

REPORT OF QUARTERLY ACTIVITIES

FOR

**BROADWAY VOLKSWAGEN
2740 BROADWAY
OAKLAND, CALIFORNIA**

Prepared For:

**Alameda County Department of Environmental Health
Hazardous Materials Program
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and

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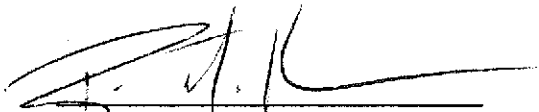
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**Project No. 6-91-5165
November 12, 1991**

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, Broadway Volkswagen in 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 professional advice in this report.


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Project No. 6-91-5165

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1.0 INTRODUCTION

1.1 Purpose

Four underground storage tanks (UST's) were removed from three areas at the Broadway Volkswagen Facility located at 2740 Broadway Avenue, Oakland, Alameda County, California during August of 1988 (Figure 1 - Site Plan). Soil and ground-water samples collected at two of the three UST removal sites were found to contain detectable petroleum hydrocarbons. Site investigative and ground-water monitoring fieldwork performed by Environmental Science & Engineering, Inc. (ESE) during May, 1991, concluded that overexcavation was performed at the UST areas. Detectable petroleum hydrocarbons and volatile organic compounds were observed in soil and ground water at one of the three UST areas. The purpose of a more recent investigation conducted by ESE during October, 1991, was to delineate the extent of detectable petroleum hydrocarbons and volatile organic compounds in soil and ground water at the one abovementioned UST location and to collect additional information concerning the direction of local ground-water flow.

This report documents the findings of the recent investigation and monitoring activities, as well as, provide recommendations for future work.

1.2 Background

In August of 1988, four underground fuel storage tanks (referred to as Tanks A, B, C and D) were removed from three areas at the Broadway Volkswagen Facility located at 2740 Broadway Avenue, Oakland, Alameda County, California which is owned by Vorelco, Inc. of Troy, Michigan. Engineering Science (ES) was the environmental consultant and SEMCO of Modesto, California acted as the tank removal contractor.

Environmental Science & Engineering, Inc. (ESE), formerly known as Hunter/Gregg, Inc., was retained by SEMCO in November of 1988 to install three ground-water monitoring wells (MW-1, MW-2 and MW-3) at the site. The purpose of these wells was to provide the Alameda County Department of Environmental Health (ACDEH) with a characterization of ground water downgradient from the former underground tanks and information as to the local ground-water flow direction.

A tank removal report was issued to Vorelco by ES during January of 1990. Findings from the ES report and a Hunter/Gregg, Inc. (1989) report which documents the ground-water data collected at the three tank areas, are presented in the ESE workplan for Site Assessment dated March 27, 1991.

In summary:

- Tank A was a 1,000 gallon waste oil tank and samples collected at the tank area during removal were nondetectable for hydrocarbons.
- Tank B was a 550 gallon waste oil tank ~~reported to have holes~~ at the time of removal. Soil samples collected at the tank site contained detectable Total Petroleum Hydrocarbons (TPH) and Oil and Grease (O&G) concentrations. Soil samples collected during the installation of monitoring well MW-2, located 15 feet southeast of the former tanks, were nondetectable for O&G and ground-water samples were nondetectable for TPH and Benzene, Toluene, Ethylbenzene, and Total Xylenes (BTEX).
- Tanks C and D, located adjacent to each other, were reported to be a 500 gallon waste oil tank and a 3,000 gallon gasoline tank, respectively. Both tanks ~~did have holes when removed~~ and all ground-water samples (plus some

soil samples) collected during tank removal contained detectable TPH and BTEX. Ground water collected at monitoring well MW-1, installed 15 feet east of the C/D tank area during 1989, contained detectable BTEX.

- Soil and ground-water samples collected during the installation of monitoring well MW-3, located 45 feet west of the C/D area, contained detectable O&G in the soil and detectable TPH as gasoline and BTEX in the ground water.
- Site ground-water levels may be skewed by perched water zones found in the Bay Mud. January 1989, ground-water level measurements in three site monitoring wells vary from the assumed regional ground-water gradient by approximately 90 degrees.
- Additional research has shown that several sites surrounding the subject area handle hazardous waste and have documented leaks. No data have been reported indicating a hazardous material release to the subsurface within a 1000-foot radius of the subject site. Ground-water levels at surrounding properties have indicated a regional south-southeast ground-water flow direction toward Lake Merritt.

1.3 Activities

All field activities reported were performed in accordance with Alameda County Department of Environmental Management (ACDEM) and Regional Water Quality Control Board guidelines. Field activities included a subsurface soil sampling, well installation, well monitoring, and well surveying.

Upon locating and permitting borings at offsite locations, ESE drilled two soil borings and installed two monitoring wells, MW-5 and MW-6 (Figure 2 - Area of Investigation). All soil borings and well installations occurred at the area surrounding former Tanks C and D. Monitoring wells MW-5 and MW-6 were surveyed to determine relative elevation and location. Measured ground-water levels at all monitoring wells were corrected to the relative elevation and results are tabulated in the body of this report.

All recent measurements and sampling activities are considered to be the second quarter of site monitoring.

2.0 METHODS AND PROCEDURES

2.1 Soil Sampling

Two soil borings, designated MW-5 and MW-6, were drilled using a Mobile B-41 hollow-stem auger drill rig to depths of 30 feet and 26.5 feet below ground surface (bgs), respectively. Exploration Geoservices, Inc. of San Jose performed all drilling under the direct supervision of an ESE geologist.

Both soil borings were sampled at depth intervals of 5, 10, and 15 feet bgs with the exception of one additional soil sample collected from boring MW-5 at a depth interval of 20 feet for the purpose of further delineation of perched zones. Soil samples were collected by driving a Modified California Split Spoon sampler, lined with two-inch diameter brass rings, 18-inches ahead of and through the center of the hollow stem augers. A 140-pound hammer dropping 30-inches was used to pound the sampler downward into the soil. The blow counts required to pound the sampler each 6-inch interval were recorded and appear on the attached boring logs (Appendix). The ends of one brass ring from each sampler were covered with Teflon-lined plastic caps which were sealed to the brass ring with duct tape. The samples were then labeled and placed in a cooler on ice.

All soil samples and drill cuttings were logged by the ESE geologist in accordance with the Unified Soil Classification System (USCS). Additionally, the ESE geologist made observations of soil color, odor, moisture content, and mechanical characteristics such as degree of plasticity or friability. Some soil retrieved from each sampling interval was placed in individual Ziploc plastic bags and set in direct sunlight to enhance the volatilization of any volatile organic compounds (VOC's) present. Subsequently, the head space of each Ziploc bag containing soil was screened for VOC's using a Photoionization Detector (PID). PID measurements appear on the geologic boring logs (Appendix A). Drill cuttings generated during drilling were retained in drums on site.

2.2 Monitoring Well Installation

Two 4-inch diameter ground-water monitoring wells were then installed in borings MW-5 and MW-6 under ACDEH and Regional Water Quality Control Board specifications. These wells were emplaced using a 0.02-inch slot-sized, schedule 40 screened PVC portion extending from the bottom of the borings upward to 10-feet bgs in MW-5 and to 6.5-feet bgs in MW-6. These screened intervals are overlain by blank schedule 40 PVC to a depth of approximately one-foot bgs where water-tight, traffic-rated well boxes were installed. Monterey #3 sand was used as a filter in the annulus from the well bottom to a depth of two feet above the screened PVC interval. One foot of bentonite pellets overlain by cement grout acts as a seal from the top of the sand filter to the well box (one foot bgs) and concrete was used to set flush-mounted well boxes. The wells were developed and surged with a 5-gallon bailer. Wells were also purged of three volumes of water. Evacuated water from the third well volumes in each new well were translucent to slightly cloudy. All water was drummed and retained on site.

2.3 Water Sampling

All pre-existing monitoring wells, including MW-1, MW-3, and MW-4, were also purged of three well volumes. Ground-water levels in all monitoring wells were allowed to equilibrate over a period of 24 hours before measurements for potential product were taken with an interface probe and ground-water samples were collected using disposable polyethylene bailers (Appendix B - Well Purging and Sampling Data).

Three 40 ml VOA vials and one 1-liter amber bottle of ground water were collected from each well. One 1-liter ground-water sample was also collected in a plastic bottle containing nitric acid as preservative from well MW-3 for metals analyses. Each container was labeled and immediately placed in a cooler for cold transport to the laboratory under chain of custody.

2.4 Analytical Methods Used

All samples were submitted and analyzed by Curtis and Tompkins, Ltd. of Berkeley, California (a State certified laboratory). The seven soil samples collected during this investigation were analyzed for Total Volatile Hydrocarbons as gasoline (TVH-g) using method EPA 5030/8015 modified and Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) using method EPA 5030/8020. One selected soil sample collected from boring MW-5 at a depth of 10 feet bgs was further analyzed for cadmium (Cd), chromium (Cr), nickel (Ni), and zinc (Zn) metals using method EPA 6010 and for lead (Pb) using method EPA 7420.

Five ground water samples were analyzed for Total Volatile Hydrocarbons as gasoline (TVH-g), kerosene, diesel, and motor oil using method EPA 5030/8015 scan and Volatile Organic Compounds (VOC's) using method EPA 624/8240. One selected ground-water sample was then analyzed for cadmium (Cd), chromium (Cr), nickel (Ni), and zinc (Zn) using method EPA 6010, and total lead (Pb) using method EPA 7420. The purpose of metals analyses was for waste characterization for soil and purge-water disposal.

One trip blank accompanied the sample cooler and was analyzed for TVH-g and BTEX in order to assure quality control.

3.0 FINDINGS

3.1 Site Conditions

Based upon the results of drilling activities to date, the local sediments have been identified as unconsolidated, dark grey to olive green, Bay Mud clay having a high plasticity. Interbedded sandy layers and stringers have been observed. Most notably, one sand interbed of an approximate two-foot thickness is present at the investigation site and occurs at an approximate depth interval of 11 to 17 feet bgs. Sand observed in a soil sample collected from boring MW-5 and as drill cuttings from boring MW-6 was noted to have a slight fuel odor.

A strong dissolved fuel odor was observed at monitoring well MW-3 during sampling and weaker fuel odors were emanated from monitoring wells MW-5 and MW-6 upon development. Wells MW-1 and MW-4 were virtually odorless.

The area of investigation is located in a paved street flanked by concrete sidewalks. Utility cables, such as telephone and electrical, and pipes for water, a sewer main, and sewer pipes extending to the main from buildings are abundant in number.

3.2 Ground-Water Flow Direction and Elevation

In general, the ground-water flow direction in the vicinity surrounding the subject site is reported to follow a southerly to southeasterly trending topographic slope toward Lake Merritt. This statement is based on the results of previous research by ESE for eight sites located in the vicinity surrounding the subject facility. All are reported to have an easterly through southerly ground-water flow direction in the subsurface and, as well, have at some point in time submitted an Unauthorized Release document for hazardous material(s) with

the ACDEH.

Ground-water level measurements collected from monitoring wells MW-1, MW-3, MW-4, MW-5, and MW-6 during this investigation indicate a local northeasterly to easterly ground-water flow direction (Figure 3 - Ground-Water Elevation). This apparently localized anomaly in ground-water flow direction is suspected to be due to the perched, water-bearing, sand lenses identified within the Bay Mud clays. Depth to ground-water levels in October, 1991 ranged between 9.55 feet bgs at MW-4 and 11.27 feet bgs at MW-5. When compared with ground-water elevation measurements collected during May, 1991, recent measurements indicate that ground-water levels have risen between approximately 0.5 to 2.5 feet in wells MW-1, MW-3, and MW-4 (Table 1 - Ground-Water Elevation Measurements). Ground-water elevation measurements collected during the spring of 1989 indicate that ground-water levels have decreased approximately 2.5 feet in well MW-1 and increased approximately 1.5 feet in well MW-3. Local ground-water flow direction during 1989 was also reported to be easterly and thought to be due to perched zones in the Bay Mud Clays (Hunter/Gregg, 1989).

During drilling activities a water-saturated Bay Mud clay sediment, excluding the wet, perched, sand interbed, was encountered at a depth of approximately 22 to 23 feet bgs at locations MW-5 and MW-6 (Appendix A - Boring Logs and Well Completion Summaries). After well development ground-water levels at the above monitoring wells were noted to rise to approximately 10 to 11 feet bgs.

3.3 Results for Chemical Analyses

All soil samples collected from borings MW-5 and MW-6 were nondetectable for TVH-g and BTEX except for one designated MW-5 - 18' collected in the two-foot thick sand interbed at a depth of 18 feet in boring MW-5 (Appendix C - Analytical Results). Concentrations of 2 parts per million (ppm) TVH-g and 220 parts per billion (ppb) benzene

were detected in this sample.

Concentrations of TVH-g ranging between 16 to 73 ppm were detected in ground-water samples collected at monitoring wells MW-3, MW-5, and MW-6 (Table 2 - Petroleum Hydrocarbon Concentrations in Ground-Water; Figure 4 - TVH-Gasoline Concentration in Ground Water). Benzene concentrations ranging between 0.011 ppm and 9.4 ppm were detected at wells MW-3, MW-4, MW-5, and MW-6 (Table 3 - Volatile Organics in Ground-Water; Figure 5 - Benzene Concentration in Ground Water). The highest concentration of TVH-g and benzene was detected in a sample from well MW-3 located approximately 60 feet west of the former gasoline UST location. A water sample collected by ESE during May, 1991 from well MW-3 was also noted to contain the highest concentrations of TVH-g and benzene (ESE Report of Quarterly Activities, July 1991). One exploratory soil boring drilled by ESE during May, 1991 fieldwork and designated SB-3, intersected free gasoline product at 10 feet bgs in pea gravel backfill occupying the former gasoline UST location. No diesel, kerosene, or motor oil was detected in water samples collected during this quarter.

Chlorinated solvent-type compounds, of trichloroethylene (TCE), cis-1,2-dichloroethene (DCE), and 1,2 dichloropropane were detected in ground water at concentrations ranging between 0.0039 ppm and 0.45 ppm (Table 3 - Volatile Organics in Ground-Water; Figure 6 - TCE Concentration in Ground Water). DCE is recognized as a breakdown product of TCE. The highest concentration of TCE was detected in a water sample collected at well MW-4.

Cd, Cr, Pb, Ni and Zn analytical results for a soil sample collected this quarter from boring MW-5 at a depth of 10 feet bgs and a water sample collected at well MW-3 indicate concentrations less than the California Code of Regulations (CCR) Title 22 Total Threshold Limit Concentrations (TTLC's) and Soluble Threshold Limit Concentrations (STLC's), respectively.

4.0 DISCUSSION

A semi-perched, water-bearing sand interbed with confining clays found at depths of 11 to 17 feet bgs may be acting as a permeable substratum for the migration of ground water containing petroleum hydrocarbons and solvents at the site (Figure 7 - Northwest-Southeast Cross-Section; Figure 8 - Northeast-Southwest Cross-Section). Rising ground-water levels immediately after monitoring well installation and development may be due to the confining pressures exerted on an underlying water-bearing sediment by the thick, dense, overlying Bay Mud clay sediments.

Based on the findings of field investigations to date, there remains question as to the past history of the subject site and vicinity. Multiple potential sources for volatile hydrocarbons, such as gasoline, and chlorinated solvents, specifically TCE and DCE, detected in soil and ground-water samples at the site, do exist. Potential sources include the former combined waste oil UST and gasoline UST excavation at the site, spillage or leakage into ground water at one or more neighboring facilities, introduction to the site from offsite sources by a leaking sewer main in the immediate vicinity and/or leakage from buried sewer or UST pipes extending from buildings to the street area. The past use of buildings on site and buildings immediately surrounding the investigation site may also indicate more potential sources. In combination with a perched water-bearing zone, fluctuating ground-water flow directions and ground-water levels, and an upward hydraulic gradient, plume delineation will be difficult at the site.

Difficulties encountered while conducting logistical activities and fieldwork at the subject facility include time and expense of obtaining Encroachment and Excavation Permits from the City of Oakland Department of Public Works for work on City property, the abundance of automobile and pedestrian traffic, the abundance of buildings and overhead electrical/telephone cables, and the abundance of buried cables and pipes. Future site investigation and remedial activities will also be constrained by the lack of available space.

5.0 CONCLUSIONS

The following conclusions are made from the findings of subsurface investigations to date, in combination with quarterly monitoring observations at the subject site:

- Local ground-water flow direction at the site this quarter is towards the east through northeast and is discordant with the regional flow direction. Ground-water levels and ground-water flow directions have been observed to fluctuate significantly between each monitoring event. An upward hydraulic gradient was observed during monitoring well installation at the site.
- Some soil and ground-water samples collected during field investigations to date contain detectable TPH as gasoline, BTEX compounds, and some chlorinated volatile organic compounds. Potential sources include ground-water transport from offsite locations, sewer main transport from offsite locations, buried sewer pipes sourcing from buildings at the investigation area, and/or a former UST site at the site known to have contained both unleaded gasoline and waste oil. BTEX and VOC concentrations detected in ground-water monitoring wells at the subject facility are above the State of California Primary Maximum Contaminant Levels (MCL's).
- TCE and DCE are common degreasing solvents. The identified solvent plume differs from that of gasoline suggesting the possibility of different sources and/or various age and volume of solvent releases. The plume in ground water is elusive and may be multi-sourced.
- No free product has been found other than during the April, 1991 fieldwork when soil boring into the old tanks C/D excavation.

- In combination with the heavy automobile/pedestrian traffic and the high density of buildings and utilities at the site, the boundaries of a plume in ground water and soil are difficult to accurately delineate.

6.0 RECOMMENDATIONS

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

For the next phase of work:

- A. One recovery well be installed and developed within the former UST excavation located on 28th Street. This well will be a recovery well for any product in the excavation area. If product is found, then ESE recommends evacuation of the recovery well with a vacuum type system and immediate disposal of the product for recycling.
- B. Quarterly monitoring, to include ground-water level measurements and the sampling of 4 wells in the Tank C/D vicinity, so as to aid in the definition of plume characteristics. In addition, ground-water levels be gauged monthly to assess ground-water level fluctuations and flow directions seasonally.

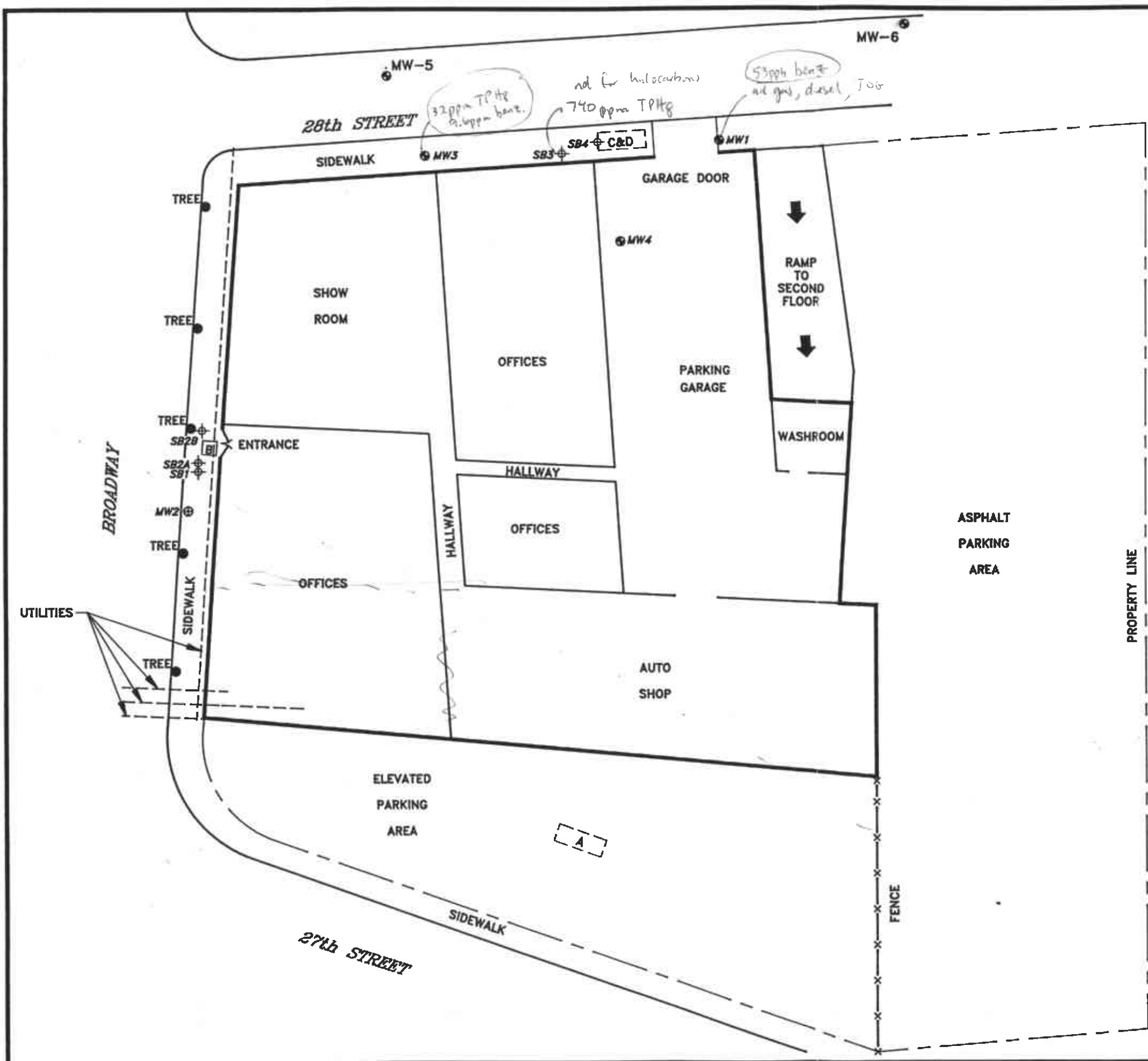
7.0 REFERENCES

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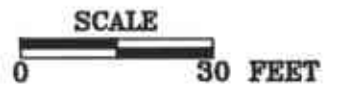


LEGEND

- MONITORING WELL
- ⊕ ABANDONED MONITORING WELL
- ⊕ SOIL BORING

TANKS

- A WASTE OIL (1,000 GAL.); TANK REMOVED, SITE CLEAN
- B WASTE OIL (550 GAL.); TANK REMOVED
- C&D WASTE OIL (550 GAL.) AND UNLEADED GASOLINE (3,000 GAL.); TANKS REMOVED



Environmental Science & Engineering, Inc.	
VORELCO #4286 BROADWAY VOLKSWAGEN OAKLAND, CALIFORNIA	
FIGURE 1 SITE PLAN	
DRAWN BY CVS	APPROVED BY
DATE 6/91	PROJ. NO. 6-91-5185



BROADWAY AVENUE

UNOCCUPIED BUILDING

AUTOMOBILE EXCHANGE SERVICE

(AES)

MW-5

MW-6

28th STREET

MW-3

SB-3

SB-4

MW-1

ENTRANCE

MW-4

OFFICES

RAMP TO SECOND FLOOR

PARKING LOT

SHOWROOM

HALLWAY

GARAGE

PARKING LOT

OFFICES

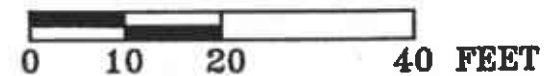
EXIT

LEGEND:

● MW-6 MONITORING WELL

▭ FORMER UNDERGROUND TANK AREA

SCALE



Environmental Science & Engineering, Inc.

VORELCO #4286
BROADWAY VOLKSWAGEN
OAKLAND, CALIFORNIA

FIGURE 2
AREA OF INVESTIGATION

DRAWN BY DWR	APPROVED BY	REVISED
DATE 10/91	FILE NAME F2INVE20	PROJ. NO. 8-91-5165



BROADWAY AVENUE

UNOCCUPIED BUILDING

AUTOMOBILE EXCHANGE SERVICE (AES)

MW-5
19.23

MW-6
18.98

28th STREET

MW-3
19.79

SB-3

SB-4

MW-1
19.11

ENTRANCE

SHOWROOM

OFFICES

GARAGE

RAMP TO SECOND FLOOR

PARKING LOT

HALLWAY

OFFICES

EXIT

LEGEND:

⊙ MW-6 18.98 MONITORING WELL WITH GROUND-WATER ELEVATION (10/18/91)

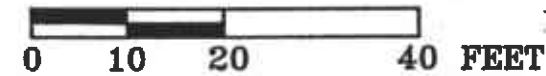
⌚ FORMER UNDERGROUND TANK AREA


— 20.0 — GROUND-WATER ELEVATION CONTOUR (feet AMSL)

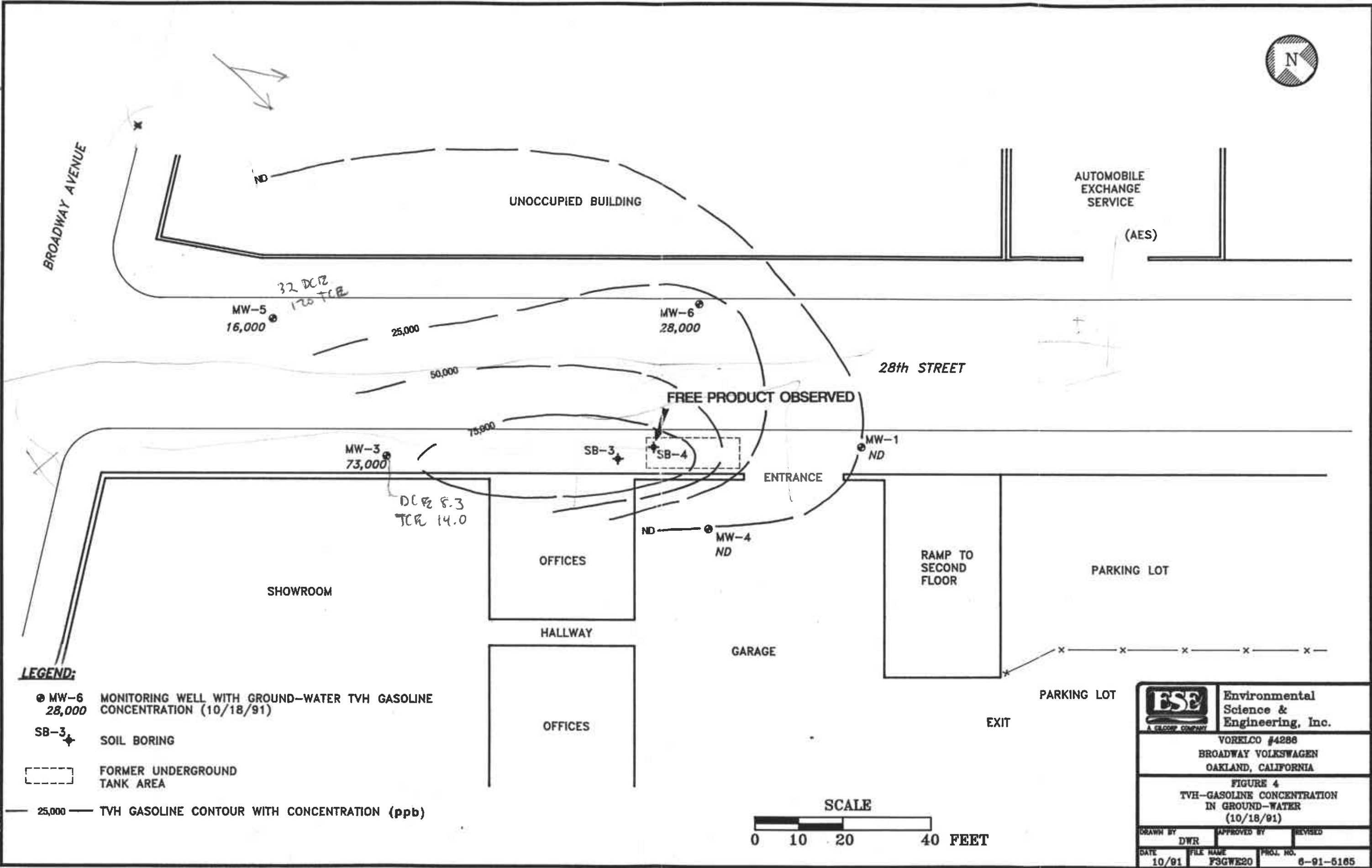
↙ LOCAL GROUND-WATER FLOW DIRECTION

↘ APPROXIMATE REGIONAL GROUND-WATER FLOW DIRECTION

SCALE

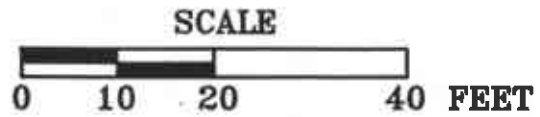


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VORELCO #4286 BROADWAY VOLKSWAGEN OAKLAND, CALIFORNIA					
FIGURE 3 GROUND-WATER ELEVATION (10/18/91)					
DRAWN BY DWR		APPROVED BY		REVISED	
DATE 10/91	FILE NAME F3GWE20	PROJ. NO.		6-91-5165	



LEGEND:

- MW-6 28,000 MONITORING WELL WITH GROUND-WATER TVH GASOLINE CONCENTRATION (10/18/91)
- ◆ SB-3 SOIL BORING
- ⬜ FORMER UNDERGROUND TANK AREA
- 25,000 — TVH GASOLINE CONTOUR WITH CONCENTRATION (ppb)



Environmental Science & Engineering, Inc.		
VORELCO #4288 BROADWAY VOLKSWAGEN OAKLAND, CALIFORNIA		
FIGURE 4 TVH-GASOLINE CONCENTRATION IN GROUND-WATER (10/18/91)		
DRAWN BY DWR	APPROVED BY	REVISED
DATE 10/91	FILE NAME F3GWE20	PROJ. NO. 6-91-5165



BROADWAY AVENUE

UNOCCUPIED BUILDING

AUTOMOBILE EXCHANGE SERVICE (AES)

MW-5
3,500 ppb

MW-6
640 ppb

28th STREET

FREE PRODUCT OBSERVED

MW-3
9,400 ppb

SB-3

SB-4

MW-1
ND

ENTRANCE

OFFICES

MW-4
11 ppb

RAMP TO SECOND FLOOR

PARKING LOT

SHOWROOM

HALLWAY

GARAGE

PARKING LOT

EXIT

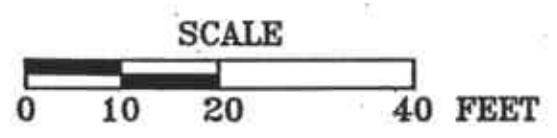
OFFICES


LEGEND:

⊕ MW-6 MONITORING WELL

▭ FORMER UNDERGROUND TANK AREA

— 2000 — BENZENE CONTOUR WITH CONCENTRATION (ppb)



		Environmental Science & Engineering, Inc.	
VORELCO #4286		BROADWAY VOLKSWAGEN OAKLAND, CALIFORNIA	
FIGURE 5 BENZENE CONCENTRATION IN GROUND-WATER (10/18/91)			
DRAWN BY	DWR	APPROVED BY	REVISED
DATE	11/91	FILE NAME	FBEN20
		PROJ. NO.	6-91-5165



BROADWAY AVENUE

UNOCCUPIED BUILDING

AUTOMOBILE EXCHANGE SERVICE

(AES)

MW-5
120 ppb

MW-6 230 ppb

SEWER MAIN

28th STREET

ECHO
GREEN

FORMER WASTE OIL UST

FORMER GASOLINE UST

MW-3 14 ppb

SB-3

SB-4

MW-1
120 ppb

ENTRANCE

MW-4
450 ppb

SHOWROOM

OFFICES

RAMP TO
SECOND
FLOOR

PARKING LOT

HALLWAY

GARAGE

PARKING LOT

OFFICES

EXIT

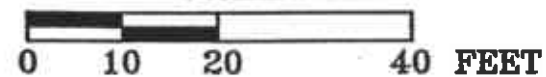
LEGEND:


● MW-6 MONITORING WELL

▭ FORMER UNDERGROUND TANK AREA

— 200 — TCE CONTOUR WITH CONCENTRATION (ppb)

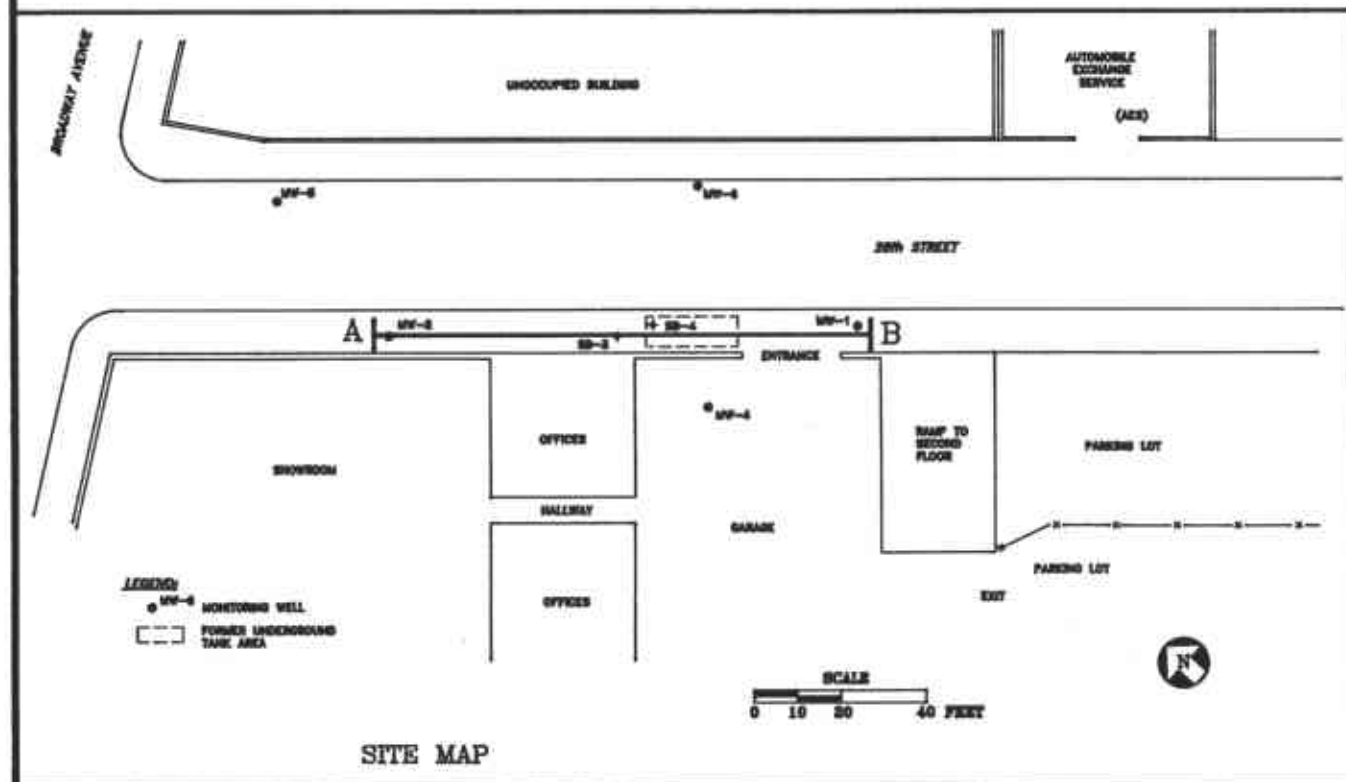
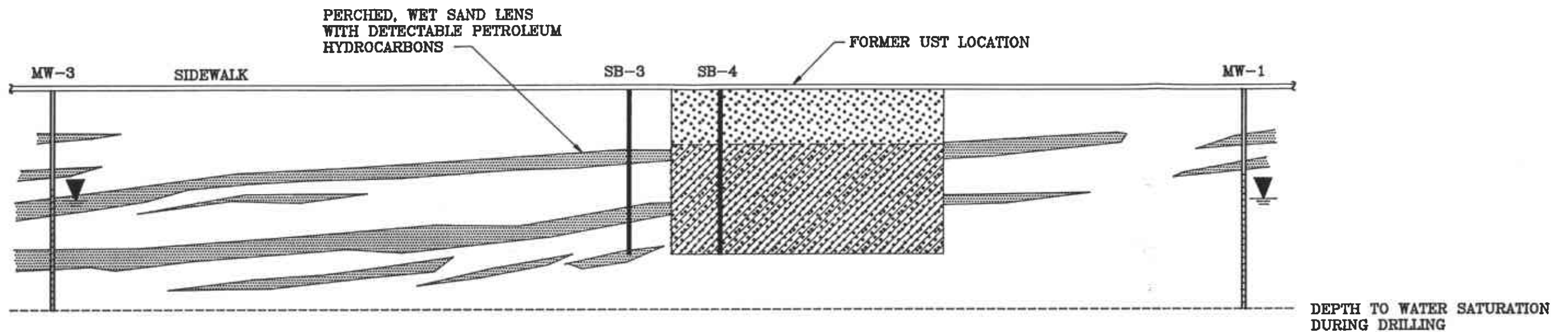
SCALE



		Environmental Science & Engineering, Inc.
VORELCO #4286 BROADWAY VOLKSWAGEN OAKLAND, CALIFORNIA		
FIGURE 6 TCE CONCENTRATION IN GROUND WATER (ppb) (10/18/91)		
DRAWN BY DWR	APPROVED BY	REVISED
DATE 10/91	FILE NAME F2INVE20	PROJ. NO. 6-91-5165

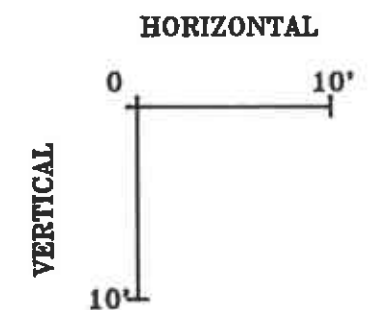
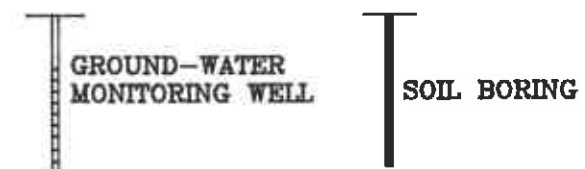
NORTHWEST
A

SOUTHEAST
B



LEGEND

- CLAY
- POORLY SORTED SAND
- PEA GRAVEL
- DETECTED HIGH CONCENTRATIONS OF PETROLEUM HYDROCARBONS INCLUDING FREE PRODUCT
- MEASURED WATER LEVEL (10/10/91)



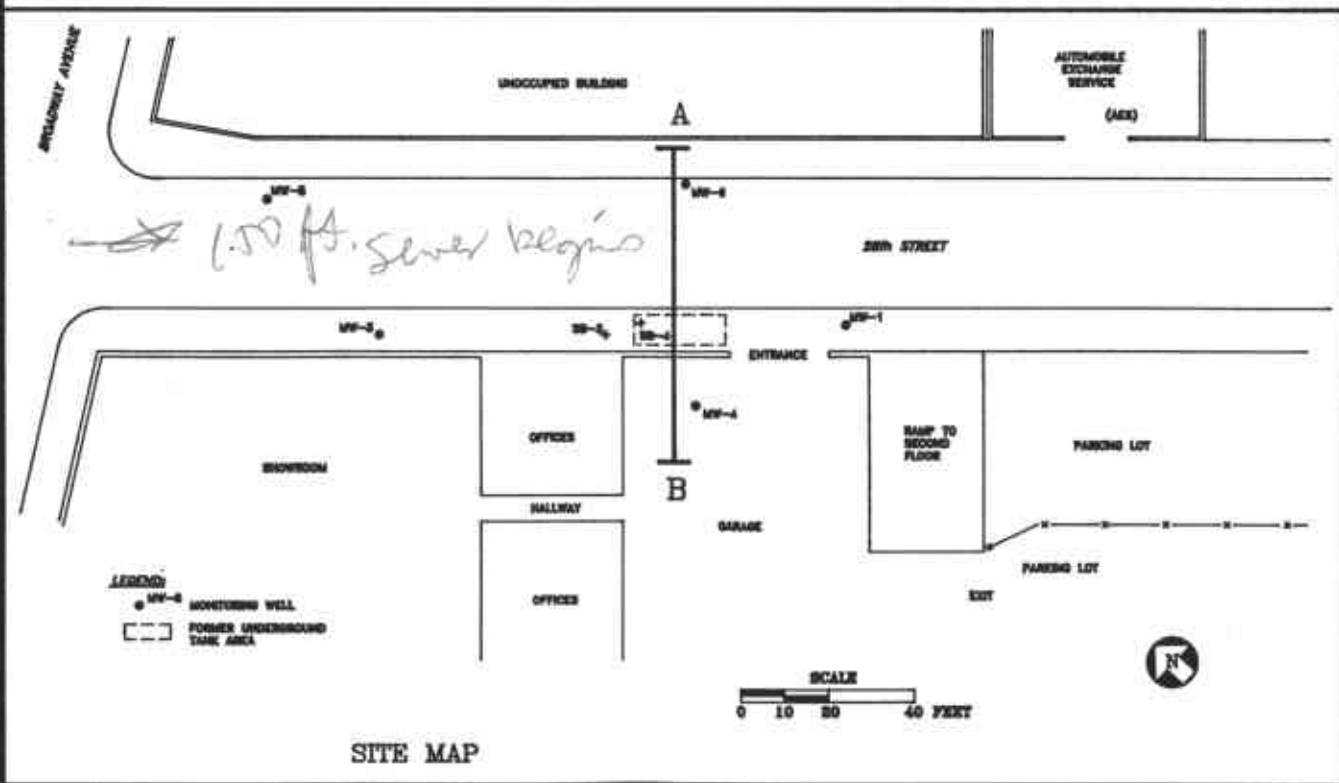
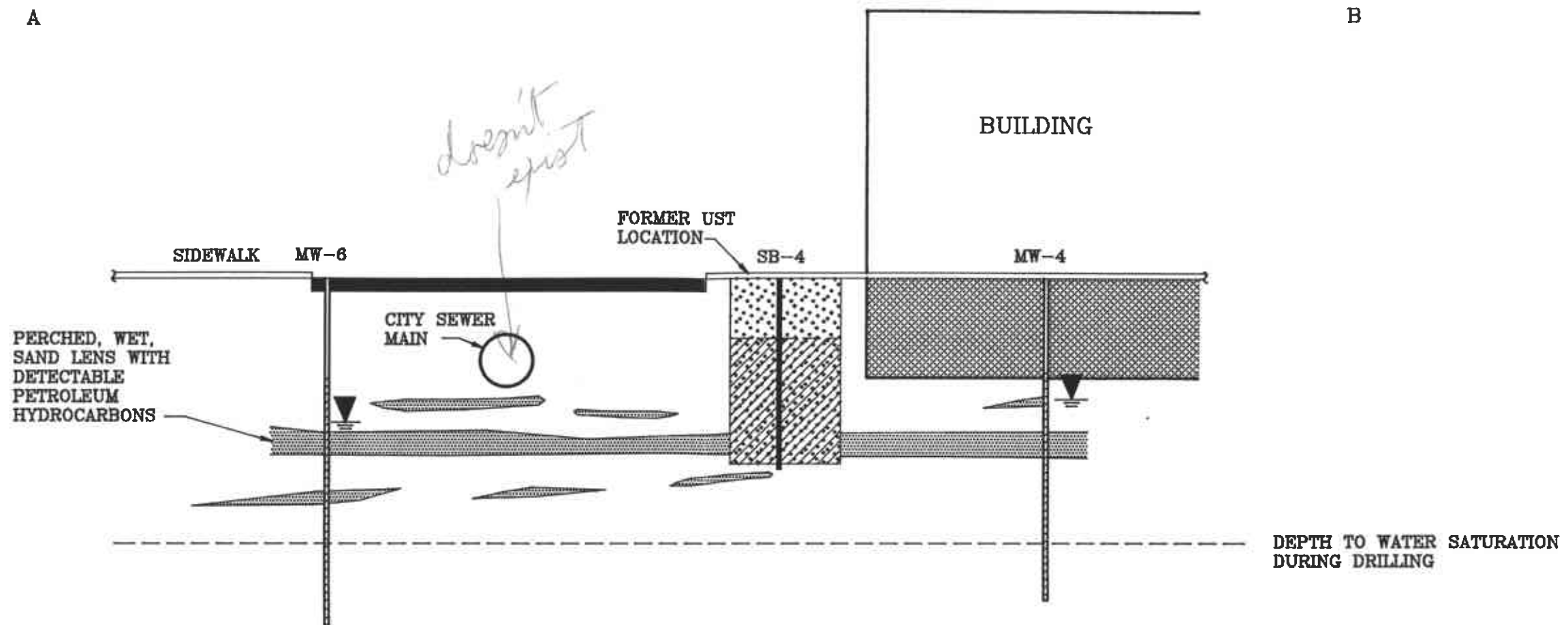
		Environmental Science & Engineering, Inc.	
VORELCO #4286 BROADWAY VOLKSWAGEN OAKLAND, CALIFORNIA			
FIGURE 7 NORTHWEST-SOUTHEAST CROSS SECTION			
DRAWN BY DWR	APPROVED BY	REVISED	
DATE 11/91	FILE NAME F7NSCS10	PROJ. NO. 8-91-5165	

NORTHEAST

A

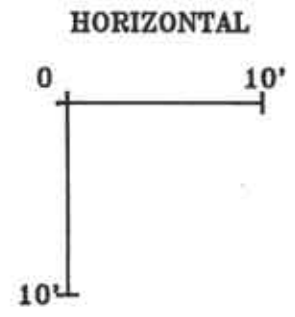
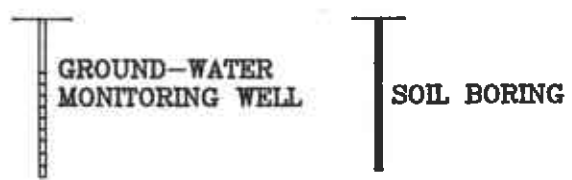
SOUTHWEST

B



LEGEND

- CLAY
 - POORLY SORTED SAND
 - PEA GRAVEL
 - DETECTED HIGH CONCENTRATIONS OF PETROLEUM HYDROCARBONS INCLUDING FREE PRODUCT
 - MEASURED WATER LEVEL (10/10/91)
- sewer begins*
- to 27th St*



Environmental Science & Engineering, Inc.		
VORELCO #4286 BROADWAY VOLKSWAGEN OAKLAND, CALIFORNIA		
FIGURE 8 NORTHEAST-SOUTHWEST CROSS SECTION		
DRAWN BY DWR	APPROVED BY	REVISED
DATE 11/91	FILE NAME F8NSCS10	PROJ. NO. 6-91-5185

TABLE 1. GROUND-WATER ELEVATION MEASUREMENTS

VORELCO #4286
 BROADWAY VOLKSWAGEN
 2740 BROADWAY AVENUE
 OAKLAND, CALIFORNIA

WELL NUMBER	WELL DEPTH (feet)	WELL ELEVATION (feet AMSL)	GROUND-WATER ELEVATION (feet AMSL)	
			5/13/91	10/18/91
MW-1	20	29.22	16.62	19.11
MW-3	20	30.00	19.44	19.79
MW-4	25	29.70	18.50	20.15
MW-5	30	30.50	-----	19.23
MW-6	27	29.19	-----	18.98

AMSL - Above Mean Sea Level

TABLE 2 - PETROLEUM HYDROCARBON CONCENTRATIONS IN GROUND WATER

VORELCO #4286
 BROADWAY VOLKSWAGEN
 2740 BROADWAY AVENUE
 OAKLAND, CALIFORNIA

WELL #	TVH AS GASOLINE (ppb)		KEROSENE (ppb)		DIESEL (ppb)		MOTOR OIL (ppb)	
	5/13/91	10/18/91	5/13/91	10/18/91	5/13/91	10/18/91	5/13/91	10/18/91
MW-1	130	ND	ND	ND	ND	ND	ND	ND
MW-3	81,000	73,000	ND	ND	ND	ND	155	ND
MW-4	13,000	ND	ND	ND	ND	ND	ND	ND
MW-5	---	16,000	---	ND	---	ND	---	ND
MW-6	---	28,000	---	ND	---	ND	---	ND

Samples Collected by ESE on 5/13/91 and 10/18/91

ND = Not detected using EPA method 8015
 ppb = parts per billion

TABLE 3. VOLATILE ORGANICS IN GROUND WATER

VORELCO #4286
 BROADWAY VOLKSWAGEN
 2740 BROADWAY AVENUE
 OAKLAND, CALIFORNIA

COMPOUND (ppb)	MW-1	MW-3	MW-4	MW-5	MW-6
Chloromethane.....	ND...	ND...	ND...	ND...	ND...
Bromomethane.....	ND...	ND...	ND...	ND...	ND...
Vinyl Chloride.....	ND...	ND...	ND...	ND...	ND...
Chloroethane.....	ND...	ND...	ND...	ND...	ND...
Methylene Chloride.....	ND...	ND...	ND...	ND...	ND...
Acetone.....	ND...	ND...	ND...	ND...	ND...
Carbon Disulfide.....	ND...	ND...	ND...	ND...	ND...
Trichlorofluoromethane.....	ND...	ND...	ND...	ND...	ND...
1,1-Dichloroethene.....	ND...	ND...	ND...	ND...	ND...
1,1-Dichloroethane.....	ND...	ND...	ND...	ND...	ND...
cis-1,2-Dichloroethene.....	ND...	8.3	3.9	32.0	60.0
trans-1,2-Dichloroethene.....	ND...	ND...	ND...	ND...	ND...
Chloroform.....	ND...	ND...	ND...	ND...	ND...
Freon 113.....	ND...	ND...	ND...	ND...	ND...
1,2-Dichloroethane.....	ND...	ND...	ND...	ND...	ND...
2-Butanone.....	ND...	ND...	ND...	ND...	ND...
1,1,1-Trichloroethane.....	ND...	ND...	ND...	ND...	ND...
Carbon Tetrachloride.....	ND...	ND...	ND...	ND...	ND...
Vinyl Acetate.....	ND...	ND...	ND...	ND...	ND...
Bromodichloromethane.....	ND...	ND...	ND...	ND...	ND...
1,2-Dichloropropane.....	ND...	12.0	ND...	ND...	ND...
cis-1,3-Dichloropropene.....	ND...	ND...	ND...	ND...	ND...
Trichloroethylene.....	120	14.0	450	120	230
Dibromochloromethane.....	ND...	ND...	ND...	ND...	ND...
1,1,2-Trichloroethane.....	ND...	ND...	ND...	ND...	ND...
Benzene.....	ND...	9,400	11.0	3,500	640
trans-1,3-Dichloropropene.....	ND...	ND...	ND...	ND...	ND...
2-Chloroethylvinyl Ether.....	ND...	ND...	ND...	ND...	ND...
Bromoform.....	ND...	ND...	ND...	ND...	ND...
2-Hexanone.....	ND...	ND...	ND...	ND...	ND...
4-Methyl-2-Pentanone.....	ND...	100	ND...	ND...	ND...
1,1,2,2-Tetrachloroethane.....	ND...	ND...	ND...	ND...	ND...
Tetrachloroethylene.....	ND...	ND...	ND...	ND...	ND...
Toluene.....	ND...	8,600	11.0	530	2,700
Chlorobenzene.....	ND...	ND...	ND...	ND...	ND...
Ethyl Benzene.....	ND...	750	ND...	670	1,100
Styrene.....	ND...	ND...	ND...	ND...	ND...
Total Xylenes.....	ND...	3,300	15.0	1,100	4,500

Samples collected by ESE on 10/18/91

ND = Not Detected using EPA Method 8240
 ppb = parts per billion



**Environmental
Science &
Engineering, Inc.**

**BORING LOG AND
WELL COMPLETION SUMMARY**

MW-5

WELL COMPLETION

Completion Depth: 25 Feet

Size/Type	From	To
Casing: 4 In. Diam. Blank PVC	1 Foot	9 Feet
Screen: 4 In. Diam. (0.02 In. Slotted) PVC	9 Feet	30 Feet
Filter: #3 Sand	7 Feet	30 Feet
Seal: Bentonite Pellets	6 Feet	7 Feet
Cement Grout	1 Foot	6 Feet
Well Cap or Box: Flush Mounted	0 Feet	1 Foot

Project Name: Vorelco
Location: Broadway Volkswagen
2740 Broadway Ave.
Oakland, CA

Project No: 6-91-5165

Driller: Exploration Geoservices, Inc.
Method: Hollow-Stem Auger
Hole Diameter: 12 In. Total Depth: 30 Feet
Ref. Elevations: NA
Logged By: Bart Miller

Page 1 of 1

Dates:
Start: 10-10-91
Finish: 10-10-91

Depth (ft)	Lithologic Description	USC	Graphic Log			Vapor	Remarks Water, drilling/completion, summary, sample type
			Sample/Blows	Lithology	Well Installation		
0	ASPHALT - 4 In. GRAVEL FILL - 6 In.	GP					TIME: 9:25
	<u>Formational Sediments</u>						
	CLAY; reddish brown, sandy, brittle, unconsolidated, dry, no odor.	CL	20 22 23				Collect soil sample* 9:44
5	CLAY; olive green, sandy, high plasticity, moist, no odor.	CL	10 12 16				Mechanical problem with drill rig. 10:00
10	CLAY, as above with reddish Fe mottling.	CL	8 10 14				Collect soil sample* 12:45
15	SAND; brown, wet, no clay, two-foot thick bed, fuel odor detected.	SP	4 13				Collect soil sample* 12:55
20	CLAY; greenish-gray, sandy, slightly moist, high plasticity, no odor.	CL	9				Collect soil sample* 13:15
25	CLAY; gray to brown, sandy, wet, high plasticity, no odor.	CL					Total Depth: 30 Feet
30							* Samples submitted for chemical analysis.





Environmental
Science &
Engineering, Inc.

BORING LOG AND WELL COMPLETION SUMMARY

MW-6

WELL COMPLETION

Completion Depth: 25 Feet

	Size/Type	From	To
Casing:	4 In. Diam. Blank PVC	1 Foot	6.5 Feet
Screen:	4 In. Diam. (0.02 In. Slotted) PVC	6.5 Feet	26.5 Feet
Filter:	#3 Sand	5 Feet	26.5 Feet
Seal:	Bentonite Pellets	4 Feet	5 Feet
	Cement Grout	1 Foot	4 Feet
Well Cap or Box:	Flush Mounted	0 Feet	1 Foot

Project Name: Voreloo

Project No: 6-91-5165

Location: Broadway Volkswagen
2740 Broadway Ave.
Oakland, CA

Page 1 of 1

Driller: Exploration Geoservices, Inc.

Method: Hollow-Stem Auger

Hole Diameter: 9 In.

Total Depth: 26.5 Feet

Ref. Elevations: NA

Logged By: Bart Miller

Dates:

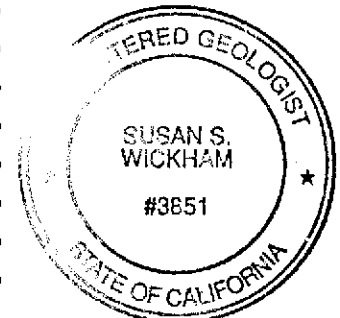
Start: 10-11-91

Finish: 10-11-91

Depth (ft)	Lithologic Description	USC	Graphic Log			Vapor	Remarks
			Sample/Blows	Lithology	Well Installation		
0	ASPHALT - 2 in. CONCRETE curb extension - 4 in. Quarried rock slabs - 4 in.	GP					TIME: 13:00
5	SAND FILL; tan brown, moderately graded, some pebbles, moist, unindurated, no odor.		3 2 3			0	Collect soil sample* 13:20
10	Formational Sediments CLAY; olive green, sandy, high plasticity, no odor.	CL	8 10 12			0	Collect soil sample* 13:35
15	SAND; brown, wet, no clay, two-foot thick bed, slight fuel odor detected.	SP				3	Vapor measurement taken using drill cuttings.
15	CLAY; olive green to brown, sandy, moist, high plasticity, no odor.	CL	6 7 10			0	Collect soil sample* 13:53
20	CLAY; gray to brown, sandy, wet, high plasticity, no odor.						
25							
30							
35							

Total Depth: 26.5 Feet

* Samples submitted for chemical analysis.



WELL PURGING AND SAMPLING DATA

Date: 10/11/91 Project Number: 6-91-5165 Project Name: VORELCO

Well Number: MW-1 Boring Diameter: 8 INCH Casing Diameter: 2 INCH

Column of Fluid in Well	Volume to be Removed
depth to product <u> ✓ </u>	gal per ft Annular Space = <u>1.5</u>
depth to water <u>10.38</u>	column of water X <u>8.76</u>
total depth of well <u>19.14</u>	volume of annular space = <u>13.14 x 30% = 3.9</u>
column of product <u> ∅ </u>	gal per ft of casing = <u>0.16</u>
column of water <u>8.76</u>	column of water X <u>8.76</u>
	volume of casing = <u>1.4</u>
	total volume = <u>5.3</u>
	number of vol to remove X <u>3</u>
	total vol to remove = <u>15.9</u>

method of measuring fluid Electric Tape

method of purging well Hand Pump rate _____

method of decon Alconex and water

Physical appearance of water (clarity, color, particulates, odor)

Initial Light brown

During _____

Final Clear

Field Analysis	Initial	During	Final
time	_____	_____	_____
conductivity	_____	_____	_____
pH	_____	_____	_____
temperature	_____	_____	_____
method of measurement	_____		

Total volume purged 23 gallons Comments No odor

Sample Number MW-1 Amount of Sample 3 x 40 ml VOA; 1 x 1 liter

Signed/Sampler [Signature] Date 10/11/91

Signed/Reviewer _____ Date _____

WELL PURGING AND SAMPLING DATA

Date: 10/11/91 Project Number: 6-91-5165 Project Name: VORELLO

Well Number: MW-3 Boring Diameter: 8 INCH Casing Diameter: 2 INCH

Column of Fluid in Well		Volume to be Removed	
depth to product	<u>∅</u>	gal per ft Annular Space	= <u>1.5</u>
		column of water	X <u>7.62</u>
depth to water	<u>11.52</u>	volume of annular space	= <u>11.43 x 30% = 3.4</u>
		gal per ft of casing	= <u>0.16</u>
total depth of well	<u>19.14</u>	column of water	X <u>7.62</u>
		volume of casing	= <u>1.22</u>
column of product	<u>∅</u>	total volume	= <u>4.6</u>
		number of vol to remove	X <u>3</u>
column of water	<u>7.62</u>	total vol to remove	= <u>13.8</u>

method of measuring fluid Electric Tape

method of purging well Hand pump rate _____

method of decon Alconox and water

Physical appearance of water (clarity, color, particulates, odor)

Initial Clear

During _____

Final Clear

Field Analysis	Initial	During	Final
time	_____	_____	_____
conductivity	_____	_____	_____
pH	_____	_____	_____
temperature	_____	_____	_____
method of measurement	_____		

Total volume purged .16 gallons Comments Strong dissolved fuel
odor

Sample Number MW-3 Amount of Sample 3 x 40ml VOA; 1 x 1 liter

Signed/Sampler [Signature] Date 10/11/91

Signed/Reviewer _____ Date _____

WELL PURGING AND SAMPLING DATA

Date: 10/11/91 Project Number: 6-91-5165 Project Name: VORELLO

Well Number: MW-4 Boring Diameter: 8 INCH Casing Diameter: 2 INCH

Column of Fluid in Well		Volume to be Removed	
depth to product	<u>∅</u>	gal per ft Annular Space	= <u>1.5</u>
		column of water	X <u>13.34</u>
depth to water	<u>9.56</u>	volume of annular space	= <u>20.01 x 30% = 6</u>
		gal per ft of casing	= <u>0.16</u>
total depth of well	<u>22.9</u>	column of water	X <u>13.34</u>
		volume of casing	= <u>2.13</u>
column of product	<u>∅</u>	total volume	= <u>8.13</u>
		number of vol to remove	X <u>3</u>
column of water	<u>13.34</u>	total vol to remove	= <u>24.4</u>

method of measuring fluid Electric Tape

method of purging well Hand Pump rate _____

method of decon Alconox and water

Physical appearance of water (clarity, color, particulates, odor)

Initial Silty; dark brown

During _____

Final Translucent

Field Analysis	Initial	During	Final
time	_____	_____	_____
conductivity	_____	_____	_____
pH	_____	_____	_____
temperature	_____	_____	_____
method of measurement	_____		

Total volume purged .35 gallons Comments No odor

Sample Number MW-4 Amount of Sample 3x40ml VOA; 1x1 liter

Signed/Sampler [Signature] Date 10/11/91

Signed/Reviewer _____ Date _____

WELL PURGING AND SAMPLING DATA

Date: 10/11/91 Project Number: 6-91-5165 Project Name: VORELCO

Well Number: MW-5 Boring Diameter: 12 INCH Casing Diameter: 4 INCH

Column of Fluid in Well		Volume to be Removed	
depth to product	<u>∅</u>	gal per ft Annular Space	= <u>2.6</u>
depth to water	<u>8.0</u>	column of water	X <u>22</u>
total depth of well	<u>30.0</u>	volume of annular space	= <u>57.2 x 30% = 17.16</u>
column of product	<u>∅</u>	gal per ft of casing	= <u>0.65</u>
column of water	<u>22.0</u>	column of water	X <u>22</u>
		volume of casing	= <u>14.3</u>
		total volume	= <u>31.46</u>
		number of vol to remove	X <u>3</u>
		total vol to remove	= <u>94.38</u>

method of measuring fluid Electric Tape

method of purging well Bailer rate 5 gals/bail

method of decon Alconox and water

Physical appearance of water (clarity, color, particulates, odor)

Initial Silty; dark brown

During As above

Final Cloudy; light brown

Field Analysis	<u>Initial</u>	<u>During</u>	<u>Final</u>
time	_____	_____	_____
conductivity	_____	_____	_____
pH	_____	_____	_____
temperature	_____	_____	_____
method of measurement	_____		

Total volume purged .110 gallons Comments 100% sandpack in monitoring well. Faint detectable fuel odor.

Sample Number MW-5 Amount of Sample 3 x 40 ml VOA; 1 x 1 liter

Signed/Sampler [Signature] Date 10/11/91

Signed/Reviewer _____ Date _____

WELL PURGING AND SAMPLING DATA

Date: 10/11/91 Project Number: 6-91-5165 Project Name: VORELCO

Well Number: MW-6 Boring Diameter: 9 INCH Casing Diameter: 4 INCH

Column of Fluid in Well		Volume to be Removed	
depth to product	<u>∅</u>	gal per ft Annular Space	= <u>1.47</u>
depth to water	<u>11.49</u>	column of water	X <u>15.01</u>
total depth of well	<u>26.5</u>	volume of annular space	= <u>22.07 x 30% = 6.62</u>
column of product	<u>∅</u>	gal per ft of casing	= <u>0.65</u>
column of water	<u>15.01</u>	column of water	X <u>15.01</u>
		volume of casing	= <u>9.76</u>
		total volume	= <u>16.38</u>
		number of vol to remove	X <u>3</u>
		total vol to remove	= <u>49.13</u>

method of measuring fluid Electric Tape

method of purging well Boiler rate 5 gals/bail

method of decon Alconox and water

Physical appearance of water (clarity, color, particulates, odor)

Initial Silty; dark brown

During _____

Final Translucent

Field Analysis	<u>Initial</u>	<u>During</u>	<u>Final</u>
time	_____	_____	_____
conductivity	_____	_____	_____
pH	_____	_____	_____
temperature	_____	_____	_____
method of measurement	_____		

Total volume purged 50 gallons Comments 100% sandpack in monitoring well. Detectable fuel odor. No sheen. Fuel dissolved.

Sample Number MW-6 Amount of Sample 3 x 40ml VOA; 1 x 1 liter

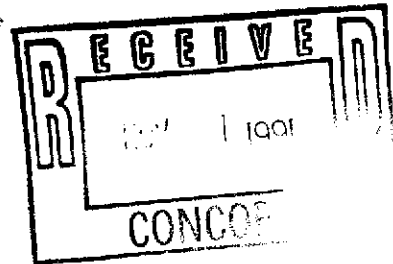
Signed/Sampler [Signature] Date 10/11/91

Signed/Reviewer _____ Date _____



Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878

2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900



DATE RECEIVED: 10/14/91
DATE REPORTED: 10/29/91

LABORATORY NUMBER: 105477

CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

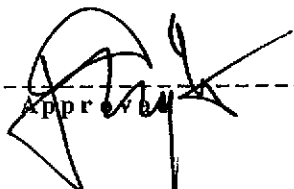
PROJECT ID: 6-91-5165

LOCATION: VORELCO

RESULTS: SEE ATTACHED



QA/QC Approval



Final Approval

LABORATORY NUMBER: 105477
 CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
 PROJECT ID: 6-91-5165
 LOCATION: VORELCO

DATE RECEIVED: 10/14/91
 DATE ANALYZED: 10/18/91
 DATE REPORTED: 10/21/91

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
 TVH by California DOHS Method/LUFT Manual October 1989
 BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
105477-1	MV5-5'	ND(1.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
105477-2	MV5-18'	2.0	220	ND(10)	28	22
105477-3	MV5-10'	ND(1.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
105477-4	MV5-15'	ND(1.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
105477-5	MV6-5'	ND(1.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
105477-6	MV6-10'	ND(1.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
105477-7	MV6-15'	ND(1.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY

RPD, %	1
RECOVERY, %	92



LABORATORY NUMBER: 105477-8
 CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
 PROJECT ID: 6-91-5165
 LOCATION: VORELCO
 SAMPLE ID: MW1

DATE RECEIVED: 10/14/91
 DATE ANALYZED: 10/22/91
 DATE REPORTED: 10/29/91

EPA METHOD 8240: VOLATILE ORGANICS IN WATER

COMPOUND	Result ug/L	Reporting Limit (ug/L)
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl chloride	ND	10
Chloroethane	ND	10
Methylene chloride	ND	5.0
Acetone	ND	10
Carbon disulfide	ND	5.0
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
Freon 113	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	10
1,1,1-Trichloroethane	ND	5.0
Carbon tetrachloride	ND	5.0
Vinyl acetate	ND	10
Bromodichloromethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethylene	ND	5.0
Dibromochloromethane	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
2-Chloroethylvinyl ether	ND	10
Bromoform	ND	5.0
2-Hexanone	ND	10
4-Methyl-2-pentanone	ND	10
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethylene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethyl benzene	ND	5.0
Styrene	ND	5.0
Total xylenes	ND	5.0

120

ND = Not detected at or above reporting limit

QA/QC SUMMARY: SURROGATE RECOVERIES

1,2-Dichloroethane-d4	106 %
Toluene-d8	99 %
Bromofluorobenzene	102 %

LABORATORY NUMBER: 105477-9
 CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
 PROJECT ID: 6-91-5165
 LOCATION: VORELCO
 SAMPLE ID: MW3

DATE RECEIVED: 10/14/91
 DATE ANALYZED: 10/23/91
 DATE REPORTED: 10/29/91

EPA METHOD 8240: VOLATILE ORGANICS IN WATER

COMPOUND	Result ug/L	Reporting Limit (ug/L)
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl chloride	ND	10
Chloroethane	ND	10
Methylene chloride	ND	5.0
Acetone	ND	10
Carbon disulfide	ND	5.0
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
cis-1,2-Dichloroethene	8.3	5.0
trans-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
Freon 113	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	10
1,1,1-Trichloroethane	ND	5.0
Carbon tetrachloride	ND	5.0
Vinyl acetate	ND	10
Bromodichloromethane	ND	5.0
1,2-Dichloropropane	12	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethylene	14	5.0
Dibromochloromethane	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Benzene	9,400	5.0
trans-1,3-Dichloropropene	ND	5.0
2-Chloroethylvinyl ether	ND	10
Bromoform	ND	5.0
2-Hexanone	ND	10
4-Methyl-2-pentanone	100	10
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethylene	ND	5.0
Toluene	8,600	5.0
Chlorobenzene	ND	5.0
Ethyl benzene	750	5.0
Styrene	ND	5.0
Total xylenes	3,300	5.0

ND = Not detected at or above reporting limit

QA/QC SUMMARY: SURROGATE RECOVERIES

1,2-Dichloroethane-d4	95 %
Toluene-d8	103 %
Bromofluorobenzene	102 %

LABORATORY NUMBER: 105477-10
 CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
 PROJECT ID: 6-91-5165
 LOCATION: VORELCO
 SAMPLE ID: MW4

DATE RECEIVED: 10/14/91
 DATE ANALYZED: 10/23/91
 DATE REPORTED: 10/29/91

EPA METHOD 8240: VOLATILE ORGANICS IN WATER

COMPOUND	Result ug/L	Reporting Limit (ug/L)
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl chloride	ND	10
Chloroethane	ND	10
Methylene chloride	ND	5.0
Acetone	ND	10
Carbon disulfide	ND	5.0
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
cis-1,2-Dichloroethene	Detected (3.9)	5.0
trans-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
Freon 113	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	10
1,1,1-Trichloroethane	ND	5.0
Carbon tetrachloride	ND	5.0
Vinyl acetate	ND	10
Bromodichloromethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethylene	450	5.0
Dibromochloromethane	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Benzene	11	5.0
trans-1,3-Dichloropropene	ND	5.0
2-Chloroethylvinyl ether	ND	10
Bromoform	ND	5.0
2-Hexanone	ND	10
4-Methyl-2-pentanone	ND	10
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethylene	ND	5.0
Toluene	11	5.0
Chlorobenzene	ND	5.0
Ethyl benzene	ND	5.0
Styrene	ND	5.0
Total xylenes	15	5.0

ND = Not detected at or above reporting limit

QA/QC SUMMARY: SURROGATE RECOVERIES

1,2-Dichloroethane-d4	106 %
Toluene-d8	95 %
Bromofluorobenzene	105 %

LABORATORY NUMBER: 105477-11
 CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
 PROJECT ID: 6-91-5165
 LOCATION: VORELCO
 SAMPLE ID: MWS

DATE RECEIVED: 10/14/91
 DATE ANALYZED: 10/23/91
 DATE REPORTED: 10/29/91

EPA METHOD 8240: VOLATILE ORGANICS IN WATER

COMPOUND	Result ug/L	Reporting Limit (ug/L)
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl chloride	ND	10
Chloroethane	ND	10
Methylene chloride	ND	5.0
Acetone	ND	10
Carbon disulfide	ND	5.0
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
cis-1,2-Dichloroethene	32	5.0
trans-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
Freon 113	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	10
1,1,1-Trichloroethane	ND	5.0
Carbon tetrachloride	ND	5.0
Vinyl acetate	ND	10
Bromodichloromethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethylene	120	5.0
Dibromochloromethane	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Benzene	3,500	5.0
trans-1,3-Dichloropropene	ND	5.0
2-Chloroethylvinyl ether	ND	10
Bromoform	ND	5.0
2-Hexanone	ND	10
4-Methyl-2-pentanone	ND	10
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethylene	ND	5.0
Toluene	530	5.0
Chlorobenzene	ND	5.0
Ethyl benzene	670	5.0
Styrene	ND	5.0
Total xylenes	1,100	5.0

ND = Not detected at or above reporting limit

QA/QC SUMMARY: SURROGATE RECOVERIES

1,2-Dichloroethane-d4	109 %
Toluene-d8	100 %
Bromofluorobenzene	109 %

LABORATORY NUMBER: 105477-12
 CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
 PROJECT ID: 6-91-5165
 LOCATION: VORELCO
 SAMPLE ID: MW6

DATE RECEIVED: 10/14/91
 DATE ANALYZED: 10/23/91
 DATE REPORTED: 10/29/91

EPA METHOD 8240: VOLATILE ORGANICS IN WATER

COMPOUND	Result ug/L	Reporting Limit (ug/L)
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl chloride	ND	10
Chloroethane	ND	10
Methylene chloride	ND	5.0
Acetone	ND	10
Carbon disulfide	ND	5.0
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
cis-1,2-Dichloroethene	60	5.0
trans-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
Freon 113	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	10
1,1,1-Trichloroethane	ND	5.0
Carbon tetrachloride	ND	5.0
Vinyl acetate	ND	10
Bromodichloromethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethylene	230	5.0
Dibromochloromethane	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Benzene	640	5.0
trans-1,3-Dichloropropene	ND	5.0
2-Chloroethylvinyl ether	ND	10
Bromoform	ND	5.0
2-Hexanone	ND	10
4-Methyl-2-pentanone	ND	10
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethylene	ND	5.0
Toluene	2,700	5.0
Chlorobenzene	ND	5.0
Ethyl benzene	1,100	5.0
Styrene	ND	5.0
Total xylenes	4,500	5.0

ND = Not detected at or above reporting limit

QA/QC SUMMARY: SURROGATE RECOVERIES

1,2-Dichloroethane-d4	108 %
Toluene-d8	103 %
Bromofluorobenzene	97 %

LABORATORY NUMBER: 105477
 CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
 PROJECT ID: 6-91-5165
 LOCATION: VORELCO

DATE RECEIVED: 10/14/91
 DATE ANALYZED: 10/16/91
 DATE REPORTED: 10/21/91

Benzene, Toluene, Ethyl Benzene, Xylenes by EPA 8020
 Extraction by EPA 5030 Purge and Trap

LAB ID	CLIENT ID	BENZENE (ug/L)	TOLUENE (ug/L)	ETHYL BENZENE (ug/L)	TOTAL XYLENES (ug/L)	REPORTING LIMIT * (ug/L)
105477-13	BLANK	ND	ND	ND	ND	0.5

ND = Not detected at or above reporting limit.

* Reporting Limit applies to all analytes.

QA/QC SUMMARY

RPD, %	5
RECOVERY, %	92

LABORATORY NUMBER: 105477
 CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
 PROJECT ID: 6-91-5165
 LOCATION: VORELCO

DATE RECEIVED: 10/14/91
 DATE ANALYZED: 10/16,18/91
 DATE REPORTED: 10/21/91

Total Volatile Hydrocarbons as Gasoline in Aqueous Solutions
 California DOHS Method
 LUFT Manual October 1989

LAB ID	CLIENT ID	TVH AS GASOLINE (ug/L)	REPORTING LIMIT (ug/L)
105477-8	MW1	ND	50
105477-9	MW3	73,000	5,000
105477-10	MW4	ND	50
105477-11	MW5	16,000	500
105477-12	MW6	28,000	500

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

RPD, %	1
RECOVERY, %	105

LABORATORY NUMBER: 105477
 CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
 PROJECT ID: 6-91-5165
 LOCATION: VORELCO

DATE RECEIVED: 10/14/91
 DATE EXTRACTED: 10/16/91
 DATE ANALYZED: 10/17,18/91
 DATE REPORTED: 10/21/91

Extractable Petroleum Hydrocarbons in Aqueous Solutions
 California DOHS Method
 LUFT Manual October 1989

LAB ID	CLIENT ID	KEROSENE RANGE (ug/L)	DIESEL RANGE (ug/L)	MOTOR OIL RANGE (ug/L)
105477-8	MW1	ND(50)	ND(50)	ND(1250)
105477-9	MW3	ND(50)	ND(50)	ND(12500)
105477-10	MW4	ND(50)	ND(50)	ND(1250)
105477-11	MW5	ND(500)	ND(500)	ND(12500)
105477-12	MW6	ND(500)	ND(500)	ND(12500)

ND = Not detected at or above reporting limit.

*Reporting limit applies to all analytes.

QA/QC SUMMARY

RPD, %	8
RECOVERY, %	111

LABORATORY NUMBER: 105477-3
 CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
 PROJECT ID: 6-91-5165
 LOCATION: VORELCO
 SAMPLE ID: MW5-10'

DATE RECEIVED: 10/14/91
 DATE ANALYZED: 10/16,17/91
 DATE REPORTED: 10/21/91

PARAMETER	RESULT	UNITS	REPORTING LIMIT	METHOD
CADMIUM	ND	mg / Kg	0.25	EPA 6010
CHROMIUM	39.8	mg / Kg	0.50	EPA 6010
LEAD	7.5	mg / Kg	3.0	EPA 7420
NICKEL	60.0	mg / Kg	1.6	EPA 6010
ZINC	53.9	mg / Kg	1.0	EPA 6010

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

	RPD, %	Recovery, %
CADMIUM	2	96
CHROMIUM	<1	94
LEAD	3	81
NICKEL	<1	88
ZINC	1	92

LABORATORY NUMBER: 105477-9
 CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
 PROJECT ID: 6-91-5165
 LOCATION: VORELCO
 SAMPLE ID: MW3

DATE RECEIVED: 10/14/91
 DATE ANALYZED: 10/17/91
 DATE REPORTED: 10/21/91

PARAMETER	RESULT	UNITS	REPORTING LIMIT	METHOD
CADMIUM	ND	ug/L	5.0	EPA 6010
CHROMIUM	ND	ug/L	10.0	EPA 6010
LEAD	ND	ug/L	3.0	EPA 7421
NICKEL	ND	ug/L	32.0	EPA 6010
ZINC	52.6	ug/L	20.0	EPA 6010

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

	RPD, %	Recovery, %
CADMIUM	2	99
CHROMIUM	4	100
LEAD	5	99
NICKEL	4	96
ZINC	<1	98

105477

CHAIN OF CUSTODY RECORD

DATE 10/11/91 PAGE 1 OF 2

PROJECT NAME VORELCO
 ADDRESS BROADWAY VOLKSWAGEN
2740 BROADWAY, OAKLAND
 PROJECT NO. 6-91-5165
 SAMPLED BY [Signature] - BART MILLER
 LAB NAME CURTIS & TRAPIKINS



Environmental Science & Engineering, Inc.

4090 Nelson Avenue
 Suite J
 Concord, CA 94520

(415) 685-4053

Fax (415) 685-5123

SAMPLE #	DATE	TIME	LOCATION	ANALYSES TO BE PERFORMED							MATRIX	NUMBER OF CONTAINERS	REMARKS (CONTAINER, SIZE, ETC.)		
				TVM-8015	TEH-d 8015	BTEX	8240	6010/7900							
1	MW5-5'	10/10/91	9:44	VORELCO	X		X						SOIL	1	2-inch diameter brass rings
2	MW5-10'	10/10/91	13:07	"	X		X						"	1	"
3	MW5-10'	10/10/91	12:45	"	X		X		X				"	1	"
4	MW5-15'	10/10/91	12:55	"	X		X						"	1	"
5	MW6-5'	10/11/91	13:20	"	X		X						"	1	"
6	MW6-10'	10/11/91	13:35	"	X		X						"	1	"
7	MW6-15'	10/11/91	13:50	"	X		X						"	1	"
8	MW1	10/11/91	14:20	"	X	X	X	X					WATER	4	3x 40ml VOA, 1x 1 liter
9	MW3	10/11/91	17:15	"	X	X	X	X	X				"	5	" plus 1 plastic w MnO ₂
10	MW4	10/11/91	14:40	"	X	X	X	X					"	4	"
11	MW5	10/11/91	15:05	"	X	X	X	X					"	4	"
12	MW6	10/11/91	18:18	"	X	X	X	X					"	4	"

RELINQUISHED BY: (signature) 1. <u>[Signature]</u>	RECEIVED BY: (signature) <u>Susan Wickham</u>	date <u>10/11/91</u>	time <u>11:15</u>	REPORT RESULTS TO: <u>BART MILLER</u> <u>QUESTIONS TO</u> <u>Sue Wickham</u>	SPECIAL SHIPMENT REQUIREMENTS
2. <u>Susan S Wickham</u>	<u>Scott Kitta</u>	<u>10/11/91</u>	<u>1:00</u>		
3.					
4.					
5.					
INSTRUCTIONS TO LABORATORY (handling, analyses, storage, etc.): <u>Normal TA</u> <u>5-d TPH / BTEX</u> <u>10-d 8240/6010</u>				TOTAL NUMBER OF CONTAINERS	
				CHAIN OF CUSTODY SEALS	
				REC'D GOOD CONDTN/COLD	
				CONFORMS TO RECORD	

* per Sue Wickham - Metals = Cd, Cr, Pb, Ni, Zn
 D - not to be performed unless analysis is requested.

