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REPORT OF QUARTERLY ACTIVITIES
VORELCO PROPERTY NO. 4286
BROADWAY VOLKSWAGEN
2740 BROADWAY
OAKLAND, CALIFORNIA

(ESE PROJECT # 6-93-5093)

PRESENTED TO:

VORELCO, INC.
3800 HAMLIN ROAD
AUBURN HILLS, MICHIGAN 48326

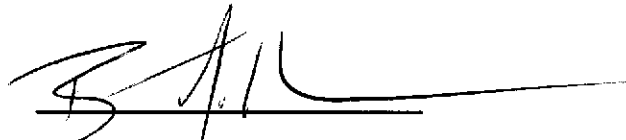
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AUGUST 3, 1993

This report has been prepared by Environmental Science & Engineering, Inc. for the exclusive use of Vorelco, Inc. as it pertains to their site located at 2740 Broadway, Oakland, California. Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by other geologists and engineers practicing in this field. No other warranty, express or implied, is made as to the professional advice in this report.

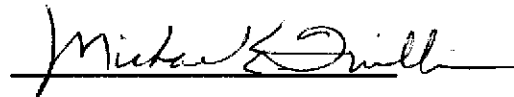
REPORT PREPARED BY:



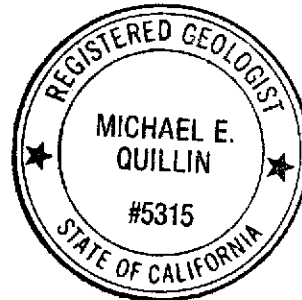
Bart S. Miller

Bart S. Miller
Senior Staff Geologist

UNDER THE PROFESSIONAL REVIEW AND SUPERVISION OF:



Michael E. Quillin
Senior Hydrogeologist
California Registered Geologist No. 5315



August 3, 1993

ESE Project # 6-93-5093 Task 0001

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**REPORT OF QUARTERLY ACTIVITIES
VORELCO PROPERTY NO. 4286
2740 BROADWAY, OAKLAND, CALIFORNIA**

1.0 INTRODUCTION

1.1 OBJECTIVE

On July 13, 1993 Environmental Science & Engineering, Inc. (ESE) monitored and sampled ground water in five monitoring wells located at Vorelco Property No. 4286 (Broadway Volkswagen), 2740 Broadway Avenue, Oakland, Alameda County, California (Figure 1 - Vicinity Map). The purpose of this fieldwork was to monitor ground-water elevations and define the extent of petroleum hydrocarbons and volatile organic compounds (VOCs) in ground water at the site. This document presents procedures and findings associated with ground-water monitoring activities. In addition, ESE provides recommendations for future work.

1.2 ENVIRONMENTAL BACKGROUND

During August 1988, two underground storage tanks (USTs), referred to as USTs C and D, were removed by SEMCO, Inc. of Modesto, California from one area at Broadway Volkswagen. Broadway Volkswagen is located at a commercially zoned area and is surrounded by numerous automobile maintenance facilities.

USTs C and D (one 500-gallon waste oil tank and one 3,000-gallon gasoline tank, respectively) were formerly located adjacent to each other at the northeast side of the property along 28th Avenue (Figure 2 - Site Map). Soil samples collected from the excavation during removal of the USTs were reported to contain detectable concentrations of total petroleum hydrocarbons as gasoline (TPH-g) and benzene, toluene, ethylbenzene, and total xylenes (BTEX). Two soil borings, SB-3 and SB-4, were drilled under the supervision of ESE during May 1991 at the UST C and D area. Three soil samples

collected from boring SB-3 (5, 10, and 15-foot depth) were observed to contain detectable TPH-g and BTEX. Boring SB-4 intersected gravel fill in the former UST excavation. One soil sample collected at the base of the fill (15-feet below ground surface) was noted to contain detectable TPH-g and BTEX.

Boring logs for five additional ground water monitoring wells (MW-1, MW-3, MW-4, MW-5, and MW-6) installed by ESE at the site indicate the presence of clay sediments with perched, water-bearing sand beds at depths ranging between 11 to 17 feet below grade (ESE, 1991a and ESE, 1991b). ESE installed wells MW-1 and MW-3 to a depth of approximately 20 feet below grade and screened both over the interval containing the perched sand beds. No confining pressures were observed by ESE when installing these wells. ESE identified one two-foot thick perched sand bed in wells MW-5 and MW-6 at depths of 17 and 11 feet, respectively (ESE, 1991b). The sand bed was observed to dip toward the west (ESE, 1991b). Clay sediments above and immediately below the sand beds were observed to be dry.

Soil samples collected from the sand bed in borings MW-5 and MW-6 were noted to have a fuel odor and detectable VOC concentrations as determined using a photoionization detector (PID). However, ESE did not observe a fuel odor or detect VOCs with a PID in samples of clay collected above and below the sand bed in these borings. No detectable concentrations of halogenated volatile organic compounds (HVOCs) have been reported in soil samples collected from the sand and clay sediments at the site.

A sandy clay aquifer was intersected beneath the clay unit containing the perched sand beds at a depth of approximately 22 to 23 feet below grade in wells MW-4, MW-5, and MW-6. Monitoring well MW-4 was installed to a depth of 25 feet below grade and wells MW-5 and MW-6 were installed to a depth of 30 feet below grade. Water levels in these wells were observed to rise approximately 12 to 14 feet when the sandy clay aquifer was penetrated suggesting some confining pressures. These three wells were screened over the interval

containing the sandy clay aquifer as well as the perched sand beds.

Detectable concentrations of TPH-g, BTEX, and HVOCs such as trichloroethylene (TCE), tetrachloroethylene (PCE), and 1,2-Dichloroethane (DCA) have been reported in some ground water samples collected from various site wells since May 13, 1991 (ESE, 1991a; ESE, 1991b and ESE, 1992). Historically, the highest concentrations of TPH-g and BTEX have been reported in ground water samples collected from well MW-3 located west and hydraulically downgradient of the former UST area. The highest concentrations of HVOCs have been reported in ground water samples collected from well MW-6 located offsite to the north and crossgradient of the former UST area.

Background research by ESE indicates that several sites surrounding the Vorelco property handle petroleum hydrocarbons and solvents containing HVOCs and that numerous unauthorized releases from other properties have been documented by the Alameda County Health Care Services Agency (HCSA) and the Regional Water Quality Control Board (RWQCB) - San Francisco Bay Region (ESE, 1991a).

2.0 SAMPLING METHODOLOGY

On July 13 1993, ESE measured depths to ground water were monitored at each of the five wells by ESE in accordance with ESE SOP No. 3 (Appendix A). Ground-water elevations were calculated by correcting these depths with respect to the surveyed top-of-casing elevations for each well. ESE plotted and contoured the ground-water elevation data for the purpose of estimating ground water gradient and flow direction.

ESE also sampled ground water from the five monitoring wells in accordance with ESE SOP No. 3. Three well volumes of ground water were purged from each well prior to sampling and placed with decontamination rinseates in Department of Transportation (DOT)-rated, 55-gallon capacity drums. The drummed purge water and rinseates are temporarily stored at the site pending appropriate disposal/recycling.

Ground-water samples were submitted under chain-of-custody documentation to Sequoia Analytical of Concord, California (a State-Certified laboratory) and analyzed for TPH-g/BTEX using EPA analytical methods 8015 (modified per CA LUFT) and 8020, respectively, and for HVOCs using EPA analytical method 8010. For sample handling QA/QC purposes, a travel blank was supplied by the laboratory with the sample cooler. The travel blank was analyzed for TPH-g, BTEX, and HVOCs using the methods described above. For laboratory QA/QC purposes, one duplicate ground-water sample was collected during the sampling event and submitted to the laboratory as a blind sample. The duplicate sample was also analyzed for TPH-g, BTEX, and HVOCs using the analytical methods described above. All analyses were performed on a ten-day turnaround basis.

ESE utilized the analytical results to plot and contour TPH-g and TCE concentrations in ground water for the purpose of identifying chemical gradients indicative of distinct contaminant plumes. The TPH-g and TCE concentration contour maps were also compared with past data to determine the direction of plume migration over time.

3.0 RESULTS OF INVESTIGATION

3.1 SITE HYDROLOGY

Depth to ground water was observed to range between 6 to 10 feet bgs in ground-water monitoring wells MW-1, MW-3, MW-4, MW-5, and MW-6 on July 13, 1993. Ground water monitoring data are presented in ESE Well Sampling Field Logs (Appendix B). Measured ground water elevations, corrected to an arbitrary datum, are presented in Table 1 - Relative Ground Water Elevations.

Ground water flow direction during this quarter was observed to be toward the west-northwest at a gradient ranging from approximately 0.05 feet per foot in the vicinity of wells MW-1, MW-4, and MW-6 to 0.009 feet per foot in the vicinity of wells MW-3 and MW-5 (Figure 3 - Relative Ground Water Elevations). This ground water flow direction is not consistent with the reported regional ground water flow direction toward the southeast (ESE, 1991a).

3.2 ANALYTICAL RESULTS FOR GROUND WATER SAMPLES

Detectable concentrations of TPH-g were reported in ground water samples collected from monitoring wells MW-3, MW-4, MW-5, and MW-6 (Table 2 - TPH-g and BTEX Concentrations in Ground Water). All samples contained detectable concentrations of BTEX except the one collected from well MW-6 (Table 2). As during past monitoring events, the concentrations of TPH-g and BTEX were highest in a sample collected from well MW-3 located downgradient from the former UST area (Figure 4 - TPH-g Concentration in Ground Water). No detectable concentrations of TPH-g and BTEX were reported in a sample collected from well MW-1 located upgradient of the former UST area.

One ground water sample collected from well MW-5 was reported to contain 90 micrograms per liter ($\mu\text{g/L}$) of TPH-g. The chromatogram pattern was noted to have discrete peaks other than gasoline, suggesting a false positive for TPH-g.

Detectable concentrations of TCE were observed in ground-water samples collected from monitoring wells MW-1, MW-3, MW-4, MW-5, and MW-6 (Table 3 - TCE and DCA Concentrations in Ground Water). In addition, detectable DCA was reported in a sample collected from well MW-3. ESE notes that the highest historical concentrations of TCE in ground water have been reported for samples collected from well MW-6 located offsite and crossgradient to the north (Figure 5 - TCE Concentration in Ground Water).

4.0 DISCUSSION AND CONCLUSIONS

Soil boring data collected at the site indicate that gasoline constituents occur at the bottom of the UST excavation backfill and in sand beds to the north and west of the former UST area. The highest concentrations of gasoline constituents in ground water have been reported in samples collected in well MW-3. ESE concludes that the permeable sand beds may intersect the UST excavation backfill and may have played a major role in the transport of gasoline constituents from the UST area because:

- Well ~~MW-3~~ is selectively screened to recharge with water from the sand beds and has historically yielded ground water samples containing the highest TPH-g and BTEX concentrations; and,
- Well ~~MW-3~~ is located downgradient from the former UST area.

The highest concentrations of TCE have been reported in samples collected from wells screened into the deeper sandy clay aquifer (MW-4, MW-5, and MW-6). Contours of TCE concentration in ground water indicate an offsite source of TCE located to the north of the former UST area (Figure 5). ESE concludes that the TCE in ground water is migrating to the site from an off-site source and is being transported in the sandy clay aquifer. ESE also concludes that ground water in the sandy clay aquifer containing TCE is cross-contaminating the upper perched sand beds at the site by upward migration through the monitoring wells completed in the shallower sand beds. This process may be augmented by the upward hydraulic gradient observed.

5.0 RECOMMENDATIONS

Based upon the findings from field investigations and monitoring activities conducted at Broadway Volkswagen to date, ESE recommends the following:

- Do not extract ground water from the deeper, semi-confined, sandy clay aquifer at the site as this will expedite the on-site migration of TCE in ground water from off-site sources;
- Obtain permits to abandon the deeper ground-water monitoring wells MW-4, MW-5, and MW-6 to prevent further TCE impact from deeper, semi-confined ground water; and,
- Install three selectively screened vadose wells and conduct vapor extraction system (VES) performance testing to determine whether it is feasible for recovery of gasoline constituents from the UST excavation backfill and the perched sand beds at the site.

Should VES performance testing indicate that vapor extraction is a feasible method of remediation for the site, Vorelco may suggest to the HCSA that a human and environmental health-based risk assessment be performed to identify cleanup goals for the site. Wells MW-1 and MW-3 will be monitored on a regular basis as is required by RWQCB guidelines for petroleum hydrocarbon releases and to determine the effectiveness of the vapor extraction remediation. These wells will be abandoned upon receipt of site closure.

In the event that the perched sand beds yield significant ground water during VES well installation and will not dry out during VES performance testing, alternative remediation technologies will need to be reviewed.

6.0 REFERENCES

ESE, 1991a. Report of Quarterly Activities for Vorelco Property No. 4286, July 1991.

ESE, 1991b. Report of Quarterly Activities for Vorelco Property No. 4286, November 1991.

ESE, 1992. Report of Quarterly Activities for Vorelco Property No. 4286, December 1992.

TABLE 1. RELATIVE GROUND WATER ELEVATIONS

Well No.	Well El. (feet)	Relative Ground Water Elevation (feet)						
		1/29/89	2/06/89	3/13/89	5/13/91	10/18/91	10/27/92	7/13/93
MW-1	29.22	21.72	20.22	20.72	16.62	19.11	19.59	22.96
MW-3	30.00	18.30	19.00	19.30	19.44	19.79	19.19	20.36
MW-4	29.70	NA	NA	NA	18.50	20.15	20.49	21.38
MW-5	30.50	NA	NA	NA	NA	19.23	19.26	20.29
MW-6	29.19	NA	NA	NA	NA	18.98	19.41	20.69

NOTE : *EL = Elevation.*
NA = Not Applicable (wells constructed after date indicated).
 • *All elevations relative to mean sea level.*
 • *Reference survey point is notched at top of each well riser.*

TABLE 2. TPH-g AND BTEX CONCENTRATIONS IN GROUND WATER

Well No.	Analyte	Concentrations				
		1/21/89	5/13/91	10/18/91	10/27/92	7/13/93
MW-1	B	53	ND	ND	ND	ND
	T	13	ND	ND	ND	ND
	E	1.4	ND	ND	ND	ND
	X	8.2	1.1	ND	ND	ND
	TPH-g	ND	130	ND	ND	ND
MW-3	B	9,600	7,800	9,400	7,100	8,100
	T	8,200	12,000	8,600	4,900	6,200
	E	1,800	1,200	750	970	1,400
	X	6,200	4,000	3,300	3,500	4,400
	TPH-g	32,000	81,000	73,000	37,000	41,000
MW-4	B	NA	160	11.0	6.4	36
	T	NA	690	11.0	2.8	4.4
	E	NA	250	ND	1.2	1.8
	X	NA	1,100	15.0	6.2	5.3
	TPH-g	NA	13,000	ND	180	320
MW-5	B	NA	NA	3,500	ND	ND
	T	NA	NA	530	ND	ND
	E	NA	NA	670	ND	ND
	X	NA	NA	1,100	ND	ND
	TPH-g	NA	NA	16,000	87	90
MW-6	B	NA	NA	640	48	5.1
	T	NA	NA	2,700	130	30
	E	NA	NA	1,100	55	30
	X	NA	NA	4,500	230	230
	TPH-g	NA	NA	28,000	1,300	1,100

NOTE : NA = Not Applicable (wells constructed after date indicated).
 ND = Not Detected Using Analytical Methods EPA 8010, 8015, 8020 or 8240.
 B = Benzene, T = Toluene, E = Ethylbenzene, X = Xylenes.
 TPH-g = Total Petroleum Hydrocarbons as gasoline
 • all results reported in micrograms per Liter ($\mu\text{g/L}$).

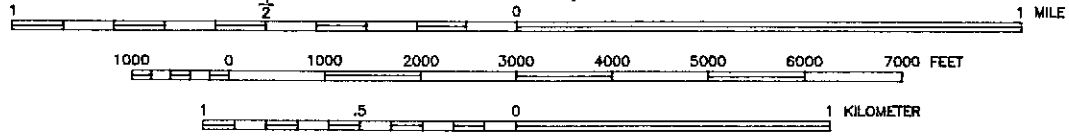
TABLE 3. TCE AND DCA CONCENTRATION IN GROUND WATER

Well No.	Analyte	Concentrations			
		5/13/91	10/18/91	10/27/92	7/13/93
MW-1	TCE	58	120	11	6.4
	DCA	ND	ND	ND	ND
MW-3	TCE	14	14	ND	14
	DCA	380	8.3	170	150
MW-4	TCE	490	450	520	550
	DCA	ND	3.9	ND	ND
MW-5	TCE	NA	120	410	530
	DCA	NA	32	ND	ND
MW-6	TCE	NA	230	2,000	2,100
	DCA	NA	60	ND	ND


NOTE : TCE = Trichloroethylene.
DCA = 1,2 Dichloroethane.
ND = Not Detected Using Analytical Methods EPA 8010 or 8240.
NA = Not Applicable (wells constructed after date indicated).
• all results reported in micrograms per Liter ($\mu\text{g/L}$).



SCALE 1:24,000



ADAPTED FROM U.S.G.S. OAKLAND WEST 7.5 MINUTE TOPOGRAPHIC QUADRANGLE, 1959, PHOTOREVISED 1980.

 <p>Environmental Science & Engineering, Inc. A GILCORP Company</p>	<p>DATE 8/93</p>	<p>VICINITY MAP</p>	<p>FIGURE NO. 1</p>
	<p>REVISED</p>		<p>VORELCO PROPERTY NO. 4286 2740 BROADWAY OAKLAND, CALIFORNIA</p>
<p>4090 NELSON AVENUE, SUITE J CONCORD, CA 94520</p>		<p>CAD FILE 50931001</p>	



BROADWAY AVENUE

AUTOMOBILE INTERIOR SERVICE

AUTOMOBILE EXCHANGE SERVICE (AES)

MW-5

MW-6

28th STREET

MW-3

SB-3

SB-4

MW-1

ENTRANCE

MW-4

SHOWROOM

OFFICES

RAMP TO SECOND FLOOR

PARKING LOT




HALLWAY

GARAGE


OFFICES

PARKING LOT

LEGEND:

-  MW-6 MONITORING WELL
-  SB-3 SOIL BORING
-  FORMER UNDERGROUND TANK AREA



	DATE	8/93	SITE MAP	FIGURE NO.
	REVISED			VORELCO PROPERTY NO. 4286 2740 BROADWAY OAKLAND, CALIFORNIA
	CAD FILE	50932002	PROJ. NO.	



BROADWAY AVENUE

AUTOMOBILE INTERIOR SERVICE

AUTOMOBILE EXCHANGE SERVICE (AES)

MW-5
20.29

MW-6
20.69

28th STREET

MW-3
20.36

SB-3

SB-4

MW-4
21.38

MW-1
22.96

ENTRANCE

SHOWROOM

OFFICES

RAMP TO SECOND FLOOR

PARKING LOT





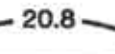
HALLWAY

GARAGE

PARKING LOT

OFFICES

LEGEND

-  MW-6 20.69 MONITORING WELL WITH MEASURED RELATIVE GROUND WATER ELEVATION
-  SB-3 SOIL BORING
-  FORMER UNDERGROUND TANK AREA
-  ESTIMATED DIRECTION OF GROUND WATER FLOW
-  20.8 RELATIVE GROUND WATER ELEVATION CONTOUR



BSE Environmental Science & Engineering, Inc.
A CECO/CP Company

DATE	8/93
REVISED	
CAD FILE	50932003

RELATIVE GROUND WATER ELEVATIONS JULY 13, 1993	
VORELCO PROPERTY NO. 4286 2740 BROADWAY OAKLAND, CALIFORNIA	

FIGURE NO.	3
PROJ. NO.	6-93-5093

4090 NELSON AVENUE, SUITE J
CONCORD, CA 94520



BROADWAY AVENUE

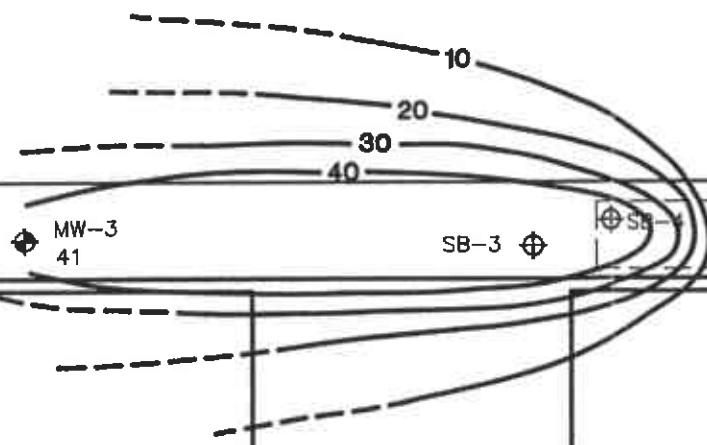
AUTOMOBILE INTERIOR SERVICE

AUTOMOBILE EXCHANGE SERVICE (AES)

MW-5
0.09

MW-6
1.1*

28th STREET



MW-1
ND

ENTRANCE

MW-4
0.32

RAMP TO SECOND FLOOR

PARKING LOT

SHOWROOM

OFFICES

HALLWAY

GARAGE

PARKING LOT

OFFICES

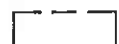
LEGEND



MONITORING WELL WITH REPORTED TPH-g CONCENTRATIONS IN GROUND WATER (mg/L) SAMPLED ON JULY 13, 1993. SAMPLES ANALYZED USING EPA METHOD 5030/8015 (MODIFIED PER CA LUFT).



SOIL BORING



FORMER UNDERGROUND TANK AREA



CONTOUR OF TPH-g CONCENTRATION IN GROUND WATER IN MILLIGRAMS PER LITER (mg/L)

*

CONCENTRATION REPORTED AS TOTAL PETROLEUM HYDROCARBON WITH DISCRETE PEAKS IN CHROMATOGRAPHIC PATTERN OTHER THAN GASOLINE

SCALE



Environmental Science & Engineering, Inc.

DATE
8/93

REVISED

CAD FILE
50932004

TPH-g CONCENTRATION IN GROUND WATER (JULY 13, 1993)

VORELCO PROPERTY NO. 4286
2740 BROADWAY
OAKLAND, CALIFORNIA

FIGURE NO.

4

PROJ. NO.

6-93-5093

4090 NELSON AVENUE, SUITE J
CONCORD, CA 94520



BROADWAY AVENUE

AUTOMOBILE INTERIOR SERVICE

AUTOMOBILE EXCHANGE SERVICE (AES)

MW-5
530

2000

MW-6
2,100

1500

1000

28th STREET

MW-3
14*

SB-3

SB-4

MW-1
6.4

ENTRANCE

MW-4
550

OFFICES

RAMP TO SECOND FLOOR

PARKING LOT

SHOWROOM

HALLWAY

GARAGE

PARKING LOT

LEGEND

MW-6
2,100

MONITORING WELL WITH REPORTED TCE CONCENTRATIONS IN GROUND WATER (mg/L) SAMPLED ON JULY 13, 1993. SAMPLES ANALYZED USING EPA METHOD 5030/8010.

SB-3

SOIL BORING



FORMER UNDERGROUND TANK AREA

1000

CONTOUR OF TCE CONCENTRATION IN GROUND WATER IN MILLIGRAMS PER LITER (mg/L) ALSO DETECTED 150 ug/L 1,2-DICHLOROETHANE (1,2-DCA)

*

DUPLICATE SAMPLE REPORTED TO CONTAIN 2,000 ug/L TCE

**

SCALE

0 20 FEET



Environmental Science & Engineering, Inc.

DATE

8/93

REVISED

CAD FILE

50932005

TCE CONCENTRATION IN GROUND WATER (JULY 13, 1993)

VORELCO PROPERTY NO. 4286
2740 BROADWAY
OAKLAND, CALIFORNIA

FIGURE NO.

5

PROJ. NO.

6-93-5093

4090 NELSON AVENUE, SUITE J
CONCORD, CA 94520

APPENDIX A

ESE Standard Operating Procedure No. 3

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 3
FOR GROUND-WATER MONITORING AND SAMPLING FROM MONITORING WELLS

Environmental Science & Engineering, Inc. (ESE) typically performs ground-water monitoring at project sites on a quarterly basis. As part of the monitoring program an ESE staff member will first gauge the depth to water and free product (if present) in each well, then collect ground-water samples from each well. Depth to water measurements are taken by lowering an electric fiberglass tape measure into the well and recording the occurrence of water in feet below a fixed datum set on the top of the well-casing. If free-phase liquid hydrocarbons (free product) are known or suspected to be present in the well, then an electric oil/water interface probe is used to determine the depth to the occurrence of ground-water and the free product in feet below the fixed datum on the top of the well-casing. Depth to water and depth to product measurements are measured and recorded within an accuracy of 0.005-foot. The electric tape and the electric oil/water interface probe are washed with an Alconox® detergent and tap water solution then rinsed with tap water between uses in different wells.

Ground-water samples are collected from a well subsequent to purging a minimum of three to four well-casing volumes of ground water from the well, if the well bails dry prior to the removal of the required minimum volume, then the samples are collected upon the recovery of the ground water in that well to 80% of its initial static level. Ground water is typically purged from monitoring wells using either a hand-operated positive displacement pump, constructed of polyvinylchloride (PVC); a new (precleaned), disposable polyethylene bailer; or, a variable-flow submersible pump, constructed of stainless steel and Teflon®. The hand pumps and the submersible pumps are cleaned between each use with an Alconox® detergent and tap water solution followed by a tap water rinse. During the well purging process the conductivity, pH and temperature of the ground water are monitored by the ESE staff member. Ground-water samples are collected from the well subsequent to the stabilization of the of the conductivity, pH and temperature of the purge water, and the removal of four well-casing volumes of ground-water (unless the well bails dry). The parameters are deemed to have stabilized when two consecutive measurements are within 10% of each other, for each respective parameter. The temperature, pH, conductivity and purge volume measurements, and observations of water clarity and sediment content will be documented by the ESE staff member on ESE Ground-Water Sampling Data Forms.

Ground-water samples are collected by lowering a new (precleaned), disposable polyethylene bailer into the well using new, disposable nylon cord. The filled bailer is retrieved, emptied, then filled again. The ground water from this bailer is decanted into appropriate laboratory supplied glassware and/or plastic containers (if sample preservatives are required, they are added to the empty containers at the laboratory prior to the sampling event). The containers are filled carefully so that no headspace is present to avoid volatilization of the sample. The filled sample containers are then labeled and placed in a cooler with ice for transport under chain of custody documentation to the designated analytical laboratory. The ESE staff member will document the time and method of sample collection, and the type of sample containers and preservatives (if any) used. These facts will appear on the ESE Ground-Water Sampling Data Forms. ESE will collect a duplicate ground-water sample from one well for every ten wells sampled at each site. The duplicate will be a blind sample (its well designation will be unknown to the laboratory). The duplicate sample is for Quality Assurance and Quality Control (QA/QC) purposes, and provides a check on ESE sampling procedures and laboratory sample handling procedures. When VOCs are included in the laboratory analyses, ESE will include a trip blank, if required, in the cooler with the ground-water samples for analysis for the identical VOCs. The trip blank is supplied by the laboratory and consists of deionized water. The trip blank is for QA/QC purposes and provides a check on both ESE and laboratory sample handling and storage procedures. Since disposable bailers are used for sample collection, and are not reused, no equipment blank (rinsate) samples are collected.

APPENDIX B

Well Sampling Field Logs

WELL SAMPLING FIELD LOG

PROJECT NAME: VORELCO #4286
 PROJECT MANAGER: B. MILLER
 SAMPLER: B. MILLER
 GROUNDWATER: _____ OTHER: _____

DATE: JULY 13, 1993
 CLIENT: VORELCO, INC.
 SAMPLE LOCATION I.D. MW-1
 START TIME: _____

CASING ELEVATION (FT): 29.22 DATUM: _____ CASING DIAMETER: 2" ✓ 4" _____ OTHER _____

DEPTH TO WATER (FT): 6.26 DEPTH OF WELL (FT): 19.0 DIFFERENCE (FT): 2.74

WATER ELEVATION (FT): 22.96 CALCULATED WELL VOLUME (GAL): 2.1

ACTUAL PURGE VOLUME (GAL): 10 MINIMUM PURGE VOLUME (3 x WV): 6.3

FIELD MEASUREMENTS

TIME	Volume (GAL)	pH (Units)	E.C.	Temp.	Clarity & Color	Other
<u>11:50</u>	<u>2</u>	<u>5.37</u>	<u>263</u>	<u>68.6</u>	<u>Clear</u>	<u>Sewer Odor</u>
<u>12:00</u>	<u>4</u>	<u>4.95</u>	<u>270</u>	<u>70.1</u>	<u>"</u>	<u>"</u>
<u>12:12</u>	<u>6</u>	<u>4.96</u>	<u>267</u>	<u>70.5</u>	<u>"</u>	<u>"</u>
<u>12:20</u>	<u>10</u>	<u>4.93</u>	<u>269</u>	<u>70.2</u>	<u>"</u>	<u>"</u>

PURGE METHOD

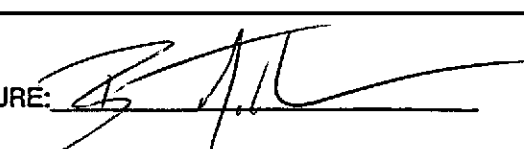
Pneumatic Displacement Pump Other
 Bailer (Teflon/PVC/SS) Submersible Pump

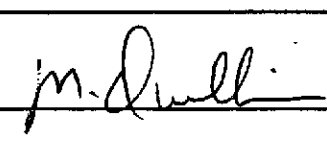
SAMPLE METHOD

Bailer (Teflon/PVC/SS) Dedicated
 Bailer (Disposable) Other

WELL INTEGRITY: _____

REMARKS: _____

SIGNATURE: 

CHECKED BY: 

SELECTED WELL CASING DIAMETERS VOLUMES PER UNIT LENGTH

WELL CASING LD. (Inches)	GAL/FT	CUBIC FT/FT
2.0	0.1632	0.0218
4.0	0.6528	0.0873
6.0	1.4690	0.1963

CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY
Feet of Water	Lbs/Sq. Inch	0.4335
Lbs/Sq. Inch	Feet of Water	2.3070
Cubic Feet	Gallons	7.4800
Gallons	Liters	3.7850
Feet	Meters	0.3048
Inches	Centimeters	2.5400

WELL SAMPLING FIELD LOG

PROJECT NAME: VORELCO # 4286
 PROJECT MANAGER: B. MILLER
 SAMPLER: B. MILLER
 GROUNDWATER: _____ OTHER: _____

DATE: JULY 13, 1993
 CLIENT: VORELCO, INC.
 SAMPLE LOCATION I.D.: MW-3
 START TIME: 12:50

CASING ELEVATION (FT): 30.00 DATUM: _____ CASING DIAMETER: 2" 4" _____ OTHER _____

DEPTH TO WATER (FT): 9.64 DEPTH OF WELL (FT): 19.0 DIFFERENCE (FT): 8.36

WATER ELEVATION (FT): 20.36 CALCULATED WELL VOLUME (GAL): 1.4

ACTUAL PURGE VOLUME (GAL): 8 MINIMUM PURGE VOLUME (3 x WV): 4.2

FIELD MEASUREMENTS

TIME	Volume (GAL)	pH (Units)	E.C.	Temp.	Clarity & Color	Other Fuel Odor
<u>13:01</u>	<u>2</u>	<u>4.56</u>	<u>380</u>	<u>69.4</u>	<u>Clear</u>	<u>"</u>
<u>13:08</u>	<u>4</u>	<u>4.47</u>	<u>347</u>	<u>67.0</u>	<u>"</u>	<u>"</u>
<u>13:15</u>	<u>6</u>	<u>4.66</u>	<u>367</u>	<u>66.6</u>	<u>"</u>	<u>"</u>
<u>15:22</u>	<u>8</u>	<u>4.69</u>	<u>356</u>	<u>66.4</u>	<u>"</u>	<u>"</u>

PURGE METHOD

Pneumatic Displacement Pump Other
 Bailer (Teflon/PVC/SS) Submersible Pump

SAMPLE METHOD

Bailer (Teflon/PVC/SS) Dedicated
 Bailer (Disposable) Other

WELL INTEGRITY: _____

REMARKS: _____

SIGNATURE: B. Miller

CHECKED BY: M. Jull

SELECTED WELL CASING DIAMETERS VOLUMES PER UNIT LENGTH

WELL CASING I.D. (Inches)	GAL/FT	CUBIC FT/FT
2.0	0.1632	0.0218
4.0	0.6528	0.0873
6.0	1.4690	0.1963

CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY
Feet of Water	Lbs/Sq. Inch	0.4335
Lbs/Sq. Inch	Feet of Water	2.3070
Cubic Feet	Gallons	7.4800
Gallons	Liters	3.7850
Feet	Meters	0.3048
Inches	Centimeters	2.5400

WELL SAMPLING FIELD LOG

PROJECT NAME: VORELCO #4286 DATE: JULY 13, 1993
 PROJECT MANAGER: B. MILLER CLIENT: VORELCO INC.
 SAMPLER: B. MILLER SAMPLE LOCATION I.D. MW-4
 GROUNDWATER: _____ OTHER: _____ START TIME: 13:47

CASING ELEVATION (FT): 29.70 DATUM: _____ CASING DIAMETER: 2" 4" _____ OTHER _____

DEPTH TO WATER (FT): 8.32 DEPTH OF WELL (FT): 24.0 DIFFERENCE (FT): 15.68

WATER ELEVATION (FT): 21.38 CALCULATED WELL VOLUME (GAL): 2.6

ACTUAL PURGE VOLUME (GAL): 9 MINIMUM PURGE VOLUME (3 x WW): 7.8

FIELD MEASUREMENTS

TIME	Volume (GAL)	pH (Units)	E.C.	Temp.	Clarity & Color	Other
<u>13:56</u>	<u>2</u>	<u>6.01</u>	<u>759</u>	<u>67.2</u>	<u>Opaque; Brown</u>	<u>No odor</u>
<u>14:05</u>	<u>4</u>	<u>6.2</u>	<u>725</u>	<u>66.9</u>	<u>"</u>	<u>"</u>
<u>14:13</u>	<u>6</u>	<u>6.4</u>	<u>737</u>	<u>66.2</u>	<u>"</u>	<u>"</u>
<u>14:23</u>	<u>8</u>	<u>7.2</u>	<u>785</u>	<u>65.9</u>	<u>"</u>	<u>"</u>
<u>14:30</u>	<u>9</u>	<u>6.9</u>	<u>749</u>	<u>66.1</u>	<u>"</u>	<u>"</u>

PURGE METHOD

Pneumatic Displacement Pump Other
 Bailer (Teflon/PVC/SS) Submersible Pump

SAMPLE METHOD

Bailer (Teflon/PVC/SS) Dedicated
 Bailer (Disposable) Other

WELL INTEGRITY: _____

REMARKS: _____

SIGNATURE: *[Signature]* CHECKED BY: *[Signature]*

SELECTED WELL CASING DIAMETERS VOLUMES PER UNIT LENGTH

WELL CASING I.D. (inches)	GAL/FT	CUBIC FT/FT
2.0	0.1632	0.0218
4.0	0.6528	0.0873
6.0	1.4690	0.1963

CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY
Feet of Water	Lbs/Sq. Inch	0.4335
Lbs/Sq. Inch	Feet of Water	2.3070
Cubic Feet	Gallons	7.4800
Gallons	Liters	3.7850
Feet	Meters	0.3048
Inches	Centimeters	2.5400

WELL SAMPLING FIELD LOG

PROJECT NAME: VORELCO # 4286 DATE: JUL 13, 1993
 PROJECT MANAGER: B. MILLER CLIENT: VORELCO, INC.
 SAMPLER: B. MILLER SAMPLE LOCATION I.D.: MW-5
 GROUNDWATER: _____ OTHER: _____ START TIME: 9:31

CASING ELEVATION (FT): 30.50 DATUM: _____ CASING DIAMETER: 2" _____ 4" OTHER _____
 DEPTH TO WATER (FT): 10.21 DEPTH OF WELL (FT): 29.0 DIFFERENCE (FT): 18.79
 WATER ELEVATION (FT): 20.29 CALCULATED WELL VOLUME (GAL): 12.3
 ACTUAL PURGE VOLUME (GAL): 40 MINIMUM PURGE VOLUME (3 x WV): 36.9

FIELD MEASUREMENTS

TIME	Volume (GAL)	pH (Units)	E.C.	Temp.	Clarity & Color	Other
9:39	10	6.80	857	68.5	OPAQUE, TAN	NO odor
9:47	20	4.82	813	65.5	"	"
9:55	30	4.69	836	65.6	"	"
10:05	40	4.57	834	65.4	"	"

PURGE METHOD

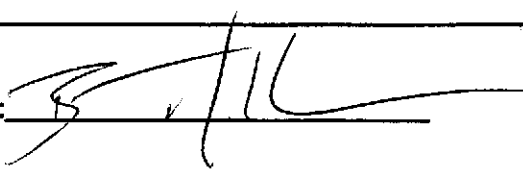
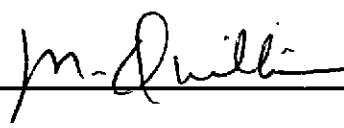
Pneumatic Displacement Pump Other
 Bailer (Teflon/PVC/SS) Submersible Pump

SAMPLE METHOD

Bailer (Teflon/PVC/SS) Dedicated
 Bailer (Disposable) Other

WELL INTEGRITY: _____

REMARKS: _____

SIGNATURE:  CHECKED BY: 

SELECTED WELL CASING DIAMETERS VOLUMES PER UNIT LENGTH

WELL CASING I.D. (Inches)	GAL/FT	CUBIC FT/FT
2.0	0.1632	0.0218
4.0	0.6528	0.0873
6.0	1.4690	0.1963

CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY
Feet of Water	Lbs/Sq. Inch	0.4335
Lbs/Sq. Inch	Feet of Water	2.3070
Cubic Feet	Gallons	7.4800
Gallons	Liters	3.7850
Feet	Meters	0.3048
Inches	Centimeters	2.5400

WELL SAMPLING FIELD LOG

PROJECT NAME: VORELCO #4286 DATE: JULY 13, 1993
 PROJECT MANAGER: B. MILLER CLIENT: VORELCO, INC.
 SAMPLER: B. MILLER SAMPLE LOCATION I.D.: MW-6
 GROUNDWATER: _____ OTHER: _____ START TIME: 10:36

CASING ELEVATION (FT): 29.19 DATUM: _____ CASING DIAMETER: 2" _____ 4" OTHER _____
 DEPTH TO WATER (FT): 8.50 DEPTH OF WELL (FT): 25.20 DIFFERENCE (FT): ~~10.9~~ 16.7
 WATER ELEVATION (FT): 20.69 CALCULATED WELL VOLUME (GAL): 10.9
 ACTUAL PURGE VOLUME (GAL): 40 MINIMUM PURGE VOLUME (3 x WV): 32.7

FIELD MEASUREMENTS

TIME	Volume (GAL)	pH (Units)	E.C.	Temp.	Clarity & Color	Other
<u>10:47</u>	<u>10</u>	<u>4.63</u>	<u>787</u>	<u>68.5</u>	<u>opaque, tan</u>	<u>No odor</u>
<u>10:55</u>	<u>20</u>	<u>4.61</u>	<u>784</u>	<u>69.1</u>	<u>"</u>	<u>"</u>
<u>11:04</u>	<u>30</u>	<u>4.46</u>	<u>775</u>	<u>68.5</u>	<u>"</u>	<u>"</u>
<u>11:14</u>	<u>40</u>	<u>4.55</u>	<u>768</u>	<u>69.3</u>	<u>"</u>	<u>"</u>

PURGE METHOD

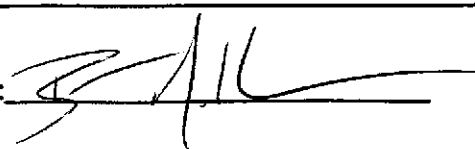
Pneumatic Displacement Pump Other
 Bailer (Teflon/PVC/SS) Submersible Pump

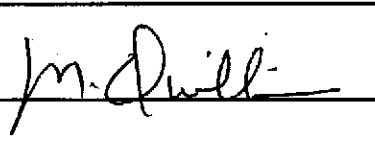
SAMPLE METHOD

Bailer (Teflon/PVC/SS) Dedicated
 Bailer (Disposable) Other

WELL INTEGRITY: _____

REMARKS: Duplicate sample collected here

SIGNATURE: 

CHECKED BY: 

SELECTED WELL CASING DIAMETERS VOLUMES PER UNIT LENGTH

WELL CASING I.D. (Inches)	GAL/FT	CUBIC FT/FT
2.0	0.1632	0.0218
4.0	0.6528	0.0873
6.0	1.4690	0.1963

CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY
Feet of Water	Lbs/Sq. Inch	0.4335
Lbs/Sq. Inch	Feet of Water	2.3070
Cubic Feet	Gallons	7.4800
Gallons	Liters	3.7850
Feet	Meters	0.3048
Inches	Centimeters	2.5400

APPENDIX C

Analytical Results and Chain of Custody Documentation



SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Environmental Science & Engineering, Inc. 4090 Nelson Ave., Ste J Concord, CA 94520 Attention: Bart Miller	Client Project ID: Vorelco # 4286 Sample Matrix: Water Analysis Method: EPA 5030/8015/8020 First Sample #: 307-0543	Sampled: Jul 13, 1993 Received: Jul 14, 1993 Reported: Jul 26, 1993
---	--	---

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 307-0543 MW-1	Sample I.D. 307-0544 MW-3	Sample I.D. 307-0545 MW-4	Sample I.D. 307-0546 MW-5	Sample I.D. 307-0547 MW-6	Sample I.D. 307-0548 Dup.
Purgeable Hydrocarbons	50	N.D.	41,000	320	90	1,100	850
Benzene	0.5	N.D.	8,100	36	N.D.	5.1	4.1
Toluene	0.5	N.D.	6,200	4.4	N.D.	30	24
Ethyl Benzene	0.5	N.D.	1,400	1.8	N.D.	30	23
Total Xylenes	0.5	N.D.	4,400	5.3	N.D.	230	180
Chromatogram Pattern:		--	Gasoline	Gasoline	Discrete Peaks	Gasoline	Gasoline

Quality Control Data

Report Limit Multiplication Factor:	1.0	200	1.0	1.0	1.0	1.0
Date Analyzed:	7/20/93	7/21/93	7/20/93	7/20/93	7/20/93	7/20/93
Instrument Identification:	HP-4	HP-2	HP-2	HP-2	HP-2	HP-2
Surrogate Recovery, %: (QC Limits = 70-130%)	109	104	118	108	104	104

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL


Karen L. Enstrom
Project Manager



SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Environmental Science & Engineering, Inc. 4090 Nelson Ave., Ste J Concord, CA 94520 Attention: Bart Miller	Client Project ID: Vorelco # 4286 Sample Matrix: Water Analysis Method: EPA 5030/8015/8020 First Sample #: 307-0549	Sampled: Jul 13, 1993 Received: Jul 14, 1993 Reported: Jul 26, 1993
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TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 307-0549 Trip Blank
Purgeable Hydrocarbons	50	N.D.
Benzene	0.5	N.D.
Toluene	0.5	N.D.
Ethyl Benzene	0.5	N.D.
Total Xylenes	0.5	N.D.
Chromatogram Pattern:		--

Quality Control Data

Report Limit Multiplication Factor:	1.0
Date Analyzed:	7/20/93
Instrument Identification:	HP-2
Surrogate Recovery, %: (QC Limits = 70-130%)	101

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL


Karen L. Enstrom
Project Manager



SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
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Environmental Science & Engineering, Inc.	Client Project ID: Vorelco # 4286	Sampled: Jul 13, 1993
4090 Nelson Ave., Ste J	Sample Descript: Water, MW-1	Received: Jul 14, 1993
Concord, CA 94520	Analysis Method: EPA 5030/8010	Analyzed: Jul 15, 1993
Attention: Bart Miller	Lab Number: 307-0543	Reported: Jul 26, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane.....	0.50	N.D.
Bromoform.....	0.50	N.D.
Bromomethane.....	1.0	N.D.
Carbon tetrachloride.....	0.50	N.D.
Chlorobenzene.....	0.50	N.D.
Chloroethane.....	1.0	N.D.
2-Chloroethylvinyl ether.....	1.0	N.D.
Chloroform.....	0.50	N.D.
Chloromethane.....	1.0	N.D.
Dibromochloromethane.....	0.50	N.D.
1,3-Dichlorobenzene.....	0.50	N.D.
1,4-Dichlorobenzene.....	0.50	N.D.
1,2-Dichlorobenzene.....	0.50	N.D.
1,1-Dichloroethane.....	0.50	N.D.
1,2-Dichloroethane.....	0.50	N.D.
1,1-Dichloroethene.....	0.50	N.D.
cis-1,2-Dichloroethene.....	0.50	N.D.
trans-1,2-Dichloroethene.....	0.50	N.D.
1,2-Dichloropropane.....	0.50	N.D.
cis-1,3-Dichloropropene.....	0.50	N.D.
trans-1,3-Dichloropropene.....	0.50	N.D.
Methylene chloride.....	5.0	N.D.
1,1,2,2-Tetrachloroethane.....	0.50	N.D.
Tetrachloroethene.....	0.50	N.D.
1,1,1-Trichloroethane.....	0.50	N.D.
1,1,2-Trichloroethane.....	0.50	N.D.
Trichloroethene.....	0.50	6.4
Trichlorofluoromethane.....	0.50	N.D.
Vinyl chloride.....	1.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL


 Karen L. Enstrom
 Project Manager



SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Environmental Science & Engineering, Inc.	Client Project ID: Vorelco # 4286	Sampled: Jul 13, 1993
4090 Nelson Ave., Ste J	Sample Descript: Water, MW-3	Received: Jul 14, 1993
Concord, CA 94520	Analysis Method: EPA 5030/8010	Analyzed: Jul 15, 1993
Attention: Bart Miller	Lab Number: 307-0544	Reported: Jul 26, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane.....	5.0	N.D.
Bromoform.....	5.0	N.D.
Bromomethane.....	10	N.D.
Carbon tetrachloride.....	5.0	N.D.
Chlorobenzene.....	5.0	N.D.
Chloroethane.....	10	N.D.
2-Chloroethylvinyl ether.....	10	N.D.
Chloroform.....	5.0	N.D.
Chloromethane.....	10	N.D.
Dibromochloromethane.....	5.0	N.D.
1,3-Dichlorobenzene.....	5.0	N.D.
1,4-Dichlorobenzene.....	5.0	N.D.
1,2-Dichlorobenzene.....	5.0	N.D.
1,1-Dichloroethane.....	5.0	N.D.
1,2-Dichloroethane.....	5.0	150
1,1-Dichloroethene.....	5.0	N.D.
cis-1,2-Dichloroethene.....	5.0	N.D.
trans-1,2-Dichloroethene.....	5.0	N.D.
1,2-Dichloropropane.....	5.0	N.D.
cis-1,3-Dichloropropene.....	5.0	N.D.
trans-1,3-Dichloropropene.....	5.0	N.D.
Methylene chloride.....	50	N.D.
1,1,2,2-Tetrachloroethane.....	5.0	N.D.
Tetrachloroethene.....	5.0	N.D.
1,1,1-Trichloroethane.....	5.0	N.D.
1,1,2-Trichloroethane.....	5.0	N.D.
Trichloroethene.....	5.0	14
Trichlorofluoromethane.....	5.0	N.D.
Vinyl chloride.....	10	N.D.

Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

SEQUOIA ANALYTICAL


Karen L. Enstrom
Project Manager



SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Environmental Science & Engineering, Inc.	Client Project ID: Vorelco # 4286	Sampled: Jul 13, 1993
4090 Nelson Ave., Ste J	Sample Descript: Water, MW-4	Received: Jul 14, 1993
Concord, CA 94520	Analysis Method: EPA 5030/8010	Analyzed: Jul 26, 1993
Attention: Bart Miller	Lab Number: 307-0545	Reported: Jul 26, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane.....	50	N.D.
Bromoform.....	50	N.D.
Bromomethane.....	100	N.D.
Carbon tetrachloride.....	50	N.D.
Chlorobenzene.....	50	N.D.
Chloroethane.....	100	N.D.
2-Chloroethylvinyl ether.....	100	N.D.
Chloroform.....	50	N.D.
Chloromethane.....	100	N.D.
Dibromochloromethane.....	50	N.D.
1,3-Dichlorobenzene.....	50	N.D.
1,4-Dichlorobenzene.....	50	N.D.
1,2-Dichlorobenzene.....	50	N.D.
1,1-Dichloroethane.....	50	N.D.
1,2-Dichloroethane.....	50	N.D.
1,1-Dichloroethene.....	50	N.D.
cis-1,2-Dichloroethene.....	50	N.D.
trans-1,2-Dichloroethene.....	50	N.D.
1,2-Dichloropropane.....	50	N.D.
cis-1,3-Dichloropropene.....	50	N.D.
trans-1,3-Dichloropropene.....	50	N.D.
Methylene chloride.....	500	N.D.
1,1,2,2-Tetrachloroethane.....	50	N.D.
Tetrachloroethene.....	50	N.D.
1,1,1-Trichloroethane.....	50	N.D.
1,1,2-Trichloroethane.....	50	N.D.
Trichloroethene.....	50	550
Trichlorofluoromethane.....	50	N.D.
Vinyl chloride.....	100	N.D.

Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

SEQUOIA ANALYTICAL


Karen L. Enstrom
Project Manager



SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Environmental Science & Engineering, Inc.	Client Project ID: Vorelco # 4286	Sampled: Jul 13, 1993
4090 Nelson Ave., Ste J	Sample Descript: Water, MW-5	Received: Jul 14, 1993
Concord, CA 94520	Analysis Method: EPA 5030/8010	Analyzed: Jul 26, 1993
Attention: Bart Miller	Lab Number: 307-0546	Reported: Jul 26, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane.....	50	N.D.
Bromoform.....	50	N.D.
Bromomethane.....	100	N.D.
Carbon tetrachloride.....	50	N.D.
Chlorobenzene.....	50	N.D.
Chloroethane.....	100	N.D.
2-Chloroethylvinyl ether.....	100	N.D.
Chloroform.....	50	N.D.
Chloromethane.....	100	N.D.
Dibromochloromethane.....	50	N.D.
1,3-Dichlorobenzene.....	50	N.D.
1,4-Dichlorobenzene.....	50	N.D.
1,2-Dichlorobenzene.....	50	N.D.
1,1-Dichloroethane.....	50	N.D.
1,2-Dichloroethane.....	50	N.D.
1,1-Dichloroethene.....	50	N.D.
cis-1,2-Dichloroethene.....	50	N.D.
trans-1,2-Dichloroethene.....	50	N.D.
1,2-Dichloropropane.....	50	N.D.
cis-1,3-Dichloropropene.....	50	N.D.
trans-1,3-Dichloropropene.....	50	N.D.
Methylene chloride.....	500	N.D.
1,1,2,2-Tetrachloroethane.....	50	N.D.
Tetrachloroethene.....	50	N.D.
1,1,1-Trichloroethane.....	50	N.D.
1,1,2-Trichloroethane.....	50	N.D.
Trichloroethene.....	50	530
Trichlorofluoromethane.....	50	N.D.
Vinyl chloride.....	100	N.D.

Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

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Karen L. Enstrom
Project Manager



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Environmental Science & Engineering, Inc.	Client Project ID: Vorelco # 4286	Sampled: Jul 13, 1993
4090 Nelson Ave., Ste J	Sample Descript: Water, MW-6	Received: Jul 14, 1993
Concord, CA 94520	Analysis Method: EPA 5030/8010	Analyzed: Jul 26, 1993
Attention: Bart Miller	Lab Number: 307-0547	Reported: Jul 26, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane.....	50	N.D.
Bromoform.....	50	N.D.
Bromomethane.....	100	N.D.
Carbon tetrachloride.....	50	N.D.
Chlorobenzene.....	50	N.D.
Chloroethane.....	100	N.D.
2-Chloroethylvinyl ether.....	100	N.D.
Chloroform.....	50	N.D.
Chloromethane.....	100	N.D.
Dibromochloromethane.....	50	N.D.
1,3-Dichlorobenzene.....	50	N.D.
1,4-Dichlorobenzene.....	50	N.D.
1,2-Dichlorobenzene.....	50	N.D.
1,1-Dichloroethane.....	50	N.D.
1,2-Dichloroethane.....	50	N.D.
1,1-Dichloroethene.....	50	N.D.
cis-1,2-Dichloroethene.....	50	N.D.
trans-1,2-Dichloroethene.....	50	N.D.
1,2-Dichloropropane.....	50	N.D.
cis-1,3-Dichloropropene.....	50	N.D.
trans-1,3-Dichloropropene.....	50	N.D.
Methylene chloride.....	500	N.D.
1,1,2,2-Tetrachloroethane.....	50	N.D.
Tetrachloroethene.....	50	N.D.
1,1,1-Trichloroethane.....	50	N.D.
1,1,2-Trichloroethane.....	50	N.D.
Trichloroethene.....	50	2,100
Trichlorofluoromethane.....	50	N.D.
Vinyl chloride.....	100	N.D.

Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

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Environmental Science & Engineering, Inc.	Client Project ID: Vorelco # 4286	Sampled: Jul 13, 1993
4090 Nelson Ave., Ste J	Sample Descript: Water, Dup.	Received: Jul 14, 1993
Concord, CA 94520	Analysis Method: EPA 5030/8010	Analyzed: Jul 26, 1993
Attention: Bart Miller	Lab Number: 307-0548	Reported: Jul 26, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane.....	50	N.D.
Bromoform.....	50	N.D.
Bromomethane.....	100	N.D.
Carbon tetrachloride.....	50	N.D.
Chlorobenzene.....	50	N.D.
Chloroethane.....	100	N.D.
2-Chloroethylvinyl ether.....	100	N.D.
Chloroform.....	50	N.D.
Chloromethane.....	100	N.D.
Dibromochloromethane.....	50	N.D.
1,3-Dichlorobenzene.....	50	N.D.
1,4-Dichlorobenzene.....	50	N.D.
1,2-Dichlorobenzene.....	50	N.D.
1,1-Dichloroethane.....	50	N.D.
1,2-Dichloroethane.....	50	N.D.
1,1-Dichloroethene.....	50	N.D.
cis-1,2-Dichloroethene.....	50	N.D.
trans-1,2-Dichloroethene.....	50	N.D.
1,2-Dichloropropane.....	50	N.D.
cis-1,3-Dichloropropene.....	50	N.D.
trans-1,3-Dichloropropene.....	50	N.D.
Methylene chloride.....	500	N.D.
1,1,2,2-Tetrachloroethane.....	50	N.D.
Tetrachloroethene.....	50	N.D.
1,1,1-Trichloroethane.....	50	N.D.
1,1,2-Trichloroethane.....	50	N.D.
Trichloroethene.....	50	2,000
Trichlorofluoromethane.....	50	N.D.
Vinyl chloride.....	100	N.D.

Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

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Karen L. Enstrom
Project Manager



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Environmental Science & Engineering, Inc.	Client Project ID: Vorelco # 4286	Sampled: Jul 13, 1993
4090 Nelson Ave., Ste J	Sample Descript: Water, Trip Blank	Received: Jul 14, 1993
Concord, CA 94520	Analysis Method: EPA 5030/8010	Analyzed: Jul 28, 1993
Attention: Bart Miller	Lab Number: 307-0549	Reported: Jul 29, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane.....	0.50	N.D.
Bromoform.....	0.50	N.D.
Bromomethane.....	1.0	N.D.
Carbon tetrachloride.....	0.50	N.D.
Chlorobenzene.....	0.50	N.D.
Chloroethane.....	1.0	N.D.
2-Chloroethylvinyl ether.....	1.0	N.D.
Chloroform.....	0.50	N.D.
Chloromethane.....	1.0	N.D.
Dibromochloromethane.....	0.50	N.D.
1,3-Dichlorobenzene.....	0.50	N.D.
1,4-Dichlorobenzene.....	0.50	N.D.
1,2-Dichlorobenzene.....	0.50	N.D.
1,1-Dichloroethane.....	0.50	N.D.
1,2-Dichloroethane.....	0.50	N.D.
1,1-Dichloroethene.....	0.50	N.D.
cis-1,2-Dichloroethene.....	0.50	N.D.
trans-1,2-Dichloroethene.....	0.50	N.D.
1,2-Dichloropropane.....	0.50	N.D.
cis-1,3-Dichloropropene.....	0.50	N.D.
trans-1,3-Dichloropropene.....	0.50	N.D.
Methylene chloride.....	5.0	N.D.
1,1,2,2-Tetrachloroethane.....	0.50	N.D.
Tetrachloroethene.....	0.50	N.D.
1,1,1-Trichloroethane.....	0.50	N.D.
1,1,2-Trichloroethane.....	0.50	N.D.
Trichloroethene.....	0.50	N.D.
Trichlorofluoromethane.....	0.50	N.D.
Vinyl chloride.....	1.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Karen L. Enstrom
Project Manager



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Environmental Science & Engineering, Inc.
4090 Nelson Ave., Ste J
Concord, CA 94520
Attention: Bart Miller

Client Project ID: Vorelco # 4286
Matrix: Water

QC Sample Group: 3070543-549

Reported: Jul 26, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl- Benzene	Xylenes
	Method:	EPA 8020	EPA 8020	EPA 8020
Analyst:	J.F.	J.F.	J.F.	J.F.
Conc. Spiked:	20	20	20	60
Units:	µg/L	µg/L	µg/L	µg/L
LCS Batch#:	1LCS072093	1LCS072093	1LCS072093	1LCS072093
Date Prepared:	7/20/93	7/20/93	7/20/93	7/20/93
Date Analyzed:	7/20/93	7/20/93	7/20/93	7/20/93
Instrument I.D.#:	HP-2	HP-2	HP-2	HP-2
LCS % Recovery:	93	92	95	97
Control Limits:	70-130	70-130	70-130	70-130

MS/MSD Batch #:	3070667	3070667	3070667	3070667
Date Prepared:	7/20/93	7/20/93	7/20/93	7/20/93
Date Analyzed:	7/20/93	7/20/93	7/20/93	7/20/93
Instrument I.D.#:	HP-2	HP-2	HP-2	HP-2
Matrix Spike % Recovery:	100	100	100	102
Matrix Spike Duplicate % Recovery:	100	100	100	103
Relative % Difference:	0.0	0.0	0.0	0.98

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Karen L. Enstrom
Project Manager

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation and analytical methods employed for the samples. The LCS % recovery data is used for validation of sample batch results. Due to matrix effects, the QC limits for MS/MSD's are advisory only and are not used to accept or reject batch results.



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Environmental Science & Engineering, Inc.
4090 Nelson Ave., Ste J
Concord, CA 94520
Attention: Bart Miller

Client Project ID: Vorelco # 4286
Matrix: Water

QC Sample Goup: 3070543-549

Reported: Jul 26, 1993

QUALITY CONTROL DATA REPORT

ANALYTE:	1,1-Dichloro-ethene	Trichloroethene	Chloro-Benzene
Method:	EPA 8010	EPA 8010	EPA 8010
Analyst:	K.N.	K.N.	K.N.
Conc. Spiked:	10	10	10
Units:	µg/L	µg/L	µg/L
LCS Batch#:	LCS071593	LCS071593	LCS071593
Date Prepared:	7/15/93	7/15/93	7/15/93
Date Analyzed:	7/15/93	7/15/93	7/15/93
Instrument I.D.#:	HP-5890/1	HP-5890/1	HP-5890/1
LCS % Recovery:	72	93	90
Control Limits:	70-130	70-130	70-130

MS/MSD			
Batch #:	3070393	3070393	3070393
Date Prepared:	7/15/93	7/15/93	7/15/93
Date Analyzed:	7/15/93	7/15/93	7/15/93
Instrument I.D.#:	HP-5890/1	HP-5890/1	HP-5890/1
Matrix Spike % Recovery:	85	100	84
Matrix Spike Duplicate % Recovery:	83	92	80
Relative % Difference:	1.2	8.3	4.9

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation and analytical methods employed for the samples. The LCS % recovery data is used for validation of sample batch results. Due to matrix effects, the QC limits for MS/MSD's are advisory only and are not used to accept or reject batch results.

SEQUOIA ANALYTICAL


Karen L. Enstrom
Project Manager



SEQUOIA ANALYTICAL

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Environmental Science & Engineering, Inc.
4090 Nelson Ave., Ste J
Concord, CA 94520
Attention: Bart Miller

Client Project ID: Vorelco # 4286
Matrix: Water

QC Sample Goup: 3070543-549

Reported: Jul 26, 1993

QUALITY CONTROL DATA REPORT

ANALYTE:	1,1-Dichloro-ethene	Trichloroethene	Chloro-Benzene
Method:	EPA 8010	EPA 8010	EPA 8010
Analyst:	K.N.	K.N.	K.N.
Conc. Spiked:	10	10	10
Units:	µg/L	µg/L	µg/L
LCS Batch#:	LCS072493	LCS072493	LCS072493
Date Prepared:	7/24/93	7/24/93	7/24/93
Date Analyzed:	7/24/93	7/24/93	7/24/93
Instrument I.D.#:	HP-5890/6	HP-5890/6	HP-5890/6
LCS % Recovery:	110	110	100
Control Limits:	70-130	70-130	70-130

MS/MSD			
Batch #:	3070858	3070858	3070858
Date Prepared:	7/24/93	7/24/93	7/24/93
Date Analyzed:	7/24/93	7/24/93	7/24/93
Instrument I.D.#:	HP-5890/6	HP-5890/6	HP-5890/6
Matrix Spike % Recovery:	130	120	110
Matrix Spike Duplicate % Recovery:	120	120	100
Relative % Difference:	8.0	0.0	9.5

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation and analytical methods employed for the samples. The LCS % recovery data is used for validation of sample batch results. Due to matrix effects, the QC limits for MS/MSD's are advisory only and are not used to accept or reject batch results.

SEQUOIA ANALYTICAL


Karen L. Enstrom
Project Manager

CHAIN OF CUSTODY RECORD

DATE JULY 13, 1993 PAGE 1 OF

PROJECT NAME VORELCO # 4286

ADDRESS BROADWAY VOLKSWAGEN

OAKLAND, CALIFORNIA

PROJECT NO. 6-93-5093

SAMPLED BY [Signature] BART MUMER

LAB NAME SEQUOIA ANALYTICAL

ANALYSES TO BE PERFORMED		MATRIX	MATRIX	NUMBER OF CONTAINERS	REMARKS (CONTAINER, SIZE, ETC.)
TAM-G/BTEX (Ba15m/Bp2g)	MVOC's (Bo10)				
X	X		WATER	3	40ml VOA vials w HCl preservative.
X	X		"	3	
X	X		"	3	* No headspace observed in field during collection
X	X		"	3	
X	X		"	3	
X	X		"	3	
X	X		"	2	



Environmental Science & Engineering, Inc.

4090 Nelson Avenue
Suite J
Concord, CA 94520

(415) 685-4053

Fax (415) 685-5323

RELINQUISHED BY: (signature) [Signature]

RECEIVED BY: (signature) [Signature]

date 7/14/93 time 8:10 AM

20

TOTAL NUMBER OF CONTAINERS

- 1.
- 2.
- 3.
- 4.
- 5.

REPORT RESULTS TO:
Bart Mumer

SPECIAL SHIPMENT REQUIREMENTS
COLD TRANSPORT

SAMPLE RECEIPT

INSTRUCTIONS TO LABORATORY (handling, analyses, storage, etc.):

Normal T.A.T.

CHAIN OF CUSTODY SEALS

REC'D GOOD CONDTH/COLD

CONFORMS TO RECORD