BSK & ASSOCIATES
JOB No. P90165

REPORT
SOIL BORINGS FOR SOIL CONTAMINATION ASSESSMENT
UNOCAL 76 SERVICE STATION
20405 REDWOOD ROAD
CASTRO VALLEY, CALIFORNIA
APRIL 1991

BSK
& Associates

BSK & Associates, Geotechnical Consultants, Inc.

Geotechnical Engineering • Engineering Geology • Environmental Engineering • Engineering Laboratories • Chemical Laboratories

April 29, 1991 BSK JOB No. P90165

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

Attention: Mr. Randy T. Nahas

SUBJECT: Soil Borings for Soil Contamination Assessment
Unocal 76 Service Station
20405 Redwood Road
Castro Valley, California

Gentlemen:

As requested and authorized, BSK & Associates has performed supplemental soil contamination assessment at the above-referenced location. However, a down-gradient groundwater monitoring well, described in our Work Plan P90165, dated August 1990, was not installed due to encountered site conditions. The project site location is shown on the Vicinity Map, Figure 1.

INTRODUCTION

SITE DESCRIPTION

The project site comprises the grounds of a Unocal 76 Service Station located at 20405 Redwood Road, Castro Valley, California and an adjoining driveway south of the station, which allows access to a shopping center west of the station.

The Unocal 76 Service Station is operated by Mr. Frank Tien. The property owner is R.T. Nahas Company, who also owns the driveway area and carwash adjoining the station's west property line. The Unocal Station has two pump islands, offering unleaded and

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super unleaded gasoline. The pumps draw gasoline from two 10,000 gallon underground tanks located just south of the pump islands. A 300-gallon underground waste oil tank is behind (west of) the service station building. The station and driveway are paved in asphalt. The pump islands are on a concrete slab. Three storm drains service the project area, and a utility corridor exists between the station grounds and the shopping center access driveway, as shown on the Site Plan, Figure 2.

The project site is bound to the east by Redwood Road, a busy four-lane thoroughfare. The north border is the parking area for professional offices, the west boundary is a coin-operated carwash. The south boundary is the rear wall of a multiple retail-space building. The surrounding vicinity includes residential neighborhoods to the north and east and retail and services developments to the south and west. The land surface slopes gently to the south, and a small stream drainage is located approximately 750 feet east of the site.

BACKGROUND

In December 1989, BSK & Associates installed three groundwater monitoring wells adjacent to two underground gasoline tanks, and one waste oil storage tank, as part of a monitoring program for the tanks as mandated by the California Administrative Code, Title 23, Chapter 3, Subchapter 16. A fourth well (adjacent to the gasoline tanks) was to complete the installation, but perched water and encountered soil and water fuel contamination prevented well emplacement. The fourth well (proposed MW-1) would have been the down-gradient well for the gasoline tanks. The locations of the three installed wells (MW-2, MW-3, MW-4), as well as two attempted locations for MW-1, are located on the Site Plan, Figure 2.

Minor hydrocarbon contamination in groundwater was noted immediately upon sampling of Monitoring Well MW-2, and shown to be 72 ppb Total Petroleum Hydrocarbon as gasoline (TVH). Subsequent periodic monitoring in October and December 1990, and January 1991 revealed Benzene, Toluene, Ethylbenzene and Xylene (BTEX) compounds, as well as elevated amounts of TVH in MW-2 and MW-3. Benzene concentrations have exceeded those allowable for drinking water. TVH values have exceeded informal action levels used by regulatory agencies.

No contamination has been observed from Monitoring Well MW-4, adjacent to the waste oil tank.

Soil contamination encountered in Borings MW-1 and MW-1A during the initial well installation occurred at 10 to 15 feet in depth at a perched water zone. Field hydrocarbon detector values were significant, but results of laboratory analyses generally revealed relatively minor amounts of BTEX, TVH, and TPH. [redacted] observations reported heavy sheen on water observed in the borings.

In March 1991, BSK was authorized to evaluate the extent of soil and groundwater contamination discovered during the initial well installation, and to install a down-gradient groundwater monitoring well to complete the initial tank monitoring requirements. For the reasons stated previously, the down-gradient well was not installed.

PURPOSE AND SCOPE

PURPOSE

This investigation was performed in accordance with our Work Plan (referenced P90165), dated August 30, 1990. The investigation was undertaken in order to evaluate the lateral boundaries of shallow soil and perched groundwater contamination by motor fuels at the project site. Installation of a down-gradient groundwater well for monitoring the gasoline tanks had also been planned. At the request of the client, a limited investigation of the source of the contamination was also performed.

SCOPE

In order to meet the described objectives, the following activities were performed:

- Excavation of 13 shallow borings to first encountered groundwater, or less, to determine the presence of hydrocarbon contamination.

- Acquisition of 14 soil samples, and analysis of those samples for hydrocarbon constituents to quantify contaminant amounts and document contaminant boundaries.

- Site mapping to locate salient features such as under and above-ground utilities, surface drains, boring locations, etc.

- Limited inquiry regarding the source of the observed contamination.

- Review and synthesis of field, analytical and office data to characterize the contaminant area, and to plan succeeding courses of action.

- Preparation of a report summarizing and presenting field data, observations, analysis results, conclusions and recommendations for additional work, if necessary.

FIELD WORK

Thirteen exploratory soil borings were advanced from 11 to 21.5 feet in depth. Their locations are shown on Figure 2, Site Plan, as Borings SB-1 through SB-13. The borings were generally drilled to first encountered groundwater, or just above.

The soil borings were drilled utilizing a Mobile Drill truck-mounted B-53 rig using 8-inch hollow-stem auger. Two-inch I.D. split-spoon samplers housing three 2 x 6-inch stainless steel sampling tubes were used for soil sampling for chemical analysis. A 1.4-inch I.D. standard penetration split-spoon (SPT) sampler was used for field soil classification and Photo-ionization Detector (PID) screening. Soils were classified in the field by a geologist using the Unified Soil Classification System (ASTM D-2487), as shown on the Legend for Test Hole Logs, Figure 3. The Logs of Borings are presented on Figures 4 through 16.

Soil samples were obtained from each boring at approximately five foot intervals, at the soil/groundwater interface and other suspect horizons. The samples were utilized for the determination of soil classification and condition. Soil samples obtained from the soil/groundwater interface from each exploratory boring were retained for possible chemical analysis for contaminants. Selected soil samples obtained above groundwater in the soil borings were also retained for chemical analysis. Following boring and sampling completion, each boring

was backfilled to the ground surface with an 11-sack cement and sand slurry.

Retained samples were sealed within the aforementioned stainless steel tubes with teflon sheeting and pressure-fitted plastic caps, labeled, and refrigerated for delivery to our State-certified analytical laboratories.

A Photo-ionization Detector (PID) was used to screen soils exhumed from each of the borings while drilling. PID values were recorded on the boring logs at the depth from which the screened sample was obtained.

Drilling and sampling equipment used during drilling were cleaned by hi-pressure, hi-temperature wash and/or non-phosphate detergent wash, and rinsed prior to usage at the site, and between borings.

SUBSURFACE CONDITIONS

GENERAL

Site subsurface conditions were explored to a maximum depth of 21.5 feet by auger boring and sampling. Previous work (BSK Report P89134) provided limited data to 31 feet in depth. The subsurface materials explored consist of Holocene Alluvium derived from Cretaceous clay shale, sandstone, and conglomerate. The site soils are predominantly fine grained, consisting principally of silt and clay, with sand. **Minor sand and gravel lenses were occasionally encountered. Groundwater is shallow, and varies from 13 to 22 feet in depth across the site.** – presumably referring to 1st encountered GW

Clayey fill covers the site to a depth of 2.5 to 5 feet, beneath a thin asphalt pavement and aggregate base. **The fill was observed to 9 feet at Boring SB-5, likely indicating a former trench.** The fill was soft, moist, and often contained trash remnants such as glass, wood, and brick shards.

The fill is underlain across the site by mottled gray and orange, very stiff to hard silty clay. This unit is 2 to 3 feet thick to the north and 4 to 5 feet thick to the south; which suggests that the unit dips to the south. **This unit is underlain by 2 to**

3 feet of sand and gravel in the northwestern one-fourth of the site. In the southeast corner of the site, this unit may extend to 20 feet in depth.

At depths of 8 to 14 feet, most of the site is underlain by silt and silty clay. This unit is yellow-brown and light gray mottled, stiff to very stiff, and varies from sandy to clayey. The deposit is 5 to 6 feet thick, and may be underlain by 1 to 3 feet of gravel in the north and central portions of the project area. This unit appears to pinch out in the southeastern corner of the site where it is replaced at a slightly greater depth by yellow-brown sandy and silty clay. The yellow-brown clay is 3 to 5 feet thick, and lies under the overlying silty unit in the central and northern portions of the site. This unit is very stiff to hard, has trace fine-to-no pores, and generally acts as an upper water barrier.

Clayey/silty sand occurs from 12.5 to 16.5 feet in the southwestern half of the subject property. This unit is the principal upper water-bearing horizon, and is 5 or more feet in thickness. It is orange with blue vertical streaks or mottles, is medium dense to dense, contains less than 10% small pebbles, and grades finer to the south and west. This deposit appears to form a curvilinear ridge from north to south near the gasoline tank location. The ridge is concave to the west, with a depression at Boring SB-3. The variation in this unit's upper surface appears to affect perched groundwater levels. An approximation of this unit's upper surface is portrayed in Figure 17, Upper Surface - First Water-Bearing Unit.

This clayey sand may connect with a similar water-bearing unit in the eastern and northwestern portions of the site located 17 to 20 feet below ground surface.

A light brown silty clay was encountered below 22 to 24.5 feet, to the maximum depths explored. This unit is greater than 5 feet thick, is stiff to very stiff, and saturated; its upper surface dips to the east.

The Boring Logs, Figures 4 through 16, should be consulted for more detailed soil profiles at each boring location. It should be understood that the soil unit demarcations shown on the logs are approximate, and actual soil change may be more gradual.

HYDROGEOLOGY

The site is located within the Castro Valley Basin in the Alameda County Flood Control and Water Conservation District. Castro Valley is an intermontane valley containing less than 100 feet of Pleistocene Alluvium, consisting primarily of fine silt and sand. Underlying bedrock is considered essentially non-water-bearing.

The Castro Valley Basin is not considered a major water resource; most wells are utilized for private irrigation. Five active water wells within one-half mile of the site are shown on a 1989 well location map. No wells are located in the expected down-gradient direction. The wells listed are generally less than 100 feet in depth, and used for irrigation. One small private water-purveyor exists in the Basin on Cull Canyon Road, east of the site.

Two to three groundwater "contamination-by-motor-fuel" sites are known to exist south and west of the project site, along Castro Valley Boulevard. These sites may contain groundwater monitoring wells. It is not likely that these sites affect the project area because they are down-gradient or cross-gradient from the project site.

Groundwater within the site area was 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. The 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 at 10 to 12 feet below ground surface. The 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 Boring SB-3, and possibly SB-12.

Groundwater flow direction at the site has been towards the southwest since December 1989. Gradient has varied at the site from 1.4% to 0.4%. Electrical conductivity is a relatively low 700 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.

CONTAMINANTS

Soil contamination by petroleum hydrocarbons was observed olfactorily and by Photo-ionization Detector (PID) in 11 borings in the south-central portion of the site, as depicted in Figure 18, Approximate Area of Known Shallow Soil Contamination. Hydrocarbons were detected at depths ranging from just below the asphalt pavement to 16 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. PID values measured in the field are recorded on the Boring Logs.

Where? SB-B

Groundwater contamination has been encountered at the site in samples obtained quarterly from Wells MW-2 and MW-3 in the lower water horizon. These wells are considered to be up and cross-gradient to what is believed to be the contaminant source area. Sheen and possible free product were observed on "perched" water in the exploratory soil borings, and on auger and soil removed from the borehole.

CHEMICAL ANALYSES

The 14 soil samples retained for chemical analysis during this characterization investigation were primarily analyzed for the gasoline indicators TVH and BTXE, because of the contaminant source's potential relationship to the two 10,000-gallon gasoline tanks. Due to source uncertainty, and the possibility

f aged product, several samples were analyzed for heavier hydrocarbons as TPH. In addition, two organic lead analyses were performed.

The analyses performed are those specified by the Tri-Regional Water Quality Control Board Recommendations of July 6, 1990. The analyses results are presented in the following tables. The Chemical Test Data Sheets are presented in Appendix "A," Figures A-1 through A-10. Project Chain-of-Custody records are shown as Figures A-11 through A-13.

SUMMARY OF CHEMICAL TEST RESULTS: SOIL SAMPLES

All units in mg/kg (ppm) unless otherwise indicated.

TABLE I

TVH and TPH

Sample Designation (Action Level)*	CONSTITUENTS TVH (10)	Organic Lead (13)	TPH (100)
SB-1 at 14.5'	ND	--	--
SB-2 at 10.5'	440	--	--
SB-2 at 13'	810	ND	340
SB-3 at 13.5	15	ND	ND
SB-3 at 17'	ND	--	--
SB-4 at 14'	ND	--	ND
SB-5 at 14.5'	ND	--	--
SB-6 at 15'	310	--	--
SB-8 at 20.5'	ND	--	--
SB-10 at 16'	ND	--	--
SB-11 at 10.5'	31	--	--
SB-12 at 15.5'	ND	--	--
SB-13 at 10.5'	1100	--	--
SB-13 at 14'	530	--	--

ND = None Detected
-- = Not Tested for this Parameter

*TVH/TPH Action Levels: Derived from Table 2-1, Leaching Potential Analysis, RWQCB LUFT Manual, October 18, 1989.

TABLE II

BTXE

	C O N S T I T U E N T S			
Sample Designation (Action Level)*	Benzene (NA)	Toluene (NA)	Ethylbenzene (NA)	Xylene (NA)
SB-1 at 14.5'	0.05	0.03	ND	0.06
SB-2 at 10.5'	4.5	18	11	55
SB-[illegible] at 13'	5.3	4.2	13	76
SB-3 at 13.5'	0.09	0.18	0.19	1.1
SB-3 at 17'	ND	ND	ND	ND
SB-4 at 14'	0.09	0.18	0.19	1.1
SB-5 at 14.5'	ND	ND	ND	ND
SB-6 at 15'	0.8	15	6.2	36
SB-8 at 20.5'	ND	ND	ND	ND
SB-10 at 16'	ND	ND	ND	ND
SB-11 at 10.5'	0.09	0.03	0.49	1.8
SB-12 at 15.5'	ND	ND	ND	ND
SB-[illegible] at 10.5'	5.5	67	27	140
SB-[illegible] at 14'	7.8	48	14	73

ND = None Detected
NA = Not Applicable**

*BTXE Action Level: Derived from Table 2-1, Leaching Potential Analysis, RWQCB LUFT Manual, October 18, 1989.

**NA indicates that Action Levels are not applicable for BTEX in soils at this site, as characterized by Table 2-1

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The following determinations are derived from the field and office studies performed for this site, and presented in this report.

1. Significant motor fuel is present in soil and groundwater in the area of the service station building and pump islands to and possibly beyond the south property boundary.

2. Shallow soil (10-17 feet in depth) in this area contains chemical compounds in excess of recommended allowable limits to protect groundwater.

3. Shallow soil contamination (Figure 18) to the north, east and west appears to be limited to the boundaries of the service station grounds, and those boundaries extended south into the access driveway. The south contaminant limit is unknown.

4. The lower water unit, intersected at the site by Wells MW-2 and MW-3 contains levels of Benzene and Toluene that exceed State and Federal Drinking Water Standards. Informal action levels for Total Hydrocarbons are also exceeded. Quantitative water data for the upper water-bearing horizon has not been obtained; however, field observations suggest the possibility of a floating immiscible product layer.

5. The lateral extent of the upper and lower water contamination plumes is not known. The lateral extent of the upper unit is considered to be consistent with the limits of known shallow soil contamination. The lateral extent of lower aquifer contamination is not known, except that currently, MW-4 has not been affected.

6. The vertical extent of groundwater contamination in the subject area is not known.

7. The immediate risk to human health from this contamination to soil and groundwater has not been addressed in this report, as it is not within the project scope. However, it is

currently considered that known wells within one-half mile of the site are likely unaffected, and the unnamed stream course to the east is not at significant risk.

Due to the shallow nature of the known contamination, volatiles may be entering and collecting in utility excavations, underground vaults, and in drain rock beneath building floor slabs in the immediate vicinity of the contaminant area. The concentration of organic vapors within a confined space can result in a fire and explosion hazard, and risk to persons entering these spaces.

8. The contaminant source or sources have not been ascertained, however, three potential sources have been determined.

   a. According to station personnel, a leak in the tank plumbing may have been discovered as a result of tank testing by Unocal in the early 1980's. A repair was made on the plumbing at that time. During the repair, a rainstorm resulted in water collecting in the gasoline tanks overnight. Related release of motor fuel to soils is inferred.

   b. A 200- to 300-gallon gasoline overspill was recorded by the station manager on February 27, 1987. The gasoline was reported to have pooled in the low area south of the gasoline tanks to a depth of 4 to 6-inches, and persisted for much of the day. This area is drained by one to two storm drains.

   c. The gasoline tank fill ports do not currently have overspill protection. Overspill occurring during tank fill would then collect in the tank backfill, and act as a source for soil and groundwater contamination. A steel probe inserted into the backfill from the fill port indicated saturated conditions in the backfill.

If the contaminant source has been primarily gasoline, the TPH values observed could indicate aged product, where volatile compounds have escaped or degraded, leaving non-volatile, heavier compounds. The negative organic lead findings to date suggest that the source fuel may have been unleaded gasoline.

RECOMMENDATIONS

Based upon the foregoing conclusions regarding the current environmental condition of the project site, the following actions are recommended:

1. **Define Southern Limit of Shallow Soil Contamination**
   If access to the adjoining property parking area is obtained, a maximum of five shallow soil borings and soil samples could define the southern extent of contamination.

2. **Assess Vertical Plume Migation and Groundwater Plume Extent**
   Use of a Hydropunch discrete point sampling system would allow quantitative determination of dissolved contaminant concentrations at different depths in the groundwater. Four hydropunch borings are proposed.

3. **Define Groundwater Plume Boundaries**
   Installation of three groundwater monitoring wells outside the projected east, west, and south plume limits would allow monitoring of plume migration and characterization of plume extent.

4. **Interim Remediation, Plume Control and Aquifer Assessment**
   The installation of one 4-inch groundwater well to intersect the upper and possibly lower aquifer within the plume. The installation would allow removal of contaminants, possible containment or semi-containment of the plume, retardation of migration, quantification of water quality within the plume, and characterization of the aquifer(s) with respect to final remedial measures.

5. **Sample Storm Drain Sediment and Gasoline Tank Backfill**
   In order to evaluate if these areas are contributing to groundwater contamination, and aid in investigating contaminant source(s).

6. **Continue Monitoring of Existing Groundwater Wells**

7. **Further Determination of Contaminant Source**
   Additional inquiry would be made toward substantiation of reported releases, and assessment of neighboring release locations with respect to the subject site.

These recommendations, when implemented, should provide sufficient information to design and activate a final remediation scheme to remove motor fuel contaminants from soil and groundwater in the subject area.

Following receipt and review of this report by yourselves and the ACEH, BSK would be pleased to prepare a Work Plan for the performance of the recommendations provided here.

REPORT DISTRIBUTION

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

LIMITATIONS

This report has been prepared for the exclusive use of R.T. Nahas Company/Eden Managements. Unauthorized use of or reliance on the information contained in this report, without express written consent by BSK & Associates, is strictly prohibited.

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 of the area. No other warranty, expressed or implied, is 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 an adjacent property may cause changed conditions which can invalidate the findings and conclusions presented in this report.

* * * * *

BSK & Associates is pleased to have been of service to you during this project. If you have questions concerning the contents of this 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	Legend for Test Hole Logs
FIGURES	4 - 16	Boring Logs
FIGURE	17	Upper Surface - First Water-Bearing Unit
FIGURES	18	Approximate Area of Known Shallow Soil Contamination

APPENDIX "A"

FIGURES A-1 through A-10	Laboratory Chemical Test Data Sheets
FIGURES A-11 through A-13	Project Chain-of-Custody Records

Respectfully submitted,

BSK & Associates

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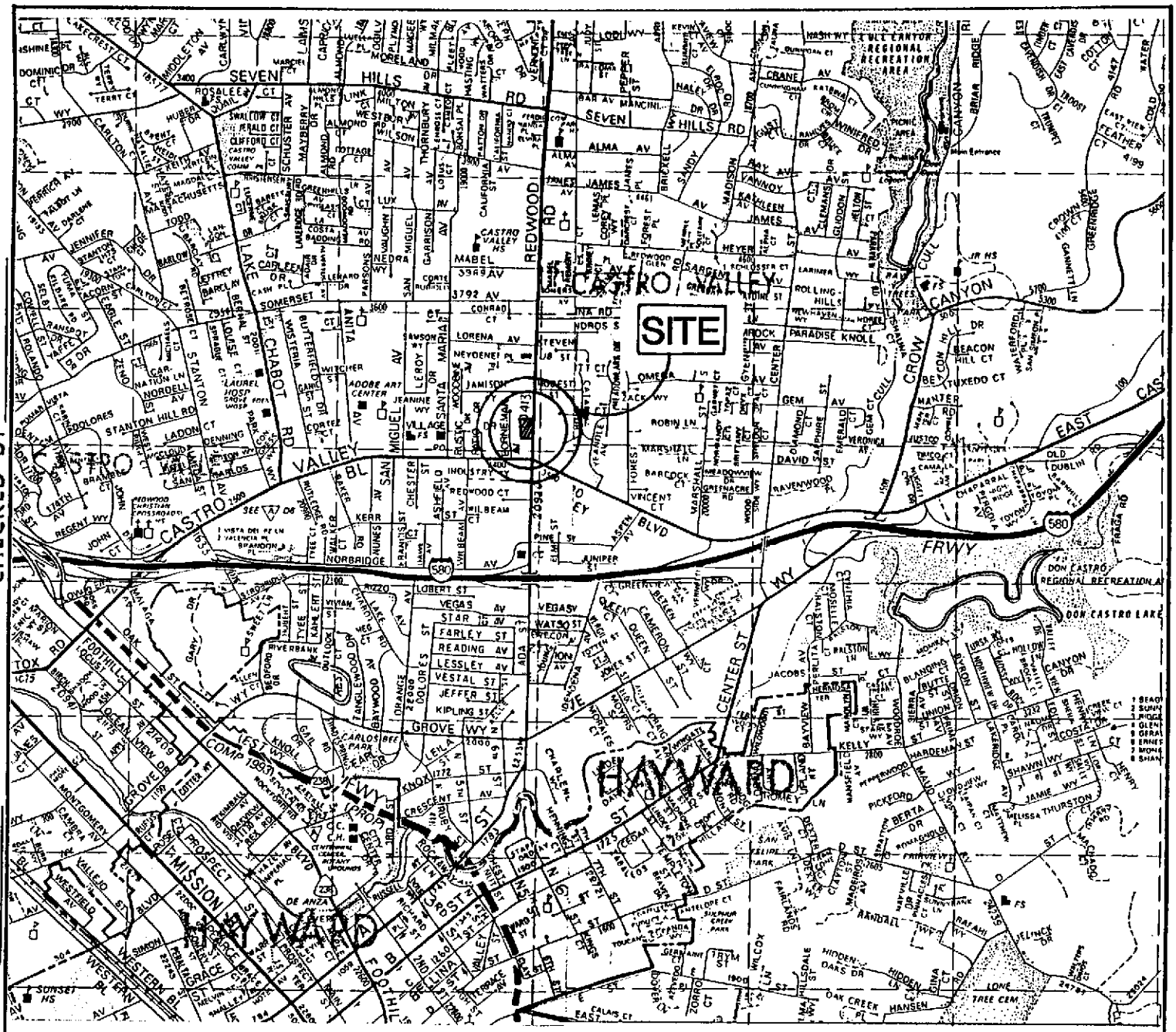

VICINITY MAP

SOIL BORINGS FOR
SOIL CONTAMINATION ASSESSMENT
UNOCAL 76 SERVICE STATION
20405 REDWOOD ROAD
CASTRO VALLEY, CALIFORNIA

BSK Job No. P90165
May 1991
FIGURE: 1

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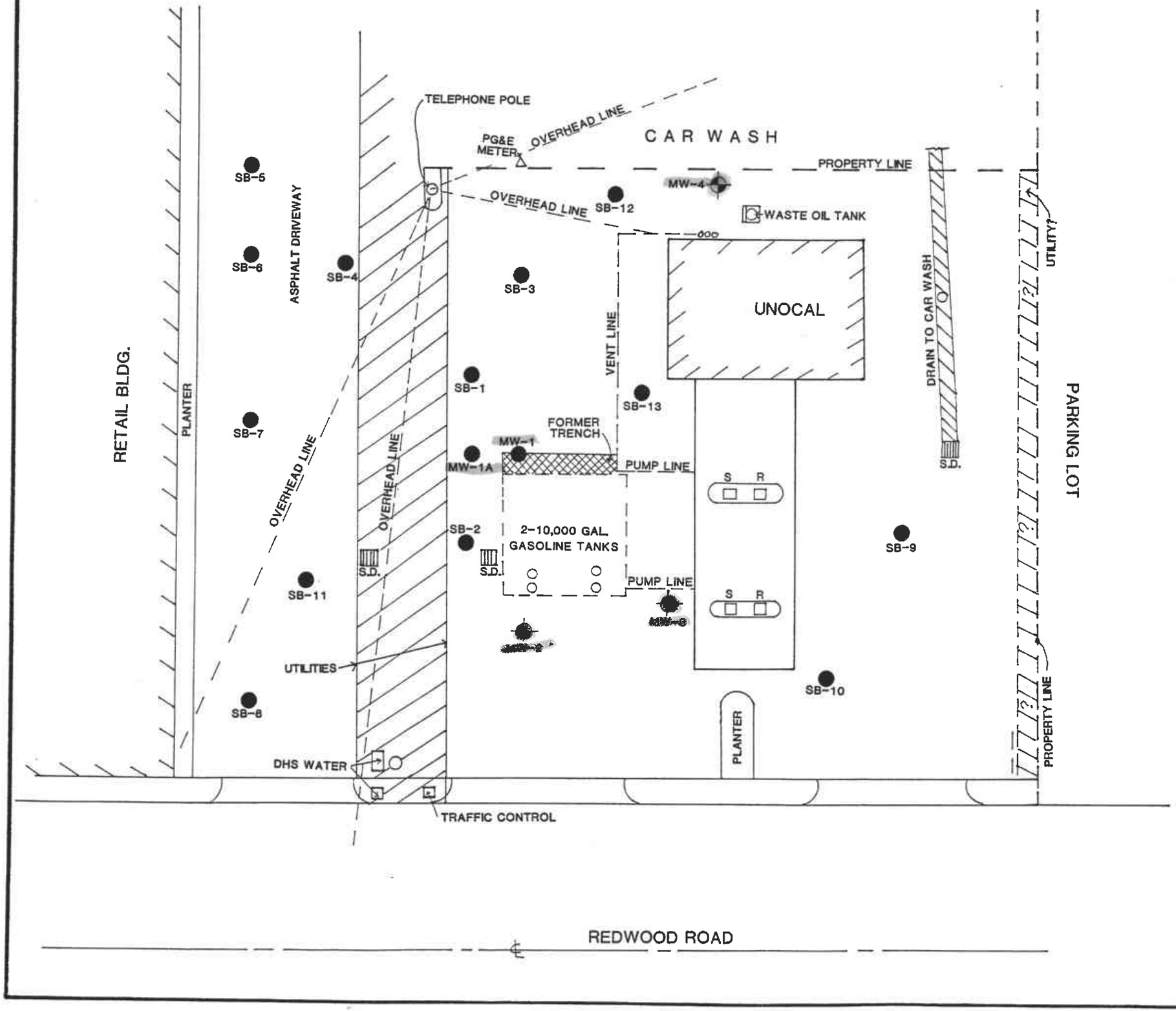


SITE PLAN

SOIL BORINGS FOR
SOIL CONTAMINATION ASSESSMENT
UNOCAL 76 SERVICE STATION
20405 REDWOOD ROAD
CASTRO VALLEY, CALIFORNIA

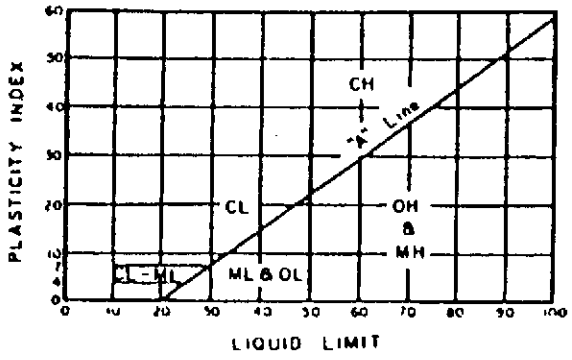
BSK Job No. P90165
April 1991
FIGURE: 2

BSK & Associates

LEGEND FOR TEST HOLE LOGS

METHOD OF SOIL CLASSIFICATION
(Unified Soil Classification System)

MAJOR DIVISIONS		SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 1/2 of soil > no. 200 sieve size)	GRAVELS (More than 1/2 of coarse fraction > no. 4 sieve size)	GW	Well graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS (More than 1/2 of coarse fraction < no. 4 sieve size)	SW	Well graded sands or gravelly sands, little or no fines
		SP	Poorly graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS (More than 1/2 of soil < no. 200 sieve size)	SILTS & CLAYS LL < 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS LL > 50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silty clays, organic silts



PLASTICITY CHART

Key to Samples

- ■ Indicates depth of undisturbed sample
- ☐ Sample not recovered
- ⊠ Indicates depth of disturbed sample
- ◪ Indicates depth of Standard Penetration Split Spoon Sample

BSK & Associates

DATE: March 13, 1991

LOGGED BY: TWB

ELEVATION: Approximately +180' MSL

WATER LEVEL: NA

EQUIPMENT: B-53 Mobile Drill Using 8" Hollow Stem Auger

LOG DESIGNATION [redacted]

JOB: P90165

FIGURE: 4

DEPTH, FEET	NOMINAL (1) DIAMETER, IN.	BLOWS/FOOT (2)	MOISTURE %	DRY DENSITY, PCF	SAMPLES	U.S.C.S.	SOIL OR ROCK DESCRIPTION	NOTES
							Asphalt Pavement	
0						FILL	SAND & GRAVEL: Orange, aggregate base, moist	
							SILT CLAY: Dark gray, moist, slight hydrocarbon odor	PID to 0.8
						CL	SANDY CLAY: Mottled blue-gray and orange, fine-grained, damp	
5	2.0	45	-	-	1			PID to 0.8
							Grades brown	
							Grades gray-yellow	
10	2.0	45	-	-	2		Grades stiff, trace small pebbles	PID to 111
						CL	SILTY CLAY: Yellow-brown, damp, stiff to hard	PID to 72
								First Encounter
						SC	CLAYEY SAND: Mottled blue-gray and orange, wet to saturated, trace to little gravel	PID to 168
15	2.0	38	-	-	3			PID to 48
								Boring Terminated at 16'
20								PID = Photo-ionization Detector
								Boring Backfilled with Grout
25								

THE LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

(1) SAMPLER INSIDE DIAM.
(2) 140lbs HAMMER - 30 INCH DROP.
(P) HYDRAULICALLY PUSHED

BSK & Associates

DATE: March 13, 1991
LOGGED BY: TWB
ELEVATION: Approximately +180' MSL
WATER LEVEL: First Encountered at 14'
EQUIPMENT: B-53 Mobile Drill Using 8" Hollow Stem Auger

LOG DESIGNATION [redacted]

JOB: P90165
FIGURE: 5

DEPTH, FEET	NOMINAL (1) DIAMETER, IN.	BLOWS/FOOT (2)	MOISTURE %	DRY DENSITY, PCF	SAMPLES	U.S.C.S.	SOIL OR ROCK DESCRIPTION	NOTES
							Asphalt Pavement	
0						FILL	SILTY CLAY: Dark gray, damp to moist, firm strong odor	PID to 0
							Grades medium gray	PID to 2
5	2.0	42	-	-	1	ML	CLAYEY SILT: Greenish-gray, damp, very stiff to hard, brittle, sand blebs [redacted]	PID to 18
10	2.0	46	-	-	2	CL	SANDY CLAY: Yellow-orange, moist to wet, very stiff to hard, black mottles, no pores, medium sand, [redacted]	PID to 400
								First Encounter [redacted]
	2.0	29	-	-	3	SM	SILTY SAND: Orange to red-orange, wet to saturated, vertical blue-gray streaks, trace to little fine gravel, [redacted] odor, fine sand	PID to 450
15								Boring Terminated at 14.5'
								Boring Backfilled with Grout
20							Note: [redacted]	PID = Photo-ionization Detector
25								

THE LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

(1) SAMPLER INSIDE DIAM.
(2) 140lbs HAMMER - 30 INCH DROP.
(P) HYDRAULICALLY PUSHED

BSK & Associates

DATE: March 13, 1991
LOGGED BY: TWB
ELEVATION: Approximately +180' MSL
WATER LEVEL: First Encountered at 15'
EQUIPMENT: B-53 Mobile Drill Using 8" Hollow Stem Auger

LOG DESIGNATION [redacted]

JOB: P90165
FIGURE: 6

DEPTH, FEET	NOMINAL (1) DIAMETER, IN.	BLOWS/FOOT (2)	MOISTURE %	DRY DENSITY, PCF	SAMPLES	U.S.C.S.	SOIL OR ROCK DESCRIPTION	NOTES
							Asphalt Surface (2-1/2 inches)	
0						FILL	AGGREGATE BASE: Orange and gray, moist to wet	PID to 0
							CLAYEY SILT: Black, damp	PID to 0
5	2.0	41	-	-		ML	CLAYEY SILT: Mottled dark-gray and yellow-brown, very stiff to hard, damp, rootlets	PID to 0
10	2.0	42	-	-	1	SC	CLAYEY SAND: Mottled blue-gray and yellow-brown, moist, dense, many very fine pores, hydrocarbon odor	PID to 37
	2.0	30	-	-	2	ML	SANDY SILT: Orange-brown, fine-grained sand, minor clay, moist to wet, very stiff, porous, saturated pores have strong odor	PID to 1500 First Encounter PID to 20
15							[redacted]	2C
	2.0	27	-	-				PID to 70
						SC	[redacted] SAND: Orange-brown, saturated, medium-dense	
20							Note: [redacted] observed on water in boring	Boring Terminated at 18'
								Boring Backfilled with Grout
25								PID = Photo-ionization Detector

THE LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

(1) SAMPLER INSIDE DIAM.
(2) 140 lbs HAMMER - 30 INCH DROP.
(P) HYDRAULICALLY PUSHED

BSK & Associates

DATE: March 13, 1991
LOGGED BY: TWB
ELEVATION: Approximately +180' MSL
WATER LEVEL: Not Encountered
EQUIPMENT: B-53 Mobile Drill Using 8" Hollow Stem Auger

LOG DESIGNATION [redacted]

JOB: P90165
FIGURE: 7

DEPTH, FEET	NOMINAL (1) DIAMETER, IN.	BLOWS/FOOT (2)	MOISTURE %	DRY DENSITY, PCF	SAMPLES	U.S.C.S.	SOIL OR ROCK DESCRIPTION	NOTES
							Asphalt Pavement (2-1/2 inches)	
0							AGGREGATE BASE: Orange	
						FILL	SILTY CLAY: Dark gray-brown, sandy, moist	
5	1.4	33	-	-		CL	SILTY CLAY: Mottled dark gray and brown, damp, very stiff, sandy, roots to 1/8" diameter Grades gray-yellow	
10	2.0	49	-	-		SC	CLAYEY SAND: Orange-brown, damp to moist, dense, friable, no pores Grades gray, odorous Grades moister, more clay	PID to 2
15	2.0	42	-	-	1	SM	[redacted] Orange and blue-gray, moist to wet, dense, fine grained sand, trace clay, trace small pebbles, vertical wet blue-gray odorous seams	PID to 98 Boring Terminated at 15' Boring Backfilled with Grout PID = Photo-ionization Detector
20								
25								

THE LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

(1) SAMPLER INSIDE DIAM.
(2) 140lbs HAMMER - 30 INCH DROP.
(P) HYDRAULICALLY PUSHED

BSK & Associates

DATE: March 13, 1991
LOGGED BY: TWB
ELEVATION: Approximately +180' MSL
WATER LEVEL: Not Encountered
EQUIPMENT: B-53 Mobile Drill Using 8" Hollow Stem Auger

LOG DESIGNATION [redacted]

JOB: P90165
FIGURE: 8

DEPTH, FEET	NOMINAL (1) DIAMETER, IN.	BLOWS/FOOT (2)	MOISTURE %	DRY DENSITY, PCF	SAMPLES	U.S.C.S.	SOIL OR ROCK DESCRIPTION	NOTES
							Asphalt Pavement	
0						FILL	AGGREGATE BASE: Orange, moist	
							SILTY CLAY: Dark to medium gray, some sand moist, firm	
5	1.4	20	-	-			Grades mottled gray, black, and yellow-brown, moist, stiff, organics present	PID to 0
							Red vitreous clay pipe shards encountered	PID to 0
						ML	CLAYEY SILT: Orange-brown with light yellow-gray mottles, damp, very stiff, little sand	
10	1.4	39	-	-				PID to 0
						CL	SILTY CLAY: Orange with few blue-gray blebs, little to some sand, damp to moist, stiff	
15	2.0	25	-	-	1			PID to 0
								Boring Terminated at 15.5'
								Boring Backfilled with Grout
20								PID = Photo-ionization Detector
20								

THE LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

(1) SAMPLER INSIDE DIAM.
(2) 140 lbs HAMMER - 30 INCH DROP.
(P) HYDRAULICALLY PUSHED

BSK & Associates

DATE: March 13, 1991
LOGGED BY: TWB
ELEVATION: Approximately +180' MSL
WATER LEVEL: First Encountered at 15-1/2'
EQUIPMENT: B-53 Mobile Drill Using 8" Hollow Stem Auger

LOG DESIGNATION [redacted]

JOB: P90165
FIGURE: 9

DEPTH, FEET	NOMINAL (1) DIAMETER, IN.	BLOWS / FOOT (2)	MOISTURE %	DRY DENSITY, PCF	SAMPLES	U.S.C.S.	SOIL OR ROCK DESCRIPTION	NOTES
							Asphalt Pavement (1.75 inches)	
0						FILL	AGGREGATE BASE: Orange, sandy, moist	
							CLAYEY SILT: Dark gray-brown, damp, firm, some sand and pebbles Glass encountered	
5	1.4	46	-	-		CL	SILTY CLAY: Mottled yellow-gray and medium gray, damp, hard, little to some sand, no pores	
						ML	SILT: Mottled, yellow-brown and light gray, damp to moist, stiff to very stiff, some very fine pores, trace to little clay	
10	1.4	36	-	-				PID to 21
						SM	SILTY SAND: Orange-brown with vertical blue-gray streaks, moist to saturated, medium dense, fine to medium grained, no pores, trace clay	PID to 164
15	2.0	34	-	-	1			[redacted]
								Boring Terminated at 15.5' Boring Backfilled with Grout PID = Photo-ionization Detector
20								
25								

THE LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

(1) SAMPLER INSIDE DIAM.
(2) 140lbs HAMMER - 30 INCH DROP.
(P) HYDRAULICALLY PUSHED

BSK & Associates

DATE: March 14, 1991
LOGGED BY: TWB
ELEVATION: Approximately +180' MSL
WATER LEVEL: Not Encountered
EQUIPMENT: B-53 Mobile Drill Using 8" Hollow Stem Auger

LOG DESIGNATION [redacted]

JOB: P90165
FIGURE: 10

DEPTH, FEET	NOMINAL (1) DIAMETER, IN.	BLOWS/FOOT (2)	MOISTURE %	DRY DENSITY, PCF	SAMPLES	U.S.C.S.	SOIL OR ROCK DESCRIPTION	NOTES
							Asphalt Pavement	
0						FILL	AGGREGATE BASE: Orange, sandy, damp to moist	
							SILTY CLAY: Black, damp to moist, firm, with wood	
							Roots, glass encountered	
5	1.4	31	-	-		ML	CLAYEY SILT: Mottled orange and gray, damp to moist, very stiff, some fine sand, few very fine pores	
							Grades gray-yellow	PID to 7
10	1.4	38	-	-			Grades orange, vertical blue-gray streaks	[redacted]
								Boring Terminated at 11'
15								Boring Backfilled with Grout
								PID = Photo-ionization Detector
20								
25								

THE LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

(1) SAMPLER INSIDE DIAM.
(2) 140lbs HAMMER - 30 INCH DROP.
(P) HYDRAULICALLY PUSHED

BSK & Associates

DATE: March 14, 1991
LOGGED BY: TWB
ELEVATION: Approximately +180' MSL
WATER LEVEL: Not Encountered
EQUIPMENT: B-53 Mobile Drill Using 8" Hollow Stem Auger

LOG DESIGNATION [redacted]

JOB: P90165
FIGURE: 11

DEPTH, FEET	NOMINAL (1) DIAMETER, IN.	BLOWS/FOOT (2)	MOISTURE %	DRY DENSITY, PCF	SAMPLES	U.S.C.S.	SOIL OR ROCK DESCRIPTION	NOTES
							Asphalt Pavement	
0						FILL	AGGREGATE BASE: Orange, sandy	
							SILTY CLAY: Black, moist, firm	
							Grades dark gray	
5	1.4	31	-	-		ML/CL	CLAYEY SILT/SILTY CLAY: Mottled dark gray and orange, damp to moist, stiff to very stiff, thin layers of manganese coated small pebbles, some sand	
						CL	SANDY CLAY: Yellow-brown, damp to moist, hard, some medium sand, trace pebbles	PID to 0
10	1.4	60	-	-			Grades gravelly	
						ML	CLAYEY SILT: Yellow-brown, damp, hard, no pores	
	2.0	57	-	-				PID to 0
15	2.0	60	-	-			Grades clayey, mottled gray with orange	PID to 0
	2.0	52	-	-				PID to 0
	2.0	43	-	-			Grades brownish-gray, gray pore walls, trace sand	PID to 0
20	2.0	39	-	-		SC	[redacted] Orange, moist to wet, medium dense, medium grained	PID to 0
								Boring Terminated at 21.5'
								Boring Backfilled with Grout
25							PID = Photo-ionization Detector	

THE LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

(1) SAMPLER INSIDE DIAM.
(2) 140lbs HAMMER - 30 INCH DROP.
(P) HYDRAULICALLY PUSHED

BSK & Associates

DATE: March 14, 1991
LOGGED BY: TWB
ELEVATION: Approximately +180' MSL
WATER LEVEL: First Encountered at 17'
EQUIPMENT: B-53 Mobile Drill Using 8" Hollow Stem Auger

LOG DESIGNATION [redacted]

JOB: P90165
FIGURE: 12

DEPTH, FEET	NOMINAL (1) DIAMETER, IN.	BLOWS/FOOT (2)	MOISTURE %	DRY DENSITY, PCF	SAMPLES	U.S.C.S.	SOIL OR ROCK DESCRIPTION	NOTES
							Asphalt Pavement	
0						FILL	SILTY CLAY: Black, moist, soft	
						CL	SILTY CLAY: Mottled gray and orange, moist to damp, little sand	
5	1.4	35	-	-			Grades brown-gray, moist, firm	
						GC	CLAYEY SANDY GRAVEL: Orange, moist, medium dense, well bound, coarse sand	
						CL	SANDY CLAY: Yellow-brown, moist, stiff, fine to medium sand, few small pores, gray pore walls	
10	1.4	27	-	-				PID to 0
						GC	CLAYEY SANDY GRAVEL: Orange, moist, medium dense, angular gravel to 1/2" diameter	
	2.0	38	-	-				PID to 0
15								PID to 0
	2.0	60	-	-		CL	SILTY CLAY: Orange-gray, damp, hard, trace to little sand	
	1.4	60	-	-		ML/CL	CLAYEY SILT/SILTY CLAY: Gray-brown with gray mottles, damp, hard, very few fine pores	[redacted] PID to 0
20								Boring Terminated at 18'
								Boring Backfilled with Grout
25								PID = Photo-ionization Detector

THE LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

(1) SAMPLER INSIDE DIAM.
(2) 140lbs HAMMER - 30 INCH DROP.
(P) HYDRAULICALLY PUSHED

BSK & Associates

DATE: March 14, 1991
LOGGED BY: TWB
ELEVATION: Approximately +180' MSL
WATER LEVEL: Not Encountered
EQUIPMENT: B-53 Mobile Drill Using 8" Hollow Stem Auger

LOG DESIGNATION [redacted]0

JOB: P90165
FIGURE: 13

DEPTH, FEET	NOMINAL (1) DIAMETER, IN.	BLOWS/FOOT (2)	MOISTURE %	DRY DENSITY, PCF	SAMPLES	U.S.C.S.	SOIL OR ROCK DESCRIPTION	NOTES
							Asphalt Pavement (1-1/2 inches)	
0						FILL	AGGREGATE BASE: Orange, wet	
							CLAYEY SILT: Dark gray, moist, firm, roots and brick shards	
						CL	SILTY CLAY: Mottled gray and orange, damp to moist, very stiff, with sand	PID to 0
5	1.4	37	-	-		SP	CLAYEY GRAVELLY SAND: Orange damp, medium dense, angular, well bound	PID to 0
						SC	CLAYEY SAND: Yellow-gray, moist, dense, fine-grained, mottled wiht black blebs	PID to 0
10	1.4	43	-	-				PID to 0
							Grades gravelly	
						CL	SILTY CLAY: Gray-brown, damp, hard, few pores with gray walls	
15	2.0	53	-	-				PID to 0
	2.0	56	-	-	1		Grades brown, no pores	
20								Boring Terminated at 17'
								Boring Backfilled with Grout
								Photo-ionization Detector
25								

THE LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

(1) SAMPLER INSIDE DIAM.
(2) 140 lbs HAMMER - 30 INCH DROP.
(P) HYDRAULICALLY PUSHED

BSK & Associates

DATE: 3/28/91
LOGGED BY: MC
ELEVATION: Approx. +180' MSL
WATER LEVEL: First Encountered at -15'
EQUIPMENT: B-53 Mobile Drill using 8" Hollow Stem Auger

LOG DESIGNATION [redacted]

JOB: P90165
FIGURE: 14

DEPTH, FEET	NOMINAL (1) DIAMETER, IN.	BLOWS/FOOT (2)	MOISTURE %	DRY DENSITY, PCF	SAMPLES	U.S.C.S.	SOIL OR ROCK DESCRIPTION	NOTES
							Asphalt Pavement = 3-1/2"	
0						FILL	SAND & GRAVEL: Orange, aggregate base	
							SILTY CLAY: Dark gray, very moist	
							Grades to dark brown	
						CL	SILTY CLAY: Brown with gray mottles, damp to moist, very stiff, slightly sandy	
5	1.4	24	-	-				PID to 0
								PID to 13
							Grades greenish-gray, sandier, with greenish staining around pores	
10	2.0	49	--	--	1			PID to 226 Stabilized
								▼
						SC?	CLAYEY SAND: Wet, gravelly	1st Encounter
15	2.0	49	-	-	2	CL	SILTY CLAY: Greenish-gray mottled with brownish-yellow, Manganese stained sand grains, moist, hard	[redacted]
								PID to 0
								Boring terminated at 16.5'
							NOTE: [redacted] observed in boring upon auger removal	PID = Photo-ionization Detector
20								Boring backfilled with grout
25								

THE LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

(1) SAMPLER INSIDE DIAM.
(2) 140lbs HAMMER - 30 INCH DROP.
(P) HYDRAULICALLY PUSHED

BSK & Associates

DATE: 3/28/91
LOGGED BY: MC
ELEVATION: Approx. +180' MSL
WATER LEVEL: First encountered at 14'
EQUIPMENT: B-53 Mobile Drill using 8" Hollow Stem Auger

LOG DESIGNATION [redacted]

JOB: P90165
FIGURE: 15

DEPTH, FEET	NOMINAL (1) DIAMETER, IN.	BLOWS/FOOT (2)	MOISTURE %	DRY DENSITY, PCF	SAMPLES	U.S.C.S.	SOIL OR ROCK DESCRIPTION	NOTES
							Asphalt Pavement - 2"	
0						FILL	SAND & GRAVEL: Orange, aggregate base	
							SILTY CLAY: Brownish-yellow, moist, sandy	
							Grades dark gray, moist, clayey	
						CL	SILTY CLAY: Brown and gray mottled, moist, very stiff, slightly sandy	
5	1.4	37	-	-				PID to 0
								stabilized ▼
10	1.4	33	-	-			Grades yellow-brown, contains roots having grenish-gray aureole, slightly moist	PID to 0
							Grades very moist	
						SC	CLAYEY SAND: Yellow-brown with gray mottles, saturated from 14' to 15.5', moist with saturated vertical lenses below 15.5', dense, gravel lenses inclined to 30°	[redacted] 1st Encounter
15	2.0	30	-	-	1			PID to 0
								Boring terminated at 16.5'
20								PID = Photo-ionization Detector
								Boring back-filled with grout
25								

THE LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

(1) SAMPLER INSIDE DIAM.
(2) 140lbs HAMMER - 30 INCH DROP.
(P) HYDRAULICALLY PUSHED

BSK & Associates

DATE: 3/28/91
LOGGED BY: MC
ELEVATION: Approx. +180' MSL
WATER LEVEL: First Encountered at 13.5'
EQUIPMENT: B-53 Mobile Drill, Using 8" Hollow Stem Auger

LOG DESIGNATION [redacted]

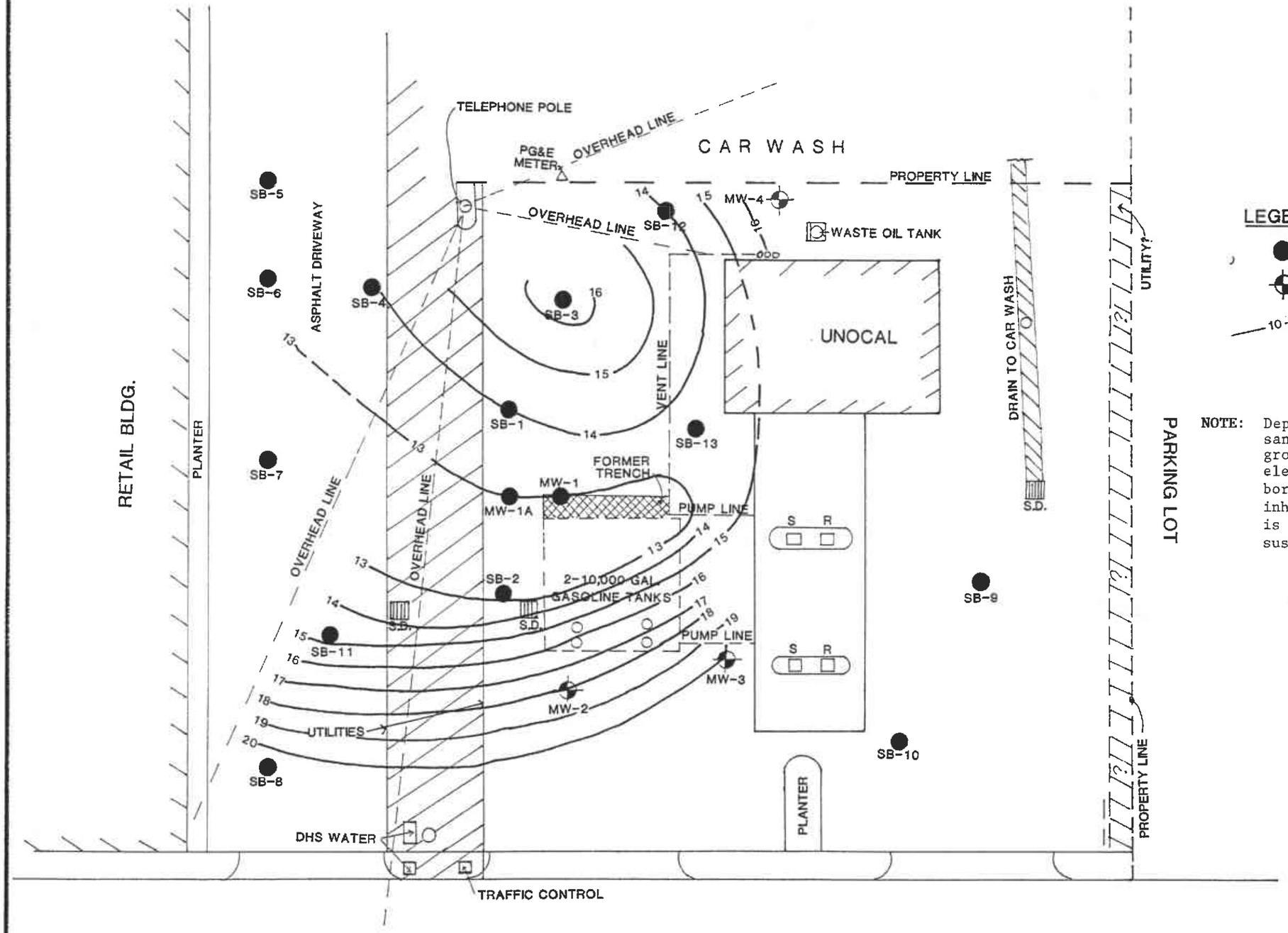
JOB: P90165
FIGURE: 16

DEPTH, FEET	NOMINAL (1) DIAMETER, IN.	BLOWS/FOOT (2)	MOISTURE %	DRY DENSITY, PCF	SAMPLES	U.S.C.S.	SOIL OR ROCK DESCRIPTION	NOTES
							Asphalt Pavement = 3"	
0						FILL	SAND & GRAVEL: Orange, aggregate base	
							SILTY CLAY: Dark gray, very moist, wood fragments	
						CL	SILTY CLAY: Gray mottled with brown, moist, very stiff, sandy	
5	2.0	31	-	-	1			PID to 4
								stabilized ▼
10	2.0	54	-	-	2		Grades brown mottled with olive, slightly moist, hard, sandy	[redacted] 1st [redacted] unter
						SC	[redacted] SAND: [redacted] et to saturated	
	2.0	29	-	-	3	CL	SILTY CLAY: Yellow-brown, moist, very stiff, pores, [redacted] stained olive	[redacted] Boring terminated at 15'
15								PID = Photo-Ionization Detector
20								Boring back-filled with grout
25								

THE LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

(1) SAMPLER INSIDE DIAM.
(2) 140lbs HAMMER - 30 INCH DROP.
(P) HYDRAULICALLY PUSHED

BSK & Associates



NORTH

Scale: 1" = 20'

LEGEND:

- ● – Exploratory Boring Location
- ⊕ – Groundwater Monitoring Well Location
- 10 – Line of Equal Depth to Upper Surface of Clayey Sand Unit

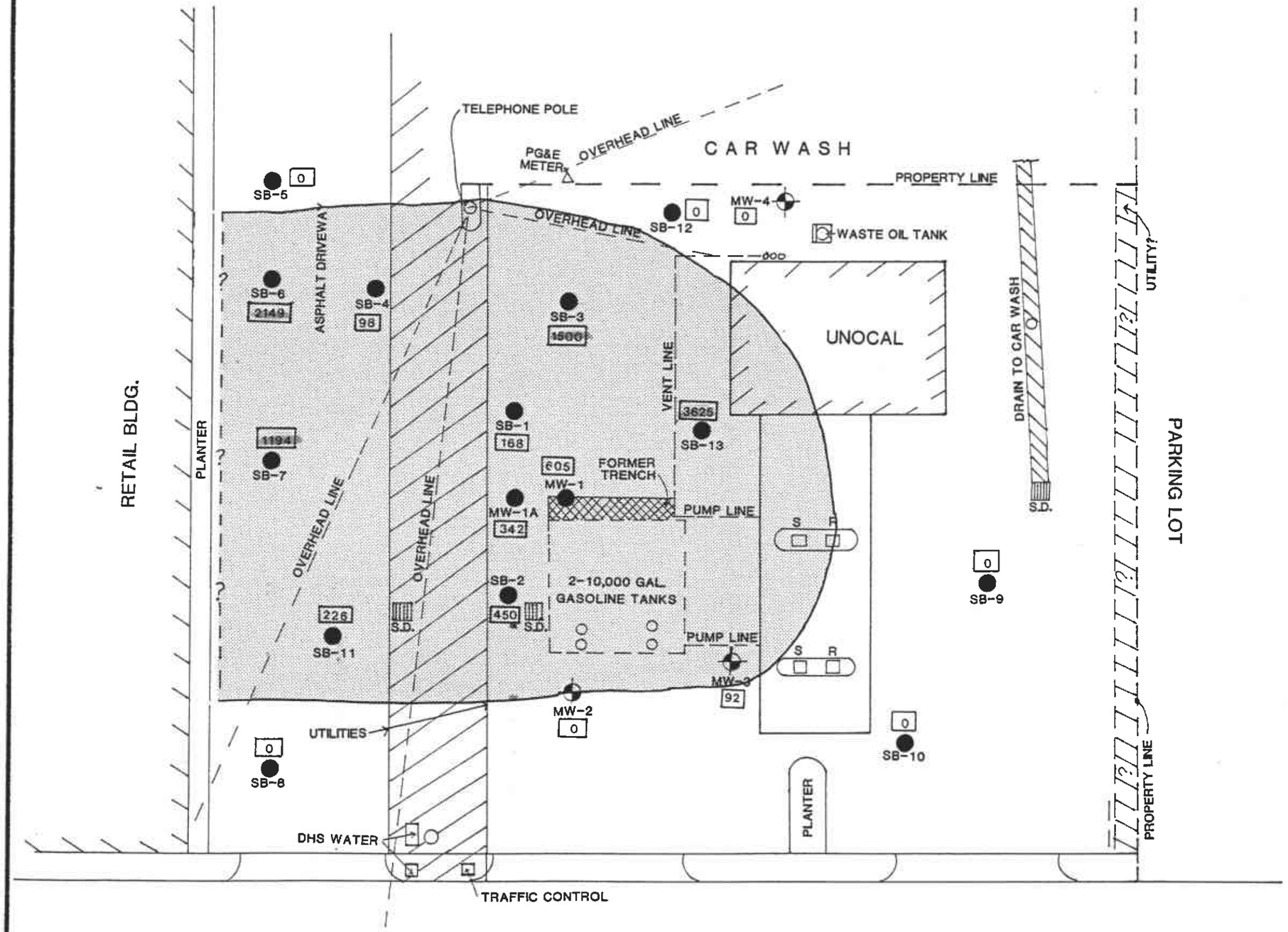
NOTE: Depth to upper surface of clayey sand determined from existing ground surface, without known elevation, and approximated from boring logs. However, the inherent variation in the surface is considered sufficient to sustain this diagram

UPPER SURFACE– FIRST WATER BEARING UNIT

SOIL BORING FOR
SOIL CONTAMINATION ASSESSMENT
UNOCAL 76 SERVICE STATION
20405 REDWOOD ROAD
CASTRO VALLEY, CALIFORNIA

BSK Job No. P90165
April 1991
FIGURE: 17

BSK & Associates



APPROXIMATE AREA OF KNOWN SHALLOW SOIL CONTAMINATION

SOIL BORINGS FOR
SOIL CONTAMINATION ASSESSMENT
UNOCAL 76 SERVICE STATION
20405 REDWOOD ROAD
CASTRO VALLEY, CALIFORNIA

BSK Job No. P90165
April 1991
FIGURE: 18

BSK & Associates

APPENDIX "A"

BSK & ASSOCIATES' LABORATORY CHEMICAL TEST DATA

BSK Analytical Laboratories

1414 Stanislaus Street * Fresno, California 93706 * Telephone (209) 485-8310 * Fax (209) 485-6935

FIGURE: A-1

BSK-Pleasanton
R. T. Nahas

Report Issue Date: 03/23/91
Date Received: 03/14/91
Project Number: P90165

Lab Number	Date Sampled	Client's Sample Description		Date Analyzed
Ch911239-1	03/13/91	0859 hrs.	SB-1 #3 at 14 1/2'	03/15/91
Ch911239-5	03/13/91	1147 hrs.	SB-3 #3 at 17'	03/15/91

Soil Analyses for BTXE and TVH

Results Reported in Milligrams per Kilogram (mg/kg)

Compound	Lab # 1239-1	Lab # 1239-5	Detection Limit (DLR)
Benzene	0.05	ND	0.02
Toluene	0.03	ND	0.02
Ethylbenzene	ND	ND	0.02
Total Xylene Isomers	0.06	ND	0.02
Total Volatile Hydrocarbons	ND	ND	10.00

Analyses for BTEX by EPA 8020. Analyses for TVH by EPA 8015.
ND: None Detected
DLR: Detection Limit For the Purposes of Reporting

Cynthia Pigman
QA/QC Supervisor

Michael Brechmann,
Organics Supervisor

R05 90btxetvhs

BSK Analytical Laboratories

1414 Stanislaus Street * Fresno, California 93706 * Telephone (209) 485-8310 * Fax (209) 485-6935

FIGURE: A-2

BSK-Pleasanton
R. T. Nahas

Report Issue Date: 03/23/91
Date Received: 03/14/91
Project Number: P90165

Lab Number	Date Sampled	Client's Sample Description	Date Analyzed
Ch911239-2	03/13/91	1013 hrs. SB-2 #2 at 10 1/2'	03/18/91

Soil Analyses for BTXE and TVH

Results Reported in Milligrams per Kilogram (mg/kg)

Compound	Lab # 1239-2	Detection Limit (DLR)
Benzene	4.5	0.2
Toluene	18	0.2
Ethylbenzene	11	0.2
Total Xylene Isomers	55	0.2
Total Volatile Hydrocarbons	440	100

Analyses for BTEX by EPA 8020. Analyses for TVH by EPA 8015.

ND: None Detected

DLR: Detection Limit For the Purposes of Reporting

Cynthia Pigman,
QA/QC Supervisor

Michael Brechmann,
Organics Supervisor

R0[illegible]890btxetvhs

BSK Analytical Laboratories

FIGURE: A-3

1414 Stanislaus Street * Fresno, California 93706 * Telephone (209) 485-8310 * Fax (209) 485-6935

BSK-Pleasanton
R. T. Nahas

Report Issue Date: 03/23/91
Date Received: 03/14/91
Project Number: P90165

Lab Number	Date Sampled	Client's Sample Description	Date Analyzed
Ch911239-3	03/13/91	1025 hrs. SB-2 #3 at 13'	03/18/91

Soil Analyses for BTXE, TPH, and TVH

Results Reported in Milligram per Kilogram (mg/kg)

Compound	Lab.No. 1239-3	Detection Limit (DLR)
Benzene	5.3	0.2
Toluene	4.2	0.2
Ethylbenzene	13	0.2
Total Xylene Isomers	76	0.2
Total Petroleum Hydrocarbons	340*	0.2
Total Votatile Hydrocarbons	810	100

Method: BTXE and TVH -EPA 8020 TPH-DHS GC/FID
ND: None Detected
DLR: Detection Limit For the Purposes of Reporting
*This sample contains low molecular weight hydrocarbons.

Cynthia Pigman,
QA/QC Supervisor

Michael Brechmann,
Organics Supervisor

BSK Analytical Laboratories

1414 Stanislaus Street * Fresno, California 93706 * Telephone (209) 485-8310 * Fax (209) 485-6935

FIGURE: A-4

BSK-Pleasanton
R. T. Nahas

Report Issue Date: 03/23/91
Date Received: 03/14/91
Project Number: P90165

Lab Number	Date Sampled	Client's Sample Description	Date Analyzed
Ch911239-4	03/13/91	1130 hrs. SB-3 #2 at 13 1/2'	03/18/91
Ch911239-6	03/13/91	1340 hrs. SB-4 #1 at 14'	03/18/91

Soil Analyses for BTXE, TPH, and TVH

Results Reported in Milligram per Kilogram (mg/kg)

Compound	Lab.No. 1239-4	Lab.No. 1239-6	Detection Limit (DLR)
Benzene	0.09	ND	0.02
Toluene	0.18	ND	0.02
Ethylbenzene	0.19	ND	0.02
Total Xylene Isomers	1.1	0.10	0.02
Total Petroleum Hydrocarbons	ND	ND	10.00
Total Votatile Hydrocarbons	15	ND	10.00

Method: BTXE and TVH -EPA 8020 TPH-DHS GC/FID

ND: None Detected

DLR: Detection Limit For the Purposes of Reporting

Cynthia Pigman,
QA/QC Supervisor

Michael Brechmann,
Organics Supervisor

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BSK Analytical Laboratories

1414 Stanislaus Street * Fresno, California 93706 * Telephone (209) 485-8310 * Fax (209) 485-6935

FIGURE: A-5

BSK-Pleasanton
R. T. Nahas

Report Issue Date: 03/23/91
Date Received: 03/14/91
Project Number: P90165

Lab Number	Date Sampled	Client's Sample Description	Date Analyzed
Ch911239-7	03/13/91	1456 hrs. SB-5 #1 at 14 1/2'	03/16/91

Soil Analyses for BTXE and TVH

Results Reported in Milligrams per Kilogram (mg/kg)

Compound	Lab # 1239-7	Detection Limit (DLR)
Benzene	ND	0.02
Toluene	ND	0.02
Ethylbenzene	ND	0.02
Total Xylene Isomers	ND	0.02
Total Volatile Hydrocarbons	ND	10.00

Analyses for BTEX by EPA 8020. Analyses for TVH by EPA 8015.
ND: None Detected
DLR: Detection Limit For the Purposes of Reporting

Cynthia Pigman,
QA/QC Supervisor

Michael Brechmann,
Organics Supervisor

51890btxetvhs

BSK Analytical Laboratories

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FIGURE: A-6

BSK-Pleasanton
Nahas

Report Issue Date: 03/23/91
Date Received: 03/15/91
Project Number: P90165

Lab Number	Date Sampled	Client's Sample Description	Date Analyzed
Ch911272-1	03/14/91	0840 hrs. SB-6 #1 at 15'	03/16/91

Soil Analyses for BTXE and TVH

Results Reported in Milligrams per Kilogram (mg/kg)

Compound	Lab # 1272-1	Detection Limit (DLR)
Benzene	0.8	0.2
Toluene	15	0.2
Ethylbenzene	6.2	0.2
Total Xylene Isomers	36	0.2
Total Volatile Hydrocarbons	310	100

Analyses for BTEX by EPA 8020. Analyses for TVH by EPA 8015.
ND: None Detected
DLR: Detection Limit For the Purposes of Reporting

Cynthia Pigman,
QA/QC Supervisor

Michael Brechmann,
Organics Supervisor

051890btxetvhs

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FIGURE: A-7

BSK-Pleasanton
Nahas

Report Issue Date: 03/23/91
Date Received: 03/15/91
Project Number: P90165

Lab Number	Date Sampled	Client's Sample Description		Date Analyzed
Ch911272-2	03/14/91	1145 hrs.	SB-8 #1 at 20 1/2'	03/16/91
Ch911272-3	03/14/91	1458 hrs.	SB-10 #1 at 16'	03/16/91

Soil Analyses for BTXE and TVH

Results Reported in Milligrams per Kilogram (mg/kg)

Compound	Lab # 1272-2	Lab # 1272-3	Detection Limit (DLR)
Benzene	ND	ND	0.02
Toluene	ND	ND	0.02
Ethylbenzene	ND	ND	0.02
Total Xylene Isomers	ND	ND	0.02
Total Volatile Hydrocarbons	ND	ND	10.00

Analyses for BTEX by EPA 8020. Analyses for TVH by EPA 8015.

ND: None Detected

DLR: Detection Limit For the Purposes of Reporting

Cynthia Pigman,
QA/QC Supervisor

Michael Brechmann,
Organics Supervisor

051890btxetvhs

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FIGURE: A-8

BSK-Pleasanton
R.T. Nahas

Report Issue Date: 04/15/91
Date Received: 03/29/91
Project Number: P90165

Lab Number	Date Sampled	Client's Sample Description	Date Analyzed
Ch911520-1	03/28/91	0920 hrs. SB-11 #1 at 10.5 ft.	04/02/91
Ch911520-2	03/28/91	1114 hrs. SB-12 #1 at 15.5 ft.	04/02/91

Soil Analyses for BTXE and TVH

Results Reported in Milligrams per Kilogram (mg/kg)

Compound	Lab # 1520-1	Lab # 1520-2	Detection Limit (DLR)
Benzene	0.09	ND	0.02
Toluene	0.03	ND	0.02
Ethylbenzene	0.49	ND	0.02
Total Xylene Isomers	1.8	ND	0.02
Total Volatile Hydrocarbons	31	ND	10.00

Analyses for BTEX by EPA 8020. Analyses for TVH by EPA 8015.
ND: None Detected
DLR: Detection Limit For the Purposes of Reporting

Cynthia Pigman,
QA/QC Supervisor

Michael Brechmann,
Organics Supervisor

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FIGURE: A-9

BSK-Pleasanton
R.T. Nahas

Report Issue Date: 04/15/91
Date Received: 03/29/91
Project Number: P90165

Lab Number	Date Sampled	Client's Sample Description	Date Analyzed
Ch911520-3	03/28/91	1249 hrs. SB-13 #2 at 10.5 ft.	04/03/91
Ch911520-4	03/28/91	1304 hrs. SB-13 #3 at 14.0 ft.	04/03/91

Soil Analyses for BTXE and TVH

Results Reported in Milligrams per Kilogram (mg/kg)

Compound	Lab # 1520-3	Lab # 1520-4	Detection Limit (DLR)
Benzene	5.5	7.8	1.0
Toluene	67	48	1.0
Ethylbenzene	27	14	1.0
Total Xylene Isomers	140	73	1.0
Total Volatile Hydrocarbons	1100	530	500

Analyses for BTEX by EPA 8020. Analyses for TVH by EPA 8015.
DLR: Detection Limit For the Purposes of Reporting

Cynthia Pigman,
QA/QC Supervisor

Michael Brechmann,
Organics Supervisor

51890btxetvhs

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FIGURE: A-10

BSK-Pleasanton
R. T. Nahas

Report Issue Date: 03/23/91
Date Received: 03/14/91
Project Number: P90165

Lab Number	Date Sampled	Client's Sample Description		Date Analyzed
Ch911239-3	03/13/91	1025 hrs.	SB-2 #3 at 13'	03/18/91
Ch911239-4	03/13/91	1130 hrs.	SB-3 #2 at 13 1/2'	03/18/91

Soil Analyses for Total Organic Lead

Results Reported in Milligrams per Kilogram (mg/kg)

Compound	Results 1239-3	Results 1239-4	Detection Limit (DLR)
Total Organic Lead	ND	ND	2.0

Method: DHS
ND: None Detected
DLR:Detection Limit For the Purposes of Reporting

Cynthia Pigman, QA/QC Supervisor

Doug Deasy, Inorganics Supervisor

051890

BSK Log Number 1236

ANALYSIS REQUEST/CHAIN OF CUSTODY RECORD

Client Name: R.T. Nahas	Project or P.O.# P90165
Address: 5729 F Sonoma Drive	Phone # 415 462 4000
City, State, Zip: Pleasanton, CA 94566	Report, attention: Tim Berger

Lab Use Only in this section: KL

Analysis required: BTXE+TVH; TPH; Total Org. Lead; Hazardous sample Special handling required

3/26/91

Date sampled	Time sampled	Type (See key below)	Sampled by: Tim Berger 3/14/91 — Sample description	Number of containers	Lab Sample number	Sample Seals (See key below)	BTXE+TVH	TPH	Total Org. Lead	Hazardous sample Special handling required	Remarks
3/13/91	8:59	SO	SB-1 #3 at 14½'	1	-1	P	X			1X SOIL TUBE	odd smelly
"	10:13	SO	SB-2 #2 at 10½'	1	-2		X				
"	10:25	SO	SB-2 #3 at 13'	1	-3		X	X	X		
"	11:30	SO	SB-3 #2 at 13½'	1	-4		X	X	X		
"	11:47	SO	SB-3 #3 at 17'	1	-5		X				
"	13:40	SO	SB-4 #1 at 14'	1	-6		X	X			
"	14:56	SO	SB-5 #1 at 14½'	1	-7	V	X				
		S									

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: Tim Berger
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	Tim Berger	Tim Berger	BSK-P	3/13/91	1700
Received by	[signature]	K. Eldridge	BSK	3/14/91	1115
Relinquished by					
Received by					
Relinquished by					
Received by					

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.

FIGURE: A-11

BSK Log Number 1F—

ANALYSIS REQUEST/CHAIN OF CUSTODY RECORD

1000 7905

Client Name: Dames	Project or P.O.#: 790165
Address: 5729 F Sonoma Dr.	Phone #: 415 462 4000
City, State, Zip: Pleasanton CA 94566	Report, attention: Tim Berger

Lab Use Only in this section

Analysis required: TVH + BTXE; Hazardous sample / Special handling required

3/27/91

Date sampled	Time sampled	Type (See key below)	Sampled by: Tim Berger Sample description	Number of containers	Lab Sample number	Sample Seals (See key below)	TVH + BTXE	Remarks
3/14/91	8:40	SO	SB-6 #1 at 15'	1	-1	P	X	1X SOIL TUBE
"	11:45	SO	SB-8 #1 at 20½'	1	-2	↓	X	↓
"	14:58	SO	SB-D #1 at 16'	1	-3	↓	X	
		S						

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: Tim Berger
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	Tim Berger	Tim Berger	BSK-P	3/14/91	17:00
Received by	Beus. Eldridge	L. Eldridge	LAB	3/15/91	1030
Relinquished by					
Received by					
Relinquished by					
ed by					

Associates Chemical Laboratories

Street Fresno, California 93706

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.

FIGURE: A-12

BSK Log Number 1500

ANALYSIS REQUEST/CHAIN OF CUSTODY RECORD

1000-7948

Client Name: R.T. Nahas ~~P2016-5~~	Project or P.O.#: P20165
Address: 5729-F Sonoma	Phone #: (415) 462-4000
City, State, Zip: Pleasanton	Report, attention: Tim Berger

Lab Use Only in this section

Analysis required: TVH & BTXE; Hazardous sample Special handling required

4/11/91

Date sampled	Time sampled	Type (See key below)	Sampled by: M. Cline 3/29/91 — Sample description	Number of containers	Lab Sample number	Sample Seals (See key below)	Remarks
3-28-91	9:20	SO	SB-11 #1 at 10.5 FT	1	-1	P	PID TO 226 PPM
	11:14	S	SB-12 #1 at 15.5 FT	1	-2		PID TO 0
	12:49		SB-13 #2 at 10.5 FT	1	-3		PID TO 2479 PPM
↓	13:04	↓	SB-13 #3 at 14.0 FT	1	-4	↓	PID TO 3625 PPM
							IX 8011 TUBE (each)

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: Marty Cline
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	Marty Cline	Martin Cline	BSK-P	3-28-91	5:37
Received by	[signature]	L. Edwards	LAB	3/29/91	1445
Relinquished by					
Received by					
Relinquished by					
Received by					

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.

FIGURE: A-13