Environmental
Science &
Engineering, Inc.
A CILCORP Company

TO: Alameda County
Health Care Services Agency
80 Swan Way, Room 350
Oakland, CA 94621

DATE: April 27, 1994

ATTN: Mr. Thomas Peacock

JOB NUMBER: 6-93-5093

SUBJECT: Broadway Volkswagen, 2740 Broadway, Oakland, California

WE ARE TRANSMITTING THE FOLLOWING:

One Report of Site Activities pertaining to the subject site. Please feel free to contact the undersigned at (510) 685-4053 with any questions or comments.

DIST:
LB
FILE
ORIGINATOR

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

BY _____
Bart S. Miller
Project Geologist

4090 Nelson Avenue, Suite J Concord, CA 94520 Phone (510) 685-4053 Fax (510) 685-5323

Environmental
Science &
Engineering, Inc.
A CILCORP Company

April 26, 1994

Mr. Tom Moffatt
Construction Engineer
Vorelco, Inc.
3800 Hamlin Road
Auburn Hills, MI 48326

SUBJECT: REPORT OF SITE ACTIVITIES
VORELCO PROPERTY NO. 4826
BROADWAY VOLKSWAGEN
2740 BROADWAY AVENUE
OAKLAND, CALIFORNIA
ESE PROJECT NO. 6-93-5093

Dear Mr. Moffatt:

Environmental Science & Engineering, Inc. (ESE) has prepared this letter report to document fieldwork performed on March 16 through 18, 1994, at the subject site (Figure 1 - Vicinity Map). These activities were recommended by ESE in a Report of Quarterly Activities dated August 3, 1993 and approved with comment by the Alameda County Health Care Services Agency (HCSA) in a letter dated September 23, 1993.

OBJECTIVES

The purpose of this fieldwork was to:

- Abandon three ground water monitoring wells which penetrate a semi-confined aquifer impacted with halogenated volatile organic compounds (HVOCs) from off-site sources; and,

- Install four monitoring wells with selective screening over a perched, moist to wet sand lens containing detectable concentrations of total petroleum hydrocarbons as gasoline (TPH-G).

This document presents procedures and findings associated with the well abandonment and installation activities.

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 the site. The site is located at a commercially zoned area and is surrounded by numerous automobile maintenance facilities.

USTs C and D (one 500-gallon waste oil UST and one 3,000-gallon gasoline UST, respectively) were formerly located adjacent to each other at the northeast side of the site 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 TPH-G and benzene, toluene, ethylbenzene, and total xylenes (BTEX) (SEMCO, 1989). 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 (ESE, 1991a). Three soil samples collected from boring SB-3 (5, 10, and 15-foot depth) were observed to contain detectable concentrations of 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 at a depth of 15 feet below grade was reported to contain detectable concentrations of 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, moist to wet sand beds at depths ranging between 11 to 17 feet below grade (ESE, 1991a; 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. 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 have an apparent dip toward the west. Clay sediments above and immediately below the sand beds were observed to be dry.

Soil samples collected from the sand beds in borings MW-5 and MW-6 were noted to have a fuel odor and detectable volatile organic compound (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 HVOCs have been reported to occur 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 to occur in some ground water samples collected from various site wells since May 13, 1991 (ESE, 1991a; ESE, 1991b; ESE, 1992; ESE, 1993). Historically, the highest concentrations of TPH-G and BTEX have been reported to occur in ground water samples collected from well MW-3 located west and hydraulically downgradient of the former UST area. Well MW-3 is selectively screened to recharge with water from the perched sand beds. The highest concentrations of HVOCs have been reported to occur in ground water samples collected from wells screened into the deeper, semi-confined 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 UST area. **ESE concluded that ground water in the semi-confined aquifer containing TCE was cross-contaminating the upper perched sand beds at the site by upward migration through the monitoring wells completed in the shallower sand beds.**

Background research by ESE indicates that several sites surrounding the Vorelco property handle petroleum hydrocarbons and solvents containing HVOCs and that numerous unauthorized releases at 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).

ESE recommended that no ground water extraction from the deeper semi-confined aquifer be performed at the site, that monitoring wells MW-4, MW-5, and MW-6 be properly abandoned to prevent further HVOC cross-contamination of the shallow sediments, and that three selectively screened vadose wells be installed for the purpose of conducting vapor extraction 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 (ESE, 1993). The HCSA also recommended that one additional well be installed further west of MW-3 to try and define the TPH-G plume in the downgradient direction (HCSA, 1993).

SITE ACTIVITIES

On March 16, 1994, ESE supervised Exploration Geoservices of San Jose, California (a State Licensed C-57 drilling contractor) during the abandonment of monitoring wells MW-4, MW-5, and MW-6. All well abandonments were performed in accordance with the guidelines of the State of California Department of Water Resources Water Well Standards (1981) and the Zone 7 Water Agency. Due to spatial constraints, well MW-4, located inside the site building, was backfilled with neat cement grout under pressure during one

continuous operation. The casings of wells MW-5 and MW-6 were drilled out using a Mobile B61 hollow-stem auger drill rig. The resultant borings were then backfilled with neat cement grout using the hollow-stem auger as a tremie to place the grout beneath the occurrence of ground water.

On March 17 and 18, 1994, ESE strategically located and drilled a total of four ten-inch diameter soil borings (VW-1, VW-2, VW-3, and MW-7) at the site (Figure 2). Three of the borings (VW-1, VW-2, and MW-7) were located in formational sediments and one boring (VW-3) was located in the UST excavation backfill material. Soil samples were collected from borings VW-1, VW-2, and MW-7 at five-foot intervals, at distinct lithologic contacts, at zones of obvious petroleum hydrocarbon impact, and at the soil/ground water interface, where intersected. Soil samples were collected from boring VW-3 within the backfill material and in the formational sediments immediately underlying the backfill material. Soil boring and soil sampling was conducted in accordance with ESE Standard Operating Procedure (SOP) No. 1 for soil borings and soil sampling with hollow-stem augers in unconsolidated formations (Appendix A - ESE Standard Operating Procedure No. 1).

All soil samples were logged by an ESE geologist in accordance with the Unified Soil Classification Syatem (USCS) and screened for VOCs using a PID (Appendix B - Boring Logs and Well Completion Summaries). No soil samples were submitted to a laboratory for analysis since the soils at the site had already been characterized during past site investigations (ESE, 1991a; ESE, 1991b). All borings were terminated approximately six inches beneath the lower contact of the perched wet sand lens. None of the borings penetrated the deeper, semi-confined sandy clay aquifer beneath the site.

An ESE geologist supervised the installation of four wells (VW-1, VW-2, VW-3, and MW-7) in the borings described above. Each well was constructed by inserting a four-inch diameter polyvinyl chloride (PVC) pipe through the center of the hollow stem augers. The pipe (well casing) was fastened together by joining the factory threaded pipe ends. A portion of each well casing was constructed using 0.030-inch factory perforated (screen) PVC. The screened well casing was selectively located over the interval containing the perched wet sand lens (Appendix B). A PVC threaded cap was placed at the bottom of each well creating a six-inch deep sump. A sand pack comprised of No. 3 Monterey sand was placed in the borehole annulus, from the bottom of the well casing up to one to two feet above the top of the screened portion, by pouring the clean sand through the hollow stem augers. One to two feet of bentonite pellets was placed on top of the sand pack and hydrated with three to four gallons of potable water, to protect the sand pack from intrusion during the placement of the sanitary seal. A sanitary seal comprised of neat cement grout was placed on top of the hydrated bentonite pellets to approximately six inches below the top of the well casing. A Department of Transportation (DOT)-rated utility box was then set in concrete over the top of each well. Well completion details are presented in Appendix B.

Wells VW-1, VW-2, and MW-7 were not developed by surging and bailing during this site work due to the extremely slow infiltration of perched ground water into each well. Well development by surging and bailing was not required at VW-3 due to the highly permeable characteristics of the UST excavation backfill material.

OBSERVATIONS

No noticeable petroleum hydrocarbon odor or significant VOC concentrations were observed in soil samples collected from the perched sand lens at borings VW-1 and MW-7. A noticeable petroleum hydrocarbon odor and detectable VOC concentrations were observed in a soil sample collected from the perched sand lens at boring VW-2. Standing water with a high apparent concentration of dissolved gasoline constituents was observed in the UST backfill material at boring VW-3. A soil sample of the perched sand lens located directly beneath the UST backfill material was noted to have a strong petroleum hydrocarbon odor.

The depth to the top of the perched sand lens varies across the site from approximately 13 feet below grade (VW-2) to approximately 17 feet below grade (MW-7). This finding concurs with the conclusion of a previous site investigation that the perched sand lens has an apparent dip toward the west from the UST excavation area (ESE, 1991b). The perched sand lens is also noted to vary in thickness across the site from approximately two feet (VW-1, former MW-5, and former MW-6) to approximately four feet (VW2).

RECOMMENDATIONS

Based on the observations made during this site work and the findings of past site investigations, ESE recommends the following:

- Standing water impacted with petroleum hydrocarbons located in the UST excavation backfill be extracted from well VW-3 by vacuum truck and transported to a licensed facility for disposal by recycling;

- Assuming the standing ground water in the UST excavation backfill will be extracted and shallow ground water recharge to well VW-3 is slow, proceed to prepare a workplan for vapor extraction performance testing at the site for presentation to the HCSA; and

- Commence quarterly ground water monitoring and sampling at wells MW-1, MW3, and MW-7 in accordance with HCSA guidelines. All quarterly ground water samples collected from these wells should be analyzed for TPH-G and BTEX only.

REFERENCES

County of Alameda Health Care Services Agency (HCSA), 1993. Unpublished Letter Response to Recommendations in August 3, 1993 Environmental Science & Engineering, Inc. Report of Quarterly Activities at Vorelco Property No. 4826, Broadway Volkswagen, 2740 Broadway, Oakland, California; September 23, 1993.

Environmental Science & Engineering, Inc. (ESE), 1991a. Unpublished Report of Quarterly Activities at Vorelco Property No. 4826, Broadway Volkswagen, 2740 Broadway, Oakland, California; July 10, 1991.

_____, 1991b. Unpublished Report of Quarterly Activities at Vorelco Property No. 4826, Broadway Volkswagen, 2740 Broadway, Oakland, California; November 12, 1991.

_____, 1992. Unpublished Report of Quarterly Activities at Vorelco Property No. 4826, Broadway Volkswagen, 2740 Broadway, Oakland, California; December 3, 1992.

_____, 1993. Unpublished Report of Quarterly Activities at Vorelco Property No. 4826, Broadway Volkswagen, 2740 Broadway, Oakland, California; August 3, 1993.

SEMCO, Inc., 1989. Unpublished Report of Underground Storage Tank Removal at Vorelco Property No. 4826, Broadway Volkswagen, 2740 Broadway, Oakland, California; February 3, 1989.

State of California Department of Water Resources (DWR), 1981. Water Well Standards: State of California. DWR Bull. 74-81; December, 1981.

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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. If you have any questions or comments regarding the contents of this report, please contact Bart Miller at (510) 685-4053.

Sincerely,
ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

Bart S. Miller
Project Geologist

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

Figures: (2)
Attachments: (2)

p.c.: **Thomas Peacock - Alameda County HCSA**

SCALE 1:24,000

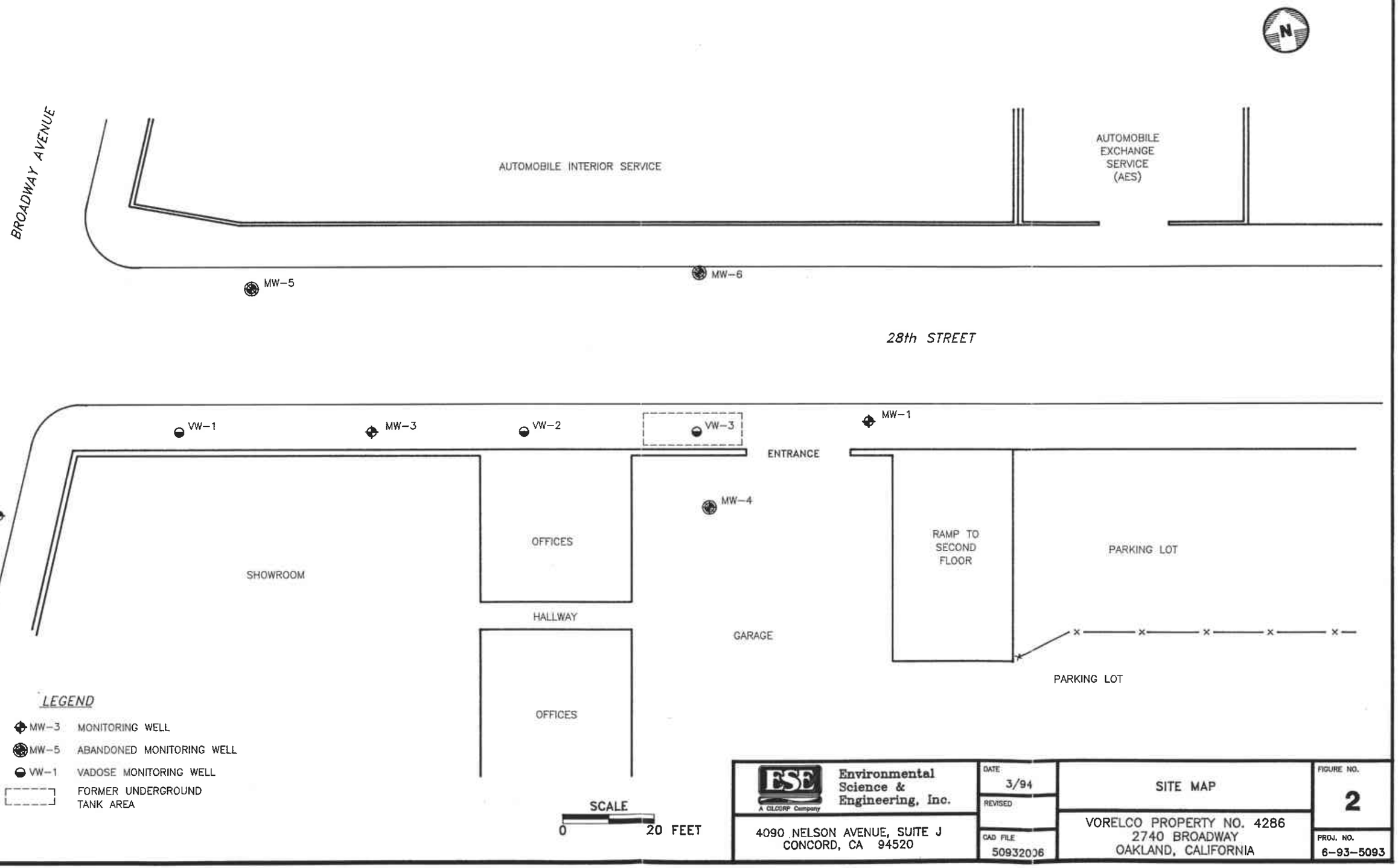
1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

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

ESE A CILCORP Company — Environmental Science & Engineering, Inc.	DATE 8/93	VICINITY MAP	FIGURE NO. 1
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED	VORELCO PROPERTY NO. 4286 2740 BROADWAY OAKLAND, CALIFORNIA	PROJ. NO. 6-93-5093
	CAD FILE 50931001		



ESE A CILCORP Company
Environmental Science & Engineering, Inc.
4090 NELSON AVENUE, SUITE J
CONCORD, CA 94520

DATE 3/94
REVISED
CAD FILE 50932006

SITE MAP
VORELCO PROPERTY NO. 4286
2740 BROADWAY
OAKLAND, CALIFORNIA

FIGURE NO. 2
PROJ. NO. 6-93-5093

APPENDIX A

ESE STANDARD OPERATING PROCEDURE NO. 1

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 1
FOR SOIL BORINGS AND SOIL SAMPLING WITH HOLLOW-STEM AUGERS IN UNCONSOLIDATED FORMATIONS

Environmental Science & Engineering, Inc. (ESE) typically drills soil borings using a truck-mounted, continuous-flight, hollow-stem auger drill rig. The drill rig is owned and operated by a drilling company possessing a valid State of California C-57 license. The soil borings are conducted under the direct supervision and guidance of an experienced ESE geologist. Prior to drilling, the ESE geologist will clear the borehole location with a hand auger to a depth of five feet. The ESE geologist logs each borehole during drilling in accordance with the Unified Soil Classification System (USCS). Additionally, the ESE geologist observes and notes the soil color, relative density or stiffness, moisture content, odor (if obvious) and organic content (if present). The ESE geologist will record all observations on geologic boring logs.

Soil samples are collected during drilling at a minimum of five-foot intervals by driving an 18-inch long Modified California Split-spoon sampler (sampler), lined with new, thin-wall brass sleeves, through the center of and ahead of the hollow stem augers, thus collecting a relatively undisturbed soil sample core. The brass sleeves are typically 2-inches in diameter and 6-inches in length. The sampler is driven by dropping a 140-pound hammer 30-inches onto rods attached to the top of the sampler. Soil sample depth intervals and the number of hammer blows required to advance the sampler each six-inch interval are recorded by the ESE geologist on geologic boring logs. The ends of one brass sleeve are covered with Teflon sheeting, then covered with plastic end caps. The end caps are sealed to the brass sleeve using duct tape. Each sample is then labeled and placed on ice in a cooler for transport under chain of custody documentation to the designated analytical laboratory. A portion of the remaining soil in the sampler is placed in either a new Ziploc® bag or a clean Mason Jar® and set in direct sunlight to enhance the volatilization of any Volatile Organic Compounds (VOCs) present in the soil. After approximately 15-minutes that sample is screened for VOCs using a photoionization detector (PID). The PID measurements will be noted on the geologic boring logs. The PID provides qualitative data for use in selecting samples for laboratory analysis. Soil samples from the saturated zone (beneath the ground-water table) are collected as described above, are not screened with the PID, and are not submitted to the analytical laboratory. The samples from the saturated zone are used for descriptive purposes. Soil samples from the saturated zone may be retained as described above for physical analyses (grain size, permeability and porosity testing).

If the soil boring is not going to be completed as a well, then the boring is typically terminated upon penetrating the saturated soil horizon or until a predetermined interval of soil containing no evidence of contamination is penetrated. This predetermined interval is typically based upon site specific regulatory or client guidelines. The boring is then backfilled using either neat cement, neat cement and bentonite powder mixture (not exceeding 5% bentonite), bentonite pellets, or a sand and cement mixture (not exceeding a 2:1 ratio of sand to cement). However, if the boring is to be completed as a monitoring well, then the boring is continued until either a competent, low estimated-permeability, lower confining soil layer is found or 10 to 15-feet of the saturated soil horizon is penetrated, whichever occurs first. If a low estimated-permeability soil layer is found, the soil boring will be advanced approximately five-feet into that layer to evaluate its competence as a lower confining layer, prior to the termination of that boring.

All soil sampling equipment is cleaned between each sample collection event using an Alconox® detergent and tap water solution followed by a tap water rinse. Additionally, all drilling equipment and soil sampling equipment is cleaned between borings, using a high pressure steam cleaner, to prevent cross-contamination. All wash and rinse water is collected and contained onsite in Department of Transportation approved containers (typically 55-gallon drums) pending laboratory analysis and proper disposal/recycling.

APPENDIX B

BORING LOGS AND WELL COMPLETION SUMMARIES

Environmental Science & Engineering, Inc.

A DELCORP Company

BORING LOG AND WELL COMPLETION SUMMARY

VW1

Page 1 of 1

WELL COMPLETION

Completion Depth: 20 Feet

	Size/Type	From	To
Casing:	4" Diam. Blank PVC	0 Feet	14.5 Feet
	4" Diam. Blank PVC	19.5 Feet	20.0 Feet
Screen:	4" Diam. Slotted (0.030") PVC	14.5 Feet	19.5 Feet
Filter:	#3 Monterey Sand	13.0 Feet	20.0 Feet
Seal:	Bentonite Pellets	11.0 Feet	13.0 Feet
	Grout	1.0 Feet	11.0 Feet

Well Cap or Box: Emco-Wheaton (15/16-inch bolts)

Project Name: Voreico Project No: 6-93-5093

Location: 2740 Broadway
Oakland, California

Driller: Exploration Geoservices, Inc
Method: Mobile B61 Hollow-Stem Auger
Hole Diameter: 10 Inches Total Depth: 20.0 Feet
Ref. Elevations:
Logged By: Bart Miller

Dates:
Start: 3-17-94
Finish: 3-18-94

Depth (ft)	Lithologic Description	USC	Graphic Log: Sample/Blows	Graphic Log: Lithology	Graphic Log: Well Installation	Vapor	Remarks (Water, drilling/completion, summary, sample type)
0	CONCRETE						START 9:40
	FORMATIONAL SEDIMENTS						
	SILTY CLAY, reddish brown, slightly moist, moderate plasticity, no odor.	CL	1 2 3				
	SANDY SILT with minor clay, mottled reddish-brown, dry, low plasticity, no odor.	ML	4 12 16			6.5	
5			14 16 22			6.5	
	SAND, four-inch lens, minor silt, dry, no odor.	SP	12 12 11				
		ML	8 9 11			7.0	
	SAND, six-inch lens, contains small amount of perched water, no odor.	SP	7 14 26				Perched water observed in sand layer at 9.5-10 feet.
10	SILTY CLAY, greyish-green, dry, moderate plasticity, no odor.	CL	13 15 17			6.5	
			9 12 13				
			9 12 17				
15	SANDY CLAY, greenish-brown, slightly moist, moderate plasticity, no odor.	CL	9 16 20			4.0	
	SAND, slightly moist, well graded, fine to coarse grained, no odor.	SW	11 20 25			1.5	
			17 33 40			1.5	
	CLAY, brown, dry, moderate plasticity, no odor.	CL	6 10 12				
20							Well installed to depth of 20 feet. Screened over target sand lens. No samples submitted for analysis.
25							
30							
35							

Environmental Science & Engineering, Inc.

A GILDORP Company

BORING LOG AND WELL COMPLETION SUMMARY

VW2

Page 1 of 1

WELL COMPLETION

Completion Depth: 17 Feet

	Size/Type	From	To
Casing:	4" Diam. Blank PVC	0 Feet	12.0 Feet
	4" Diam. Blank PVC	16.5 Feet	17.0 Feet
Screen:	4" Diam. Slotted (0.030") PVC	12.0 Feet	16.5 Feet
Filter:	#3 Monterey Sand	11.0 Feet	17.0 Feet
Seal:	Bentonite Pellets	9.0 Feet	11.0 Feet
	Grout	1.0 Feet	9.0 Feet

Well Cap or Box: Emco-Wheaton (15/16-inch bolts)

Project Name: Vorelco Project No: 6-93-5093

Location: 2740 Broadway
Oakland, California

Driller: Exploration Geoservices, Inc.
Method: Mobile B61 Hollow-Stem Auger
Hole Diameter: 10 Inches Total Depth: 17.0 Feet
Ref. Elevations:
Logged By: Bart Miller

Dates:
Start: 3-17-94
Finish: 3-18-94

Depth (ft)	Lithologic Description	USC	Graphic Log: Sample/Blows	Graphic Log: Lithology	Graphic Log: Well Installation	Vapor	Remarks (Water, drilling/completion, summary, sample type)
0	CONCRETE						START 13:55
	FORMATIONAL SEDIMENTS						
	SILTY CLAY, reddish brown, slightly moist, moderate plasticity, no odor.	CL					
	SANDY SILT, mottled reddish-brown, dry, low plasticity, no odor	ML					
5							
	SILTY CLAY, greyish-green, dry, moderate plasticity, no odor	CL					
10							
	SAND, moist, well graded, fine to coarse grained, strong petroleum hydrocarbon odor	SW	12 16 23			100	Minor wetness observed (not saturated)
15			5 9 22			1500	
	CLAY, brown, dry, moderate plasticity, no odor	CL				17	Well installed to depth of 17 feet. Screened over target sand lens. No samples submitted for analysis.
20							
25							
30							
35							

REGISTERED GEOLOGIST
MICHAEL E. QUILLIN
#5315
STATE OF CALIFORNIA

Environmental Science & Engineering, Inc.

BORING LOG AND WELL COMPLETION SUMMARY

VW3

Page 1 of 1

WELL COMPLETION

Completion Depth: 16 Feet

	Size/Type	From	To
Casing:	4" Diam. Blank PVC	0 Feet	5.5 Feet
	4" Diam. Blank PVC	15.5 Feet	16.0 Feet
Screen:	4" Diam. Slotted (0.030") PVC	5.5 Feet	15.5 Feet
Filter:	#3 Monterey Sand	4.5 Feet	16.0 Feet
Seal:	Bentonite Pellets	1.5 Feet	4.5 Feet
	Grout	1.0 Feet	1.5 Feet

Well Cap or Box: Emco-Wheaton (15/16-inch bolts)

Project Name: Vorelco Project No: 6-93-5093

Location: 2740 Broadway
Oakland, California

Driller: Exploration Geoservices, Inc.
Method: Mobile B61 Hollow-Stem Auger
Hole Diameter: 10 Inches Total Depth: 16.0 Feet
Ref. Elevations:
Logged By: Bart Miller

Dates:
Start: 3-17-94
Finish: 3-18-94

Depth (ft)	Lithologic Description	USC	Graphic Log: Sample/Blows	Graphic Log: Lithology	Graphic Log: Well Installation	Vapor	Remarks: Water, drilling/completion, summary, sample type
0	CONCRETE						START 17:00
	FILL, rounded gravel fragments with clayey sand matrix, dry, no odor.						
5						8	
	FILL, pea gravel, no fines, dry, slight petroleum hydrocarbon odor.		2 2 3				Standing water with high concentration of dissolved product.
10							
	FORMATIONAL SEDIMENTS		3				
	SAND, wet, well graded, fine to coarse grained, strong petroleum hydrocarbon odor.	SW	5 13 16 20 30				
15							
	CLAY, brown, dry, moderate plasticity, no odor.	CL				20	Well installed to depth of 16 feet in gasoline UST backfill. Screened over interval of impacted standing water. No samples submitted for analysis.
20							
25							
30							
35							

REGISTERED GEOLOGIST
MICHAEL E. QUILLIN
#5315
STATE OF CALIFORNIA

Environmental Science & Engineering, Inc.

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BORING LOG AND WELL COMPLETION SUMMARY

MW7

Page 1 of 1

WELL COMPLETION

Completion Depth: 25 Feet

	Size/Type	From	To
Casing:	4" Diam. Blank PVC	0 Feet	19.5 Feet
	4" Diam. Blank PVC	24.5 Feet	25.0 Feet
Screen:	4" Diam. Slotted (0.030") PVC	19.5 Feet	24.5 Feet
Filter:	#3 Monterey Sand	18.5 Feet	25.0 Feet
Seal:	Bentonite Pellets	16.5 Feet	18.5 Feet
	Grout	1.0 Feet	16.5 Feet

Well Cap or Box: Emco-Wheaton (15/16-inch bolts)

Project Name: Vorelco Project No: 6-93-5093

Location: 2740 Broadway
Oakland, California

Driller: Exploration Geoservices, Inc.
Method: Mobile B61 Hollow-Stem Auger
Hole Diameter: 10 Inches Total Depth: 25.0 Feet
Ref. Elevations:
Logged By: Bart Miller

Dates:
Start: 3-18-94
Finish: 3-18-94

Depth (ft)	Lithologic Description	USC	Graphic Log: Sample/Blows	Graphic Log: Lithology	Graphic Log: Well Installation	Vapor	Remarks (Water, drilling/completion, summary, sample type)
							START 13:20
0	CONCRETE						
	FORMATIONAL SEDIMENTS SILTY CLAY, reddish-brown, slightly moist, moderate plasticity, no odor.	CL					
	SILT, some gravel fragments and sand, brown, slightly moist, low plasticity, no odor.	ML					
5							
	SILTY CLAY, brown, slightly moist, moderate plasticity, no odor.	CL					Minor perched water observed at 7.5-10 feet.
10	SANDY SILT, greenish-grey, dry, low plasticity, no odor.	ML					
	SILTY CLAY, greyish-green, dry, moderate plasticity, no odor.	CL					
15	SILT, greyish-green, dry, low plasticity, no odor.	ML	7 11 16 6 7 10 10 20 35 9 20 28 10 16 32 9 19 30			4.0 5.0 11.0 7.0	
	SILT, as above except becoming sandy.						
20	SILTY SAND, brown, slightly moist, well graded, fine to coarse grained, no odor.	SW					
	CLAY, brown, dry, moderate plasticity, no odor.	CL					
25							Well installed to depth of 25 feet. Screened over target sand lens. No samples submitted for analysis.
30							
35							

REGISTERED GEOLOGIST
MICHAEL E. QUILLIN
#5315
STATE OF CALIFORNIA