BSK & ASSOCIATES

GEOTECHNICAL CONSULTANTS, INC.

BSK JOB NO. P92057.3

EIGHTH QUARTERLY GROUNDWATER MONITORING REPORT UNOCAL 76 SERVICE STATION 20405 AND 20629 REDWOOD ROAD CASTRO VALLEY, CALIFORNIA

JULY 1992

BSK & Associates

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SEC

July 31, 1992

BSK JOB P92057.3

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

Subject: Eighth Quarterly 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 quarterly sampling on July 9, 1992 at the above-referenced facility. This quarterly report presents the project background, groundwater data obtained during this sampling event, conclusions based on this quarter's data, and recommendations for further action.

BACKGROUND

BSK & Associates installed three groundwater monitoring wells 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. Initially, the plan included four monitoring wells with at least one well (MW-1) to be located down-gradient of the existing tank cluster. However, due to the encounter of fuel contamination of soil from approximately 10 to 13 feet below grade, during boring for monitoring well installation, the down-gradient borings (MW-1 and MW-1A) were backfilled with 11-sack cement-sand grout following soil sampling in order to avoid further groundwater contamination. 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 installed and attempted groundwater monitoring well locations are shown in Figure 2, Site Plan.

Following a subsequent meeting with Eden Managements and Mr. Scott Seery on April 24, 1990, and receipt of the Alameda County Environmental Health letter dated April 24, 1990, we prepared and submitted our Proposal PR90066 to provide quarterly monitoring services for one year, and to assess the extent of soil contamination at the subject site.

A Soil Contamination Assessment Work Plan was also prepared in accordance with Appendix "A" of the Regional Board Staff Recommendations.

The first quarterly groundwater monitoring report was submitted on August 30, 1990. The first quarterly report concluded that an apparent unauthorized petroleum release had occurred at the site, based on groundwater data adjacent to, but up-gradient from the UST group. This report also reiterated that a down-gradient well does not exist at the site.

BSK & Associates submitted the second quarterly groundwater monitoring report in January 1991. The second quarterly report verified that motor fuel hydrocarbons were present in groundwater at the site. Benzene and TVH concentrations remained above primary drinking water and informal action levels, respectively.

BSK performed an assessment of the lateral extent of shallow soil contamination in April 1991 (see our Report P90165, dated April 1991). During this 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 third quarterly monitoring report was submitted contemporaneously with the soil contamination assessment. A large increase in contaminant concentrations in Wells MW-2 and MW-3 was reported in conjunction with water level increase due to March precipitation. Toluene levels were observed to exceed recommended limits, in addition to Benzene and Total Petroleum Hydrocarbons.

A fourth quarterly groundwater monitoring report was submitted on July 30, 1991. In this report, contaminant levels are shown to be sharply reduced to below previously recorded levels. Benzene, however, remained above recommended allowable levels.

The fifth quarterly groundwater monitoring report showed continued decrease in contaminant concentration, likely resultant of a further decrease of groundwater levels. No contaminants were detected in Well MW-3.

The sixth quarterly monitoring revealed increases in all the constituents tested in wells MW-2 and 3. MW-4 was not tested. The increases were likely in response to the increase in groundwater level due to winter precipitation.

The seventh quarterly monitoring report was included with the results of additional lateral contamination characterization in the off-site area to the south (BSK Report P92057.3, dated May 29, 1992). The report indicated a decrease in contaminant concentration in water near the UST group, and extension of the groundwater contaminant plume south of the site, between Wells MW-6 and MW-5, and south of MW-7.

Review of Subsurface Conditions

The site subsurface soil conditions, as exposed by 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 between 17 and 24 feet, and continued 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 2.0% to 0.4%. Electrical conductivity is a relatively low 500 to 1,000 micromhos, 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. This data is derived from measurements made of the lower groundwater unit.

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 PID was calibrated daily to a 100 ppm isobutylene standard with a 10.6 eV lamp). 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 the initial sample obtained from Well MW-7. Wells MW-2 and MW-3 are considered to be up and cross-gradient to what is believed to be the contaminant source area. Well MW-7 is down gradient from the source area. No evidence of hydrocarbons has been noted during observation of this well.

EIGHTH QUARTERLY MONITORING ACTIVITIES

General

Quarterly monitoring and/or observation of Underground Storage Tank (UST) groundwater monitoring wells (MW-2, MW-3, MW-4, MW-5, MW-6 and MW-7) were performed on July 9, 1992. Field procedures and observations are provided in the following text and figures.

Field Work

Wells MW-2, MW-3, MW-5, MW-6 and MW-7 were purged using a Teflon® bladder pump. Four well volumes were removed from each well. Purge effluent was field monitored for pH, Conductivity and Temperature during purging, to assess the influx of fresh formational water into the well. Purged water was then transferred to a 55-gallon DOT-approved steel drum for holding. The drum was labeled according to its contents, suspected contaminants, content source, date, etc.

Prior to purging, the depth to water in each well was measured using a Solinst electric sounding tape, marked in twentieths of a foot. The water depth was then interpolated to a hundredth of a foot increment from the tape. Each well was subsequently examined for floating and sinking immiscible product layers, sheen and odor, using a clean PVC bailer having dual check valves for point-source sampling. Groundwater flow direction and gradient data were determined from the depth measurements, and are presented in Figure 3, Groundwater Flow Direction and Gradient. 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® bailer or bladder pump. Sampling for contaminants was done in the order of their volatility, with the most volatile constituents

sampled first. Sampling for contaminants known to have densities greater than water were sampled at the bottom of the well. Each water sample obtained for a specific contaminant, or contaminants, was placed into the appropriate receptacle, 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, water temperature and other data. The Well Field Logs are shown as Figures 4.1 through 4.6.

Site Hydrology

Groundwater measurements were made of the six existing wells on July 9, 1992, in order to assess the flow and gradient in the area. **On this date, groundwater flow is southeast in the north portion of the site, and south near MW-7.** The gradient is 1.5 percent. This flow is more easterly than the previous quarter. **The gradient is 0.8 percent greater than the previous quarter. Groundwater levels have dropped 0.39 to 0.65 feet since May 1992.** Groundwater flow direction and gradient are shown on Figure 3, Potentiometric Surface Map.

Conductivity, pH and temperature data are presented in the Well Field Logs, Figures 4.1 through 4.6, little significant change has occurred in these parameters. Electrical conductivity is slightly less, and the water slightly more acidic than April 1992.

The changes in flow direction and water level since May 1992 are likely the result of a falling water table due to seasonal dry weather.

Chemical Analyses

The water samples obtained from Wells MW-2; MW-3 and MW-5 through MW-7, were analyzed for constituents related to gasoline, since the wells are located adjacent to two 10,000 gallon underground gasoline tanks. The samples were tested for the following contaminants: Total Volatile Hydrocarbons (TVH) and Benzene, Toluene, Xylene and Ethylbenzene (BTXE).

The contaminants tested are those specified by the Tri-Regional Water Quality Control Board Recommendations of August 10, 1990 and listed in the Alameda County Department of Environmental Health letter, dated April 26, 1990 to R.T. Nahas Co. Current and former analyses results are presented for comparison in the following tables. The Chemical Test Data Sheets are presented in Appendix A, Figures A-1 and A-5. Project Chain-of-Custody record is shown as Figure A-6.

WATER ANALYSES

TABLE 1

(Results in ppb)

Sampling Date	Sample Location	Benzene (1)*	Toluene (100)+	Xylene (1750)*	Ethylbenzene (680)*
October 1990	Well MW-2	64	30	160	35
	Well MW-3	18	ND	5.6	3.8
	Well MW-4	ND	ND	ND	ND
December 1990	Well MW-2	17	10	59	13
	Well MW-3	7	2	5	2
January 1991	Well MW-2	50	33	110	22
	Well MW-3	29	3.3	34	9.7
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	82	
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

ND = None Detected
*DHS: Primary Drinking Water Standard (3/89)
+DHS: Action Level

TABLE 2
(Results in ppb)

Sampling Date	Sample Location	TPH (100)*	TVH (100)*	Oil and Grease (100)*
October 1990	Well MW-2	--	740	--
	Well MW-3	--	87	--
	Well MW-4	ND	ND	ND
December 1990	Well MW-2	--	370	--
	Well MW-3	--	76	--
January 1990	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
	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
	Well MW-4	ND	ND	ND
	Well MW-5	--	--	--
	Well MW-6	--	--	--
	Well MW-7	--	1300	--
July 1992	Well MW-2	--	84	--
	Well MW-3	--	ND	--
	Well MW-5	--	ND	--
	Well MW-6	--	ND	--
	Well MW-7	--	830	--

-- = Not Tested
ND = None Detected

*Quantified Action Levels are not provided for these parameters. The amount given is often informally used by regulatory agencies as a threshold value.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

On the basis of our findings to date, an unauthorized fuel release to soil and groundwater has occurred at the site, in the vicinity of the two 10,000-gallon underground gasoline storage tanks.

Contaminants associated with gasoline have generally decreased in Monitoring Wells MW-2 and MW-3, MW-5, MW-6 and MW-7 since the last quarterly sampling event (April 1992). At this time, Benzene concentrations meet or exceed State and Federal Standards in Wells MW-2 and MW-3. Although no standard has been devised for Total Volatile Hydrocarbon concentration, the quantity observed in Well MW-7 exceeds general informal regulatory action levels.

The decrease in contaminant concentrations is likely related to falling groundwater levels

There are now three groundwater monitoring wells located down-gradient from the contamination source area.

Recommendations

With respect to the findings of this quarterly sampling and the previous section of this report, it is recommended that quarterly groundwater monitoring continue. **It is further recommended that the southern limit of the groundwater contaminant plume be located, and monitored.**

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 ACEH to the Regional Water Quality Control Board in Oakland for their review.

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.

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 have been of service to you during this project. If you have questions concerning the contents of the report, please do not hesitate to contact us.

The following are attached and complete this report:

FIGURE 1 Vicinity Map

FIGURE 2 Site Plan

FIGURE 3 Potentiometric Surface Map

FIGURE 4.1 through 4.6 Well Field Logs

APPENDIX "A"

FIGURES A-1 through A-5 Eighth Quarterly Laboratory Chemical Test Data Sheets

FIGURE A-6 Project Chain-of-Custody Record

Respectfully submitted,

BSK & Associates

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REGISTERED PROFESSIONAL ENGINEER YAHYA ESKANDARI No. C038101 Exp. 3/31/93 CIVIL STATE OF CALIFORNIA

Tim W. Berger, R.E.A. #02336
Project Geologist

AYE/TWB:kl(rprts\env.Q7)

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

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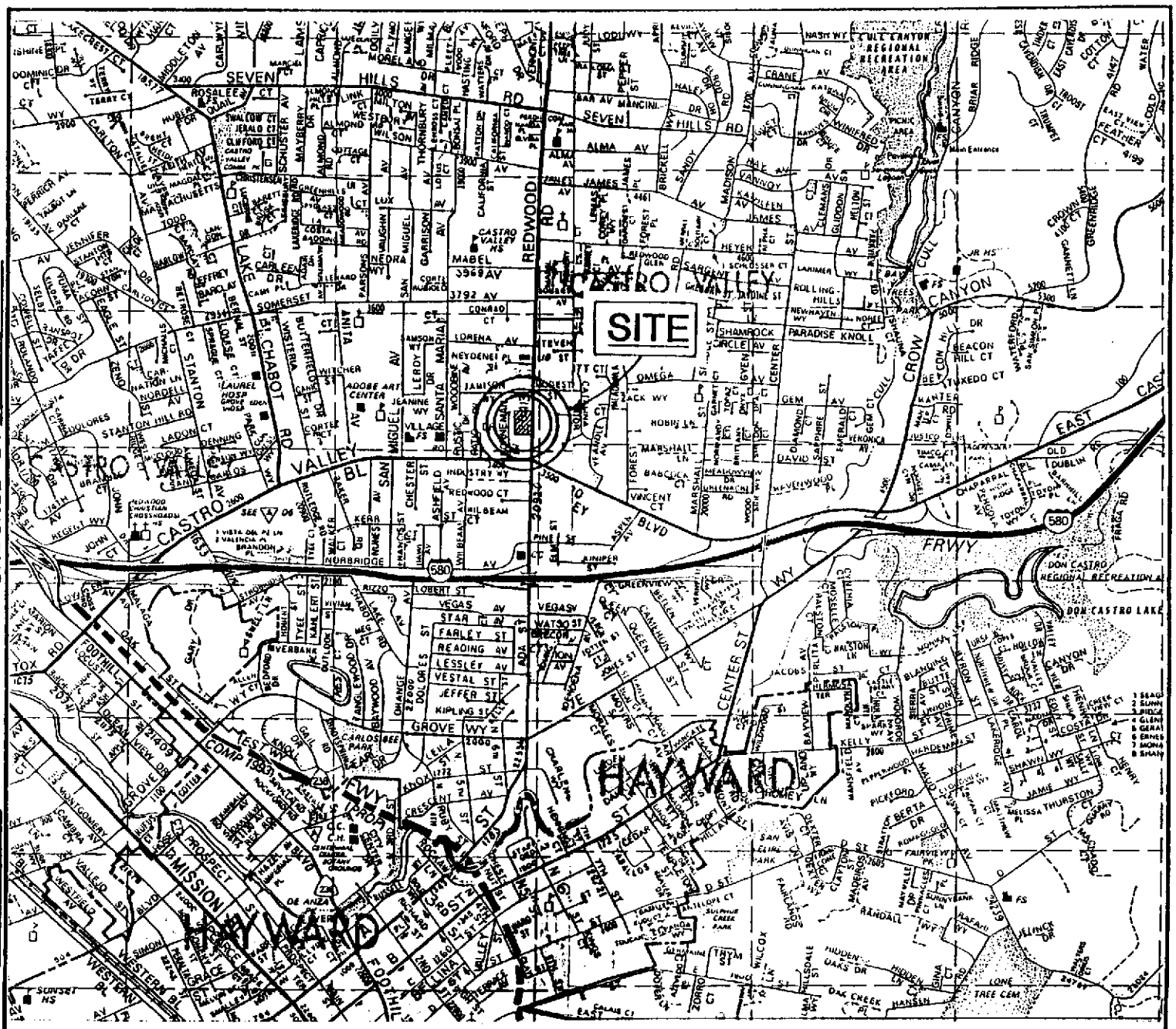
DATE 7-28-92

BY TWB

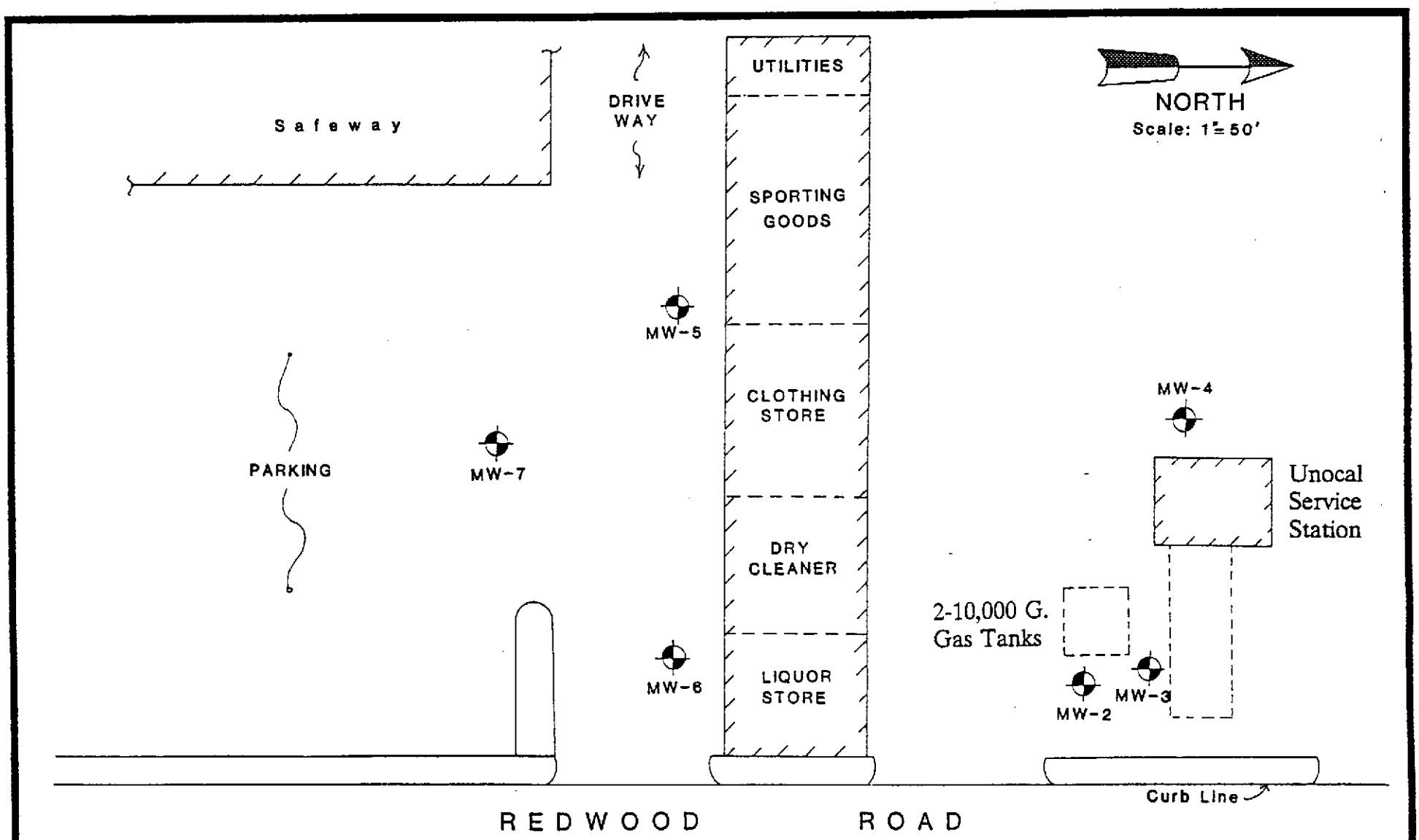


VICINITY MAP

EIGHTH QUARTERLY GROUNDWATER
MONITORING REPORT
UNOCAL 76 SERVICE STATION
20405 AND 20629 REDWOOD ROAD
CASTRO VALLEY, CALIFORNIA

Job No. P92057.3
July 1992
FIGURE: 1

BSK & Associates



LEGEND:

- Location And Designation Of Groundwater Monitoring Well

SITE PLAN

Job No. P92057.3
July 1992
FIGURE: 2

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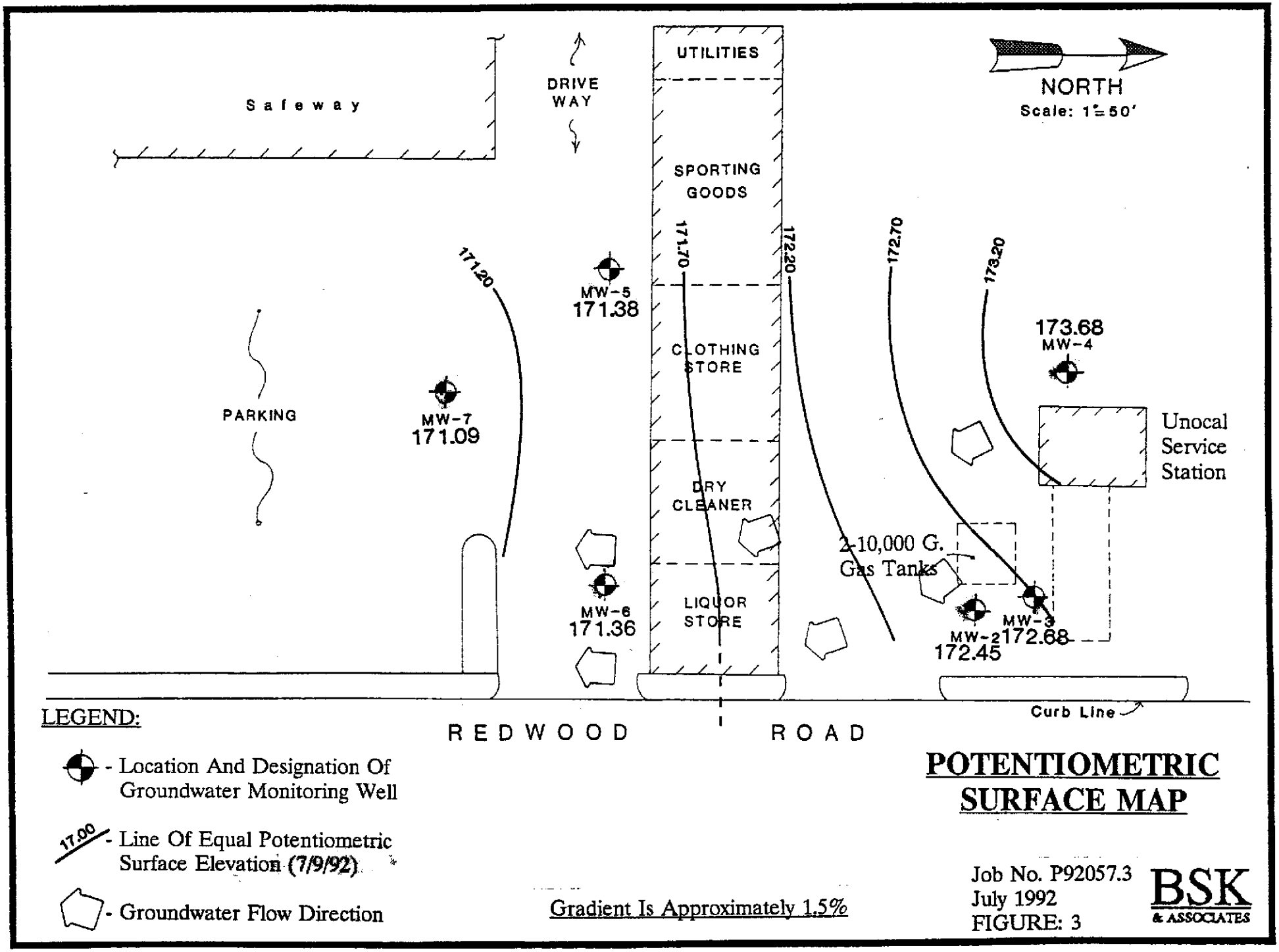
Safeway
DRIVE WAY
UTILITIES
SPORTING GOODS
CLOTHING STORE
DRY CLEANER
LIQUOR STORE
NORTH
Scale: 1"=50'
171.20
171.70
172.20
172.70
173.20
MW-5
171.38
MW-7
171.09
MW-6
171.36
MW-4
173.68
MW-3
172.68
MW-2
172.45
PARKING
Unocal Service Station
2-10,000 G. Gas Tanks
REDWOOD ROAD
Curb Line
LEGEND:
- Location And Designation Of Groundwater Monitoring Well
17.00 - Line Of Equal Potentiometric Surface Elevation (7/9/92)
- Groundwater Flow Direction
Gradient Is Approximately 1.5%
POTENTIOMETRIC SURFACE MAP
Job No. P92057.3
July 1992
FIGURE: 3
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WELL FIELD LOG

PROJECT NAME AND LOCATION: Unocal 76, Service Station
20405 Redwood Road, Castro Valley, CA. 94546

PERSONNEL: M. Cline
WEATHER: Clear, Hot

WELL INFORMATION:

Well No.: MW-2
Depth to Water: 10.65 feet
Water Volume: 3.1 gallons
Reference Elevation: 183.10 (MSL)
Groundwater Elevation: 172.45 (MSL)
Measurement Technique: Electric Well Sounder

Date Purged: 7/9/92
Purge Method: Bladder Pump
Purge Rate: 0.5 gpm

IMMISCIBLE LAYERS:

Top: Slight Sheen, Slight Odor
Bottom: Slight Sheen, Moderate Odor
Detection Method: Visual, Olfactory
Collection Method: Clear PVC Bailer

WELL DEVELOPMENT/PURGE DATA:

TIME	Volume Removed (gallons)	Electrical Conductivity (uS/cm)	pH	Temperature (degrees F)	Remarks
14:15	--	--	--	--	
14:20	3.0	824	6.2	78	
14:25	6.0	717	5.4	76	
14:31	9.0	695	5.3	74	
14:37	12.0	677	5.3	74	

SAMPLE COLLECTION DATA

Sampling Equipment: Teflon Point Source Bailer

TIME	ANALYSIS	CONTAINER USED	SAMPLE INTERVAL
14:40	TVH &BTXE	2-40 ml vials with HCL	12 feet

UNOCAL 76, SERVICE STATION QUARTERLY GROUNDWATER SAMPLING AND ANALYSIS	Job No. P92057.3 July 1992 FIGURE: 4.1	BSK & ASSOCIATES

WELL FIELD LOG

PROJECT NAME AND LOCATION: Unocal 76, Service Station
20405 Redwood Road, Castro Valley, CA. 94546

PERSONNEL: M. Cline
WEATHER: Clear, Hot

WELL INFORMATION:

Well No.: MW-3
Depth to Water: 10.84 feet
Water Volume: 3.1 gallons
Reference Elevation: 183.52 (MSL)
Groundwater Elevation: 172.68 (MSL)
Measurement Technique: Electric Well Sounder

Date Purged: 7/9/92
Purge Method: Bladder pump
Purge Rate: 0.5 gpm

IMMISCIBLE LAYERS:

Top: None Observed, No Odor
Detection Method: Visual, Olfactory
Collection Method: Clear PVC Bailer

Bottom: None Observed , No Odor

WELL DEVELOPMENT/PURGE DATA:

TIME	Volume Removed (gallons)	Electrical Conductivity (uS/cm)	pH	Temperature (degrees F)	Remarks
13:35	--	--	--	--	
13:39	3.0	647	6.0	79	
13:45	6.0	622	5.6	76	
13:50	9.0	616	5.5	75	
13:55	12.0	613	5.4	74	

SAMPLE COLLECTION DATA

Sampling Equipment: Teflon Point Source Bailer

TIME	ANALYSIS	CONTAINER USED	SAMPLE INTERVAL
14:00	TVH &BTXE	2-40 ml vials with HCL	12 feet

UNOCAL 76, SERVICE STATION
QUARTERLY GROUNDWATER
SAMPLING AND ANALYSIS

Job No. P92057.3
July 1992
FIGURE: 4.2

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WELL FIELD LOG

PROJECT NAME AND LOCATION: Unocal 76, Service Station
20405 Redwood Road, Castro Valley, CA. 94546

PERSONNEL: M. Cline
WEATHER: Clear, Hot

WELL INFORMATION:

Well No.: MW-4
Depth to Water: 10.65 feet
Water Volume: NA
Reference Elevation: 184.33(MSL)
Groundwater Elevation: 173.68(MSL)
Measurement Technique: Electric Well Sounder

Date Purged: NA
Purge Method: NA
Purge Rate: NA

IMMISCIBLE LAYERS:

Top: None Observed, No Odor
Detection Method: Visual, Olfactory
Collection Method: Clear PVC Bailer

Bottom: Trace Brown Clay, No Odor

WELL DEVELOPMENT/PURGE DATA:

TIME	Volume Removed (gallons)	Electrical Conductivity (uS/cm)	pH	Temperture (degrees F)	Remarks

SAMPLE COLLECTION DATA

Sampling Equipment:

TIME	ANALYSIS	CONTAINER USED	SAMPLE INTERVAL

UNOCAL 76, SERVICE STATION
QUARTERLY GROUNDWATER
SAMPLING AND ANALYSIS

Job No. P92057.3
July 1992
FIGURE: 4.3

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WELL FIELD LOG

PROJECT NAME AND LOCATION: Unocal 76, Service Station
20405 Redwood Road, Castro Valley, CA. 94546

PERSONNEL: M. Cline
WEATHER: Clear, Warm

WELL INFORMATION:

Well No.: MW-5
Depth to Water: 12.24 feet
Water Volume: 3.6 gallons
Reference Elevation: 183.62(MSL)
Groundwater Elevation: 171.38 (MSL)
Measurement Technique: Electric Well Sounder

Date Purged: 7/9/92
Purge Method: Bladder Pump
Purge Rate: 0.4 gpm

IMMISCIBLE LAYERS:

Top: None Observed, No Odor
Detection Method: Visual, Olfactory
Collection Method: Clear PVC Bailer

Bottom: Brown Clay -Silt, No Odor

WELL DEVELOPMENT/PURGE DATA:

TIME	Volume Removed (gallons)	Electrical Conductivity (uS/cm)	pH	Temperature (degrees F)	Remarks
11:25	--	--	--	--	
11:35	3.5	675	6.0	80	
11:41	7.0	641	5.8	77	
11:48	10.5	637	6.0	76	
11:58	14.0	637	5.9	78	

SAMPLE COLLECTION DATA

Sampling Equipment: Teflon Point Source Bailer

TIME	ANALYSIS	CONTAINER USED	SAMPLE INTERVAL
12:00	TVH &BTXE	2-40 ml vials with HCL	13 feet

UNOCAL 76, SERVICE STATION
QUARTERLY GROUNDWATER
SAMPLING AND ANALYSIS

Job No. P92057.3
July 1992
FIGURE: 4.4

BSK & ASSOCIATES

WELL FIELD LOG

PROJECT NAME AND LOCATION: Unocal 76, Service Station
20405 Redwood Road, Castro Valley, CA. 94546

PERSONNEL: M. Cline
WEATHER: Clear, Hot

WELL INFORMATION:

Well No.: MW-6
Depth to Water: 12.34 feet
Water Volume: 2.7 gallons
Reference Elevation: 183.70 (MSL)
Groundwater Elevation: 171.36 (MSL)
Measurement Technique: Electric Well Sounder

Date Purged: 7/9/92
Purge Method: Bladder Pump
Purge Rate: 0.5 gpm

IMMISCIBLE LAYERS:

Top: None Observed, No Odor
Bottom: Brown Clay -Silt, No Odor
Detection Method: Visual, Olfactory
Collection Method: Clear PVC Bailer

WELL DEVELOPMENT/PURGE DATA:

TIME	Volume Removed (gallons)	Electrical Conductivity (uS/cm)	pH	Temperature (degrees F)	Remarks
10:26	--	--	--	--	
10:32	3.0	613	6.7	80	
10:38	6.0	624	6.1	78	
10:45	9.0	608	6.1	77	
10:50	12.0	607	6.2	76	

SAMPLE COLLECTION DATA

Sampling Equipment: Teflon Point Source Bailer

TIME	ANALYSIS	CONTAINER USED	SAMPLE INTERVAL
11:00	TVH &BTXE	2-40 ml vials with HCL	13 feet

UNOCAL 76, SERVICE STATION
QUARTERLY GROUNDWATER
SAMPLING AND ANALYSIS

Job No. P92057.3
July 1992
FIGURE: 4.5

BSK & ASSOCIATES

WELL FIELD LOG

PROJECT NAME AND LOCATION: Unocal 76, Service Station
20405 Redwood Road, Castro Valley, CA. 94546

PERSONNEL: M. Cline
WEATHER: Clear, Hot

WELL INFORMATION:

Well No.: MW-7
Depth to Water: 11.43 feet
Water Volume: 2.7 gallons
Reference Elevation: 182.52(MSL)
Groundwater Elevation: 171.09 (MSL)
Measurement Technique: Electric Well Sounder

Date Purged: 7/9/92
Purge Method: Bladder Pump
Purge Rate: 0.7 gpm

IMMISCIBLE LAYERS:

Top: None Observed, No Odor
Bottom: Brown Clay -Silt, No Odor
Detection Method: Visual, Olfactory
Collection Method: Clear PVC Bailer

WELL DEVELOPMENT/PURGE DATA:

TIME	Volume Removed (gallons)	Electrical Conductivity (uS/cm)	pH	Temperature (degrees F)	Remarks
12:35	--	--	--	--	
12:40	3.0	876	5.5	79	
12:46	7.0	869	5.4	77	
12:49	9.0	862	5.4	75	
12:53	12.0	863	5.4	75	

SAMPLE COLLECTION DATA

Sampling Equipment: Teflon Point Source Bailer

TIME	ANALYSIS	CONTAINER USED	SAMPLE INTERVAL
13:00	TVH &BTXE	2-40 ml vials with HCL	13 feet

APPENDIX A

CHEMICAL TEST DATA SHEETS

AND

PROJECT-CHAIN-OF-CUSTODY RECORD

ANALYTICAL BSK LABORATORIES
Environmental Services

1414 Stanislaus Street
Fresno, California 93706
Telephone (209) 485-8310
FAX (209) 485-6935
1-800-877-8310

FIGURE: A-1

BSK-Pleasanton
R.T. Nahas

Date Sampled : 07/09/92
Time Sampled : 1440
Date Received : 07/10/92
Date of Analysis : 07/13/92
Report Issue Date: 07/22/92

Case Number : Ch921824
Lab ID Number : 1824-5
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	10	0.3
Toluene	ND	0.3
Ethylbenzene	0.6	0.3
Total Xylene Isomers	2.3	0.3
Total Petroleum Hydrocarbons (G)	84	50

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

1/22/92 SL
Cynthia Pigman, QA/QC Supervisor

Jeffrey Creager, Organics Manager

FIGURE: A-2

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Fresno, California 93706
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BSK-Pleasanton
R.T. Nahas

Date Sampled : 07/09/92
Time Sampled : 1400
Date Received : 07/10/92
Date of Analysis : 07/13/92
Report Issue Date: 07/16/92

Case Number : Ch921824
Lab ID Number : 1824-4
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	1.3	0.3
Toluene	0.4	0.3
Ethylbenzene	ND	0.3
Total Xylene Isomers	1.3	0.3
Total Petroleum Hydrocarbons (G)	ND	50

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

Cynthia Pigman, QA/QC Supervisor

Jeffrey Creager, Organics Manager

R91 1009 BTPL.t

FIGURE: A-3

ANALYTICAL BSK LABORATORIES
Environmental Services

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Fresno, California 93706
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BSK-Pleasanton
R.T. Nahas

Date Sampled : 07/09/92
Time Sampled : 1200
Date Received : 07/10/92
Date of Analysis : 07/13/92
Report Issue Date: 07/16/92

Case Number : Ch921824
Lab ID Number : 1824-2
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

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

Jeffrey Creager, Organics Manager

R91 1009 BTPL.t

FIGURE: A-4

ANALYTICAL BSK LABORATORIES
Environmental Services

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Fresno, California 93706
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BSK-Pleasanton
R.T. Nahas

Date Sampled : 07/09/92
Time Sampled : 1100
Date Received : 07/10/92
Date of Analysis : 07/13/92
Report Issue Date: 07/16/92

Case Number : Ch921824
Lab ID Number : 1824-1
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	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

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

Jeffrey Creager, Organics Manager

R91 1009 BTPL.t

FIGURE: A-5

ANALYTICAL BSK LABORATORIES
Environmental Services

1414 Stanislaus Street
Fresno, California 93706
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1-800-877-8310

BSK-Pleasanton
R.T. Nahas

Date Sampled : 07/09/92
Time Sampled : 1300
Date Received : 07/10/92
Date of Analysis : 07/13/92
Report Issue Date: 07/16/92

Case Number : Ch921824
Lab ID Number : 1824-3
Project Number : P92057.3
Sample Description: MW-7

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)	830	50

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

Cynthia Pigman, QA/QC Supervisor

Jeffrey Creager, Organics Manager

R91 1009 BTPL.t

BSK Log Number 1829

ANALYSIS REQUEST/CHAIN OF CUSTODY RECORD

1000-7462

Client Name: R.T. Nakus (BSK P)	Project or P.O.#: P92057.3
Address: 1181 Quarry Ln.	Phone #: 510 462-4000
City, State, Zip: Pleasanton	Report, attention: Tim Berger

Sampled by: M. Cline

Lab Use Only in this section

Analysis required: BTXE & TPH G; Hazardous sample / Special handling required

7-16-92

Date sampled	Time sampled	Type (See key below)	Sample description	Number of containers	Lab Sample number	Sample Seals (See key below)	BTXE & TPH G	Hazardous sample / Special handling required	Remarks
7/9/92	11:00	L	MW-6	2	1	P	X		2x40ml
	12:00		MW-5	2	2		X		
	13:00		MW-7	2	3		X		
	14:00		MW-3 ML	2	4		X		
	14:~~00~~ MC		MW-~~X~~-2 TWB 7/22/92	2	5	V	X		

IMPORTANT NOTICE: No samples will be analyzed without an authorized signature in this section.

I am hereby requesting BSK's Normal Chain-of-Custody Procedures for the above samples. I understand that these procedures are generally consistent with those outlined in the U.S. E.P.A. SW 846 and that there is no extra charge for this service.

By: Mart Cli
Authorized Signature

I am hereby requesting BSK's Formal Chain-of-Custody Procedures for the above samples. I understand that these procedures are generally consistent with those outlined in U.S. EPA Contract Laboratory Program Statement of Work, Section F, and that there is a charge of $50.00 per work order or $5.00 a bottle, whichever is greater.

By: _____
Authorized Signature

	Signature	Print Name	Company	Date	Time
Relinquished by	Mart Cli	Martin Cline	BSK & Assoc.	7/10/92	08:45
Received by	D. Fiello	D. Fiello	BSK	7-10-92	1715
Relinquished by					
Received by					
Relinquished by					
Received by					

FIGURE: A-6

BSK & Associates Chemical Laboratories

1414 Stanislaus Street Fresno, California 93706

Telephone (209) 485-8310 • Fax (209) 485-7427

KEY: Type: AQ–Aqueous SL–Sludge SO–Soil PE–Petroleum OT–Other
Seals: P–Present A–Absent B–Broken
DISTRIBUTION: WHITE, CANARY - LABORATORY PINK - ORIGINATOR
Note:
Samples are discarded 14 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.