Report Issued:

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PG&E

Oakland Service Center

1992 Third Quarter

Groundwater Sampling

4801 OAKPORT RD

OAKLAND

Prepared by

Land and Water Quality Unit

October 1992

Report 402.331-92.44

Pacific Gas and Electric Company
Technical and Ecological Services
3400 Crow Canyon Road, San Ramon, California 94583

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INTRODUCTION

This report presents the results of the groundwater sampling conducted during the third quarter of 1992 in the vicinity of the fuel facility at PG&E's Oakland Service Center, 4801 Oakport Street, Oakland, California (Figure 1). The purpose of the sampling program is to continue to evaluate groundwater quality near the site of four former underground fuel tanks and one waste oil tank.

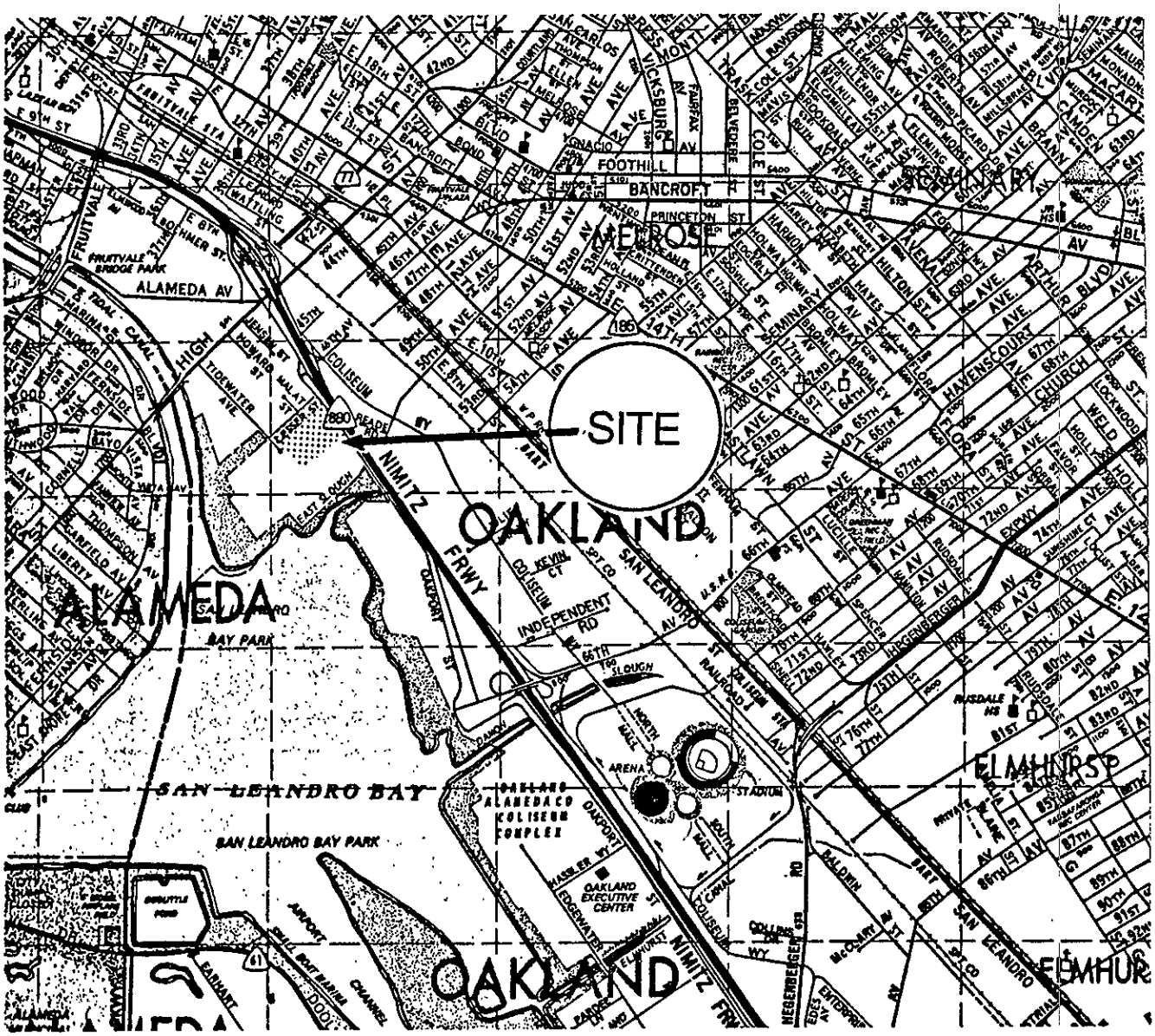
SAMPLING ACTIVITIES

On July 2, 1992, groundwater samples and water level measurements were collected from five shallow monitoring wells (P4 through P8). The depth to water level also was measured in two piezometers (P2 and P3). The locations of the wells relative to site structures are shown in Figure 2.

The groundwater samples collected from each well were analyzed for total petroleum hydrocarbons as gasoline (TPH-G) (EPA Method 5030/8015), total petroleum hydrocarbons as diesel (TPH-D) (EPA Method 3510/8015), and benzene, toluene, ethylbenzene, and xylenes (BTEX) (EPA Method 602). In addition, a field blank was collected for quality control purposes. Well purging and sampling procedures are presented in Appendix A. All groundwater samples were submitted to BC Analytical (Emeryville, California) for chemical analyses. The field data sheets are in Appendix B. Appendix C contains the laboratory data sheets and chain-of-custody form.

GROUNDWATER FLOW DIRECTION

The static groundwater levels measured in monitoring wells P2 through P8 ranged from 2.89 to 4.17 feet below the tops of the well casings (Table 1). On July 2, 1992, the water level data indicate that groundwater beneath the former fuel facility flowed radially toward P4 with a hydraulic gradient of 0.01 foot/foot. Figure 2 shows the contours of the groundwater potentiometric surface measured on July 2, 1992.



Scale: 1 inch equals 2200 feet

Figure 1. Location map of PG&E's Oakland Service Center.

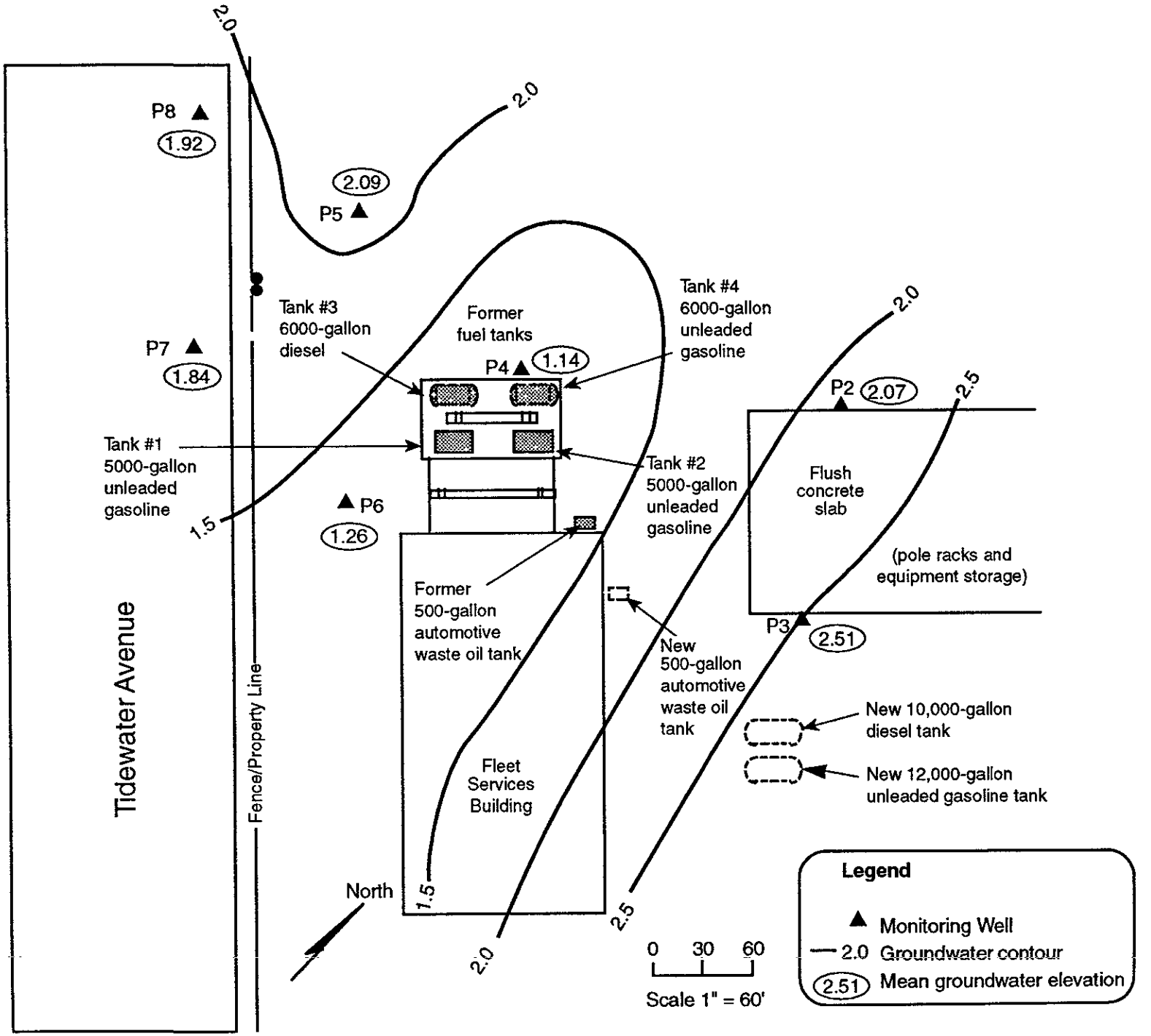


Figure 1. Groundwater contour map at PG&E Oakland Service Center - July 2, 1992.

Table 1

Summary of Groundwater Gradient Data
PG&E's Oakland Service Center

Date Measured	BM	P1	P2	P3	P4	P5	P6	P7	P8
Relative Elevations of the Tops of Casings (feet)									
	5.00	5.89	6.17	5.76	5.31	5.22	5.42	4.97	4.81
Depth to Groundwater (feet) Below the Top of Casings									
		P1*	P2	P3	P4	P5	P6	P7	P8
11/25/87		4.70	4.87						
12/1/87		4.66	4.88	5.33					
1/7/88		3.63	4.01	4.55					
2/4/88		3.67	4.22	3.55					
2/9/88		3.76	4.26	3.44					
6/1/88		3.85	4.01	3.24					
12/11/90			4.59	4.85	4.00	3.32	4.31		
2/15/91			3.68	2.70	2.86	2.43	3.98		
4/30/91			3.08	1.93	3.62	2.29	2.57		
7/11/91			3.98	3.05	4.86	4.23	3.94		
9/24/91			4.54	3.77	3.71	3.69	3.90	3.67	4.31
1/31/92			4.22	3.63	4.20	4.10	5.71	3.20	2.82
4/1/92			3.00	4.81	2.20	2.32	3.54	2.30	2.13
7/2/92			4.10	3.25	4.17	3.13	4.16	3.13	2.89
Groundwater Elevation (feet above Mean Sea Level relative to Site Benchmark)									
		P1	P2	P3	P4	P5	P6	P7	P8
11/25/87		1.19	1.30	5.76					
12/1/87		1.23	1.29	0.43					
1/7/88		2.26	2.16	1.21					
2/4/88		2.22	1.95	2.21					
2/9/88		2.13	1.91	2.32					
6/1/88		2.04	2.16	2.52					
12/11/90			1.58	0.91	1.31	1.90	1.11		
2/15/91			2.49	3.06	2.45	2.79	1.44		
4/30/91			3.09	3.83	1.69	2.93	2.85		
7/11/91			2.19	2.71	0.45	0.99	1.48		
9/24/91			1.63	1.99	1.60	1.53	1.52	1.30	0.50
1/31/92			1.95	2.13	1.11	1.12	-0.29	1.77	1.99
4/1/92			3.17	0.95	3.11	2.90	1.88	2.67	2.68
7/2/92			2.07	2.51	1.14	2.09	1.26	1.84	1.92

	Groundwater Flow	
	Direction	Magnitude
11/25/87	—	—
12/1/87	SE	0.007
1/7/88	SE	0.008
2/4/88	NE	0.008
2/9/88	N	0.028
6/1/88	NNE	0.005
12/11/90	ESE	0.012
2/15/91	NW - W	0.007-0.02
4/30/91	N-W	0.014
7/11/91	N-W	0.017
9/24/91	W	0.002-0.009
1/31/92	S-E	0.015-0.02
4/1/92	SE	0.016
7/2/92	E-W	0.01

Notes:
All depths are in feet.
BM = Benchmark (assigned elevation of 5.00 feet), center of the storm drain (north of P4).
* P1 destroyed during tank removal in December 1988.

ANALYTICAL RESULTS

Table 2 summarizes the results of chemical analyses of groundwater samples through 1991. Table 3 summarized the results of chemical analysis for samples collected in 1992.

In July 1992, TPH-D was present in the following concentrations: P4 (180 µg/l); P5 (110 µg/l); P6 (160 µg/l); P7 (400 µg/l); and P8 (140 µg/l). TPH-G was present in P4 at 70 µg/l. The lab also detected 1,100 µg/l as diesel in P7, yet these compounds are within the C18 to C35 hydrocarbon range, which are typical of oil and grease.

CONCLUSIONS

July 1992 groundwater monitoring results indicate that groundwater beneath the site flowed radially toward well P4 with a hydraulic gradient of 0.01 ft/ft. Samples contained TPH-D in the following concentrations: P4 (180 µg/l); P5 (110 µg/l); P6 (160 µg/l); P7 (400 µg/l); and P8 (140 µg/l). P4 contained TPH-G at 70 µg/l. P7 contained 1,100 µg/l TPH-D in the C18 to C35 hydrocarbon range.

Table 2

Summary of Analytical Results for Water Samples Taken at PG&E's Oakland Service Center

Sample Date	Sample Location	B µg/l	T µg/l	E µg/l	X µg/l	TPH-G µg/l	TPH-D µg/l
11/8/90	P4	2.4	0.8	2.8	1.3	110	150
11/8/90	P5	15	2.4	6.1	6.6	220	300
11/8/90	P6	<0.5	<0.5	<0.5	<0.5	<50	230
11/8/90	FB	<0.5	0.8	<0.5	<0.5	<50	<50
DETECTION LIMITS		<0.5	<0.5	<0.5	<0.5	<50	<50
2/15/91	P4	1.2	<0.5	3.1	5.9	230	310
2/15/91	P5	8.2	1.0	22	38	900	930
2/15/91	P6	<0.5	<0.5	<0.5	<0.5	<50	110
2/15/91	FB	<0.5	1.3	<0.5	1.5	<50	<50
DETECTION LIMITS		<0.5	<0.5	<0.5	<0.5	<50	<50
4/30/91	P4	0.6	<0.5	<0.5	<0.5	130	210
4/30/91	P5	4	3.3	<0.5	3.9	1000	590
4/30/91	P6	<0.5	<0.5	<0.5	<0.5	<50	80
4/30/91	FB	<0.5	<0.5	<0.5	<0.5	<50	<50
DETECTION LIMITS		<0.5	<0.5	<0.5	<0.5	<50	<50
7/11/91	P4	0.6	<0.5	<0.5	0.8	200	92
7/11/91	P5	8.1	2.5	2	3.4	540	100
7/11/91	P6	<0.5	<0.5	<0.5	<0.5	<50	<50
7/11/91	FB	<0.5	0.6	<0.5	<0.5	<50	<50
DETECTION LIMITS		<0.5	<0.5	<0.5	<0.5	<50	<50
9/24/91	P4	<0.5	<0.5	2	1	70	130
9/24/91	P5	1.4	1.6	3.0	6.1	350	190
9/24/91	P6	<0.5	<0.5	<0.5	<0.5	<50	430
9/24/91	P7	<0.5	<0.5	<0.5	<0.5	<50	350
9/24/91	P8	<0.5	<0.5	<0.5	<0.5	<50	100
9/24/91	FB	<0.5	<0.5	<0.5	<0.5	<50	<50
DETECTION LIMITS		<0.5	<0.5	<0.5	<0.5	<50	<50

B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes

µg/l = micrograms per liter
FB = Field Blank
TPH-G = Total Petroleum Hydrocarbons as Gasoline
TPH-D = Total Petroleum Hydrocarbons as Diesel

P1 Destroyed.
P2 and P3 gauged for determination of groundwater gradient only.

Table 3

Summary of Analytical Results for Water Samples
Taken at PG&E's Oakland Service Center

Sample Date	Sample Location	B µg/l	T µg/l	E µg/l	X µg/l	TPH-G µg/l	TPH-D µg/l
1/31/92	P4	50	51	51	160	540	100
1/31/92	P5	<0.5	0.8	<0.5	0.5	100	70
1/31/92	P6	<0.5	<0.5	<0.5	<0.5	<50	330
1/31/92	P7	<0.5	<0.5	<0.5	<0.5	<50	220
1/31/92	P8	<0.5	<0.5	<0.5	<0.5	<50	320
1/31/92	FB	<0.5	<0.5	<0.5	<0.5	<50	<50
DETECTION LIMITS		<0.5	<0.5	<0.5	<0.5	<50	<50
4/1/92	P4	<0.5	<0.5	<0.5	<0.5	<50	100
4/1/92	P5	<0.5	<0.5	<0.5	<0.5	<50	110
4/1/92	P6	<0.5	<0.5	<0.5	<0.5	<50	160
4/1/92	P7	<0.5	<0.5	<0.5	<0.5	<50	110
4/1/92	P8	<0.5	<0.5	<0.5	<0.5	<50	300
4/1/92	FB	<0.5	<0.5	<0.5	<0.5	<50	—
DETECTION LIMITS		<0.5	<0.5	<0.5	<0.5	<50	<50
7/2/92	P4	<0.5	<0.5	<0.5	<0.5	70	180
7/2/92	P5	<0.5	<0.5	<0.5	<0.5	<50	110
7/2/92	P6	<0.5	<0.5	<0.5	<0.5	<50	160
7/2/92	P7	<0.5	<0.5	<0.5	<0.5	<50	400
7/2/92	P8	<0.5	<0.5	<0.5	<0.5	<50	140
7/2/92	FB	<0.5	<0.5	<0.5	<0.5	<50	--
DETECTION LIMITS		<0.5	<0.5	<0.5	<0.5	<50	<50

B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes
-- = not tested

µg/l = micrograms per liter
FB = Field Blank
TPH-G = Total Petroleum Hydrocarbons as Gasoline
TPH-D = Total Petroleum Hydrocarbons as Diesel

P1 Destroyed.
P2 and P3 gauged for determination of groundwater gradient only.

Appendix A

GROUNDWATER SAMPLING PROCEDURES

GROUNDWATER SAMPLING PROCEDURES

Before water sampling, the depth to water was measured in the monitoring wells and recorded. The groundwater in the monitoring wells was sampled according to the following methodology:

1. The wells were checked for the presence of floating product by partially submerging a clear Teflon bailer past the air/water interface to collect any possible product for measurement.
2. At least three well volumes were removed from each well or the wells were purged dry, and the water level was allowed to return to 80% of the original water level.
3. Samples were collected using a stainless steel bailer that was washed in a trisodium phosphate solution followed by rinses with distilled water. The bailer was cleaned between sampling of different wells to avoid cross-contamination. The bailer line was replaced between well samplings.
4. Samples for BTEX and TPH-G analysis were transferred from the bailer to appropriately prepared 40-ml volatile organic analysis vials with caps having Teflon septums. Care was taken when transferring the water from the bailer to the containers to avoid turbulence. The containers were filled and the caps slipped onto the containers so that no air bubbles were trapped.
5. Samples for TPH-D analysis were transferred from the bailer to 1-l amber bottles with Teflon caps, which were filled so that no air bubbles were present.
6. Samples were placed on ice and chilled to less than 4°C.

Appendix B

FIELD DATA SHEETS

TE ORKPORT JOB ID 60007150 WELL # 1-4

PURGE DATE 7/2/92 BY S. Polston WEATHER Sunny

SAMPLE DATE 7/2/92 BY S. Polston

WATER ELEVATION / VOLUME CALCULATIONS

MEASURING POINT (MP) TOC @ Black mark HYDROCARBON ODOR (YES) NO

DEPTH OF WELL (DTB) 8.21 FT THICKNESS

DEPTH TO WATER (DTW) 4.17 FT

TOTAL WATER DEPTH 4.04 FT

MEASUREMENT METHOD SOLINST SLOPE INDICATOR

TOC ELEV = _____ FT - DTW _____ FT = GW ELEV. _____ FT

PURGE VOLUME CALCULATIONS

4.04 FT WATER * CASING FACTOR = .68 GAL/CASING VOL. * 3 VOLUMES = 2.04 TOTAL PURGED (GALS)

CASING FACTOR (CIRCLE ONE)

FOR 2" DIA = 0.17 GAL / FT

FOR 3" DIA = 0.38 GAL / FT

FOR 4" DIA = 0.66 GAL / FT

PURGING

TIME START	TIME END	CUMULATIVE DISCHARGE (GAL)	pH	CONDUCTIVITY umho/cm	TURBIDITY	°C TEMP	COMMENTS
1249	1250	~.75	6.77	~~3~~ 3000	15.0	23.5	Hydrocarbon odor
1250	1251	1.5	6.77	3000	69.9	23.4	
1251							well DRY
1340							DTW = 4.62

METHOD OF DISCHARGE DISPOSAL GROUND BARREL POND (CIRCLE ONE)

METHOD OF PURGING HOMELITE BAILER HAND PUMP SUBMERSIBLE WATERRA (CIRCLE ONE)

METHOD OF SAMPLING WELL WIZARD TEFLON BAILER HAND PUMP DISPOSABLE BAILER (CIRCLE ONE)

METHOD OF CLEANING ALCONOX / DI WATER STEAM CLEANER / DI WATER (CIRCLE ONE)

PUMP LINES / BAILER ROPES NEW, CLEANED, OR DEDICATED (CIRCLE ONE)

pH METER 0222204 CALIBRATED (YES) NO COND. METER 890454 CALIBRATED (YES) NO

TEMP. CORRECTED (YES) NO CALIBRATION DATA pH 4 = 4.00 COND. ~~1,000~~ 718 = 718

pH 7 = 7.07 COND. 10,000 = _____

pH 10 = 10.06

SAMPLES

LAB ANALYSIS TPH as GAS, BTEX, TPH as Diesel

LABORATORY BCA

SAMPLE TIME 1342

REMARKS

TE Oakport JOB ID 20007150 WELL # MW-5

PURGE DATE 7/2/92 BY S. Polston WEATHER Sunny

SAMPLE DATE 7/2/92 BY S. Polston

WATER ELEVATION / VOLUME CALCULATIONS

MEASURING POINT (MP) TOC @ Blackmark HYDROCARBON ODOR YES NO

DEPTH OF WELL (DTB) 8.23 FT THICKNESS

DEPTH TO WATER (DTW) 3.13 FT

TOTAL WATER DEPTH 5.1 FT

MEASUREMENT METHOD SOLINST SLOPE INDICATOR

TOC ELEV = _____ FT - DTW _____ FT = GW ELEV. _____ FT

PURGE VOLUME CALCULATIONS

5.10 FT WATER * CASING FACTOR = .86 GAL/CASING VOL * 3 VOLUMES = 2.58 TOTAL PURGED (GALS)

CASING FACTOR (CIRCLE ONE)

FOR 2" DIA = 0.17 GAL / FT

FOR 3" DIA = 0.38 GAL / FT

FOR 4" DIA = 0.66 GAL / FT

PURGING

TIME START	TIME END	CUMULATIVE DISCHARGE (GAL)	pH	CONDUCTIVITY umho/cm	TURBIDITY	°C TEMP	COMMENTS
1201	1202	1.0	7.21	2800	2.06	26.0	
1202	1203	2.0	7.13	2800	.86	26.1	
1203	1204	3.0	7.09	2800	1.45	26.0	

METHOD OF DISCHARGE DISPOSAL GROUND BARREL POND *(CIRCLE ONE)*

METHOD OF PURGING HOMELITE BAILER HAND PUMP SUBMERSIBLE WATERRA *(CIRCLE ONE)*

METHOD OF SAMPLING WELL WIZARD TEFLON BAILER HAND PUMP DISPOSABLE BAILER *(CIRCLE ONE)*

METHOD OF CLEANING ALCONOX / DI WATER STEAM CLEANER / DI WATER *(CIRCLE ONE)*

PUMP LINES / BAILER ROPES NEW, CLEANED, OR DEDICATED *(CIRCLE ONE)*

pH METER 0222204 CALIBRATED (YES) NO COND. METER 890054 CALIBRATED (YES) NO

TEMP. CORRECTED YES NO CALIBRATION DATA pH 4 = 4.00 COND. ~~1,000~~ 718 = 718

pH 7 = 7.07 COND. 10,000 = _____

pH 10 = 10.06

SAMPLES

LAB ANALYSIS Btex, TPH AS GAS, TPH AS Diesel

LABORATORY BCA

SAMPLE TIME 1307

REMARKS

SITE Oakport JOB ID 6C00R/150 WELL # P-6

PURGE DATE 7/2/92 BY S. Polston WEATHER Sunny

SAMPLE DATE 7/2/92 BY S. Polston

WATER ELEVATION / VOLUME CALCULATIONS

MEASURING POINT (MP) TOC @ Black mark HYDROCARBON ODOR YES (NO, circled)

DEPTH OF WELL (DTB) 8.21 FT THICKNESS ______

DEPTH TO WATER (DTW) 4.16 FT

TOTAL WATER DEPTH 4.05 FT

MEASUREMENT METHOD SOLINST SLOPE INDICATOR

TOC ELEV = ______ FT - DTW ______ FT = GW ELEV. ______ FT

PURGE VOLUME CALCULATIONS

4.05 FT WATER * CASING FACTOR = .64 GAL/CASING VOL * 3 VOLUMES = 1.92 TOTAL PURGED (GALS).

CASING FACTOR (CIRCLE ONE)

FOR 2" DIA = 0.17 GAL / FT

FOR 3" DIA = 0.38 GAL / FT

FOR 4" DIA = 0.66 GAL / FT

PURGING

TIME START	TIME END	CUMULATIVE DISCHARGE (GAL)	pH	CONDUCTIVITY umho/cm	TURBIDITY	°C TEMP	COMMENTS
1315	1316	.75	6.88	2700	152	25.8	
1316	1317	1.50	6.84	2500	421	25.6	
1317	1318	2.25	6.76	2500	231	25.9	

METHOD OF DISCHARGE DISPOSAL GROUND BARREL POND (CIRCLE ONE)

METHOD OF PURGING HOMELITE BAILER HAND PUMP SUBMERSIBLE WATERRA (CIRCLE ONE)

METHOD OF SAMPLING WELL WIZARD TEFLON BAILER HAND PUMP DISPOSABLE BAILER (CIRCLE ONE)

METHOD OF CLEANING ALCONOX / DI WATER STEAM CLEANER / DI WATER (CIRCLE ONE)

PUMP LINES / BAILER ROPES NEW, CLEANED, OR DEDICATED (CIRCLE ONE)

pH METER 0222104 CALIBRATED (YES, circled) NO COND. METER 8904054 CALIBRATED (YES, circled) NO

TEMP. CORRECTED YES NO CALIBRATION DATA pH 4 = 4.00 COND. ~~1,000~~ 718 = 718

pH 7 = 7.07 COND. 10,000 = ______

SAMPLES pH 10 = 10.06

LAB ANALYSIS TPH AS GAS, BTEX, TPH AS Diesel

LABORATORY BCA

SAMPLE TIME 1321

REMARKS

TE OAKPORT JOB ID 60007150 WELL # P-07

PURGE DATE 7/2/92 BY S. PALSTON WEATHER SUNNY

SAMPLE DATE 7/2/92 BY S. PALSTON

WATER ELEVATION / VOLUME CALCULATIONS

MEASURING POINT (MP) TOC @ Black mark HYDROCARBON ODOR YES NO

DEPTH OF WELL (DTB) 8.07 FT THICKNESS

DEPTH TO WATER (DTW) 3.13 FT

TOTAL WATER DEPTH 4.94 FT

MEASUREMENT METHOD SOLINST SLOPE INDICATOR

TOC ELEV = _____ FT - DTW _____ FT = GW ELEV. _____ FT

PURGE VOLUME CALCULATIONS

4.94 FT WATER * CASING FACTOR = .79 GAL/CASING VOL. * 3 VOLUMES = 2.37 TOTAL PURGED (GALS)

CASING FACTOR (CIRCLE ONE)

FOR 2" DIA = 0.17 GAL / FT

FOR 3" DIA = 0.38 GAL / FT

FOR 4" DIA = 0.66 GAL / FT

PURGING

TIME START	TIME END	CUMULATIVE DISCHARGE (GAL)	pH	CONDUCTIVITY umho/cm	TURBIDITY	°C TEMP	COMMENTS
1217	1218	1.0	6.82	4000	185	24.1	
1218	1219	2.0	6.66	3400	131	24.1	
1219	1220	3.0	6.64	3400	135	24.4	

METHOD OF DISCHARGE DISPOSAL GROUND BARREL POND (CIRCLE ONE)

METHOD OF PURGING HOMELITE BAILER HAND PUMP SUBMERSIBLE WATERRA (CIRCLE ONE)

METHOD OF SAMPLING WELL WIZARD TEFLON BAILER HAND PUMP DISPOSABLE BAILER (CIRCLE ONE)

METHOD OF CLEANING ALCONOX / DI WATER STEAM CLEANER / DI WATER (CIRCLE ONE)

PUMP LINES / BAILER ROPES NEW, CLEANED, OR DEDICATED (CIRCLE ONE)

pH METER 0222204 CALIBRATED (YES) NO COND. METER 8904054 CALIBRATED (YES) NO

TEMP. CORRECTED (YES) NO CALIBRATION DATA pH 4 = 4.00 COND. ~~1,000~~ 718 = 718

pH 7 = 7.07 COND. 10,000 = _____

pH 10 = 10.06

SAMPLES

LAB ANALYSIS BTEX, TPHAS GAS, TPHAS Diesel

LABORATORY BCA

SAMPLE TIME 1224

REMARKS

TE Oakport JOB ID 60007150 WELL # P-6

PURGE DATE 7/2/92 BY S. Polston WEATHER Sunny

SAMPLE DATE 7/2/92 BY S. Polston

WATER ELEVATION / VOLUME CALCULATIONS

MEASURING POINT (MP) TOC @ Blackmark HYDROCARBON ODOR YES (NO)

DEPTH OF WELL (DTB) 7.81 FT THICKNESS

DEPTH TO WATER (DTW) 2.89 FT

TOTAL WATER DEPTH 4.92 FT

MEASUREMENT METHOD SOLINST SLOPE INDICATOR

TOC ELEV = _____ FT - DTW _____ FT = GW ELEV. _____ FT

PURGE VOLUME CALCULATIONS

4.92 FT WATER * CASING FACTOR = .83 GAL/CASING VOL * 3 VOLUMES = 2.49 TOTAL PURGED (GALS)

CASING FACTOR (CIRCLE ONE)

FOR 2" DIA = 0.17 GAL / FT

FOR 3" DIA = 0.38 GAL / FT

FOR 4" DIA = 0.66 GAL / FT

PURGING

TIME START	TIME END	CUMULATIVE DISCHARGE (GAL)	pH	CONDUCTIVITY umho/cm	TURBIDITY	°C TEMP	COMMENTS
1234	1235	1.0	6.96	3800	24.2	24.5	
1235	1236	2.0	6.94	3800	5.16	24.1	
1236	1237	3.0	6.88	3800	5.63	24.0	

METHOD OF DISCHARGE DISPOSAL GROUND BARREL POND *(CIRCLE ONE)*

METHOD OF PURGING HOMELITE BAILER HAND PUMP SUBMERSIBLE WATERRA *(CIRCLE ONE)*

METHOD OF SAMPLING WELL WIZARD TEFLON BAILER HAND PUMP DISPOSABLE BAILER *(CIRCLE ONE)*

METHOD OF CLEANING ALCONOX / DI WATER STEAM CLEANER / DI WATER *(CIRCLE ONE)*

PUMP LINES / BAILER ROPES NEW, CLEANED, OR DEDICATED *(CIRCLE ONE)*

pH METER 0222204 CALIBRATED (YES) NO COND. METER 8904054 CALIBRATED (YES) NO

TEMP. CORRECTED YES NO CALIBRATION DATA pH 4 = 4.0 COND. ~~4,000~~ 718 = 718

pH 7 = 7.07 COND. 10,000 = _____

pH 10 = 10.06

SAMPLES

LAB ANALYSIS Btex, TPH AS GAS, TPH AS Diesel

LABORATORY BCA

SAMPLE TIME 1240

REMARKS

Appendix C

ANALYTICAL DATA SHEETS AND CHAIN-OF-CUSTODY FORM

B C Analytical

1255 Powell Street
Emeryville, CA 94608
510/428-2300
Fax: 510/547-3643

ANALYTICAL REPORT

LOG NO: E92-07-039

Received: 02 JUL 92

Mailed: JUL 21 1992

Mr. Fred Flint
PG&E Technical & Eco. Services
3400 Crow Canyon Road
San Ramon, California 94583

Purchase Order: Z-19-1-245-91

Project: 60007150HATESA22-375

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
07-039-1	P-8	02 JUL 92
07-039-2	P-7	02 JUL 92
07-039-3	P-5	02 JUL 92
07-039-4	P-6	02 JUL 92
07-039-5	P-4	02 JUL 92

PARAMETER	07-039-1	07-039-2	07-039-3	07-039-4	07-039-5
TPH - Semivolatile Hydrocarbons					
Date Analyzed	07.15.92	07.15.92	07.15.92	07.15.92	07.15.92
Date Extracted	07.06.92	07.06.92	07.06.92	07.06.92	07.06.92
Dilution Factor, Times	1	1	1	1	1
C10 to C22 (as diesel), ug/L	140	400	110	160	180
C18 to C35 (as oil), ug/L	<500	1100	<500	<500	<500
Approximate Character, .	DIESEL	DIESEL	DIESEL	DIESEL	DIESEL
Aromatic Hydrocarbons					
Date Analyzed	07.09.92	07.09.92	07.09.92	07.09.92	07.09.92
Dilution Factor, Times	1	1	1	1	1
Benzene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylene Isomers, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5

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REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
07-039-1	P-8	02 JUL 92
07-039-2	P-7	02 JUL 92
07-039-3	P-5	02 JUL 92
07-039-4	P-6	02 JUL 92
07-039-5	P-4	02 JUL 92

PARAMETER	07-039-1	07-039-2	07-039-3	07-039-4	07-039-5
TPH - Volatile Hydrocarbons					
Date Analyzed	07.09.92	07.09.92	07.09.92	07.09.92	07.09.92
Dilution Factor, Times	1	1	1	1	1
C6 to C14 (as gasoline), ug/L	<50	<50	<50	<50	70
Approximate Character, .	NO PATTERN	NO PATTERN	NO PATTERN	NO PATTERN	GASOLINE

BCA

B C Analytical

1255 Powell Street
Emeryville, CA 94608
510/428-2300
Fax: 510/547-3643

LOG NO: E92-07-039

Received: 02 JUL 92

Mr. Fred Flint
PG&E Technical & Eco. Services
3400 Crow Canyon Road
San Ramon, California 94583

Purchase Order: Z-19-1-245-91

Project: 60007150HATESA22-375

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, BLANK WATER SAMPLES	DATE SAMPLED
07-039-6	Field Blank	02 JUL 92

PARAMETER	07-039-6
Aromatic Hydrocarbons	
Date Analyzed	07.08.92
Dilution Factor, Times	1
Benzene, ug/L	<0.5
Ethylbenzene, ug/L	<0.5
Toluene, ug/L	<0.5
Total Xylene Isomers, ug/L	<0.5
TPH - Volatile Hydrocarbons	
Date Analyzed	07.08.92
Dilution Factor, Times	1
C6 to C14 (as gasoline), ug/L	<50
Approximate Character, .	NO PATTERN

Edward Wilson, Laboratory Director

BATCH QC REPORT: Definitions and Terms

Accuracy	The ability of a procedure to determine the "true" concentration of an analyte
Precision	The reproducibility of a procedure demonstrated by the agreement between analyses performed on either duplicates of the same sample or a pair of duplicate spikes
Batch	A group of samples analyzed sequentially using the same calibration curve, reagents, and instrument
Laboratory Control Standard (LCS)	Laboratory reagent water spiked with known compounds and subjected to the same procedures as the samples. The LCS thus indicates the accuracy of the analytical method and, because it is prepared from a different source than the standard used to calibrate the instrument, it also serves to double-check the calibration
Matrix QC	Quality control tests performed on actual client samples. For most inorganic analyses, the laboratory uses a pair of duplicate samples and a spiked sample. For most organic analyses, the laboratory uses a pair of spiked samples (duplicate spikes)
LC Result	Laboratory result of an LCS analysis
LT Result	Expected result, or true value, of the LCS analysis
R1, R2 Result:	Result of the analysis of replicate aliquots of a sample, with R1 indicating the first analysis of the sample and R2 its corresponding duplicate; used to determine precision
S1, S2 Result	Result of the analysis of replicate spiked aliquots, with S1 indicating one spike of the sample and S2 the second spike; used to determine precision and accuracy
R Bar Result	The average of replicate analysis results
S Bar Result:	The average of spike analysis results
True value	The theoretical, or expected, result of a spike sample analysis
Percent Recovery	The percentage of analyte recovered. For LCS, the percent recovery calculation is: LC + LT x 100 For spike recoveries, the percent recovery calculatiion is: $\frac{\text{(S Bar - Sample Concentration)}}{\text{Spike Amount}} \times 100$
Relative Percent Difference (RPD)	Calculated using one of the following: $\frac{(R1 - R2) \times 100}{(R1 + R2) + 2}$ $\frac{(S1 - S2) \times 100}{(S1 + S2) + 2}$
Blank Result	The result of the analysis of a method blank, which is reagent water that is analysed using the same reagents, instruments and procedures as the samples in a batch; used to determine laboratory contamination
Reporting Detection Limit (RDL)	BCA-assigned limit based on—but not the same as—method detection limits (MDLs) determined using EPA guidelines

: ORDER PLACED FOR CLIENT: PG&E Technical & Eco. Services 9207039 :
: BC ANALYTICAL : EMVL LAB : 10:25:33 21 JUL 1992 - P. 1 :

SAMPLES...	SAMPLE DESCRIPTION..	DETERM.....	DATE.... ANALYZED	METHOD.....	EQUIP.	BATCH	ID.NO
9207039*1	P-8	TPH.3510	07.15.92	3510/8015	516-08	92166	7867
		TPHG,BTEX	07.09.92	5030/8015	516-23	92195	7258
		TPHG.5030	07.09.92	5030/8015	516-23	92195	7258
9207039*2	P-7	TPH.3510	07.15.92	3510/8015	516-08	92166	7867
		TPHG,BTEX	07.09.92	5030/8015	516-23	92195	7258
		TPHG.5030	07.09.92	5030/8015	516-23	92195	7258
9207039*3	P-5	TPH.3510	07.15.92	3510/8015	516-08	92166	7867
		TPHG,BTEX	07.09.92	5030/8015	516-23	92196	7258
		TPHG.5030	07.09.92	5030/8015	516-23	92196	7258
9207039*4	P-6	TPH.3510	07.15.92	3510/8015	516-08	92166	7867
		TPHG,BTEX	07.09.92	5030/8015	516-23	92196	7258
		TPHG.5030	07.09.92	5030/8015	516-23	92196	7258
9207039*5	P-4	TPH.3510	07.15.92	3510/8015	516-08	92166	7867
		TPHG,BTEX	07.09.92	5030/8015	516-23	92196	7258
		TPHG.5030	07.09.92	5030/8015	516-23	92196	7258
9207039*6	Field Blank	TPHG,BTEX	07.08.92	5030/8015	516-23	92195	7258
		TPHG.5030	07.08.92	5030/8015	516-23	92195	7258

***

Notes: Equipment = BC Analytical identification number for a particular piece of analytical equipment.

ID.NO = BC Analytical employee identification number of analyst.

BC ANALYTICAL

BATCH QC REPORT
ORDER: E9207039

ATE REPORTED : 07/21/92

LABORATORY CONTROL STANDARDS

PARAMETER	DATE ANALYZED	BATCH NUMBER	LC RESULT	LT RESULT	UNIT	PERCENT RECOVERY
PH - Semivolatile Hydrocarbons						
C10 to C22 (as diesel)	07.15.92	92166	311	400	ug/L	78
TPH - Semivolatile Hydrocarbons						
C10 to C22 (as diesel)	07.15.92	92166	300	400	ug/L	75
romatic Hydrocarbons						
Benzene	07.09.92	92195	20	20	ug/L	100
Ethylbenzene	07.09.92	92195	20	20	ug/L	100
Toluene	07.09.92	92195	21	20	ug/L	105
Total Xylene Isomers	07.09.92	92195	64	60	ug/L	107
TPH - Volatile Hydrocarbons						
C6 to C14 (as gasoline)	07.09.92	92195	240	220	ug/L	109
romatic Hydrocarbons						
Benzene	07.10.92	92196	18	20	ug/L	90
Ethylbenzene	07.10.92	92196	18	20	ug/L	90
Toluene	07.10.92	92196	19	20	ug/L	95
Total Xylene Isomers	07.10.92	92196	59	60	ug/L	98
TPH - Volatile Hydrocarbons						
C6 to C14 (as gasoline)	07.10.92	92196	220	220	ug/L	100

BC ANALYTICAL

BATCH QC REPORT
ORDER: E9207039

ATE REPORTED : 07/21/92

MATRIX QC PRECISION (DUPLICATE SPIKES)

PARAMETER	DATE ANALYZED	BATCH NUMBER	S1 RESULT	S2 RESULT	UNIT	RELATIVE %DIFF
Aromatic Hydrocarbons						
Benzene	07.08.92	92195	18	18	ug/L	0
Ethylbenzene	07.08.92	92195	18	18	ug/L	0
Toluene	07.08.92	92195	18	19	ug/L	5
Total Xylene Isomers	07.08.92	92195	56	59	ug/L	5
PH - Volatile Hydrocarbons						
C6 to C14 (as gasoline)	07.08.92	92195	210	220	ug/L	5
Aromatic Hydrocarbons						
Benzene	07.09.92	92196	19	19	ug/L	0
Ethylbenzene	07.09.92	92196	18	19	ug/L	5
Toluene	07.09.92	92196	19	19	ug/L	0
Total Xylene Isomers	07.09.92	92196	58	60	ug/L	3
PH - Volatile Hydrocarbons						
C6 to C14 (as gasoline)	07.09.92	92196	230	240	ug/L	4

BC ANALYTICAL

BATCH QC REPORT
ORDER: E9207039

ATE REPORTED : 07/21/92

MATRIX QC ACCURACY (SPIKES)

PARAMETER	DATE ANALYZED	BATCH NUMBER	SBAR RESULT	TRUE RESULT	RBAR RESULT	UNIT	PERCENT RECOVERY
romatic Hydrocarbons							
Benzene	07.08.92	92195	18	20	<0.5	ug/L	90
Ethylbenzene	07.08.92	92195	18	20	<0.5	ug/L	90
Toluene	07.08.92	92195	18.5	21	0.8	ug/L	88
Total Xylene Isomers	07.08.92	92195	57.5	61	1.2	ug/L	94
TPH - Volatile Hydrocarbons							
C6 to C14 (as gasoline)	07.08.92	92195	215	220	<50	ug/L	98
romatic Hydrocarbons							
Benzene	07.09.92	92196	19	20	<0.5	ug/L	95
Ethylbenzene	07.09.92	92196	18.5	20	<0.5	ug/L	93
Toluene	07.09.92	92196	19	20	<0.5	ug/L	95
Total Xylene Isomers	07.09.92	92196	59	60	<0.5	ug/L	98
TPH - Volatile Hydrocarbons							
C6 to C14 (as gasoline)	07.09.92	92196	235	220	<50	ug/L	107

BC ANALYTICAL

BATCH QC REPORT
ORDER: E9207039

ATE REPORTED : 07/21/92

METHOD BLANKS AND REPORTING DETECTION LIMIT (RDL)

PARAMETER	DATE ANALYZED	BATCH NUMBER	BLANK RESULT	RDL	UNIT	METHOD
TPH - Semivolatile Hydrocarbons						
Date Analyzed	07.15.92	92166	7.15.92	NA	Date	3510/8015
Date Extracted	07.15.92	92166	7.06.92	NA	Date	3510/8015
C10 to C22 (as diesel)	07.15.92	92166	1.3	NA	ug/L	3510/8015
C18 to C35 (as oil)	07.15.92	92166	0.88	NA	ug/L	3510/8015
romatic Hydrocarbons						
Date Analyzed	07.08.92	92195	7.08.92	NA	Date	5030/8015
Benzene	07.08.92	92195	0	0.5	ug/L	5030/8015
Ethylbenzene	07.08.92	92195	0	0.5	ug/L	5030/8015
Toluene	07.08.92	92195	0.11	0.5	ug/L	5030/8015
Total Xylene Isomers	07.08.92	92195	0.083	0.5	ug/L	5030/8015
PH - Volatile Hydrocarbons						
Date Analyzed	07.08.92	92195	7.08.92	NA	Date	5030/8015
C6 to C14 (as gasoline)	07.08.92	92195	1.4	50	ug/L	5030/8015
romatic Hydrocarbons						
Date Analyzed	07.09.92	92196	7.09.92	NA	Date	5030/8015
Benzene	07.09.92	92196	0.12	0.5	ug/L	5030/8015
Ethylbenzene	07.09.92	92196	0.099	0.5	ug/L	5030/8015
Toluene	07.09.92	92196	0.31	0.5	ug/L	5030/8015
Total Xylene Isomers	07.09.92	92196	0.42	0.5	ug/L	5030/8015
TPH - Volatile Hydrocarbons						
Date Analyzed	07.09.92	92196	7.09.92	NA	Date	5030/8015
C6 to C14 (as gasoline)	07.09.92	92196	3.1	50	ug/L	5030/8015

CHAIN OF CUSTODY RECORD

BCA Log Number 920703

Client name: PGE. DER OAKPORT	Project or PO#: 60007150 HATESA (22-375)
Address:	Phone #: (510) 866-5866
City, State, Zip:	Report attention: FRED FLINT

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sampled by: S. POLSTON / Sample description	Number of containers	TPH as Gas BTEX	TPH as Diesel						Hazardous sample Special handling required	Remarks
1	7/2/92	1240	GW	P-8	3	X	X							
2		1224		P-7	3	X	X							
3		1307		P-5	3	X	X							
6		1312	AQ	Field Blank	2	X								
4		1321	GW	P-6	3	X	X							
5		1343		P-4	3	X	X							

	Signature	Print Name	Company	Date	Time
Relinquished by		SCOTT POLSTON	BCA	7/2/92	1417
Received by					
Relinquished by					
Received by					
Relinquished by					
Received by Laboratory		G-CHIENA	BCA	7/2/92	1425

B C ANALYTICAL

☐ 1255 Powell Street, Emeryville, CA 94608 (510) 428-2300

☐ 801 Western Avenue, Glendale, CA 91201 (818) 247-5737

☐ 1200 Gene Autry Way, Anaheim, CA 92805 (714) 978-0113

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.

Disposal arrangements: _____

*KEY: WW—Wastewater SU—Surface Water SO—Soil SL—Sludge PE—Petroleum OT—Other NA—Nonaqueous GW—Groundwater AQ—Aqueous