CERTIFIED
ENVIRONMENTAL
CONSULTING INC.

April 25, 1994

REF: 92-221-1088

Ms. Susan L. Hugo
Senior Hazardous Materials Specialist
Alameda County Department of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 350
Oakland, CA 94621
(510) 271-4530
(510) 579-4757 FAX

SUBJECT: QUARTERLY GROUNDWATER MONITORING AND SAMPLING RESULTS FOR QUIK STOP MARKET #47, 6001 MACARTHUR BOULEVARD, OAKLAND, CA

Dear Ms. Hugo:

Certified Environmental Corporation (CEC) is pleased to submit our fourth Quarterly Groundwater Monitoring report for the above site. At this time CEC would like to request case closure for the subject site.

TPH-G, TOG and BTEX were not detected in any of the recent samples (Table 1). Diesel was detected again in MW-1 and MW-2 however, TPH-D has decreased significantly over the last two sample rounds in both wells. The source of the diesel has not been identified. Also, pumping water from MW-1 and MW-2 following the first and second monitoring events had negligible impact on the diesel concentration detected in the wells. Diesel has never been detected in MW-3 which is in the center of the site. This appears to indicate an off-site source which is still releasing diesel constituents. Therefore, MW-1 and MW-2 appear to be on the edge of a diesel plume which has an off-site source.

It is possible the former site owner (Atlantic Richfield) may have stored diesel in their underground storage tanks. However, a Richfield source is not probable because diesel has not been detected in MW-3. We believe there is an unidentified diesel storage tank in the upgradient direction which is releasing contaminants into the aquifer.

536 Stone Road, Suite J
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The groundwater flow direction for this sampling event was calculated to be N 65° W. Groundwater flow direction has varied between N 65° W and S 86° W during our monitoring events. With this in mind, the diesel source must be located east or northeast of the site. Possible upgradient sources include the PG&E facility on MacArthur Blvd., the Chevron station on the corner of MacArthur and Seminary, the Caltrans or Mills College vehicle maintenance stations on Seminary Ave., small businesses or older residences. The Alameda County Flood Control "J Line" which contains Leona Creek may be a pathway for contaminants migrating from sites along Seminary Avenue.

Chains of custody, laboratory analytical sheets, sampling event data sheets and groundwater flow direction calculations are attached.

At this time CEC would like to request a case review and case closure. The request for case closure is based on the following conditions:

1) The site was remediated during excavation activities, (soil removal and disposal).
2) Gasoline was the only known material stored in the former UST's.
3) All three monitoring wells have been below detection limits for TPHG/BTXE and Oil & Grease for four consecutive quarters.
4) TPH-D concentrations have relatively low in MW-1 and MW-2 are approaching non-detectable levels.
5) TPH-D in the groundwater is most likely occuring due to an unauthorized release from an off-site source.

If you have any questions regarding the quarterly sampling or the request for case closure please contact me at (707) 745-0171.

Sincerely,

Scott L. Parker
Project Geologist

Stanley L. Klemetson, Ph.D., P.E.
Exec. Vice President

Attachments

cc: Mr. Michael Karvelot, Quik Stop Markets, Inc.
Ms. Christine Noma, Wendel, Rosen, Black, Dean & Levitan
Mr. Richard Hiett, San Francisco Bay Regional Water Quality Control Board

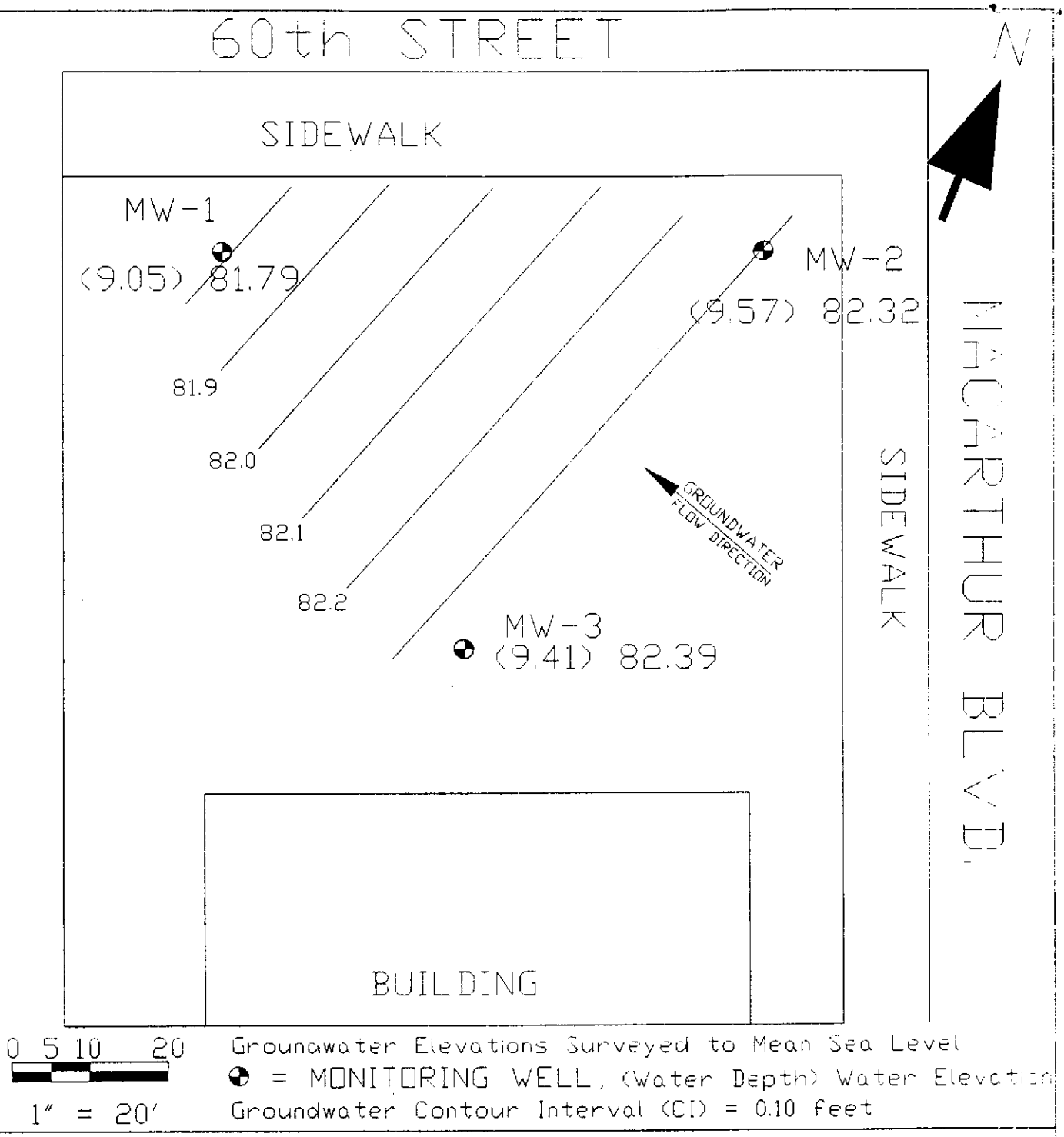
Table 1.
Groundwater Monitoring Well Analytical Results for
Quik Stop Market #47
6001 MacArthur Boulevard, Oakland, CA

Well Number	Date Collected	Groundwater Flow Direction	Well Elevation	Depth to Water	Water Elevation	TPH-D ug/L	TPH-G ug/L	Benzene ug/L	Toluene ug/L	Ethyl Benzene ug/L	Xylenes ug/L	Total Oil and Grease mg/L
MW-1	6/08/93	N 70° W	90.84	8.78	82.06	**240**	ND	ND	ND	ND	ND	ND
	*7/29/93	NC		10.5	81.04	*140	ND	ND	ND	ND	ND	ND
	9/29/93	S 86° W		10.8	90.84	200	ND	ND	ND	ND	ND	ND
	*10/7/93	NC		10.86	79.98	*200	NA	NA	NA	NA	NA	NA
	12/20/93	N 68° W		8.84	82.00	220	ND	ND	ND	ND	ND	ND
	4/04/94	N 65° W		9.05	81.79	75	ND	ND	ND	ND	ND	ND
MW-2	6/08/93		91.89	9.46	82.43	**300**	**73**	ND	ND	**0.62**	**0.94**	ND
	*7/29/93			9.80	81.39	*190	ND	ND	ND	ND	ND	ND
	9/29/93			11.43	91.89	200	ND	ND	ND	ND	ND	ND
	*10/7/93			11.52	80.37	*190	NA	NA	NA	NA	NA	NA
	12/20/93			9.47	82.42	140	ND	ND	ND	ND	ND	ND
	4/04/94			9.57	82.32	77	ND	ND	ND	ND	ND	ND
MW-3	6/08/93		91.80	9.36	82.44	ND	ND	ND	ND	ND	ND	ND
	9/29/93			11.48	91.80	ND	ND	ND	ND	ND	ND	ND
	12/20/93			9.35	82.45	ND	ND	ND	ND	ND	ND	ND
	4/04/94			9.41	82.39	ND	ND	ND	ND	ND	ND	ND
Detection Limits						50	50	0.5	0.5	0.5	0.5	5
**California MCL's Primary						None	None	1.0	None	680	1750	None
**California MCL's Secondary						None	None	None	40	30	20	None

* RESULTS FROM RESAMPLING GROUNDWATER AFTER REMOVING APPROXIMATELY 750 GALLONS OF WATER FROM WELLS MW-1 AND MW-2.

** Marshack, J., B., 1991, A Compilation of Water Quality Goals, Staff Report, California Regional Water Quality Control Board, Central Valley Region

Elevations in feet above mean sea level (MSL)
ND = Not Detected, NA = Not Analyzed, NC = Not Calculated



QUIK STOP # 47
6001 MACARTHUR BLVD.
OAKLAND, CA
WELL LOCATIONS, GROUNDWATER FLOW DIRECTION SHOWING GROUNDWATER CONTOUR INTERVALS

CERTIFIED ENVIRONMENTAL CONSULTING
356 STONE ROAD, SUITE J, BENICIA, CA 94510
(707) 745-0171 / (800) 228-0171 / (707) 745-0163 FAX

FIGURE 1

SLP 3/94

1.0 INTRODUCTION

1.1 SITE LOCATION AND DESCRIPTION

The project site is located at 6001 MacArthur Boulevard, Oakland, California (Figure 1). The site is approximately 45 feet above mean sea level (MSL) and consists of approximately 10,000 square feet (Figure 2).

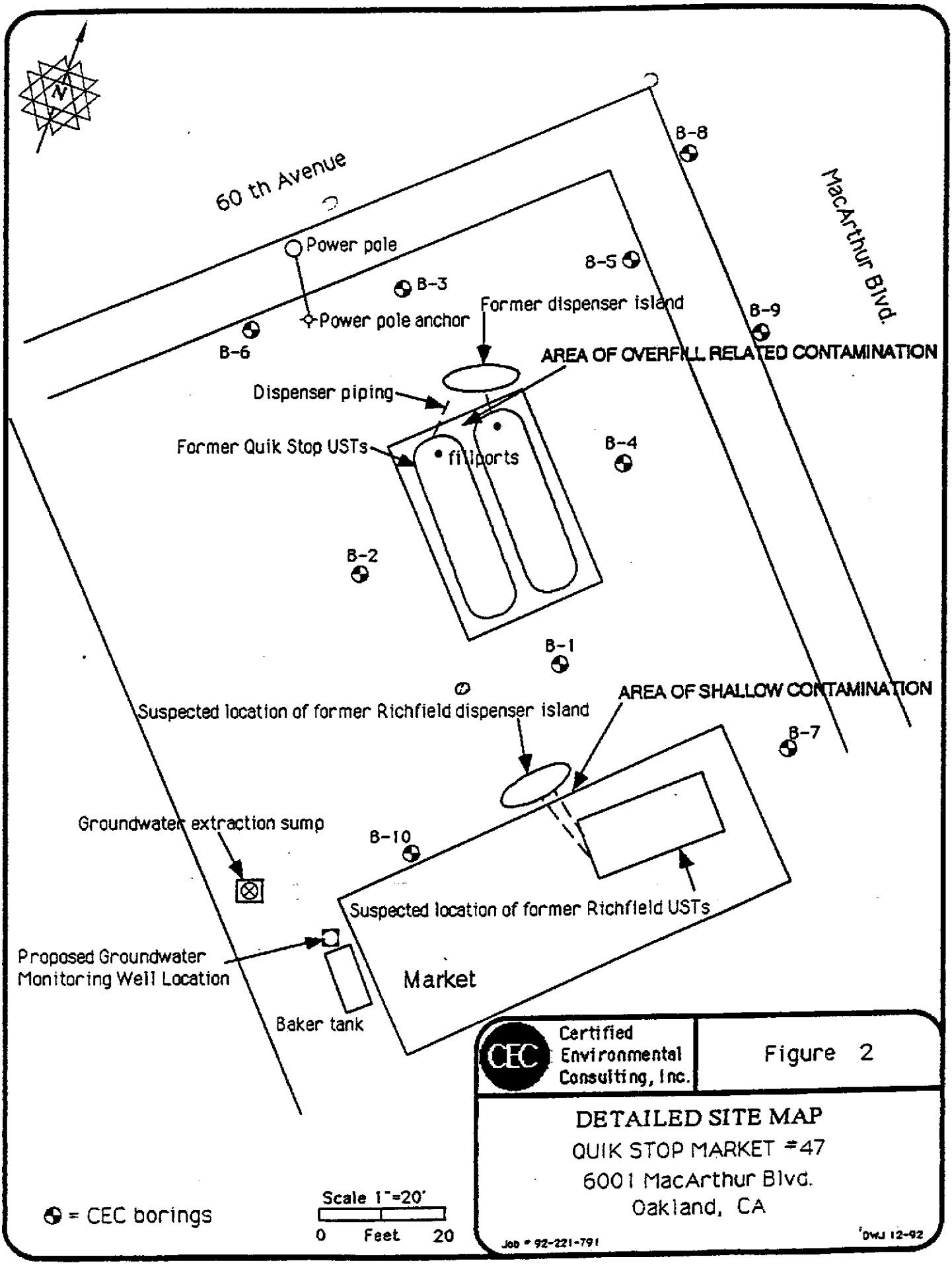
1.2 BACKGROUND

The site was a Richfield Oil Company gasoline station from approximately 1950 through 1970. The former Richfield station operator indicated the station had two 4,000-gallon, leaded gasoline underground storage tanks (USTs) and one 100-gallon waste oil UST. Quik Stop Markets, Inc. apparently removed the Richfield gasoline tanks and installed two 10,000-gallon, single wall, steel, asphalt wrapped USTs in approximately 1972.

The Quik Stop tanks were removed by SEMCO on April 14, 1992. They were observed to be in very good condition and free of holes and corrosion. The asphalt tank wrap was dissolved on the fillport ends of the tanks. Soil samples collected from the bottom of the excavation and from the spoils pile of excavated soil contained detectable hydrocarbons. Samples collected from the south end of the tank excavation contained significantly higher concentrations of TPH-G than samples collected from the north end (fillport end). High levels on the south end may have been related to the former Richfield tanks.

Contamination delineation drilling was performed on April 29 and May 21, 1992 by Bay Area Exploration of Cordelia, California. CEC supervised the drilling of ten holes to a maximum depth of 27 feet using a CME 55 drilling rig equipped with hollow stem augers and a modified California split spoon sampler.

Excavation of contaminated soil began on July 14, 1992 and continued until August 28, 1992. Approximately 7,839 cubic yards of soil were excavated. The soil was screened and determined to contain less than 1000 ppm TPH-G/BTEX, therefore it was classified as non-hazardous. Soil was transported to a Quik Stop property located at 991 Vasco Road, Livermore, California.


N
60 th Avenue
MacArthur Blvd.
Power pole
Power pole anchor
B-8
B-5
B-3
B-9
B-6
Former dispenser island
AREA OF OVERFILL RELATED CONTAMINATION
Dispenser piping
Former Quik Stop USTs
fillports
B-4
B-2
B-1
AREA OF SHALLOW CONTAMINATION
Suspected location of former Richfield dispenser island
B-7
Groundwater extraction sump
B-10
Suspected location of former Richfield USTs
Proposed Groundwater Monitoring Well Location
Market
Baker tank
= CEC borings
Scale 1"=20'
0 Feet 20
CEC
Certified Environmental Consulting, Inc.
Figure 2
DETAILED SITE MAP
QUIK STOP MARKET #47
6001 MacArthur Blvd.
Oakland, CA
Job # 92-221-791
DWJ 12-92

2.0 INVESTIGATIVE METHODS

2.1 DRILLING AND SOIL BORINGS

Contamination delineation drilling was performed on April 29 and May 21, 1992 by Bay Area Exploration of Cordelia, California. CEC supervised the boring of ten holes to a maximum depth of 27 feet using a CME 55 drilling rig equipped with hollow stem augers and a modified California split spoon sampler. Soil samples were recovered on five foot intervals, changes in soil type, and in the capillary fringe zone above the water table. Samples were collected and preserved according to San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) guidelines. Drilling equipment decontamination was performed according to the protocol outlined in the work plan.

Hydrocarbons were not detected at a depth of 11.5 feet bgs in two of the five holes drilled north of the former tank excavation (B-8 and B-9). No hydrocarbons were detected below 11.5 feet in any of the holes drilled north of the former tank excavation (B-3, B-5, B-6, B-8, B-9). Hydrocarbons were detected at a depth of 16.5 feet in all holes drilled south of the former tank excavation (B-1, B-2, B-4, B-10), with the exception of B-7. This indicates soil contamination has migrated to greater depths and to greater distances in a southerly direction. It did not appear contamination had migrated off-site and it did not appear a significant amount of contamination was present beneath the market. Refer to Figure 3.

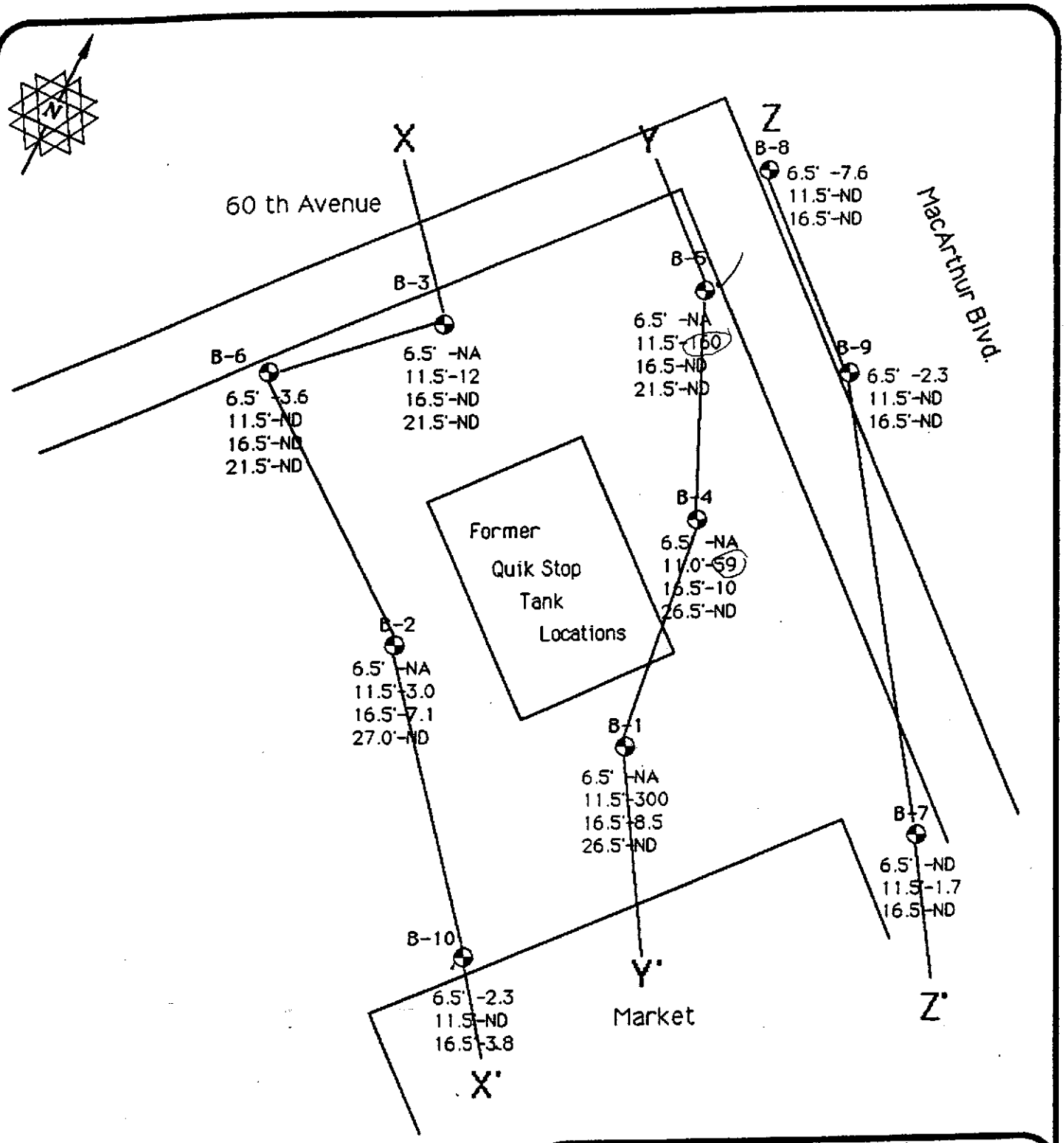
Soils Exploration Services, Inc. (SES) of Vacaville, California (CA License # C-57-582-696) installed three, four-inch groundwater monitoring wells under CEC supervision on May 25 and 26, 1993. The wells were installed in the locations shown on Figure 4 using a CME 55 drilling rig equipped with 10-inch diameter hollow stem augers. Water was encountered between 12 and 16 feet in the borings. All of the wells were installed within the backfill of the former site remediation excavation. Therefore, foreign backfill was penetrated for approximately the first twenty feet in each hole. No samples were collected from the foreign backfill. The first sample from each hole was collected at approximately one-foot into native soil.

The 12-inch groundwater extraction sump used to dewater the excavation during remediation activities, was backfilled to grade with neat cement grout according to Zone 7 requirements.

Auger decontamination was performed on-site. Decontamination water and drilling cuttings were contained on-site in sealed, labeled, DOT approved, 17H steel drums.

2.2 SOIL SAMPLING

Soil samples were collected on five foot intervals beginning at approximately one foot into native soil (approximately 22 feet bgs). Samples were recovered in two-inch diameter, six-inch long stainless steel tubes using a modified California split spoon sampler. Following recovery, the ends of the sample tubes were covered with Teflon tape and plastic caps to prevent the loss of volatile constituents. The tubes were labeled and refrigerated on ice for transport under chain of custody to McCampbell Analytical Laboratory of Pacheco, California. The samples were analyzed for TPH-G and BTEX. No hydrocarbons were detected in the soil samples.



EXPLANATION

X ——— X' Cross section Lines

◓ = Existing Borings, Depth samples collected, TPH-G concentrations in ppm

B-1 - B-6 drilled 4/29/92
B-7 - B-10 drilled 5/21/92
NA = Not Analyzed
ND = Not Detected

Scale 1"=20'
0 Feet 20

Certified Environmental Consulting, Inc.

Figure 3

DETAILED SITE MAP SHOWING CROSS SECTION LOCATIONS
QUIK STOP MARKET #47
6001 MacArthur Blvd.
Oakland, CA

Job # 92-221-791 DWJ 6-92

TABLE 1

Well Construction Data

6001 MacArthur Boulevard, Oakland, CA

Well	Diameter (Inches)	Date Drilled	**Total Boring Depth (Feet)**	**Top of Casing Elevation***	**Screened Interval (feet below grade)**
MW-1	4	5/25/93	27.50	90.84	10-26
MW-2	4	5/25/93	29.00	91.89	8-27
MW-3	4	5/26/93	29.00	91.80	8-28

Table 2
Groundwater Monitoring Well Analytical Results
Quik Stop Market #47
6001 MacArthur Boulevard, Oakland, CA

Well Number	Date Collected	Groundwater Flow Direction	Well Elevation	Depth to Water	Water Elevation	TPH-D µg/L	TPH-G µg/L	Benzene µ/L	Toluene µg/L	Ethyl Benzene µg/L	Xylenes µg/L	Total Oil and Grease mg/L
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	4/04/94	N 65° W		9.05	81.79	75	ND	ND	ND	ND	ND	ND
	07/06/94	N 80° W		9.96	80.88	ND	ND	ND	ND	ND	ND	ND
MW-2	6/08/93		91.89	9.46	82.43	300	73	ND	ND	0.62	0.94	ND
	*7/29/93			9.80	82.09	*190	ND	ND	ND	ND	ND	ND
	9/29/93			11.43	80.46	200	ND	ND	ND	ND	ND	ND
	*10/7/93			11.52	80.37	*190	NA	NA	NA	NA	NA	NA
	12/20/93			9.47	82.42	140	ND	ND	ND	ND	ND	ND
	4/04/94			9.57	82.32	77	ND	ND	ND	ND	ND	ND
	07/06/94			10.51	81.38	ND	ND	ND	ND	ND	ND	ND
MW-3	6/08/93		91.80	9.36	82.44	ND	ND	ND	ND	ND	ND	ND
	9/29/93			11.48	80.32	ND	ND	ND	ND	ND	ND	ND
	12/20/93			9.35	82.45	ND	ND	ND	ND	ND	ND	ND
	4/04/94			9.41	82.39	ND	ND	ND	ND	ND	ND	ND
	07/06/94			10.48	81.32	ND	ND	ND	ND	ND	ND	ND
Detection Limits						50	50	0.5	0.5	0.5	0.5	5
**California MCL's Primary						None	None	1.0	None	680	1750	None
**California MCL's Secondary						None	None	None	40	30	20	None

* RESULTS FROM RESAMPLING GROUNDWATER AFTER REMOVING APPROXIMATELY 750 GALLONS OF WATER FROM WELLS MW-1 AND MW-2.

** Marshack, J., B., 1991, A Compilation of Water Quality Goals, Staff Report, California Regional Water Quality Control Board, Central Valley Region

Elevations in feet above mean sea level (MSL)

ND = Not Detected, NA = Not Analyzed, NC = Not Calculated

4.0 HYDROLOGY

4.1 LOCAL GEOLOGY AND HYDROLOGY

In general, the local area is underlain by Late Quaternary age fine to coarse grained stream deposits. The deposits consist of weakly to strongly consolidated, poorly sorted, irregularly interbedded clay, silt, sand, and gravel (Helley and Lajoie, 1979). Locally, depth to groundwater ranges between 7 and 15 feet. Local groundwater flow direction varies from west to southeast and is strongly influenced by the steep topographic gradients east of the site.

4.2 SITE GEOLOGY AND HYDROLOGY

Prior to performing the site remediation process, moist, dark yellow-brown, medium dense to stiff, lean clay (CL) with no plasticity to low plasticity was present from surface to approximately 12 feet bgs. In general, dark gray to dark brown, medium dense, silty to clayey gravel (GM-GC) was present below the lean clay to approximately 25 feet bgs. Between 12 and 25 feet bgs, clay generally comprises less than 15% of total soil volume. Groundwater was encountered between 12 and 16 feet bgs.

During our initial site investigation, groundwater was encountered at approximately 16 feet bgs. During the course of site excavation, standing water level in the excavation stabilized at approximately 18 feet bgs. During well installation, drilling water was encountered between 12 and 16 feet bgs and stabilized in the wells at between 8 and 12 feet bgs.

4.3 GROUNDWATER GRADIENT

Groundwater flow direction was calculated after each well sampling round. Groundwater elevation data collected from June 1993 to July 1994 indicate a moderate gradient. The calculated hydraulic gradient between wells MW-1, MW-2 and MW-3 ranged from 0.0059 feet/foot in September 1993 to 0.01 feet/foot in April 1994. The groundwater flow direction has varied from N 65° W to S 86° W. The gradient trends towards San Francisco Bay.

4.4 SEASONAL VARIATIONS OF GROUNDWATER

Groundwater elevations were measured in wells MW-1, MW-2 and MW-3 on a quarterly basis from June 1993 to July 1994. Static water levels were recorded to the nearest 0.01 foot using an electronic water level sounder. Well construction and groundwater elevation data collected from June 1993 to July 1994, are presented in Tables 1 and 2, respectively. All three monitoring wells were installed in the shallow uppermost unconfined aquifer.

The largest fluctuation in static water level, (SWL), was observed in well MW-3. The recorded SWL for MW-3 was 9.35 and 11.48 feet below ground surface (bgs), for December 1993 and September 1993, respectively. The highest SWL was observed in well MW-1 at 8.78 feet bgs during June 1993. The lowest SWL was observed in well MW-2 at 11.52 feet bgs in October 1993. The static groundwater elevation was recorded on Sample Event Data Sheets during quarterly sampling events.

4.5 AQUIFER CHARACTERISTICS

Based on the soil types encountered during drilling the water bearing zone beneath the site is predominantly clayey sand and clayey gravel. The clayey gravel zone was encountered at approximately 21.5 feet bgs in all three wells. An impermeable clay zone was encountered in all three wells at approximately 27 to 28 feet bgs in all three wells. The typical range of hydraulic conductivity for sand, gravel and clay mixes is 0.001 - 0.1 m/day. During groundwater sampling, the wells were pumped at approximately 2 gpm for a period of fifteen minutes. The observed drawdown between all three wells ranged from 1 to 4 feet.

5.0 BENEFICIAL USES OF GROUNDWATER

There were no drinking water wells identified within a 1/2 mile radius of the site. There are no known drinking water sources immediately downgradient of the site and potable water for drinking purposes is typically drawn from aquifers greater than 50 feet depth. The San Leandro Bay is located approximately 2 miles southwest and downgradient of the subject site. Potential migration of contaminants toward the bay would degrade to non-detectable levels through dispersion and bioattenuation before contacting the bay. The diesel concentrations detected in MW-1 and MW-2, prior to the fifth quarter sample round, are considered residual quantities and would degrade over time further reducing the risk to health and the environment. A 1/2 mile well radius search was obtained from the County of Alameda Public Works Agency and is

contained in Appendix A. Calaveras Lake is the closest body of surface water located upgradient approximately 1,500 feet northeast of the subject site in a topographic high. Surface water originating from the subject site is transported through the public storm drain system eventually entering Dammon Slough approximately 2 miles downgradient. Dammon Slough is tidally influenced, cross gradient of the site and flows into San Leandro Bay. Contaminants detected at the subject site are contained immediately adjacent to the tank excavations and have not adversely impacted surface waters.

The subject site is located within the Central Bay according to the San Francisco Bay Basin Plan. The Basin Plan lists the existing and potential beneficial uses of groundwater as municipal supply, industrial process water supply, industrial supply, and agricultural supply. However, most of the usable groundwater exists beneath brackish shallow aquifers. A significant portion of the groundwater is not usable due to limited yield and the economics of groundwater extraction.

6.0 REMEDIATION ACTIVITIES AND EFFECTIVENESS

6.1 SOIL REMEDIATION

The asphalt parking surface was removed from the site on July 13, 1992. An eight-foot high chain-link fence was erected around the perimeter of the site. American Protective Service (APS) was hired to provide security during non-working hours. Soil excavation began along the east side of the site on July 14, 1992 and continued until August 28, 1992. Approximately 7,839 cubic yards of soil were excavated. Approximately 45 cubic yards of contaminated soil was transported under non-hazardous waste manifest to Guadalupe landfill in San Jose, California. Soil was transported under non-hazardous waste manifests to a Quik Stop property located at 991 Vasco Rd, Livermore, California. Soil was transported in 17 cubic yard capacity end dump trucks. Soil loaded into the first 351 trucks (5967 cubic yards) was screened with a Thermo Environmental Instruments Model 580 A photo-ionization, organic vapor meter (OVM) to prevent the transport of soil with a hazardous concentration of TPH-G (greater than 1000 parts per million (ppm)). OVM readings were collected from each two cubic yard loader bucket of soil placed into end-dump trucks. All trucks had an average OVM reading of less than 1000 ppm. To correlate the OVM readings with quantitative analysis, soil samples were collected from 22 trucks with a soil hammer-tube sampler. Samples were collected, preserved, and transported under SFBRWQCB guidelines outlined in the work plan. Samples were transported to the refrigerator of the on-site Coast to Coast mobile laboratory (CAELP #1255) and analyzed for TPH-G and BTEX by CAL DHS DRAFT TPH (modified) and EPA 8260 (GC/MS). A summary of the analytical results is presented in Table 3.

On June 31, 1992, a 100 gallon waste oil tank was excavated from the site. The bottom of the tank was approximately 3.5 feet below grade. The tank was removed from the ground by BKH Excavators of Santa Rosa, CA (contractors license #498540) and wrapped in plastic sheeting and stored along the west property boundary. During removal, the tank was damaged by the excavator bucket, otherwise it appeared to be in good condition. It contained approximately 50 gallons of liquid. Soil beneath the tank had a minor dark black hydrocarbon stain. A soil sample was collected according to SFBRWQCB guidelines approximately one foot below the bottom of the former tank. The sample was transported to McCampbell Analytical of Pacheco, California (CAL DHS Cert. # 1644) analyzed for total petroleum hydrocarbons as diesel (TPH-D).

(method 3550), TPH-G, BTEX (method 5030), total oil and grease (TOG) (method 5520 or 503), and total cadmium, chromium, lead, nickel, and zinc (method 3050). A summary of the analytical results is presented in Table 4. On August 7, 1992, the tank and contents were transported and disposed under Uniform Hazardous Waste Manifest by Erickson, Inc. of Richmond, California. Soil beneath the tank was excavated to a depth of approximately six feet and transported to 991 Vasco Rd. in Livermore where it was stockpiled separately on plastic sheeting and covered by plastic.

6.2 EXCAVATION SOIL SAMPLING

Soil samples were collected from excavation sidewalls every 20 linear feet and in different soil types. Bottom samples were collected at various depths for every 400 square feet of excavation bottom. All samples were collected with a slide hammer-tube sampler according to SFBRWQCB guidelines outlined in the work plan. Samples were transported under chain of custody to the on-site Coast to Coast mobile lab or refrigerated and transported to McCampbell Analytical in Pacheco, California. All samples were analyzed for TPH-G and BTEX. Selected samples were analyzed for total lead (Pb). Samples QS812-1 and QS812-5 were analyzed for organic lead, none was detected. Sample QS730-3 was analyzed for soluble lead, none was detected. Analytical results for excavation completion samples are summarized in Table 5. Completion sampling locations are presented in Figure 5.

The east boundary of the site was excavated to within two feet of MacArthur Boulevard. It was not possible to excavated further in this direction without impairing the integrity of the street. Soil exposed in the east wall consisted of lean clay to a depth of approximately 12 feet bgs. Lean clay is underlain by approximately 7 feet of gravelly clay. Gravelly clay is underlain by at least three feet of well sorted gravel with less than 5% silt and clay. Contamination in the northeast and southeast corner was more widespread than indicated by borings. Exposure of this sidewall confirmed contaminant migration was strongly controlled by soil type. OVM readings from samples collected in lean clay within 12 feet of the ground surface were consistently less than 10 ppm. Laboratory analysis confirmed the OVM readings. OVM readings on samples collected in clayey gravel at depths greater than 12 feet bgs ranged between 10 and 500 ppm. Clayey gravel had a conspicuous dark green to dark grayish green color. Samples collected at various depths along the central portion of the east side of the excavation did not contain greater than 10 ppm TPH-G. Soil samples collected in the southeast corner on the east wall contained up to 460 ppm TPH-G and concentrations of up to 140 ppm TPH-G were detected in samples collected in the northeast corner along the east wall. Sampling along the east wall indicates isolated areas with TPH-G concentrations greater than 10 ppm.

The south side of the site was excavated to the edge of the four-foot wide sidewalk along the front of the market. This side could not have been excavated further without impairing the stability of the market. Gravelly clay was encountered at depths between one and nine feet bgs along the south wall. Lean clay was encountered in lenses in the southeast and southwest corners. Thicknesses of the lean clay and gravelly clay were not as uniform as they had been on the east wall. Lean clay was encountered again at approximately 7 feet bgs and present to

Table 4

Analytical Results for Soil Sample Associated With the Waste Oil Tank
Quik Stop Market #47
6001 MacArthur Boulevard, Oakland, CA

Sample Number	Date Collected	Sample Location	TPH-G mg/Kg	Benzene mg/Kg	Toluene mg/Kg	Ethyl Benzene mg/Kg	Xylenes mg/Kg	TPH-D mg/Kg	Total Oil and Grease mg/Kg	VOCs ug/Kg	Cadmium mg/Kg	Chromium mg/Kg	Lead mg/Kg	Nickel mg/Kg	Zinc mg/Kg
QS85-1	8/5/92	1' below tank bottom	66	0.020	0.081	0.094	0.20	370	3000	ND	2.6	35	21	53	66

TABLE 5
COMPLETION SOIL SAMPLE ANALYTICAL RESULTS
QUIK STOP MARKET #47
6001 MACARTHUR BOULEVARD
OAKLAND, CA

Date Collected	Sample Number	Depth Below Ground Surface	Location	TPH-G mg/Kg	Benzene mg/Kg	Toluene mg/Kg	Ethyl Benzene mg/Kg	Xylene mg/Kg	Total Lead mg/Kg	Description
7/14/92	QS-714-2	16.0'	E. Side Wall	ND	ND	ND	ND	ND	NA	clayey gravel
7/14/92	QS-714-3	14.0'	E. Side Wall	ND	ND	ND	ND	ND	NA	gravelly clay
7/14/92	QS-714-4	16.0'	Bottom	ND	ND	ND	ND	ND	NA	clayey gravel
7/15/92	QS-715-1	8.5'	E. Side Wall	0.9	ND	ND	ND	0.014	NA	lean clay
7/15/92	QS-715-2	15.85'	E. Side Wall	ND	ND	ND	ND	0.014	NA	clayey gravel
7/15/92	QS-715-3	15.5'	Bottom	ND	ND	ND	0.005	0.020	NA	clayey gravel
7/15/92	QS-715-4	14.0'	E. Side Wall	6.0	ND	ND	ND	0.010	NA	gravelly lean clay
7/15/92	QS-715-5	15.0'	Bottom	ND	ND	ND	ND	0.015	NA	clayey gravel
7/15/92	QS-715-6	16.0'	Bottom	ND	ND	ND	ND	0.012	NA	clayey gravel
7/15/82	QS-715-7	16.0'	Bottom	ND	ND	ND	ND	0.015	NA	clayey gravel
7/17/92	QS-717-1	22.0'	Bottom	ND	0.014	0.014	0.006	0.015	NA	gravelly clay
7/17/92	QS-717-2	21.0'	Bottom	ND	0.006	0.006	ND	0.008	NA	gravelly clay
7/21/92	QS-721-1	11.5'	N. Side Wall	670.0	0.4	0.2	0.2	ND	NA	clayey gravel
7/21/92	QS-721-2	14.5'	E. Side Wall	140.0	ND	ND	ND	ND	NA	clayey gravel
7/21/92	QS-721-3	13.0'	E. Side Wall	10.0	0.006	ND	ND	0.005	NA	gravelly clay
7/22/92	QS-722-1	19.0'	Bottom	ND	ND	ND	ND	ND	NA	clayey gravel
Detection Limits				1.0	0.005	0.005	0.005	0.005		

TABLE 5
COMPLETION SOIL SAMPLE ANALYTICAL RESULTS
QUIK STOP MARKET #47
6001 MACARTHUR BOULEVARD
OAKLAND, CA

Date Collected	Sample Number	Depth Below Ground Surface	Location	TPH-G mg/Kg	Benzene mg/Kg	Toluene mg/Kg	Ethyl Benzene mg/Kg	Xylene mg/Kg	Total Lead mg/Kg	Description
7/22/92	QS-722-2	12.33'	S. Side Wall	150	ND<0.05	0.31	0.57	ND<0.05	NA	gravelly clay
7/22/92	QS-722-3	13.5'	E. Side Wall	ND	ND	ND	ND	ND	NA	gravelly clay
7/22/92	QS-722-4	8.75'	E. Side Wall	2.2	ND	ND	0.033	0.016	NA	lean clay
7/22/92	QS-722-5	9.0'	S. Side Wall	3.1	ND	ND	0.027	0.014	NA	lean clay
7/22/92	QS-722-6	13.75'	E. Side Wall	460	ND<0.1	1.3	1.8	ND<0.1	NA	gravelly clay
7/24/92	QS-724-1	5.0'	S. Side Wall	130	ND<0.05	0.11	0.026	0.16	NA	gravelly clay
7/24/92	QS-724-2	1.0'	S. Side Wall	780	0.51	1.7	3.0	1.8	NA	gravelly clay
7/27/92	QS-727-1	21.0'	Bottom	ND	ND	ND	ND	ND	NA	gravelly clay
7/27/92	QS-727-2	9.0'	N. Side Wall	6.9	0.008	ND	0.047	0.025	NA	lean clay
7/27/92	QS-727-3	18.0'	N. Side Wall	ND	ND	ND	ND	ND	NA	clayey gravel
7/27/92	QS-727-4	9.75'	N. Side Wall	1.7	ND	ND	ND	0.010	NA	lean clay
7/27/92	QS-727-5	15.5'	N. Side Wall	ND	ND	ND	ND	ND	NA	clayey gravel
7/28/92	QS-728-1	9.0'	N. Side Wall	8.0	ND	ND	ND	0.010	NA	lean clay
7/28/92	QS-728-2	14.0'	N. Side Wall	670.0	1.9	1.5	1.3	4.4	7.3	clayey gravel
7/28/92	QS-728-3	20.0'	Bottom	ND	ND	ND	ND	ND	NA	gravelly clay
Detection Limits				1.0	0.005	0.005	0.005	0.005		

TABLE 5
COMPLETION SOIL SAMPLE ANALYTICAL RESULTS
QUIK STOP MARKET #47
6001 MACARTHUR BOULEVARD
OAKLAND, CA

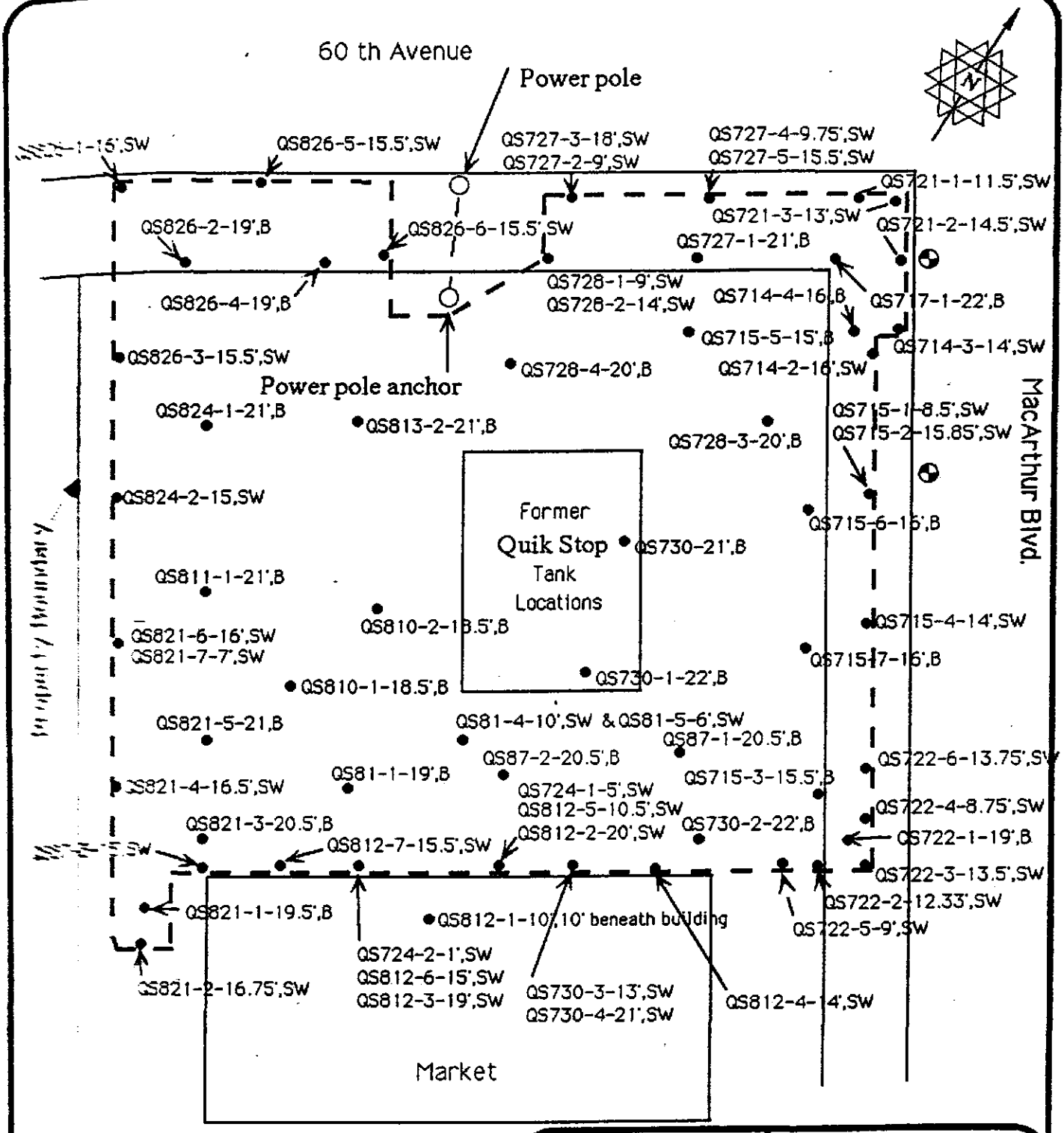
Date Collected	Sample Number	Depth Below Ground Surface	Location	TPH-G mg/Kg	Benzene mg/Kg	Toluene mg/Kg	Ethyl Benzene mg/Kg	Xylene mg/Kg	Total Lead mg/Kg	Description
7/28/92	QS-728-4	20.0'	Bottom	ND	ND	ND	ND	ND	NA	gravelly clay
7/30/92	QS-730-1	22.0'	Bottom	ND	ND	ND	ND	ND	NA	gravelly clay
7/30/92	QS-730-2	22.0'	Bottom	ND	ND	ND	ND	ND	8.8	gravelly clay
7/30/92	QS-730-3	13.0'	S. Side Wall	1300.0	0.60	2.6	3.2	3.5	NA	gravelly clay
7/30/92	QS-730-4	21.0'	S. Side Wall	ND	ND	ND	ND	ND	NA	clayey gravel
7/30/92	QS-730-5	21.0'	Bottom	ND	ND	ND	ND	ND	NA	clayey gravel
8/01/92	QS-81-1	19.0'	Bottom	ND	ND	ND	ND	ND	NA	brown clayey gravel
8/01/92	QS-81-2	17.5'	*Side Wall	ND	ND	ND	ND	ND	NA	green clayey gravel
8/01/92	QS-81-3	17.6'	*Side Wall	ND	ND	ND	ND	ND	NA	green clayey gravel
8/01/92	QS-81-4	10.0'	*Side Wall	ND	ND	ND	ND	ND	NA	brown lean clay
8/01/92	QS-81-5	6.0'	*Side Wall	ND	ND	ND	ND	ND	NA	green clayey gravel
8/01/92	QS-81-6	16.5'	*Side Wall	ND	ND	ND	ND	ND	NA	green clayey gravel
8/07/92	QS-87-1	20.5'	Bottom	ND	ND	ND	ND	ND	NA	yellow-brown lean clay
8/07/92	QS-87-2	20.5'	Bottom	ND	ND	ND	ND	ND	NA	yellow-brown lean clay
8/07/92	QS-87-3	15.5'	S. Side Wall	54.0	ND<0.025	0.29	0.37	ND<0.025	NA	green gravelly clay
Detection Limits				1.0	0.005	0.005	0.005	0.005		
8/10/92	QS-810-1	18.51'	Bottom	ND	ND	ND	ND	ND	NA	brown clayey gravel

TABLE 5
COMPLETION SOIL SAMPLE ANALYTICAL RESULTS
QUIK STOP MARKET #47
6001 MACARTHUR BOULEVARD
OAKLAND, CA

Date Collected	Sample Number	Depth Below Ground Surface	Location	TPH-G mg/Kg	Benzene mg/Kg	Toluene mg/Kg	Ethyl Benzene mg/Kg	Xylene mg/Kg	Total Lead mg/Kg	Description
8/10/92	QS-810-2	18.5'	Bottom	ND	ND	ND	ND	ND	NA	brown clayey gravel
8/11/92	QS-811-1	21.0'	Bottom	ND	ND	ND	ND	ND	NA	brown clayey gravel
8/12/92	QS-812-1	10.0'	S. Beneath Bld.	200.0	ND<0.05	0.48	0.62	0.32	3	green gravelly clay
8/12/92	QS-812-2	20.0'	S. Side Wall	ND	ND	ND	ND	ND	NA	brown clayey gravel
8/12/92	QS-812-3	19.0'	S. Side Wall	ND	ND	ND	ND	ND	NA	brown clayey gravel
8/12/92	QS-812-4	14.0'	S. Side Wall	310.0	0.47	1.2	1.4	1.3	NA	green gravelly clay
8/12/92	QS-812-5	10.5'	S. Side Wall	1100.0	0.53	2.4	2.6	4.0	3.7	green gravelly clay
8/12/92	QS-812-6	15.0'	S. Side Wall	230.0	0.14	1.0	1.1	1.1	5.3	green gravelly clay
8/12/92	QS-812-7	15.5'	S.Side Wall	4.4	ND	0.034	0.028	0.019	NA	green gravelly clay
8/13/92	QS-813-2	21.0'	Bottom	ND	ND	ND	ND	ND	NA	brown lean clay
8/21/92	QS-821-1	19.5'	Bottom	ND	ND	ND	ND	ND	NA	yellow-brown lean clay
8/21/92	QS-821-2	16.75'	S. Side Wall	14.0	ND	0.054	0.065	ND	NA	green gravelly clay
8/21/92	QS-821-3	20.5'	Bottom	ND	ND	ND	ND	ND	NA	yellow-brown lean clay
8/21/92	QS-821-4	16.5'	W. Side Wall	3.4	ND	0.024	0.027	0.008	NA	green gravelly clay
Detection Limits				1.0	0.005	0.005	0.005	0.005		

TABLE 5
COMPLETION SOIL SAMPLE ANALYTICAL RESULTS
QUIK STOP MARKET #47
6001 MACARTHUR BOULEVARD
OAKLAND, CA

Date Collected	Sample Number	Depth Below Ground Surface	Location	TPH-G mg/Kg	Benzene mg/Kg	Toluene mg/Kg	Ethyl Benzene mg/Kg	Xylene mg/Kg	Total Lead mg/Kg	Description
8/21/92	QS-821-5	21.0'	Bottom	ND	ND	ND	ND	ND	NA	yellow-brown lean clay
8/21/92	QS-821-6	16.0'	W. Side Wall	8.6	ND	0.022	0.036	ND	NA	brown lean clay with minor gray streaks
8/21/92	QS-821-7	7.0'	W. Side Wall	110.0	ND<0.05	ND<0.05	0.38	0.28	NA	brown lean clay
8/24/92	QS-824-1	21.0'	Bottom	ND	ND	ND	ND	ND	NA	yellow brown lean clay
8/24/92	QS-824-2	15.0'	W. Side Wall	1.4	ND	0.008	0.007	ND	NA	green gravelly clay
8/26/92	QS-826-1	16.0'	W. Side Wall	ND	ND	ND	ND	0.008	NA	green gravelly clay
8/26/92	QS-826-2	19.0'	W. Bottom	ND	ND	ND	ND	ND	NA	brown clayey gravel
8/26/92	QS-826-3	15.5'	W. Side Wall	ND	ND	ND	ND	ND	NA	light green gravelly clay
8/26/92	QS-826-4	19.0'	Bottom	ND	ND	ND	ND	ND	NA	brown clayey gravel
8/26/92	QS-826-5	15.5'	N. Side Wall	280.0	ND<0.1	0.75	1.3	ND<0.1	5.1	green gravelly clay
8/26/92	QS-826-6	15.5'	N. Side Wall	3.2	0.11	0.016	0.014	0.017	NA	green gravelly clay
Detection Limits				1.0	0.005	0.005	0.005	0.005		



EXPLANATION

- [illegible]5' = Sample Number-Depth Collected (B=bottom, SW=sidewall)
- Excavation Boundary
- Existing Borings

Scale 1"=20'

0 Feet 20

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FIGURE 5

DETAILED SITE MAP SHOWING COMPLETION SOIL SAMPLING LOCATIONS

QUIK STOP MARKET #47
6001 MacArthur Blvd.
Oakland,CA

Job # 92-221-791

DWJ 12-92

approximately 16 feet bgs. Below this, clayey gravel to gravelly clay was present to approximately 19 feet bgs. This was underlain by at least three feet of well sorted gravel with less than 5% silt and clay.

Gravelly clay was encountered approximately one foot bgs at the side walk in the center of the market. At this depth, contamination was detected in concentrations as high as 1017 ppm (according to the OVM). Laboratory analysis of sample QS724-2, collected at this depth, contained 780 ppm TPH-G. Shallow contamination along this wall was localized near the center of the market. Sample QS812-1 was collected from a backhoe trench at 10 feet bgs approximately six horizontal feet under the north side of the market (10 horizontal feet under the north edge of the sidewalk). This sample contained 200 ppm TPH-G and is approximately two feet above the bottom of the former Quik Stop tanks. As the excavation was expanded from the former tank locations towards the front of the market, hydrocarbons were no detected in samples collected at six and 10 feet bgs approximately 14 feet north of the market.

The west side of the site was excavated to the curb within four feet of the property line. It was not possible to excavate further in this direction without impairing the integrity of the fence along the property boundary. Soil exposed in the west wall consisted of lean clay to a depth of approximately 14 feet bgs. Below this, gravelly clay is present to approximately 20 feet bgs. All soil samples collected in gravelly clay contained less than 10 ppm TPH-G. A sample of lean clay collected at a depth of 7 feet bgs in the center of the west sidewall contained 110 ppm TPH-G. The west side was excavated 16 feet south of the store front. Analytical results for sample QS21-2, collected at 16.75 feet bgs, indicate minor contamination is present at this depth. Due to limited space (access) in this area, it was not possible to excavate further in this direction.

The north boundary of the site was excavated to within one foot of 60th Avenue. It was not possible to excavate further in this direction without impairing the integrity of the street. A pillar of soil approximately 20' x 18' remained around the base of a power pole and power pole anchor wire. The north wall consisted of brown lean clay to approximately 13 feet bgs. Approximately six feet of green gravelly clay was present beneath the lean clay. As on the other walls, gravel with less than 5% silt and clay was present below this to a depth of at least 21 feet bgs. All soil samples collected in lean clay contained less than 10 ppm TPH-G. Soil samples collected in gravelly clay contained between 0 and 670 ppm TPH-G.

The final depth of the excavation ranged between 16 and 22 feet. Soil exposed at these depths consisted of gravelly clay to gravel with less than 5% slit and clay. The depth of the excavation varied according to the depth of contamination. All contaminated soil was removed within the boundaries of the excavation. Hydrocarbons were not detected in any of the final samples collected from the excavation bottom. A summary of completion excavation sampling is presented in Table 5. Backfill which would have indicated the location of the former Richfield tanks was not encountered during the course of excavation.

During the coarse of backfilling, we installed a temporary, 12-inch diameter, PVC groundwater extraction sump to a depth of 24 feet in the southwest corner of the site. The sump collar casing was installed inside a locking utility box set to grade. Following monitoring well construction, the sump was properly destroyed.

The excavation was backfilled to approximately 16 feet bgs (the water table) with 3/4-inch minus drain rock. The remainder of the excavation was backfilled with 6-inch minus bank-run. The backfill was compacted to 90%.

6.3 EXCAVATION DEWATERING

Groundwater was pumped from the excavation at several times during site work. It was stored on-site in a 4,000 gallon Baker tank. Hydrocarbons concentrations in samples collected from the tank were very low. An Aqua Scrub 200 carbon canister was plumbed to the discharge of the tank. The breakthrough time on the canister for the hydrocarbon concentrations present in the tank water was calculated by the manufacturer to be 2,400 hours. Samples of canister effluent were collected and transported to McCampbell Analytical for TPH-G and BTEX analyses. Hydrocarbons were not detected in any of the canister effluent samples. All carbon canister effluent samples were collected according to SFBRWQCB guidelines outlined in our work plan. Effluent sample results were submitted to the SFBRWQCB. Verbal approval to discharge canister effluent into the storm drain was granted by Mr. Rich Hiett. Approximately 12,000 gallons of treated water was discharged into the storm drain located at 60th Avenue and Campden. Water entering this storm drain is discharged into Demmon slough.

6.4 ADDITIONAL SAMPLING

On November 13, 1992, depth to groundwater in the extraction sump was measured at 15.8 feet bgs. Approximately 3,800 gallons of groundwater were purged from the sump and stored in the Baker tank. A groundwater sample was collected from the sump and analyzed for TPH-G and BTEX. No hydrocarbons were detected. On November 30, 1992, a water sample was collected from the Baker tank and from the carbon canister effluent. Hydrocarbons were not detected in either sample.

7.0 SUMMARY AND CONCLUSIONS

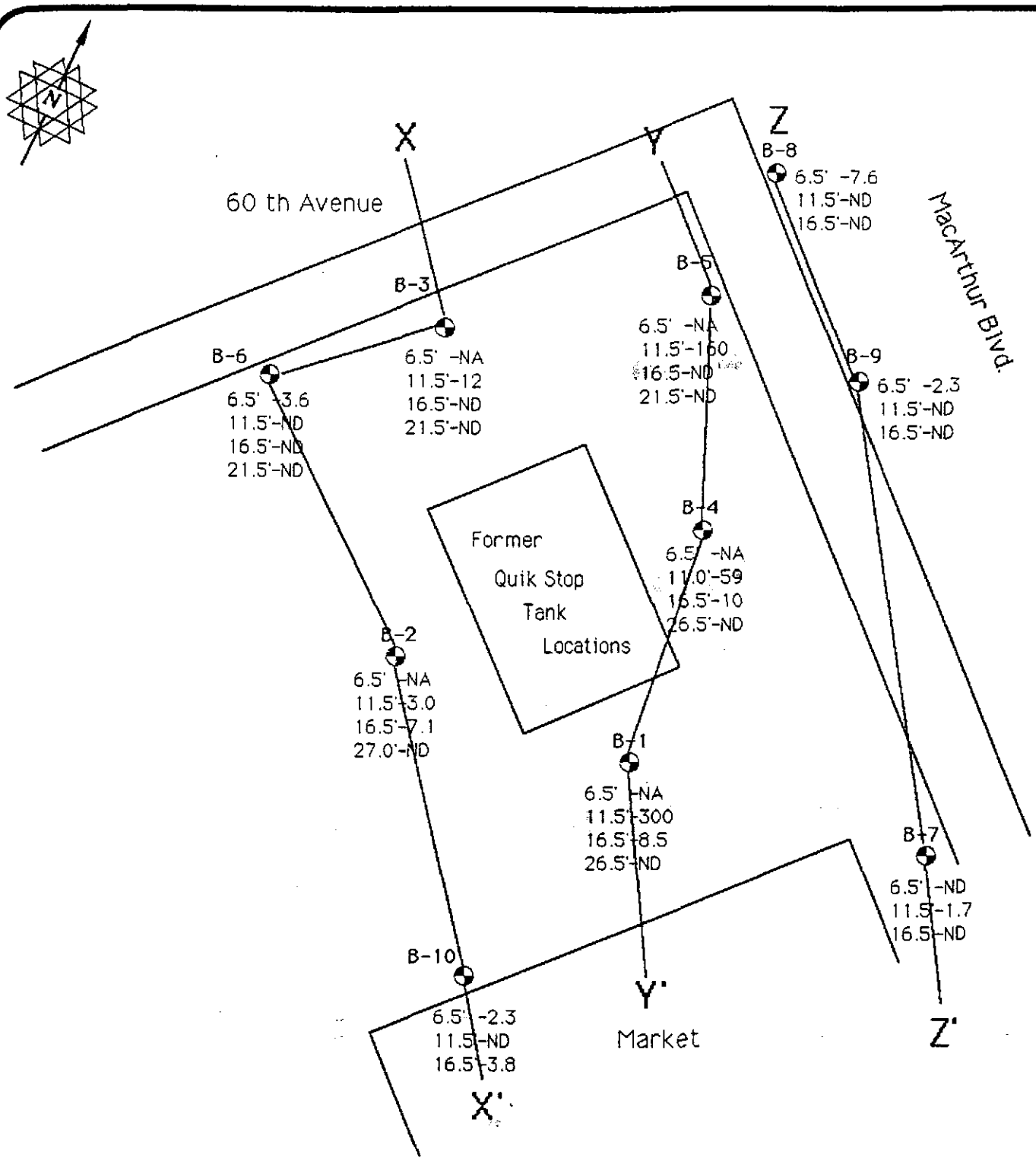
All three wells have exhibited a fluctuation in groundwater surface elevation consistent with the change in the hydrologic cycle (i,e., rainy vs. dry season). The change in relative groundwater elevations did not have a significant impact on groundwater flow direction or hydraulic gradient.

Groundwater samples were collected for five consecutive quarters, June 1993 to July 1994, from wells MW-1, MW-2 and MW-3. Water samples collected over five quarters from MW-3 have been below detectable levels for all parameters. MW-1 and MW-2 contained TPH-Diesel ranging from Non-Detectable levels to 300 ppb and was below detectable levels for TPH-G and BTXE. MW-1 and MW-2 were both below detectable levels for TPH-D during the fifth sample round. MW-1 and MW-2 have been below detection limits for TPH-G and BTXE for five consecutive quarters. The existing analytical data obtained from groundwater samples suggest the source contaminants were successfully remediated during over excavation and dewatering activities. Primary MCL's for TPH-D in the state of California do not exist.

Most of the shallow groundwater within one mile of the bay is brackish, high in dissolved solids and is not potable, rendering it unusable for municipal purposes. There are no drinking water sources downgradient of the site and potable water for drinking purposes is typically drawn from aquifers greater than 50 feet depth. The brackish water also causes corrosion in industrial equipment rendering it unusable for industrial supply and industrial process water supply.

There are no identified drinking water wells within one-half mile downgradient of the site and potable water for drinking purposes is typically drawn from aquifers greater than 50 feet depth. The most likely contact with any surface water from groundwater originating from the site would occur at Damon Slough approximately 2 miles downgradient. Potential migration of residual contaminants toward the Slough would degrade to non-detectable levels through dispersion and bioattenuation before contacting surface waters.

The potential threat to human health an welfare related to the subject site is very minimal. Since any residual contaminants that may exist are at dept and the excavation was backfilled, exposure to the contaminants through inhalation or direct skin contact aboveground is not possible. The risk to human health and welfare through ingestion is extremely minimal.



EXPLANATION

X ——— X' Cross section Lines

◒ = Existing Borings, Depth samples collected, TPH-G concentrations in ppm

B-1 - B-6 drilled 4/29/92
B-7 - B-10 drilled 5/21/92
NA = Not Analyzed
ND = Not Detected

Scale 1"=20'
0 Feet 20

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Figure 3

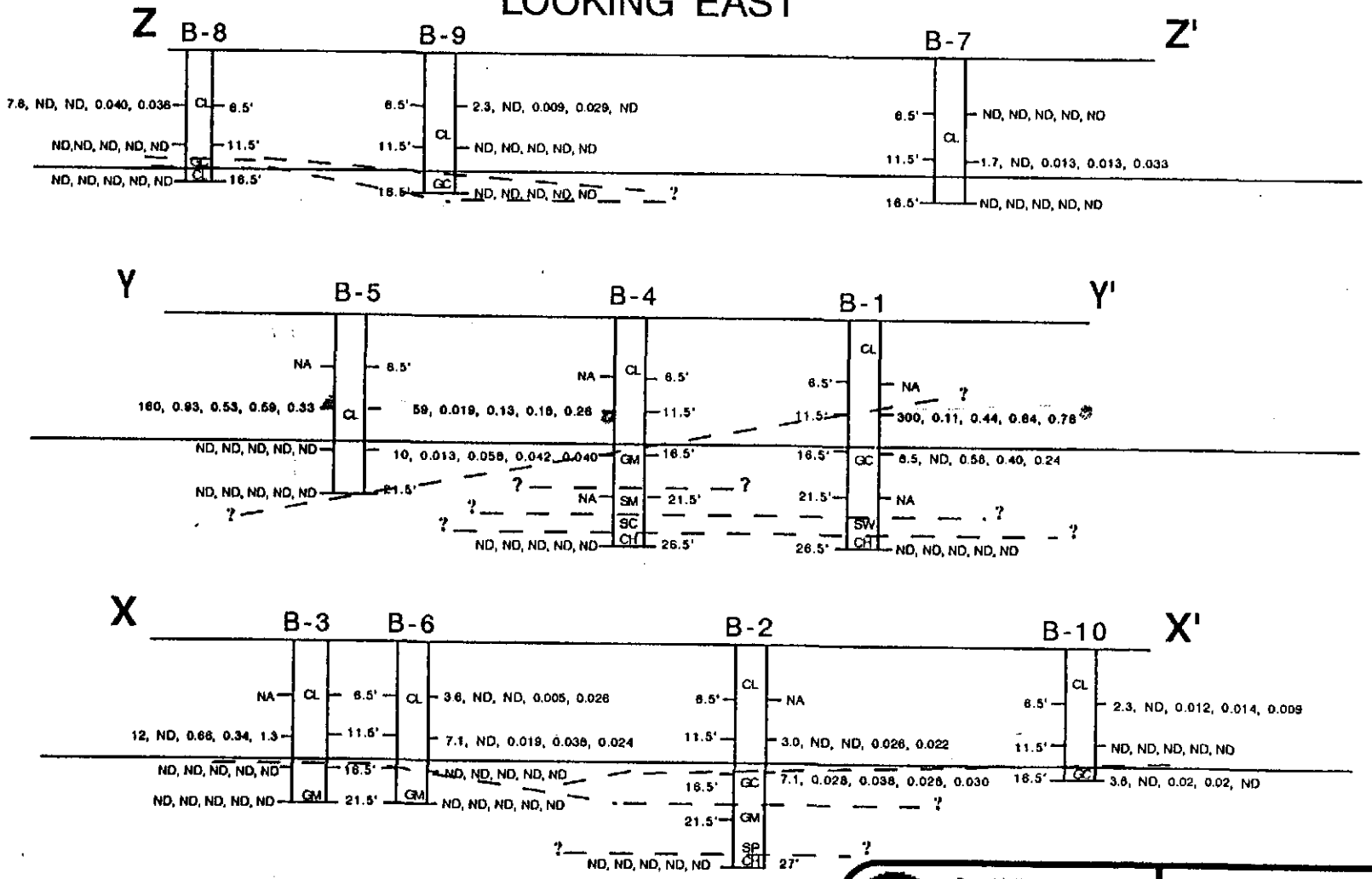
DETAILED SITE MAP SHOWING CROSS SECTION LOCATIONS

QUIK STOP MARKET #47
6001 MacArthur Blvd.
Oakland, CA

Job # 92-221-791

DWJ 6-92

LOOKING EAST



EXPLANATION

CL	Lean Clay
GC	Clayey Gravel
GM	Silty Gravel
SP	Sand with Gravel
CH	Fat Clay

SC	Clayey Sand
SW	Gravelly Sand
SM	Silty Sand

Water Depth During Drilling

— — Approximate Geologic Contact

Values in ppm
TPH-G, B, T, E, X
NA Not Analyzed
ND Not Detected

SOILS CLASSIFICATION BASED ON UNIFIED SOILS CLASSIFICATION SYSTEM

Scale 1" = Approximately 20'

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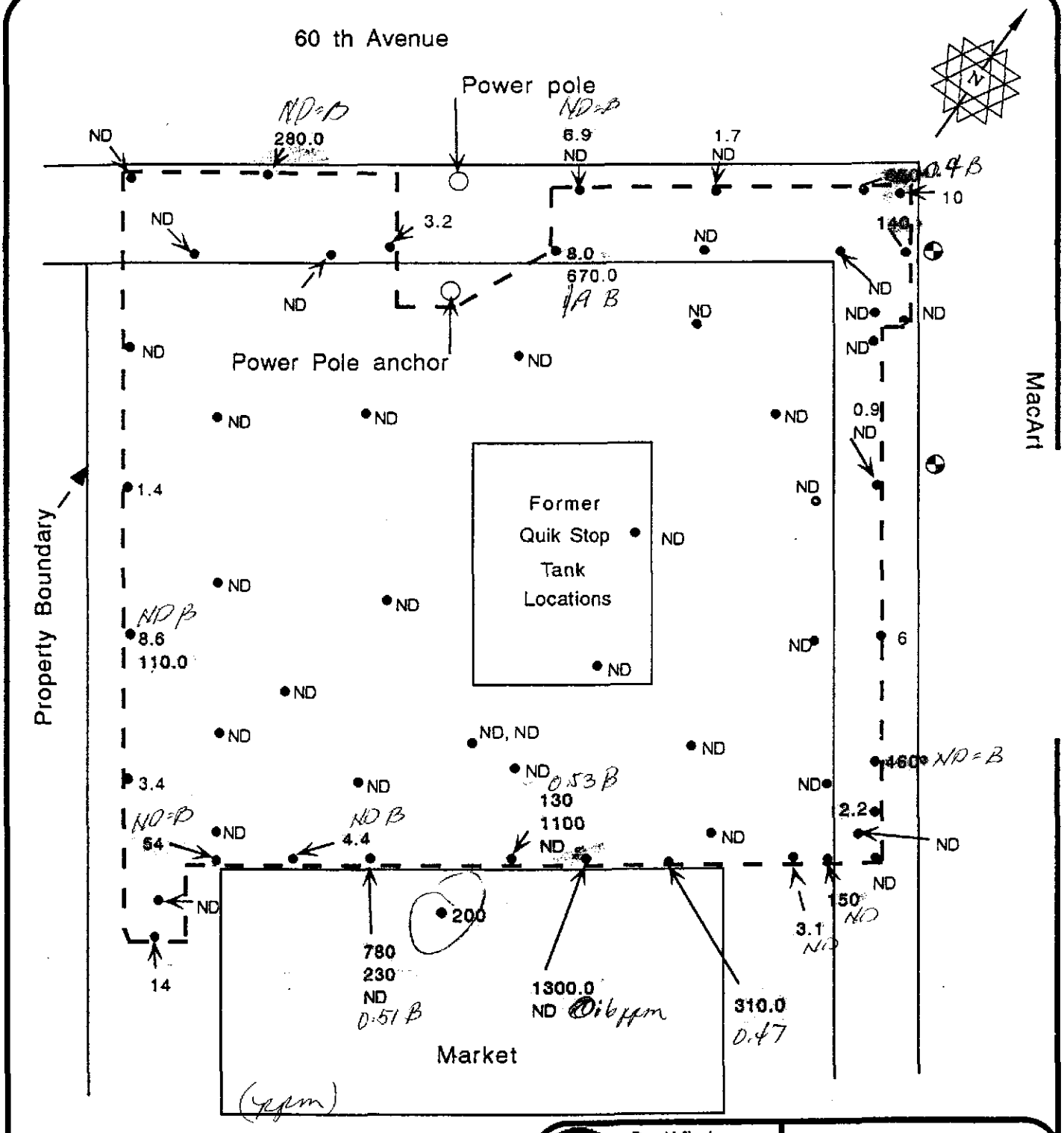
Figure 4

BORE HOLE GEOLOGIC CROSS SECTIONS

QUIK STOP MARKET #47
6001 MacArthur Blvd.
Oakland, CA

Job # 92-221-791

DWJ 8-92



EXPLANATION

- TOTAL PETROLEUM HYDROCARBON(TPH-G) CONCENTRATIONS IN Mg/Kg (ppm)
- — — Excavation Boundary
- = Existing Borings

NOTE: Refer to Figure 5 For Sample Number and Depth Collected

Scale 1"=20'
0 Feet 20

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Figure 6

COMPLETION SAMPLE LOCATIONS AND TPH-G CONCENTRATIONS

QUIK STOP MARKET #47
6001 MacArthur Blvd.
Oakland, CA

Job # 92-221-791 DWJ 12-92