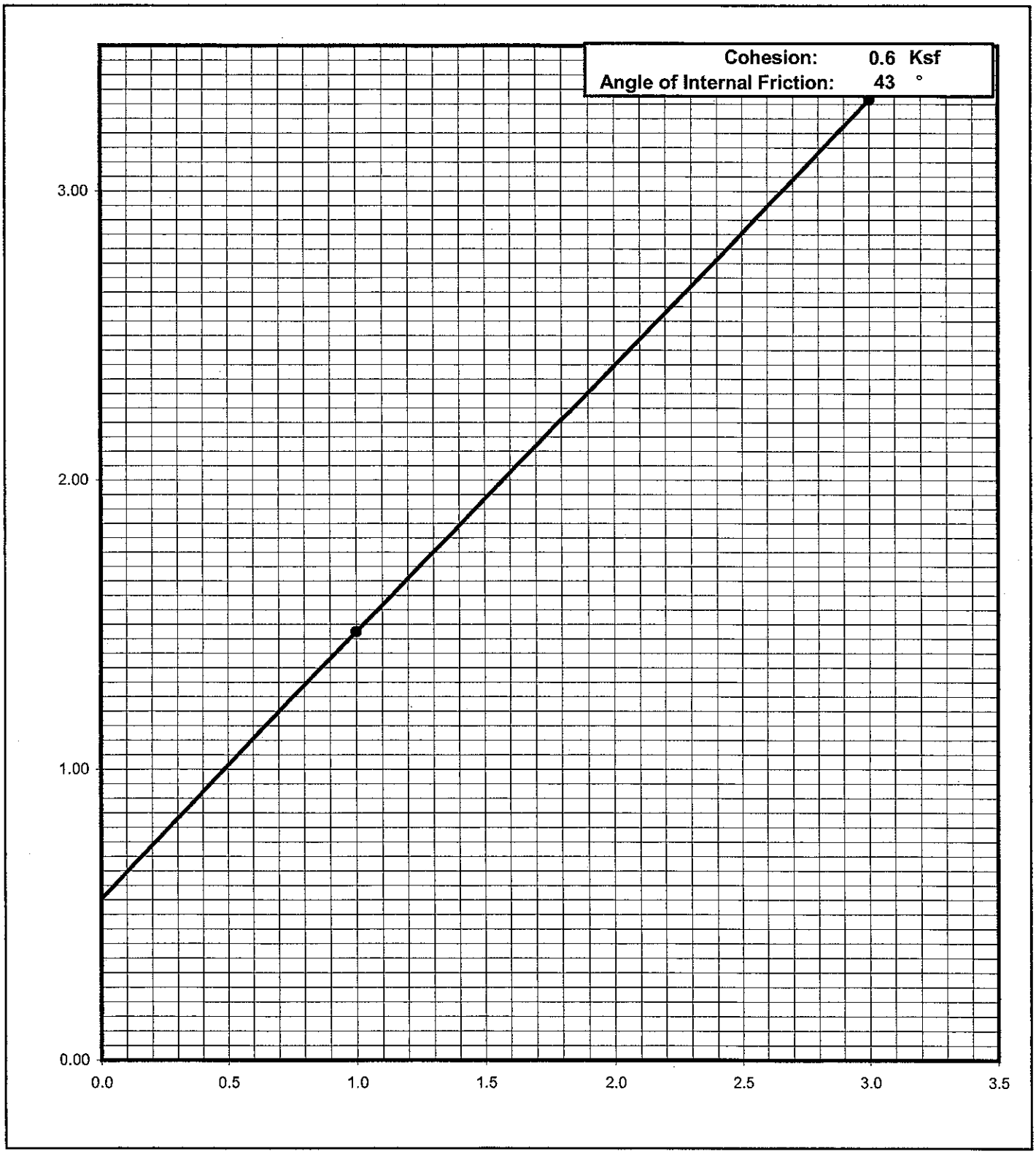
Project Number	Boring No. & Depth	Soil Type	Date
1208068	B34 @ 25-26'	SM w/ grvl	10/9/2008



Krazan Testing Laboratory

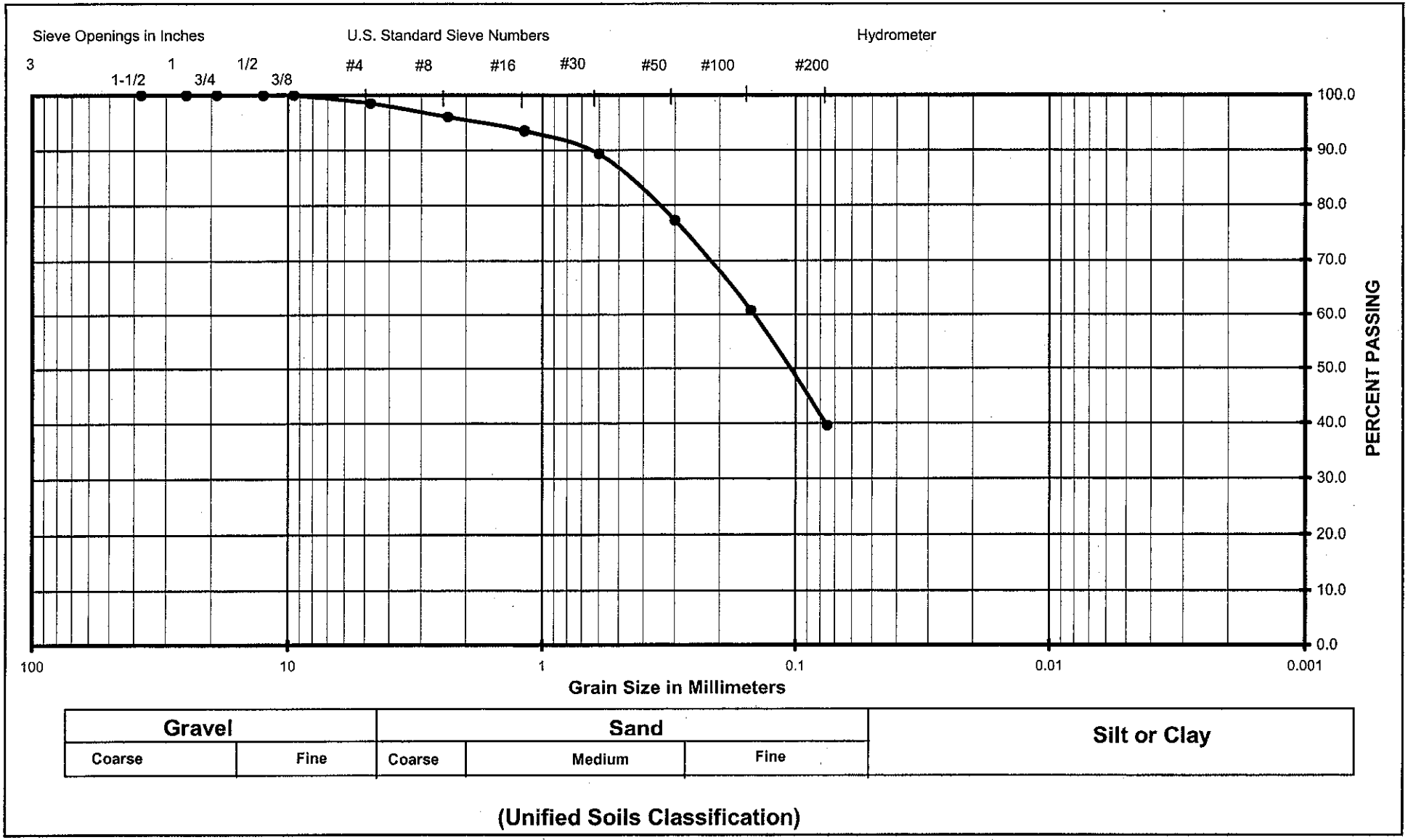
Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

Project Number	Boring No. & Depth	Soil Type	Date
1208068	B35 @ 5-6'	SC	10/9/2008



Krazan Testing Laboratory

Grain Size Analysis

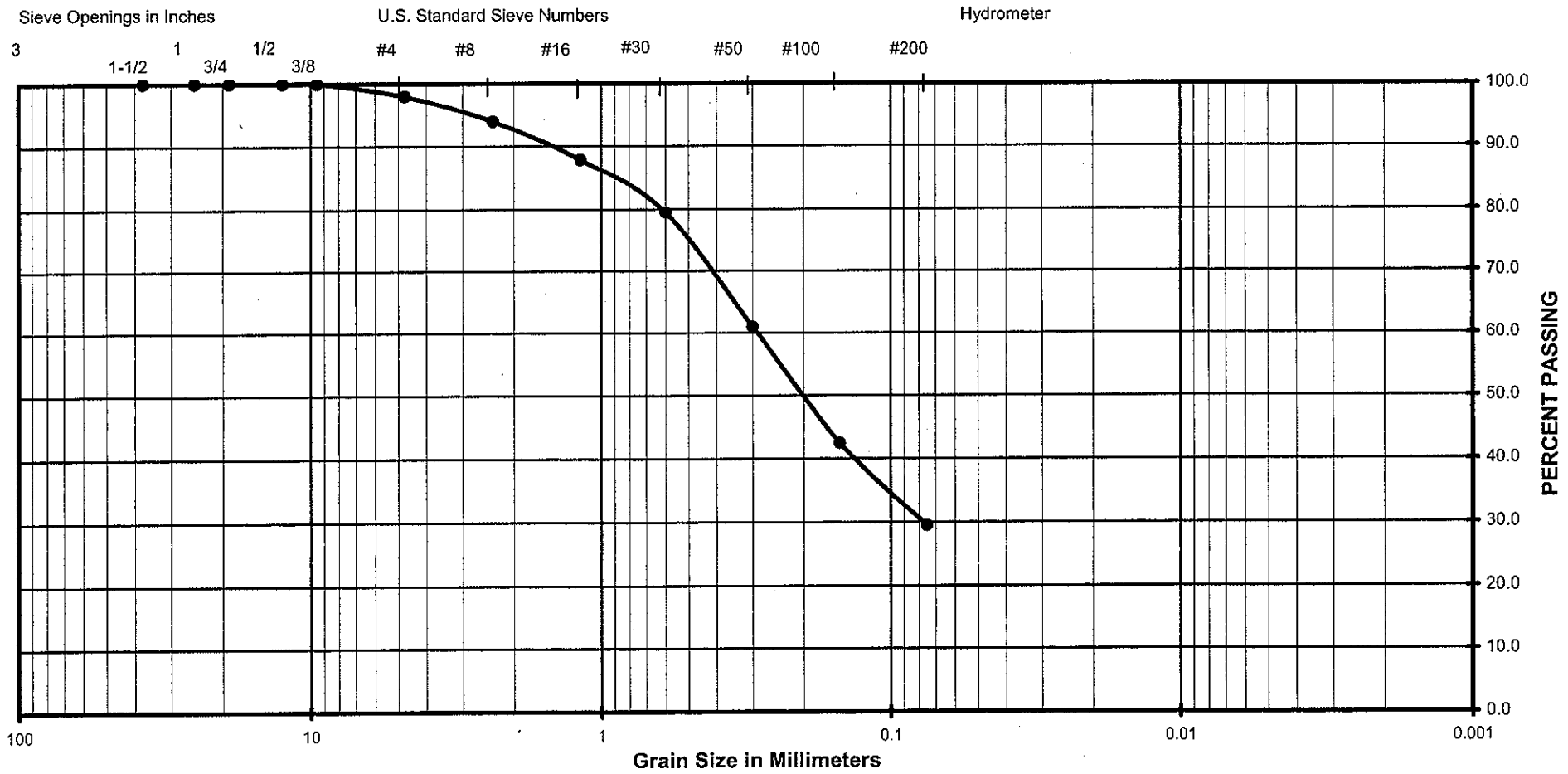


(Unified Soils Classification)

Project Name	Proposed San Joaquin Solar 1 & 2 Projects
Project Number	1208068
Soil Classification	SM w/ clay
Sample Number	B25 @ 2-3'

Krazan Testing Laboratory

Grain Size Analysis



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Proposed San Joaquin Solar 1 & 2 Projects
Project Number	1208068
Soil Classification	SC
Sample Number	B29 @ 2-3'

Krazan Testing Laboratory

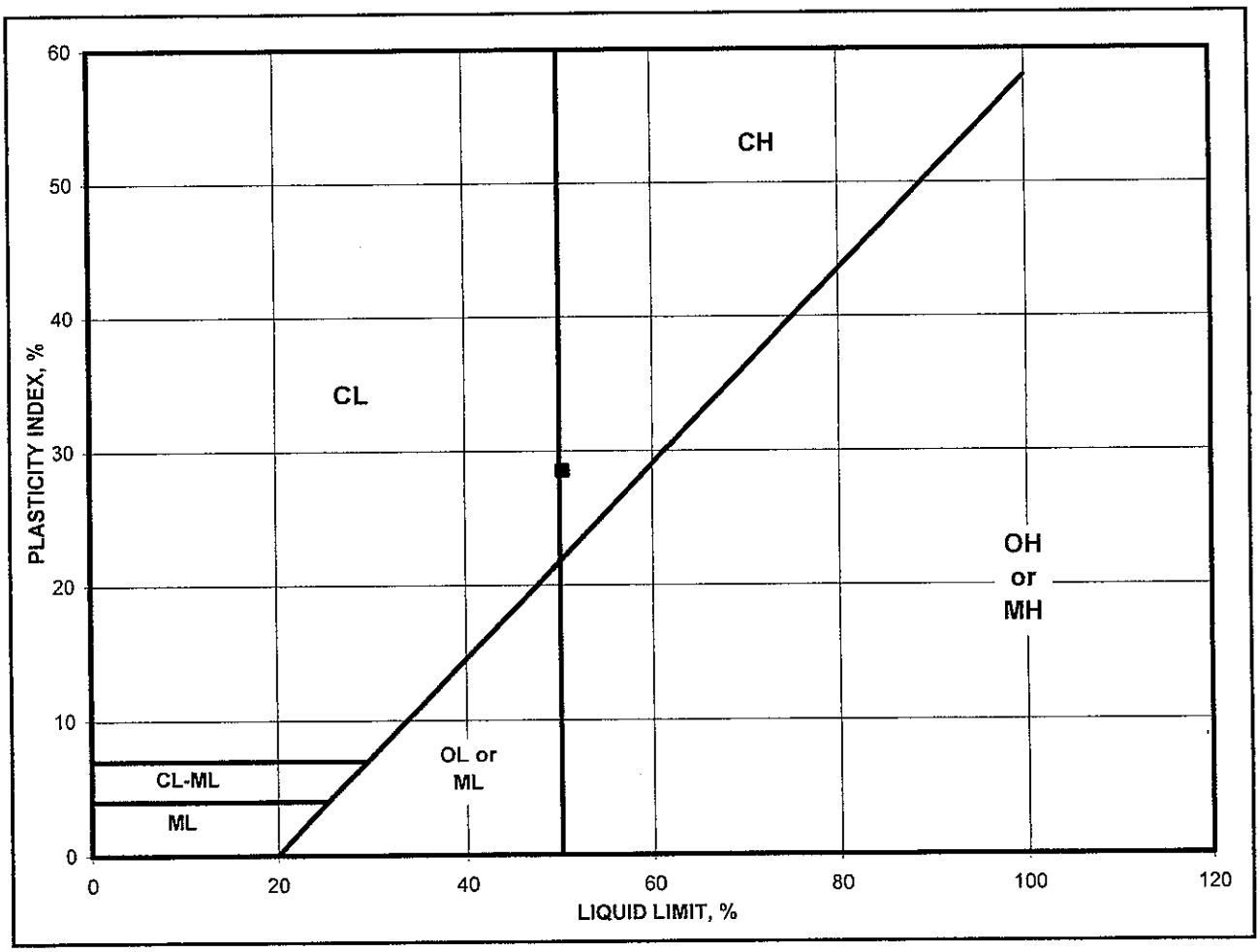
Atterberg Limits Determination
ASTM D - 4318

Project Number	: 01208068
Project Name	: Proposed San Joaquin Solar 1 & 2 Projects
Date	: 9/5/2008
Sample Number	: X1A
Sample Location/Depth	: B8 @ 0-5'

	Plastic Limit			Liquid Limit		
Run Number	1	2	3	1	2	3
Weight of Wet Soil & Tare	18.88			28.27	27.54	
Weight of Dry Soil & Tare	17.53			22.53	22.08	
Weight of water	1.35			5.74	5.46	
Weight of Tare	11.35			11.13	11.05	
Weight of Dry Soil	6.18			11.40	11.03	
Water Content	21.8			50.4	49.5	
Number of Blows				25	31	

Plastic Limit : 21.84 **Liquid Limit : 50.35**

Plasticity Index : **28.51**
Classification of < #40 : **CL/CH**
Unified Soil Classification : **CL/CH**



Krazan Testing Laboratory

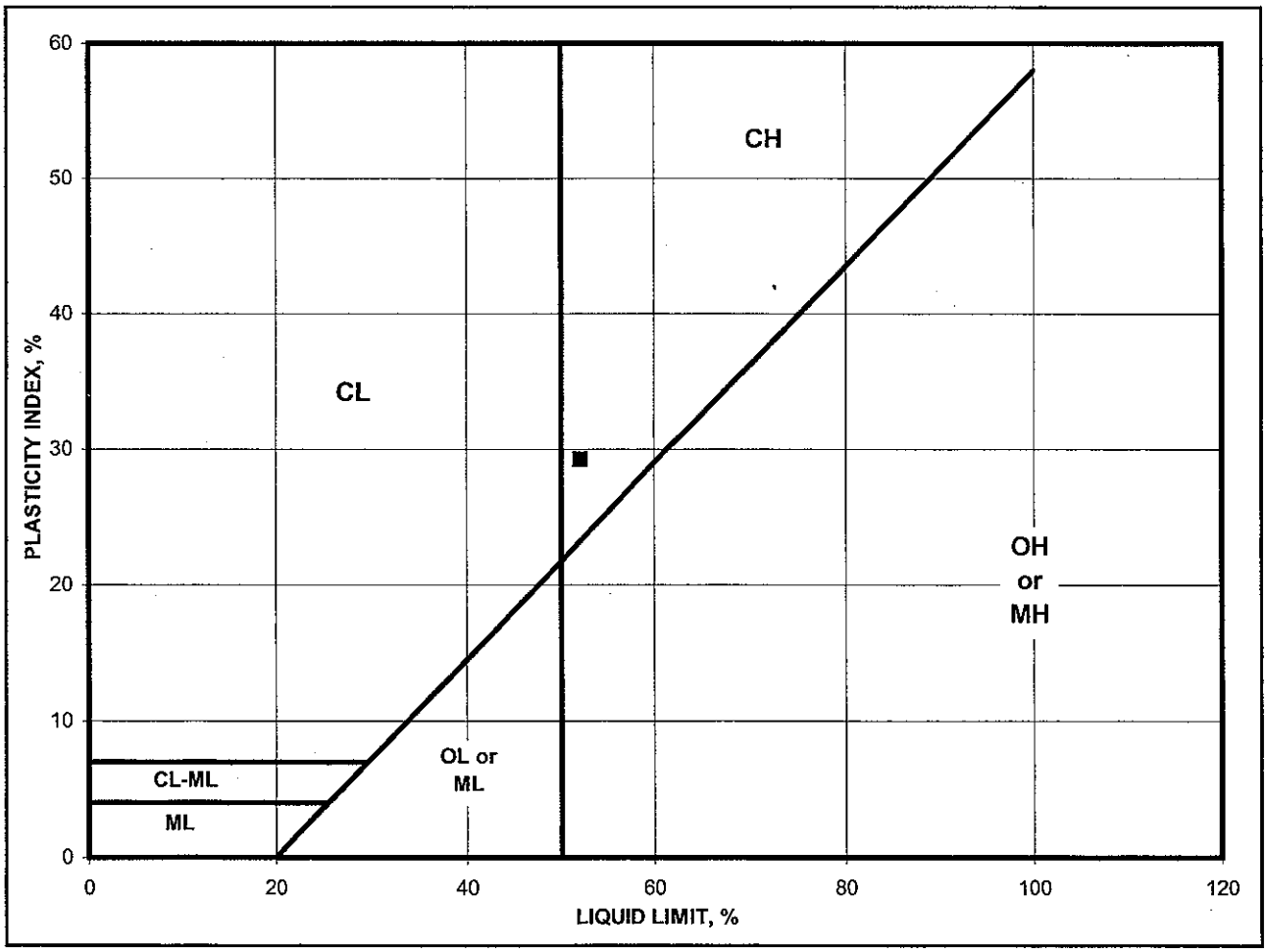
Atterberg Limits Determination
ASTM D - 4318

Project Number	: 01208068
Project Name	: Proposed San Joaquin Solar 1 & 2 Projects
Date	: 9/5/2008
Sample Number	: X2A
Sample Location/Depth	: B16 @ 1-4'

	Plastic Limit			Liquid Limit		
Run Number	1	2	3	1	2	3
Weight of Wet Soil & Tare	17.98			26.03	27.23	
Weight of Dry Soil & Tare	16.75			21.01	21.85	
Weight of water	1.23			5.02	5.38	
Weight of Tare	11.36			11.37	11.21	
Weight of Dry Soil	5.39			9.64	10.64	
Water Content	22.8			52.1	50.6	
Number of Blows				25	35	

Plastic Limit : 22.82 **Liquid Limit : 52.07**

Plasticity Index : 29.25
Classification of < #40 : CH
Unified Soil Classification : CH



Krazan Testing Laboratory

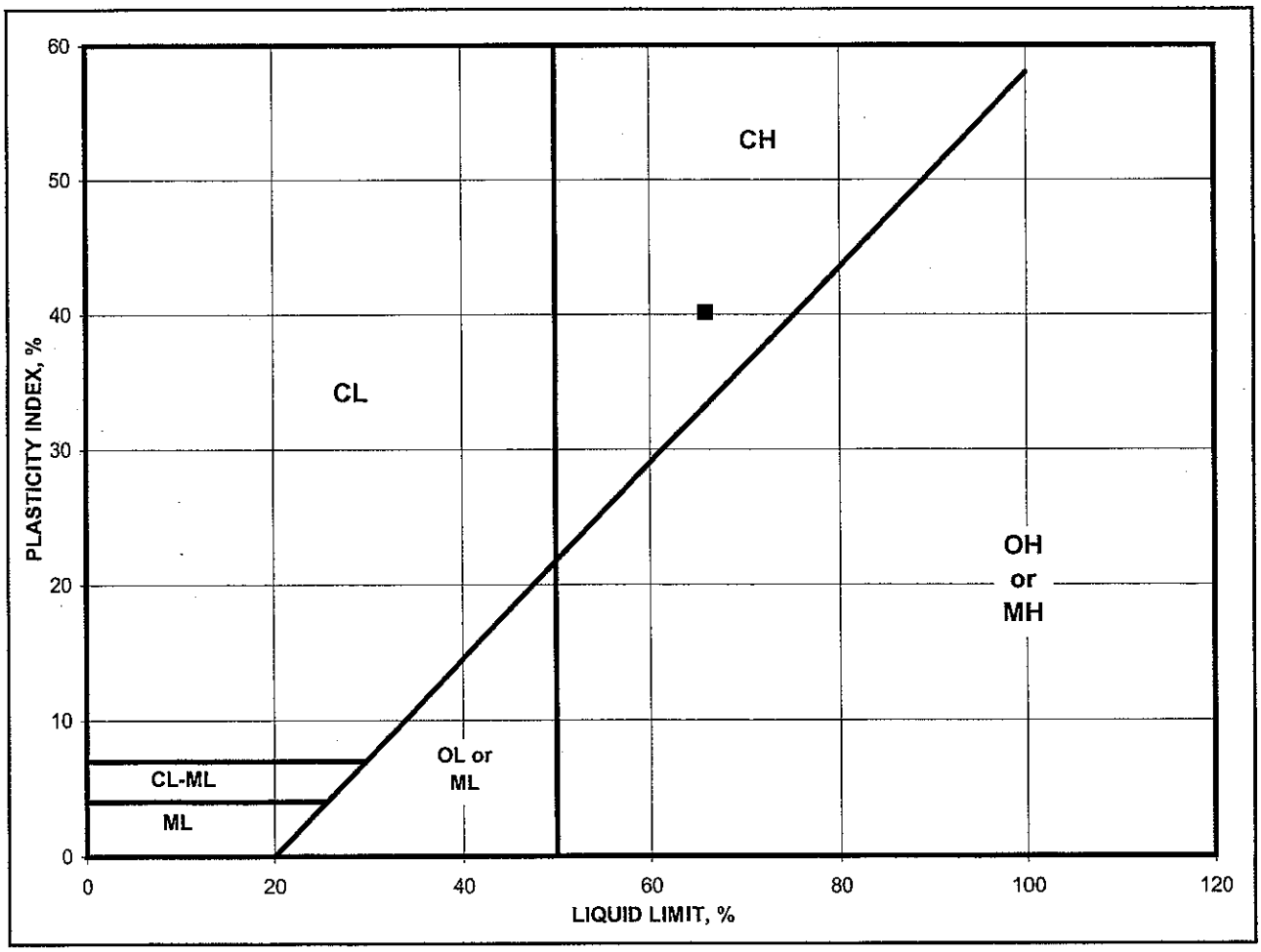
Atterberg Limits Determination
ASTM D - 4318

Project Number	: 01208068
Project Name	: Proposed San Joaquin Solar 1 & 2 Projects
Date	: 9/5/2008
Sample Number	: X3A
Sample Location/Depth	: B19 @ 1-4'

	Plastic Limit			Liquid Limit		
Run Number	1	2	3	1	2	3
Weight of Wet Soil & Tare	17.40			26.47	28.05	
Weight of Dry Soil & Tare	16.18			20.48	21.24	
Weight of water	1.22			5.99	6.81	
Weight of Tare	11.43			11.38	11.07	
Weight of Dry Soil	4.75			9.10	10.17	
Water Content	25.7			65.8	67.0	
Number of Blows				25	17	

Plastic Limit : 25.68 **Liquid Limit : 65.82**

Plasticity Index : **40.14**
Classification of < #40 : **CH**
Unified Soil Classification : **CH**



Krazan Testing Laboratory

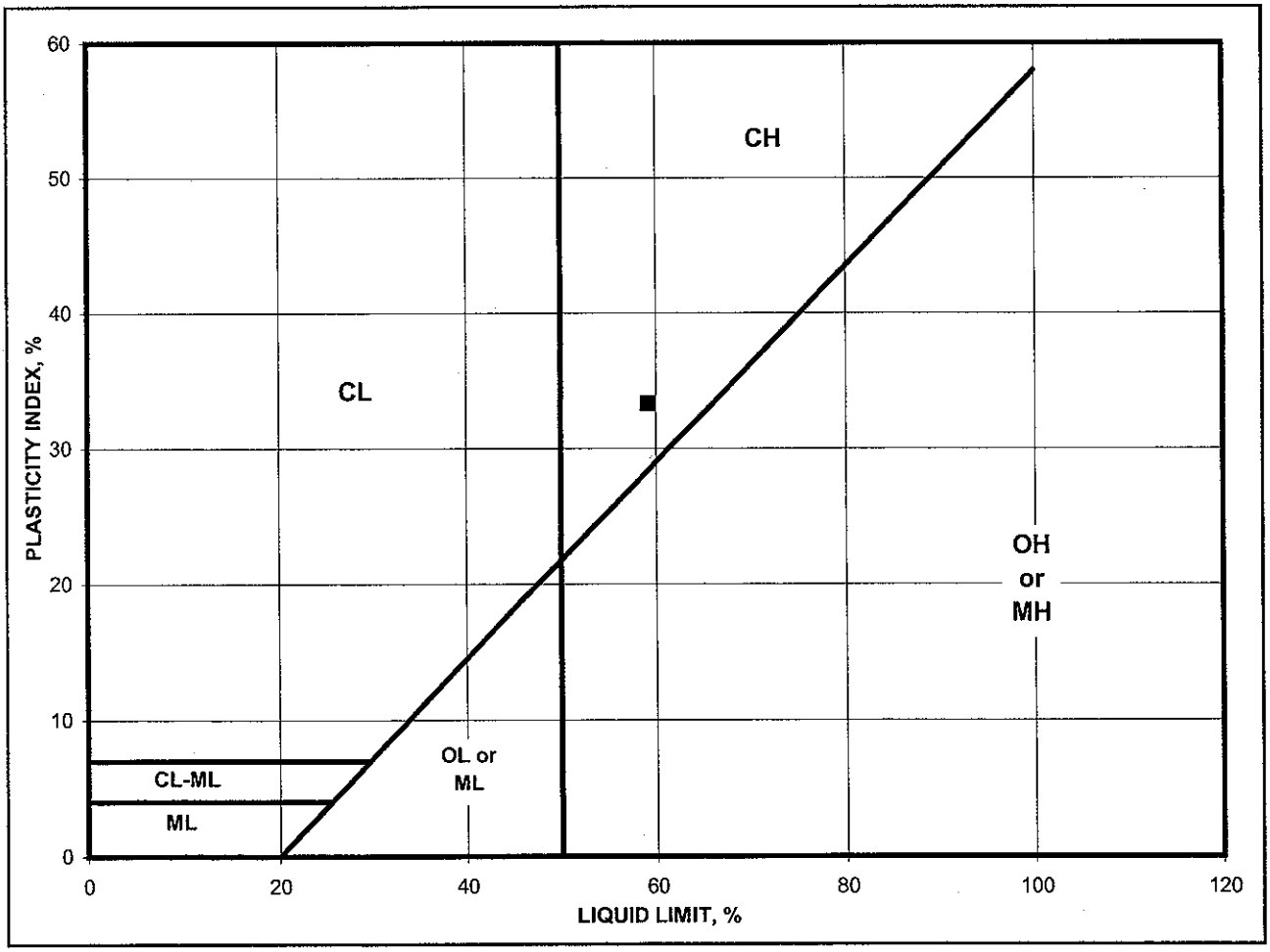
Atterberg Limits Determination
ASTM D - 4318

Project Number	: 01208068
Project Name	: Proposed San Joaquin Solar 1 & 2 Projects
Date	: 9/29/2008
Sample Number	: --
Sample Location/Depth	: B26 @ 2-3'

	Plastic Limit			Liquid Limit		
Run Number	1	2	3	1	2	3
Weight of Wet Soil & Tare	18.20			26.35	27.22	
Weight of Dry Soil & Tare	16.79			20.76	21.38	
Weight of water	1.41			5.59	5.84	
Weight of Tare	11.34			11.31	11.23	
Weight of Dry Soil	5.45			9.45	10.15	
Water Content	25.9			59.2	57.5	
Number of Blows				25	34	

Plastic Limit : 25.87 **Liquid Limit : 59.15**

Plasticity Index : **33.28**
Classification of < #40 : **CH**
Unified Soil Classification : **CH**



Krazan Testing Laboratory

Atterberg Limits Determination
ASTM D-4318

Project Number : *01208068*
Project Name: *Proposed San Joaquin Solar 1 & 2 Projects*
Date: *10/7/2008*
Sample Number: *B33 @ 0-2'*

Plastic Limit	Liquid Limit	Plasticity Index
N.A.	*N.A.*	*Non-Plastic*

Krazan Testing Laboratory

Expansion Index Test

ASTM D - 4829/ UBC Std. 18-2

Project Number	: 1208068
Project Name	: Proposed San Joaquin Solar 1 & 2 Projects
Date	: 9/5/2008
Sample location/ Depth	: B8 @ 0-5'
Sample Number	: X1A
Soil Classification	: CL/CH

Trial #	1	2	3
Weight of Soil & Mold, gms	560.8		
Weight of Mold, gms	206.9		
Weight of Soil, gms	353.9		
Wet Density, Lbs/cu.ft.	106.7		
Weight of Moisture Sample (Wet), gms	300.0		
Weight of Moisture Sample (Dry), gms	266.4		
Moisture Content, %	12.6		
Dry Density, Lbs/cu.ft.	94.8		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	43.8		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.153

Expansion Index $_{measured}$ = 153

Expansion Index $_{50}$ = 145.3

Expansion Index = 145

Expansion Potential Table	
Exp. Index	Potential Exp.
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

Krazan Testing Laboratory

Expansion Index Test

ASTM D - 4829/ UBC Std. 18-2

Project Number	: 1208068
Project Name	: Proposed San Joaquin Solar 1 & 2 Projects
Date	: 9/5/2008
Sample location/ Depth	: B19 @ 1-4'
Sample Number	: X3A
Soil Classification	: CH

Trial #	**1**	**2**	**3**
Weight of Soil & Mold, gms	541.2		
Weight of Mold, gms	185.2		
Weight of Soil, gms	356.0		
Wet Density, Lbs/cu.ft.	107.4		
Weight of Moisture Sample (Wet), gms	300.0		
Weight of Moisture Sample (Dry), gms	259.5		
Moisture Content, %	15.6		
Dry Density, Lbs/cu.ft.	92.9		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	51.8		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.175

Expansion Index $_{measured}$ = 175

Expansion Index $_{50}$ = 177.5

Expansion Index = **178**

Expansion Potential Table	
Exp. Index	Potential Exp.
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

Krazan Testing Laboratory

Expansion Index Test

ASTM D - 4829/ UBC Std. 18-2

Project Number	: 1208068
Project Name	: Proposed San Joaquin Solar 1 & 2 Projects
Date	: 9/5/2008
Sample location/ Depth	: B16 @ 1-4'
Sample Number	: X2A
Soil Classification	: CH

Trial #	**1**	**2**	**3**
Weight of Soil & Mold, gms	544.4		
Weight of Mold, gms	183.7		
Weight of Soil, gms	360.7		
Wet Density, Lbs/cu.ft.	108.8		
Weight of Moisture Sample (Wet), gms	300.0		
Weight of Moisture Sample (Dry), gms	262.2		
Moisture Content, %	14.4		
Dry Density, Lbs/cu.ft.	95.1		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	50.4		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.152

Expansion Index $_{measured}$ = 152

Expansion Index $_{50}$ = 152.5

Expansion Index = **153**

Expansion Potential Table	
Exp. Index	Potential Exp.
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

Krazan Testing Laboratory

Expansion Index Test

ASTM D - 4829/ UBC Std. 18-2

Project Number	: 1208068
Project Name	: Proposed San Joaquin Solar 1 & 2 Projects
Date	: 9/29/2008
Sample location/ Depth	: B27 @ 1-4'
Sample Number	: X1B
Soil Classification	: CH

Trial #	1	2	3
Weight of Soil & Mold, gms	538.8		
Weight of Mold, gms	183.7		
Weight of Soil, gms	355.1		
Wet Density, Lbs/cu.ft.	107.1		
Weight of Moisture Sample (Wet), gms	300.0		
Weight of Moisture Sample (Dry), gms	260.6		
Moisture Content, %	15.1		
Dry Density, Lbs/cu.ft.	93.0		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	50.3		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.1581

Expansion Index $_{measured}$ = 158.1

Expansion Index $_{50}$ = 158.5

Expansion Index = 159

Expansion Potential Table	
Exp. Index	Potential Exp.
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

Krazan Testing Laboratory

Expansion Index Test

ASTM D - 4829/ UBC Std. 18-2

Project Number	: 1208068
Project Name	: Proposed San Joaquin Solar 1 & 2 Projects
Date	: 10/7/2008
Sample location/ Depth	: B33 @ 0-2'
Sample Number	: --
Soil Classification	: SM w/ trace of clay

Trial #	**1**	**2**	**3**
Weight of Soil & Mold, gms	568.5		
Weight of Mold, gms	185.2		
Weight of Soil, gms	383.3		
Wet Density, Lbs/cu.ft.	115.6		
Weight of Moisture Sample (Wet), gms	300.0		
Weight of Moisture Sample (Dry), gms	266.4		
Moisture Content, %	12.6		
Dry Density, Lbs/cu.ft.	102.7		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	53.1		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.021

Expansion Index $_{measured}$ = 21

Expansion Index $_{50}$ = 22.6

Expansion Index = 23

Expansion Potential Table	
Exp. Index	Potential Exp.
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

Krazan Testing Laboratory

Appendix B

General Earthwork Specifications

APPENDIX B

EARTHWORK SPECIFICATIONS

GENERAL

When the text of the report conflicts with the general specifications in this appendix, the recommendations in the report have precedence.

SCOPE OF WORK: These specifications and applicable plans pertain to and include all earthwork associated with the site rough grading, including but not limited to the furnishing of all labor, tools, and equipment necessary for site clearing and grubbing, stripping, preparation of foundation materials for receiving fill, excavation, processing, placement and compaction of fill and backfill materials to the lines and grades shown on the project grading plans, and disposal of excess materials.

PERFORMANCE: The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications. This work shall be inspected and tested by a representative of Krazan and Associates, Inc., hereinafter known as the Soils Engineer and/or Testing Agency. Attainment of design grades when achieved shall be certified by the project Civil Engineer. Both the Soils Engineer and the Civil Engineer are the Owner's representatives. If the Contractor should fail to meet the technical or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory as determined by both the Soils Engineer and the Civil Engineer. No deviation from these specifications shall be made except upon written approval of the Soils Engineer, Civil Engineer or project Architect.

No earthwork shall be performed without the physical presence or approval of the Soils Engineer. The Contractor shall notify the Soils Engineer at least 2 working days prior to the commencement of any aspect of the site earthwork.

The Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineers harmless from any and all liability, real or alleged, in connection with the performance of work on this project, except for liability arising from the sole negligence of the Owner or the Engineers.

TECHNICAL REQUIREMENTS: All compacted materials shall be densified to a density not less than 90 percent relative compaction based on ASTM Test Method D1557 or CAL-216, as specified in the technical portion of the Soil Engineer's report. The location and frequency of field density tests shall be as determined by the Soils Engineer. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work will be judged by the Soils Engineer.

SOILS AND FOUNDATION CONDITIONS: The Contractor is presumed to have visited the site and to have familiarized himself with existing site conditions and the contents of the data presented in the soil report.

The Contractor shall make his own interpretation of the data contained in said report, and the Contractor shall not be relieved of liability under the Contract documents for any loss sustained as a result of any variance between conditions indicated by or deduced from said report and the actual conditions encountered during the progress of the work.

DUST CONTROL: The work includes dust control as required for the alleviation or prevention of any dust nuisance on or about the site or the borrow area, or off-site if caused by the Contractor's operation either during the performance of the earthwork or resulting from the conditions in which the Contractor leaves the site. The Contractor shall assume all liability, including court costs of codefendants, for all claims related to dust or windblown materials attributable to his work.

SITE PREPARATION

Site preparation shall consist of site clearing and grubbing and the preparations of foundation materials for receiving fill.

CLEARING AND GRUBBING: The Contractor shall accept the site in this present condition and shall demolish and/or remove from the area of designated project earthwork all structures, both surface and subsurface, trees, brush, roots, debris, organic matter, and all other matter determined by the Soils Engineer to be deleterious or otherwise unsuitable. Such materials shall become the property of the Contractor and shall be removed from the site.

Tree root systems in proposed building areas should be removed to a minimum depth of 3 feet and to such an extent which would permit removal of all roots larger than 1 inch. Tree roots removed in parking areas may be limited to the upper 1½ feet of the ground surface. Backfill of tree root excavations should not be permitted until all exposed surfaces have been inspected and the Soils Engineer is present for the proper control of backfill placement and compaction. Burning in areas which are to receive fill materials shall not be permitted.

SUBGRADE PREPARATION: Surfaces to receive Engineered Fill, building or slab loads shall be prepared as outlined above, excavated/scarified to a depth of 12 inches, moisture-conditioned as necessary, and compacted to 90 percent relative compaction.

Loose soil areas, areas of uncertified fill, and/or areas of disturbed soils shall be moisture-conditioned as necessary and recompacted to 90 percent relative compaction. All ruts, hummocks, or other uneven surface features shall be removed by surface grading prior to placement of any fill materials. All areas which are to receive fill materials shall be approved by the Soils Engineer prior to the placement of any of the fill material.

EXCAVATION: All excavation shall be accomplished to the tolerance normally defined by the Civil Engineer as shown on the project grading plans. All over-excavation below the grades specified shall be backfilled at the Contractor's expense and shall be compacted in accordance with the applicable technical requirements.

FILL AND BACKFILL MATERIAL: No material shall be moved or compacted without the presence of the Soils Engineer. Material from the required site excavation may be utilized for construction site fills provided prior approval is given by the Soils Engineer. All materials utilized for constructing site fills shall be free from vegetation or other deleterious matter as determined by the Soils Engineer.

PLACEMENT, SPREADING AND COMPACTION: The placement and spreading of approved fill materials and the processing and compaction of approved fill and native materials shall be the responsibility of the Contractor. However, compaction of fill materials by flooding, ponding, or jetting shall not be permitted unless specifically approved by local code, as well as the Soils Engineer.

Both cut and fill areas shall be surface-compacted to the satisfaction of the Soils Engineer prior to final acceptance.

SEASONAL LIMITS: No fill material shall be placed, spread, or rolled while it is frozen or thawing or during unfavorable wet weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until the Soils Engineer indicates that the moisture content and density of previously placed fill are as specified.

General Paving Specifications

Appendix C

APPENDIX C

PAVEMENT SPECIFICATIONS

1. DEFINITIONS - The term "pavement" shall include asphaltic concrete surfacing, untreated aggregate base, and aggregate subbase. The term "subgrade" is that portion of the area on which surfacing, base, or subbase is to be placed.

The term "Standard Specifications": hereinafter referred to is the May 2006 Standard Specifications of the State of California, Department of Transportation, and the "Materials Manual" is the Materials Manual of Testing and Control Procedures, State of California, Department of Public Works, Division of Highways. The term "relative compaction" refers to the field density expressed as a percentage of the maximum laboratory density as defined in the applicable tests outlined in the Materials Manual.

2. SCOPE OF WORK - This portion of the work shall include all labor, materials, tools, and equipment necessary for, and reasonably incidental to the completion of the pavement shown on the plans and as herein specified, except work specifically noted as "Work Not Included."

3. PREPARATION OF THE SUBGRADE - The Contractor shall prepare the surface of the various subgrades receiving subsequent pavement courses to the lines, grades, and dimensions given on the plans. The upper 12 inches of the soil subgrade beneath the pavement section shall be compacted to a minimum relative compaction of 90 percent. The finished subgrades shall be tested and approved by the Soils Engineer prior to the placement of additional pavement courses.

4. UNTREATED AGGREGATE BASE - The aggregate base material shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate base material shall conform to the requirements of Section 26 of the Standard Specifications for Class II material, 1½ inches maximum size. The aggregate base material shall be spread and compacted in accordance with Section 26 of the Standard Specifications. The aggregate base material shall be spread in layers not exceeding 6 inches and each layer of aggregate material course shall be tested and approved by the Soils Engineer prior to the placement of successive layers. The aggregate base material shall be compacted to a minimum relative compaction of 95 percent.

5. AGGREGATE SUBBASE - The aggregate subbase shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate subbase material shall conform to the requirements of Section 25 of the Standard Specifications for Class II material. The aggregate subbase material shall be compacted to a minimum relative compaction of 95 percent, and it shall be spread and compacted in accordance with Section 25 of the Standard Specifications. Each layer of aggregate subbase shall be tested and approved by the Soils Engineer prior to the placement of successive layers.

6. ASPHALTIC CONCRETE SURFACING - Asphaltic concrete surfacing shall consist of a mixture of mineral aggregate and paving grade asphalt, mixed at a central mixing plant and spread and compacted on a prepared base in conformity with the lines, grades and dimensions shown on the plans. The viscosity grade of the asphalt shall be PG 64-10. The mineral aggregate shall be Type B, ½ inch maximum size, medium grading and shall conform to the requirements set forth in Section 39 of the Standard Specifications. The drying, proportioning and mixing of the materials shall conform to Section 39.

The prime coat, spreading and compacting equipment and spreading and compacting mixture shall conform to the applicable chapters of Section 39, with the exception that no surface course shall be placed when the atmospheric temperature is below 50° F. The surfacing shall be rolled with a combination of steel wheel and pneumatic rollers, as described in Section 39-6. The surface course shall be placed with an approved self-propelled mechanical spreading and finishing machine.

7. FOG SEAL COAT - The fog seal (mixing type asphaltic emulsion) shall conform to and be applied in accordance with the requirements of Section 37.

APPENDIX B – PHASE II REPORT

URS

June 1, 2009

Mr. Kent Larsen
Martifer Renewables Solar Thermal LLC
12555 High Bluff Drive, Suite 100
San Diego, CA 92130

Subject: Report of Phase II Environmental Investigation
Response to Data Request #146, Data Set #1
San Joaquin Solar Hybrid Power Stations 1 & 2 (08-AFC-12)
Coalinga, California
URS Project No. 27658033.00200

Dear Mr. Larsen:

URS Corporation Americas (URS) is pleased to provide Martifer Renewables Solar Thermal LLC (Martifer) this letter report summarizing the results of a Phase II Environmental Investigation at the San Joaquin Solar Hybrid Power Stations 1 & 2, located on West Jayne Avenue, Coalinga, California (the site; see Figures 1 and 2). Our services were performed in accordance with our proposal dated May 1, 2009 that was approved by Martifer on May 22, 2009.

BACKGROUND

URS performed a Phase I Environmental Site Assessment in accordance with ASTM 1597-05 for the above-referenced site as part of Martifer's Application for Certification (AFC) for the project. The results of the Phase I ESA are summarized in a report dated June 16, 2008 and identified no recognized environmental conditions (RECs) on the property. Because some of the site had been used historically for agricultural purposes, the California Energy Commission (CEC) requested additional information (Data Request #146, Data Set 1, dated April 30, 2009) related to the potential presence of chemicals associated with agricultural property use on the site that might pose a health risk and/or hazard to construction workers and/or operations personnel associated with the project. On May 13, 2009, URS provided a brief work plan to the CEC via electronic mail describing our proposed sampling and analysis plan. Ms. Ellie Townsend-Hough of the CEC concurred with the approach and plan on May 15, 2009.

PURPOSE

The purpose of this investigation was to evaluate the potential presence of persistent chemicals such as organochlorine pesticides (OCPs) that may pose a risk to construction workers during construction of the project in order to address Data Request #146, Data Set #1.

SCOPE OF WORK

URS completed the following services:

URS Corporation
1615 Murray Canyon Road, Suite 1000
San Diego, CA 92108
Tel: 619.294.9400
Fax: 619.293.7920

- Mobilized to collect soil samples.
- Collected ten surface soil samples (surface to 1 foot below the ground surface) samples at locations of known historical agricultural use.
- Collected one composite surface soil sample in the vicinity of the site water well where there is an aboveground diesel-fuel tank and several pesticide mixing tanks.
- Analyzed the soil samples for chemicals of concern (COPCs).
- Prepared this letter report summarizing the field procedures and analytical results. The analytical results were compared to screening criteria for human health risk and hazardous waste regulatory criteria, where appropriate.

SAMPLING RATIONALE AND FIELD ACTIVITIES

URS' review of historical aerial photographs of the site appearing in the Phase I ESA indicate that approximately 1/8 of the site (southeast corner) was cultivated during the period that persistent pesticides may have been applied to crops between the 1950s and about 1980 (see Appendix D of Phase I ESA). URS conducted surface soil sampling (from ground surface to 1 foot below the ground surface) for OCPs in this area of the site, since the highest residual concentrations would be expected in the upper portion of the tilled zone. The samples were collected on a systematic random grid in accordance with U.S. EPA Guidance SW-846 from ten cells of approximately equal area on a rectangular grid (approximately representing 8 acres each). Random locations were generated using a random number generator, and the coordinates of the locations were programmed into a hand-held Global Positioning System (GPS) unit. The locations were identified in the field with the GPS unit with approximately 3-meter (10-foot) accuracy. This approach is very similar to that appearing in the California Department of Toxic Substances Control (DTSC) Guidance, titled "Interim Guidance for Sampling Agricultural Fields for School Sites", Second Revision, dated August 26, 2002.

Because the risk associated with the proposed property use (non-residential and construction worker) is significantly less than that associated with exposures to sensitive receptors at school sites, the number of samples collected for analyses was reduced compared to the number of samples suggested in the DTSC guidance. It was assumed based on the historical aerial photographs that the agricultural practices appeared to be consistent on the roughly 80 acres, therefore, it would be expected that there would not be variations in OCP concentrations assuming that the pesticides would have been uniformly applied.

On May 14, 2009, one soil sample was collected by a URS field technician at each location (locations SJS-01 through -10) from the ground surface to approximately 1 foot below the ground surface (bgs). Minimal surface grading is proposed on the approximately 800 acres that have been used historically to cultivate crops. In addition as agreed with the CEC, four soil samples (SJS-11A through -11D) were collected from the ground surface (0 to 1 foot bgs) near a diesel-fuel AST and pesticide mixing ASTs on the southwest corner of the site. The four samples were composited by

the laboratory in accordance with standard methods. The approximate locations of the samples colled and analyzed are shown on Figure 2. The samples were transported under chain-of-custody procedures in an insulated cooler with ice, maintained at 4°C, and delivered to Calscience Environmental Laboratories, Inc. (Calscience), a California Department of Health Services-certified laboratory for analyses.

The samples were collected using a shovel that was decontaminated between uses using a non-phosphate detergent solution followed by rinsing twice with deionized water. Wastewater was placed on the ground surface and allowed to infiltrate the soil following completion of sampling.

LABORATORY METHODS AND ANALYTICAL RESULTS

Each of the soil samples was analyzed for OCPs by EPA Method 8081A. The composite soil sample from the vicinity of the ASTs was additionally analyzed for total petroleum hydrocarbons quantified as diesel fuel (TPH-d). The analytical results are presented in Table 1 and a copy of the laboratory analytical report and chain-of-custody form is provided in Attachment A.

AREA OF HISTORICAL AGRICULTURAL USE

The following OCPs were detected in the surface soil samples collected from the area identified as being used historically for agriculture: dieldrin, 4,4'-DDE, 4, 4'-DDD, 4,4'-DDT and toxaphene. Dieldrin was detected in seven of the ten samples analyzed at concentrations ranging from 5.6 to 13 ug/kg. 4,4'-DDE was detected in each of the ten samples analyzed at concentrations ranging from 18 to 270 ug/kg. 4,4'-DDD was detected in four of the ten samples at concentrations ranging from 5.6 to 12 ug/kg. 4,4'-DDT was detected eight of the ten samples analyzed at concentrations ranging from 14 to 90 ug/kg. Toxaphene was detected in each of the ten samples analyzed at concentrations ranging from 600 to 3,100 ug/kg.

AST AREA

TPH-d were detected in the composite sample at a concentration of 23,000 ug/kg. No OCPs were detected in the composite sample. It should be noted that the AST area was not used for agriculture prior to 1980 when persistent pesticides would have been applied to crops.

SOIL SCREENING

URS conducted screening of the soil sample analytical results that compared the detected COPC concentrations to human health risk and hazardous waste criteria. The analytical data were compared to California Human Health Screening Levels (CHHSLs; Cal EPA 2005) for a commercial/industrial land use scenario. The data were also compared to state and federal hazardous waste criteria. For comparative purposes, the CHHSLs and hazardous waste criteria are listed at the bottom of Table 1.

HUMAN HEALTH SCREENING

The CHHSLs were modeled after the USEPA Region IX Preliminary Remediation Goals (PRGs) and are described in the document prepared by the California EPA titled, "Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties", dated January 2005. The CHHSLs have been developed for 54 chemicals in soil or soil gas based on a threshold of one in a million (1×10^{-6}) lifetime cancer risk and a hazard quotient of 1.0 for non-cancer health effects. The CHHSLs were developed using standard exposure assumptions and chemical toxicity values published by the Cal EPA, where available, and the U.S. EPA, in instances where no Cal EPA-specific toxicity value exists. CHHSLs are not regulatory cleanup standards. Because the site will be industrial and the potential exposures would be to construction workers or operators at the site, the analytical results for the soil samples have been compared to the industrial/commercial CHHSLs for the OCPs detected.

Of the OCPs detected, only toxaphene detected in three samples was present at concentrations above the commercial/industrial CHHSL of 1,800 ug/kg. If the average concentration of toxaphene detected in the samples collected from the area of historical agricultural use is considered (1,432 ug/kg), it is below the commercial/industrial CHHSL for this compound. The concentration of TPH in the composite sample (23,000 ug/kg) is not considered a health concern under any property use scenario.

HAZARDOUS WASTE SCREENING

State (CCR Title 22 Section 66261.3) and Federal hazardous waste regulations (40CFR 261.3) include regulatory limits for certain constituents based on toxicity. In California, the regulatory limits for the toxicity characteristic are identified by comparing the concentrations of a constituent to the Total Threshold Limit Concentration (TTLC) and Soluble Threshold Limit Concentration (STLC). If a constituent concentration is above either of these regulatory limits, the material may be considered a non-Resource Conservation and Recovery Act (RCRA), California hazardous waste. As such, the materials may require disposal at a Class I landfill if these materials were to be removed from the site. To identify whether a material is a Federal or RCRA hazardous waste, the materials are subjected to a leaching procedure and the concentration of that constituent in the extract is compared to the Toxicity Characteristic Leaching Procedure (TCLP) regulatory limit.

Each of the OCPs detected have regulatory limits for waste classification in California based on toxicity. Of these compounds, only toxaphene has a regulatory limit for RCRA waste classification based on toxicity. None of the OCPs detected were present at a concentration above its respective TTLC regulatory limit. The Waste Extraction Test (WET) that is used to obtain the STLC for a constituent has an inherent 10 times dilution factor. For example, a sample with a toxaphene concentration of 5,000 ug/kg cannot have a STLC toxaphene concentration that is greater than the regulatory limit of 500 ug/l. Of the samples analyzed during this investigation, none has the potential to exceed the STLC for the OCPs that were detected. Therefore, none of the samples could be considered a non-RCRA (California) hazardous waste. Similarly, the TCLP has a 20 times dilution factor inherent in the procedure. Therefore, a sample containing less than 10,000 ug/kg

toxaphene could not exceed the TCLP regulatory limit of 500 ug/l. None of the samples contained toxaphene at a concentration above 20 times the TCLP regulatory limit, therefore none of the samples could be considered a RCRA hazardous waste.

CONCLUSIONS

Based on the limited investigation conducted, URS concludes the following:

- The results of sampling confirmed that OCPs were detected in surface soil on the property that had been used historically for the cultivation of crops prior to 1980.
- The concentrations of toxaphene detected in three of the soil samples are above the industrial/commercial CHHSL. The average concentration in the 10 samples analyzed is 1,432 ug/kg, and is less than the commercial/industrial CHHSL.
- The surface soil would not be considered a non-RCRA or RCRA hazardous waste, if it were removed from the site.
- The concentrations of persistent pesticides (OCPs) detected in the soil at the site are not at levels that would be considered hazardous to the health of construction workers or site operators.
- The movement of soil on the site during grading will be sprayed with water to control fugitive dust. This will also serve as an effective measure in managing any potential health risk to construction workers posed by the OCPs in soil during grading.
- The concentration of TPH-d was relatively low in the vicinity of the ASTs where the soil was visibly stained and does not require any further action. However, the soil containing visual indications of the presence of TPH will be removed and properly disposed at a permitted landfill.

LIMITATIONS

The results described herein are intended to provide a limited, but reasonable evaluation of risk. The intent is that we take such steps as we determine are reasonable, under the circumstances to identify potential environmental concerns. Such steps do not eliminate the possibility of a property having some degree of environmental problems. It should be noted that any level of assessment cannot ascertain that a property is completely free of chemical or toxic substances. Therefore, URS cannot certify that a site is "clean."

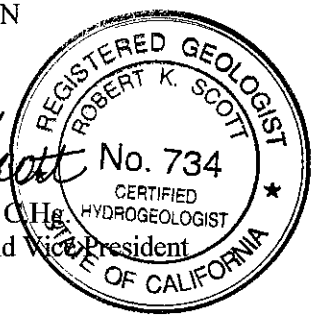
The results and conclusions are based on the information acquired during the assessment. It is possible that variations at the property could exist between and/or beyond points explored during the course of the assessment. Also, changes in conditions found could occur at some time in the future due to variations and factors not apparent at the time of the fieldwork.

All work performed was consistent with the level of care and skill ordinarily exercised by members of our profession, currently practicing under similar conditions in Southern California. *No other warranty is expressed or implied.*

URS appreciates the opportunity to assist Martifer with this project. If you have any questions concerning the results of this investigation, please do not hesitate to call.

Sincerely,

URS CORPORATION



Robert K. Scott, P.G., C.Hg.
Principal Geologist and Vice President

RKS:ml

Attachments: Table 1 - Soil Sample Analytical Results
Figure 1 - Site Location Map
Figure 2 - Site Plan
Figure 3 - Soil Sample Location Map
Attachment A - Laboratory Analytical Report and Chain-of-Custody Form

TABLE

Table 1
SOIL SAMPLE ANALYTICAL RESULTS
SAN JOAQUIN SOLAR 1 & 2

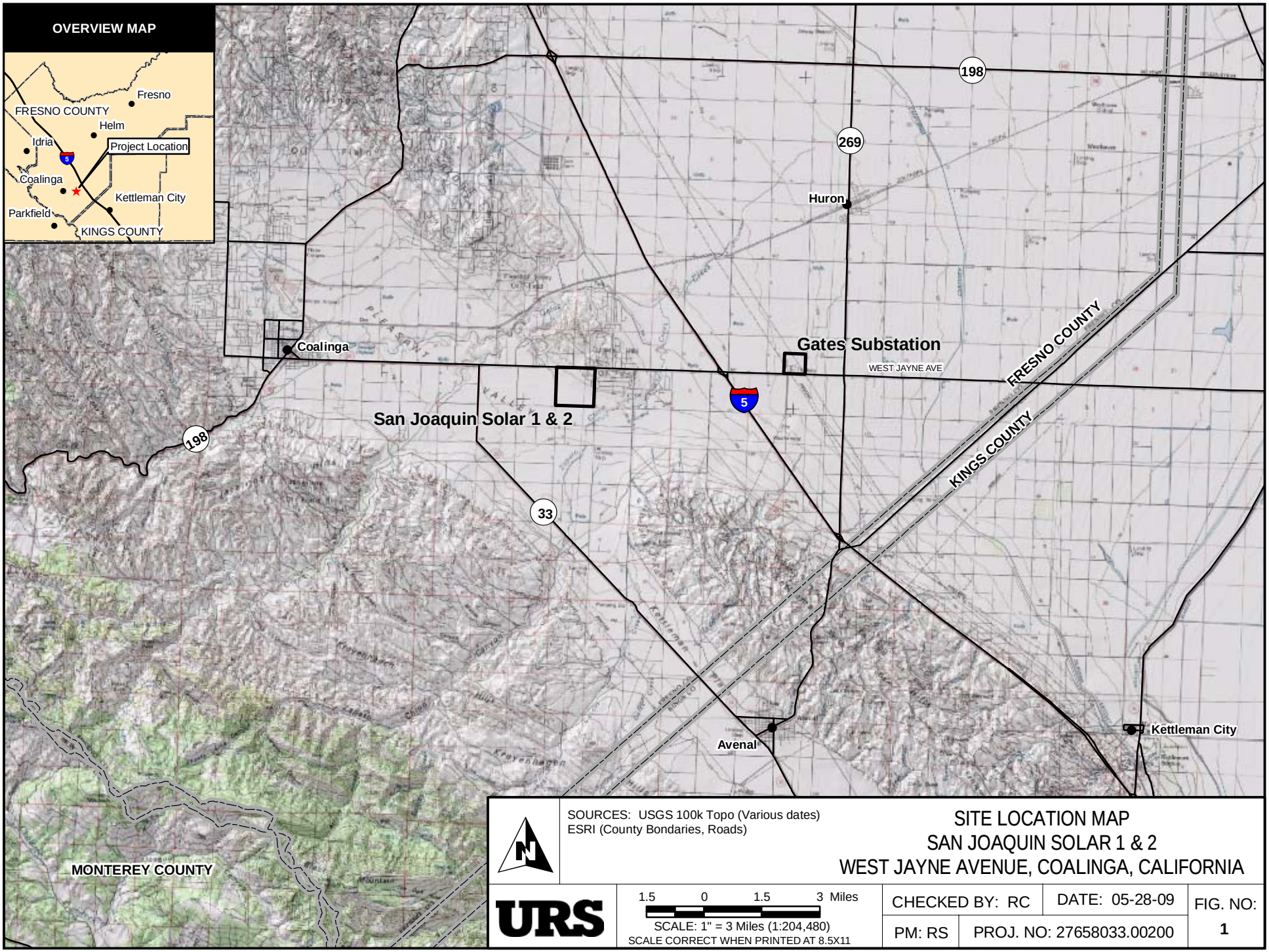
Sample ID	Sample Depth (ft)	OCPs (ug/kg)					TPH-d
		Dieldrin	4,4'-DDE	4,4'-DDD	4,4'-DDT	Toxaphene	
SJS-01	0-1	9.6	61	<5.0	15	770	NA
SJS-02	0-1	6.9	100	<5.0	20	840	NA
SJS-03	0-1	5.6	18	<5.0	<5.0	600	NA
SJS-04	0-1	6.6	55	<5.0	<5.0	960	NA
SJS-05	0-1	9.6	170	<5.0	28	1,000	NA
SJS-06	0-1	13	270	12	63	1,300	NA
SJS-07	0-1	6.9	90	5.6	14	950	NA
SJS-08	0-1	<5.0	230	11	63	2,400	NA
SJS-09	0-1	<5.0	260	<5.0	90	3,100	NA
SJS-10	0-1	<5.0	230	11	68	2,400	NA
SJS-11-A-D (Composite)	0-1	<5.0	<5.0	<5.0	<5.0	<100	23,000
Commerical/Industrial CHHSL		130	6,300	9,000	6,300	1,800	---
TTLC (ug/kg)		8,000	1,000	1,000	1,000	5,000	---
STLC (ug/l)		800	100	100	100	500	---
TCLP (ug/l)		NE	NE	NE	NE	500	---

Notes:

OCPs: Organochlorine pesticides by EPA Method 8081A
NA: Not analyzed
---: Not applicable
CHHSL: California Human Health Screening Level
TTLC: Total Threshold Limit Concentration
STLC: Soluble Threshold Limit Concentration
TCLP: Toxicity Characteristic Leaching Procedure

BOLD indicates concentration detected is above commercial/industrial CHHSL.
None of the detected concentrations is above hazardous waste criteria. See text for discussion.

FIGURES



SOURCES: USGS 100k Topo (Various dates)
ESRI (County Bondaries, Roads)

SITE LOCATION MAP
SAN JOAQUIN SOLAR 1 & 2
WEST JAYNE AVENUE, COALINGA, CALIFORNIA

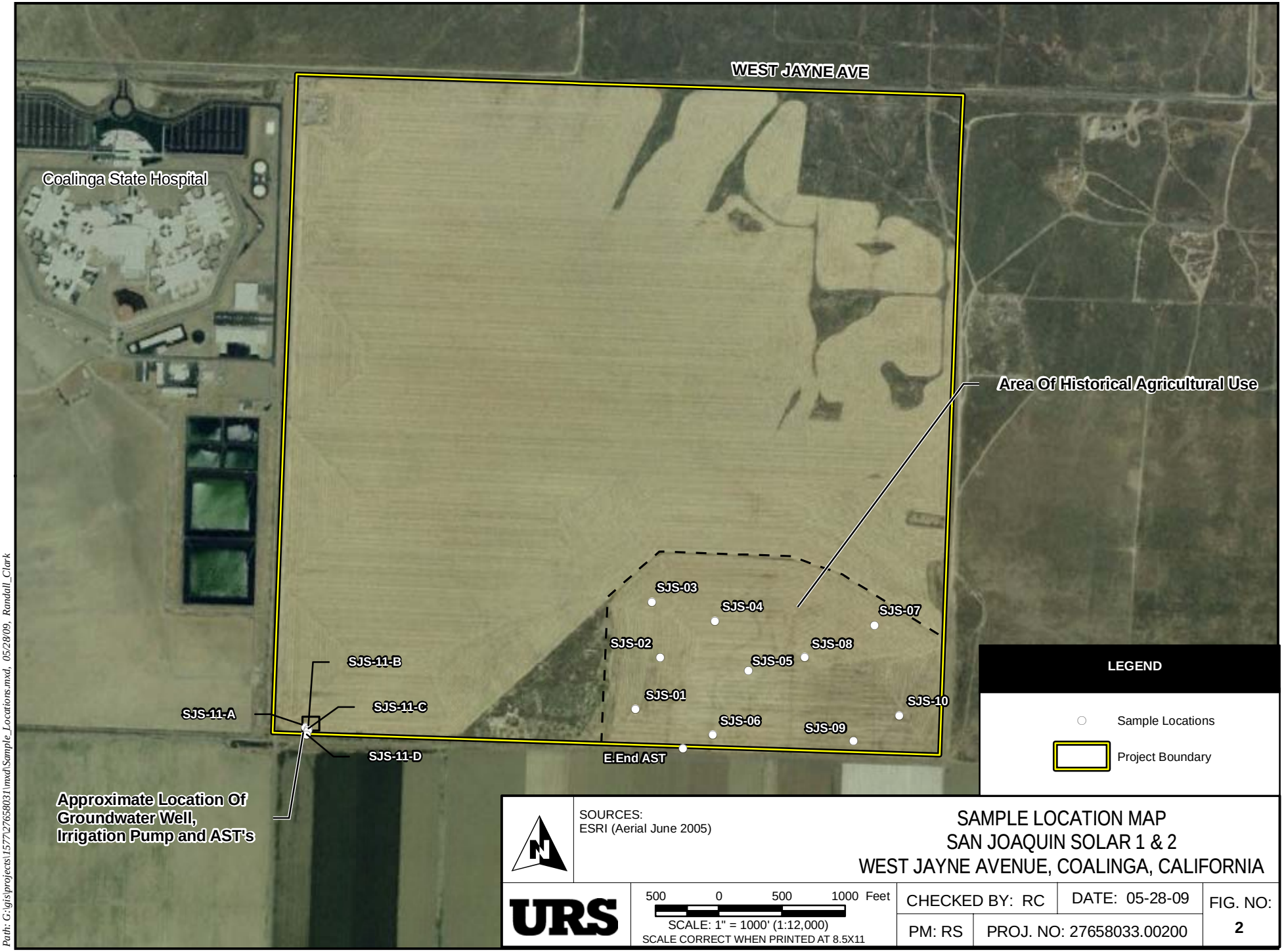
URS

1.5 0 1.5 3 Miles

SCALE: 1" = 3 Miles (1:204,480)
SCALE CORRECT WHEN PRINTED AT 8.5X11

CHECKED BY: RC	DATE: 05-28-09	FIG. NO: 1
PM: RS	PROJ. NO: 27658033.00200	

Path: G:\gis\projects\1577\27658031\mxd\Site_Location.mxd, 05/28/09, Randall_Clark



SOURCES:
ESRI (Aerial June 2005)

SAMPLE LOCATION MAP
SAN JOAQUIN SOLAR 1 & 2
WEST JAYNE AVENUE, COALINGA, CALIFORNIA

URS

500 0 500 1000 Feet

SCALE: 1" = 1000' (1:12,000)

SCALE CORRECT WHEN PRINTED AT 8.5X11

CHECKED BY: RC	DATE: 05-28-09	FIG. NO: 2
PM: RS	PROJ. NO: 27658033.00200	

Path: G:\gis\projects\1577\27658033\mxd\Sample_Locations.mxd, 05/28/09, Randall_Clark

ATTACHMENT A

LABORATORY ANALYTICAL REPORT AND CHAIN-OF-CUSTODY FORM

Calscience Environmental Laboratories, Inc.

May 22, 2009

Robert Scott
URS Corporation
1615 Murray Canyon Road, Suite 1000
San Diego, CA 92108-4319

Subject: **Calscience Work Order No.: 09-05-1394**
Client Reference: SJS 1 & 2 Discovery / 27658033.00200

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 5/15/2009 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Systems Manual, applicable standard operating procedures, and other related documentation. The original report of subcontracted analysis, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Sincerely,

Vikas Patel

Calscience Environmental
Laboratories, Inc.
Vikas Patel
Project Manager

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation
1615 Murray Canyon Road, Suite 1000
San Diego, CA 92108-4319

Date Received: 05/15/09
Work Order No: 09-05-1394
Preparation: EPA 3550B
Method: EPA 8015B (M)

Project: SJS 1 & 2 Discovery / 27658033.00200

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SJS-11-A-D (COMPOSITE)	**09-05-1394-15-A**	**05/14/09 00:00**	**Solid**	**GC 47**	**05/18/09**	**05/19/09 13:49**	**090518B05**

Parameter	Result	RL	DF	Qual	Units
TPH as Diesel	23000	100	20		mg/kg

Surrogates:	REC (%)	Control Limits	Qual
Decachlorobiphenyl	113	61-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-275-2,734**	**N/A**	**Solid**	**GC 47**	**05/18/09**	**05/18/09 18:33**	**090518B05**

Parameter	Result	RL	DF	Qual	Units
TPH as Diesel	ND	5.0	1		mg/kg

Surrogates:	REC (%)	Control Limits	Qual
Decachlorobiphenyl	96	61-145	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation		Date Received:	05/15/09
1615 Murray Canyon Road, Suite 1000		Work Order No:	09-05-1394
San Diego, CA 92108-4319		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg

Project: SJS 1 & 2 Discovery / 27658033.00200

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SJS-01@0-1'	**09-05-1394-1-A**	**05/14/09 16:35**	**Solid**	**GC 44**	**05/18/09**	**05/21/09 01:18**	**090518L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Alpha-BHC	ND	5.0	1		Endrin	ND	5.0	1	
Gamma-BHC	ND	5.0	1		Endrin Aldehyde	ND	5.0	1	
Beta-BHC	ND	5.0	1		4,4'-DDD	ND	5.0	1	
Heptachlor	ND	5.0	1		Endosulfan II	ND	5.0	1	
Delta-BHC	ND	5.0	1		4,4'-DDT	15	5.0	1	
Aldrin	ND	5.0	1		Endosulfan Sulfate	ND	5.0	1	
Heptachlor Epoxide	ND	5.0	1		Methoxychlor	ND	5.0	1	
Endosulfan I	ND	5.0	1		Chlordane	ND	50	1	
Dieldrin	9.6	5.0	1		Toxaphene	770	100	1	
4,4'-DDE	61	10	2		Endrin Ketone	ND	5.0	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Decachlorobiphenyl	78	50-130			2,4,5,6-Tetrachloro-m-Xylene	85	50-130		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SJS-02@0-1'	**09-05-1394-2-A**	**05/14/09 16:45**	**Solid**	**GC 44**	**05/18/09**	**05/21/09 17:23**	**090518L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Alpha-BHC	ND	5.0	1		Endrin	ND	5.0	1	
Gamma-BHC	ND	5.0	1		Endrin Aldehyde	ND	5.0	1	
Beta-BHC	ND	5.0	1		4,4'-DDD	ND	5.0	1	
Heptachlor	ND	5.0	1		Endosulfan II	ND	5.0	1	
Delta-BHC	ND	5.0	1		4,4'-DDT	20	5.0	1	
Aldrin	ND	5.0	1		Endosulfan Sulfate	ND	5.0	1	
Heptachlor Epoxide	ND	5.0	1		Methoxychlor	ND	5.0	1	
Endosulfan I	ND	5.0	1		Chlordane	ND	50	1	
Dieldrin	6.9	5.0	1		Toxaphene	840	100	1	
4,4'-DDE	100	25	5		Endrin Ketone	ND	5.0	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Decachlorobiphenyl	84	50-130			2,4,5,6-Tetrachloro-m-Xylene	76	50-130		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation		Date Received:	05/15/09
1615 Murray Canyon Road, Suite 1000		Work Order No:	09-05-1394
San Diego, CA 92108-4319		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg

Project: SJS 1 & 2 Discovery / 27658033.00200

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SJS-03@0-1'	**09-05-1394-3-A**	**05/14/09 16:55**	**Solid**	**GC 44**	**05/18/09**	**05/21/09 02:13**	**090518L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Alpha-BHC	ND	5.0	1		Endrin	ND	5.0	1	
Gamma-BHC	ND	5.0	1		Endrin Aldehyde	ND	5.0	1	
Beta-BHC	ND	5.0	1		4,4'-DDD	ND	5.0	1	
Heptachlor	ND	5.0	1		Endosulfan II	ND	5.0	1	
Delta-BHC	ND	5.0	1		4,4'-DDT	ND	5.0	1	
Aldrin	ND	5.0	1		Endosulfan Sulfate	ND	5.0	1	
Heptachlor Epoxide	ND	5.0	1		Methoxychlor	ND	5.0	1	
Endosulfan I	ND	5.0	1		Chlordane	ND	50	1	
Dieldrin	5.6	5.0	1		Toxaphene	600	100	1	
4,4'-DDE	18	5.0	1		Endrin Ketone	ND	5.0	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Decachlorobiphenyl	77	50-130			2,4,5,6-Tetrachloro-m-Xylene	83	50-130		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SJS-04@0-1'	**09-05-1394-4-A**	**05/14/09 17:05**	**Solid**	**GC 44**	**05/18/09**	**05/21/09 02:40**	**090518L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Alpha-BHC	ND	5.0	1		Endrin	ND	5.0	1	
Gamma-BHC	ND	5.0	1		Endrin Aldehyde	ND	5.0	1	
Beta-BHC	ND	5.0	1		4,4'-DDD	ND	5.0	1	
Heptachlor	ND	5.0	1		Endosulfan II	ND	5.0	1	
Delta-BHC	ND	5.0	1		4,4'-DDT	ND	5.0	1	
Aldrin	ND	5.0	1		Endosulfan Sulfate	ND	5.0	1	
Heptachlor Epoxide	ND	5.0	1		Methoxychlor	ND	5.0	1	
Endosulfan I	ND	5.0	1		Chlordane	ND	50	1	
Dieldrin	6.6	5.0	1		Toxaphene	960	100	1	
4,4'-DDE	55	10	2		Endrin Ketone	ND	5.0	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Decachlorobiphenyl	83	50-130			2,4,5,6-Tetrachloro-m-Xylene	88	50-130		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation		Date Received:	05/15/09
1615 Murray Canyon Road, Suite 1000		Work Order No:	09-05-1394
San Diego, CA 92108-4319		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg

Project: SJS 1 & 2 Discovery / 27658033.00200

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SJS-05@0-1'	**09-05-1394-5-A**	**05/14/09 17:25**	**Solid**	**GC 44**	**05/18/09**	**05/21/09 03:08**	**090518L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Alpha-BHC	ND	5.0	1		Endrin	ND	5.0	1	
Gamma-BHC	ND	5.0	1		Endrin Aldehyde	ND	5.0	1	
Beta-BHC	ND	5.0	1		4,4'-DDD	ND	5.0	1	
Heptachlor	ND	5.0	1		Endosulfan II	ND	5.0	1	
Delta-BHC	ND	5.0	1		4,4'-DDT	28	5.0	1	
Aldrin	ND	5.0	1		Endosulfan Sulfate	ND	5.0	1	
Heptachlor Epoxide	ND	5.0	1		Methoxychlor	ND	5.0	1	
Endosulfan I	ND	5.0	1		Chlordane	ND	50	1	
Dieldrin	9.6	5.0	1		Toxaphene	1000	100	1	
4,4'-DDE	170	50	10		Endrin Ketone	ND	5.0	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Decachlorobiphenyl	74	50-130			2,4,5,6-Tetrachloro-m-Xylene	81	50-130		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SJS-06@0-1'	**09-05-1394-6-A**	**05/14/09 17:35**	**Solid**	**GC 44**	**05/18/09**	**05/21/09 03:35**	**090518L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Alpha-BHC	ND	5.0	1		Endrin	ND	5.0	1	
Gamma-BHC	ND	5.0	1		Endrin Aldehyde	ND	5.0	1	
Beta-BHC	ND	5.0	1		4,4'-DDD	12	5.0	1	
Heptachlor	ND	5.0	1		Endosulfan II	ND	5.0	1	
Delta-BHC	ND	5.0	1		4,4'-DDT	63	10	2	
Aldrin	ND	5.0	1		Endosulfan Sulfate	ND	5.0	1	
Heptachlor Epoxide	ND	5.0	1		Methoxychlor	ND	5.0	1	
Endosulfan I	ND	5.0	1		Chlordane	ND	50	1	
Dieldrin	13	5.0	1		Toxaphene	1300	100	1	
4,4'-DDE	270	50	10		Endrin Ketone	ND	5.0	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Decachlorobiphenyl	76	50-130			2,4,5,6-Tetrachloro-m-Xylene	82	50-130		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation		Date Received:	05/15/09
1615 Murray Canyon Road, Suite 1000		Work Order No:	09-05-1394
San Diego, CA 92108-4319		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg

Project: SJS 1 & 2 Discovery / 27658033.00200

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SJS-07@0-1'	**09-05-1394-7-A**	**05/14/09 17:50**	**Solid**	**GC 44**	**05/18/09**	**05/21/09 04:03**	**090518L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Alpha-BHC	ND	5.0	1		Endrin	ND	5.0	1	
Gamma-BHC	ND	5.0	1		Endrin Aldehyde	ND	5.0	1	
Beta-BHC	ND	5.0	1		4,4'-DDD	5.6	5.0	1	
Heptachlor	ND	5.0	1		Endosulfan II	ND	5.0	1	
Delta-BHC	ND	5.0	1		4,4'-DDT	14	5.0	1	
Aldrin	ND	5.0	1		Endosulfan Sulfate	ND	5.0	1	
Heptachlor Epoxide	ND	5.0	1		Methoxychlor	ND	5.0	1	
Endosulfan I	ND	5.0	1		Chlordane	ND	50	1	
Dieldrin	6.9	5.0	1		Toxaphene	950	100	1	
4,4'-DDE	90	25	5		Endrin Ketone	ND	5.0	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Decachlorobiphenyl	73	50-130			2,4,5,6-Tetrachloro-m-Xylene	79	50-130		

SJS-08@0-1'	**09-05-1394-8-A**	**05/14/09 18:00**	**Solid**	**GC 44**	**05/18/09**	**05/21/09 04:17**	**090518L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Alpha-BHC	ND	5.0	1		Endrin	ND	5.0	1	
Gamma-BHC	ND	5.0	1		Endrin Aldehyde	ND	5.0	1	
Beta-BHC	ND	5.0	1		4,4'-DDD	11	5.0	1	
Heptachlor	ND	5.0	1		Endosulfan II	ND	5.0	1	
Delta-BHC	ND	5.0	1		4,4'-DDT	63	25	5	
Aldrin	ND	5.0	1		Endosulfan Sulfate	ND	5.0	1	
Heptachlor Epoxide	ND	5.0	1		Methoxychlor	ND	5.0	1	
Endosulfan I	ND	5.0	1		Chlordane	ND	50	1	
Dieldrin	ND	5.0	1		Toxaphene	2400	500	5	
4,4'-DDE	230	100	20		Endrin Ketone	ND	5.0	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Decachlorobiphenyl	76	50-130			2,4,5,6-Tetrachloro-m-Xylene	83	50-130		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation		Date Received:	05/15/09
1615 Murray Canyon Road, Suite 1000		Work Order No:	09-05-1394
San Diego, CA 92108-4319		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg

Project: SJS 1 & 2 Discovery / 27658033.00200

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SJS-09@0-1'	**09-05-1394-9-A**	**05/14/09 18:10**	**Solid**	**GC 44**	**05/18/09**	**05/21/09 04:44**	**090518L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Alpha-BHC	ND	5.0	1		Endrin	ND	5.0	1	
Gamma-BHC	ND	5.0	1		Endrin Aldehyde	ND	5.0	1	
Beta-BHC	ND	5.0	1		4,4'-DDD	ND	5.0	1	
Heptachlor	ND	5.0	1		Endosulfan II	ND	5.0	1	
Delta-BHC	ND	5.0	1		4,4'-DDT	90	25	5	
Aldrin	ND	5.0	1		Endosulfan Sulfate	ND	5.0	1	
Heptachlor Epoxide	ND	5.0	1		Methoxychlor	ND	5.0	1	
Endosulfan I	ND	5.0	1		Chlordane	ND	50	1	
Dieldrin	ND	5.0	1		Toxaphene	3100	500	5	
4,4'-DDE	260	100	20		Endrin Ketone	ND	5.0	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Decachlorobiphenyl	76	50-130			2,4,5,6-Tetrachloro-m-Xylene	81	50-130		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SJS-10@0-1'	**09-05-1394-10-A**	**05/14/09 18:20**	**Solid**	**GC 44**	**05/18/09**	**05/21/09 05:11**	**090518L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Alpha-BHC	ND	5.0	1		Endrin	ND	5.0	1	
Gamma-BHC	ND	5.0	1		Endrin Aldehyde	ND	5.0	1	
Beta-BHC	ND	5.0	1		4,4'-DDD	11	5.0	1	
Heptachlor	ND	5.0	1		Endosulfan II	ND	5.0	1	
Delta-BHC	ND	5.0	1		4,4'-DDT	68	25	5	
Aldrin	ND	5.0	1		Endosulfan Sulfate	ND	5.0	1	
Heptachlor Epoxide	ND	5.0	1		Methoxychlor	ND	5.0	1	
Endosulfan I	ND	5.0	1		Chlordane	ND	50	1	
Dieldrin	ND	5.0	1		Toxaphene	2400	500	5	
4,4'-DDE	230	100	20		Endrin Ketone	ND	5.0	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Decachlorobiphenyl	75	50-130			2,4,5,6-Tetrachloro-m-Xylene	83	50-130		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation		Date Received:	05/15/09
1615 Murray Canyon Road, Suite 1000		Work Order No:	09-05-1394
San Diego, CA 92108-4319		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg

Project: SJS 1 & 2 Discovery / 27658033.00200

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SJS-11-A-D (COMPOSITE)	**09-05-1394-15-A**	**05/14/09 00:00**	**Solid**	**GC 44**	**05/18/09**	**05/21/09 05:38**	**090518L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Alpha-BHC	ND	5.0	1		Endrin	ND	5.0	1	
Gamma-BHC	ND	5.0	1		Endrin Aldehyde	ND	5.0	1	
Beta-BHC	ND	5.0	1		4,4'-DDD	ND	5.0	1	
Heptachlor	ND	5.0	1		Endosulfan II	ND	5.0	1	
Delta-BHC	ND	5.0	1		4,4'-DDT	ND	5.0	1	
Aldrin	ND	5.0	1		Endosulfan Sulfate	ND	5.0	1	
Heptachlor Epoxide	ND	5.0	1		Methoxychlor	ND	5.0	1	
Endosulfan I	ND	5.0	1		Chlordane	ND	50	1	
Dieldrin	ND	5.0	1		Toxaphene	ND	100	1	
4,4'-DDE	ND	5.0	1		Endrin Ketone	ND	5.0	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Decachlorobiphenyl	82	50-130			2,4,5,6-Tetrachloro-m-Xylene	85	50-130		

Method Blank	099-12-537-651	N/A	Solid	GC 44	05/18/09	05/20/09 19:49	090518L07

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Alpha-BHC	ND	5.0	1		Endrin	ND	5.0	1	
Gamma-BHC	ND	5.0	1		Endrin Aldehyde	ND	5.0	1	
Beta-BHC	ND	5.0	1		4,4'-DDD	ND	5.0	1	
Heptachlor	ND	5.0	1		Endosulfan II	ND	5.0	1	
Delta-BHC	ND	5.0	1		4,4'-DDT	ND	5.0	1	
Aldrin	ND	5.0	1		Endosulfan Sulfate	ND	5.0	1	
Heptachlor Epoxide	ND	5.0	1		Methoxychlor	ND	5.0	1	
Endosulfan I	ND	5.0	1		Chlordane	ND	50	1	
Dieldrin	ND	5.0	1		Toxaphene	ND	100	1	
4,4'-DDE	ND	5.0	1		Endrin Ketone	ND	5.0	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Decachlorobiphenyl	91	50-130			2,4,5,6-Tetrachloro-m-Xylene	98	50-130		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

URS Corporation
1615 Murray Canyon Road, Suite 1000
San Diego, CA 92108-4319

Date Received: 05/15/09
Work Order No: 09-05-1394
Preparation: EPA 3550B
Method: EPA 8015B (M)

Project SJS 1 & 2 Discovery / 27658033.00200

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
09-05-1390-1	**Solid**	**GC 47**	**05/18/09**	**05/18/09**	**090518S05**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
TPH as Diesel	89	102	64-130	13	0-15	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

URS Corporation
1615 Murray Canyon Road, Suite 1000
San Diego, CA 92108-4319

Date Received: 05/15/09
Work Order No: 09-05-1394
Preparation: EPA 3545
Method: EPA 8081A

Project SJS 1 & 2 Discovery / 27658033.00200

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
SJS-01@0-1'	**Solid**	**GC 44**	**05/18/09**	**05/21/09**	**090518S07**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Gamma-BHC	89	86	50-135	4	0-25	
Heptachlor	87	83	50-135	5	0-25	
Endosulfan I	87	85	50-135	3	0-25	
Dieldrin	93	89	50-135	3	0-25	
Endrin	111	106	50-135	4	0-25	
4,4'-DDT	125	105	50-135	11	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

URS Corporation		Date Received:	N/A
1615 Murray Canyon Road, Suite 1000		Work Order No:	09-05-1394
San Diego, CA 92108-4319		Preparation:	EPA 3550B
		Method:	EPA 8015B (M)

Project: SJS 1 & 2 Discovery / 27658033.00200

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-275-2,734	**Solid**	**GC 47**	**05/18/09**	**05/18/09**	**090518B05**

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
TPH as Diesel	89	88	75-123	1	0-12	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

URS Corporation
1615 Murray Canyon Road, Suite 1000
San Diego, CA 92108-4319

Date Received: N/A
Work Order No: 09-05-1394
Preparation: EPA 3545
Method: EPA 8081A

Project: SJS 1 & 2 Discovery / 27658033.00200

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-537-651	**Solid**	**GC 44**	**05/18/09**	**05/20/09**	**090518L07**

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Gamma-BHC	90	97	50-135	7	0-25	
Heptachlor	91	98	50-135	7	0-25	
Endosulfan I	87	94	50-135	7	0-25	
Dieldrin	87	93	50-135	7	0-25	
Endrin	93	100	50-135	8	0-25	
4,4'-DDT	90	97	50-135	7	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Glossary of Terms and Qualifiers

Work Order Number: 09-05-1394

Qualifier	Definition
*	See applicable analysis comment.
1	Surrogate compound recovery was out of control due to a required sample dilution, therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification.
4	The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification.
5	The PDS/PDSD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported with no further corrective action required.
A	Result is the average of all dilutions, as defined by the method.
B	Analyte was present in the associated method blank.
C	Analyte presence was not confirmed on primary column.
E	Concentration exceeds the calibration range.
H	Sample received and/or analyzed past the recommended holding time.
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
ME	LCS Recovery Percentage is within LCS ME Control Limit range.
N	Nontarget Analyte.
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
U	Undetected at the laboratory method detection limit.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture.

Calscience Environmental Laboratories, Inc.
7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 . FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

DATE:

PAGE: 1 OF 2

LABORATORY CLIENT: URS Corporation
ADDRESS: 30 River Park Place West, Suite 180
CITY: Fresno, CA 93720
TEL: (559)-256-1444 FAX: (559)-256-1478 E-MAIL:

CLIENT PROJECT NAME / NUMBER:
PROJECT CONTACT: Jason Moore
SAMPLER(S): (SIGNATURE)

P.O. NO.:
QUOTE NO.:
LAB USE ONLY 05-1394

TURNAROUND TIME
☐ SAME DAY ☐ 24 HR ☐ 48HR ☐ 72 HR ☐ 5 DAYS ☐ 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
☐ RWQCB REPORTING ☐ ARCHIVE SAMPLES UNTIL ____/____/____

SPECIAL INSTRUCTIONS

REQUESTED ANALYSIS

LAB USE ONLY	SAMPLE ID	LOCATION/ DESCRIPTION	SAMPLING DATE	SAMPLING TIME	Matrix	#Cont	OCPs by EPA Method 8081A
1	SJS-01 @0-1'		05/14/09	1635	S	1	X
2	SJS-02 @0-1'		05/14/09	1645	S	1	X
3	SJS-03 @0-1'		05/14/09	1655	S	1	X
4	SJS-04 @0-1'		05/14/09	1705	S	1	X
5	SJS-05 @0-1'		05/14/09	1725	S	1	X
6	SJS-06 @0-1'		05/14/09	1735	S	1	X
7	SJS-07 @0-1'		05/14/09	1750	S	1	X
8	SJS-08 @0-1'		05/14/09	1800	S	1	X
9	SJS-09 @0-1'		05/14/09	1810	S	1	X
10	SJS-10 @0-1'		05/14/09	1820	S	1	X

Relinquished by: (Signature) R.V. NEWMAN	Received by: (Signature) ON-TRAC COURIER	Date: 05-14-09	Time: 2115
Relinquished by: (Signature) ONTRAC D10010211524453	Received by: (Signature) Wcbatn CET	Date: 5/15/09	Time: 0900
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:

Calscience Environmental Laboratories, Inc.
7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 . FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

DATE:

PAGE: 2 OF 2

LABORATORY CLIENT: URS Corporation
ADDRESS: 30 River Park Place West, Suite 180
CITY: Fresno, CA 93720
TEL: (559)-256-1444 FAX: (559)-256-1478 E-MAIL

CLIENT PROJECT NAME / NUMBER:
PROJECT CONTACT: Jason Moore
SAMPLER(S): (SIGNATURE)
P.O. NO.:
QUOTE NO.:
LAB USE ONLY 05-1394

TURNAROUND TIME
☐ SAME DAY ☐ 24 HR ☐ 48HR ☐ 72 HR ☐ 5 DAYS ☐ 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
☐ RWQCB REPORTING ☐ ARCHIVE SAMPLES UNTIL ____/____/____

SPECIAL INSTRUCTIONS

REQUESTED ANALYSIS

LAB USE ONLY	SAMPLE ID	LOCATION/ DESCRIPTION	SAMPLING DATE	SAMPLING TIME	Matrix	#Cont	Composite by Lab	TPH-D by EPA Method 8015M	OCPs by Method 8081A
11	SJS-11-A		05/14/09	1840	S	1	X		
12	SJS-11-B		05/14/09	1845	S	1	X		
13	SJS-11-C		05/14/09	1855	S	1	X		
14	SJS-11-D		05/14/09	1900	S	1	X		
15	SJS-11-A-D (Composite by Lab)							X	X

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
R.V. Newman	ON-TRAK COURIER	05-14-09	2115
Relinquished by: (Signature) ONTRAC D10010211524A53	Received by: (Signature) Wahath CEL	Date: 5/15/09	Time: 0900
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 09-05-1394

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: URS Corp

DATE: 5/15/09

TEMPERATURE: (Criteria: 0.0 °C – 6.0 °C, not frozen)

Temperature 3.9 °C - 0.2 °C (CF) = 3.7 °C ☐ Blank ☑ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter ☐ Metals Only ☐ PCBs Only **Initial:** WB

CUSTODY SEALS INTACT:

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A **Initial:** WB

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present **Initial:** PS

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ COC not relinquished. ☐ No date relinquished. ☐ No time relinquished.			
Sampler's name indicated on COC	☐	☑	☐
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Correct containers and volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
Proper preservation noted on COC or sample container	☐	☐	☑
☐ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☐	☐	☑
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☑4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve ☐EnCores® ☐TerraCores® ☐_____

Water: ☐VOA ☐VOA**h** ☐VOA**na$_2$** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na$_2$** ☐1AGB**s** ☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐500PB ☐500PB**na** ☐250PB ☐250PB**n** ☐125PB ☐125PB**znna** ☐100PB ☐100PB**na$_2$** ☐_____ ☐_____ ☐_____

Air: ☐Tedlar® ☐Summa® ☐_____ **Other:** ☐_____ **Checked/Labeled by:** PS

Container: **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar (Wide-mouth) **B:** Bottle (Narrow-mouth) **Reviewed by:** WB

Preservative: **h:** HCL **n:** HNO3 **na$_2$:** $Na_2S_2O_3$ **Na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **znna:** $ZnAc_2$+NaOH **f:** Field-filtered **Scanned by:** PS

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION FOR THE *SAN JOAQUIN SOLAR UNITS 1 AND 2 LICENSING PROJECT*

Docket No. 08-AFC-12

PROOF OF SERVICE
(Revised 5/14/2009)

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*indicates change

Declaration of Service

I, Anne Runnalls, declare that on June 1, 2009, I served and filed copies of the attached Second Response to CEC Data Request Set #1. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [http://www.energy.ca.gov/sitingcases/sjsolar/index.html]. The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

For service to all other parties:

__X__sent electronically to all email addresses on the Proof of Service list;

___X_by personal delivery or by depositing in the United States mail at San Diego, California with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses NOT marked "email preferred."

AND

For filing with the Energy Commission:

__X___sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (preferred method);

OR

_____depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 08-AFC-12
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.

Anne Runnalls