ATTACHMENT WM-82A

PHASE II ENVIRONMENTAL SITE ASSESSMENT
RETENTION BASINS
RIVERSIDE CANAL POWER COMPANY
GRAND TERRACE, CALIFORNIA

Prepared for:

Thermo Ecotek Corporation
245 Winter Street, Suite 300
Waltham, Massachusetts 02154

Prepared by:

Golder Associates

10 Chrysler, Suite B
Irvine, California 92618

March 1999
Project No.: 993-1986

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RETENTION BASINS

RIVERSIDE CANAL POWER COMPANY
12700 TAYLOR STREET
GRAND TERRACE, CALIFORNIA

Submitted to:

Thermo Ecotek Corporation
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1. INTRODUCTION

This report presents the results of the Retention Basins Assessment conducted by Golder Associates Inc. (Golder) at the Riverside Canal Power Company (site or subject property) in Grand Terrace, California.

The subject property was recently acquired by Thermo-Ecotek Corporation from Southern California Edison. Following the transfer of the property, Southern California Edison (SCE) is attempting to close two retention basins located on the northern portion of the property. Golder has been requested by Thermo-Ecotek to assess the possible presence of VOCs beneath the basins prior to closure.

The possible presence of VOCs was assessed beneath the East and West Retention Basins (*Leak Detection Investigation*, SCE 1997). This assessment, however, was limited to depths of 9 feet bgs in moderately permeable soils. Based upon this, further assessment was recommended to assess underlying soil and groundwater quality in the area of the two retention basins. A copy of the SCE Leak Detection Investigation is included as Appendix C.

The following sections detail the Site Description (Section 2), Summary of Field Investigation (Section 3), Laboratory Analysis and Results (Section 4), and Findings and Conclusions (Section 5).

2. SITE DESCRIPTION

The Riverside Canal Power Company is located immediately west of the intersection of Pico and Taylor Streets in Grand Terrace, California. (Figure 1). The predominant structures located on the property include cooling towers; process units that include boilers, tanks, and various mechanical equipment and vessels; retention basins, and buildings used for offices and control and maintenance operations. Detailed site descriptions of the subject property can be located in two reports titled "Phase II Environmental Site Assessment, Highgrove Generating Station" (Golder, 1998) and "Phase II Environmental Site Assessment, Highgrove Generating Station" (Geraghty & Miller, 1997).

3. SITE İNVESTIGATION

To accomplish the Retention Basin Assessment, Golder collected soil samples beneath the two basins by drilling one slant boring under each basin using a truck-mounted drill rig. During drilling, soil samples in each boring were collected at depths of approximately 10, 20, 30, 40, 50, 60, 70, and 80 feet below ground surface. Three samples and one duplicate sample collected beneath each basin were then analyzed for Volatile Organic Compounds (VOCs) by EPA Method 8260. The following sections detail each of the tasks associated with the above scope of work.

3.1 Health And Safety Plan

Golder prepared a site-specific Health and Safety Plan (HASP) for the site prior to the initiation of field work. The HASP is consistent with current federal Occupational Safety and Health Administration (OSHA) requirements for hazardous waste operations as contained in the Code of Federal Regulations Section 1910.120. The HASP was presented to workers in meetings before initiating field work, and implemented at the site during the field activities. The HASP is available for review upon request.

3.2 Underground Service Alert

All boring locations were marked and Underground Service Alert was notified more than 48 hours in advance of the initiation of field work as required by California law.

3.3 Soil Sample Collection

Soil samples were collected beneath each retention basin on February 26, 1999 using a CME 75 truck-mounted drill rig. Layne Christensen Company of Fontana, California was subcontracted to provide the direct push services. The approximate boring locations are shown on the Site Layout Map, Figure 2.

Slant boring B1 was drilled twelve feet north of the western retention basin at an approximate 20° angle (Figure 2). Soil samples were collected at 10, 20, 30, 40, 50, 60, 70, and 80 feet of drilling distance, corresponding to actual depths of approximately 9, 19, 28, 38, 47, 56, 66, and 75 feet below ground surface. Sample B1-80 was thus collected

approximately 75 feet below the center of the western basin. Similarly, slant boring B2 was drilled twelve feet north of the eastern retention basin at an approximate 20° angle. The sample designation, approximate sample depths, and headspace readings for each sample are indicated in Table 1.

Soil samples were obtained in 2-inch by 6-inch cylindrical brass sleeves using a California split spoon sampler. Each sample was sealed using Teflon tape, covered with plastic caps, and stored inside a chilled cooler. Labels were affixed to the sample sleeves identifying the boring, sample number, sample depth, date sampled, and project information. Headspace readings were taken from each sample with a photoionization detector. The samples were transported to Advanced Technology Laboratory of Newport Beach, California. All sampling equipment was decontaminated prior to use and between borings. Following sampling, borings B1 and B2 were backfilled with 5% cement / 95% bentonite grout to within approximately 1 foot of ground surface. The borings were capped with bentonite chips to match the existing unpaved surface area north of the retention basins.

3.4 Site Geology and Hydrogeology

Surface deposits at the site have been mapped as Pleistocene non-marine deposits. These are alluvial fan deposits (fanglomerate) which have been dissected by the modern drainage courses to form remnant terraces. The deposits include indurated older decomposed clay-rich alluvium. Water well drillers logs indicate that these materials extend to about 420 feet below the site and rest on granitic rocks (Geraghty & Miller, 1997). On the basis of soil borings made during previous Phase II studies and during this Retention Basin Assessment effort, subsurface material in the upper 80 feet were observed to consist of varying density silts and sands with occasional pebbles or gravel. Previous groundwater assessment efforts have reported depths to groundwater ranging from 94 to 98 feet bgs (Golder, 1999).

4. LABORATORY ANALYSIS RESULTS

Six soil samples and one duplicate sample were analyzed by a state-certified analytical laboratory for Volatile Organic Compounds (VOCs) by EPA Method 8260. No VOCs were detected above the method detection limits in any of the soil samples. The soil analysis results are summarized in Table 2. Complete analytical reports and chain-of-custody documentation for these analyses are contained in Appendix C.

4.1 Data Validation

Analytical results and associated quality control (QC) data were reviewed to determine the adequacy of the data for use in support of the project objectives. The review included an evaluation of chain-of-custody, sample holding times, consistency in reporting and method-specific QC: method blanks, laboratory control samples (LCS), matrix spikes (MS) and matrix spike duplicates (MSD).

- Chain-of-custody. Chain-of-custody forms were included for all samples and proper custody was maintained from the field to the laboratory.

- Holding times. Sample holding times were acceptable for all analyses.

- Reporting consistency. Sample results were reported in the proper units with correct adjustment for dilution.

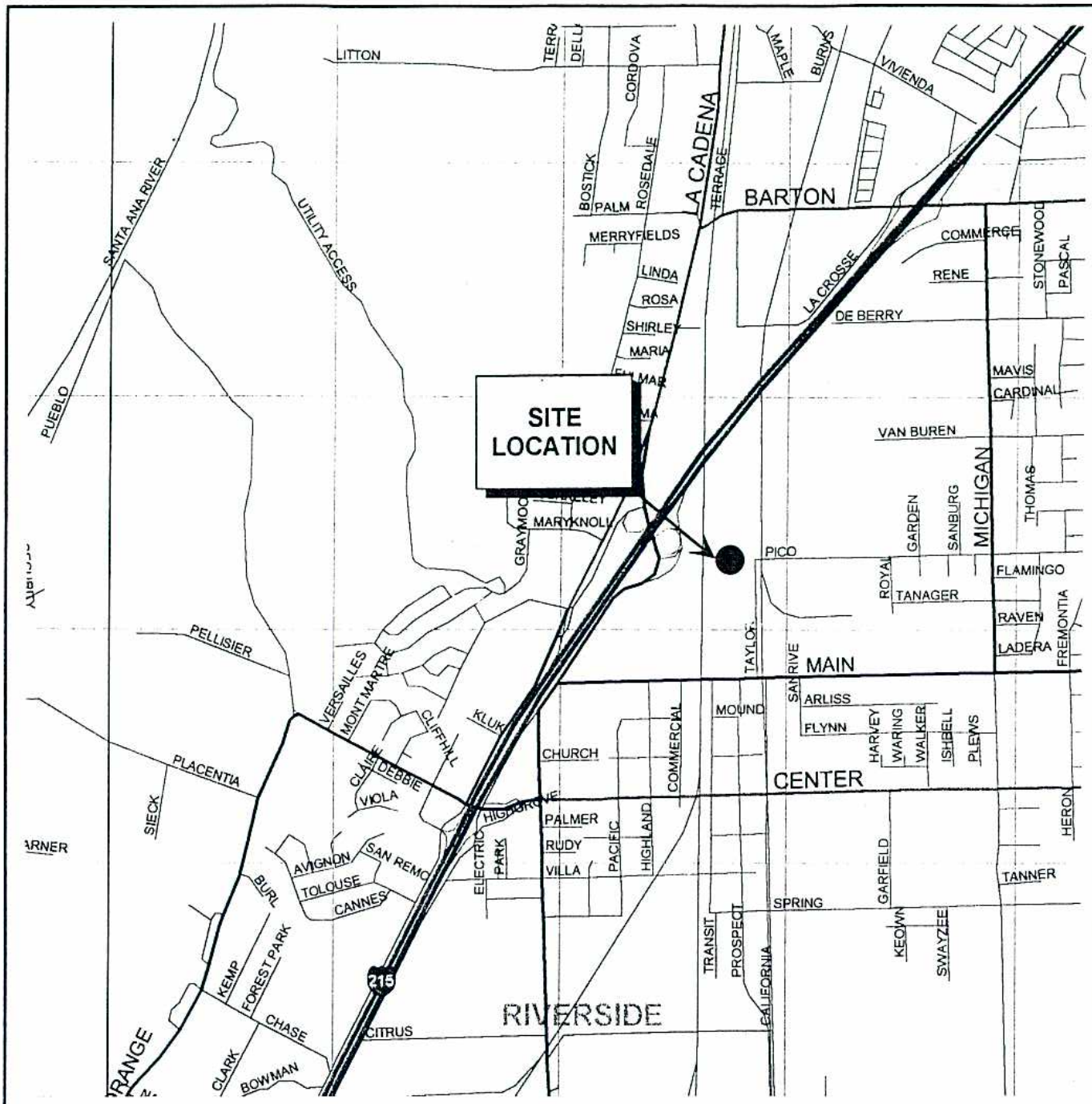
- Method specific QC. QC results were acceptable for all method blanks, LCS, MS and MSD.

5. CONCLUSIONS AND RECOMMENDATIONS

Two slant borings were drilled to sample soils beneath the retention basins at the subject property. Lab analysis of soil samples collected did not indicate the presence of VOCs above the method detection limits. Golder does not recommend further assessment beneath the basins.

6. LIMITATIONS

This assessment represents Golder's professional interpretation and judgment of the existing site conditions based on the facts currently available within the limits of the mutually agreed to scope of work, budget, and schedule, which are not intended to be exhaustive in scope. Golder's work was performed in accordance with generally accepted engineering standards. All information obtained and herein provided is presented subject to the terms and conditions of the Golder Consulting Agreement. It is Golder's specific intent that the conclusions and recommendations presented herein be used as a guidance and not necessarily as a firm course of action unless explicitly stated as such. We make no warranties, expressed or implied, as to the marketability of the property for a particular purpose. The information provided in this report is not to be construed as legal advice.



North

0 2400 feet

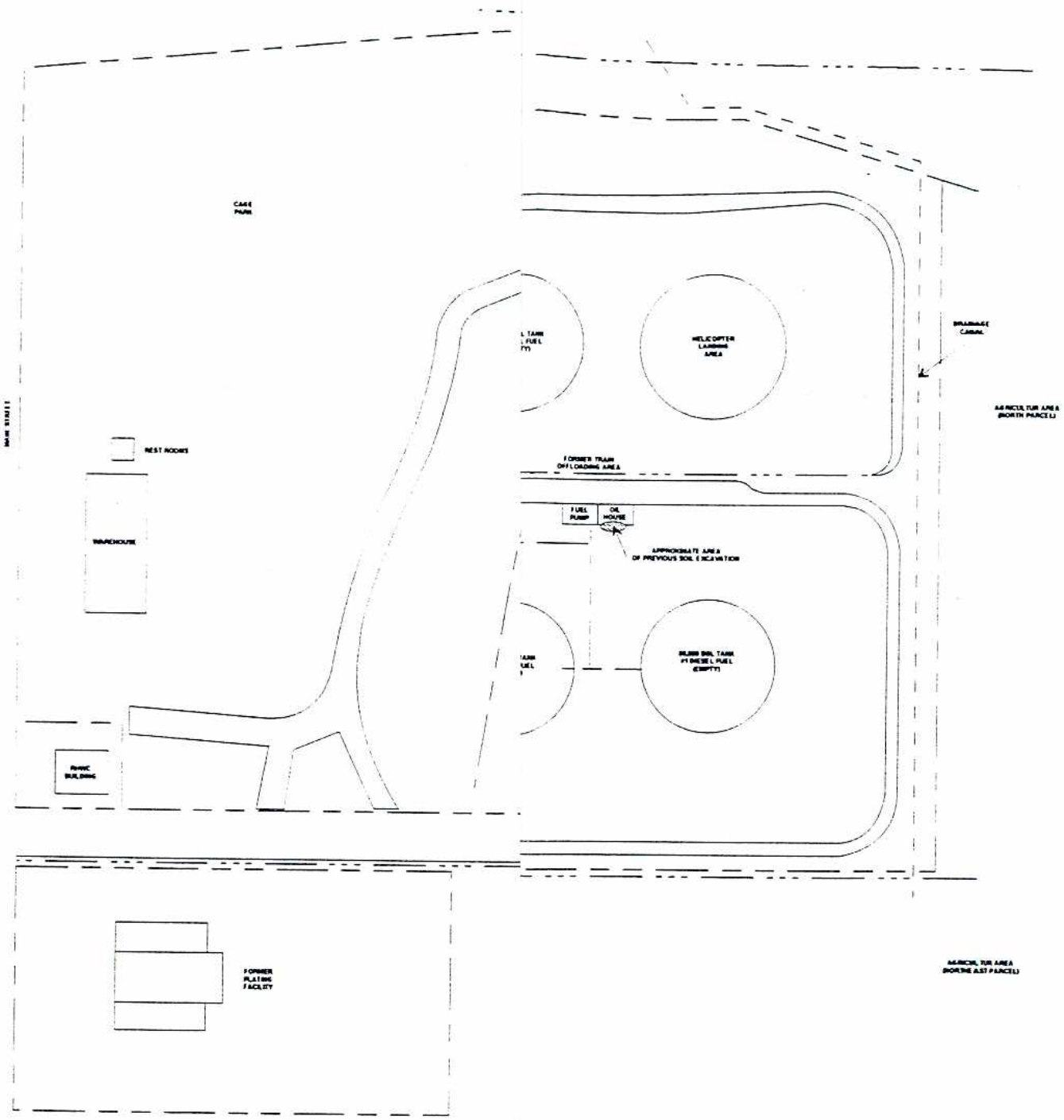
Approximate Scale

FIGURE 1

SITE LOCATION MAP
RIVERSIDE CANAL POWER COMPANY
GRAND TERRACE, CALIFORNIA

PROJECT NO: 983-1920.200 DATE: 12/14/98 DRAWN BY: BAH

Golder Associates



North

Approximate Scale: 1" = 140'

FIGURE 2
BORING LOCATION MAP
RIVERSIDE CANAL POWER COMPANY
GRAND TERRACE, CALIFORNIA

PROJECT NO: 983-1986 DATE: 03/10/99 DRAWN BY: BAH

FILE NAME: 983-1986 Figure 2 Boring Location Map Riverside Canal

Golder Associates

Table 1
Sample Designations, Sample Depths, and Headspace Readings
Riverside Canal Power Company
February 26, 1999

Sample ID	Sample Depth (feet)*	Headspace Reading (ppm)	Location
B1-10	9	2.5	Western Retention Basin
B1-20	19	3	
B1-30	28	3	
B1-40	38	1.2	
B1-50	47	2.5	
B1-60	56	4.9	
B1-70	66	3.7	
B1-80	75	1	
B2-10	9	1.5	Eastern Retention Basin
B2-20	19	3	
B2-30	28	- -	
B2-40	38	2.5	
B2-40 Duplicate	38	2.5	
B2-50	47	3	
B2-60	56	2.5	
B2-70	66	- -	
B2-70 Duplicate	66	- -	
B2-80	75	1	

Notes:

*Slant borings B1 and B2 drilled at approximate 20 degree angle

- - : Not analyzed

Table 2
Laboratory Analysis Resutls
Riverside Canal Power Company
February 26, 1997

Sample ID	VOCs 8260 (ug/kg)	Location
B1-10	- -	Western Retention Basin
B1-20	- -	
B1-30	- -	
B1-40	- -	
B1-50	- -	
B1-60	ND	
B1-70	ND	
B1-80	ND	
B2-10	- -	Eastern Retention Basin
B2-20	- -	
B2-30	- -	
B2-40	- -	
B2-40 Duplicate	- -	
B2-50	- -	
B2-60	ND	
B2-70	ND	
B2-70 Duplicate	ND	
B2-80	ND	

Notes:
ND : Not detected above Method Detection Limit
- - : Not analyzed

APPENDIX A

BORING LOGS

PROJECT: RCPC Basin

LOCATION: Grand Terrace, California

DIP: -20

RECORD OF BORING B1

BORING DATE: 2-26-99

SHEET 1 OF 3

DATUM:

SAMPLER HAMMER, 140 lb; DROP, 30 in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES: NUMBER	BLOWS/6"	RECOVERY %	PID ppm (2 4 6 8)	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT, PERCENT Wp — W — Wl	MONITORING INSTALLATIONS GROUNDWATER AND ENVIRONMENTAL OBSERVATIONS
0		Gravel and Sand		0.0						
5										
10	CME 75 8" Hollow Stem Auger	Silty SAND (SM), slightly moist, moderate brown, no odor, no cohesion, micaceous, stage 1 CaC03 staining, fine grained, well graded			B1-10			⊕		
15										
20		Silty SAND (SM), slightly moist, moderate brown, no odor, no cohesion, micaceous, fine grained			B1-20			⊕		
25										
30		Silty SAND (SM), slightly moist, moderate brown, no odor, very slight to no cohesion, micaceous, very fine grained			B1-30			⊕		
35										
40		Sandy SILT (ML), slightly moist, light brown, no odor, very slight cohesion		38.0	B1-40			⊕		
		CONTINUED ON NEXT PAGE								

DATA INPUT:

DEPTH SCALE (ALONG HOLE)

1 to 5

Golder Associates

LOGGED: O. Sendowski

CHECKED: E. Allison

PROJECT: RCPC Basin

LOCATION: Grand Terrace, California

DIP: -20

RECORD OF BORING B1

BORING DATE: 2-26-99

SHEET 2 OF 3

DATUM:

SAMPLER HAMMER, 140 lb; DROP, 30 in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	BLOWS/6"	RECOVERY %	PID ppm (2 4 6 8)	HYDRAULIC CONDUCTIVITY, k, cm/s	WATER CONTENT, PERCENT Wp — W — Wl	MONITORING INSTALLATIONS GROUNDWATER AND ENVIRONMENTAL OBSERVATIONS
40	CME 75 8" Hollow Stem Auger	~~CONTINUED FROM PREVIOUS PAGE~~									
45		Sandy SILT (ML), dry to slightly moist, light brown, no odor, slight cohesion			B1-50			⊕			
50											
55				56.0	B1-60			⊕			
60		Sandy CLAY/Sandy SILT (CL/ML), slightly moist, moderate brown, no odor, some cohesion									
65				66.0	B1-70			⊕			
70		Silty SAND (SM), slightly moist, light brown, no odor, slight cohesion									
75				75.0	B1-80			⊕			
80		Clayey SAND (SC), moist, moderate brown, cohesive, no odor, gravel to 1/4" diameter (10 to 20% by weight)									
		~~CONTINUED ON NEXT PAGE~~		80.0							

DATA INPUT:

DEPTH SCALE (ALONG HOLE)

1 to 5

LOGGED: O. Sendowski

Golder Associates

PROJECT: RCPC Basin

LOCATION: Grand Terrace, California

DIP: -20

RECORD OF BORING B1

BORING DATE: 2-26-99

SHEET 3 OF 3

DATUM:

SAMPLER HAMMER, 140 lb; DROP, 30 in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	SAMPLES: BLOWS/6"	SAMPLES: RECOVERY %	PID ppm (2 4 6 8)	HYDRAULIC CONDUCTIVITY, K, cm/s	WATER CONTENT, PERCENT (Wp — W — Wl)	MONITORING INSTALLATIONS GROUNDWATER AND ENVIRONMENTAL OBSERVATIONS
80		~~CONTINUED FROM PREVIOUS PAGE~~ Bottom of boring at approximately 80 feet. Borehole backfilled with 5% cement bentonite grout mix.		80.0							
85											
90											
95											
100											
105											
110											
115											
120											

DATA INPUT:

DEPTH SCALE (ALONG HOLE)

1 to 5

Golder Associates

LOGGED: O. Sendowski

PROJECT: RCPC Basin

LOCATION: Grand Terrace, California

DIP: -20

RECORD OF BORING B2

BORING DATE: 2-26-99

SHEET 1 OF 2

DATUM:

SAMPLER HAMMER, 140 lb; DROP, 30 in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES: NUMBER	BLOWS/6"	RECOVERY %	PID ppm (2 4 6 8)	HYDRAULIC CONDUCTIVITY, K, cm/s	WATER CONTENT, PERCENT Wp W Wl	MONITORING INSTALLATIONS GROUNDWATER AND ENVIRONMENTAL OBSERVATIONS
0	CME 75 8" Hollow Stem Auger	Gravel and Sand		0.0							
5											
10		Silty SAND (SM), slightly moist, moderate brown, no odor, no cohesion			B2-10			⊕			
15											
20		SAND (SW), slightly moist, light brown, no odor, no cohesion, well graded, fine to medium grained		19.0	B2-20			⊕			
25											
30		– medium grained			B2-30						
35											
40		Silty SAND (SM), slightly moist, moderate brown, no odor, no cohesion, very fine grained		38.0	B2-40			⊕			
		~~CONTINUED ON NEXT PAGE~~									

DATA INPUT:

DEPTH SCALE (ALONG HOLE)

1 to 5

LOGGED: O. Sendowski

Golder Associates

PROJECT: RCPC Basin

LOCATION: Grand Terrace, California

DIP: -20

RECORD OF BORING B2

BORING DATE: 2-26-99

SHEET 2 OF 2

DATUM:

SAMPLER HAMMER, 140 lb; DROP, 30 in

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	BLOWS/6"	RECOVERY %	PID ppm (2 4 6 8)	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT, PERCENT Wp W Wl	MONITORING INSTALLATIONS GROUNDWATER AND ENVIRONMENTAL OBSERVATIONS
40		CONTINUED FROM PREVIOUS PAGE								
45										
		SAND (SW), slightly moist, light brown to light olive brown, no odor, no cohesion, fine grained		47.0	B2-60					
50										
55	CME 75 8" Hollow Stem Auger	SAND (SP), slightly moist, white, olive, and black, no odor, no cohesion			B2-65					
60										
65		– brown, medium grained								
70										
75		Bottom of boring at approximately 75 feet. Borehole backfilled with 5% cement bentonite grout.		75.0	B2-70					
80										

DATA INPUT:

DEPTH SCALE (ALONG HOLE)

1 to 5

Golder Associates

LOGGED: O. Sendowski

APPENDIX B

LABORATORY ANALYSIS RESULTS

March 8, 1999

ELAP No.: 1838

Golder Associates
10 Chrysler, Suite #B
Irvine, CA 92618-2008

ATTN: Fred Allison

Client's Project: RCPC
Lab No.: 33534-001/020

Enclosed are the results for sample(s) received by Advanced Technology Laboratories and tested for the parameters indicated in the enclosed chain of custody.

Thank you for the opportunity to service the needs of your company. Please feel free to call me at (562) 989 - 4045 if I can be of further assistance to your company.

Sincerely,

Cheryl De Los Reyes
Technical Operations Manager
CDR/cp

Enclosures

This cover letter is an integral part of this analytical report.

Client: Golder Associates
Attn: Fred Allison

Client's Project: RCPC
Date Received: 02/27/99
Matrix: Soil
Units: µg/kg

EPA Method 8260

Lab No.:		Method Blank		33534-006		33534-007		33534-008		33534-017	
Client Sample I.D.:		--		B1-60		B1-70		B1-80		B2-60	
Date Sampled:		--		02/26/99		02/26/99		02/26/99		02/26/99	
QC Batch #:		P99VOCS040		P99VOCS040		P99VOCS040		P99VOCS040		P99VOCS040	
Date Analyzed:		03/05/99		03/05/99		03/05/99		03/05/99		03/05/99	
Analyst Initials:		SMC		SMC		SMC		SMC		SMC	
Dilution Factor:		1		1		1		1		1	
ANALYTE	MDL	DLR	Results	DLR	Results	DLR	Results	DLR	Results	DLR	Results
Benzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Bromobenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Bromodichloromethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Bromoform	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Bromomethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
n-Butylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
sec-Butylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
tert-Butylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Carbon tetrachloride	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Chlorobenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Chloroethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Chloroform	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Chloromethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
2-Chlorotoluene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
4-Chlorotoluene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Dibromochloromethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,2-Dibromo-3-chloropropane	10	10	ND	10	ND	10	ND	10	ND	10	ND
1,2-Dibromoethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Dibromomethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,2-Dichlorobenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,3-Dichlorobenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,4-Dichlorobenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Dichlorodifluoromethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,1-Dichloroethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,2-Dichloroethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,1-Dichloroethene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
cis-1,2-Dichloroethene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND

MDL = Method Detection Limit
ND = Not Detected (Below DLR).
DLR = MDL X Dilution Factor
NA = Not Analyzed

The cover letter is an integral part of this analytical report.

Client: Golder Associates
Attn: Fred Allison

Client's Project: RCPC
Date Received: 02/27/99
Matrix: Soil
Units: µg/kg

EPA Method 8260

Lab No.:		Method Blank		33534-006		33534-007		33534-008		33534-017	
Client Sample I.D.:		--		B1-60		B1-70		B1-80		B2-60	
ANALYTE	MDL	DLR	Results	DLR	Results	DLR	Results	DLR	Results	DLR	Results
trans-1,2-Dichloroethene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,2-Dichloropropane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,3-Dichloropropane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
2,2-Dichloropropane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,1-Dichloropropene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Ethylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Hexachlorobutadiene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Isopropylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
p-Isopropyltoluene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Methylene Chloride	15	15	ND	15	ND	15	ND	15	ND	15	ND
Naphthalene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
n-Propylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Styrene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,1,1,2-Tetrachloroethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,1,2,2-Tetrachloroethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Tetrachloroethene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Toluene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,2,3-Trichlorobenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,2,4-Trichlorobenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,1,1-Trichloroethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,1,2-Trichloroethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Trichloroethene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Trichlorofluoromethane	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,2,3-Trichloropropane	10	10	ND	10	ND	10	ND	10	ND	10	ND
1,2,4-Trimethylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
1,3,5-Trimethylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Vinyl Chloride	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND
Xylenes (Total)	5.0	5.0	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND

MDL = Method Detection Limit
ND = Not Detected (Below DLR).
DLR = MDL X Dilution Factor
NA = Not Analyzed

Reviewed/Approved By: _____ Date 03/08/99
Lee Ingvaldson
Department Supervisor

The cover letter is an integral part of this analytical report.

Client: Golder Associates
Attn: Fred Allison

Client's Project: RCPC
Date Received: 02/27/99
Matrix: Soil
Units: µg/kg

EPA Method 8260

Lab No.:		33534-018		33534-019		33534-020					
Client Sample I.D.:		B2-70		B2-70 Duplicate		B2-80					
Date Sampled:		02/26/99		02/26/99		02/26/99					
QC Batch #:		P99VOCS040		P99VOCS040		P99VOCS040					
Date Analyzed:		03/05/99		03/05/99		03/05/99					
Analyst Initials:		SMC		SMC		SMC					
Dilution Factor:		1		1		1					
ANALYTE	MDL	DLR	Results	DLR	Results	DLR	Results	DLR	Results	DLR	Results
Benzene	5.0	5.0	ND	5.0	ND	5.0	ND				
Bromobenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
Bromodichloromethane	5.0	5.0	ND	5.0	ND	5.0	ND				
Bromoform	5.0	5.0	ND	5.0	ND	5.0	ND				
Bromomethane	5.0	5.0	ND	5.0	ND	5.0	ND				
n-Butylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
sec-Butylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
tert-Butylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
Carbon tetrachloride	5.0	5.0	ND	5.0	ND	5.0	ND				
Chlorobenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
Chloroethane	5.0	5.0	ND	5.0	ND	5.0	ND				
Chloroform	5.0	5.0	ND	5.0	ND	5.0	ND				
Chloromethane	5.0	5.0	ND	5.0	ND	5.0	ND				
2-Chlorotoluene	5.0	5.0	ND	5.0	ND	5.0	ND				
4-Chlorotoluene	5.0	5.0	ND	5.0	ND	5.0	ND				
Dibromochloromethane	5.0	5.0	ND	5.0	ND	5.0	ND				
1,2-Dibromo-3-chloropropane	10	10	ND	10	ND	10	ND				
1,2-Dibromoethane	5.0	5.0	ND	5.0	ND	5.0	ND				
Dibromomethane	5.0	5.0	ND	5.0	ND	5.0	ND				
1,2-Dichlorobenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
1,3-Dichlorobenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
1,4-Dichlorobenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
Dichlorodifluoromethane	5.0	5.0	ND	5.0	ND	5.0	ND				
1,1-Dichloroethane	5.0	5.0	ND	5.0	ND	5.0	ND				
1,2-Dichloroethane	5.0	5.0	ND	5.0	ND	5.0	ND				
1,1-Dichloroethene	5.0	5.0	ND	5.0	ND	5.0	ND				
cis-1,2-Dichloroethene	5.0	5.0	ND	5.0	ND	5.0	ND				

MDL = Method Detection Limit
ND = Not Detected (Below DLR).
DLR = MDL X Dilution Factor
NA = Not Analyzed

The cover letter is an integral part of this analytical report.

Client: Golder Associates
Attn: Fred Allison

Client's Project: RCPC
Date Received: 02/27/99
Matrix: Soil
Units: µg/kg

EPA Method 8260

Lab No.:		33534-018		33534-019		33534-020					
Client Sample I.D.:		B2-70		B2-70 Duplicate		B2-80					
ANALYTE	MDL	DLR	Results	DLR	Results	DLR	Results	DLR	Results	DLR	Results
trans-1,2-Dichloroethene	5.0	5.0	ND	5.0	ND	5.0	ND				
1,2-Dichloropropane	5.0	5.0	ND	5.0	ND	5.0	ND				
1,3-Dichloropropane	5.0	5.0	ND	5.0	ND	5.0	ND				
2,2-Dichloropropane	5.0	5.0	ND	5.0	ND	5.0	ND				
1,1-Dichloropropene	5.0	5.0	ND	5.0	ND	5.0	ND				
Ethylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
Hexachlorobutadiene	5.0	5.0	ND	5.0	ND	5.0	ND				
Isopropylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
p-Isopropyltoluene	5.0	5.0	ND	5.0	ND	5.0	ND				
Methylene Chloride	15	15	ND	15	ND	15	ND				
Naphthalene	5.0	5.0	ND	5.0	ND	5.0	ND				
n-Propylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
Styrene	5.0	5.0	ND	5.0	ND	5.0	ND				
1,1,1,2-Tetrachloroethane	5.0	5.0	ND	5.0	ND	5.0	ND				
1,1,2,2-Tetrachloroethane	5.0	5.0	ND	5.0	ND	5.0	ND				
Tetrachloroethene	5.0	5.0	ND	5.0	ND	5.0	ND				
Toluene	5.0	5.0	ND	5.0	ND	5.0	ND				
1,2,3-Trichlorobenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
1,2,4-Trichlorobenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
1,1,1-Trichloroethane	5.0	5.0	ND	5.0	ND	5.0	ND				
1,1,2-Trichloroethane	5.0	5.0	ND	5.0	ND	5.0	ND				
Trichloroethene	5.0	5.0	ND	5.0	ND	5.0	ND				
Trichlorofluoromethane	5.0	5.0	ND	5.0	ND	5.0	ND				
1,2,3-Trichloropropane	10	10	ND	10	ND	10	ND				
1,2,4-Trimethylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
1,3,5-Trimethylbenzene	5.0	5.0	ND	5.0	ND	5.0	ND				
Vinyl Chloride	5.0	5.0	ND	5.0	ND	5.0	ND				
Xylenes (Total)	5.0	5.0	ND	5.0	ND	5.0	ND				

MDL = Method Detection Limit
ND = Not Detected (Below DLR).
DLR = MDL X Dilution Factor
NA = Not Analyzed

Reviewed/Approved By: _____ Date 03/08/99

Lee Ingvaldson
Department Supervisor

The cover letter is an integral part of this analytical report.

Spike Recovery and RPD Summary Report - Soil(ug/Kg)

Method : C:\HPCHEM\1\METHODS\PVS0224.M (RTE Integrator)
Title : VOC 8240/8260B Advanced Technology Laboratory
Last Update : Fri Mar 05 09:19:47 1999
Response via : Initial Calibration

Non-Spiked Sample: 33430-53.D

	Spike Sample	Spike Duplicate Sample
File ID :	PMS0305A.D	PMD0305A.D
Sample :	33430-53 spike	33430-53 spike dup
Acq Time:	5 Mar 1999 1:16 pm	5 Mar 1999 1:44 pm

Compound	Sample Conc	Spike Added	Spike Res	Dup Res	Spike %Rec	Dup %Rec	RPD	QC Limits RPD	QC Limits % Rec
1,1-dichloroethene	0.0	100	113	99	113	99	13	20	58-156
benzene	0.0	100	108	102	108	102	6	12	72-134
trichloroethene	0.0	100	111	105	111	105	5	16	55-145
toluene	0.0	100	93	86	93	86	7	16	73-127
chlorobenzene	0.0	100	96	95	96	95	1	11	80-119

QCBATCH#P99VOCS040

Reviewed/Approved By: _____ Date: 03/08/99
Lee Ingvaldson
Department Supervisor

Advanced Technology Laboratories
1510 E. 33rd Street Signal Hill, CA 90807 Tel: 562 989-4045 Fax: 562 989-4040

Golder Associates Fax

To: Dianne
Company: ATL
From: Ofer Senderovitz
Our ref: RCPC
RE:
Total pages (including cover): 3

Fax Numbers: 562 989-4040
Date: 3-1-99
e-mail:
Voice Mail:
Hard copy to follow ☐

MESSAGE

Diane,

Can you run 8260 b (VOCs)

for:
B1-60
B1-70
B1-80
B2-60
B2-70
B2-70 Duplicate
B2-80

Chain-of-custody forms are attached.

Ofer Senderovitz

Golder Associates
10 Chrysler, Suite B
Irvine, California 92618
Telephone (949) 583-2700
Facsimile (949) 583-2770

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Water Resources

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CHAIN OF CUSTODY RECORD

PROJ. NO.

SITE/LOCATION: RCPC

SAMPLERS: (Signature) Ofer Sandowski

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT/ PRESERVATIVE VOCs 8260b						SEAL NO.	SEAL INTACT? (Y or N)	REMARKS (with initials)
	2-26-99		Soil		B1-10	1									
					B1-20	1									
					B1-30	1									
					B1-40	1									
					B1-50	1									
					B1-60	1									
					B1-70	1									
					B1-80	1									
					Trip Blank TB1	1									
					Trip Blank TB2	1									
					B2-10	1									
					B2-20	1									
					B2-30	1									
					B2-40	1									
					B2-40 Duplicate	1									

Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
Ofer Sandowski	2-27-99 12:10	[signature]			
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Date/Time	Remarks (attachments if necessary)	
				HOLD	

CHAIN OF CUSTODY RECORD

PROJ. NO.: RCPC

SITE/LOCATION: RCPC

SAMPLERS: (Signature) Ofer Sendrowski

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO OF CONTAINERS	AMOUNT/ PRESERVATIVE: VOCs 8260b						SEAL NO.	SEAL INTACT? (Y or N)	REMARKS (with initials)
	2-26-99		Soil		B2-50	1									
	↓		↓		B2-60	1									
					B2-70	1									
					B2-70 Duplicate	1									
					B2-80	1									

Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)
Ofer Sendrowski	2-27-99 12:10				
Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)
Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)	Date / Time	Remarks (attachments if necessary)	
				HOLD	

APPENDIX C

Leak Detection Investigation

Highgrove Generating Station

May 5, 1997

#20D

LEAK DETECTION INVESTIGATION

Highgrove Generating Station

May 5, 1997

Prepared by:

P. Hamilton

P. Hamilton, CEG #998
Engineering Geologist

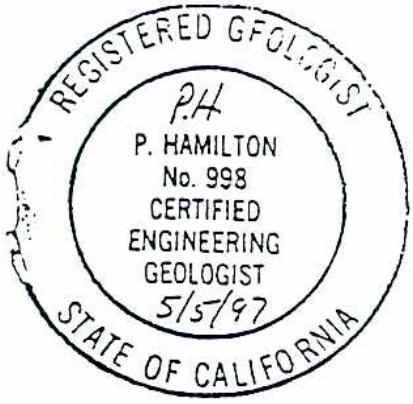


Table of Contents

1. Introduction

Southern California Edison Company (Edison) implemented an investigation in response to a Consent Agreement with the Department of Toxic Substances Control (BC 121219). The purpose of the investigation was to execute a study to demonstrate that no environmental contamination has resulted from the operation of two surface impoundments at the Highgrove Generating Station. Edison owns and operates the Highgrove Generating Station.

The investigation was designed to determine if the basins at the site had released any water containing abnormal pH values or metals to the soil leading to ground water. Due to the size of the basins and the minor usage, it was proposed that an extensive soil sampling program be performed below the liners. If the soils directly beneath the basins can be demonstrated to be free of abnormal pH and metal concentration values, then a ground water monitoring program would not be necessary.

This report compiles all of the data and information derived during the soil exploration in compliance with the Work Plan submitted to the DTSC. The Work Plan was part of the Edison submittal titled "Leak Detection Investigation, Highgrove Generating Station," dated April 1996. Any deviation or field change to the plan is described in this report.

2. Exploration

The soil beneath the East and West basins were investigated using two methods: a soil gas survey and soil sampling. Three exploratory borings were advanced within each basin for a total of six holes. The locations of the holes are

shown on Figures 2 and 3. The location of the basins and background boring (H-1) are shown on Figure 1.

On September 17, a soil gas survey was performed by Hydro Geo Spectrum, a RWQCB approved contractor. The company presented in the Work Plan was no longer performing soil gas surveys. A total of six soil gas samples was collected for analysis; three in each basin. The proposed depth of for the samples was 5 feet. However, for a few samples, the cemented soil would not allow the gas sampling tube to be driven past 3.5 feet.

Two types of drilling equipment was used to advance the bore holes: hand auger and track mounted drill rig. The exploratory holes within the basins were drilled using a minimum 3-inch diameter, hand auger. Three samples were taken in each hole at 1, 5, and 9 feet with a drive sampler attached on the hand auger equipment. The samples were retrieved in the plastic inter tube within the drive sampler.

A drill rig was used to advance the background boring due to the required depth. Soil samples were taken through the 6-inch hollow stem auger by using the drive sampler from the hand augering process. Again, the samples were captured in the plastic inter tube.

The drilling and soil gas contractors mobilized on September 17. The exploratory hole locations were chosen and a circular opening cut in the liner. The soil gas survey was performed in the six locations. The soil sampling in the basins occurred on the 18th with the East basin completed first. The background soil sampling was accomplished on the September 20.

The pH meter failed on the day soil sampling occurred in the basins. No field screening was performed on the samples. A new meter was acquired before the background boring was drilled.

3. Results

The basins were constructed with a base of asphaltic tile placed on the excavated native soil. The tile was covered by a coating of thin hypalon fabric. The HDPE was applied over the hypalon in one or two layers. The second layer was overlap in the corner sections. In the East Basin, a third layer of the HDPE was discovered on the bottom.

Water was encountered when the liner was opened at the West Basin. It was not determined if the water was between the liners or below. Faint rainbows were observed on the water indicating the presence of petroleum products. The petroleum could have been a by-product of the asphaltic tiles.

The methods, quality control, and results of the soil gas survey are presented in a report prepared by Hydro Geo Spectrum. The complete report is contained in Appendix 1. The survey detected small amounts of TCE in two samples collected from the West Basin. The values were near the detection limit at 1 ug/L. The three samples from the West Basin also had similar concentrations of a gasoline additive, MTBE. All soil gas samples from the East Basin did not detect any volatile organic constituents.

The field forms generated during the soil sampling are contained in Appendix 2. These include the Daily Reports for the two sampling days and the Calibration Log for the pH meter on the second day. The boring logs for the six exploratory holes and the background boring are submitted in Appendix 3.

The soil beneath the basins is layered silty to clayey sand that are locally cemented causing difficult hand augering. The fine grained portion of the soil below the West Basin appeared to be clay rather than the silt at the East Basin. A distinct, 1-foot layer of red-brown clayey sand was encountered at 7 feet beneath the West Basin. The horizon was very dense and dry. It was not observed below

the East Basin but was crossed in the background boring, H-1. This horizon appears to be naturally occurring rather than from the operation of the basin.

Nine soil samples were removed from three exploratory holes in each basin. The samples were delivered to Weck Laboratories to be tested for the following parameters: pH, metals, chromium 6, chloride, fluoride, iron, and TCE. The resultant data from the lab analysis is arranged by boring on Tables 1 and 3 for the East and West basins, respectively. The same data is arranged by depth on Tables 2 and 4. The background data has been highlighted. The laboratory data sheets and Chain of Custody forms are contained in Appendix 4. The TCE findings are shown on the tables. The remainder of the lab data sheets for the 8260 analysis is presented in Appendix 5.

The tables show that no abnormal values for the tested parameters exist below the basins. The 8260 analysis indicated a non-detect for all parameters in all samples. It is concluded that there has been no leakage of basin liquids to the soil beneath the liners.

East Retention Basin -- Data Arranged by Boring

Table 1

	Boring ID		1-1	1-2	1-3	2-1	2-2	2-3	3-1	3-2	3-3	B-2	B--4	B-5
	Depth (feet)		0.5	5	9	1	5	9	0.66	5	9	1	5	9
Parameter	PQL	Units												
pH		units	9.95	8.82	8.5	9.73	9.64	9.61	9.65	8.69	7.54	8.43	8.05	8.56
TCE	2.5	ug/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Antimony	5	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	6	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Barium	0.7	mg/Kg	65.4	90.3	86	82.6	122	120	62	106	38.3	105	104	80
Beryllium	0.7	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	0.7	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloride	2	mg/L	ND	ND	ND	ND	ND	ND	ND	2.58	ND	ND	ND	ND
Chromium, Total	1.5	mg/Kg	5.66	5.46	9.06	4.35	5.06	5.82	5.09	5.48	3.1	3.95	7.1	12.8
Chromium 6	5	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	1.5	mg/Kg	6.69	4.36	7.35	6.02	5.6	4.13	7.33	7.15	1.66	5.22	4.37	7.63
Cobalt	2.5	mg/Kg	3.05	3.77	5.6	4.89	4.57	5.69	ND	5.07	ND	4.66	3.76	5.71
Fluoride	1	mg/L	ND	3.33	1.34	ND	1.84	1.55	ND	ND	ND	1.31	ND	1.27
Iron	50	mg/Kg	14,400	13,400	16,000	14,300	16,300	19,700	14,000	15,400	6,010	20,900	19,900	22,800
Lead	1.5	mg/Kg	3.27	2.8	4.16	2.89	3.6	4.08	5.43	3.69	ND	3.86	3.2	4.83
Mercury	0.06	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum	2.5	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	2.5	mg/Kg	4.33	5.16	8.16	4.64	6.78	6.11	5.38	5.75	ND	4.9	6.6	10.4
Selenium	0.06	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	0.7	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	1.5	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	2.5	mg/Kg	13.4	18.3	13.2	5.06	6.95	5.86	7.41	13	ND	46.1	49.8	55.1
Zinc	1.5	mg/Kg	36.2	37.5	41.8	37	51.9	53.4	28.3	50.1	18.4	41.1	40.9	30.5

East Retention Basin -- Data Arranged by Depth

Table 2

	Boring ID		1-1	2-1	3-1	B-2		1-2	2-2	3-2	B--4		1-3	2-3	3-3	B-5
	Depth (feet)		0.5	0.66	1	1		5	5	5	5		9	9	9	9
Parameter	PQL	Units														
pH		units	9.95	9.73	9.65	8.43		8.82	9.64	8.69	8.05		8.5	9.61	7.54	8.56
TCE	2.5	ug/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Antimony	5	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Arsenic	6	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Barium	0.7	mg/Kg	65.4	82.6	62	105		90.3	122	106	104		86	120	38.3	80
Beryllium	0.7	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Cadmium	0.7	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Chloride	2	mg/L	ND	ND	ND	ND		ND	ND	2.58	ND		ND	ND	ND	ND
Chromium, Total	1.5	mg/Kg	5.66	4.35	5.09	3.95		5.46	5.06	5.48	7.1		9.06	5.82	3.1	12.8
Chromium 6	5	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Copper	1.5	mg/Kg	6.69	6.02	7.33	5.22		4.36	5.6	7.15	4.37		7.35	4.13	1.66	7.63
Cobalt	2.5	mg/Kg	3.05	4.89	ND	4.66		3.77	4.57	5.07	3.76		5.6	5.69	ND	5.71
Fluoride	1	mg/L	ND	ND	ND	1.31		3.33	1.84	ND	ND		1.34	1.55	ND	1.27
Iron	50	mg/Kg	14,400	14,300	14,000	20,900		13,400	16,300	15,400	19,900		16,000	19,700	6,010	22,800
Lead	1.5	mg/Kg	3.27	2.89	5.43	3.86		2.8	3.6	3.69	3.2		4.16	4.08	ND	4.83
Mercury	0.06	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Molybdenum	2.5	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Nickel	2.5	mg/Kg	4.33	4.64	5.38	4.9		5.16	6.78	5.75	6.6		8.16	6.11	ND	10.4
Selenium	0.06	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Silver	0.7	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Thallium	1.5	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Vanadium	2.5	mg/Kg	13.4	5.06	7.41	46.1		18.3	6.95	13	49.8		13.2	5.86	ND	55.1
Zinc	1.5	mg/Kg	36.2	37	28.3	41.1		37.5	51.9	50.1	40.9		41.8	53.4	18.4	30.5

West Retention Basin -- Data Arranged by Boring

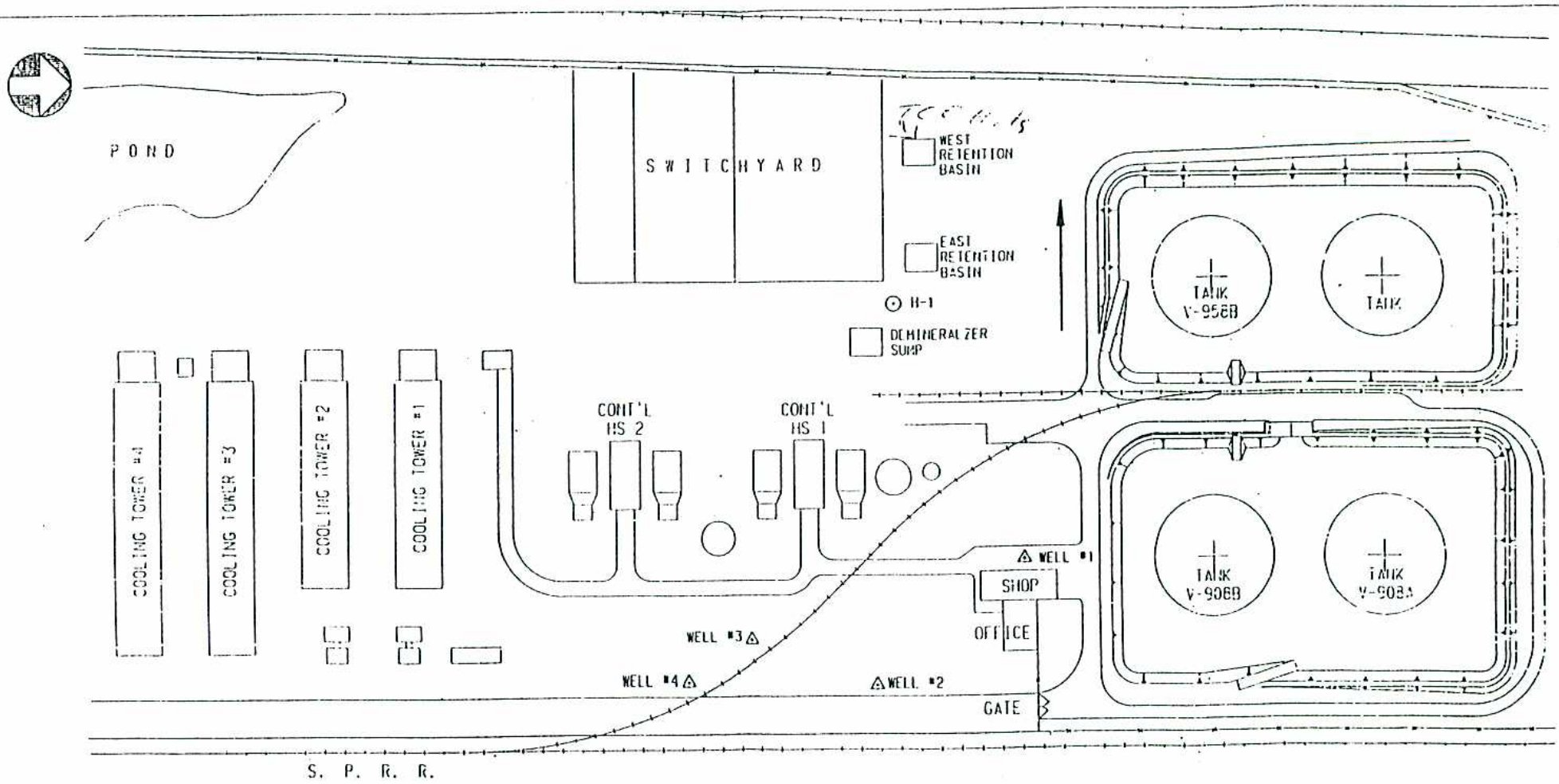
Table 3

	Boring ID		4-1	4-2	4-3	5-1	5-2	5-3	6-1	6-2	6-3	B-2	B--4	B-5
	Depth (feet)		1	5	9	1	5	9	1	5	9	1	5	9
Parameter	PQL	Units												
pH		units	8.6	9.25	8.82	8.28	8.78	8.5	8.43	8.44	8.28	8.43	8.05	8.56
TCE	2.5	ug/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Antimony	5	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	6	mg/Kg	ND	ND	ND	ND	ND	9.03	ND	ND	ND	ND	ND	ND
Barium	0.7	mg/Kg	134	105	102	91	122	108	102	94.7	90.2	105	104	80
Beryllium	0.7	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	0.7	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloride	2	mg/L	ND	ND	ND	ND	ND	ND	2.74	ND	ND	ND	ND	ND
Chromium, Total	1.5	mg/Kg	7	7.01	8.14	4.68	7.05	9.6	6.64	10.1	2.03	3.95	7.1	12.8
Chromium 6	5	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	1.5	mg/Kg	9.43	4.42	6.49	4.89	4.74	7.4	5.25	4.39	2.67	5.22	4.37	7.63
Cobalt	2.5	mg/Kg	8.32	4.25	5.28	5.16	4.91	6.71	5.19	2.79	3.77	4.66	3.76	5.71
Fluoride	1	mg/L	ND	1.17	ND	ND	ND	ND	ND	ND	ND	1.31	ND	1.27
Iron	50	mg/Kg	16,600	12,600	15,200	13,100	14,400	16,400	15,400	12,000	12,500	20,900	19,900	22,800
Lead	1.5	mg/Kg	4.05	2.51	4.26	3.16	3.03	3.99	3.7	2.52	1.98	3.86	3.2	4.83
Mercury	0.06	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum	2.5	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	2.5	mg/Kg	31.4	7.47	8.07	5.99	6.47	9.27	6.39	6.73	3.14	4.9	6.6	10.4
Selenium	0.06	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	0.7	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	1.5	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	2.5	mg/Kg	28.3	26.9	27.9	13.9	27.2	32.6	22.3	18.8	20.7	46.1	49.8	55.1
Zinc	1.5	mg/Kg	60.7	38.6	43.9	37.5	48.3	48.1	41.6	34.3	38.4	41.1	40.9	30.5

West Retention Basin -- Data Arranged by Depth

Table 4

	Boring ID		4-1	5-1	6-1	B-2		4-2	5-2	6-2	B--4		4-3	5-3	6-3	B-5
	Depth (feet)		1	1	1	1		5	5	5	5		9	9	9	9
Parameter	PQL	Units														
pH		units	8.6	8.28	8.43	8.43		9.25	8.78	8.44	8.05		8.82	8.5	8.28	8.56
TCE	2.5	ug/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Antimony	5	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Arsenic	6	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	9.03	ND	ND
Barium	0.7	mg/Kg	134	91	102	105		105	122	94.7	104		102	108	90.2	80
Beryllium	0.7	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Cadmium	0.7	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Chloride	2	mg/L	ND	ND	2.74	ND		ND	ND	ND	ND		ND	ND	ND	ND
Chromium, Total	1.5	mg/Kg	7	4.68	6.64	3.95		7.01	7.05	10.1	7.1		8.14	9.6	2.03	12.8
Chromium 6	5	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Copper	1.5	mg/Kg	9.43	4.89	5.25	5.22		4.42	4.74	4.39	4.37		6.49	7.4	2.67	7.63
Cobalt	2.5	mg/Kg	8.32	5.16	5.19	4.66		4.25	4.91	2.79	3.76		5.28	6.71	3.77	5.71
Fluoride	1	mg/L	ND	ND	ND	1.31		1.17	ND	ND	ND		ND	ND	ND	1.27
Iron	50	mg/Kg	16,600	13,100	15,400	20,900		12,600	14,400	12,000	19,900		15,200	16,400	12,500	22,800
Lead	1.5	mg/Kg	4.05	3.16	3.7	3.86		2.51	3.03	2.52	3.2		4.26	3.99	1.98	4.83
Mercury	0.06	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Molybdenum	2.5	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Nickel	2.5	mg/Kg	31.4	5.99	6.39	4.9		7.47	6.47	6.73	6.6		8.07	9.27	3.14	10.4
Selenium	0.06	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Silver	0.7	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Thallium	1.5	mg/Kg	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND
Vanadium	2.5	mg/Kg	28.3	13.9	22.3	46.1		26.9	27.2	18.8	49.8		27.9	32.6	20.7	55.1
Zinc	1.5	mg/Kg	60.7	37.5	41.6	41.1		38.6	48.3	34.3	40.9		43.9	48.1	38.4	30.5



LEGEND

△ EXISTING WATER WELL

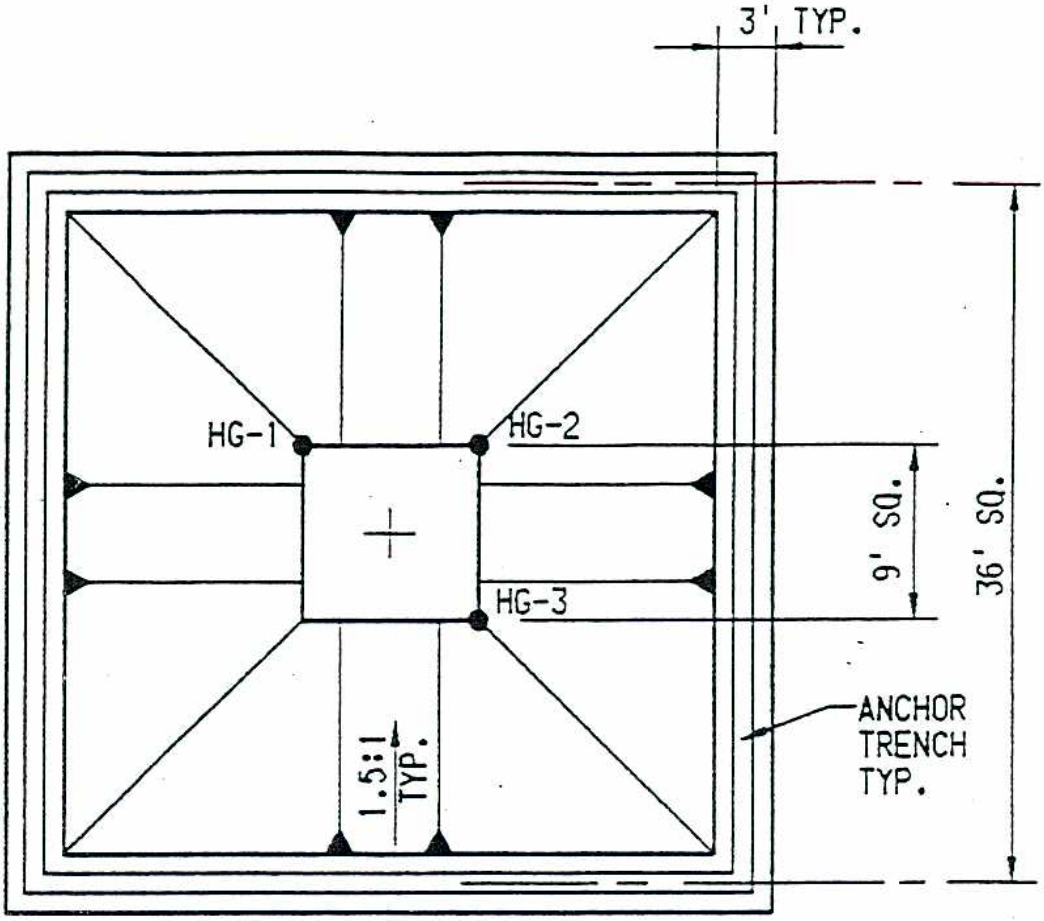
⊙ PROPOSED BACKGROUND BORING

TYPICAL GROUND WATER FLOW DIRECTION

0 50 100

HIGHGROVE GENERATING STATION

LOCATION OF BASINS



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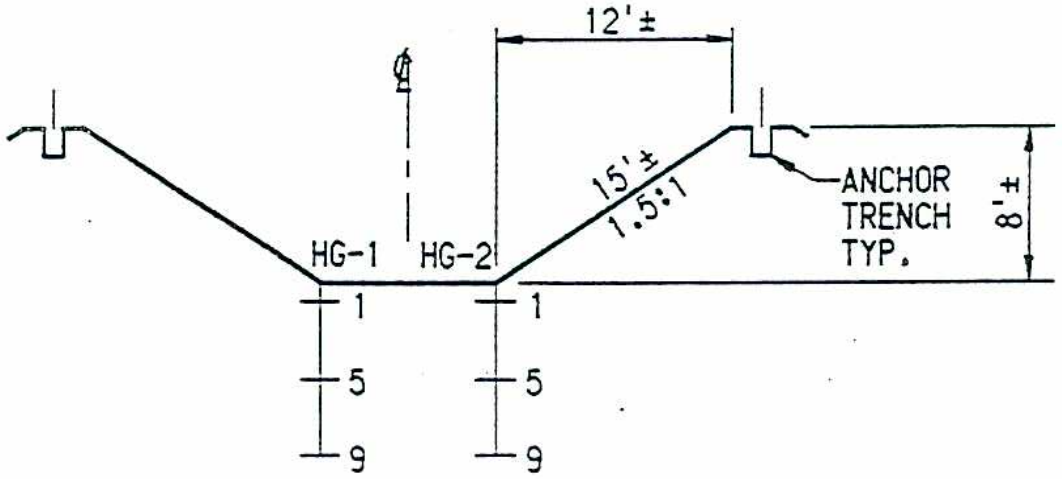
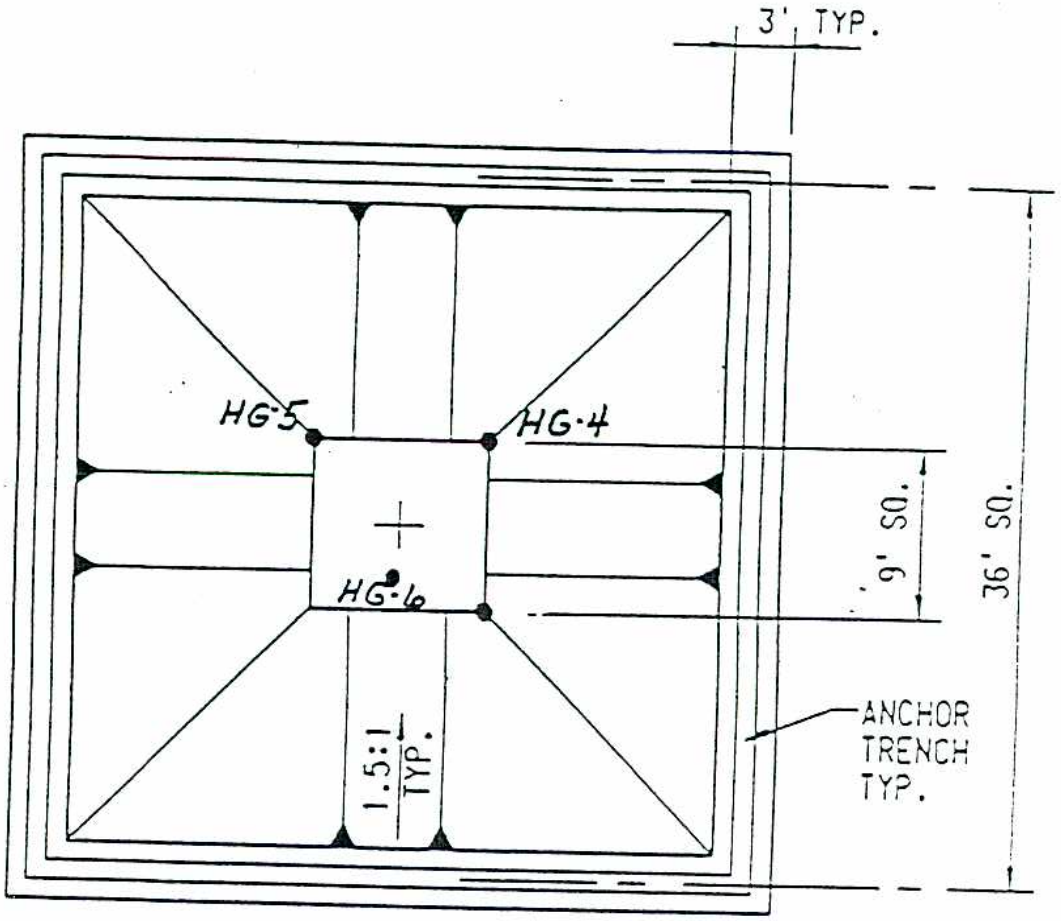


SECTION
1" = 10'

HIGHGROVE GENERATING STATION

EAST RETENTION BASI
FIGURE 2

SK011596.DGN



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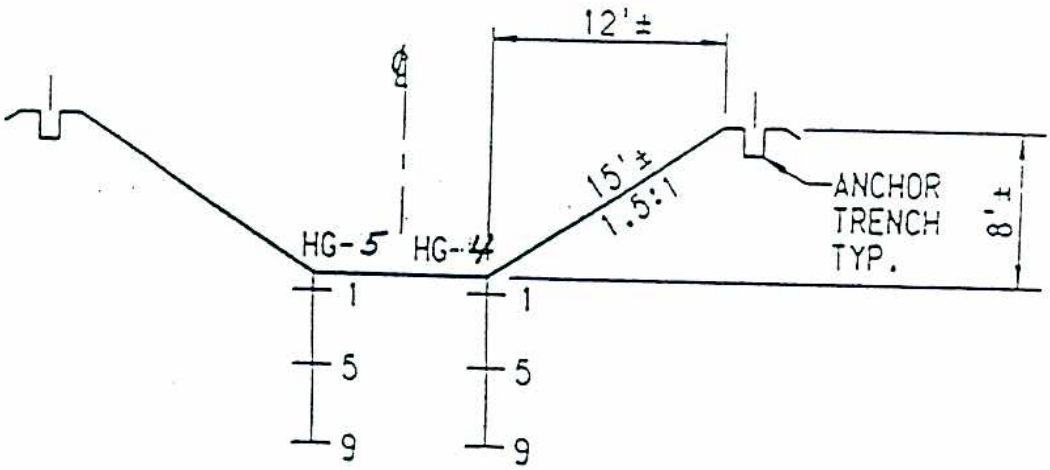

SECTION
1" = 10'

HIGHGROVE GENERATING STATION

WEST RETENTION BASIN
FIGURE 3

SK011596.DGN

Table of Contents

December 11, 1996

On Site Soil • Soil Vapor • GH_2O
Sampling and GCMS Analysis

Hydro Geo Spectrum

Pat Hamilton
Southern California Edison
2131 Walnut Grove Avenue
Rosemead, CA 91770

Dear Pat:

Enclosed please find the report on the soil vapor investigation performed at the Southern California Edison facility in Highlands performed on September 24, 1996. I have produced one bound copy and have forwarded one unbound copy to Rod Loftis of Odyssey Engineering for inclusion into his report. My reports consist of the following sections:

i. Technical approach with results and discussion.

ii. Map of probe locations.

iii. Raw data in LARWQCB format.

iv. QA/QC section in LARWQCB format.

v. Chromatograms (unbound copy only).

vi. Chains of Custody (unbound copy only).

vii. Raw data in laboratory format (unbound copy only).

If you have any questions or additional requirements, please do not hesitate to call. It was a pleasure working with you, and I look forward to future projects.

Sincerely,

Raphe Pavlick

Director

400 So. Barrington • Suite #3 • P.O. Box 49931 • Los Angeles, CA 90049
Phone • (310) 440 - 5077 • Fax (310) 471 - 6879

SOIL VAPOR TECHNICAL APPROACH

Soil vapor probes were installed using a manual installation system (either a Bosch rotary hammer or more simply when possible, a large hammer). Using this system, a ½ inch steel pipe with a drop-off well point on the lead end is inserted to depth of between 3.5 and 5 feet. Upon reaching depth, the pipe is withdrawn approximately six inches, allowing the well point to drop off and thus exposing the pipe to the open annulus at depth. Polyethylene tubing (1/4 inch) equipped with an *anchor* is inserted through the tubing into the open annulus. A small amount of coarse sand is allowed to flow through the inside of the steel pipe so as to form a permeable sand pack at depth. At this point the steel pipe is withdrawn using a specially-adapted jack while grouting the upper part of the hole with bentonite slurry formed *in situ* from granular bentonite. The polyethylene tubing is connected to the sampling train, and soil vapor sampling is initiated.

The actual collection of soil vapor is done as follows. The tubing exiting the surface of the ground is connected to a glass sampling bulb fitted with Teflon stopcocks and a viton rubber sampling port. This bulb is connected in turn to a vacuum gauge, flowmeter, and portable sampling pump. Initially both stopcocks are closed, and the absence of flow and the presence of a slight vacuum is noted. This demonstrates that the sampling train on the far end of the bulb is leak-tight. Then the first stopcock (pump end) is opened; the absence of flow demonstrates that the sampling bulb itself is leaktight. The ground end of the bulb is then opened, and a flow of 150 ml/min is maintained for seven to ten purge volumes. During the sampling an open container containing pentane is exposed to the sampling train. Any trace of pentane detected in the sample indicates the intrusion of ambient air into the sampling train, invalidating the results of that sample. No such leaks were detected with any of the samples. The stopcocks were then closed (pump end first), and the sample retained in the container. Approximately 25 NG each of deutero-chloroform, deutero-acetone, deutero-tetrahydrofuran, deutero-methylene chloride and deutero-benzene were added through the septum into the bulb. The recovery of these isotopically-labeled surrogate compounds demonstrates that the bulbs have remained leak-free up until the actual analysis. A recovery of 90% For the deuterated-benzene and the deuterated chloroform is desirable; a recovery of less than 75% invalidates the sample results. The deuterated acetone is added as a measure of water vapor in the sampling and analysis systems; a recovery of greater than 70% is acceptable, although levels of the water-soluble compounds (ketones) may be affected. All recoveries during this project were within acceptable range. These bulbs were then delivered to the mobile laboratory for analysis by GCMS.

RESUL

chloroethene (TCE
oline additive, was

of both HydroGeoS

The analyses of the soil vapor samples proceeded as follows. A 1 ml aliquot of soil va withdrawn from each bulb and injected into a Hewlett-Packard model 5890 gas chrom interfaced to a Hewlett-Packard model 5972 mass spectrometer. Chromatography was in such a way that the combination of retention times and mass fragmentation allowed complete separation of all the target compounds. The mass spec was operated in *full s* between 35 and 350 amu. This allows for the identification of any volatile organic spe may be present in the soil vapor.

The following laboratory QA/QC was performed. An initial six-point calibration was September 9, 1996 A laboratory control standard (LCS) from *Absolute Standards* 82- run at the end of the same day and at the end of the sampling days. The daily standar the sampling day, was made from a different lot and mixture from *Absolute Standard* initial calibration was also run on this standard stock. The surrogate calibration curve Aldrich certified material. All results were within the LAWQCB and HGS requireme

Two notable additions to the LAWQCB requirements were deemed necessary:

i. Five isotopically-labeled surrogates, D6-Benzene, D6-Acetone, D2-Methylene D8-Tetrahydrofuran and D-Chloroform, were added to the collection vessel, a glass bulb fitted with Teflon stopcocks and a viton rubber septum, to measure percentages. The benzene and chloroform surrogates are used to verify the rec BTEX and chlorinated hydrocarbons respectively; a recovery of at least 90% i The deuterated acetone is a measure of the possible presence of water vapor in and general condition of the chromatographic system in terms of hydration; a 70% indicates acceptability of the complete sampling and analysis procedure; level, water vapor presence in the sampling line should be investigated or chromatographic dehydration procedures should be considered.

ii. Pentane vapor was used to surround the sampling train at the surface to identi ambient intrusion into the sampling train or down the outside surface of the sa tubing connected to the subsurface.

SOUTHERN CAL EDISON SOIL VAPOR (μG/L)

LOCATION	MTBE	TCE
GENSTWEST-SV1	3.7	1
GENSTWEST-SV2	0.6	1
GENSTWEST-SV3	1.8	N
GENSTEAST-SV4	N	N
GENSTEAST-SV5	N	N
GENSTEAST-SV6	N	N