Corporate Offices 41674 Christy Street, Fremont, CA 94538-3114 (415) 659-0404 Fax: (415) 651-4677 Contr. Lic. No. 550205

ensco environmental services, inc.
a subsidiary of environmental system company

January 19, 1990

Jack Brastad 676-1414 127

Shell Oil Company
1390 Willow Pass Road
Suite 900
Concord, CA 94520

Attention: Ms. Diane Lundquist

Subject: December Quarterly Report
Groundwater Sampling and Analyses and
Supplemental Shallow Groundwater Survey
Shell Gas Station, 230 MacArthur Boulevard, Oakland, California
EES Project No. 1847-2G

Dear Ms. Lundquist:

This report presents the results of groundwater sampling and analyses performed at the subject site since September 1989. It includes all current and past analytical data acquired during this continuing investigation. In addition, Ensco Environmental Services, Inc. (EES) completed a shallow groundwater survey on October 17, 1989 at the site, and the results are presented in the attached report along with a description of methodology.

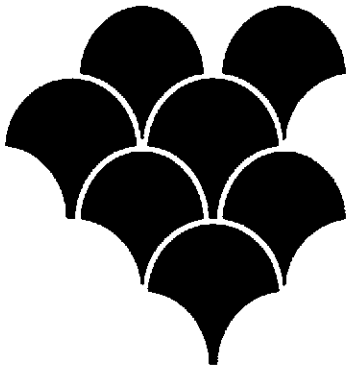
If you have any questions, please call.

Sincerely,
Ensco Environmental Services, Inc.

Kay Pannell
Staff Geologist

Neil H. Zickefoose, C.E.G. 398
Senior Program Geologist

KP/NHZ/sw
Enclosure



ensco
environmental
services, inc.

DECEMBER QUARTERLY REPORT
GROUNDWATER SAMPLING
AND ANALYSES
AND SUPPLEMENTAL
SHALLOW GROUNDWATER SURVEY

FOR

SHELL SERVICE STATION
230 MacARTHUR BOULEVARD
OAKLAND, CALIFORNIA

94610

Project No. 1847-2G
January 1990

CONTENTS

DECEMBER QUARTERLY REPORT
GROUNDWATER SAMPLING AND ANALYSES
AND
SHALLOW GROUNDWATER SURVEY

FOR

SHELL SERVICE STATION
230 MacARTHUR BOULEVARD
OAKLAND, CALIFORNIA

This report presents the results of a Phase II shallow groundwater survey and quarterly groundwater monitoring by Ensco Environmental Services, Inc. (EES) at the Shell Gas Station located at 230 MacArthur Boulevard in the City of Oakland, Alameda County, California (Figure 1). This report presents the monitoring data for the period of October through December 1989. The objectives of the groundwater monitoring program are listed below.

- Plot the groundwater contour surface and apparent flow direction.
- Investigate the possible presence of a petroleum hydrocarbon plume and determine its concentrations.
- Compare current and past data.

The existence and degree of hydrocarbon contamination is determined by (1) checking free-floating product thickness and (2) performing laboratory analyses on groundwater samples to determine concentrations of total petroleum hydrocarbons as gasoline (TPHG), with benzene, toluene, ethyl benzene, and total xylenes (BTEX).

The objective of the Phase II shallow groundwater survey was to investigate the possible presence and extent of contamination in the groundwater adjacent to the existing pump islands.

BACKGROUND

The station currently uses two dispensing islands and three underground storage tanks (replaced in November 1987). The background information that follows was compiled from information provided to EES by Shell.

In April 1986, EMCON Associates drilled four exploratory soil borings in the tank complex area to a depth of 20 feet. Water was encountered at approximately 13 feet, below ground surface. The soil samples were analyzed for total petroleum hydrocarbons (TPH) and benzene, toluene, and xylene (BTX) compounds. Results indicated that TPH concentrations ranged from 1,200 to 5,700 parts per million (ppm).

In December 1986, W.W. Irvin, Inc. performed a soil gas survey, which indicated that concentrations of hydrocarbons existed primarily around the tank complex and in the vicinity of the pump island nearest MacArthur Boulevard.

Three vapor recovery wells were installed in the tank complex in March 1987 by Wayne Perry Construction, Inc. The soil venting system was operated between April and November 1987. In November, the underground fuel storage tanks were removed. Tests of the excavation soil stockpile revealed TPH concentrations ranging from 8.4 to 250 ppm.

EES performed a supplemental site assessment in July 1988, which included the installation of three groundwater monitoring wells. In October 1988, a monthly monitoring groundwater sampling program began and continued until March 1989, when a quarterly groundwater sampling schedule was substituted. Monthly water level measurements were continued to determine groundwater flow direction and gradient.

In April 1989, the Alameda County Health Department expressed concern about the 1986 soil gas survey results in the vicinity of the pump islands. EES then drilled three exploratory soil borings around the pump islands in August 1989, and discovered contamination (TPHG results) at 15 feet in one boring (SB-2). A shallow groundwater

survey was then conducted in October 1989 to determine lateral on-site extent of the contamination.

PHASE II SUPPLEMENTAL SHALLOW GROUNDWATER SURVEY

EES subcontracted NET Pacific, Inc., of Santa Rosa, California, to conduct a shallow groundwater survey on October 17, 1989. NET Pacific, Inc., a state-certified laboratory, uses a mobile on-site laboratory with a portable gas chromatograph (PGC), to analyze groundwater samples for TPHG/ BTEX. The results are given in Appendix A and are summarized in Table 1. Figure 2 shows the relative locations of the soil borings and the groundwater survey points.

Three groundwater probes were advanced to a maximum depth of 18 feet, by driving a 3/4-inch probe into the soil with a truck-mounted hydraulic hammer. After inserting the probes, samples were taken by purging three probe volumes of water with dedicated bailers, and then filling three 40-milliliter glass containers. The samples were analyzed with an on-site gas chromatograph for TPHG and BTEX. After removing the probes, the holes were backfilled with neat cement grout.

The PGC results indicated detectable concentrations of BTEX in groundwater samples GS-2 and GS-3 near soil boring SB-2.

GROUNDWATER MONITORING

Results of the laboratory analyses of the groundwater samples are given in Appendix B along with the chain-of-custody form. Sampling of the monitoring wells was performed in accordance with the attached EES protocol (Appendix C). Before sampling, all wells were field-checked for the presence of floating product: none was found. All water purged from each well was placed in drums and properly labeled. The water was transferred by Crosby and Overton, a licensed hauler, to the Shell refinery for recycling.

Groundwater Conditions

The results of the quarterly monitoring program are summarized on Table 2. The analytical results for last quarter indicate that benzene was found in MW-3 at a concentration of 0.00065 ppm. All other analyses showed non-detectable results. The analytical results for this quarter indicate TPHG, benzene, ethyl benzene, and xylenes were detected in MW-3, and toluene was detected in MW-2. The laboratory analytical reports are attached in Appendix B.

EES prepared groundwater surface contour maps based on the data collected from the on-site groundwater monitoring wells. These maps are presented as Figures 3, 4, and 5. The apparent groundwater surface was inclined to the northwest throughout the quarter. The calculated gradient has decreased over the past quarter from 0.007 feet per foot to 0.005 feet per foot.

CONCLUSIONS AND RECOMMENDATIONS

1. Groundwater at the subject site was measured at elevations ranging between 58.5 and 59.6 feet above mean sea level during the last quarter. Gradient determinations have shown that the groundwater table is inclined to the northwest at about 0.005 feet per foot.

2. Gasoline constituents were detected in two of the three individual shallow groundwater samples tested. Benzene was detected at 3.4 and 3.8 ppm; ethyl benzene was found at 12 and 5.8 ppm. Toluene and xylenes concentrations were below Department of Health Services (DHS) maximum contaminant levels and action levels.

3. Benzene, ethyl benzene, and xylenes were detected in the groundwater in MW-3 and toluene was detected in MW-2. No free product was observed in the groundwater monitoring wells at the site. The fact that contamination was detected in MW-3 and not in the nearby GS-1, is probably due to the higher detection limit for the mobile laboratory equipment.

4. EES will continue to monitor the wells on the site. The next quarterly groundwater monitoring report will be submitted in April 1990, and will include analytical results of samples collected in March 1990 as well as monthly groundwater surface elevation data. This schedule will continue until the reported conditions meet the approval of the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB).

5. EES recommends that installation of a fourth monitoring well to be placed downgradient from the pump island nearest MacArthur Boulevard.

REPORTING REQUIREMENTS

A copy of this report should be forwarded to the following agencies:

Alameda County Flood Control and
Water Conservation District
5997 Parkside Drive
Pleasanton, California 94566
Attention: Mr. Craig Mayfield

Regional Water Quality Control Board
San Francisco Bay Region
1800 Harrison Street, Suite 700
Oakland, California 94612-3429
Attention: Ms. Lisa McCann

Alameda County Health Department
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621
Attention: Mr. Lowell Miller

DISCLAIMER

This report has been prepared solely for the use of Shell and any reliance on this report by third parties shall be as such party's sole risk.

REFERENCE

Wayne Perry Construction, Inc. Review of Venting Operations Shell Station, 230 MacArthur Boulevard, Oakland, California. Project No. 86.255, January 26, 1988.

LIMITATIONS

The discussions and recommendations presented in this report are based on the following:

1. The exploratory test borings drilled at the site.
2. The observations by field personnel.
3. The results of laboratory analyses performed by a state-certified laboratory.
4. Our understanding of the regulations of the State of California and Alameda County and/or the City of Oakland.
5. Past reports.

It is possible that variations in the soil or groundwater conditions could exist beyond the points explored in this investigation. Also, changes in the groundwater conditions could occur at sometime in the future due to variations in rainfall, temperature, regional water usage or other factors.

The service performed by EES has been conducted in a manner consistent with the level of care and skill exercised by members of our profession currently practicing under similar conditions in the San Francisco Bay Area. Please note that contamination of soil and groundwater must be reported to the appropriate agencies in a timely manner. No other warranty, expressed or implied, is made.

The chemical analytical data included in this report have been obtained from a state-certified laboratory. The analytical methods employed by the laboratory were in accordance with procedures suggested by the U.S. EPA and the State of California. EES is not responsible for laboratory errors in procedure or result reporting.

Ensco Environmental Services, Inc.
Project No. 1847-2G

Shell Oil, Inc.
230 MacArthur Blvd.
Oakland, CA

TABLE 1
SHALLOW GROUNDWATER SURVEY DATA

Sample Number	Sample Date	Sample Depth (ft.)	TPHG (ppm)	Benzene (ppm)	Toluene (ppm)	Ethyl Benzene (ppm)	Xylenes (ppm)
GS-1	10/17/89	18	N D	N D	N D	N D	N D
GS-2	10/17/89	17	5.6	3.4	0.27	12	0.62
GS-3	10/17/89	18	8.8	3.8	0.06	5.8	0.42

TPHG	Total petroleum hydrocarbons as gasoline
ppm	Parts per million
ND	Not detected at or above detection limit

Ensco Environmental Services, Inc.
Project No. 1847-2G

Shell Oil Company
230 MacArthur Blvd.
Oakland, CA

TABLE 2
GROUNDWATER ANALYSES DATA

Well	Date Sampled	TPHG (ppm)	Benzene (ppm)	Toluene (ppm)	Ethyl Benzene (ppm)	Total Xylenes (ppm)	TDS (ppm)	Well Elevation (ft.)	Depth To Water (ft.)
MW-1	7/14/88	N D	N D	N D	N D	N D	N A	73.89	13.30
	10/4/88	B R L	0.008	0.0043	B R L	0.009	N A		13.65
	11/10/88	B R L	B R L	B R L	B R L	B R L	N A		13.55
	12/9/88	N D	N D	N D	N D	N D	N A		13.22
	1/10/89	N D	N D	N D	N D	N D	N A		12.86
	1/20/89	N A	N A	N A	N A	N A	N A		12.91
	2/6/89	N D	N D	N D	N D	N D	N A		12.94
	3/10/89	N D	N D	N D	N D	N D	N A		12.59
	6/6/89	N D	N D	N D	N D	N D	N A		14.05
	9/7/89	N D	N D	N D	N D	N D	N A		14.92
	12/18/89	N D	N D	N D	N D	N D	N A		14.88
MW-2	7/14/88	N D	0.0079	0.0026	0.0011	0.004	N A	75.24	15.18
	10/4/88	0.09	B R L	0.0013	0.0025	0.012	N A		15.30
	11/10/88	B R L	B R L	B R L	B R L	0.002	N A		15.17
	12/9/88	N D	N D	0.0006	N D	0.003	N A		14.82
	1/20/89	N D	N D	N D	N D	N D	456		14.54
	2/6/89	N D	N D	N D	N D	N D	400		14.59
	3/10/89	N D	N D	N D	N D	N D	407		14.88
	6/6/89	N D	N D	N D	N D	N D	N A		15.30
	9/7/89	N D	N D	N D	N D	N D	N A		16.76
	12/18/89	N D	N D	0.0005	N D	N D	N A		16.65

Ensco Environmental Services, Inc.
Project No. 1847-2G

Shell Oil Company
230 MacArthur Blvd.
Oakland, CA

TABLE 2 (CONT.)
GROUNDWATER ANALYSES DATA

Well	Date Sampled	TPHG (ppm)	Benzene (ppm)	Toluene (ppm)	Ethyl Benzene (ppm)	Total Xylenes (ppm)	TDS (ppm)	Well Elevation (ft.)	Depth To Water (ft.)
MW-3	7/14/88	N D	N D	N D	N D	N D	N A	74.68	14.05
	10/4/88	B R L	B R L	B R L	B R L	0.005	N A		14.60
	11/10/88	B R L	B R L	B R L	B R L	B R L	N A		14.35
	12/9/88	N D	N D	N D	N D	N D	N A		14.04
	1/10/89	N D	N D	N D	N D	N D	N A		13.70
	1/20/89	N A	N A	N A	N A	N A	N A		13.72
	2/6/89	0.07	N D	N D	N D	N D	N A		13.75
	3/10/89	0.15	N D	N D	N D	N D	N A		13.42
	6/6/89	N D	N D	N D	N D	N D	N A		14.52
	9/7/89	N D	0.00065	N D	N D	N D	N A		15.52
	12/6/89	0.04	0.0013	N D	0.00044	0.00066	N A		19.59

TPHG	Total petroleum hydrocarbons as gasoline
ppm	parts per million
N D	None detected at or above detection limit method
B R L	Below reporting limit
N A	Not Analyzed
T D S	Total dissolved solids

Note: See lab reports for detection limits and reporting limits

LEGEND:

SITE LOCATION

BASE: USGS 7.5 MINUTE TOPOGRAPHIC SHEET

SCALE IN MILES

ensco environmental services, Inc.

SITE LOCATION MAP

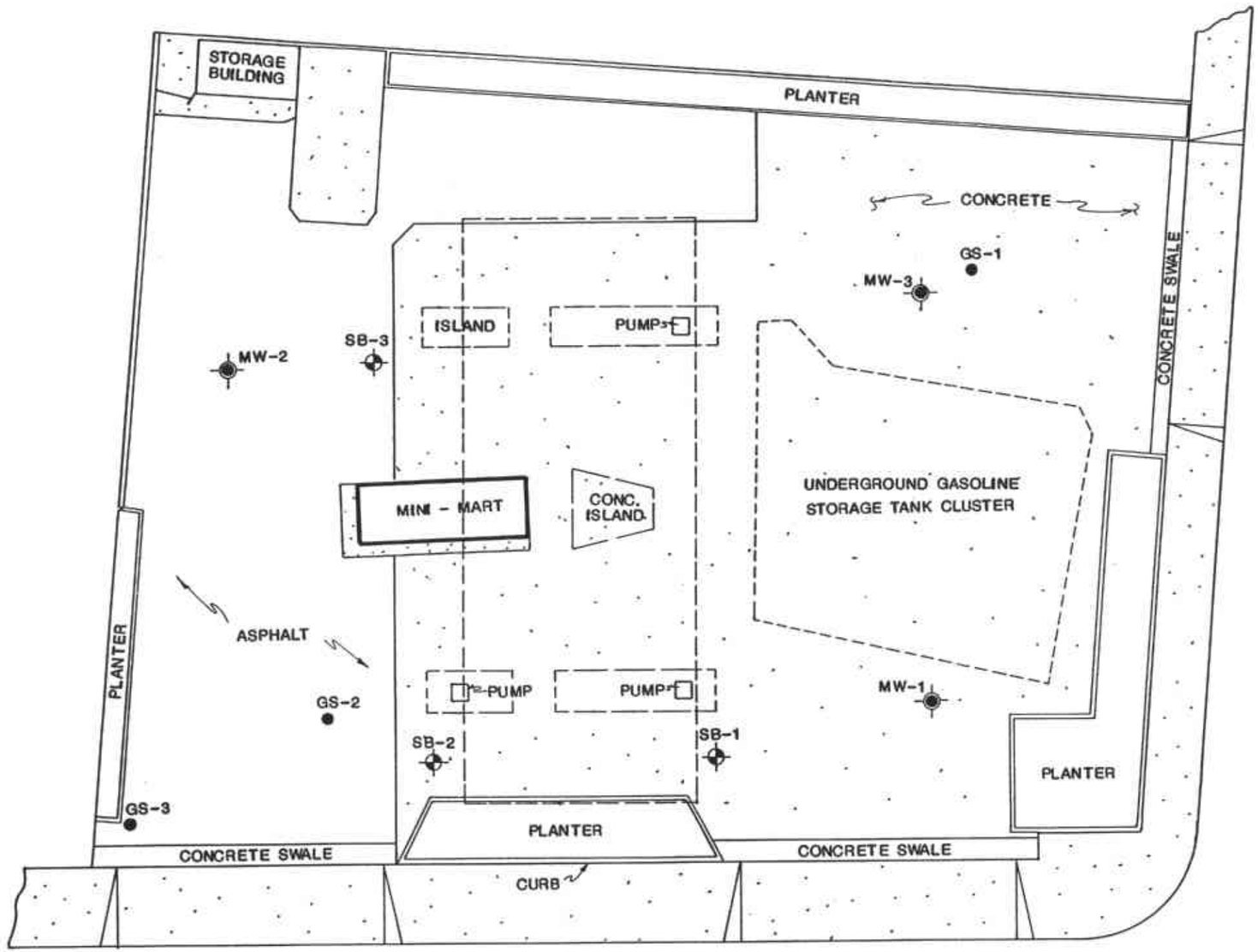
SHELL SERVICE STATION

230 MacARTHUR BOULEVARD

OAKLAND, CALIFORNIA

REVIEWED BY:	APPROVED BY:
JOB #: 1847G	DRAWN BY: SLS
DATE: 9-16-88	DRAWING #: FIG: 1

A-1847G-1



LEGEND

- MW-1 GROUNDWATER MONITORING WELL
- SB-1 EXPLORATORY SOIL BORING
- GS-1 GROUNDWATER SAMPLE POINT

N

0 20

APPROX. SCALE IN FEET

ensco environmental services, Inc.

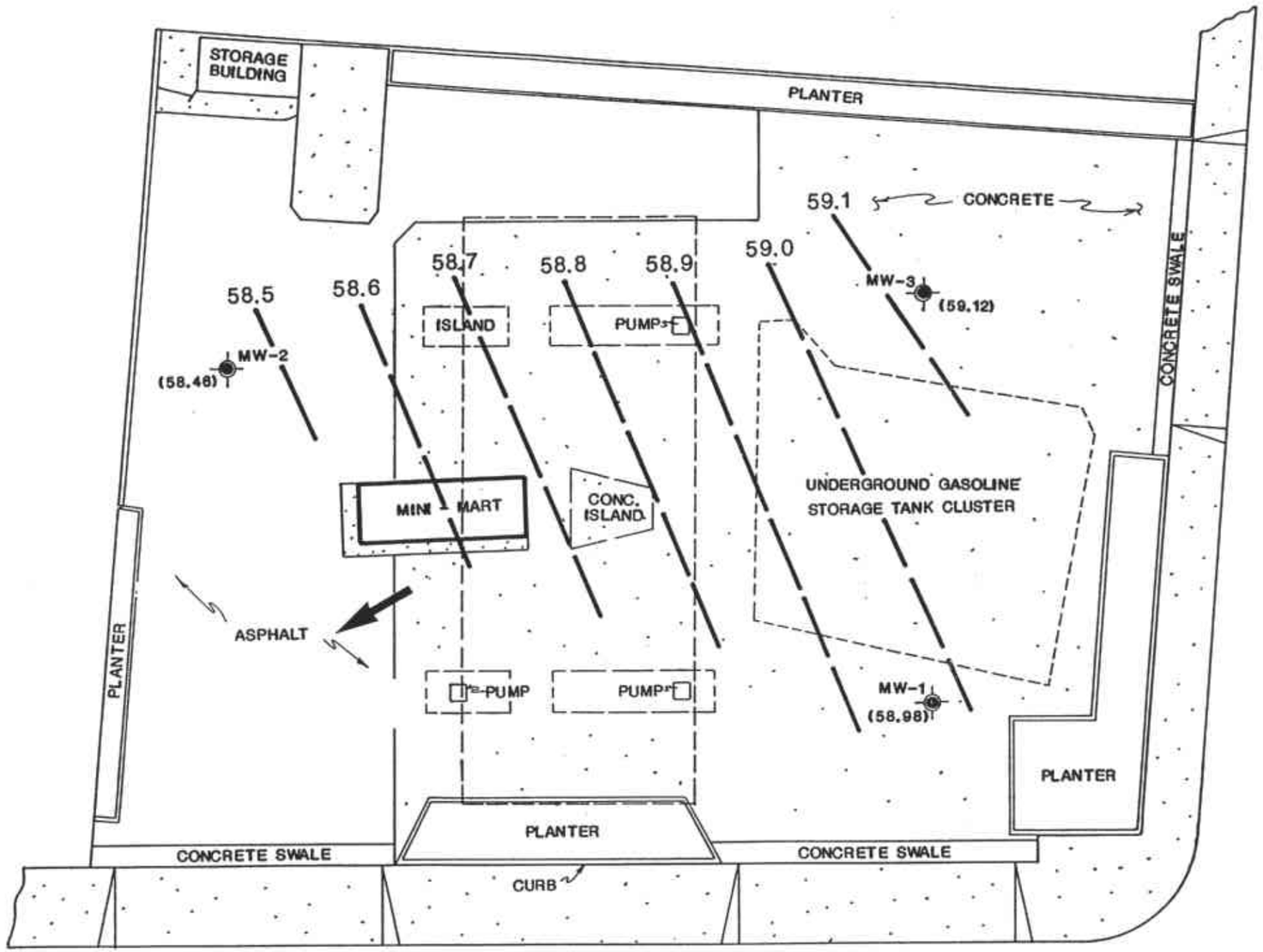
SHALLOW GROUNDWATER SAMPLE POINT LOCATIONS

SHELL SERVICE STATION

230 Mac ARTHUR BOULEVARD

OAKLAND, CALIFORNIA

REVIEWED BY:	APPROVED BY:
K.P.	
JOB #: 1847-2G	DRAWN BY: J.C.
DATE: 1-3-90	DRAWING #: FIG. 2



LEGEND

- MW-1 GROUNDWATER MONITORING WELL
- (59.12) GROUNDWATER ELEVATION IN FEET (DATUM: M.S.L.)
- 59.1 GROUNDWATER ELEVATION CONTOUR LINE IN FEET (DATUM: M.S.L.)
- APPARENT GROUNDWATER FLOW DIRECTION

N

0 20

APPROX. SCALE IN FEET

ensco environmental services, inc.

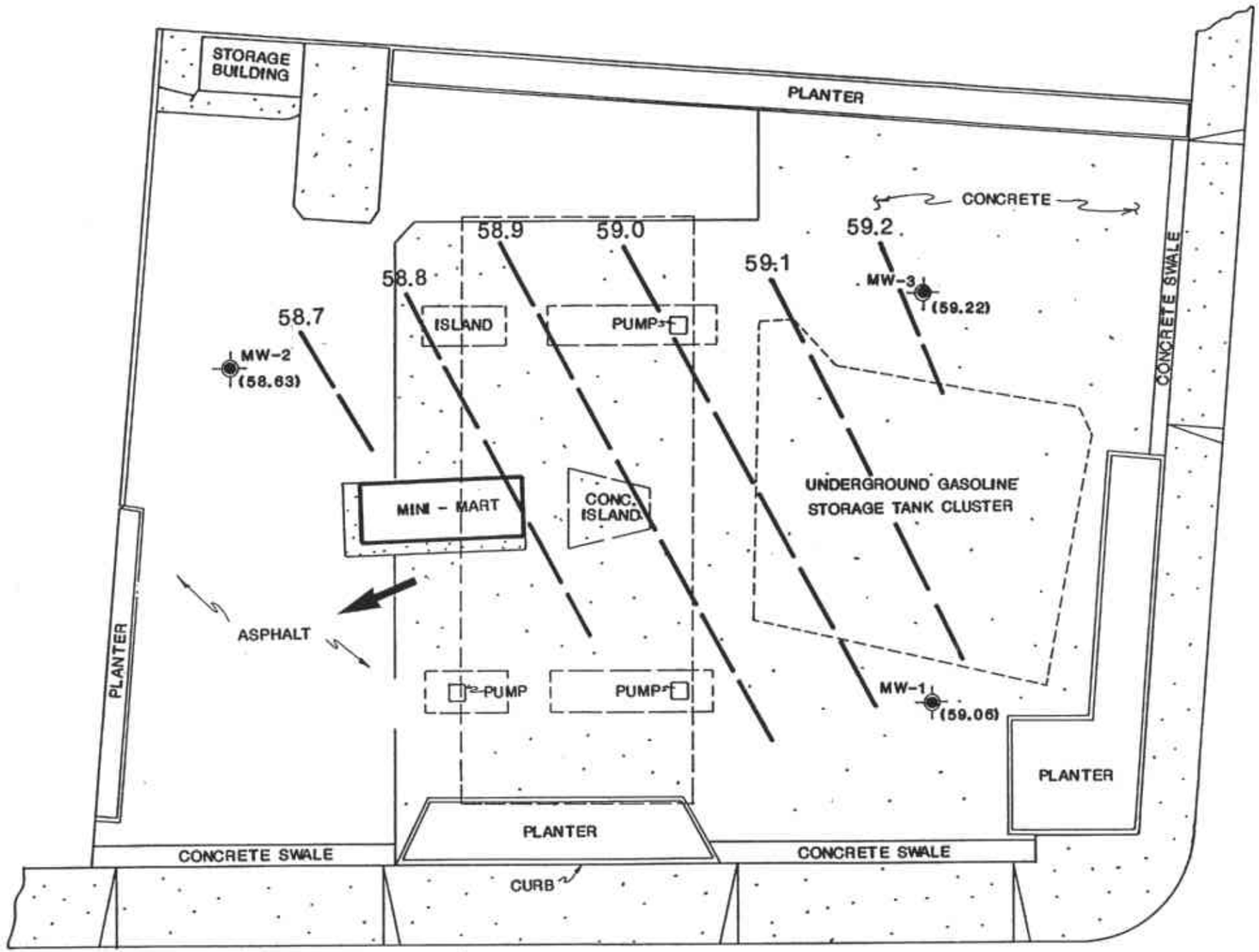
GROUNDWATER ELEVATION MAP (10/10/89)

SHELL SERVICE STATION

230 Mac ARTHUR BOULEVARD

OAKLAND, CALIFORNIA

REVIEWED BY:	APPROVED BY:
X.P.	
JOB #: 1847-2G	DRAWN BY: J.C.
DATE: 12-21-89	DRAWING #: FIG. 3



LEGEND

- MW-1 GROUNDWATER MONITORING WELL
- (59.22) GROUNDWATER ELEVATION IN FEET (DATUM: M.S.L.)
- 59.1 GROUNDWATER ELEVATION CONTOUR LINE IN FEET (DATUM: M.S.L.)
- APPARENT GROUNDWATER FLOW DIRECTION

N

0 20

APPROX. SCALE IN FEET

ensco environmental services, Inc.

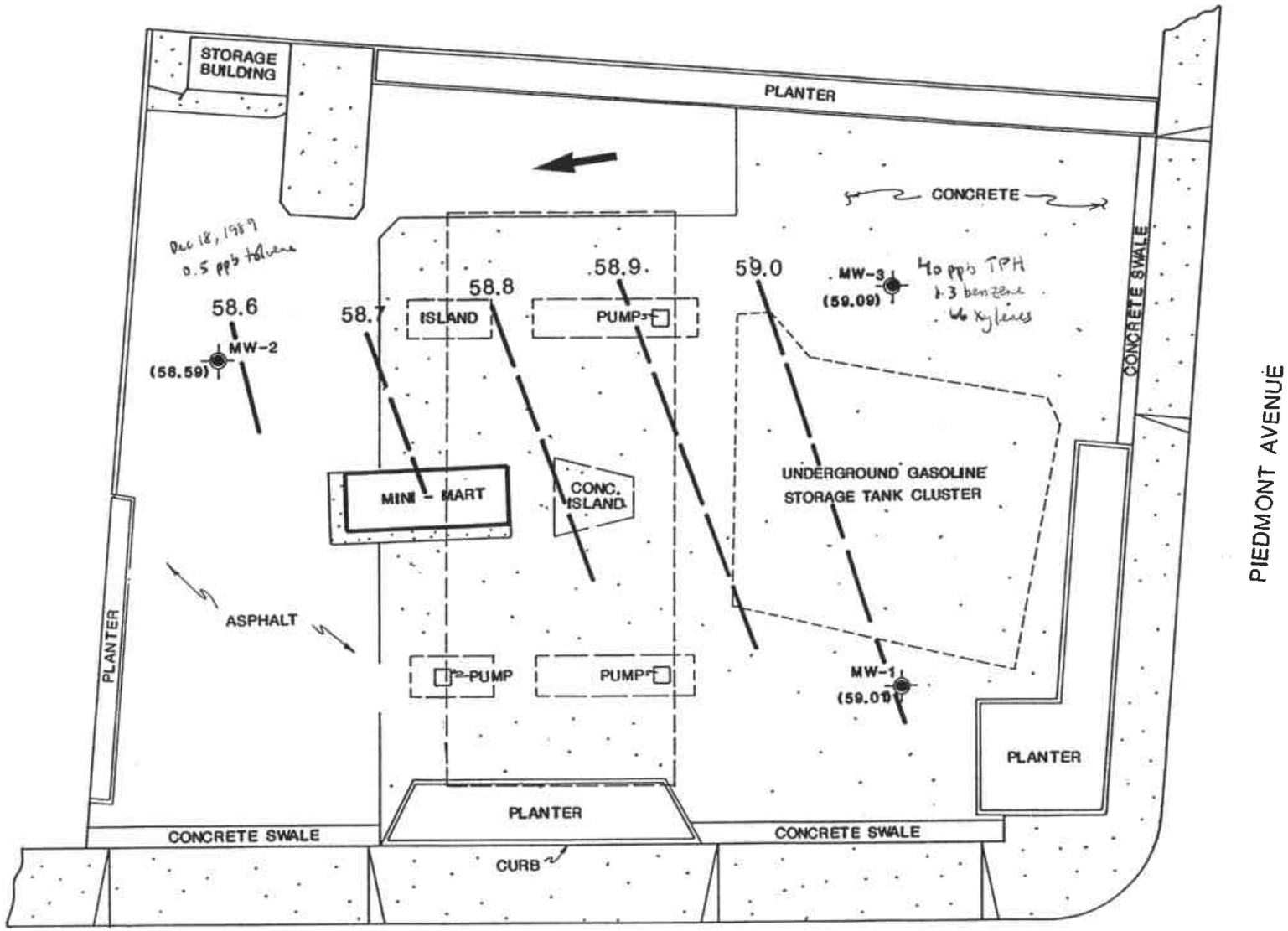
GROUNDWATER ELEVATION MAP (11/10/89)

SHELL SERVICE STATION

230 Mac ARTHUR BOULEVARD

OAKLAND, CALIFORNIA

REVIEWED BY:	APPROVED BY:
K.R.	
JOB #: 1847-2G	DRAWN BY: J.C.
DATE: 12-21-89	DRAWING #: FIG. 4



LEGEND

- MW-1 GROUNDWATER MONITORING WELL
- (59.09) GROUNDWATER ELEVATION IN FEET (DATUM: M.S.L.)
- 59.0 GROUNDWATER ELEVATION CONTOUR LINE IN FEET (DATUM: M.S.L.)
- APPARENT GROUNDWATER FLOW DIRECTION

N

0 20

APPROX. SCALE IN FEET

ensco environmental services, Inc.

GROUNDWATER ELEVATION MAP (12/18/89)

SHELL SERVICE STATION

230 Mac ARTHUR BOULEVARD

OAKLAND, CALIFORNIA

REVIEWED BY:	APPROVED BY:
R.P.	
JOB #: 1847-2G	DRAWN BY: J.C.
DATE: 12-21-89	DRAWING #: FIG. 5

APPENDIX A

SHALLOW GROUNDWATER SURVEY DATA

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Pacific, Inc.
435 Tesconi Circle
Santa Rosa, CA 95401
Tel: (707) 526-7200
Fax: (707) 526-9623

Formerly: ANATEC Labs, Inc.

Dave Siegel
ENSCO
41674 Christy St
Fremont, CA 94538

10-30-89
NET Pacific Log No: 8207
Series No: 509
Client Ref: Dave Siegel

Subject: Results of On Site Analysis of Groundwater Samples Obtained at 230 MacArthur Blvd., Oakland, CA, on 10-17-89.

Dear Mr. Siegel:

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Submitted by:

Brian Fies
Group Leader
Atomic Spectroscopy

Approved by:

William G. Rotz
Group Leader
Mobile Laboratory

/ma
Enc: Sample Custody Document

KEY TO ABBREVIATIONS and METHOD REFERENCES

Abbreviations

mean : Average; sum of measurements divided by number of measurements.

mg/Kg (ppm) : Concentration in units of milligrams of analyte per kilogram of sample, wet-weight basis (parts per million).

mg/L : Concentration in units of milligrams of analyte per liter of sample.

mL/L/hr : Milliliters per liter per hour.

MPN/100 mL : Most probable number of bacteria per one hundred milliliters of sample.

N/A : Not applicable.

NA : Not analyzed.

ND : Not detected; the analyte concentration is less than applicable listed reporting limit.

NR : Not requested.

NTU : Nephelometric turbidity units.

RPD : Relative percent difference, 100 [Value 1 - Value 2]/mean value.

SNA : Standard not available.

ug/Kg (ppb) : Concentration in units of micrograms of analyte per kilogram of sample, wet-weight basis (parts per billion).

ug/L : Concentration in units of micrograms of analyte per liter of sample.

umhos/cm : Micromhos per centimeter.

Method References

Methods 601 through 625: see "Guidelines Establishing Test Procedures for the Analysis of Pollutants" U.S. EPA, 40 CFR, Part 136, rev. 1988.

Methods 1000 through 9999: see "Test Methods for Evaluating Solid Waste", U.S. EPA SW-846, 3rd edition, 1986.

* Reporting Limits are a function of the dilution factor for any given sample. To obtain the actual reporting limits for this sample, multiply the stated reporting limits by the dilution factor.

SAMPLE DESCRIPTION: GS-1 10-17-89 1525
LAB NO.: (-37766)

Parameter	Reporting Limit	Results	Units
DILUTION FACTOR*		1	
PETROLEUM HYDROCARBONS			
Volatile, as Gasoline	0.05	ND	mg/L
Benzene	0.5	ND	ug/L
Ethyl benzene	0.6	ND	ug/L
Toluene	0.5	ND	ug/L
Xylenes, total	1.5	ND	ug/L

SAMPLE DESCRIPTION: GS-2 10-17-89 1300
LAB NO.: (-37767)

Parameter	Reporting Limit	Results	Units
DILUTION FACTOR*		5	
PETROLEUM HYDROCARBONS			
Volatile, as Gasoline	0.05	5.6	mg/L
Benzene	0.5	340	ug/L
Ethyl benzene	0.6	1,200	ug/L
Toluene	0.5	27	ug/L
Xylenes, total	1.5	62	ug/L

SAMPLE DESCRIPTION: GS-3 10-17-89 1430
LAB NO.: (-37768)

Parameter	Reporting Limit	Results	Units
DILUTION FACTOR*		2	
PETROLEUM HYDROCARBONS			
Volatile, as Gasoline	0.05	8.8	mg/L
Benzene	0.5	380	ug/L
Ethyl benzene	0.6	580	ug/L
Toluene	0.5	6	ug/L
Xylenes, total	1.5	42	ug/L

NET Pacific, Inc.

435 TESCONI CIRCLE
SANTA ROSA, CA 95401
TEL: 707-526-7200
FAX: 707-526-9623

CHAIN OF CUSTODY RECORD

PROJ. NO. 8207

PROJECT NAME: 230 MacArthur Blvd., Oakland
Ensco, Dave Siegel

SAMPLERS: (Signature) John C. Penrod

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TPH-G/BTEX	REMARKS
GS-1	10/17	1525			18'	2		ground water
GS-2	↓	1360			17'	1		"
GS-3	↓	1430			18'	2		"

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
John C. Penrod					
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
Michael Seda	10/17/89 1730	K Temple	10/17/89 1730	ENSCO - MOB LAB JOB # 8207	

APPENDIX B

LABORATORY ANALYTICAL DATA AND CHAIN-OF-CUSTODY

SEQUOIA ANALYTICAL

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

Ensco Environmental Services
41674 Christy Street
Fremont, CA 94538
Attention: Kay Pannell

Project: 1847G, Shell MacArthur

Enclosed are the results from 2 water samples received at Sequoia Analytical on December 7,1989. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
9120665	Water, BB 1	12/6/89	EPA 5030/8015/8020
9120666	Water, MW 3	12/6/89	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

VM Tague

Vickie Tague
Project Manager

SEQUOIA ANALYTICAL

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

Ensco Environmental Services	Client Project ID:	1847G, Shell MacArthur	Sampled:	Dec 6, 1989
41674 Christy Street	Matrix Descript:	Water	Received:	Dec 7, 1989
Fremont, CA 94538	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Dec 11, 1989
Attention: Kay Pannell	First Sample #:	912-0665 A	Reported:	Dec 15, 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)
912-0665	BB 1	N.D.	N.D.	0.75	N.D.	N.D.
912-0666	MW 3	40	1.3	N.D.	0.44	0.66
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

Vickie Tague
Project Manager

CHAIN OF CUSTODY RECORD

PROJECT NO	PROJECT NAME
1847 G	Shell-MacArthur (230 MacArthur, Oak)

SAMPLERS (Signature) Michael H Friedman

NO.	DATE	TIME	STATION AND LOCATION
BB-1	12-6-89	1:43	2 preserved VOA
MW-1	"	1:47	" "

TEST REQUESTED: TPHG/BTEX

WC# ~~BC#~~ 204 5508 0703

LAB ~~[redacted]~~ Sequoia

TURN AROUND TIME ~~Normal~~ 5 day

REMARKS: [redacted]

9120665 AA 66

EXP Code: 5440
AFE: 986645
~~[redacted]~~

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
Michael H Friedman	12-7-89	9:30a	M. Paschal
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:

REMARKS:

REPORT TO: Kay

FORM DATED 5-30-89

ensco environmental services, Inc.
41674 Christy Street
Fremont, C.A. 94538-3114
(415) 659-0404
Fax (415) 651-4677
Contr. Lic. No. 550205

SEQUOIA ANALYTICAL

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

Exceltech
41674 Christy Street
Fremont, CA 94538
Attention: Kay Pannell

Project: #1847-2G, Shell, 230 W. MacArthur Blvd

Enclosed are the results from 2 water samples received at Sequoia Analytical on December 19,1989. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
9122725 A	Water, MW-1	12/18/89	EPA 5030/8015/8020
9122726 A	Water, MW-2	12/18/89	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

VMTague

Vickie Tague
Project Manager

SEQUOIA ANALYTICAL

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

Exceltech	Client Project ID:	#1847-2G, Shell, 230 W. MacArthur Blvd	Sampled:	Dec 18, 1989
41674 Christy Street	Matrix Descript:	Water	Received:	Dec 19, 1989
Fremont, CA 94538	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Dec 27, 1989
Attention: Kay Pannell	First Sample #:	912-2725 A	Reported:	Jan 2, 1990

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)
9122725 A	MW-1	N.D.	N.D.	N.D.	N.D.	N.D.
9122726 A	MW-2	N.D.	N.D.	0.50	N.D.	N.D.
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

MT Tague

Vickie Tague
Project Manager

CHAIN OF CUSTODY RECORD

PROJECT NO	PROJECT NAME	TEST REQUESTED	P.O. #
1847-26	Shell, 230 Macarthur Blvd. Oakland	TPH/BTEX	LAB Sequoia
SAMPLERS (Signature)	Michael Friedman		TURN AROUND TIME Normal

NO.	DATE	TIME	STATION AND LOCATION	TPH/BTEX	REMARKS
MW-1	12-8-89	2:15	2 pres. VOA's	X	9122-15 a-b
MW-2	"	3:05	"	X	20-1
					204-5508-0703
					98645
					DML

RELINQUISHED BY:	DATE: TIME:	RECEIVED BY:	RELINQUISHED BY:	DATE: TIME:	RECEIVED BY:
Michael H. Friedman	12-19-89 10:35				
RELINQUISHED BY:	DATE: TIME:	RECEIVED BY:	RELINQUISHED BY:	DATE: TIME:	RECEIVED BY:

REMARKS:

REPORT TO: Kay Parnell

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APPENDIX C

EES GROUNDWATER SAMPLING PROTOCOL

ENSCO ENVIRONMENTAL SERVICES, INC.

GROUNDWATER SAMPLING PROTOCOL

GROUNDWATER SAMPLING PROTOCOL

Sampling of groundwater is performed by Ensco Environmental Services, Inc. (EES) sampling technicians. Summarized field sampling procedures are as follows:

1. Measurements of liquid surface in the well and depth of monitoring well.

2. Field check for presence of floating product.

3. Purge well prior to collecting samples.

4. Monitor groundwater for temperature, pH, and specific conductance during purging.

5. Collect samples using Environmental Protection Agency (EPA) approved sample collection devices, i.e., teflon or stainless steel bailers or pumps.

6. Transfer samples into laboratory-supplied EPA-approved containers.

7. Label samples and log onto chain-of-custody form.

8. Store samples in a chilled ice chest for shipment to a state-certified analytical laboratory.

GROUNDWATER SAMPLING PROCEDURES

Equipment Cleaning

All water samples are placed in precleaned laboratory-supplied bottles. Sample bottles and caps remain sealed until actual usage at the site. All equipment which comes in contact with the well or groundwater is thoroughly cleaned with a tri sodium phosphate (TSP) solution and rinsed with deionized or distilled water before use at the site. This cleaning procedure is followed between each well sampled. Wells are sampled in approximate order of increasing contamination. If a teflon cord is used, the cord is cleaned. If a nylon or cotton cord is used, a new cord is used in each well All equipment blanks are collected prior to sampling. The blanks are analyzed periodically to ensure proper cleaning.

Water Level Measurements

Depth to groundwater is measured in each well using a sealed sampling tape or scaled electric sounder prior to purging or sampling. If the well is known or suspected of containing free-phase petroleum hydrocarbons, an optical interface probe is used to measure the hydrocarbon thickness and groundwater level. Measurements are collected and recorded to the nearest 0.01 foot.

Bailer Sheen Check

If no measurable free-phase petroleum hydrocarbons are detected, a clear acrylic bailer is used to determine the presence of a sheen. Any observed film as well as odor and color of the water is recorded.

Groundwater Sampling

Prior to groundwater sampling, each well is purged of "standing" groundwater. Either a bailer, hand pump, or submersible pump is used to purge the well. The amount of purging is dependent on the well yield. In a high yield formation, samples will be collected when normal field measurement, including temperature, pH, and specific conductance stabilize, provided a minimum of three well-casing volumes of water have been removed. Field measurements will be taken after purging each well volume. In low yield formations, the well is purged such that the "standing" water is removed and the well is allowed to recharge. (Normal field measurements will be periodically recorded during the purging process.) In situations where recovery to 80% of static water level is estimated, or observed to exceed a two hour duration, a sample will be collected when sufficient volume is available for a sample for each parameter. At no time will the well be purged dry so that the recharge rate causes the formation water to cascade into the well.

In wells where free-phase hydrocarbons are detected, the free-phase portion will be bailed from the well and the volume removed recorded. A groundwater sample will be collected if bailing reduces the amount of free-phase hydrocarbons to the point where they are not present in the well. Well sampling will be conducted using one of the aforementioned methods depending on the formation yield. However, if free-phase hydrocarbons persist throughout bailing, then groundwater samples will not be collected.

Groundwater sample containers are labeled with a unique sample number, location, product name and number, and date of collection. All samples are logged onto a chain-of-custody form and placed in a chilled ice chest for shipment to a laboratory certified by the State of California Department of Health Services.