Shell Oil Company

EAST BAY MARKETING DISTRICT

P.O. Box 4023
Concord, CA 94524
(415) 676-1414

February 7, 1989

2/10/89
ALAMEDA COUNTY
DEPT. OF ENVIRONMENTAL HEALTH
HAZARDOUS MATERIALS

Ms. Lisa McCann
Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Street, Room 6000
Oakland, CA 94607

SUBJECT: SHELL STATION
230 W. MACARTHUR BOULEVARD
OAKLAND, CA 94611

Dear Ms. McCann:

Attached is the Groundwater Sampling Report for the above station. Sample analysis of the three onsite wells indicates very low or non-detectable levels of contamination.

If you have any questions or comments, please contact me at (415) 676-1414, Ext. 127.

Very truly yours,

Diane Lundquist

Diane Lundquist
Environmental Engineer

Attachment

cc + Attach: Mr. Craig Mayfield, Alameda County Flood Control
Mr. Lowell Miller, Alameda County Health Department

JM/1

ENSCO ENVIRONMENTAL SERVICES, INC.

JANUARY QUARTERLY REPORT
GROUND-WATER SAMPLING
AND ANALYSES

FOR

SHELL OIL COMPANY
230 MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

Project No. 1847G
FEBRUARY, 1989

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

February 6, 1989

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

Attn: Ms. Diane Lundquist

Re: January Quarterly Report
Ground-Water Sampling and Analyses
Shell Gas Station, 230 MacArthur Boulevard, Oakland, California
EES Project No. 1847G

Dear Ms. Lundquist:

This report presents the results of ground-water sampling and analyses performed at the above referenced site since October, 1988. It includes all current and past analytical data acquired during the course of this ongoing investigation.

If you have any questions, please call.

Sincerely,
Ensco Environmental Services, Inc.

Stephen Costello
Project Geologist

Christopher M. Palmer, C.E.G. 1262 R.E.A. 285
Senior Program Manager

SC/CMP/sr
Enclosure

JANUARY QUARTERLY REPORT
GROUND-WATER SAMPLING AND ANALYSES

FOR

SHELL OIL COMPANY
230 MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

INTRODUCTION

This report presents the results of ground-water 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 (see Figure 1). Ground-water sampling has been performed monthly since October 1988. This report represents the first quarterly report for this property. The program objectives are listed below.

- Plot the ground-water contour surface and inferred flow direction.
- Investigate for the presence of a petroleum hydrocarbon plume and 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 ground-water samples to determine concentrations of total petroleum hydrocarbons as gasoline (TPHG), benzene, toluene, ethyl benzene, and total xylenes (BTEX).

BACKGROUND

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

Emcon Associates performed an investigation on the property on April 14, 1986 which involved the drilling of four exploratory borings within the tank complex area. These borings were advanced to final depths of 20.5 feet. Ground water was initially encountered at an approximate depth of 13 feet in each boring. Emcon reported that the soils underlying the tank complex consisted of fine to medium grained silty sand and clayey silt to the total depth explored. The soil samples collected were analyzed for the presence of total petroleum hydrocarbons (TPH) and benzene, toluene, and xylene (BTX) compounds. One soil sample was analyzed for total lead. Laboratory results indicated that TPH concentrations in the soils analyzed ranged from 1,200 to 5,700 parts-per-million (ppm) at depths between 8 and 15 feet.

An additional site assessment was performed by W.W. Irwin, Inc. on December 2 and 3, 1986 which consisted of analyzing soil gas vapors from 38 probe holes located within the tank complex and throughout the rest of the site. They concluded that very high concentrations of hydrocarbons were primarily confined to the area of the tank complex and the vicinity of the pump island (southwest portion of site) nearest MacArthur Boulevard.

On March 12, 1987, Wayne Perry Construction, Inc. installed three vapor recovery wells within the tank complex for the purpose of venting the soil. These wells were installed to a depth of 13 feet and were constructed of solid and machine-slotted 4-inch diameter PVC pipe. The slotted interval (slot size 0.02-inch) extended from the bottoms of the borings to three feet below ground surface. A soil venting system, utilizing an activated carbon scrubber, was operated on the site between April and November, 1987. Gas vapors were analyzed using a Foxboro 128 OVA system with a portable chart recorder.

Wayne Perry Construction concluded that the well gas contained light hydrocarbon compounds and that prolonged venting reduced their concentrations. Once the venting operation stopped, however, the hydrocarbon concentrations began increasing. On August 27, 1987 Wayne Perry drilled and sampled two additional borings within the tank complex for the purpose of analyzing concentrations of residual hydrocarbons remaining in the soils beneath the tanks after the first phase of soil venting was completed. Analyses of the samples collected indicated that the highest remaining concentrations of TPH (1,870 ppm) occurred at a depth of eight feet.

On November 2, 1987 the underground storage tanks were removed from the site and soil samples were collected from the excavation and soil stockpile. Analytical results indicated that TPH contamination was detected in the soil samples from the excavation at concentrations ranging from 8.6 to 480 ppm at a depth of 15 feet. Five composite samples were collected from the soil stockpile and the TPH concentrations detected in them ranged from 8.4 to 250 ppm.

In June of 1988, Shell contracted EES to perform a supplemental site assessment for the purpose of further delineating the subsurface hydrocarbon contamination at the subject property. The scope of work for this project included drilling three exploratory borings, collecting soil samples from the borings, converting each boring to a ground-water monitoring well, development and sampling of the wells, providing laboratory analyses of the samples, surveying the well heads, and technical report preparation. The field work was performed in July, 1988. Beginning in October 1988, EES initiated a monthly sampling program to monitor depth, flow direction, gradient, and quality of the ground water beneath the site.

The soil and ground-water samples collected during the course of this supplemental investigation were analyzed for TPHG with BTEX distinction. The soil sample collected at a depth of 10 feet from the boring for MW-3 in the area of the former underground fuel tanks was found by the laboratory analyses to contain TPHG at a concentration of 278 ppm. No petroleum contamination

was detected in any of the other soil samples submitted for analysis was presented in an EES report issued in November, 1988.

GROUND-WATER SAMPLING

Sampling of the monitoring wells was performed in accordance with the attached EES protocol. Prior to sampling, all wells were field checked for the presence of floating product. No floating product was observed in the wells. 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.

SITE CONDITIONS

The results of the monthly monitoring program are summarized in Table 1. Only minor quantities of dissolved hydrocarbons have been detected in the ground water over the past quarter. The December 9, 1988 analytical results indicate that only toluene (0.0006 ppm) and total xylenes (0.003 ppm) are present in well MW-2. No other hydrocarbon contamination was detected in any of the water samples submitted for laboratory analysis on this date.

Ground-water surface contour maps were prepared based on the data collected from the on-site ground-water monitoring wells. These maps are presented as Figures 2, 3, and 4. The apparent ground-water surface was inclined to the north in October and to the northwest in November and December. The calculated gradient has decreased over the past quarter from 0.0029 feet-per-foot in October to 0.0025 feet-per-foot in November to 0.0022 feet-per-foot in December.

To compare hydrocarbon concentrations with time, logarithmic graphical representations of current data are presented in Figures 5 through 7. These graphs show the concentrations of dissolved constituents detected during monitoring of the wells.

LONG-TERM MONITORING

EES will continue to monitor the wells on a monthly basis. The monitoring will include depth-to-water measurements as well as sample collection for laboratory analysis. The next quarterly report summarizing the results of this monitoring program will be issued in April, 1989.

CONCLUSIONS AND RECOMMENDATIONS

1. Ground water at the subject site was measured at elevations ranging between 60.0 and 60.6 feet above mean sea level during the last quarter.

2. Very low concentrations of dissolved hydrocarbons have been sporadically detected in the ground water beneath the subject property. No free product was observed in the ground-water monitoring wells at the site.

3. EES will continue with the current monitoring schedule. The next quarterly ground-water monitoring report will be submitted in April 1989, and will include monthly depth, flow direction, gradient, and quality data. If the concentrations of hydrocarbons continue to be below action levels the monitoring will revert to quarterly sample collection and monthly gradient determination. This schedule will continue until reviewed by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB). In general, the SFBRWQCB requires a minimum of one year of monitoring with "clean" results to discontinue site ground-water monitoring.

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
Attn: Mr. Craig Mayfield

Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Street
Oakland, California 94607
Attn: Ms. Lisa McCann

Alameda County Health Department
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621
Attn: 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.

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 of field personnel.
3. The results of laboratory analyses performed by a state-certified laboratory.
4. Referenced documents.
5. Our understanding of the regulations of the State of California and Alameda County and/or the City of Oakland.

It is possible that variations in the soil or ground-water conditions could exist beyond the points explored in this investigation. Also, changes in the ground-water 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 ordinarily exercised by members of our profession currently practicing under similar conditions in the San Francisco Bay Area. Please note that contamination of soil and ground water 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.

TABLE 1
GROUND-WATER ANALYSES DATA

230 MacArthur Blvd; 1847G

SAMPLE NUMBER	DATE SAMPLED	TPHG (ppm)	BENZENE (ppm)	TOLUENE (ppm)	ETHYL BENZENE (ppm)	TOTAL XYLENES (ppm)	WELL ELEVATION	DEPTH TO WATER
MW-1	7/14/88	ND	ND	ND	ND	ND	73.89	13.30
	10/04/88	BRL	0.008	0.0043	BRL	0.009		13.65
	11/10/88	BRL	BRL	BRL	BRL	BRL		13.55
	12/09/88	ND	ND	ND	ND	ND		13.22
MW-2	7/14/88	ND	0.0079	0.0026	0.0011	0.004	75.24	15.18
	10/04/88	0.09	BRL	0.0013	0.0025	0.012		15.30
	11/10/88	BRL	BRL	BRL	BRL	0.002		15.17
	12/09/88	ND	ND	0.0006	ND	0.003		14.82
MW-3	7/14/88	ND	ND	ND	ND	ND	74.68	14.05
	10/04/88	BRL	BRL	BRL	BRL	0.005		14.60
	11/10/88	BRL	BRL	BRL	BRL	BRL		14.35
	12/09/88	ND	ND	ND	ND	ND		14.04

TPHG = Total Petroleum Hydrocarbons as Gasoline
ppm = parts-per-million
ND = Not Detected
B R L = Below Reporting Limit

Note: See lab reports for detection limits and reporting limit

LEGEND:

SITE LOCATION

N

0 1

SCALE IN MILES

BASE: USGS 7.5 MINUTE TOPOGRAPHIC SHEET

ensco environmental services, inc.

SITE LOCATION MAP

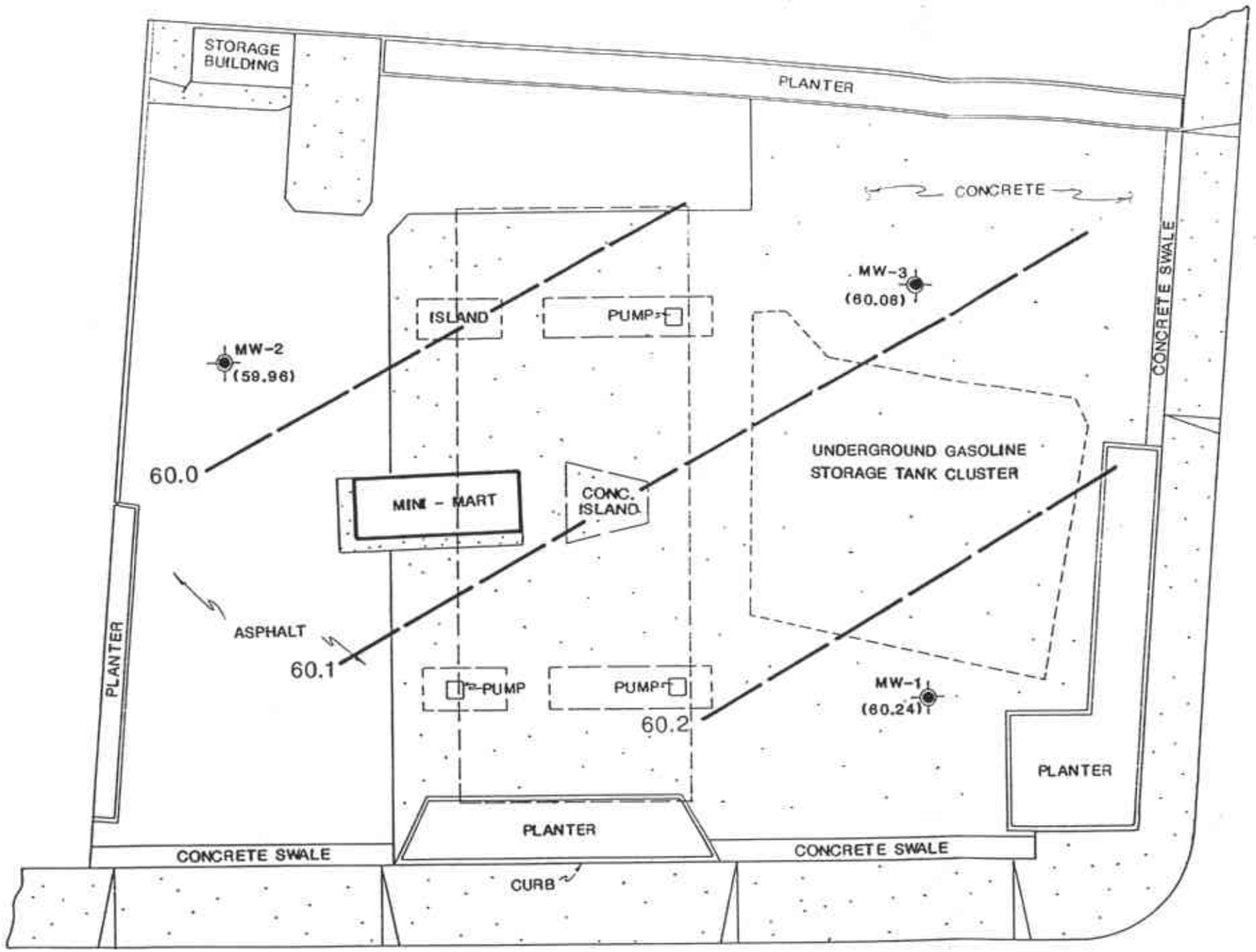
SHELL SERVICE STATION

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 GROUND-WATER MONITORING WELL
- (59.96) GROUND-WATER ELEVATION IN FEET (DATUM: M.S.L.)
- 60.0 GROUND-WATER ELEVATION CONTOUR LINE IN FEET (DATUM: M.S.L.)

N

0 20

APPROX. SCALE IN FEET

ensco environmental services, Inc.

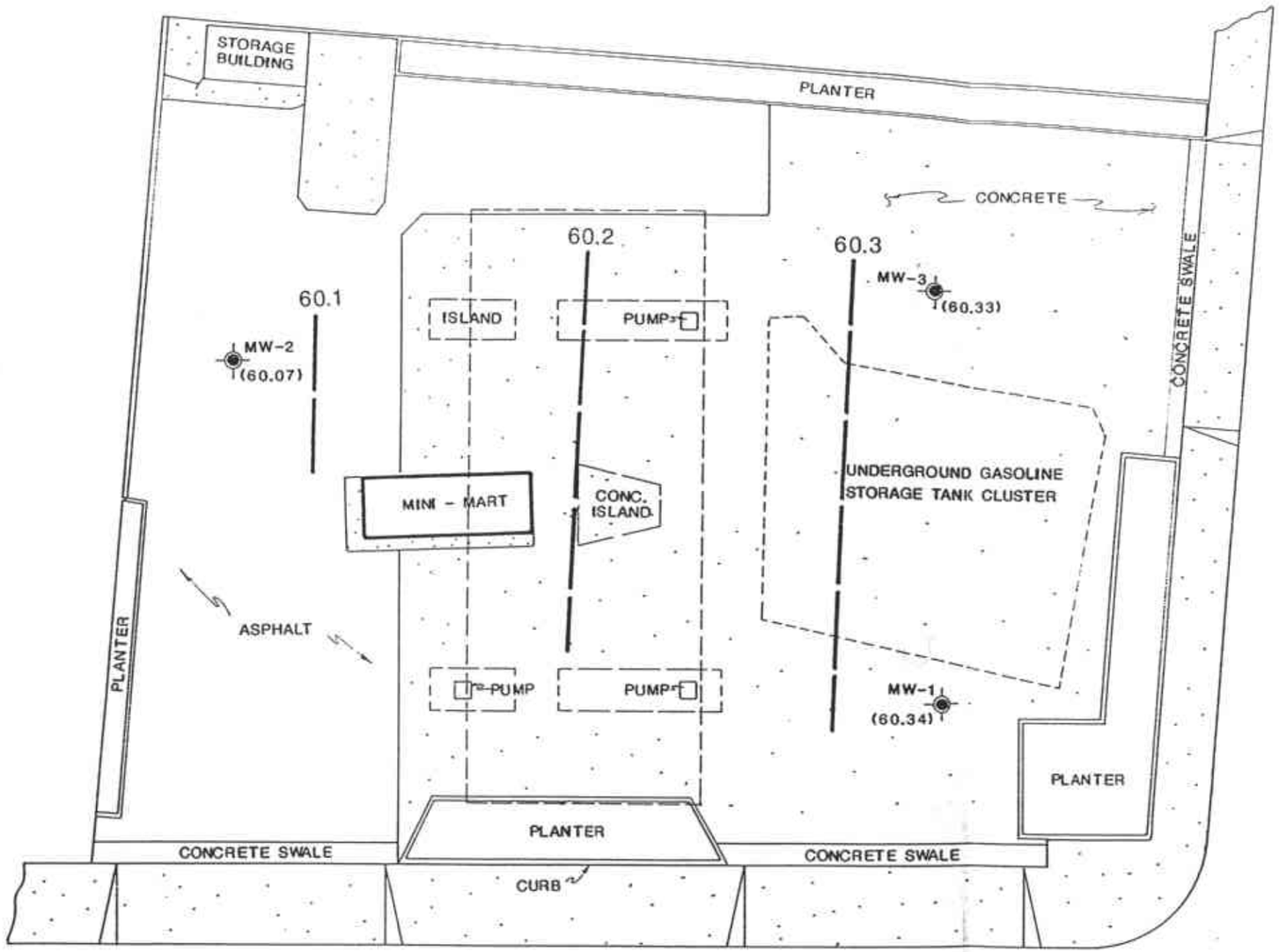
GROUND-WATER ELEVATION MAP (10/4/88)

SHELL SERVICE STATION

230 MAC ARTHUR BOULEVARD

OAKLAND, CALIFORNIA

REVIEWED BY:	APPROVED BY:
JOB #: 1847G	DRAWN BY: J.C.
DATE: 12-14-88	DRAWING #: FIG. 2



LEGEND

- MW-1 GROUND-WATER MONITORING WELL
- (60.34) GROUND-WATER ELEVATION IN FEET (DATUM: M.S.L.)
- 60.1 GROUND-WATER ELEVATION CONTOUR IN FEET (DATUM: M.S.L.)

N

0 20

APPROX. SCALE IN FEET

ensco environmental services, inc.

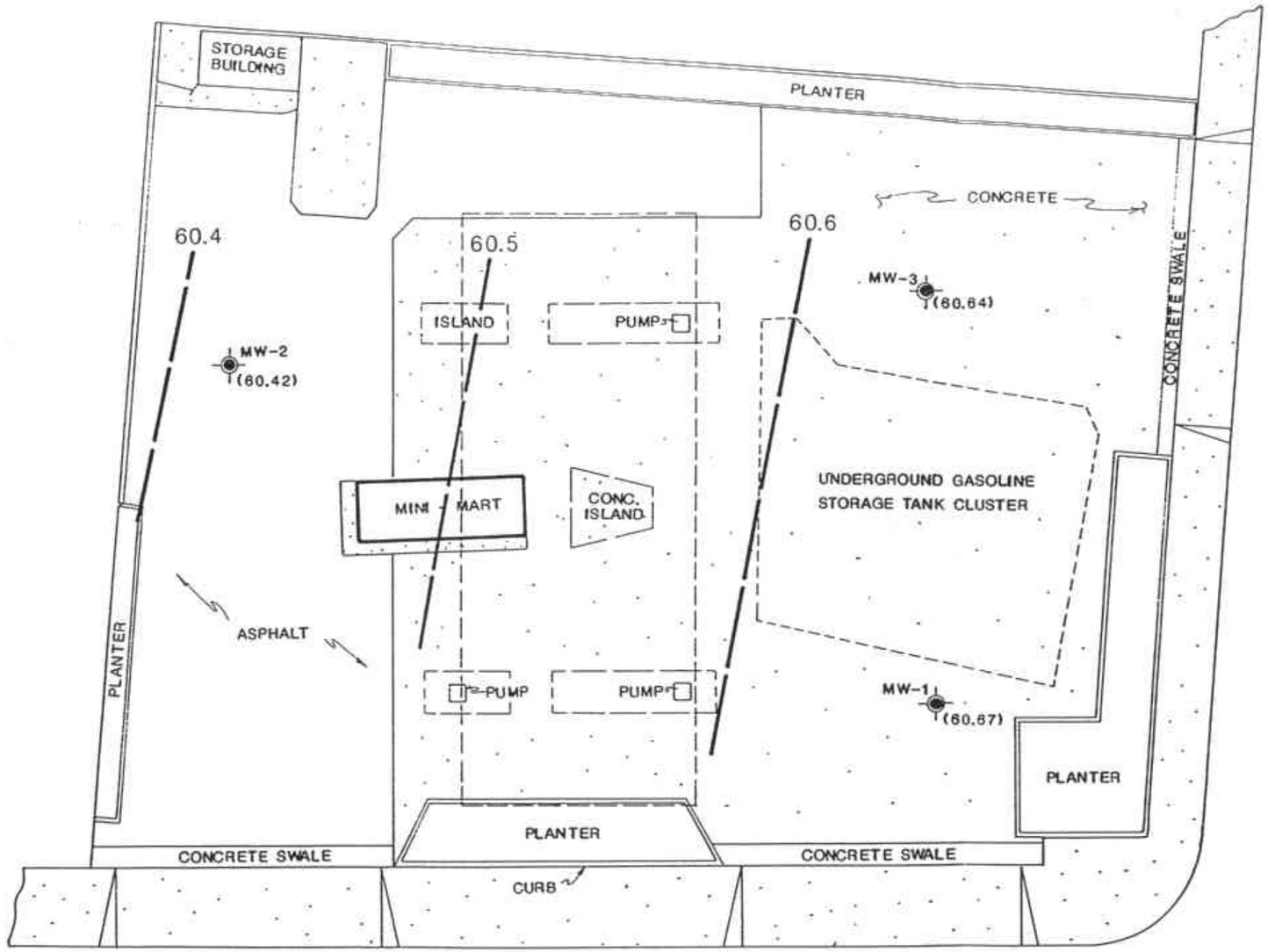
GROUND-WATER ELEVATION MAP (11/10/88)

SHELL SERVICE STATION

230 MAC ARTHUR BOULEVARD

OAKLAND, CALIFORNIA

REVIEWED BY:	APPROVED BY:
JOB #: 1847G	DRAWN BY: J.C.
DATE: 12-14-88	DRAWING #: FIG. 3



LEGEND

MW-1	GROUND-WATER MONITORING WELL
(60.64)	GROUND-WATER ELEVATION IN FEET (DATUM: M.S.L.)
60.6	GROUND-WATER ELEVATION CONTOUR IN FEET (DATUM: M.S.L.)

N

0 20

APPROX. SCALE IN FEET

ensco environmental services, inc.

GROUND-WATER ELEVATION MAP (12/9/88)

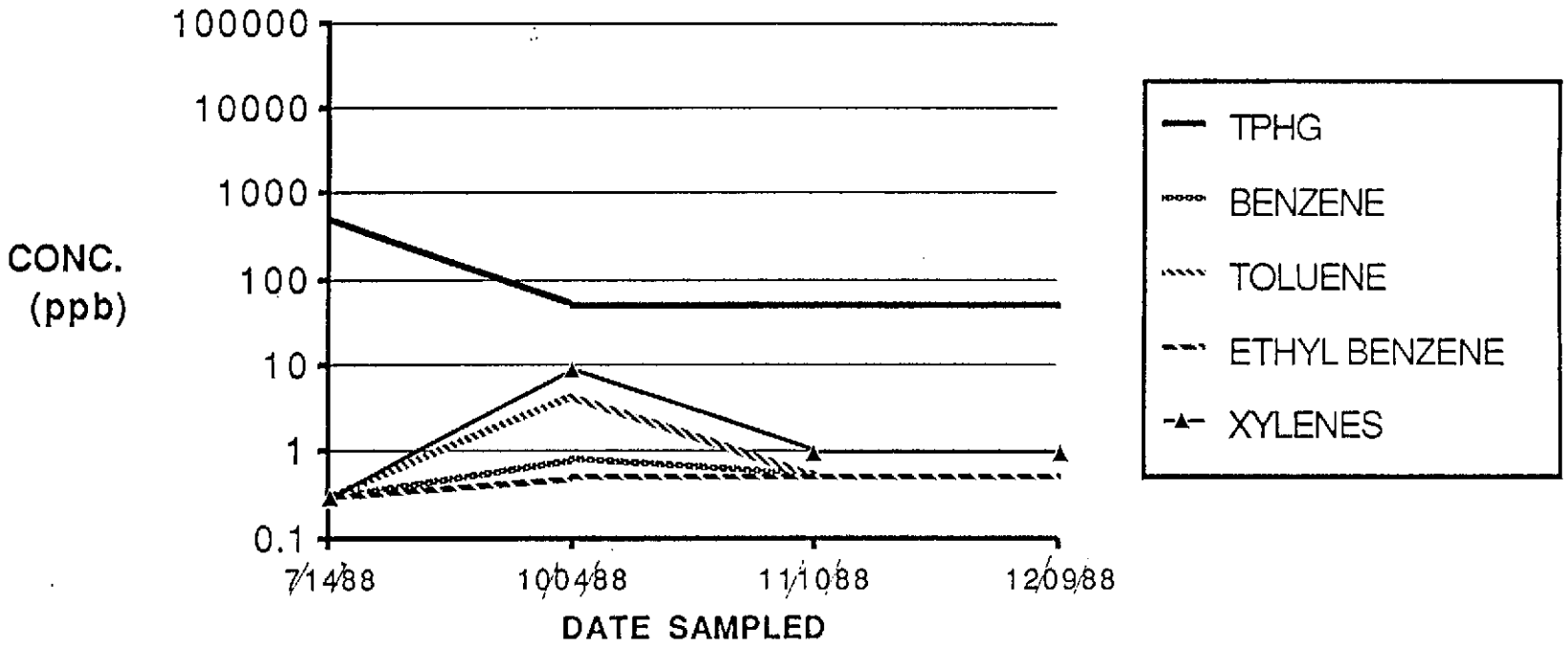
SHELL SERVICE STATION

230 MAC ARTHUR BOULEVARD

OAKLAND, CALIFORNIA

REVIEWED BY:	APPROVED BY:
JOB #: 1847G	DRAWN BY: J.C.
DATE: 12-14-88	DRAWING #: FIG. 4

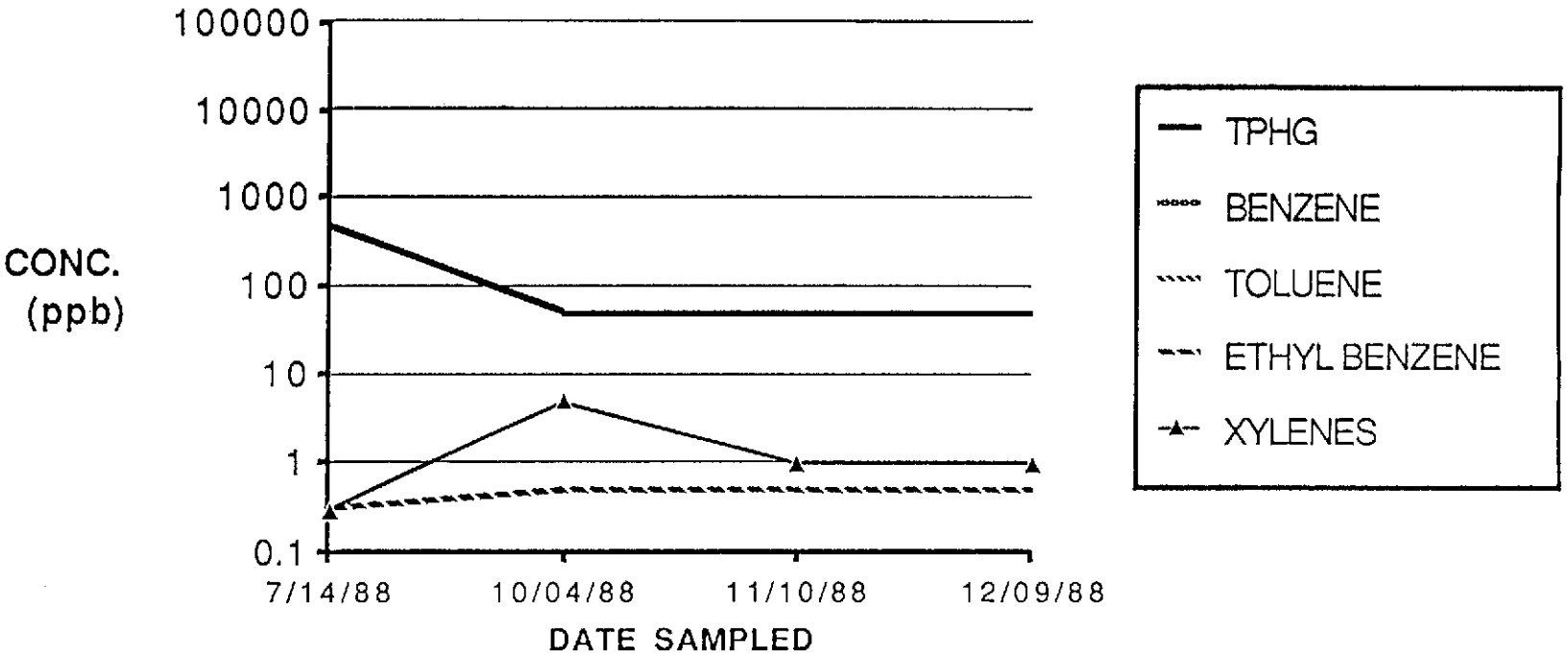
MW-1 GROUND-WATER ANALYSES DATA
EES DATA



NOTE: Graphed results may display higher laboratory equipment detection or reporting limits. For exact analytical results, refer to appended laboratory reports.

Figure # 5

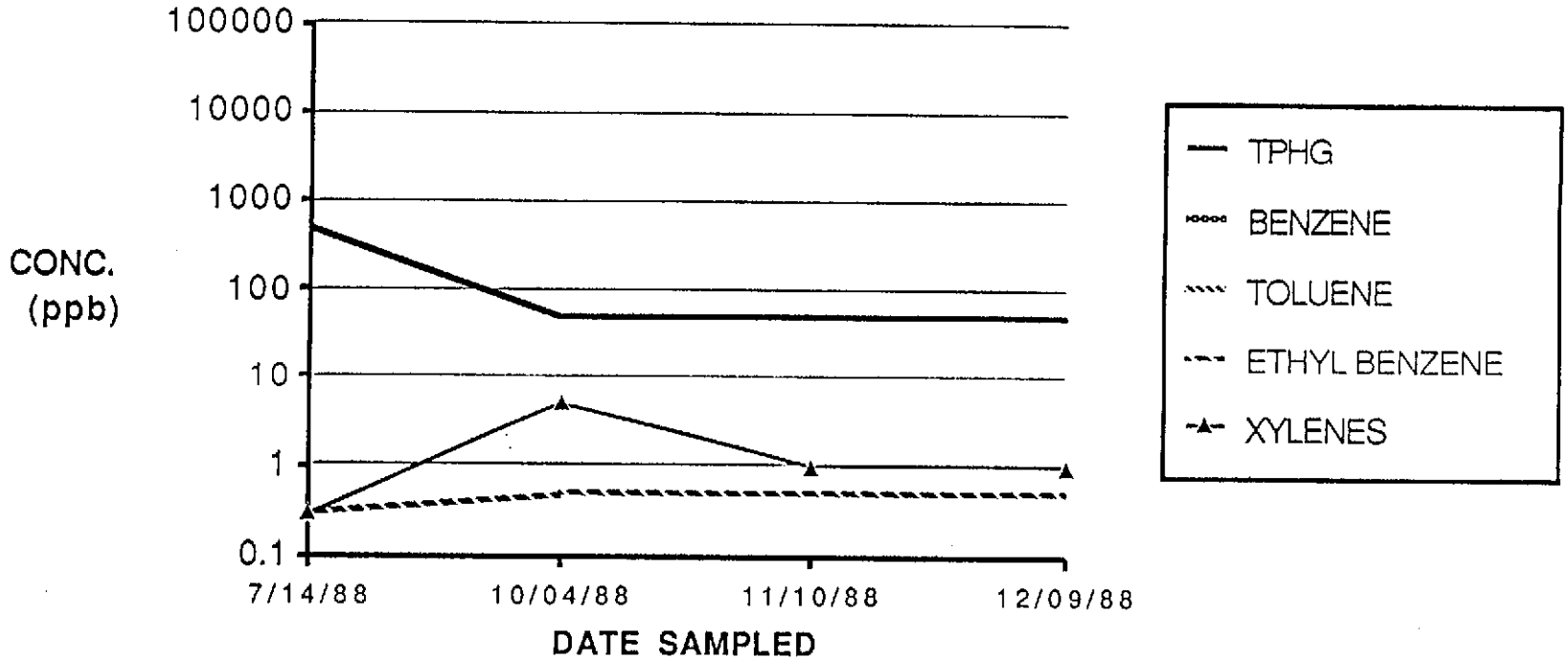
MW-2 GROUND-WATER ANALYSES DATA
EES DATA



NOTE: Graphed results may display higher laboratory equipment detection or reporting limits. For exact analytical results, refer to appended laboratory reports.

Figure # 6

MW-3 GROUND-WATER ANALYSES DATA
EES DATA



NOTE: Graphed results may display higher laboratory equipment detection or reporting limits. For exact analytical results, refer to appended laboratory reports.

Figure # 7

APPENDIX A

LABORATORY ANALYTICAL REPORTS

ANAMETRIX INC
Environmental & Analytical Chemistry

1961 Concourse Drive, Suite E
San Jose, CA 95131
(408) 432-8192 • Fax (408) 432-5198

Dave Blunt
Ensco
41674 Christy Street
Fremont, CA 94538-3114

October 12, 1988
Work Order Number 8810025
Date Received 10/05/88
PO No. 2754
Site: Shell Station
MacArthur Blvd.
Oakland, CA

Dear Mr. Blunt:

Three water samples were received for analysis of BTEX plus total volatile hydrocarbons as gasoline by gas chromatography, using the following EPA method(s):

ANAMETRIX I.D.	SAMPLE I.D.	METHOD(S)
8810025-01	1847G MW-2	TVH/BTEX
-02	"	"
-03	"	"

RESULTS

See enclosed data sheets, Pages 2 thru 4.

If there is any more that we can do, please give us a call. Thank you for using ANAMETRIX, INC.

Sincerely,

Sarah Schoen

Sarah Schoen
GC Manager

SS/dlm

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 629-1132

Sample I.D.	: 1847G MW-2	Anametrix I.D.	: 8810025-01
Matrix	: WATER	Analyst	:
Date sampled	: 10-04-88	Supervisor	:
Date anl. TVH	: 10-10-88	Date released	: 10-12-88
Date ext. TEH	: NA	Date ext. TOG	: NA
Date anl. TEH	: NA	Date anl. TOG	: NA

CAS #	Compound Name	Reporting Limit (ppm)	Amount Found (ppm)
71-43-2	Benzene	0.0005	BRL
108-88-3	Toluene	0.0005	0.0013
100-41-4	Ethylbenzene	0.0005	0.0025
1330-20-7	Total Xylenes	0.001	0.012
	TVH as Gasoline	0.05	0.09

BRL - Below reporting limit.
TVH - Total Volatile Hydrocarbons is determined by modified EPA 8015 with either headspace or purge and trap.
TEH - Total Extractable Hydrocarbons is determined by modified EPA 8015 with direct injection.
TOG - Total Oil & Grease is determined by Standard Method 503E.
BTEX- Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow CRWQCB Region 2 guidelines.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 629-1132

Sample I.D.	: 1847G MW-1	Anametrix I.D.	: 8810025-02
Matrix	: WATER	Analyst	: aw
Date sampled	: 10-04-88	Supervisor	: RS
Date anl. TVH	: 10-10-88	Date released	: 10-12-88
Date ext. TEH	: NA	Date ext. TOG	: NA
Date anl. TEH	: NA	Date anl. TOG	: NA

CAS #	Compound Name	Reporting Limit (ppm)	Amount Found (ppm)
71-43-2	Benzene	0.0005	0.0008
108-88-3	Toluene	0.0005	0.0043
100-41-4	Ethylbenzene	0.0005	BRL
1330-20-7	Total Xylenes	0.001	0.009
	TVH as Gasoline	0.05	BRL

BRL - Below reporting limit.
TVH - Total Volatile Hydrocarbons is determined by modified EPA 8015 with either headspace or purge and trap.
TEH - Total Extractable Hydrocarbons is determined by modified EPA 8015 with direct injection.
TOG - Total Oil & Grease is determined by Standard Method 503E.
BTEX- Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow CRWQCB Region 2 guidelines.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 629-1132

Sample I.D.	: 1847G MW-3	Anametrix I.D.	: 8810025-03
Matrix	: WATER	Analyst	:
Date sampled	: 10-04-88	Supervisor	:
Date anl. TVH	: 10-10-88	Date released	: 10-12-88
Date ext. TEH	: NA	Date ext. TOG	: NA
Date anl. TEH	: NA	Date anl. TOG	: NA

CAS #	Compound Name	Reporting Limit (ppm)	Amount Found (ppm)
71-43-2	Benzene	0.0005	BRL
108-88-3	Toluene	0.0005	BRL
100-41-4	Ethylbenzene	0.0005	BRL
1330-20-7	Total Xylenes	0.001	0.005
	TVH as Gasoline	0.05	BRL

BRL - Below reporting limit.
TVH - Total Volatile Hydrocarbons is determined by modified EPA 8015 with either headspace or purge and trap.
TEH - Total Extractable Hydrocarbons is determined by modified EPA 8015 with direct injection.
TOG - Total Oil & Grease is determined by Standard Method 503E.
BTEX- Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow CRWQCB Region 2 guidelines.

AMETRIX INC
Environmental & Analytical Chemistry

1961 Concourse Drive Suite E
San Jose, CA 95131
(408) 432-8192 • Fax (408) 432-8198

Dave Blunt
Ensco Environmental
41674 Christy Street
Fremont, CA 94538-3114

November 17, 1988
Work Order Number 8811106
Date Received 11/11/88
PO No. 10982
Site Specification:
Shell Oil
MacArthur Blvd.
Oakland, CA

Dear Mr. Blunt:

Three water samples were received for analysis of BTEX plus total volatile hydrocarbons as gasoline by gas chromatography, using the following EPA method(s):

ANAMETRIX I.D.	SAMPLE I.D.	METHOD(S)
8811106-01	1847G MW-2	TVH/BTEX
-02	" MW-1	"
-03	" MW-3	"

RESULTS

See enclosed data sheets, Pages 2-4.

NOTE: Amounts reported are net values, i.e. corrected for method blank contamination.

If there is any more that we can do, please give us a call. Thank you for using ANAMETRIX, INC.

Sincerely,

Sarah Schoen

Sarah Schoen, Ph.D.
GC Manager

SRS/dm

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

mple I.D. : 1847G MW-2
atrix : WATER
Date sampled : 11-10-88
Date anl. TVH: 11-16-88
Date ext. TEH: NA
Date anl. TEH: NA

Anametrix I.D. : 8811106-01
Analyst : [illegible]
Supervisor : [illegible]
Date released : 11-17-88
Date ext. TOG : NA
Date anl. TOG : NA

CAS #	Compound Name	Reporting Limit (ppm)	Amount Found (ppm)
71-43-2	Benzene	0.0005	BRL
108-88-3	Toluene	0.0005	BRL
100-41-4	Ethylbenzene	0.0005	BRL
1330-20-7	Total Xylenes	0.001	0.002
	TVH as Gasoline	0.05	BRL

BRL - Below reporting limit.
TVH - Total Volatile Hydrocarbons is determined by modified EPA 8015 with either headspace or purge and trap.
TEH - Total Extractable Hydrocarbons is determined by modified EPA 8015 with direct injection.
TOG - Total Oil & Grease is determined by Standard Method 503E.
BTEX- Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow CRWQCB Region 2 guidelines.

Shell Oil
MacArthur Blvd.
Oakland, CA

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: 1847G MW-1	Anametrix I.D.	: 8811106-02
Matrix	: WATER	Analyst	: [illegible]
Date sampled	: 11-10-88	Supervisor	: [illegible]
Date anl. TVH	: 11-16-88	Date released	: 11-17-88
Date ext. TEH	: NA	Date ext. TOG	: NA
Date anl. TEH	: NA	Date anl. TOG	: NA

CAS #	Compound Name	Reporting Limit (ppm)	Amount Found (ppm)
71-43-2	Benzene	0.0005	BRL
108-88-3	Toluene	0.0005	BRL
100-41-4	Ethylbenzene	0.0005	BRL
1330-20-7	Total Xylenes	0.001	BRL
	TVH as Gasoline	0.05	BRL

BRL - Below reporting limit.
TVH - Total Volatile Hydrocarbons is determined by modified EPA 8015 with either headspace or purge and trap.
TEH - Total Extractable Hydrocarbons is determined by modified EPA 8015 with direct injection.
TOG - Total Oil & Grease is determined by Standard Method 503E.
BTEX- Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow CRWQCB Region 2 guidelines.

Shell Oil
MacArthur Blvd.
Oakland, CA

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

mple I.D. : 1847G MW-3
trix : WATER
ate sampled : 11-10-88
Date anl. TVH: 11-16-88
Date ext. TEH: NA
Date anl. TEH: NA

Anametrix I.D. : 8811106-03
Analyst :
Supervisor :
Date released : 11-17-88
Date ext. TOG : NA
Date anl. TOG : NA

CAS #	Compound Name	Reporting Limit (ppm)	Amount Found (ppm)
71-43-2	Benzene	0.0005	BRL
108-88-3	Toluene	0.0005	BRL
100-41-4	Ethylbenzene	0.0005	BRL
1330-20-7	Total Xylenes	0.001	BRL
	TVH as Gasoline	0.05	BRL

BRL - Below reporting limit.
TVH - Total Volatile Hydrocarbons is determined by modified EPA 8015 with either headspace or purge and trap.
TEH - Total Extractable Hydrocarbons is determined by modified EPA 8015 with direct injection.
TOG - Total Oil & Grease is determined by Standard Method 503E.
BTEX- Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow CRWQCB Region 2 guidelines.

hell Oil
acArthur Blvd.
Oakland, CA

ANAMETRIX INC
Environmental & Analytical Chemistry

[illegible]

Kent Parrish
Ensco Environmental Services, Inc.
41674 Christy Street
Fremont, CA 94538-3114

December 21, 1988
Work Order Number 8812061
Date Received 12/12/88
PO No. 11302
Site: Shell Oil
230 MacArthur Blvd.
Oakland, CA
Ensco Project #1847

Dear Mr. Parrish:

Three water samples were received for analysis of BTEX plus total volatile hydrocarbons as gasoline by gas chromatography, using the following EPA method(s):

ANAMETRIX I.D.	SAMPLE I.D.	METHOD(S)
8812061-01	1847 MW-2	TVH/BTEX
-02	" MW-3	"
-03	" MW-1	"

RESULTS

See enclosed data sheets, Pages 2 thru 4.

NOTE: Amounts reported are net values, i.e. corrected for method blank contamination.

If there is any more that we can do, please give us a call. Thank you for using ANAMETRIX, INC.

Sincerely,

ANAMETRIX, INC.

Sarah Schoen

Sarah Schoen, Ph.D.
GC Manager

SRS/dg

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: 1847 MW-2	Anametrix I.D.	: 8812061-01
Matrix	: WATER	Analyst	: RK
Date sampled	: 12-09-88	Supervisor	: JHF
Date anl.TPHg	: 12-14-88	Date released	: 12-21-88
Date ext.TPHd	: NA	Date ext. TOG	: NA
Date anl.TPHd	: NA	Date anl. TOG	: NA

CAS #	Compound Name	Detection Limit (ppm)	Amount Found (ppm)
71-43-2	Benzene	0.0005	ND
108-88-3	Toluene	0.0005	0.0006
100-41-4	Ethylbenzene	0.0005	ND
1330-20-7	Total Xylenes	0.001	0.003
	TVH as Gasoline	0.05	ND

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
TPHd - Total Petroleum Hydrocarbons as diesel is determined by GCFID following either EPA Method 3510 or 3550.
TOG - Total Oil & Grease is determined by Standard Method 503E.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

Shell Oil
230 MacArthur Blvd.
Oakland, CA

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: 1847 MW-3	Anametrix I.D.	: 8812061-02
Matrix	: WATER	Analyst	: RK
Date sampled	: 12-09-88	Supervisor	: SJ
Date anl.TPHg	: 12-16-88	Date released	: 12-21-88
Date ext.TPHd	: NA	Date ext. TOG	: NA
Date anl.TPHd	: NA	Date anl. TOG	: NA

CAS #	Compound Name	Detection Limit (ppm)	Amount Found (ppm)
71-43-2	Benzene	0.0005	ND
108-88-3	Toluene	0.0005	ND
100-41-4	Ethylbenzene	0.0005	ND
1330-20-7	Total Xylenes	0.001	ND
	TVH as Gasoline	0.05	ND

ND - Not detected at or above the practical quantitation limit for the method.

TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.

TPHd - Total Petroleum Hydrocarbons as diesel is determined by GCFID following either EPA Method 3510 or 3550.

TOG - Total Oil & Grease is determined by Standard Method 503E.

BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

Shell Oil
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Oakland, CA

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: 1847 MW-1	Anametrix I.D.	: 8812061-03
Matrix	: WATER	Analyst	: RK
Date sampled	: 12-09-88	Supervisor	: SL
Date anl.TPHg	: 12-14-88	Date released	: 12-21-88
Date ext.TPHd	: NA	Date ext. TOG	: NA
Date anl.TPHd	: NA	Date anl. TOG	: NA

CAS #	Compound Name	Detection Limit (ppm)	Amount Found (ppm)
71-43-2	Benzene	0.0005	ND
108-88-3	Toluene	0.0005	ND
100-41-4	Ethylbenzene	0.0005	ND
1330-20-7	Total Xylenes	0.001	ND
	TVH as Gasoline	0.05	ND

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
TPHd - Total Petroleum Hydrocarbons as diesel is determined by GCFID following either EPA Method 3510 or 3550.
TOG - Total Oil & Grease is determined by Standard Method 503E.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

Shell Oil
230 MacArthur Blvd.
Oakland, CA

Anametrix

CHAIN OF CUSTODY RECORD

PROJECT NO	PROJECT NAME
1847G	Shell oil Oakland (MacArthur BLVD)

SAMPLERS: (Signature)

NO	DATE	TIME	DRIVE	GRAB	STATION AND LOCATION	TEST REQUESTED: TPH G/BTEX	REMARKS
MW-2	10/9/88	11:42			Two Preserved Vials	X	Two Preserved Vials
MW-1	10/9/88	12:21			" " "	X	" " "
MW-3	10/9/88	1:19			" " "	X	" " "

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

REMARKS: Report To Dave Blewett

DISTRIBUTION

FORM ED 1-28-87

ensco environmental services, inc.
41674 Christy Street
Fremont, CA 94538-3114
(415) 659-0404
Fax: (415) 651-4677
Contr. Lic. No. 464324

Ahametrix

CHAIN OF CUSTODY RECORD

P.O. #10982

PROJECT NO	PROJECT NAME
18476	Shell Oakland, MacArthur

SAMPLERS: (Signature)

NO	DATE	TIME	DRIVE	GRAB	STATION AND LOCATION
MW2	11/10/88	12:32			2 Preserved VOAs
MW-1	11/10/88	1:01			" " "
MW-3	11/10/88	1:44			" " "

TEST REQUESTED: TPH/BTEX

REMARKS: normal TAT

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

RELINQUISHED BY:	DATE	TIME	RECEIVED BY
RELINQUISHED BY:	DATE 11/11	TIME 13:30	RECEIVED BY LABORATORY Taghi Kermani

REMARKS: Report to Dave Blunt

DISTRIBUTION

FORM DATED 1-28-87

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Fremont, CA 94538-3114
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Contr. Lic. No. 464324

Anametrix

Stevens

CHAIN OF CUSTODY RECORD

P.O. # 113012

PROJECT NO	PROJECT NAME
1847	Shell-Oakland 230 MacArthur Blvd.

SAMPLERS: (Signature)

NO	DATE	TIME	DRIVE	GRAB	STATION AND LOCATION	TPHG/BTEX
MW-2	12/9	13:10			2 Preserved Vials	X
MW-3	12/9	12:50			↓	X
MW-4	12/9	1:32				X

TEST REQUESTED

REMARKS: normal TAT

RELINQUISHED BY	DATE	TIME	RECEIVED BY	RELINQUISHED BY	DATE	TIME	RECEIVED BY
RELINQUISHED BY	DATE	TIME	RECEIVED BY	RELINQUISHED BY	DATE	TIME	RECEIVED BY LABORATORY
					12/12/89	11:55	Tgh. Hemzadeh

REMARKS

DISTRIBUTION

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FORM DATED 1-28-87

APPENDIX B

EES WATER SAMPLING PROTOCOL
AND
LABORATORY PROCEEDURES

ENSCO ENVIRONMENTAL SERVICES, INC.

WATER SAMPLING PROTOCOL

WATER SAMPLING PROTOCOL

Sampling of monitoring wells is performed by Ensco Environmental Services technicians. Field sampling procedures are as follows:

1. Measurement of liquid surface elevation and depth of monitoring well.

2. Field check for presence of floating product.

3. If measurement of floating product is <1/4 inch, a ground water sample is taken.

4. Prior to sampling a minimum of four well casings volumes of water is removed.

5. During purging, water is monitored for temperature, pH, and specific conductance.

6. Samples for analysis are placed in EPA-approved containers.

7. Samples are immediately put in a chilled cooler for transportation to a state-certified analytical laboratory.

8. Appropriate documentation accompanies the sample at all times.

SAMPLING PROCEDURES

Equipment Cleaning - All water samples are placed in precleaned laboratory supplied glassware. Sample bottles and caps remain sealed until actual usage at the site. Before use at the site, all equipment which comes in contact with the well or ground water is thoroughly cleaned with trisodium phosphate and rinsed with deionized or distilled water. This procedure is followed between each well sampled, and wells are sampled in approximate order of increasing contamination. A pump blank is collected prior to all sampling. Pump blanks are analyzed periodically to ensure proper cleaning.

Water Level Measurements - Prior to checking for floating product, purging of the well, and sampling, the depth to water is measured in each well using a sealed sounding tape or a scaled electric sounder. Water levels are recorded in the field log book to the nearest 0.01 foot.

Floating Product Thickness - A field check for floating product is made with a clear acrylic or teflon bailer. Thickness of floating product is measured to the nearest 1/32 of an inch. Any observed film as-well-as odor and color of the water is recorded. 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.

Water Sampling Procedures

Immediately prior to sampling of the ground water, four well-casing volumes of water are removed. Water is removed by either bailer or submersible nitrogen-driven bladder pump. During the purging operation, purged water is monitored for temperature, pH and specific conductance. If the well is dewatered during purging, and recovery to 80% is estimated or observed to exceed a two hour duration, a sample will be collected when sufficient volume is available for the sampling parameter.

After the wells are purged and the temperature, pH, and specific conductance of the water stabilize, a water sample is collected. Samples for volatile organic and gasoline analyses are placed in EPA-approved 40-ml containers with teflon-septa caps. Sample bottles are completely filled with water with no observed air bubbles present within the bottle. Samples for acid, base and neutral organics, pesticides and heavy metals analysis are placed in appropriate laboratory prepared containers. Water sample containers are labeled with the appropriate sample number, location, project name and number, time, and date of collection. All samples are placed in an iced cooler and transported to a state-certified analytical laboratory.

In cases where very oily contaminants are encountered teflon bailers may be substituted with stainless steel bailers. This will be done to minimize cross contamination.

Chain-of-custody forms are logged and signed and accompany the samples to the laboratory. One travel blank accompanies the samples and is held by the lab for possible analysis.

All sample containers issued by the laboratory are properly prepared by the laboratory for the requested analysis.

- Total Volatile Hydrocarbons and/or benzene, toluene and xylenes - 2 40-milliliter bottles
- Total Lead - 1 500-milliliter bottle
- Ethylene Dibromide - 1 500-milliliter bottle
- Metals - 1 500-milliliter bottle
- Pesticides/Herbicides - 2 2-liter bottles
- Acid Base Neutral Organics - 2 1-liter bottles
- Halogenated Volatile Organics - 2 40-milliliter bottles
- Aromatic Volatile Organics - 2 40-milliliter bottles (preserved)
- Total Phenolics - 1 1-liter bottle (preserved)

ENSCO ENVIRONMENTAL SERVICES, INC.
Water Sampling Protocol
Latest Revision: May 12, 1988

ENSCO ENVIRONMENTAL SERVICES, INC.

LABORATORY PROCEDURES

LABORATORY PROCEDURES

Selection of the Laboratory

The laboratories selected to perform the analytical work are certified by the California State Department of Health Services as being qualified to perform the selected analyses. The selected laboratories are reviewed by Ensco Environmental Services, Inc. to ensure that an adequate quality control program is in place and certified by the State of California.

Chain-of-Custody Control

The following procedures are used during sampling and analytical activities to provide chain-of-custody control during transfer of samples from collection through delivery to the laboratories. Record keeping activities used to achieve chain-of-custody control are:

- Contact made by sampling organization with facility supervisor and laboratory prior to sampling to alert them of dates of sampling and sample delivery.
- Well location map with well identification number prominently displayed.
- Field log book for documenting sampling activities in the field.
- Labels for identifying individual samples.
- Chain-of-custody record for documenting transfer and possession of samples.
- Laboratory analysis request sheet for documenting analyses to be performed.

Field Filtration of Samples

Samplers will refrain from filtering TOC, TOX or other organic compound samples as the increased handling required may result in the loss of chemical constituents of interest. Allowing the samples to settle prior to analysis followed by decanting the sample is preferable to filtration of these instances. If filtration is necessary for the determination of extractable organic compounds, the filtration should be performed in the laboratory. It may be necessary to run parallel sets of filtered and unfiltered samples with standards to establish the recovery of hydrophobic compounds when sample must be filtered. All the materials' precautions used in the construction of the sampling train should be observed for filtration apparatus. Vacuum filtration of ground water samples is not recommended.

Water samples for dissolved inorganic chemical constituents (e.g., metals, alkalinity and anionic species) will be filtered in the field.

Sample Containers

Sample containers vary with each type of analytical parameter. Selected container types and materials are non-reactive with the sample and the particular analytical parameter being tested. Appropriate containers for volatile organics are glass bottles of at least 40 milliliters in size fitted with teflon-faced silicon septa. Sample containers are properly cleaned and sterilized by the certified laboratory according to the EPA protocol for the individual analysis.

Sample Preservation and Shipment

Various preservatives are used by the certified laboratory to retard changes in samples. Sample shipment from Ensco Environmental Services to laboratories performing the selected analyses routinely occurs within 24 hours of sample collection.

Analytical Procedures

The analysis of ground water samples is conducted in accordance with accepted quantitative analytical procedures. The following four publications are considered the primary references for ground water sample analysis, and the contracts with the laboratories analyzing the samples stipulate that the methods set out in these publications be used. Please note that procedures used are periodically updated by federal and state agencies, and the certified laboratories amend analysis as required by the update.

- Standard Methods for the Examination of Water and Wastewater, 16th Ed., American Public Health Association, et al., 1985.
- Methods for Chemical Analysis of Water and Wastes, U.S. EPA, 600/4-79-020, March 1979.
- Test Methods for Evaluation of Solid Waste: Physical/Chemical Methods, U.S. EPA SW-846, 1982.
- Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA, 600/4-82-057, 1982.
- Practical Guide for Ground water Sampling, EPA, 600/2-85/104, September 1985.
- RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, EPA, September 1986.

Analytical Methods

The analytical methods used by the selected laboratories are those required by the type of analysis (fuels, metals, etc.). These methods are those currently approved by the State Regional Water Quality Control Board.