URS

January 9, 2007

James W. Reede, Jr., Ed.D.
Energy Facility Siting Project Manager
California Energy Commission
1516 - 9th Street
Sacramento, CA 95814

RE: Response to Panoche Energy Center Power Plant Project (06-AFC-5) Data Requests

Dear Dr. Reede:

Panoche Energy Center, LLC herby submits its response to the December 8, 2006 Data Requests (06-AFC-5) to the Application for Certification for the Panoche Energy Center Project submitted in August 2006.

If you have any questions or concerns please do not hesitate to call me at 714-648-2759.

Sincerely,

Margaret M Fitz

Margaret M. Fitzgerald
Program Manager

URS Corporation
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Panoche Energy Center
Application for Certification
Data Requests Responses
06-AFC-5

Data Response Guide

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TECHNICAL AREA: AIR QUALITY

Data Request 1 Rev: Please provide copies of all substantive District correspondence regarding the PEC permit application, including e-mails, within one week of submittal or receipt. This request is in affect until the final Commission Decision has been recorded.

Response:

Effective this date of PEC's response to the CEC Data Request dated December 8, 2006, PEC plans to provide the CEC with copies of all substantive correspondence between PEC and the SJVAPCD (Air District or District) within one-week of submittal or receipt.

TECHNICAL AREA: AIR QUALITY

Data Request 2 Rev: Please provide revised project emission tables that incorporate all proposed changes to the gas turbine and emergency engine emissions. The tables with revised emission values would likely include: Table 5.2-12, Table 5.2-13, Table 5.2-14, Table 5.2-15, Table 5.2-21, Table 5.2-24, and the tables provided in Appendix I, Attachment C.

Response:

Revised Tables 5.2-12, 5.2-13, 5.2-14, 5.2-15, 5.2-21 and 5.2-24 are provided below. The most significant change in these emission data compared with those in the AFC result from an improvement in the manufacturer's guaranteed PM10 emission rate for the LMS100 CTGs from 11 lb/hr/turbine to 6 lb/hr/turbine. Other much smaller changes have resulted from small revisions to the turbine commissioning and startup emissions, as described in the responses to several other data requests. Sulfur dioxide emissions from the turbines continue to be calculated in these tables based on a very conservative assumed natural gas fuel sulfur content of 0.75 grains per 100 dry standard cubic feet, since this is the sulfur level required to be assumed per the policy of the San Joaquin Valley Air Pollution Control District. However, per agreement with SJVAPCD, emissions offset requirements for this pollutant will be determined based on an annual average sulfur content of 0.32 grains per 100 dry standard cubic feet.

Revised operational emission spreadsheets replacing those originally presented in Appendix I, Attachment C are also provided immediately following the above mentioned revised tables.

TABLE 5.2-12 (REVISED)
1-HOUR OPERATING EMISSION RATES FOR CTG OPERATING LOAD SCENARIOS

Load	Exhaust Flow (acfm)	Exit Velocity (ft/s)	Exit Temp (°F)	NO_X Normal (lb/hr)	NO_X Uncontrolled (lbs/hr)	CO Normal (lbs/hr)	CO Uncontrolled (lbs/hr)	SO_2 Normal (lbs/hr)	SO_2 Uncontrolled (lbs/hr)	VOC Normal (lbs/hr)	VOC Uncontrolled (lbs/hr)	PM_{10} Normal (lbs/hr)	PM_{10} Uncontrolled (lbs/hr)
100%													
114°F Off	816,088	95.0	817	7.20	80.6	10.46	183.1	1.7	1.7	2.0	3.0	6.0	6.0
114°F On	854,672	99.5	801	7.63	85.4	11.23	196.6	1.8	1.8	2.67	3.2	6.0	6.0
63°F	888,554	103.5	787	8.03	89.9	11.81	206.6	1.9	1.9	2.2	3.3	6.0	6.0
17°F	873,723	101.7	741	7.79	87.2	11.45	200.4	1.85	1.85	2.43	5.1	6.0	6.0
75%													
114°F	721,939	84.1	800	6.12	68.5	8.86	155.1	1.48	1.48	1.80	2.7	6.0	6.0
63°F	746,033	86.9	766	6.32	70.8	9.22	161.4	1.54	1.54	1.93	2.9	6.0	6.0
17°F	737,502	85.9	746	6.19	69.3	9.02	157.9	1.52	1.52	2.05	4.3	6.0	6.0
50%													
114°F	578,809	67.4	804	4.49	50.3	6.47	113.3	1.12	1.12	1.1	1.1	6.0	6.0
63°F	598,001	69.6	783	4.57	51.2	6.81	119.1	1.15	1.15	0.92	1.1	6.0	6.0
17°F	591,948	68.9	765	4.61	51.6	6.63	116.1	1.17	1.17	1.53	2.3	6.0	6.0

Note: Maintenance rates are uncontrolled emission rates.

ºF	=	degrees Fahrenheit
%	=	percent
acfm	=	actual cubic feet per minute
CO	=	carbon monoxide
CTG	=	combustion turbine generator
lbs/hr	=	pounds per hour
ft/s	=	feet per second
NO_X	=	nitrogen oxide(s)
Ops	=	operations
PM_{10}	=	particulate matter less than 10 micrometers in diameter
VOC	=	volatile organic compounds
SO_2	=	sulfur dioxide

TABLE 5.2-13 (REVISED)
CRITERIA POLLUTANT EMISSIONS FOR EACH CTG DURING STARTUP AND SHUTDOWN

	Startup/Warmup 10 minutes/20 minutes		Shutdown 10.5 minutes
Pollutant	Startup Total lbs per Event	Warmup Total lbs per Event	Total lbs per Event
NO_X	5.0	17.3	6.0
CO	14.0	39.3	47.0
VOC	3.0	0.8	3.0
SO_2	0.32	0.63	0.33
PM_{10}	1.0	2.0	1.05

Notes:
CO = carbon monoxide
CTG = combustion turbine generator
lbs = pounds
NO_X = nitrogen oxide(s)
PM_{10} = particulate matter less than 10 micrometers in diameter
VOC = volatile organic compounds
SO_2 = sulfur dioxide

TABLE 5.2-14 (REVISED)
CRITERIA POLLUTANT SOURCES AND EMISSION TOTALS FOR THE WORST-CASE PLANT-WIDE EMISSIONS SCENARIOS CORRESPONDING TO ALL AVERAGING TIMES

Averaging Time	Operating Equipment	Pollutant	Sources		
			Turbines 1-4	Diesel Fire Pump	Cooling Tower
			Emissions in lbs – Entire Period		
1-hour	Four turbines operating at highest commissioning rate, except for SO_2 which uses normal operating load for all.	NO_X	672.24	1.38	-
		CO	1,222.52	0.23	-
		SO_2	7.6	0.002	-
3-hour	All turbines operating at normal operating loads.	SO_2	22.8	0.002	-
8-hour	Four turbines operating 8 hours at highest commissioning rates.	CO	9,780.16	0.23	-
24-hour	For PM_{10}, turbines operate with 3 startups, 3 shutdowns, and remaining time at normal operating load, plus cooling tower and 1 hour of fire pump. For SO_2, turbines operate at normal operating load.	PM_{10}	576.0	0.05	8.4
		SO_2	182.4	0.002	-
Annual	Turbines operate for 5,000 total hours which include 365 startups, 365 shutdowns, and 4,754 hour at normal operating loads. Cooling Tower operates 5,000 hours and fire pump operates 52 hours (1 hour per week).	NO_X	193,943.2	71.54	-
		PM_{10}	120,000.0	2.75	1,750.0
		SO_2	36,718.0	0.12	-

Notes:
CO = carbon monoxide
lbs = pounds
NO_X = nitrogen oxide(s)
PM_{10} = particulate matter less than 10 micrometers in diameter
SO_2 = sulfur dioxide

TABLE 5.2-15 (REVISED)
ESTIMATED ANNUAL PEC OPERATIONAL EMISSIONS OF CRITERIA POLLUTANTS

Pollutant	Emissions (tons/year)[1,2]
SO_2[3]	18.36
NO_X	97.01
VOC	30.33
PM_{10}[4]	60.88
CO	185.46
Lead	Negligible[5]

Notes:

1 Includes emissions from four turbines, cooling tower, and 52 hours per year testing of the emergency diesel fire pump driver.

2 Turbine missions based on 365 startups and shutdowns, and 4,754 hours of normal full-load operations for each turbine.

3 SO_2 emissions shown in this table are calculated based on a worst-case natural gas fuel sulfur content of 0.75 grains per 100 standard cubic feet.

4 PM_{10} emissions include both filterable (front-half) and condensable (back-half) particulates.

5 Lead emissions are 'non-detect' from AP-42 for natural gas-fired combustion turbines and the diesel fire pump will operate no more than 24 hours per year.

CO = carbon monoxide
NO_X = nitrogen oxide(s)
PM_{10} = particulate matter less than 10 micrometers in diameter
VOC = volatile organic compounds
SO_2 = sulfur dioxide

TABLE 5.2-21 (REVISED)
ESTIMATED EMISSIONS OFFSETS REQUIREMENTS

Calendar Quarter	Project Emissions (tons)	ERCs Required (tons)[1,2]
NO_x		
First	21.34	27.742 – 32.01
Second	21.34	27.742 – 32.01
Third	31.04	40.352 – 46.56
Fourth	23.28	30.264 – 34.92
Max. Annual Total		**145.50 tons**
VOC		
First	6.67	8.671 – 10.005
Second	6.67	8.671 – 10.005
Third	9.71	12.623 – 14.565
Fourth	7.28	9.464 – 10.920
Max. Annual Total		**45.495 tons**
PM_{10}		
First	13.39	17.407 – 20.085
Second	13.39	17.407 – 20.085
Third	19.48	25.324 – 29.22
Fourth	14.61	18.993 – 21.915
Max. Annual Total		**91.305 tons**
SO_x[3]		
First	1.78	1.78
Second	1.78	1.78
Third	2.59	2.59
Fourth	1.95	1.95
Max. Annual Total		**8.10 tons**

Notes:

1 Quantity of ERCs required depends on distance factor applicable to individual emission reduction sources. Values shown here correspond to a range of distance factors from 1.3/1 to 1.5/1

2 No distance factor applied in calculating SO_2 ERC requirements, because annual emissions for this pollutant will be below the SJVAPCD offset triggering threshold of 27.375 tons

3 For purposes of offset calculations, SO2 emissions are calculated based on a natural gas fuel

ERCs = emission reduction credits
NO_x = nitrogen oxide(s)
PM_{10} = particulate matter less than 10 microns in diameter
SO_x = sulfur oxides
VOC = volatile organic compounds

TABLE 5.2-24 (REVISED)
PSD EMISSION THRESHOLD TRIGGERS
FOR NEW STATIONARY SOURCES

Pollutant	Significant Thresholds (tpy)	Project Emissions (tpy)	PSD Triggered by Project?
SO_2	250	8.01	No
NO_X	250	97.01	No
VOC	250	30.33	No
PM_{10}	250	60.88	No
CO	250	185.46	No

Project emissions include all emissions from natural gas turbines, cooling tower, and emergency diesel fire pump driver.

Notes:
CO = carbon monoxide
NO_X = nitrogen oxide(s)
Pb = lead
PM_{10} = particulate matter less than 10 micrometers in diameter
PSD = prevention of significant deterioration
SO_2 = sulfur dioxide
tpy = tons per year
VOC = volatile organic compounds

APPENDIX I

AIR QUALITY DATA

ATTACHMENT C

SUPPORTING INFORMATION ON ESTIMATION OF PROJECT OPERATION EMISSIONS

PEC Turbines 100%

Case	100	101	104	107
Ambient Temperature (°F)	114	114	63.3	16.8
Stack Diameter (ft)	13.5	13.5	13.5	13.5
Exhaust Flow (lb/hr)	1496922	1584697	1669071	1710622
CTG Load Level	100%	100%	100%	100%
Evap. Cooler	OFF	ON	OFF	OFF

Data from Vendor Area = 143.14 ft^2

Expected Operation of Each Gas Turbine - Normal Operation

(Reference: Emission Summary GE LMS100 PA Turbine/Site Specific (372 elev) Information)

Heat Consumed (MMBTU/hr)	813.8	862.5	909.7	885.2
Turbine Outlet Temperature (°F)	817	801	787	741
Exhaust Flow (acfm)	816088	854672	888554	873723
Stack Exit Velocity, ft/m	5701.4	5970.9	6207.6	6104.0
Stack Exit Velocity, m/s	28.96	30.33	31.53	31.01
Nitrogen, % Vol	71.82	71.54	71.84	72.68
Oxygen, % Vol	11.51	11.43	11.49	12.08
Carbon Dioxide, % Vol	3.95	3.95	3.96	3.78
Argon, % Vol	0.86	0.86	0.86	0.87
Water Vapor, % Vol	11.85	12.20	11.83	10.57
Molecular Weight	28.01	27.97	28.01	28.13

Data from Vendor

Average Emission Rates from Each Gas Turbine (lbs/hr) - Normal Operations

NO_X at 28 ppmvd pre-BACT level	80.60	85.40	89.90	87.20
NO_X at 2.5 ppmvd BACT level	7.20	7.63	8.03	7.79
CO at 105 ppmvd pre BACT level	183.10	196.60	206.60	200.40
CO at 6.0 ppmvd BACT level	10.46	11.23	11.81	11.45
UHC at 4-7 ppmvd pre-BACT leve	4.50	4.80	6.70	8.60
VOC at 2.4-4.2 ppmvd BACT leve	3.00	3.20	3.30	5.10
VOC at 2.0 ppmvd BACT level	2.00	2.67	2.20	2.43
SO_2 short-term rate	1.70	1.80	1.90	1.85
SO_2 annual rate	1.70	1.80	1.90	1.85
PM_{10}	6.00	6.00	6.00	6.00
NH_3 at 10 ppmvd tBACT level	10.70	11.30	11.90	11.50
Sulfur content in fuel basis for abov	0.75	grains total S/100 scf		short-term
Sulfur content in fuel basis for abov	0.75	grains total S/100 scf		long-term

Data from Vendor

Startup / Shutdown Emissions from Turbine

Startup

duration in minutes	10	20	30	30	Average	1 hour of
	Startup	SCR Warmup	Total Startup	Normal	Startup	Startup
	Emissions	Emissions	Emissions	Emissions	Emissions	Emissions
	lb/event	**lb/event**	**lb/event**	lb/hour	lb/hour	lb/hour
NO_X	5.00	17.30	22.30	8.03	26.31	44.6
CO	14.00	39.30	53.30	11.81	59.20	106.6
VOC	3.00	0.80	3.80	2.67	5.13	7.6
SO_2	0.32	0.63	0.95	1.90	1.90	1.9
PM_{10}	1.00	2.00	3.00	6.00	6.00	6

Assumptions:

Startup Emissions for CO, NO_2, PM_{10}, and VOC integrated from data provided by GE and Bibb.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Normal emissions are highest of four operating cases listed above (case 104), except for VOC.

Shutdown

duration in minutes	10.5	49.5		1 hour of
	Shutdown	Normal	Total Shutdown	Shutdown
	Emissions	Emissions	Emissions	Emissions
	lb/event	lb/hour	lb/hr	lb/hour
NO_X	6.00	8.03	12.62	34.3
CO	47.00	11.81	56.74	268.6
VOC	3.00	2.67	5.20	17.1
SO_2	0.33	1.90	1.90	1.9
PM_{10}	1.05	6.00	6.00	6.0

Assumptions:

Shutdown Emissions for CO, NO_2, PM_{10}, and VOC integrated from data provided by GE and Bibb.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Normal emissions are highest of four operating cases listed above (case 104) except for VOC.

Commissioning Emissions

		Total Pounds Emitted				
	Hours	NO_x	CO	VOC	PM_{10}	SO_2
First Fire	16	178.00	727.00	18.50	96.00	30.4
Synch & Check E Stop	12	133.50	545.20	13.90	72.00	22.8
Additional AVR Testing	12	251.00	363.20	8.70	72.00	22.8
Break-In Run	8	167.30	242.10	5.80	48.00	15.2
Dynamic AVR	40	1959.40	3012.00	191.90	240.00	76
Base Load AVR	16	2689.00	4890.00	239.00	96.00	30.4
Total Commissioning Hours	104					
		Maximum Emission Rates lb/hr				
		NO_x	CO	VOC	PM_{10}	SO_2
First Fire	16	11.13	45.44	1.16	6.00	1.90
Synch & Check E Stop	12	11.13	45.43	1.16	6.00	1.90
Additional AVR Testing	12	20.92	30.27	0.73	6.00	1.90
Break-In Run	8	20.91	30.26	0.73	6.00	1.90
Dynamic AVR	40	48.99	75.30	4.80	6.00	1.90
Base Load AVR	16	168.06	305.63	14.94	6.00	1.90

Worst-Case 1-Hour Emissions per Turbine

Worst-Case 1-Hour Emissions are equal to the commissioning emission rates, except for SO_2 which has worst-case emissions during normal operations and PM_{10} which has worst-case emissions during startup.

Emissions per turbine	**lb/hr**						**g/s**
NO_2	168.06						21.18
CO	305.63						38.51
VOC	14.94						1.88
SO_2	1.90						0.24
PM_{10}	6.00						0.76

Worst-Case 3 Hour Emission Rate per Turbine

Only SO_2 is considered for an average 3-hour Ambient Air Quality Standard.

Worst-case 3-Hour Scenario are equal to 3 hours at normal rate.

Emissions per turbine	**Worst-case Total**	**Startup /Warmup**	**Shutdown**	**Normal Operations**	**Worst-case Total**	**Startup /Warmup**	**Shutdown**	**Normal Operations**	**Worst-case Total**
	lb/hr				**Total lbs**				**g/s**
Total Hours of Operation	3.0			3.0				3.0	
SO_2	1.90			1.90	5.71			5.71	0.24

Worst-Case 8-Hour Emission Rates

Only CO is considered for an average 8-hour Ambient Air Quality Standard.

Worst-case 8-Hour Scenario includes 8 hours of commissioning. Only one turbine will be undergoing commissioning at any one time.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Commis-sioning	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Commis-sioning	Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	8			8	0				8	0.00	
CO	305.63			305.63	0.00	2445.00			2445.00	0.00	38.51

Worst-Case 24 Hour Emission Rate

Only SO_2 and PM_{10} are considered for an average 24-hour Ambient Air Quality Standard.

Worst-case 24-Hour Scenario for PM_{10} includes 3 Startups, 3 Shutdowns, and remaining time at normal rate.

Worst-case 24-hour scenario for SO_2 uses normal operations.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Normal Operations	Worst-case Total
	lb/hr				Total lbs				g/s
Total Hours of Operation	24	1.50	0.525	21.975		1.50	0.525	21.975	
NO_X	10.89	44.60	34.29	8.03	261.29	66.90	18.00	176.39	1.37
CO	23.35	106.60	268.57	11.81	560.33	159.90	141.00	259.43	2.94
VOC	3.29	7.60	17.14	2.67	79.00	11.40	9.00	58.60	0.41
SO_2	1.90			1.90	41.83	0.00	0.00	41.83	0.24
PM_{10}	6.00	6.00	6.00	6.00	144.00	9.00	3.15	131.85	0.76

SO_2 Commissioning		**PM_{10} Commissioning**	
First Fire	1.90	First Fire	6.00
Synch & Check E Stop	1.90	Synch & Che	6.00
Additional AVR Testing	1.90	Additional AV	6.00
Break-In Run	1.90	Break-In Run	6.00
Dynamic AVR	1.90	Dynamic AVF	6.00
Base Load AVR	1.90	Base Load A	6.00

CTG Commissioning testing could operate for 24 hours.

Commissioning

	First Fire	Synch & Check E Sto	Additional AVR Testing	Break-In Run	Dynamic AVR	Base Load AVR
			Emissions	Emissions	Emissions	Emissions
	Total lbs					
	16	12	12	8	40	16
NO_X	178.00	133.5	251	167.3	1959.4	2689
CO	727.00	545.2	363.2	242.1	3012	4890
VOC	18.50	13.9	8.7	5.8	191.9	239
SO_2						
PM_{10}	96.00	72	72	48	240	96

Average Annual Emissions

Average Operation lb/hr Emission Rates presented below for normal operations are based on the 63°F, 100% load operation scenario for 5,000 total operating hours, which includes 365 startup/warmup events, 365 shutdown events, and 20 maintenance hours.
Worst-case total emission rate incorporates estimated operating hours at different temperatures.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Normal Operations	Worst-case Total
	lb/hr				Total lbs				g/s
Total Hours of Operation	5000	182.50	63.88	4753.6250					
Number per Scenario		365	365						
Duration of Event (min)		30	10.5	60					
NO_X	5.53	44.60	34.29	8.03	48485.8	8139.5	2190.0	38156.3	0.70
CO	10.59	106.60	268.57	11.81	92729.4	19454.5	17155.0	56119.9	1.33
VOC	1.73	7.60	17.14	2.67	15158.3	1387.0	1095.0	12676.3	0.22
SO_2	1.09	1.90	1.89	1.90367	9516.5	346.8	120.5	9049.3	0.14
PM_{10}	3.42	6.00	6.00	6.00	30000.0	1095.0	383.3	28521.8	0.43

Note: Worst-case lb/hr is the total emissions (lbs) over 8760 hours/year

timated annual normal operating ho 4754

ANNUAL TOTALS	1 unit	4 units		turbines + fire pump		cooling tower + turbines + fire pump	
NO_X	24.24	96.97	tpy	97.01	tpy	97.01	tpy
CO	46.36	185.46	tpy	185.46	tpy	185.46	tpy
VOC	7.58	30.32	tpy	30.33	tpy	30.33	tpy
SO_2	4.76	19.03	tpy	19.03	tpy	19.03	tpy
PM_{10}	15.00	60.00	tpy	60.00	tpy	60.88	tpy

PEC Turbines 75%

Case	102	105	108
Ambient Temperature (°F)	114	63.3	16.8
Stack Diameter (ft)	13.5	13.5	13.5
Exhaust Flow (lb/hr)	1345262	1429908	1442911
CTG Load Level	**75%**	**75%**	**75%**
Evap. Cooler	OFF	OFF	OFF

Data from Vendor Area = 143.14 ft^2

Expected Operation of each Gas Turbine - Normal Operation

(Reference: Emission Summary GE LMS100 PA Turbine/Site Specific (372 elev) Information)

Heat Consumed (MMBTU/hr)	708.8	737.2	724.8
Turbine Outlet Temperature (°F)	800	766	746
Exhaust Flow (acfm)	721939	746033	737502
Stack Exit Velocity, ft/m	5043.6	5212.0	5152.4
Stack Exit Velocity, m/s	25.6	26.5	26.2
Nitrogen, % Vol	72.33	72.54	73.20
Oxygen, % Vol	12.11	12.32	12.66
Carbon Dioxide, % Vol	3.72	3.64	3.56
Argon, % Vol	0.86	0.87	0.88
Water Vapor, % Vol	10.96	10.62	9.69
Molecular Weight	28.08	28.11	28.21

Data from Vendor

Average Emission Rates from each Gas Turbine (lbs/hr/turbine) - Normal Operations

NO_X at 28 ppmvd pre-BACT level	68.50	70.80	69.30	
NO_X at 2.5 ppmvd BACT level	6.12	6.32	6.19	
CO at 105 ppmvd pre BACT level	155.10	161.40	157.90	
CO at 6.0 ppmvd BACT level	8.86	9.22	9.02	
VOC at 3-4.2 ppmvd pre-BACT level	2.70	2.90	4.30	
VOC at 2.0 ppmvd BACT level	1.80	1.93	2.05	
SO_2 short-term rate	1.48	1.54	1.52	
SO_2 annual rate	0.63	0.66	0.65	
PM_{10}	6.00	6.00	6.00	
NH_3 at 10 ppmvd tBACT level	9.10	9.40	9.20	
Sulfur content in fuel basis for above:	0.75	grain total S/100 scf		short-term
Sulfur content in fuel basis for above:	0.32	grain total S/100 scf		long-term

Data from Vendor
Part load cases assume no evap cooling

Startup / Shutdown Emissions from Turbine

Startup

duration in minutes	10	20	30	30	Average	1 hour of
	Startup	CR Warmu	Total Startup	Normal	Startup	Startup
	Emissions	Emissions	Emissions	Emissions	Emissions	Emissions
	lb/event	**lb/event**	**lb/event**	lb/hour	lb/hour	lb/hour
NO_X	5.00	17.30	22.30	6.32	25.46	44.6
CO	14.00	39.30	53.30	9.22	57.91	106.6
VOC	3.00	0.80	3.80	2.05	4.82	7.6
SO_2	0.04	0.24	0.28	1.54	1.05	0.56
PM_{10}	1.00	2.00	3.00	6.00	6.00	6

Assumptions:

Startup Emissions for CO, NO_2, PM_{10}, and VOC integrated from data provided by GE and Bibb.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Shutdown

duration in minutes	10.5	49.5		1 hour of
	Shutdown	Normal	Total Shutdown	Shutdown
	Emissions	Emissions	Emissions	Emissions
	lb/event	lb/hour	lb/hr	lb/hour
NO_X	6.00	6.32	11.22	34.3
CO	47.00	9.22	54.61	268.6
VOC	3.00	2.05	4.69	17.1
SO_2	0.03	1.54	1.31	0.2
PM_{10}	1.05	6.00	6.00	6.0

Assumptions:

Shutdown Emissions for CO, NO_2, PM_{10}, and VOC integrated from data provided by GE and Bibb.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Worst-Case 1-Hour Emissions per Turbine

Worst-Case 1-Hour Emissions are equal to the uncontrolled emission rates for NO_2, CO, and SO_2. For VOC the worst-case 1-hour is shutdown and for PM_{10} the worst-case hour is startup.

Emissions per turbine	**lb/hr**										**g/s**
NO_2	70.80										8.92
CO	161.40										20.34
VOC	4.69										0.59
SO_2	1.54										0.19
PM_{10}	6.00										0.76

Worst-Case 3 Hour Emission Rate per Turbine

Only SO_2 is considered for an average 3-hour Ambient Air Quality Standard.
Worst-case 3-Hour Scenario are equal to 3 hours at normal rate.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	3				3		0	0		3	
SO_2	1.54				1.54	4.63	0.00	0.00		4.63	0.19

Worst-Case 8-Hour Emission Rates

Only CO is considered for an average 8-hour Ambient Air Quality Standard.
Worst-case 8-Hour Scenario includes 2 Startups, 2 Shutdown, and remaining time at Normal rate.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	8	1.00	0.350		6.65		1.00	0.35		6.65	
CO	32.74	106.60	268.57		9.22	261.93	106.60	94.00		61.33	4.13

Worst-Case 24 Hour Emission Rate

Only SO_2 and PM_{10} are considered for an average 24-hour Ambient Air Quality Standard.
Worst-case 24-Hour Scenario includes 3 Startups, 3 Shutdowns, and remaining time at Normal rate.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	24	1.50	0.525		21.975		1.5	0.525		21.975	
NO_X	9.33	44.60	34.29		6.32	223.81	66.90	18.00		138.91	1.17
CO	20.98	106.60	268.57		9.22	503.57	159.90	141.00		202.67	2.64
VOC	2.72	7.60	17.14		2.05	65.40	11.40	9.00		45.00	0.34
SO_2	1.45	0.56	0.19		1.54	34.84	0.84	0.10		33.90	0.18
PM_{10}	6.00	6.00	6.00		6.00	144.00	9.00	3.15		131.85	0.76

Average Annual Emissions

Average Operation Emission Rates are based on the average operation scenario (63°F; 100% load) for 5,000 hours total operations which includes 365 startup/warmup events and 365 shutdown events and 20 maintenance hours. The four turbines will each have these operating conditions.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	5000	182.50	63.88		4753.63						
Number per Scenario		365	365		0						
Duration of Event (min)		30	10.5		60						
NO_X	4.61	44.60	34.29		6.32	40379.2	8139.5	2190.0		30049.7	0.58
CO	9.18	106.60	268.57		9.22	80451.5	19454.5	17155.0		43842.0	1.16
VOC	1.39	7.60	17.14		2.05	12215.6	1387.0	1095.0		9733.6	0.18
SO_2	0.85	0.56	0.19		1.54	7447.5	102.2	11.9		7333.4	0.11
PM_{10}	3.42	6.00	6.00		6.00	30000.0	1095.0	383.3		28521.8	0.43

Note: Worst-case lb/hr is the total emissions (lbs) over 8760 hours/year

Estimated annual normal operating hours 4754

PEC Turbines 50%

Case	103	106	109
Ambient Temperature (°F)	114	63.3	16.8
Stack Diameter (ft)	13.5	13.5	13.5
Exhaust Flow (lb/hr)	1079315	1134608	1143414
CTG Load Level	**50%**	**50%**	**50%**
Evap. Cooler	OFF	OFF	OFF

Data from Vendor Area = 143.14 ft^2

Expected Operation of each Gas Turbine - Normal Operation

(Reference: Emission Summary GE LMS100 PA Turbine/Site Specific (372 elev) Information)

Heat Consumed (MMBTU/hr)	535.0	557.6	548.9
Turbine Outlet Temperature (°F)	804	783	765
Exhaust Flow (acfm)	578809	598001	591948
Stack Exit Velocity, ft/m	4043.7	4177.8	4135.5
Stack Exit Velocity, m/s	20.5	21.2	21.0
Nitrogen, % Vol	72.99	73.12	73.77
Oxygen, % Vol	12.89	12.97	13.28
Carbon Dioxide, % Vol	3.42	3.39	3.32
Argon, % Vol	0.87	0.87	0.88
Water Vapor, % Vol	9.82	9.63	8.73
Molecular Weight	28.18	28.20	28.29

Data from Vendor

Average Emission Rates from each Gas Turbine (lbs/hr/turbine) - Normal Operations

NO_X at 28 ppmvd pre-BACT level	50.30	51.20	51.60	
NO_X at 2.5 ppmvd BACT level	4.49	4.57	4.61	
CO at 105 ppmvd pre BACT level	113.30	119.10	116.10	
CO at 6.0 ppmvd BACT level	6.47	6.81	6.63	
VOC at 2-3 ppmvd pre-BACT level	1.10	1.10	2.30	
VOC at 2.0 ppmvd BACT level	1.10	0.92	1.53	
SO_2 short-term rate	1.12	1.17	1.15	
SO_2 annual rate	0.48	0.50	0.49	
PM_{10}	6.00	6.00	6.00	
NH_3 at 10 ppmvd tBACT level	6.60	6.80	6.80	
Sulfur content in fuel basis for above:	0.75	grain total S/100 scf		short-term
Sulfur content in fuel basis for above:	0.32	grain total S/100 scf		long-term

Data from Vendor
Part load cases assume no evap cooling

Startup / Shutdown Emissions from Turbine

Startup

duration in minutes	10	20	30	30	Average	1 hour of
	Startup Emissions	SCR Warmup Emissions	Total Startup Emissions	Normal Emissions	Startup Emissions	Startup Emissions
	lb/event	**lb/event**	**lb/event**	lb/hour	lb/hour	lb/hour
NO_X	5.00	17.30	22.30	4.61	24.60	44.6
CO	14.00	39.30	53.30	6.81	56.70	106.6
VOC	3.00	0.80	3.80	1.53	4.57	7.6
SO_2	0.04	0.24	0.28	1.17	0.86	0.56
PM_{10}	1.00	2.00	3.00	6.00	6.00	6

Assumptions:

Startup Emissions for CO, NO_2, PM_{10}, and VOC integrated from data provided by GE and Bibb.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Shutdown

duration in minutes	10.5	49.5		1 hour of
	Shutdown Emissions	Normal Emissions	Total Shutdown Emissions	Shutdown Emissions
	lb/event	lb/hour	lb/hr	lb/hour
NO_X	6.00	4.61	9.80	34.3
CO	47.00	6.81	52.61	268.6
VOC	3.00	1.53	4.27	17.1
SO_2	0.03	1.17	1.00	0.2
PM_{10}	1.05	6.00	6.00	6.0

Assumptions:

Shutdown Emissions for CO, NO_2, PM_{10}, and VOC integrated from data provided by GE and Bibb.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Worst-Case 1-Hour Emissions per Turbine

Worst-Case 1-Hour Emissions are equal to the uncontrolled emission rates for NO_2, CO, and SO_2. For VOC the worst-case 1-hour is shutdown and for PM_{10} the worst-case hour is startup.

Emissions per turbine	**lb/hr**										**g/s**
NO_2	51.60										6.50
CO	119.10										15.01
VOC	4.57										0.58
SO_2	1.17										0.15
PM_{10}	6.00										0.76

Worst-Case 3 Hour Emission Rate per Turbine

Only SO_2 is considered for an average 3-hour Ambient Air Quality Standard.
Worst-case 3-Hour Scenario are equal to 3 hours at normal rate.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	3				3						
SO_2	1.15				1.15	3.45				3.45	0.14

Worst-Case 8-Hour Emission Rates

Only CO is considered for an average 8-hour Ambient Air Quality Standard.
Worst-case 8-Hour Scenario includes 2 Startups, 2 Shutdowns, and remaining time at Normal rate.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	8	1.00	0.350		6.650						
CO	30.73	106.60	268.57		6.81	245.86	106.60	94.00		45.26	3.87

Worst-Case 24 Hour Emission Rate

Only SO_2 and PM_{10} are considered for an average 24-hour Ambient Air Quality Standard.
Worst-case 24-Hour Scenario includes 2 Startups, 2 Shutdowns, 2 hours at Maintenance rate, and remaining time at Normal rate.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	24	1.50	0.525		21.98						
NO_X	7.76	44.60	34.29		4.61	186.14	66.90	18.00		101.24	0.98
CO	18.61	106.60	268.57		6.63	446.69	159.90	141.00		145.79	2.35
VOC	1.86	7.60	17.14		1.10	44.57	11.40	9.00		24.17	0.23
SO_2	1.09	0.56	0.19		1.15	26.18	0.84	0.10		25.24	0.14
PM_{10}	6.00	6.00	6.00		6.00	144.00	9.00	3.15		131.85	0.76

Average Annual Emissions

Average Operation Emission Rates are based on the average operation scenario (63°F; 100% load) for 5,000 hours
which includes 365 startup/warmup events, 365 shutdown events, and 20 maintenance hours. The four turbines will each have these operating conditions.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	5000	182.50	63.88		4754						
Number per Scenario		365	365		0						
Duration of Event (min)		30	10.5		60						
NO_X	3.68	44.60	34.29		4.61	32230.1	8139.5	2190.0		21900.6	0.46
CO	7.87	106.60	268.57		6.81	68961.3	19454.5	17155.0		32351.8	0.99
VOC	1.12	7.60	17.14		1.53	9770.9	1387.0	1095.0		7288.9	0.14
SO_2	0.65	0.56	0.19		1.17	5660.9	102.2	11.9		5546.8	0.08
PM_{10}	3.42	6.00	6.00		6.00	30000.0	1095.0	383.3		28521.8	0.43

Note: Worst-case lb/hr is the total emissions (lbs) over 8760 hours/year

Estimated annual normal operating hours 4754

Startup Shutdown

Transient Emissions Summary

LMS100 PA Estimated Startup / Shutdown Emissions at Package Exit

Tamb (°F / °C)		CO (lb)*	NOx (lb)*	VOC (lb)*	PM10 (lb)*	LHV Fuel MMBtu	SO2** lb
-30 / -34.4	Start	15	5	3	11	26	0.04
	Shutdown	59	6	3	11	33	0.05
59 / 15	Start	13	5	3	11	26	0.04
	Shutdown	35	6	3	11	33	0.05
78 / 25.5	Start	13	5	3	11	26	0.04
	Shutdown	29	6	3	11	33	0.05
90 / 32.2	Start	13	5	3	11	26	0.04
	Shutdown	29	6	3	11	33	0.05

* Margined average engine emissions - NOT A GUARANTEE

Notes: The table shown in the box above was provided by GE

Based on the table, the cold start CO used is 14 lb

All other startup values at all other ambients are a constant

Complete Start (Ignition to full compliance)		CO lb	NOx lb	VOC lb	PM10 lb	Fuel MMBtu	SO2** lb
Cold Day (16.8F)	Initial 10 minutes	14.0	5.0	3.0	11.0	26.0	0.04
	Final 20 minutes	39.2	17.1	0.8	3.7	152.4	0.24
	Total	53.2	22.1	3.8	14.7	178.4	0.28
Avg Day (63.3F)	Initial 10 minutes	13.0	5.0	3.0	11.0	26.0	0.04
	Final 20 minutes	39.3	17.3	0.4	3.7	153.8	0.24
	Total	52.3	22.3	3.4	14.7	179.8	0.28
Hot Day (114.0F)	Initial 10 minutes	13.0	5.0	3.0	11.0	26.0	0.04
	Final 20 minutes	37.8	16.6	0.4	3.7	147.6	0.23
	Total	50.8	21.6	3.4	14.7	173.6	0.27

** Based on a gas heating value (LHV) of 924 Btu/scf
and a maximum total sulfur content of 0.50 grains/100 scf

Cooling Tower Drift Calculation

Cooling Tower			
design circulating water rate	27,600	gallons/min	
cycles of concentration	3		
TDS	1700	mg/liter	
	14.19	lb/1000 gallons	
Drift Eliminator Control	0.000005		
Operating hours per year	5000		
Drift PM emissions	0.3524	lb/hr	total from all cells
	0.0881	lb/hr	from each cell (4 of 5 for short-term)
	0.0402246	lb/hr	from each cell (all 5 for long-term)
	0.8809	**tpy**	

Emissions from Emergency Diesel Firewater Pump

Rated Horsepower	**160**	**BHP**	
Testing duration	**60**	**min/week**	
Yearly testing	**52**	**week/year**	
Expected non-emergency usage	**52**	**hr/yr**	
Diesel Fired	Emision Factor	Emission Rate per Testing	Yearly Emission Rate
	g/HP/Hr	lb/hr	lb/yr
NO_X	3.90	1.38	71.54
CO	0.66	0.23	12.11
VOC (Total Hydrocarbons)	1.00	0.35	18.34
SO_X		2.26E-03	0.12
PM_{10}	0.15	0.05	2.75

Engine parameters

Flow Rate (acfm)	1235	
Exhaust Temp (degrees F)	872	
Stack Diameter (feet)	0.5052	
Stack height (feet)	17	(13 ft building + 4 ft stack)

Data from Bibb
Sulfur content 15 ppm in fuel

Plant Operating Scenarios

1-Hour Worst-Case Emission Scenario for PEC

Only NO_2, CO and SO_2 are considered for the 1-hour Ambient Air Quality Standard.

Worst-case 1-Hour Scenario for NO_2 and CO includes new turbines operating for 1 hour at highest commissioning rate.

Worst-case 1-Hour Scenario for SO_2 includes new turbines operating for 1 hour at highest normal rate.

Fire Pump operates 1 hour per week.

Emissions per turbine	lb/hr	g/s
NO_2	168.06	21.18
CO	305.63	38.51
SO_2	1.90	0.24
Emissions from Fire Pump		
NO_2	1.38	0.17
CO	0.23	0.03
SO_2	2.26E-03	2.85E-04

3 Hour Emissions Scenarios for PEC

Only SO_2 is considered for an average 3-hour Ambient Air Quality Standard.

The worst-case 3-hour emission rate is the maximum SO_2 rate for 100% load, normal operating case.

Fire Pump operates 1 hour per week.

Emissions per turbine	lb/hr	g/s
SO_2	1.90	0.24
Emissions from Fire Pump		
SO_2	7.53E-04	9.48E-05

8-Hour Emissions Scenarios for PEC

Only CO is considered for an average 8-hour Ambient Air Quality Standard.

Worst-case 8-Hour Scenario includes 8 hours of commissioning. Fire Pump operates 1 hour per week.

Emissions per turbine	lb/hr	g/s
CO	305.63	38.51
Emissions from Fire Pump		
CO	2.82E-04	3.56E-05

24-Hour Emissions Scenarios for PEC

Only SO_2 and PM_{10} are considered for an average 24-hour Ambient Air Quality Standard.

Worst-case 24-Hour Scenario for PM_{10} includes 3 Startups, 3 Shutdowns, and remaining time at normal rate.

SO2 uses normal operating rate. Fire Pump operates 1 hour per week.

Emissions per turbine	lb/hr	g/s
NO_2	10.89	1.37
CO	23.35	2.94
VOC	3.29	0.41
SO_2	1.90	0.24
PM_{10}	6.00	0.76
Emissions from Cooling Tower	**lb/hr**	**g/s**
PM_{10}	0.35	0.04
Emissions from Fire Pump		
SO_2	9.41E-05	1.19E-05
PM_{10}	2.20E-03	2.78E-04

Average Annual Emissions for PEC

Average Annual Emission Rates presented in this table are based on 8,760 hours even though the PEC facility will operate no more than 5,000 hours annually. The totals include 365 startup/warmup and 365 shutdown events Fire Pump operates 52 hours per year. Cooling tower operates 5,000 hours per year.

Emissions per turbine	lb/hr	g/s
NO_X	5.53	0.70
CO	10.59	1.33
VOC	1.73	0.22
SO_2	1.09	0.14
PM_{10}	3.42	0.43
Emissions from Cooling Tower		
PM_{10}	0.20	0.03
Emissions from Fire Pump		
NO_2	8.17E-03	1.03E-03
CO	1.38E-03	1.74E-04
VOC	2.09E-03	2.64E-04
SO_2	1.34E-05	1.69E-06
PM_{10}	3.14E-04	3.96E-05

TECHNICAL AREA: AIR QUALITY

Data Request 3 Rev: Please provide any other revised project information that was provided to the District but not included in the October 30, 2006 AFC Supplement.

Response:

Applicant is providing correspondence from the district as well as correspondence to the District in order to fully understand the content of the correspondence.

The following table lists the information, including copies of e-mails, that is included in this response:

Air District Correspondence Table

Date	Description	Attachment ID	Comments
September 11, 2006	District "Incompleteness" Letter	Attachment 1	2 Pages, Single .pdf doc
October 5, 2006	Email from James Harader of District defining how Inter-pollutant Offset ratio is calculated	Attachment 2	3 Pages, Single .pdf doc
October 11, 2006	PEC response letter to District "Incompleteness" letter with attachments (Attachment A – Emissions, Attachment B – ERCs, Attachment C – ERC Offset Ratio Analysis)	Attachment 3	19 Pages, Single .pdf doc
December 15, 2006	Email from James Harader at District on Fuel Sulfur Content	Attachment 4	5 Pages, Single .pdf doc
December 19, 2006	Email to District for "cumulative modeling analysis"	Attachment 5	1 Page, Single .pdf doc

Attachment 1

San Joaquin Valley
Air Pollution Control District

TO: GC/KD
SEP 14 2006

SEP 11 2006

Gary Chandler
Panoche Energy Center, LLC
63 Kendrick Street
Needham, MA 02494

Re: Notice of Incomplete Application
Project Number: C-1062518

Dear Mr. Chandler:

The District has received your Authority to Construct application for the installation of a 400 MW powerplant, at West Panoche Road, in Firebaugh, CA. Based on our preliminary review, the application has been determined to be incomplete. The following information is required prior to further processing:

1. Your request for 20 hours of operation of each turbine for maintenance, without emission controls, does not meet District BACT Guideline 3.4.7 requirements. Therefore, please revise your proposal.

2. Please provide a cost estimate for the purchase and operation of an oxidation catalyst capable of achieving VOC emissions of 0.6 ppmvd @ 15% O_2.

3. Please provide your revised hourly, daily, and annual PM10 emission estimates.

4. Please identify a source of offsets, citing specific Emission Reduction Credit (ERC) certificate numbers to be used to offset the project's emissions. If the facility is currently not the owner of the identified ERC's, please provide the District with justification that the facility has the right to use the ERC's (i.e. a purchase option/contract or similar document).

5. Please provide a SOx/PM10 interpollutant offset ratio analysis along with the proposed interpollutant offset ratio. Please be aware that the EPA has expressed the opinion that SOx credits can't be used to offset PM10 emissions. The District disagrees with EPA and is pursuing a reversal of EPA's opinion.

Seyed Sadredin
Executive Director / Air Pollution Control Officer

Northern Region Office
4800 Enterprise Way
Modesto, CA 95356-8718
(209) 557-6400 • FAX (209) 557-6475

Central Region Office
1990 East Gettysburg Avenue
Fresno, CA 93726-0244
(559) 230-6000 • FAX (559) 230-6061
www.valleyair.org

Southern Region Office
2700 M Street, Suite 275
Bakersfield, CA 93301-2373
(661) 326-6900 • FAX (661) 326-6985

Mr. Chandler
Page 2

In response, please refer to the above project number, and send to the attention of Mr. James Harader.

Please submit the requested information within 30 days. The District will not be able to process your application until this information is received. Please note that the District's Small Business Assistance (SBA) office is available to assist you in this matter. You may contact an SBA engineer at (559) 230-5888.

Thank you for your cooperation in this matter. If you have any questions, please contact Mr. James Harader at (559) 230-5887.

Sincerely,

David Warner
Director of Permit Services

Arnaud Marjollet
Permit Services Manager
DW:jh

CC: John Lague
URS Corporation
1615 Murray Canyon Road, Suite 1000
San Diego, CA 92108

Dave Jenkins
Cinergy Services Inc.
1000 East Main Street
Plainfield, IN 46168-1782

Attachment 2

David Jenkins <davdjenk@gmail.com>

Panoche Questions

John_Lague@urscorp.com <John_Lague@urscorp.com> **Thu, Oct 5, 2006 at 6:44 AM**
To: James.Harader@valleyair.org
Cc: davdjenk@gmail.com

Hi, James

We are preparing the response to the District's completeness letter on the PEC, and two questions have come up.

Do PM10 emissions from the cooling tower and from the emergency firewater pump engine have to be offset, or just the turbine emissions?

If an interpollutant offset is used, how does SJVAPCD require the combination of distance factor and interpollutant factor to be calculated in order to determine the required offset amount. In other words, are the project emissions multiplied by the greater of the two factors, the sum of the two factors or the product of the two factors?

Thanks and best regards - jsl

John Lague
Senior Air Quality Consultant
URS Corporation
1615 Murray Canyon Road, Suite 1000
San Diego, California 92108
Phone: (619) 294-9400
Fax: (619) 293-7920

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David Jenkins <davdjenk@gmail.com>

Panoche Questions

John_Lague@urscorp.com <John_Lague@urscorp.com> **Thu, Oct 5, 2006 at 8:02 AM**
To: davdjenk@gmail.com

Dave

Please note this email from SJVAPCD about how to calculate interpollutant credit requirements. It looks like you need to get more SO2 than you indicated in Response No 4 in your letter. Also, James is asking a question at the end of his email that I don't know how to answer.

Thanks - jsl

John Lague
Senior Air Quality Consultant
URS Corporation
1615 Murray Canyon Road, Suite 1000
San Diego, California 92108
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----- Forwarded by John Lague/SanDiego/URSCorp on 10/05/2006 08:59 AM -----

James Harader <James.Harader@valleyair.org> 10/05/2006 08:54 AM

To: "'John_Lague@URSCorp.com'" <John_Lague@URSCorp.com>, James Harader <James.Harader@valleyair.org>

cc: davdjenk@gmail.com

Subject: RE: Panoche Questions

John,

The emergency firewater pump engine is exempt from offsets. Our rule only requires offsets above the offset threshold. The quantity of offsets required, before factoring in the distance and interpollutant ratios, is:

Offsets(PM10, without ratios) = [Turbine emissions + Cooling Tower Emissions
- 29,200 lb/year]

When factoring in the distance ratio and the interpollutant ratio, we use the product. The quantity of PM10 offsets required, factoring in the ratios, is:

Offsets Required (PM10, with ratios) = [Turbine emissions + Cooling Tower Emissions - 29, 200 lb/year] x Distance Ratio x Interpollutant Ratio

I have been assigned two ERC transfer projects for the transfer of SOx credits from J R Simplot to Panoche Energy Center. Since these credits were
generated in our Northern Region, I will have to create a placeholder facility in our database for the credits. My question is, since you also have the Bullard Project as well, I would think we want to create only one place holder for the credits rather than two. What do you want the facility name to be for the placeholder??

Regards,

James Harader
Air Quality Engineer II
San Joaquin Valley APCD
(559) 230-5887

[Quoted text hidden]

Attachment 3

Panoche Energy Center, LLC

October 11, 2006

David Warner
Director of Permit Section
1990 East Gettysburg Avenue
San Joaquin Valley Air Pollution Control District
Central Region Office
Fresno, CA 93726-0244

Re: Project No. C-1062518, Response to *Notice of Incomplete Application*

Dear Mr. Warner,

On behalf of Panoche Energy Center, LLC, (PEC) this letter serves as a response to your letter dated September 11, 2006 regarding the SJVAPCD's *Notice of Incomplete Application*. PEC respectfully responds to the five items your letter raised as follows:

1. PEC understands that the District does not intend to allow 20 hours of maintenance operation without the CO catalyst and SCR. Accordingly, all future representations of the project's potential to emit will be based on normal, controlled operation for these hours. A spreadsheet showing the revised emissions for all pollutants is provided as *Attachment A – Revised PEC Criteria Emissions*. This revised project inventory also incorporates the change in turbine PM_{10} emission rates discussed in Response No. 3 below, as well as a change in the assumed long-term average natural gas sulfur content to 0.32 grains total sulfur per 100 dry standard cubic feet (gr/100 dscf). The latter change was suggested by CEC in its review of the AFC for this project. For averaging times of 24 hours and less, we are continuing to use a worst-case sulfur content of 0.50 gr/100 dscf.

2. To achieve additional reduction of VOC emissions from 2.0 (as requested in the PEC application) to 0.6 ppmvd @ 15% O_2, additional capital costs are estimated by the SCR supplier, Deltak, to be $250,000 per unit, or $1,000,000 for all four units. Assuming full load for 5000 hours per year per unit, a 0.6 ppmvd emission rate would produce 11 tons/yr of VOC, compared to 25 tons/yr at 2.0 ppmvd. The net annual VOC reduction would be 14 tons/yr. In simple terms that exclude added O&M costs, the cost-per-ton of VOC reductions is estimated to be $14,286. This per-ton cost is significantly above the recent history VOC ERC market price on a per-ton basis. As such, PEC recommends that the proposed VOC emission rate of 2.0 ppmdv @ 15% O2 be accepted as BACT.

3. Since the submittal of the original ATC application, PEC has secured guarantee from the LMS100 manufacturer, General Electric, that PM_{10} emissions will not exceed 6.0 lb/hr/turbine. As shown in *Attachment A*, the estimated maximum hourly, daily and 24-hourly PM_{10} emissions rates for the project with this change, including the contributions of the four turbines, cooling tower and firewater pump, are as follows:

Maximum hourly PM_{10} emissions:	24.40 pounds
Maximum daily PM_{10} emissions:	584.45 pounds
Maximum annual PM_{10} emissions:	60.88 tons

4. PEC believes that it has secured the needed ERCs to offset projected emissions identified its application to the SJVAPCD. ERC certificate numbers and related information are shown in *Attachment B – Emission Reduction Certificates*. It is important to note that while Agreements between PEC and the Certificate holders have been executed for all these certificates, several transactions are pending with the District, while others will not transacted until the option to purchase period expires (December 2007 at the latest). Also of note, PEC applied 99.480 tons of SO_x for 55.265 tons of PM10. In addition to applying the 1.5 distance ratio, a 1.8 inter-pollutant ratio was applied, as described in Response No. 5 below.

5. PEC intends to meet all or part of its PM_{10} emissions offset requirement using inter-pollutant credits, specifically SO_x credits. Accordingly, an analysis was conducted to derive an appropriate inter-pollutant ratio for application of SO_x ERCs to offset project PM_{10} emissions, using an approach that was recommended to URS by SJVAPCD for another project earlier this year. This method uses monitoring data and the results of chemical mass balance modeling developed by SJVAPCD. In this case only data for Fresno County were used. The summary of this analysis is provided as *Attachment C- NOx/PM_{10} and SO_2/PM10 Inter-pollutant Offset Ratio*, which provides the rationale for a proposed inter-pollutant ratio (SO_2 to PM_{10}) of 1.8 to 1. While not requested by SJVAPCD, a comparable analysis was conducted to determine an appropriate ratio for the use of NO_x credits to satisfy PM_{10} offset requirements, which is also presented in Supplement C. The result for this calculation was a NO_x/PM_{10} ratio of 3.0.

I appreciate your attention to PEC's application, and trust that this response will meet the District's requirements for "completeness." Please do not hesitate to contact John Lague (URS) for matters related to Items 1, 3 and 5 above, and Dave Jenkins (PEC) for Items 2 and 4. It is my expectation that one or both will contact you and your staff soon to setup a follow-up discussion.

Respectfully,

Gary R. Chandler,

President, Panoche Energy Center, LLC
P.O. Box 95592
South Jordan, Utah 84095

Attachments: A -*Revised PEC Criteria Emissions; B- Emission Reduction Certificates, and C- NOx/PM_{10} and SO_2/PM10 Inter-pollutant Offset Ratio.*
CC: Arnaud Marjollet, Errol Villegas, James Harader - SJVAPCD
David Jenkins, Mikael King - PEC
Lohn Laque, Cindy Poire - URS Corp.

Attachment A: Revised PEC Criteria Pollutant Emissions

Case	100	101	104	107
Ambient Temperature (°F)	114	114	63.3	16.8
Stack Diameter (ft)	13.5	13.5	13.5	13.5
Exhaust Flow (lb/hr)	1496922	1584697	1669071	1710622
CTG Load Level	100%	100%	100%	100%
Evap. Cooler	OFF	ON	OFF	OFF

Data from Vendor Area = 143.14 ft^2

Expected Operation of Each Gas Turbine - Normal Operation

(Reference: Emission Summary GE LMS100 PA Turbine/Site Specific (372 elev) Information)

Heat Consumed (MMBTU/hr)	813.8	862.5	909.7	885.2
Turbine Outlet Temperature (°	817	801	787	741
Exhaust Flow (acfm)	816088	854672	888554	873723
Stack Exit Velocity, ft/m	5701.4	5970.9	6207.6	6104.0
Stack Exit Velocity, m/s	28.96	30.33	31.53	31.01
Nitrogen, % Vol	71.82	71.54	71.84	72.68
Oxygen, % Vol	11.51	11.43	11.49	12.08
Carbon Dioxide, % Vol	3.95	3.95	3.96	3.78
Argon, % Vol	0.86	0.86	0.86	0.87
Water Vapor, % Vol	11.85	12.20	11.83	10.57
Molecular Weight	28.01	27.97	28.01	28.13

Data from Vendor

Average Emission Rates from Each Gas Turbine (lbs/hr) - Normal Operations

NO_X at 28 ppmvd pre-BACT le	80.60	85.40	89.90	87.20
NO_X at 2.5 ppmvd BACT level	7.20	7.63	8.03	7.79
CO at 105 ppmvd pre BACT le	183.10	196.60	206.60	200.40
CO at 6.0 ppmvd BACT level	10.46	11.23	11.81	11.45
UHC at 4-7 ppmvd pre-BACT l	4.50	4.80	6.70	8.60
VOC at 2.4-4.2 ppmvd BACT le	3.00	3.20	3.30	5.10
VOC at 2.0 ppmvd BACT level	2.00	2.67	2.20	2.43
SO_2 short-term rate	1.14	1.20	1.27	1.23
SO_2 annual rate	0.73	0.77	0.81	0.79
PM_{10}	6.00	6.00	6.00	6.00
NH_3 at 10 ppmvd tBACT level	10.70	11.30	11.90	11.50
NH_3 at 6 ppmvd BACT level	6.42	6.78	7.14	6.90
Sulfur content in fuel basis for al	0.5	grain total :	short-term	
Sulfur content in fuel basis for al	0.32	grain total :	long-term	

Data from Vendor

Startup / Shutdown Emissions from Turbine

Startup

duration in minutes	10	20	30	30	Average	1 hour of
	Startup	CR Warmu	Total Startup	Normal	Startup	Startup
	Emissions	Emissions	Emissions	Emissions	Emissions	Emissions
	lb/event	lb/event	lb/event	lb/hour	lb/hour	lb/hour
NO_X	5.00	17.20	22.20	8.03	26.21	44.4
CO	14.00	39.30	53.30	11.81	58.20	108.6
VOC	3.00	0.80	3.80	2.67	5.13	7.6
SO_2	0.04	0.24	0.28	1.27	0.91	0.56
PM_{10}	1.00	2.00	3.00	6.00	6.00	6

Assumptions:

Startup Emissions for CO, NO_2, PM_{10}, and VOC integrated from data provided by GE and Bibb.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Normal emissions are highest of four operating cases listed above (case 104), except for VOC.

Shutdown

duration in minutes	10.5	49.5		1 hour of
	Shutdown	Normal	Total Shutdown	Shutdown
	Emissions	Emissions	Emissions	Emissions
	lb/event	lb/hour	lb/hr	lb/hour
NO_x	6.00	8.03	12.62	34.3
CO	47.00	11.81	56.74	268.6
VOC	3.00	2.67	5.20	17.1
SO_2	0.05	1.27	1.10	0.3
PM_{10}	1.05	6.00	6.00	6.0

Assumptions:

Shutdown Emissions for CO, NO_x, PM_{10}, and VOC integrated from data provided by GE and Bibb.

SO_2 emissions assume complete conversion of all sulfur to SO_2.

Normal emissions are highest of four operating cases listed above (case 104) except for VOC.

Commissioning Emissions

			Total Pounds Emitted			
	Hours	NO_x	CO	VOC	PM_{10}	SO_2
First Fire	28	1371.00	800.00	17.00	168.00	3
Controlled Break-in	20	1236.00	721.00	15.00	120.00	3
Dynamic AVR	24	4488.00	4553.00	98.00	144.00	18
Base Load AVR	16	1274.00	4956.00	106.00	96.00	20
SCR Commissioning	24	849.00	215.00	43.00	144.00	30
Full Load Testing	24	191.00	266.00	53.00	144.00	30
Total Commissioning Hours	136					
			Maximum Emission Rates lb/hr			
		NO_x	CO	VOC	PM_{10}	SO_2
First Fire		48.96	28.57	0.61	6.00	0.11
Controlled Break-in		61.80	36.05	0.75	6.00	0.15
Dynamic AVR		187.00	189.71	4.08	6.00	0.75
Base Load AVR		79.63	309.75	6.63	6.00	1.25
SCR Commissioning		35.38	8.96	1.79	6.00	1.25
Full Load Testing		7.96	11.08	2.21	6.00	1.25

Worst-Case 1-Hour Emissions per Turbine

Worst-Case 1-Hour Emissions are equal to the commissioning emission rates, except for SO_2 which has worst-case emissions during normal operations and PM_{10} which has worst-case emissions during startup.

Emissions per turbine	lb/hr			g/s
NO_x	187.00			23.56
CO	309.75			39.03
VOC	6.63			0.83
SO_2	1.27			0.16
PM_{10}	6.00			0.76

Worst-Case 3 Hour Emission Rate per Turbine

Only SO_2 is considered for an average 3-hour Ambient Air Quality Standard.

Worst-case 3-Hour Scenario are equal to 3 hours at normal rate.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total	Startup /Warmup	Shutdown		Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	3.0				3.000					3.000	
SO_2	1.27				1.27	3.81				3.81	0.16

Worst-Case 8-Hour Emission Rates

Only CO is considered for an average 8-hour Ambient Air Quality Standard.
Worst-case 8-Hour Scenario includes 8 hours of commissioning. Only one turbine will be undergoing commissioning at any one time.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Commissioning	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Commissioning	Normal Operations	Worst-case Total
	lb/hr					Total lbs					g/s
Total Hours of Operation	8			8	0				8	0.00	
CO	309.75			309.75	0.00	2478.00			2478.00	0.00	39.03

Worst-Case 24 Hour Emission Rate

Only SO_2 and PM_{10} are considered for an average 24-hour Ambient Air Quality Standard.
Worst-case 24-Hour Scenario for PM_{10} includes 3 Startups, 3 Shutdowns, and remaining time at normal rate.
Worst-case 24-hour scenario for SO_2 uses normal operations.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Normal Operations	Worst-case Total	Commissioning: First Fire	Controlled Break-in	Dynamic AVR	Base Load AVR	SCR Commissioning	Full Load Commissioning
	lb/hr				Total lbs				g/s	Emissions	Emissions	Emissions	Emissions	Emissions	Emissions
										Total lbs					
Total Hours of Operation	24	1.50	0.525	21.975		1.50	0.525	21.975		28	20	24	16	24	24
NO_x	10.87	44.40	34.29	8.03	260.99	66.60	18.00	176.39	1.37	1371	1236	4488	1274	649	191
CO	23.35	106.60	268.57	11.81	560.33	159.90	141.00	259.43	2.94	800	721	4563	4956	215	266
VOC	3.29	7.60	17.14	2.67	79.00	11.40	9.00	58.60	0.41	17	15	98	106	43	53
SO_2	1.27			1.27	27.89	0.00	0.00	27.89	0.16	3	3	18	20	24	30
PM_{10}	6.00	6.00	6.00	6.00	144.00	9.00	3.15	131.85	0.76	308	220	264	176	264	264

SO_2 Commissioning		PM_{10} Commissioning	
First Fire	0.11	First Fire	6.00
Controlled Break-in	0.15	Controlled	6.00
Dynamic AVR	0.75	Dynamic A	6.00
Base Load AVR	1.25	Base Load	6.00
SCR Commissioning	1.25	SCR Comm	6.00
Full Load Testing	1.25	Full Load T	6.00

CTG Commissioning testing could operate for 24 hours.

Average Annual Emissions

Average Operation lb/hr Emission Rates presented below for normal operations are based on the 63°F, 100% load operation scenario for 5,000 total operating hours, which includes 365 startup/warmup events and 365 shutdown events. Worst-case total emission rate incorporates estimated operating hours at different temperatures.

Emissions per turbine	Worst-case Total	Startup /Warmup	Shutdown	Normal Operations	Worst-case Total	Startup /Warmup	Shutdown	Normal Operations	Worst-case Total
	lb/hr				Total lbs				g/s
Total Hours of Operation	5000	182.50	63.88	4753.63					
Number per Scenario		365	365						
Duration of Event (min)		30	10.5	60					
NO_x	5.53	44.40	34.29	8.03	48449.3	8103.0	2190.0	38156.3	0.70
CO	10.59	106.60	268.57	11.81	92729.4	19454.5	17155.0	56119.9	1.33
VOC	1.73	7.60	17.14	2.67	15158.3	1387.0	1095.0	12676.3	0.22
SO_2	0.45	0.56	0.29	0.81	3981.9	102.2	18.6	3861.0	0.06
PM_{10}	3.42	6.00	6.00	6.00	30000.0	1095.0	383.3	28521.8	0.43

Note: Worst-case lb/hr is the total emissions (lbs) over 8760 hours/year

mated annual normal operating h 4754

ANNUAL TOTALS	1 unit	4 units		turbines + fire pump		cooling tower + turbines + fire pump	
NO_x	24.22	96.90	tpy	96.93	tpy	96.93	tpy
CO	46.38	185.46	tpy	185.46	tpy	185.46	tpy
VOC	7.58	30.32	tpy	30.33	tpy	30.33	tpy
SO_2	1.99	7.96	tpy	7.96	tpy	7.96	tpy
PM_{10}	15.00	60.00	tpy	60.00	tpy	60.88	tpy

Emissions from Emergency Diesel Firewater Pump

Rated Horsepower	160	BHP	
Testing duration	60	min/week	
Yearly testing	52	week/year	
Expected non-emergency usa	52	hr/yr	
Diesel Fired	mision Fact	Emission Rate per Testing	Yearly Emission Rate
	g/HP/Hr	lb/hr	lb/yr
NO_X	3.90	1.38	71.54
CO	0.66	0.23	12.11
VOC (Total Hydrocarbons)	1.00	0.35	18.34
SO_X		2.26E-03	0.12
PM_{10}	0.15	0.05	2.75

Engine parameters

Flow Rate (acfm)	1235	
Exhaust Temp (degrees F)	872	
Stack Diameter (feet)	0.5052	
Stack height (feet)	17	(13 ft building + 4 ft stack)

Data from Bibb
Sulfur content 15 ppm in fuel

Cooling Tower Drift Calculation

Cooling Tower

design circulating water rate	27,600	gallons/min	
cycles of concentration	3		
TDS	1700	mg/liter	
	14.19	lb/1000 gallons	
Drift Eliminator Control	0.000005		
Operating hours per year	5000		
Drift PM emissions	0.35	lb/hr	total from all cells
	0.12	lb/hr	from each cell
	0.88	**tpy**	

Attachment B

Emission Reduction Certificates

Secured by Panoche Energy Center, LLC

Cert. No.	Holder	Type	1Q	2Q	3Q	4Q	Annual	Status/comments
Required		SOx	2.627	2.627	3.821	2.866	11.94	
N-74-5	J R Simplot Company	SOx	0.78	0.78	0.78	0.78	3.120	Agreement signed August 29, 2006
N-268-5	J R Simplot Company	SOx	26.765	24.655	0	72.808	124.228	Agreement signed August 29, 2006
Surplus		SOx					115.038	99.480 applied to PEC PM10
Required		PM_{10}	20.09	20.09	29.222	21.917	91.320	
S-2209-4	Complete Energy (LaPaloma)	PM_{10}	4.3705	3.7595	4.1065	4.2285	16.465	Agreement to be signed October 16, 2006.
S-2210-4	Complete Energy (LaPaloma)	PM_{10}	0.452	0.4615	0.4905	0.4805	1.8845	Agreement to be signed October 16, 2006.
S-2211-4	Complete Energy (LaPaloma)	PM_{10}	1.7935	1.9285	2.208	2.11	8.04	Agreement to be signed October 16, 2006.
S-2212-4	Complete Energy (LaPaloma)	PM_{10}	1.691	1.811	1.5865	1.9275	7.016	Agreement to be signed October 16, 2006.
S-2213-4	Complete Energy (LaPaloma)	PM_{10}	0	0.343	0.401	0.3615	1.1055	Agreement to be signed October 16, 2006.
S-2227-4	Complete Energy (LaPaloma)	PM_{10}	0	0.5295	0.529	0.4755	1.544	Agreement to be signed October 16, 2006.
N-268-5	J R Simplot Company	PM_{10}					55.265	99.48 tons SOx applied at 1.8SOx to1PM10 ratio.
Surplus		PM_{10}					0.00	
Required		VOC	10.035	10.035	14.105	10.95	45.125	
S-2331-1	Big West of CA	VOC	11.653	11.654	11.654	11.654	46.615	Agreement signed October 09, 2006.
Annual Surplus		VOC					01.615	
Required		NOx	31.987	31.987	46.526	34.895	145.400	
S-2214-2	Complete Energy (LaPaloma)	NOx	11.190	11.313	11.438	11.438	45.379	Agreement to be signed October 16, 2006.
S-2362-2	Panoche Energy Center, LLC	NOx	22.049	26.057	26.057	26.057	100.220	SJVAPCD issued Certificate on September 25, 2006
Surplus		NOx					9.5495	Surplus will be applied to Bullard Energy Center, LLC

Note: all ERC values in expressed in tons

Attachment C
Development of NOx/PM_{10} and SO_2/PM10 Inter-pollutant Offset Ratio for Fresno County

1.0 Introduction

The San Joaquin Valley Unified Air Pollution Control District is a PM_{10} non-attainment area with respect to both the federal and California ambient standards for this pollutant. The Panoche Energy Center proposed for Fresno County would result in PM_{10} emissions from various onsite stationary source units. Because the background concentrations already exceed the National and California ambient standards for this pollutant, such emissions increases in PM_{10} have the potential to exacerbate existing exceedances. Accordingly, SJVAPCD regulations require a project that will cause an increase in PM_{10} emissions to provide offsets in sufficient amounts to provide a net air quality benefit.

Reductions of SO_x and NO_x emissions can be used to offset the PM_{10} impact from a new source within the SJVAPCD, because sulfates and nitrates are precursors of particulate matter. In order to quantify the offset requirement when such interpollutant trading is used, the appropriate ratios between PM_{10} and SO_x and PM_{10} and NO_x must be calculated. According to SJVAPCD policy (Sweet, 2006), inter-pollutant trading ratios specific to the Panoche project area can be calculated using results of Chemical Mass Balance (CMB) modeling conducted by SJVAPCD staff as part of the District's 2003 PM_{10} Attainment Plan. As recently as the spring of 2006, URS was informed by SJVAPCD that the assumptions, monitoring data, emissions inventory data and calculation methods used in the Attainment Plan are sufficiently recent to be considered valid for the purpose of estimating current SO_x/PM_{10} and NO_x/PM_{10} interpollutant offset ratios.

2.0 CMB Modeling Results and Annual Roll Back Analysis

Receptor modeling using the chemical mass balance model was conducted by SJVAPCD for sites in the project area that currently do not comply with the federal PM_{10} air quality standards. This method uses chemical analysis of collected air monitoring samples and information about the chemical composition of contributing sources to evaluate the link between observed concentrations and contributing emission sources. The SJVAPCD used the results of its CMB analysis with a modified rollback approach to calculate the effects on design particulate values that would result from implementation of adopted and proposed control measures to reduce PM_{10} pollution and other predicted emission trends for the most recent PM_{10} Attainment Plan. The results can also be used to support calculation of interpollutant offset ratios, as described later. The data used for this purpose were taken from an Excel workbook titled N2-Annual Rollback Analysis which was provided by SJVAPCD. Tables 1-4 summarize the data from the N2 Rollback Analysis that are relevant to this application

Table 1 presents monthly and annual average CMB modeling results for Fresno County. This includes measured PM10 concentrations at the Fresno Drummond monitoring site

and model predicted contributions to these concentrations due to various source types. Table 2 shows the annual average CMB modeling results and design values for the SJVAPCD areas that are noncompliant with the PM_{10} standards from Table 1, including Fresno Drummond results. The design values were determined using EPA calculation methods (EPA 2004) and the air quality monitoring data collected in Fresno County. In Table 2, 'Sum of Species' represents the summation of the mass concentrations across all source categories, including 'Burning', 'Motor Vehicle', 'Tire/Brake', 'Sulfate', 'Nitrate', and 'Geological'. The value difference between 'Sum of Species' and 'Design Value' was left in the "unassigned" column.

The rollback analyses conducted by SJVAPCD used a speciation model with the CMB results. This modified rollback analysis showed not only the speciation, but also how the species were distributed and estimated source attributions for both primary and secondary pollutant species. The rollback analysis also considered other factors, including geological information, PM, VOC, and NO_x inventory totals, and other relevant information. Separate modeling was conducted in the rollback analysis for each county to account for conditions and characteristics that are unique to specific areas of the SJVAPCD. The rollback analysis for Fresno County is shown in the tab labeled "Fresno" within the Excel Workbook provided in Attachment 1 "N2-Annual Rollback Analysis".

The SJVAPCD rollback analysis was conducted as follows. Line 1 in Table 3 shows the concentration values influenced by the local area emissions. The 'Annual design value' equivalent to the chemistry of the CMB monthly analysis of the Fresno Drummond data in the Table 2 matches with the 'General Note' in Line 1 of Table 3. The mass concentrations of 'Geological', 'Mobile', 'Tire/Brake', and 'Unassigned' in Table 2 are equivalent to the corresponding attributes in line 1 of Table 3. The cells in Line 1 for vegetative burning and organic carbon represent 70% and 30% respectively of the value for 'Burning' in Table 2.

Line 2 of Table 3 shows concentration values for the natural and transport contributions for each attribute, which come from background concentration measurements. Line 3 is the 'net for rollback' concentrations, which means the differences in values between Line 1 and Line 2. The values of Line 3 are distributed to Line 4 through Line 7 based on the area of influence and the percentage distribution of PM10 source categories used by SJVAPCD. The attributes of 'Geological and Construction', 'Tire/Brake', and 'Unassigned' follow the corresponding percentages of PM_{10} distribution. The attributes of 'Mobile', 'Organic Carbon', 'Vegetation Burning', 'Ammonium Nitrate', and 'Ammonium Sulfate' follow the percent of $PM_{2.5}$ distribution. Lines 4 and 5 represent the local contribution of $PM_{2.5}$ minus PM_{10} and $PM_{2.5}$, respectively. Line 6 presents the sub-regional contribution, and Line 7 shows the regional contributions.

The most current emission inventory (lb/day) for PM_{10}, NO_x, total organic compounds (TOG) and SO_x for the Fresno-Madera area is provided in Table 4.

Values from Tables 3 and 4 were used to calculate the inter-pollutant trading ratio for Fresno County. The methods employed for these calculations are addressed in the next section.

Table 1 Monthly and Annual Average CMB results at the Fresno Drummond site for February to December 2000 plus the January 2001 Episode (all concentrations are in µg/m^3)

Fresno Drummond Monthly

							Burning		Motor Vehicle		Tire/Brake		Sulfate		Nitrate		Geological	
SITE ID	DATE	CONC	UCONC	PCMASS	RSQ	CHISQ	Mass	Unc	Mass	Unc	Mass	Unc	Mass	Unc	Mass	Unc	Mass	Unc
FSD	1/1/01	186	9.4	87.9	1.0	1.1	40.1	11.3	18.5	9.6	2.5	1.5	5.0	0.7	62.4	5.1	35.1	6.8
FSD	Feb	27.0	2.1	97.3	1.0	0.7	5.7	2.5	3.1	1.8	0.3	0.4	1.1	0.2	7.7	0.8	8.3	2.1
FSD	Mar	23.9	2.1	116.0	1.0	0.7	4.6	2.4	3.1	1.8	0.1	0.4	1.8	0.2	8.2	0.9	9.9	2.3
FSD	Apr	24.8	2.2	112.1	1.0	0.6	3.4	2.7	2.4	1.6	0.2	0.5	2.4	0.2	5.0	0.5	14.4	3.0
FSD	May**	20.0	2.1	99.5	1.0	0.6	0.345	0.329	2.1	1.4			2.327	0.226	2.4774	0.3211	12.6	1.7055
FSD	Jun*	34.1	2.5	105.8	1.0	1.0	1.9	0.4	3.8	2.3	0.0	0.6	4.2	0.4	3.6	0.4	22.5	3.8
FSD	Jul*	26.4	2.3	100.6	1.0	0.6	1.0	0.4	1.5	1.3			1.7	0.2	2.7	0.3	19.6	2.2
FSD	Aug*	38.2	2.5	90.2	0.9	2.7	3.8	0.7	0.9	1.5	1.4	0.9	2.0	0.3	3.3	0.4	23.1	4.3
FSD	Sep*	56.7	3.3	92.8	1.0	0.9	1.5	0.6	3.4	2.5	0.9	1.0	2.6	0.4	3.6	0.4	40.6	6.0
FSD	Oct*	50.7	3.4	93.5	1.0	0.5	1.8	0.4	4.5	2.6			2.2	0.3	8.4	0.8	30.6	3.3
FSD	Nov	40.5	2.6	95.7	1.0	0.4	11.9	3.3	4.5	2.7	0.4	0.4	2.1	0.2	13.1	1.2	6.8	1.8
FSD	Dec	65.8	3.9	89.7	1.0	0.8	13.7	4.3	7.3	3.8	0.8	0.6	3.2	0.3	23.4	2.0	10.6	2.6
Min		20.0	2.1	87.9	0.9	0.4	0.3	0.3	0.9	1.3	0.0	0.4	1.1	0.2	2.5	0.3	6.8	1.7
Avg		49.5	3.2	98.4	1.0	0.9	7.5	2.4	4.6	2.8	0.7	0.7	2.6	0.3	12.0	1.1	19.5	3.3
Max		186.0	9.4	116.0	1.0	2.7	40.1	11.3	18.5	9.6	2.5	1.5	5.0	0.7	62.4	5.1	40.6	6.8

Note:
CONC: concentration
UCONC: Uncertainty of concentration
PCMASS: Percent of mass
RSQ: R square
CHISQ: Chi square
Mass: concentration based on mass
UNC: Uncertainty of concentration based on mass

Table 2 Annual Average CMB results and Design Value for the Counties Noncompliant with the Standards (50) in San Joaquin Valley Unified Air Pollution Control District (All concentrations in μg/m^3)

SITE ID	CONC	UCONC	PCMASS	Design Value *	Sum of species	Burning		Motor Vehicle		Tire/Brake		Sulfate		Nitrate		Geological		Geological	Un-assigned
						Mass	UNC	Mass	UNC	Mass	UNC	Mass	UNC	Mass	UNC	Mass	UNC	Profile	
BGS	57.7	3.6	98.5	57.0	55.6	6.3	2.3	3.6	2.4	1.1	1.2	3.0	0.3	14.9	1.3	26.7	5.8	FDKERANN	1.4
FSD	**49.5**	**3.2**	**98.4**	**50.0**	**46.9**	**7.5**	**2.4**	**4.6**	**2.8**	**0.7**	**0.7**	**2.6**	**0.3**	**12.0**	**1.1**	**19.5**	**3.3**	**FDFSDANN**	**3.1**
HAN	51.5	3.3	104.1	53.0	52.9	6.6	2.0	4.0	2.3	0.5	0.7	3.0	0.3	15.7	1.4	23.2	4.2	FDHANANN	0.1
VCS	52.5	3.3	99.6	54.0	51.8	6.7	2.5	4.0	2.5	0.5	1.0	3.1	0.3	15.9	1.5	21.7	3.8	FDVCSANN	2.2

Note:
* All Design Values are equal to or exceed the California 24-Hour Standard (50 μg/m^3)
BGS: Bakersfield Golden State for Kern County
FSD: Fresno Drummond for Fresno County
HAN: Hanford for Kings County
VCS: Visalia Church Street for Tulare County
Unassigned: Mass based concentration that CMB model did not assign to attribute.

Table 3
SJVAPCD N2 Annual Rollback Analysis (Concentrations on Lines 1 through 7 are in µg/m^3)

Fresno - Drummond, Annual, Design value = 50 µg/m3	General Note	Geologic and Construction	Mobile Exhaust	Tire and Brake Wear	Organic Carbon	Vegetative Burning	Ammonium Nitrate including associated water	Ammonium Sulfate	Marine	Unassigned
Line1 Source Contribution from Analysis	From CMB monthly analysis Feb 2000 to Dec 2000, adding January 2001 episode for chemistry equivalent to annual design value	From CMB	From CMB	From CMB	Estimated portion of mass included in Vegetative Burning =30%	From CMB minus estimated Organic Carbon from other sources	From CMB	From CMB	From CMB, if present	Unaccounted mass from CMB, if any.
LINE 1	**50.00**	**19.50**	**4.60**	**0.70**	**2.25**	**5.25**	**12.00**	**2.60**	**0.00**	**3.1**
Line2 Natural and Transport Contribution, see "Background" sheet	Portion not included in rollback analysis, removed prior to rollback as not subject to local control, added back to projected future concentrations	See background sheet for numerical estimate and episode adjustment. Removed prior to rollback as not subject to local control, added back to projected future concentrations	0, no natural background, transport estimated at 0	0, no natural background, transport estimated at 0	See background sheet for numerical estimate and episode adjustment. Removed prior to rollback as not subject to local control, added back to projected future concentrations. Includes biogenic emissions. = 20%	See background sheet for numerical estimate and episode adjustment. Removed prior to rollback as not subject to local control, added back to projected future concentrations. Includes wildfires and biogenic. =20% + 10%	See background sheet for numerical estimate and episode adjustment. Removed prior to rollback as not subject to local control, added back to projected future concentrations	See background sheet for numerical estimate and episode adjustment. Removed prior to rollback as not subject to local control, added back to projected future concentrations	100% because marine salts are a natural emission	0, background estimate at maximum, no additional background estimate for unexplained mass
LINE 2	**8.25**	**4.0**	**0.0**	**0.0**	**0.7**	**1.6**	**1.0**	**1.0**		
Line 3 Net for Rollback	Net for Rollback, default percentages adjustable for episode characteristics, applicable to all columns except						Net for non-linear rollback, default percentages adjustable for episode characteristics		Removed entirely from rollback, added back to result	

Fresno - Drummond, Annual, Design value = 50 µg/m3	General Note	Geologic and Construction	Mobile Exhaust	Tire and Brake Wear	Organic Carbon	Vegetative Burning	Ammonium Nitrate including associated water	Ammonium Sulfate	Marine	Unassigned
	as indicated.									
LINE 3	**41.75**	**15.5**	**4.6**	**0.7**	**1.6**	**3.7**	**11.0**	**1.6**	**0.0**	**3.1**
Line4 Local Contribution PM2.5-PM10 Area of Influence	Source contribution from smallest area of influence, representative of large particle primary source area, includes all PM size emissions in the area - Rolled back against local area of influence emission estimates	70%PM10 50%PM2.5 of net	70%PM10 50%PM2.5 of net	70%PM10 50%PM2.5 of net	70%PM10 50%PM2.5 of net	70%PM10 50%PM2.5 of net	70%PM10 50%PM2.5 of net, non-linear rollback	70%PM10 50%PM2.5 of net		70%PM10 50%PM2.5 of net
LINE 4	**24.74**	**10.9**	**2.3**	**0.5**	**0.8**	**1.8**	**5.5**	**0.8**		**2.2**
Line5 Local Contribution Area of Influence of PM2.5	Rolled back against local PM2.5 area of influence emission estimates - episode specific adjustments based on meteorology and episode duration	15%PM10 30%PM2.5	15%PM10 30%PM2.5	15%PM10 30%PM2.5	15%PM10 30%PM2.5	15%PM10 30%PM2.5	15%PM10 30%PM2.5 non-linear rollback	15%PM10 30%PM2.5		15%PM10 30%PM2.5
LINE 5	**9.63**	**2.3**	**1.4**	**0.1**	**0.47**	**1.1**	**3.3**	**0.5**		**0.5**
Line6 Sub regional Contribution	Rolled back against specified County(ies) emission estimates - episode specific	10%PM10 15%PM2.5	10%PM10 15%PM2.5	10%PM10 15%PM2.5	10%PM10 15%PM2.5	10%PM10 15%PM2.5	10%PM10 15%PM2.5 non-linear rollback	10%PM10 15%PM2.5		10%PM10 15%PM2.5

Fresno - Drummond, Annual, Design value = 50 µg/m3	General Note	Geologic and Construction	Mobile Exhaust	Tire and Brake Wear	Organic Carbon	Vegetative Burning	Ammonium Nitrate including associated water	Ammonium Sulfate	Marine	Unassigned
	adjustments based on meteorology and episode duration									
LINE 6	**5.30**	**1.6**	**0.7**	**0.1**	**0.24**	**0.6**	**1.65**	**0.24**		**0.3**
Line7 Regional Contribution	Rolled back against Valley-wide emission estimates - episode specific adjustments based on meteorology and episode duration	5%PM10 5%PM2.5	5%PM10 5%PM2.5	5%PM10 5%PM2.5	5%PM10 5%PM2.5	5%PM10 5%PM2.5	5%PM10 5%PM2.5 non-linear rollback	5%PM10 5%PM2.5		5%PM10 5%PM2.5
LINE 7	**2.09**	**0.8**	**0.2**	**0.0**	**0.08**	**0.2**	**0.55**	**0.08**		**0.2**
Associated Emissions Categories	Based upon appropriate seasonal or annual inventory	PM10 paved roads+ PM10 unpaved roads+ PM10 off road mobile+ PM10 farm operations+ PM10 construction+ PM10 windblown	PM10, TOG & CO onroad mobile+ PM10, TOG & CO 860 offroad equipment PM10, TOG & CO 870 farm equipment CO presumed to add minimal mass	Tire and brake wear as predicted by EMFAC2002	Total TOG minus motor vehicle, OC may also include a small portion of otherwise unassigned elemental carbon PM10 & CO Area, Stationary CO presumed to add minimal mass	PM10 & CO residential burning PM10 & CO waste burning and disposal PM10 cooking PM10 & CO fires CO presumed to add minimal mass	Total E.I. NOx (+ bacterial soil NOx estimate removed as natural background)	Total SOx	None, natural emission from the ocean, bay and delta waters	Total PM10

Table 4 Emission Inventory for Year 1999 through Current Year (valid for this project)- All emissions in tons per day

Emissions Inventory	Area of Influence	Geologic and Construction	Mobile Exhaust	Tire and Brake Wear	Organic Carbon	Vegetative Burning	Ammonium Nitrate including associated water	Ammonium Sulfate	Marine	Unassigned
PM10	Fresno	74.4504	4.1236	0.511	5.6266	10.4843				39.92145356
NOx	Fresno						174.7763			
TOG	Fresno		58.2653		396.7168					
SOx	Fresno							9.0772		

3.0 Interpollutant Trading Ratio

The SJVAPCD (Sweet, 2005) provided the interpollutant trading calculation method, which is presented in Tables 5, 6, and 7. Summing 'organic carbon' and 'vegetation burning' from Line 1 in Table 3 gave the value of 'Vegetative Burning Total' in Table 5. 'Industry Component' and 'Regional Background' were calculated as 30% and 20% of the'Vegetative Burning Total', respectively. The value for 'Regional Background' was subtracted from the 'Industry Component' to obtain the 'Industry minus Background' value. The value for 'County Contribution' was estimated to be 50% of the value of 'Industry minus Background'. The value for 'Organic Carbon PM_{10} Inventory-Fresno County' was obtained from the emission inventory shown in Table 4. The value for 'County Contribution' divided by the value of 'Organic Carbon PM_{10} Inventory' gave the 'County Impact' in units of $\mu g/m^3$ per ton.

The values of 'Ammonium Sulfate' and 'Regional Background' in Table 6 were obtained from the values of 'Ammonium Sulfate' in Lines 1 and 2 in Table 4, respectively. The value of 'Ammonium Sulfate' was reduced by the value of 'Regional Background' to obtain the entry labeled 'Ammonium Sulfate minus Background'. The value for 'County Contribution' was also determined as 50% of the value of 'Ammonia Sulfate minus Background'. The value of 'SO_x Inventory-Fresno County' was obtained from the emission inventory shown in Table 4. The value of 'County Contribution' divided by the value of 'SO_x Inventory' gave the 'County Impact' in units of $\mu g/m^3$ per ton.

The inter-pollutant trading ratio of SO_2 to PM_{10} was calculated as the ratio of the 'County Impact' of PM_{10} to the 'County Impact' of SO_x. The ratio is 1.8 (tons of SO_2 to equal the effect of 1 ton of PM_{10} reduction). Likewise, the interpollutant trading ratio of NO_2 to PM_{10} was calculated in Table 7 as a ratio of the 'County Impact' of PM_{10} to the 'County Impact' of NO_x. The resulting ratio is 3.0 (tons of NO_2 to equal the effect of reducing 1 ton of PM_{10}).

Table 5 PM_{10} County Impact

PM_{10}	Note	Units	Estimate	Uncertainty
"Vegetative Burning" Total	1	$\mu g/m^3$	7.50	2.43
Industry Component (30%)	2	$\mu g/m^3$	2.25	
Regional Background (20%)	3	$\mu g/m^3$	0.45	
Industry minus Background		$\mu g/m^3$	1.80	
County Contribution	4	$\mu g/m^3$	0.90	
Organic Carbon PM_{10} Inventory - Fresno County	5	ton/day	5.63	
County Impact		$\mu g/m^3$ per ton	0.16	0.21

Table 6 SO_x County Impact and Inter-pollutant trading ratio of SO_x and PM_{10}

Sulfate	Note	Units	Estimate	Uncertainty
Ammonia Sulfate	6	$\mu g/m^3$	2.60	0.29
Regional Background	7	$\mu g/m^3$	1.00	
Ammonium Sulfate minus Background		$\mu g/m^3$	1.60	
County Contribution	8	$\mu g/m^3$	0.80	
SO_x Inventory - Fresno County	9	ton/day	9.08	
County Impact		$\mu g/m^3$ per ton	0.09	0.10
Tons of SO_x to Equal Effect of 1 ton PM_{10} Reduction	10		**1.8**	2.2

Table 7 NOx County Impact and Inter-pollutant trading ratio of NO_x and PM_{10}

Nitrate	Note	Units	Estimate	Uncertainty
Ammonium Nitrate	11	$\mu g/m^3$	12.00	0.29
Regional Background	12	$\mu g/m^3$	1.00	
Ammonium Nitrate minus Background		$\mu g/m^3$	11.00	
County Contribution	13	$\mu g/m^3$	5.50	
NOx Inventory - Fresno	14	ton/day	174.7763	
County Impact		$\mu g/m^3$ per ton	0.03	0.03
Tons of NO_x to Equal Effect of 1 ton PM_{10} Reduction	15		**3.0**	4.0

Note:
1. Per SJVUAPCD and CARB, PM_{10} emissions from stationary industrial combustion sources are included in the Vegetative Burning category from Chemical Mass Balance modeling performed for the SJVUAPCD 2003 PM_{10} Attainment Plan (Fresno-Drummond monitoring station).
2. Per SJVUAPCD, 30% of this category is attributed to stationary industrial combustion sources.
3. Per SJVUAPCD, regional background is estimated to be 20% of net concentration after previous adjustment to Vegetative Burning category.
4. Contribution from sources within Fresno County is estimated to be 50% of net concentration after previous adjustments to Vegetative Burning category.
5. Organic carbon PM_{10} inventory for Fresno County that contributes to this monitoring location; from SIP inventory with updates and adjustments based on Central California Ozone Study (CCOS) study.

6. Ammonium sulfate category from Chemical Mass Balance modeling performed for the SJVUAPCD 2003 PM_{10} Attainment Plan (Fresno-Drummond monitoring station).
7. Per SJVUAPCD, regional background of ammonium sulfate is estimated to be 1 mg/m^3.
8. Contribution from sources within Fresno is estimated to be 50% of net concentration after previous adjustment to Vegetative Burning category.
9. SO_x inventory for Fresno that contributes to this monitoring location; from SIP inventory with updates and adjustments based on CCOS study.
10. PM_{10} County Impact divided by Ammonium Sulfate County Impact.
11. Ammonium nitrate category from Chemical Mass Balance modeling performed for the SJVUAPCD 2003 PM_{10} Attainment Plan (Fresno - Drummond monitoring station).
12. Per SJVUAPCD, regional background of ammonium nitrate is estimated to be 1 mg/m^3.
13. Contribution from sources within Fresno County is estimated to be 50% of net concentration after previous adjustment to Vegetative Burning category.
14. NO_x inventory for Fresno County that contributes to this monitoring location; from SIP inventory with updates and adjustments based on Central California Ozone Study (CCOS) study.
15. PM_{10} County Impact divided by Ammonium Nitrate County Impact.

4.0 Reference

1) EPA-CMB8.2 Users Manual, December, 2004
2) San Joaquin Valley Air Pollution Control District State Implementation Plan PM10 Modeling Protocol (SJVAPCD, 2005)
3) Attachment 6 and calculation method obtained from SJVAPCD (James Sweet, james.sweet@valleyair.org, 559-230-5810)

Attachment 4

Gmail

David Jenkins <davdjenk@gmail.com>

RE: Starwood Proposed Fuel Sulfur Content and Testing

James Harader <James.Harader@valleyair.org> **Fri, Dec 15, 2006 at 8:52 AM**
To: "John_Lague@URSCorp.com" <John_Lague@urscorp.com>
Cc: Dustin Brown <Dustin.Brown@valleyair.org>, Stanley Tom <stanley.Tom@valleyair.org>, Errol Villegas <errol.villegas@valleyair.org>, "davdjenk@gmail.com" <davdjenk@gmail.com>, "Maggie_Fitzgerald@urscorp.com" <Maggie_Fitzgerald@urscorp.com>

John,

Sorry we haven't included you yet in the discussion regarding the fuel sulfur content of NG, which affects Bullard, Panoche, and Starwood. I understand that Dustin Brown recently brought some of the details to your attention. I think I can shed some light on the fuel sulfur content and how the District handles this in our evaluations.

To be conservative, the District typically assumes the worst case sulfur fuel content for all of our calculations. Therefore, our evaluations are typically based on a fuel sulfur content of 0.75 grains/scf or 1 grain/scf depending on BACT. This results in inflated annual SOx emission estimates, when you consider that PG&E's published annual average fuel sulfur content for their pipeline gas is much less than 0.75 grains/scf. My understanding is that the CEC requires you to offset SOx emissions and their regulations (or CEQA?) allow them to use the annual average sulfur fuel content. This leads to a relatively large discrepancy between our emission calculations and CEC's determination for SOx offsets.

Will Walters contacted myself to see if there was any way the District could use the annual average fuel sulfur content to calculate emissions in our evaluation. This way our numbers are consistent with CEC's. At this point in time, it appears that the District would only consider an annual average fuel sulfur content if site-specific fuel sulfur content testing was placed on the turbine permit. For a similar project, EPA has very recently stated that if we use an annual average fuel sulfur content on the permit, testing of fuel sulfur content would have to be at least monthly and site specific. Otherwise, they will most likely comment during the public notice period. Furthermore, I'm not entirely sure whether our upper management would buy off on limiting the annual average fuel sulfur content.

I contacted Will Walters on Wednesday, and what I took out of our conversation is that if the District uses 0.75 or 1.0 grains/SCF in our evaluation, the CEC doesn't necessarily have to use that for their offset determination for SOx. This is provided our emission estimates don't result in SOx emissions triggering offsets under our regulations. In other words, the CEC's offset determination is independent from ours.

In all likelihood, we will use the worst case fuel sulfur content for our analysis, while the CEC will continue to use the average fuel sulfur content for their offset analysis. Another option, is to perform periodic testing (most likely monthly) to confirm the average annual fuel sulfur content, if ourupper management would approve of that type of proposal. I encourage you to contact the CEC directly and see what their position on the fuel sulfur content is, and how it would affect SOx offsets if we use the worst case fuel sulfur content in our analysis.

If you have further questions or comments on the fuel sulfur content, feel free to give me a call at (559) 230-5887.

I also want to inform you that the final review for Panoche Energy Center has been re-assigned for final review to Stanley Tom, one of our senior engineers.

Thanks,

James Harader
Air Quality Engineer II
San Joaquin Valley APCD
(559) 230-5887

-----Original Message-----
From: Dustin Brown
Sent: Wednesday, December 13, 2006 11:34 AM
To: James Harader
Subject: FW: Starwood Proposed Fuel Sulfur Content and Testing

-----Original Message-----
From: John_Lague@URSCorp.com [mailto:John_Lague@URSCorp.com]
Sent: Wednesday, December 13, 2006 11:12 AM
To: Dustin.Brown@valleyair.org
Cc: rweiss@houston.rr.com; Ron.Watkins@calpeak.com; David_Marx@URSCorp.com; Angela_Leiba@URSCorp.com; Thomas_Carr@URSCorp.com; David A. Tyburski
Subject: FW: Starwood Proposed Fuel Sulfur Content and Testing

Dustin

As shown by the attached string of emails, we developed the sulfur contents for the Panoche Energy Center application (right next to the Midway site) based on looking at the pipeline quality natural gas characteristics PG&E put on their webpage and some subsequent discussions with Will Walters, the CEC air quality consultant for that job (and probably for Midway too). James Harader, the PEC permit engineer has not indicated that he has a problem with these sulfur levels, so I was surprised by your comment that we need to use a higher value for this project, which uses the same gas supply. Are you sure about this?

Thanks very much and best regards - jsl

John Lague
Senior Air Quality Consultant
URS Corporation
1615 Murray Canyon Road, Suite 1000
San Diego, California 92108
Phone: (619) 294-9400
Fax: (619) 293-7920

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----- Forwarded by John Lague/SanDiego/URSCorp on 12/13/2006 10:55 AM -----

"Will Walters" <WWalters@aspeneg.com>
08/11/2006 10:15 AM
Please respond to <WWalters@aspeneg.com>

To <John_Lague@URSCorp.com>
cc "'Matthew Layton'" <Mlayton@energy.state.ca.us>, <Cindy_Poire@URSCorp.com>
Subject FW: Panoche Gas Composition - File: 012A

John,

Thank you, this supplemental filing provides the information needed for data adequacy. I will also like to know if it is included in a named submittal package (like AFC Supplement A, or some such name) and on what date it is officially submitted to dockets so that I can properly reference it in the DA form. I think that the Sulfur content information provided confirms that a 0.32 grain/100 scf value is a reasonably conservative value for determination of annual SOx emissions.

We have until Tuesday to receive the ERC information for its inclusion, any later and I cannot guarantee it will be included. As I mentioned over the phone, the District will try to complete their permit application completeness review within two weeks but they have until September 9th by rule.

Will Walters, Aspen
(818) 597-3407 ext. 345

From: John_Lague@URSCorp.com [mailto:John_Lague@URSCorp.com]
Sent: Friday, August 11, 2006 6:13 AM

To: WWalters@aspeneg.com
Cc: Cindy_Poire@URSCorp.com
Subject: Fw: Panoche Gas Composition - File: 012A

Hi, Will

See attachments provided in response to your request for a gas analysis. I will try to contact the client today about the additional detail on available ERCs you were asking about.

Cindy: I guess this needs to be docketed as well.

Regards - jsl

John Lague
Senior Air Quality Consultant
URS Corporation
1615 Murray Canyon Road, Suite 1000
San Diego, California 92108
Phone: (619) 294-9400
Fax: (619) 293-7920

-----Forwarded by John Lague/SanDiego/URSCorp on 08/11/2006 06:12AM -----

To: "'John_Lague@URSCorp.com'" <John_Lague@URSCorp.com>
From: "Brown, Robert E." <rebrown@bibb.com>
Date: 08/11/2006 05:49AM
cc: allanori@comcast.net, Cindy_Poire@URSCorp.com, dale@dgpower.com, gchandler@mstar2.net, "'Jennifer_Wu@URSCorp.com'" <Jennifer_Wu@URSCorp.com>, "'Howard, Milton'" <Milton.Howard@cinergy.com>, "'davdjenk@gmail.com'" <davdjenk@gmail.com>, "'mpk.nextgen@gmail.com'" <mpk.nextgen@gmail.com>, "Garrett, Stephen M." <SMGarrett@bibb.com>, "Swofford, Michael J." <MJSWOFFORD@bibb.com>, Duke - Panoche Project <duke-panoche@bibb.com>
Subject: Panoche Gas Composition - File: 012A

John,

Attached are two documents. One is the expected gas composition, which shows zero sulfur. The other is from the PG&E web site about the sulfur content of the gas in their pipe lines.

Bob

-----Original Message-----
From: John_Lague@URSCorp.com [mailto:John_Lague@URSCorp.com]
Sent: Thursday, August 10, 2006 8:46 PM
To: Brown, Robert E.
Cc: allanori@comcast.net; Cindy_Poire@urscorp.com; dale@dgpower.com;'Jenkins, Dave'; Duke - Panoche Project; gchandler@mstar2.net;'Jennifer_Wu@URSCorp.com'; 'King, Michael (Cinergy Solutions)'; 'Howard,Milton'; Garrett, Stephen M.;

'Tom.McNay@Cinergy.COM'; 'Zwinklis,Victor'

Subject: Re: Panoche AFC - Revised Water Balances - File: 012E

Bob

Will Walters, who is doing the CEC review of our Panoche AFC air quality section is asking me for a fuel gas analysis. I looked through the Bibb web site and could not find one. I do have emails from you that reference a fuel analysis that shows no sulfur in the gas, but I don't think I ever actually saw this. Will is saying this is a data adequacy item that he would like to check off rather than make it an issue so if you could send me the analysis you have,that will save having it show up as a missing item.

Thanks - jsl

John Lague
Senior Air Quality Consultant
URS Corporation
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San Diego, California 92108
Phone: (619) 294-9400
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This e-mail and any attachments are confidential. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

(See attached file: Panoche Gas Analysis.pdf)(See attached file: Panoche Gas Sulfur Content.pdf)

Attachment 5

Gmail +talk BETA

David Jenkins <davdjenk@gmail.com>

Cumulative Modeling Analysis

David Jenkins <davdjenk@gmail.com> **Tue, Dec 19, 2006 at 10:55 AM**
To: James Harader <james.harader@valleyair.org>, Errol Villegas <errol.villegas@valleyair.org>
Cc: "John_Lague@urscorp.com" <john_lague@urscorp.com>

Erroll & James,

As part of Panoche's CEC data request, PEC needs to provide a "cumulative modeling analysis" for all existing and planned facilities within a 6-mile radius of our project site. (As far as I know, this would include the two nearby power plants and the proposed Starwood plant.) We would like to add this analysis to our formal data request submittal to the CEC by January 9, 2007. If possible, could you provide me (or John Lague) with this analysis by January 2, 2007 so URS will have time to package it with this other information? Thanks,

Dave

Cell (317) 431-1004
davdjenk@gmail.com

Technical Area: Air Quality

Data Request 4 Rev: Please update as necessary any modeling files with emissions affected by these proposed changes; combine the receptors and multiple year meteorological files to reduce the number of modeling runs by a factor of ten.

Response:

Revised dispersion model input/output files reflecting the changes to operational project emissions discussed in these data request responses are provided electronically on a DVD accompanying these data request responses. The results of the revised modeling are presented below in Revised Table 5.2-18B.

Note: Modeling for the worst-case 1-hour NO2 scenario assumed concurrent commissioning emissions for all four turbines. When added to a conservative background concentration based on the highest monitored value, this result exceeded the California 1-hour standard for NO2 of 470 µg/m3. For this reason, PEC will accept a condition not to conduct commissioning tests on more than 2 turbines in the same hour. Based on this commitment, and because no other facility sources would be operating during commissioning, the maximum predicted concentration due to this activity has been divided by 2 in Table 5.2-18B below, which results in compliance with the standard.

Table 5.2-18B (Revised)
Maximum Modeled Criteria Pollutant Impacts due to Operational PEC Emissions

Pollutant	Averaging Period	Maximum Modeled Impact ($\mu g/m^3$)	PSD Significant Impact Level[1] ($\mu g/m^3$)	Background[2] ($\mu g/m^3$)	Maximum Total Predicted Concentration ($\mu g/m^3$)	Most Stringent AAQS ($\mu g/m^3$)	UTM Coordinates	
							East (m)	North (m)
CO	1 hour[1]	346.26	2,000	7,705	8,051.3	23,000	710,920	4,053,581
	8 hour[2]	191.49	500	5,156	5,347.5	10,000	714,670	4,049,781
NO_2	1 hour[1]	171.6	NA	169.2	340.8	470	710,895	4,053,606
	1 hour (normal ops)	136.02	NA	169.2	305.2	470	715,985	4,058,633
	Annual[3]	0.12	1	42.0	42.12	100	707,770	4,056,655
PM_{10}	24 hour[4]	2.83	5	193.0[4]	195.83	50	708,095	4,057,055
	Annual[3]	0.52	1	43.0[4]	43.52	20	716,126	4,058,637
$PM_{2.5}$	24 hour[4,5]	4.47	NA	110.0	114.47	65	716,126	4,058,637
	Annual[3,5]	0.17	NA	21.6	21.77	12	716,126	4,058,637
SO_2	1 hour[1]	2.10	NA	23.6	25.70	655	710,895	4,053,606
	3 hour[6]	1.57	25	15.6	17.17	1,300	711,095	4,053,606
	24 hour[4]	0.57	5	10.5	11.07	105	707,695	4,056,830
	Annual[3]	0.02	1	5.3	5.32	80	707,770	4,056,655

Notes:

$\mu g/m^3$ = micrograms per cubic meter
CO = carbon monoxide
ISCST3 = USEPA Industrial Source Complex model, Version 02035
m = meters
NA = Not applicable
NAAQS = Most stringent ambient air quality standard for the averaging period
NO_2 = nitrogen dioxide
OLM = ozone limiting method
PM_{10} = particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter. All PM emissions during operation assumed to be $PM_{2.5}$
PSD = Prevention of Significant Deterioration
SO_2 = sulfur dioxide
UTM = Universal Transverse Mercator

[1] Maximum hourly impact based on four turbines operating under commissioning conditions and one hour of diesel fire pump operation. Since this resulted in a predicted total NO_2 concentration above the California ambient standard, the predicted maximum impact from commissioning emissions of NO_x was divided by a factor of two to represent the impacts of only two turbines conducting commissioning tests in the same hour. PEC will accept a condition to this effect.

[2] Maximum 8-hour impact based on four turbines operating for 8 hours under commissioning conditions and one hour of diesel fire pump operation.

[3] Annual impact based on 4,734 hours of normal operation, 20 maintenance hours, 365 startups, and 365 shutdowns for all four turbines (total of 5,000 hours), 5,000 hours of cooling tower operation, and 52 hours of diesel fire pump engine operation.

[4] Maximum 24-hour impact based on three startups, three shutdowns and remainder of period at normal operations for four turbines and 1 hour of fire pump engine.

[5] All operational Project equipment PM_{10} emissions assumed to be $PM_{2.5}$.

[6] Maximum 3-hour impact based on 3 hours of normal operation for four turbines and one hour of fire pump engine.

[7] PM10 and PM2.5 monitored concentrations used for background exceed standards.

TECHNICAL AREA: AIR QUALITY

Data Request 5 Rev: The ammonia slip emissions estimate provided in Appendix I provides emissions based on both 10 ppm, identified as T-BACT and 6 ppm, identified as BACT. However, Section 5.2 of the AFC indicates ammonia slip BACT to be 10 ppm. Please confirm which level is proposed as BACT, and if 10 ppm is proposed please explain why Appendix I provides calculations for 6 ppm slip.

Response:

The reference in Appendix I to a 6 ppmvd stack concentration of ammonia slip was incorrect. The proposed value is 10 ppmvd @15% O2.

TECHNICAL AREA: AIR QUALITY

Data Request 6 Rev: Please explain why the startup and shutdown emission levels indicated in Table 5.2-13 are significantly different than the startup/shutdown estimates provided for the Walnut Creek Energy Park (05-AFC-2), Sun Valley Energy Project (05-AFC-3), and Highgrove (06-AFC-2) that also will use the GE LMS100 turbines.

Response:

The turbine startup and shutdown data provided by General Electric and the breakdown of this information by Bibb Engineering to represent cold start emissions are included in the response to Data Request 2 in the revised AFC Appendix I Attachment C spreadsheets, which is the revised Excel workbook for operational emissions calculations that is referenced in Response No. 2. Since the original data were developed for a fuel gas sulfur content of 0.5 grain per 100 dry standard cubic feet, the emissions information in Revised Table 5.2-13 has been adjusted to reflect a sulfur content of 0.75 grains per 100 cubic feet (see Response No. 4). We have not received any information from General Electric that would suggest these numbers are not reasonably representative for cold starts.

TECHNICAL AREA: AIR QUALITY

Data Request 7 Rev: For unsteady state operations, Table 5.2-13 in the AFC shows an initial startup period of 10 minutes, an additional warm-up period after initial startup of 20 minutes needed to completely warm-up the SCR system, and a 10.5 minute shutdown. The delineation of these unsteady state operations and the emissions assumed for these unsteady state operations are considerably different than those for the Walnut Creek Energy Park (05-AFC-2), Sun Valley Energy Project (05-AFC-3), and Highgrove (06-AFC-2) that also will use the GE LMS100 turbines. Please explain why the warm-up and the shutdown emission rates are higher for NOx, CO, and SO2 and lower for VOC and PM10 than the startup emission rates. The difference in the emission rate direction of the SO2 and PM10 emission rates, which are both generally based on fuel flow, are of particular interest.

Response:

Corrected startup and shutdown LMS100 turbine emissions are presented in Revised Table 5.2-13 which is provide with the response to Data Request No. 2. These data were based on data provided by General Electric and are similar to the values shown in the AFC. However, the SO2 emissions have been revised to reflect a worst-case fuel gas sulfur content required by SJVAPCD of 0.75 grains per 100 dry standard cubic feet, which is higher than the value assumed in the AFC. Similarly, the startup and shutdown PM10 emissions have been adjusted due to General Electric's agreement after AFC submittal to guarantee a base full-load PM10 emission rate for the LMS100 of 6 rather than 11 lb/hour/turbine. We do not know why these vendor-provided data differ from those of other recent LMS100 projects.

TECHNICAL AREA: AIR QUALITY

Data Request 8 Rev: Please provide the expected exhaust parameters (temperature and velocity) for the six specific initial commissioning tests identified on page 5.2-19 of the AFC.

Response:

Information provided by the turbine manufacturer (General Electric) on commissioning stack parameters and emissions for each LMS100 CTG is provided in the table below. The revised modeling conducted for the PEC operational emissions in response to these CEC data requests used a conservative combination of the stack parameters shown here. Note that the SO2 emissions have been revised to reflect a worst-case fuel gas sulfur content required by SJVAPCD of 0.75 grains per 100 dry standard cubic feet, which is higher than the value assumed in the AFC. Similarly, the commissioning PM10 emissions have been adjusted due to General Electric's agreement after AFC submittal to guarantee a base full-load PM10 emission rate for the LMS100 of 6 rather than 11 lb/hour/turbine.

Operating and stack parameter for LMS100 Commissioning

Description	Power Level	Corrected Operating Hours	Estimated Fuel Rate (MMBtu/hr)	Total Estimated Emission per Event				Exhaust Temperature (deg F)	Exhaust Flow (ACFM)
				NO_X (lbs)	CO (lbs)	VOC (lbs)	PM_{10} (lbs)		
*** First fire the unit & then shutdown to check for leaks, etc**									
	Core/Sync Idle	16	73.5	178	727	18.5	96	859	163836
*** Synch & Check E-stop**									
	Sync Idle	12	73.5	133.5	545.2	13.9	72	859	163836
*** Additional AVR Commissioning**									
	5%	12	92.8	251	363.2	8.7	72	864	226630
*** Break-in Run**									
	5%	8	92.8	167.3	242.1	5.8	48	864	226630
*** Dynamic Commissioning of AVR & Commission Water**									
Load Step 1	10.00%	4	166.1	66.8	277	21.0	24	868	289675
Load Step 2	20.00%	4	245.5	98.6	181	10.4	24	827	380155
Load Step 3	30.00%	4	319.3	128	181	10.6	24	806	456411
Load Step 4	40.00%	4	389.1	156	160	10.7	24	785	524273
Load Step 5	50.00%	4	457.4	184	132	11.3	24	770	588755
Load Step 6	60.00%	4	524.6	211	180	13.5	24	760	648646
Load Step 7	70.00%	4	590.8	237	247	16.3	24	752	706812
Load Step 8	80.00%	4	658.5	265	349	20.7	24	752	761888
Load Step 9	90.00%	4	727.9	292	516	29.5	24	758	817320
Load Step 10	100.00%	4	798.1	321	789	47.9	24	767	873543
*** Base load AVR Commissioning**									
	100%	16	798.1	2689	4890	239.0	96	767	873543

TECHNICAL AREA: AIR QUALITY

Data Request 9 Rev: The operating cases modeled are conservative, but seem unrealistically conservative. Please provide brief but specific explanations of the source of the emission input assumptions and the stack parameter (temperature and velocity) input assumptions for each of the pollutant/averaging time modeling scenarios presented. Also, please identify whether any multipliers were used to account for the maximum proposed annual operations limit of 5,000 hours.

Response:

The procedure followed to determine emission rates and stack parameters for each pollutant and averaging time combination was described in the AFC.

- Screening dispersion modeling was conducted using unit emission rates for the turbines, since these are by far the most significant operational emission sources associated with the project. These simulations were performed using five years of meteorological input data for each of 12 different combinations of turbine operating load and ambient temperatures. The screening results (concentrations per unit emission rate) were then scaled by the actual emission rates for each pollutant to determine the stack parameters corresponding to the highest off-site concentrations for each pollutant and averaging time. In the subsequent refined model simulations, the turbine stack parameters identified in the screening runs were chosen for the appropriate averaging time. The temperatures and flow rates for each of the 12 operating conditions considered in the screening analysis are presented in the spreadsheets included in the response to Data Request 2 in the revised AFC Appendix I Attachment C spreadsheets.

- The combination of emission events that would produce the highest mass emissions that would be reasonably expected to occur over the averaging times of concern (1, 3, 8, and 24 hours and annual) were determined (see Revised Table 5.2-14 in Response No. 2). Then the stack parameters found to result in the maximum offsite impacts for that pollutant and averaging time in the screening modeling described above were matched with the maximum emissions. When the refined modeling was conducted with the five-year meteorological input data, the worst-case emissions and stack parameters were forced to occur with the worst-case dispersion conditions for each averaging time of concern. The use of this very conservative methodology is designed to ensure that compliance with the applicable ambient air quality standards will be ensure no matter what operating conditions the new power plant may face.

TECHNICAL AREA: AIR QUALITY

Data Request 10 Rev: Please provide a tabulated list showing quarterly emission and emission offset accounting indicating the proposed quantity used quarterly from each ERC source to fully offset the project's emissions. Please show the current updated ERC certificate number and former certificate number for all certificates that have been recently split and/or re-issued in the name of the project.

Response:

See tables below showing emissions and offset requirements by quarter, as well as the ERC credits that have been secured as of the date of these data request responses. Note that use of SO2 ERCs to offset project PM10 emissions at an interpollutant ratio of 1.8 to 1 is assumed.

DR No. 10

PANOCHE ENERGY CENTER, LLC - *EMISSIONS and EMISSION REDUCTION OFFSETS*

NOx			1Q, lbs	2Q, lbs.	3Q, lbs.	4Q, lbs.	Annual, lbs.	Annual, tons
ERC Certificate No.	Name on Certificate	Offset Requirements (adjusted to 1.5 distance ratio)	64020	64020	93120	69840	291000	145.500
S-2362-2	Panoche Energy Center, LLC	certificate value	44097	52114	52114	52114	200439	100.220
S-2363-2	Bullard Energy Center,LLC	certificate value	22343	26405	26405	26405	50.779	
S-2214-2	LaPaloma	certificate value	22379	22627	22876	22876	90758	45.379
S-2217-2	LaPaloma	certificate value	9294	4654	14613	14.2805	28575	14.288
S-2218-2	LaPaloma	certificate value	5123	5415	2148	3593	8.1395	8.140
S-2217-2	LaPaloma	certificate value	0	9294	4654	14613	14.2805	14.2805
S-2218-2	LaPaloma	certificate value	5123	5415	2148	3593	8.1395	8.1395
		total holdings	108359	125924	124958	123208	319854	190.446
		surplus	44339	61904	31838	53368	28854	44.95

VOC			1Q, lbs	2Q, lbs.	3Q, lbs.	4Q, lbs.	Annual, lbs.	Annual, tons
ERC Certificate No.	Name on Certificate	Offset Requirements (adjusted to 1.5 distance ratio)	20010	20010	29130	21840	90990	45.500
S-2333-1	Flying J/Big West	certificate value	34685	34685	34685	34685	138740	69.370
		surplus	14675	14675	5555	12845	47750	23.87

PM10			1Q, lbs	2Q, lbs.	3Q, lbs.	4Q, lbs.	Annual, lbs.	Annual, tons
ERC Certificate No.	Name on Certificate	Offset Requirements (adjusted to 1.5 distance ratio)	40170	40170	58440	43830	182610	91.305
		SOx surplus applied to PM	51530	43690	0	143276	238496	119.25
		SOx surplus adjusted to 1.8 ratio	28628	24272	0	79598	132498	66.25
S-2209-4	LaPaloma	certificate value	8741	7519	8213	8457	32930	16.465
S-2210-4	LaPaloma	certificate value	904	923	981	961	3769	1.8845
S-2211-4	LaPaloma	certificate value	3587	3857	4416	4220	16080	8.04
S-2212-4	LaPaloma	certificate value	3382	3622	3173	3855	14032	7.016
S-2227-4	LaPaloma	certificate value	0	1079	1058	951	3088	1.544
S-2213-4	LaPaloma	certificate value	0	686	802	723	2211	1.1055
S-2363-2	Grey K Holdings	certificate value	22343	26405	26405	26405	50.779	50.779
		transfer from 1Q to 3Q	-13392		13392			
		surplus	14023	28193	0	81340	22049	62
		adjusted surplus						

SOx			1Q, lbs	2Q, lbs.	3Q, lbs.	4Q, lbs.	Annual, lbs.	Annual, tons
ERC Certificate No.	Name on Certificate	projected actual emissions (distance ratio does not apply)	3560	3560	5180	3900	16200	8.1
N-74-5	J.R. Simplot	certificate value	1560	1560	1560	1560	6240	3.120
N-268-5	J.R. Simplot	certificate value	53530	49310	0	145616	248456	124.228
		transfer from 2Q to 3Q		-3620	3620			
		surplus	51530	43690	0	143276	238496	119.248

Consistent with AQ-1, PEC will submit to the CEC updated correspondence from the SJVAPCD related to the transfer of ERCs from prior holders to the Applicant.

TECHNICAL AREA: AIR QUALITY

Data Request 11 Rev: Please provide correspondence with the District indicating that they have accepted the proposed SO2 for PM 10 interpollutant offset trading ratio at least one month prior to the publication of the Preliminary Staff Assessment.

Response:

In a meeting with the District on January 4, 2007, the District stated that they have reviewed PEC's SOx-PM10 inter-pollutant ratio proposal and are continuing their assessment. They stated that a final determination would be made and delivered to PEC before February 27, 2007 so as to accommodate CEC's data request for such determination. See Attachment C of AQ-3 for PEC's development of its 1.8 to 1 SOx-PM10 ratio proposal to the District.

TECHNICAL AREA: AIR QUALITY

Data Request 12 Rev: Please provide emission estimates for these two construction activities and indicate if they will overlap the schedule for any of the other construction activities.

Response:

A revised schedule for the entire construction effort is provided below. The well drilling and tree removal tasks have been added and will occur sequentially before (not overlapping with) site grading,. Natural gas pipeline construction and expansion within the existing PG&E substation have been added to months 13 through 18, overlapping part of the facilities building task.

Estimated pollutant emissions for all construction tasks are presented in a new Excel workbook (starting on the following page) with separate spreadsheets for the equipment exhaust and fugitive dust emissions associated with each distinct construction activity. These revised spreadsheets replace those originally presented in Appendix I, Attachment B of the AFC.

EXPECTED PEC CONSTRUCTION SCHEDULE

Injection Well Installation
Month 1
2 wells drilled

Production Well Installation
Months 2 and 3
2 wells drilled

Clearing and Grubbing (Removal of Trees)
Month 4

Civil Work (Site Grading)
Months 5 and 6

Facility Building
Months 7 - 16
Includes 8 months Concrete Pouring

Natural Gas Pipeline Construction
Month 13
Overlaps in time with Facility Building

Substation Expansion n
Months14 - 18
Overlaps in time with Facility Building

APPENDIX I

AIR QUALITY DATA

ATTACHMENT B (REVISED)

SUPPORTING INFORMATION ON ESTIMATION OF PROJECT CONSTRUCTION EMISSIONS

Construction Emissions

Annual Emissions

			Daily Emissions (lb/day)						Annual Emissions (tons/year)					
Activity	**Months**	**Emission Type**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**
Injection Well Installation	1	Combustion exhaust	5.60	5.15	92.61	26.14	303.45	0.33	0.09	0.08	0.80	0.23	2.57	0.00
	Month 1	Fugitive dust	0.53	0.11					0.00	0.00				
Total Emissions from Injection Well Installation			**6.1**	**5.3**	**92.6**	**26.1**	**303.4**	**0.3**	**0.1**	**0.1**	**0.8**	**0.2**	**2.6**	**0.0**
Production Well Installation	2	Combustion exhaust	6.08	5.60	47.30	14.27	142.33	0.17	0.20	0.19	1.68	0.50	5.28	0.01
	Months 2, 3	Fugitive dust	0.53	0.11					0.00	0.000				
Total Emissions from Production Well Installation			**6.6**	**5.7**	**47.3**	**14.3**	**142.3**	**0.2**	**0.2**	**0.2**	**1.7**	**0.5**	**5.3**	**0.0**
Clearing and Grubbing	1	Combustion exhaust	3.58	3.29	32.29	9.22	85.67	0.07	0.02	0.02	0.18	0.05	0.47	0.00
	Month 4	Fugitive dust	21.82	4.63					0.12	0.15				
Total Emissions from Clearing and Grubbing			**25.4**	**7.9**	**32.3**	**9.2**	**85.7**	**0.1**	**0.1**	**0.2**	**0.2**	**0.1**	**0.5**	**0.0**
Site Grading	2	Combustion exhaust	5.62	5.17	53.98	14.37	137.93	0.12	0.12	0.11	1.19	0.32	3.03	0.00
	Months 5, 6	Fugitive dust	30.95	6.50					1.54	0.19				
Total Emissions from Site Grading			**36.6**	**11.7**	**54.0**	**14.4**	**137.9**	**0.1**	**1.7**	**0.3**	**1.2**	**0.3**	**3.0**	**0.0**
Facilities Building	10	Combustion exhaust	6.42	5.91	49.01	15.02	128.33	0.12	0.71	0.65	5.39	1.65	14.12	0.01
	Month 7 - 16	Fugitive dust	4.6211	0.98					0.51	0.11				
Total Emissions from Facilities Building			**11.0**	**6.9**	**49.0**	**15.0**	**128.3**	**0.1**	**1.2**	**0.8**	**5.4**	**1.7**	**14.1**	**0.0**
Pipeline Construction	1	Combustion exhaust	2.81	2.59	19.51	6.77	54.55	0.13	0.03	0.03	0.21	0.07	0.60	0.00
	Month 13	Fugitive dust	4.38	0.93					0.05	0.01				
Total Emissions from Pipeline Construction			**7.2**	**3.5**	**19.5**	**6.8**	**54.5**	**0.1**	**0.1**	**0.0**	**0.2**	**0.1**	**0.6**	**0.0**
Substation Expansion	5	Combustion exhaust	1.53	1.41	9.90	3.49	15.61	0.01	0.08	0.08	0.54	0.19	0.86	0.00
	Months 14 - 18	Fugitive dust	6.89	1.46					0.38	0.08				
Total Construction Emissions from Substation Expansion			**8.4**	**2.9**	**9.9**	**3.5**	**15.6**	**0.0**	**0.5**	**0.2**	**0.5**	**0.2**	**0.9**	**0.0**
Commuter Vehicles	18	Combustion exhaust	0.86	0.15	138.46	14.94	14.70	0.10	0.11	0.02	18.28	1.97	1.94	0.01
	Months 1 - 18	Fugitive dust	69.12	11.68					9.12	1.54				
Total Emissions from Construction Worker Commuter Vehicles			**70.0**	**11.83**	**138.46**	**14.94**	**14.70**	**0.10**	**9.2**	**1.6**	**18.3**	**2.0**	**1.9**	**0.0**
Highest Daily Emissions from Any Activity (pounds)			**70.0**	**11.8**	**138.5**	**26.1**	**303.4**	**0.3**						
Total Annual Emissions from All Activities									**13.1**	**3.3**	**28.3**	**5.0**	**28.9**	**0.0**

Injection Well Installation - Diesel Fired Equipment

Activity occurs in month 1 only.

					Emission factors (lb/hr)						Hourly Emissions (lb/hr)						Daily Emissions (lb/day)						Annual Emissions (ton/yr)					
Equipment	**Quantity**	**Hours/Day**	**Horsepower**	**Days/year**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**
Drill Rig	1	24	750	18	0.134	0.123	1.122	0.337	4.655	0.006	0.13	0.12	1.12	0.34	4.65	0.01	1.07	0.99	26.93	8.08	111.71	0.15	0.029	0.027	0.242	0.073	1.005	0.001
Generator	2	24	200	28	0.078	0.071	0.704	0.196	1.924	0.002	0.16	0.14	1.41	0.39	3.85	0.00	1.24	1.14	33.78	9.39	92.35	0.09	0.052	0.048	0.473	0.132	1.293	0.001
Mud Pump	2	10	500	6	0.115	0.106	1.202	0.298	3.599	0.003	0.23	0.21	2.40	0.60	7.20	0.01	2.30	2.11	24.05	5.96	71.98	0.07	0.007	0.006	0.072	0.018	0.216	0.000
Concrete Truc	1	4	400	8	0.091	0.084	0.771	0.250	2.512	0.002	0.09	0.08	0.77	0.25	2.51	0.002	0.37	0.34	3.08	1.00	10.05	0.01	0.001	0.001	0.012	0.004	0.040	3.808E-05
Loging Truck	1	8	300	2	0.078	0.072	0.597	0.212	2.170	0.002	0.08	0.07	0.60	0.21	2.17	0.00	0.62	0.57	4.77	1.70	17.36	0.02	0.001	0.001	0.005	0.002	0.017	0.000
										Total	**0.69**	**0.63**	**6.30**	**1.79**	**20.38**	**0.02**	**5.60**	**5.15**	**92.61**	**26.14**	**303.45**	**0.33**	**0.09**	**0.08**	**0.80**	**0.23**	**2.57**	**0.003**

Notes:
Equipment list, quantity, horsepower, and hours of operation from EIF and Bibb
Emission factors from CARB Off-road Mobile Source Emission Factors (2006-2020). (2007 data used). Values presented are scaled to match the HP presented.
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions. PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for onroad or offroad diesel vehicles.
Concrete Truck and Loging Truck are Off-Highway Trucks.

MODEL EMISSION RATE INPUTS (pounds per hour)

Drill Rig

CO 1-HR	CO 8-HR	NOx 1-HR	NOx Annual
1.12	1.12	4.65	0.2295
PM10 24-HR	PM10 Ann	PM2.5 24-H	PM2.5 Annual
0.13	0.0066	0.12	0.0061
SO2 1-HR	SO2 3-HR	SO2 24-HR	SO2 Annual
0.01	0.01	0.02	3.06E-04

Generator

CO 1-HR	CO 8-HR	NOx 1-HF	NOx Annual
1.41	1.41	3.85	0.2952
PM10 24-	PM10 Ani	PM2.5 24	PM2.5 Annual
0.16	0.0119	0.14	0.0109
SO2 1-HF	SO2 3-HF	SO2 24-H	SO2 Annual
3.74E-03	3.74E-03	0.01	2.87E-04

Mud Pump

CO 1-H	CO 8-H	NOx 1-	NOx Annual
2.40	2.40	7.20	0.0493
PM10 2	PM10 A	PM2.5 2	PM2.5 Annual
0.29	0.0016	0.26	0.0014
SO2 1-H	SO2 3-H	SO2 24	SO2 Annual
0.01	0.01	0.01	4.66E-05

Loging Truck

CO 1-HR	CO 8-HR	NOx 1-HR	NOx Annual
0.60	0.60	2.17	0.0040
PM10 24-HR	PM10 Ann	PM2.5 24-H	PM2.5 Annual
0.08	0.0001	0.07	0.0001
SO2 1-HR	SO2 3-HR	SO2 24-HR	SO2 Annual
2.06E-03	2.06E-03	2.06E-03	3.76E-06

InjWell (Concrete Truck)

CO 1-HR	CO 8-HR	NOx 1-HF	NOx Annual
0.77	0.77	2.51	0.0092
PM10 24-	PM10 Ani	PM2.5 24	PM2.5 Annual
0.05	2.28E-04	0.04	2.28E-04
SO2 1-HF	SO2 3-HF	SO2 24-H	SO2 Annual
2.38E-03	2.38E-03	1.19E-03	8.69E-06

Minor differences between inputs and calculated values are due to rounding differences.

Travel on unpaved road

Activity occurs in month 1 only.

$F = 2.1 * G/12 * H/30 * (J/3)^{0.7} * (I/4)^{0.5} * (365-K)/365$ SCAQMD Table A9-9-D

Emission factor for vehicle travel on unpaved roads (lb/VMT)

16 G = Surface silt loading (%) (from Table A9-9-D-1 for farm road)
5 H = Mean vehicle speed (mph)
10 I = Mean number of wheels on vehicle (from Table A9-9-D-3)
16.5 J = Mean vehicle weight (ton) (from Table A9-9-D-3)
98 K = Mean number of days per year with at least 0.01 inches of precipitation (from Panoche Junction COOP weather station Western Regional Climate Center)
1.780 PM10 lb/VMT

Equipment	Quantity	Hours/Day	Days/year	Miles travelled per hour	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM10 Emissions (tons/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)	PM2.5 Emissions (tons/yr)
Drill Rig	1	24	24	0	85%	0.00	0.00	0.00	0.00	0.00	0.000
Concrete Trucl	1	4	10	0.5	85%	0.13	0.53	0.003	0.03	0.11	0.001
Loging Truck	1	8	8	0	85%	0.00	0.00	0.00	0.00	0.00	0.000
					Total	**0.13**	**0.53**	**0.003**	**0.03**	**0.11**	**0.001**

Equipment won't move once onsite, except for concrete truck.
Distance from road to farthest well site is 0.25 miles, 0.5 mile onsite RT used as worst-case.
Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.
PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.

MODEL EMISSION RATE INPUTS (pounds per hour)

PM10 24-HR	PM10 Annu	PM2.5 24-HF	PM2.5 Annual
0.0663	0.0007	0.0138	0.0002

Minor differences between inputs and calculated values are due to rounding differences.

Production Water Well Installation - Diesel Fired Equipment

Activity occurs in months 2 and 3 only.

					Emission factors (lb/hr)						Hourly Emissions (lb/hr)						Daily Emissions (lb/day)						Annual Emissions (ton/yr)					
Equipment	**Quantity**	**Hours/Day**	**Horsepower**	**Days/year**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**
Drill Rig	1	24	500	100	0.066	0.061	0.568	0.163	2.233	0.003	0.07	0.06	0.57	0.16	2.23	0.00	1.58	1.46	13.63	3.91	53.60	0.07	0.079	0.073	0.681	0.195	2.680	0.004
Air Compressors	1	24	200	140	0.060	0.055	0.479	0.144	1.299	0.001	0.06	0.05	0.48	0.14	1.30	0.00	1.43	1.32	11.50	3.46	31.17	0.03	0.100	0.092	0.805	0.242	2.182	0.002
Generator	1	12	25	140	0.012	0.011	0.114	0.035	0.180	0.000	0.01	0.01	0.11	0.03	0.18	0.00	0.15	0.14	1.37	0.42	2.16	0.00	0.010	0.010	0.096	0.029	0.151	0.000
Concrete Truck	1	1	400	2	0.091	0.084	0.771	0.250	2.512	0.002	0.09	0.08	0.77	0.25	2.51	0.00	0.09	0.08	0.77	0.25	2.51	0.00	0.000	0.000	0.001	0.000	0.003	0.000
Water Pump	1	24	120	10	0.082	0.076	0.527	0.169	1.049	0.001	0.08	0.08	0.53	0.17	1.05	0.00	1.97	1.81	12.64	4.04	25.17	0.02	0.010	0.009	0.063	0.020	0.126	0.000
Welder	1	8	25	6	0.009	0.008	0.073	0.029	0.115	0.000	0.01	0.01	0.07	0.03	0.12	0.00	0.07	0.06	0.58	0.24	0.92	0.00	0.000	0.000	0.002	0.001	0.003	0.000
Pump Test Rig	1	12	500	10	0.066	0.061	0.568	0.163	2.233	0.003	0.07	0.06	0.57	0.16	2.23	0.00	0.79	0.73	6.81	1.95	26.80	0.04	0.004	0.004	0.034	0.010	0.134	0.000
										Total	**0.39**	**0.36**	**3.10**	**0.95**	**9.62**	**0.01**	**6.08**	**5.60**	**47.30**	**14.27**	**142.33**	**0.17**	**0.20**	**0.19**	**1.68**	**0.50**	**5.28**	**0.01**

Notes:
Equipment list, quantity, horsepower, and hours of operation from EIF and Bibb
Emission factors from CARB Off-road Mobile Source Emission Factors (2006-2020). (2007 data used). Values presented are scaled to match the HP presented.
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions. PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for onroad or offroad diesel vehicles.
Concrete Truck is Off-Highway Trucks.
Only one Concrete Truck will be onsite at any time.

Travel on unpaved road

Activity occurs in months 2 and 3 only.

$F = 2.1 * G/12 * H/30 * (J/3)^{0.7} * (I/4)^{0.5} * (365-K)/365$ SCAQMD Table A9-9-D

Emission factor for vehicle travel on unpaved roads (lb/VMT)

16 G = Surface silt loading (%) (from Table A9-9-D-1 for farm road)
5 H = Mean vehicle speed (mph)
10 I = Mean number of wheels on vehicle (from Table A9-9-D-3)
16.5 J = Mean vehicle weight (ton) (from Table A9-9-D-3)
98 K = Mean number of days per year with at least 0.01 inches of precipitation (from Panoche Junction COOP weather station Western Regional Climate Center)
1.780 PM10 lb/VMT

Equipment	Quantity	Hours/Day	Days/year	Miles travelled per hour	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM10 Emissions (tons/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)	PM2.5 Emissions (tons/yr)
Drill Rig	1	24	100	0	85%	0.00	0.00	0.00	0.00	0.00	0.000
Concrete Truck	1	4	2	0.5	85%	0.13	0.53	0.00	0.03	0.11	0.000
Pump Test Rig	1	12	10	0	85%	0.00	0.00	0.00	0.00	0.00	0.000
					Total	**0.13**	**0.53**	**0.00**	**0.03**	**0.11**	**0.000**

Equipment won't move once onsite, except for concrete truck.
Distance from road to farthest well site is 0.25 miles, 0.5 mile RT used as worst-case.
Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.
PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.
Only one Concrete Truck will be onsite at any time.

Clearing and Grubbing - Diesel Fired Equipment

Activity occurs in month 4 only.

					Emission factors (lb/hr)						Hourly Emissions (lb/hr)						Daily Emissions (lb/day)						Annual Emissions (ton/yr)					
Equipment	**Quantity**	**Hours/Day**	**Horsepower**	**Days/year**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**
Wheeled Loader	1	8	500	11	0.098	0.09	0.971	0.253	2.604	0.002	0.10	0.09	0.97	0.25	2.60	0.00	0.78	0.72	7.76	2.02	20.83	0.02	0.004	0.004	0.043	0.011	0.115	0.000
Tracked Dozer	1	8	500	11	0.129	0.119	1.526	0.332	3.198	0.003	0.13	0.12	1.53	0.33	3.20	0.00	1.03	0.95	12.21	2.66	25.58	0.02	0.006	0.005	0.067	0.015	0.141	0.000
Dump Trucks	1	8	300	11	0.078	0.071	0.597	0.212	2.17	0.002	0.08	0.07	0.60	0.21	2.17	0.00	0.62	0.57	4.77	1.70	17.36	0.02	0.003	0.003	0.026	0.009	0.095	0.000
Water Trucks	1	8	250	11	0.071	0.065	0.51	0.193	1.999	0.002	0.07	0.07	0.51	0.19	2.00	0.00	0.57	0.52	4.08	1.55	15.99	0.02	0.003	0.003	0.022	0.009	0.088	0.000
Chipper	1	8	100	11	0.072	0.066	0.433	0.162	0.738	0.00	0.07	0.07	0.43	0.16	0.74	0.00	0.57	0.53	3.46	1.29	5.91	0.00	0.003	0.003	0.019	0.007	0.032	0.000
										Total	**0.45**	**0.41**	**4.04**	**1.15**	**10.71**	**0.01**	**3.58**	**3.29**	**32.29**	**9.22**	**85.67**	**0.07**	**0.02**	**0.02**	**0.18**	**0.05**	**0.47**	**0.00**

Notes:
Equipment list, quantity, horsepower, and hours of operation from EIF and Bibb
Emission factors from CARB Off-road Mobile Source Emission Factors (2006-2020). (2007 data used). Values presented are scaled to match the HP presented.
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions. PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for onroad or offroad diesel vehicles.
Other General Industrial Equipment emission factor is used for Chipper

Bulldozing

Activity occurs in month 4 only.

$E = p * 1 * G^{1.5} / H^{1.4}$ PM10 Emis: PM10 Emissions from dirt pushing (lb/hr)

EPA AP-42 Table 11.9-1 EMISSION FACTOR EQUATIONS FOR UNCONTROLLED OPEN DUST SOURCES AT WESTERN SURFACE COAL MINES (Overburden)

0.75 p = particle size multiplier = 0.75 for PM10

18 G = Silt content (%) (from Table A9-9-F-1 for flue dust - fine soils located at site)

16 H = Moisture content of surface material (%) (from Table A9-9-F-2 for moist dirt)

1.18 lb/hr of PM10

22.00 days of activity per month 0.5 duration of activity (months)

Equipment	Quantity	Hours/Day	Days/year	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM10 Emissions (tons/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)	PM2.5 Emissions (tons/yr)
Tracked Dozer	1	8	11	85%	0.177	1.42	0.01	0.04	0.30	0.00
Wheeled Loader	1	8	11	85%	0.177	1.42	0.01	0.04	0.30	0.00
				Total	**0.354**	**2.83**	**0.02**	**0.08**	**0.60**	**0.00**

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

Travel on unpaved road

Activity occurs in month 4 only.

$F = 2.1 * G/12 * H/30 * (J/3)^{0.7} * (I/4)^{0.5} * (365-K)/365$ SCAQMD Table A9-9-D

Emission factor for vehicle travel on unpaved roads (lb/VMT)

16 G = Surface silt loading (%) (from Table A9-9-D-1 for farm road)

5 H = Mean vehicle speed (mph)

10 I = Mean number of wheels on vehicle (from Table A9-9-D-3)

13 J = Mean vehicle weight (ton) (from Table A9-9-D-3)

98 K = Mean number of days per year with at least 0.01 inches of precipitation (from Panoche Junction COOP weather station Western Regional Climate Center)

1.507 PM10 lb/VMT

Equipment	Quantity	Hours/Day	Days/year	Miles travelled per hour	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM10 Emissions (tons/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)	PM2.5 Emissions (tons/yr)
Service Truck	2	2	11	1	85%	0.45	0.90	0.00	0.10	0.19	0.01
Service Trucks will operate 2 hours at end of day, not during daily activities											
Chipper	1	8	11	1	85%	0.23	1.81	0.01	0.05	0.38	0.04
Water Truck	1	8	11	5	85%	1.13	9.04	0.05	0.24	1.92	0.04
Dump Truck	1	8	11	4	85%	0.90	7.23	0.04	0.19	1.53	0.04
					Total	**2.03**	**18.98**	**0.10**	**0.57**	**4.02**	**0.14**

Assumed maximum travel speed is 10 mph

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.

PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.

Site Grading - Diesel Fired Equipment

Activity occurs in months 5 and 6 only.

					Emission factors (lb/hr)						Hourly Emissions (lb/hr)						Daily Emissions (lb/day)						Annual Emissions (ton/yr)					
Equipment	**Quantity**	**Hours/Day**	**Horsepower**	**Days/year**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**
Wheeled Loade	1	8	500	44	0.098	0.090	0.971	0.253	2.604	0.002	0.10	0.09	0.97	0.25	2.60	0.00	0.78	0.72	7.76	2.02	20.83	0.02	0.02	0.02	0.17	0.04	0.46	0.00
Tracked Dozer	1	8	500	44	0.129	0.119	1.526	0.332	3.198	0.003	0.13	0.12	1.53	0.33	3.20	0.00	1.03	0.95	12.21	2.66	25.58	0.02	0.02	0.02	0.27	0.06	0.56	0.00
Water Truck	1	8	250	44	0.071	0.065	0.510	0.193	1.993	0.002	0.07	0.07	0.51	0.19	1.99	0.00	0.57	0.52	4.08	1.55	15.94	0.02	0.01	0.01	0.09	0.03	0.35	0.00
Compactor	1	8	150	44	0.074	0.068	0.546	0.161	1.167	0.001	0.07	0.07	0.55	0.16	1.17	0.00	0.59	0.55	4.36	1.29	9.34	0.01	0.01	0.01	0.10	0.03	0.21	0.00
Motor Grader	1	8	220	44	0.084	0.078	0.650	0.208	1.939	0.002	0.08	0.08	0.65	0.21	1.94	0.00	0.68	0.62	5.20	1.67	15.51	0.01	0.01	0.01	0.11	0.04	0.34	0.00
Dump Trucks	1	8	400	44	0.091	0.084	0.771	0.250	2.512	0.002	0.09	0.08	0.77	0.25	2.51	0.00	0.73	0.67	6.17	2.00	20.09	0.02	0.02	0.01	0.14	0.04	0.44	0.00
Scrapers	1	8	460	44	0.155	0.143	1.774	0.399	3.828	0.003	0.16	0.14	1.77	0.40	3.83	0.00	1.24	1.14	14.20	3.19	30.62	0.02	0.03	0.03	0.31	0.07	0.67	0.00
										Total	**0.70**	**0.65**	**6.75**	**1.80**	**17.24**	**0.015**	**5.62**	**5.17**	**53.98**	**14.37**	**137.93**	**0.12**	**0.12**	**0.11**	**1.19**	**0.32**	**3.03**	**0.003**

Notes:
Equipment list, quantity, horsepower, and hours of operation from EIF and Bibb
Emission factors from CARB Off-road Mobile Source Emission Factors (2006-2020). (2007 data used). Values presented are scaled to match the HP presented.
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions. PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for onroad or offroad diesel vehicles.

MODEL EMISSION RATE INPUTS (pounds per hour)

CO 1-HR	CO 8-HR	NOx 1-HR	NOx Annual
6.75	6.75	17.24	0.6928

PM10 24-HR	PM10 Ann	PM2.5 24-H	PM2.5 Annual
0.70	0.0282	0.65	0.0260

SO2 1-HR	SO2 3-HR	SO2 24-HR	SO2 Annual
0.01	0.01	0.01	5.96E-04

Minor differences between inputs and calculated values are due to rounding differences.
(1 volume source)

Bulldozing

Activity occurs in months 5 and 6 only.

$E = p * 1 * G^{1.5} / H^{1.4}$ PM10 Emissions from bulldozing (lb/hr)

EPA AP-42 Table 11.9-1 EMISSION FACTOR EQUATIONS FOR UNCONTROLLED OPEN DUST SOURCES AT WESTERN SURFACE COAL MINES (Overburden)

0.75 p = particle size multiplier = 0.75 for PM10

18 G = Silt content (%) (from Table A9-9-F-1 for flue dust - fine soils located at site)

16 H = Moisture content of surface material (%) (from Table A9-9-F-2 for moist dirt)

1.18 lb/hr of PM10

Equipment	Quantity	Hours/Day	Days/year	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM10 Emissions (tons/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)	PM2.5 Emissions (tons/yr)
Scrapers	1	8	44	85%	0.18	1.42	0.03	0.04	0.31	0.01
Tracked Dozer	1	8	44	85%	0.18	1.42	0.03	0.04	0.31	0.01
Compactor	1	8	44	85%	0.18	1.42	0.03	0.04	0.31	0.01
				Total	**0.53**	**4.25**	**0.09**	**0.12**	**0.94**	**0.02**

22 construction days per month

2 duration of activity (months)

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

Grading

Activity occurs in months 5 and 6 only.

$E = p* .051 * (S)^{2.0}$

0.6 p = particle size multiplier = 0.60 for PM10

5 S = avg speed of vehicle (mph) (from AP-42 Table 11.9-3)

0.77 lb/VMT EPA AP-42 Table 11.9-1 EMISSION FACTOR EQUATIONS FOR

PM10 UNCONTROLLED OPEN DUST SOURCES AT WESTERN SURFACE COAL MINES

Equipment	Quantity	Hours/Day	Days/year	Miles travelled per hour	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM10 Emissions (tons/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)	PM2.5 Emissions (tons/yr)
Motor Grader	1	8	44	2	85%	0.23	1.84	0.04	0.05	0.41	0.01

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

Truck filling or storage pile emptying

PM10 emissions per ton of material handled (SCAQMD Table A9-9)

0.02205 lb/ton

Truck dumping

PM10 emissions per ton of material handled (SCAQMD Table A9-9)

0.009075 lb/ton

Equipment	Quantity	Hours/Day	Days/year	Material Handled (ton/day)	Material Handled (ton)	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM10 Emissions (tons/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)	PM2.5 Emissions (tons/yr)
Wheeled Loader	1	8	44	1398	61,504	85%	0.58	4.62	0.58	0.13	1.03	0.02
Dump Trucks	1	8	44	1398	61,504	85%	0.24	1.90	0.24	0.05	0.42	0.01
						Total	**0.82**	**6.53**	**0.81**	**0.18**	**1.45**	**0.03**

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

1216 yd3/day 1398 ton/day 48.6 trucks/day 1.0 trucks/hr

53,482 yd3 61,504 tons 2300 density of soil (lb/yd3)

(USDA NRCS Physical Soil Properties from Fresno County Western Part for Panoche Clay Loam soil)

assume all soil moved in first 2 months (44 days)

assume each dump truck carries 25 yd3 = 28.75 tons

assume each truck can haul 6 loads per hour

22.1 acres (entire site) = 53,482 square yds, assume depth of 0.5 yd of soils moved

Cover Storage Pile
Activity occurs in months 5 and 6 only.
SCAQMD Table A9-9-E
E = 1.7 * G/1.5 * (365-H)/235 * I/15 * J
PM10 Emission factor from wind erosion of storage piles per day per acre

15	G = Silt content (%) (from Table A9-9-E-1 for blended dirt)
98	H = Number of days with >= 0.01 inches of precipitation per year (from Panoche Junction COOP weather station WRCC)
8	I = Percentage of time that the unobstructed wind speed exceeds 12 mph at mean pile height
0.5	J = Fraction of TSP that is PM10 = 0.5
5.151	lb/acre/day

wind speed percentage based on 1984-92 (9 yrs) of wind speed data (actual hours > 10 knots) as recorded at Fresno Air Terminal data from EPA SCRAM website

Source	Quantity	Size of Pile (acre)	Hours/Day	Days/year	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM10 Emissions (tons/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)	PM2.5 Emissions (tons/yr)
Cover Storage Pile	1	1.5	24	365	85%	0.05	1.16	0.21	0.01	0.26	0.05

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
pile size assumed

Travel on unpaved road
Activity occurs in months 5 and 6 only.
F = 2.1 * G/12 * H/30 * $(J/3)^{0.7}$ * $(I/4)^{0.5}$ * (365-K)/365 SCAQMD Table A9-9-D
Emission factor for vehicle travel on unpaved roads (lb/VMT)

16	G = Surface silt loading (%) (from Table A9-9-D-1 for farm road)
5	H = Mean vehicle speed (mph)
10	I = Mean number of wheels on vehicle (from Table A9-9-D-3)
13	J = Mean vehicle weight (ton) (from Table A9-9-D-3)
98	K = Mean number of days per with at least 0.01 inches of precipitation (from Panoche Junction COOP weather station Western Regional Climate Center)
1.507	PM10 lb/VMT

MODEL EMISSION RATE INPUTS (pounds per hour)

PM10 24-H	PM10 Annua	PM2.5 24-H	PM2.5 Annual
3.8683	0.3509	0.8373	0.0431

Minor differences between inputs and calculated values are due to rounding differences.

Equipment	Quantity	Hours/Day	Days/year	Miles travelled per hour	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM10 Emissions (tons/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)	PM2.5 Emissions (tons/yr)
Service Truck	2	2	44	1	85%	0.45	0.90	0.02	0.10	0.19	0.00
Service Trucks will operate 2 hours at end of day, not during daily activities											
Water Truck	1	8	44	5	85%	1.13	9.04	0.20	0.24	1.92	0.04
Dump Truck	1	8	44	4	85%	0.90	7.23	0.16	0.19	1.53	0.03
					Total	**2.03**	**17.17**	**0.38**	**0.53**	**3.64**	**0.08**

Assumed maximum travel speed is 10 mph
Equipment weight from SCAQMD Table A9-9-D-3 for Waste Dump trucks
Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.
PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.

Site Building - Diesel Fired Equipment

Activity occurs in months 7 through 16 only.

					Emission factors (lb/hr)						Hourly Emissions (lb/hr)						Daily Emissions (lb/day)						Annual Emissions (ton/yr)					
Equipment	**Quantity**	**Hours/Day**	**Horsepower**	**Days/year**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**
Water Truck	1	8	250	220	0.071	0.065	0.510	0.193	1.999	0.002	0.07	0.07	0.51	0.19	2.00	0.00	0.57	0.52	4.08	1.55	15.99	0.02	0.06	0.06	0.45	0.17	1.76	0.00
Forklift	1	8	120	220	0.043	0.039	0.234	0.079	0.436	0.000	0.04	0.04	0.23	0.08	0.44	0.00	0.34	0.32	1.87	0.63	3.49	0.00	0.04	0.03	0.21	0.07	0.38	0.00
Portable Air Compres	1	8	120*	220	0.059	0.054	0.342	0.116	0.676	0.001	0.06	0.05	0.34	0.12	0.68	0.00	0.47	0.43	2.73	0.93	5.41	0.00	0.05	0.05	0.30	0.10	0.60	0.00
Welder	2	8	120*	220	0.047	0.043	0.280	0.093	0.556	0.001	0.09	0.09	0.56	0.19	1.11	0.00	0.75	0.69	4.48	1.49	8.89	0.01	0.08	0.08	0.49	0.16	0.98	0.00
Concrete Truck	1	8	400	220	0.091	0.084	0.771	0.250	2.515	0.002	0.09	0.08	0.77	0.25	2.52	0.00	0.73	0.67	6.17	2.00	20.12	0.02	0.08	0.07	0.68	0.22	2.21	0.00
Concrete Boom Truc	1	8	250	220	0.071	0.065	0.510	0.193	1.999	0.002	0.07	0.07	0.51	0.19	2.00	0.00	0.57	0.52	4.08	1.55	15.99	0.02	0.06	0.06	0.45	0.17	1.76	0.00
Aerial Lift	2	8	120	220	0.043	0.039	0.234	0.079	0.436	0.000	0.09	0.08	0.47	0.16	0.87	0.00	0.68	0.63	3.74	1.26	6.97	0.01	0.08	0.07	0.41	0.14	0.77	0.00
Light Plant	1	4	120*	220	0.090	0.082	0.561	0.171	1.058	0.001	0.09	0.08	0.56	0.17	1.06	0.00	0.36	0.33	2.24	0.68	4.23	0.00	0.04	0.04	0.25	0.08	0.47	0.00
Electrical Generator	1	8	175*	220	0.080	0.073	0.757	0.194	1.694	0.002	0.08	0.07	0.76	0.19	1.69	0.00	0.64	0.59	6.06	1.56	13.55	0.01	0.07	0.06	0.67	0.17	1.49	0.00
Crane	2	8	500	220	0.082	0.075	0.848	0.212	2.105	0.002	0.16	0.15	1.70	0.42	4.21	0.00	1.31	1.21	13.57	3.39	33.68	0.03	0.14	0.13	1.49	0.37	3.70	0.00
										Total	**0.85**	**0.78**	**6.41**	**1.96**	**16.57**	**0.02**	**6.42**	**5.91**	**49.01**	**15.02**	**128.33**	**0.12**	**0.71**	**0.65**	**5.39**	**1.65**	**14.12**	**0.01**

Notes:
* - Equipment hp rating assumed
Equipment list, quantity, horsepower, and hours of operation EIF and Bibb
Emission factors from CARB Off-road Mobile Source Emission Factors (2006-2020). (2007 data used).
Values presented are scaled (as needed) to match the HP presented.
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.
PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for onroad or offroad diesel vehicles.
All Trucks are assumed to be Off-Highway Trucks.
Aerial Lift is a Forklift, Light Plant is Other Construction Equipment.

EMISSION FACTOR FOR ONROAD VEHICLES

Onroad Vehicle	Fuel Type	Vehicle Count	Weight (lbs)	Vehicle Type	EF (lbs/mile) TOC	CO	NOx	PM_{10}	SO_2
Passenger Vehicles	G/D	120	4000	LDA	1.38E-03	1.28E-02	1.36E-03	8.00E-05	9.00E-06

Emission factors from SCAQMD Emission Factors for Onroad Vehicles for 2007 from EMFAC2002 (version 2.2)

EMISSION CALCULATION FOR ONROAD VEHICLES

	Total Op.	Trips or Hours/Day	Round Trip Distance	Daily Total VMT	Daily Emissions (lbs) TOC	CO	NOx	PM_{10}	SO_2	PM2.5
Highway Vehicles	**Total Days**									
Passenger Vehicles	264	1	90	10800	14.9	138.5	14.7	0.9	9.72E-02	0.1

Annual Emission Rate (tons/year)					
TOC	**CO**	**NOx**	**PM10**	**SO2**	**PM2.5**
1.97	18.28	1.94	0.11	0.01	0.02

MODEL EMISSION RATE INPUTS (pounds per hour)

CO 1-HR	CO 8-HR	NOx 1-HR	NOx Annual
2.14	2.14	5.52	1.0743
PM10 24-HR	PM10 Annual	PM2.5 24-HR	PM2.5 Annual
0.27	0.0537	0.25	0.0494
SO2 1-HR	SO2 3-HR	SO2 24-HR	SO2 Annual
0.01	0.01	0.00	9.80E-04

Minor differences between inputs and calculated values are due to rounding differences.
(3 volume sources)

Travel on unpaved road

Activity occurs in months 7 through 16 only.

$F = 2.1 * G/12 * H/30 * (J/3)^{0.7} * (I/4)^{0.5} * (365-K)/365$ SCAQMD Table A9-9-D

Emission factor for vehicle travel on unpaved roads (lb/VMT)

16 G = Surface silt loading (%) (from Table A9-9-D-1 for farm road)

4 H = Mean vehicle speed (mph)

4 I = Mean number of wheels on vehicle (average of equipment listed below)

19.90 J = Mean vehicle weight (ton) (average of equipment listed below)

98 K = Mean number of days per with at least 0.01 inches of precipitation (from Panoche Junction COOP weather station Western Regional Climate Center)

1.027 PM10 lb/VMT

Most of the equipment onsite will not be moving on a continuous basis.

Welder, Light Plant, Generator, Compressor assumed to weigh 1000 pounds each.

Equipment	Quantity	Hours/Day	Days/year	Miles travelled per hour	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM10 Emissions (tons/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)	PM2.5 Emissions (tons/yr)
Service Trucks	2	2	220	1	85%	0.31	0.62	0.07	0.07	0.13	0.01
Service Trucks will operate 2 hours at end of day, not during daily activities											
Water Truck	1	8	220	3	85%	0.46	3.70	0.41	0.10	0.78	0.09
Forklift	1	8	220	1	85%	0.15	1.23	0.14	0.03	0.26	0.03
Portable Air Compressor	1	8	220	0	85%	0.00	0.00	0.00	0.00	0.00	0.00
Welder	2	8	220	0	85%	0.00	0.00	0.00	0.00	0.00	0.00
Concrete Truck	1	8	220	0.75	85%	0.12	0.92	0.10	0.02	0.20	0.02
Concrete Boom Truck	1	8	220	0	85%	0.00	0.00	0.00	0.00	0.00	0.00
Aerial Lift	2	8	220	1	85%	0.31	2.46	0.27	0.07	0.52	0.06
Light Plant	1	8	220	0	85%	0.00	0.00	0.00	0.00	0.00	0.00
Electrical Generator	1	8	220	0	85%	0.00	0.00	0.00	0.00	0.00	0.00
Crane	2	8	220	0	85%	0.00	0.00	0.00	0.00	0.00	0.00
					Total	**0.6**	**4.6**	**0.5**	**0.1**	**1.0**	**0.1**

Assumed maximum travel speed is 10 mph

Crane weight average of 4 cranes listed below.

Water and Dump Truck weights from SCAQMD Table A9-9-D-3 for Waste Dump trucks

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

No more than 1 concrete trucks onsite at any one time.

Passenger vehicle travel on paved roads

0.0064 PM10 lb/VMT (from Table A9-9-B-1 for major streets/highways) CEQA Table A9-9-B

Equipment	Monthly Average Number of Employees	Hours/Day	Days/year	Miles travelled per trip	Total miles travelled per year	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM10 Emissions (tons/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)	PM2.5 Emissions (tons/yr)
All Employee Vehicles	120	2	264	90	2851200	34.56	69.12	9.124	5.84	11.68	1.54

Assumed average distance travelled off site for all employees commuting will be 45 miles (approximate distance to Fresno) times 2 for return trip 90 miles

Employee numbers based on total employees on site (2317) for 13 months, based on AFC Data Needs checklist item A37 - Total Workforce

Assumed 1.5 employees per vehicle

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

Equipment weight from Caterpillar website (www.cat.com/cda).

Concrete vehicle and Crane weights from various websites.

PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.

PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.

MODEL EMISSION RATE INPUTS (pounds per hour)

PM10 24-H	PM10 Annua	PM2.5 24-H	PM2.5 Annual
0.578	0.116	0.064	0.025

Minor differences between inputs and calculated values are due to rounding differences.

Equipment	Wheels	Weight (tons)	Caterpillar Model
Water Truck	10	13.00	
Forklift	4	7.74	TH330B
Portable Air Compressor	4	0.5	
Welder	4	1	
Concrete Truck	10	30	
Concrete Boom Truck	10	25	
Aerial Lift	8	15.47	TH330B
Light Plant	4	0.5	
Electrical Generator	4	0.5	
Crane		165.00	
	58	**258.71**	
	4	19.90	

Cranes (500 hp)	Weight (tons)
Terex DeMag	79.0
Lieber 1800	105
Lieber 1300	79
Grove GMK5240	67
TOTAL	**330.00**
AVERAGE WT	82.50

NG Pipeline Construction - Diesel Fired Equipment

Activity occurs in month 13 only (overlap with building construction).

					Emission factors (lb/hr)						Hourly Emissions (lb/hr)						Daily Emissions (lb/day)						Annual Emissions (ton/yr)					
Equipment	**Quantity**	**Hours/Day**	**Horsepower**	**Days/year**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**
Backhoe	1	8	100	22	0.061	0.056	0.382	0.132	0.592	0.001	0.06	0.06	0.38	0.13	0.59	0.00	0.49	0.45	3.05	1.06	4.74	0.00	0.005	0.005	0.034	0.012	0.052	0.000
Wheeled Dozer	1	8	250	22	0.124	0.114	0.884	0.314	2.800	0.002	0.12	0.11	0.88	0.31	2.80	0.00	0.99	0.91	7.07	2.51	22.40	0.02	0.011	0.010	0.078	0.028	0.246	0.000
Water Truck	1	8	250	22	0.071	0.065	0.510	0.193	1.999	0.002	0.07	0.07	0.51	0.19	2.00	0.00	0.57	0.52	4.08	1.55	15.99	0.02	0.006	0.006	0.045	0.017	0.176	0.000
Pipelayer	1	8	150	22	0.096	0.088	0.664	0.207	1.426	0.011	0.10	0.09	0.66	0.21	1.43	0.01	0.77	0.71	5.31	1.66	11.41	0.09	0.008	0.008	0.058	0.018	0.126	0.001
										Total	**0.35**	**0.32**	**2.44**	**0.85**	**6.82**	**0.02**	**2.81**	**2.59**	**19.51**	**6.77**	**54.55**	**0.13**	**0.03**	**0.03**	**0.21**	**0.07**	**0.60**	**0.00**

Notes:
Equipment list, quantity, horsepower, and hours of operation from EIF and Bibb
Emission factors from CARB Off-road Mobile Source Emission Factors (2006-2020). (2007 data used). Values presented are scaled to match the HP presented.
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions. PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for onroad or offroad diesel vehicles.
Pipelayer is Crawler Tractor

Travel on unpaved road

Activity occurs in month 13 only.

$F = 2.1 * G/12 * H/30 * (J/3)^{0.7} * (I/4)^{0.5} * (365-K)/365$ SCAQMD Table A9-9-D

Emission factor for vehicle travel on unpaved roads (lb/VMT)

16 G = Surface silt loading (%) (from Table A9-9-D-1 for farm road)
2 H = Mean vehicle speed (mph)
4 I = Mean number of wheels on vehicle (from Table A9-9-D-3)
16.82 J = Mean vehicle weight (ton) (from Caterpillar website, average of 4 pieces of equipment)
98 K = Mean number of days per with at least 0.01 inches of precipitation (from Panoche Junction COOP weather station Western Regional Climate Center)
0.457 PM10 lb/VMT

Equipment	Quantity	Hours/Day	Days/year	Miles travelled per hour	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM10 Emissions (tons/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)	PM2.5 Emissions (tons/yr)
Service Trucks	2	2	22	1	85%	0.14	0.27	0.00	0.03	0.06	0.00
Service Trucks will operate 2 hours at end of day, not during daily activities											
Backhoe	1	8	22	1	85%	0.07	0.55	0.01	0.01	0.12	0.00
Wheeled Dozer	1	8	22	1	85%	0.07	0.55	0.01	0.01	0.12	0.00
Water Truck	1	8	22	5	85%	0.34	2.74	0.03	0.07	0.58	0.01
Pipelayer	1	8	22	1	85%	0.07	0.55	0.01	0.01	0.12	0.00
					Total	**0.55**	**4.38**	**0.05**	**0.12**	**0.93**	**0.01**

Equipment weight from Caterpillar website (www.cat.com/cda)
Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.
PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.
Pipelayer is Crawler Tractor

Equipment	Weight (tons)	Caterpillar Model
Backhoe	11.78	430E
Wheeled Dozer	23.94	814F
Water Truck	13.00	
Pipelayer	18.58	561N
	67.30	**TOTAL**
	16.82	AVERAGE WT

Substation Expansion - Diesel Fired Equipment

Activity occurs in months 14 through 18 only (three months of overlap with building construction).

					Emission factors (lb/hr)						Hourly Emissions (lb/hr)						Daily Emissions (lb/day)						Annual Emissions (ton/yr)					
Equipment	**Quantity**	**Hours/Day**	**Horsepower**	**Days/year**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**
Loader	1	8	100	110	0.056	0.052	0.382	0.132	0.592	0.001	0.06	0.05	0.38	0.13	0.59	0.00	0.45	0.42	3.05	1.06	4.74	0.00	0.025	0.023	0.168	0.058	0.261	0.000
Backhoe	1	8	80	110	0.049	0.045	0.388	0.147	0.487	0.000	0.05	0.05	0.39	0.15	0.49	0.00	0.40	0.36	3.11	1.17	3.89	0.00	0.022	0.020	0.171	0.065	0.214	0.000
Hydraulic Lift	2	8	120	110	0.043	0.039	0.234	0.079	0.436	0.000	0.09	0.08	0.47	0.16	0.87	0.00	0.68	0.63	3.74	1.26	6.97	0.01	0.038	0.035	0.206	0.069	0.384	0.000
										Total	**0.19**	**0.18**	**1.24**	**0.44**	**1.95**	**0.00**	**1.53**	**1.41**	**9.90**	**3.49**	**15.61**	**0.01**	**0.08**	**0.08**	**0.54**	**0.19**	**0.86**	**0.00**

Notes:
Equipment list, quantity, horsepower, and hours of operation from EIFand Bibb
Emission factors from CARB Off-road Mobile Source Emission Factors (2006-2020). (2007 data used). Values presented are scaled to match the HP presented.
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions. PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for onroad or offroad diesel vehicles.
Hydraulic Lift is Forklift

MODEL EMISSION RATE INPUTS (pounds per hour)

CO 1-HR	CO 8-HR	NOx 1-HR	NOx Annual
0.62	0.62	0.98	0.0980

PM10 24-HR	PM10 Ann	PM2.5 24-H	PM2.5 Annual
0.10	0.0096	0.09	0.0088

SO2 1-HR	SO2 3-HR	SO2 24-HR	SO2 Annual
9.17E-04	9.17E-04	9.17E-04	9.21E-05

Minor differences between inputs and calculated values are due to rounding differences.
(2 volume sources)

Travel on unpaved road

Activity occurs in months 14 through 18 only.

$F = 2.1 * G/12 * H/30 * (J/3)^{0.7} * (I/4)^{0.5} * (365-K)/365$ SCAQMD Table A9-9-D

Emission factor for vehicle travel on unpaved roads (lb/VMT)

16 G = Surface silt loading (%) (from Table A9-9-D-1 for farm road)
5 H = Mean vehicle speed (mph)
4 I = Mean number of wheels on vehicle (from Table A9-9-D-3)
6.78 J = Mean vehicle weight (ton) (average from equipment listed below)
98 K = Mean number of days per with at least 0.01 inches of precipitation (from Panoche Junction COOP weather station Western Regional Climate Center)
0.604 PM10 lb/VMT

Equipment	Quantity	Hours/Day	Days/year	Miles travelled per hour	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM10 Emissions (tons/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)	PM2.5 Emissions (tons/yr)
Service Trucks	2	2	110	1	85%	0.18	0.36	0.02	0.04	0.08	0.00
Service Trucks will operate 2 hours at end of day, not during daily activities											
Loader	1	6	110	5	85%	0.45	2.72	0.15	0.10	0.58	0.03
Backhoe	1	6	110	1	85%	0.09	0.54	0.03	0.02	0.12	0.01
Hydraulic Lift	1	8	110	5	85%	0.45	3.62	0.20	0.10	0.77	0.04
					Total	**1.00**	**6.89**	**0.38**	**0.21**	**1.46**	**0.08**

Equipment weight from Caterpillar website (www.cat.com/cda)
Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.
PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.

Equipment	Weight (tons)	Caterpillar Model
Loader	6.64	908
Backhoe	11.78	430E
Hydraulic Lift	7.74	TH330B
	33.90	**TOTAL**
	6.78	**AVERAGE**

MODEL EMISSION RATE INPUTS (pounds per hour)

PM10 24-HI	PM10 Annu	PM2.5 24-H	PM2.5 Annual
0.861	0.086	0.182	0.018

Minor differences between inputs and calculated values are due to rounding differences.

Panoche Energy Center
Wastewater Injection Well – Diesel Engine Characterization[1]

Overall Duration:	10 to 14 days per well, two wells total
Drawworks:	5 to 9 days, 24-hours per day 750 HP diesel engine ½ time full load ½ time idling
Generators:	Two @ 200 HP diesel engines Operate for the complete duration
Mud Pumps:	Two @ 500 HP diesel engines Operate 10 to 24 hours
Cement Truck:	One @ 400 HP diesel Operates for 4 hours
Loging Truck:	One @ 300 HP diesel Operates for 6 to 8 hours

[1] Rig type and engine emissions will vary depending on the rig selected and the specific well construction methods of the selected contractor.

Panoche Energy Center
Water Supply Wells – Engine Characterization[1]

Overall Duration:	60 to 70 days per well, two wells total
Drill Rig:	40 to 50 days, 24-hours per day One 500 HP diesel engine
Air Compressors:	One @ 200 HP diesel engine Operates for the complete duration, 24 hr/day
Generator:	One @ 25 HP diesel engine Operate for the complete duration, at night only
Cement Truck:	Ten truckloads @ 400 HP diesel Cementing takes 1 day only
Water Pump:	One @ 120 HP diesel Operate for 5 days
Welder:	One @ 25 HP diesel Operates for 48 hours over the duration
Pump Test Rig:	One @ 500 HP diesel Operates for 7 to 10 days, daytime only

[1] Rig type and engine emissions will vary depending on the rig selected and the specific well construction methods of the selected contractor.

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Panoche Energy Center					
Power Block Construction -Engine Characterization					
12/20/06, Rev 1					
Activity	**Type of Equipment (Quantity)**	**Engine Horsepower**	**Max No. of heavy vehicle trips**	**Vehicle Miles Traveled**	**Assumed roundtrip location**
1) Clearing and Grubbing					
	Wheel Loader (1)	500	NA	NA	NA
Overall Duration: 1 month	Chipper (1)	100	NA	NA	NA
	Dump Truck	300	67	133	within 1 mile
	Track Dozer (1)	500	NA	NA	NA
2) Civil Work (overex, rough grading and pond construction, fill import)					
	Motor Grader (1)	220	NA	NA	NA
Overall Duration: 2 months	Scaper (1)	460	NA	NA	NA
	Wheel Loader (1)	500	NA	NA	NA
	Compactor (1)	150	NA	NA	NA
	Dump Truck (fill import)	400	1,400	50,000	within 15 miles
	Track Dozer (1)	500	NA	NA	NA
	Water Truck (1)	250	NA	NA	NA
3) Concrete Pours (Foundations)					
	8 CY Concrete Truck	400	1,050	105,000	Fresno
Piling Duration: 2 months	Boom Pumper Truck (1)	400	NA	NA	NA
Foundation Pours: 8 months	Delivery Truck for Reinforcing Steel	400	21	2,110	Fresno
	Diesel Hammer -Pile Driver (1)	1.5 gal/hr	NA	NA	NA
	Delivery Truck for Piles	400	18	1,754	Fresno
	Crane (2)	500	NA	NA	NA
4) Natural Gas Pipeline					
	Backhoe Loader (1)	100	NA	NA	NA
Overall Duration: 1 month	Pipelayer (1)	150	NA	NA	NA
	Wheel Dozer (1)	400	NA	NA	NA

EMISSION CALCULATIONS FOR ONROAD HEAVY DUTY VEHICLES

EMISSION FACTOR FOR ONROAD VEHICLES

Onroad Vehicle	Fuel Type	Vehicle Count	Weight (lbs)	Vehicle Type	EF (lbs/VMT) [1]				
					TOC	CO	NOx	PM10	SO2
TREE REMOVAL - Dump Truck	D	1	46000	HHD	1.72E-03	6.45E-03	3.08E-02	6.45E-04	2.15E-05
EARTH TRANSPORT - Dump Truck	D	2	46000	HHD	1.72E-03	6.45E-03	3.08E-02	6.45E-04	2.15E-05
CONCRETE DELIVERIES - Heavy Duty Delivery Truck	D	2	28000	HHD	1.72E-03	6.45E-03	3.08E-02	6.45E-04	2.15E-05

1. To obtain the emission factors, EMFAC2002 was run in the "planning inventory" mode for the modeling year of 2007. The San Benito County average fleet information was chosen, and the inventory was run for winter. The emission factor for a given vehicle category was back calculated using the daily emissions and daily VMT for that vehicle category.

EMISSION CALCULATION FOR ONROAD VEHICLES

Onroad Vehicles[1]	Total Days[2]	Total Trips / Activity	Total Trips / Day	Round Trip	Daily Total VMT	Daily Emissions (lbs)					Project Emissions (lbs)				
						TOC	CO	NOx	PM10	SO2	TOC	CO	NOx	PM10	SO2
TREE REMOVAL - Dump Truck	22	67	3	30	91.4	1.57E-01	5.89E-01	2.81E+00	5.89E-02	1.96E-03	3.46E+00	1.30E+01	6.18E+01	1.30E+00	4.32E-02
EARTH TRANSPORT - Dump Truck	44	1,400	32	10	318.2	5.47E-01	2.05E+00	9.78E+00	2.05E-01	6.84E-03	2.41E+01	9.03E+01	4.31E+02	9.03E+00	3.01E-01
CONCRETE DELIVERIES - Heavy Duty Delivery Truck	176	1050	6	100	596.6	1.03E+00	3.85E+00	1.83E+01	3.85E-01	1.28E-02	1.81E+02	6.77E+02	3.23E+03	6.77E+01	2.26E+00
Total					**Total**	**1.73 lbs**	**6.49 lbs**	**30.94 lbs**	**0.65 lbs**	**0.02 lbs**	**208.19 lbs**	**780.71 lbs**	**3721.38 lbs**	**78.07 lbs**	**2.60 lbs**
											0.10	**0.39**	**1.86**	**0.04**	**0.0 tons**

1. Based on equipment usage as given for each respective phase:
Tree Removal - Clear & Grubb Phase
Earth Transport - Grading Phase
Concrete Deliveries - Building Phase
2. Total Days based on 5 days/week, 22 days/month schedule

FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED ROAD

Vehicle Type	Mean Vehicles Speed (mph) [Vehicles Weight (tons)]	Total No. Of Trips / Day	PM10 EF (lbs/VMT) [1]	Round Trip Distance (mile)	Daily Total VMT (all units)	Total No. of Days Operated	VMT/ Project	Daily Emissions (lbs)	Project Emissions (lbs)
TREE REMOVAL - Dump Truck	[23]	3	0.0792	30	91.4	22	2,010	7.24	159.22
EARTH TRANSPORT - Dump Truck	[23]	32	0.0792	10	318.2	44	14,000	25.20	1109.00
CONCRETE DELIVERIES - Heavy Duty Delivery Truck	[14]	6	0.0634	100	596.6	176	105,000	37.80	6652.31
Total								**70**	**7,921**

1. EF are calculated using equations in AP-42, Section 13.2.2. Equation 1a is used for heavy duty trucks.
EF calculations are based on the following assumptions:

Paved road silt content (%)	0.1348	SCAQMD CEQA Table A-9-C-1, 5% local, 5% collector, 90% freeway		
Silt Loading	0.04	oz/yr^2	1.356 g/m^2	SCAQMD CEQA Table A9-9-C-1.

Title : San Benito County Avg 2007 Winter Default Title
Version : Emfac2002 V2.2 Apr 23 2003
Run Date : 01/04/07 11:58:42
Scen Year: 2007 -- Model Years: 1965 to 2007
Season : Winter
Area : San Benito County Average
I/M Stat : I and M program in effect
Emissions: Tons Per Day
****

Dump And Delivery Trucks

	HHDT-NCAT	HHDT-CAT	HHDT-DSL
Vehicles	8	42	536
VMT/1000	0	4	93
Trips	362	1917	2713
Total Organic Gas Emissions			
Run Exh	0	0.02	0.08
Idle Exh	0	0	0.01
Start Ex	0.01	0.02	0
	---	---	---
Total Ex	0.01	0.03	0.08
Diurnal	0	0	0
Hot Soak	0	0	0
Running	0	0.01	0
Resting	0	0	0
	---	---	---
Total	0.02	0.04	0.08
EF (lbs/VMT)			**0.00172043**
Carbon Monoxide Emissions			
Run Exh	0.08	0.23	0.28
Idle Exh	0	0	0.03
Start Ex	0.12	0.29	0
	---	---	---
Total Ex	0.2	0.51	0.3
EF (lbs/VMT)			**0.006451613**
Oxides of Nitrogen Emissions			
Run Exh	0	0.06	1.35
Idle Exh	0	0	0.08
Start Ex	0	0.02	0
	---	---	---
Total Ex	0.01	0.09	1.43
EF (lbs/VMT)			**0.030752688**
Carbon Dioxide Emissions (000)			
Run Exh	0	0	0.22
Idle Exh	0	0	0
Start Ex	0	0	0
	---	---	---
Total Ex	0	0	0.23
EF (lbs/VMT)			**0.004946237**
PM10 Emissions			
Run Exh	0	0	0.03
Idle Exh	0	0	0
Start Ex	0	0	0
	---	---	---
Total Ex	0	0	0.03
TireWear	0	0	0
BrakeWr	0	0	0
	---	---	---
Total	0	0	0.03
EF (lbs/VMT)			**0.000645161**
Lead	0	0	0
		SOx	0.001
EF (lbs/VMT)			**0.0000215054**
Fuel Consumption (000 gallons)			
Gasoline	0.05	0.33	0
Diesel	0	0	20.47

```
1 2 20 6 30423          ! Number of scenarios in file, version info
San Benito County Avg 2007 Winter Default Title ! Scenario Title
Burden    8  2          ! Program mode TOG  PM10
2007                    ! Calendar Year
14                      ! Month/Season
 4                      ! Geographic area selection: San Benito County
35                      ! County Number
FFFFF                   ! WEIGHT Output Options
FFFTF                   ! EMFAC Output Options
TTTFF                   ! BURDEN Output Options
FTFFF                   ! CALIMFAC Output Options
FFFFF                   ! EMFACnn Output Options
25                      ! First hour printed for detailed Burden output
6 1                     ! Bag and correction for Calimfac output
1965                    ! First model year considered in calculations
2007                    ! Last model year considered in calculations

                        ! Data on I/M Programs
                        ! --------------------
 3                      ! Number of I/M programs (num_prog) in scenario  1
17                      ! Area used for I/M basis: San Benito (NCC)
 3  1 1992              ! Subprograms, start month, and start year for I/M program  1
 2 2 2                  ! Inspection frequency (1=Annual, 2=Biennial)
 1 1 2                  ! Test method
 3 3 3                  ! Visual/Functional checks
 2 2 2                  ! Exhaust Cutpoint Stringency
 2 2 2                  ! Repair Cost
 2 2 2                  ! Mechanic Inspection Effectiveness
 0  0  0                ! Minimum vehicle age
 45 45 45               ! Maximum vehicle age
 1966 1966 1980         ! Minimum model year
 2040 1979 2040         ! Maximum model year
 1 1 1                  ! Free years
 0 0 0                  ! Years to skip
 2 2 2                  ! Mechanic Repair Effectiveness
 1 1 1                  ! Evap test: 1 => None, 2 => Gas Cap, 3 => Pressure-purge
 0.17 0.17 0.17         ! Change of ownership percentage
 0.00 0.00 0.00         ! Annual % vehs captured by random roadside program
 0.00 0.00 0.00         ! Annual % vehs captured by remote sensing program
 0.00 0.00 0.00         ! Annual % vehs captured by tamper detection program
 0  0  0                ! Years of annual inspections for a gross polluter
 0  0  0                ! Zero if high-emitter profile is not used
 F  F  F                ! True if bad exhaust text algorithm is used
 T  T  T                ! True if ARB's OBD II assumptions are used for OBD II vehicles
 F  T  T                ! All PCs  included in program [Yes(T) or No(F)]
 F  T  T                ! All LDT  included in program [Yes(T) or No(F)]
 F  T  T                ! All MDV  included in program [Yes(T) or No(F)]
 T  F  F                ! All HDGV included in program [Yes(T) or No(F)]
 F  F  F                ! All HDDV included in program [Yes(T) or No(F)]
 F  F  F                ! All MCs  included in program [Yes(T) or No(F)]
                        ! Tech groups (if any) in subprogram.
 1  7 1996              ! Subprograms, start month, and start year for I/M program  2
 2                      ! Inspection frequency (1=Annual, 2=Biennial)
 2                      ! Test method
 3                      ! Visual/Functional checks
 3                      ! Exhaust Cutpoint Stringency
 2                      ! Repair Cost
 2                      ! Mechanic Inspection Effectiveness
 0                      ! Minimum vehicle age
 45                     ! Maximum vehicle age
 1966                   ! Minimum model year
 2040                   ! Maximum model year
 1                      ! Free years
 0                      ! Years to skip
 2                      ! Mechanic Repair Effectiveness
 1                      ! Evap test: 1 => None, 2 => Gas Cap, 3 => Pressure-purge
 0.17                   ! Change of ownership percentage
 0.00                   ! Annual % vehs captured by random roadside program
 0.00                   ! Annual % vehs captured by remote sensing program
 0.00                   ! Annual % vehs captured by tamper detection program
 0                      ! Years of annual inspections for a gross polluter
 0                      ! Zero if high-emitter profile is not used
 F                      ! True if bad exhaust text algorithm is used
 T                      ! True if ARB's OBD II assumptions are used for OBD II vehicles
 T                      ! All PCs  included in program [Yes(T) or No(F)]
 T                      ! All LDT  included in program [Yes(T) or No(F)]
 T                      ! All MDV  included in program [Yes(T) or No(F)]
 T                      ! All HDGV included in program [Yes(T) or No(F)]
 F                      ! All HDDV included in program [Yes(T) or No(F)]
 F                      ! All MCs  included in program [Yes(T) or No(F)]
                        ! Tech groups (if any) in subprogram.
 2  6 1998              ! Subprograms, start month, and start year for I/M program  3
 2 2                    ! Inspection frequency (1=Annual, 2=Biennial)
 2 2                    ! Test method
 3 3                    ! Visual/Functional checks
 3 3                    ! Exhaust Cutpoint Stringency
 3 3                    ! Repair Cost
 2 2                    ! Mechanic Inspection Effectiveness
 0  0                   ! Minimum vehicle age
 30 30                  ! Maximum vehicle age
 1974 1974              ! Minimum model year
 2040 2040              ! Maximum model year
 4 4                    ! Free years
 0 0                    ! Years to skip
 2 2                    ! Mechanic Repair Effectiveness
 2 2                    ! Evap test: 1 => None, 2 => Gas Cap, 3 => Pressure-purge
 0.17 0.17              ! Change of ownership percentage
 0.00 0.00              ! Annual % vehs captured by random roadside program
 0.00 0.00              ! Annual % vehs captured by remote sensing program
 0.00 0.00              ! Annual % vehs captured by tamper detection program
 0  0                   ! Years of annual inspections for a gross polluter
 0  0                   ! Zero if high-emitter profile is not used
 F  F                   ! True if bad exhaust text algorithm is used
 T  T                   ! True if ARB's OBD II assumptions are used for OBD II vehicles
 F  T                   ! All PCs  included in program [Yes(T) or No(F)]
 F  T                   ! All LDT  included in program [Yes(T) or No(F)]
 F  T                   ! All MDV  included in program [Yes(T) or No(F)]
 T  F                   ! All HDGV included in program [Yes(T) or No(F)]
 F  F                   ! All HDDV included in program [Yes(T) or No(F)]
 F  F                   ! All MCs  included in program [Yes(T) or No(F)]
                        ! Tech groups (if any) in subprogram.
#
```

Title : San Benito County Avg 2007 Winter Default Title
Version : Emfac2002 V2.2 Apr 23 2003
Run Date : 01/04/07 11:58:42
Scen Year: 2007 -- Model Years: 1965 to 2007
Season : Winter
Area : San Benito County Average
I/M Stat : I and M program in effect
Emissions: Tons Per Day

	- - - Light Duty Passenger Cars - - -				- - - - - Light Duty Trucks - - - - -				- - - - - Medium Duty Trucks - - - -				----- Gasoline Trucks ------			- - - - H e a v y D u t y T r u c k s - - - Diesel	Total HD	Urban	Motor-	All
	Non-cat	Cat	Diesel	Total	Non-cat	Cat	Diesel	Total	Non-cat	Cat	Diesel	Total	Non-cat	Cat	Total	Trucks	Trucks	Buses	cycles	Vehicles
Vehicles	372.	20585.	101.	21059.	431.	16864.	465.	17760.	66.	3988.	354.	4407.	94.	724.	817.	1081.	1899.	37.	1691.	46853.
VMT/1000	5.	789.	3.	796.	7.	634.	14.	655.	1.	172.	22.	194.	1.	19.	21.	127.	147.	5.	16.	1814.
Trips	1532.	130035.	580.	132148.	1827.	106013.	2850.	110691.	547.	45994.	3928.	50469.	2387.	7870.	10256.	15232.	25489.	148.	3382.	322326.
Total Organic Gas Emissions																				
Run Exh	0.04	0.13	0.00	0.17	0.05	0.14	0.00	0.19	0.01	0.04	0.01	0.06	0.01	0.03	0.04	0.09	0.13	0.01	0.08	0.64
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
Start Ex	0.01	0.14	0.00	0.16	0.01	0.14	0.00	0.15	0.01	0.05	0.00	0.06	0.04	0.03	0.07	0.00	0.07	0.00	0.01	0.46
Total Ex	0.05	0.27	0.00	0.33	0.07	0.28	0.00	0.34	0.01	0.10	0.01	0.12	0.06	0.06	0.12	0.10	0.21	0.01	0.09	1.11
Diurnal	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Hot Soak	0.01	0.02	0.00	0.03	0.01	0.02	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Running	0.04	0.11	0.00	0.15	0.02	0.15	0.00	0.18	0.00	0.04	0.00	0.05	0.01	0.02	0.04	0.00	0.04	0.00	0.01	0.42
Resting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Total	0.09	0.41	0.00	0.51	0.10	0.46	0.00	0.56	0.02	0.15	0.01	0.18	0.07	0.08	0.16	0.10	0.25	0.01	0.11	1.62
Carbon Monoxide Emissions																				
Run Exh	0.47	2.60	0.00	3.07	0.68	3.09	0.01	3.78	0.16	0.68	0.03	0.88	0.31	0.46	0.77	0.36	1.13	0.08	1.09	10.03
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.04
Start Ex	0.06	1.53	0.00	1.58	0.07	1.70	0.00	1.77	0.03	0.57	0.00	0.60	0.26	0.54	0.81	0.00	0.81	0.01	0.04	4.81
Total Ex	0.52	4.13	0.00	4.66	0.74	4.79	0.01	5.55	0.19	1.26	0.03	1.49	0.57	1.00	1.58	0.39	1.97	0.09	1.13	14.88
Oxides of Nitrogen Emissions																				
Run Exh	0.03	0.36	0.00	0.39	0.04	0.49	0.02	0.55	0.01	0.17	0.12	0.30	0.01	0.11	0.12	1.71	1.83	0.03	0.03	3.13
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.00	0.00	0.09
Start Ex	0.00	0.08	0.00	0.09	0.00	0.10	0.00	0.10	0.00	0.08	0.00	0.08	0.00	0.04	0.05	0.00	0.05	0.00	0.00	0.31
Total Ex	0.03	0.44	0.00	0.47	0.04	0.59	0.02	0.65	0.01	0.25	0.12	0.38	0.01	0.15	0.16	1.80	1.96	0.04	0.03	3.53
Carbon Dioxide Emissions (000)																				
Run Exh	0.00	0.32	0.00	0.32	0.00	0.31	0.01	0.32	0.00	0.14	0.01	0.15	0.00	0.01	0.02	0.28	0.29	0.01	0.00	1.10
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Ex	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Total Ex	0.00	0.33	0.00	0.33	0.00	0.33	0.01	0.33	0.00	0.14	0.01	0.15	0.00	0.01	0.02	0.28	0.30	0.01	0.00	1.13
PM10 Emissions																				
Run Exh	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.07
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Ex	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Ex	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.07
TireWear	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
BrakeWr	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Total	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.04	0.05	0.00	0.00	0.12
Lead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SOx	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01

Fuel Consumption (000 gallons)

Gasoline	0.39	34.29	0.00	34.68	0.56	34.14	0.00	34.70	0.12	14.73	0.00	14.85	0.26	1.68	1.94	0.00	1.94	0.31	0.44	86.92
Diesel	0.00	0.00	0.09	0.09	0.00	0.00	0.48	0.48	0.00	0.00	1.08	1.08	0.00	0.00	0.00	25.48	25.48	0.41	0.00	27.54

Title : San Benito County Avg 2007 Winter Default Title
Version : Emfac2002 V2.2 Apr 23 2003
Run Date : 01/04/07 11:58:42
Scen Year: 2007 -- Model Years: 1965 to 2007
Season : Winter
Area : San Benito County Average
I/M Stat : I and M program in effect
Emissions: Tons Per Day

	- - - Light Duty Trucks 1 (T1) - - -				- - - Light Duty Trucks 2 (T2) - - -				- - - Medium Duty Trucks (T3) - - -				- Light-Heavy Duty Trucks 1 (T4) - -				- Light-Heavy Duty Trucks 2 (T5) - -				- Medium-Heavy Duty Trucks (T6) - -				HH Duty	School Buses		Urban Buses		Total
	Non-cat	Cat	Diesel	Total	Non-cat	Cat	Diesel	Total	Non-cat	Cat	Diesel	Total	Non-cat	Cat	Diesel	Total	Non-cat	Cat	Diesel	Total	Non-cat	Cat	Diesel	Total	Diesel Trks	Gas	Diesel	Gas	Diesel	Buses
Vehicles	266.	9680.	376.	10322.	165.	7184.	89.	7438.	57.	3207.	83.	3347.	9.	688.	158.	855.	0.	92.	112.	204.	82.	674.	498.	1254.	536.	12.	47.	25.	12.	96.	
VMT/1000	4.	364.	11.	379.	3.	270.	3.	276.	1.	119.	3.	123.	0.	47.	12.	59.	0.	6.	7.	12.	1.	15.	31.	47.	93.	1.	2.	3.	2.	8.	
Trips	1122.	60685.	2300.	64108.	705.	45328.	550.	46583.	253.	20185.	528.	20966.	294.	22756.	1991.	25042.	0.	3052.	1408.	4460.	2007.	5923.	12331.	20261.	2713.	47.	188.	99.	49.	382.	

Total Organic Gas Emissions

Run Exh	0.03	0.08	0.00	0.11	0.02	0.06	0.00	0.08	0.01	0.04	0.00	0.05	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.03	0.08	0.00	0.00	0.01	0.00	0.01	
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
Start Ex	0.01	0.08	0.00	0.09	0.01	0.06	0.00	0.07	0.00	0.04	0.00	0.04	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	
Total Ex	0.04	0.15	0.00	0.20	0.03	0.12	0.00	0.15	0.01	0.08	0.00	0.09	0.00	0.02	0.01	0.03	0.00	0.00	0.00	0.01	0.04	0.03	0.01	0.08	0.08	0.00	0.00	0.01	0.00	0.02	
Diurnal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Hot Soak	0.01	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Running	0.02	0.09	0.00	0.11	0.01	0.06	0.00	0.07	0.00	0.03	0.00	0.03	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	
Resting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total	0.06	0.26	0.00	0.32	0.04	0.20	0.00	0.23	0.01	0.11	0.00	0.13	0.01	0.03	0.01	0.04	0.00	0.01	0.00	0.01	0.05	0.04	0.01	0.11	0.08	0.00	0.00	0.01	0.00	0.02	

Carbon Monoxide Emissions

Run Exh	0.42	1.82	0.01	2.25	0.26	1.27	0.00	1.53	0.15	0.62	0.00	0.77	0.02	0.04	0.02	0.08	0.00	0.02	0.01	0.03	0.18	0.21	0.07	0.47	0.28	0.06	0.01	0.08	0.00	0.15	
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	
Start Ex	0.04	0.98	0.00	1.02	0.03	0.72	0.00	0.75	0.01	0.40	0.00	0.42	0.01	0.14	0.00	0.15	0.00	0.03	0.00	0.03	0.14	0.26	0.00	0.40	0.00	0.01	0.00	0.01	0.00	0.01	
Total Ex	0.46	2.80	0.01	3.27	0.28	1.99	0.00	2.28	0.16	1.02	0.00	1.19	0.03	0.19	0.02	0.23	0.00	0.06	0.01	0.07	0.32	0.47	0.08	0.87	0.30	0.07	0.01	0.09	0.00	0.17	

Oxides of Nitrogen Emissions

Run Exh	0.02	0.24	0.02	0.28	0.01	0.25	0.00	0.27	0.01	0.15	0.01	0.16	0.00	0.02	0.07	0.09	0.00	0.00	0.04	0.05	0.00	0.04	0.33	0.38	1.35	0.00	0.03	0.01	0.02	0.07	
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	
Start Ex	0.00	0.04	0.00	0.04	0.00	0.06	0.00	0.06	0.00	0.03	0.00	0.03	0.00	0.04	0.00	0.04	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	
Total Ex	0.03	0.28	0.02	0.33	0.02	0.30	0.00	0.32	0.01	0.18	0.01	0.19	0.00	0.06	0.07	0.13	0.00	0.01	0.05	0.06	0.01	0.06	0.34	0.41	1.43	0.00	0.04	0.01	0.02	0.07	

Carbon Dioxide Emissions (000)

Run Exh	0.00	0.18	0.00	0.19	0.00	0.13	0.00	0.14	0.00	0.08	0.00	0.08	0.00	0.05	0.01	0.06	0.00	0.01	0.00	0.01	0.00	0.01	0.05	0.06	0.22	0.00	0.00	0.00	0.00	0.01	
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Start Ex	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total Ex	0.00	0.19	0.00	0.19	0.00	0.14	0.00	0.14	0.00	0.08	0.00	0.09	0.00	0.05	0.01	0.06	0.00	0.01	0.00	0.01	0.00	0.01	0.05	0.06	0.23	0.00	0.00	0.00	0.00	0.01	

PM10 Emissions

Run Exh	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.00	0.00	0.00	0.00	0.00	
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Start Ex	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total Ex	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.00	0.00	0.00	0.00	0.00	
TireWear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
BrakeWr	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.00	0.00	0.00	0.00	0.00	
Lead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
SOx	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Fuel Consumption (000 gallons)

Gasoline	0.34	19.58	0.00	19.92	0.21	14.56	0.00	14.78	0.10	8.78	0.00	8.88	0.02	5.31	0.00	5.33	0.00	0.64	0.00	0.64	0.18	1.31	0.00	1.49	0.00	0.06	0.00	0.31	0.00	0.37	
Diesel	0.00	0.00	0.37	0.37	0.00	0.00	0.10	0.10	0.00	0.00	0.11	0.11	0.00	0.00	0.63	0.63	0.00	0.00	0.35	0.35	0.00	0.00	4.66	4.66	20.47	0.00	0.34	0.00	0.41	0.76	

TECHNICAL AREA: AIR QUALITY

Data Request 13 Rev: Please describe how much of the surface soils will need to be removed, and how much will have to be excavated and recompacted, and describe the final disposal for the removed soils.

Response:

Exporting of soils from the site will not be required. Plant drainage will work with a plant elevation of 411 feet. The amount of fill that will need to be imported from borrow areas is roughly 30,000 cubic yards (cy) instead of 60,000 cy.

TECHNICAL AREA: AIR QUALITY

Data Request 14 Rev: Please identify if these notations provide "smaller than 200" sieve percentages based on actual sieve results or are visual estimates, or whether they note something else entirely.

Response:

The "-200" numbers are the percentage of materials that pass through a 200 mesh screen, which is generally considered the mesh that defines the break point for fine grain materials (i.e., silt and/or clay). The reported percentages were determined by actual tests. The test methods utilized and the meaning of the data presented in the soil bore logs are explained in Appendix B of the Geotechnical report.

TECHNICAL AREA: AIR QUALITY

Data Request 15 Rev: Please provide the equipment and fugitive dust assumptions for both the pipeline and substation construction phases and indicate whether either of these two construction activities would overlap the schedule for other onsite construction activities.

Response:

A new Excel workbook with separate spreadsheets showing the equipment exhaust and fugitive dust emissions estimates for each construction activity has been prepared in lieu of the previous URBEIS2002 model calculations. The spreadsheets are notated to document the sources of emission factors and assumptions used in developing the emissions estimates. Please see the revised spreadsheets provided in the response to Data Request 12, the revised spreadsheets replace those originally presented in Appendix I, Attachment B of the AFC.

TECHNICAL AREA: AIR QUALITY

Data Request 16 Rev: Please confirm that emulsified diesel is proposed for construction, or revise the URBEMIS modeling runs appropriately.

Response:

As noted in previous responses, the construction emissions have been recalculated using spreadsheets, rather than URBEMIS, and South Coast AQMD emission factors recommended by CEC, which do not assume the use of emulsified diesel fuel.

TECHNICAL AREA: AIR QUALITY

Data Request 17 Rev: Please provide an appropriate correction for the fugitive dust mitigation efficiency overestimate by URBEMIS considering the applicant's proposed fugitive dust mitigation measures.

Response:

As described in previous responses, pollutant emissions for all construction activities have been recalculated using a different approach. Please see the revised spreadsheets provided in the response to Data Request 12, the revised spreadsheets replace those originally presented in Appendix I, Attachment B of the AFC. The spreadsheets clearly show the level of dust control assumed for each activity. In most cases, an 85% reduction in dust emissions was credited for watering the site at least three times daily or applying chemical dust suppressants on disturbed bare areas.

TECHNICAL AREA: AIR QUALITY

Data Request 18 Rev: Please review all of the modeling inputs, correct as necessary based on this request and other applicable data requests using URBEMIS or an alternative more site specific emission estimating approach and resubmit the construction emission estimates.

Response:

A new Excel workbook with separate spreadsheets showing the equipment exhaust and fugitive dust emissions estimates for each construction activity has been prepared in lieu of the previous URBEIS2002 model calculations. The spreadsheets are notated to document the sources of emission factors and assumptions used in developing the emissions estimates. Please see the revised spreadsheets provided in the response to Data Request 12, the revised spreadsheets replace those originally presented in Appendix I, Attachment B of the AFC.

TECHNICAL AREA: AIR QUALITY

Data Request 19 Rev: To confirm these estimates, please identify the maximum number of daily heavy vehicle trips and VMT for these three construction peak periods and the total number of heavy vehicle trips, by type and assumed round trip locations, needed for all construction activities.

Response:

The revised construction emissions tables in the revised Appendix I, Attachment B spreadsheets provided in the response to Data Request 12, show the emissions associated with heavy duty vehicle trips. Specifically emissions for these trips may be seen on the spreadsheets for Clearing and Grubbing, Site Grading and Facility Building (which includes concrete pouring). The table below presents the requested information regarding these heavy vehicle trips.

Estimated Heavy Vehicle Trips Associated with Specific PEC Construction Activities

Activity	Duration (months)	Engine Horsepower/Cubic Yards	Maximum Heavy Vehicle Trips for Activity	Assumed Two-Way Trip Distance (miles)	Total Vehicle Miles	Vehicle Miles per Day*
Tree Removal	1	300/15	67	30	2,010	91.4
Earth Transport	2	400/15	1,667	30	50,010	1,136.6
Concrete Deliveries	8	400/8	1,050	100	105,000	596.6

* Daily miles estimated based on 22 work days per month

TECHNICAL AREA: AIR QUALITY

Data Request 20 Rev: Please identify the final disposal option that will be used for the pomegranate trees removed from the site. If that option will create emissions concurrent to the project construction or operation (such as stockpiling, drying and later burning onsite) please provide an estimate of the tree waste disposal action emissions.

Response:

Current plans are for the uprooted trees to be processed in a chipper at the PEC site and subsequently loaded into trucks and delivered to a biomass plant to be used as fuel. There will be no extended stockpiling or burning of trees or chips on the site. The distance from the PEC site to the biomass plant is about 15 miles.

TECHNICAL AREA: AIR QUALITY

Data Request 21 Rev: Please provide a PM2.5 emission estimate for construction. For engine emissions please either assume 100% of engine particulate emissions are PM2.5 or use approved California Air Resources Board (CARB) California Emission Inventory Development and Reporting System (CEIDARS) particulate size speciation profiles. For fugitive dust emissions please use approved CEIDARS particulate size speciation profiles.

Response:

The revised emission calculations presented in the revised Appendix I, Attachment B spreadsheets provided in the response to Data Request 12 include PM2.5 emissions estimates for fugitive dust and exhaust sources based on the CEIDARS data base.

TECHNICAL AREA: AIR QUALITY

Data Request 22 Rev: Please rerun the model using appropriate hourly emission factors for the hours in the day assumed for construction and provide revised results. Also as noted previously please combine receptors and meteorological files to reduce the number of modeling runs by a factor of ten.

Response:

Dispersion model runs have been made incorporating all of the changes to construction emission sources that are discussed in the responses to previous data requests.

As described in Response No. 12, The PEC construction effort will be comprised of a number of separate activities occurring at different times over an 18-month period. Each phase of construction will require different numbers and sizes of construction equipment operating at different locations within the PEC site. Thus it is not obvious which activity would be likely to produce the highest offsite concentrations of air pollutants. Accordingly, several different candidate scenarios were modeled to ensure that worst-case impacts would in fact be addressed. Experience shows that the pollutants and averaging times that are generally most important for construction emissions in California are: one-hour NO2 concentrations and 24-hour PM10/PM2.5 concentrations; therefore scenarios that would maximize potential offsite impacts for these values were chosen. The main criteria for selecting these modeling scenarios were magnitude of estimated emissions, activity duration and proximity of emission sources to the PEC site boundary. The three selected scenarios are:

- Site Grading (Months 5 and 6)

- Injection Well Installation (Month 1)

- Site Building with Overlapping Substation Expansion Construction (Month 14 – 18).

For each scenario, short-term impacts were modeled using the largest equipment grouping (in terms of potential emissions) that would be expected to cause the highest emissions on the same day. All construction activities, except well drilling, were assumed to occur during an 8-hour day. Calculation of annual emissions assumed all construction activities that would occur over a 12-month period.

The results of the revised modeling are summarized in the Revised Table 5.2-18A below. Full electronic copies of the construction phase modeling input/output files are provided on an accompanying DVD along with the operational modeling files referenced in the response to Data Request No. 4.

Table 5.2-18A (Revised) (1st of 3 Parts)

Maximum Modeled Criteria Pollutant Impacts due to PEC Construction Emissions

Pollutant	Averaging Period	Maximum Modeled Impact (μg/m³)	PSD Significant Impact Level[1] (μg/m³)	Background[2] (μg/m³)	Maximum Total Predicted Concentration (μg/m³)	Most Stringent AAQS (μg/m³)	UTM Coordinates	
							East (m)	North (m)
Construction Impacts – Injection Well Installation								
CO	1 hour	536.1	NA	7,705	8,241	23,000	716,189	4,058,631
	8 hour	246.3	NA	5,156	5,402	10,000	716,189	4,058,631
NO_2	1 hour[3]	193.9[3]	NA	169.2	363.1[3]	470	716,189	4,058,631
	Annual	1.48	NA	42.0	43.5	100	716,214	4,058,606
PM_{10}	24 hour	34.46	NA	193.0 [4]	227.46	50	716,189	4,058,631
	Annual	0.14	NA	43.0 [4]	43.14	20	716,189	4,058,631
$PM_{2.5}$	24 hour	11.1	NA	110.0 [4]	121.1	65	716,189	4,058,631
	Annual	0.07	NA	21.6 [4]	21.67	12	716,214	4,058,606
SO_2	1 hour	1.39	NA	23.6	24.99	655	716,189	4,058,631
	3 hour	0.81	NA	15.6	16.41	1,300	716,173	4,058,652
	24 hour	0.22	NA	10.5	10.72	105	716,239	4,058,581
	Annual	0.002	NA	5.3	5.302	80	716,214	4,058,606

1 Source: 40 CFR 52.21

2 Background represents the maximum values measured at Fresno First St. (CO, NO_2, PM_{10}, $PM_{2.5}$) or Fresno Fremont School (SO_2) monitoring stations, 2001-2005

3 Results for 1-hour NO_2 during construction used ozone limiting method (OLM) to estimate NO_2 impacts. Ozone measurement at Hanford monitoring station for the same hour of meteorological data as maximum predicted 1-hour NOx concentration (1/17/89 hour 9) was used in the OLM calculation

4 PM_{10} and $PM_{2.5}$ background levels exceed ambient standards.

Table 5.2-18A (Revised) (2nd of 3 Parts)
Maximum Modeled Criteria Pollutant Impacts due to PEC Construction Emissions

Pollutant	Averaging Period	Maximum Modeled Impact (µg/m³)	PSD Significant Impact Level[1] (µg/m³)	Background[2] (µg/m³)	Maximum Total Predicted Concentration (µg/m³)	Most Stringent AAQS (µg/m³)	UTM Coordinates	
							East (m)	North (m)
Construction Impacts – Site Grading								
CO	1 hour	579.3	NA	7,705	8,284	23,000	715,865	4,058,740
	8 hour	265.2	NA	5,156	5,667	10,000	715,958	4,058,791
NO_2	1 hour[3]	184.8[3]	NA	169.2	354.0[3]	470	715,865	4,058,740
	Annual	1.54	NA	42.0	43.54	100	716,106	4,058,530
PM_{10}	24 hour	49.2	NA	193.0 [4]	242.2	50	715,864	4,058,789
	Annual	0.93	NA	43.0 [4]	43.93	20	716,174	4,058,604
$PM_{2.5}$	24 hour	17.32	NA	110.0 [4]	127.32	65	715,864	4,058,789
	Annual	0.16	NA	21.6 [4]	21.76	12	716,165	4,058,580
SO_2	1 hour	1.29	NA	23.6	24.89	655	715,865	4,058,740
	3 hour	0.78	NA	15.6	16.38	1,300	715,865	4,058,765
	24 hour	0.22	NA	10.5	10.72	105	716,012	4,058,527
	Annual	0.001	NA	5.3	5.30	80	716,106	4,058,530

1 Source: 40 CFR 52.21

2 Background represents the maximum values measured at Fresno First St. (CO, NO_2, PM_{10}, $PM_{2.5}$) or Fresno Fremont School (SO_2) monitoring stations, 2001-2005

3 Results for 1-hour NO2 during construction used ozone limiting method (OLM) to estimate NO_2 impacts. Ozone measurement at Hanford monitoring station for the same hour of meteorological data as maximum predicted 1-hour NOx concentration (11/29/89 hour 16) was used in the OLM calculation

4 PM_{10} and $PM_{2.5}$ background levels exceed ambient standards.

Table 5.2-18A (Revised) (3rd of 3 Parts)
Maximum Modeled Criteria Pollutant Impacts due to PEC Construction Emissions

Pollutant	Averaging Period	Maximum Modeled Impact (µg/m³)	PSD Significant Impact Level[1] (µg/m³)	Background[2] (µg/m³)	Maximum Total Predicted Concentration (µg/m³)	Most Stringent AAQS (µg/m³)	UTM Coordinates	
							East (m)	North (m)
Concurrent Site Building and Substation Expansion								
CO	1 hour	1,114.8	NA	7,705	8,820	23,000	715,865	4,058,740
	8 hour	870.2	NA	5,156	6,026	10,000	715,958	4,058,791
NO_2	1 hour[3]	290.4[3]	NA	169.2	459.6[3]	470	715,865	4,058,740
	Annual	11.89	NA	42.0	53.89	100	716,106	4,058,530
PM_{10}	24 hour	46.27	NA	193.0 [4]	239.27	50	715,864	4,058,789
	Annual	1.27	NA	43.0 [4]	44.27	20	716,289	4,058,781
$PM_{2.5}$	24 hour	18.97	NA	110.0 [4]	128.97	65	715,865	4,058,765
	Annual	0.66	NA	21.6 [4]	22.26	12	715,981	4,058,791
SO_2	1 hour	4.69	NA	23.6	28.29	655	715,839	4,058,681
	3 hour	2.35	NA	15.6	17.95	1,300	715,867	4,058,668
	24 hour	0.69	NA	10.5	11.19	105	715,865	4,058,765
	Annual	.011	NA	5.3	5.31	80	715,981	4,058,791

1 Source: 40 CFR 52.21

2 Background represents the maximum values measured at Fresno First St. (CO, NO_2, PM_{10}, $PM_{2.5}$) or Fresno Fremont School (SO_2) monitoring stations, 2001-2005

3 Results for 1-hour NO_2 during construction used ozone limiting method (OLM) to estimate NO_2 impacts. Ozone measurement at Hanford monitoring station for the same hour of meteorological data as maximum predicted 1-hour NO_x concentration (12/04//90 hour 8) was used in the OLM calculation

4 PM_{10} and $PM_{2.5}$ background levels exceed ambient standards.

TECHNICAL AREA: AIR QUALITY

Data Request 23 Rev: Please provide the NOx_OLM input/output files, including ozone input files, if NOx_OLM was used, or provide the simplified OLM calculations and assumptions if that method was used to determine worst case 1-hour NOx impacts. Please note that other modeling corrections may be necessary based on the previous data request and the other data requests regarding construction emission estimates.

Response:

The ozone limiting method was applied to the predicted maximum one-hour ozone concentrations during construction. NOx OLM with sequential ozone input data could not be used because that model only works properly with point source emission input data, whereas certain construction sources, such as exhaust from moving equipment within the site, are more appropriately represented as volume sources. Accordingly, a simple hand calculation was made to estimate the portion of the maximum predicted 1-hour NOx concentrations for each modeled construction activity that would be converted to NO2. The hourly ozone data used for this purpose was the value recorded at the Hanford monitoring station for the same hour of the meteorological input data record that produced the highest NOx concentration in ISCST3. As described in Response No. 24, separate modeling was conducted for several different tasks (scenarios) that were selected to ensure that maximum off-site pollutant concentrations would be addressed.

Among the different candidate construction scenarios modeled, the highest predicted hourly NOx concentration (2,712 µg/m3) occurred for Site Building with Substation Expansion. This value was predicted to occur with the meteorological input data for December 4, 1991. The ozone concentration recorded at Hanford during this hour was 10 parts per billion or 0.01 parts per million (20 µg/m3). The ozone limiting calculation is:

$$[NO_2]_{ann} = \{(0.1) \times [NO_x]_{pred}\} + \text{MIN}\{(0.9) \times [NO_x]_{pred}, \text{ or } (46/48) \times [O_3]_{bkgd}\}$$

where

$[NO_2]_{ann}$ is the predicted annual NO_2 concentration
$[NO_x]_{pred}$ is the model predicted annual NO_x concentration
MIN means the minimum of the two quantities within the brackets
$[O_3]_{bkgd}$ is the representative annual average ambient O3 concentration
(46/48) is the molecular weight of NO_2 divided by the molecular weight of O_3

Substituting the values obtained for December 4, 1991 yields a project NO2 impact of 290.4 µg/m^3. When this is added to the conservative background NO_2 concentration of 169.2 µg/m^3 used throughout the modeling analyses, the resulting total concentration is 459.6 µg/m^3.

TECHNICAL AREA: AIR QUALITY

Data Request 24 Rev: Please provide corrected modeling runs or provide corrections for the modeling file names when not rerun as necessary to respond to other data requests.

Response:

Revised construction modeling input/output files are provided electronically on the DVD that accompanies these Data Request responses.

TECHNICAL AREA: AIR QUALITY

Data Request 25 Rev: Please provide a copy of the District's correspondence regarding existing and planned cumulative projects located within six miles of the PEC site.

Response:

During a meeting with SJVAPCD on January 4, 2007, the following District "PAS Listing" was provided to PEC. Note that the proposed PEC and Starwood facilities are not on this list. The District contact is:

Mr. Leland Villalvazo
Supervising Air Quality Specialist
(559) 230-5881 tel
(559) 230-6061 fax
Leland.villalvazo@valleyair.org

The PAS Listing follows:

PAS LISTING

County: 10 Region: C Facility ID: 213
UTMZ: 10 UTME: 722.59 UTMN: 4063.48 SPHEROID: WGS84 DATUM: NAD83

FacilityName: EAGLE VALLEY GINNING, LLC
Faciliity Type: COTTON GINNING
Distance To Location (m): 7551.68
Direction To Location(deg): 33.17
Accuracy:

Facility Name: EAGLE VALLEY GINNING LLC
Address1: 39936 W NORTH AVE
Address2:
City: MENDOTA
State: CA Zip: 93640

County: 10 Region: C Facility ID: 290
UTMZ: 10 UTME: 712.16 UTMN: 4057.34 SPHEROID: WGS84 DATUM: NAD83

FacilityName: CHEVRON USA, INC. #92316
Faciliity Type: GASOLINE DISPENSING
Distance To Location (m): 4568.66
Direction To Location(deg): 205.98
Accuracy:

Facility Name: CHEVRON USA, INC. #92316
Address1: 46330 W PANOCHE RD
Address2:
City: FIREBAUGH
State: CA Zip: 93622

County: 10 Region: C Facility ID: 911
UTMZ: 10 UTME: 716.06 UTMN: 4063.38 SPHEROID: WGS84 DATUM: NAD83

FacilityName: PANOCHE GINNING CO
Faciliity Type: COTTON GINNING
Distance To Location (m): 4043.57
Direction To Location(deg): 356.97
Accuracy:

Facility Name: PANOCHE GINNING CO
Address1: 43890 W NORTH AVE
Address2:
City: FIREBAUGH
State: CA Zip: 93622

PAS LISTING

County: 10 Region: C Facility ID: 1124
UTMZ: 10 UTME: 713.18 UTMN: 4057.82 SPHEROID: DATUM:

FacilityName: WESTSIDE 76
Faciliity Type: GASOLINE DISPENSING
Distance To Location (m): 3444.89
Direction To Location(deg): 206.25
Accuracy: found by street

Facility Name: WESTSIDE 76
Address1: 46370 PANOCHE RD
Address2:
City: FIREBAUGH
State: CA Zip:

County: 10 Region: C Facility ID: 1256
UTMZ: 10 UTME: 711.78 UTMN: 4057.16 SPHEROID: WGS84 DATUM: NAD83

FacilityName: TRIPLE L LAND CO
Faciliity Type: SAND AND GRAVEL
Distance To Location (m): 4993.35
Direction To Location(deg): 205.96
Accuracy:

Facility Name: TRIPLE L LAND CO
Address1: 46924 W PANOCHE RD
Address2:
City: FIREBAUGH
State: CA Zip: 93622

County: 10 Region: C Facility ID: 1385
UTMZ: 10 UTME: 715.88 UTMN: 4063.38 SPHEROID: WGS84 DATUM: NAD83

FacilityName: ANDERSON CLAYTON CORP/SILVER C
Faciliity Type: COTTON GINNING
Distance To Location (m): 4053.41
Direction To Location(deg): 354.52
Accuracy:

Facility Name: ANDERSON CLAYTON CORP/SILVER C
Address1: 43939 NORTH AVE
Address2:
City: FIREBAUGH
State: CA Zip: 93622

PAS LISTING

County: 10 Region: C Facility ID: 1892
UTMZ: 10 UTME: 712.18 UTMN: 4057.34 SPHEROID: WGS84 DATUM: NAD83

FacilityName: M J EPPLER INC
Faciliity Type: GASOLINE DISPENSING
Distance To Location (m): 4556.84
Direction To Location(deg): 206.17
Accuracy:

Facility Name: M J EPPLER INC
Address1: 46331 W PANOCHE RD
Address2:
City: FIREBAUGH
State: CA Zip:

County: 10 Region: C Facility ID: 2974
UTMZ: 10 UTME: 722.60 UTMN: 4058.57 SPHEROID: DATUM:

FacilityName: DEPARTMENT OF FISH & GAME
Faciliity Type: WILDLIFE MANAGEMENT
Distance To Location (m): 6377.90
Direction To Location(deg): 96.99
Accuracy: found by zip code

Facility Name: DEPARTMENT OF FISH & GAME
Address1: 4333 S SANTA FE GRADE
Address2:
City: MENDOTA
State: CA Zip: 93640

County: 10 Region: C Facility ID: 3374
UTMZ: 10 UTME: 713.59 UTMN: 4058.00 SPHEROID: DATUM:

FacilityName: WEST VALLEY HULLING CO
Faciliity Type: AGRICULTURAL PRODUCTS PROCESSI
Distance To Location (m): 2999.74
Direction To Location(deg): 206.62
Accuracy:

Facility Name: WEST VALLEY HULLING CO
Address1: 45475 W PANOCHE RD
Address2:
City: FIREBAUGH
State: CA Zip: 93622

PAS LISTING

County: 10 Region: C Facility ID: 3811
UTMZ: 10 UTME: 716.27 UTMN: 4059.35 SPHEROID: WGS84 DATUM: NAD83

FacilityName: CAL PEAK POWER - PANOCHE, LLC
Faciliity Type: POWER GENERATION
Distance To Location (m): 0.00
Direction To Location(deg):
Accuracy:

Facility Name: CAL PEAK POWER - PANOCHE, LLC
Address1: 43699 WEST PANOCHE RD
Address2:
City: FIREBAUGH
State: CA Zip: 93622-9720

County: 10 Region: C Facility ID: 3844
UTMZ: 10 UTME: 715.98 UTMN: 4059.40 SPHEROID: WGS84 DATUM: NAD83

FacilityName: WELLHEAD POWER PANOCHE, LLC.
Faciliity Type: POWER GENERATION
Distance To Location (m): 291.02
Direction To Location(deg): 280.67
Accuracy:

Facility Name: WELLHEAD POWER PANOCHE, LLC.
Address1: 43649 W PANOCHE RD
Address2:
City: FIREBAUGH
State: CA Zip: 93622

County: 10 Region: C Facility ID: 4185
UTMZ: 10 UTME: 712.10 UTMN: 4057.40 SPHEROID: WGS84 DATUM: NAD83

FacilityName: PANOCHE MOBIL
Faciliity Type: GASOLINE DISPENSING
Distance To Location (m): 4602.52
Direction To Location(deg): 204.96
Accuracy:

Facility Name: PANOCHE MOBIL
Address1: 46365 PANOCHE
Address2:
City: FIREBAUGH
State: CA Zip: 93622

TECHNICAL AREA: AIR QUALITY

Data Request 26 Rev: Please provide the cumulative modeling analysis, including the nearby Calpeak and Wellhead Energy peaker sites as proposed in the modeling protocol, as well as all District identified cumulative sources and the recently proposed Starwood Power-Midway Peaking Project (06-AFC-10).

Response:

Contrary to PEC's prior understanding, the District stated at PEC's meeting with the District on January 4, 2007 that the District would not perform the cumulative modeling analysis because it is not required to do so. PEC is willing to provide this analysis via its consultant, but requests until January 18, 2007 in which to submit a final analysis to the CEC. This cumulative analysis will consider the significance and appropriate inclusion of emissions from facilities in the District's PAS Listing, along with those of the proposed PEC and Starwood projects.

TECHNICAL AREA: BIOLOGICAL RESOURCES

Data Request 27 Rev: Please provide any supporting documents (letter or record of conversation) that resulted from communication with USFWS and CDFG regarding potential impacts to the state and federally listed San Joaquin kit fox. Please provide contact information for the USFWS and CDFG staff.

Response:

California Department of Fish and Game
Julie Lance, Habitat Conservation Division
559-243-4014 x222

Conversation with Julie Lance on July 19, 2006. In the conversation, Julie Lance stated URS Biologists would not need to conduct protocol level surveys for San Joaquin kit fox since the habitat at the project site is not suitable for dens; however, Ms. Lance referred URS Biologists to guidelines on avoidance and minimization measures for San Joaquin kit fox foraging habitat found in "Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance" (Sacramento Fish & Wildlife Office, US Fish & Wildlife Service, 6/1999) located on the CDFG Habitat Conservation Planning Branch website (http:// www.dfg.ca.gov/hcpb/species/stds_gdl/survmonitr.shtml#MAMMALS). The guidelines were followed when preparing the biology section for the AFC and are attached, in its entirety, on the following pages. The record of the telephone conversation is also attached.

U.S. Fish and Wildlife Service
San Joaquin Valley Division
916-414-6630

Left a message on July 12, 2006 but calls were not returned.

U.S. FISH AND WILDLIFE SERVICE
STANDARDIZED RECOMMENDATIONS
FOR PROTECTION OF THE SAN JOAQUIN KIT FOX
PRIOR TO OR DURING GROUND DISTURBANCE

Prepared by the Sacramento Fish and Wildlife Office
June 1999

INTRODUCTION

The following document includes many of the San Joaquin kit fox (*Vulpes macrotis mutica*) protection measures typically recommended by the U. S. Fish and Wildlife Service (Service), prior to and during ground disturbance activities. However, incorporating relevant sections of these guidelines into the proposed project is not the only action required under the Endangered Species Act of 1973, as amended (Act). Project applicants should contact the Service in Sacramento to determine the full range of requirements that apply to your project; the address and telephone number are given at the end of this document. Formal authorization for the project may be required under either section 7 or section 10 of the Act. Implementation of the measures presented in this document may be necessary to avoid violating the provisions of the Act, including the prohibition against "take" (defined as killing, harming, or harassing a listed species, including actions that damage or destroy its habitat). Such protection measures may also be required under the terms of a biological opinion pursuant to section 7 of the Act resulting in incidental take authorization (authorization), or an incidental take permit (permit) pursuant to section 10 of the Act. The specific measures implemented to protect kit fox for any given project shall be determined by the Service based upon the applicant's consultation with the Service.

The purpose of this document is to make information on kit fox protection strategies readily available and to help standardize the methods and definitions currently employed to achieve kit fox protection. The measures outlined in this document are subject to modification or revision at the discretion of the Service.

All surveys, den destructions, and monitoring described in this document must be conducted by a qualified biologist. A qualified biologist (biologist) means any person who has completed at least four years of university training in wildlife biology or a related science and/or has demonstrated field experience in the identification and life history of the San Joaquin kit fox. In addition, biologist(s) must be able to identify coyote, red fox, gray fox, and kit fox tracks, and to have seen a kit fox in the wild, at a zoo, or as a museum mount.

SMALL PROJECTS

Small projects are considered to be those projects with small foot prints such as an individual in-fill oil well, communication tower, or bridge repair. These projects must stand alone and not be part of, or in any way connected to larger projects (i.e., bridge repair or improvement to serve a

future urban development). The Service recommends that on these small projects, the biologist survey the proposed project boundary and a 200-foot area outside of the project footprint to identify habitat features, and make recommendations on situating the project to minimize or avoid impacts. If habitat features cannot be completely avoided, then preconstruction surveys should be conducted.

Preconstruction/preactivity surveys shall be conducted no less than 14 days and no more than 30 days prior to the beginning of ground disturbance and/or construction activities or any project activity likely to impact the San Joaquin kit fox. Surveys should identify kit fox habitat features on the project site and evaluate use by kit fox and, if possible, and assess the potential impacts to the kit fox by the proposed activity. The status of all dens should be determined and mapped (see Survey Protocol).

Written results of preconstruction/preactivity surveys must be received by the Service within five days after survey completion and prior to the start of ground disturbance and/or construction activities. If a natal/pupping den is discovered within the project area or within 200-feet of the project boundary, the Service shall be immediately notified. If the preconstruction/preactivity survey reveals an active natal pupping or new information, the project applicant should contact the Service immediately to obtain the necessary take authorization/permit.

If take authorization/permit has already been issued, then the biologist may proceed with den destruction within the project boundary, except natal/pupping dens (active or inactive). Protective exclusion zones can be placed around all known and potential dens which occur outside the project footprint (conversely, the project boundary can be demarcated, see den destruction section).

OTHER PROJECTS

It is likely that all other projects occurring within kit fox habitat will require a take authorization/permit from the Service. This determination would be made by the Service during the early evaluation process (see Survey Protocol). These other projects would include, but are not limited to: linear projects; projects with large footprints such as urban development; and projects which in themselves may be small but have far reaching impacts (i.e., water storage or conveyance facilities that promote urban growth or agriculture, etc.).

The take authorization/permit issued by the Service may incorporate some or all of the protection measures presented in this document. The take authorization/permit may include measures specific to the needs of the project, and those requirements supersede any requirements found in this document.

EXCLUSION ZONES

The configuration of exclusion zones around the kit fox dens should have a radius measured outward from the entrance or cluster of entrances. The following radii are minimums, and if they cannot be followed the Service must be contacted:

Potential den	50 feet
Known den	100 feet
Natal/pupping den (occupied and unoccupied)	Service must be contacted
Atypical den	50 feet

Known den: To ensure protection, the exclusion zone should be demarcated by fencing that encircles each den at the appropriate distance and does not prevent access to the den by kit foxes. Exclusion zone fencing should be maintained until all construction related or operational disturbances have been terminated. At that time, all fencing shall be removed to avoid attracting subsequent attention to the dens.

Potential and Atypical dens: Placement of 4-5 flagged stakes 50 feet from the den entrance(s) will suffice to identify the den location; fencing will not be required, but the exclusion zone must be observed.

Construction and other project activities should be prohibited or greatly restricted within these exclusion zones. Only essential vehicle operation on existing roads and foot traffic should be permitted. Otherwise, all construction, vehicle operation, material storage, or any other type of surface-disturbing activity should be prohibited within the exclusion zones.

DESTRUCTION OF DENS

Disturbance to all San Joaquin kit fox dens should be avoided to the maximum extent possible. Protection provided by kit fox dens for use as shelter, escape, cover, and reproduction is vital to the survival of the species. Limited destruction of kit fox dens may be allowed, if avoidance is not a reasonable alternative, provided the following procedures are observed. The value to kit foxes of potential, known, and natal/pupping dens differ and therefore, each den type needs a different level of protection. **Destruction of any known or natal/pupping kit fox den requires take authorization/permit from the Service.**

Natal/pupping dens: Natal or pupping dens which are occupied will not be destroyed until the pups and adults have vacated and then only after consultation with the Service. Therefore, project activities at some den sites may have to be postponed.

Known Dens: Known dens occurring within the footprint of the activity must be monitored for three days with tracking medium or an infra-red beam camera to determine the current use. If no kit fox activity is observed during this period, the den should be destroyed immediately to preclude subsequent use. If kit fox activity is observed at the den during this period, the den should be monitored for at least five consecutive days from the time of the observation to allow any resident animal to move to another den during its normal activity. Use of the den can be discouraged during this period by partially plugging its entrances(s) with soil in such a manner that any resident animal can escape easily. Only when the den is determined to be unoccupied may the den be excavated under the direction of the biologist. If the animal is still present after five or more consecutive days of plugging and monitoring, the den may have to be excavated when, in the judgment of a biologist, it is temporarily vacant, for example during the animal's normal foraging activities. The Service encourages hand excavation, but realizes that soil conditions may necessitate the use of excavating equipment. However, extreme caution must be exercised.

Destruction of the den should be accomplished by careful excavation until it is certain that no kit foxes are inside. The den should be fully excavated, filled with dirt and compacted to ensure that kit foxes cannot reenter or use the den during the construction period. If at any point during excavation a kit fox is discovered inside the den, the excavation activity shall cease immediately and monitoring of the den as described above should be resumed. Destruction of the den may be completed when in the judgement of the biologist, the animal has escaped from the partially destroyed den.

Potential Dens: If a take authorization/permit has been obtained from the Service, den destruction may proceed without monitoring, unless other restrictions were issued with the take authorization/permit. If no take authorization/permit has been issued, then potential dens should be monitored as if they were known dens. If any den was considered to be a potential den, but is later determined during monitoring or destruction to be currently, or previously used by kit fox (e.g., if kit fox sign is found inside), then destruction shall cease and the Service shall be notified immediately.

CONSTRUCTION AND OPERATIONAL REQUIREMENTS

Habitat subject to permanent and temporary construction disturbances and other types of project-related disturbance should be minimized. Project designs should limit or cluster permanent project features to the smallest area possible while still permitting project goals to be achieved. To minimize temporary disturbances, all project-related vehicle traffic should be restricted to established roads, construction areas, and other designated areas. These areas should also be

included in preconstruction surveys and, to the extent possible, should be established in locations disturbed by previous activities to prevent further impacts.

1. Project-related vehicles should observe a 20-mph speed limit in all project areas, except on county roads and State and Federal highways; this is particularly important at night when kit foxes are most active. To the extent possible, night-time construction should be minimized. Off-road traffic outside of designated project areas should be prohibited.

2. To prevent inadvertent entrapment of kit foxes or other animals during the construction phase of a project, all excavated, steep-walled holes or trenches more than 2 feet deep should be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals. If at any time a trapped or injured kit fox is discovered, the procedures under number 13 of this section must be followed.

3. Kit foxes are attracted to den-like structures such as pipes and may enter stored pipe becoming trapped or injured. All construction pipes, culverts, or similar structures with a diameter of 4-inches or greater that are stored at a construction site for one or more overnight periods should be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe should not be moved until the Service has been consulted. If necessary, and under the direct supervision of the biologist, the pipe may be moved once to remove it from the path of construction activity, until the fox has escaped.

4. All food-related trash items such as wrappers, cans, bottles, and food scraps should be disposed of in closed containers and removed at least once a week from a construction or project site.

5. No firearms shall be allowed on the project site.

6. To prevent harassment, mortality of kit foxes or destruction of dens by dogs or cats, no pets should be permitted on project sites.

7. Use of rodenticides and herbicides in project areas should be restricted. This is necessary to prevent primary or secondary poisoning of kit foxes and the depletion of prey populations on which they depend. All uses of such compounds should observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other State and Federal legislation, as well as additional project-related restrictions deemed necessary by the Service. If rodent control

must be conducted, zinc phosphide should be used because of proven lower risk to kit fox.

8. A representative shall be appointed by the project proponent who will be the contact source for any employee or contractor who might inadvertently kill or injure a kit fox or who finds a dead, injured or entrapped individual. The representative will be identified during the employee education program. The representative's name and telephone number shall be provided to the Service.

9. An employee education program should be conducted for any project that has expected impacts to kit fox or other endangered species. The program should consist of a brief presentation by persons knowledgeable in kit fox biology and legislative protection to explain endangered species concerns to contractors, their employees, and military and agency personnel involved in the project. The program should include the following: a description of the San Joaquin kit fox and its habitat needs; a report of the occurrence of kit fox in the project area; an explanation of the status of the species and its protection under the Endangered Species Act; and a list of measures being taken to reduce impacts to the species during project construction and implementation. A fact sheet conveying this information should be prepared for distribution to the above-mentioned people and anyone else who may enter the project site.

10. Upon completion of the project, all areas subject to temporary ground disturbances, including storage and staging areas, temporary roads, pipeline corridors, etc. should be re-contoured if necessary, and revegetated to promote restoration of the area to pre-project conditions. An area subject to "temporary" disturbance means any area that is disturbed during the project, but that after project completion will not be subject to further disturbance and has the potential to be revegetated. Appropriate methods and plant species used to revegetate such areas should be determined on a site-specific basis in consultation with the Service, California Department of Fish and Game (CDFG), and revegetation experts.

11. In the case of trapped animals, escape ramps or structures should be installed immediately to allow the animal(s) to escape, or the Service should be contacted for advice.

12. Any contractor, employee, or military or agency personnel who inadvertently kills or injures a San Joaquin kit fox shall immediately report the incident to their representative. This representative shall contact the CDFG immediately in the case of a dead, injured or entrapped kit fox. The CDFG contact for immediate assistance is State Dispatch at (916) 445-0045. They will contact the local warden or biologist.

13. The Sacramento Fish and Wildlife Office and CDFG will be notified in writing within three working days of the accidental death or injury to a San Joaquin kit fox during

project related activities. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal and any other pertinent information. The Service contact is the Chief of the Division of Endangered Species, at the addresses and telephone numbers given below. The CDFG contact is Mr. Ron Schlorff at 1416 9th Street, Sacramento, California 95814, (916) 654-4262.

Any project-related information required by the Service or questions concerning the above conditions or their implementation may be directed in writing to the U.S. Fish and Wildlife Service at:

Endangered Species Division
2800 Cottage Way, Suite W2605
Sacramento, California 95825-1846
(916) 414-6620

"Take" - Section 9 of the Endangered Species Act of 1973, as amended (Act) prohibits the "take" of any federally listed endangered species by any person (an individual, corporation, partnership, trust, association, etc.) subject to the jurisdiction of the United States. As defined in the Act, take means " . . . to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Thus, not only is a listed animal protected from activities such as hunting, but also from actions that damage or destroy its habitat.

"Dens" - San Joaquin kit fox dens may be located in areas of low, moderate, or steep topography. Den characteristics are listed below, however, the specific characteristics of individual dens may vary and occupied dens may lack some or all of these features. Therefore, caution must be exercised in determining the status of any den. Typical dens may include the following: (1) one or more entrances that are approximately 5 to 8 inches in diameter; (2) dirt berms adjacent to the entrances; (3) kit fox tracks, scat, or prey remains in the vicinity of the den; (4) matted vegetation adjacent to the den entrances; and (5) manmade features such as culverts, pipes, and canal banks.

"Known den" - Any existing natural den or manmade structure that is used or has been used at any time in the past by a San Joaquin kit fox. Evidence of use may include historical records, past or current radiotelemetry or spotlighting data, kit fox sign such as tracks, scat, and/or prey remains, or other reasonable proof that a given den is being or has been used by a kit fox. The Service discourages use of the terms "active" and "inactive" when referring to any kit fox den because a great percentage of occupied dens show no evidence of use, and because kit foxes change dens often, with the result that the status of a given den may change frequently and abruptly.

"Potential Den" - Any subterranean hole within the species' range that has entrances of appropriate dimensions for which available evidence is insufficient to conclude that it is being used or has been used by a kit fox. Potential dens shall include the following: (1) any suitable subterranean hole; or (2) any den or burrow of another species (e.g., coyote, badger, red fox, or ground squirrel) that otherwise has appropriate characteristics for kit fox use.

"Natal or Pupping Den" - Any den used by kit foxes to whelp and/or rear their pups. Natal/pupping dens may be larger with more numerous entrances than dens occupied exclusively by adults. These dens typically have more kit fox tracks, scat, and prey remains in the vicinity of the den, and may have a broader apron of matted dirt and/or vegetation at one or more entrances. A natal den, defined as a den in which kit fox pups are actually whelped but not necessarily reared, is a more restrictive version of the pupping den. In practice, however, it is difficult to distinguish between the two, therefore, for purposes of this definition either term applies.

"Atypical Den" - Any manmade structure which has been or is being occupied by a San Joaquin kit fox. Atypical dens may include pipes, culverts, and diggings beneath concrete slabs and buildings.

TELEPHONE CONVERSATION RECORD

URS

COPIES TO:

130 Robin Hill Road, Ste. 100, Santa Barbara,
California 93117
805.964-6010 FAX 805.964.0259

DATE	July 19, 2006	TIME	9 am
TO	Julie Lance	FROM	Johanna LaClaire
COMPANY	California Department of Fish and Game Habitat Conservation Planning Branch		
ADDRESS	1416 Ninth St., Sacramento, CA 95814	PHONE NO.	559-243-4014 x222
PROJ NAME	Panoche AFC	PROJ/TASK NO.	28906795.00030

Spoke with Julie Lance on July 19, 2006. She said we would not need to conduct protocol level surveys for San Joaquin kit fox since the habitat at the project site is not suitable for dens; however, she referred me to guidelines on avoidance and minimization measures for San Joaquin kit fox foraging habitat found in "Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance" (Sacramento Fish & Wildlife Office, US Fish & Wildlife Service, 6/1999) located on the CDFG Habitat Conservation Planning Branch website (http://www.dfg.ca.gov/hcpb/species/stds_gdl /survmonitr.shtml#MAMMALS). These guidelines were followed when preparing the biology section for the AFC (see attached).

TECHNICAL AREA: CULTURAL RESOURCES

Data Request 28 Rev: If off-site disposal and borrow sites are not commercial operations and consequently have not been surveyed for cultural resources, please conduct such surveys and provide the personnel qualifications, methods, and findings to staff.

Response:

The off-site disposal and borrow sites have not yet been determined, and will be determined immediately prior to construction. Borrow will come from a commercial operator and site. Soil to be removed from the site has been analyzed for pesticides and determined to be non-hazardous. (See WM-60.) As such, soils removed from the site prior to placement of borrow will be reused as topsoil in yet-to-be determined nearby agricultural settings.

TECHNICAL AREA: CULTURAL RESOURCES

Data Request 29 Rev: Please provide a map showing both proposed natural gas pipeline routes and a detailed description (with depth and width measurements) for the alternate route.

Response:

The primary route that will be used for the natural gas pipeline is described in PEC AFC Section 3.7.1 and shown on Figure 3.2-1. The only alternate is if the line may be installed on the north side of Panoche Road instead of the south side. The alternative route that was originally shown in the AFC Figure 3.4-1 will not be used by PG&E.

The pipeline trench is expected to be 18 inches wide and 48 inches deep.

TECHNICAL AREA: CULTURAL RESOURCES

Data Request 30 Rev: If the Panoche Substation is 45 years of age or older, please have a qualified architectural historian complete Department of Parks and Recreation (DPR) 523 "Primary" and "Building, Structure, and Object" forms, including an evaluation of significance. Please have the qualified architectural historian also assess the project's potential impact on the substation, and provide the DPR 523 forms and impact assessment.

Response:

Background research was conducted by JRP Historical Consulting Services for the proposed project. The background research included a history of the region and the project area, specifically focusing on the construction history, from the California State Library, Sacramento; U.C. Davis and U.C. Berkeley libraries; California State University East Bay; and the Fresno Historical Society. In addition, an on-site inventory of the existing structures and other built resources within and adjacent to the PEC and laydown area was conducted. According to the background research, no resources were found to be eligible for the National Register of Historic Places (NRHP) or the California Register of Historic Resources (CRHR). Furthermore, during the course of research, JRP Historical Consulting Services found no additional information to suggest that the Panoche Substation was in any way significant, therefore evaluation was unnecessary. The substation is a relatively recent facility and was not located or found on earlier historical maps.

TECHNICAL AREA: CULTURAL RESOURCES

Data Request 31 Rev: To verify that they have no concerns regarding cultural resources in the PEC project area, please telephone those Native American individuals or groups who have not yet responded to the informational letters that were sent out and provide summaries of the calls.

Response:

Attempts had been made to contact all members of the Native American community prior to the creation of the draft AFC. Although there were six individuals listed by the NAHC as contacts, these individuals are represented, and are contacted through, three organizations. The three organizations are the Santa Rosa Rancheria, Table Mountain Rancheria, and the Chaushiha Tribe. When these organizations and individuals were contacted by telephone, URS Staff was directed to the cultural resources department or specialist to discuss the project.

The letters describing the project and maps of the site and various components were sent on May 9, 2006 via certified mail, to the six contacts identified by the Native American Heritage Commission as appropriate for Fresno County. The letters inquired whether the groups/individuals had any concerns regarding the project, or wished to provide input regarding cultural resources in the project area.

A fax was received from Mr. Brian Austin, Tribal Attorney of the Chaushiha Tribe, on June 5, 2006. In this faxed letter, Mr. Austin stated that the Chaushiha Tribal Council was not, at the time, aware of any specific cultural significance of the proposed site. However, in the event that any resources are found, Mr. Austin requested that the tribe be notified.

Subsequent to the mailed letters, URS Archaeological Staff contacted the Table Mountain Rancheria on June 30, 2006. At that time, a representative of the Cultural Resources office stated that the Table Mountain Rancheria had no concerns regarding the project.

A follow-up call was also made to the Santa Rosa Rancheria on June 30, 2006 and URS staff was notified by Mr. Lalo Franco of the Cultural Resources Office that there may be some concerns regarding a nearby village site for which the Southern San Joaquin Valley Information Center did not have a site record. On July 7, 2006, an email was received from Mr. Franco stating that the village was, in fact, some distance from the project site, and that there were no further concerns regarding the project area.

The list of Native American organizations as provided by the Native American Heritage Commission, dated May 4, 2006 is attached on the following pages.

05/04/2006 16:35 FAX 916 657 5390 NAHC 001

STATE OF CALIFORNIA Arnold Schwarzenegger, Governor

NATIVE AMERICAN HERITAGE
COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390

May 4, 2006

Christine K. Hacking
Senior Archaeologist
URS Corporation

Sent by Fax: 510-874-3268
Number of Pages: 2

RE: Proposed Panoche Energy Center PG& E Power project, Chaney Ranch, Fresno County.

Dear Ms. Hacking:

A record search of the sacred lands file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4040.

Sincerely,

Rob Wood
Environmental Specialist III

05/04/2006 16:35 FAX 916 657 5390 NAHC 002

Native American Contacts
Fresno County
May 3, 2006

Santa Rosa Rancheria
Clarence Atwell, Chairperson
P.O. Box 8 Tache
Lemoore , CA 93245 Tachi
(559) 924-1278 Yokut
(559) 924-3583 Fax

Table Mountain Rancheria
John Goodfellow, Environmental Coordinator
P.O. Box 410 Yokuts
Friant , CA 93626-0177
(559) 822-2587
(559) 822-2693 FAX

Table Mountain Rancheria
Lee Ann Walker Grant, Chairperson
P.O. Box 410 Yokuts
Friant , CA 93626-0177
(559) 822-2587
(559) 822-2693 FAX

Chaushiha Tribe
Jerry Brown
10553 N. Rice Road North Valley Yokuts
Fresno , CA 93720
559-434-3160

Table Mountain Rancheria
Michael Russell, Tribal Administrator
P.O. Box 410 Yokuts
Friant , CA 93626-0177
(559) 822-2587
(559) 822-2693 FAX

Table Mountain Rancheria
Bob Pennell, Cultural Resources Director
P.O. Box 410 Yokuts
Friant , CA 93626-0177
(559) 822-2587
(559) 822-2693 FAX

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural for the proposed * Panoche Energy Center PG&E Power Project, Chaney Ranch, Fresno County.

TECHNICAL AREA: CULTURAL RESOURCES

Data Request 32 Rev: Please provide copies of any additional letters received from Native Americans since the AFC was compiled and a summary of the telephone call made to the Table Mountain Rancheria representative on June 30, 2006. If the location of archaeological sites may be revealed, please provide the responses under confidential cover.

Response:

No additional letters have been received from the Native American community, nor have any additional phone calls been received.

TECHNICAL AREA: CULTURAL RESOURCES

Data Request 33 Rev: For the project region, please provide a map (at a scale of 1:24,000) showing the greatest extent of former Lake Tulare and its tributaries, and please mark on this map the location of the proposed PEC plant site.

Response:

A map at 1:24,000 scale would be too large to show the extent of the former Lake Tulare and its tributaries. As per a voicemail message from Beverly E. Bastion of the California Energy Commission, on December 21st, 2006, a map at a larger scale to show the full extent of the lake was prepared. Refer to Figure 1, Regional Location Map on the following page.

Map Placeholder

TECHNICAL AREA: GEOLOGICAL HAZARDS AND RESOURCES

Data Request 34 Rev: Please provide the balance of the text omitted from Section 5.3.1.1.10.

Response:

The balance of the text was inadvertently omitted from the Application for Certification. The last paragraph of Section 5.3.1.1.10 should have read:

"No specific countywide assessments to identify liquefaction hazards have been performed. Ground accelerations must approach 0.3g before liquefaction occurs in a sandy soil with relative densities typical of San Joaquin alluvial deposits. Areas subject to 0.3g acceleration or greater are located along the Coast Range foothills, but depth to ground water in these areas is typically great enough to minimize liquefaction potential (Fresno County, 2000). Recent soil borings drilled at the site did not encounter ground water to the maximum depths explored of 65 feet below ground surface. As discussed in Section 5.3.1.1.3, the depth to ground water is expected to be around 195 feet below ground surface. The depth to groundwater makes liquefaction at the site unlikely."

Liquefaction occurs only in saturated soils, and liquefaction susceptibility decreases with increasing groundwater depth. The generation of excess pore pressure under undrained loading conditions is a prerequisite for liquefaction phenomena (Kramer, 1996). The depth to ground water in a new, on-site monitoring well completed within the upper, semi-confined aquifer after submittal of the Application for Certification was approximately 175 feet below ground surface in December, 2006. The depth to groundwater makes liquefaction at the site unlikely.

TECHNICAL AREA: GEOLOGICAL HAZARDS AND RESOURCES

Data Request 35 Rev: Please clarify what value of peak horizontal ground acceleration is appropriate for this site.

Response:

Discrepancies between the Geological Hazards and Resources section and the preliminary geotechnical investigation report included as Appendix L of the Application for Certification occurred because the section was completed before the appendix. In addition, the peak site acceleration values provided in Section 5.3.1.1.8 are based on deterministic seismic hazard assessment and the Appendix L Peak Horizontal Ground Accelerations (PHGA) values are based on probabilistic seismic hazard assessment (PSHA). The seismic hazard assessment summarized in the preliminary geotechnical investigation report supersedes the assessment summarized in Section 5.3.1.1.8 of the Application for Certification. The estimated PHGA with a 10 percent probability of exceedance in 50 years at the PEC Site is approximately 0.48g (recurrence interval of 475 years). This level of ground motion is considered the Design Basis Earthquake (DBE) for the project.

TECHNICAL AREA: GEOLOGICAL HAZARDS AND RESOURCES

Data Request 36 Rev: Please clarify this discrepancy, and describe what impact this settlement may have on the operation of the proposed facilities, and how such impacts will be mitigated.

Response:

Discrepancies between the Geological Hazards and Resources section and the preliminary geotechnical investigation report included as Appendix L of the Application for Certification occurred because the section was completed before the appendix. Geotechnical investigation of the PEC Site identified loose, unsaturated granular soil layers that could result in some seismic-induced settlement. The potential for seismic-induced settlement reported in the preliminary geotechnical investigation report supersedes the last sentence in paragraph 5 of Section 5.3.1.1.11 of the Application for Certification. The potential for seismic-induced settlement was analyzed using the LIQUEFY program. Based on the results of the analyses, some seismic-induced settlement could occur within the loose to medium dense sandy and silty layers within 40 feet of the ground surface based on a Design Level Earthquake (DLE) event, resulting in settlement of about 2 inches within the susceptible soil layers.

Constructing settlement-sensitive structures on driven piles will mitigate potential seismic-induced settlement impacts on the operation of the facilities. Geotechnical recommendations for driven piles are provided in Appendix L of the Application for Certification (see Section 7.9).

TECHNICAL AREA: GEOLOGICAL HAZARDS AND RESOURCES

Data Request 37 Rev: Please address the potential for site soils, in particular silts, to collapse when subjected to water, and how the impact will be mitigated.

Response:

Hydrocompaction is the process of volume decrease and density increase that occurs when moisture-deficient deposits compact as they are wetted for the first time since burial. The PEC Site is located close to or within areas of historic hydrocompaction or near-surface subsidence.

The PEC Site has been irrigated for agricultural use for many years, which lessens the likelihood of near-surface subsidence following construction of the PEC. Constructing settlement-sensitive structures on driven piles will mitigate potential hydrocompaction impacts on the operation of the facilities. Geotechnical recommendations for driven piles are provided in Appendix L of the Application for Certification (see Section 7.9).

TECHNICAL AREA: GEOLOGICAL HAZARDS AND RESOURCES

Data Request 38 Rev: Please clarify this discrepancy, what impact expansive soils may have on the operation of the proposed facilities, and how such impacts will be mitigated.

Response:

Discrepancies between the Geological Hazards and Resources section and the preliminary geotechnical investigation report included as Appendix L of the Application for Certification occurred because the section was completed before the appendix. Geotechnical investigation identified the presence of some moderately expansive fine-grained soils underlying the PEC Site. The potential for moderately expansive soils reported in the preliminary geotechnical investigation report supersedes the last sentence in paragraph 1 of Section 5.3.1.1.12 of the Application for Certification.

Recommendations in Appendix L for foundation considerations, earthwork, pavements, and sidewalks include mitigation measures for potential moderately expansive soil impacts. Constructing settlement-sensitive structures on driven piles will mitigate potential moderately expansive soil impacts on the operation of the facilities. Geotechnical recommendations for driven piles are provided in Appendix L of the Application for Certification (see Section 7.9). The expansion potential of the compacted soils below non-settlement sensitive structures will be mitigated by mixing moderately expansive soils with non-expansive soils and compacting the mixed soils on the wet side of optimum moisture content. Geotechnical recommendations for engineered fill and spread footings for lightly loaded structures are provided in Appendix L of the Application for Certification (see Sections 7.2.2 and 7.7).

TECHNICAL AREA: LAND USE

Data Request 39 Rev: For staff to complete evaluation of the proposed cancellation, please submit a schedule as to when Fresno County will process the cancellation application and when the Board of Supervisors will hear the cancellation application.

Response:

Williamson Act Cancellation Process Schedule

The Fresno County process and anticipated timetable for the Williamson Act cancellation of the 12.8 acres is as follows:

1. Petition for Cancellation - Filed by the Landowner on November 3, 2006
2. Determination of Completeness - November 2006
3. DOC Review and Comment – January 18, 2007
4. Memo to Assessor's Office requesting Fee amount – November 2007
5. County "sign-off" on CEQA analysis - January 2007
6. Cancellation comes before Agricultural Land Conservation Committee for recommendation to Board of Supervisors - (meets 1st Wednesday of Month; needs 30 days after CEQA/Assess. Office steps) - TBD
7. Board of Supervisors acts on ALCC recommendation (meets on the following Tuesdays: 3-13, 3-27, 4-17, 4-24, 5-1, 5-15, 5-22) - TBD

TECHNICAL AREA: LAND USE

Data Request 40 Rev: To conform to the requirements of Section 66412.2 of the Subdivision Map Act, please provide a plot plan that demonstrates the project's conformance with Section 816.5 (Property Development Standards) of the Fresno County Zoning Ordinance.

Response:

PEC will submit a *Site Plan Review* to Fresno County Department of Public Works and Planning - Development Services Division in lieu of proceeding with County provisions pursuant to the Subdivision Map Act, Section 66412.2. The *Site Plan Review* will be submitted by January 27, 2007. A final review by the County is expected by March 23, 2007.

This submittal consists of the following:

Cover letter
Site Plan
Operational Statement
Grading and Drainage Plan
Check for submittal Fee

The principal contact at the Department of Public Works and Planning, Development Services Division is:

Mr. Robin Tani
(559) 262-4215
(800) 742-1011, ext. 24215
rtani@co.fresno.ca.us

TECHNICAL AREA: NOISE

Data Request 41 Rev: Please provide the mitigation measures being considered and the final estimated project noise levels during operations at locations ML1 and ML2 after incorporating the effects of the additional noise mitigation measures into the noise calculations. As an alternative for ML2, state if, in fact, the use of this location as a multi-family residence will be removed prior to the start of project operation.

Response:

Panoche Energy Center has entered discussions with Farmer's International, the owner of the property ML2, to relocate the residence approximately 0.5 miles away so that it is unaffected by the power plant.

ML-1 consists of a five-unit, one-story residential complex. The Applicant is evaluating abatement designs that would limit noise levels at ML-1 to meet the 45 dbA nighttime County standard. Meanwhile, it should be noted that Starwood Power – Midway, LLC (Starwood) filed an AFC with this Commission on November 17, 2006 (AFC 06-AFC-10). The proposed Starwood project will be located approximately 460 feet from ML-1 (Starwood AFC, Section 5.12.5.1). The Starwood AFC, in section 5.12.5.1, points out "A signed agreement is in place between the landowner of the 5-plex at ML-1 and Starwood-Power Midway, LLC to relocate the current residences."

If Starwood implements its agreement with the landowner to relocate the residents at ML-1, then PEC will not have to implement its abatement design. Conversely, if Starwood does not implement its agreement, PEC will be able to demonstrate compliance with the 45 dBa Fresno County nighttime standard..

TECHNICAL AREA: SOCIOECONOMICS

Data Request 42 Rev: Please indicate the year for all economic estimates (e.g., school impact fees, construction and operation sales tax).

Response:

The economic estimates provided in Section 5.10 Socioeconomics, of the PEC Application for Certification appear in 2005 U.S. dollars.

TECHNICAL AREA: SOCIOECONOMICS

Data Request 43 Rev: Please provide an estimate of the percentage of the construction workforce that would be local, from Fresno County, and non-local.

Response:

Based on current projected labor and employment data from the California Employment Development Department, 2006, and Building and Construction Trades Council of Fresno, Madera, Tulare, and Kings County, 2006, the PEC project expects that construction labor requirements will be met with workers from Fresno, Madera, Tulare, and Kings Counties.

TECHNICAL AREA: SOCIOECONOMICS

Data Request 44 Rev: Please provide an estimate of the amount of sales tax paid by the owners of the project during construction and operation.

Response:

The estimated value of materials and supplies that would be purchased within Fresno County during the construction phase is between $1 to 2 million, which would provide an average of $119,620 (2005 U.S. dollars) in sales tax. Annual sales tax from plant operation, based on estimated local materials and supplies purchases of $970,000, is expected to be $77,358 per year, in 2005 U.S. dollars. The table below summarizes the estimated construction and operation sales tax for Fresno County.

Estimated Construction and Operation Sales Tax
For Fresno County

Recipient	Percentage Sales Tax Allocation[1]	PEC Construction Estimated Sales Tax[2] (2005 U.S. dollars)	PEC Operation Estimated Sales Tax (2005 U.S. dollars)
State	6.0	90,000	58,200
Combined State and Local (Fresno County)	1.0	15,000	9,700
Fresno County	0.25	3,750	2,425
District Tax[3]	0.725	10,875	7,033
Total Sales Tax	7.975	119,620	77,358

[1] As per California Board of Equalization, 2006.
[2] Sales tax is based on the average ($1.5 million) of the estimated value of materials and supplies purchased within Fresno County during the construction phase (between $1-2 million).
[3] With exception to the district tax in the City of Clovis (1.025%), all other district taxes in Fresno County are 0.725%.

TECHNICAL AREA: SOILS AND WATER RESOURCES

Data Request 45 Rev: Please provide the results of laboratory analyses of groundwater, including TDS, for each of the three aquifers.

Response:

Results of laboratory analyses for groundwater samples recovered from three depths underlying the PEC site are included in the attached Report of Monitoring Well Installation (Appendix A). Total dissolved solids concentrations were 1,100, 840, and 2,900 milligrams per liter in groundwater samples collected from the lower portion of the confined aquifer, the upper portion of the confined aquifer, and the semi-confined aquifer, respectively.

TECHNICAL AREA: SOILS AND WATER RESOURCES

Data Request 46 Rev: Please provide the above mentioned cross-sections in standard engineering drawings of no smaller than 11 x 17 inches.

Response:

Standard engineering drawings drafted as 11 x 17 inch figures are provided as Figures 1A and 1B through Figure 3. Figures 1A and 1B show the locations of the lines of cross section. Figures 2 and 3 show Geologic Cross Section A-A' and Geologic Cross Section B-B', respectively.

Insert DR # 46 Figure 1a

Insert DR # 46 Figure 1b

Insert DR # 46 Figure 2

Insert DR # 46 Figure 3

TECHNICAL AREA: SOILS AND WATER RESOURCES

Data Request 47 Rev: Please provide aquifer data for the groundwater production wells proposed for the project, and the effect(s) that these wells will have on the upper aquifer, as well as each of the confined aquifers. The vertical gradient for each aquifer should be presented as part of this analysis.

Response:

Several aquifer parameters including depth to groundwater, and lithologic samples were collected during the drilling and installation of the three monitoring wells. Depth to groundwater and screened intervals were then used to calculate the vertical gradients below the site. Since these wells were completed as monitoring wells, no aquifer tests were performed. There are a few existing production wells that are similar in size as the proposed PEC producing well and several attempts were made to collect additional aquifer data from these wells, but the attempts were unsuccessful. Therefore, initial estimates of hydraulic conductivity were obtained from the US Geologic Survey (USGS). The USGS estimates of hydraulic conductivity for the Central Valley were developed from aquifer test data, specific capacity data from area wells.

To estimate the effects the future pumping of the proposed groundwater production well might have on Upper Tulare Aquifer, the Corcoran Aquitard, the Lower Tulare Aquifer, both local and regional flow regime and on surrounding wells, a 3-D groundwater model was constructed. Both the vertical gradient data (collected from the recent monitoring well installation) and hydraulic conductivity data (from published references) were used in the construction of the 3-D groundwater model. The specific details [including input parameters (vertical gradients, groundwater elevation data, hydraulic conductivity information), assumptions and limitation] of the 3-D model can be found in the attached URS Technical Memorandum (Appendix B). In summary, four groundwater-pumping scenarios (Scenario 1, no pumping; Scenario 2, pumping at 750 gpm; Scenario 3, pumping at 1000 gpm; Scenario 4, pumping at 2000 gpm) were incorporated into the model. Based on the predicted groundwater demand of the proposed facility, the proposed PEC well will be pumped at an average of 750 gpm. The Model run (Scenario 2) predict that if the well is pumped at 750 gpm, there will be no impacts (no drawdown) will occur in either of the aquifers. Even when the well is pumped at 1000 gpm (33% more than the proposed pumping rate) no noticeable drawdown occurs. Limited drawdown (less than 2.5 feet) occurs when the well is pumped at 2000 gpm.

TECHNICAL AREA: SOILS AND WATER RESOURCES

Data Request 48 Rev: Please evaluate slug testing as a means of obtaining site specific aquifer data. Slug test data would provide a better estimate of site specific aquifer parameters than those obtained from regional data sources that were used.

Response:

Estimation of aquifer parameters using slug test data from monitoring wells MW-1, MW-2, and MW-3 is feasible. However, slug tests only stress the aquifer in a relatively small zone of influence immediately surrounding the screened interval of the well. The method will produce hydraulic conductivity estimates that are not necessarily representative of the hydraulic conductivity of the aquifer at a larger scale. In addition, the high permeability of the aquifers will yield almost immediate recovery from negligible stresses placed on the aquifer by inserting slugs in a small diameter well, which will likely result in meaningless data for slug test analysis. It is important to match the scale of the aquifer test with the scale of the area of interest. Aquifer test data generated using small diameter monitoring wells with 20-foot long screened intervals will not be directly applicable to production wells with screened intervals that are hundreds of feet long.

Subbasin-specific estimates of hydrogeologic parameters such as specific yield and hydraulic conductivity cited in detailed regional studies and groundwater modeling efforts are inevitably more reliable than site-specific data from the on-site monitoring wells when predicting the performance of production wells at the site. However, if the collection of site-specific data fulfills a regulatory obligation, then it may be more appropriate to consider the application of more significant stresses on the aquifer, such as water injection or pumping and recovery. Although the test results may not be representative of the entire aquifer conditions, the resulting test data would be more precise than what might be collected from slug tests.

TECHNICAL AREA: SOILS AND WATER RESOURCES

Data Request 49 Rev: Please provide an update on the EPA review of the permit application. Include technical comments from EPA as well as an updated schedule and timeline for permit approval.

Response:

The status of the permit application is that it is Administratively Complete and it is in the Technical Review phase (copy of letter from EPA on the following page).

Per our December 21, 2006 correspondence with U.S. EPA (copy of e-mail message is provided on the following pages), updates and progress reports are not necessary from EPA. All written correspondence to and from both EPA and Panoche Energy Center is required to be provided to the primary contacts of the Energy Commission, the Regional Board, and the Division of Oil, Gas, and Geothermal Resources.

The PEC will provide CEC with copies of any future correspondence received from EPA.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

October 20, 2006

Gary Chandler
President
Panoche Energy Center, LLC
2542 Singletree Lane
South Jordan, Utah 84095

RE: Administrative Review

Dear Mr. Chandler,

We reviewed your permit application for 4 Class 1Nonhazardous wells which was sent on September 14, 2006. The application is Administratively Complete. We have begun the Technical Review process which was outlined in a meeting at our office on September 28, 2006.

If you have any questions or need to discuss this further, please do not hesitate to call Mr. George Robin, of my staff at 415-972-3532 or me at 415-972-3971.

Sincerely,

Elizabeth Jones for

David Albright, Manager
Ground Water Office

cc: Doug Patteson, Ca. Central Valley Regional Water Quality Control Board
Glenn Muggleberg, Ca. Division of Oil, Gas, and Geothermal Resources, District 5
Michael Stephens, Ca. Energy Commission

Printed on Recycled Paper

-----Robin.George@epamail.epa.gov wrote: -----

To: Maggie_Fitzgerald@URSCorp.com George Robin/R9/USEPA/US@EPA
From: George Robin/R9/USEPA/US@EPA
Date: 12/21/2006 08:35AM
cc: Jreede@energy.state.ca.us, Albright.David@epamail.epa.gov
Subject: Re: Updates - Panoche Energy Center

Hello Maggie,

The status of the permit application is that it is Administratively complete and it is in the Technical Review phase. Timelines, schedules will not be specifically available however we understand your need for expedient review and processing and are likewise working on this project.

Updates and progress reports are not necessary from EPA in that copies of all written correspondence to and from both EPA and Panoche Energy Center is required to be provided to the primary contacts of the Energy Commission, the Regional Board and the Division of Oil, Gas, and Geothermal Resources.

If you need to discuss this further, please reply to this e-mail or call me at (415) 972-3532.

George Robin
Engineer
Ground Water Office, WTR-9
Underground Injection Control program

-----Maggie_Fitzgerald@URSCorp.com wrote: -----

To: George Robin/R9/USEPA/US@EPA
From: Maggie_Fitzgerald@URSCorp.com
Date: 12/20/2006 10:54AM
cc: Jreede@energy.state.ca.us
Subject: Panoche Energy Center

Good morning George.

We have not met yet but I am the new URS Program Manager for the Panoche Energy Center project. I am writing to inquire about the status of the UIC permit application submitted in September 2006.

On December 8, 2006 we received formal data requests from the CEC for the PEC project. One of the data requests, data request #49, refers to the status of the UIC permit application process. Data Request #49 is as follows:

"Please provide an update on the EPA review of the permit application. Include technical comments from EPA as well as an updated schedule and timeline for permit approval."

I am aware that you have been contacted recently by the Applicant so I apologize for yet another request. If you are able to provide any update on the schedule, timeline, any potential data requests, etc., it would be greatly appreciated. Our Data Request responses are due to

CEC on January 9, 2007 and we are in the process of compiling all of the responses.

I look forward to meeting you soon and hope that you have a great holiday(s). Thank you.

Maggie Fitzgerald
URS Corporation
2020 East First Street, Suite 400
Santa Ana, CA 92705
714-648-2759 direct
maggie_fitzgerald@urscorp.com

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TECHNICAL AREA: SOILS AND WATER RESOURCES

Data Request 50 Rev: In the event that data from the exploratory boring does not support underground injection as a means of waste-water disposal, please discuss alternative means of disposal.

Response:

Development and use of deep injection wells has been singularly proposed for disposal of wastewater from the PEC. However, in the unlikely event that deep injection wells cannot be utilized due to scheduling or technical considerations, use of alternative technologies for disposal of wastewater from the PEC will be evaluated. Evaluation of alternative technologies and resources would include feasibility, environmental and engineering studies as well as detailed cost estimates. Such studies would need to be completed to determine if the Project could sustain the associated economic and operational impacts. These studies are not normally undertaken or justified for alternatives that are not likely to be implemented. The studies would be initiated in late spring of 2007 if there are indications of significant problems with the permitting or technical viability of the deep injection wells.

Analysis of wastewater disposal alternatives showed injection wells to be a superior technology based on economics and operational characteristics. Evaluation of geologic information from the project area provides strong evidence that development of deep injection wells for wastewater disposal at the PEC is technically feasible. Two 100% redundant wells are initially proposed for installation. To ensure that adequate redundancy and capacity will be available, the applicant has applied for authorization to construct four deep injection wells at the PEC. Based on the applicant's discussions with permitting staff at USEPA Region IX, it is expected that the permit for construction of the deep injection wells will be received between June and September of 2007. The applicant has begun its request for proposals to potential contractors for the development and installation of the deep injection well(s) in the fall of 2007.

TECHNICAL AREA: TRANSMISSION SYSTEM ENGINEERING

Data Request 51 Rev: Please provide the final System Impact Study. The Study should analyze the system impact with and without the project during peak and off-peak system conditions, which will demonstrate conformance or non-conformance with the utility reliability and planning criteria with the following provisions:

a. Identify major assumptions in the base cases including imports to the system, major generation and load changes in the system and queue generation.

b. Analyze system for N-0, important N-1 and critical N-2 contingency conditions and provide a list of criteria violations in a table showing the loadings before and after adding the new generation and all short circuit studies.

c. Analyze system for Transient Stability and Post-transient voltage conditions under critical N-1 and N-2 contingencies, and provide related plots, switching data and a list for voltage violations in the studies.

d. Provide a list of contingencies evaluated for each study.

e. List mitigation measures considered and those selected for all criteria violations.

f. Provide electronic copies of *.sav and *.drw PSLF files.

g. Provide power flow diagrams (MW, % loading & per unit voltage) for base cases with and without the project. Power flow diagrams must also be provided for all N-0, N-1 and N-2 studies where overloads or voltage violations appear.

h. Provide environmental information related to any mitigation identified in the studies.

Response:

Per Dr. James W. Reede's (Energy Facility Siting Project Manager of the California Energy Commission) request, 7 hard copies and 5 CDs have been sent out on December 21, 2006 via FedEx Overnight and delivered on December 22, 2006.

Responses to items b. and f. will be provided upon agreement of confidentiality with PG&E.

TECHNICAL AREA: VISUAL RESOURCES - PLUME

Data Request 52 Rev: Please summarize for the cooling tower the conditions that affect vapor plume formation including number of cells in operation, cooling tower 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 ambient conditions cooling tower cells may be shut down.

Parameter	Cooling Tower Exhausts		
Number of Cells	5 cells		
Cell Height*	12.8 meters (42 feet)		
Cell Diameter*	6.71 meters (22 feet)		
Tower Housing Length*	15.24 meters (151 feet)		
Tower Housing Width*	12.8 meters (42 feet)		
Ambient Temperature*	16.8°F	63.3°F	114°F
Ambient Relative Humidity	95.2%	76%	14.4%
Number of Cells in Operation			
Heat Rejection (MW/hr)	90.5	117.5	127.8
Exhaust Temperature (°F)			
Exhaust Flow Rate (lb/hr)			

*Ambient conditions and heat rejection, neglecting water makeup and blowdown, are based on the three heat balance cases provided in Appendix A of the AFC. Cell diameter and height are from the air quality modeling CD. Tower length and width are from AFC Table 3.4-1.

Response:

Parameter	Cooling Tower Exhausts		
Number of Cells	5 cells		
Cell Height*	12.8 meters (42 feet)		
Cell Diameter*	6.71 meters (22 feet)		
Tower Housing Length*	15.24 meters (151 feet)		
Tower Housing Width*	12.8 meters (42 feet)		
Ambient Temperature*	16.8°F	63.3°F	114°F
Ambient Relative Humidity	84.0%	62.0%	14.6%
Number of Cells in Operation	2	4	4
Heat Rejection (MMBtu/hr)	313	392	441
Exhaust Temperature (°F)	82	90	103
Exhaust Flow Rate (lb/hr)	8,100,000	13,300,000	12,800,000

The cooling tower performance data is provided in the table above. Four (4) cells are expected to be in operation at ambient temperatures above 50ºF; three cells from 30ºF to 50ºF; and two cells

for temperatures below 30ºF. The heat rejection can be defined as a function of ambient temperature in two regions: below 60ºF and 60ºF and higher. This is because evaporative coolers are used for CTG inlet air cooling at ambient temperatures 60ºF and higher. The expected heat rejection is given as follows:

Below 60ºF	-	HR = 70.3 + 0.48*Tamb (MMBtu/hr for each CT in service)
60ºF and above	-	HR = 82.8 + 0.24*Tamb (MMBtu/hr for each CT in service)

TECHNICAL AREA: VISUAL RESOURCES - PLUME

Data Request 53 Rev: Additional combinations of temperature and relative humidity or curves showing heat rejection vs. ambient condition, if provided by the applicant, will be used to more accurately represent the cooling tower exhaust conditions. Please include appropriate design margins for the number of cells in operation, exhaust flow rate and exhaust temperature in consideration that the air flow per heat rejection ratio is often used as a Condition of Certification design limit.

Response:

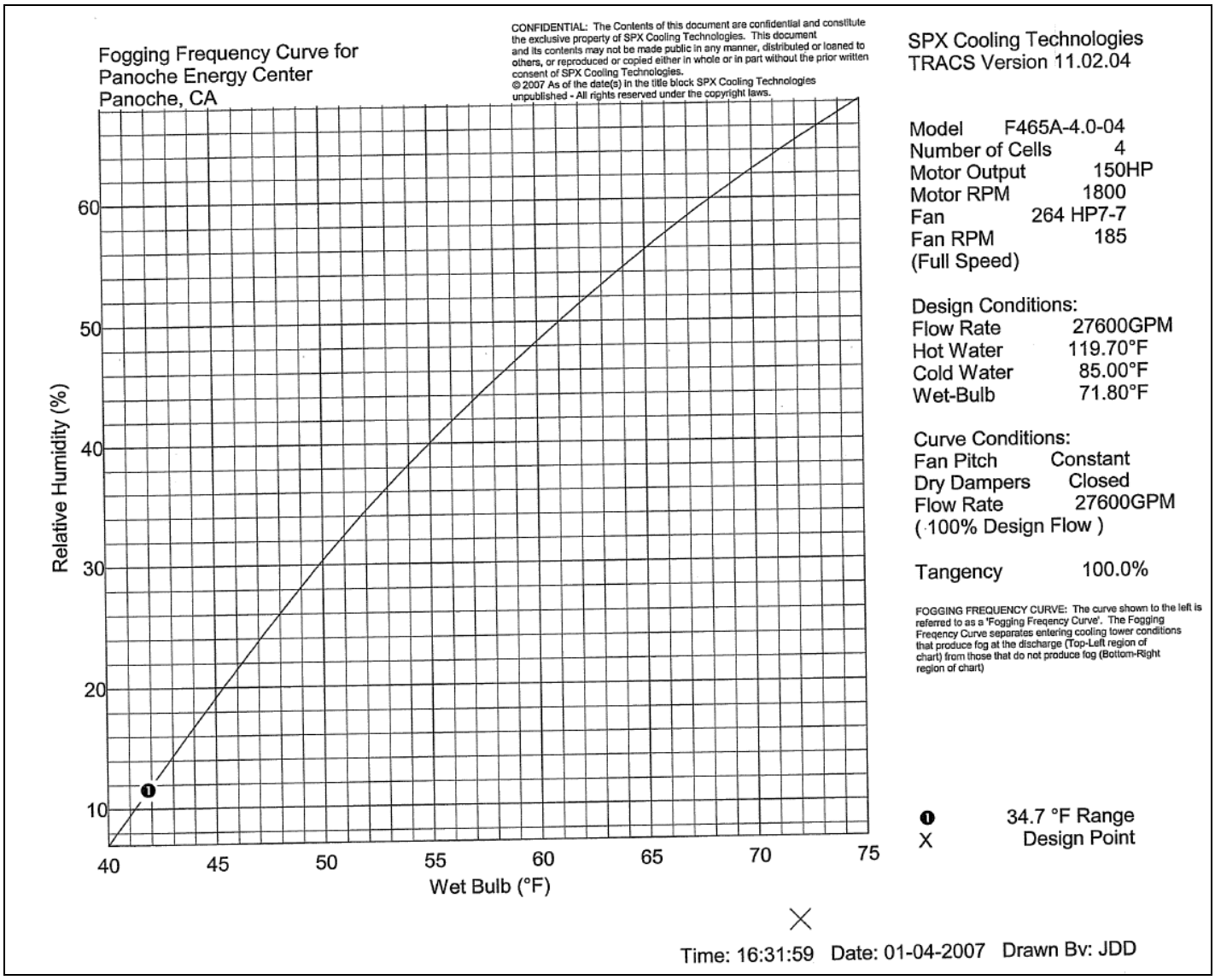
The requested information is provided in the response to item 52, above.

TECHNICAL AREA: VISUAL RESOURCES - PLUME

Data Request 54 Rev: Please provide the cooling tower manufacturer and model number information and a fogging frequency curve from the cooling tower vendor, if available.

Response:

The specific cooling tower for the project has not yet been selected. However, it will be a fiberglass, counter-flow, mechanical-draft cooling tower such as a Marley Model F465A-4.0-4. A fogging frequency curve created by Marley for this tower model is provided below.



TECHNICAL AREA: VISUAL RESOURCES - PLUME

Data Request 55 Rev: Please confirm that under normal full load operation of the four turbines only four of the five cooling tower cells will be operating, as noted in Table 3.11.1 of the AFC. Also, please indicate under what ambient conditions that additional cooling tower cells may be shut down while still operating under full load for all four turbines.

Response:

The tower is designed for four-cell operation, with the fifth cell as a spare for reliability purposes. Four cells or less will be used under normal four-unit operation. The conditions for cell shut down are addressed in response for Data Request 52, above.

TECHNICAL AREA: VISUAL RESOURCES - PLUME

Data Request 56 Rev: Please confirm that the cooling tower fan motors will not have variable speed/flow controllers.

Response:

The cooling tower fan motors will not be of the variable speed type.

TECHNICAL AREA: VISUAL RESOURCES - PLUME

Data Request 57 Rev: Please provide representative raw and formatted meteorological data for visible plume modeling, if desired. This meteorological data set must be reasonably determined to be from a more project representative site than Lemoore NAS and include at least 5 years of 95 percent or better complete data. Additionally, this data set must have all of the normal ISCST3 meteorological data parameters, plus the following formatted parameters: relative humidity, present weather, visibility, cloud cover, and ceiling height. As appropriate, the units (such as knots for wind speed) for each of the parameters must also be provided.

Response:

PEC is not aware of any more complete or more representative meteorological data set to support CEC's visible plume modeling than the Lemoore NAS data referenced in the data request.

TECHNICAL AREA: VISUAL RESOURCES - PLUME

Data Request 58 Rev: Please indicate by quarter, or by day or day of week if desired, the hours of the day that the project would be expected to operate given the maximum quarterly operating schedule of 1,100 hours in the first and second quarters, 1,200 hours in the fourth quarter, and 1,600 hours in the third quarter (AFC page 5.2-36).

Response:

The units will be dispatched by PG&E based on an economic dispatch model. PEC is contractually obligated to be able to operate up to the stated number of hours per calendar quarter. The GE LMS100 machines are very efficient units designed to meet peaking and intermediate load requirements. Although PG&E can dispatch these units whenever needed, PEC believes these units will likely be dispatched during weekday peak hours and other times when demand is great. However, PEC is unable to predict any details beyond the quarterly hour limits in the PG&E contract.

TECHNICAL AREA: VISUAL RESOURCES - PLUME

Data Request 59 Rev: Please indicate any other reasonable worst-case hourly operating profiles for this project that are supported by PG&E data on expected maximum future load demand for the life of the facility. Please provide all supporting PG&E reference materials for the referenced maximum hourly operating profiles.

Response:

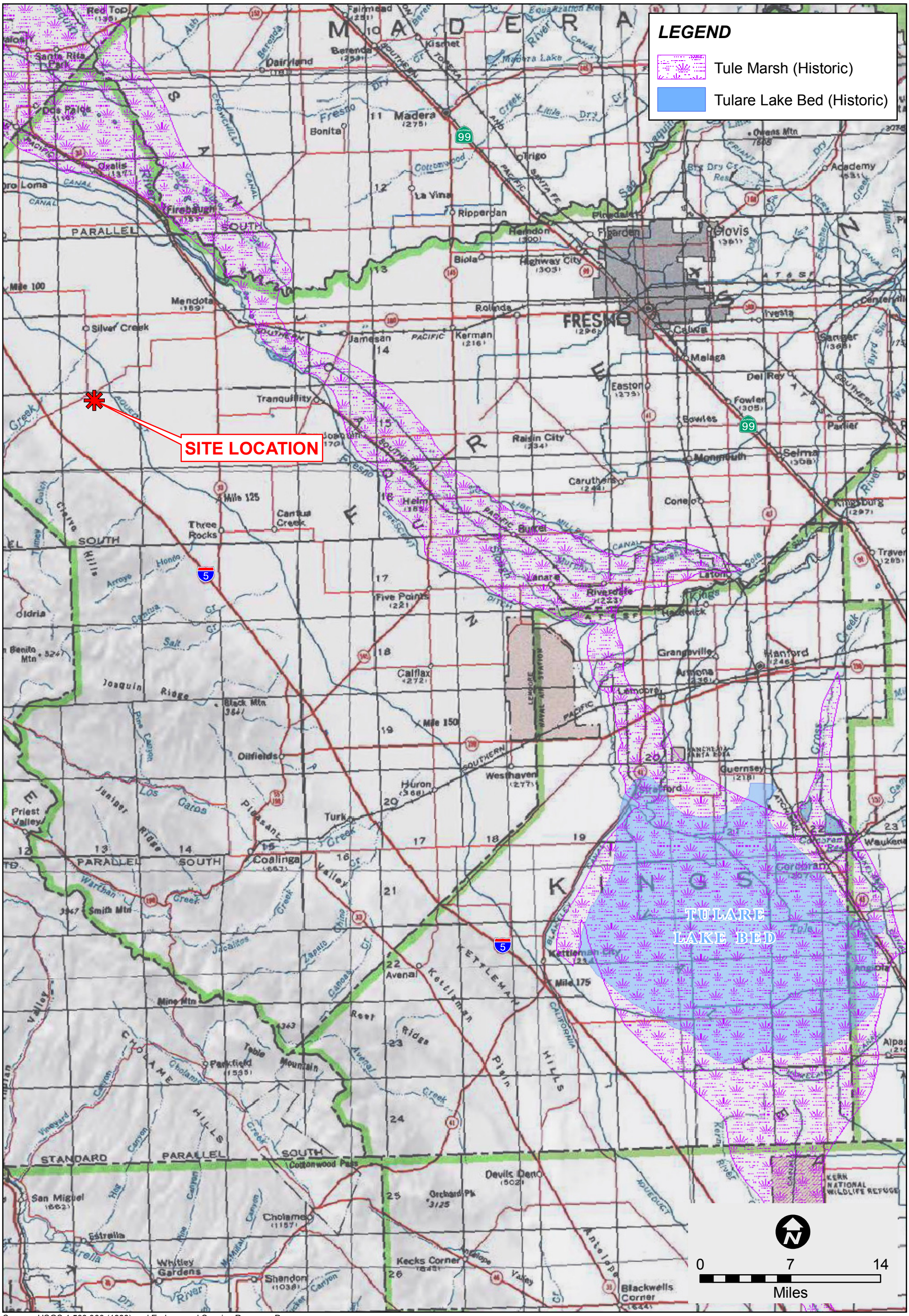
The units will be dispatched by PG&E based on an economic dispatch model. PEC is contractually obligated to be able to operate up to the stated number of hours per calendar quarter. Any load predictions beyond the quarterly hour limits in the PG&E contract are not available to PEC.

TECHNICAL AREA: WASTE MANAGEMENT

Data Request 60 Rev: Using the Interim Guidance for Sampling Agricultural Fields for School Sites (Second Revision, dated August 26, 2002) sponsored by the California Department of Toxic Substances Control, California Environmental Protection Agency, please identify agricultural chemicals used on the site and chemicals or metals of potential concern. The project owner should also sample for concentrations of arsenic and selenium in addition to the other chemicals. A minimum of eight composite samples should also be taken on half-acre centers. Although the guidance is listed as an "Interim Guidance...for School Sites," DTSC uses the guidance for all types of commercial and industrial businesses constructed on agricultural properties. The guidance is intended to assist environmental assessors in designing initial investigation for sites with historical agricultural uses.

Response:

Soil samples were collected to confirm the presence of agricultural chemicals, concentrations of arsenic and selenium, as well as other chemicals and metals of potential concern. The results of this soil sampling event are presented in the attached technical memorandum (Appendix C)

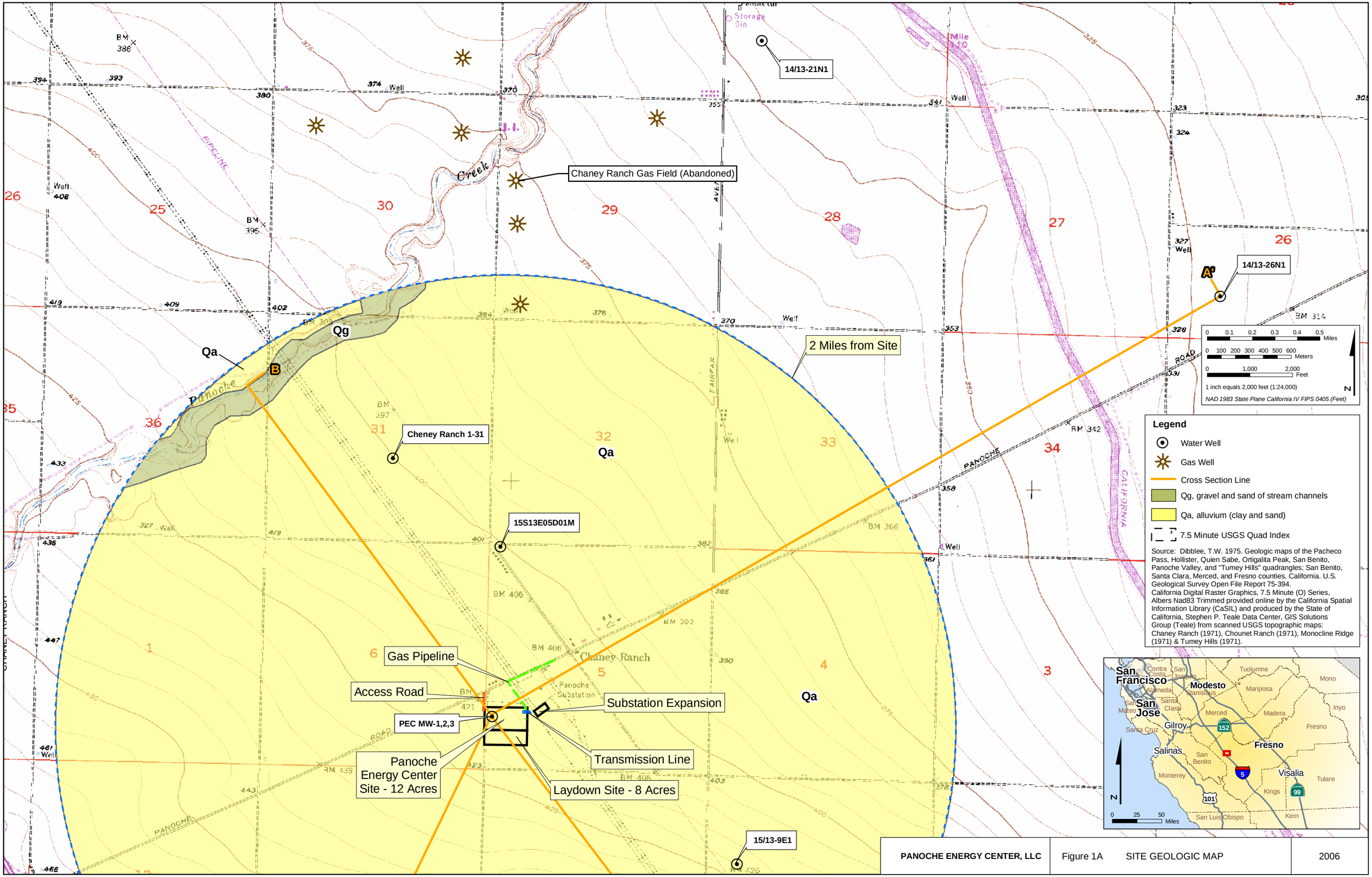


Source: USGS 1:500,000 (1980) and Endangered Species Recovery Program and the Bureau of Reclamation MPGIS Service Center (Kuchler 1977)

FIGURE 1
REGIONAL LOCATION MAP

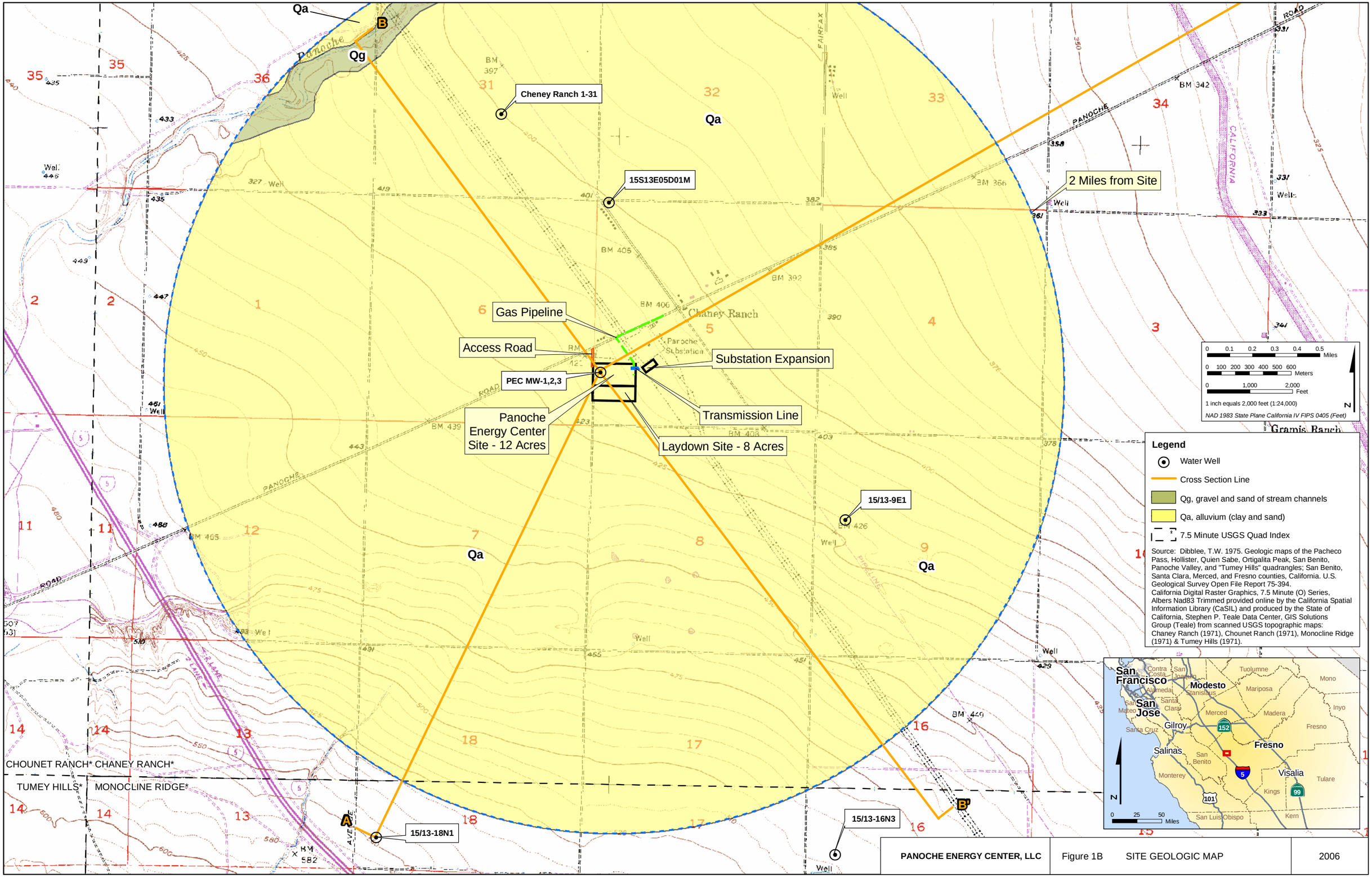
PANOCHE ENERGY CENTER, LLC

URS



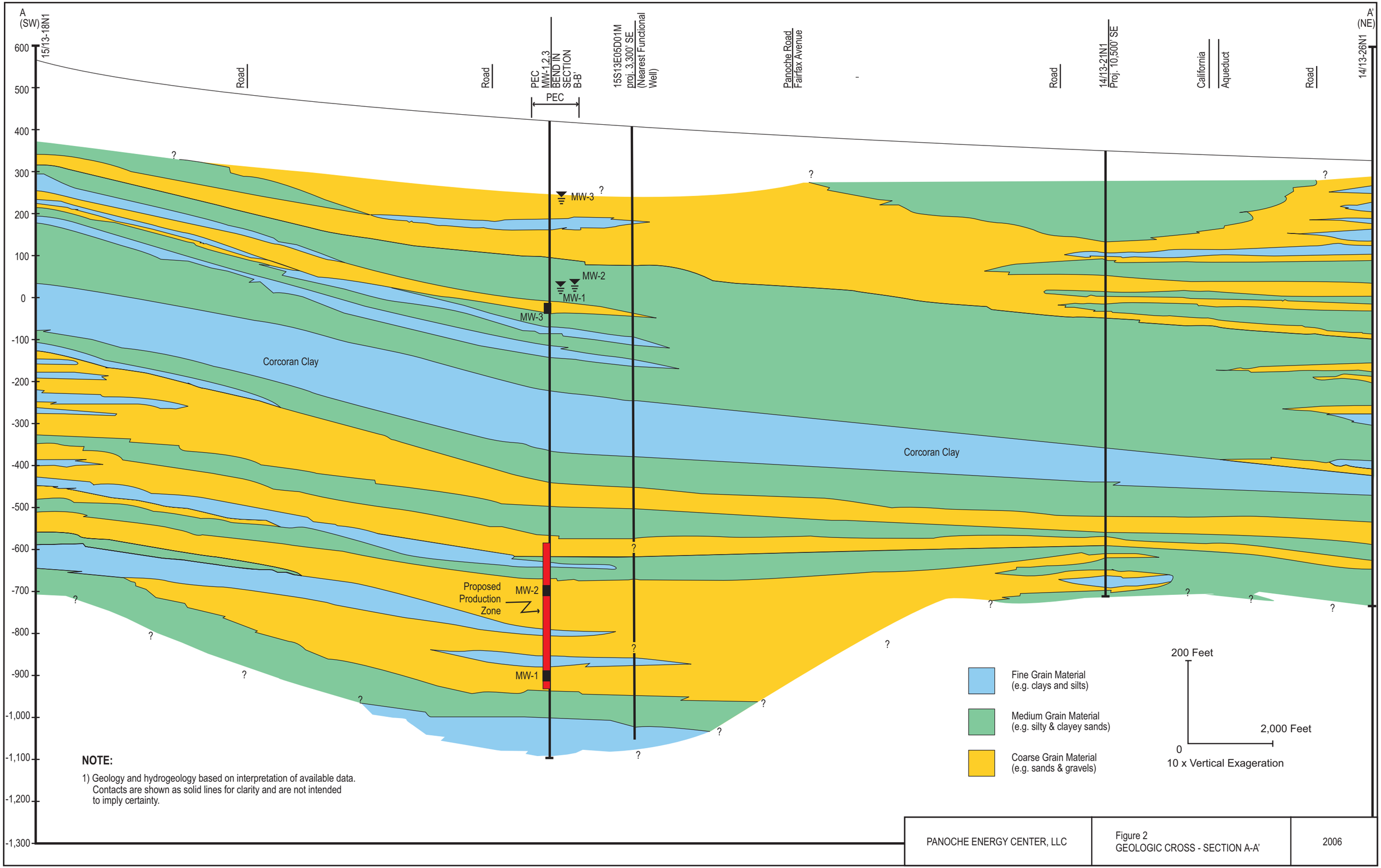
PANOCHE ENERGY CENTER, LLC	Figure 1A SITE GEOLOGIC MAP	2006

G:\gis\projects\1577\2890679\mxd\geology_site_fig1a.mxd

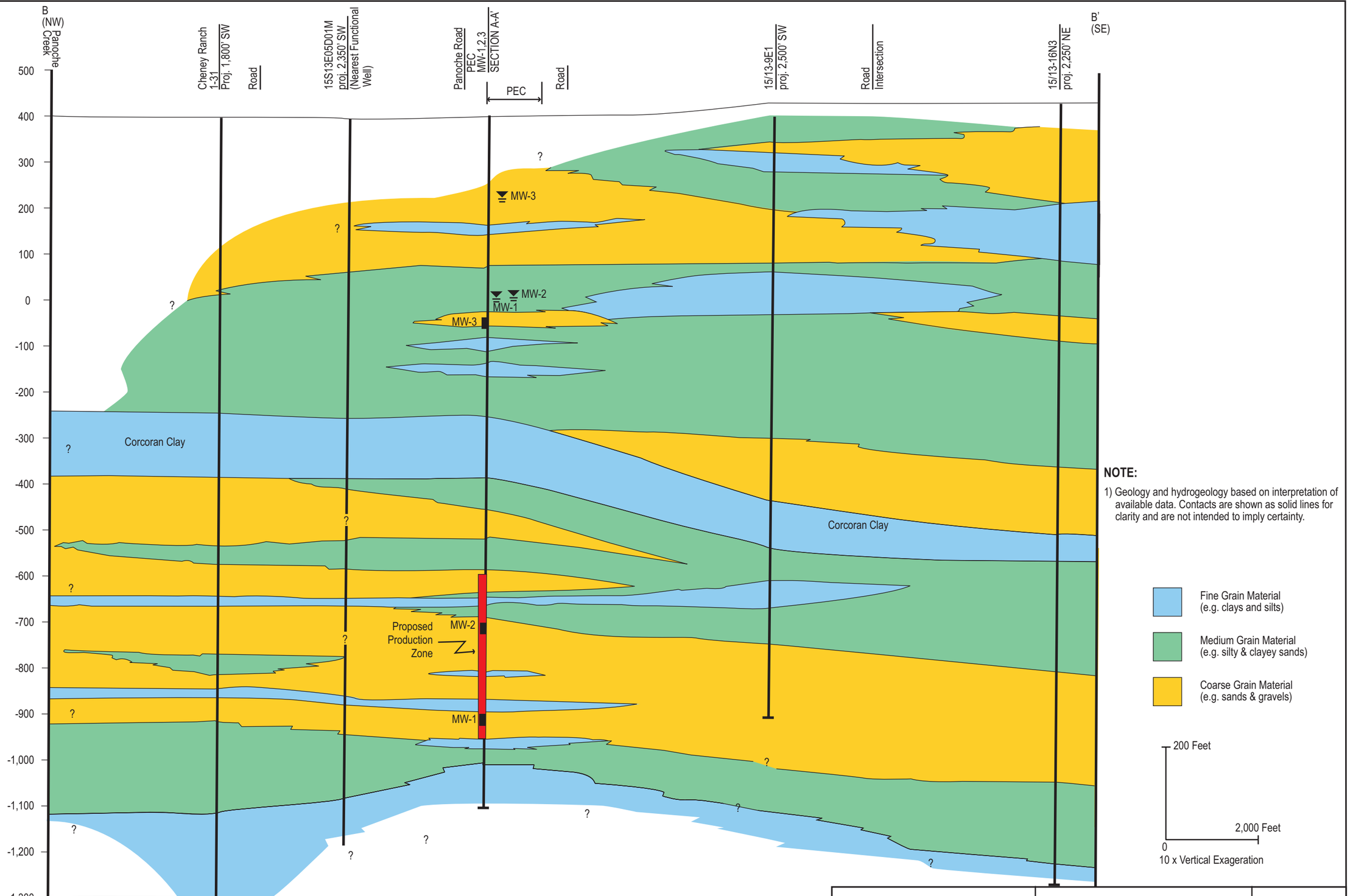


PANOCHE ENERGY CENTER, LLC	Figure 1B SITE GEOLOGIC MAP	2006

G:\gis\projects\1577\289067\95\mxd\geology_site_fig1b.mxd



PANOCHE ENERGY CENTER, LLC	Figure 2 GEOLOGIC CROSS - SECTION A-A'	2006



PANOCHE ENERGY CENTER, LLC	FIGURE 3 GEOLOGIC CROSS SECTION B-B'	2006

URS

REPORT OF MONITORING WELL INSTALLATION

Panoche Energy Center Site
Fresno County, California

Prepared for:

Panoche Energy Center, LLC
2542 Singletree Lane
South Jordan, Utah 84095

Prepared by:

URS Corporation
30 River Park Place West, Suite 180
Fresno, California 93720
559.256.1444

URS Job No. 28906795

January 5, 2007

TABLE 3
INORGANICS CONCENTRATIONS IN WATER
Panoche Energy Center
Fresno County, California

Well Identification		Lower Confined Aquifer		Upper Confined Aquifer		Semi-Confined Aquifer	Water Quality Limits For Constituents[a]					
		MW-1		MW-2		MW-3	CDHS[b]		USEPA[c]			
Sample Identification		MW-1	MW-4 (Blind Duplicate of MW-1)	MW-2	MW-5 (Blind Duplicate of MW-2)		Primary MCL[d]	Secondary MCL[e]	Primary MCL	Secondary MCL	CA PHG[f]	Ag Water Quality Limits[g]
		Sample Date										
Constituent or Parameter	Units	10/25/2006	10/25/2006	10/25/2006	10/25/2006	10/27/2006						
Total Alkalinity as $CaCO_3$	mg/L[h]	180	180	110	110	180	-	-	-	-	-	-
Bicarbonate Alkalinity as HCO_3	mg/L	200	200	130	140	230	-	-	-	-	-	-
Carbonate Alkalinity as CO_3	mg/L	< 20	< 20	< 20	< 20	< 20						
Hydroxide Alkalinity as OH	mg/L	< 20	< 20	< 20	< 20	< 20						
Ammonia as N	mg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0						
Biochemical Oxygen Demand	mg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0						
Chloride	mg/L	85	85	40	41	**160**	-	250	-	250	-	106
Chemical Oxygen Demand	mg/L	< 10	< 10	26	< 10	< 10	-	-	-	-	-	-
Cyanide (total)	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005						
Specific Conductance (EC)	µS/cm[i]	**1,500**	**1,500**	**1,100**	**1,100**	**3,000**		900			-	700
Fluoride	mg/L	0.60	0.68	0.56	0.59	0.71	2		4	2	1	1
Hardness	mg equiv. $CaCO_3$/L[j]	40	41	56	56	1,100	-	-	-	-	-	-
Methylene Blue Active Substances	mg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050						
Nitrate as NO_3	mg/L	< 6.0	< 6.0	< 6.0	< 6.0	**27**	45	-	10	-	10	-
Orthophosphate as P	mg/L	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5						
pH	pH units	**8.9**	**9.0**	**8.6**	**8.6**	8.1				6.5 - 8.5		6.5 - 8.4
Phosphorus	mg/L	0.12	0.16	0.14	< 0.10	< 0.10	-	-	-	-	-	-
Sulfate as SO_4	mg/L	**440**	**440**	**380**	**400**	**1,500**	-	250	500	250	-	-
Sulfide	mg/L	< 1.0[k]	< 1.0[k]	< 1.0[k]	< 1.0[k]	< 1.0						
Total Dissolved Solids	mg/L	**1,100**	**1,100**	**840**	**840**	**2,900**	-	500	-	500	-	450
Total Organic Carbon	mg/L	1	< 1.0	< 1.0	1	< 1.0	-	-	-	-	-	-
Total Suspended Solids	mg/L	110	94	25	15	< 4.0	-	-	-	-	-	-
Turbidity	NTU[l]	**89[m]**	**87[m]**	**52[m]**	**45[m]**	**2.3**	1 or 5	5	1 or 5	-	-	-

Note: Values shown in bold print exceed one or more water quality limits shown on right.
[a] Water quality limits for detected constituents summarized from A Compilation of Water Quality Goals, August, 2003, Regional Water Quality Control Board, Central Valley Region
[b] California Department of Health Services
[c] U.S. Environmental Protection Agency
[d] Primary Maximum Contaminant Level
[e] Secondary Maximum Contaminant Level
[f] California Office of Environmental Health Hazard Assessment Public Health Goal in Drinking Water
[g] Agricultural Water Quality Limits based on Ayers, R.S. and D.W. Westcot, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations - Irrigation and Drainage Paper No. 29, Rev. 1, Rome, 1965, as summarized in A Compilation of Water Quality Goals, August, 2003
[h] mg/L = milligrams per liter
[i] µS/cm = microsiemens per centimeter
[j] mg equiv. $CaCO_3$/L = milligrams equivlent calcium carbonate
[k] Analyst noted that samples were orange in color and indicated possible matrix interference
[l] NTU = Nephelometric Turbidity Units
[m] Sample analyzed outside of U.S. Environmental Protection Agency recommended holding time

URS

REPORT OF MONITORING WELL INSTALLATION

Panoche Energy Center Site
Fresno County, California

This Report of Monitoring Well Installation for the Panoche Energy Center Site in western Fresno County, California was prepared by URS Corporation (URS) for Panoche Energy Center, LLC (Client) in a manner consistent with the level of care and skill ordinarily exercised by professional engineers, geologists, and environmental scientists in the geographic area of the site at this time. URS provides no other warranties, either express or implied, concerning the contents of this report, which was prepared under the technical direction of the undersigned.

URS CORPORATION

Jason M. Moore, PG, CEG
Senior Geologist

PROFESSIONAL GEOLOGIST
JASON M. MOORE
No. 2434
CERTIFIED ENGINEERING GEOLOGIST
Exp. 12/31/08
STATE OF CALIFORNIA

Maggie Fitzgerald
Program Manager

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REPORT OF MONITORING WELL INSTALLATION
Panoche Energy Center Site
Fresno County, California

1.0 INTRODUCTION

This report has been prepared by URS Corporation (URS) on behalf of Panoche Energy Center, LLC (Client). The report describes the methodology and results of the recent monitoring well installations and groundwater monitoring at the Panoche Energy Center site (Site) in Fresno County, California. The location of the Site and the surrounding area are depicted on Figure 1.

Client is currently seeking approval from the California Energy Commission (CEC) to construct and operate a power generation facility at the Site. The Panoche Energy Center (PEC) is a proposed simple-cycle power generation project that will include four natural gas-fired combustion turbine generators. Process water for the PEC will be supplied via two onsite supply wells to be completed within a confined aquifer underlying the Corcoran Clay. Safety water will be supplied by a single, relatively shallow onsite supply well completed within a semi-confined aquifer overlying the Corcoran Clay. Client submitted an Application for Certification (AFC) for the PEC project to the CEC in August 2006. During the data adequacy review process, CEC staff requested site-specific groundwater data for the water-bearing zone that is proposed for project water supply. In response, Client retained a drilling contractor to install three monitoring wells at the Site, and retained URS to provide construction observation and groundwater monitoring services.

The remainder of this report summarizes the scope of work conducted in accordance with the client-approved workplan and is comprised of the following sections:

- Section 2.0 summarizes the geologic setting of the Site.
- Section 3.0 summarizes the construction observation and groundwater monitoring.
- Section 4.0 summarizes findings of the groundwater monitoring.
- Section 5.0 presents a summary of the report and recommendations.
- Section 6.0 presents limitations for this report.
- Section 7.0 presents pertinent references.
- Tables 3 and 4 and figures are presented following Section 6.0.
- Appendix A presents the well permits issued by Fresno County for installation of the monitoring wells.
- Appendix B presents the lithologic log with part of the electric log shown for reference.
- Appendix C presents the downhole geophysical log.
- Appendix D presents the laboratory report for sieve testing of cuttings from the completion intervals and the sand filter packs of the monitoring wells.
- Appendix E presents drillers tally sheets for installation of the monitoring wells.
- Appendix F presents morning reports for drilling and installation of the monitoring wells.

- Appendix G presents the laboratory reports for initial groundwater samples collected from the new monitoring wells.

2.0 GEOLOGIC SETTING

The PEC is located on the Panoche Creek alluvial fan within the San Joaquin Valley portion of the Great Valley geomorphic province. The most extensive geomorphic units in the province include dissected uplands, low alluvial plains and fans, river flood plains and channels, and overflow lands and lake bottoms. The region persisted as a lowland or shallow marine embayment during the entire Cenozoic and at least the later Mesozoic. In the late Cenozoic, much of the area was occupied by shallow brackish and freshwater lakes, particularly in the San Joaquin Valley, which has had interior drainage in its southern third since the Pliocene. Lake Corcoran formerly spread over much of the northern San Joaquin Valley during the middle and late Pleistocene. The associated, diatomaceous-lacustrine clay know as the Corcoran Clay or E-Clay covers more than 5,000 square miles of the San Joaquin Valley and is the confining layer for the most extensive confined aquifer in the San Joaquin Valley (Poland and Evenson, 1966; Croft, 1972; Page, 1986; Norris and Webb, 1990).

2.1 Regional Geology

The San Joaquin Valley is an asymmetrical basin defined by the Coast Ranges to the west, the Tehachapi Mountains to the south, the Sierra Nevada to the east, and the delta of the San Joaquin and Sacramento Rivers to the north. The axis of the valley trough is closer to the Coast Ranges than to the Sierra Nevada (Belitz and Heimes, 1990). The oldest rocks in the area are basement complex rocks underlying the basin that form much of the Tehachapi Mountains, San Emigdio Mountains, and the southern Sierra Nevada. The basement rocks are composed of a mass of plutonic and metamorphic rocks commonly referred to as the Sierra Nevada batholith of pre-Tertiary age. The basin is filled with more than 14,000 feet of rocks of Jurassic, Cretaceous, Tertiary, and Quaternary age (Croft, 1972).

The Site is situated on a thick section of Quaternary surficial sediments and older alluvium underlain by tertiary sediments. The Corcoran Clay is an extensive diatomaceous-lacustrine clay deposit of low permeability that divides the groundwater flow system into a confined hydrogeologic unit and an overlying semi-confined hydrogeologic unit (Davis and Poland, 1957). The Corcoran Clay was encountered in nearby USGS water well at a depth of about 666 feet below ground surface (bgs) (USGS, 1987). The Corcoran Clay ranges in thickness from 20 to 120 feet and is estimated to be about 100 to 120-feet thick underlying the Site (Page, 1986, Belitz and Heimes, 1990).

2.2 Regional Hydrogeology

The aquifer system comprising the Westside Subbasin consists of unconsolidated continental deposits of Tertiary and Quaternary age. These deposits form an unconfined to semi-confined aquifer overlying a confined aquifer. These aquifers are separated by an aquitard that is

composed of the Corcoran Clay member of the Tulare Formation. The aquifers are recharged by subsurface inflow from the west, east and northeast and by percolation of applied surface water. The deposits of the semi-confined hydrogeologic unit above the Corcoran Clay are typically alluvium derived from the Coast Ranges. These deposits can include Sierran-derived sand east of the Site. The two hydrogeologic units differ in texture, hydrologic properties, and oxidation state. In contrast to Coast Ranges alluvium, the Sierran sand is reduced in the valley trough. The Sierran deposits are highly permeable and historically have been tapped by wells as a source of irrigation water (Belitz and Heimes, 1990). Sierran sands do not generally extend very far to the west of the axis of the valley trough, and the semi-confined hydrogeologic unit underlying the Site is dominated by Coast Range alluvium. Groundwater within the Coast Ranges alluvium is generally of sulfate or bicarbonate type with relatively high dissolved mineral concentration and is generally considered to be of relatively low quality. Groundwater within the Coast Ranges alluvium is generally considered to be of relatively low quality due to the presence of water-soluble deleterious minerals within the parent rocks (Davis et al., 1959; Bull and Miller, 1975; Gilliom et al., 1989).

The unconfined to semi-confined aquifer above the Corcoran Clay includes younger alluvium, older alluvium, and part of the Tulare Formation. These deposits consist of highly lenticular, poorly sorted clay, silt, and sand intercalated with occasional beds of well-sorted sand.

The deposits of the confined hydrogeologic unit below the Corcoran Clay used as aquifers for groundwater production consist of poorly consolidated floodplain, deltaic, alluvial fan, and lacustrine deposits of the Tulare Formation. In general, groundwater in the confined aquifer generally contains smaller quantities of dissolved minerals and a higher concentration of sodium than groundwater in the overlying semi-confined aquifer (Davis et al., 1959). Brackish or saline groundwater underlies the fresh groundwater in the confined aquifer.

Many of the agricultural production wells in the study area are perforated below the Corcoran Clay (Belitz and Heimes, 1990). About 75 to 80 percent of the groundwater pumped for irrigation was from the confined aquifer (Davis and Poland, 1957; Bull and Miller, 1975). Groundwater withdrawal from the confined aquifer generated large-scale ground subsidence prior to delivery of surface water for agricultural water supply replacement beginning in the 1960's (Poland et al., 1975). Today, readily available, relatively high quality surface water supplants agricultural use of groundwater in the region except in times of drought when surface water supplies are curtailed.

2.2.1 Groundwater Subbasins

The Project Site is located in the Westside Subbasin of the San Joaquin Valley Groundwater Basin. The Westside Subbasin consists mainly of the lands in Westlands Water District. It is located between the Coast Range foothills on the west and the San Joaquin River Drainage and Fresno Slough on the east. The subbasin is bordered on the southwest by the Pleasant Valley Groundwater Subbasin and on the west by Tertiary marine sediments of the Coast Ranges, on the north and northeast by the Delta-Mendota Groundwater Subbasin, and on the east and southeast by the Kings and Tulare Lake Groundwater Subbasins (DWR, 2003).

2.2.2 Subbasin Groundwater Occurrence and Flow

The development of irrigated agriculture in the western San Joaquin Valley including the Panoche Fan area has significantly altered the groundwater flow system. Percolation of irrigation water past crop roots has caused a rise in the altitude of the water table in mid-fan and distal fan areas. Pumpage of groundwater from wells caused a lowering of the potentiometric surface of the confined aquifer over much of the western valley. Percolation of irrigation water has replaced infiltration of intermittent streamflow as the primary mechanism of recharge. Pumpage of groundwater from wells and crop evapotranspiration have replaced natural evapotranspiration and seepage to streams in the valley trough as the primary mechanisms of discharge. The combination of percolation and pumpage has resulted in development of a large downward hydraulic-head gradient in the semi-confined aquifer and has created a groundwater divide east of the Site. Decreases in groundwater pumping following delivery of surface-water have allowed consequent recovery in hydraulic head throughout the groundwater flow system. The present-day groundwater flow system is in a transient state and is adjusting to the stresses placed upon it in both the past and present (Belitz and Heimes, 1990).

2.2.3 Subbasin Groundwater Quality

Groundwater in the Westside Subbasin is generally of the sulfate or bicarbonate type. The waters of the semi-confined aquifer are generally high in calcium and magnesium sulfate. Groundwater below 300 feet and above the Corcoran Clay shows a tendency towards decreased dissolved solids with increased depth. Most of the groundwater of the confined aquifer is of the sodium sulfate type. Fresh groundwater in the confined aquifer generally contains less dissolved solids than the unconfined aquifer. Groundwater in the Westside Subbasin can have an upper range of dissolved solids concentrations between 2,000 and 3,000 milligrams per liter (mg/L). Dissolved solids concentrations in shallow groundwater can be greater than 10,000 mg/L at some locations. Locally, the base of fresh groundwater is defined as groundwater with total dissolved solids exceeding 2,000 parts per million (equivalent to mg/L) total dissolved solids, which is too high for irrigating crops (Westlands, 2006).

3.0 CONSTRUCTION OBSERVATION AND GROUNDWATER MONITORING

URS performed construction observation and groundwater monitoring activities required to assess the groundwater quality parameters at three depths below the Site. URS was responsible for lithologically logging the test hole based on returned cuttings and collecting groundwater samples from each well. Client contracted directly with a qualified, licensed well drilling contractor who performed the drilling, downhole geophysical logging, well construction, and development of the three monitoring wells. URS personnel observed the drilling activities intermittently, with nearly continuous observation during test hole drilling. URS personnel directed downhole geophysical logging of the test hole and interpreted the associated geophysical log. In addition, URS personnel continuously observed installation of the well casings and annular materials and most of the development of the three monitoring wells.

Two well casings were completed within one boring drilled to a depth of 1,510 feet bgs. The third completion was installed within a second boring drilled adjacent to monitoring wells MW-1 and MW-2 due to potential instability of the first hole. Well locations are depicted on Figure 2.

One of the wells was completed with the screened interval in the semi-confined aquifer above the Corcoran Clay and the other two wells were completed with the screened intervals in the underlying confined aquifer. The scope of work included water quality analyses intended to satisfy project and regulatory requirements for site-specific groundwater data.

Drilling, lithologic and downhole geophysical logging, well construction, development and groundwater sampling occurred over a 4-week period beginning in early October 2006. The work was conducted under the oversight of a California-registered geologist. The procedures used were in accordance with those described in the Scope of Work (URS, 2006a). Field work conformed with the Site's safe work plan (URS, 2006b). The investigative activities are summarized below:

- The drilling contractor obtained permits for well construction from the County of Fresno. Copies of the two permits are provided in Appendix A. The drilling contractor contacted the regional underground service alert provider and submitted a ticket for excavation of the soil borings prior to beginning work.

- A URS senior geologist provided ongoing oversight of field staff during the investigation through periodic site visits, daily debriefing meetings, and frequent contact via mobile telephone. Client was apprised of key findings as the investigation progressed through telephone conversations and transmittals of morning reports. Morning reports summarizing progress are provided in Appendix F.

- Bradley and Sons, Inc. of Del Rey, California, a California C-57 licensed drilling contractor provided drilling services using an Ingersoll-Rand TH-60 drilling rig. An approximately 8 3/4-inch diameter test hole was advanced to a depth of approximately 1,510 feet below ground surface (bgs) using the rotary-wash ("mud rotary") drilling method. During drilling, a URS field geologist prepared a lithologic log of the test hole based on cuttings returned in the drilling fluid at approximately 10-foot intervals. The lithologic log was prepared based on the Unified Soil Classification System (USCS) and generally accepted geologic interpretive descriptions. Portions of the drilled cuttings from each interval were secured in specially designed chip trays suitable for review and archiving. Drilled cuttings from selected intervals of the borehole were submitted for sieve analysis by a geotechnical laboratory for comparison with well screen slot size and filter pack grain size.

- After drilling, a downhole geophysical log of the test hole was obtained using spontaneous potential (SP), short-normal resistivity (16-inch spacing), and long-normal resistivity (64-inch spacing) instruments. Natural gamma and temperature logs were also run. A subsequent attempt to complete additional geophysical logs was blocked by an obstruction of the test hole at a depth of about 760 feet bgs.

- After geophysical logging, the test hole was reamed to a diameter of approximately 12 inches for installation of a nested set of two groundwater monitoring wells screened at different depth intervals. The test hole was reamed to a total depth of 1,360 feet bgs prior

to well installation. The first monitoring well (MW-1) was completed with a 20-foot screened interval in the lower portion of the confined aquifer at a depth of approximately 1,302 to 1,322 feet bgs. A deeper screened interval of 1,320 to 1,340 was intended for the well but was not feasible because the drag bit used to ream the test hole twisted off within the borehole at a depth of approximately 1,325 feet bgs while tripping out of the hole. The installed screened interval is at a higher elevation within the target sand than specified based on interpretation of the electric log. The 10-foot long sump planned for the lower completion was deleted to keep the screened interval as deep as possible. The second monitoring well (MW-2) was completed with a 20-foot screened interval in the upper portion of the confined aquifer at a depth of approximately 1,100 to 1,120 feet bgs. A 10-foot long sump was installed below the screened interval as planned for the second completion.

- MW-3 was completed with a screened interval in the semi-confined aquifer at a depth of approximately 440 to 460 feet bgs. A 10-foot long sump was also completed as planned in MW-3. Monitoring well MW-3 was installed in a second borehole located about 10-feet to the north of monitoring wells MW-1 and MW-2.

- Figures 3 and 4 show monitoring well construction diagrams. All three groundwater monitoring-wells were constructed of 2-inch nominal diameter, Schedule 40, steel casing with a 20-foot long section of 0.020-inch machine slotted steel screen. Flush threaded connections were made up with polytetrafluoroethylene (PTFE) tape and tack welded. Strap-on stainless steel centralizers were installed at roughly 100-foot intervals while the well casings were tripped into the hole. Annular materials were installed via tremie pipe. Annular materials included a number 8-16 sand filter pack for the screened intervals of each monitoring well. Screened intervals for monitoring wells MW-1, MW-2, and MW-3 were isolated by installing ¼ inch coated bentonite tablets above each filter pack interval within depth intervals identified as low resistivity clay intervals based on interpretation of the electric log. Neat-cement grout seals were pumped into the annular space between the uppermost bentonite tablet seal and the ground surface for monitoring wells MW-1/MW-2 and MW-3. Drillers tally sheets for construction of the monitoring wells are provided in Appendix E.

- Well development commenced after the completion of grouting. Well development was accomplished by surging and air-lift pumping. Air-lift pumps displace water from the well bore by forcing compressed air into tubing extending below the water surface within the well bore. Temperature, conductivity, pH, and qualitative sediment content of the discharge water were monitored periodically to ensure that representative groundwater samples could be obtained. Development continued until the discharged water was relatively clear and the temperature, pH, and electrical conductivity (EC) of the discharged water was relatively stable. Extracted development water was discharged to the ground surface near the wells. The estimated total amount of water extracted during well development is provided in Table 1.

Table 1
Monitoring Well Development
Panoche Energy Center
Fresno County, California

Monitoring Well	Estimated Purge Volume (Gallons)	Development Date
MW-1	1,000	October 24 and 25, 2006
MW-2	3,510	
MW-3	4,500	October 27, 2006

Note: Purge volumes based on periodic estimates of flow rate from air-lift pump water discharge line using bucket and stopwatch.

- Groundwater samples were collected at the conclusion of the air-lift pumping of the wells due to the deep static water levels. Groundwater samples were collected from MW-1, MW-2, and MW-3 from the air-lift pump water discharge line following development of the wells. Temperature, conductivity, pH, and qualitative sediment content of the discharge water were measured prior to sampling to ensure that representative groundwater samples were obtained. Samples were secured in coolers with ice using a chain of custody procedure and transported to the analytical laboratory. Samples were submitted to The Twining Laboratories in Fresno, California, a California-certified environmental analytical laboratory for testing. The groundwater samples were analyzed for a suite of parameters and constituents that include general water quality and water chemistry using US Environmental Protection Agency (US EPA) and other appropriate methods (see Section 4.2.2).

- Quality assurance/quality control measures during the groundwater investigation included analysis of blind duplicate samples submitted from the field as well as laboratory blank, control spike, control spike duplicate, matrix spike and matrix spike duplicate, and duplicate samples.

- Figure 5 shows the locking monuments and bollards installed to protect the monitoring wells from damage by vehicles or vandals.

- Approximate locations of the wells were measured using a hand held global positioning system (GPS) unit. The elevation of the ground surface at the well heads was estimated based on a 2006 survey of the Site and surrounding area by URS.

4.0 FINDINGS

The subsections below present the findings regarding lithology and groundwater at the Site.

4.1 Lithology

The lithology in the area of the Site, based on the lithologic log and downhole geophysical survey is generally comprised of fine-grained (clays and silts) and coarse-grained (sands and gravels) sediments typical of alluvial fan settings. The lithologic and downhole geophysical logs for the test hole are presented in Appendices B and C, respectively.

4.1.1 Lithologic Log

Predominantly fine to coarse sediments (gravels and sands) with interbedded finer grain units were encountered to a depth of 650 feet bgs. Distinctive blue clay associated with the Corcoran Clay was first encountered in drill cuttings at about 650 feet bgs. The thickness of the Corcoran Clay was difficult to quantify based on cuttings, partly due to its similarity to underlying units of the Tulare formation, but it was estimated to be approximately 110 feet thick. From approximately 850 feet bgs, it was noted that the unit was similar to the Corcoran Clay but that the drilling was much harder and the unit seemed to be more consolidated with a higher sand content. Predominantly fine to medium grained sands with interbedded clayey sands were encountered from approximately 980 to 1,430 feet bgs. Finer grained sandy clays and clayey sands were recovered from approximately 1,430 bgs to the bottom of the borehole.

Drilled cuttings from selected intervals of the borehole were submitted for sieve analysis by a geotechnical laboratory. Cuttings from 450 to 460, 1,110 to 1,120, and 1,330 to 1,340 feet bgs were submitted for analysis. Sieve analyses of drilled sediments are useful for the selection of appropriate filter pack when designing a production well. The analysis involves passing a sediment sample through a series of calibrated screens to quantify sorting and grain size. Sieve data are provided in Appendix D.

4.1.2 Geophysical Logs

Geophysical logging was conducted after the test hole was drilled to its total depth of 1,510 feet bgs. Geophysical logs help to characterize subsurface hydrogeologic conditions that cannot be readily determined from drilled cuttings.

A resistivity and SP electric log was run for the test hole from ground surface to 1,500 feet bgs. Natural gamma and temperature logs were run with the electric log. Final designs of the wells were based on interpretation of the lithologic and geophysical logs for the test hole. Additional geophysical logs could not be completed due to obstruction of the test hole at a depth of about 760 feet bgs after the first tool run. A general description and interpretation of each geophysical log is presented below.

4.1.2.1 Electric Log

The electric log consists of a SP log, a short-normal (16-inch spacing) resistivity log, and a long-normal (64-inch spacing) resistivity log, which were recorded simultaneously. The SP log measured naturally occurring electrical signals and is used mainly for lithologic correlations or for differentiating non-permeable strata in a clay-sand sequence. The SP log can also be used to calculate estimated water quality. The short-normal and long-normal resistivity logs are measured as the reciprocal of a formation's electrical conductivity. The increase or decrease of a formation's resistivity is partially controlled by its porosity. Because groundwater is an electrical conductor, its presence in the interconnected pores reduces the overall formation resistivity. Typically, silt and clay units will have lower resistivity values in comparison to sand and gravel units. The short-normal resistivity log measures the resistivity of the formation near the borehole, while the long-normal resistivity log measures the resistivity at a greater distance from the borehole. The long-normal and short-normal logs measure similar resistivities in non-permeable clay zones, although the two logs may also show similar responses in highly permeable zones where drilling fluid invasion is extensive.

The electric log for the test hole indicates predominantly medium-grained sediments (gravels and sands) to about 330 feet bgs with resistivities exceeding 15 ohmmeters^2 per meter (ohmmeters^2/m). From 330 to 470 feet bgs the electric log indicates predominantly fine grained sediments (clay and silt) with interbeds of coarser materials (resistivity between 5 and 25 ohmmeters^2/m). From 470 to 770 feet bgs, the long and short normal resistivities are less than 10 ohmmeters^2/m, indicating clay and silt, probably corresponding to the Corcoran Clay and other fine grained sediments. The Corcoran Clay appears to be represented by a zone of low resistivity extending from about 650 to 770 feet bgs. Medium grained sediments (gravels and sands) with interbedded fine-grained sediments occur from approximately 770 to 1,440 feet bgs based on resistivities ranging from 10 to 50 ohmmeters^2/m. From about 1,440 feet bgs to the bottom of the logged interval, the long and short normal resistivities are less than 5 ohmmeters^2/m, indicating the presence of clay and silt deposits.

4.1.2.2 Gamma-Ray Log

The gamma-ray log measures the naturally occurring gamma emissions from the decay of unstable elements in the formation surrounding the borehole. One of the most significant and the most abundant radioactive elements is potassium-40. As potassium-40 decays, it emits electromagnetic radiation, which the gamma-ray probe detects and records. The greater the counting rate, the higher the amount of potassiuim-40 in the formation. Minerals such as feldspar, biotite, and several clay minerals contain potassium-40. Consequently, an increase in clay content in the strata typically results in an elevated gamma-ray response. However, in many portions of California, arkosic (feldspar-rich, poorly weathered) sand formations are present, which also have high gamma-ray emissions.

The gamma-ray log for the test hole shows a fairly consistent gamma count from ground surface to about 470 feet bgs, at which depth the gamma count increases. The increase in gamma counts at 470 feet bgs correlates well with the electric log, and indicates an increase in fine grain sediments with higher clay content.

4.1.2.3 Temperature Log

The temperature survey provides a relative indication of the ambient groundwater temperature. Changes in temperature can in some cases be related to influx of formation water from the aquifer into the open hole or well.

Based on the temperature survey log, ambient temperatures within the test hole ranged from 80 to 86 degrees Fahrenheit. No significant influxes or outflows were apparent based on the temperature survey.

4.2 Groundwater

The geologic characteristics identified in the lithologic log and geophysical logs of the test hole indicate that the formations between about 170 feet and 470 feet bgs and between 770 and 1,350 feet bgs appear to represent potential areas for groundwater production. The upper interval is part of the semi-confined aquifer, and the lower interval is part of the confined aquifer underlying the Site. Groundwater production from approximately 470 to 770 and 1,350 to 1,500 feet bgs would be expected to be negligible due to presence of the thick deposits of fine-grained sediments in those intervals.

4.2.1 Groundwater Occurrence

Subsequent to development of the monitoring wells, static water levels were approximately 390 to 386 feet bgs for the confined aquifer monitoring wells (MW-1 and MW-2 respectively) and 178 feet bgs for the semi-confined aquifer monitoring well (MW-3). Measured depths to water are provided in Table 2.

Table 2
Depths and Elevations of Groundwater
Panoche Energy Center
Fresno County, California

Monitoring Well	Depth to Groundwater (Feet Below Top of Casing)	Elevation of Groundwater (Feet Above Mean Sea Level)
MW-1	389.98	22
MW-2	386.05	26
MW-3	177.55	234

Note: Depths to groundwater measured December 4, 2006. Casing stickups are approximately 2 feet above ground surface. Top of casing assumed to be approximately 412 feet above mean sea level.

Varying depths to groundwater in the three monitoring wells indicates that seals placed between the screened intervals of each completion during construction and the installation of monitoring well MW-3 within a second hole proved to be effective.

4.2.2 Groundwater Quality

Groundwater samples were analyzed for the following constituents and parameters by the analytical laboratory using the methods shown:

- Ammonia as nitrogen by US EPA Method 350.2
- Biochemical oxygen demand (5 day) by SM5210B / US EPA Method 405
- Chemical oxygen demand by US EPA Method 410.1
- Cyanide by SM4500CN-E
- Fluoride by US EPA Method 300.0
- General minerals dissolved by various methods
- ICP scan by various methods
- Mercury by US EPA Method 245.1
- Nitrate as NO_3 by US EPA Method 300.0
- o-Phosphate by US EPA Method 300.0
- Total Phosphorous (TKP) by US EPA Method 365.4
- Sulfide by US EPA Method 376.1
- Total organic carbon by SM5310B
- Total suspended solids by US EPA Method 160.2
- Turbidity by US EPA Method 180.1

Analytical results reported for groundwater quality parameters such as biochemical oxygen demand (BOD) and chemical oxygen demand (COD) may have been influenced by the sampling method. Groundwater samples were collected from the air-lift pump water discharge line at the conclusion of the air-lift pumping of the wells due to the deep static water levels.

Groundwater in the semi-confined confined aquifers differs greatly in total concentration of dissolved salts and in the relative abundance of various constituents. Less pronounced differences between groundwater within the upper and lower portions of the confined aquifer are also apparent. Laboratory reports are presented in Appendix G and the results are summarized in Tables 3 and 4. No apparent data quality problems were identified during review of the quality analysis / quality control (QA/QC) sample results.

4.2.2.1 Semi-Confined Aquifer Water Quality

Laboratory analytical results for groundwater collected from monitoring well MW-3 indicate that dissolved salts and the abundance of various constituents is generally higher than groundwater samples collected from the underlying confined aquifer. The concentration of silica was reported as 46 mg/L, which is reportedly within the operational range of use for cooling water in the proposed power generation facility. No other specific parameters or constituents have been identified as critical to the suitability of groundwater for use as process water within the proposed facility. However, a specific conductance value of 3,000 microsiemens per centimeter (µS/cm), hardness of 1,100 milligrams equivalent $CaCO_3$ per liter, a TDS of 2,900 mg/L, and undesirable concentrations of other constituents indicate relatively poor water quality within the represented portion of the semi-confined aquifer (see Tables 3 and 4).

Detected constituents in the groundwater sample (MW-3) collected from the semi-confined aquifer were compared to water quality limits for drinking water and agricultural use published by the Central Valley Regional Water Quality Control Board (RWQCB, 2003). The comparison was intended to indicate the suitability of the sampled groundwater for use as drinking water or agricultural water. Based on the analytical reports, the sampled groundwater appears to be a poor candidate for use as a drinking or agricultural water supply without treatment. Detected concentrations of nitrate as NO_3 and sulfate as SO_4 exceeded US EPA primary maximum contaminant limits (MCLs) for drinking water. The reported turbidity value may also exceed US EPA and California Department of Health Services (CDHS) primary MCLs for drinking water but may have been negatively influenced by air-lift pumping. Specific conductance as well as total dissolved solids (TDS) and manganese concentrations exceeded CDHS and/or US EPA Secondary MCLs for drinking water. Specific conductance also exceeded agricultural water quality limits in addition to chloride, TDS, boron, selenium, and sodium concentrations.

4.2.2.2 Confined Aquifer Water Quality

Laboratory analytical results for groundwater collected from monitoring well MW-2 indicate that dissolved salts and the abundance of various constituents is generally lower than groundwater samples collected from the overlying semi-confined aquifer. The concentrations of silica were reported as 33 mg/L, which is reportedly within the operational range of use for cooling water in the proposed power generation facility. No other specific parameters or constituents have been identified as critical to the suitability of groundwater for use as process water within the proposed facility. However, specific conductance values of 1,100 µS/cm, TDS concentrations of 840 mg/L, and undesirable concentrations of other constituents indicate relatively poor water quality within the represented portion of the confined aquifer (see Tables 3 and 4).

Laboratory analytical results for groundwater collected from monitoring well MW-1 indicate that dissolved salts and the abundance of various constituents is generally higher than groundwater samples collected from the upper portion of the confined aquifer and lower than the groundwater samples collected from the semi-confined aquifer. The concentrations of silica were reported as 33 mg/L, which is reportedly within the operational range of use for cooling water in the proposed power generation facility. No other specific parameters or constituents have been identified as critical to the suitability of groundwater for use as process water within the proposed facility. However, specific conductance values of 1,500 µS/cm, TDS concentrations of 1,100 mg/L, and undesirable concentrations of other constituents indicate relatively poor water quality within the represented portion of the confined aquifer (see Tables 3 and 4).

Analytical results were generally consistent between groundwater samples MW-1 and MW-2 and their associated field blind duplicate samples (MW-4 and MW-5, respectively).

Detected constituents in the groundwater samples collected from both the upper (MW-2 and MW-5) and lower (MW-1 and MW-4) portions of the confined aquifer were compared to water quality limits for drinking water and agricultural use published by the Central Valley Regional Water Quality Control Board (RWQCB, 2003). The comparison was intended to indicate the suitability of the sampled groundwater for use as drinking water or agricultural water. Based on the analytical reports, the sampled groundwater appears to be a poor candidate for use as a drinking or agricultural water supply without treatment. The reported turbidity value may also

exceed US EPA and CDHS primary MCLs for drinking water but may have been negatively influenced by air-lift pumping. Specific conductance and pH values as well as TDS, and iron concentrations exceeded CDHS and/or US EPA Secondary MCLs for drinking water and agricultural water quality limits. Detected concentrations of sulfate as SO4 exceeded US EPA secondary MCLs for drinking water. Boron, molybdenum, and sodium concentrations also exceeded agricultural water quality limits.

5.0 SUMMARY AND CONCLUSIONS

URS performed construction observation and groundwater monitoring activities required to assess the groundwater quality parameters in three hydrogeologic units below the Site. Client contracted directly with a qualified, licensed well drilling contractor who performed the drilling, downhole geophysical logging, well construction, and development of the three monitoring wells.

The lithology in the area of the Site is generally comprised of fine-grained (clays and silts) and coarse-grained (sands and gravels) sediments typical of alluvial fan settings based on the lithologic log and a downhole geophysical survey. The Corcoran Clay appears to be represented by a zone of low resistivity extending from about 650 to 770 feet bgs. The Corcoran Clay divides the groundwater flow system underlying the Site into a confined aquifer and an overlying semi-confined aquifer.

The formations between about 170 feet and 470 feet bgs and between 770 and 1,350 feet bgs have the greatest potential for groundwater production. Static water levels were approximately 390 to 386 feet bgs for the confined aquifer monitoring wells (MW-1 and MW-2 respectively) and 178 feet bgs for the semi-confined aquifer monitoring well (MW-3) in December 2006. Based on interpretation of the available data, installation of production wells in the zones with the greatest potential for groundwater production appears to be feasible. Process water production wells at the Site would likely be screened from 1,000 to 1,350 feet bgs.

Laboratory analytical results for groundwater collected from monitoring well MW-1 indicate that dissolved salts and the abundance of various constituents is generally higher than groundwater samples collected from the upper portion of the confined aquifer and lower than the groundwater sample collected from the semi-confined aquifer. Salinity of the groundwater appears to increase with increased depth in the confined aquifer. Undesirable parameter values and concentrations of various constituents indicate relatively poor water quality within all of the represented portions the aquifers. Several parameters or constituents in each sample analyzed exceeded drinking water or agricultural water limits. The sampled groundwater appears to be a poor candidate for use as a drinking or agricultural water supply without treatment.

Client should consider the following recommendations for groundwater quality monitoring at the PEC Site:

- The locations of monitoring wells MW-1, MW-2, and MW-3 should be surveyed by a California licensed Professional Land Surveyor.

- Process water production well design should incorporate data developed from monitoring wells installed at the Site.
- A groundwater-monitoring program to determine baseline groundwater quality and levels should be established prior to construction of the proposed power generation facility.
- A groundwater-monitoring program should be implemented during operation of the facility to monitor changes in groundwater levels or quality associated with pumping groundwater for use at the PEC.

6.0 LIMITATIONS

The findings and recommendations discussed herein are in accordance with generally accepted engineering practices in Fresno County at this time. The findings are based on data collected from specific depths at a single location. Any findings regarding the conditions at other depths or locations is solely an interpretation based the data acquired. Such findings regarding conditions underlying the Site may not accurately represent all conditions that may be encountered. No warranties, either express or implied, are made as to the professional advice provided under the terms of URS' agreement with Client. The passage of time, natural processes, human intervention on the Site or adjacent properties, or changes in regulations can cause altered conditions that may invalidate the findings and recommendations presented within.

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Tables 3 and 4

Figures

APPENDIX A

Fresno County Well Permits

APPENDIX B

Lithologic and Electric Log

APPENDIX C

Downhole Geophysical Log

APPENDIX D

Laboratory Report for Sieve Testing

APPENDIX E

Drillers Tally Sheets

APPENDIX F

Morning Reports

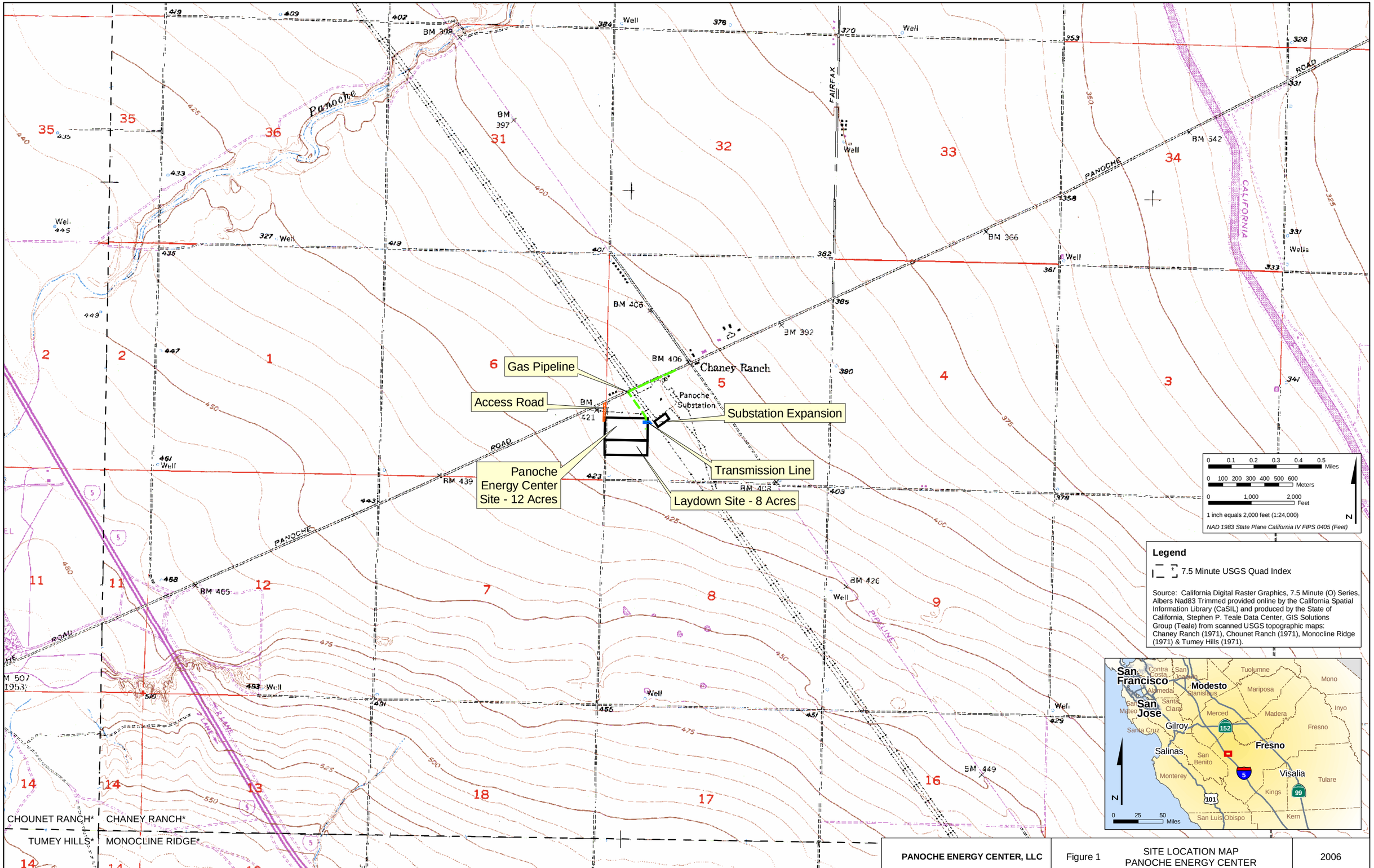
APPENDIX G

Laboratory Reports for Groundwater Samples

TABLE 4
METALS CONCENTRATIONS IN WATER
Panoche Energy Center
Fresno County, California

Well Identification		Lower Confined Aquifer		Upper Confined Aquifer		Semi-Confined Aquifer	Water Quality Limits For Constituents[a]					
		MW-1		MW-2		MW-3	CDHS[b]		USEPA[c]			
Sample Identification		MW-1	MW-4 (Blind Duplicate of MW-1)	MW-2	MW-5 (Blind Duplicate of MW-2)		Primary MCL[d]	Secondary MCL[e]	Primary MCL	Secondary MCL	CA PHG[f]	Ag Water Quality Limits[g]
		Sample Date										
Constituent	Units	10/25/2006	10/25/2006	10/25/2006	10/25/2006	10/27/2006						
Aluminum	mg/L[h]	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050						
Antimony	mg/L	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050						
Arsenic	mg/L	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010						
Barium	mg/L	0.19	0.18	0.16	0.16	0.14	1		2		0.7	
Beryllium	mg/L	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010						
Boron	mg/L	**2.9**	**3.0**	**1.6**	**1.7**	**4.1**	-	-	-	-	-	0.7 or 0.75
Cadmium	mg/L	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010						
Calcium	mg/L	11	11	20	20	170	-	-	-	-	-	-
Chromium	mg/L	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050						
Cobalt	mg/L	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020						
Copper	mg/L	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050						
Iron	mg/L	**5.9**	**5.8**	**3.9**	**3.3**	< 0.10	-	0.3	-	0.3	-	5
Lead	mg/L	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050						
Magnesium	mg/L	3.1	3.2	1.4	1.5	170	-	-	-	-	-	-
Manganese	mg/L	**0.12**	**0.12**	**0.08**	**0.076**	**0.064**	-	0.05	-	0.05	-	2
Mercury	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002						
Molybdenum	mg/L	**0.04**	**0.041**	**0.023**	**0.022**	0.0056	-	-	-	-	-	0.01
Nickel	mg/L	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050						
Potassium	mg/L	4.7	4.9	4.2	4.3	16	-	-	-	-	-	-
Selenium	mg/L	< 0.020	< 0.020	< 0.020	< 0.020	**0.025**	0.05	-	0.05	-	-	0.02
Silica (SiO2)	mg/L	31	32	33	33	46	-	-	-	-	-	-
Silicon	mg/L	14	15	15	15	21	-	-	-	-	-	-
Silver	mg/L	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050						
Sodium	mg/L	**300**	**310**	**220**	**230**	**380**	-	-	-	-	-	69
Strontium	mg/L	0.114	0.118	0.051	0.0509	2.47	-	-	-	-	-	-
Thallium	mg/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020						
Tin	mg/L	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010						
Titanium	mg/L	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010						
Vanadium	mg/L	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010						
Zinc	mg/L	0.015	0.017	0.027	0.027	0.024		5		5		2

Note: Values shown in bold print exceed one or more water quality limits shown on right.
[a] Water quality limits for detected constituents summarized from A Compilation of Water Quality Goals, August, 2003, Regional Water Quality Control Board, Central Valley Region
[b] California Department of Health Services
[c] U.S. Environmental Protection Agency
[d] Primary Maximum Contaminant Level
[e] Secondary Maximum Contaminant Level
[f] California Office of Environmental Health Hazard Assessment Public Health Goal in Drinking Water
[g] Agricultural Water Quality Limits from Ayers, R.S. and D.W. Westcot, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations - Irrigation and Drainage Paper No. 29, Rev. 1, Rome, 1965 as summarized in A Compilation of Water Quality Goals, August, 2003
[h] mg/L = milligrams per liter



PANOCHE ENERGY CENTER, LLC	Figure 1	SITE LOCATION MAP PANOCHE ENERGY CENTER	2006

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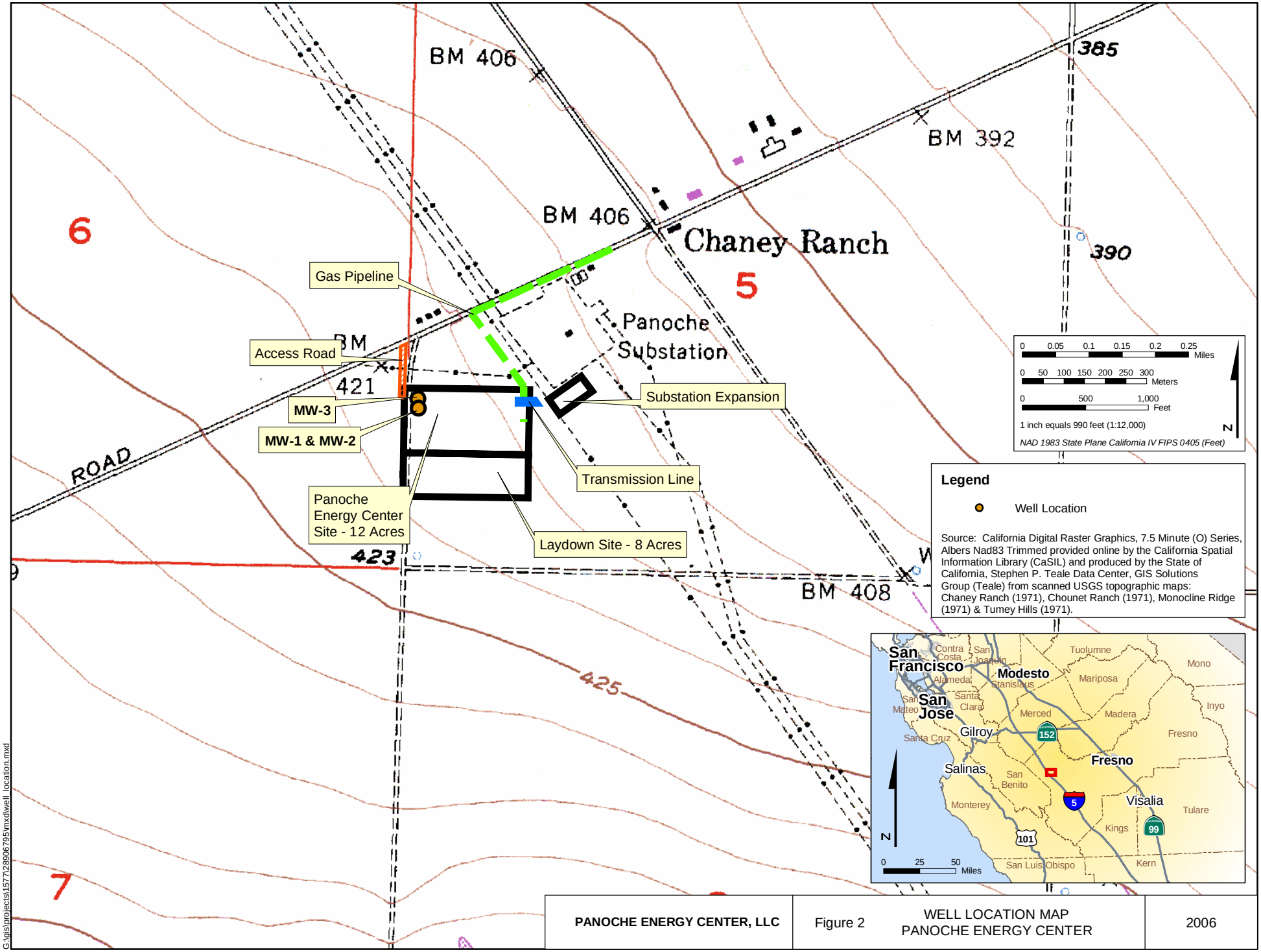

PANOCHE ENERGY CENTER, LLC	Figure 2	WELL LOCATION MAP PANOCHE ENERGY CENTER	2006

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DEPARTMENT OF COMMUNITY HEALTH, ENVIRONMENTAL HEALTH DIVISION

P.O. Box 11867, Fresno, California 93775-1867 Tel: (559) 445-3357 FAX: (559) 445-3301
Website: www.fresnohumanservices.org

PERMIT TO CONSTRUCT, DEEPEN, DESTROY, RECONDITION, OR REPAIR A WELL

Note: This permit is non-transferable and is valid for 180 days

PERMIT NUMBER: WP0027106

10/23/06 Application Date — 10/24/06 Estimated Starting Date

T: 15 R: 13 S: 5

APN: 027 / 060 / 78

Sam 6 AS WP0027090

OFFICE USE ONLY
Payment Date: 10-23-06 Receipt #: 28691 Amount: $462.00
Specialist: DIANA Census Tract: 8302
Facility ID #: Record ID #: WP0027106
☒ Well Location In Designated Flood Zone. Extend casing above known flood level.
Depth To Corcoran Clay (special annular seal requirements apply) 650

Job Address / Location: SO. SIDE PANOCHE RD 2 MI N/E I-5 Parcel Size: 720
Owner Name: BAKER FARMS Owner Phone: 659-3942
Owner Address: 30 RIVER PARK PLACE #150 City: FRESNO State: CA Zip: 93720
Contractor Name: BRADLEY & SONS License #: 41078 Phone: 441-1401

TYPE OF WORK ☐ New Well ☐ Replacement Well ☐ Reconstruction/Deepening ☐ Test Hole Only ☐ Destruction

INTENDED USE ☐ Domestic Private ☐ Agricultural ☒ Industrial ☐ Cathodic ☐ Monitoring ☐ Soil Boring ☐ Domestic Public System Name:

WELL CONSTRUCTION ☐ Casing Driven ☐ Cable Tool ☐ Hand dug ☐ Auger ☒ Direct Rotary ☐ Reverse Rotary
Conductor Casing Material: N/A Diameter: in Depth: ft
Well Casing Material: STEEL Diameter: 2 in Gauge: Sch 40
Annular Seal Depth: 400 ft ☐ Neat Cement ☒ Sand Cement ☐ Concrete
☐ Bentonite - Manufacturer and Product Name ☐ Mixed With Water ☐ Dry Application
Seal Placement Method ☒ Pumped ☐ Free Fall (allowed only when the interval to be sealed is dry and less than 30 feet in depth)

WELL DESTRUCTION ☐ Open Bottom ☐ Gravel Packed ☐ Uncased ☐ Other
Diameter in Total Depth ft Depth To Water ft ☐ Casing To Be Perforated ft To ft
Destruction Seal ☐ Neat Cement ☐ Sand Cement ☐ Concrete Fill Material Below Seal
☐ Bentonite - Manufacturer and Product Name ☐ Mixed With Water ☐ Dry Application
☐ Seal Interval Feet Below Grade To Top Of Casing ☐ Seal Bottom Of Well To Top Of Casing
☐ Casing Cut Off Feet Below Grade (6 feet maximum allowed)
Seal Placement Method ☐ Pumped ☐ Free Fall (allowed only when the interval to be sealed is dry and less than 30 feet in depth)
☐ Oil-lubricated pump. Any oil in the well will be removed and properly disposed of prior to destruction.

SETBACKS (in feet) ☒ All Setbacks Exceed 300 Feet Other Wells Leach Lines Septic Tank
Cesspool Seepage Pits Sewer Lines Designated Sewage Replacement Area
Animal/Fowl Enclosure Flood Control Basins Waste Water Disposal Ponds Lakes, Streams

SPECIAL SUBDIVISION, TRACT RESTRICTIONS Tract Name, Number
☐ Setbacks (specify type, e.g. well-to-well, etc. and required distance)
☐ Designated Engineered Sewage Disposal Areas (enclose tract map showing designated areas on each parcel)

FEE ☒ $462 (Domestic, Agricultural, Cathodic, Industrial) ☐ No Charge (Well Destructions, Monitoring Wells, Soil Borings)
PAYMENT METHOD ☐ Cash ☐ Check ☒ Credit Card*
*Authorization on file with Fresno County Department of Community Health, Environmental Health Division

I hereby certify that the information described herein is correct. I understand that all work is to be done in accordance with the California Well Standards Ordinance and the conditions of this permit application, including any conditions which are added by the Environmental Health Division upon review of this application and issuance of the permit. I certify that I have a current C-57 Contractor's License and, if I employ workers, a current certificate of Workers' Compensation Insurance. I further understand that any permit issued pursuant to this application is subject to such further conditions as may be deemed necessary to ensure compliance with the Ordinance.

CONTRACTOR SIGNATURE: DATE: 10/23/06

OFFICE USE ONLY
Permission is hereby granted to perform the work as set forth on this application.
Approved: DM Date: 10/24/06
Final Inspection: Date:
Filed Complete: Date:
Filed Incomplete: Date:
Supervisor:

Business Office Use

Revision 5/27/06

Emission Clerical Use
Account # PE
Entered By Date

DEPARTMENT OF COMMUNITY HEALTH, ENVIRONMENTAL HEALTH DIVISION
P.O. Box 11867, Fresno, California 93775-1867 Tel: (559) 445-3357 FAX: (559) 445-3301
Website: www.fresnohumanservices.org

PERMIT TO CONSTRUCT, DEEPEN, DESTROY, RECONDITION, OR REPAIR A WELL

Note: This permit is non-transferable and is valid for 180 days

PERMIT NUMBER: WP0027090

10/12/06 Application Date — 10/16/06 Estimated Starting Date

T: 15 R: 13 S: 5

APN: 027 / 060 / 78

OFFICE USE ONLY
Payment Date: 10/13/06 Receipt #: 28651 Amount: $462.00
Specialist: Navarro Census Tract: 93.02
Facility ID #: Record ID #: WP0027090
☒ Well Location In Designated Flood Zone. Extend casing above known flood level.
Depth To Corcoran Clay (special annular seal requirements apply) 700 FT

Job Address / Location: So. Side Panoche Rd. 2mi N/E I-5 Parcel Size: 720 AC
Owner Name: BAYGL FARMS Owner Phone: 659-3992
Owner Address: 30 River Park Place #150 City: FRESNO State: CA Zip: 93720
Contractor Name: BRADLEY & SONS License #: 414178 Phone: 559-441-1401

TYPE OF WORK: ☒ New Well ☐ Replacement Well ☐ Reconstruction/Deepening ☐ Test Hole Only ☐ Destruction

INTENDED USE: ☐ Domestic Private ☐ Agricultural ☒ Industrial ☐ Cathodic ☐ Monitoring ☐ Soil Boring ☐ Domestic Public System Name:

WELL CONSTRUCTION: ☐ Casing Driven ☐ Cable Tool ☐ Hardrock ☐ Auger ☒ Direct Rotary ☐ Reverse Rotary
Conductor Casing Material: N/A Diameter: in Depth: Ft
Well Casing Material: STEEL Diameter: 2 in Gauge: SCH 40
Annular Seal Depth: 1080' Ft ☐ Neat Cement ☒ Sand Cement ☐ Concrete
☐ Bentonite - Manufacturer and Product Name ☐ Mixed With Water ☐ Dry Application
Seal Placement Method ☒ Pumped ☐ Free Fall (allowed only when the interval to be sealed is dry and less than 30 feet in depth)

WELL DESTRUCTION: ☐ Open Bottom ☐ Gravel Packed ☐ Uncased ☐ Other
Diameter in Total Depth Ft Depth To Water Ft ☐ Casing To Be Perforated Ft To Ft
Destruction Seal ☐ Neat Cement ☐ Sand Cement ☐ Concrete Fill Material Below Seal
☐ Bentonite - Manufacturer and Product Name ☐ Mixed With Water ☐ Dry Application
☐ Seal Interval Feet Below Grade To Top Of Casing ☐ Seal Bottom Of Well To Top Of Casing
☐ Casing Cut Off Feet Below Grade (6 feet maximum allowed)
Seal Placement Method ☐ Pumped ☐ Free Fall (allowed only when the interval to be sealed is dry and less than 30 feet in depth)
☐ Oil-lubricated pump. Any oil in the well will be removed and properly disposed of prior to destruction.

SETBACKS (in feet): ☒ All Setbacks Exceed 800 Feet Other Wells Leach Lines Septic Tank
Cesspool Seepage Pits Sewer Lines Designated Sewage Replacement Area
Animal/Fowl Enclosure Flood Control Basins Waste Water Disposal Ponds Lakes, Streams
SPECIAL SUBDIVISION, TRACT RESTRICTIONS: Tract Name, Number
☐ Setbacks (specify type, e.g. wall-to-wall, etc. and required distance)
☐ Designated Engineered Sewage Disposal Areas (enclose tract map showing designated areas on each parcel)

FEE: ☒ $462 (Domestic, Agricultural, Cathodic, Industrial) ☐ No Charge (Well Destructions, Monitoring Wells, Soil Borings)
PAYMENT METHOD: ☐ Cash ☐ Check ☒ Credit Card*
*Authorization on file with Fresno County Department of Community Health, Environmental Health Division

I hereby certify that the information described herein is correct. I understand that all work is to be done in accordance with the California Well Standards Ordinance and the conditions of this permit application, including any conditions which are added by the Environmental Health Division upon review of this application and issuance of the permit. I certify that I have a current C-57 Contractor's License and, if I employ workers, a current certificate of Workers' Compensation Insurance. I further understand that any permit issued pursuant to this application is subject to such further conditions as may be deemed necessary to ensure compliance with the Ordinance.

CONTRACTOR SIGNATURE: DATE: 10/12/06

OFFICE USE ONLY
Permission is hereby granted to perform the work as set forth on this application.
Approved: Date: 10/13/06
Final Inspection: Date:
Filed Complete: Date:
Filed Incomplete: Date:
Supervisor:

Business Office Use

Revision 6/27/05

Envision Clerical Use
Account #: PE 4652
Filed w/ Rv Date

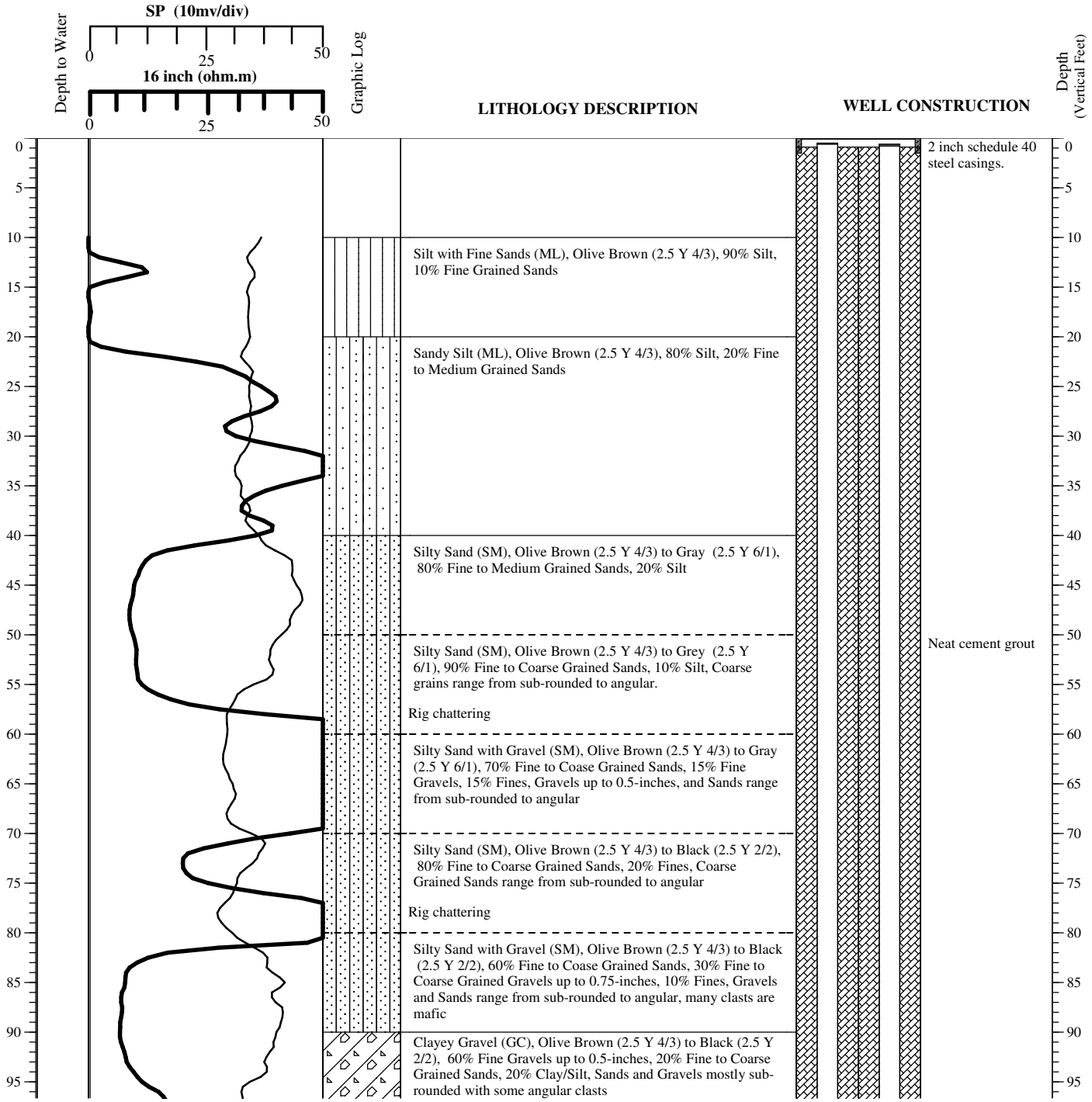
Project: Panoche Energy Center

Location: Mendota, California **Project: 28906795**

Log of Monitoring Wells: MW-1 and MW-2

Drilling Contractor: Bradley and Sons Inc.	Borehole Diameter: 12.25-inches	Borehole Name: B-1	Logged By: Thomas Pender
C-57 Lisence No.: 414178	Dates Drilled:10/3/06-10/17/06	Well Construction: 10/19/06-10/20/06	Checked By: Jason Moore, P.G.
Drilling Method: Mud Rotary	Casing Diameter: 2-inches	Casing Type: SCH 40 Steel	Slot Size: 0.020-inch
Total Depth Drilled: 1,510 ft bgs	Screen Intervals (ft bgs): MW-1 1302-1322 MW-2 1100-1120		
Sampling Method: Cuttings	Top of Casing Elevations: ~412 ft amsl		Ground Surface Elevation: ~410.2 ft amsl
MW-1/MW-2: N 36.65165° W 120.58591° (GPS-Not Surveyed)		Depth to Water (ft btoc): MW-1 389.98 MW-2 386.05 12/4/06	

Comments: Electric log track data from electric, gamma ray, and temperature log run in open hole by Welenco 10/11/06.

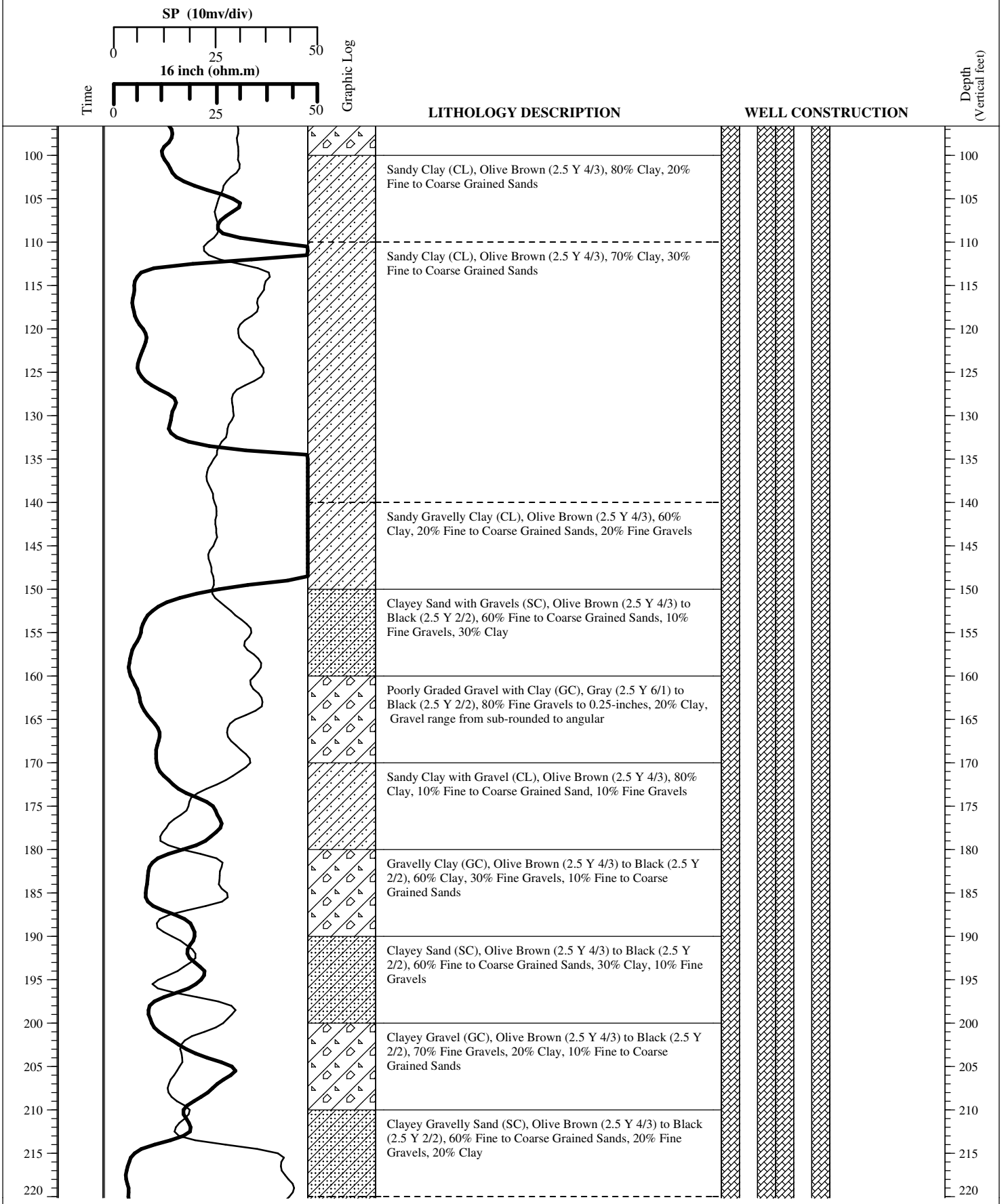


URS
30 River Park Place West, Ste. 180
Fresno, CA 93720
559.256.1444

Project: Panoche Energy Center

Location: Mendota, California **Project: 28906795**

Log of Monitoring Wells: MW-1 and MW-2



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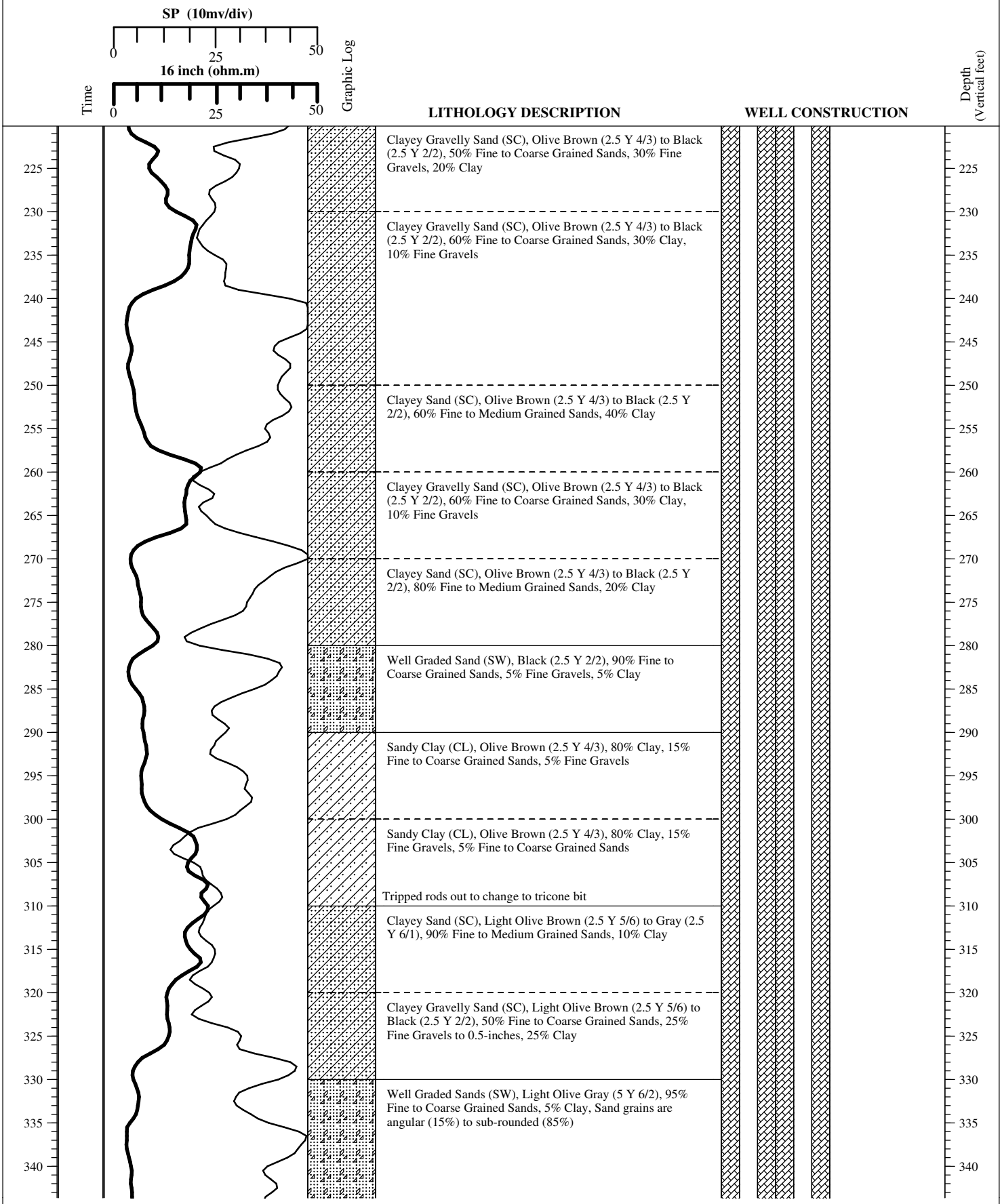

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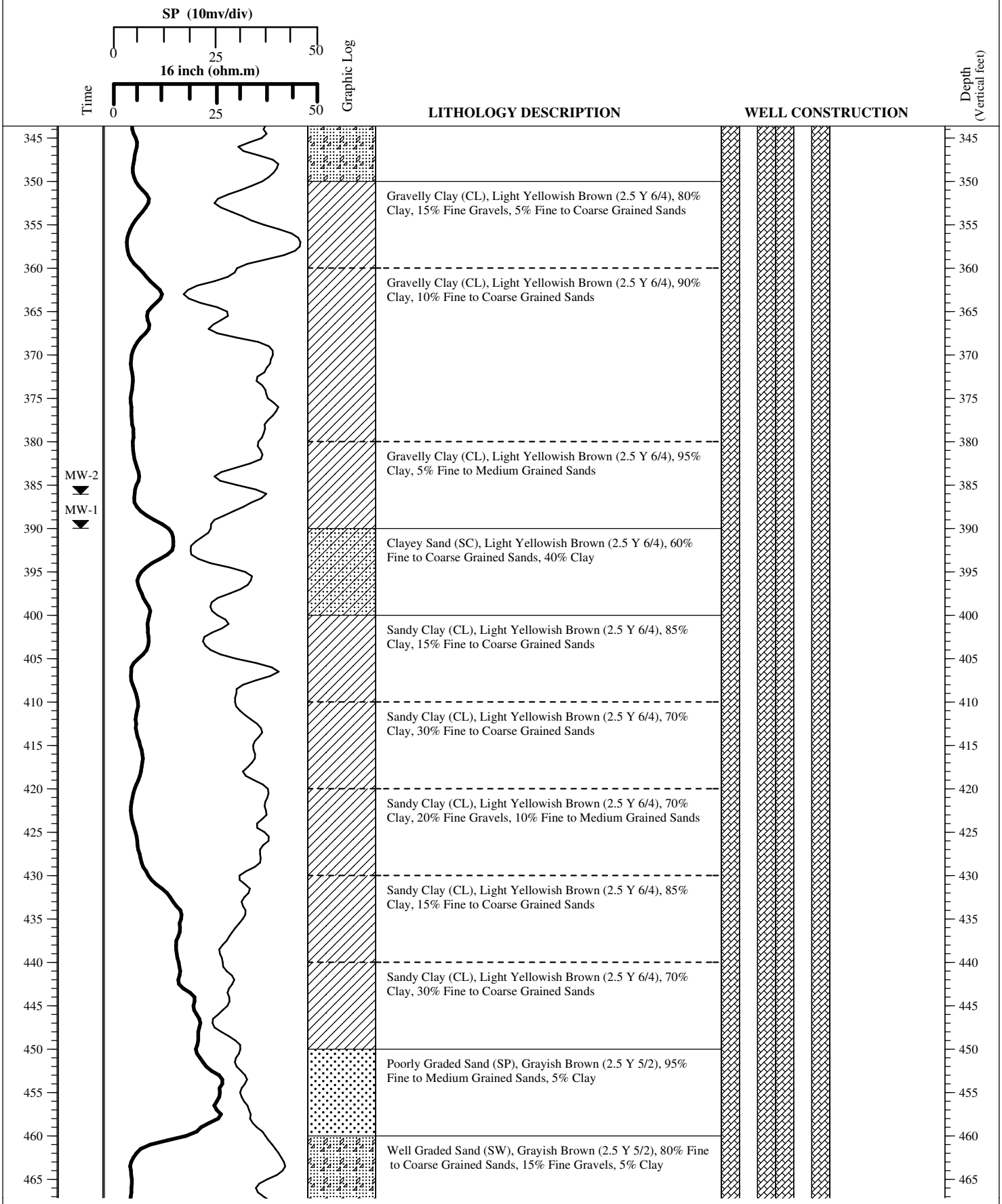

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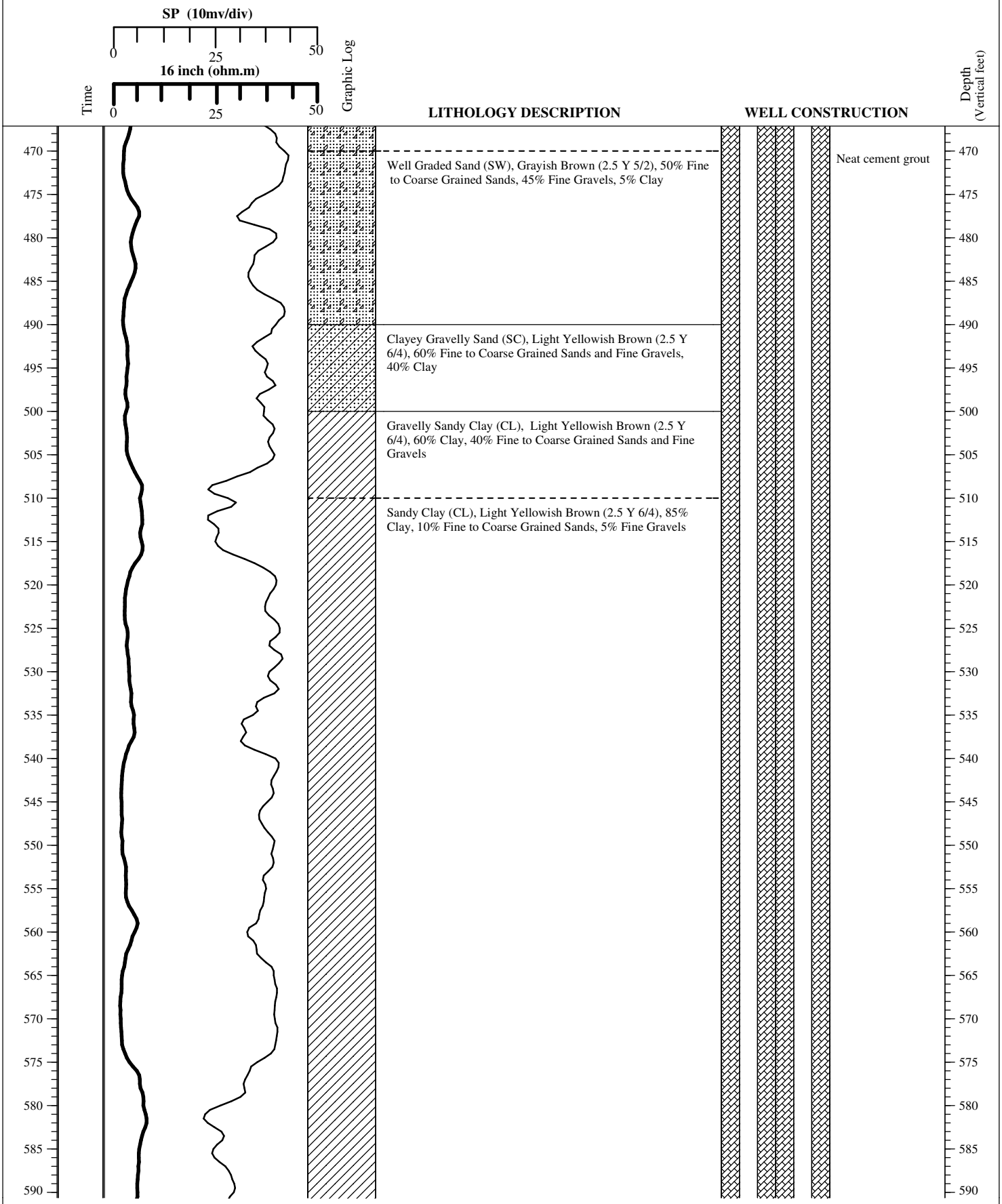

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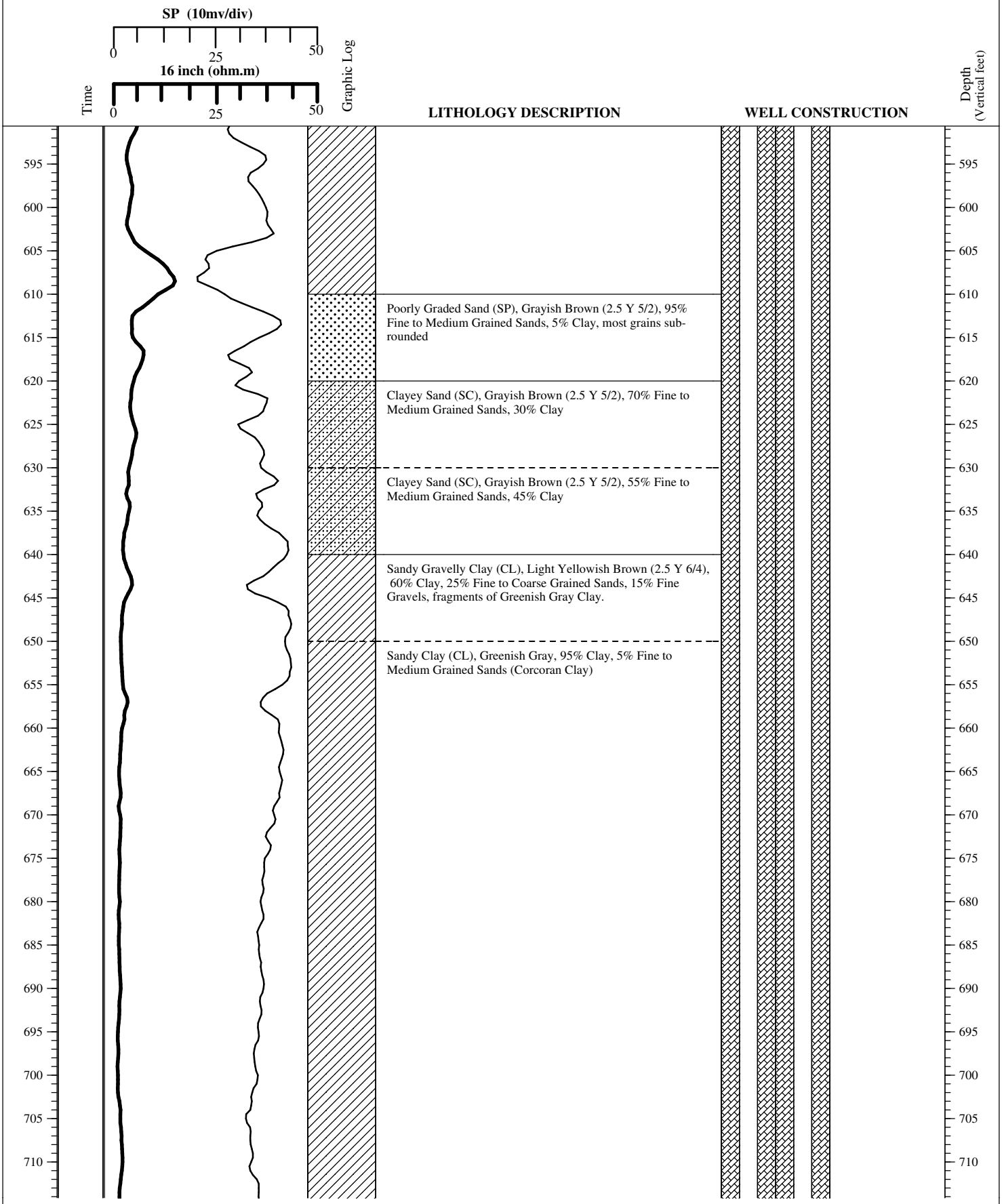

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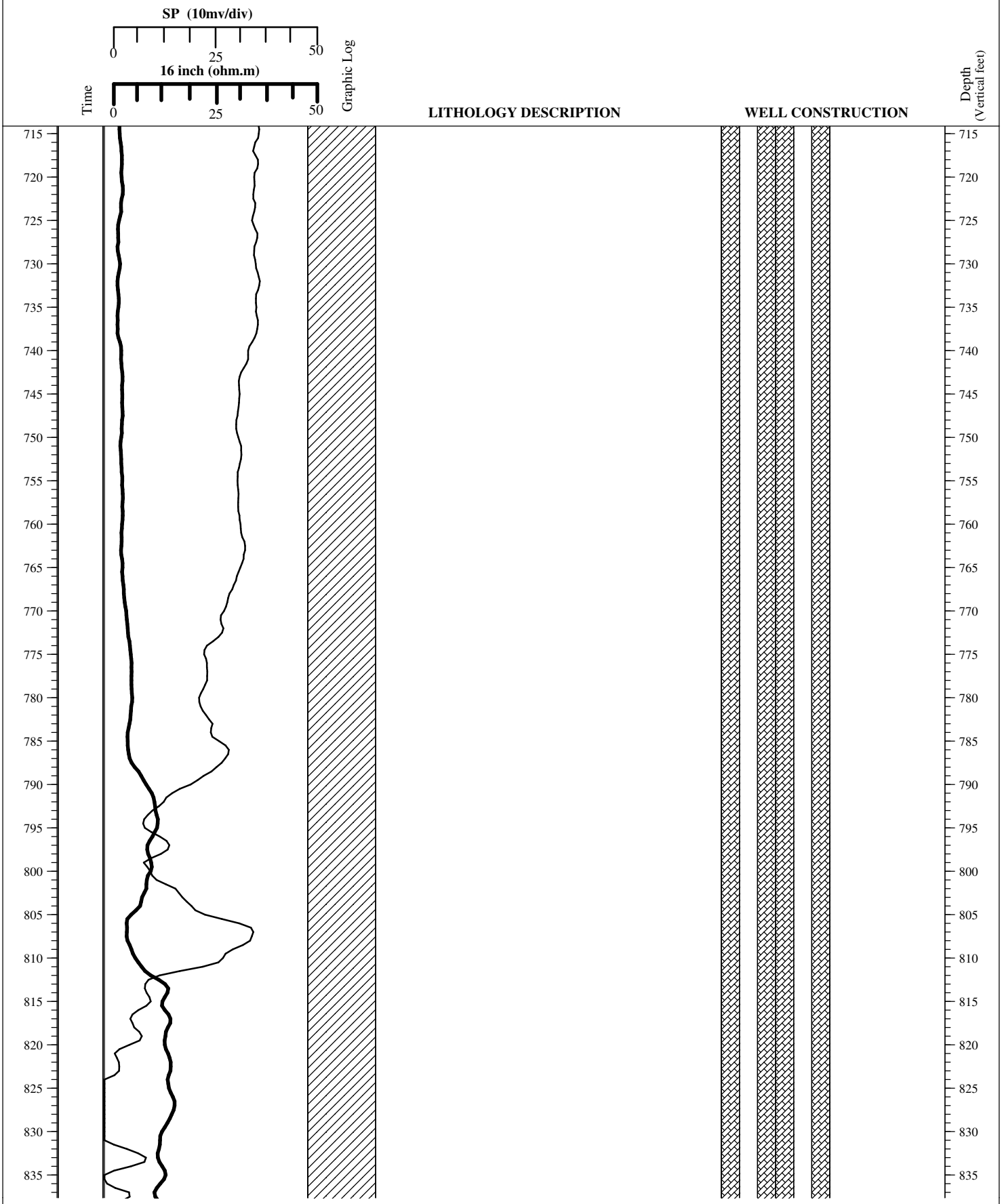

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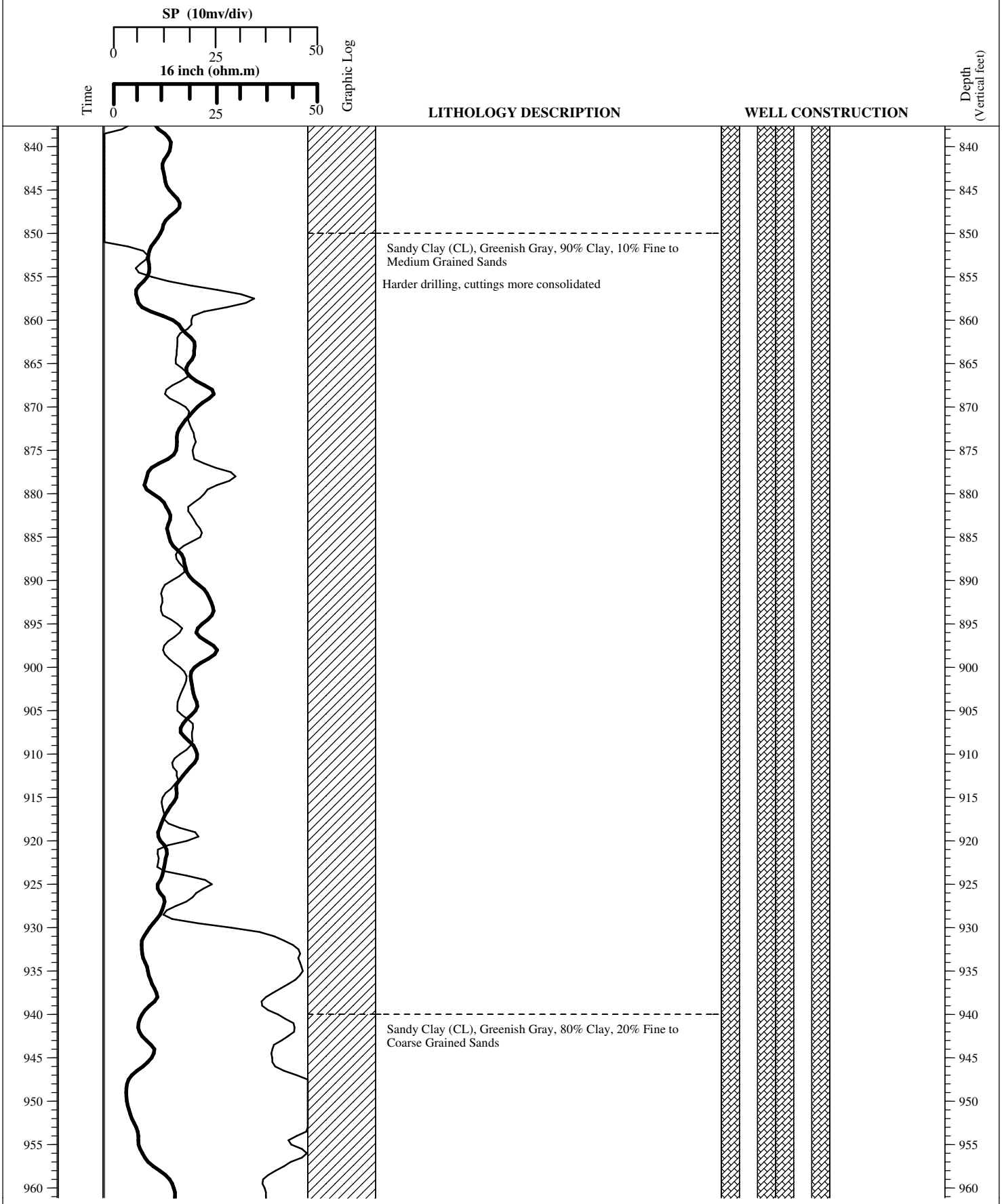

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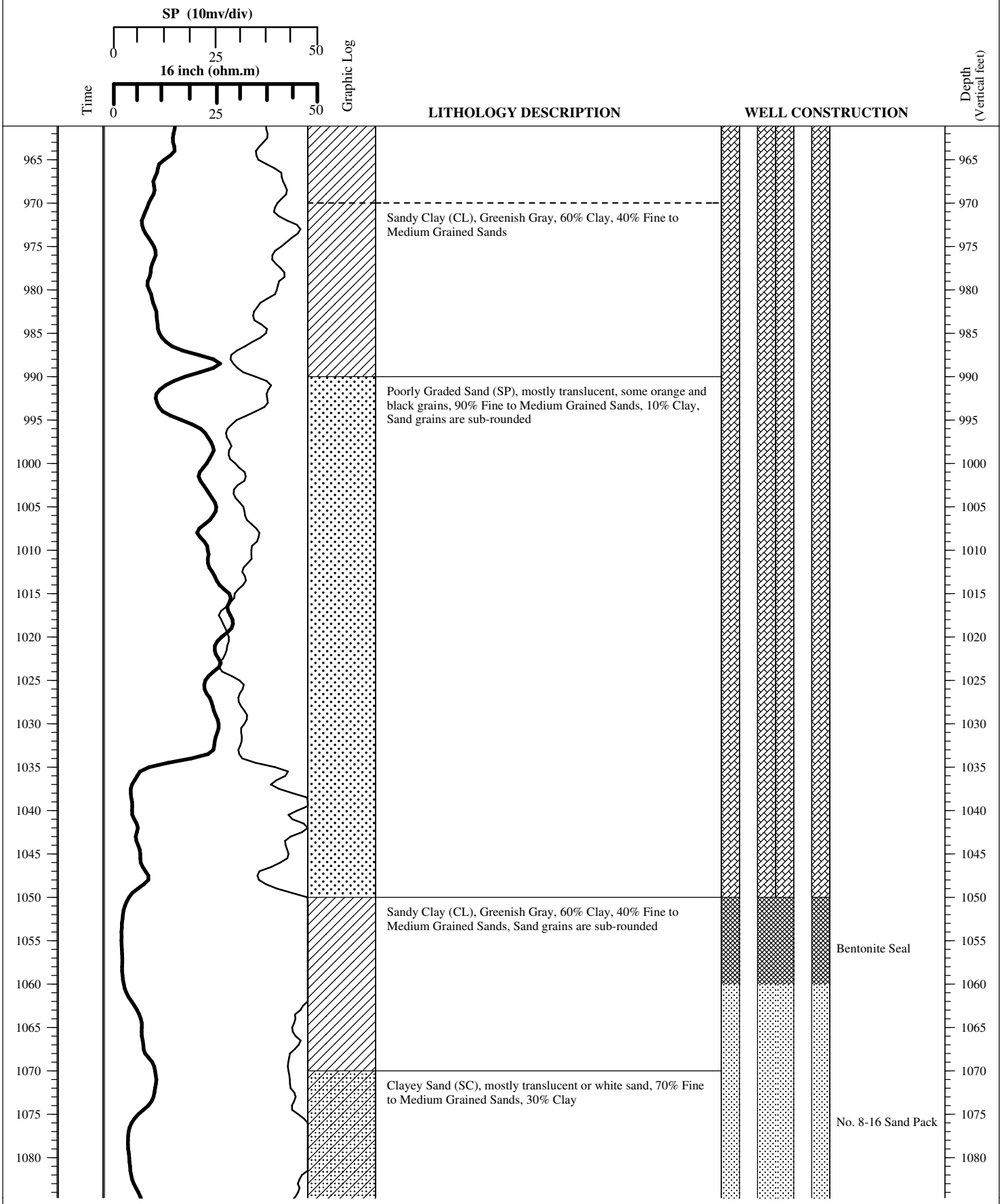

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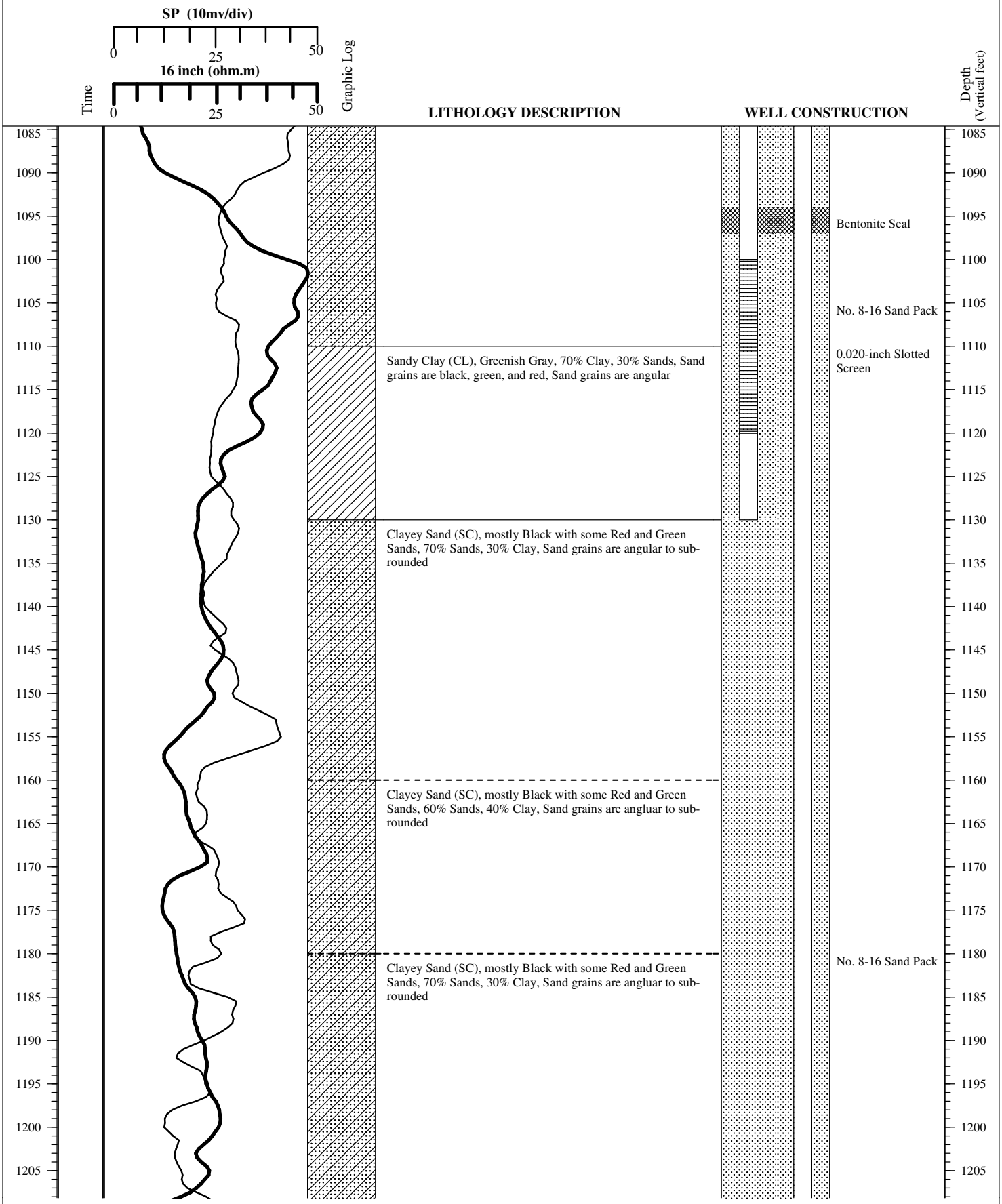

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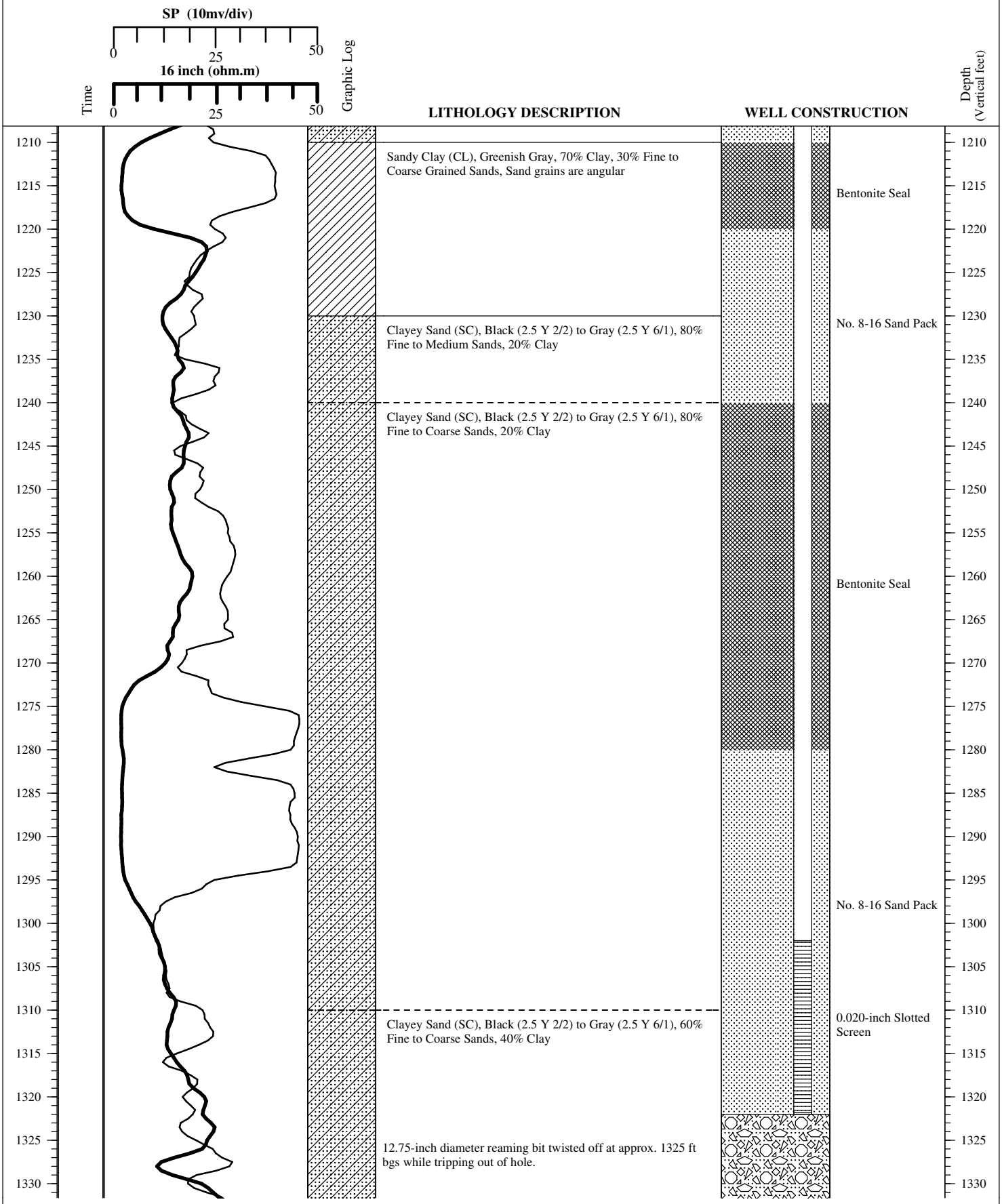

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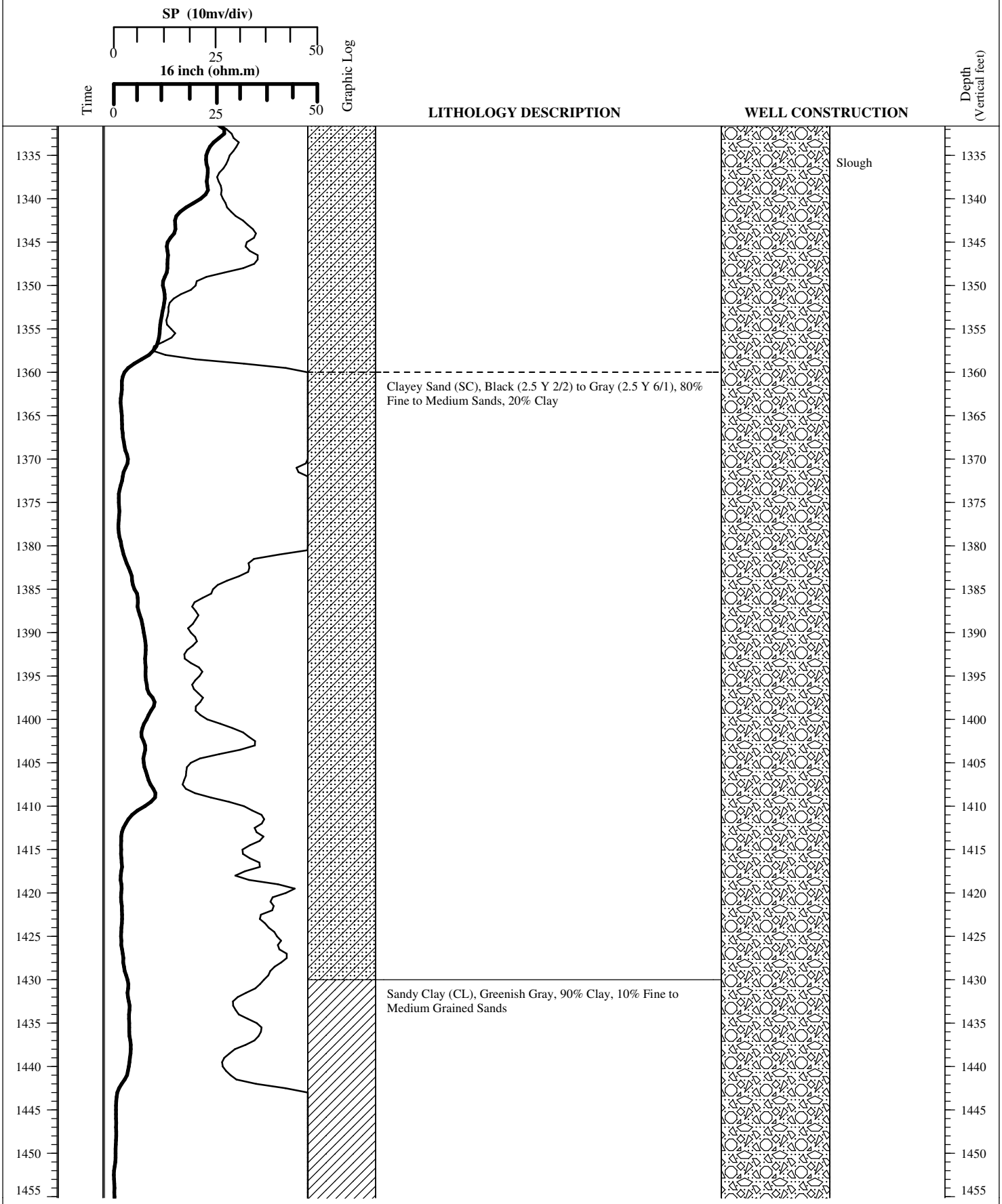

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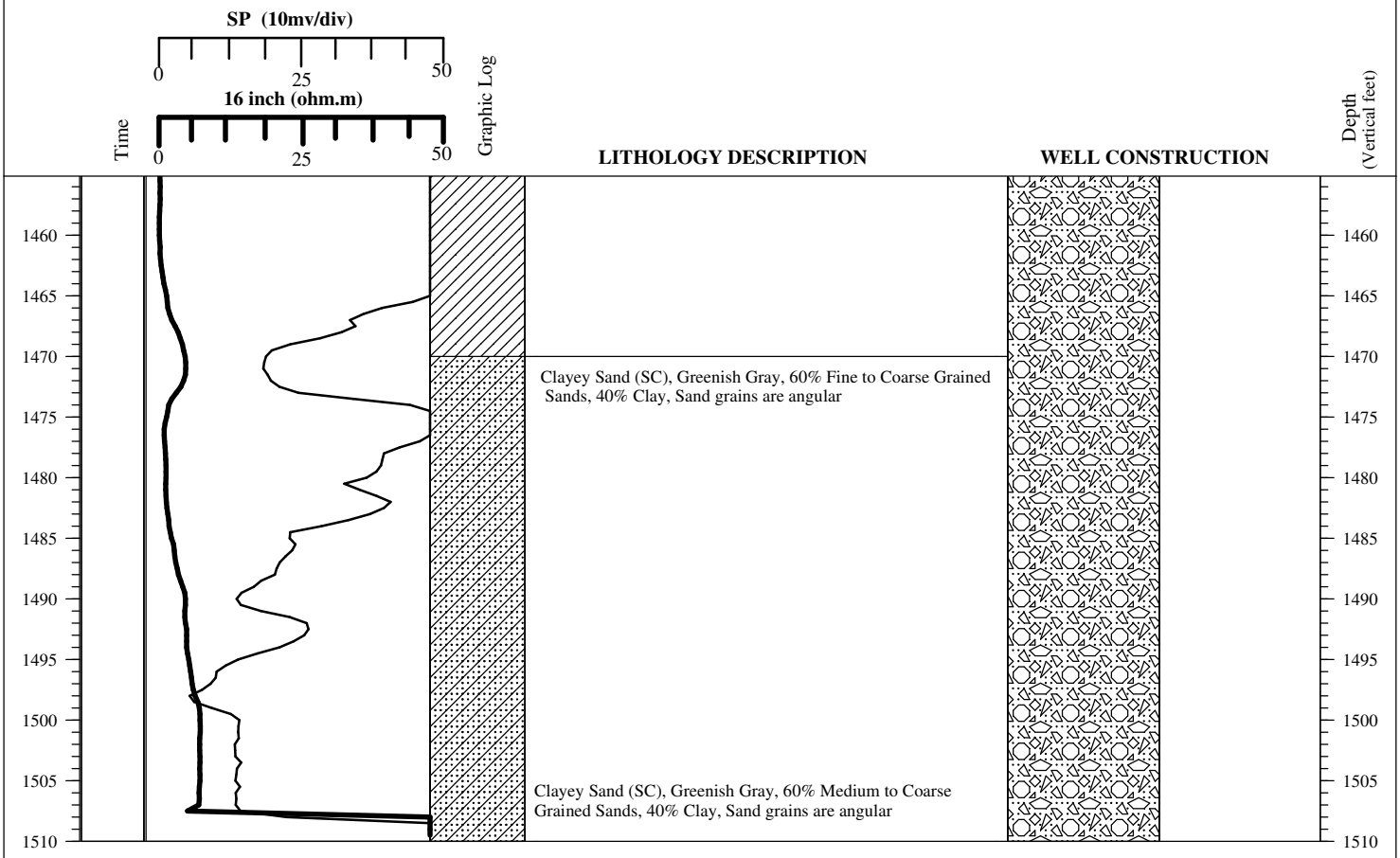
Location: Mendota, California **Project: 28906795**

Log of Monitoring Wells: MW-1 and MW-2



URS
30 River Park Place West, Ste. 180
Fresno, CA 93720
559.256.1444

welenco

5201 Woodmere Drive, Bakersfield, CA 93313-- www.welenco.com--(800) 445-9914
California Contractor's License No. 722373

ELECTRIC - GAMMA RAY - TEMPERATURE LOG

FILING NO.

COMPANY Bradley & Sons Drilling

WELL PEC MW-1

FIELD Firebaugh

STATE California COUNTY Fresno

LOCATION:
Panoche Road

OTHER SERVICES:
None

JOB NO.
6607

SEC: 5 TWP: 15S RGE: 13E LAT.: 36° 39' 5.4" LONG.: 120° 35' 9.4" MERIDIAN.: Mt. Diablo

Permanent Datum: Ground Level, **Elev.** 300 **Ft. Elev.: K.B.** _____ **Ft.**
Log Measured From: Ground Level, 0 **Ft. Above Perm. Datum** **D.F.** _____ **Ft.**
Drilling Measured From: Ground Level **G.L.** 300 **Ft.**

Run No.	One			
Date	Oct. 11, 2006			
Depth-Driller	1500 Ft	Ft	Ft	Ft
Depth-Logger	1500 Ft	Ft	Ft	Ft
Top Logged Interval	10 Ft	Ft	Ft	Ft
Btm. Logged Interval	1500 Ft	Ft	Ft	Ft
Casing-Driller	n/a In @ Ft	In @ Ft	In @ Ft	In @ Ft
Casing-Logger	n/a In @ Ft	In @ Ft	In @ Ft	In @ Ft
Bit Size	8 In	In	In	In
Time On Bottom	11:07			
Type Fluid In Hole	Bentonite			
Density / Viscosity				
pH / Fluid Loss	n/a / n/a ml	ml	ml	ml
Source of Sample	Pit			
Rm @ Measured Temp.	23 @ 69 °F	@ °F	@ °F	@ °F
Rmf @ Measured Temp.	21.6 @ 75 °F	@ °F	@ °F	@ °F
Rmc @ Measured Temp.	n/a @ °F	@ °F	@ °F	@ °F
Source Rmf / Rmc	Meas			
Rm @ BHT	n/a @ °F	@ °F	@ °F	@ °F
Time Since Circulation	4 hr Hr	Hr	Hr	Hr
Max. Rec. Temp.	86 °F	°F	°F	°F
Van No. / Location	L-18 / Sns			
Recorded By	M. Sharpless			
Witnessed By	Moore			

Miscellaneous Information

Latitude, Longitude & Elevation values were determined using a Garmin eTrex
Accuracy is within 14 feet
Drilled By: Bradley & Sons

SP Calculations For Water Quality

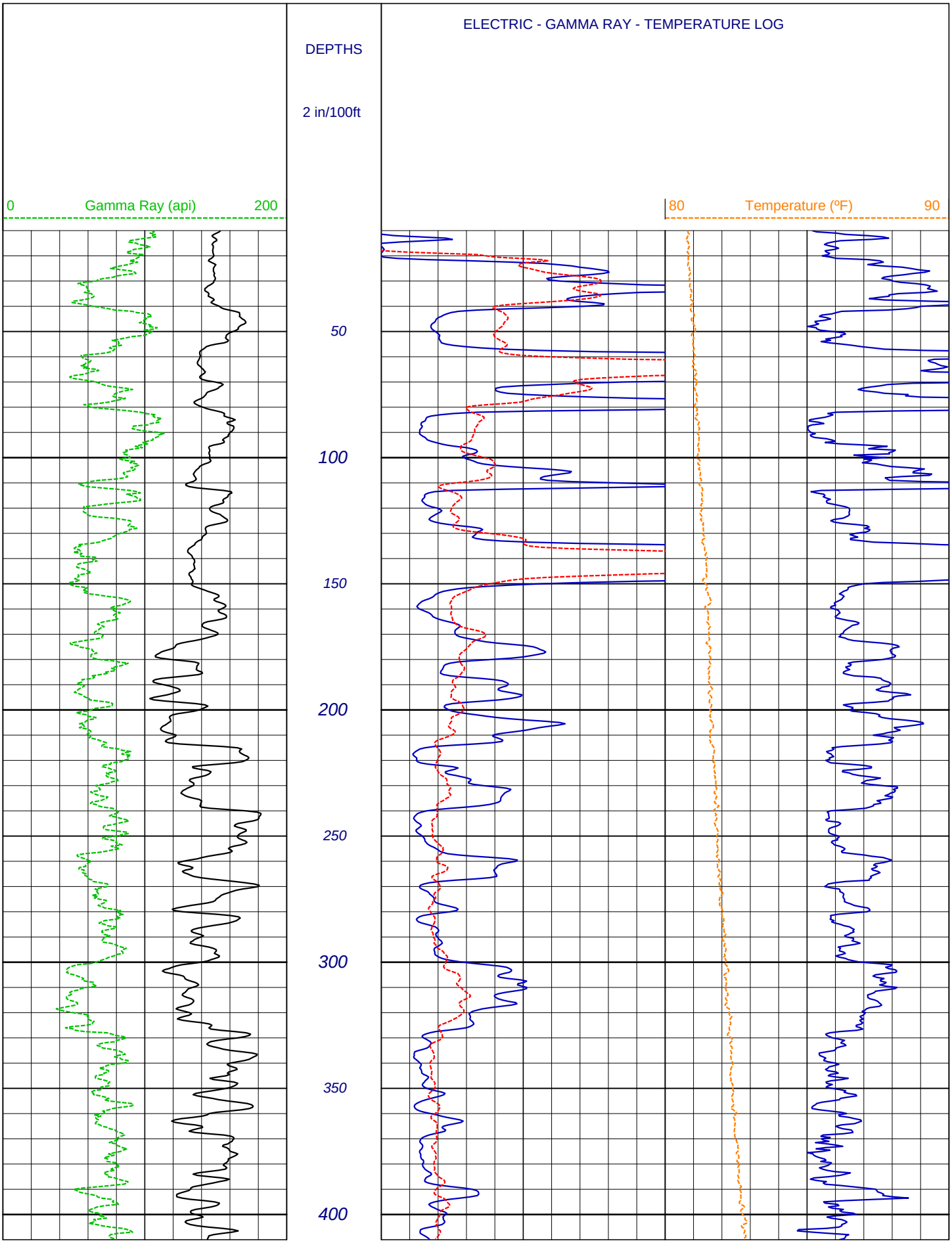
LOG DEPTHS	S.P.	Rwe	Rw RANGE Ohmeters2/M		E.C. RANGE MSiemens		TDS RANGE ppm	
			NaCl	NaHCo3	NaCl	NaHCo3	NaCl	NaHCo3
170 to 280 Feet	-30	8.1	10.7	12.6	935	794	495	769
300 to 450 Feet	-20	11.3	16.2	19.1	617	524	327	526
505 to 660 Feet	-19	11.6	16.7	19.6	599	510	317	500
785 to 950 Feet	-35	6.9	8.8	10.4	1136	962	602	1000
955 to 1035 Feet	-20	11.3	16.2	19.1	617	524	327	526
10901275 to -30 Feet	-30	8.1	10.7	12.6	935	794	495	769
1295 to 1360 Feet	-50	4.2	4.8	5.6	2083	1786	1104	1667
1380 to 1470 Feet	-40	5.9	7.3	8.6	1370	1163	726	1111

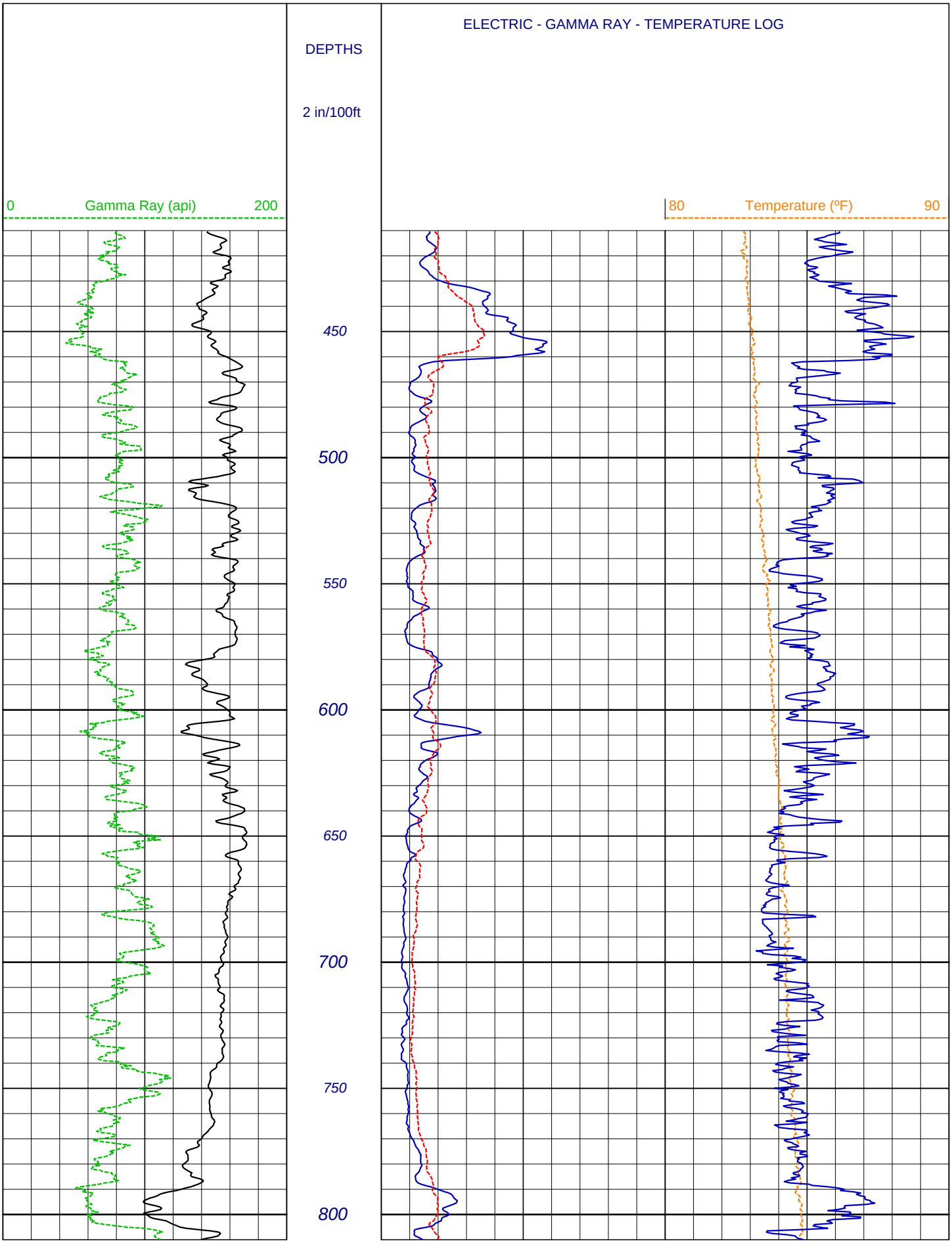
Class I (Excellent to Good)	Class II (Good to Injurious)	Class III (Injurious to Poor)
Less than 700 ppm	700-2000 ppm	More than 2000 ppm

NOTICE

All interpretations are opinions based on inferences from electrical and other measurements and we do not guarantee the accuracy or correctness of any verbal or written interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by one of our officers, agents or employees. These interpretations are also subject to our General Terms and Conditions as set out in our current Price Schedule.

welenco, inc. October 11, 2006


ELECTRIC - GAMMA RAY - TEMPERATURE LOG
DEPTHS
2 in/100ft
0
Gamma Ray (api)
200
80
Temperature (ºF)
90
50
100
150
200
250
300
350
400


ELECTRIC - GAMMA RAY - TEMPERATURE LOG
DEPTHS
2 in/100ft
0
Gamma Ray (api)
200
80
Temperature (ºF)
90
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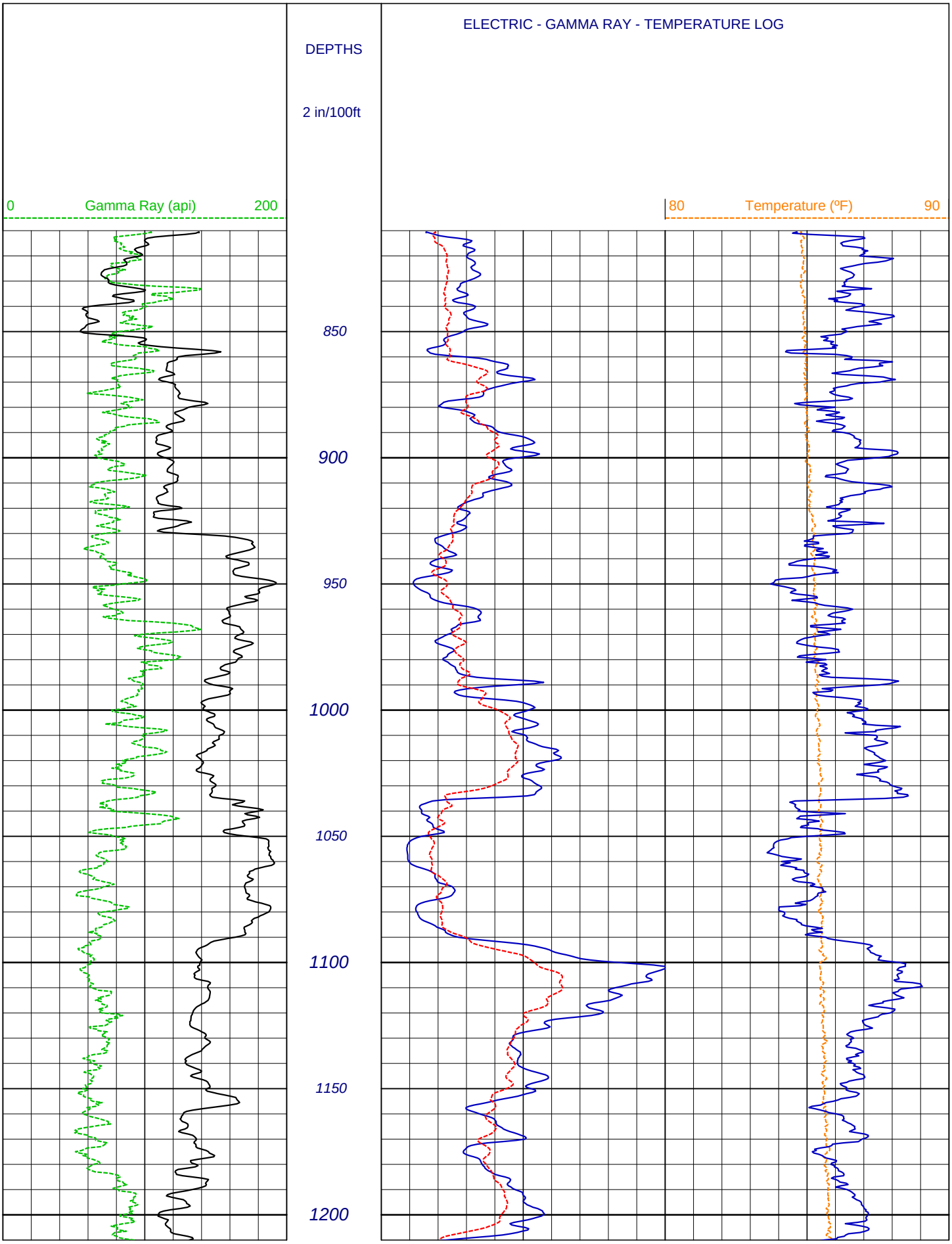
550
600
650
700
750
800



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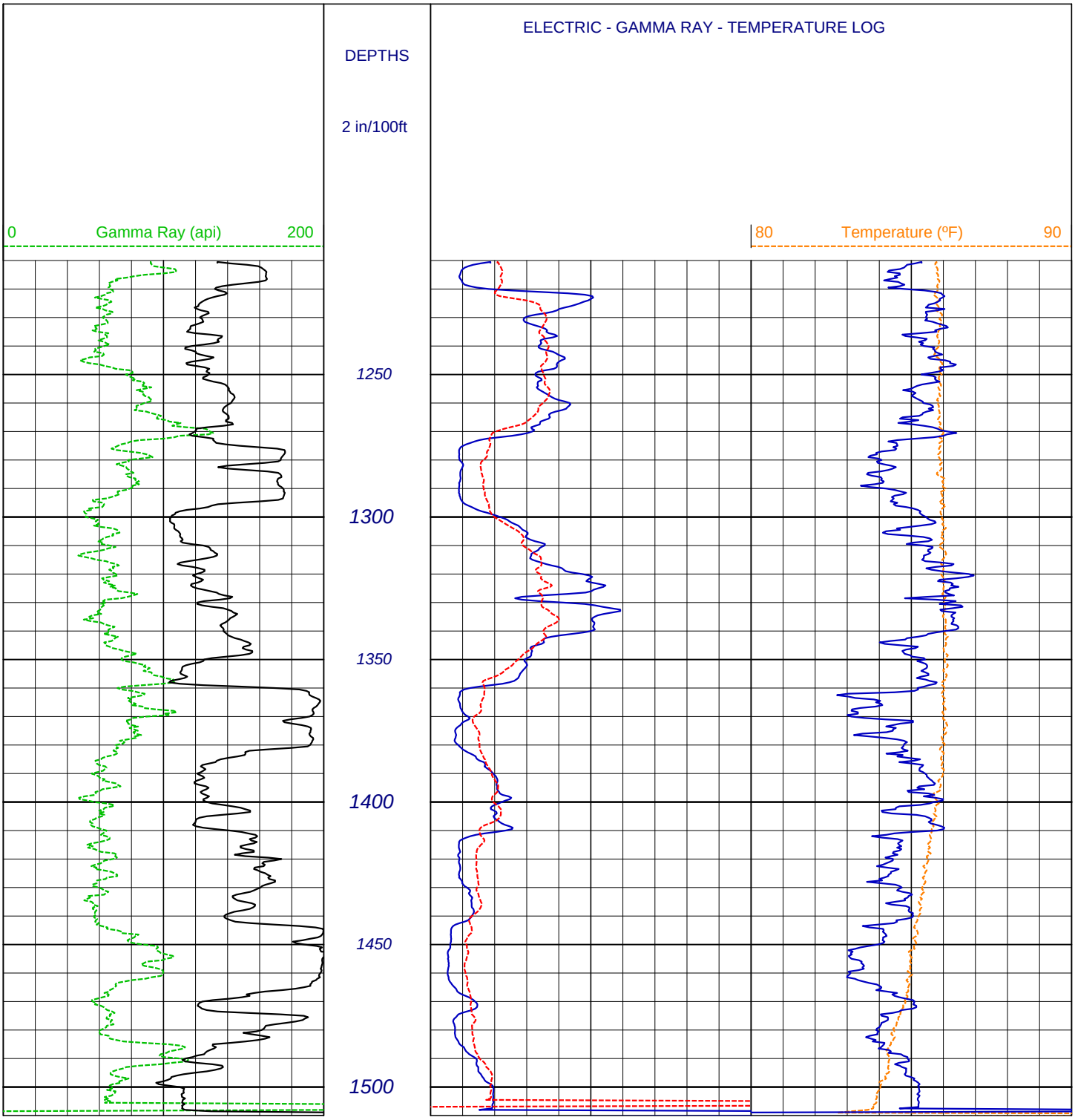

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TECHNICON
ENGINEERING SERVICES, Inc.

*Construction Testing & Inspection * Geotechnical & Environmental Engineering*

Sieve Analysis
for
Coarse and Fine Aggregate

Project:	URS Lab Testing	Technician:	M. Hughes
		Date:	10/13/2006
TES#:	16542-T61	Sample No.:	MW-1
Location:	N/R	Remarks:	1330-1340

	Weight (lbs. or grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.	609	Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	566.3	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash		1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	408.6	2"	44.0 (20.0)

Sieve Size	Individual Weight Retained	Individual % Retained	Cumulative % Retained	Cumulative % Passing	% Passing Specs.
3 in.		0.0	0.0	100.0	
2 1/2 in.		0.0	0.0	100.0	
2 in.		0.0	0.0	100.0	
1 1/2 in.		0.0	0.0	100.0	
1 in.		0.0	0.0	100.0	
3/4 in.		0.0	0.0	100.0	
1/2 in.		0.0	0.0	100.0	
3/8 in.		0.0	0.0	100.0	
#4	7.5	1.3	1.3	98.7	
#8	18.3	3.2	4.6	95.4	
#16	83.0	14.7	19.2	80.8	
#30	120.7	21.3	40.5	59.5	
#50	107.6	19.0	59.5	40.5	
#100	49.0	8.7	68.2	31.8	
#200	22.5	4.0	72.2	27.8	
Pan					

4539 N. Brawley Avenue, #108, Fresno, CA 93722
Phone (559) 276-9311 Fax (559) 276-9344

TECHNICON
ENGINEERING SERVICES, Inc.

*Construction Testing & Inspection * Geotechnical & Environmental Engineering*

Sieve Analysis for Coarse and Fine Aggregate

Project:	URS Lab Testing	Technician:	M. Hughes
		Date:	10/13/2006
TES#:	16542-T61	Sample No.:	MW-2
Location:	N/R	Remarks:	1110-1120

	Weight (lbs. or grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.	609.3	Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	557.9	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash		1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	282.6	2"	44.0 (20.0)

Sieve Size	Individual Weight Retained	Individual % Retained	Cumulative % Retained	Cumulative % Passing	% Passing Specs.
3 in.		0.0	0.0	100.0	
2 1/2 in.		0.0	0.0	100.0	
2 in.		0.0	0.0	100.0	
1 1/2 in.		0.0	0.0	100.0	
1 in.		0.0	0.0	100.0	
3/4 in.		0.0	0.0	100.0	
1/2 in.		0.0	0.0	100.0	
3/8 in.		0.0	0.0	100.0	
#4	0.9	0.2	0.2	99.8	
#8	15.5	2.8	2.9	97.1	
#16	78.0	14.0	16.9	83.1	
#30	86.7	15.5	32.5	67.5	
#50	57.4	10.3	42.7	57.3	
#100	27.8	5.0	47.7	52.3	
#200	16.3	2.9	50.7	49.3	
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*Construction Testing & Inspection * Geotechnical & Environmental Engineering*

Sieve Analysis for Coarse and Fine Aggregate

Project:	URS Lab Testing	Technician:	M. Hughes
		Date:	10/13/2006
TES#:	16542-T61	Sample No.:	MW-3
Location:	N/R	Remarks:	450-460

	Weight (lbs. or grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.	609.7	Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	603.3	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash		1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	556.8	2"	44.0 (20.0)

Sieve Size	Individual Weight Retained	Individual % Retained	Cumulative % Retained	Cumulative % Passing	% Passing Specs.
3 in.		0.0	0.0	100.0	
2 1/2 in.		0.0	0.0	100.0	
2 in.		0.0	0.0	100.0	
1 1/2 in.		0.0	0.0	100.0	
1 in.		0.0	0.0	100.0	
3/4 in.		0.0	0.0	100.0	
1/2 in.		0.0	0.0	100.0	
3/8 in.		0.0	0.0	100.0	
#4	23.3	3.9	3.9	96.1	
#8	35.2	5.8	9.7	90.3	
#16	148.6	24.6	34.3	65.7	
#30	186.2	30.9	65.2	34.8	
#50	122.1	20.2	85.4	14.6	
#100	28.8	4.8	90.2	9.8	
#200	12.6	2.1	92.3	7.7	
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Sieve Analysis for Coarse and Fine Aggregate

Project:	URS Lab Testing	Technician:	M. Hughes
		Date:	10/13/2006
TES#:	16542-T61	Sample No.:	PEC Filter Pack
Location:	N/R	Remarks:	

	Weight (lbs. or grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.	1859.6	Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	1856.9	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash		1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	1856.4	2"	44.0 (20.0)

Sieve Size	Individual Weight Retained	Individual % Retained	Cumulative % Retained	Cumulative % Passing	% Passing Specs.
3 in.		0.0	0.0	100.0	
2 1/2 in.		0.0	0.0	100.0	
2 in.		0.0	0.0	100.0	
1 1/2 in.		0.0	0.0	100.0	
1 in.		0.0	0.0	100.0	
3/4 in.		0.0	0.0	100.0	
1/2 in.		0.0	0.0	100.0	
3/8 in.		0.0	0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	210.0	11.3	11.3	88.7	
#16	1637.4	88.2	99.5	0.5	
#30	9.0	0.5	100.0	0.0	
#50	0.0	0.0	100.0	0.0	
#100	0.0	0.0	100.0	0.0	
#200	0.0	0.0	100.0	0.0	
Pan					

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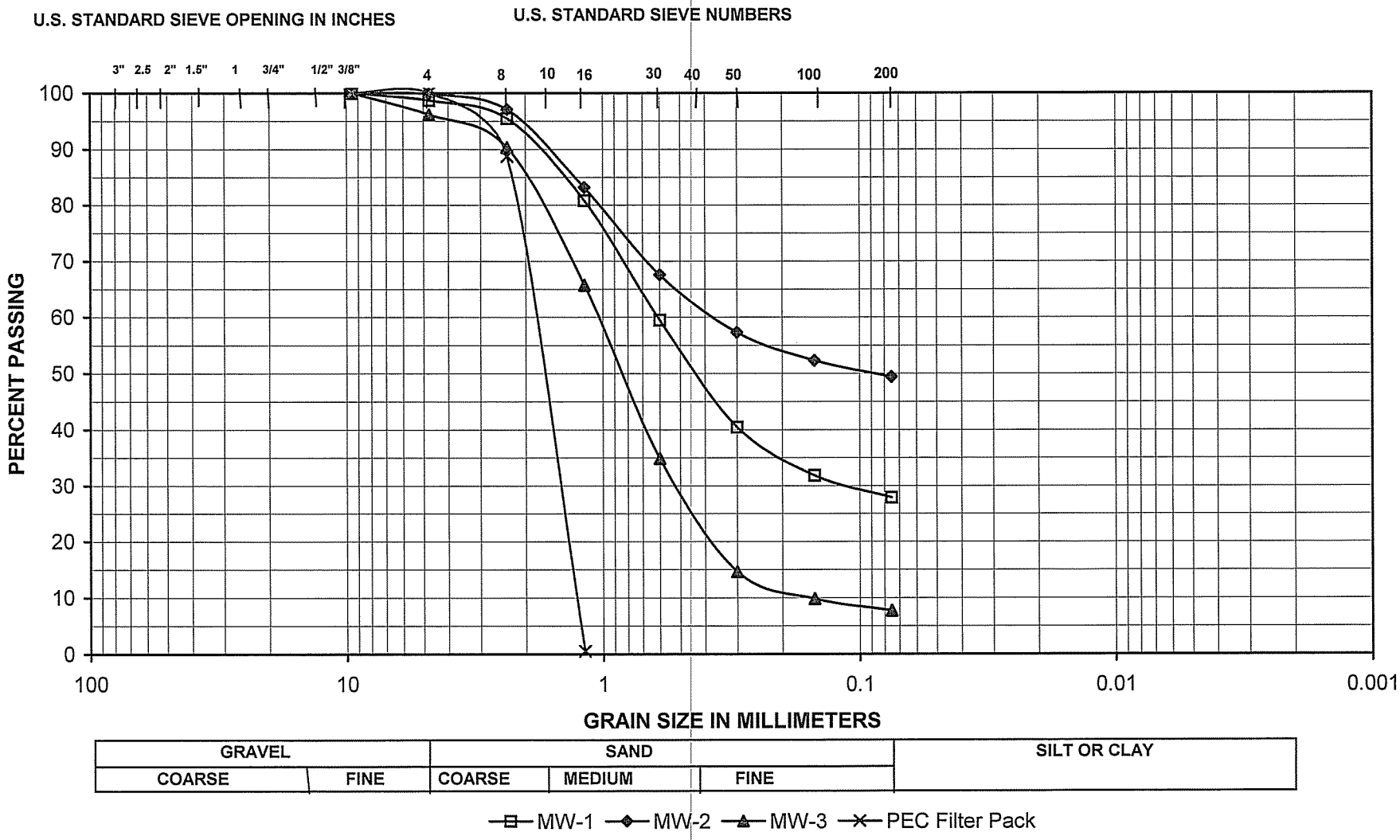

Sample #	LOCATION	% Gravel	% Sand	% Fines	% Moist.	LL	PL	PI
MW-1	1330-1340	1.3	70.8	27.8	7.5			
MW-2	1110-1120	0.2	50.5	49.3	9.2			
MW-3	450-460	3.9	88.4	7.7	1.1			
PEC Filter Pack	PEC Filter Pack	0	100.0	0.0	0.1			

Project:	URS Lab Testing
	0
TES#:	16542
Date:	10/13/2006

Fire Baugh

WELL# PEC MW-1 & MW-2

DATE STARTED _____ DATE COMPLETED 10-20-06

BIT SIZE 12 1/4"

CASING MATERIAL Steel Sch 40 CASING SIZE 2"

CASINGS #1	FROM 1322'	TO 1302'	BLANK/SCREEN	
#1	FROM 1302'	TO Surface	BLANK/SCREEN	
	FROM _____	TO _____	BLANK/SCREEN	
	FROM _____	TO _____	BLANK/SCREEN	
	FROM _____	TO _____	BLANK/SCREEN	
#2	FROM 1130'	TO 1120'	BLANK/SCREEN	
#2	FROM 1120'	TO 1100'	BLANK/SCREEN	
#2	FROM 1100'	TO Surface	BLANK/SCREEN	

SEALS

FROM 1280'	TO 1240'	MATERIAL Chip Seal
FROM 1220'	TO 1210'	MATERIAL Chip Seal
FROM 1060'	TO 1050'	MATERIAL Chip Seal
FROM 1050'	TO Surface	MATERIAL Cement
FROM _____	TO _____	MATERIAL _____
FROM _____	TO _____	MATERIAL _____

Fire Baugh

WELL# MW-3

DATE STARTED _____ DATE COMPLETED 10-26-06

BIT SIZE 8 3/4"

CASING MATERIAL Steel sch.40 CASING SIZE 2"

CASINGS #3 FROM 470' TO 460' BLANK/SCREEN

#3 FROM 460' TO 440' BLANK/SCREEN

#3 FROM 440' TO Surface BLANK/SCREEN

FROM _____ TO _____ BLANK/SCREEN

FROM _____ TO _____ BLANK/SCREEN

FROM _____ TO _____ BLANK/SCREEN

FROM _____ TO _____ BLANK/SCREEN

FROM _____ TO _____ BLANK/SCREEN

SEALS

FROM 410' TO 405' MATERIAL Chip Seal

FROM 405' TO Surface MATERIAL Cement

FROM _____ TO _____ MATERIAL _____

FROM _____ TO _____ MATERIAL _____

FROM _____ TO _____ MATERIAL _____

FROM _____ TO _____ MATERIAL _____

URS

Drilling Morning Report #1
Monitoring Wells 1, 2, 3

10/5/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Thomas Pender

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	440 ft	Hole Size:	8 3/4 in.	Casing O.D.:	-
Site:	PEC	Reamed Depth:	-	Reamed Hole Size:	-	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	440 ft	Completion:	-	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	2	Down Time:	5 hrs	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Continued to observe pilot hole drilling. Total depth drilled since spudding midday Tuesday (10/3/06) is 440 ft. Hard drilling at approx. 310 ft. Drag bit worn out. Driller POOH to replace drag bit with roller bit. Hydraulic pump on rig failed while POOH approx. 1100 hrs - replaced approx. 1600 hrs. Drilling resumed following repairs to rig.

Planned Operations

Continue drilling pilot hole. Corcoran Clay (E-clay) is expected at approx. 650 ft.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	310

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	-	-	NA
MW-2	-	-	NA
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	Field Truck
Mud Pump Trailer	Pickup
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #2
Monitoring Wells 1, 2, 3

10/6/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Thomas Pender

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	760 ft	Hole Size:	8 3/4 in.	Casing O.D.:	-
Site:	PEC	Reamed Depth:	-	Reamed Hole Size:	-	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	320 ft	Completion:	-	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	3	Down Time:	0	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Continued to observe pilot hole drilling. Mud pump on trailer failed - switched to mud pump on rig. Corcoran Clay (E-Clay) encountered at approx. 645 ft.

Planned Operations

Continue drilling pilot hole. Reaming of Corcoran Clay may be required prior to resumption of drilling due to anticipated squeezing of clay into the hole.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	645
Corcoran Clay	645	>115

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	-	-	NA
MW-2	-	-	NA
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	Field Truck
Mud Pump Trailer (Mud Pump Down)	
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #3
Monitoring Wells 1, 2, 3

10/7/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Thomas Pender

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,100 ft	Hole Size:	8 3/4 in.	Casing O.D.:	-
Site:	PEC	Reamed Depth:	-	Reamed Hole Size:	-	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	340 ft	Completion:	-	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	4	Down Time:	0	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Continued to observe pilot hole drilling. Cuttings changed from hard clay to interbedded sands and clays at a depth of approx. 990 ft.

Planned Operations

None - weekend off. Driller plans to resume pilot hole drilling at 0800 hrs, Monday, 10/09/06.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	645
Corcoran Clay / lower Tulare Formation	645	345
Alluvium (undifferentiated)	990	>110

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	-	-	NA
MW-2	-	-	NA
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	Field Truck
Mud Pump Trailer (Mud Pump Down)	
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #4
Monitoring Wells 1, 2, 3

10/10/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Thomas Pender

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,100 ft	Hole Size:	8 3/4 in.	Casing O.D.:	-
Site:	PEC	Reamed Depth:	-	Reamed Hole Size:	-	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	0 ft	Completion:	-	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	7	Down Time:	10 hrs	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Driller repaired bearings on drive unit between deck engine and kelly. The bearings were apparently damaged while pulling drill string out of hole to shut down site for the weekend. Portions of the hole required reaming for reentry following repairs to the rig. Hole reentry was reportedly conducted between 1600 and 2300 hrs Monday. Driller maintained mud circulation overnight using a hole sitter to allow drilling ahead first thing Tuesday (10/10/06) morning.

Planned Operations

Continue to observe drilling of pilot hole. Driller has scheduled geophysical crew for 1000 hrs on Wednesday (10/11/06). The pilot hole will be drilled to the total depth prior to running geophysical tools into the hole.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	645
Corcoran Clay / lower Tulare Formation	645	345
Alluvium (undifferentiated)	990	>110

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	-	-	NA
MW-2	-	-	NA
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	Field Truck
Mud Pump Trailer (Mud Pump Down)	
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #5
Monitoring Wells 1, 2, 3

10/11/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Thomas Pender

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,420 ft	Hole Size:	8 3/4 in.	Casing O.D.:	-
Site:	PEC	Reamed Depth:	-	Reamed Hole Size:	-	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	320 ft	Completion:	-	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	8	Down Time:	-	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Driller continued drilling pilot hole.

Planned Operations

Pilot hole is expected to reach TD of approx. 1,500 ft this AM. Driller has scheduled geophysical crew for 1000 hrs. Driller has expressed concern over the number of trips required for desired logging suite (up to 3) due to potential hole stability problems. Tools will be prioritized based on 1) water quality data, 2) lithology data, 3) water level data. Logging suite may be reduced to limit trips depending on conditions encountered downhole.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	645
Corcoran Clay / lower Tulare Formation	645	345
Alluvium (undifferentiated)	990	>430

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	-	-	NA
MW-2	-	-	NA
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	Field Truck
Mud Pump Trailer (Mud Pump Down)	
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #6
Monitoring Wells 1, 2, 3

10/12/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Jason Moore

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,510 ft	Hole Size:	8 3/4 in.	Casing O.D.:	-
Site:	PEC	Reamed Depth:	200 ft	Reamed Hole Size:	12 in.	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	90 ft	Completion:	-	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	9	Down Time:	-	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Driller extended pilot hole to total depth of 1,510 ft. Run in hole to TD w/ E-log tool (SP, gamma ray, resistivity [64" / 16" / single point], temperature). Pull out of hole w/ tool. Run in hole to 720 ft w/ guard log tool - hole obstructed in Corcoran Clay zone. Pull out of hole and abandon attempts to log w/ additional tools. Field picks for completions: MW-1 - 1,320 to 1,340 ft; MW-2 - 1,100 to 1,120 ft; MW-3 - 440 to 460 ft. Depth to water estimated at 150 ft based on E-log. Water quality in all zones better than anticipated. Drillers run in hole w/ 12 in. bit to ream at 1330 hrs.

Planned Operations

Driller to ream pilot hole. URS to provide final completion depths for MW-1, 2, 3 by 10/13/06.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	660
Corcoran Clay	660	110
Alluvium (undifferentiated)	770	740

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	-	-	NA
MW-2	-	-	NA
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	Rental Truck
Mud Pump Trailer (Mud Pump Down)	
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #7
Monitoring Wells 1, 2, 3

10/13/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Jason Moore

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,510 ft	Hole Size:	8 3/4 in.	Casing O.D.:	-
Site:	PEC	Reamed Depth:	560 ft	Reamed Hole Size:	12 in.	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	360 ft	Completion:	-	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	10	Down Time:	-	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Driller reamed pilot hole to 560 ft.URS delivered formation material and filter pack samples to geotechnical lab for gradation analysis. Estimated water quality based on geophysical log subcontractors E-log SP calculations for intervals including recommended completion depths: 1,295 to 1,360 ft - 1,667 ppm TDS (NaHCO3); 1,090 to 1,275 ft - 769 ppm TDS (NaHCO3); 300 to 450 ft - 526 ppm TDS (NaHCO3). Calculations assume water is bicarbonate type, groundwater in the subbasin is generally of the sulfate or bicarbonate type.

Planned Operations

Driller to ream pilot hole. URS recommended final completion depths: MW-1 - 1,320 to 1,340 ft; MW-2 - 1,100 to 1,120 ft; MW-3 - 440 to 460 ft. Final completion depths are due to driller today. Gradation analyses for cuttings representative of the recommended intervals and the planned filter pack are due from lab by COB today.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	660
Corcoran Clay	660	110
Alluvium (undifferentiated)	770	740

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	-	-	NA
MW-2	-	-	NA
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	Personal Vehicle
Mud Pump Trailer (Mud Pump Down)	
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #8
Monitoring Wells 1, 2, 3

10/16/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Jason Moore

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,510 ft	Hole Size:	8 3/4 in.	Casing O.D.:	-
Site:	PEC	Reamed Depth:	900 ft	Reamed Hole Size:	12 in.	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	340 ft	Completion:	-	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	13	Down Time:	-	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Driller reamed pilot hole to 900 ft. Driller notified of desired final completion depths: MW-1 - 1,320 to 1,340 ft; MW-2 - 1,100 to 1,120 ft; MW-3 - 440 to 460 ft. Received gradation analysis data for formation material and filter pack samples from geotechnical lab.

Planned Operations

Driller to ream pilot hole. Corcoran Clay will require additional reaming to run in hole.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	660
Corcoran Clay	660	110
Alluvium (undifferentiated)	770	740

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	-	-	NA
MW-2	-	-	NA
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	
Mud Pump Trailer (Mud Pump Down)	
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #9
Monitoring Wells 1, 2, 3

10/17/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Thomas Pender

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,510 ft	Hole Size:	8 3/4 in.	Casing O.D.:	-
Site:	PEC	Reamed Depth:	1,100 ft	Reamed Hole Size:	12 in.	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	220 ft	Completion:	-	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	14	Down Time:	-	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Driller reamed pilot hole to 1,120 ft starting with obstruction at 240 ft.

Planned Operations

Driller to ream pilot hole below target depth for lower confined aquifer completion. Circulation will be maintained overnight by hole sitter to allow construction of confined aquifer wells to start without additional reaming during next shift.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	660
Corcoran Clay	660	110
Alluvium (undifferentiated)	770	740

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	-	-	NA
MW-2	-	-	NA
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	Field Truck
Mud Pump Trailer (Mud Pump Down)	
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #10
Monitoring Wells 1, 2, 3

10/18/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Thomas Pender

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,510 ft	Hole Size:	8 3/4 in.	Casing O.D.:	-
Site:	PEC	Reamed Depth:	1,360 ft	Reamed Hole Size:	12 in.	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	260 ft	Completion:	-	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	15	Down Time:	-	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Driller completed pilot hole reaming.

Planned Operations

Driller to install tremie pipe for filter pack installation, seal placement, and cementing. Construction of lower confined aquifer completion (MW-1) to start.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	660
Corcoran Clay	660	110
Alluvium (undifferentiated)	770	740

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	-	-	NA
MW-2	-	-	NA
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	Field Truck
Mud Pump Trailer (Mud Pump Down)	
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #11
Monitoring Wells 1, 2, 3

10/19/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Thomas Pender

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,510 ft	Hole Size:	8 3/4 in.	Casing O.D.:	-
Site:	PEC	Reamed Depth:	1,360 ft	Reamed Hole Size:	12 in.	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	-	Completion:	-	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	16	Down Time:	-	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Driller tripped out of hole with drill string. Bit twisted off at 1,325 ft and cannot be recovered. Tripped in tremie pipe to 1,320 ft and circulated hole overnight through tremie pipe.

Planned Operations

Construct lower confined aquifer completion (MW-1). 20 ft long screened interval will be placed above bit from approximately 1,305 to 1,325 ft. 10 ft long sump will be deleted to keep screened interval as deep as possible at the future risk of silting problems within the screened interval. Screened interval will be higher within same sand interval selected for planned lower confined aquifer completion.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	660
Corcoran Clay	660	110
Alluvium (undifferentiated)	770	740

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	-	-	NA
MW-2	-	-	NA
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	Field Truck
Mud Pump Trailer (Mud Pump Down)	
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #12
Monitoring Wells 1, 2, 3

10/20/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Jason Moore

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,510 ft	Hole Size:	8 3/4 in.	Casing O.D.:	-
Site:	PEC	Reamed Depth:	1,360 ft	Reamed Hole Size:	12 in.	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	-	Completion:	-	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	17	Down Time:	-	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Twisted-off bit prevented drillers from placing screened interval for lower confined aquifer completion (MW-1) at target depth. Screened interval placed above bit from approximately 1,302 to 1,322 ft. Sump was deleted. #8-16 sand placed as filter pack and annulus filling material. 1/4-in. diameter bentonite tablets placed as seals at clay intervals based on E-log. Screened interval for upper confined aquifer completion (MW-2) placed from approximately 1,100 to 1,120 ft. Filter pack, annulus filling material, and seal placed as MW-1. Mud circulated in hole with hole sitter on site overnight to be ready for cement placement at beginning of next shift.

Planned Operations

Drillers to place cement seal for MW-1 / MW-2 and install protective monument.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	660
Corcoran Clay	660	110
Alluvium (undifferentiated)	770	740

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	1,302	1,322	Partial
MW-2	1,100	1,120	Partial
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	Personal Vehicle
Mud Pump Trailer (Mud Pump Down)	
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #13
Monitoring Wells 1, 2, 3

10/21/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Jason Moore

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,510 ft	Hole Size:	8 3/4 in.	Casing O.D.:	-
Site:	PEC	Reamed Depth:	1,360 ft	Reamed Hole Size:	12 in.	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	-	Completion:	-	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	18	Down Time:	-	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Placed cement for MW-1 and MW-2. Fresno County inspector observed placement of cement seal with no comment or concerns noted. Cement seal will need to be topped off after slump occurs.

Planned Operations

No operations planned for weekend. Plans for next shift (Monday) include: development of MW-1 and MW-2, repair top drive unit on rig, and move rig forward to spud semi-confined aquifer completion (MW-3).

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	660
Corcoran Clay	660	110
Alluvium (undifferentiated)	770	740

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	1,302	1,322	Partial
MW-2	1,100	1,120	Partial
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	Personal Vehicle
Support Truck (No. 1)	
Support Truck (No. 2)	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #14
Monitoring Wells 1, 2, 3

10/25/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Thomas Pender

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,510 ft	Hole Size:	8 3/4 in.	Casing O.D.:	2 in.
Site:	PEC	Reamed Depth:	1,360 ft	Reamed Hole Size:	12 in.	Depth to Water MW-1:	-
Drill Co.:	Bradley & Sons	Progress:	400 ft	Completion:	2	Depth to Water MW-2:	-
Rig:	TH-60	Days from Start:	22	Down Time:	-	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Drilled semi-confined aquifer completion (MW-3) to 400 ft. Continued development of MW-1 and MW-2. MW-1 produced approx. 1 gpm and MW-2 produced approx. 10 gpm during air-lift pumping.

Planned Operations

Drill MW-3 to total depth of 480 ft. Install tremie pipe and condition hole. Install well casing and filter pack / seal. Continue development of MW-1. Collect groundwater samples from MW-1 and MW-2.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	660
Corcoran Clay	660	110
Alluvium (undifferentiated)	770	740

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	1,302	1,322	Partial
MW-2	1,100	1,120	Partial
MW-3	-	-	NA

Equipment

Bradley and Sons	URS
Drill Rig	Field Truck
Support Truck (No. 1)	
Support Truck (No. 2)	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #15
Monitoring Wells 1, 2, 3

10/26/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Frank Gegunde

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,510 ft	Hole Size:	8 3/4 in.	Casing O.D.:	2 in.
Site:	PEC	Reamed Depth:	1,360 ft	Reamed Hole Size:	12 in.	Depth to Water MW-1:	400 ft* pre-development
Drill Co.:	Bradley & Sons	Progress:	80 ft	Completion:	2	Depth to Water MW-2:	380 ft* pre-development
Rig:	TH-60	Days from Start:	23	Down Time:	-	Depth to Water MW-3:	-

Summary of Period 0700 to 0700 Hrs

Driller extended second borehole to total depth of 480 ft - tripped out of hole with drill string. Tripped into hole with sump, screen, and blank casing. Screened interval placed from 440 to 460 ft within semi-confined aquifer (MW-3). #8-16 sand placed as filter pack and annulus filling material. 1/4-in. diameter bentonite tablets placed as seal. Installed tremie pipe and circulated hole. Continued development of MW-1 and MW-2. Collected groundwater samples and blind duplicates from MW-1 (blind duplicate identified as MW-4) and MW-2 (blind duplicate identified as MW-5).

Planned Operations

Deliver samples to analytical laboratory. Place cement seal in MW-3. Demobilize drill rig and support equipment. Site cleanup.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	660
Corcoran Clay	660	110
Alluvium (undifferentiated)	770	740

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	1,302	1,322	Partial
MW-2	1,100	1,120	Partial
MW-3	440	460	Partial

Equipment

Bradley and Sons	URS
Drill Rig	Personal Vehicles (2)
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	

URS

Drilling Morning Report #16
Monitoring Wells 1, 2, 3

10/27/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Frank Gegunde

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,510 ft	Hole Size:	8 3/4 in.	Casing O.D.:	2 in.
Site:	PEC	Reamed Depth:	1,360 ft	Reamed Hole Size:	12 in.	Depth to Water MW-1:	362 ft
Drill Co.:	Bradley & Sons	Progress:	-	Completion:	3	Depth to Water MW-2:	380 ft
Rig:	TH-60	Days from Start:	24	Down Time:	-	Depth to Water MW-3:	180* pre-development

Summary of Period 0700 to 0700 Hrs

Delivered groundwater samples to analytical laboratory (Twining Laboratories). Driller placed cement seal for MW-3. Fresno County inspector declined to observe placement of cement seal. Demobilize drill rig and support equipment. Site cleanup.

Planned Operations

Develop MW-3. Collect groundwater sample from MW-3. Deliver sample to analytical laboratory.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	660
Corcoran Clay	660	110
Alluvium (undifferentiated)	770	740

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	1,302	1,322	Partial
MW-2	1,100	1,120	Partial
MW-3	440	460	Partial

Equipment

Bradley and Sons	URS
Drill Rig	Personal Vehicle
Support Truck	
Backhoe	
Chase Truck	
Toolpusher Truck	
Cement Pump	
Short Load Cement Mixing Truck	

URS

Drilling Morning Report #17
Monitoring Wells 1, 2, 3

10/28/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Jason Moore

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,510 ft	Hole Size:	8 3/4 in.	Casing O.D.:	2 in.
Site:	PEC	Reamed Depth:	1,360 ft	Reamed Hole Size:	12 in.	Depth to Water MW-1:	362 ft
Drill Co.:	Bradley & Sons	Progress:	-	Completion:	3	Depth to Water MW-2:	380 ft
Rig:	TH-60	Days from Start:	25	Down Time:	-	Depth to Water MW-3:	180* pre-development

Summary of Period 0700 to 0700 Hrs

Developed MW-3. Collected groundwater sample from MW-3. Delivered sample to analytical laboratory.

Planned Operations

No operations planned for weekend. Plans for next shift (Monday) include: install well monuments, install bollards, and site cleanup.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	660
Corcoran Clay	660	110
Alluvium (undifferentiated)	770	740

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	1,302	1,322	Partial
MW-2	1,100	1,120	Partial
MW-3	440	460	Partial

Equipment

Bradley and Sons	URS
Well Development Rig Backhoe	Personal Vehicle

URS

Drilling Morning Report #18
Monitoring Wells 1, 2, 3

11/01/2006 (Time is PST / Depth is BGS)

Prepared by: Jason Moore
Geologist: Jason Moore

Well Data

Client:	Panoche Energy Center, LLC	Drilled Depth:	1,510 ft	Hole Size:	8 3/4 in.	Casing O.D.:	2 in.
Site:	PEC	Reamed Depth:	1,360 ft	Reamed Hole Size:	12 in.	Depth to Water MW-1:	397 ft
Drill Co.:	Bradley & Sons	Progress:	-	Completion:	3	Depth to Water MW-2:	379 ft
Rig:	TH-60	Days from Start:	29	Down Time:	-	Depth to Water MW-3:	180 ft

Summary of Period 0700 to 0700 Hrs

Driller installed well pads, monuments, and bollards. Monument lids secured with padlocks (Master No. 2126).

Planned Operations

Monitoring wells complete. Backhoe and flatbed trailer to be demobilized.

Geology

Unit	Depth to Top (ft)	Thickness (ft)
Alluvium (undifferentiated)	0	660
Corcoran Clay	660	110
Alluvium (undifferentiated)	770	740

Completion

Monitoring Well	Top of Screen (ft)	Bottom of Screen (ft)	Construction
MW-1	1,302	1,322	Complete
MW-2	1,100	1,120	Complete
MW-3	440	460	Complete

Equipment

Bradley and Sons	URS
Well Development Rig	Personal Vehicle
Backhoe	

THE TWINING LABORATORIES, INC.
EST. 1898
CALIFORNIA ELAP CERTIFICATE #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

November 08, 2006

Work Order #: 6J26012

Cindy Poire
URS
130 Robin Hill Road, Ste 100
Santa Barbara, CA 93117

RE: Panoche Energy Center

Enclosed are the analytical results for samples received by our laboratory on 10/26/06 . For your reference, these analyses have been assigned laboratory work order number 6J26012 .

All analyses have been performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, The Twining Laboratories, Inc. (TL) is not responsible for use of less than complete reports. Results apply only to samples analyzed.

If you have any questions, please feel free to contact us at the number listed above.

Sincerely,

The Twining Laboratories, Inc.

Ronald J. Boquist
Director of Analytical Chemistry

THE TWINING LABORATORIES, INC.
EST. 1898
CALIFORNIA ELAP CERTIFICATE #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

URS	Project: Panoche Energy Center	
130 Robin Hill Road, Ste 100	Project Number: 28906795.00200	**Reported:**
Santa Barbara CA, 93117	Project Manager: Cindy Poire	11/08/06 1

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1	6J26012-01	Ground Water	10/25/06 15:00	10/26/06 11:20
MW-2	6J26012-02	Ground Water	10/25/06 15:15	10/26/06 11:20
MW-4	6J26012-03	Ground Water	10/25/06 15:30	10/26/06 11:20
MW-5	6J26012-04	Ground Water	10/25/06 15:45	10/26/06 11:20

THE TWINING LABORATORIES, INC.
EST. 1898
CALIFORNIA ELAP CERTIFICATE #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

URS	Project: Panoche Energy Center	
130 Robin Hill Road, Ste 100	Project Number: 28906795.00200	**Reported:**
Santa Barbara CA, 93117	Project Manager: Cindy Poire	11/08/06 1

MW-1

6J26012-01 (Ground Water) Sampled: 10/25/06 15:00

Analyte		Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes.
Inorganics										
Total Alkalinity as CaCO3		**180**	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Bicarbonate Alkalinity as HCO3		**200**	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Carbonate Alkalinity as CO3		ND	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Hydroxide Alkalinity as OH		ND	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Ammonia as N		ND	1.0	mg/L	1	T6J3103	10/31/06	11/01/06	EPA 350.2	
Biochemical Oxygen Demand		ND	1.0	mg/L	1	T6J2709	10/27/06	11/01/06	SM5210B/EPA 405.1	
Chloride		**85**	6.0	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
Chemical Oxygen Demand		ND	10	mg/L	1	T6K0315	11/03/06	11/03/06	EPA 410.1	
Cyanide (total)		ND	5.0	µg/L	1	T6J3010	10/31/06	11/03/06	SM4500CN-E	
Specific Conductance (EC)		**1500**	1.0	µS/cm	1	T6J2616	10/26/06	10/26/06	SM2510B	
Fluoride		**0.60**	0.30	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
Hardness		**40**	0.66	mg equiv. CaCO3/L	1	[CALC]	10/31/06	11/01/06	[CALC]	
Methylene Blue Active Substances		ND	0.050	mg/L	1	T6J2710	10/27/06	10/27/06	SM5540C	
Nitrate as NO3		ND	6.0	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
Orthophosphate as P		ND	1.5	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
pH		**8.9**	0.10	pH Units	1	T6J2615	10/26/06	10/26/06	EPA 150.1	
Phosphorus		**0.12**	0.10	mg/L	1	T6J3003	10/30/06	10/31/06	EPA 365.4	
Sulfate as SO4		**440**	20	mg/L	10	T6J2703	10/27/06	10/27/06	EPA 300.0	
Sulfide	*	ND	1.0	mg/L	1	T6J3004	10/30/06	10/30/06	EPA 376.1	
Total Dissolved Solids		**1100**	20	mg/L	2	T6J3107	10/31/06	11/03/06	EPA 160.1	
Total Organic Carbon		**1.0**	1.0	mg/L	1	T6K0613	11/06/06	11/07/06	SM5310B	
Total Suspended Solids		**110**	6.7	mg/L	1.67	T6J3108	10/31/06	11/01/06	EPA 160.2	
Turbidity	HT	**89**	0.080	NTU	4	T6J3014	10/30/06	10/30/06	EPA 180.1	
Metals										
Mercury		ND	0.20	µg/L	1	T6J3006	10/30/06	10/30/06	EPA 245.1	
Metals - Dissolved										
Aluminum		ND	0.050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Antimony		ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Arsenic		ND	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Barium		**0.19**	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Beryllium		ND	0.0010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Boron		**2.9**	0.050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Cadmium		ND	0.0010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	

THE TWINING LABORATORIES, INC.
EST. 1898
CALIFORNIA ELAP CERTIFICATE #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
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URS	Project: Panoche Energy Center	
130 Robin Hill Road, Ste 100	Project Number: 28906795.00200	**Reported:**
Santa Barbara CA, 93117	Project Manager: Cindy Poire	11/08/06 1

MW-1

6J26012-01 (Ground Water) Sampled: 10/25/06 15:00

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes.
Metals - Dissolved									
Calcium	**11**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Chromium	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Cobalt	ND	0.0020	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Copper	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Iron	**5.9**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Lead	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Magnesium	**3.1**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Manganese	**0.12**	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Molybdenum	**0.040**	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Nickel	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Potassium	**4.7**	1.0	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Selenium	ND	0.020	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Silica (SiO2)	**31**	0.20	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Silicon	**14**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Silver	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Sodium	**300**	1.0	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Strontium	**0.114**	0.00200	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Thallium	ND	0.020	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Tin	ND	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Titanium	ND	0.0100	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Vanadium	ND	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Zinc	**0.015**	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	

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URS	Project: Panoche Energy Center	
130 Robin Hill Road, Ste 100	Project Number: 28906795.00200	Reported:
Santa Barbara CA, 93117	Project Manager: Cindy Poire	11/08/06 1

MW-2

6J26012-02 (Ground Water) Sampled: 10/25/06 15:15

Analyte		Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes.
Inorganics										
Total Alkalinity as CaCO3		**110**	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Bicarbonate Alkalinity as HCO3		**130**	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Carbonate Alkalinity as CO3		ND	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Hydroxide Alkalinity as OH		ND	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Ammonia as N		ND	1.0	mg/L	1	T6J3103	10/31/06	11/01/06	EPA 350.2	
Biochemical Oxygen Demand		ND	1.0	mg/L	1	T6J2709	10/27/06	11/01/06	SM5210B/EPA 405.1	
Chloride		**40**	6.0	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
Chemical Oxygen Demand		**26**	10	mg/L	1	T6K0315	11/03/06	11/03/06	EPA 410.1	
Cyanide (total)		ND	5.0	µg/L	1	T6J3010	10/31/06	11/03/06	SM4500CN-E	
Specific Conductance (EC)		**1100**	1.0	µS/cm	1	T6J2616	10/26/06	10/26/06	SM2510B	
Fluoride		**0.56**	0.30	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
Hardness		**56**	0.66	mg equiv. CaCO3/L	1	[CALC]	10/31/06	11/01/06	[CALC]	
Methylene Blue Active Substances		ND	0.050	mg/L	1	T6J2710	10/27/06	10/27/06	SM5540C	
Nitrate as NO3		ND	6.0	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
Orthophosphate as P		ND	1.5	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
pH		**8.6**	0.10	pH Units	1	T6J2615	10/26/06	10/26/06	EPA 150.1	
Phosphorus		**0.14**	0.10	mg/L	1	T6J3003	10/30/06	10/31/06	EPA 365.4	
Sulfate as SO4		**380**	20	mg/L	10	T6J2703	10/27/06	10/27/06	EPA 300.0	
Sulfide	*	ND	1.0	mg/L	1	T6J3004	10/30/06	10/30/06	EPA 376.1	
Total Dissolved Solids		**840**	10	mg/L	1	T6J3107	10/31/06	11/03/06	EPA 160.1	
Total Organic Carbon		ND	1.0	mg/L	1	T6K0613	11/06/06	11/07/06	SM5310B	
Total Suspended Solids		**25**	6.7	mg/L	1.67	T6J3108	10/31/06	11/01/06	EPA 160.2	
Turbidity	HT	**52**	0.080	NTU	4	T6J3014	10/30/06	10/30/06	EPA 180.1	
Metals										
Mercury		ND	0.20	µg/L	1	T6J3006	10/30/06	10/30/06	EPA 245.1	
Metals - Dissolved										
Aluminum		ND	0.050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Antimony		ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Arsenic		ND	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Barium		**0.16**	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Beryllium		ND	0.0010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Boron		**1.6**	0.050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Cadmium		ND	0.0010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	

THE TWINING LABORATORIES, INC.
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CALIFORNIA ELAP CERTIFICATE #1371

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URS	Project: Panoche Energy Center	
130 Robin Hill Road, Ste 100	Project Number: 28906795.00200	**Reported:**
Santa Barbara CA, 93117	Project Manager: Cindy Poire	11/08/06 1

MW-2

6J26012-02 (Ground Water) Sampled: 10/25/06 15:15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes.
Metals - Dissolved									
Calcium	**20**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Chromium	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Cobalt	ND	0.0020	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Copper	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Iron	**3.9**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Lead	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Magnesium	**1.4**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Manganese	**0.080**	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Molybdenum	**0.023**	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Nickel	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Potassium	**4.2**	1.0	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Selenium	ND	0.020	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Silica (SiO2)	**33**	0.20	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Silicon	**15**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Silver	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Sodium	**220**	1.0	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Strontium	**0.0510**	0.00200	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Thallium	ND	0.020	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Tin	ND	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Titanium	ND	0.0100	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Vanadium	ND	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Zinc	**0.027**	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	

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URS	Project: Panoche Energy Center	
130 Robin Hill Road, Ste 100	Project Number: 28906795.00200	**Reported:**
Santa Barbara CA, 93117	Project Manager: Cindy Poire	11/08/06 1

MW-4

6J26012-03 (Ground Water) Sampled: 10/25/06 15:30

Analyte		Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes.
Inorganics										
Total Alkalinity as CaCO3		**180**	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Bicarbonate Alkalinity as HCO3		**200**	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Carbonate Alkalinity as CO3		ND	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Hydroxide Alkalinity as OH		ND	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Ammonia as N		ND	1.0	mg/L	1	T6J3103	10/31/06	11/01/06	EPA 350.2	
Biochemical Oxygen Demand		ND	1.0	mg/L	1	T6J2709	10/27/06	11/01/06	SM5210B/EPA 405.1	
Chloride		**85**	6.0	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
Chemical Oxygen Demand		ND	10	mg/L	1	T6K0315	11/03/06	11/03/06	EPA 410.1	
Cyanide (total)		ND	5.0	µg/L	1	T6J3010	10/31/06	11/03/06	SM4500CN-E	
Specific Conductance (EC)		**1500**	1.0	µS/cm	1	T6J2616	10/26/06	10/26/06	SM2510B	
Fluoride		**0.68**	0.30	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
Hardness		**41**	0.66	mg equiv. CaCO3/L	1	[CALC]	10/31/06	11/01/06	[CALC]	
Methylene Blue Active Substances		ND	0.050	mg/L	1	T6J2710	10/27/06	10/27/06	SM5540C	
Nitrate as NO3		ND	6.0	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
Orthophosphate as P		ND	1.5	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
pH		**9.0**	0.10	pH Units	1	T6J2615	10/26/06	10/26/06	EPA 150.1	
Phosphorus		**0.16**	0.10	mg/L	1	T6J3003	10/30/06	10/31/06	EPA 365.4	
Sulfate as SO4		**440**	20	mg/L	10	T6J2703	10/27/06	10/27/06	EPA 300.0	
Sulfide	*	ND	1.0	mg/L	1	T6J3004	10/30/06	10/30/06	EPA 376.1	
Total Dissolved Solids		**1100**	20	mg/L	2	T6J3107	10/31/06	11/03/06	EPA 160.1	
Total Organic Carbon		ND	1.0	mg/L	1	T6K0613	11/06/06	11/07/06	SM5310B	
Total Suspended Solids		**94**	6.7	mg/L	1.67	T6J3108	10/31/06	11/01/06	EPA 160.2	
Turbidity	HT	**87**	0.080	NTU	4	T6J3014	10/30/06	10/30/06	EPA 180.1	
Metals										
Mercury		ND	0.20	µg/L	1	T6J3006	10/30/06	10/30/06	EPA 245.1	
Metals - Dissolved										
Aluminum		ND	0.050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Antimony		ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Arsenic		ND	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Barium		**0.18**	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Beryllium		ND	0.0010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Boron		**3.0**	0.050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Cadmium		ND	0.0010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	

THE TWINING LABORATORIES, INC.
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URS	Project: Panoche Energy Center	
130 Robin Hill Road, Ste 100	Project Number: 28906795.00200	**Reported:**
Santa Barbara CA, 93117	Project Manager: Cindy Poire	11/08/06 1

MW-4

6J26012-03 (Ground Water) Sampled: 10/25/06 15:30

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes.
Metals - Dissolved									
Calcium	**11**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Chromium	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Cobalt	ND	0.0020	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Copper	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Iron	**5.8**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Lead	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Magnesium	**3.2**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Manganese	**0.12**	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Molybdenum	**0.041**	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Nickel	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Potassium	**4.9**	1.0	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Selenium	ND	0.020	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Silica (SiO2)	**32**	0.20	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Silicon	**15**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Silver	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Sodium	**310**	1.0	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Strontium	**0.118**	0.00200	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Thallium	ND	0.020	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Tin	ND	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Titanium	ND	0.0100	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Vanadium	ND	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Zinc	**0.017**	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	

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URS	Project: Panoche Energy Center	
130 Robin Hill Road, Ste 100	Project Number: 28906795.00200	Reported:
Santa Barbara CA, 93117	Project Manager: Cindy Poire	11/08/06 1

MW-5

6J26012-04 (Ground Water) Sampled: 10/25/06 15:45

Analyte		Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes.
Inorganics										
Total Alkalinity as CaCO3		**110**	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Bicarbonate Alkalinity as HCO3		**140**	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Carbonate Alkalinity as CO3		ND	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Hydroxide Alkalinity as OH		ND	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Ammonia as N		ND	1.0	mg/L	1	T6J3103	10/31/06	11/01/06	EPA 350.2	
Biochemical Oxygen Demand		ND	1.0	mg/L	1	T6J2709	10/27/06	11/01/06	SM5210B/EPA 405.1	
Chloride		**41**	6.0	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
Chemical Oxygen Demand		ND	10	mg/L	1	T6K0315	11/03/06	11/03/06	EPA 410.1	
Cyanide (total)		ND	5.0	µg/L	1	T6J3010	11/01/06	11/03/06	SM4500CN-E	
Specific Conductance (EC)		**1100**	1.0	µS/cm	1	T6J2616	10/26/06	10/26/06	SM2510B	
Fluoride		**0.59**	0.30	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
Hardness		**56**	0.66	mg equiv. CaCO3/L	1	[CALC]	10/31/06	11/01/06	[CALC]	
Methylene Blue Active Substances		ND	0.050	mg/L	1	T6J2710	10/27/06	10/27/06	SM5540C	
Nitrate as NO3		ND	6.0	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
Orthophosphate as P		ND	1.5	mg/L	3	T6J2601	10/26/06	10/26/06	EPA 300.0	
pH		**8.6**	0.10	pH Units	1	T6J2615	10/26/06	10/26/06	EPA 150.1	
Phosphorus		ND	0.10	mg/L	1	T6J3003	10/30/06	10/31/06	EPA 365.4	
Sulfate as SO4		**400**	20	mg/L	10	T6J2703	10/27/06	10/27/06	EPA 300.0	
Sulfide	*	ND	1.0	mg/L	1	T6J3004	10/30/06	10/30/06	EPA 376.1	
Total Dissolved Solids		**840**	10	mg/L	1	T6J3107	10/31/06	11/03/06	EPA 160.1	
Total Organic Carbon		**1.0**	1.0	mg/L	1	T6K0613	11/06/06	11/07/06	SM5310B	
Total Suspended Solids		**15**	5.0	mg/L	1.25	T6J3108	10/31/06	11/01/06	EPA 160.2	
Turbidity	HT	**45**	0.080	NTU	4	T6J3014	10/30/06	10/30/06	EPA 180.1	
Metals - Dissolved										
Aluminum		ND	0.050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Antimony		ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Arsenic		ND	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Barium		**0.16**	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Beryllium		ND	0.0010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Boron		**1.7**	0.050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Cadmium		ND	0.0010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Calcium		**20**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Chromium		ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Cobalt		ND	0.0020	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	

THE TWINING LABORATORIES, INC.
EST. 1898
CALIFORNIA ELAP CERTIFICATE #1371

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URS	Project: Panoche Energy Center	
130 Robin Hill Road, Ste 100	Project Number: 28906795.00200	Reported:
Santa Barbara CA, 93117	Project Manager: Cindy Poire	11/08/06 1

MW-5

6J26012-04 (Ground Water) Sampled: 10/25/06 15:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes.
Metals - Dissolved									
Copper	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Iron	**3.3**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Lead	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Magnesium	**1.5**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Manganese	**0.076**	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Mercury	ND	0.20	µg/L	1	T6J3006	10/30/06	10/30/06	EPA 245.1	
Molybdenum	**0.022**	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Nickel	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Potassium	**4.3**	1.0	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Selenium	ND	0.020	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Silica (SiO2)	**33**	0.20	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Silicon	**15**	0.10	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Silver	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Sodium	**230**	1.0	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Strontium	**0.0509**	0.00200	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Thallium	ND	0.020	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Tin	ND	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Titanium	ND	0.0100	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Vanadium	ND	0.010	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	
Zinc	**0.027**	0.0050	mg/L	1	T6J3110	10/31/06	11/01/06	EPA 200.7	

Notes and Definitions

QL	Sample results for the QC batch were accepted based on LCS/LCSD percent recoveries and RPD values.
Q4	The spike recovery was outside of QC acceptance limits for the MS and/or MSD due to analyte concentration at 4 times or greater the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
M	Matrix interference noted.
HT	This result was analyzed outside of the EPA recommended holding time.
*	Samples were orange in color. Possible matrix interference.
ug/L	micrograms per liter (parts per billion concentration units)
mg/L	milligrams per kilogram (parts per million concentration units)
mg/kg	milligrams per liter (parts per million concentration units)
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference

Inorganics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J2601 - No Prep										
Blank (T6J2601-BLK1)				Prepared & Analyzed: 10/26/06						
Fluoride	ND	0.10	mg/L							
Orthophosphate as P	ND	0.50	mg/L							
Chloride	ND	2.0	mg/L							
Nitrate as NO3	ND	2.0	mg/L							
Sulfate as SO4	ND	2.0	mg/L							
Blank (T6J2601-BLK2)				Prepared & Analyzed: 10/26/06						
Fluoride	ND	0.10	mg/L							
Chloride	ND	2.0	mg/L							
Orthophosphate as P	ND	0.50	mg/L							
Nitrate as NO3	ND	2.0	mg/L							
Sulfate as SO4	ND	2.0	mg/L							
LCS (T6J2601-BS1)				Prepared & Analyzed: 10/26/06						
Fluoride	2.01	0.10	mg/L	2.00		100	90-110		20	
Chloride	24.2	2.0	mg/L	25.0		96.8	90-110		20	
Orthophosphate as P	4.86	0.50	mg/L	5.00		97.2	90-110		20	
Nitrate as NO3	24.1	2.0	mg/L	25.0		96.4	90-110		20	
Sulfate as SO4	24.1	2.0	mg/L	25.0		96.4	90-110		20	
LCS (T6J2601-BS2)				Prepared: 10/26/06 Analyzed: 10/27/06						
Fluoride	1.92	0.10	mg/L	2.00		96.0	90-110		20	
Chloride	23.5	2.0	mg/L	25.0		94.0	90-110		20	
Orthophosphate as P	4.78	0.50	mg/L	5.00		95.6	90-110		20	
Nitrate as NO3	24.0	2.0	mg/L	25.0		96.0	90-110		20	
Sulfate as SO4	23.7	2.0	mg/L	25.0		94.8	90-110		20	
LCS Dup (T6J2601-BSD1)				Prepared & Analyzed: 10/26/06						
Fluoride	2.00	0.10	mg/L	2.00		100	90-110	0.499	20	
Orthophosphate as P	5.09	0.50	mg/L	5.00		102	90-110	4.62	20	
Chloride	24.5	2.0	mg/L	25.0		98.0	90-110	1.23	20	
Nitrate as NO3	24.5	2.0	mg/L	25.0		98.0	90-110	1.65	20	
Sulfate as SO4	24.5	2.0	mg/L	25.0		98.0	90-110	1.65	20	
LCS Dup (T6J2601-BSD2)				Prepared: 10/26/06 Analyzed: 10/27/06						
Fluoride	1.89	0.10	mg/L	2.00		94.5	90-110	1.57	20	
Orthophosphate as P	4.88	0.50	mg/L	5.00		97.6	90-110	2.07	20	
Chloride	23.3	2.0	mg/L	25.0		93.2	90-110	0.855	20	
Nitrate as NO3	23.8	2.0	mg/L	25.0		95.2	90-110	0.837	20	
Sulfate as SO4	23.7	2.0	mg/L	25.0		94.8	90-110	0.00	20	
Matrix Spike (T6J2601-MS1)		**Source: 6J25026-07**		Prepared & Analyzed: 10/26/06						
Fluoride	2.15	0.10	mg/L	2.00	0.19	98.0	48.9-155		20	
Chloride	36.8	2.0	mg/L	25.0	11	103	48-147		15	
Orthophosphate as P	3.86	0.50	mg/L	5.00	ND	77.2	80-120		20	M
Nitrate as NO3	30.6	2.0	mg/L	25.0	5.1	102	70-130		20	
Sulfate as SO4	33.1	2.0	mg/L	25.0	7.8	101	70-130		20	
Matrix Spike (T6J2601-MS2)		**Source: 6J25032-01**		Prepared & Analyzed: 10/26/06						
Fluoride	2.22	0.10	mg/L	2.00	0.14	104	48.9-155		20	
Chloride	41.0	2.0	mg/L	25.0	14	108	48-147		15	
Orthophosphate as P	2.78	0.50	mg/L	5.00	ND	55.6	80-120		20	M
Nitrate as NO3	43.4	2.0	mg/L	25.0	16	110	70-130		20	
Sulfate as SO4	36.3	2.0	mg/L	25.0	11	101	70-130		20	

Inorganics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J2601 - No Prep										
Matrix Spike (T6J2601-MS3)		**Source: 6J26010-04**		Prepared & Analyzed: 10/26/06						
Fluoride	2.23	0.10	mg/L	2.00	0.15	104	48.9-155		20	
Orthophosphate as P	5.38	0.50	mg/L	5.00	0.31	101	80-120		20	
Chloride	26.4	2.0	mg/L	25.0	2.3	96.4	48-147		15	
Nitrate as NO3	26.6	2.0	mg/L	25.0	1.5	100	70-130		20	
Sulfate as SO4	28.0	2.0	mg/L	25.0	2.5	102	70-130		20	
Matrix Spike Dup (T6J2601-MSD1)		**Source: 6J25026-07**		Prepared & Analyzed: 10/26/06						
Fluoride	2.08	0.10	mg/L	2.00	0.19	94.5	48.9-155	3.31	20	
Orthophosphate as P	3.72	0.50	mg/L	5.00	ND	74.4	80-120	3.69	20	M
Chloride	37.0	2.0	mg/L	25.0	11	104	48-147	0.542	15	
Nitrate as NO3	30.8	2.0	mg/L	25.0	5.1	103	70-130	0.651	20	
Sulfate as SO4	32.9	2.0	mg/L	25.0	7.8	100	70-130	0.606	20	
Matrix Spike Dup (T6J2601-MSD2)		**Source: 6J25032-01**		Prepared & Analyzed: 10/26/06						
Fluoride	2.05	0.10	mg/L	2.00	0.14	95.5	48.9-155	7.96	20	
Chloride	40.3	2.0	mg/L	25.0	14	105	48-147	1.72	15	
Orthophosphate as P	2.60	0.50	mg/L	5.00	ND	52.0	80-120	6.69	20	M
Nitrate as NO3	42.7	2.0	mg/L	25.0	16	107	70-130	1.63	20	
Sulfate as SO4	36.0	2.0	mg/L	25.0	11	100	70-130	0.830	20	
Matrix Spike Dup (T6J2601-MSD3)		**Source: 6J26010-04**		Prepared & Analyzed: 10/26/06						
Fluoride	2.23	0.10	mg/L	2.00	0.15	104	48.9-155	0.00	20	
Orthophosphate as P	5.52	0.50	mg/L	5.00	0.31	104	80-120	2.57	20	
Chloride	26.6	2.0	mg/L	25.0	2.3	97.2	48-147	0.755	15	
Nitrate as NO3	26.9	2.0	mg/L	25.0	1.5	102	70-130	1.12	20	
Sulfate as SO4	28.1	2.0	mg/L	25.0	2.5	102	70-130	0.357	20	
Batch T6J2615 - No Prep										
LCS (T6J2615-BS1)				Prepared & Analyzed: 10/26/06						
pH	7.00	0.10	pH Units	7.00		100	80-120		20	
LCS Dup (T6J2615-BSD1)				Prepared & Analyzed: 10/26/06						
pH	7.00	0.10	pH Units	7.00		100	80-120	0.00	20	
Duplicate (T6J2615-DUP1)		**Source: 6J25021-01**		Prepared & Analyzed: 10/26/06						
pH	7.50	0.10	pH Units		7.5			0.00	20	
Batch T6J2616 - No Prep										
Blank (T6J2616-BLK1)				Prepared & Analyzed: 10/26/06						
Specific Conductance (EC)	ND	1.0	µS/cm							
LCS (T6J2616-BS1)				Prepared & Analyzed: 10/26/06						
Specific Conductance (EC)	513	1.0	µS/cm	500		103	80-120		20	
LCS Dup (T6J2616-BSD1)				Prepared & Analyzed: 10/26/06						
Specific Conductance (EC)	513	1.0	µS/cm	500		103	80-120	0.00	20	
Duplicate (T6J2616-DUP1)		**Source: 6J25021-01**		Prepared & Analyzed: 10/26/06						
Specific Conductance (EC)	1880	1.0	µS/cm		1900			1.06	20	
Batch T6J2703 - No Prep										
Blank (T6J2703-BLK1)				Prepared & Analyzed: 10/27/06						
Fluoride	ND	0.10	mg/L							

Inorganics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J2703 - No Prep										
Blank (T6J2703-BLK1)				Prepared & Analyzed: 10/27/06						
Chloride	ND	2.0	mg/L							
Orthophosphate as P	ND	0.50	mg/L							
Nitrate as NO3	ND	2.0	mg/L							
Sulfate as SO4	ND	2.0	mg/L							
LCS (T6J2703-BS1)				Prepared & Analyzed: 10/27/06						
Fluoride	2.04	0.10	mg/L	2.00		102	90-110		20	
Orthophosphate as P	4.71	0.50	mg/L	5.00		94.2	90-110		20	
Chloride	23.3	2.0	mg/L	25.0		93.2	90-110		20	
Nitrate as NO3	23.8	2.0	mg/L	25.0		95.2	90-110		20	
Sulfate as SO4	23.8	2.0	mg/L	25.0		95.2	90-110		20	
LCS Dup (T6J2703-BSD1)				Prepared & Analyzed: 10/27/06						
Fluoride	1.97	0.10	mg/L	2.00		98.5	90-110	3.49	20	
Orthophosphate as P	4.77	0.50	mg/L	5.00		95.4	90-110	1.27	20	
Chloride	23.2	2.0	mg/L	25.0		92.8	90-110	0.430	20	
Nitrate as NO3	23.5	2.0	mg/L	25.0		94.0	90-110	1.27	20	
Sulfate as SO4	23.6	2.0	mg/L	25.0		94.4	90-110	0.844	20	
Matrix Spike (T6J2703-MS1)		**Source: 6J26032-01**		Prepared & Analyzed: 10/27/06						
Fluoride	2.55	0.20	mg/L	2.00	0.53	101	48.9-155		20	
Chloride	166	4.0	mg/L	25.0	130	144	48-147		15	Q4
Orthophosphate as P	7.19	1.0	mg/L	5.00	2.3	97.8	80-120		20	
Nitrate as NO3	31.5	4.0	mg/L	25.0	6.3	101	70-130		20	
Matrix Spike (T6J2703-MS2)		**Source: 6J27006-04**		Prepared & Analyzed: 10/27/06						
Fluoride	2.09	0.30	mg/L	2.00	0.14	97.5	48.9-155		20	
Chloride	46.8	6.0	mg/L	25.0	23	95.2	48-147		15	
Orthophosphate as P	3.12	1.5	mg/L	5.00	ND	62.4	80-120		20	M
Nitrate as NO3	61.0	6.0	mg/L	25.0	37	96.0	70-130		20	
Sulfate as SO4	43.2	6.0	mg/L	25.0	18	101	70-130		20	
Matrix Spike Dup (T6J2703-MSD1)		**Source: 6J26032-01**		Prepared & Analyzed: 10/27/06						
Fluoride	2.65	0.20	mg/L	2.00	0.53	106	48.9-155	3.85	20	
Orthophosphate as P	7.30	1.0	mg/L	5.00	2.3	100	80-120	1.52	20	
Chloride	165	4.0	mg/L	25.0	130	140	48-147	0.604	15	Q4
Nitrate as NO3	31.0	4.0	mg/L	25.0	6.3	98.8	70-130	1.60	20	
Matrix Spike Dup (T6J2703-MSD2)		**Source: 6J27006-04**		Prepared & Analyzed: 10/27/06						
Fluoride	2.25	0.30	mg/L	2.00	0.14	106	48.9-155	7.37	20	
Chloride	46.9	6.0	mg/L	25.0	23	95.6	48-147	0.213	15	
Orthophosphate as P	2.80	1.5	mg/L	5.00	ND	56.0	80-120	10.8	20	M
Nitrate as NO3	60.2	6.0	mg/L	25.0	37	92.8	70-130	1.32	20	
Sulfate as SO4	43.2	6.0	mg/L	25.0	18	101	70-130	0.00	20	
Batch T6J2709 - No Prep										
Blank (T6J2709-BLK1)				Prepared: 10/27/06 Analyzed: 11/01/06						
Biochemical Oxygen Demand	ND	1.0	mg/L							
Blank (T6J2709-BLK2)				Prepared: 10/27/06 Analyzed: 11/01/06						
Biochemical Oxygen Demand	ND	1.0	mg/L							
LCS (T6J2709-BS1)				Prepared: 10/27/06 Analyzed: 11/01/06						
Biochemical Oxygen Demand	169	40	mg/L	198		85.4	80-120		20	

Inorganics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J2709 - No Prep										
LCS Dup (T6J2709-BSD1)				Prepared: 10/27/06 Analyzed: 11/01/06						
Biochemical Oxygen Demand	182	40	mg/L	198		91.9	80-120	7.41	20	
Duplicate (T6J2709-DUP1)		**Source: 6J26017-01**		Prepared: 10/27/06 Analyzed: 11/01/06						
Biochemical Oxygen Demand	140	30	mg/L		140			0.00	20	
Duplicate (T6J2709-DUP2)		**Source: 6J26030-01**		Prepared: 10/27/06 Analyzed: 11/01/06						
Biochemical Oxygen Demand	94.7	30	mg/L		95			0.316	20	
Batch T6J2710 - No Prep										
Blank (T6J2710-BLK1)				Prepared & Analyzed: 10/25/06						
Methylene Blue Active Substances	ND	0.050	mg/L							
LCS (T6J2710-BS1)				Prepared & Analyzed: 10/25/06						
Methylene Blue Active Substances	0.935	0.050	mg/L	1.00		93.5	80-120		20	
LCS Dup (T6J2710-BSD1)				Prepared & Analyzed: 10/25/06						
Methylene Blue Active Substances	1.04	0.050	mg/L	1.00		104	80-120	10.6	20	
Matrix Spike (T6J2710-MS1)		**Source: 6J24041-01**		Prepared & Analyzed: 10/25/06						
Methylene Blue Active Substances	1.01	0.050	mg/L	1.00	ND	101	80-120		20	
Matrix Spike Dup (T6J2710-MSD1)		**Source: 6J24041-01**		Prepared & Analyzed: 10/25/06						
Methylene Blue Active Substances	1.04	0.050	mg/L	1.00	ND	104	80-120	2.93	20	
Batch T6J3003 - Default Prep GenChem										
Blank (T6J3003-BLK1)				Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	ND	0.10	mg/L							
LCS (T6J3003-BS1)				Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	2.40	0.10	mg/L	2.50		96.0	80-120		20	
LCS Dup (T6J3003-BSD1)				Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	2.46	0.10	mg/L	2.50		98.4	80-120	2.47	20	
Matrix Spike (T6J3003-MS1)		**Source: 6J25006-02**		Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	2.48	0.10	mg/L	2.50	ND	99.2	80-120		20	
Matrix Spike (T6J3003-MS2)		**Source: 6J27016-01**		Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	2.50	0.10	mg/L	2.50	0.083	96.7	80-120		20	
Matrix Spike Dup (T6J3003-MSD1)		**Source: 6J25006-02**		Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	2.52	0.10	mg/L	2.50	ND	101	80-120	1.60	20	
Matrix Spike Dup (T6J3003-MSD2)		**Source: 6J27016-01**		Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	2.51	0.10	mg/L	2.50	0.083	97.1	80-120	0.399	20	
Batch T6J3004 - No Prep										
Blank (T6J3004-BLK1)				Prepared & Analyzed: 10/30/06						
Sulfide	ND	1.0	mg/L							
LCS (T6J3004-BS1)				Prepared & Analyzed: 10/30/06						
Sulfide	5.02	1.0	mg/L	5.04		99.6	80-120		20	
LCS Dup (T6J3004-BSD1)				Prepared & Analyzed: 10/30/06						
Sulfide	5.08	1.0	mg/L	5.04		101	80-120	1.19	20	
Batch T6J3010 - No Prep										

Inorganics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3010 - No Prep										
Blank (T6J3010-BLK1)				Prepared: 10/30/06 Analyzed: 11/03/06						
Cyanide (total)	ND	5.0	µg/L							
LCS (T6J3010-BS1)				Prepared: 10/30/06 Analyzed: 11/03/06						
Cyanide (total)	46.1	5.0	µg/L	50.0		92.2	80-120		20	
LCS Dup (T6J3010-BSD1)				Prepared: 10/30/06 Analyzed: 11/03/06						
Cyanide (total)	51.4	5.0	µg/L	50.0		103	80-120	10.9	20	
Matrix Spike (T6J3010-MS1)		**Source: 6J25026-03**		Prepared: 10/30/06 Analyzed: 11/03/06						
Cyanide (total)	49.4	5.0	µg/L	50.0	ND	98.8	80-120		20	
Matrix Spike Dup (T6J3010-MSD1)		**Source: 6J25026-03**		Prepared: 10/30/06 Analyzed: 11/03/06						
Cyanide (total)	52.9	5.0	µg/L	50.0	ND	106	80-120	6.84	20	
Batch T6J3014 - No Prep										
LCS (T6J3014-BS1)				Prepared & Analyzed: 10/30/06						
Turbidity	9.92	0.020	NTU	10.0		99.2	80-120		20	
LCS Dup (T6J3014-BSD1)				Prepared & Analyzed: 10/30/06						
Turbidity	9.93	0.020	NTU	10.0		99.3	80-120	0.101	20	
Duplicate (T6J3014-DUP1)		**Source: 6J26012-01**		Prepared & Analyzed: 10/30/06						
Turbidity	45.2	0.080	NTU		89			65.3	20	
Batch T6J3103 - Default Prep GenChem										
Blank (T6J3103-BLK1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	ND	1.0	mg/L							
LCS (T6J3103-BS1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	23.8	1.0	mg/L	25.0		95.2	80-120		20	
LCS Dup (T6J3103-BSD1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	22.6	1.0	mg/L	25.0		90.4	80-120	5.17	20	
Matrix Spike (T6J3103-MS1)		**Source: 6J24023-01**		Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	22.2	1.0	mg/L	25.0	0.48	86.9	80-120		20	
Matrix Spike (T6J3103-MS2)		**Source: 6J30022-04**		Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	25.2	1.0	mg/L	25.0	0.26	99.8	80-120		20	
Matrix Spike Dup (T6J3103-MSD1)		**Source: 6J24023-01**		Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	24.2	1.0	mg/L	25.0	0.48	94.9	80-120	8.62	20	
Matrix Spike Dup (T6J3103-MSD2)		**Source: 6J30022-04**		Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	25.5	1.0	mg/L	25.0	0.26	101	80-120	1.18	20	
Batch T6J3107 - Default Prep GenChem										
Blank (T6J3107-BLK1)				Prepared: 10/31/06 Analyzed: 11/03/06						
Total Dissolved Solids	ND	10	mg/L							
LCS (T6J3107-BS1)				Prepared: 10/31/06 Analyzed: 11/03/06						
Total Dissolved Solids	206	10	mg/L	186		111	80-120		20	
LCS Dup (T6J3107-BSD1)				Prepared: 10/31/06 Analyzed: 11/03/06						
Total Dissolved Solids	200	10	mg/L	186		108	80-120	2.96	20	
Duplicate (T6J3107-DUP1)		**Source: 6J30024-01**		Prepared: 10/31/06 Analyzed: 11/03/06						
Total Dissolved Solids	412	10	mg/L		400			2.96	20	

Inorganics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3107 - Default Prep GenChem										
Duplicate (T6J3107-DUP2)		**Source: 6J27006-02**		Prepared: 10/31/06 Analyzed: 11/03/06						
Total Dissolved Solids	444	10	mg/L		440			0.905	20	
Batch T6J3108 - No Prep										
Blank (T6J3108-BLK1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Total Suspended Solids	ND	4.0	mg/L							
LCS (T6J3108-BS1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Total Suspended Solids	210	10	mg/L	218		96.3	80-120		20	
LCS Dup (T6J3108-BSD1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Total Suspended Solids	204	10	mg/L	218		93.6	80-120	2.90	20	
Duplicate (T6J3108-DUP1)		**Source: 6J26012-03**		Prepared: 10/31/06 Analyzed: 11/01/06						
Total Suspended Solids	96.3	6.7	mg/L		94			2.42	20	
Duplicate (T6J3108-DUP2)		**Source: 6J31008-02**		Prepared: 10/31/06 Analyzed: 11/01/06						
Total Suspended Solids	2700	330	mg/L		2700			0.00	20	
Batch T6K0306 - No Prep										
Blank (T6K0306-BLK1)				Prepared & Analyzed: 11/03/06						
Total Alkalinity as CaCO3	ND	20	mg/L							
Bicarbonate Alkalinity as HCO3	ND	20	mg/L							
Carbonate Alkalinity as CO3	ND	20	mg/L							
Hydroxide Alkalinity as OH	ND	20	mg/L							
LCS (T6K0306-BS1)				Prepared & Analyzed: 11/03/06						
Total Alkalinity as CaCO3	250	20	mg/L	250		100	80-120		20	
LCS Dup (T6K0306-BSD1)				Prepared & Analyzed: 11/03/06						
Total Alkalinity as CaCO3	250	20	mg/L	250		100	80-120	0.00	20	
Duplicate (T6K0306-DUP1)		**Source: 6J25026-08**		Prepared & Analyzed: 11/03/06						
Total Alkalinity as CaCO3	243	20	mg/L		240			1.24	20	
Bicarbonate Alkalinity as HCO3	297	20	mg/L		300			1.01	20	
Carbonate Alkalinity as CO3	ND	20	mg/L		ND				20	
Hydroxide Alkalinity as OH	ND	20	mg/L		ND				20	
Duplicate (T6K0306-DUP2)		**Source: 6J30021-01**		Prepared & Analyzed: 11/03/06						
Total Alkalinity as CaCO3	56.0	20	mg/L		56			0.00	20	
Bicarbonate Alkalinity as HCO3	68.3	20	mg/L		68			0.440	20	
Carbonate Alkalinity as CO3	ND	20	mg/L		ND				20	
Hydroxide Alkalinity as OH	ND	20	mg/L		ND				20	
Batch T6K0315 - No Prep										
Blank (T6K0315-BLK1)				Prepared & Analyzed: 11/03/06						
Chemical Oxygen Demand	ND	10	mg/L							
LCS (T6K0315-BS1)				Prepared & Analyzed: 11/03/06						
Chemical Oxygen Demand	485	10	mg/L	500		97.0	80-120		20	
LCS Dup (T6K0315-BSD1)				Prepared & Analyzed: 11/03/06						
Chemical Oxygen Demand	485	10	mg/L	500		97.0	80-120	0.00	20	
Duplicate (T6K0315-DUP1)		**Source: 6J26012-01**		Prepared & Analyzed: 11/03/06						
Chemical Oxygen Demand	7.00	10	mg/L		ND				20	QL

Inorganics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6K0613 - Default Prep GC-Semi										
Blank (T6K0613-BLK1)				Prepared: 11/06/06 Analyzed: 11/07/06						
Total Organic Carbon	ND	1.0	mg/L							
LCS (T6K0613-BS1)				Prepared: 11/06/06 Analyzed: 11/07/06						
Total Organic Carbon	5.00	1.0	mg/L	5.00		100	70-130		20	
LCS Dup (T6K0613-BSD1)				Prepared: 11/06/06 Analyzed: 11/07/06						
Total Organic Carbon	4.96	1.0	mg/L	5.00		99.2	70-130	0.803	20	

Metals - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3006 - EPA 245.1/7470A Prep										
Blank (T6J3006-BLK1)				Prepared & Analyzed: 10/30/06						
Mercury	ND	0.20	µg/L							
LCS (T6J3006-BS1)				Prepared & Analyzed: 10/30/06						
Mercury	5.01	0.20	µg/L	5.00		100	85-115		20	
LCS Dup (T6J3006-BSD1)				Prepared & Analyzed: 10/30/06						
Mercury	4.81	0.20	µg/L	5.00		96.2	85-115	4.07	20	
Matrix Spike (T6J3006-MS1)		**Source: 6J20019-04**		Prepared & Analyzed: 10/30/06						
Mercury	4.90	0.20	µg/L	5.00	ND	98.0	70-130		20	
Matrix Spike (T6J3006-MS2)		**Source: 6J24040-01**		Prepared & Analyzed: 10/30/06						
Mercury	5.09	0.20	µg/L	5.00	ND	102	70-130		20	
Matrix Spike Dup (T6J3006-MSD1)		**Source: 6J20019-04**		Prepared & Analyzed: 10/30/06						
Mercury	4.59	0.20	µg/L	5.00	ND	91.8	70-130	6.53	20	
Matrix Spike Dup (T6J3006-MSD2)		**Source: 6J24040-01**		Prepared & Analyzed: 10/30/06						
Mercury	4.75	0.20	µg/L	5.00	ND	95.0	70-130	6.91	20	

Metals - Dissolved - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3006 - EPA 245.1/7470A Prep										
Blank (T6J3006-BLK1)				Prepared & Analyzed: 10/30/06						
Mercury	ND	0.20	µg/L							
LCS (T6J3006-BS1)				Prepared & Analyzed: 10/30/06						
Mercury	5.01	0.20	µg/L	5.00		100	85-115		20	
LCS Dup (T6J3006-BSD1)				Prepared & Analyzed: 10/30/06						
Mercury	4.81	0.20	µg/L	5.00		96.2	85-115	4.07	20	
Matrix Spike (T6J3006-MS1)		**Source: 6J20019-04**		Prepared & Analyzed: 10/30/06						
Mercury	4.90	0.20	µg/L	5.00	ND	98.0	75-125		20	
Matrix Spike (T6J3006-MS2)		**Source: 6J24040-01**		Prepared & Analyzed: 10/30/06						
Mercury	5.09	0.20	µg/L	5.00	ND	102	75-125		20	
Matrix Spike Dup (T6J3006-MSD1)		**Source: 6J20019-04**		Prepared & Analyzed: 10/30/06						
Mercury	4.59	0.20	µg/L	5.00	ND	91.8	75-125	6.53	20	
Matrix Spike Dup (T6J3006-MSD2)		**Source: 6J24040-01**		Prepared & Analyzed: 10/30/06						
Mercury	4.75	0.20	µg/L	5.00	ND	95.0	75-125	6.91	20	
Batch T6J3110 - EPA 200.2										
Blank (T6J3110-BLK1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Aluminum	ND	0.050	mg/L							
Selenium	ND	0.020	mg/L							
Molybdenum	ND	0.0050	mg/L							
Manganese	ND	0.0050	mg/L							
Lead	ND	0.0050	mg/L							
Vanadium	ND	0.010	mg/L							
Zinc	ND	0.0050	mg/L							
Antimony	ND	0.0050	mg/L							
Cadmium	ND	0.0010	mg/L							
Iron	ND	0.10	mg/L							
Magnesium	ND	0.10	mg/L							
Tin	ND	0.010	mg/L							
Chromium	ND	0.0050	mg/L							
Calcium	ND	0.10	mg/L							
Titanium	ND	0.0100	mg/L							
Nickel	ND	0.0050	mg/L							
Thallium	ND	0.020	mg/L							
Cobalt	ND	0.0020	mg/L							
Barium	ND	0.010	mg/L							
Beryllium	ND	0.0010	mg/L							
Boron	ND	0.050	mg/L							
Arsenic	ND	0.010	mg/L							
Sodium	ND	1.0	mg/L							
Potassium	ND	1.0	mg/L							
Silver	ND	0.0050	mg/L							
Silicon	ND	0.10	mg/L							
Copper	ND	0.0050	mg/L							
Strontium	ND	0.00200	mg/L							
Silica (SiO2)	ND	0.20	mg/L							
LCS (T6J3110-BS1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Sodium	2.22	1.0	mg/L	2.00		111	85-115		20	

Metals - Dissolved - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3110 - EPA 200.2										
LCS (T6J3110-BS1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Magnesium	2.00	0.10	mg/L	2.00		100	85-115		20	
Manganese	0.102	0.0050	mg/L	0.100		102	85-115		20	
Molybdenum	0.0967	0.0050	mg/L	0.100		96.7	85-115		20	
Nickel	0.104	0.0050	mg/L	0.100		104	85-115		20	
Potassium	4.04	1.0	mg/L	4.00		101	85-115		20	
Selenium	0.403	0.020	mg/L	0.400		101	85-115		20	
Silica (SiO2)	4.47	0.20	mg/L	4.28		104	85-115		20	
Silver	0.103	0.0050	mg/L	0.100		103	85-115		20	
Strontium	0.100	0.00200	mg/L	0.100		100	85-115		20	
Lead	0.106	0.0050	mg/L	0.100		106	85-115		20	
Cobalt	0.0408	0.0020	mg/L	0.0400		102	85-115		20	
Silicon	2.08	0.10	mg/L	2.00		104	85-115		20	
Vanadium	0.197	0.010	mg/L	0.200		98.5	85-115		20	
Antimony	0.0908	0.0050	mg/L	0.100		90.8	85-115		20	
Copper	0.0992	0.0050	mg/L	0.100		99.2	85-115		20	
Iron	2.08	0.10	mg/L	2.00		104	85-115		20	
Thallium	0.402	0.020	mg/L	0.400		100	85-115		20	
Titanium	0.210	0.0100	mg/L	0.200		105	85-115		20	
Zinc	0.107	0.0050	mg/L	0.100		107	85-115		20	
Aluminum	1.01	0.050	mg/L	1.00		101	85-115		20	
Arsenic	0.204	0.010	mg/L	0.200		102	85-115		20	
Beryllium	0.0198	0.0010	mg/L	0.0200		99.0	85-115		20	
Boron	1.01	0.050	mg/L	1.00		101	85-115		20	
Cadmium	0.0201	0.0010	mg/L	0.0200		100	85-115		20	
Calcium	1.98	0.10	mg/L	2.00		99.0	85-115		20	
Chromium	0.103	0.0050	mg/L	0.100		103	85-115		20	
Barium	0.196	0.010	mg/L	0.200		98.0	85-115		20	
Tin	0.397	0.010	mg/L	0.400		99.2	85-115		20	
LCS Dup (T6J3110-BSD1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Chromium	0.104	0.0050	mg/L	0.100		104	85-115	0.966	20	
Lead	0.106	0.0050	mg/L	0.100		106	85-115	0.00	20	
Copper	0.100	0.0050	mg/L	0.100		100	85-115	0.803	20	
Magnesium	2.02	0.10	mg/L	2.00		101	85-115	0.995	20	
Nickel	0.105	0.0050	mg/L	0.100		105	85-115	0.957	20	
Titanium	0.211	0.0100	mg/L	0.200		106	85-115	0.475	20	
Tin	0.403	0.010	mg/L	0.400		101	85-115	1.50	20	
Thallium	0.402	0.020	mg/L	0.400		100	85-115	0.00	20	
Strontium	0.101	0.00200	mg/L	0.100		101	85-115	0.995	20	
Cobalt	0.0410	0.0020	mg/L	0.0400		102	85-115	0.489	20	
Calcium	2.01	0.10	mg/L	2.00		100	85-115	1.50	20	
Molybdenum	0.0990	0.0050	mg/L	0.100		99.0	85-115	2.35	20	
Zinc	0.108	0.0050	mg/L	0.100		108	85-115	0.930	20	
Vanadium	0.201	0.010	mg/L	0.200		100	85-115	2.01	20	
Manganese	0.103	0.0050	mg/L	0.100		103	85-115	0.976	20	
Selenium	0.407	0.020	mg/L	0.400		102	85-115	0.988	20	
Barium	0.198	0.010	mg/L	0.200		99.0	85-115	1.02	20	
Iron	2.11	0.10	mg/L	2.00		106	85-115	1.43	20	
Arsenic	0.207	0.010	mg/L	0.200		104	85-115	1.46	20	
Antimony	0.0953	0.0050	mg/L	0.100		95.3	85-115	4.84	20	

Metals - Dissolved - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3110 - EPA 200.2										
LCS Dup (T6J3110-BSD1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Aluminum	1.01	0.050	mg/L	1.00		101	85-115	0.00	20	
Potassium	4.06	1.0	mg/L	4.00		102	85-115	0.494	20	
Silver	0.104	0.0050	mg/L	0.100		104	85-115	0.966	20	
Sodium	2.02	1.0	mg/L	2.00		101	85-115	9.43	20	
Silicon	2.10	0.10	mg/L	2.00		105	85-115	0.957	20	
Silica (SiO2)	4.51	0.20	mg/L	4.28		105	85-115	0.891	20	
Cadmium	0.0204	0.0010	mg/L	0.0200		102	85-115	1.48	20	
Boron	1.02	0.050	mg/L	1.00		102	85-115	0.985	20	
Beryllium	0.0198	0.0010	mg/L	0.0200		99.0	85-115	0.00	20	
Matrix Spike (T6J3110-MS1)		**Source: 6J26009-09**		Prepared: 10/31/06 Analyzed: 11/01/06						
Boron	1.22	0.050	mg/L	1.00	0.19	103	70-130		20	
Iron	2.08	0.10	mg/L	2.00	0.050	102	70-130		20	
Strontium	0.324	0.00200	mg/L	0.100	0.218	106	70-130		20	
Lead	0.102	0.0050	mg/L	0.100	ND	102	70-130		20	
Nickel	0.101	0.0050	mg/L	0.100	0.0012	99.8	70-130		20	
Molybdenum	0.106	0.0050	mg/L	0.100	0.0080	98.0	70-130		20	
Antimony	0.106	0.0050	mg/L	0.100	ND	106	70-130		20	
Aluminum	1.06	0.050	mg/L	1.00	0.047	101	70-130		20	
Thallium	0.378	0.020	mg/L	0.400	ND	94.5	70-130		20	
Beryllium	0.0198	0.0010	mg/L	0.0200	ND	99.0	70-130		20	
Tin	0.385	0.010	mg/L	0.400	ND	96.2	70-130		20	
Manganese	0.107	0.0050	mg/L	0.100	0.0072	99.8	70-130		20	
Cobalt	0.0396	0.0020	mg/L	0.0400	ND	99.0	70-130		20	
Chromium	0.102	0.0050	mg/L	0.100	0.00056	101	70-130		20	
Cadmium	0.0194	0.0010	mg/L	0.0200	ND	97.0	70-130		20	
Arsenic	0.206	0.010	mg/L	0.200	ND	103	70-130		20	
Copper	0.106	0.0050	mg/L	0.100	0.0024	104	70-130		20	
Barium	0.220	0.010	mg/L	0.200	0.021	99.5	70-130		20	
Selenium	0.398	0.020	mg/L	0.400	ND	99.5	70-130		20	
Silica (SiO2)	27.6	0.20	mg/L	4.28	23	107	70-130		20	
Silver	0.103	0.0050	mg/L	0.100	ND	103	70-130		20	
Titanium	0.208	0.0100	mg/L	0.200	ND	104	70-130		20	
Zinc	0.143	0.0050	mg/L	0.100	0.037	106	70-130		20	
Vanadium	0.202	0.010	mg/L	0.200	0.0036	99.2	70-130		20	
Matrix Spike (T6J3110-MS2)		**Source: 6J27006-02**		Prepared: 10/31/06 Analyzed: 11/02/06						
Antimony	0.100	0.0050	mg/L	0.100	ND	100	70-130		20	
Cadmium	0.0196	0.0010	mg/L	0.0200	ND	98.0	70-130		20	
Chromium	0.104	0.0050	mg/L	0.100	0.0016	102	70-130		20	
Cobalt	0.0386	0.0020	mg/L	0.0400	ND	96.5	70-130		20	
Barium	0.352	0.010	mg/L	0.200	0.15	101	70-130		20	
Arsenic	0.210	0.010	mg/L	0.200	ND	105	70-130		20	
Thallium	0.402	0.020	mg/L	0.400	ND	100	70-130		20	
Copper	0.151	0.0050	mg/L	0.100	0.049	102	70-130		20	
Tin	0.394	0.010	mg/L	0.400	ND	98.5	70-130		20	
Beryllium	0.0198	0.0010	mg/L	0.0200	ND	99.0	70-130		20	
Molybdenum	0.0989	0.0050	mg/L	0.100	0.0018	97.1	70-130		20	
Nickel	0.101	0.0050	mg/L	0.100	0.0017	99.3	70-130		20	
Silver	0.105	0.0050	mg/L	0.100	ND	105	70-130		20	
Strontium	0.477	0.00200	mg/L	0.100	0.379	98.0	70-130		20	

Metals - Dissolved - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3110 - EPA 200.2										
Matrix Spike (T6J3110-MS2)		**Source: 6J27006-02**		Prepared: 10/31/06 Analyzed: 11/02/06						
Zinc	0.145	0.0050	mg/L	0.100	0.042	103	70-130		20	
Manganese	0.101	0.0050	mg/L	0.100	0.0013	99.7	70-130		20	
Titanium	0.208	0.0100	mg/L	0.200	ND	104	70-130		20	
Silica (SiO2)	67.8	0.20	mg/L	4.28	64	88.8	70-130		20	
Selenium	0.402	0.020	mg/L	0.400	ND	100	70-130		20	
Lead	0.104	0.0050	mg/L	0.100	0.0021	102	70-130		20	
Iron	2.05	0.10	mg/L	2.00	ND	102	70-130		20	
Boron	1.05	0.050	mg/L	1.00	0.015	104	70-130		20	
Aluminum	1.01	0.050	mg/L	1.00	ND	101	70-130		20	
Vanadium	0.239	0.010	mg/L	0.200	0.043	98.0	70-130		20	
Matrix Spike Dup (T6J3110-MSD1)		**Source: 6J26009-09**		Prepared: 10/31/06 Analyzed: 11/01/06						
Vanadium	0.208	0.010	mg/L	0.200	0.0036	102	70-130	2.93	20	
Tin	0.395	0.010	mg/L	0.400	ND	98.8	70-130	2.56	20	
Aluminum	1.09	0.050	mg/L	1.00	0.047	104	70-130	2.79	20	
Boron	1.25	0.050	mg/L	1.00	0.19	106	70-130	2.43	20	
Cadmium	0.0199	0.0010	mg/L	0.0200	ND	99.5	70-130	2.54	20	
Thallium	0.382	0.020	mg/L	0.400	ND	95.5	70-130	1.05	20	
Zinc	0.145	0.0050	mg/L	0.100	0.037	108	70-130	1.39	20	
Antimony	0.109	0.0050	mg/L	0.100	ND	109	70-130	2.79	20	
Lead	0.105	0.0050	mg/L	0.100	ND	105	70-130	2.90	20	
Barium	0.226	0.010	mg/L	0.200	0.021	102	70-130	2.69	20	
Beryllium	0.0202	0.0010	mg/L	0.0200	ND	101	70-130	2.00	20	
Selenium	0.408	0.020	mg/L	0.400	ND	102	70-130	2.48	20	
Nickel	0.104	0.0050	mg/L	0.100	0.0012	103	70-130	2.93	20	
Titanium	0.211	0.0100	mg/L	0.200	ND	106	70-130	1.43	20	
Arsenic	0.212	0.010	mg/L	0.200	ND	106	70-130	2.87	20	
Silica (SiO2)	28.2	0.20	mg/L	4.28	23	121	70-130	2.15	20	
Chromium	0.104	0.0050	mg/L	0.100	0.00056	103	70-130	1.94	20	
Cobalt	0.0406	0.0020	mg/L	0.0400	ND	102	70-130	2.49	20	
Copper	0.109	0.0050	mg/L	0.100	0.0024	107	70-130	2.79	20	
Strontium	0.331	0.00200	mg/L	0.100	0.218	113	70-130	2.14	20	
Silver	0.105	0.0050	mg/L	0.100	ND	105	70-130	1.92	20	
Molybdenum	0.110	0.0050	mg/L	0.100	0.0080	102	70-130	3.70	20	
Manganese	0.109	0.0050	mg/L	0.100	0.0072	102	70-130	1.85	20	
Iron	2.13	0.10	mg/L	2.00	0.050	104	70-130	2.38	20	
Matrix Spike Dup (T6J3110-MSD2)		**Source: 6J27006-02**		Prepared: 10/31/06 Analyzed: 11/02/06						
Iron	2.02	0.10	mg/L	2.00	ND	101	70-130	1.47	20	
Lead	0.102	0.0050	mg/L	0.100	0.0021	99.9	70-130	1.94	20	
Manganese	0.0999	0.0050	mg/L	0.100	0.0013	98.6	70-130	1.10	20	
Molybdenum	0.0983	0.0050	mg/L	0.100	0.0018	96.5	70-130	0.609	20	
Tin	0.391	0.010	mg/L	0.400	ND	97.8	70-130	0.764	20	
Silica (SiO2)	67.1	0.20	mg/L	4.28	64	72.4	70-130	1.04	20	
Silver	0.103	0.0050	mg/L	0.100	ND	103	70-130	1.92	20	
Vanadium	0.238	0.010	mg/L	0.200	0.043	97.5	70-130	0.419	20	
Zinc	0.144	0.0050	mg/L	0.100	0.042	102	70-130	0.692	20	
Titanium	0.205	0.0100	mg/L	0.200	ND	102	70-130	1.45	20	
Arsenic	0.206	0.010	mg/L	0.200	ND	103	70-130	1.92	20	
Antimony	0.0988	0.0050	mg/L	0.100	ND	98.8	70-130	1.21	20	
Aluminum	1.00	0.050	mg/L	1.00	ND	100	70-130	0.995	20	

Metals - Dissolved - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3110 - EPA 200.2										
Matrix Spike Dup (T6J3110-MSD2)		**Source: 6J27006-02**		Prepared: 10/31/06 Analyzed: 11/02/06						
Strontium	0.472	0.00200	mg/L	0.100	0.379	93.0	70-130	1.05	20	
Selenium	0.395	0.020	mg/L	0.400	ND	98.8	70-130	1.76	20	
Nickel	0.0997	0.0050	mg/L	0.100	0.0017	98.0	70-130	1.30	20	
Cadmium	0.0192	0.0010	mg/L	0.0200	ND	96.0	70-130	2.06	20	
Boron	1.04	0.050	mg/L	1.00	0.015	102	70-130	0.957	20	
Beryllium	0.0193	0.0010	mg/L	0.0200	ND	96.5	70-130	2.56	20	
Barium	0.347	0.010	mg/L	0.200	0.15	98.5	70-130	1.43	20	
Copper	0.149	0.0050	mg/L	0.100	0.049	100	70-130	1.33	20	
Cobalt	0.0383	0.0020	mg/L	0.0400	ND	95.8	70-130	0.780	20	
Chromium	0.102	0.0050	mg/L	0.100	0.0016	100	70-130	1.94	20	
Thallium	0.398	0.020	mg/L	0.400	ND	99.5	70-130	1.00	20	

THE TWINING LABORATORIES, INC.
EST. 1898
CALIFORNIA ELAP CERTIFICATE #1371

2527 Fresno Street
Fresno, CA 93721
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November 08, 2006

Work Order #: 6J27016

Cindy Poire
URS
130 Robin Hill Road, Ste 100
Santa Barbara, CA 93117

RE: Panoche Energy Center

Enclosed are the analytical results for samples received by our laboratory on 10/27/06 . For your reference, these analyses have been assigned laboratory work order number 6J27016 .

All analyses have been performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, The Twining Laboratories, Inc. (TL) is not responsible for use of less than complete reports. Results apply only to samples analyzed.

If you have any questions, please feel free to contact us at the number listed above.

Sincerely,

The Twining Laboratories, Inc.

Ronald J. Boquist
Director of Analytical Chemistry

THE TWINING LABORATORIES, INC.
EST. 1898
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URS	Project: Panoche Energy Center	
130 Robin Hill Road, Ste 100	Project Number: 28906795.00200	**Reported:**
Santa Barbara CA, 93117	Project Manager: Cindy Poire	11/08/06 1

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-3	6J27016-01	Ground Water	10/27/06 00:00	10/27/06 16:05

THE TWINING LABORATORIES, INC.
EST. 1898
CALIFORNIA ELAP CERTIFICATE #1371

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Fresno, CA 93721
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URS	Project: Panoche Energy Center	
130 Robin Hill Road, Ste 100	Project Number: 28906795.00200	**Reported:**
Santa Barbara CA, 93117	Project Manager: Cindy Poire	11/08/06 1

MW-3

6J27016-01 (Ground Water) Sampled: 10/27/06 00:00

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes.
Inorganics									
Total Alkalinity as CaCO3	**180**	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Bicarbonate Alkalinity as HCO3	**230**	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Carbonate Alkalinity as CO3	ND	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Hydroxide Alkalinity as OH	ND	20	mg/L	1	T6K0306	11/03/06	11/03/06	SM 2320B	
Ammonia as N	ND	1.0	mg/L	1	T6J3103	10/31/06	11/01/06	EPA 350.2	
Biochemical Oxygen Demand	ND	1.0	mg/L	1	T6J2709	10/27/06	11/01/06	SM5210B/EPA 405.1	
Chloride	**160**	50	mg/L	25	T6J3002	10/30/06	10/30/06	EPA 300.0	
Chemical Oxygen Demand	ND	10	mg/L	1	T6K0315	11/03/06	11/03/06	EPA 410.1	
Cyanide (total)	ND	5.0	µg/L	1	T6J3010	10/30/06	11/03/06	SM4500CN-E	
Specific Conductance (EC)	**3000**	1.0	µS/cm	1	T6J3008	10/27/06	10/27/06	SM2510B	
Fluoride	**0.71**	0.30	mg/L	3	T6J2703	10/27/06	10/27/06	EPA 300.0	
Hardness	**1100**	0.66	mg equiv. CaCO3/L	1	[CALC]	10/31/06	11/02/06	[CALC]	
Methylene Blue Active Substances	ND	0.050	mg/L	1	T6J2710	10/27/06	10/27/06	SM5540C	
Nitrate as NO3	**27**	6.0	mg/L	3	T6J2703	10/27/06	10/27/06	EPA 300.0	
Orthophosphate as P	ND	1.5	mg/L	3	T6J2703	10/27/06	10/27/06	EPA 300.0	
pH	**8.1**	0.10	pH Units	1	T6J3007	10/27/06	10/27/06	EPA 150.1	
Phosphorus	ND	0.10	mg/L	1	T6J3003	10/30/06	10/31/06	EPA 365.4	
Sulfate as SO4	**1500**	100	mg/L	50	T6J3002	10/30/06	10/30/06	EPA 300.0	
Sulfide	ND	1.0	mg/L	1	T6J3004	10/30/06	10/30/06	EPA 376.1	
Total Dissolved Solids	**2900**	20	mg/L	2	T6J3107	10/31/06	11/03/06	EPA 160.1	
Total Organic Carbon	ND	1.0	mg/L	1	T6K0613	11/06/06	11/07/06	SM5310B	
Total Suspended Solids	ND	4.0	mg/L	1	T6J3108	10/31/06	11/01/06	EPA 160.2	
Turbidity	**2.3**	0.020	NTU	1	T6J2714	10/27/06	10/27/06	EPA 180.1	
Metals - Dissolved									
Aluminum	ND	0.050	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Antimony	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Arsenic	ND	0.010	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Barium	**0.14**	0.010	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Beryllium	ND	0.0010	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Boron	**4.1**	0.050	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Cadmium	ND	0.0010	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Calcium	**170**	0.10	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Chromium	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Cobalt	ND	0.0020	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	

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URS	Project: Panoche Energy Center	
130 Robin Hill Road, Ste 100	Project Number: 28906795.00200	**Reported:**
Santa Barbara CA, 93117	Project Manager: Cindy Poire	11/08/06 1

MW-3

6J27016-01 (Ground Water) Sampled: 10/27/06 00:00

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes.
Metals - Dissolved									
Copper	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Iron	ND	0.10	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Lead	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Magnesium	**170**	0.10	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Manganese	**0.064**	0.0050	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Mercury	ND	0.20	µg/L	1	T6J3006	10/30/06	10/31/06	EPA 245.1	
Molybdenum	**0.0056**	0.0050	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Nickel	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Potassium	**16**	1.0	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Selenium	**0.025**	0.020	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Silica (SiO2)	**46**	0.20	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Silicon	**21**	0.10	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Silver	ND	0.0050	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Sodium	**380**	1.0	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Strontium	**2.47**	0.00200	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Thallium	ND	0.020	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Tin	ND	0.010	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Titanium	ND	0.0100	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Vanadium	ND	0.010	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	
Zinc	**0.024**	0.0050	mg/L	1	T6J3110	10/31/06	11/02/06	EPA 200.7	

Notes and Definitions

QL	Sample results for the QC batch were accepted based on LCS/LCSD percent recoveries and RPD values.
Q4	The spike recovery was outside of QC acceptance limits for the MS and/or MSD due to analyte concentration at 4 times or greater the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
M	Matrix interference noted.
ug/L	micrograms per liter (parts per billion concentration units)
mg/L	milligrams per kilogram (parts per million concentration units)
mg/kg	milligrams per liter (parts per million concentration units)
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference

Inorganics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J2703 - No Prep										
Blank (T6J2703-BLK1)				Prepared & Analyzed: 10/27/06						
Fluoride	ND	0.10	mg/L							
Chloride	ND	2.0	mg/L							
Orthophosphate as P	ND	0.50	mg/L							
Nitrate as NO3	ND	2.0	mg/L							
Sulfate as SO4	ND	2.0	mg/L							
LCS (T6J2703-BS1)				Prepared & Analyzed: 10/27/06						
Fluoride	2.04	0.10	mg/L	2.00		102	90-110		20	
Chloride	23.3	2.0	mg/L	25.0		93.2	90-110		20	
Orthophosphate as P	4.71	0.50	mg/L	5.00		94.2	90-110		20	
Nitrate as NO3	23.8	2.0	mg/L	25.0		95.2	90-110		20	
Sulfate as SO4	23.8	2.0	mg/L	25.0		95.2	90-110		20	
LCS Dup (T6J2703-BSD1)				Prepared & Analyzed: 10/27/06						
Fluoride	1.97	0.10	mg/L	2.00		98.5	90-110	3.49	20	
Orthophosphate as P	4.77	0.50	mg/L	5.00		95.4	90-110	1.27	20	
Chloride	23.2	2.0	mg/L	25.0		92.8	90-110	0.430	20	
Nitrate as NO3	23.5	2.0	mg/L	25.0		94.0	90-110	1.27	20	
Sulfate as SO4	23.6	2.0	mg/L	25.0		94.4	90-110	0.844	20	
Matrix Spike (T6J2703-MS1)		**Source: 6J26032-01**		Prepared & Analyzed: 10/27/06						
Fluoride	2.55	0.20	mg/L	2.00	0.53	101	48.9-155		20	
Chloride	166	4.0	mg/L	25.0	130	144	48-147		15	Q4
Orthophosphate as P	7.19	1.0	mg/L	5.00	2.3	97.8	80-120		20	
Nitrate as NO3	31.5	4.0	mg/L	25.0	6.3	101	70-130		20	
Matrix Spike (T6J2703-MS2)		**Source: 6J27006-04**		Prepared & Analyzed: 10/27/06						
Fluoride	2.09	0.30	mg/L	2.00	0.14	97.5	48.9-155		20	
Chloride	46.8	6.0	mg/L	25.0	23	95.2	48-147		15	
Orthophosphate as P	3.12	1.5	mg/L	5.00	ND	62.4	80-120		20	M
Nitrate as NO3	61.0	6.0	mg/L	25.0	37	96.0	70-130		20	
Sulfate as SO4	43.2	6.0	mg/L	25.0	18	101	70-130		20	
Matrix Spike Dup (T6J2703-MSD1)		**Source: 6J26032-01**		Prepared & Analyzed: 10/27/06						
Fluoride	2.65	0.20	mg/L	2.00	0.53	106	48.9-155	3.85	20	
Chloride	165	4.0	mg/L	25.0	130	140	48-147	0.604	15	Q4
Orthophosphate as P	7.30	1.0	mg/L	5.00	2.3	100	80-120	1.52	20	
Nitrate as NO3	31.0	4.0	mg/L	25.0	6.3	98.8	70-130	1.60	20	
Matrix Spike Dup (T6J2703-MSD2)		**Source: 6J27006-04**		Prepared & Analyzed: 10/27/06						
Fluoride	2.25	0.30	mg/L	2.00	0.14	106	48.9-155	7.37	20	
Chloride	46.9	6.0	mg/L	25.0	23	95.6	48-147	0.213	15	
Orthophosphate as P	2.80	1.5	mg/L	5.00	ND	56.0	80-120	10.8	20	M
Nitrate as NO3	60.2	6.0	mg/L	25.0	37	92.8	70-130	1.32	20	
Sulfate as SO4	43.2	6.0	mg/L	25.0	18	101	70-130	0.00	20	
Batch T6J2709 - No Prep										
Blank (T6J2709-BLK1)				Prepared: 10/27/06 Analyzed: 11/01/06						
Biochemical Oxygen Demand	ND	1.0	mg/L							
Blank (T6J2709-BLK2)				Prepared: 10/27/06 Analyzed: 11/01/06						
Biochemical Oxygen Demand	ND	1.0	mg/L							
LCS (T6J2709-BS1)				Prepared: 10/27/06 Analyzed: 11/01/06						

Inorganics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J2709 - No Prep										
LCS (T6J2709-BS1)				Prepared: 10/27/06 Analyzed: 11/01/06						
Biochemical Oxygen Demand	169	40	mg/L	198		85.4	80-120		20	
LCS Dup (T6J2709-BSD1)				Prepared: 10/27/06 Analyzed: 11/01/06						
Biochemical Oxygen Demand	182	40	mg/L	198		91.9	80-120	7.41	20	
Duplicate (T6J2709-DUP1)		**Source: 6J26017-01**		Prepared: 10/27/06 Analyzed: 11/01/06						
Biochemical Oxygen Demand	140	30	mg/L		140			0.00	20	
Duplicate (T6J2709-DUP2)		**Source: 6J26030-01**		Prepared: 10/27/06 Analyzed: 11/01/06						
Biochemical Oxygen Demand	94.7	30	mg/L		95			0.316	20	
Batch T6J2710 - No Prep										
Blank (T6J2710-BLK1)				Prepared & Analyzed: 10/25/06						
Methylene Blue Active Substances	ND	0.050	mg/L							
LCS (T6J2710-BS1)				Prepared & Analyzed: 10/25/06						
Methylene Blue Active Substances	0.935	0.050	mg/L	1.00		93.5	80-120		20	
LCS Dup (T6J2710-BSD1)				Prepared & Analyzed: 10/25/06						
Methylene Blue Active Substances	1.04	0.050	mg/L	1.00		104	80-120	10.6	20	
Matrix Spike (T6J2710-MS1)		**Source: 6J24041-01**		Prepared & Analyzed: 10/25/06						
Methylene Blue Active Substances	1.01	0.050	mg/L	1.00	ND	101	80-120		20	
Matrix Spike Dup (T6J2710-MSD1)		**Source: 6J24041-01**		Prepared & Analyzed: 10/25/06						
Methylene Blue Active Substances	1.04	0.050	mg/L	1.00	ND	104	80-120	2.93	20	
Batch T6J2714 - Default Prep GenChem										
LCS (T6J2714-BS1)				Prepared & Analyzed: 10/27/06						
Turbidity	9.92	0.020	NTU	10.0		99.2	80-120		20	
LCS Dup (T6J2714-BSD1)				Prepared & Analyzed: 10/27/06						
Turbidity	9.95	0.020	NTU	10.0		99.5	80-120	0.302	20	
Duplicate (T6J2714-DUP1)		**Source: 6J27006-02**		Prepared & Analyzed: 10/27/06						
Turbidity	0.100	0.020	NTU		0.11			9.52	20	
Batch T6J3002 - No Prep										
Blank (T6J3002-BLK1)				Prepared & Analyzed: 10/30/06						
Fluoride	ND	0.10	mg/L							
Chloride	ND	2.0	mg/L							
Nitrate as NO3	ND	2.0	mg/L							
Sulfate as SO4	ND	2.0	mg/L							
LCS (T6J3002-BS1)				Prepared & Analyzed: 10/30/06						
Fluoride	2.04	0.10	mg/L	2.00		102	90-110		20	
Chloride	23.6	2.0	mg/L	25.0		94.4	90-110		20	
Nitrate as NO3	23.8	2.0	mg/L	25.0		95.2	90-110		20	
Sulfate as SO4	23.9	2.0	mg/L	25.0		95.6	90-110		20	
LCS Dup (T6J3002-BSD1)				Prepared & Analyzed: 10/30/06						
Fluoride	1.97	0.10	mg/L	2.00		98.5	90-110	3.49	20	
Chloride	23.4	2.0	mg/L	25.0		93.6	90-110	0.851	20	
Nitrate as NO3	23.7	2.0	mg/L	25.0		94.8	90-110	0.421	20	
Sulfate as SO4	23.8	2.0	mg/L	25.0		95.2	90-110	0.419	20	

Inorganics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3002 - No Prep										
Matrix Spike (T6J3002-MS1)		**Source: 6J30022-04**		Prepared & Analyzed: 10/30/06						
Fluoride	2.18	0.10	mg/L	2.00	ND	109	48.9-155		20	
Chloride	24.7	2.0	mg/L	25.0	1.5	92.8	48-147		15	
Nitrate as NO3	25.5	2.0	mg/L	25.0	ND	102	70-130		20	
Sulfate as SO4	25.1	2.0	mg/L	25.0	ND	100	70-130		20	
Matrix Spike (T6J3002-MS2)		**Source: 6J30024-02**		Prepared: 10/30/06 Analyzed: 10/31/06						
Fluoride	2.09	0.10	mg/L	2.00	0.19	95.0	48.9-155		20	
Chloride	48.4	2.0	mg/L	25.0	20	114	48-147		15	
Nitrate as NO3	47.9	2.0	mg/L	25.0	19	116	70-130		20	
Sulfate as SO4	32.6	2.0	mg/L	25.0	6.2	106	70-130		20	
Matrix Spike Dup (T6J3002-MSD1)		**Source: 6J30022-04**		Prepared & Analyzed: 10/30/06						
Fluoride	2.14	0.10	mg/L	2.00	ND	107	48.9-155	1.85	20	
Chloride	25.0	2.0	mg/L	25.0	1.5	94.0	48-147	1.21	15	
Nitrate as NO3	26.0	2.0	mg/L	25.0	ND	104	70-130	1.94	20	
Sulfate as SO4	25.8	2.0	mg/L	25.0	ND	103	70-130	2.75	20	
Matrix Spike Dup (T6J3002-MSD2)		**Source: 6J30024-02**		Prepared: 10/30/06 Analyzed: 10/31/06						
Fluoride	2.28	0.10	mg/L	2.00	0.19	104	48.9-155	8.70	20	
Chloride	49.2	2.0	mg/L	25.0	20	117	48-147	1.64	15	
Nitrate as NO3	48.4	2.0	mg/L	25.0	19	118	70-130	1.04	20	
Sulfate as SO4	33.2	2.0	mg/L	25.0	6.2	108	70-130	1.82	20	
Batch T6J3003 - Default Prep GenChem										
Blank (T6J3003-BLK1)				Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	ND	0.10	mg/L							
LCS (T6J3003-BS1)				Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	2.40	0.10	mg/L	2.50		96.0	80-120		20	
LCS Dup (T6J3003-BSD1)				Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	2.46	0.10	mg/L	2.50		98.4	80-120	2.47	20	
Matrix Spike (T6J3003-MS1)		**Source: 6J25006-02**		Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	2.48	0.10	mg/L	2.50	ND	99.2	80-120		20	
Matrix Spike (T6J3003-MS2)		**Source: 6J27016-01**		Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	2.50	0.10	mg/L	2.50	0.083	96.7	80-120		20	
Matrix Spike Dup (T6J3003-MSD1)		**Source: 6J25006-02**		Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	2.52	0.10	mg/L	2.50	ND	101	80-120	1.60	20	
Matrix Spike Dup (T6J3003-MSD2)		**Source: 6J27016-01**		Prepared: 10/30/06 Analyzed: 10/31/06						
Phosphorus	2.51	0.10	mg/L	2.50	0.083	97.1	80-120	0.399	20	
Batch T6J3004 - No Prep										
Blank (T6J3004-BLK1)				Prepared & Analyzed: 10/30/06						
Sulfide	ND	1.0	mg/L							
LCS (T6J3004-BS1)				Prepared & Analyzed: 10/30/06						
Sulfide	5.02	1.0	mg/L	5.04		99.6	80-120		20	
LCS Dup (T6J3004-BSD1)				Prepared & Analyzed: 10/30/06						
Sulfide	5.08	1.0	mg/L	5.04		101	80-120	1.19	20	
Batch T6J3007 - No Prep										

Inorganics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3007 - No Prep										
LCS (T6J3007-BS1)				Prepared & Analyzed: 10/27/06						
pH	7.00	0.10	pH Units	7.00		100	80-120		20	
LCS Dup (T6J3007-BSD1)				Prepared & Analyzed: 10/27/06						
pH	7.00	0.10	pH Units	7.00		100	80-120	0.00	20	
Duplicate (T6J3007-DUP1)		**Source: 6J27002-02**		Prepared & Analyzed: 10/27/06						
pH	6.80	0.10	pH Units		6.8			0.00	20	
Batch T6J3008 - No Prep										
Blank (T6J3008-BLK1)				Prepared & Analyzed: 10/27/06						
Specific Conductance (EC)	ND	1.0	µS/cm							
LCS (T6J3008-BS1)				Prepared & Analyzed: 10/27/06						
Specific Conductance (EC)	492	1.0	µS/cm	500		98.4	80-120		20	
LCS Dup (T6J3008-BSD1)				Prepared & Analyzed: 10/27/06						
Specific Conductance (EC)	495	1.0	µS/cm	500		99.0	80-120	0.608	20	
Batch T6J3010 - No Prep										
Blank (T6J3010-BLK1)				Prepared: 10/30/06 Analyzed: 11/03/06						
Cyanide (total)	ND	5.0	µg/L							
LCS (T6J3010-BS1)				Prepared: 10/30/06 Analyzed: 11/03/06						
Cyanide (total)	46.1	5.0	µg/L	50.0		92.2	80-120		20	
LCS Dup (T6J3010-BSD1)				Prepared: 10/30/06 Analyzed: 11/03/06						
Cyanide (total)	51.4	5.0	µg/L	50.0		103	80-120	10.9	20	
Matrix Spike (T6J3010-MS1)		**Source: 6J25026-03**		Prepared: 10/30/06 Analyzed: 11/03/06						
Cyanide (total)	49.4	5.0	µg/L	50.0	ND	98.8	80-120		20	
Matrix Spike Dup (T6J3010-MSD1)		**Source: 6J25026-03**		Prepared: 10/30/06 Analyzed: 11/03/06						
Cyanide (total)	52.9	5.0	µg/L	50.0	ND	106	80-120	6.84	20	
Batch T6J3103 - Default Prep GenChem										
Blank (T6J3103-BLK1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	ND	1.0	mg/L							
LCS (T6J3103-BS1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	23.8	1.0	mg/L	25.0		95.2	80-120		20	
LCS Dup (T6J3103-BSD1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	22.6	1.0	mg/L	25.0		90.4	80-120	5.17	20	
Matrix Spike (T6J3103-MS1)		**Source: 6J24023-01**		Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	22.2	1.0	mg/L	25.0	0.48	86.9	80-120		20	
Matrix Spike (T6J3103-MS2)		**Source: 6J30022-04**		Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	25.2	1.0	mg/L	25.0	0.26	99.8	80-120		20	
Matrix Spike Dup (T6J3103-MSD1)		**Source: 6J24023-01**		Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	24.2	1.0	mg/L	25.0	0.48	94.9	80-120	8.62	20	
Matrix Spike Dup (T6J3103-MSD2)		**Source: 6J30022-04**		Prepared: 10/31/06 Analyzed: 11/01/06						
Ammonia as N	25.5	1.0	mg/L	25.0	0.26	101	80-120	1.18	20	
Batch T6J3107 - Default Prep GenChem										

Inorganics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3107 - Default Prep GenChem										
Blank (T6J3107-BLK1)				Prepared: 10/31/06 Analyzed: 11/03/06						
Total Dissolved Solids	ND	10	mg/L							
LCS (T6J3107-BS1)				Prepared: 10/31/06 Analyzed: 11/03/06						
Total Dissolved Solids	206	10	mg/L	186		111	80-120		20	
LCS Dup (T6J3107-BSD1)				Prepared: 10/31/06 Analyzed: 11/03/06						
Total Dissolved Solids	200	10	mg/L	186		108	80-120	2.96	20	
Duplicate (T6J3107-DUP1)		**Source: 6J30024-01**		Prepared: 10/31/06 Analyzed: 11/03/06						
Total Dissolved Solids	412	10	mg/L		400			2.96	20	
Duplicate (T6J3107-DUP2)		**Source: 6J27006-02**		Prepared: 10/31/06 Analyzed: 11/03/06						
Total Dissolved Solids	444	10	mg/L		440			0.905	20	
Batch T6J3108 - No Prep										
Blank (T6J3108-BLK1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Total Suspended Solids	ND	4.0	mg/L							
LCS (T6J3108-BS1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Total Suspended Solids	210	10	mg/L	218		96.3	80-120		20	
LCS Dup (T6J3108-BSD1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Total Suspended Solids	204	10	mg/L	218		93.6	80-120	2.90	20	
Duplicate (T6J3108-DUP1)		**Source: 6J26012-03**		Prepared: 10/31/06 Analyzed: 11/01/06						
Total Suspended Solids	96.3	6.7	mg/L		94			2.42	20	
Duplicate (T6J3108-DUP2)		**Source: 6J31008-02**		Prepared: 10/31/06 Analyzed: 11/01/06						
Total Suspended Solids	2700	330	mg/L		2700			0.00	20	
Batch T6K0306 - No Prep										
Blank (T6K0306-BLK1)				Prepared & Analyzed: 11/03/06						
Total Alkalinity as CaCO3	ND	20	mg/L							
Bicarbonate Alkalinity as HCO3	ND	20	mg/L							
Carbonate Alkalinity as CO3	ND	20	mg/L							
Hydroxide Alkalinity as OH	ND	20	mg/L							
LCS (T6K0306-BS1)				Prepared & Analyzed: 11/03/06						
Total Alkalinity as CaCO3	250	20	mg/L	250		100	80-120		20	
LCS Dup (T6K0306-BSD1)				Prepared & Analyzed: 11/03/06						
Total Alkalinity as CaCO3	250	20	mg/L	250		100	80-120	0.00	20	
Duplicate (T6K0306-DUP1)		**Source: 6J25026-08**		Prepared & Analyzed: 11/03/06						
Total Alkalinity as CaCO3	243	20	mg/L		240			1.24	20	
Bicarbonate Alkalinity as HCO3	297	20	mg/L		300			1.01	20	
Carbonate Alkalinity as CO3	ND	20	mg/L		ND				20	
Hydroxide Alkalinity as OH	ND	20	mg/L		ND				20	
Duplicate (T6K0306-DUP2)		**Source: 6J30021-01**		Prepared & Analyzed: 11/03/06						
Total Alkalinity as CaCO3	56.0	20	mg/L		56			0.00	20	
Bicarbonate Alkalinity as HCO3	68.3	20	mg/L		68			0.440	20	
Carbonate Alkalinity as CO3	ND	20	mg/L		ND				20	
Hydroxide Alkalinity as OH	ND	20	mg/L		ND				20	
Batch T6K0315 - No Prep										

Inorganics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6K0315 - No Prep										
Blank (T6K0315-BLK1)				Prepared & Analyzed: 11/03/06						
Chemical Oxygen Demand	ND	10	mg/L							
LCS (T6K0315-BS1)				Prepared & Analyzed: 11/03/06						
Chemical Oxygen Demand	485	10	mg/L	500		97.0	80-120		20	
LCS Dup (T6K0315-BSD1)				Prepared & Analyzed: 11/03/06						
Chemical Oxygen Demand	485	10	mg/L	500		97.0	80-120	0.00	20	
Duplicate (T6K0315-DUP1)		**Source: 6J26012-01**		Prepared & Analyzed: 11/03/06						
Chemical Oxygen Demand	7.00	10	mg/L		ND				20	QL
Batch T6K0613 - Default Prep GC-Semi										
Blank (T6K0613-BLK1)				Prepared: 11/06/06 Analyzed: 11/07/06						
Total Organic Carbon	ND	1.0	mg/L							
LCS (T6K0613-BS1)				Prepared: 11/06/06 Analyzed: 11/07/06						
Total Organic Carbon	5.00	1.0	mg/L	5.00		100	70-130		20	
LCS Dup (T6K0613-BSD1)				Prepared: 11/06/06 Analyzed: 11/07/06						
Total Organic Carbon	4.96	1.0	mg/L	5.00		99.2	70-130	0.803	20	

Metals - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3006 - EPA 245.1/7470A Prep										
Blank (T6J3006-BLK1)				Prepared & Analyzed: 10/30/06						
Mercury	ND	0.20	µg/L							
LCS (T6J3006-BS1)				Prepared & Analyzed: 10/30/06						
Mercury	5.01	0.20	µg/L	5.00		100	85-115		20	
LCS Dup (T6J3006-BSD1)				Prepared & Analyzed: 10/30/06						
Mercury	4.81	0.20	µg/L	5.00		96.2	85-115	4.07	20	
Matrix Spike (T6J3006-MS1)		**Source: 6J20019-04**		Prepared & Analyzed: 10/30/06						
Mercury	4.90	0.20	µg/L	5.00	ND	98.0	70-130		20	
Matrix Spike (T6J3006-MS2)		**Source: 6J24040-01**		Prepared & Analyzed: 10/30/06						
Mercury	5.09	0.20	µg/L	5.00	ND	102	70-130		20	
Matrix Spike Dup (T6J3006-MSD1)		**Source: 6J20019-04**		Prepared & Analyzed: 10/30/06						
Mercury	4.59	0.20	µg/L	5.00	ND	91.8	70-130	6.53	20	
Matrix Spike Dup (T6J3006-MSD2)		**Source: 6J24040-01**		Prepared & Analyzed: 10/30/06						
Mercury	4.75	0.20	µg/L	5.00	ND	95.0	70-130	6.91	20	

Metals - Dissolved - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3006 - EPA 245.1/7470A Prep										
Blank (T6J3006-BLK1)				Prepared & Analyzed: 10/30/06						
Mercury	ND	0.20	µg/L							
LCS (T6J3006-BS1)				Prepared & Analyzed: 10/30/06						
Mercury	5.01	0.20	µg/L	5.00		100	85-115		20	
LCS Dup (T6J3006-BSD1)				Prepared & Analyzed: 10/30/06						
Mercury	4.81	0.20	µg/L	5.00		96.2	85-115	4.07	20	
Matrix Spike (T6J3006-MS1)		**Source: 6J20019-04**		Prepared & Analyzed: 10/30/06						
Mercury	4.90	0.20	µg/L	5.00	ND	98.0	75-125		20	
Matrix Spike (T6J3006-MS2)		**Source: 6J24040-01**		Prepared & Analyzed: 10/30/06						
Mercury	5.09	0.20	µg/L	5.00	ND	102	75-125		20	
Matrix Spike Dup (T6J3006-MSD1)		**Source: 6J20019-04**		Prepared & Analyzed: 10/30/06						
Mercury	4.59	0.20	µg/L	5.00	ND	91.8	75-125	6.53	20	
Matrix Spike Dup (T6J3006-MSD2)		**Source: 6J24040-01**		Prepared & Analyzed: 10/30/06						
Mercury	4.75	0.20	µg/L	5.00	ND	95.0	75-125	6.91	20	
Batch T6J3110 - EPA 200.2										
Blank (T6J3110-BLK1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Cobalt	ND	0.0020	mg/L							
Potassium	ND	1.0	mg/L							
Antimony	ND	0.0050	mg/L							
Manganese	ND	0.0050	mg/L							
Magnesium	ND	0.10	mg/L							
Sodium	ND	1.0	mg/L							
Lead	ND	0.0050	mg/L							
Barium	ND	0.010	mg/L							
Copper	ND	0.0050	mg/L							
Silica (SiO2)	ND	0.20	mg/L							
Arsenic	ND	0.010	mg/L							
Beryllium	ND	0.0010	mg/L							
Silicon	ND	0.10	mg/L							
Iron	ND	0.10	mg/L							
Molybdenum	ND	0.0050	mg/L							
Selenium	ND	0.020	mg/L							
Silver	ND	0.0050	mg/L							
Boron	ND	0.050	mg/L							
Zinc	ND	0.0050	mg/L							
Aluminum	ND	0.050	mg/L							
Strontium	ND	0.00200	mg/L							
Vanadium	ND	0.010	mg/L							
Tin	ND	0.010	mg/L							
Nickel	ND	0.0050	mg/L							
Calcium	ND	0.10	mg/L							
Titanium	ND	0.0100	mg/L							
Thallium	ND	0.020	mg/L							
Chromium	ND	0.0050	mg/L							
Cadmium	ND	0.0010	mg/L							
LCS (T6J3110-BS1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Boron	1.01	0.050	mg/L	1.00		101	85-115		20	

Metals - Dissolved - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3110 - EPA 200.2										
LCS (T6J3110-BS1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Silver	0.103	0.0050	mg/L	0.100		103	85-115		20	
Silicon	2.08	0.10	mg/L	2.00		104	85-115		20	
Cadmium	0.0201	0.0010	mg/L	0.0200		100	85-115		20	
Zinc	0.107	0.0050	mg/L	0.100		107	85-115		20	
Selenium	0.403	0.020	mg/L	0.400		101	85-115		20	
Silica (SiO2)	4.47	0.20	mg/L	4.28		104	85-115		20	
Calcium	1.98	0.10	mg/L	2.00		99.0	85-115		20	
Sodium	2.22	1.0	mg/L	2.00		111	85-115		20	
Chromium	0.103	0.0050	mg/L	0.100		103	85-115		20	
Copper	0.0992	0.0050	mg/L	0.100		99.2	85-115		20	
Strontium	0.100	0.00200	mg/L	0.100		100	85-115		20	
Vanadium	0.197	0.010	mg/L	0.200		98.5	85-115		20	
Cobalt	0.0408	0.0020	mg/L	0.0400		102	85-115		20	
Barium	0.196	0.010	mg/L	0.200		98.0	85-115		20	
Beryllium	0.0198	0.0010	mg/L	0.0200		99.0	85-115		20	
Thallium	0.402	0.020	mg/L	0.400		100	85-115		20	
Arsenic	0.204	0.010	mg/L	0.200		102	85-115		20	
Titanium	0.210	0.0100	mg/L	0.200		105	85-115		20	
Antimony	0.0908	0.0050	mg/L	0.100		90.8	85-115		20	
Aluminum	1.01	0.050	mg/L	1.00		101	85-115		20	
Iron	2.08	0.10	mg/L	2.00		104	85-115		20	
Nickel	0.104	0.0050	mg/L	0.100		104	85-115		20	
Tin	0.397	0.010	mg/L	0.400		99.2	85-115		20	
Lead	0.106	0.0050	mg/L	0.100		106	85-115		20	
Magnesium	2.00	0.10	mg/L	2.00		100	85-115		20	
Manganese	0.102	0.0050	mg/L	0.100		102	85-115		20	
Molybdenum	0.0967	0.0050	mg/L	0.100		96.7	85-115		20	
Potassium	4.04	1.0	mg/L	4.00		101	85-115		20	
LCS Dup (T6J3110-BSD1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Cobalt	0.0410	0.0020	mg/L	0.0400		102	85-115	0.489	20	
Tin	0.403	0.010	mg/L	0.400		101	85-115	1.50	20	
Beryllium	0.0198	0.0010	mg/L	0.0200		99.0	85-115	0.00	20	
Silica (SiO2)	4.51	0.20	mg/L	4.28		105	85-115	0.891	20	
Chromium	0.104	0.0050	mg/L	0.100		104	85-115	0.966	20	
Manganese	0.103	0.0050	mg/L	0.100		103	85-115	0.976	20	
Titanium	0.211	0.0100	mg/L	0.200		106	85-115	0.475	20	
Magnesium	2.02	0.10	mg/L	2.00		101	85-115	0.995	20	
Thallium	0.402	0.020	mg/L	0.400		100	85-115	0.00	20	
Nickel	0.105	0.0050	mg/L	0.100		105	85-115	0.957	20	
Boron	1.02	0.050	mg/L	1.00		102	85-115	0.985	20	
Vanadium	0.201	0.010	mg/L	0.200		100	85-115	2.01	20	
Calcium	2.01	0.10	mg/L	2.00		100	85-115	1.50	20	
Cadmium	0.0204	0.0010	mg/L	0.0200		102	85-115	1.48	20	
Molybdenum	0.0990	0.0050	mg/L	0.100		99.0	85-115	2.35	20	
Antimony	0.0953	0.0050	mg/L	0.100		95.3	85-115	4.84	20	
Zinc	0.108	0.0050	mg/L	0.100		108	85-115	0.930	20	
Aluminum	1.01	0.050	mg/L	1.00		101	85-115	0.00	20	
Strontium	0.101	0.00200	mg/L	0.100		101	85-115	0.995	20	
Iron	2.11	0.10	mg/L	2.00		106	85-115	1.43	20	

Metals - Dissolved - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3110 - EPA 200.2										
LCS Dup (T6J3110-BSD1)				Prepared: 10/31/06 Analyzed: 11/01/06						
Silicon	2.10	0.10	mg/L	2.00		105	85-115	0.957	20	
Arsenic	0.207	0.010	mg/L	0.200		104	85-115	1.46	20	
Silver	0.104	0.0050	mg/L	0.100		104	85-115	0.966	20	
Selenium	0.407	0.020	mg/L	0.400		102	85-115	0.988	20	
Copper	0.100	0.0050	mg/L	0.100		100	85-115	0.803	20	
Barium	0.198	0.010	mg/L	0.200		99.0	85-115	1.02	20	
Lead	0.106	0.0050	mg/L	0.100		106	85-115	0.00	20	
Potassium	4.06	1.0	mg/L	4.00		102	85-115	0.494	20	
Sodium	2.02	1.0	mg/L	2.00		101	85-115	9.43	20	
Matrix Spike (T6J3110-MS1)		**Source: 6J26009-09**		Prepared: 10/31/06 Analyzed: 11/01/06						
Cadmium	0.0194	0.0010	mg/L	0.0200	ND	97.0	70-130		20	
Molybdenum	0.106	0.0050	mg/L	0.100	0.0080	98.0	70-130		20	
Thallium	0.378	0.020	mg/L	0.400	ND	94.5	70-130		20	
Nickel	0.101	0.0050	mg/L	0.100	0.0012	99.8	70-130		20	
Iron	2.08	0.10	mg/L	2.00	0.050	102	70-130		20	
Silica (SiO2)	27.6	0.20	mg/L	4.28	23	107	70-130		20	
Zinc	0.143	0.0050	mg/L	0.100	0.037	106	70-130		20	
Arsenic	0.206	0.010	mg/L	0.200	ND	103	70-130		20	
Boron	1.22	0.050	mg/L	1.00	0.19	103	70-130		20	
Selenium	0.398	0.020	mg/L	0.400	ND	99.5	70-130		20	
Beryllium	0.0198	0.0010	mg/L	0.0200	ND	99.0	70-130		20	
Manganese	0.107	0.0050	mg/L	0.100	0.0072	99.8	70-130		20	
Cobalt	0.0396	0.0020	mg/L	0.0400	ND	99.0	70-130		20	
Lead	0.102	0.0050	mg/L	0.100	ND	102	70-130		20	
Copper	0.106	0.0050	mg/L	0.100	0.0024	104	70-130		20	
Tin	0.385	0.010	mg/L	0.400	ND	96.2	70-130		20	
Barium	0.220	0.010	mg/L	0.200	0.021	99.5	70-130		20	
Chromium	0.102	0.0050	mg/L	0.100	0.00056	101	70-130		20	
Strontium	0.324	0.00200	mg/L	0.100	0.218	106	70-130		20	
Aluminum	1.06	0.050	mg/L	1.00	0.047	101	70-130		20	
Titanium	0.208	0.0100	mg/L	0.200	ND	104	70-130		20	
Silver	0.103	0.0050	mg/L	0.100	ND	103	70-130		20	
Vanadium	0.202	0.010	mg/L	0.200	0.0036	99.2	70-130		20	
Antimony	0.106	0.0050	mg/L	0.100	ND	106	70-130		20	
Matrix Spike (T6J3110-MS2)		**Source: 6J27006-02**		Prepared: 10/31/06 Analyzed: 11/02/06						
Antimony	0.100	0.0050	mg/L	0.100	ND	100	70-130		20	
Beryllium	0.0198	0.0010	mg/L	0.0200	ND	99.0	70-130		20	
Arsenic	0.210	0.010	mg/L	0.200	ND	105	70-130		20	
Zinc	0.145	0.0050	mg/L	0.100	0.042	103	70-130		20	
Aluminum	1.01	0.050	mg/L	1.00	ND	101	70-130		20	
Barium	0.352	0.010	mg/L	0.200	0.15	101	70-130		20	
Silica (SiO2)	67.8	0.20	mg/L	4.28	64	88.8	70-130		20	
Cobalt	0.0386	0.0020	mg/L	0.0400	ND	96.5	70-130		20	
Titanium	0.208	0.0100	mg/L	0.200	ND	104	70-130		20	
Lead	0.104	0.0050	mg/L	0.100	0.0021	102	70-130		20	
Molybdenum	0.0989	0.0050	mg/L	0.100	0.0018	97.1	70-130		20	
Copper	0.151	0.0050	mg/L	0.100	0.049	102	70-130		20	
Tin	0.394	0.010	mg/L	0.400	ND	98.5	70-130		20	
Selenium	0.402	0.020	mg/L	0.400	ND	100	70-130		20	

Metals - Dissolved - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3110 - EPA 200.2										
Matrix Spike (T6J3110-MS2)		**Source: 6J27006-02**		Prepared: 10/31/06 Analyzed: 11/02/06						
Nickel	0.101	0.0050	mg/L	0.100	0.0017	99.3	70-130		20	
Manganese	0.101	0.0050	mg/L	0.100	0.0013	99.7	70-130		20	
Chromium	0.104	0.0050	mg/L	0.100	0.0016	102	70-130		20	
Vanadium	0.239	0.010	mg/L	0.200	0.043	98.0	70-130		20	
Silver	0.105	0.0050	mg/L	0.100	ND	105	70-130		20	
Iron	2.05	0.10	mg/L	2.00	ND	102	70-130		20	
Cadmium	0.0196	0.0010	mg/L	0.0200	ND	98.0	70-130		20	
Strontium	0.477	0.00200	mg/L	0.100	0.379	98.0	70-130		20	
Thallium	0.402	0.020	mg/L	0.400	ND	100	70-130		20	
Boron	1.05	0.050	mg/L	1.00	0.015	104	70-130		20	
Matrix Spike Dup (T6J3110-MSD1)		**Source: 6J26009-09**		Prepared: 10/31/06 Analyzed: 11/01/06						
Manganese	0.109	0.0050	mg/L	0.100	0.0072	102	70-130	1.85	20	
Nickel	0.104	0.0050	mg/L	0.100	0.0012	103	70-130	2.93	20	
Molybdenum	0.110	0.0050	mg/L	0.100	0.0080	102	70-130	3.70	20	
Titanium	0.211	0.0100	mg/L	0.200	ND	106	70-130	1.43	20	
Aluminum	1.09	0.050	mg/L	1.00	0.047	104	70-130	2.79	20	
Antimony	0.109	0.0050	mg/L	0.100	ND	109	70-130	2.79	20	
Selenium	0.408	0.020	mg/L	0.400	ND	102	70-130	2.48	20	
Silica (SiO2)	28.2	0.20	mg/L	4.28	23	121	70-130	2.15	20	
Silver	0.105	0.0050	mg/L	0.100	ND	105	70-130	1.92	20	
Strontium	0.331	0.00200	mg/L	0.100	0.218	113	70-130	2.14	20	
Thallium	0.382	0.020	mg/L	0.400	ND	95.5	70-130	1.05	20	
Tin	0.395	0.010	mg/L	0.400	ND	98.8	70-130	2.56	20	
Cobalt	0.0406	0.0020	mg/L	0.0400	ND	102	70-130	2.49	20	
Boron	1.25	0.050	mg/L	1.00	0.19	106	70-130	2.43	20	
Cadmium	0.0199	0.0010	mg/L	0.0200	ND	99.5	70-130	2.54	20	
Vanadium	0.208	0.010	mg/L	0.200	0.0036	102	70-130	2.93	20	
Zinc	0.145	0.0050	mg/L	0.100	0.037	108	70-130	1.39	20	
Beryllium	0.0202	0.0010	mg/L	0.0200	ND	101	70-130	2.00	20	
Chromium	0.104	0.0050	mg/L	0.100	0.00056	103	70-130	1.94	20	
Barium	0.226	0.010	mg/L	0.200	0.021	102	70-130	2.69	20	
Copper	0.109	0.0050	mg/L	0.100	0.0024	107	70-130	2.79	20	
Iron	2.13	0.10	mg/L	2.00	0.050	104	70-130	2.38	20	
Lead	0.105	0.0050	mg/L	0.100	ND	105	70-130	2.90	20	
Arsenic	0.212	0.010	mg/L	0.200	ND	106	70-130	2.87	20	
Matrix Spike Dup (T6J3110-MSD2)		**Source: 6J27006-02**		Prepared: 10/31/06 Analyzed: 11/02/06						
Selenium	0.395	0.020	mg/L	0.400	ND	98.8	70-130	1.76	20	
Boron	1.04	0.050	mg/L	1.00	0.015	102	70-130	0.957	20	
Thallium	0.398	0.020	mg/L	0.400	ND	99.5	70-130	1.00	20	
Strontium	0.472	0.00200	mg/L	0.100	0.379	93.0	70-130	1.05	20	
Cadmium	0.0192	0.0010	mg/L	0.0200	ND	96.0	70-130	2.06	20	
Zinc	0.144	0.0050	mg/L	0.100	0.042	102	70-130	0.692	20	
Silver	0.103	0.0050	mg/L	0.100	ND	103	70-130	1.92	20	
Arsenic	0.206	0.010	mg/L	0.200	ND	103	70-130	1.92	20	
Silica (SiO2)	67.1	0.20	mg/L	4.28	64	72.4	70-130	1.04	20	
Iron	2.02	0.10	mg/L	2.00	ND	101	70-130	1.47	20	
Vanadium	0.238	0.010	mg/L	0.200	0.043	97.5	70-130	0.419	20	
Tin	0.391	0.010	mg/L	0.400	ND	97.8	70-130	0.764	20	
Chromium	0.102	0.0050	mg/L	0.100	0.0016	100	70-130	1.94	20	

Metals - Dissolved - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T6J3110 - EPA 200.2										
Matrix Spike Dup (T6J3110-MSD2)		**Source: 6J27006-02**		Prepared: 10/31/06 Analyzed: 11/02/06						
Molybdenum	0.0983	0.0050	mg/L	0.100	0.0018	96.5	70-130	0.609	20	
Antimony	0.0988	0.0050	mg/L	0.100	ND	98.8	70-130	1.21	20	
Manganese	0.0999	0.0050	mg/L	0.100	0.0013	98.6	70-130	1.10	20	
Lead	0.102	0.0050	mg/L	0.100	0.0021	99.9	70-130	1.94	20	
Aluminum	1.00	0.050	mg/L	1.00	ND	100	70-130	0.995	20	
Cobalt	0.0383	0.0020	mg/L	0.0400	ND	95.8	70-130	0.780	20	
Barium	0.347	0.010	mg/L	0.200	0.15	98.5	70-130	1.43	20	
Titanium	0.205	0.0100	mg/L	0.200	ND	102	70-130	1.45	20	
Nickel	0.0997	0.0050	mg/L	0.100	0.0017	98.0	70-130	1.30	20	
Copper	0.149	0.0050	mg/L	0.100	0.049	100	70-130	1.33	20	
Beryllium	0.0193	0.0010	mg/L	0.0200	ND	96.5	70-130	2.56	20	

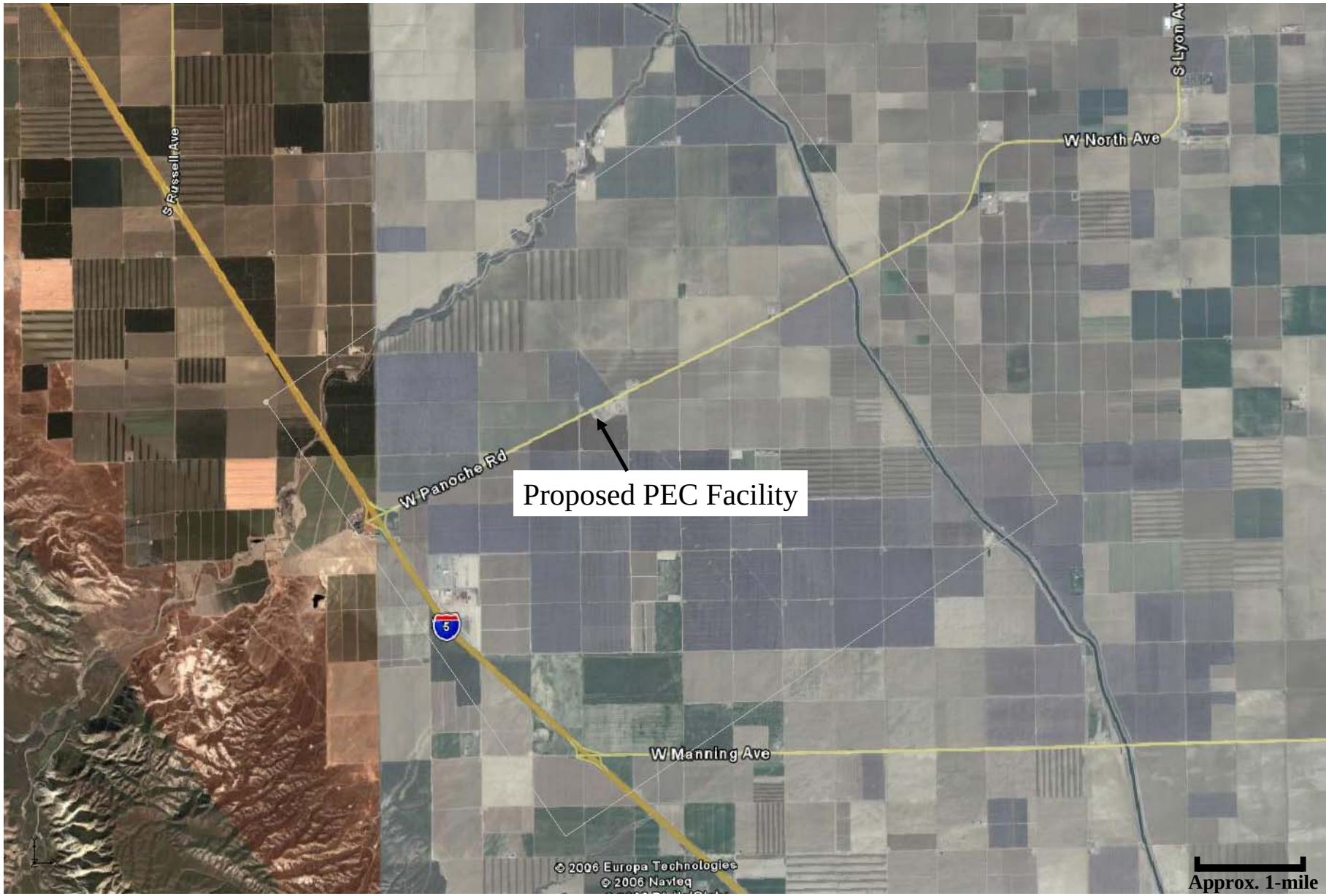


Figure 1. Model Domain (Approximately 6 miles x 6 miles)

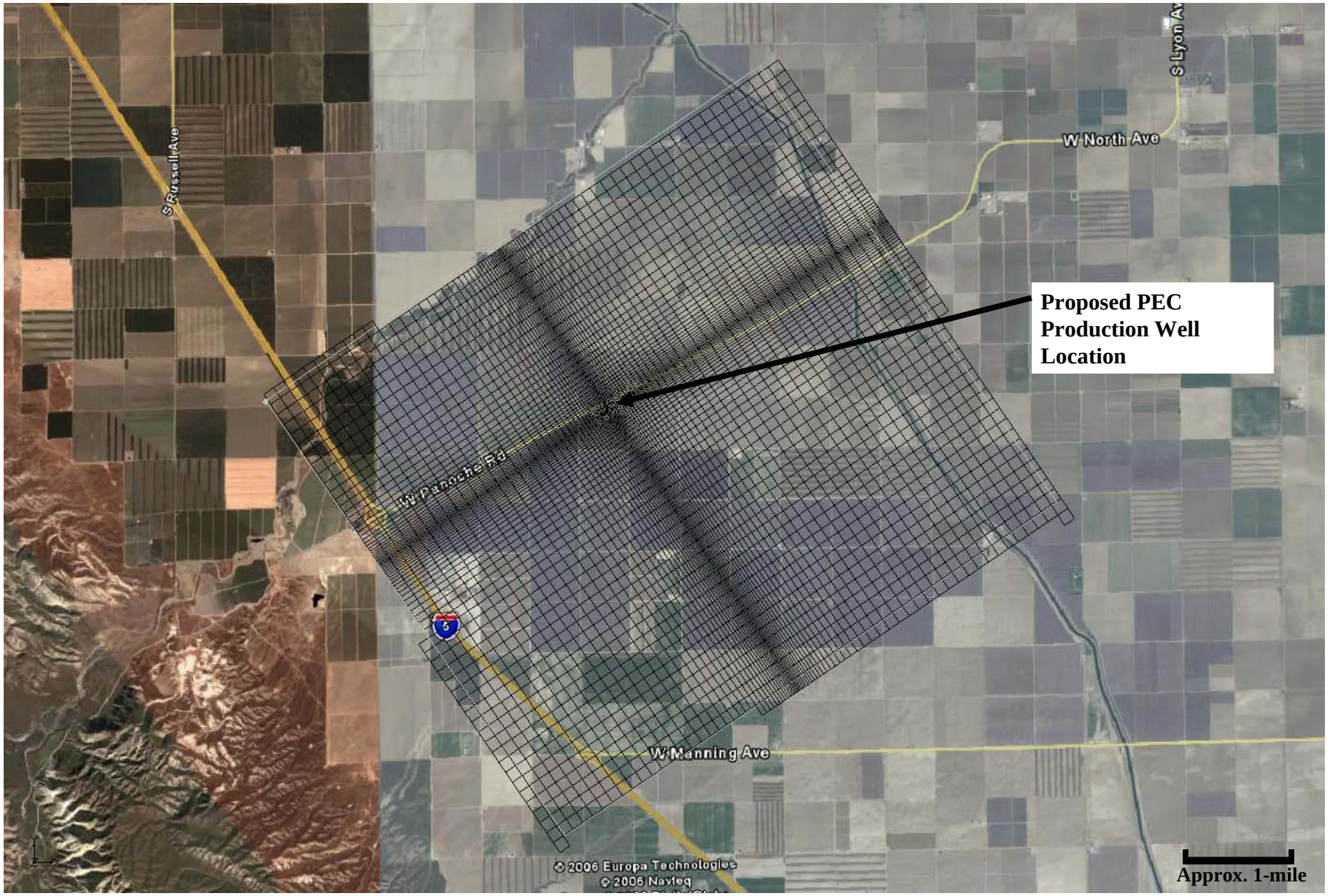
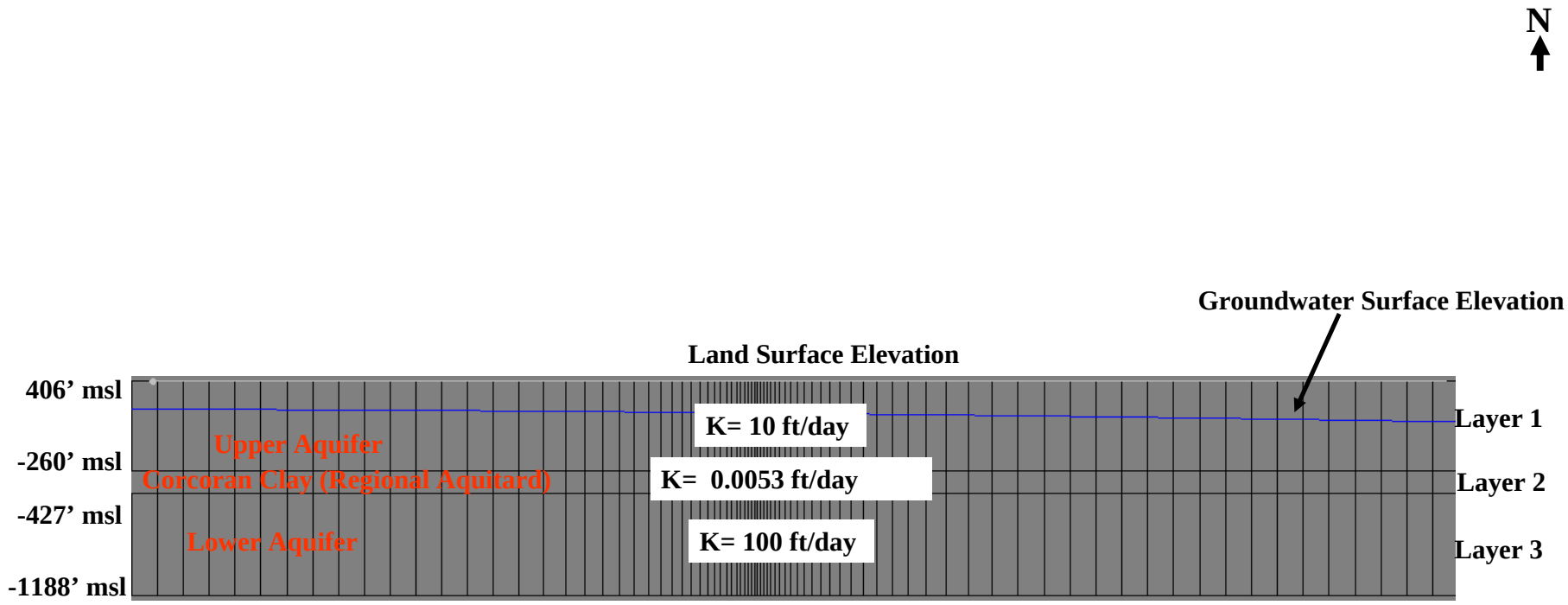


Figure 2. Model Grid



***Model layer thickness (1,2 and 3) correspond with geologic/geophysical interpretations from PEC Monitoring Well Installation.**

Figure 3. General Cross-Section

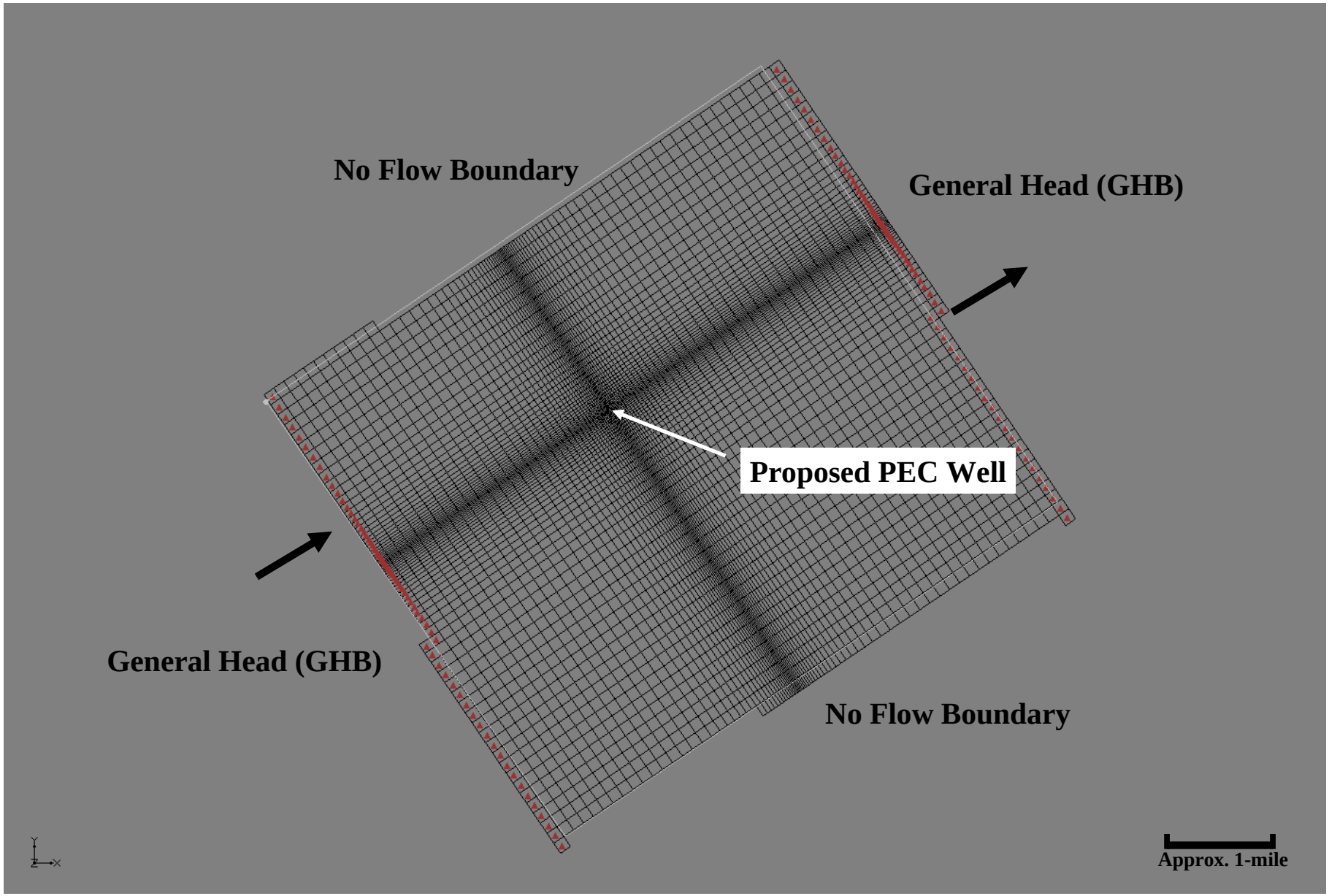


Figure 4. Model Boundary Conditions

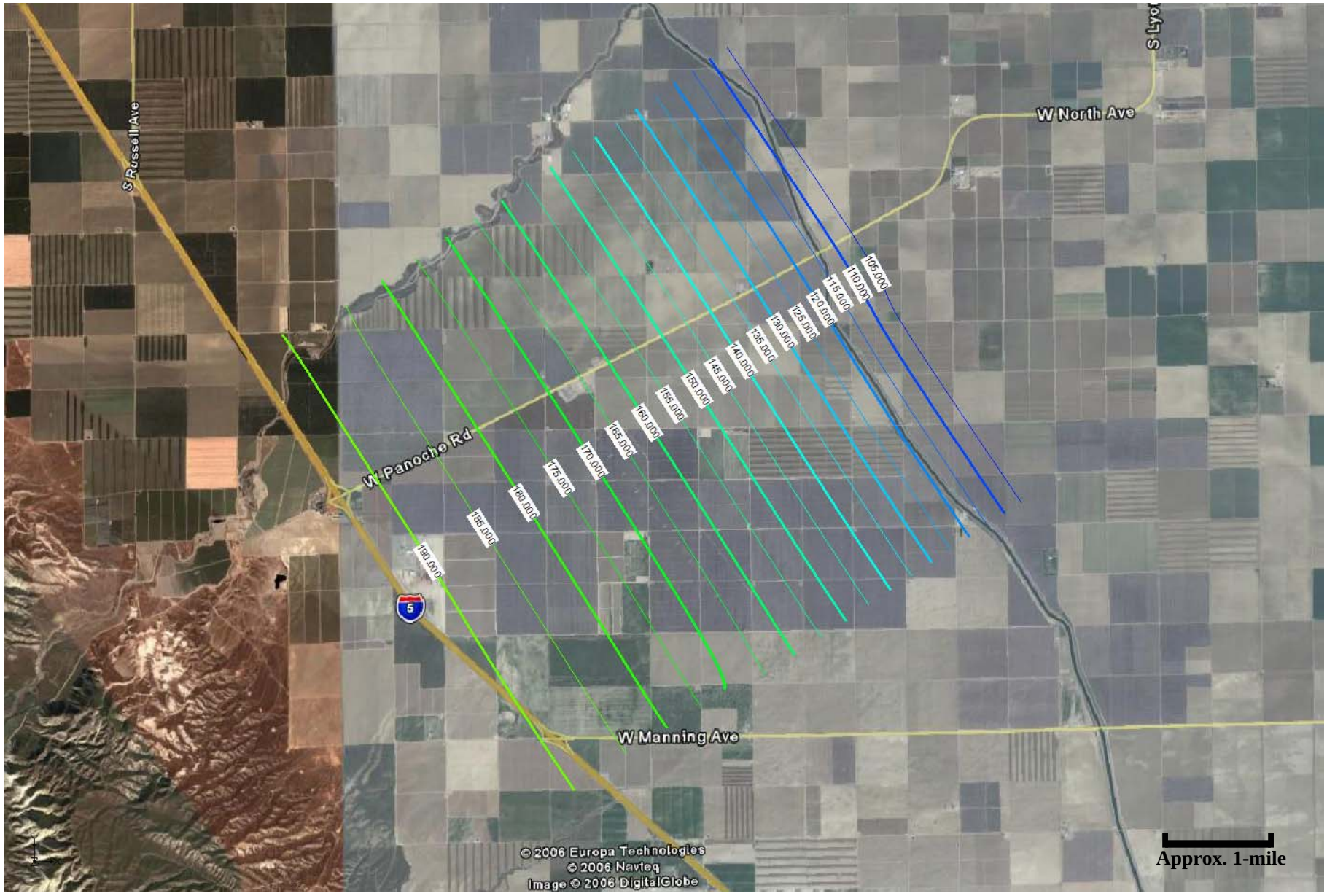


Figure 5. Layer 1 Groundwater Contour Map – No Pumping

Figure 6. Layer 2 Groundwater Contour Map – No Pumping

Figure 7. Layer 3 Groundwater Contour Map – No Pumping

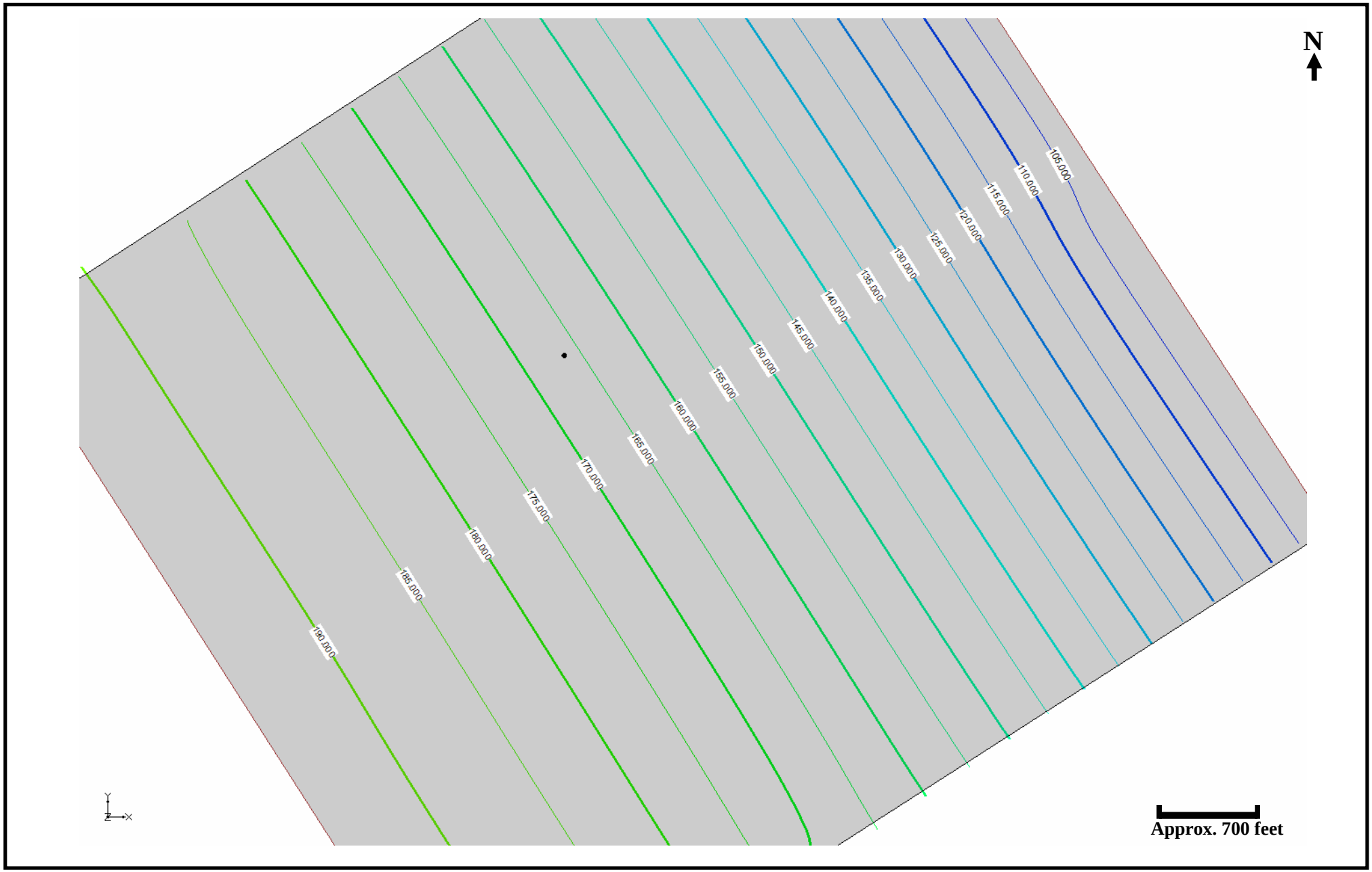


Figure 8. Layer 1 Groundwater Contour Map –Pumping at 750 gpm

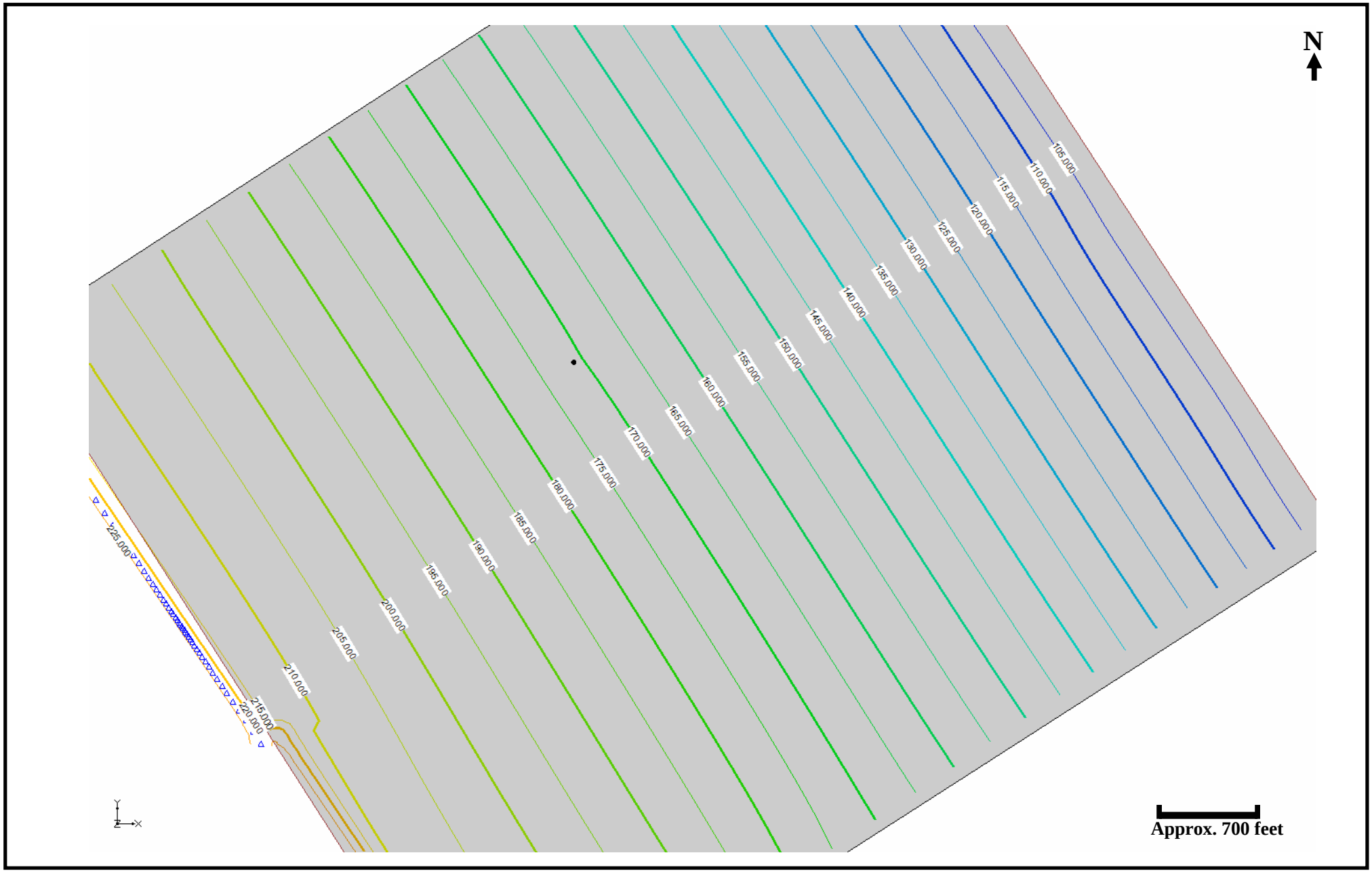


Figure 9. Layer 2 Groundwater Contour Map –Pumping at 750 gpm

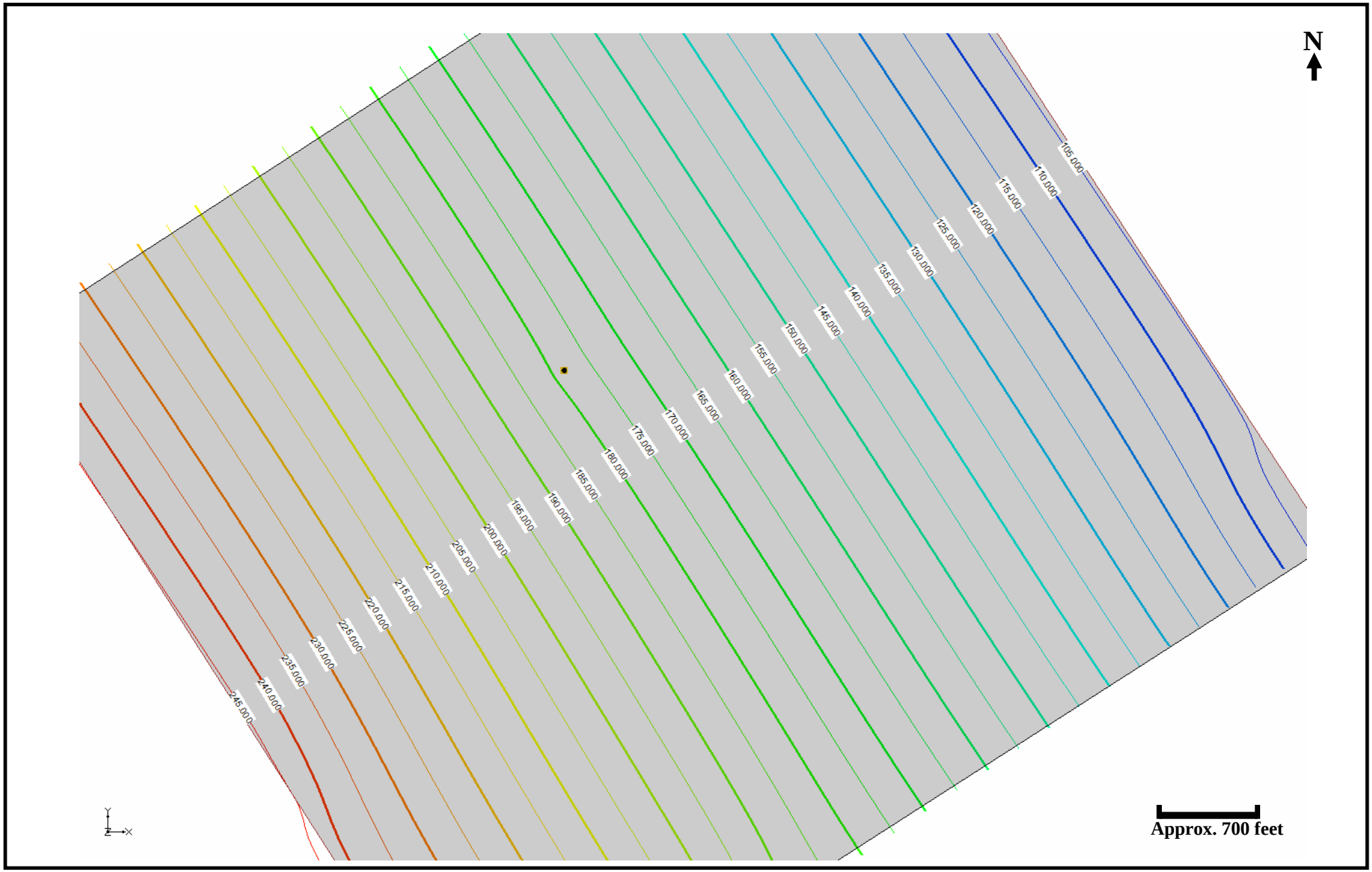


Figure 10. Layer 3 Groundwater Contour Map –Pumping at 750 gpm

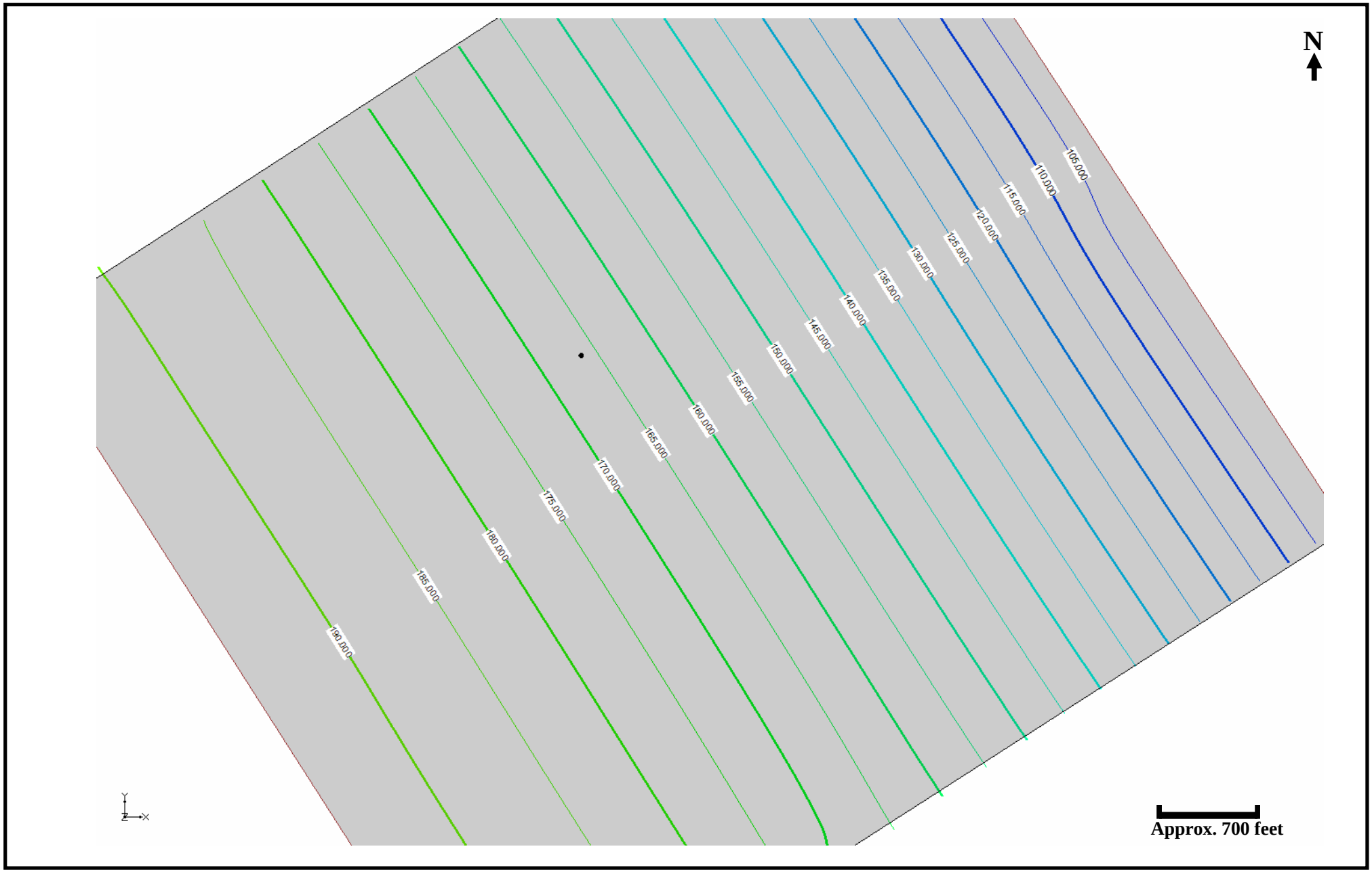


Figure 11. Layer 1 Groundwater Contour Map –Pumping at 1000 gpm

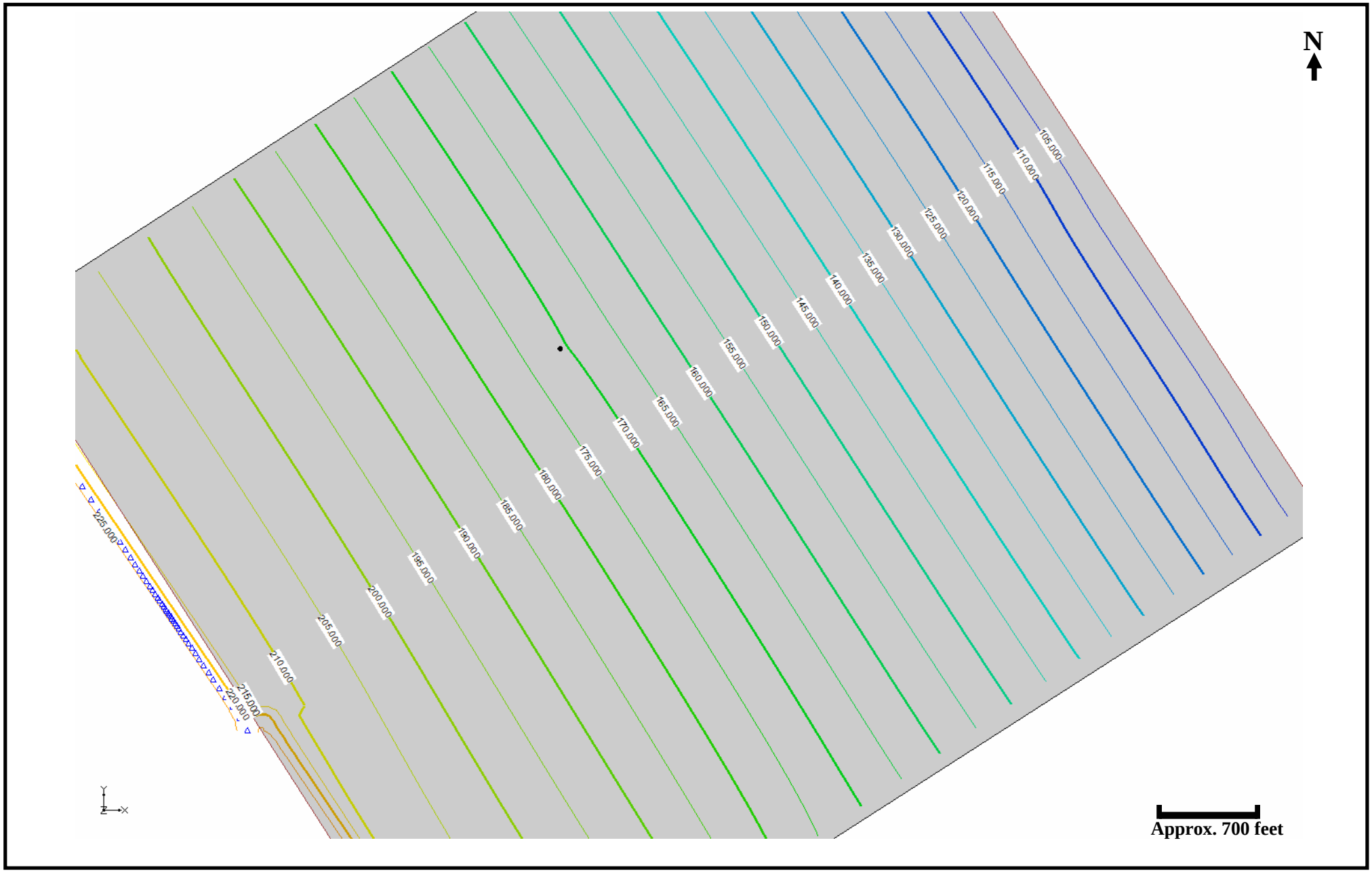


Figure 12. Layer 2 Groundwater Contour Map –Pumping at 1000 gpm

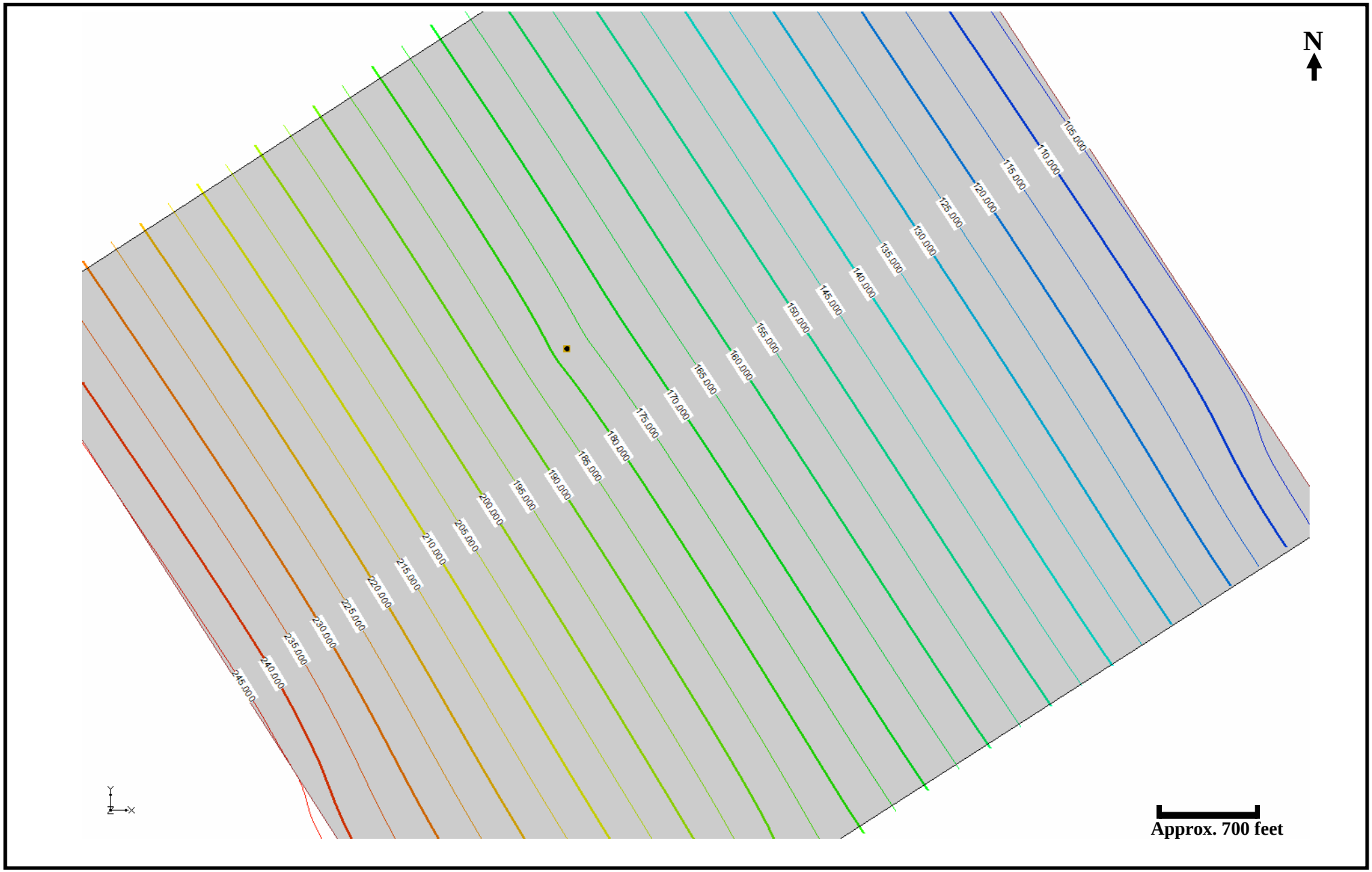


Figure 13. Layer 3 Groundwater Contour Map –Pumping at 1000 gpm

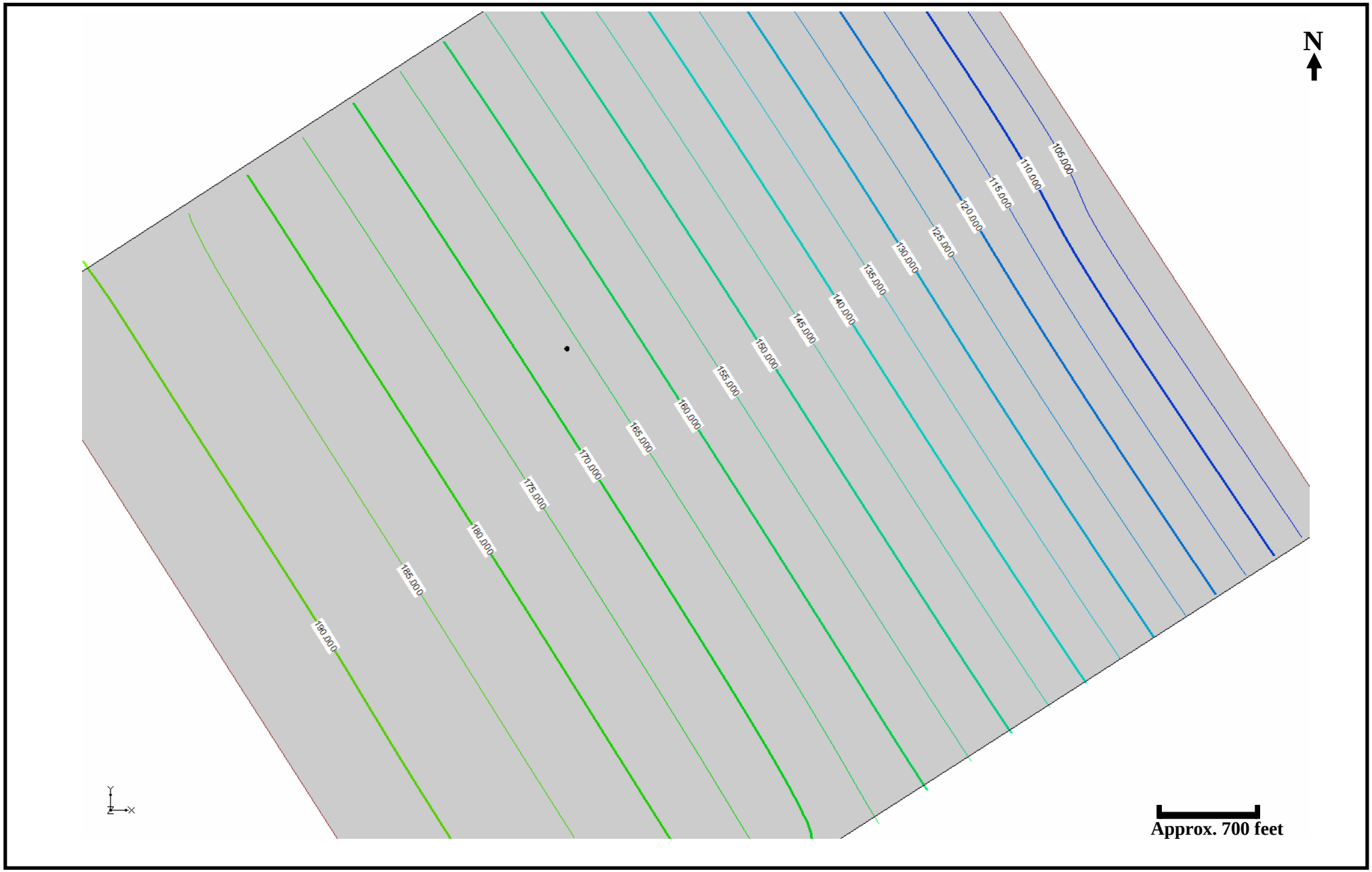


Figure 14. Layer 1 Groundwater Contour Map –Pumping at 2000 gpm

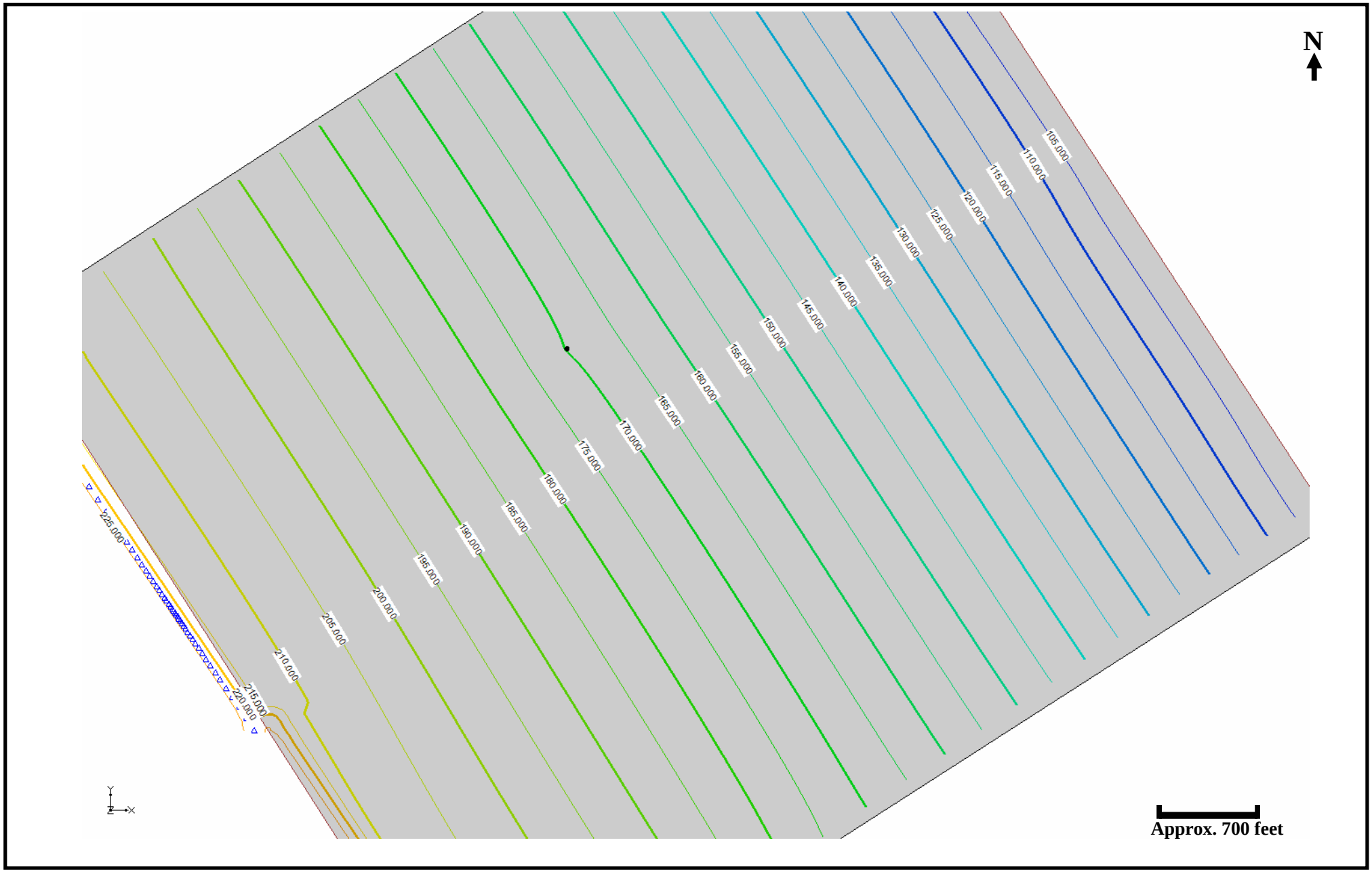


Figure 15. Layer 2 Groundwater Contour Map –Pumping at 2000 gpm

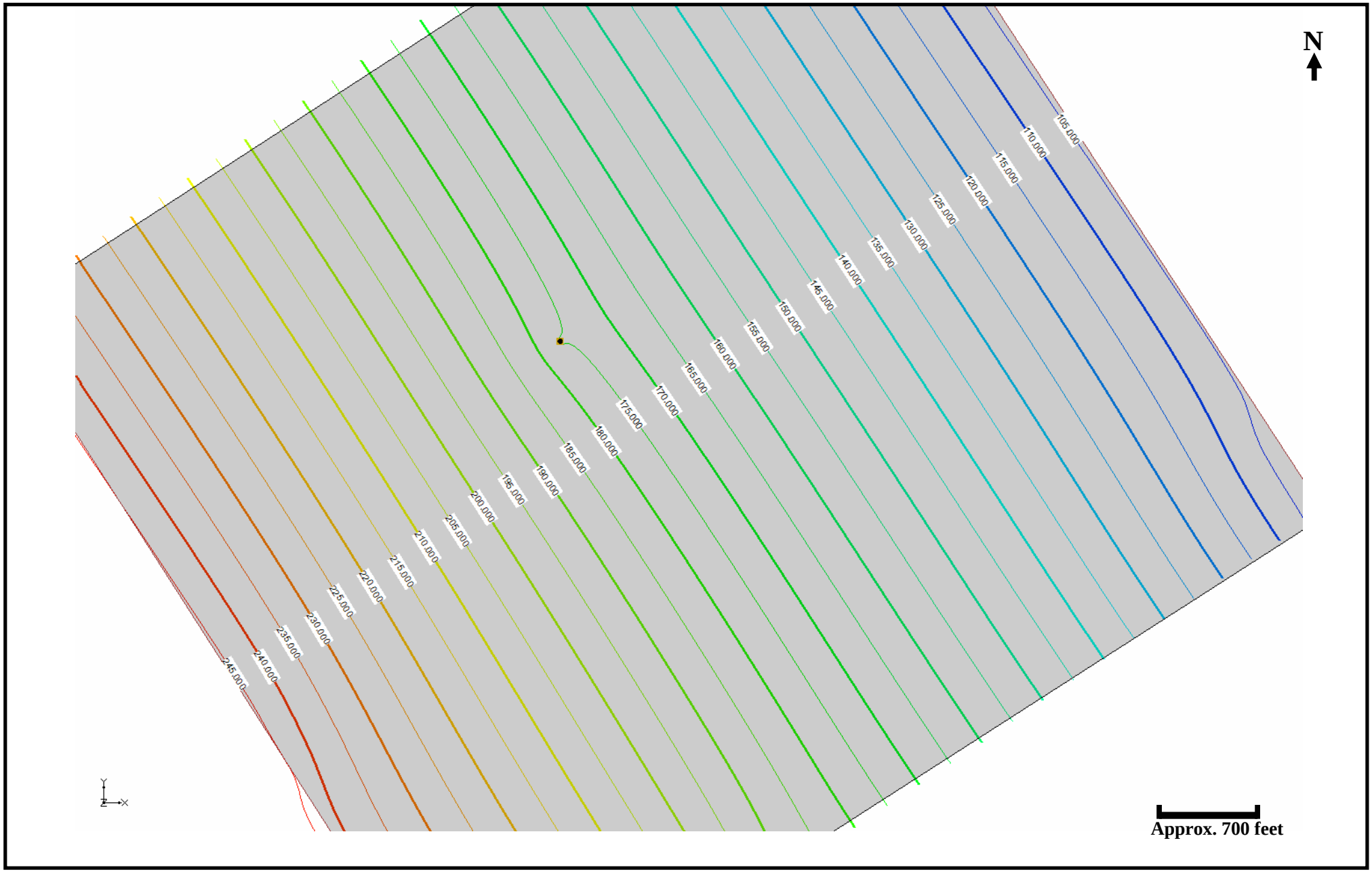


Figure 16. Layer 3 Groundwater Contour Map –Pumping at 2000 gpm

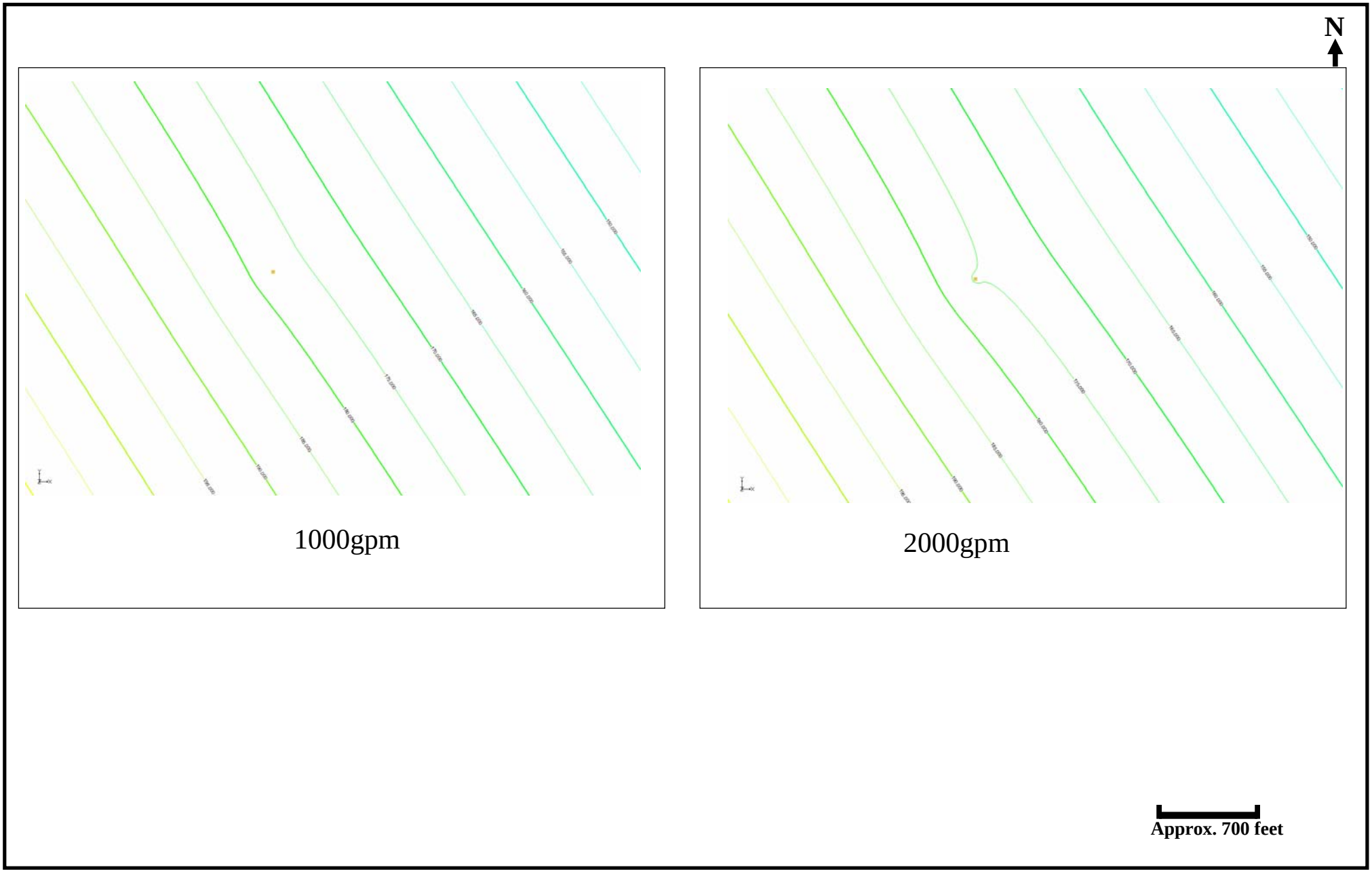


Figure 17. Layer 3 Comparison between pumping at 1000 gpm and 2000 gpm

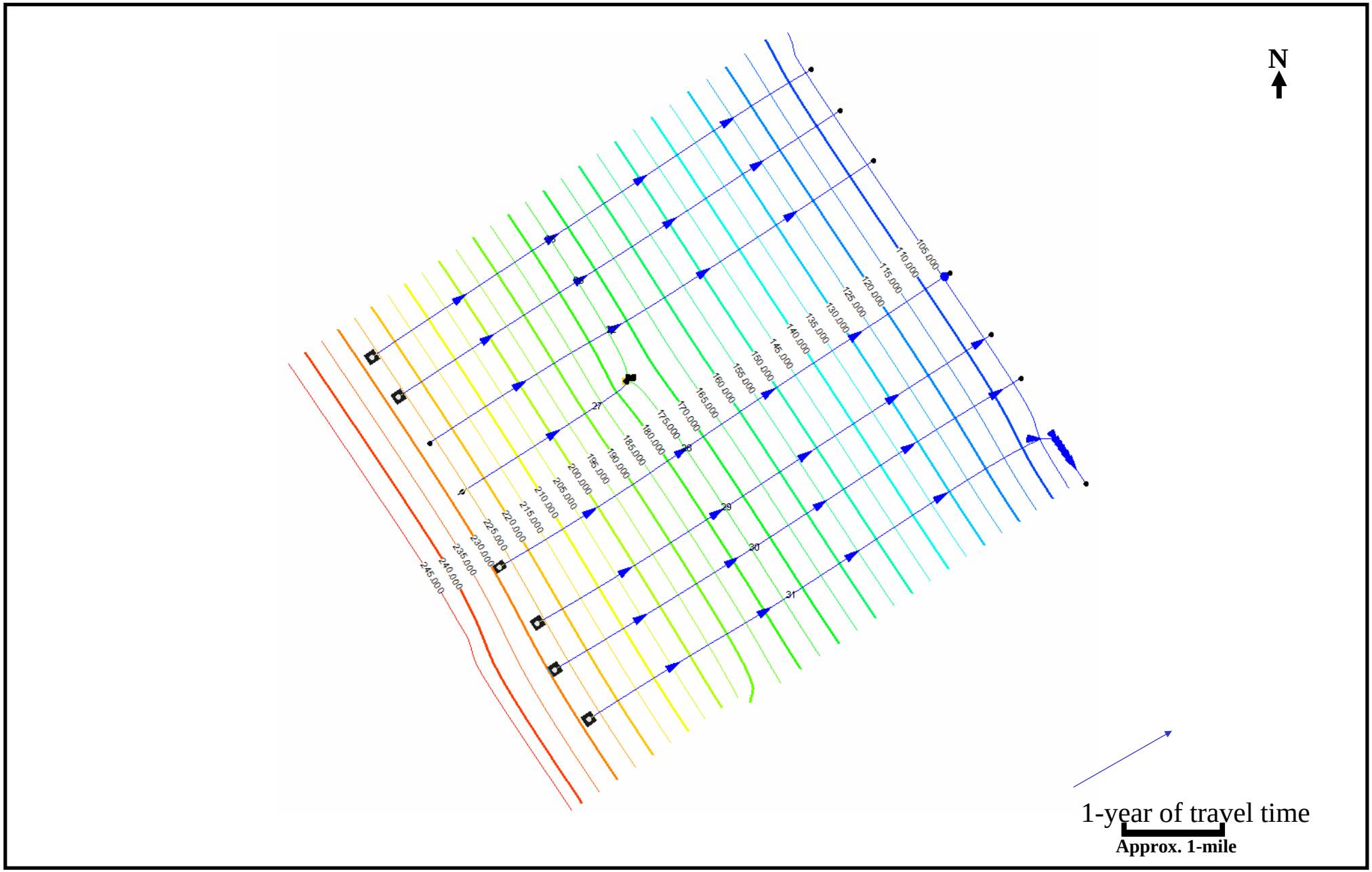


Figure 18. Forward Particle Tracking - Layer 3

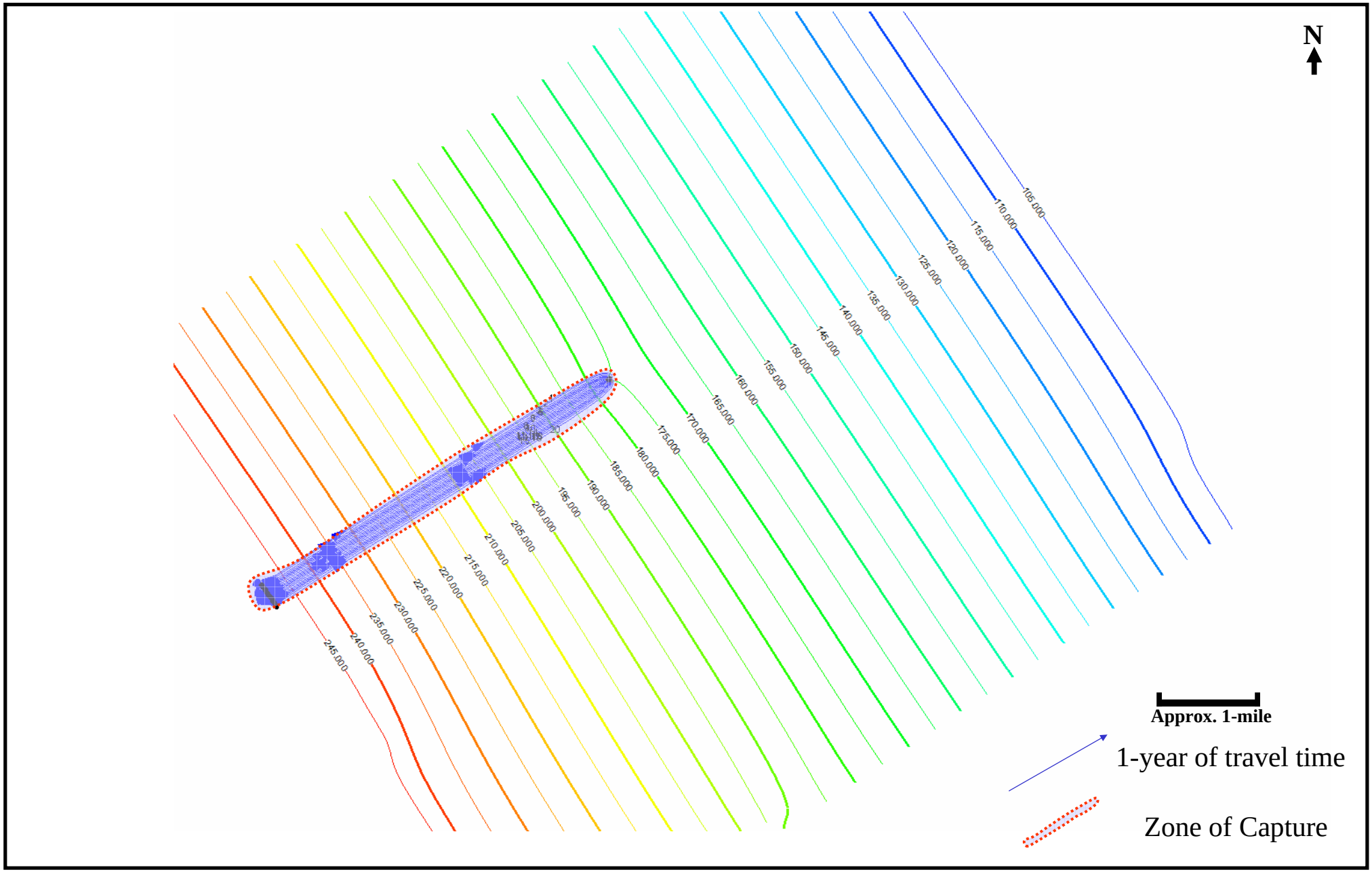


Figure 19. Backward Particle Tracking - Layer 3

URS

TECHNICAL MEMORANDUM

To: Jason Moore, Maggie Fitzgerald and Taras Kruk
From: Eddy Teasdale
Date: December 29, 2006

SUBJECT: PANOCHHE ENERGY CENTER (PEC) PROJECT - GROUNDWATER MODEL.

1.0 INTRODUCTION

This report summarizes the results of a Physical Availability Demonstration for the PEC Well, which might be drilled to provide industrial supply water to the new Panoche Energy Center. In order to complete the Physical Availability Demonstration as efficiently and quickly as possible, URS constructed and utilized a steady-state groundwater flow model. The purpose of this report is to summarize the geologic and hydrogeologic factors that control groundwater flow in proposed Well area, and to demonstrate the quantity of local groundwater resources that will be available to meet the demands without negatively impacting surrounding well purveyors.

1.1 MODEL COMPONENTS AND STRUCTURE

The groundwater flow model for PEC needs the following data:

- Size of model domain;
- Size of model grid (finite-difference discretization);
- Number of model layers;
- Top elevation of model top layer (layer 1);
- Bottom elevation of each model layer;
- Initial heads across model domain (initial condition);
- General heads and conductance at particular model boundaries (boundary condition);
- Horizontal hydraulic conductivity/transmissivity;
- Vertical anisotropy ratio;
- Groundwater recharge rates and distribution;
- Pumping rates for wells;

- Definition of time parameters for simulation (steady-state);
- Parameters for output control; and
- Control parameters for the selected solver.

1.2 MODEL ASSUMPTIONS

Assumptions are often required for modeling because of the characteristics of governing equations, system complexity, limited availability of measured data, modeling objectives, and constraints of solution methods and computer systems. Because the model was developed for PEC groundwater system, several basic assumptions are specific to local conditions. Following are the initial model assumptions.

- Groundwater behaves in accordance with Darcy's Law;
- Horizontal hydraulic conductivity is isotropic;
- There is no groundwater movement through the base layer of the model; and
- Groundwater head is vertically uniform within a model layer.

Model assumptions may influence the accuracy and reliability of simulation results. Where possible, fewer simplifying assumptions should be made, to ensure the appropriate representation of the complex system. The closer the assumptions approximate the groundwater system and field conditions, the more accurately the model will predict the real conditions. However, certain assumptions are deemed necessary to develop a practical model to conduct simulation. The impact of model assumptions may or may not be quantifiable, depending on the characteristics of individual assumptions and the capability of the modeling software. A reasonable set of assumptions will create a model that is not too complex to be handled by the mathematical techniques, yet is sufficiently detailed to accurately represent the system. The assumptions described are reasonable and practical, based on field conditions and professional judgment. However, as new data become available, some of the initial assumptions could be modified after upgrading the model.

2.0 NUMERICAL MODEL

Model Code

The groundwater flow model was developed using the Brigham Young University Environmental Modeling Research Laboratory (EMRL) *Groundwater Modeling System* (GMS), Version 6.0 (EMRL, 2006). GMS is a comprehensive graphical user interface (GUI) for performing groundwater simulations. GMS provides a graphical preprocessor/postprocessor interface to several groundwater modeling codes including MODFLOW and MODPATH. The EMRL of Brigham Young University, in partnership with the WES, developed the GMS interface. The GMS was used to develop a site conceptual hydrogeological model and to convert it into groundwater flow model. A brief summary of all modeling codes used during this modeling effort are presented below.

MODFLOW Groundwater Flow Model. The computer code selected to model groundwater flow beneath the site was MODFLOW. MODFLOW is a 3-D, cell-centered, finite difference, saturated flow model developed by the United States Geological Survey (USGS) (McDonald and Harbaugh, 1988). GMS provides an interface to the updated version, MODFLOW 2000 (Hill et al., 2000). Based on the information available, the uncertainties in site-specific information, the hydrogeologic complexity of the site, and the modeling objectives, MODFLOW was considered an appropriate groundwater flow code.

MODPATH Particle-Tracking Model. Particle-tracking simulations provide a convenient means of visualizing groundwater flow paths. This is particularly useful for evaluating capture zones around a pumping well. MODPATH was selected as the particle-tracking program for this effort. MODPATH is a 3-D particle-tracking program that enables reverse and forward tracking from sinks (wells) and sources, respectively. MODPATH also was developed by the USGS (Pollock, 1994). GMS has updated the interface for MODPATH to a seamless module that couples with MODFLOW 2000. MODFLOW flow modeling results (direction and rates of groundwater movement) are among the inputs for MODPATH runs.

2.1 MODEL GRID

The model grid extends approximately 6 miles in an east to west direction, and approximately 6 miles in a north to south direction, a total area of 36 square miles approximately centering on PEC Well Site, as shown on Figure 1. The model is this large to ensure that any irregularities along the model edges, caused by a lack of data, do not affect model calculations in the area of interest—the proposed well site and a one- to two-mile area surrounding it. The model grid is aligned in a northeast-southwest direction, which corresponds with the regional groundwater flow direction. The model grid has been refined within the PEC area to more accurately simulate hydrologic stresses in the area of primary interest. The variable model grid is shown in plan view on Figure 2. The variable model grid cell sizes range from 20 by 20 foot cells to 200 by 200 feet cells. The smaller grid spacing was used around the proposed PEC well site to minimize numerical errors in the flow simulation. In addition, the variable grid size allows for finer resolution in areas of steep hydraulic gradients such as near pumping wells. The wider-spaced cells, located far away from the PEC area and near the model edges where less computation resolution is required, require less computer resources during simulations.

In plan view, the domain is spatially discretized into 95 columns in length and 81 rows in width. Vertically, the model extends to a maximum depth of approximately -1188 feet msl. The model is divided into three layers. These layers roughly correspond to monitoring zones beneath the site: Layer 1: Upper Hydrologic Zone (Upper Tulare); Layer 2: Aquitard (Corcoran Clay); Layer 3: Lower Aquifer (Lower Tulare). The correlation of model domain layers to monitoring zone layers are shown on Figure 3. Model layer 1 and 2 are simulated as unconfined aquifers, and Model Layer 3 is simulated as a confined aquifer.

2.2 MODEL BOUNDARY CONDITIONS

2.2.1 General Head Boundaries

General head boundaries were specified along the model's eastern, and western Boundary. A general head boundary is a leakage boundary through which a groundwater flux can move either into or out of the model.

2.2.2 No Flow Boundaries

As previously mentioned, the model domain was rotated so that the top and bottom model boundaries (in plan view) are parallel to the general groundwater flow direction. Since the top and bottom boundaries (in plan view) of the model domain are parallel to the general groundwater flow directions, the top and bottom boundaries were set as no-flow boundaries.

Boundary conditions in all three layers are the same and are presented on Figure 4.

2.3 GROUNDWATER LEVELS

The starting heads for the model were calculated from a recent groundwater investigation performed at PEC (URS, 2006) and local groundwater elevation maps (Westlands Water District, 2001). The Westlands Water District groundwater elevation maps were used to qualitatively check model results to ensure reasonable model-calculated directions of groundwater flow. Additional data used to construct the groundwater model were obtained from the Ground-water Flow in the Central Valley Report (Williamson et. al 1989).

2.4 HYDRULIC CONDUCTIVITY AQUIFER PARAMETERS

Several attempts were made to collect aquifer characteristic data from surrounding production wells and site-specific aquifer parameter data were very limited. Therefore, Initial estimates of hydraulic conductivity for model layers 1 through 3 were obtained from The US Geological Survey Professional Paper 1401-D (Williamson et. al 1989). Williamson et. al initial estimates of hydraulic conductivity for the Central Valley model were developed from aquifer test data, specific capacity data from area wells, recovery test data and particle size data from the USGS. These values were then adjusted during their model calibration process. According to Williamson et. al., Upper Tulare hydraulic conductivity values that range from 0.0053 to 110 feet/day with higher conductivity values corresponding to the coarser materials along major drainages. The Corcoran hydraulic conductivity values that range from 0.0053 to 1.1 feet/day with lower values generally corresponding to central basin areas where finer-grained (clay) sediments are located. The Lower Tulare sediments have hydraulic conductivity values that range from 1.1 to 110 feet/day

Model layer 1 and 2 were modeled as unconfined and Model layers 3 was modeled as a fully confined aquifer. Model layer 1 has hydraulic conductivity value of 10 feet/day. Model layer 2 has a hydraulic conductivity values of 0.0053 feet/day. Model Layer 3 has a hydraulic

conductivity values of 100 feet/day. Vertical anisotropy ratios for the three model layers are as follows:

Layer 1 Kh/Kv = 10:1
Layer 2 Kh/Kv = 100:1
Layer 3 Kh/Kv = 10:1

2.5 VERTICAL GRADIENTS

Vertical gradients (potential for vertical flow) were calculated for several important reasons:

- Used to determine the potential vertical flow direction of groundwater
- It can reveal the hydraulic effects of groundwater pumping on different monitoring zones
- Is used as a tool to calculate groundwater elevations in areas where no current groundwater data is available.
- Used in the groundwater model to set-up initial boundary condition values.

Vertical gradients are based on depth-to-groundwater measurements collected from "cluster" wells (wells located radially within 50-feet of each other and screened in different monitoring zones) or "nested" wells (multiple wells in one borehole and screened in different zones). The head in the well within the deeper screen elevation minus the screen in the well with the shallow screen elevation divided by the vertical distance between the midpoint of the well screens of the two wells is used to determine the potential for groundwater to flow upward (positive gradient) or downward (negative gradient).

Ideally, several well pairs throughout an area will be used to calculate vertical gradients so an average vertical gradient can be computed. Unfortunately; because of limited access at the PEC site, vertical gradients were only available from the recent monitoring well install, so this data should not be considered an adequate representation of the entire area. Vertical gradients range from –0.0046 to 0.0020. Vertical gradient calculations indicate that there is an upwards gradient (positive) in the upper aquifer and downward (negative) gradient in the lower aquifer. Published data from Belitz and Heimes (1990) indicate that vertical gradients are variable depending where in the subsurface the wells are completed and also vary depending on the geologic environment.

2.6 RECHARGE

Recharge is the primary inflow model study area. Initial estimates of groundwater recharge were obtained from Rantz (1969). The components of groundwater recharge within the model study area do not include agricultural irrigation, urban irrigation, canal leakage, artificial lake seepage, and ephemeral stream infiltration.

2.7 PUMPING

Groundwater pumping represents the major outflow from the groundwater system within the model study area. Pumping from existing production wells are not simulated in the model as individual well screened intervals and pumping rates are not known. Attempts were made to contact neighboring well owners, but unfortunately specific well construction details and flow rates could not be acquired.

3.0 PHYSICAL AVAILABILITY ANALYSIS

The impact on the regional aquifers from groundwater pumping of the proposed PEC well to meet project water demands was evaluated. Following the completion of the steady-state groundwater flow model, several model simulations were run. To simulate the pumping from the proposed PEC well, the well was installed in Layer 3. The following is summary of those runs:

Simulation	Simulated PEC Pumping (Yes/No)	Pumping Rate (gpm)
1	No	N/A
2	Yes	750
3	Yes	1000
4	Yes	2000

3.1 SIMULATION 1

The model calculated groundwater surface contour map is illustrated for each layer (see Figures 5, 6 and 7). Note that the groundwater surface contour maps do not include the impacts of the proposed PEC well.

3.2 SIMULATION 2

The proposed PEC well pumped from Layer 3 at 750gpm (see Figures 8, 9 and 10). Note no noticeable drawdown occurs in any of the layers. The 750 gpm rate is the proposed pumping rate for the PEC well.

3.3 SIMULATION 3

The proposed PEC well pumped from Layer 3 at 1000 gpm. Note no noticeable drawdown occurs in any of the layers (see Figures 11, 12 and 13). The 1000 gpm rate is 33% more than the proposed pumping rate for the proposed PEC well.

3.4 SIMULATION 4

The proposed PEC well pumped from Layer 3 at 2000 gpm (see Figures 14, 15, and 16). Note less than 0.5 feet of drawdown occurs in Layer 2 (see Figure 15) and approximately 2 feet of drawdown was noticed in Layer 3 (see Figure 16). Comparisons between the 1000 gpm and 2000 gpm are presented on Figure 17. The 2000 gpm rate is 160% more than the proposed pumping rate for the PEC well.

4.0 LIMITED PARTICLE TRACKING ANALYSIS

Particles generated using MODPATH may be calculated to travel either forward (downgradient) through the model simulation or backward (upgradient from a specific point, such as an pumping well). Forward traveling particles provide information about the predicted route of groundwater over the model run. The particle starting locations are selected to predict groundwater migration from specific locations through time. Forward-traveling particles that are captured in an extraction well might not, however, predict the full capture zone for that well. They only predict the travel route for the particular starting location of the particle. Backward traveling particles predict where groundwater has traveled to reach a specific location. Particles traveling backward from an extraction well would predict the extent of that well's capture zone. Two separate predictive scenarios were conducted to evaluate where the groundwater being captured was coming from and to also see if the proposed PEC well will have a significant impact on the regional groundwater flow system in the lower aquifer.

Figure 18 shows the model results of "forward" predictive scenarios. Starting locations for the forward-traveling particles were set along the perimeters of the model area, the PEC well is pumping at 2000 gpm. Individual arrowheads along each particle path represent a 1-year time frame. As noted in Figure 18, there is no significant change in the regional groundwater flow regime.

Figure 19 shows the model results of the "backward" traveling particles. For backward particle tracking, particles are added at the well and the model is run to see what the proposed pumping influence would be on up gradient flow regimes and can also be used as a tool to estimate the zone of capture. The zone of capture for the PEC well pumping at 2000 gpm is approximately 270-feet wide. As with the forward particle tracking, individual arrowheads along each particle path represent a 1-year time frame.

It should be noted that in reality, the anisotropy of the aquifer and recharge characteristics would likely distort both of these scenarios.

5.0 SUMMARY AND CONCLUSIONS

A three-dimensional, finite-difference groundwater flow model was developed for the Panoche Energy Site in Fresno County, California. The model was developed using available historical information, PEC monitoring well installation data, and selected literature. The purpose of this model is to estimate the effects the future pumping of the proposed groundwater production well might have on Upper Tulare Aquifer, the Corcoran Aquitard, the Lower Tulare Aquifer, both local and regional flow regime and on surrounding wells.

Both the vertical gradient data (collected from the recent monitoring well installation) and hydraulic conductivity data (from published references) were used in the construction of the 3-D groundwater model. In summary, four groundwater-pumping scenarios (Scenario 1, no pumping; Scenario 2, pumping at 750 gpm; Scenario 3, pumping at 1000 gpm; Scenario 4, pumping at 2000 gpm) were incorporated into the model. Based on the predicted groundwater demand of the proposed facility, the proposed PEC well will be pumped at an average of 750 gpm. The Model run (Scenario 2) predict that if the well is pumped at 750 gpm, there will be no impacts (no drawdown) will occur in either of the aquifers. Even when the well is pumped at 1000 gpm (33% more than the proposed pumping rate) no noticeable drawdown occurs. Limited drawdown (less than 2.5 feet) occurs when the well is pumped at 2000 gpm.

Use of this model is considered adequate for screening purposes during this study. It is worth mentioning that a numerical model is a convenient and cost-efficient tool to mimic site conditions and to provide some difficult-to-attain insight into the groundwater responses under various natural and man-made conditions. However, any information obtained from modeling contains a certain level of uncertainty, especially for long-term predictions. Section 6.0 discusses uncertainty in greater detail.

6.0 MODEL USE, LIMITATIONS, AND UNCERTAINTY

This document and the model documented herein have been developed based on certain key assumptions made by URS, which substantially affect the efforts. These assumptions, although thought to be reasonable and appropriate, may not prove true in the future. Some of the data and assumptions have not been developed by URS have been accepted at face value. URS is not responsible for the validity or accuracy of non-URS information.

This document has been prepared by URS under the review of registered professionals. The model and this document are based upon URS interpretation of the available information. The interpretation and the conclusions drawn were governed by URS' experience and professional judgment.

This groundwater flow model can be a powerful tool, if used appropriately, to assist in making management decisions for the PEC groundwater program. Groundwater models are simplifications of the natural environment and therefore have recognized limitations. Hence, some uncertainty exists in the ability of this model to predict groundwater flow. Considerable effort was expended to minimize model uncertainty by using real-world values as model input whenever available and by conducting numerous model runs to calibrate and verify the model. Uncertainty of the model output reflects uncertainties in the conceptual model, the input parameters, and the ability of the mathematical model to simulate real-world conditions adequately.

The model uses steady-state flow conditions. It should be noted that no calibration was performed on this model other than visually comparing reference groundwater elevation contours from Westlands Water District to simulated heads. Additional data/model improvements required to vastly improve the current steady state flow model would include the following:

1. A well inventory would initially be performed and then the model results (simulated) could be compared/calibrated to observed well data.
2. Land Use would be incorporated into the Recharge values
3. Westland Water District groundwater contour maps for current conditions (2006) should be incorporated in to groundwater model for both upper and lower aquifer.
4. Water Purveyors in model domain could provide pumping rate data
5. Update hydraulic conductivity data with site-specific data.
6. If future modeling is required, a transient model could be developed using site-specific data including specific yield and specific storage values.
7. After the proposed PEC well has been installed, pumping test data could be incorporated in to this model and used as a tool to see how future pumping will influence local groundwater flow regimes.

7.0 REFERENCES

Anderson, M., and W. Woessner, 1992. *Applied Groundwater Modeling: Simulation of Flow and Advective Transport*. Academic Press, San Diego, California.

Belitz, K., and F.J. Heimes, 1990. Character and Evolution of the Ground-Water Flow System in the Central Part of the Western San Joaquin Valley, California, US Geological Survey Water Supply Paper 2348

EMRL, 2006. *Groundwater Modeling System*, Version 6.0. Brigham Young University.

Hill, M., E. Banta, A. Harbaugh, and E. Anderman, 2000. *MODFLOW-2000, The U.S. Geological Survey Modular Ground-Water Model; User Guide to the Observation, Sensitivity, and Parameter-Estimation Processes and Three Post-Processing Programs*. Open-File Report 00-184. U.S. Geological Survey. Denver, Colorado.

McDonald, M., and A. Harbaugh, 1988. *A Modular Three-Dimensional Finite-Difference Ground-Water Flow Model*. Book 6, Chapter A1. Techniques of Water-Resources Investigations of the United States Geological Survey. U.S. Geological Survey, Reston, Virginia.

Pollock, D., 1994. *Users Guide for MODPATH/MODPATH-Plot, Version 3: A Particle Tracking Post-Processing Package for MODFLOW, the U.S. Geological Survey Finite-Difference Ground-Water Flow Model*. U.S. Geological Survey, Reston, Virginia.

Westlands Water District (2001). Groundwater Elevation Contours for Upper and Lower Aquifer. Maps are available at www.westlandswater.org under Water & Power, Groundwater and Maps.

Williamson, A.K., Prudic, D.E., and Swain, L.A., 1989, Ground-Water Flow in the Central Valley, Regional Aquifer-System Analysis, Central Valley, California, US Geological Survey Professional Paper 1401-D.

URS

MEMORANDUM

Date: January 2, 2007 Job No. 29869765

To: **Maggie Fitzgerald**
URS Corporation

From: **Stuart B. St. Clair, PE, & Cynthia Shen**
URS Corporation

Re: Limited Soil Investigation
Planned Panoche Energy Center
Fresno County, California

At the request of the California Energy Commission (CEC), URS Corporation (URS) collected soil samples at the above-referenced site to assess whether surface soil contains residual pesticide concentrations that could pose a potential health risk or hazard to workers. The work was completed by URS on behalf of the Panoche Energy Center as a part of the Response to Data Request No. 60 being submitted to the CEC.

The proposed Panoche Energy Center Power Plant Project consists of the 12.8-acre site and the adjacent 7.2-acre planned laydown area. The site and adjacent laydown area are currently developed as part of a pomegranate orchard. The soil sampling activities discussed herein were conducted in accordance with the August 26, 2002 California Department of Toxic Substances Control (DTSC) "Interim Guidance for Sampling Agricultural Fields for School Sites" as requested by the CEC.

The current owner purchased the parcel that includes the site and laydown area in 1987. He reported to a PEC representative that paraquat has not been used on the property in the time he has owned it. Therefore, in accordance with the DTSC guidance document, the soil samples collected from the site and laydown area were analyzed only for organochlorine pesticides (OCPs) and metals.

SAMPLING AND ANALYSIS

A URS geologist collected 40 discrete soil samples on December 19, 2006. The samples were collected from the depth interval of approximately 0 to 3 inches below ground surface (bgs) at 40 locations spaced regularly across the site and the adjacent planned laydown area. The sample locations are shown on the attached Figure 1. The latitude and longitude of each of the sample locations were measured to an accuracy of approximately 15 feet using a Global Positioning System instrument.

Soil samples were collected directly into laboratory certified-clean glass jars provided by the analytical laboratory. Immediately after sampling, the jars were capped, labeled, and placed into an ice-cooled, insulated container. An equipment rinsate blank sample was not collected because no reusable sampling equipment that required cleaning between sample locations was used. The samples were shipped under chain-of-custody protocol via overnight courier to Alpha Scientific Corporation

Environmental Laboratories (Alpha). Alpha is accredited under the Environmental Laboratory Accreditation Program (ELAP) of the California Department of Health Services (Certification Number 2633).

In accordance with the DTSC guidance document, the laboratory prepared 11 composite samples (10 primary composite samples and one duplicate composite sample) from the 40 discrete samples. Each composite sample consisted of four discrete surface samples from adjacent sampling locations. The laboratory analyzed the 11 composite samples for OCPs using method 8081A of the U.S. Environmental Protection Agency (USEPA). In addition, the four discrete samples associated with the composite sample with the highest detected total concentration of OCPs were also analyzed for OCPs per the DTSC guidance document. The laboratory analyzed five of the composite samples (four primary composite samples and one duplicate composite sample) for Title 22 total metals using USEPA methods 6010B and 7471A. Eleven discrete soil samples (one discrete sample from each of the 10 primary composite samples and a duplicate discrete sample) were analyzed for arsenic using USEPA method 6010B.

DATA QUALITY ASSESSMENT

The analytical reporting limits reported by the laboratory were less than the respective California Human Health Screening Levels (CHHSL) for commercial/industrial land use as established by the California Environmental Protection Agency (CalEPA) and less than the detection limits specified in the DTSC guidance document. Analytes were not detected in any of the laboratory method blank samples. Percent recoveries for surrogate compounds and for laboratory control spike/laboratory control spike duplicate (LCS/LCSD) and matrix spike/matrix spike duplicate (MS/MSD) samples were all within the laboratory's acceptance limits. The relative percent differences (RPDs) for analytes in LCS/LCSD or MS/MSD pairs were all below 30-percent, which is generally considered acceptable. The RPDs for analytes in the primary and duplicate samples were all below 20-percent, except for nickel which had an RPD of 42-percent. An RPD of less than 50-percent is generally considered acceptable for primary/duplicate sample pairs. Non-project samples were utilized for the MS/MSD analyses. Consequently, matrix effects cannot be determined; however this is not in itself basis for data qualification.

Overall, the data are considered useable for the intended purpose.

FINDINGS

Analytical results for OCPs and metals are summarized on the attached Tables 1 and 2, respectively. The laboratory report is attached. Four of the OCP compounds analyzed and eight of the metal compounds analyzed were detected in the composite and discrete soil samples reported in Tables 1 and 2. The mean and maximum concentrations of detected chemicals are presented on the attached Table 3, along with the respective commercial/industrial CHHSLs. Note that the OCP concentrations were converted from micrograms per kilogram (µg/kg) on Table 1 to milligrams per kilogram (mg/kg) on Table 3.

As shown in Table 3, with the exception of arsenic, the maximum concentration of each chemical detected in the on-site surface soil samples was well below the respective commercial/industrial

CHHSL. In the case of arsenic, the maximum concentration of 12.2 mg/kg was greater than the commercial/industrial CHHSL of 0.24 mg/kg. However, the arsenic concentrations detected in the on-site samples are similar to background soil concentrations reported for the area. In the 1980s, 721 soil samples were collected from the Panoche Fan study area, which comprised approximately 750 square miles including the site (USGS, 1989). The samples were collected from a depth interval of approximately 5.5- to 6-feet bgs. Arsenic concentrations in the 721 samples ranged from 3.4 to 21 mg/kg. Thirty-seven of the USGS samples had arsenic concentrations of 12 mg/kg or greater. The five USGS samples nearest to the site contained arsenic concentrations ranging from 6.5 to 8.5 mg/kg. Arsenic concentrations in the 11 discrete soil samples (including one duplicate sample) analyzed by URS ranged from 4.9 to 12.2 mg/kg. Arsenic concentrations in the five composite soil samples (including one duplicate sample) analyzed by URS ranged from 7.7 to 10 mg/kg. These arsenic concentrations are within the range of background arsenic concentrations for the area as reported in the USGS report.

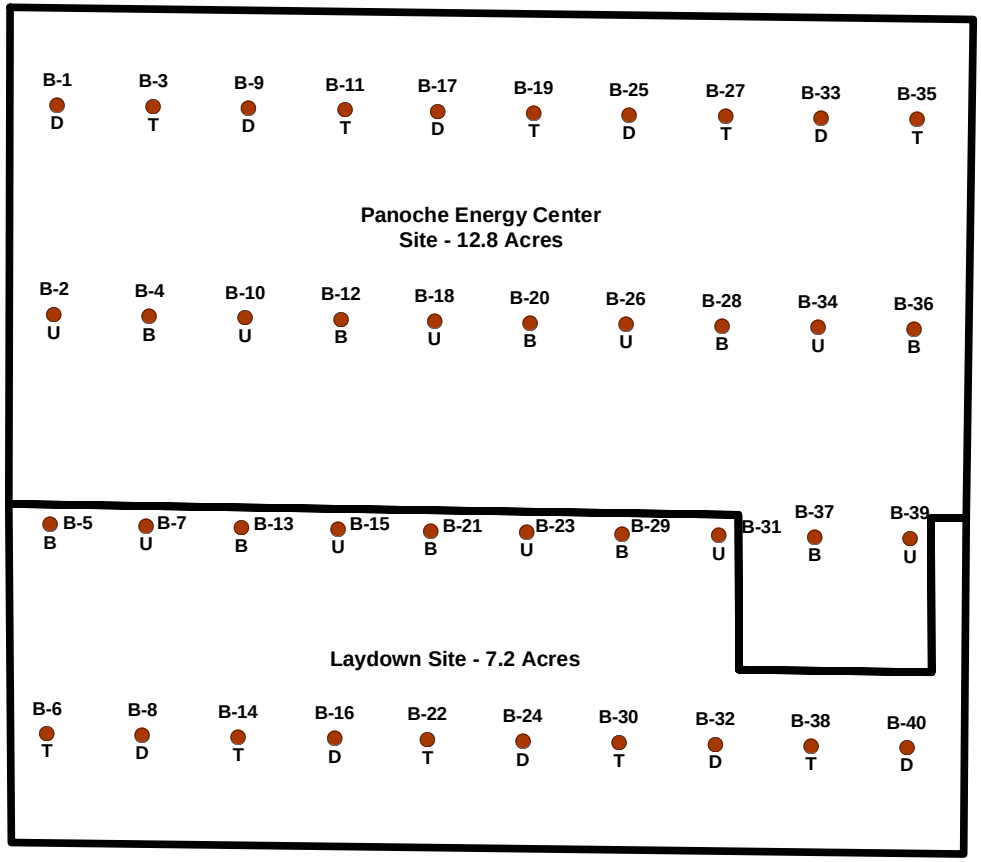
In summary, the only chemical that was detected at concentrations greater than the commercial/industrial CHHSLs was arsenic. However, it appears likely that the arsenic concentrations detected at the site are naturally occurring and are not due to applications of pesticides.

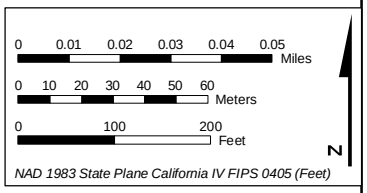
Reference: California Environmental Protetion Agency (CalEPA), 2005, “Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties”.

Department of Toxic Substances Control (DTSC), 2002, “Interim Guidance for Sampling Agricultural Fields for School Site (Second Revision)”.

United States Department of the Interior, Geological Survey (USGS), 1989, “Analysis of 721 Soil Samples from the Panoche Fan Area of the San Joaquin Valley, California” Open File Report 89-298.

Attachments: Figure 1
Tables 1 – 3
Laboratory Report





Legend

B-1 Surface Soil Sample Location

Sample Explanation

B = Sample Between Rows of Trees
D = Sample at Drip Line of Tree
T = Sampe Between Trees in a Row
U = Sample Under Tree Canopy

Source: URS 12/19/06 Sample Locations.

PANOCHE ENERGY CENTER, LLC	Figure 1	SURFACE SOIL SAMPLE LOCATIONS PANOCHE ENERGY CENTER	2006

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TABLE 1
SOIL ANALYTICAL RESULTS ORGANOCHLORINE PESTICIDES
Planned Panoche Energy Center
Fresno County, CA

	Sample Location:	B25	B26	B27	B28	B1,B2,B3,B4	B5,B6,B7,B8	B5,B6,B7,B8	B9,B10,B11,B12
	Sample ID:	B-25 @ 0-3"	B-26 @ 0-3"	B-27 @ 0-3"	B-28 @ 0-3"	Composite 1	Composite 2	Composite 2 Duplicate	Composite 3
	Sample Date:	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06
	Sample Depth:	0-3"	0-3"	0-3"	0-3"	0-3"	0-3"	0-3"	0-3"
	Method ID:	USEPA 8081A	USEPA 8081A	USEPA 8081A	USEPA 8081A	USEPA 8081A	USEPA 8081A	USEPA 8081A	USEPA 8081A
ANALYTE	Units								
Aldrin	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
a-BHC	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
b-BHC	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
g-BHC	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
d-BHC	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlordane	ug/kg	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25
Chloroneb	ug/kg	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
4,4'-DDD	ug/kg	4.3 J	6.0	4.0 J	4.8 J	3.8 J	4.6 J	4.9 J	4.3 J
4,4'-DDE	ug/kg	13.2	18.3	13.2	11.9	10.7	12.5	12.4	13.3
4,4'-DDT	ug/kg	16.7	19.1	14.3	15.8	13.6	16.2	16.5	15.0
Dieldrin	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Endosulfan I	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Endosulfan II	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Endosulfan sulfate	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Endrin	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Endrin Aldehyde	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Heptachlor	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Heptachlor epoxide	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Methoxychlor	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Mirex	ug/kg	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Toxaphene	ug/kg	160	218	156	181	133	180	181	184
Trifluralin	ug/kg	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100

NOTES:

Detected concentrations are printed in boldface type.

"< #" indicates that the chemical was not detected at or above the analytical reporting limit (#).

USEPA = U.S. Environmental Protection Agency

ug/kg = micrograms per kilogram

J = estimated trace value between the method detection limit and the practical quantitation limit

TABLE 1
SOIL ANALYTICAL RESULTS ORGANOCHLORINE PESTICIDES
Planned Panoche Energy Center
Fresno County, CA

	Sample Location:	B13,B14,B15,B16	B17,B18,B19,B20	B21,B22,B23,B24	B25,B26,B27,B28	B29,B30,B31,B32	B33,B34,B35,B36	B37,B38,B39,B40
	Sample ID:	Composite 4	Composite 5	Composite 6	Composite 7	Composite 8	Composite 9	Composite 10
	Sample Date:	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06
	Sample Depth:	0-3"	0-3"	0-3"	0-3"	0-3"	0-3"	0-3"
	Method ID:	USEPA 8081A	USEPA 8081A	USEPA 8081A	USEPA 8081A	USEPA 8081A	USEPA 8081A	USEPA 8081A
ANALYTE	Units							
Aldrin	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
a-BHC	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
b-BHC	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
g-BHC	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
d-BHC	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlordane	ug/kg	< 25	< 25	< 25	< 25	< 25	< 25	< 25
Chloroneb	ug/kg	< 500	< 500	< 500	< 500	< 500	< 500	< 500
4,4'-DDD	ug/kg	5.9	5.1	4.1 J	5.5	3.7 J	4.4 J	4.0 J
4,4'-DDE	ug/kg	21.6	13.9	13.6	16.8	12.8	16.2	16.2
4,4'-DDT	ug/kg	21.5	17.0	15.1	18.7	13.6	16.4	14.8
Dieldrin	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Endosulfan I	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Endosulfan II	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Endosulfan sulfate	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Endrin	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Endrin Aldehyde	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Heptachlor	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Heptachlor epoxide	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Methoxychlor	ug/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Mirex	ug/kg	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Toxaphene	ug/kg	180	216	175	229	158	191	182
Trifluralin	ug/kg	< 100	< 100	< 100	< 100	< 100	< 100	< 100

NOTES:

Detected concentrations are printed in boldface type.

"< #" indicates that the chemical was not detected at or above the analytical reporting limit (#).

USEPA = U.S. Environmental Protection Agency

ug/kg = micrograms per kilogram

J = estimated trace value between the method detection limit and the practical quantitation limit

TABLE 2
SOIL ANALYTICAL RESULTS TITLE 22 METALS
Planned Panoche Energy Center
Fresno County, CA

Sample Location:		B1	B5	B9	B13	B13	B20	B24	B28	B32	B33
Sample ID:		B-1 @ 0-3"	B-5 @ 0-3"	B-9 @ 0-3"	B-13 @ 0-3"	B-13 @ 0-3" Duplicate	B-20 @ 0-3"	B-24 @ 0-3"	B-28 @ 0-3"	B-32 @ 0-3"	B-33 @ 0-3"
Sample Date:		12/19/06	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06
Sample Depth:		0-3"	0-3"	0-3"	0-3"	0-3"	0-3"	0-3"	0-3"	0-3"	0-3"
Method ID:		USEPA 6010B/7471A	USEPA 6010B/7471A	USEPA 6010B/7471A	USEPA 6010B/7471A	USEPA 6010B/7471A	USEPA 6010B/7471A	USEPA 6010B/7471A	USEPA 6010B/7471A	USEPA 6010B/7471A	USEPA 6010B/7471A
ANALYTE	Units										
Antimony	mg/kg										
Arsenic	mg/kg	8.0	7.3	4.9	7.1	6.7	7.6	6.3	7.2	7.8	12.2
Barium	mg/kg										
Beryllium	mg/kg										
Cadmium	mg/kg										
Chromium	mg/kg										
Cobalt	mg/kg										
Copper	mg/kg										
Lead	mg/kg										
Mercury	mg/kg										
Molybdenum	mg/kg										
Nickel	mg/kg										
Selenium	mg/kg										
Silver	mg/kg										
Thallium	mg/kg										
Vanadium	mg/kg										
Zinc	mg/kg										

NOTES:

Detected concentrations are printed in boldface type.

A blank entry indicates the sample was not analyzed for that chemical.

"< #" indicates that the chemical was not detected at or above the analytical reporting limit (#).

USEPA = U.S. Environmental Protection Agency

mg/kg = milligrams per kilogram

TABLE 2
SOIL ANALYTICAL RESULTS TITLE 22 METALS
Planned Panoche Energy Center
Fresno County, CA

	Sample Location:	B37	B5,B6,B7,B8	B5,B6,B7,B8	B9,B10,B11,B12	B29,B30,B31,B32	B33,B34,B35,B36
	Sample ID:	B-37 @ 0-3"	Composite 2	Composite 2 Duplicate	Composite 3	Composite 8	Composite 9
	Sample Date:	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06	12/19/06
	Sample Depth:	0-3"	0-3"	0-3"	0-3"	0-3"	0-3"
	Method ID:	USEPA 6010B/7471A	USEPA 6010B/7471A	USEPA 6010B/7471A	USEPA 6010B/7471A	USEPA 6010B/7471A	USEPA 6010B/7471A
ANALYTE	Units						
Antimony	mg/kg		< 2	< 2	< 2	< 2	< 2
Arsenic	mg/kg	8.4	7.7	8.8	10	8.2	9.9
Barium	mg/kg		327	353	437	361	425
Beryllium	mg/kg		< 2	< 2	< 2	< 2	< 2
Cadmium	mg/kg		< 2	< 2	< 2	< 2	< 2
Chromium	mg/kg		< 2	< 2	< 2	< 2	< 2
Cobalt	mg/kg		9.1	11	13	11	12
Copper	mg/kg		27	29	38	30	35
Lead	mg/kg		10	11	14	11	11
Mercury	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	mg/kg		< 2	< 2	< 2	< 2	< 2
Nickel	mg/kg		13	20	27	38	41
Selenium	mg/kg		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Silver	mg/kg		< 2	< 2	< 2	< 2	< 2
Thallium	mg/kg		< 2	< 2	< 2	< 2	< 2
Vanadium	mg/kg		85	90	111	108	127
Zinc	mg/kg		84	96	117	98	110

NOTES:

Detected concentrations are printed in boldface type.

A blank entry indicates the sample was not analyzed for that chemical.

"< #" indicates that the chemical was not detected at or above the analytical reporting limit (#).

USEPA = U.S. Environmental Protection Agency

mg/kg = milligrams per kilogram

TABLE 3
SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL
Planned Panoche Energy Center
Fresno County, CA

Chemical Detected at Site	Number of Samples	Number of Detections	Frequency of Detection (%)	Site Minimum Concentration (mg/kg)	Site Maximum Concentration (mg/kg)	Site Arithmetic Mean Concentration (mg/kg)	Commercial/ Industrial CHHSL (mg/kg)
Naturally Occurring Metals							
Arsenic	16	16	100	4.9	12.2	8.0	0.24
Barium	5	5	100	327	437	381	63,000
Cobalt	5	5	100	9.1	13	11	3,200
Copper	5	5	100	27	38	32	38,000
Lead	5	5	100	10	14	11	3,500
Nickel	5	5	100	13	41	28	16,000
Vanadium	5	5	100	85	127	104	6,700
Zinc	5	5	100	84	117	101	100,000
Organochlorine Pesticides							
4,4'-DDD	15	15	100	0.0037 J	0.0060	0.0056	9.0
4,4'-DDE	15	15	100	0.0107	0.0216	0.0144	6.3
4,4'-DDT	15	15	100	0.0136	0.0215	0.0163	6.3
Toxaphene	15	15	100	0.133	0.229	0.182	1.8

NOTES:
The number of samples and number of detections include discrete, composite, and duplicate samples.
mg/kg = milligrams per kilogram
J = estimated trace value between the method detection limit and the practical quantitation limit
CHHSL = California Human Health Screening Level

Alpha Scientific Corporation
Environmental Laboratories

12 26 2006

Mr Stuart St Clair
RS Corporation
30 Ri er Park Pla e West, Suite 180
Fresno, C 93720

Pro e t: 29869765
Pro e t Site: Pano he Energy Center
Sample Date: 12 19 2006
ab Job o : R612122

Dear Mr St Clair:

En losed please find the analyti al report for the sample(s) re ei ed by lpha S ientifi Corporation on 12 20 2006 and analy ed for the follo ing analytes:

EP 8081 (Organo hlorine Pesti ides)
EP 6010B/7471 for C M Metals
EP 6010B (rseni)

The sample(s) arri ed in good onditions (i e , hilled, inta t) and ith a hain of ustody re ord atta hed

lpha S ientifi Corporation is a C DHS ertified laboratory (Certifi ate umber 2633) Thank you for gi ing us the opportunity to ser e you Please feel free to all me at (562) 809 8880 if our laboratory an be of further ser i e to you

Sin erely,

Roger Wang, Ph D
aboratory Dire tor

En losures

This o er letter is an integral part of this analyti al report

Client	RS Corporation	ab Job o:	R612122
Pro e t:	29869765		
Pro e t Site:	Pano he Energy Center	Date Sampled:	12 19 2006
Matri :	Soil	Date Re ei ed:	12 20 2006
E tra tion Method:	EP 3550B	Date E tra ted:	12 20 2006
Bat h o:	1220 PS1	Date naly ed:	12 20 2006
		Date Reported:	12 21 2006

EPA 8081A (Organochlorine Pesticides)
Reporting Unit: µg/kg (ppb)

LAB SAMPLE I.D.			MB	R612122 (1 4)	R612122 (5 8)	R612122 (5 8) D P	R612122 (9 12)	R612122 (13 16)	R612122 (17 20)
CLIENT SAMPLE I.D.				Composite 1 (B1 B4)	Composite 2 (B5 B8)	Composite 2 D P (B5 B8)	Composite 3 (B9 B12)	Composite 4 (B13 B16)	Composite 5 (B17 B20)
DILUTION FACTOR				1	1	1	1	1	1
COMPOUND	MDL	PQL							
Ipha BHC	3	5	D	D	D	D	D	D	D
Gamma BHC (indane)	3	5	D	D	D	D	D	D	D
Hepta hlor	3	5	D	D	D	D	D	D	D
Idrin	3	5	D	D	D	D	D	D	D
Beta BHC	3	5	D	D	D	D	D	D	D
Delta BHC	3	5	D	D	D	D	D	D	D
Hepta hlor Epo ide	3	5	D	D	D	D	D	D	D
Endosulfan	3	5	D	D	D	D	D	D	D
4,4 DDE	3	5	D	10 7	12 5	12 4	13 3	21 6	13 9
Dieldrin	3	5	D	D	D	D	D	D	D
Endrin	3	5	D	D	D	D	D	D	D
4,4 DDD	3	5	D	3 8J	4 6J	4 9J	4 3J	5 9	5 1
Endosulfan	3	5	D	D	D	D	D	D	D
4,4 DDT	3	5	D	13 6	16 2	16 5	15 0	21 5	17 0
Endrin Idehyde	3	5	D	D	D	D	D	D	D
Endosulfan Sulfate	3	5	D	D	D	D	D	D	D
Metho y hlor	3	5	D	D	D	D	D	D	D
Chlordane	15	25	D	D	D	D	D	D	D
To aphene	60	100	D	133	180	181	184	180	216
Chloroneb	250	500	D	D	D	D	D	D	D
Trifluralin	50	100	D	D	D	D	D	D	D
Mire	20	50	D	D	D	D	D	D	D

MD Method Dete tion imit P Pra ti al uantitation imit MB Method Blank
D ot Dete ted (belo DF MD)
: Obtained from a higher dilution analysis
J: Tra e alue Result is lo er than P but higher than MD

Client	RS Corporation	ab Job o:	R612122
Pro e t:	29869765		
Pro e t Site:	Pano he Energy Center	Date Sampled:	12 19 2006
Matri :	Soil	Date Re ei ed:	12 20 2006
E tra tion Method:	EP 3550B	Date E tra ted:	12 20 2006
Bat h o:	1220 PS1	Date naly ed:	12 20 2006
		Date Reported:	12 21 2006

EPA 8081A (Organochlorine Pesticides)
Reporting Unit: µg/kg (ppb)

LAB SAMPLE I.D.			MB	R612122 (21 24)	R612122 (25 28)	R612122 (29 32)	R612122 (33 36)	R612122 (37 40)
CLIENT SAMPLE I.D.				Composite 6 (B21 B24)	Composite 7 (B25 B28)	Composite 8 (B29 B32)	Composite 9 (B33 B36)	Composite 10 (B37 B40)
DILUTION FACTOR				1	1	1	1	1
COMPOUND	MDL	PQL						
Ipha BHC	3	5	D	D	D	D	D	D
Gamma BHC (indane)	3	5	D	D	D	D	D	D
Hepta hlor	3	5	D	D	D	D	D	D
Idrin	3	5	D	D	D	D	D	D
Beta BHC	3	5	D	D	D	D	D	D
Delta BHC	3	5	D	D	D	D	D	D
Hepta hlor Epo ide	3	5	D	D	D	D	D	D
Endosulfan	3	5	D	D	D	D	D	D
4,4 DDE	3	5	D	13 6	16 8	12 8	16 2	16 2
Dieldrin	3	5	D	D	D	D	D	D
Endrin	3	5	D	D	D	D	D	D
4,4 DDD	3	5	D	4 1J	5 5	3 7J	4 4J	4 0 J
Endosulfan	3	5	D	D	D	D	D	D
4,4 DDT	3	5	D	15 1	18 7	13 6	16 4	14 8
Endrin Idehyde	3	5	D	D	D	D	D	D
Endosulfan Sulfate	3	5	D	D	D	D	D	D
Metho y hlor	3	5	D	D	D	D	D	D
Chlordane	15	25	D	D	D	D	D	D
To aphene	60	100	D	175	229	158	191	182
Chloroneb	250	500	D	D	D	D	D	D
Trifluralin	50	100	D	D	D	D	D	D
Mire	20	50	D	D	D	D	D	D

MD Method Dete tion imit P Pra ti al uantitation imit MB Method Blank
D ot Dete ted (belo DF MD)
: Obtained from a higher dilution analysis
J: Tra e alue Result is lo er than P but higher than MD

Client	RS Corporation	ab Job o:	R612122
Pro e t:	29869765		
Pro e t Site:	Pano he Energy Center	Date Sampled:	12 19 2006
Matri :	Soil	Date Re ei ed:	12 20 2006
E tra tion Method:	EP 3550B	Date E tra ted:	12 22 2006
Bat h o:	1222 PS1	Date naly ed:	12 22 2006
		Date Reported:	12 26 2006

EPA 8081A (Organochlorine Pesticides)
Reporting Unit: µg/kg (ppb)

LAB SAMPLE I.D.			MB	R612122 25	R612122 26	R612122 27	R612122 28	
CLIENT SAMPLE I.D.				B 25 0 3	B 26 0 3	B 27 0 3	B 28 0 3	
DILUTION FACTOR				1	1	1	1	
COMPOUND	MDL	PQL						
Ipha BHC	3	5	D	D	D	D	D	
Gamma BHC (indane)	3	5	D	D	D	D	D	
Hepta hlor	3	5	D	D	D	D	D	
Idrin	3	5	D	D	D	D	D	
Beta BHC	3	5	D	D	D	D	D	
Delta BHC	3	5	D	D	D	D	D	
Hepta hlor Epo ide	3	5	D	D	D	D	D	
Endosulfan	3	5	D	D	D	D	D	
4,4 DDE	3	5	D	13 2	18 3	13 2	11 9	
Dieldrin	3	5	D	D	D	D	D	
Endrin	3	5	D	D	D	D	D	
4,4 DDD	3	5	D	4 3 J	6 0	4 0J	4 8J	
Endosulfan	3	5	D	D	D	D	D	
4,4 DDT	3	5	D	16 7	19 1	14 3	15 8	
Endrin Idehyde	3	5	D	D	D	D	D	
Endosulfan Sulfate	3	5	D	D	D	D	D	
Metho y hlor	3	5	D	D	D	D	D	
Chlordane	15	25	D	D	D	D	D	
To aphene	60	100	D	160	218	156	181	
Chloroneb	250	500	D	D	D	D	D	
Trifluralin	50	100	D	D	D	D	D	
Mire	20	50	D	D	D	D	D	

MD Method Dete tion imit P Pra ti al uantitation imit MB Method Blank
D ot Dete ted (belo DF MD)
: Obtained from a higher dilution analysis
J: Tra e alue Result is lo er than P but higher than MD

12 26 2006

Client RS Corporation
Pro e t: 29869765
Pro e t Site: Pano he Energy Center
Matri : Soil
E tra tion Method: EP 3050B
Bat h o: 1220 MS1

ab Job o: R612122

Date Sampled: 12 19 2006
Date Re ei ed: 12 20 2006
Date E tra ted: 12 20 2006
Date naly ed: 12 20 2006
Date Reported: 12 21 2006

EPA 6010B/7471A for Cam Metals (TTLC)
Reporting Units: mg/kg (ppm)

Element	EP Method	Method Blank	R612122 (5 8)	R612122 (5 8)D P	R612122 (9 12)	R612122 (29 32)	R612122 (33 36)	Reporting
			Composite 2 (B5 B8)	Composite 2 (B5 B8)Dup	Composite 3 (B9 B12)	Composite 8 (B29 B32)	Composite 9 (B33 B36)	imit
ntimony (Sb)	6010B	D	D	D	D	D	D	2
rseni (s)	6010B	D	7 7	8 8	10	8 2	9 9	0 5
Barium (Ba)	6010B	D	327	353	437	361	425	2
Beryllium (Be)	6010B	D	D	D	D	D	D	2
Cadmium (Cd)	6010B	D	D	D	D	D	D	2
Chromium (Cr)	6010B	D	D	D	D	D	D	2
Cobalt (Co)	6010B	D	9 1	11	13	11	12	2
Copper (Cu)	6010B	D	27	29	38	30	35	2
ead (Pb)	6010B	D	10	11	14	11	11	2
Mer ury (Hg)	7471	D	D	D	D	D	D	0 05
Molybdenum (Mo)	6010B	D	D	D	D	D	D	2
i kel (i)	6010B	D	13	20	27	38	41	2
Selenium (Se)	6010B	D	D	D	D	D	D	0 5
Sil er (g)	6010B	D	D	D	D	D	D	2
Thallium (Tl)	6010B	D	D	D	D	D	D	2
anadium ( )	6010B	D	85	90	111	108	127	2
in (n)	6010B	D	84	96	117	98	110	1

D: ot Dete ted (at the spe ified limit)

12 26 2006

Client RS Corporation
Pro e t: 29869765
Pro e t Site: Pano he Energy Center
Matri : Soil
E tra tion Method: EP 3050B
Bat h o: 1220 MS1

ab Job o: R612122

Date Sampled: 12 19 2006
Date Re ei ed: 12 20 2006
Date E tra ted: 12 20 2006
Date naly ed: 12 20 2006
Date Reported: 12 21 2006

EPA 6010B (Arsenic, TTLC)
Reporting Unit: mg/kg (ppm)

Sample ID	Lab ID	Arsenic (As)	Reporting Limit
MB		D	0 5
B 1 0 3	R612122 1	8 0	0 5
B 5 0 3	R612122 5	7 3	0 5
B 9 0 3	R612122 9	4 9	0 5
B 13 0 3	R612122 13	7 1	0 5
B 20 0 3	R612122 20	7 6	0 5
B 24 0 3	R612122 24	6 3	0 5
B 28 0 3	R612122 28	7 2	0 5
B 32 0 3	R612122 32	7 8	0 5
B 33 0 3	R612122 33	12 2	0 5
B 37 0 3	R612122 37	8 4	0 5
B 13 0 3	R612122 13 (D P)	6 7	0 5

D: ot Dete ted (at the spe ified limit)

12 26 2006

EPA 8081A (Pesticides)
Batch QA/QC Report

Client: RS Corporation
Pro e t: 29869765
Matri : Soil
Bat h o : 1220 PS1

ab Job o : R612122
ab Sample D: SS1220 1
Date naly ed: 12 20 2006

I. MS/MSD Report
nit: ppb

nalyte	Method Blank	Spike Con	MS	MSD	MS Re	MSD Re	RPD	RPD ept imit	Re ept imit
Gamma BHC	D	20	22 2	22 4	111 0	112 0	0 9	30	46 127
Hepta hlor	D	20	22 4	22 6	112 0	113 0	0 9	30	31 134
Idrin	D	20	24 8	22 6	124 0	113 0	9 3	30	36 132
Dieldrin	D	20	18 1	17 9	90 5	89 5	1 1	30	21 134
Endrin	D	20	22 5	24 8	112 5	124 0	9 7	30	42 139
4,4 DDT	D	20	21 9	20 9	109 5	104 5	4 7	30	21 134

II. LCS Result
Unit: ppb

nalyte	CS Report alue	True alue	Re	ept imit
Gamma BHC	22 3	20	111 5	80 120
Hepta hlor	23 0	20	115 0	80 120
Idrin	23 1	20	115 5	80 120
Dieldrin	23 0	20	115 0	80 120
Endrin	23 4	20	117 0	80 120
4,4 DDT	22 1	20	110 5	80 120

D: ot Dete ted

12 26 2006

EPA 8081A (Pesticides)
Batch QA/QC Report

Client: RS Corporation
Pro e t: 29869765
Matri : Soil
Bat h o : 1222 PS1

ab Job o : R612122
ab Sample D: SS1222 1
Date naly ed: 12 22 2006

I. MS/MSD Report
nit: ppb

nalyte	Method Blank	Spike Con	MS	MSD	MS Re	MSD Re	RPD	RPD ept imit	Re ept imit
Gamma BHC	D	20	23 2	19 0	116 0	95 0	19 9	30	46 127
Hepta hlor	D	20	23 1	19 1	115 5	95 5	19 0	30	31 134
Idrin	D	20	24 9	18 7	124 5	93 5	28 4	30	36 132
Dieldrin	D	20	17 8	15 0	89 0	75 0	17 1	30	21 134
Endrin	D	20	23 4	21 0	117 0	105 0	10 8	30	42 139
4,4 DDT	D	20	23 0	21 6	115 0	108 0	6 3	30	21 134

II. LCS Result
Unit: ppb

nalyte	CS Report alue	True alue	Re	ept imit
Gamma BHC	19 4	20	97 0	80 120
Hepta hlor	19 9	20	99 5	80 120
Idrin	20 1	20	100 5	80 120
Dieldrin	16 3	20	81 5	80 120
Endrin	21 3	20	106 5	80 120
4,4 DDT	20 9	20	104 5	80 120

D: ot Dete ted

12 26 2006

EPA 6010B/7471A for CAM Metals
Batch QA/QC Report

Client: RS Corporation
Pro e t: 29869765
Matri : Soil
Bat h o: 1220 MS1

ab Job o : R612122
ab Sample D: CS
Date naly ed: 12 20 2006

LCS/LCSD Report
nit: ppm

nalyte	MB Con	CS Re	CSD Re	RPD	RPD ept imit	Re ept imit
ntimony (Sb)	D	97 0	94 0	3 1	30	70 130
rseni (s)	D	102 0	97 0	5 0	30	70 130
Barium (Ba)	D	97 0	91 0	6 4	30	70 130
Beryllium (Be)	D	97 0	91 0	6 4	30	70 130
Cadmium (Cd)	D	100 0	98 0	2 0	30	70 130
Chromium (Cr)	D	99 0	97 0	2 0	30	70 130
Cobalt (Co)	D	102 0	95 0	7 1	30	70 130
Copper (Cu)	D	99 0	94 0	5 2	30	70 130
ead (Pb)	D	96 0	97 0	1 0	30	70 130
Mer ury (Hg)	D	104 0	100 0	3 9	30	70 130
Molybdenum (Mo)	D	97 0	93 0	4 2	30	70 130
i kel (i)	D	95 0	99 0	4 1	30	70 130
Selenium (Se)	D	102 0	102 0	0 0	30	70 130
Sil er (g)	D	113 0	97 0	15 2	30	70 130
Thallium (Tl)	D	105 0	94 0	11 1	30	70 130
anadium ( )	D	91 0	89 0	2 2	30	70 130
in (n)	D	101 0	100 0	1 0	30	70 130

D: ot Dete ted

12 26 2006

EPA 6010B (Arsenic)
Batch QA/QC Report

Client: RS Corporation
Pro e t: 29869765
Matri : Soil
Bat h o: 1220 MS1

ab Job o : R612122
ab Sample D: CS
Date naly ed: 12 20 2006

LCS/LCSD Report

nalyte	MB Con	CS Re	CSD Re	RPD	RPD ept imit	Re ept imit
rseni (s)	D	102 0	97 0	5 0	30	70 130

D: ot Dete ted

ALPHA SCIENTIFIC CORPORATION
CHAIN OF CUSTODY RECORD

Lab Job Number MR 612122

Client: URS Corporation

Address: 30 River Park Place West, Suite 180, Fresno, CA 93720

Report Attention: Stuart St. Clair | Phone: 559-256-1462 | Fax: 559-256-1478 | Sampled by: Nelson Bernal

Project Name/No.: 29869765 | Project Site: Panoche Energy Center

T.A.T. Requested: ☐ Rush 8 12 24 hrs ☑ 2-3 days ☐ Normal

Sample Condition: ☑ Chilled ☑ Intact ☐ Sample seals

Client Sample ID	Lab Sample ID	Sample Collect Date	Sample Collect Time	Matrix Type	Sample Preserv	No.,type* & size of container	8015M (Gasoline)	8015M(Diesel)	8260B(BTEX, Oxygenates)	8260B (VOCs)	8270C(SVOCs)	CAM Metals	Arsenic (on discrete samples)						Remark
B-1@0-3"	MR 612122-1	12/19/06	10:30	Soil		4 oz. jar							X						
B-2@0-3"	-2		10:42																
B-3@0-3"	Composite OCPs (8081A) -3		11:41																
B-4@0-3"	-4		11:20																
B-5@0-3"	-5		10:53										X						
B-6@0-3"	-6		11:05																Do lab duplicate for OCPs + CAM Metals on composite sample.
B-7@0-3"	OCPs CAM Metals -7		11:15																
B-8@0-3"	-8		11:10																
B-9@0-3"	-9		12:05										X						
B-10@0-3"	-10		12:12																
B-11@0-3"	OCPs CAM Metals -11		13:12																
B-12@0-3"	-12		13:08																
B-13@0-3"	-13		12:20										X						Do lab duplicate for arsenic on discrete sample.
B-14@0-3"	-14		12:30																
B-15@0-3"	OCPs -15		13:04																
B-16@0-3"	-16		13:00																

Relinquished by	Company	Date	Time	Received by	Company	Date	Time
[illegible]	URS Corp.	12/19/06	17:35	St. Clair	URS	12/19/06	17:35
St. Clair		12/19/06	21:27	California Overnight		12/19/06	21:27

Received by [illegible] ASC 12/20/06 9:05 Am

Container types: M=Metal Tube, P=Plastic bottle, A=Air Bag, V=VOA vial, G=Glass bottle

Alpha Scientific Corporation
16760 Gridley Road
Cerritos, CA 90703
Tel: (562) 809-8880
Fax: (562) 809-8801

Note: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client's expense.
Distribution: WHITE with report, PINK to courier.

ALPHA SCIENTIFIC CORPORATION
CHAIN OF CUSTODY RECORD

Lab Job Number WR 612122

Client: URS Corporation

Address

Report Attention | Phone | Fax | Sampled by

Project Name/No.: 29869765

Project Site: PEC

T.A.T. Requested: ☐ Rush 8 12 24 hrs ☑ 2-3 days ☐ Normal

Sample Condition: ☑ Chilled ☑ Intact ☐ Sample seals

Client Sample ID	Lab Sample ID	Sample Collect Date	Sample Collect Time	Matrix Type	Sample Preserv	No.,type* & size of container	8015M (Gasoline)	8015M(Diesel)	8260B(BTEX, Oxygenates)	8260B (VOCs)	8270C(SVOCs)	CAM Metals	Arsenic (on discrete samples)					Remark
B-17@0-3"	WR 612122-17	12/19/06	13:29	Soil		4 oz. jar												
B-18@0-3"	-18		13:37															
B-19@0-3"	OCPs -19		14:38															
B-20@0-3"	-20		14:35										X					
B-21@0-3"	-21		13:41															
B-22@0-3"	-22		13:45															
B-23@0-3"	OCPs -23		14:31															
B-24@0-3"	-24		14:28										X					
B-25@0-3"	-25		14:49															
B-26@0-3"	-26		14:52															
B-27@0-3"	OCPs -27		15:17															
B-28@0-3"	-28		15:15										X					
B-29@0-3"	-29		14:56															
B-30@0-3"	-30		15:00															
B-31@0-3"	OCPs CAM Metals -31		15:11															
B-32@0-3"	-32		15:08										X					

Relinquished by	Company	Date	Time	Received by	Company	Date	Time
Relinquished by	Company	Date	Time	Received by	Company	Date	Time
				[signature]	ASC	12/20/06	9:05 AM

Container types: M=Metal Tube, A=Air Bag, P=Plastic bottle, G=Glass bottle, V=VOA vial

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Distribution: WHITE with report, PINK to courier.

ALPHA SCIENTIFIC CORPORATION
CHAIN OF CUSTODY RECORD

Lab Job Number UR 612122

Client: URS Corp.

Address:

Report Attention: | Phone: | Fax: | Sampled by:

Project Name/No.: 29869765

Project Site: PEC

T.A.T. Requested: ☐ Rush 8 12 24 hrs ☑ 2-3 days ☐ Normal

Sample Condition: ☑ Chilled ☑ Intact ☐ Sample seals

Client Sample ID	Lab Sample ID	Sample Collect Date	Sample Collect Time	Matrix Type	Sample Preserv	No.,type* & size of container	8015M (Gasoline)	8015M(Diesel)	8260B(BTEX, Oxygenates)	8260B (VOCs)	8270C(SVOCs)	CAM Metals	Arsenic (on discrete samples)						Remark
B-33@0-3"	UR 612122-33	12/19/06	15:24	Soil		4 oz. jar							X						
B-34@0-3"	-34		15:28																
B-35@0-3"	OCPs CAM Metals -35		15:51																
B-36@0-3"	-36		15:48																
B-37@0-3"	-37		15:31										X						
B-38@0-3"	-38		15:34																
B-39@0-3"	OCPs -39		15:46																
B-40@0-3"	-40		15:41																

Please include chlorneb, mirex, and trifluralin in 8081A analysis

Relinquished by	Company	Date	Time	Received by	Company	Date	Time
Relinquished by	Company	Date	Time	Received by	Company	Date	Time
				[signature]	ASC	12/20/06	9:55 AM

Container types: M=Metal Tube, A=Air Bag, P=Plastic bottle, G=Glass bottle, V=VOA vial

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