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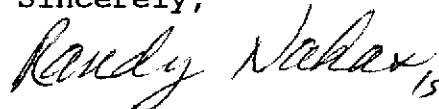
May 15, 1996

Mr. Scott Seery
Hazardous Materials Specialist
Alameda County Health Care Services
1131 Harbor Bay Parkway, Room 250
Oakland, CA 94502-6577

Dear Scott:

Enclosed is the Semi-Annual Groundwater Monitoring
Report for the Unocal 76 Service Station in Castro
Valley.

Sincerely,



Randall E. Nahas

REN/hrs

Enclosure

**Semi-Annual
Groundwater Monitoring Report
April 1996
Unocal 76 Service Station
20405 and 20629 Redwood Road
Castro Valley, California**

5/14/96

**BSK & ASSOCIATES
Geotechnical Consultants, Inc.**

BSK JOB NO. P92057.3

May 14, 1996



& Associates

1181 Quarry Lane
Building 300
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May 14, 1996

BSK JOB NO. P92057.3

R. T. Nahas Company/Eden Managements
20630 Patio Drive
Castro Valley, CA 94546

Attention: Mr. Randy T. Nahas

Subject: Semi-Annual
Groundwater Monitoring Report
Unocal 76 Service Station
20405 and 20629 Redwood Road
Castro Valley, California

Gentlemen:

As requested and authorized, we have performed groundwater monitoring well sampling at the above-referenced facility. This report presents the project background, groundwater data obtained during this sampling event, conclusions based on this event's data, and recommendations for further action. The site location is shown on Figure 1, Vicinity Map.

BACKGROUND

BSK & Associates installed three groundwater monitoring wells (MW-2, MW-3 and MW-4) in December 1989 at the Unocal 76 Service Station located at 20405 Redwood Road, Castro Valley, California. The service station location is shown on Figure 1, Vicinity Map. The monitoring facilities were installed in order to comply with the California UST Monitoring requirements of Alternative 6, Subchapter 16, Title 23, California Code of Regulations. The results of well installations, soil sampling and chemical testing of the soil and water samples were summarized in our Report P89134, dated February 5, 1990. The groundwater monitoring well locations are shown on Figure 2, Site Plan.

BSK performed an assessment of the lateral extent of shallow soil contamination in April 1991 (see our Report P90165, dated April 1991). During the investigation, shallow soil contamination was observed to occur from the pump islands to the south property boundary, and within the east and west property boundaries.

The seventh quarterly monitoring report included the results of additional lateral contamination characterization in the off-site area to the south (BSK Report P92057.3, dated May 29, 1992). This report indicated the extension of a groundwater contaminant plume south of the site, between Wells MW-6 and MW-5, but north of MW-7. Wells MW-5, MW-6 and MW-7 were installed during this investigation.

In our Special Sampling Report of December 23, 1992, BSK determined that concentrations of Total Petroleum Hydrocarbons as Gasoline (TPHg) at MW-7 were related to Perchloroethene contamination, possibly emanating from a nearby dry cleaner.

In a letter dated April 13, 1995, Alameda County Health Care Services requested that a corrective action plan (CAP) be prepared for the Site. During the development and implementation of the CAP, the six groundwater monitoring wells located at the Site maybe sampled on a semi-annual, versus quarterly, basis.

In October of 1995, BSK installed a groundwater extraction well (~~MW-101~~) down-gradient of the UST cluster. An aquifer pump test was performed to determine the aquifer characteristics for the evaluation of remedial options. Subsequent to the aquifer pump test a Feasibility Study Report was prepared, refer to BSK Report dated December 11, 1995.

Review of Subsurface Conditions

The site subsurface soil conditions, as revealed in Borings MW-1A, MW-2, MW-3, and MW-4 of our previous investigation (P89134), consist primarily of silty and sandy clays. Four to five feet of black organic-rich silty clay fill are found immediately below the ground surface, followed by three to five feet of greenish-gray sandy/silty clay native material. In the western portion of the study area, the greenish clay is underlain by seven to eleven feet of yellow-brown sandy clay, grading to a clayey sand with depth. In the eastern portion of the tank area, the sandy clay and clayey sand are split by a six foot layer of silty clay. Light brown silty clay was encountered in each boring from 17 and 24 feet in depth, and continuing to the final depth explored. It is apparent from the boring logs that this lowermost clay layer slopes to the northeast.

In the areas of Wells MW-5 through MW-7, subsurface conditions comprised 10 to 20 feet of dark gray to yellow-gray silty clay, the upper 10 feet of which may be fill. The silty clay is underlain by 4 to 5 feet of orange-brown clayey silt to silty sand. This unit often contains fine, wet to saturated pores. At fifteen to twenty feet in depth, a silty to sandy grayish clay is encountered. This clay is very stiff to hard, often porous, and contains thin saturated lenses of fine sand and silt. At approximately 25 feet, clayey sand to sand was encountered. This unit is soft to firm and contains many fine lenses of sand, silt, and clay. The sand and silt are typically saturated.

Groundwater within the site has been encountered at both 13 to 15 feet and 19 to 23 feet. The lower water levels occur in clayey sands along the east and west boundaries of the site, and likely in its northern one-third. This water horizon is considered the first primary aquifer. A shallow "perched" water is found in clayey sand at 13 to 15 feet, occurring throughout the south-central portion of the site. Hydrostatic pressure in both units results in a piezometric surface 10 to 12 feet below ground surface. The similar piezometric surface suggests that the "perched" water is connected to the underlying aquifer. Additional evidence for this connection is the lack of a confining layer below the upper clayey sand in several borings in the south-central portion of the site.

Groundwater flow direction at the site has been towards the southwest since December 1989. Gradient has varied at the site from 0.4% to 2.0%. Electrical conductivity is a relatively low 300 to 1,000 micromhos/cm, and pH has generally been slightly acidic. Seasonal precipitation appears to result in more southerly flow, a flatter gradient, and 1 to 2 feet higher water levels in early spring. 0.004-
0.02

During soil boring investigations, soil contamination by petroleum hydrocarbons was observed olfactorily and by Photo-Ionization Detector (PID) in 13 borings in the project area. Hydrocarbons were detected at depths ranging from just below the asphalt pavement to 17 feet (the greatest depth of several borings in the area of greatest contamination). PID values reached 3,600 ppm total ionizable hydrocarbons in soil. The greatest concentrations were observed between 10 feet in depth and first encountered groundwater (where encountered). It was noted that contamination was not always accompanied by soil staining, and volatilization was rapid upon exposure to air.

Groundwater contamination has been encountered at the site in samples obtained quarterly from Wells MW-2 and MW-3, and in Well MW-7. Wells MW-2 and MW-3 are adjacent to, and up- and cross-gradient to what is believed to be the contaminant source area. Well MW-7 is down gradient from the source area; however, it appears that contamination encountered in Well MW-7 is not related to the Unocal contaminant plume.

GROUNDWATER MONITORING ACTIVITIES - APRIL 1996

General

Semi-annual monitoring of groundwater Monitoring Wells MW-2, MW-3, MW-4, MW-5, MW-6 and MW-7 was performed on April 12, 1996. The semi-annual sampling schedule was approved by Mr. Scott Seery, case officer for the ACDEH. Further, per letter dated April 13, 1995 from Mr. Seery to R.T. Nahas, sampling and monitoring may follow a semi-annual schedule. Field procedures and observations are provided in the following text and Tables.

Field Work

Wells MW-2 through MW-6 were purged by an electric submersible pump. Well MW-7 was purged with a dedicated bladder pump. Three to four well casing volumes were removed from each well. Purge effluent was field monitored for pH, temperature and conductivity during purging to assess the influx of fresh formation water into the well. Purged water was transferred to 55-gallon DOT-approved steel drums for holding. Each drum was labeled according to its contents, content source, and date of accumulation.

Prior to purging, the depth to water in each well was measured using a Solinst electric sounder, marked in twentieths of a foot. The water depth was then interpolated to the 0.01 foot increment from the tape. Each well, except MW-7, was subsequently examined for floating and sinking immiscible product layers and sheen, using a clear bailer having dual check valves for point-source sampling. The piezometric contour and elevation, and well water elevations, are presented in Figure 3, Potentiometric Surface Map.

Upon purge completion, each well was again measured to confirm a minimum of 80% well recovery prior to sampling. Water sampling was then performed with a Teflon® point-source bailer. Well MW-7 was sampled with a dedicated bladder pump. Sampling for contaminants was performed in the order of decreasing contaminant volatility. Each water sample was decanted into the appropriate container with preservative (as necessary), sealed, labeled and refrigerated for delivery to our State-certified laboratory.

A Well Field Log was prepared for each well sampled, recording the water depth, well volume, pH, water temperature, conductivity and other data. The Well Field Logs are presented as Figures 4.1 through 4.6.

Site Hydrology

Groundwater measurements were made of the six sampled wells on April 12, 1996 in order to assess the flow direction and gradient. On that date, **groundwater flow was generally to the south**, similar to the previous event. **The gradient was generally flat at 0.8 percent.** Groundwater flow direction and gradient are shown on Figure 3, Potentiometric Surface Map. 0.008

Chemical Analyses

Water samples obtained from Wells MW-2, MW-3, MW-5 and MW-6 were analyzed for constituents related to gasoline, Total Petroleum Hydrocarbons as Gasoline (TPHg) and Benzene, Toluene, Ethylbenzene and Xylene (BTEX). **To account for potential PCE interference water samples obtained from MW-7 were analyzed for BTEX only.** Well MW-4 was tested for waste-oil related contaminants: TPHg, TPHd and BTEX.

The contaminants tested for are those specified by the Tri-Regional Water Quality Control Board Recommendations of August 10, 1990, and listed in the ACDEH letter, dated April 26, 1990 and April 13, 1995 to R.T. Nahas Co. Current and former analysis results are presented for comparison in the following tables. The Chemical Test Data Sheets are presented in Appendix A, Figures A-1 through A-6. The Project Chain-of-Custody record is presented in Figures A-7.

WATER ANALYSES - BTEX

TABLE 1

(Results and Action Levels presented in µg/l)

<u>Sample Date</u>	<u>Sample Location</u>	<u>Benzene (1)*</u>	<u>Toluene (100)+</u>	<u>Xylene (1750)*</u>	<u>Ethylbenzene (680)*</u>
August 1990	Well MW-2	21	3.9	28	7.2
	Well MW-3	55	3.8	59	20
	Well MW-4	ND	ND	ND	ND
January 1991	Well MW-2	50	33	110	22
	Well MW-3	29	3.3	34	9.7

WATER ANALYSES - BTEX

TABLE 1 (Continued)

(Results and Action Levels are presented in µg/l)

<u>Sampling Date</u>	<u>Sample Location</u>	<u>Benzene (1)*</u>	<u>Toluene (100)+</u>	<u>Xylene (1750)*</u>	<u>Ethylbenzene (680)*</u>
April 1991	Well MW-2	640	520	790	170
	Well MW-3	450	270	760	150
	Well MW-4	ND	ND	ND	ND
July 1991	Well MW-2	14	1	17	8
	Well MW-3	14	14	33	8
October 1991	Well MW-2	2.9	ND	6	2.5
	Well MW-3	ND	ND	ND	ND
	Well MW-4	ND	ND	ND	ND
January 1992	Well MW-2	480	870	860	160
	Well MW-3	4	10	8	2
April 1992	Well MW-2	70	0.3	7.0	15
	Well MW-3	1.0	0.4	0.9	ND
	Well MW-4	ND	ND	ND	ND
	Well MW-5	ND	ND	ND	ND
	Well MW-6	ND	0.3	ND	ND
	Well MW-7	0.4	0.3	0.9	0.3
July 1992	Well MW-2	10	ND	2.3	0.6
	Well MW-3	1.3	0.4	1.3	ND
	Well MW-5	ND	ND	ND	ND
	Well MW-6	ND	ND	ND	ND
	Well MW-7	ND	ND	ND	ND
October 1992	Well MW-2	2.3	ND	3.0	2.3
	Well MW-3	2.1	ND	0.3	ND
	Well MW-4	ND	ND	ND	ND
	Well MW-5	ND	0.4	ND	ND
	Well MW-6	ND	ND	ND	ND
	Well MW-7	ND	ND	ND	ND
January 1993	Well MW-2	11	5.1	6.3	1.4
	Well MW-3	1.2	1.0	4.1	0.6
	Well MW-4	ND	ND	ND	ND
	Well MW-5	ND	ND	ND	ND
	Well MW-6	ND	ND	ND	ND
	Well MW-7	ND	ND	ND	ND
March 1993	Well MW-2	110	32	28	67
	Well MW-3	32	0.9	13	64
	Well MW-4	ND	ND	ND	ND
	Well MW-5	ND	ND	ND	ND
	Well MW-6	ND	ND	ND	ND
	Well MW-7	ND	ND	ND	ND

WATER ANALYSES - BTEX

TABLE 1 (Continued)

(Results and Action Levels are presented in µg/l)

<u>Sampling Date</u>	<u>Sample Location</u>	<u>Benzene (1)*</u>	<u>Toluene (100)+</u>	<u>Xylene (1750)*</u>	<u>Ethylbenzene (680)*</u>
July 1993	Well MW-2	17	1.1	12	6.0
	Well MW-3	24	11	82	14
	Well MW-4	ND	ND	ND	ND
	Well MW-5	ND	ND	ND	ND
	Well MW-6	ND	ND	ND	ND
	Well MW-7	ND	ND	ND	ND
	October 1993	Well MW-2	4.0	ND	3.1
Well MW-3		5.0	ND	1.2	0.6
Well MW-4		0.4	ND	0.4	ND
Well MW-5		ND	ND	ND	ND
Well MW-6		ND	ND	ND	ND
Well MW-7		ND	ND	0.7	ND
January 1994		Well MW-2	13	3.4	9.2
	Well MW-3	5.5	2.1	14	2.6
	Well MW-7	ND	ND	ND	ND
April 1994	Well MW-2	23	1.1	17	8.2
	Well MW-3	17	1.0	24	4.9
	Well MW-4	ND	ND	0.4	ND
	Well MW-5	ND	0.4	1.0	ND
	Well MW-6	ND	0.3	0.4	ND
	Well MW-7	ND	ND	ND	ND
	July 1994	Well MW-2	14	0.7	12
Well MW-3		7.2	0.4	4.6	1.6
Well MW-4		ND	0.6	ND	ND
October 1994	Well MW-2	2.8	ND	1.8	2.9
	Well MW-3	0.9	ND	ND	ND
	Well MW-4	ND	36	1.3	ND
	Well MW-5	ND	71	1.7	0.4
	Well MW-6	0.4	140	2.3	0.5
January 1995	Well MW-2	48	5.8	27	15
	Well MW-3	24	ND	45	14
	Well MW-4	ND	ND	ND	ND
April 1995	Well MW-2	72	2.8	22	47
	Well MW-3	26	0.6	19	40
	Well MW-4	ND	ND	ND	ND
	Well MW-5	ND	ND	ND	ND
	Well MW-6	ND	ND	ND	ND
	Well MW-7	ND	ND	ND	ND

WATER ANALYSES - BTEX

TABLE 1 (Continued)

(Results and Action Levels are presented in µg/l)

<u>Sampling Date</u>	<u>Sample Location</u>	<u>Benzene (1)*</u>	<u>Toluene (100)+</u>	<u>Xylene (1750)*</u>	<u>Ethylbenzene (680)*</u>
October 1995	Well MW-2	7.4	ND	5.5	5.1
	Well MW-3	9.0	3.9	34	8.5
	Well MW-4	ND	ND	ND	ND
	Well MW-5	ND	ND	ND	ND
	Well MW-6	ND	ND	ND	ND
	Well MW-7	ND	ND	ND	ND
	April 1996	Well MW-2	41	2.8	50
Well MW-3		8.4	1.6	14	4.7
Well MW-4		ND	ND	ND	ND
Well MW-5		ND	ND	ND	ND
Well MW-6		2.0	2.0	ND	ND
Well MW-7		ND	ND	ND	ND

ND - None Detected

* - DHS: Primary Drinking Water Standard (3/89)

+ - DHS: Action Level

WATER ANALYSES - TPH and OIL & GREASE

TABLE 2

(Results and Action Levels are presented in µg/l)

<u>Sampling Date</u>	<u>Sample Location</u>	<u>TPH as Gasoline (100)*</u>	<u>TPH as Diesel (100)*</u>	<u>Oil and Grease Total Hydrocarbon (100*)</u>	
August 1990	Well MW-2	180	--	--	--
	Well MW-3	290	--	--	--
	Well MW-4	ND	ND	ND	--
January 1991	Well MW-2	430	--	--	--
	Well MW-3	110	--	--	--
April 1991	Well MW-2	4800	--	--	--
	Well MW-3	3600	--	--	--
	Well MW-4	ND	ND	ND	--
July 1991	Well MW-2	220	--	--	--
	Well MW-3	220	--	--	--
October 1991	Well MW-2	170	--	--	--
	Well MW-3	ND	ND	ND	--
	Well MW-4	ND	ND	ND	--
January 1992	Well MW-2	5200	--	--	--
	Well MW-3	60	--	--	--
April 1992	Well MW-2	300	--	--	--
	Well MW-3	ND	--	ND	--
	Well MW-4	ND	ND	ND	--
	Well MW-5	ND	--	--	--
	Well MW-6	ND	--	--	--
	Well MW-7	1300 ₃	--	--	--
July 1992	Well MW-2	84	--	--	--
	Well MW-3	ND	--	--	--
	Well MW-5	ND	--	--	--
	Well MW-6	ND	--	--	--
	Well MW-7	830 ₃	--	--	--
October 1992	Well MW-2	ND	--	--	--
	Well MW-3	ND	--	--	--
	Well MW-4	ND	120	ND	--
	Well MW-5	ND	--	--	--
	Well MW-6	ND	--	--	--
	Well MW-7	3900 ₃	--	--	--
January 1993	Well MW-2	170	--	--	--
	Well MW-3	ND	--	--	--
	Well MW-4	ND	ND	ND	--
	Well MW-5	ND	--	--	--
	Well MW-6	ND	--	--	--
	Well MW-7	1900 ₃	--	--	--

WATER ANALYSES - TPH and OIL & GREASE

TABLE 2 (Continued)

(Results and Action Levels are presented in µg/l)

<u>Sampling Date</u>	<u>Sample Location</u>	<u>TPH as Gasoline (100)*</u>	<u>TPH as Diesel (100)*</u>	<u>Oil and Grease Total Hydrocarbon (100*)</u>	
March 1993	Well MW-2	720	--	--	--
	Well MW-3	330	--	--	--
	Well MW-4	ND	ND	ND	ND
	Well MW-5	ND	--	--	--
	Well MW-6	ND	--	--	--
	Well MW-7	830 ₃	--	--	--
	July 1993	Well MW-2	220	--	--
Well MW-3		330	--	--	--
Well MW-4		ND	ND	--	1
Well MW-5		ND	--	--	--
Well MW-6		ND	--	--	--
Well MW-7		680 ₃	--	--	--
October 1993		Well MW-2	98	--	--
	Well MW-3	ND	--	--	--
	Well MW-4	ND	ND	ND	ND
	Well MW-5	ND	--	--	--
	Well MW-6	ND	--	--	--
	Well MW-7	360 ₃	--	--	--
	January 1994	Well MW-2	130	--	--
Well MW-3		69	--	--	--
Well MW-7		330 ₃	--	--	--
April 1994	Well MW-2	270	--	--	--
	Well MW-3	62	--	--	--
	Well MW-4	ND	ND	ND	ND
	Well MW-5	ND	--	--	--
	Well MW-6	ND	--	--	--
	Well MW-7	360 ₃	--	--	--
	July 1994	Well MW-2	180	--	--
Well MW-3		52	--	--	--
Well MW-4		ND	86	ND	ND
October 1994	Well MW-2	97	--	--	--
	Well MW-3	ND	--	--	--
	Well MW-4	70	ND	ND	ND
	Well MW-5	87	--	--	--
	Well MW-6	160	--	--	--
	Well MW-7	ND	--	--	--
January 1994	Well MW-2	440	--	--	--
	Well MW-3	250	--	--	--
	Well MW-4	ND	ND	2	2
April 1995	Well MW-2	480	--	--	--
	Well MW-3	450	--	--	--
	Well MW-4	ND	ND	ND	ND
	Well MW-5	ND	--	--	--
	Well MW-6	ND	--	--	--
	Well MW-7	--	--	--	--

WATER ANALYSES - TPH and OIL & GREASE

TABLE 2 (Continued)

(Results and Action Levels are presented in µg/l)

<u>Sample Date</u>	<u>Sample Location</u>	<u>TPH as Gasoline (*)</u>	<u>TPH as Diesel (100,)</u>	<u>Oil & Grease, Total (*)</u>	<u>Hydrocarbon (*)</u>
October 1995	Well MW-2	450	--	--	--
	Well MW-3	340	--	--	--
	Well MW-4	ND	ND	--	--
	Well MW-5	ND	--	--	--
	Well MW-6	ND	--	--	--
	Well MW-7	--	--	--	--
	April 1996	Well MW-2	690	--	--
Well MW-3		170	--	--	--
Well MW-4		ND	ND	--	--
Well MW-5		ND	--	--	--
Well MW-6		ND	--	--	--
Well MW-7		--	--	--	--

-- - Not Tested; ND - None Detected; * - No Drinking Water Action Levels are provided for these compounds
 1 - Results in mg/l; 2 - 1980 US EPA 10-Day Suggested No Adverse Response Level (SNARL)
 3 - TPHg values have been demonstrated to represent Perchloroethene presence

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Trace contaminant concentrations associated with gasoline (BTEX compounds) are generally at similar concentrations as the previous results from the October 1995 sampling event in Wells MW-2 and MW-3. **Unlike the last sampling event, benzene and toluene were detected at low concentration in Well MW-6.** Primary State and Federal Standards for drinking water were exceeded for benzene concentrations at Wells MW-2, MW-3, and MW-6. Total Petroleum Hydrocarbons as Gasoline (TPHg) was detected at Wells MW-2 and MW-3. Total Petroleum Hydrocarbons as Diesel was not detected in Well MW-4. Total Petroleum Hydrocarbons as Gasoline was not detected in Wells MW-4, MW-5 and MW-6. BTEX was not detected in Wells MW-4, MW-5, and MW-7. Contaminant concentrations detected this event at well locations are depicted in Figure 5, Contaminant Concentrations - 4/12/96.

As shown graphically on Figures 6 and 7, the BTEX concentrations in the groundwater samples from Well MW-2 have demonstrated a slight increase in concentration, while the BTEX concentrations in the groundwater samples from Well MW-3 have demonstrated a slight decrease since the previous sampling event.

Recommendations

Pending completion and implementation of a corrective action plan, the six groundwater monitoring wells located at the Site should be sampled on a semi-annual basis as approved by ACDEH (letter dated April 13, 1995). The next semi-annual sampling event is scheduled for October 1996.

REPORT DISTRIBUTION

Copies of this report should be submitted to the Alameda County Department of Environmental Health for their review. We are providing you with extra copies for this purpose. We understand that copies of the report may be forwarded by ACDEH to the Regional Water Quality Control Board in Oakland for their review.

Alameda County Department of Environmental Health
1181 Harbor Bay Parkway
Alameda, CA 94502

LIMITATIONS

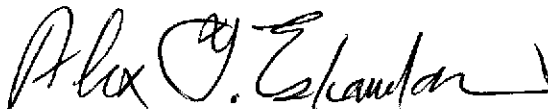
The findings and conclusions presented in this report are based on field review and observations, and from the limited testing program described in this report. This report has been prepared in accordance with generally accepted methodologies and standards of practice in the area. No other warranties, expressed or implied, are made as to the findings, conclusions and recommendations included in the report.

*MW-6
B/T
detected
for first
time since
10/95*

The findings of this report are valid as of the present. The passage of time, natural processes or human intervention on the property or adjacent property can cause changed conditions which can invalidate the findings and conclusions presented in this report.

BSK is pleased to continue to be of service to you during this project. If you have questions concerning the contents of the report, please do not hesitate to contact us.

Respectfully submitted,
BSK & Associates



Alex Y. Eskandari, P.E.
Project Manager
C.E. No. 038101, R.E.A. No. 01528



Martin B. Cline, R.G.
Geologist
R.G. No. 6244

AYE/MC:rss
(RPTS\ENV\VP92057-3.295)

Distribution:
R.T. Nahas Co. (4 copies)

The following are attached and complete this report:

FIGURE	1	Vicinity Map
FIGURE	2	Site Plan
FIGURE	3	Potentiometric Surface Map
FIGURES	4.1	Well Field Logs
through	4.6	
FIGURE	5	Contaminant Concentrations - 10/12/95
FIGURE	6	BTEX Concentrations in Groundwater - MW-2
FIGURE	7	BTEX Concentrations in Groundwater - MW-3

APPENDIX A

FIGURES	A-1	Laboratory Chemical Test Data Sheets
through	A-6	
FIGURE	A-7	Project Chain-of-Custody Record



Source: Thomas Guide, 1992, Alameda and Contra Costa Counties

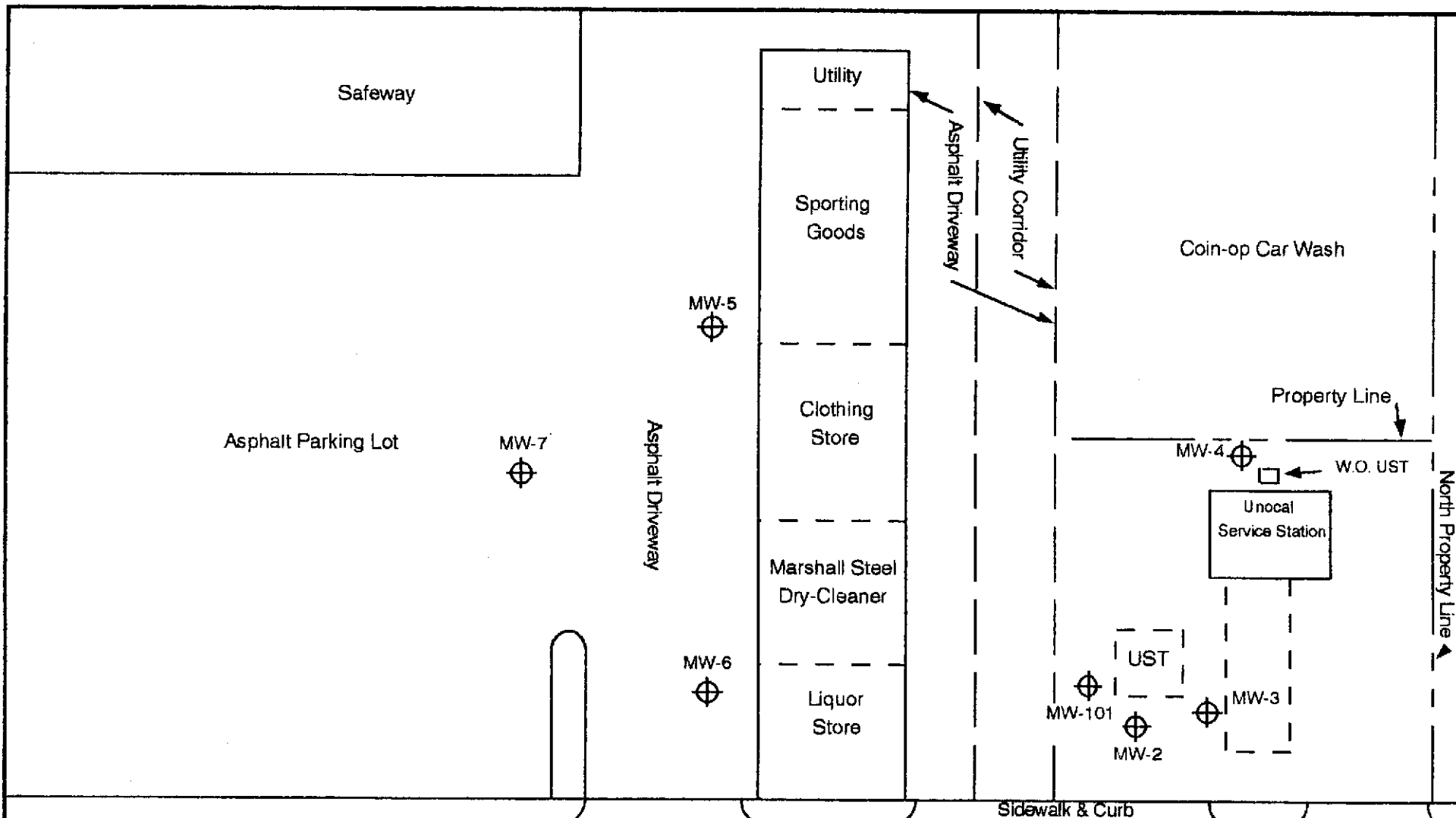
SEMI-ANNUAL GROUNDWATER
MONITORING REPORT
UNOCAL 76 SERVICE STATION
20405 AND 20629 REDWOOD ROAD
CASTRO VALLEY, CALIFORNIA

VICINITY MAP

BSK Job P92057.3

FIGURE: 1

BSK
& ASSOCIATES



REDWOOD ROAD

LEGEND:

⊕ - Groundwater Monitoring Well Location & Designation
 MW-1

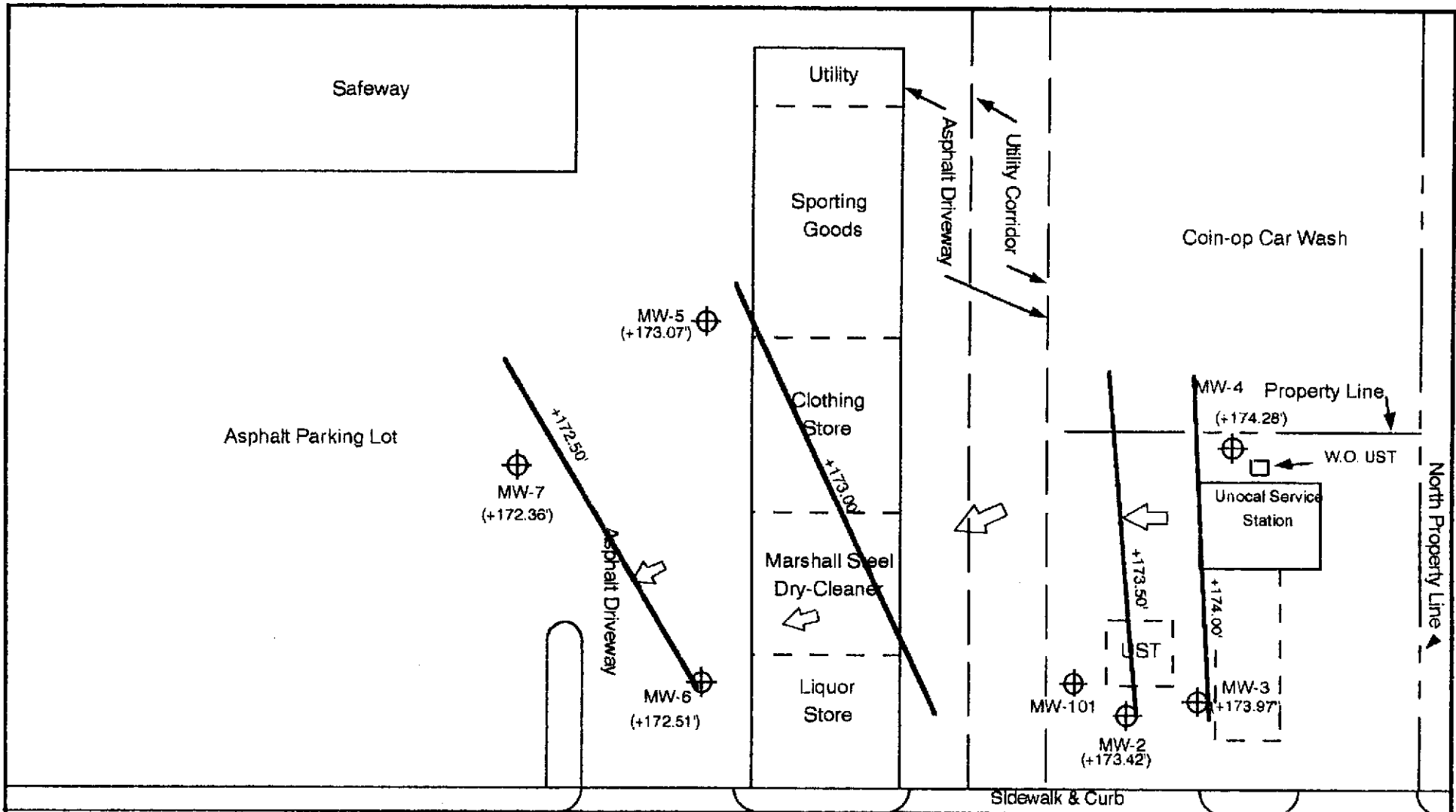


SCALE: 1" = 50'

SITE PLAN




Job No. P92057.3
 April 1996
 FIGURE: 2

BSK
 & ASSOCIATES



REDWOOD ROAD

LEGEND:

- MW-1  - Groundwater Monitoring Well Location & Designation
-  - Groundwater Flow Direction (04/12/96)
-  - Line of Equal Groundwater Elevation (04/12/96)
- (+172.00) - Groundwater Elevation (04/12/96)



SCALE: 1" = 50'

GRADIENT: 0.8 %

POTENTIOMETRIC SURFACE MAP

Job No. P92057.3
April 1996
FIGURE: 3

BSK
& ASSOCIATES

WELL FIELD LOG

Well Observation: x Date: 4/12/96
 Sample Collection: x Date: 4/12/96

Project Name: Groundwater Monitoring
 Location: Nahas/Union 76
 Personnel: RSS/JGO
 Weather: Clear, ±65° F.

WELL INFORMATION:

Well Number	MW-2	Date Purged	4/12/96
Depth to Water - feet (TOC)	10.05	Purge Method	Submersible Pump
Well Depth (feet)	28.85		
Water Volume (gallons)	3.2	Purge Begin	11:10
Reference Elevation - feet(TOC)	+183.47	Purge End	11:16
Groundwater Elevation (feet)	+173.42	Purge Rate	2.3 gal/min.
Measurement Technique	Solinst Electric Well Sounder		

IMMISCIBLE LAYERS:

Top: None
 Bottom: None
 Detection Method: Visual
 Collection Method: Clear Point-Source Bailer

WELL DEVELOPMENT/PURGE DATA:

TIME	VOLUME REMOVED (gallons)	ELECTRICAL CONDUCTIVITY (Micromhos)	pH	TEMP. (°F)	COLOR/COMMENTS
11:12	3.5	660	6.55	62.4	Clear
11:13	7.0	590	6.60	66.4	Clear
11:15	10.5	615	6.60	67.3	Clear
11:16	14.0	630	6.59	67.4	Clear

SAMPLE COLLECTION DATA

Sampling Equipment: Teflon Bailer

TIME	ANALYSIS	AMOUNT/CONTAINER USED	SAMPLE INTERVAL
11:20	BTEX & TPHg	2-40ml glass VOC with HCl	±13'

Field Observations: None

WELL FIELD LOG

Well Observation: x Date: 4/12/96
 Sample Collection: x Date: 4/12/96

Project Name: Groundwater Monitoring
 Location: Nahas/Union 76
 Personnel: RSS/JGO
 Weather: Clear, ±64° F.

WELL INFORMATION:

Well Number	MW-3	Date Purged	4/12/96
Depth to Water - feet(TOC)	10.06	Purge Method	Submersible Pump
Well Depth (feet)	28.85		
Water Volume (gallons)	3.2	Purge Begin	11:43
Reference Elevation - feet(TOC)	+184.03	Purge End	11:51
Groundwater Elevation (feet)	+173.97	Purge Rate	1.75 gal/min.
Measurement Technique	Solinst Electric Well Sounder		

IMMISCIBLE LAYERS:

Top: Clear, Hydrocarbon Odor
 Bottom: Clear, Hydrocarbon Odor
 Detection Method: Visual
 Collection Method: Clear Point-Source Bailer

WELL DEVELOPMENT/PURGE DATA:

TIME	VOLUME REMOVED (gallons)	ELECTRICAL CONDUCTIVITY (Micromhos)	pH	TEMP. (°F)	COLOR/COMMENTS
11:45	3.5	718	6.72	72.0	Clear, Faint Odor
11:47	7.0	716	6.75	70.6	Clear, No Odor
11:49	10.5	705	6.69	68.8	Clear, No Odor
11:51	14.0	705	6.69	69.3	Clear, No Odor

SAMPLE COLLECTION DATA

Sampling Equipment: Teflon Bailer

TIME	ANALYSIS	AMOUNT/CONTAINER USED	SAMPLE INTERVAL
12:00	BTEX & TPHg	2-40ml glass VOC with HCl	±13'

Field Observations: Six feet from active gas pump island

WELL FIELD LOG

Well Observation: x Date: 4/12/96
 Sample Collection: x Date: 4/12/96

Project Name: Groundwater Monitoring
 Location: Nahas/Union 76
 Personnel: RSS/JGO
 Weather: Clear, ±63° F.

WELL INFORMATION:

Well Number	MW-4	Date Purged	4/12/96
Depth to Water - feet(IOC)	10.33	Purge Method	Submersible Pump
Well Depth (feet)	24.55		
Water Volume (gallons)	2.4	Purge Begin	10:39
Reference Elevation - feet(IOC)	+184.61	Purge End	10:43
Groundwater Elevation (feet)	+174.28	Purge Rate	2.5 gal/min.
Measurement Technique	Solinst Electric Well Sounder		

IMMISCIBLE LAYERS:

Top: None, clear
 Bottom: Light Brown
 Detection Method: Visual
 Collection Method: Clear Point-Source Bailer

WELL DEVELOPMENT/PURGE DATA:

TIME	VOLUME REMOVED (gallons)	ELECTRICAL CONDUCTIVITY (Micromhos)	pH	TEMP. (°F)	COLOR/COMMENTS
10:40	2.5	463	6.92	61.2	Light brown tint
10:41	5.0	458	6.78	62.6	Clearing
10:42	7.5	460	6.71	63.4	Clear
10:43	10.0	460	6.71	63.5	Clear

SAMPLE COLLECTION DATA

Sampling Equipment: Teflon Bailer

TIME	ANALYSIS	AMOUNT/CONTAINER USED	SAMPLE INTERVAL
11:35	BTEX & TPHg	2-40ml glass VOC with HCl	±13'
11:35	TPHd	1-250 ml Amber Glass, w/H ₂ SO ₄	"

Field Observations:

WELL FIELD LOG

Well Observation: x Date: 4/12/96
 Sample Collection: x Date: 4/12/96

Project Name: Groundwater Monitoring
 Location: Nahas/Union 76
 Personnel: RSS/JGO
 Weather: Clear, ±62° F.

WELL INFORMATION:

Well Number	MW-5	Date Purged	4/12/96
Depth to Water - feet(TOC)	10.85	Purge Method	Submersible Pump
Well Depth (feet)	34.5		
Water Volume (gallons)	4.0	Purge Begin	09:40
Reference Elevation - feet(TOC)	+183.92	Purge End	09:48
Groundwater Elevation (feet)	+173.07	Purge Rate	2.0 gal/min.
Measurement Technique	Solinst Electric Well Sounder		

IMMISCIBLE LAYERS:

Top: None, clear
 Bottom: None, clear
 Detection Method: Visual
 Collection Method: Clear Point-Source Bailer

WELL DEVELOPMENT/PURGE DATA:

TIME	VOLUME REMOVED (gallons)	ELECTRICAL CONDUCTIVITY (Micromhos)	pH	TEMP. (°F)	COLOR/COMMENTS
09:42	4.0	560	6.72	62.0	Clear
09:44	8.0	560	6.73	65.0	Clear
09:46	12.0	565	6.69	66.1	Clear
09:48	16.0	560	6.68	66.3	Clear

SAMPLE COLLECTION DATA

Sampling Equipment: Teflon Bailer

TIME	ANALYSIS	AMOUNT/CONTAINER USED	SAMPLE INTERVAL
10:00	BTEX & TPH _g	2-40ml glass VOC with HCl	±12'

Field Observations: Well in busy parking lot.

WELL FIELD LOG

Well Observation: x Date: 4/12/96
 Sample Collection: x Date: 4/12/96

Project Name: Groundwater Monitoring
 Location: Nahas/Union 76
 Personnel: RSS/JGO
 Weather: Clear, $\pm 60^{\circ}\text{F}$.

WELL INFORMATION:

Well Number	MW-6	Date Purged	4/12/96
Depth to Water - feet(TOC)	11.09	Purge Method	Submersible Pump
Well Depth (feet)	26.78		
Water Volume (gallons)	2.7	Purge Begin	08:45
Reference Elevation - feet(TOC)	+183.60	Purge End	08:51
Groundwater Elevation (feet)	+172.51	Purge Rate	2.0 gal/min.
Measurement Technique	Solinst Electric Well Sounder		

IMMISCIBLE LAYERS:

Top: None
 Bottom: Some light brown clay colloids
 Detection Method: Visual
 Collection Method: Clear Point-Source Bailer

WELL DEVELOPMENT/PURGE DATA:

TIME	VOLUME REMOVED (gallons)	ELECTRICAL CONDUCTIVITY (Micromhos)	pH	TEMP. ($^{\circ}\text{F}$)	COLOR/COMMENTS
08:47	3.0	549	5.36	62.0	Slight brown tint
08:48	6.0	548	5.83	61.5	Clearing
08:50	9.0	543	6.15	61.2	Clearing
08:51	12.0	537	6.22	60.7	Clear

SAMPLE COLLECTION DATA

Sampling Equipment: Teflon Bailer

TIME	ANALYSIS	AMOUNT/CONTAINER USED	SAMPLE INTERVAL
09:10	BTEX & TPHg	2-40ml glass VOC with HCl	$\pm 14'$

Field Observations: Well in busy parking lot.

WELL FIELD LOG

Well Observation: x Date: 04/12/96
 Sample Collection: x Date: 04/12/96

Project Name: Groundwater Monitoring
 Location: Nahas/Union 76
 Personnel: RSS/JGO
 Weather: Clear, ±70° F.

WELL INFORMATION:

Well Number	MW-7	Date Purged	4/12/96
Depth to Water - feet(TOC)	10.06	Purge Method	Dedicated Bladder Pump
Well Depth (feet)	28.0		
Water Volume (gallons)	3.05	Purge Begin	12:46
Reference Elevation - feet(TOC)	+182.42	Purge End	1:14
Groundwater Elevation (feet)	+172.36	Purge Rate	0.3 gal/min.
Measurement Technique	Solinst Electric Well Sounder		

IMMISCIBLE LAYERS:

Top: --
 Bottom: --
 Detection Method: Inaccessible due to dedicated pump assembly
 Collection Method: --

WELL DEVELOPMENT/PURGE DATA:

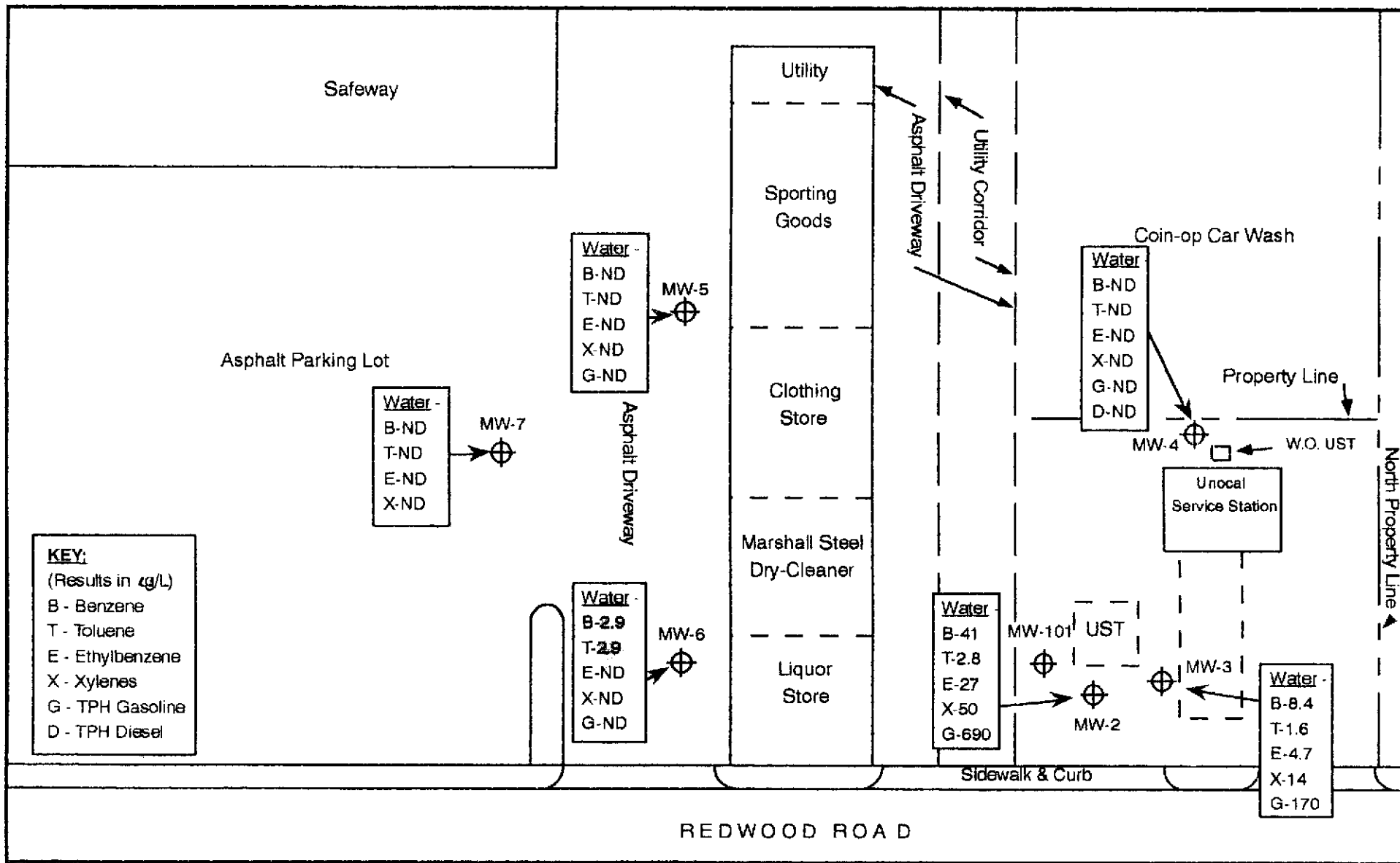
TIME	VOLUME REMOVED (gallons)	ELECTRICAL CONDUCTIVITY (Ec/Range)	pH	TEMP. (°F)	COLOR/COMMENTS
12:56	3.0	779	5.94	69.9	--
1:05	6.0	785	6.86	66.9	--
1:14	9.0	780	6.85	65.9	--

SAMPLE COLLECTION DATA

Sampling Equipment: Dedicated Bladder Pump

TIME	ANALYSIS	AMOUNT/CONTAINER USED	SAMPLE INTERVAL
1:16	BTEX	2-40ml glass VOC with HCl	

Field Observations: Well located in busy parking lot.



LEGEND:



- Groundwater Monitoring Well Location & Designation

MW-1

NORTH



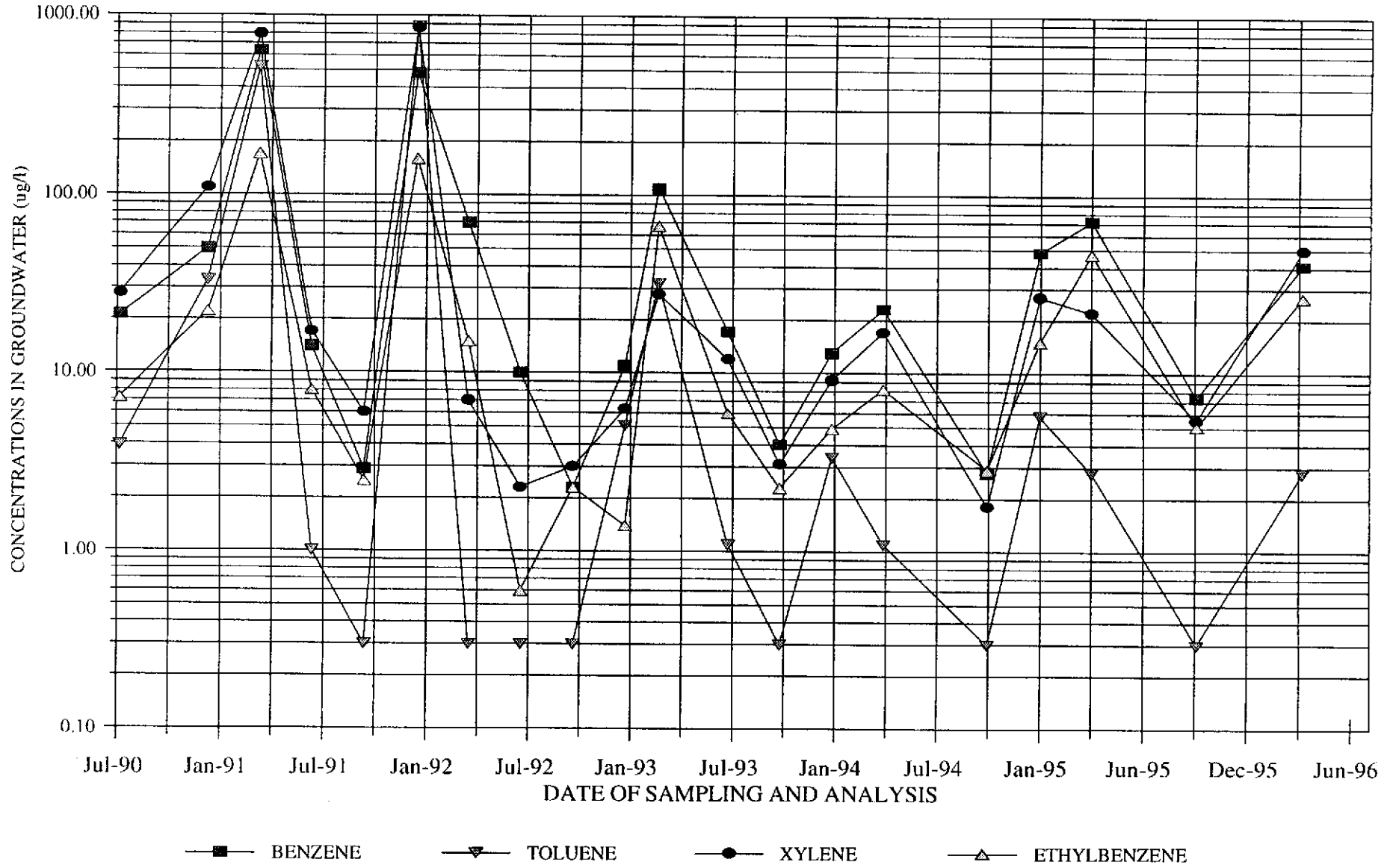
SCALE: 1" = 50'

**CONTAMINANT
 CONCENTRATIONS -
 04/12/96**

Job No. P92057.3
 April 1996
 FIGURE: 5

BSK
 & ASSOCIATES

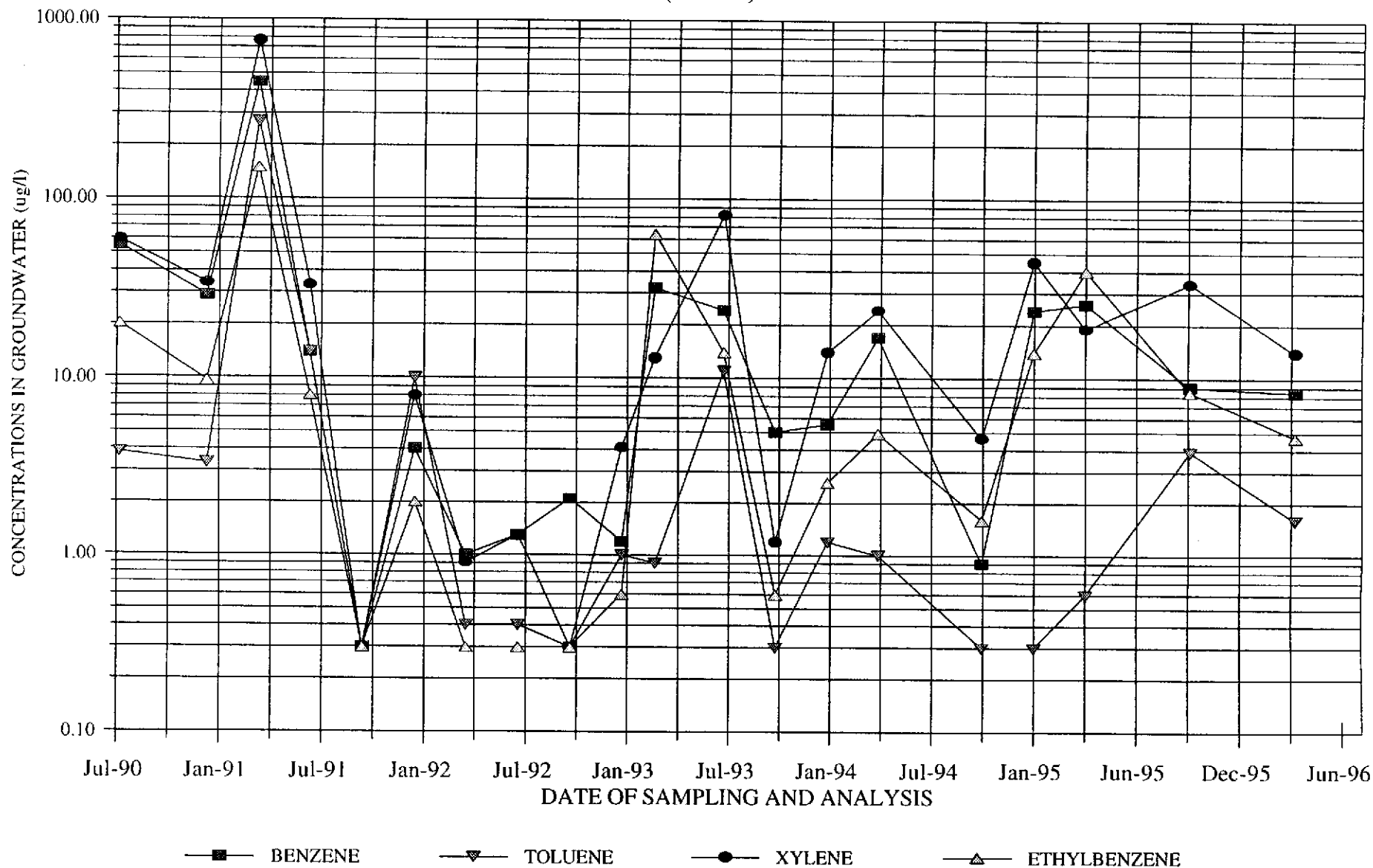
BTEX CONCENTRATIONS IN GROUNDWATER (MW-2)



BSK Job No. P90258.
APRIL 1996
FIGURE 6

BSK

BTEX CONCENTRATIONS IN GROUNDWATER (MW-3)



BSK Job No. P90258.
APRIL 1996
FIGURE 7

BSK

APPENDIX A

CHEMICAL TEST DATA SHEETS

AND

PROJECT-CHAIN-OF-CUSTODY RECORD

BSK ANALYTICAL LABORATORIES

BSK-Pleasanton
Nahas

Date Sampled : 04/12/96
Time Sampled : 1120
Date Received : 04/15/96
Date of Analysis : 04/27/96
Report Issue Date: 05/02/96

Case Number : Ch961411
Lab ID Number : 1411-4
Project Number : P92057.3
Sample Description: MW-2

Sample Type: LIQUID

Analyses for BTEX by EPA Method 8020
and TPH(G) by EPA Method 8015
Prepared by Method 5030

Results Reported in Micrograms per Liter (ug/L)

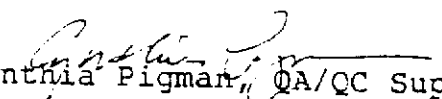
Compound	Results	DLR
Benzene	41	0.3
Toluene	2.8	0.3
Ethylbenzene	27	0.3
Total Xylene Isomers	50	0.3
Total Petroleum Hydrocarbons (G)	690	50

Sample DLR = DLR x DLR Multiplier, DLR Multiplier = 1

NOTE:
Hydrocarbons in the gasoline boiling point range are reported, in accordance with the method, as gasoline.
Chromatography for this sample is described as inconsistent with the gasoline standard.

LEGEND:

DLR: Detection Limit for the Purposes of Reporting.
Exceptional sample conditions or matrix interferences
may result in higher detection limits.
ND: None Detected


Cynthia Pigman, QA/QC Supervisor

BSK ANALYTICAL LABORATORIES

BSK-Pleasanton
Nahas

Date Sampled : 04/12/96
Time Sampled : 1200
Date Received : 04/15/96
Date of Analysis : 04/27/96
Report Issue Date: 05/02/96

Case Number : Ch961411
Lab ID Number : 1411-5
Project Number : P92057.3
Sample Description: MW-3

Sample Type: LIQUID

Analyses for BTEX by EPA Method 8020
and TPH(G) by EPA Method 8015
Prepared by Method 5030

Results Reported in Micrograms per Liter (ug/L)

Compound	Results	DLR
Benzene	8.4	0.3
Toluene	1.6	0.3
Ethylbenzene	4.7	0.3
Total Xylene Isomers	14	0.3
Total Petroleum Hydrocarbons (G)	170	50

Sample DLR = DLR x DLR Multiplier, DLR Multiplier = 1

NOTE:
Hydrocarbons in the gasoline boiling point range are reported, in accordance with the method, as gasoline.
Chromatography for this sample is described as inconsistent with the gasoline standard.

LEGEND:

DLR: Detection Limit for the Purposes of Reporting.
Exceptional sample conditions or matrix interferences
may result in higher detection limits.
ND: None Detected

Cynthia Pigman
Cynthia Pigman, QA/QC Supervisor

BSK ANALYTICAL LABORATORIES

BSK-Pleasanton
Nahas

Date Sampled : 04/12/96
Time Sampled : 1100
Date Received : 04/15/96
Report Issue Date: 05/02/96

Case Number : Ch961411
Lab ID Number : 1411-3
Project Number : P92057.3
Sample Description: MW-4

Sample Type: LIQUID

Analyses for BTEX by EPA Method 8020 and TPH(G) by EPA Method 8015
Prepared by Method 5030

Results Reported in Micrograms per Liter (ug/L)

Date of Analysis : 04/27/96

Compound	Results	DLR
Benzene	ND	0.3
Toluene	ND	0.3
Ethylbenzene	ND	0.3
Total Xylene Isomers	ND	0.3
Total Petroleum Hydrocarbons (G)	ND	50

Sample DLR = DLR x DLR Multiplier, DLR Multiplier = 1

NOTE:

Hydrocarbons in the gasoline boiling point range are reported, in accordance with the method, as gasoline.

Analyses for TPH (Total Petroleum Hydrocarbons) as Diesel
by Method DHS GC/FID.

Results Reported in Micrograms per Liter (µg/L)

Date of Analysis : 04/23/96

Analyte	Results	DLR
Total Petroleum Hydrocarbons (D)	ND	50

Sample DLR = DLR x DLR Multiplier, DLR Multiplier = 1

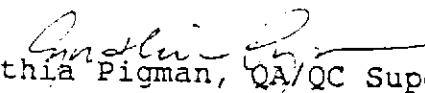
NOTE:

Hydrocarbons in the diesel boiling point range are reported, in accordance with the method, as diesel.

LEGEND:

DLR: Detection Limit for the Purposes of Reporting.
Exceptional sample conditions or matrix interferences
may result in higher detection limits.

ND: None Detected


Cynthia Pigman, QA/QC Supervisor

BSK ANALYTICAL LABORATORIES

BSK-Pleasanton
Nahas

Date Sampled : 04/12/96
 Time Sampled : 1000
 Date Received : 04/15/96
 Date of Analysis : 04/27/96
 Report Issue Date: 05/02/96

Case Number : Ch961411
 Lab ID Number : 1411-2
 Project Number : P92057.3
 Sample Description: MW-5

Sample Type: LIQUID

Analyses for BTEX by EPA Method 8020
and TPH(G) by EPA Method 8015
Prepared by Method 5030

Results Reported in Micrograms per Liter (ug/L)

Compound	Results	DLR
Benzene	ND	0.3
Toluene	ND	0.3
Ethylbenzene	ND	0.3
Total Xylene Isomers	ND	0.3
Total Petroleum Hydrocarbons (G)	ND	50

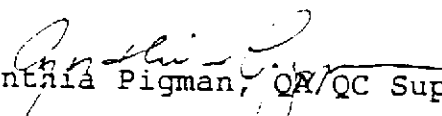
Sample DLR = DLR x DLR Multiplier, DLR Multiplier = 1

NOTE:

Hydrocarbons in the gasoline boiling point range are reported, in accordance with the method, as gasoline.

LEGEND:

DLR: Detection Limit for the Purposes of Reporting.
 Exceptional sample conditions or matrix interferences
 may result in higher detection limits.
 ND: None Detected


 Cynthia Pigman, QA/QC Supervisor

BSK ANALYTICAL LABORATORIES

BSK-Pleasanton
Nahas

Date Sampled : 04/12/96
 Time Sampled : 0910
 Date Received : 04/15/96
 Date of Analysis : 04/27/96
 Report Issue Date: 05/02/96

Case Number : Ch961411
 Lab ID Number : 1411-1
 Project Number : P92057.3
 Sample Description: MW-6

Sample Type: LIQUID

Analyses for BTEX by EPA Method 8020
and TPH(G) by EPA Method 8015
Prepared by Method 5030

Results Reported in Micrograms per Liter (ug/L)

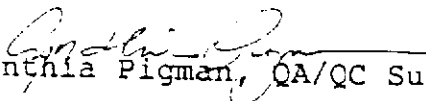
Compound	Results	DLR
Benzene	2.9	0.3
Toluene	2.9	0.3
Ethylbenzene	ND	0.3
Total Xylene Isomers	ND	0.3
Total Petroleum Hydrocarbons (G)	ND	50

Sample DLR = DLR x DLR Multiplier, DLR Multiplier = 1

NOTE:
 Hydrocarbons in the gasoline boiling point range are reported, in accordance with the method, as gasoline.

LEGEND:

DLR: Detection Limit for the Purposes of Reporting.
 Exceptional sample conditions or matrix interferences
 may result in higher detection limits.
 ND: None Detected


 Cynthia Pigman, QA/QC Supervisor

BSK ANALYTICAL
LABORATORIES

BSK-Pleasanton
Nahas

Date Sampled : 04/12/96
Time Sampled : 1316
Date Received : 04/15/96
Date of Analysis : 04/27/96
Report Issue Date: 05/02/96

Case Number : Ch961411
Lab ID Number : 1411-6
Project Number : P92057.3
Sample Description: MW-7

Sample Type: LIQUID

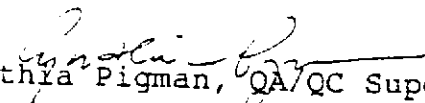
Analyses for BTEX by EPA Method 602M
Prepared by EPA Method 5030

Results Reported in Micrograms per Liter ($\mu\text{g/L}$)

Compound	Results	DLR
Benzene	ND	0.3
Toluene	ND	0.3
Ethylbenzene	ND	0.3
Xylene	ND	0.3

Sample DLR = DLR x DLR Multiplier, DLR Multiplier = 1

DLR: Detection Limit for the Purposes of Reporting.
Exceptional sample conditions or matrix interferences
may result in higher detection limits.
ND: None Detected
--: Not Analyzed


Cynthia Pigman, QA/QC Supervisor

Analyses Request / Chain of Custody

BSK Log Number: 1411

Analytical Due Date: 4/24/96

Environmental Services

Shaded areas for LAB use only

Requested Analyses

Client Name NAHAS % BSK-P	Report Attention: RIFAAT SALEM	Phone # (510) 462-4000
Address 1181 Quarry Lane # 300	Project, Quote or PO # P92057.3	FAX #
City, State, Zip Pleasanton, CA 94566	Copy to:	System #

LAB use only			Date Sampled	Time Sampled	Sampled by: RSS/JGO	Sample Description/Location	Comment or Station Code											
Sample #	Type	# Cont.																
1	L	2	4/12/96	9:10		MW-6		X	X									
2	L	2	4/12/96	10:00		MW-5		X	X									
3	L	5	4/12/96	11:00		MW-4		X	X	X								
4	L	2	4/12/96	11:20		MW-2		X	X									
5	L	2	4/12/96	12:00		MW-3		X	X									
6	L	2	4/12/96	1:16		MW-7		X										

BTEX
 TPH-G
 TPH-D

Matrix Type: L - Liquid S - Solid G - Gas
 Type of Hazards Associated with Samples:

Additional Services:
 Rush Priority: - 2 Day - 5 Day
 - Formal Chain of Custody - QC Data package

Additional Services Authorized by:

Payment Received with Delivery

Date: _____ Amount: \$ _____
 Check # _____ Initials _____
 Receipt # _____

(Signature)

Signature	Print Name	Company	Date	Time
<i>Rifaat Salem</i>	RIFAAT SALEM	BSK - P	4/15/96	8:00
<i>Jamie Garrison</i>	Jamie Garrison	BSK Labs	4/15/96	16:15