500 12th Street
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Woodward-Clyde Consultants

January 11, 1991

Mr. Dennis Byrne
Alameda County Department of Environmental Health
Division of Hazardous Materials
80 Swan Way, Room 200
Oakland, California 94621

Subject: Proposed Hydrocarbon Remediation Program
9th and Jefferson Streets
Oakland, California 94607

Dear Mr. Byrne:

This letter transmits a leak report form and related technical reports recently completed by Woodward-Clyde Consultants (WCC) for a site located at 9th and Jefferson Streets in downtown Oakland. The letter also provides a proposed program to remediate gasoline in soil in groundwater and a schedule for implementation of the recommended remedial activities.

BACKGROUND

Soil and groundwater sampling and chemical analyses completed by WCC on behalf of Mr. Douglas N. Salter indicated that petroleum hydrocarbons as gasoline occurred in soil and groundwater beneath and adjacent to portions of a parcel owned by Mr. Salter at the corner of 9th and Jefferson Streets in Oakland. The parcel consists of a level, paved surface parking lot, as shown in Figure 1 in the January 11, 1991 WCC letter report included in the enclosures to this letter. Historical research performed by Mr. Salter and WCC indicates the site at one time was used as an automotive service station and contained four 550-gallon underground storage tanks. The service station was demolished in 1953, and the site paved for use as a parking lot. Mr. Salter acquired the property in 1978, and has used the property exclusively for parking.

RECENT INVESTIGATIONS

WCC has recently completed a soil and groundwater investigation of the parcel. This work is described in the June 5, 1990 and February 1, 1991 WCC reports included with the enclosures to this letter. The results of these investigations may be summarized as follows:

1) Gasoline occurs in soil at concentrations ranging from a few parts-per-million (ppm) to at least 9300 ppm in the northeast corner of the property and beneath the adjacent portions of 9th Street and Jefferson Street. The gasoline occurs in a layer of soil approximately 4 feet thick between the depths of 20 to 24 feet below ground surface.

2) Gasoline occurs in groundwater at concentrations up to at least 26 ppm in a monitoring well installed in the northeast corner of the property. BTEX components have been identified at concentrations of up to 7.5 ppm in the groundwater. Presently, the groundwater level is several feet below the zone of maximum soil contamination.

3) Because no tanks were encountered by the 29 soil borings drilled on and adjacent to the property, it is believed that the tanks were removed from the site during the initial demolition in 1953, or perhaps at a later time when the sidewalks adjacent to the site were replaced.

4) WCC recommended vapor extraction as the most feasible method of reducing the concentrations of gasoline in the soil. WCC also recommended periodic monitoring of the groundwater using the existing monitoring wells while the vapor extraction system is operated.

PROPOSED REMEDIAL PROGRAM

Mr. Salter proposes to implement a source control program as soon as is practical in 1991. This would be done by designing and installing an active vapor extraction system at the site. The system would be designed, built and operated in accordance with the requirements of the Bay Area Air Quality Management District (BAAQMD). We believe this system will cause a substantial reduction in the concentrations of gasoline in the soil, and may reduce concentrations of petroleum hydrocarbons in the shallow groundwater as well.

SCHEDULE

We propose the following schedule of remediation activities:

1) Perform vapor extraction pilot test	February 25-28, 1991
2) Design vapor extraction system	Feb.-March 1991
3) Apply for BAAQMD discharge permit	March 22, 1991
4) BAAQMD approval (assumed)	April 30, 1991
5) Install vapor extraction system	June, 1991
6) Begin vapor extraction	July 1, 1991
7) Perform groundwater monitoring (quarterly)	February, May, August, November, 1991

Quarterly progress reports would be submitted to you documenting progress with the vapor extraction system and the results of the quarterly monitoring of groundwater. Alameda

County would be informed immediately in the event that unavoidable delays occur (such as a delay in receiving BAAQMD approval to operate the vapor extraction system).

I will call you in a few days to discuss this proposed remdiation program. In the meantime, please feel free to call if you have any questions.

Yours truly,
WOODWARD-CLYDE CONSULTANTS

George A. Ford
Associate

Attachments: 1) Leak report form

Enclosures: 1) June 5, 1990 letter report

2) February 1, 1991 letter report

Woodward-Clyde Consultants

June 90

HYDROCARBON INVESTIGATION
9TH AND JEFFERSON STREETS
OAKLAND, CALIFORNIA

Prepared for

Crosby, Heafey, Roach & May
1999 Harrison Street
Oakland, California 94612

JUNE 1990

Prepared by

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500 12th Street, Suite 100
Oakland, CA 94607-4014

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Suite 100
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Woodward-Clyde Consultants

June 5, 1990

Project No.: 8910084A

Mr. Norman Tuttle II
Crosby, Heafey, Roach & May
1999 Harrison Street
Oakland, California 94612

Subject: Hydrocarbon Investigation
9th and Jefferson Streets
Oakland, California

Dear Mr. Tuttle:

We are pleased to transmit our interim report for the above project. This report describes the initial phases of a continuing investigation. A second report describing the results of recent, off-site exploration is now being prepared and will be sent shortly. Please feel free to call me if you have any questions.

Yours very truly,

WOODWARD-CLYDE CONSULTANTS

George A. Ford

George A. Ford
Senior Project Geologist

8910084RPT/COT

HYDROCARBON INVESTIGATION
9TH AND JEFFERSON STREETS
OAKLAND, CALIFORNIA

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HYDROCARBON INVESTIGATION
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INTRODUCTION

This report presents the results of a petroleum hydrocarbon assessment of the parcel located on the west side of Jefferson Street between 9th and 10th Streets in Oakland, California. Woodward-Clyde Consultants (WCC) has performed this assessment in accordance with our proposal dated July 14, 1989. Work previously completed for this project has included:

1) Compilation and review of information on historical uses of the site, review of published regulatory listings of fuel leaks and other releases of hazardous materials in the area, and development of a sampling program.

2) Installation of ~~five~~ 4, 30-foot-deep soil borings and ~~one~~ 3 monitoring well. MW5

3) Laboratory analysis for petroleum hydrocarbons and organic solvents in soil and groundwater samples.

These investigations indicate the following: where were USTs?

1) Historical maps and aerial photographs indicate that gasoline and oil were dispensed on the site as well as from a parcel located immediately south of the site. The gas station on the site was demolished over 30 years ago.

2) TPH as gasoline was identified at a concentration of 220 ppm in a composite soil sample from soil boring 4, as shown on Figure 1.

3) In the groundwater sample from monitoring well MW-5, TPH as gasoline was identified at a concentration of 24 ppm, benzene at 7.5 to 8.1 ppm, toluene at 0.22 ppm, ethylbenzene at 0.89 to 0.99 ppm, and xylenes at 0.46 to 0.73 ppm. No floating product was observed in the groundwater samples.

Based on these results, WCC recommended the installation of additional soil borings and monitoring wells and analysis of additional soil and groundwater samples to more fully characterize the vertical and lateral extent and concentration of gasoline in the soil and groundwater. This additional work is discussed in this report, along with a recommended soil and groundwater remediation plan.

SOIL AND GROUNDWATER SAMPLING

Soil borings were drilled at 11 locations on the site on August 4 and 7, 1989, using a 6-inch outside-diameter solid-stem auger. Two monitoring wells were installed on August 7, 1989, using an 8-inch outside-diameter hollow-stem auger. Locations of soil borings and monitoring wells, including the locations of previous WCC borings and wells, are shown on Figure 1. The locations of soil borings were selected to focus on the area of soil containing TPH as gasoline identified in the initial phase of investigation. Monitoring wells were located to evaluate the groundwater flow direction and provide information on the extent of groundwater contamination.

Soil samples for chemical analysis were obtained at selected depths within each boring using a 2-inch inside-diameter drive sampler. Samples were obtained at 5-foot intervals in borings where a gasoline odor was detected, or where organic vapors were detected by a headspace test. The headspace test involves placing soil into a plastic "zip-lock" bag and analyzing vapors by inserting a photo-ionization probe into the bag. Logs

of the borings showing the depth of soil samples and results of the headspace analyses are included in Appendix A. The soil samples were retained in brass sample liners capped with Teflon sheeting and plastic end caps. The soil sampler was cleaned between each sample and between borings by washing in an Alconox detergent and tap water solution followed by a tap water rinse. Soil samples were immediately placed in ice chests for transport to Sequoia Analytical Laboratories in Redwood City, California, under chain-of-custody control. Following drilling, the borings were backfilled to the ground surface using a cement-bentonite grout, in accordance with Alameda County - Zone 7 requirements. Excess soil cuttings were placed in drums for storage on-site, and later disposal.

Two additional monitoring wells were installed on the site. MW-19 was placed at the northeast corner of the site near the intersection of Jefferson and 10th Streets. MW-18 was placed near the southern extent of the area where a gasoline odor was detected in soil samples (Figure 1). No wells were placed in the sidewalk because overhead wires obstructed access for the drill rig. The wells were constructed using a 2-inch-diameter well casing and machine-slotted, 0.020-inch aperture well screen. The screened interval extends from approximately 24 feet to 31 feet below ground surface. The screened and sand-packed interval of the wells is sealed from the surface by a 2-foot-thick bentonite seal at a depth of approximately 21 feet and cement-bentonite grout extending to the ground surface. The well collar includes a locking cap located beneath a flush-mounted steel hole cover. A schematic drawing of the well construction is shown on the boring logs for the respective wells in Appendix A.

Groundwater levels were recorded in each boring at the time of drilling (see logs in Appendix A). The static water level in all monitoring wells was also measured on August 14, 1989 (Appendix A), prior to purging and groundwater sampling. Groundwater occurred at about 25 feet below ground surface, near elevation 8 feet, based on the City of Oakland Datum (C.O.O.D.). The measured water levels indicate a gradient towards the west

as shown on Figure 1. The two new wells were developed and purged by pumping with a suction pump until the discharged water became clear and the temperature, pH, and specific conductance measurements stabilized. No hydrocarbon sheen or floating product was noted on the groundwater. Discharged water was placed in drums and stored on site for later disposal. Each of three groundwater samples was obtained with a Teflon bailer and immediately placed in three 40 ml sample bottles. The bottles were placed in an ice chest and transported to Sequoia Analytical Laboratories under chain-of-custody control. Copies of the chain-of-custody forms and analytical results are shown in Appendix B.

LABORATORY TESTING

Discrete soil samples from soil borings in which a gasoline odor was detected and groundwater samples from all three monitoring wells were analyzed for total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 5030/8015/8020. The groundwater sample from MW-5 was also analyzed for volatile organics by EPA Method 624. Analyses were limited to these compounds based on results of previous analyses in which lead was not found to occur above background levels and no volatile organics were identified at concentrations exceeding detection limits in the tested soil samples.

The results of the laboratory analysis of soil and groundwater samples are shown in Appendix B. The results of the soil analysis may be summarized as follows:

1) TPH as gasoline was detected in soil at concentrations of 1500 ppm at a depth of 25 feet in boring 17 and 1400 ppm at a depth of 26 feet in boring 14 near the northeast corner of the site. TPH at concentrations of 150 ppm and 370 ppm occurred in soil at a depth of 30 feet in borings 10 and 8, respectively, along the northern end of the eastern side of the site bordering Jefferson Street. A

composite soil sample including soil from depths of 5 to 25 feet from boring 4 in this same area showed 220 ppm TPH in the previous study. TPH as gasoline occurred in soil at concentrations of less than 5 ppm in borings MW-19, 12, and 15 on the perimeter of the area occupied by the above soil borings.

2) Benzene was detected in soil at concentrations of 0.32 ppm at a depth of 30 feet in boring 12 and 0.68 ppm at a depth of 30 feet in monitoring well 19. Toluene occurred in soil samples from five borings at concentrations of 0.20 to 6.0 ppm. Ethylbenzene and xylenes occurred in soil from six borings at 0.36 to 37 ppm and 0.53 to 99 ppm, respectively.

The results of the analysis of the groundwater samples from the monitoring wells may be summarized as follows:

1) TPH as gasoline was identified at a concentration of 19 ppm, 7.6 ppm, and 26 ppm in groundwater samples from monitoring wells MW-5, MW-18, and MW-19, respectively.

2) Benzene was identified at a concentration of 5.4 ppm in MW-5, 0.16 ppm in MW-18 and 4.3 ppm in MW-19. Toluene occurred at concentrations ranging from 0.021 to 0.69 ppm, ethylbenzene at 0.21 to 0.98 ppm, and xylenes at 0.014 to 2.6 ppm in groundwater samples from the three wells.

3) Other than the BTEX compounds noted above, no other volatile organic compounds were detected above detection limits in the groundwater sample from MW-5. Acetone, detected at a concentration of 2.1 ppm in a sample collected from MW-5 in the initial phase of the investigation, was not detected in a second sample taken from the same well.

Soil and groundwater analytical results are summarized in Table 1.

DISCUSSION

Pattern of Occurrence - The analytical data suggests that TPH as gasoline occurs in a layer of soil extending vertically from approximately 22 feet to at least 30 feet below ground surface and horizontally from the northeast corner of the site near the intersection of Jefferson and 10th Streets to approximately 120 feet south along Jefferson Street and 40 to 50 feet west of Jefferson Street. Concentrations rapidly decrease from 1500 ppm TPH at the corner of the site to a nondetectable concentration towards the west and south. Although it has not been confirmed by soil testing, it seems likely that TPH occurs in soil beneath the sidewalks and possibly beneath adjacent parts of Jefferson Street.

During the initial phase of investigation, it was assumed that the local groundwater flow direction was either to the north or south, based on work done at other sites in the area. However, recent measurements made in the three wells indicate that the groundwater flow direction (Figure 1) is west to northwest (Appendix A). The groundwater elevation falls about 0.19 feet westward from well MW-19 to well MW-5. This variation may be due to the proximity of the site to Interstate 980, located about two blocks to the west. The excavation for the below-grade interstate is believed to depress the local water table, causing a shift to a more westerly flow direction in the nearby surrounding area.

The pattern of occurrence of hydrocarbons in the soil and groundwater suggests that the source of contaminants is a leak from an underground tank located near or under the northeast corner of the site, or possibly offsite to the northeast. This is consistent with historical data, which show a small service station near the northeast corner of the site. No evidence of a tank, such as backfill, was found onsite. We believe that the soil borings would likely have encountered an existing tank on site considering

the relatively close spacing of the borings. There are several possible alternatives to an onsite tank including the following: 1) a tank may be located under the sidewalk near the corner of the site, 2) the leak may have occurred offsite, or 3) the leak may have occurred prior to removal of the tank from the site during or after demolition of the service station in circa 1958-1959.

The limited groundwater data collected in this study is not sufficient to evaluate the lateral or vertical extent of the plume of petroleum contamination in the groundwater. Because no free product (liquid-phase gasoline) was found during sampling of the three monitoring wells, it is unlikely that significant free product exists on the groundwater surface in the vicinity of those wells. The petroleum hydrocarbons appear to occur as dissolved constituents in the groundwater and in a layer of contaminated soil located in the zone of groundwater surface fluctuation.

Regulatory Considerations - Based on published guidelines and our recent work in downtown Oakland, we expect that the Alameda County Department of Environmental Health, Hazardous Materials Division, and the San Francisco Bay Regional Water Quality Control Board (RWQCB) will require: 1) remediation of soil TPH concentrations exceeding 1000 ppm and 2) groundwater remediation to reduce BTEX concentrations from approximately 10 ppm (total) to concentrations of 0.5 ppm or less. The specific soil and groundwater standards to be met would be established through consultation and negotiation with the County and RWQCB.

Soil Remediation - Preliminary calculations based on soil analytical data indicate the volume of soil on-site containing concentrations of TPH greater than 100 ppm is approximately 400 cubic yards. The volume of clean overlying soil which must be removed to expose or remove this soil is approximately 4000 cubic yards. Excavation would require a pit approximately 25 to 30 feet deep encompassing about half of 10th and Jefferson Streets near the intersection. Utilities under the streets might

need to be temporarily rerouted in the remaining street during the operation. Closure of the street intersection may be required if significant contamination is found in soil beneath the streets. Additional fill material would be needed to replace soil hauled from the excavation. Repairs to the streets, sidewalks, utility lines and poles, and the parking lot would then be required. Based on our recent experience with similar projects, we estimate that such an excavation program would cost in the range of $300,000 to $400,000 and would take the existing parking lot out of service for at least four months.

A more cost-effective alternative to excavation of the soil would be installation of a vapor extraction system (VES). The VES functions by applying a vacuum to a well, which, in turn, extracts air and vapors from the soil pore spaces and also stimulates bacterial activity which may help reduce hydrocarbon concentrations in the soil. Hydrocarbons in the soil will continue to volatilize and be removed by the VES until little or no volatiles remain. Because volatiles are also the most soluble component of petroleum products, the potential for continuing groundwater contamination is reduced significantly. Prior to installation of the system, a vapor extraction test would be conducted using portable equipment to evaluate the effectiveness of the system at the site. If the test proves successful, a long-term system could then be installed.

The vapor extraction test and VES would require the installation of about two additional wells designed for this application. The VES components would consist of a blower (vacuum source), controls, water knockout, silencer, stack, emission control devices and various gauges which can all be located in a cage to be constructed at the northeast corner of the site. Once the system is in operation, samples of the effluent would be initially taken on a weekly basis to assess the recovery performance of the system. After the first month, the sampling would be reduced to once a month until concentrations in the effluent decrease to negligible levels requiring an estimated period of approximately six months

to one year. At this point, several soil borings would be advanced in the surrounding soil to confirm the effectiveness of the system. Water samples from the wells would be taken periodically to monitor possible changes in hydrocarbon concentrations in the groundwater.

Groundwater Remediation - Groundwater remediation will probably be required by regulatory agencies to reduce BTEX concentrations in groundwater to acceptable levels. The steps involved in groundwater cleanup include 1) estimating the limits of the plume of contamination, 2) designing and installing a groundwater extraction and treatment system, and 3) pumping and treating the groundwater until the cleanup standard (agreed upon with regulatory agencies) is substantially achieved.

Because there appears to be no detected free product on the water surface based on sampling of the three wells, a single-phase recovery system is judged to be adequate for extraction of groundwater. The system functions by lowering the water table in the immediate vicinity of the well, thus creating a local cone of depression. The groundwater and dissolved hydrocarbons within the area of influence will migrate toward the recovery well and be removed by the extraction well. The groundwater will be pumped first to a holding tank and then through a pair of activated carbon filters to remove the dissolved hydrocarbons before being discharged into the sanitary sewer system. The system will require an additional recovery well and will incorporate a series of controls and switches to regulate pumping rates and prevent tank overfilling, a water table pump, water tanks, treatment equipment, an air compressor, and associated wiring and hoses.

Prior to installation of the system, a pump test would be conducted in the newly installed recovery well and one or two existing wells to evaluate various physical parameters of the local hydrogeological regime. The data acquired from these tests would be used to estimate recovery system pumping rates, area of influence, and the rate of groundwater movement.

The latter will also provide some insight into the migration potential of the dissolved hydrocarbons and the distance that they may have migrated offsite.

The proposed groundwater treatment program will require a permit from EBMUD for discharging the treated water to the sanitary sewer system. The permit will probably stipulate that samples of the discharge water be taken periodically to ensure that BTEX-component effluent limitations are not exceeded. The frequency for long-term sampling is assumed to be once per month. Other operating costs would include a system check and well monitoring once a week. Water samples may also be taken and analyzed periodically to chart the decrease in hydrocarbon levels over time.

The effectiveness of the proposed methods, and therefore the associated costs, are based on several assumptions concerning ambient subsurface conditions at the site. Should these conditions vary significantly from those assumed, our remedial recommendations may change. These costs also assume that no significant problems are encountered during well or system installation and that sampling frequencies required by the agencies will not exceed those assumed in our cost estimates. These costs also do not include the disposal of contaminated cuttings or fluids that may be generated during well installation or other activities conducted during remediation.

CONCLUSIONS AND RECOMMENDATIONS

Based on soil and groundwater sampling and analysis performed for this study, we conclude:

1) TPH as gasoline occurs in concentrations greater than 1000 ppm in the northeast corner of the site and in concentrations greater than 100 ppm in a layer of soil approximately 25 feet below the surface, covering approximately 3000 ft^2, and averaging approximately 4 feet thick.

2) The pattern of occurrence of TPH in the soil and groundwater appears to be consistent with a leak from underground tank(s) formerly located near the northeast corner of the site.

3) We believe that some soil and groundwater remediation will be required by Alameda County and the RWQCB considering the relatively high concentrations of petroleum hydrocarbons in the soil and groundwater. The extent of effort required may only be established by negotiation with the ACHSA and/or RWQCB.

Based on these conclusions, WCC recommends 1) negotiation with regulatory agencies to established the level of cleanup required; and 2) off-site exploration to characterize the extent of hydrocarbons in soil adjacent to the site. Cleanup operations may be undertaken after we have received preliminary approval from the agencies regarding the proposed program.

In regards to soil remediation, vapor extraction appears to be a preferable alternative to soil excavation and removal since the costs are substantially lower and the relatively unobtrusive nature of the installation and operation of a VES. Both systems proposed for cleanup of the soil and groundwater may be installed and operated before, during or after the sale and development of the parcel.

WCC will assist you with regulatory agency contacts and negotiation and developing a work plan to undertake the various aspects of soil and groundwater remediation.

LIMITATIONS

This report was prepared in general accordance with the accepted standard of practice which exists in central California at the time the

investigation was performed. Judgments leading to conclusions and recommendations are generally made with an incomplete knowledge of the subsurface conditions present. More extensive studies including additional subsurface investigation can tend to reduce the inherent uncertainties associated with inferring subsurface conditions.

HYDROCARBON INVESTIGATION
9TH & JEFFERSON STREETS

Table 1a. ANALYTICAL RESULTS FOR SOIL[1]

Boring	Sample #	Date	TPH[2]	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Lead	Volatile Organics
1	1-1, 1-2, 1-3, 1-4	4-19-89	ND	ND	ND	ND	ND	3.1	ND
2	2-1, 2-2, 2-3, 2-4	4-19-89	ND	ND	ND	ND	ND	2.6	ND
3	3-1, 3-2, 3-3, 3-4	4-19-89	ND	ND	ND	ND	ND	2.9	ND
4	4-1, 4-2, 4-3, 4-4	4-19-89	220	<0.25	<0.5	<0.5	<0.5	2.5	ND
5	5-1, 5-2, 5-3, 5-4	4-19-89	ND	ND	ND	ND	ND	2.2	ND
6	6-1, 6-2, 6-3	4-19-89	ND	ND	ND	ND	ND	2.7	ND
8	8-3	8-4-89	370	ND	1.1	6.5	12		
10	10-2	8-4-89	150	ND	0.20	1.9	6.4		
	10-3	8-4-89	150	ND	0.40	2.8	5.4		
12	12-3	8-4-89	3.0	0.32	ND	ND	ND		
14	14-1	8-4-89	ND	ND	ND	ND	ND		
	14-2	8-4-89	1400	ND	5.0	37	64		
15	15-2	8-7-89	2.0	ND	ND	ND	ND		
17	17-1	8-4-89	ND	ND	ND	ND	ND		
	17-2	8-4-89	1500	ND	6.0	32	99		
MW19	MW19-1	8-7-89	4.4	0.68	ND	0.36	0.53		
Detection Limits		1.0	0.05	0.1	0.1	0.1			

[1] All results reported as parts per million (ppm)
[2] Low/medium boiling point hydrocarbons - Total Petroleum Hydrocarbons (TPH)

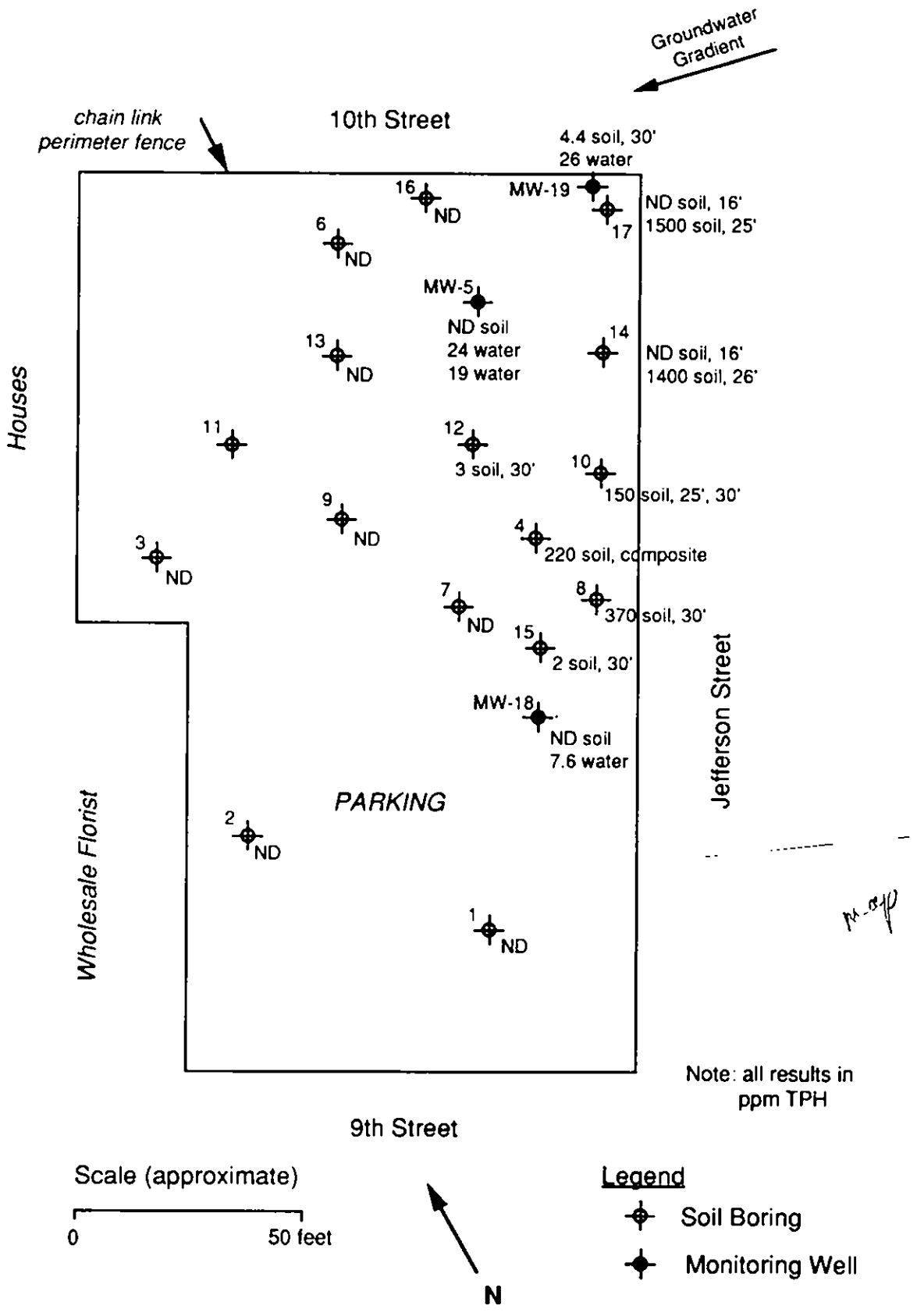
HYDROCARBON INVESTIGATION
9TH & JEFFERSON STREETS

Table 1b. ANALYTICAL RESULTS FOR WATER[1]

Well	Date	TPH[2]	Benzene	Toluene	Ethyl Benzene	Xylene	Volatile Organics[3]
MW-5	4-24-89	24.0	7.5	0.22	0.99	0.73	acetone-2.1
MW-5	8-14-89	19.0	5.4	0.21	0.77	0.44	ND
MW-18	8-14-89	7.6	0.16	0.021	0.21	0.014	
MW-19	8-14-89	26.0	4.3	0.69	0.98	2.6	
Detection Limits	0.030	0.0003	0.0003	0.0003	0.0003		

1 All results reported as parts per million (ppm)
2 Low/medium boiling point hydrocarbons - Total Petroleum Hydrocarbons (TPH)
3 Other than benzene, toluene, ethyl benzene, and xylene

data



Project No. 8910084A	9th and Jefferson EA	9th and Jefferson Site Map	Figure 1
Woodward-Clyde Consultants			

APPENDIX A

SOIL BORING LOGS AND
MONITORING WELL INSTALLATION DIAGRAM

Woodward-Clyde Consultants

PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 1		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Don	DATE STARTED / DATE FINISHED 4-20-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 30.5 feet	SAMPLER Modified Ca.
DRILLING METHOD 8" Hollow Stem Auger	DRILL BIT	NO. OF SAMPLES DIST. 6	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 25 feet ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASPHALT CONCRETE PAVEMENT - FILL			
			SILTY SAND (SM)			
			very dark brown, medium dense, dry, fine grain			
		8	becomes reddish brown			
5	1	13				
		21	HNU = 0 ppm			
		17				
10	2	28	becomes mottled reddish-brown and brown, moist, dense			
		28	HNU = 0 ppm			
		9	becomes medium dense, less silt			
15	3	16				
		18	HNU = 0 ppm			
		16				
		23	CLAYEY SAND (SC) HNU = 0.5 ppm			
20	4	37	mottled reddish-brown and gray, some silt, dense, moist			
			decreasing clay			
		16	▼ ATD			
25	5	31				
		40	HNU = 0.5 ppm			
		21				
		32				
30	6	43	HNU = 1 ppm			
			Bottom of Boring - 30.5 feet			
35			Backfilled borehole with sand / cement grout, 4-21-89			

Woodward-Clyde Consultants

PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 2		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Don	DATE STARTED / DATE FINISHED 4-20-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 30 feet	SAMPLER Modified Ca.
DRILLING METHOD 8" Hollow Stem Auger	DRILL BIT	NO. OF SAMPLES DIST. 4	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 25 feet ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASAPHALT CONCRETE PAVEMENT + FILL			
			SILTY SAND (SM) very dark brown, medium dense, dry, fine grain			
		2				
		7	becomes reddish-brown, less silt			
5	1	14	HNU = 0 ppm			
		16				
		28	becomes light brown, moist, dense, some clay			
10	2	31	HNU = 0 ppm			
		6	becomes damp, medium dense			
		7				
15	3	13	HNU = 0 ppm			
			CLAYEY SAND (SC) mottled reddish-brown and light brown, some silt, dense, moist			
		14				
		23				
20	4	33	HNU = 0 ppm			
			decreasing clay			
		16				
		19	▼ ATD			
25	5	23	HNU = 0 ppm			
		21	becomes very dense			
30	6	50/5"	HNU = 0 ppm			
			Bottom of Boring - 30 feet			
			Backfilled borehole with sand / cement grout, 4-21-89			
35						

Woodward-Clyde Consultants

PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 3		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Scott / Bob	DATE STARTED / DATE FINISHED 4-19-89	
DRILLING EQUIPMENT Mobile B-61		COMPLETION DEPTH 30.5 feet	SAMPLER Modified Ca.
DRILLING METHOD 8" Hollow Stem Auger	DRILL BIT	NO. OF SAMPLES DIST. 6	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 25 feet ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			FILL			
			SILTY SAND (SM) very dark brown, dense, dry, fine grain			
		11	becomes reddish brown			
5	1	18 31	HNU = 1 ppm			
			becomes mottled reddish-brown and gray, moist			
		17				
10	2	21 30	HNU = 0.5 ppm			
		6	becomes damp, loose			
		6				
15	3	7	HNU = 1 ppm			
			CLAYEY SAND (SC) light brown, some silt, dense, moist			
		20				
20	4	25 34	HNU = 1 ppm			
			decreasing clay			
		12				
25	5	17 22	▼ ATD HNU = 0 ppm			
			used split spoon to recover samples			
		16	becomes dark brown			
30	6	25 34	HNU = 0 ppm			
			Bottom of Boring - 30.5 feet			
35			Backfilled borehole with sand / cement grout, 4-21-89			

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 4			ELEVATION AND DATUM		
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Don		DATE STARTED / DATE FINISHED 4-20-89		
DRILLING EQUIPMENT Mobile B-53			COMPLETION DEPTH 30.5 feet	SAMPLER Modified Ca.	
DRILLING METHOD 8" Hollow Stem Auger	DRILL BIT		NO. OF SAMPLES DIST. 6	UNDIST.	
LOGGED BY: W. Copeland			WATER LEVEL FIRST 25 feet ▼	COMPL.	24 HRS.
CHECKED BY: G. Ford					

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASAPHALT CONCRETE PAVEMENT + FILL			
			SILTY SAND (SM) very dark brown, medium dense, dry, fine grain			
		7	becomes reddish brown			
5	1	13 18	HNU = 2 ppm			
			becomes mottled blue-green and brown, dense, moist, gasoline odor detected			
		23				
10	2	31 38	HNU = 5 ppm			
			HNU = 11 ppm			
		7	becomes medium dense			
15	3	12 19				
			CLAYEY SAND (SC) mottled reddish-brown and light brown, some silt, dense, moist			
		17				
20	4	23 31	HNU = 0 ppm			
			decreasing clay			
		16	▼ ATD			
25	5	24 33	HNU = 2 ppm			
		16				
30	6	24 38	HNU = 1 ppm			
			Bottom of Boring - 30.5 feet			
35			Backfilled borehole with sand / cement grout, 4-21-89			

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - MW-5		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Don	DATE STARTED / DATE FINISHED 4-21-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 30.5 feet	SAMPLER Modified Ca.
DRILLING METHOD 8" Hollow Stem Auger	DRILL BIT	NO. OF SAMPLES DIST. 6	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 25 feet ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	Monitoring Well Schematic
			ASAPHALT CONCRETE PAVEMENT + FILL	cap
			SILTY SAND (SM) very dark brown, medium dense, dry, fine grain	
		9	becomes reddish brown	
5	1	17 19	HNU = 0 ppm	
			becomes dense, moist, some clay	
		18		
10	2	25 31	HNU = 0 ppm	
			becomes loose	
		7		
15	3	8 8	HNU = 0 ppm	
			CLAYEY SAND (SC) mottled reddish-brown and light brown, some silt, dense, moist	
		13		
20	4	22 28	becomes blue-green, little clay, gasoline odor detected HNU = 1 ppm	Bentonite
			very strong gasoline odor detected	
		13	▼ ATD	
25	5	28 30	HNU = 60 ppm	#2 1/2 Sand
		20		
30	6	34 43	HNU = 100 ppm	
			Bottom of Boring - 30.5 feet	
35			Installed monitoring well as shown 4-21-89	

Concrete

Blank

Screened

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 6		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Scott / Bob	DATE STARTED / DATE FINISHED 4-19-89	
DRILLING EQUIPMENT Mobile B-61		COMPLETION DEPTH 30.5 feet	SAMPLER Modified Ca.
DRILLING METHOD 8" Hollow Stem Auger	DRILL BIT	NO. OF SAMPLES DIST. 4	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 25 feet ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASAPHALT CONCRETE PAVEMENT			
			FILL			
		3	SILTY SAND (SM)			
5	1	11 30	very dark brown, medium dense, dry, fine grain			
			HNU = 0 ppm			
			becomes medium brown			
		20				
10	2	22 32	becomes light brown, moist, some clay, dense			
			HNU = 0 ppm			
		10	becomes medium dense			
15	3	14 18	HNU = 0.5 ppm			
			CLAYEY SAND (SC)			
		26	light brown, some silt, dense, moist			
20	4	30 35	no recovery			
			HNU = 0.5 ppm			
			becomes very dense, decreasing clay			
		26				
25	5	30 50/3"	▼ ATD			
			no recovery			
			HNU = 1 ppm			
		16				
30	6	42 50/1"	used split spoon to recover sample			
			HNU = 5 ppm			
			Bottom of Boring - 30.5 feet			
35			Backfilled borehole with sand / cement grout, 4-21-89			

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 7		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Rich	DATE STARTED / DATE FINISHED 8-7-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 31 feet	SAMPLER Modified Ca.
DRILLING METHOD 6" Solid Auger	DRILL BIT	NO. OF SAMPLES DIST. 3	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 26 feet ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASAPHALT CONCRETE PAVEMENT - FILL			
			SILTY SAND (SM) dark brown, dry, fine grain			
			becomes medium brown, damp			
5			no odor			
10			little clay			
			increasing clay no odor			
			some clay			
15		8 8	medium dense HNU = 0 ppm			
	1	14				
			CLAYEY SAND (SC) brown, some silt, damp			
20			decreasing clay			
			SILTY SAND (SM) brown, some clay, dense, moist HNU = 0.5 ppm			
25		13 21	▼ ATD			
	2	40	becomes grayish brown, wet slight gasoline odor HNU = 12.6 ppm			
30		21				
	3	28				
			Bottom of Hole - 31 feet			
35			Backfilled borehole with sand / cement grout, 4-21-89			

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 8		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Rich	DATE STARTED / DATE FINISHED 8-4-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 31 feet	SAMPLER Modified Ca.
DRILLING METHOD 6" Solid Auger	DRILL BIT	NO. OF SAMPLES DIST. 3	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 26 feet ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASAPHALT CONCRETE PAVEMENT + FILL			
			- Hit concrete, moved 10' north			
			SILTY SAND (SM) very dark brown, dry, fine grain			
5			no odor becomes light brown, damp			
10			no odor			
15	1	7 12 15	mottled reddish brown and gray, medium dense, some clay OVM = 0.3 ppm			
			CLAYEY SAND (SC) medium brown, some silt, moist			
20			decreasing clay			
25	2	18 30 38	SILTY SAND (SM) gray, moist, some clay, dense ▼ ATD becomes wet OVM = 0.9 ppm slight gasoline odor			
30	3	35 37	OVM = 339 ppm moderate gasoline odor			
			Bottom of Boring - 31 feet			
35			Backfilled borehole with sand / cement grout, 8-9-89			

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 9		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Rich	DATE STARTED / DATE FINISHED 8-7-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 25 feet	SAMPLER Modified Ca.
DRILLING METHOD 6" Solid Auger	DRILL BIT	NO. OF SAMPLES DIST. 1	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASAPHALT CONCRETE PAVEMENT + FILL			
			SILTY SAND (SM) dark brown, dry, fine grain			
5			becomes medium brown — no odor			
10			increasing clay — no odor			
			becomes dark brown — no odor			
15		7 10				
	1	12	mottled reddish brown and gray, some clay, medium dense — OVM = 0 ppm			
			CLAYEY SAND (SC) brown, moist, fine grain			
20			decreasing clay — no odor			
			SILTY SAND (SM) brown, fine grain, moist			
25			Bottom of Boring - 25 feet			
30						
35			Backfilled borehole with sand / cement grout, 8-9-89			

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 10		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Rich	DATE STARTED / DATE FINISHED 8-4-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 31 feet	SAMPLER Modified Ca.
DRILLING METHOD 6" Solid Auger	DRILL BIT	NO. OF SAMPLES DIST. 3	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 26 feet ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASPHALT CONCRETE PAVEMENT - FILL			
			SILTY SAND (SM) dark brown, dry, fine grain			
5			becomes medium brown — no odor			
10			little clay — no odor			
			some clay — no odor			
15	1	7 9 15	mottled reddish brown and gray, medium dense — OVM = 2.6 ppm			
			CLAYEY SAND (SC) brown, some silt, damp			
20			OVM = 49 ppm slight gasoline odor decreasing clay			
25	2	15 26	SILTY SAND (SM) gray, moist, little clay, dense — OVM = 456 ppm ▼ ATD becomes wet — OVM = 490 ppm strong gasoline odor			
30	3	24 50/5"	OVM = 392 ppm			
			Bottom of Boring - 31 feet			
35			Backfilled borehole with sand / cement grout, 8-9-89			

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 11			ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Rich		DATE STARTED / DATE FINISHED 8-4-89	
DRILLING EQUIPMENT Mobile B-53			COMPLETION DEPTH 0.5 feet	SAMPLER Modified Ca.
DRILLING METHOD 6" Solid Auger	DRILL BIT		NO. OF SAMPLES / DIST. 0	UNDIST.
LOGGED BY: W. Copeland			WATER LEVEL / FIRST ▼	COMPL. / 24 HRS.
CHECKED BY: G. Ford				

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASAPHALT CONCRETE PAVEMENT + FILL			
			Encountered concrete at 6", moved 10' south, hit concrete again Abandoned boring			
5						
10						
15						
20						
25						
30						
35						

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 12		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Rich	DATE STARTED / DATE FINISHED 8-4-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 31 feet	SAMPLER Modified Ca.
DRILLING METHOD 6" Solid Auger	DRILL BIT	NO. OF SAMPLES DIST. 3	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 26 feet ▼	COMPL. / 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASAPHALT CONCRETE PAVEMENT • FILL			
			SILTY SAND (SM) dark brown, dry, fine grain			
5			becomes medium brown — no odor			
10			little clay — no odor			
			some clay — no odor			
15		6				
	1	9 14	mottled reddish brown, brown, and gray, medium dense — OVM = 9 ppm			
			little clay			
20						
			becomes gray, dense, wet			
25		24				
	2	34	▼ ATD — OVM = 10 ppm			
			OVM = 200 ppm strong gasoline odor			
30		21				
	3	32	OVM = 101 ppm			
			Bottom of Boring - 31 feet			
35			Backfilled borehole with sand / cement grout, 8-9-89			

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 13		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Rich	DATE STARTED / DATE FINISHED 8-4-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 26.5 feet	SAMPLER Modified Ca.
DRILLING METHOD 6" Solid Auger	DRILL BIT	NO. OF SAMPLES DIST. 2	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 25.4 feet ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASAPHALT CONCRETE PAVEMENT + FILL			
			SILTY SAND (SM) dark brown, dry, fine grain			
5			no odor			
			becomes reddish brown			
10			no odor			
			increasing clay			
			no odor			
15		8 12				
	1	17	mottled reddish brown and gray, some clay, medium dense			
			OVM = 0 ppm			
			CLAYEY SAND (SC) brown, some silt, damp			
20			no odor			
			decreasing clay			
			SILTY SAND (SM) brown, some clay, moist			
25		18 22	▼ ATD			
	2	45	OVM = 0 ppm			
			Bottom of Boring - 26.5 feet			
30						
			Backfilled borehole with sand / cement grout, 8-9-89			
35						

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 14		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Rich	DATE STARTED / DATE FINISHED 8-4-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 26.5 feet	SAMPLER Modified Ca.
DRILLING METHOD 6" Solid Auger	DRILL BIT	NO. OF SAMPLES DIST. 2	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 25.4 feet ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASAPHALT CONCRETE PAVEMENT + FILL			
			SILTY SAND (SM) dark brown, dry, fine grain			
5			no odor			
			becomes reddish brown			
10			no odor			
			increasing clay			
			no odor			
15		7				
	1	9				
		13	mottled reddish brown and gray, some clay, medium dense			
			OVM = 24 ppm			
			CLAYEY SAND (SC) brown, some silt, damp			
20			strong gasoline odor			
			decreasing clay			
			SILTY SAND (SM) brown, some clay, moist			
25		15	▼ ATD			
	2	22				
		40	OVM = 252 ppm			
			Bottom of Boring - 26.5 feet			
30						
			Backfilled borehole with sand / cement grout, 8-9-89			
35						

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 15		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Rich	DATE STARTED / DATE FINISHED 8-7-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 31 feet	SAMPLER Modified Ca.
DRILLING METHOD 6" Solid Auger	DRILL BIT	NO. OF SAMPLES DIST. 2	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 26.5 feet ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASAPHALT CONCRETE PAVEMENT + FILL			
			SILTY SAND (SM) very dark brown, dry, fine grain			
5			becomes medium brown — no odor			
10			increasing clay — no odor			
			some clay — no odor			
15			OVM = 0 ppm			
			CLAYEY SAND (SC) brown, moist			
20			decreasing clay			
			SILTY SAND (SM) brown, moist, fine grain			
25	1	15 28	▼ ATD becomes gray — OVM = 0 ppm; slight gasoline odor			
30	2	25 50/5"	OVM = 31 ppm			
			Bottom of Boring - 31 feet			
35			Backfilled borehole with sand / cement grout, 8-9-89			

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 16		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Rich	DATE STARTED / DATE FINISHED 8-4-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 26 feet	SAMPLER Modified Ca.
DRILLING METHOD 6" Solid Auger	DRILL BIT	NO. OF SAMPLES DIST. 2	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASAPHALT CONCRETE PAVEMENT + FILL			
			SILTY SAND (SM) dark brown, dry, fine grain			
5			becomes medium brown no odor			
10			no odor			
			no odor			
15		9 9				
	1	16	mottled reddish brown and gray, little clay, medium dense OVM = 0 ppm			
20			no odor			
25		21				
	2	35	OVM = 4 ppm			
			Bottom of Boring - 26 feet			
30						
35			Backfilled borehole with sand / cement grout, 8-9-89			

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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - 17		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Rich	DATE STARTED / DATE FINISHED 8-7-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 30 feet	SAMPLER Modified Ca.
DRILLING METHOD 6" Solid Auger	DRILL BIT	NO. OF SAMPLES DIST. 2	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Moisture Content	Dry Density pcf
			ASAPHALT CONCRETE PAVEMENT + FILL			
			SILTY SAND (SM) dark brown, dry, fine grain			
			hit pipe, moved 4 feet west			
5			becomes medium brown — no odor			
10			becomes gray — very slight odor			
15	1	98 2 15	becomes medium dense — OVM = 29 ppm			
20			CLAYEY SAND (SC) mottled gray and brown, some silt, damp — moderate gasoline odor OVM = 34 ppm			
			decreasing clay			
25	2	12 33	SILTY SAND (SM) gray, moist, some clay OVM = 320 ppm			
			strong gasoline odor			
30			OVM = 455 ppm			
			Bottom of Boring - 30 feet			
35			Backfilled borehole with sand / cement grout, 8-9-89			

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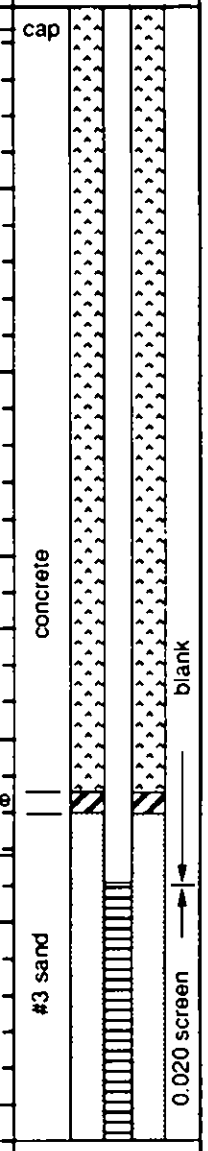
PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - MW-18		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Rich	DATE STARTED / DATE FINISHED 8-7-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 31 feet	SAMPLER Modified Ca.
DRILLING METHOD 6" Solid Auger	DRILL BIT	NO. OF SAMPLES DIST. 1	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 27 feet ▼	COMPL. / 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION
			ASAPHALT CONCRETE PAVEMENT + FILL
			SILTY SAND (SM) dark brown, dry, fine grain
			becomes medium brown
5			no odor
			increasing clay
10			no odor
			some clay
15			
			CLAYEY SAND (SC) brown, some silt, damp
20			no odor
			decreasing clay
			SILTY SAND (SM) brown, fine grain, moist
25			▼ ATD
			becomes wet
			slight gasoline odor
30	1	23 43	OVM = 9.5 ppm
			Bottom of Hole - 31 feet
35			Backfilled borehole with sand / cement grout, 4-21-89

Monitoring Well Schematic



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PROJECT NAME 9th & Jefferson EA NO. 8910084A

BORING NUMBER - MW-19		ELEVATION AND DATUM	
DRILLING AGENCY Ensco Exploration	DRILLER Tim / Rich	DATE STARTED / DATE FINISHED 8-7-89	
DRILLING EQUIPMENT Mobile B-53		COMPLETION DEPTH 31 feet	SAMPLER Modified Ca.
DRILLING METHOD 6" Solid Auger	DRILL BIT	NO. OF SAMPLES DIST. 1	UNDIST.
LOGGED BY: W. Copeland		WATER LEVEL FIRST 28 feet ▼	COMPL. 24 HRS.
CHECKED BY: G. Ford			

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	Monitoring Well Schematic
			ASPHALT CONCRETE PAVEMENT - FILL	cap
			SILTY SAND (SM) very dark brown, dry, fine grain	
			becomes medium brown	
5			no odor	
			increasing clay	
10			no odor	
			some clay	
15			less clay	concrete
			bentonite	
20			becomes gray, little clay	blank
			slight gasoline odor	
25			strong gasoline odor OVM = 663 ppm	#3 sand
			▼ ATD becomes wet	0.020 screen
30	1	28 34	OVM = 118 ppm	
			Bottom of Hole - 31 feet	
35			Backfilled borehole with sand / cement grout, 4-21-89	

APPENDIX B

CHEMICAL ANALYTICAL RESULTS
CHAIN-OF-CUSTODY FORMS
WATER SAMPLING RECORDS

Woodward-Clyde Consultants

500 12th Street, Suite 100, Oakland, CA 94607-4041
(415) 893-3600

Chain of Custody Record

PROJECT NO. 8910084A - PH52

SAMPLERS: (Signature) Wm Blaylock

DATE	TIME	SAMPLE NUMBER	General Mineral	Priority Pollutant Metals	EPA Method 624	EPA Method 625	EPA Method 608	TOTAL LEAD	TPH	BETX	8240		Number of Containers	REMARKS (Sample preservation, handling procedures, etc.)
4-20-89		1-1 } COMPOSITE											1	
		1-2											1	
		1-3											1	
		1-4											1	
		1-5 - HOLD											1	
		1-6 - HOLD											1	
		2-1 } COMPOSITE											1	
		2-2											1	
		2-3											1	
		2-4											1	
		2-5 - HOLD											1	
		2-6 - HOLD											1	
4-19		3-1 } COMPOSITE											1	
		3-2											1	
		3-3											1	
		3-4											1	
		3-5 - HOLD											1	←*
		3-6 - HOLD											1	←*
4-20		4-1 } COMPOSITE											1	
		4-2											1	
		4-3											1	
		4-4											1	
		4-5 - HOLD											1	
		4-6 - HOLD											1	

ANALYSES

* used split spoon sampler, sample tube packed by hand

TOTAL NUMBER OF CONTAINERS: 24

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)

METHOD OF SHIPMENT:	SHIPPED BY: (Signature)	COURIER: (Signature)	RECEIVED FOR LAB BY: (Signature)	DATE/TIME

Woodward-Clyde Consultants

500 12th Street, Suite 100, Oakland, CA 94607-4041
(415) 893-3600

Chain of Custody Record

PROJECT NO. 8910084A - PHS2

SAMPLERS: (Signature) Wm Bleyfeld

DATE	TIME	SAMPLE NUMBER	General Mineral	Priority Pollutant Metals	EPA Method 624	EPA Method 625	EPA Method 608	TOTAL LEAD	TPH	BETX	8240		Number of Containers	REMARKS (Sample preservation, handling procedures, etc.)
4-21		5-1 } COMPOSITE											1	
		5-2 } COMPOSITE											1	
		5-3 } COMPOSITE											1	
		5-4 } COMPOSITE											1	
		5-5 - HOLD											1	
4-19		5-6 - HOLD											1	
		6-1 } COMPOSITE											1	
		6-2 } COMPOSITE											1	
		6-3 } COMPOSITE											1	
		6-6 - HOLD											1	← *

* used split spoon sampler, sample tube packed by hand

TOTAL NUMBER OF CONTAINERS: 10

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)

METHOD OF SHIPMENT:	SHIPPED BY: (Signature)	COURIER: (Signature)	RECEIVED FOR LAB BY: (Signature)	DATE/TIME

Woodward-Clyde Consultants
500 12th Street, Suite 100, Oakland, CA 94607-4041
(415) 893-3600

Chain of Custody Record

PROJECT NO. 8910084A-PHS2

SAMPLERS: (Signature) [signature]

DATE	TIME	SAMPLE NUMBER	General Mineral	Priority Pollutant Metals	EPA Method 624	EPA Method 625	EPA Method 608	TPH	BETX					Number of Containers	REMARKS (Sample preservation, handling procedures, etc.)
4-24-89	4:30	MW5-1			X			X	X					2	
	4:35	MW5-2												2	← HOLD

Remarks: Call George Ford 874-3203 with questions

5-day turn-around on TPH/BTEX
Normal turnaround on 624

TOTAL NUMBER OF CONTAINERS: 4

RELINQUISHED BY : (Signature)	DATE/TIME	RECEIVED BY : (Signature)	RELINQUISHED BY : (Signature)	DATE/TIME	RECEIVED BY : (Signature)

METHOD OF SHIPMENT :	SHIPPED BY : (Signature)	COURIER : (Signature)	RECEIVED FOR LAB BY : (Signature)	DATE/TIME

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants
500 12th St., Suite 100
Oakland, CA 94607-4041
Attention: George Ford

Client Project ID: #8910084A-PHS2
Sample Descript: Soil Composite
Analysis for: Total Lead
First Sample #: 904-2648 A - D

Sampled: Apr 19-20, 1989
Received: Apr 25, 1989
Extracted: May 5, 1989
Analyzed: May 7, 1989
Reported: May 20, 1989

LABORATORY ANALYSIS FOR: Total Lead

Sample Number	Sample Description	Detection Limit mg/kg	Sample Result mg/kg
904-2648	1-1, 1-2, 1-3, 1-4	0.05	3.1
904-2649	2-1, 2-2, 2-3, 2-4	0.05	2.6
904-2650	3-1, 3-2, 3-3, 3-4	0.05	2.9
904-2651	4-1, 4-2, 4-3, 4-4,	0.05	2.5
904-2652	5-1, 5-2, 5-3, 5-4	0.05	2.2
904-2653	6-1, 6-2, 6-3	0.05	2.7

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

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

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(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants	Client Project ID:	#8910084A-PHS2	Sampled:	Apr 19-21, 1989
500 12th St., Suite 100	Matrix Descript:	Soil Composite	Received:	Apr 25, 1989
Oakland, CA 94607-4041	Analysis Method:	EPA 5030/8015/8020	Analyzed:	May 5, 1989
Attention: George Ford	First Sample #:	904-2648 A - D	Reported:	May 20, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
904-2648	1-1, 1-2, 1-3, 1-4	N.D.	N.D.	N.D.	N.D.	N.D.
904-2649	2-1, 2-2, 2-3, 2-4	N.D.	N.D.	N.D.	N.D.	N.D.
904-2650	3-1, 3-2, 3-3, 3-4	N.D.	N.D.	N.D.	N.D.	N.D.
904-2651	4-1, 4-2, 4-3, 4-4,	220	< 0.25	< 0.5	< 0.5	< 0.5
904-2652	5-1, 5-2, 5-3, 5-4	N.D.	N.D.	N.D.	N.D.	N.D.
904-2653	6-1, 6-2, 6-3	N.D.	N.D.	N.D.	N.D.	N.D.
Detection Limits:		**1.0**	**0.05**	**0.1**	**0.1**	**0.1**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

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Laboratory Director

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Woodward-Clyde Consultants
500 12th St., Suite 100
Oakland, CA 94607-4041
Attention: George Ford

Client Project ID: #8910084A-PHS2

QC Sample Group: 9042648 - 53

Reported: May 20, 1989

QUALITY CONTROL DATA REPORT

ANALYTE	Total Lead	Xylenes
Method:	EPA 7421	EPA 8020
Analyst:	K. Anderson	A. Miraftab
Reporting Units:	mg/L	ppm
Date Analyzed:	May 7, 1989	May 5, 1989
QC Sample #:	904-2649	9042468
Sample Conc.:	0.013	0.0
Spike Conc. Added:	0.05	15.0
Conc. Matrix Spike:	0.064	13.0
% Recovery:	102.0	87.0
Conc. Matrix Spike Dup.:	0.065	14.0
% Recovery:	104.0	93.0
% Deviation:	0.78	3.7

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(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants	Client Project ID:	#8910084A-PHS2	Sampled:	Apr 19-21, 1989
500 12th St., Suite 100	Sample Descript:	Soil Composite, 1-1 to 1-4	Received:	Apr 25, 1989
Oakland, CA 94607-4041	Analysis Method:	EPA 8240	Analyzed:	May 4, 1989
Attention: George Ford	Lab Number:	904-2648 A - D	Reported:	May 20, 1989

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500.0	N.D.
Benzene	100.0	N.D.
Bromodichloromethane	100.0	N.D.
Bromoform	100.0	N.D.
Bromomethane	100.0	N.D.
2-Butanone	500.0	N.D.
Carbon disulfide	100.0	N.D.
Carbon tetrachloride	100.0	N.D.
Chlorobenzene	100.0	N.D.
Chlorodibromomethane	100.0	N.D.
Chloroethane	100.0	N.D.
2-Chloroethyl vinyl ether	500.0	N.D.
Chloroform	100.0	N.D.
Chloromethane	100.0	N.D.
1,1-Dichloroethane	100.0	N.D.
1,2-Dichloroethane	100.0	N.D.
1,1-Dichloroethene	100.0	N.D.
Total 1,2-Dichloroethene	100.0	N.D.
1,2-Dichloropropane	100.0	N.D.
cis 1,3-Dichloropropene	100.0	N.D.
trans 1,3-Dichloropropene	100.0	N.D.
Ethylbenzene	100.0	N.D.
2-Hexanone	500.0	N.D.
Methylene chloride	100.0	N.D.
4-Methyl-2-pentanone	500.0	N.D.
Styrene	100.0	N.D.
1,1,2,2-Tetrachloroethane	100.0	N.D.
Tetrachloroethene	100.0	N.D.
Toluene	100.0	N.D.
1,1,1-Trichloroethane	100.0	N.D.
1,1,2-Trichloroethane	100.0	N.D.
Trichloroethene	100.0	N.D.
Trichlorofluoromethane	100.0	N.D.
Vinyl acetate	100.0	N.D.
Vinyl chloride	100.0	N.D.
Total Xylenes	100.0	N.D.

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

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Laboratory Director

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Woodward-Clyde Consultants	Client Project ID:	#8910084A-PHS2	Sampled:	Apr 19-21, 1989
500 12th St., Suite 100	Sample Descript:	Soil Composite, 2-1 to 2-4	Received:	Apr 25, 1989
Oakland, CA 94607-4041	Analysis Method:	EPA 8240	Analyzed:	May 4, 1989
Attention: George Ford	Lab Number:	904-2649 A - D	Reported:	May 20, 1989

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500.0	N.D.
Benzene	100.0	N.D.
Bromodichloromethane	100.0	N.D.
Bromoform	100.0	N.D.
Bromomethane	100.0	N.D.
2-Butanone	500.0	N.D.
Carbon disulfide	100.0	N.D.
Carbon tetrachloride	100.0	N.D.
Chlorobenzene	100.0	N.D.
Chlorodibromomethane	100.0	N.D.
Chloroethane	100.0	N.D.
2-Chloroethyl vinyl ether	500.0	N.D.
Chloroform	100.0	N.D.
Chloromethane	100.0	N.D.
1,1-Dichloroethane	100.0	N.D.
1,2-Dichloroethane	100.0	N.D.
1,1-Dichloroethene	100.0	N.D.
Total 1,2-Dichloroethene	100.0	N.D.
1,2-Dichloropropane	100.0	N.D.
cis 1,3-Dichloropropene	100.0	N.D.
trans 1,3-Dichloropropene	100.0	N.D.
Ethylbenzene	100.0	N.D.
2-Hexanone	500.0	N.D.
Methylene chloride	100.0	N.D.
4-Methyl-2-pentanone	500.0	N.D.
Styrene	100.0	N.D.
1,1,2,2-Tetrachloroethane	100.0	N.D.
Tetrachloroethene	100.0	N.D.
Toluene	100.0	N.D.
1,1,1-Trichloroethane	100.0	N.D.
1,1,2-Trichloroethane	100.0	N.D.
Trichloroethene	100.0	N.D.
Trichlorofluoromethane	100.0	N.D.
Vinyl acetate	100.0	N.D.
Vinyl chloride	100.0	N.D.
Total Xylenes	100.0	N.D.

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

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Laboratory Director

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(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants	Client Project ID:	#8910084A-PHS2	Sampled:	Apr 19-21, 1989
500 12th St., Suite 100	Sample Descript:	Soil Composite, 3-1 to 3-4	Received:	Apr 25, 1989
Oakland, CA 94607-4041	Analysis Method:	EPA 8240	Analyzed:	May 4, 1989
Attention: George Ford	Lab Number:	904-2650 A - D	Reported:	May 20, 1989

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500.0	N.D.
Benzene	100.0	N.D.
Bromodichloromethane	100.0	N.D.
Bromoform	100.0	N.D.
Bromomethane	100.0	N.D.
2-Butanone	500.0	N.D.
Carbon disulfide	100.0	N.D.
Carbon tetrachloride	100.0	N.D.
Chlorobenzene	100.0	N.D.
Chlorodibromomethane	100.0	N.D.
Chloroethane	100.0	N.D.
2-Chloroethyl vinyl ether	500.0	N.D.
Chloroform	100.0	N.D.
Chloromethane	100.0	N.D.
1,1-Dichloroethane	100.0	N.D.
1,2-Dichloroethane	100.0	N.D.
1,1-Dichloroethene	100.0	N.D.
Total 1,2-Dichloroethene	100.0	N.D.
1,2-Dichloropropane	100.0	N.D.
cis 1,3-Dichloropropene	100.0	N.D.
trans 1,3-Dichloropropene	100.0	N.D.
Ethylbenzene	100.0	N.D.
2-Hexanone	500.0	N.D.
Methylene chloride	100.0	N.D.
4-Methyl-2-pentanone	500.0	N.D.
Styrene	100.0	N.D.
1,1,2,2-Tetrachloroethane	100.0	N.D.
Tetrachloroethene	100.0	N.D.
Toluene	100.0	N.D.
1,1,1-Trichloroethane	100.0	N.D.
1,1,2-Trichloroethane	100.0	N.D.
Trichloroethene	100.0	N.D.
Trichlorofluoromethane	100.0	N.D.
Vinyl acetate	100.0	N.D.
Vinyl chloride	100.0	N.D.
Total Xylenes	100.0	N.D.

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

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Laboratory Director

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Woodward-Clyde Consultants
500 12th St., Suite 100
Oakland, CA 94607-4041
Attention: George Ford

Client Project ID: #8910084A-PHS2
Sample Descript: Soil Composite, 4-1 to 4-4
Analysis Method: EPA 8240
Lab Number: 904-2651 A - D

Sampled: Apr 19-21, 1989
Received: Apr 25, 1989
Analyzed: May 4, 1989
Reported: May 20, 1989

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500.0	N.D.
Benzene	100.0	N.D.
Bromodichloromethane	100.0	N.D.
Bromoform	100.0	N.D.
Bromomethane	100.0	N.D.
2-Butanone	500.0	N.D.
Carbon disulfide	100.0	N.D.
Carbon tetrachloride	100.0	N.D.
Chlorobenzene	100.0	N.D.
Chlorodibromomethane	100.0	N.D.
Chloroethane	100.0	N.D.
2-Chloroethyl vinyl ether	500.0	N.D.
Chloroform	100.0	N.D.
Chloromethane	100.0	N.D.
1,1-Dichloroethane	100.0	N.D.
1,2-Dichloroethane	100.0	N.D.
1,1-Dichloroethene	100.0	N.D.
Total 1,2-Dichloroethene	100.0	N.D.
1,2-Dichloropropane	100.0	N.D.
cis 1,3-Dichloropropene	100.0	N.D.
trans 1,3-Dichloropropene	100.0	N.D.
Ethylbenzene	100.0	N.D.
2-Hexanone	500.0	N.D.
Methylene chloride	100.0	N.D.
4-Methyl-2-pentanone	500.0	N.D.
Styrene	100.0	N.D.
1,1,2,2-Tetrachloroethane	100.0	N.D.
Tetrachloroethene	100.0	N.D.
Toluene	100.0	N.D.
1,1,1-Trichloroethane	100.0	N.D.
1,1,2-Trichloroethane	100.0	N.D.
Trichloroethene	100.0	N.D.
Trichlorofluoromethane	100.0	N.D.
Vinyl acetate	100.0	N.D.
Vinyl chloride	100.0	N.D.
Total Xylenes	100.0	N.D.

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

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Laboratory Director

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(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants	Client Project ID:	#8910084A-PHS2	Sampled:	Apr 19-21, 1989
500 12th St., Suite 100	Sample Descript:	Soil Composite, 5-1 to 5-4	Received:	Apr 25, 1989
Oakland, CA 94607-4041	Analysis Method:	EPA 8240	Analyzed:	May 4, 1989
Attention: George Ford	Lab Number:	904-2652	Reported:	May 20, 1989

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500.0	N.D.
Benzene	100.0	N.D.
Bromodichloromethane	100.0	N.D.
Bromoform	100.0	N.D.
Bromomethane	100.0	N.D.
2-Butanone	500.0	N.D.
Carbon disulfide	100.0	N.D.
Carbon tetrachloride	100.0	N.D.
Chlorobenzene	100.0	N.D.
Chlorodibromomethane	100.0	N.D.
Chloroethane	100.0	N.D.
2-Chloroethyl vinyl ether	500.0	N.D.
Chloroform	100.0	N.D.
Chloromethane	100.0	N.D.
1,1-Dichloroethane	100.0	N.D.
1,2-Dichloroethane	100.0	N.D.
1,1-Dichloroethene	100.0	N.D.
Total 1,2-Dichloroethene	100.0	N.D.
1,2-Dichloropropane	100.0	N.D.
cis 1,3-Dichloropropene	100.0	N.D.
trans 1,3-Dichloropropene	100.0	N.D.
Ethylbenzene	100.0	N.D.
2-Hexanone	500.0	N.D.
Methylene chloride	100.0	N.D.
4-Methyl-2-pentanone	500.0	N.D.
Styrene	100.0	N.D.
1,1,2,2-Tetrachloroethane	100.0	N.D.
Tetrachloroethene	100.0	N.D.
Toluene	100.0	N.D.
1,1,1-Trichloroethane	100.0	N.D.
1,1,2-Trichloroethane	100.0	N.D.
Trichloroethene	100.0	N.D.
Trichlorofluoromethane	100.0	N.D.
Vinyl acetate	100.0	N.D.
Vinyl chloride	100.0	N.D.
Total Xylenes	100.0	N.D.

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

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Arthur G. Burton
Laboratory Director

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Woodward-Clyde Consultants
500 12th St., Suite 100
Oakland, CA 94607-4041
Attention: George Ford

Client Project ID: #8910084A-PHS2
Sample Descript: Soil Composite, 6-1 to 6-3
Analysis Method: EPA 8240
Lab Number: 904-2653 A - C

Sampled: Apr 19-21, 1989
Received: Apr 25, 1989
Analyzed: May 4, 1989
Reported: May 20, 1989

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500.0	N.D.
Benzene	100.0	N.D.
Bromodichloromethane	100.0	N.D.
Bromoform	100.0	N.D.
Bromomethane	100.0	N.D.
2-Butanone	500.0	N.D.
Carbon disulfide	100.0	N.D.
Carbon tetrachloride	100.0	N.D.
Chlorobenzene	100.0	N.D.
Chlorodibromomethane	100.0	N.D.
Chloroethane	100.0	N.D.
2-Chloroethyl vinyl ether	500.0	N.D.
Chloroform	100.0	N.D.
Chloromethane	100.0	N.D.
1,1-Dichloroethane	100.0	N.D.
1,2-Dichloroethane	100.0	N.D.
1,1-Dichloroethene	100.0	N.D.
Total 1,2-Dichloroethene	100.0	N.D.
1,2-Dichloropropane	100.0	N.D.
cis 1,3-Dichloropropene	100.0	N.D.
trans 1,3-Dichloropropene	100.0	N.D.
Ethylbenzene	100.0	N.D.
2-Hexanone	500.0	N.D.
Methylene chloride	100.0	N.D.
4-Methyl-2-pentanone	500.0	N.D.
Styrene	100.0	N.D.
1,1,2,2-Tetrachloroethane	100.0	N.D.
Tetrachloroethene	100.0	N.D.
Toluene	100.0	N.D.
1,1,1-Trichloroethane	100.0	N.D.
1,1,2-Trichloroethane	100.0	N.D.
Trichloroethene	100.0	N.D.
Trichlorofluoromethane	100.0	N.D.
Vinyl acetate	100.0	N.D.
Vinyl chloride	100.0	N.D.
Total Xylenes	100.0	N.D.

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

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Laboratory Director

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Woodward-Clyde Consultants
500 12th St., Suite 100
Oakland, CA 94607-4041
Attention: George Ford

Client Project ID: #8910084A-PH52
Method (units): EPA 8240 (µg/L purged)
Analyst(s): W. Amundsen
QC Sample #: 904-1693
QC Sample Group: 9042648-53

Q.C. Sample Dates

Analyzed: May 4, 1989
Reported: May 20, 1989

QUALITY CONTROL DATA REPORT

Analyte	Sample Conc.	Spike Conc. Added	Conc. Matrix Spike	% Recovery	Conc. Matrix Spike Duplicate	% Recovery	Relative % Deviation
1,1-Dichloro-ethene	N.D.	50	49	98	46	92	3.2
Trichloroethene	N.D	50	43	86	39	78	4.9
Chlorobenzene	N.D.	50	50	100	47	94	3.1
Toluene	N.D.	50	51	102	47	94	4.1
Benzene	N.D.	50	45	90	41	82	47

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Laboratory Director

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(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants	Client Project ID:	#8910084A-PHS2	Sampled:	Apr 24, 1989
500 12th St., Suite 100	Sample Descript.:	Water, MW5-1	Received:	Apr 26, 1989
Oakland, CA 94607-4041	Analysis Method:	EPA 5030/ 8015/8020	Analyzed:	May 2, 1989
Attention: George Ford	Lab Number:	904-2550 A	Reported:	May 3, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS WITH BTEX DISTINCTION (EPA 8015/8020)

Analyte	Detection Limit µg/L (ppb)	Sample Results µg/L (ppb)
Low to Medium Boiling Point Hydrocarbons	30.0	24,000
Benzene	0.3	7,500
Toluene	0.3	220
Ethyl Benzene	0.3	990
Xylenes	0.3	730

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

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Arthur G. Burton
Laboratory Director

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(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants	Client Project ID:	8910084A-PH52	Sampled: Apr 24, 1989
500 12th St., Suite 100	Sample Descript:	Water, MW 5-1	Received: Apr 26, 1989
Oakland, CA 94607-4041	Analysis Method:	EPA 8240	Analyzed: May 4, 1989
Attention: George Ford	Lab Number:	904-2550 B	Reported: May 12, 1989

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/L	Sample Results µg/L
Acetone	500.0	2,100
Benzene	100.0	8,100
Bromodichloromethane	100.0	N.D.
Bromoform	100.0	N.D.
Bromomethane	100.0	N.D.
2-Butanone	500.0	N.D.
Carbon disulfide	100.0	N.D.
Carbon tetrachloride	100.0	N.D.
Chlorobenzene	100.0	N.D.
Chlorodibromomethane	100.0	N.D.
Chloroethane	100.0	N.D.
2-Chloroethyl vinyl ether	500.0	N.D.
Chloroform	100.0	N.D.
Chloromethane	100.0	N.D.
1,1-Dichloroethane	100.0	N.D.
1,2-Dichloroethane	100.0	N.D.
1,1-Dichloroethene	100.0	N.D.
Total 1,2-Dichloroethene	100.0	N.D.
1,2-Dichloropropane	100.0	N.D.
cis 1,3-Dichloropropene	100.0	N.D.
trans 1,3-Dichloropropene	100.0	N.D.
Ethylbenzene	100.0	890
2-Hexanone	500.0	N.D.
Methylene chloride	100.0	N.D.
4-Methyl-2-pentanone	500.0	N.D.
Styrene	100.0	N.D.
1,1,2,2-Tetrachloroethane	100.0	N.D.
Tetrachloroethene	100.0	N.D.
Toluene	100.0	220
1,1,1-Trichloroethane	100.0	N.D.
1,1,2-Trichloroethane	100.0	N.D.
Trichloroethene	100.0	N.D.
Trichlorofluoromethane	100.0	N.D.
Vinyl acetate	100.0	N.D.
Vinyl chloride	100.0	N.D.
Total Xylenes	100.0	460

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

Arthur G. Burton
Laboratory Director

9042550.WOO <1>

Woodward-Clyde Consultants

500 12th Street, Suite 100, Oakland, CA 94607-4041
(415) 893-3600

Chain of Custody Record

PROJECT NO. 89/6054.1 - PLCF

SAMPLERS: (Signature)

DATE	TIME	SAMPLE NUMBER	Sample Matrix (S)oil, (W)ater, (A)ir	EPA Method	EPA Method	EPA Method	EPA Method	TPH/BTEX					Number of Containers	REMARKS (Sample preservation, handling procedures, etc.)
8/4/89	N/A	7-1 (16') C	S										1	
		7-2 (26') C											1	
		7-3 (35.5') 12											1	
		8-1 (11') C											1	
		5-2 (26') C											1	
		5-3 (30.5') 345						⊗					1	
		10-1 (11') 3											1	
		10-2 (25.5') 460						⊗					1	
		10-3 (30.5') 400						⊗					1	
		12-1 (16') 9											1	
		12-2 (25.5') 10											1	
		12-3 (30.5') 100						⊗					1	
		13-1 (16') C											1	
		13-2 (26') C											1	
		14-1 (16') 24						⊗					1	
		14-2 (26') 252						⊗					1	
		16-1 (16') C											1	
		16-2 (25.5') 4											1	
		17-1 (16') 29						⊗					1	
↓	↓	17-2 (25.5') 320	↓					⊗					1	
8/7/89		9-1 (16') C											1	
		15-1 (25') 0											1	
		15-2 (30') 31						⊗					1	
		MW18-1 (30') 16											1	
↓	↓	MW19-1 (30') 118	↓					⊗					1	

~~24 Hour TAT for Analytical Schedule~~

Normal Turn-around Please

Report results to Geo FORD 874-3203

TOTAL NUMBER OF CONTAINERS: 20

SOIL

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME

Woodward-Clyde Consultants

500 12th Street, Suite 100, Oakland, CA 94607-4041
(415) 893-3600

Chain of Custody Record

PROJECT NO. 7110784A GW6R

SAMPLERS: (Signature)

DATE	TIME	SAMPLE NUMBER	Sample Matrix (S)oil, (W)ater, (A)ir	EPA Method	EPA Method	EPA Method	EPA Method	TPH/BTEX	EPA 624				Number of Containers
8/14/89	143	MW-18						⊗					3
"	154	MW-5						⊗	⊗				3
"	200	MW-19						⊗					3

REMARKS (Sample preservation, handling procedures, etc.)

2 WEEK TURNAROUND

2 week turnaround

Report results to George Ford 874-3203

TOTAL NUMBER OF CONTAINERS: 9

WATER

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
	8/14 1426	BEN Forward			

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME

WATER SAMPLE LOG

Sample Number MW5

Project No. 8910084B Date: 8/14/89

Project Name: 9th & Jefferson EA

Sample Location: MW-5

Weather Conditions: Sunny, clear

Observations/Comments:

QUALITY ASSURANCE

Sampling method: Teflon bailer

Method to measure water level: Power Sounder

Pump lines or bailer ropes were new or cleaned? cleaned

Method of cleaning Bailer/Pump: alconox, water

pH Meter No: Calibrated daily

Specific Conductance Meter No: Calibrated daily

Comments:

TD = 29.27'

SAMPLING MEASUREMENTS

Water Level (below MP) at start: 24.95' End:

Measuring Point (MP) top of casing

Time	Discharge (Gallons)	pH	Temp. (°C)	Specific Conductance µmhos/cm Field	Specific Conductance µmhos/cm Laboratory	Color	Odor	Turbity
11:08	0	6.31	25.0	580	0.4	lt. gray	slight	low
11:17	3	6.43	22.0	610	0.4	"	"	med
11:23	5	6.62	22.8	610	0.4	"	0	"

Total Discharge: 5 gal Casing Volumes Removed ~7

Method of disposal of discharged water: treatment

Number and size of sample containers filled: (3) 40 ml VOA's

Collected by: W. Copeland

Woodward-Clyde Consultants
One Walnut Creek Center, 100 Pringle Avenue
Walnut Creek, CA 94596 (415) 945-3000

WATER SAMPLE LOG

Sample Number MW18

Project No. 891008 4A Date 8/14/89

Project Name: 9th & Jefferson

Sample Location: MW18

Weather Conditions: sunny, clear

Observations/Comments:

QUALITY ASSURANCE

Sampling method: Teflon Bailer

Method to measure water level: power sounder

Pump lines or bailer ropes were new or cleaned? cleaned

Method of cleaning Bailer/Pump: alconox, water

pH Meter No: _____ Calibrated daily

Specific Conductance Meter No: _____ Calibrated daily

Comments:

TD = 28.70'

SAMPLING MEASUREMENTS

Water Level (below MP) at start: 25.26' End:

Measuring Point (MP) top of casing

Time	Discharge (Gallons)	pH	Temp. (°C)	Specific Conductance (µmhos/cm) Field	Specific Conductance (µmhos/cm) Lab	Color	Odor	Turbity
12:08	0	6.86	26.8	940	8.8	gr brn	0	low
12:17	6	6.80	23.0	720	0.4	"	0	high
1:43	12	6.71	27	580	0.4	"	0	low

Total Discharge: 12 gal Casing Volumes Removed 7

Method of disposal of discharged water: drummed

Number and size of sample containers filled: (3) 40ml VOAs

Collected by: W. Copeland

Woodward-Clyde Consultants
One Walnut Creek Center, 100 Pringle Avenue
Walnut Creek, CA 94596 (415) 945-3000

WATER SAMPLE LOG

Sample Number MW19

Project No. 8710084A Date 8/14/89

Project Name: 9th & Jefferson

Sample Location: MW19

Weather Conditions: sunny, clear

Observations/Comments:

QUALITY ASSURANCE

Sampling method: Teflon bailer

Method to measure water level: power sounder

Pump lines or bailer ropes were new or cleaned? Cleaned

Method of cleaning Bailer/Pump: alconox, water

pH Meter No: _____ Calibrated daily

Specific Conductance Meter No: _____ Calibrated daily

Comments:

TD = 29.57'

SAMPLING MEASUREMENTS

Water Level (below MP) at start: 25.23' End:

Measuring Point (MP) top of casing

Time	Discharge (Gallons)	pH	Temp. (°C)	Specific Conductance umhos/cm Field	Lab	Color	Odor	Turbity
11:37	0	6.55	23.8	550	0.4	gray	slight	low
11:45	4	6.77	22.2	680	0.4	gray	0	high
12:45	15	6.71	22.8	590	0.3	"	slight	"

Total Discharge: 20 Casing Volumes Removed 14.6

Method of disposal of discharged water: drummed

Number and size of sample containers filled: (3) 40 ml VOA's

Collected by: W. Copeland

Woodward-Clyde Consultants
One Walnut Creek Center, 100 Pringle Avenue
Walnut Creek, CA 94596 (415) 945-3000

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants	Client Project ID:	#8910084A-PDLF	Sampled:	See Below
500 12th St., Suite 100	Matrix Descript:	Soil	Received:	Aug 8, 1989
Oakland, CA 94607-4041	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Aug 18, 1989
Attention: George Ford	First Sample #:	908-1111 A	Reported:	Aug 23, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
9081111 A	8-3, 8/4	370	N.D.	1.1	6.5	12
9081112 A	10-2, 8/4	150	N.D.	0.20	1.9	6.4
9081113 A	10-3, 8/4	150	N.D.	0.40	2.8	5.4
9081114 A	12-3, 8/4	3.0	0.32	N.D.	N.D.	N.D.
9081115 A	14-1, 8/4	N.D.	N.D.	N.D.	N.D.	N.D.
9081116 A	14-2, 8/4	1,400	N.D.	5.0	37	64
9081117 A	17-1, 8/4	N.D.	N.D.	N.D.	N.D.	N.D.
9081118 A	17-2, 8/4	1,500	N.D.	6.0	32	99
9081119 A	15-2, 8/7	2.0	N.D.	N.D.	N.D.	N.D.
9081120 A	MW19-1, 8/7	4.4	0.68	N.D.	0.36	0.53
Detection Limits:		**1.0**	**0.05**	**0.1**	**0.1**	**0.1**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard
Analytes reported as N.D. were not present above the stated limit of detection

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants
500 12th St., Suite 100
Oakland, CA 94607-4041
Attention: George Ford

Client Project ID: #8910084A-PLDF

QC Sample Group: 908111-120A

Reported: Aug 23, 1989

QUALITY CONTROL DATA REPORT

ANALYTE	Xylenes
Method	EPA 8020
Analyst	M McBirney
Reporting Units	ppm
Date Analyzed	Aug 18 1989
QC Sample #	9082221
Sample Conc.:	N.D.
Spike Conc. Added:	3.0
Conc. Matrix Spike:	2.3
Matrix Spike % Recovery:	76
Conc. Matrix Spike Dup.:	2.7
Matrix Spike Duplicate % Recovery:	90
Relative % Difference:	16
Laboratory blank contained the following analytes:	None Detected

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

% Recovery	$\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}}$	x 100
Relative % Difference	$\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}}$	x 100

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(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants
500 12th St., Suite 100
Oakland, CA 94607-4041
Attention: George Ford

Client Project ID: #8910084A-GWGR
Method (units): EPA 8240 (µg/L purged)
Analyst(s): S. Fong
QC Sample #: 908-1416

Q.C. Sample Dates

Analyzed: Aug 28, 1989
Reported: Aug 30, 1989

QUALITY CONTROL DATA REPORT

Analyte	Sample Conc.	Spike Conc. Added	Conc. Matrix Spike	Matrix Spike % Recovery	Conc. Matrix Spike Duplicate	Matrix Spike Duplicate % Recovery	Relative % Difference
1,1-Dichloro-ethene	N.D.	50	49	98	53	106	7.8
Trichloroethene	N.D.	50	50	100	52	104	3.9
Benzene	N.D.	50	47	94	51	102	8.2
Toluene	N.D.	50	49	98	53	106	7.8
Chlorobenzene	N.D.	50	49	98	53	106	7.8

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

% Recovery: $\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$

Relative % Difference: $\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}} \times 100$

SEQUOIA ANALYTICAL

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(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants
500 12th St., Suite 100
Oakland, CA 94607-4041
Attention: George Ford

Client Project ID: #8910084A-GWGR

QC Sample Group: 9081505A

Reported: Aug 30, 1989

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene
Method	EPA 8020
Analyst:	C. Camba
Reporting Units:	ppb
Date Analyzed	Aug 17, 1989
QC Sample #:	9081591
Sample Conc.:	N.D.
Spike Conc. Added:	2.5
Conc. Matrix Spike:	2.54
Matrix Spike % Recovery:	102
Conc. Matrix Spike Dup.:	2.64
Matrix Spike Duplicate % Recovery:	106
Relative % Difference:	3.9
Laboratory blank contained the following analytes:	None Detected

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

$$\text{\% Recovery} = \frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference} = \frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{(\text{Conc. of M.S. + Conc. of M.S.D.})/2} \times 100$$

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants
500 12th St., Suite 100
Oakland, CA 94607-4041
Attention: George Ford

Enclosed are the results from 4 water samples received at Sequoia Analytical on August 15,1989. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
9081505 A	Water, MW-5	8/14/89	EPA 5030/8015/8020
9081505 B	Water, MW-5	8/14/89	EPA 8240
9081506 A	Water, MW-18	8/14/89	EPA 5030/8015/8020
9081507 A	Water, MW-19	8/14/89	EPA 5030/8015/8020

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project

Very truly yours,

SEQUOIA ANALYTICAL

Laura E. Saunders
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants	Client Project ID:	#8910084A-GWGR	Sampled:	Aug 14, 1989
500 12th St., Suite 100	Matrix Descript:	Water	Received:	Aug 15, 1989
Oakland, CA 94607-4041	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Aug 17, 1989
Attention: George Ford	First Sample #:	908-1505 A	Reported:	Aug 30, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons µg/L (ppb)	Benzene µg/L (ppb)	Toluene µg/L (ppb)	Ethyl Benzene µg/L (ppb)	Xylenes µg/L (ppb)
9081505 A	MW-5	19,000	5,400	210	770	440
9081506 A	MW-18	7,600	160	21	210	14
9081507 A	MW-19	26,000	4,300	690	980	2,600
Detection Limits:		**30.0**	**0.3**	**0.3**	**0.3**	**0.3**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Woodward-Clyde Consultants
500 12th St., Suite 100
Oakland, CA 94607-4041
Attention: George Ford

Client Project ID: #8910084A-GWGR
Sample Descript: Water, MW-5
Analysis Method: EPA 8240
Lab Number: 908-1505 B

Sampled: Aug 14, 1989
Received: Aug 15, 1989
Analyzed: Aug 28, 1989
Reported: Aug 30, 1989

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/L	Sample Results µg/L
Acetone	400.0	N.D.
Benzene	**80.0**	**7,900**
Bromodichloromethane	80.0	N.D.
Bromoform	80.0	N.D.
Bromomethane	80.0	N.D.
2-Butanone	400.0	N.D.
Carbon disulfide	80.0	N.D.
Carbon tetrachloride	80.0	N.D.
Chlorobenzene	80.0	N.D.
Chlorodibromomethane	80.0	N.D.
Chloroethane	80.0	N.D.
2-Chloroethyl vinyl ether	400.0	N.D.
Chloroform	80.0	N.D.
Chloromethane	80.0	N.D.
1,1-Dichloroethane	80.0	N.D.
1,2-Dichloroethane	80.0	N.D.
1,1-Dichloroethene	80.0	N.D.
Total 1,2-Dichloroethene	80.0	N.D.
1,2-Dichloropropane	80.0	N.D.
cis 1,3-Dichloropropene	80.0	N.D.
trans 1,3-Dichloropropene	80.0	N.D.
Ethylbenzene	**80.0**	**860**
2-Hexanone	400.0	N.D.
Methylene chloride	80.0	N.D.
4-Methyl-2-pentanone	400.0	N.D.
Styrene	80.0	N.D.
1,1,2,2-Tetrachloroethane	80.0	N.D.
Tetrachloroethene	80.0	N.D.
Toluene	**80.0**	**290**
1,1,1-Trichloroethane	80.0	N.D.
1,1,2-Trichloroethane	80.0	N.D.
Trichloroethene	80.0	N.D.
Trichlorofluoromethane	80.0	N.D.
Vinyl acetate	80.0	N.D.
Vinyl chloride	80.0	N.D.
Total Xylenes	**80.0**	**420**

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

Arthur G. Burton
Laboratory Director

9081505.WOO <3>