

October 15, 1998
941114NA

STD 567

*Preferential
pathways?
RMP?
cracks.*

Ms. Susan Hugo
Division of Environmental Protection
Department of Environmental Health
Alameda County Health Agency
1131 Harbor Bay Parkway, 2nd Floor
Alameda, California 94502

Subject: Request for Site Closure
Former Celis Alliance Fuel Station at 4000 San Pablo Avenue
Emeryville, California

Dear Ms. Hugo:

On behalf of the City of Emeryville Redevelopment Agency, Woodward-Clyde is requesting case closure for the former Celis Alliance Fuel Station Underground Storage Tank (UST) Site, which was located at 4000 San Pablo Avenue, Emeryville, California (Figure 1). The case history is summarized below.

INITIAL INVESTIGATIONS, JUNE THROUGH AUGUST 1993

In June 1993, Catellus Development Corporation (Catellus) of San Francisco, California, retained Levine-Fricke of Emeryville, California, to conduct a Phase I environmental site assessment for a planned 40th Street Right-of-Way extension to run between San Pablo Avenue and Adeline Street (Levine-Fricke, June 1993). The Celis Alliance Fuel Station (Site) is located within the extension area. The Phase I assessment revealed the existence of a fuel station on the Celis site since at least 1936 and reported the following six underground storage tanks (USTs):

- One 7,000-gallon diesel UST;
- One 6,000-gallon regular gasoline UST;
- One 4,000-gallon unleaded gasoline UST;
- One 2,000-gallon unleaded gasoline UST;
- One 3,500-gallon super unleaded gasoline UST;
- One 550-gallon waste oil UST.



Heavy oil stains were observed in many areas of the site. On the basis of the Phase I findings, Levine-Fricke performed a Phase II investigation for the 40th St. Right-of-Way in August 1993, which included:

- Site inspection and geophysical survey;
- Drilling of 22 soil borings and collection of soil samples for lithologic description and chemical analysis. Of the 22 soil borings, 14 were from the Celis site;
- Conversion of 3 soil borings to groundwater monitoring wells on the Celis site;
- Collection of groundwater samples from the monitoring wells for chemical analysis.

The locations of soil borings and monitoring wells are shown on Figure 2. Selected soil samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline (TPHg); benzene, toluene, ethylbenzene, and xylenes (BTEX); TPH as diesel (TPHd) and motor oil (TPHmo); total recoverable petroleum hydrocarbons (TRPH); and polychlorinated biphenyls (PCBs). The Phase II investigation results were summarized in a report (Levine-Fricke, September 1993) which was submitted to Alameda County Department of Environmental Health (ACDEH).

The Phase II soil analytical results are summarized in Table 2. Soil samples were generally collected at depths of 7, 9.5, and 14.5 feet below ground surface (bgs). The analytical results indicate that soil at the Celis site contains significant concentrations of petroleum hydrocarbons. TPHg was reported in 19 of the 32 soil samples analyzed, with concentrations ranging from 1 milligram per kilogram (mg/kg) to 2,800 mg/kg. Benzene was detected in all but four samples, at concentrations ranging from 0.005 to 22 mg/kg. The highest concentrations of petroleum hydrocarbons were generally reported for samples collected from 7 and 9.5 feet bgs. Four soil samples collected from soil borings SB-2 and SB-3, which were near the waste oil tank, were also analyzed for PCBs. PCB concentrations in these borings were below laboratory detection limits.

The three groundwater monitoring wells installed on the Celis site were all 2 inches in diameter, 20 feet bgs, screened from 5 to 20 feet bgs, and constructed with polyvinyl chloride. Shallow groundwater elevations varied from approximately 8 to 9.5 feet bgs during the month of August 1993. Groundwater flow direction beneath the site was generally toward the west under a hydraulic gradient of approximately 0.03 ft/ft. Free-phase fuel product was measured in monitoring well LF-1 at a thickness of 6.24 inches on August 20, 1993. LF-1 was located downgradient from the pump island and the diesel tank. Free-phase product was not detected in the other two monitoring wells.

The three monitoring wells were sampled on August 7, 1993 for the analysis of TPHg, TPHd, TPHmo, BTEX, and TRPH. The results are summarized in Table 3. The results indicated that shallow groundwater beneath the Celis site had been impacted by petroleum hydrocarbons.

ADDITIONAL INVESTIGATIONS, JANUARY 1994

At the ACDEH's request, Levine-Fricke conducted additional investigations to further assess lateral extent of petroleum hydrocarbons in groundwater downgradient (west) from the Celis site. Two soil borings were drilled, one of which was converted to a groundwater monitoring well (LF-4). Their locations are shown on Figure 2. This new monitoring well is also 2 inches in diameter, 20 feet bgs, and screened from 5 to 20 feet bgs. Results of the additional investigations were presented in a report (Levine-Fricke, March 1994) which was submitted to the ACDEH.

Soil samples were analyzed for TPHg, TPHd, TPHmo, BTEX, and TRPH. The results are included in Table 2. Groundwater samples were analyzed for the same constituents as soil samples and their results are given in Table 3.

Monitoring well LF-4 is located approximately 160 feet west (downgradient) of well LF-1. A soil sample at 10 feet bgs from this well showed TPHg (220 mg/kg), TPHd (19 mg/kg), and BTEX. Groundwater samples from this well also reported TPHg, TPHd, TPHmo, and BTEX. Soil boring EB-1 is approximately 150 feet west of well LF-4 (310 feet downgradient of well LF-1). Soil samples from this boring were below detection limits for TPHg, TPHd, TRPH and BTEX, but had low levels of TPHmo (17 mg/kg at 5 ft bgs and 49 mg/kg at 10 ft bgs). A grab groundwater sample (GWEB1) was also obtained from this boring and showed very low levels of TPHd (0.081 mg/l), toluene (0.00057 mg/l) and xylenes (0.0026 mg/l). These low levels of petroleum hydrocarbons in boring EB-1 may not necessarily originate from the Celis site because TPHg, which was reported at concentrations of approximately 10 times the TPHd concentration in well LF-4, was not detected in boring EB-1. TPHg is more mobile than TPHd in groundwater and usually appears downgradient before TPHd. Thus, the downgradient edge of the hydrocarbon plume was probably between LF-4 and EB-1 in January 1994.

BUILDING DEMOLITION, MAY 1994

Between May 2 and 13, 1994, a contractor retained by Catellus removed the fuel station building, the fuel dispenser island and the surface pavement of entire site. Two hydraulic lifts and associated piping and hydraulic fluid storage tank(s) in the service garage were also removed during that time.

UNDERGROUND TANK REMOVAL, MAY 1994

Levine-Fricke removed the six underground storage tanks (UST) and associated piping during the week of May 16, 1994 (Levine-Fricke 1994b). All six USTs were made of welded steel and single-walled. Holes were noted in the 2,000-gallon unleaded gasoline tank and the 550-gallon

waste oil tank, but not in the other four tanks. Holes were also noted in a previously abandoned product piping that appeared to have been connected to the 6,000-gallon regular gasoline tank, in the portion of the piping just north of the super unleaded gasoline tank. Results were presented in a report (Levine-Fricke, July 1994), which was submitted to the ACDEH.

A total of eight soil samples were collected from the UST excavations after the tanks were removed: five from native soils in the sidewalls of the gasoline UST excavation, two from native soils in the sidewalls of the diesel UST excavation, and one from native soil about 1 foot below the bottom of the waste oil UST excavation. Sampling locations and analytical results of TPH and BTEX are shown on Figure 3. The soil sample D1-9 in the diesel tank excavation near the monitoring well LF-1 showed a diesel concentration of 1,300 mg/kg. Free-phase product was measured previously in LF-1. Soil samples from the north side of the gasoline UST excavation showed much higher TPHg concentrations than the samples from the south side of the same excavation. No petroleum oil (TPHo) was measured above the laboratory detection limit (5 mg/kg) in the soil sample collected beneath the waste oil UST.

The soil sample (G3-9.5) taken near the regular gasoline UST was also analyzed for organic lead, and the result was below laboratory detection limit (0.5 ppm). The soil sample taken beneath the waste oil UST was also analyzed for organic lead (result below detection limit, 0.5 ppm), five LUFT metals (results were Cd < 0.1 mg/kg, Cr (total) = 27 mg/kg, Pb (total) = 2 mg/kg, Ni = 26 mg/kg, and Zn = 47 mg/kg), PCBs (result below detection limit, 0.05 mg/kg), Creosote (result below detection limit, 5 mg/kg), PNAs (polynuclear aromatics, result below detection limit, 0.2 mg/kg), and HVOCs (halogenated volatile organic compounds, results below detection limit, 0.005 mg/kg). These results indicate that the site may have only been impacted by the fuel petroleum hydrocarbons.

SOIL REMEDIATION, JUNE THROUGH OCTOBER 1994

Following the tank removal, the City retained Woodward-Clyde in June 1994 to conduct soil remediation at the Celis Fuel Station Site. Woodward-Clyde prepared a workplan for the soil remediation (June 1994), which was approved by the ACDEH in a letter to the City dated August 24, 1994. Soil excavation started in June 1994 following verbal approval of the workplan by the ACDEH. Soil remediation results were summarized in a report (Woodward-Clyde, January 1995), which was submitted to the ACDEH.

Before excavation began, the three on-site groundwater monitoring wells (LF-1 through LF-3), installed previously by Levine-Fricke, were closed in-place by pressure grouting in accordance with permit instructions from the Alameda County Flood Control and Water Conservation District, Zone 7.

Soil was excavated to the groundwater table vertically (approximately 9.5 feet below grade), and to the site boundary horizontally except the 1:1 slope on three sides of the excavation pit. The slope was needed to maintain the stability of the sidewalls and the safe work environment. The side along San Pablo Avenue was shored with sheet piling and excavated vertically. Excavated soil was temporarily stockpiled on the adjacent parking lot for further sampling and analyses. Soil from the waste oil tank area (a total of 17 cubic yards) was stockpiled separately and was analyzed for WET CAM 17 metals and petroleum oil and grease (<50 mg/kg). Soil from the diesel tank area (a total of 17 cubic yards) was also stockpiled separately and was analyzed for TPH as diesel (3,100 mg/kg). These two stockpiles of soil were disposed of at Forward Landfill, a Class II landfill, in Stockton, California. Soils from the rest of the site (a total of 3,204 loose cubic yards) were analyzed for TPH as gasoline and BTEX and were disposed of at Alta/B&J Landfill, a Class III landfill, in Vacaville, California. TPHg concentrations ranged from 2.4 to 140 mg/kg and benzene from less than 0.005 to 0.78 mg/kg. Analytical results are summarized in Table 4.

Oily-looking soils were observed on the bottom of the excavation pit near the former waste oil tank, the diesel tank, and the gasoline tank areas. A total of 22 soil samples were collected on the sidewalls (6 inches above the bottom) and the bottom of the excavation pit and were analyzed for BTEX, TPHg, TPHd, TRPH, and five metals (cadmium, chromium, lead, nickel, and zinc). Figure 4 shows sampling locations. Elevated concentrations of BTEX and gasoline were found remaining on sidewalls and the bottom, with benzene concentrations up to 3.8 mg/kg and TPHg up to 1,000 mg/kg. Only one soil sample, obtained near the southwest corner of the excavation pit, had concentrations of BTEX and gasoline below detection limits. Diesel concentrations up to 18,000 mg/kg were also detected in the former diesel tank area. Free-phase product has been reported in the diesel tank area previously by Levine-Fricke (1993b). Analytical results are summarized in Table 5.

Petroleum oil and grease (reported as TRPH, total recoverable petroleum hydrocarbons) was not detected in samples from the former waste oil tank area, but was found in one soil sample at 120 mg/kg from the former gasoline tank cluster area. The TRPH reported probably represents the heavier fraction of the diesel. Concentrations of the five metals do not appear to be at hazardous waste levels as measured by either TTLC or STLC in Title 22 of the California Code of Regulations for the definition of characteristics of toxicity.

Clean soil for backfilling was imported from the stockpile near the south terminus of Shellmound Street and owned by the City of Emeryville. Chemical and geotechnical tests were not conducted on the soil for this project, but were done previously for other projects by others. The imported soil was compacted to a minimum of 90 percent relative compaction in 8-inch lifts. The site was backfilled from the bottom of the excavation to approximately 3 feet below the original grade. The City graded the top 3 feet for road construction as discussed below.

CONSTRUCTION OF 40TH STREET RIGHT-OF-WAY, 1995

The construction of 40th Street Right-of-Way extension between San Pablo Avenue and Adeline Street was completed near the end of 1995. The road is constructed of 2.2 ft thick aggregate base and 0.55 ft asphalt-concrete surface. Figure 5 illustrates the completed 40th street between San Pablo Avenue and Adeline Street.

CLOSURE ACTIVITIES, SEPTEMBER 1996 THROUGH JULY 1998

A Closure Workplan (Woodward-Clyde, September 1996) was submitted to ACDEH in September 1996. The scope of closure activities was developed based on the Interim Guidance from the State Water Resource Control Board (SWRCB, December 8, 1995) and the Supplemental Instructions from the Regional Water Quality Control Board (RWQCB, January 5, 1996) for low risk fuel sites. The following closure activities were recommended: installation of a product recovery well (EW-1) in the area near the former monitoring well LF-1 where free product was reported previously; weekly groundwater pumping for a minimum of three months to remove free product, if any; one-year quarterly groundwater monitoring program; and site closure based on risk-based corrective action (RBCA). ACDEH approved the closure workplan in December 12, 1996.

Details of the well construction (EW-1) were submitted to the ACDEH (Woodward-Clyde, November 1997). Weekly groundwater extraction from EW-1 was conducted from September 12 through December 5, 1997. A total of 2,035 gallons of groundwater was removed. Free product, when found, was removed with the groundwater. Free product was not detected in the last four weekly extraction events. Details of the groundwater extraction were submitted to the ACDEH (Woodward-Clyde, January 8, 1998).

A RBCA evaluation based on the ASTM Standard E 1739-95 was used to develop site-specific target levels (SSTLs) for chemicals detected in soil and groundwater at the site. The results of the RBCA evaluation indicate that the site does not present unacceptable risks to human health and the environment based on the current site use and the maximum detected concentrations of chemicals in soil and groundwater. An one-year quarterly groundwater monitoring was recommended to monitor the stability of the chemicals in groundwater. The RBCA evaluation was presented in a report and submitted to the ACDEH (Woodward-Clyde, April 1997). ACDEH accepted the RBCA evaluation results and recommendations and agreed that "no further action for soil is warranted and groundwater monitoring program should be implemented to demonstrate plume stability and chemical degradation" (ACDEH letter, November 5, 1997).

Quarterly groundwater monitoring was performed from the third quarter 1997 through second quarter 1998. Quarterly monitoring reports were submitted to ACDEH. Concentrations of detected chemicals were either steady or decreasing over the one-year monitoring period and were all significantly below their respective SSTLs (RBCA Tier 2) at all times.

Therefore, all closure tasks and criteria prescribed in the Closure Workplan (Woodward-Clyde, September 1996), the RBCA Report (Woodward-Clyde, April 1997) and the two associated approval letters from the ACDEH (December 12, 1996 and November 5, 1997, respectively) were met except one task requested by ACDEH in the letter of December 12, 1996. The task requested is that "the presence of preferential pathways (i.e. utilities) acting as a conduit for the hydrocarbon plume to migrate along San Pablo Avenue should be evaluated" (ACDEH letter, December 12, 1996). This evaluation can be performed independent of the closure of this UST case. The City plans to conduct a document search to identify underground utility lines along the San Pablo Avenue which may act as potential conduits for the hydrocarbon plume migration. Because Caltrans owns the San Pablo Avenue, the City will cooperate with Caltrans on environmental issues for future subsurface work in areas near the former gas station.

Please call me at (510) 874-3060 or Mr. Ignacio Dayrit at the City of Emeryville Redevelopment Agency at (510) 596-4356 for questions or comments.

Sincerely,



Xinggang Tong, P.E., Ph.D.
Project Manager



Enclosures.

cc: Ignacio Dayrit, City of Emeryville

TABLE 1
GROUNDWATER MONITORING DATA
THE FORMER CELLI'S ALLIANCE GAS STATION SITE
4000 SAN PABLO AVE., EMERYVILLE, CA

Sample ID	Date Sampled	Water level		TPH as gasoline (mg/l)	TPH as diesel (mg/l)	TPH as motor oil (mg/l)	TRPH (mg/l)	Benzene (ug/l)	Toluene (ug/l)	Ethyl Benzene (ug/l)	Total Xylenes (ug/l)	MTBE (ug/l)	Total Lead (ug/l)	PAHs (ug/l)
		TOC (ft)	MSL (ft)											
RBCA Tier 1 *								73.9	85,000	>152,000	>198,000			
RBCA Tier 2 *								2,300	540,000	150,000	200,000	5.10E+07		
EW-1	6/2/98	7.24	31.80	18	3.4	0.55	NA	2100	460	910	2990	350	NA	naphthalene = 120
EW-1	3/13/98	5.92	33.12	33	7.7	ND (0.5)	NA	2500	1300	1000	3400	570	NA	naphthalene = 170
EW-1	12/5/97	6.00	33.04	41	4.7	ND (2)	NA	2100	1800	2500	10000	340	ND (40)	naphthalene = 420
EW-1	9/26/97	8.06	30.98	110	180	ND (20)	NA	2800	4900	3100	12000	ND (500)	ND (40)	naphthalene = 1,000
LF-4	6/2/98	6.99	31.09	0.4	ND (0.05)	ND (0.3)	NA	7.9	0.52	9.5	36	14	NA	NA
LF-4	3/13/98	6.58	31.50	0.91	0.11	ND (0.5)	NA	4.1	ND (0.5)	7.1	27	14	NA	NA
LF-4	12/5/97	6.28	31.80	1.4	0.15	ND (0.2)	NA	26	14	30	140	20	ND (40)	ND (10)
LF-4	9/26/97	8.25	29.83	3.2	0.48	ND (0.2)	NA	44	6.6	49	180	ND (5)	ND (40)	naphthalene = 17
LF-4	1/28/94	6.77	31.31	18	1.4	0.16	NA	1000	1900	880	4700	NA	NA	NA
LF-4dup	1/28/94	6.77	31.31	21	2.2	0.21	NA	1100	2000	800	4200	NA	NA	NA
Trip Blank	6/2/98			ND (0.05)	NA	NA	NA	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2)	NA	NA
Trip Blank	3/13/98			ND (0.05)	NA	NA	NA	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (5)	NA	NA
Trip Blank	12/5/97			ND (0.05)	NA	NA	NA	ND (0.5)	ND (0.5)	ND (0.5)	ND (2)	ND (5)	NA	NA
Trip blank	9/26/97			ND (0.05)	NA	NA	NA	ND (0.5)	ND (0.5)	ND (0.5)	ND (2)	ND (5)	NA	NA
MW-2	6/2/98	7.29	29.98	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2	3/13/98	7.09	30.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2	12/5/97	6.78	30.49	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2	9/26/97	8.11	29.16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LF-1AG	8/7/93	9.40	29.55	100	41	ND (2.5)	11	13000	9400	3100	14000	NA	NA	NA
LF-2AG	8/7/93	7.97	32.28	13	0.095	ND (0.5)	ND (5)	2400	2900	500	2000	NA	NA	NA
LF-3AG	8/7/93	8.90	30.45	11	0.78	ND (0.25)	ND (5)	1500	170	2900	5100	NA	NA	NA
GWEB1	1/28/94	NA	NA	ND (0.05)	0.081	ND (0.05)	NA	ND (0.5)	0.57	ND (0.5)	2.6	NA	NA	NA

TABLE 1
GROUNDWATER MONITORING DATA
THE FORMER CELL'S ALLIANCE GAS STATION SITE
4000 SAN PABLO AVE., EMERYVILLE, CA

* Data from "Development of Site-Specific Target Levels for Soil and Groundwater, 40th Street Right-of-Way." by Woodward-Clyde April 1997, and approved by the Alameda County Department of Environmental Health Services on November 5, 1997

Notes: NA - not analyzed; ND - not detected at or above the detection limit given in parentheses.
TOC - water level measured to top of well casing; MSL - mean sea level.
TPH gas, diesel, and motor oil are quantified by modified EPA Method 8015.
Benzene, toluene, ethylbenzene, xylenes, and MTBE are quantified by EPA Method 8020.
TRPH - total recoverable petroleum hydrocarbons quantified by Standard Method 5520 E&F.
Lead - quantified by EPA Method 3010/6010.
PAHs - polyaromatic hydrocarbons quantified by EPA Method 3520/8270.

TABLE 2
ANALYTICAL RESULTS FOR SOIL SAMPLES COLLECTED FROM THE FUEL STATION
40TH STREET RIGHT-OF-WAY, EMERYVILLE, CALIFORNIA
(concentrations in milligrams per kilogram [mg/kg])

Sample Name	Depth (ft)	Sample Date	TPHg	TPHd	TPHmo	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TRPH	PCBs
LF-1-4.5	4.5	07-Aug-93	550	220	16	0.84	1.2	5.6	2.7	77	NA
LF-1-9.5	9.5	07-Aug-93	470	18	<10	0.97	<0.005	6.6	8.9	<30	NA
LF-1-14.5	14.5	07-Aug-93	8.4	16	<10	0.14	0.17	0.081	0.37	60	NA
LF-2-9.5	9.5	07-Aug-93	740	14	<10	4.7	35	13	68	30	NA
LF-2-14.5	14.5	07-Aug-93	<0.5	<10	<10	0.009	0.012	<0.005	0.015	<30	NA
LF-3-9.5	9.5	07-Aug-93	75	<10	<10	0.062	0.28	1.1	1.1	37	NA
LF-3-14.5	14.5	07-Aug-93	<0.5	<10	<10	0.014	<0.005	0.01	0.007	<30	NA
LF-4-5.0	5	28-Jan-94	0.8	<10	<10	0.083	<0.005	<0.005	0.034	NA	NA
LF-4-10.0	10	28-Jan-94	220	19	<10	1.7	6.7	4.5	24	NA	NA
SB-1-7	7	08-Aug-93	850	240	27	5.4	<0.005	25	42	290	NA
SB-1-9.5	9.5	08-Aug-93	180	220	<50	0.89	1.1	4.3	18	130	NA
SB-1-14.5	14.5	08-Aug-93	7.4	<10	<10	0.44	0.44	0.14	0.61	60	NA
SB-2-7	7	08-Aug-93	780	790	57	8	<0.005	31	140	160	ND
SB-2-9.5	9.5	08-Aug-93	720	200	<50	2.4	5.2	14	59	210	NA
SB-2-14.5	14.5	08-Aug-93	1	<10	12	0.2	0.21	0.021	0.12	43	ND
SB-3-9.5	9.5	07-Aug-93	580	11	<10	9.7	50	15	90	37	ND
SB-3-14.5	14.5	07-Aug-93	0.9	<10	<10	0.092	0.16	0.031	0.17	37	ND
SB-4-7	7	08-Aug-93	380	13	<10	3	5.2	8.2	18	70	NA
SB-4-14.5	14.5	08-Aug-93	<0.5	<10	<10	0.026	0.005	0.019	0.023	210	NA
SB-5-7	7	08-Aug-93	410	15	<10	2.4	0.6	16	6.3	37	NA
SB-5-14.5	14.5	08-Aug-93	<0.5	<10	<10	0.011	<0.005	0.008	0.008	93	NA
SB-6-9.5	9.5	08-Aug-93	490	51	<10	2.7	<0.005	15	15	67	NA
SB-6-14.5	14.5	08-Aug-93	<0.5	<10	<10	<0.005	<0.005	<0.005	<0.005	<30	NA
SB-7-9.5	9.5	07-Aug-93	750	52	66	2.5	8.5	22	93	170	NA
SB-7-14.5	14.5	07-Aug-93	2.8	<10	<10	<0.005	<0.005	0.029	0.03	<30	NA
SB-8-9.5	9.5	08-Aug-93	2,800	110	<50	22	9.5	82	290	130	NA
SB-8-14.5	14.5	08-Aug-93	<0.5	<10	11	0.009	<0.005	<0.005	<0.005	37	NA
SB-9-7	7	07-Aug-93	210	14	<10	2.8	13	5.1	29	<30	NA
SB-9-9.5	9.5	07-Aug-93	1,200	NA	NA	14	81	26	140	NA	NA
SB-9-14.5	14.5	07-Aug-93	<0.5	<10	<10	0.079	0.059	0.011	0.041	77	NA
SB-10-7	7	07-Aug-93	73	NA	NA	2.6	4.5	1.6	7.7	NA	NA
SB-10-9.5	9.5	07-Aug-93	1,100	<10	<10	<0.005	7.8	<0.005	22	40	NA
SB-10-14.5	14.5	07-Aug-93	8.6	<10	<10	0.48	0.29	0.1	0.48	<30	NA
SB-11-14.5	14.5	09-Aug-93	<0.5	<10	11	<0.005	<0.005	<0.005	<0.005	40	NA
EB-1-5.0	5	28-Jan-94	<0.5	<10	17	<0.005	<0.005	<0.005	<0.005	NA	NA
EB-1-10.0	10	28-Jan-94	<0.5	<20	49	<0.005	<0.005	<0.005	<0.005	NA	NA

Data extracted from Levine-Fricke's Reports of September 1993 and March 1994

NA = not available; ND = not detected.

TPHg = total petroleum hydrocarbons as gasoline

TPHd = total petroleum hydrocarbons as diesel

TPHmo = total petroleum hydrocarbons as motor oil

TRPH = total recoverable petroleum hydrocarbons

PCBs = polychlorinated biphenyls

TABLE 3

ANALYTICAL RESULTS FOR GROUNDWATER SAMPLES
40th Street Right-of-Way, Emeryville, California
 (concentrations in milligrams per liter [mg/l])

Sample Name	Sample Date	TPHg	TPHd	TPHmo	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TRPH
LF-1AG	7-Aug-93	100	41	<2.5	13	9.4	3.1	14	11
LF-2AG	7-Aug-93	13	0.095	<0.50	2.4	2.9	0.5	2	<5
LF-3AG	7-Aug-93	11	0.78	<0.25	1.5	0.17	2.9	5.1	<5
GWEB1 *	28-Jan-94	<0.05	0.081	<0.05	<0.0005	0.00057	<0.0005	0.0026	NA
LF-4	28-Jan-94	18	1.4	0.16	1	1.9	0.88	4.7	NA
LF-4dup	28-Jan-94	21	2.2	0.21	1.1	2	0.80	4.2	NA

Data extracted from Levine-Fricke's Reports of September 1993 and March 1994.

NA = not available; ND = not detected.

TPHg = total petroleum hydrocarbons as gasoline.

TPHd = total petroleum hydrocarbons as diesel.

TPHmo = total petroleum hydrocarbons as motor oil.

TRPH = total recoverable petroleum hydrocarbons

GWEB1 * is a grab groundwater sample collected from soil boring EB-1.

TABLE 4

ANALYTICAL RESULTS FOR SOIL SAMPLES COLLECTED FROM EXCAVATED SOIL STOCKPILES
CELIS ALLIANCE FUEL STATION, EMERYVILLE, CALIFORNIA

Soil Stockpile	Sample ID	Benzene mg/kg	Toluene mg/kg	Ethyl benzene mg/kg	Xylenes mg/kg	TPHg mg/kg	TPHd mg/kg	TRPH (1) mg/kg	WET CAM 17 metals (2) mg/l
0 to 5 feet below grade	S-0-5ft-1-A,B,C,D	0.15	1.1	1.2	9	110	NA	NA	NA
	S-0-5ft-2-A,B,C,D	0.06	0.45	0.57	4.3	59	NA	NA	NA
	S-0-5ft-3-A,B,C,D	0.04	0.42	0.74	5.9	83	NA	NA	NA
	S-0-5ft-4-A,B,C,D	0.14	1.1	1.5	10	140	NA	NA	NA
	S-0-5ft-5-A,B,C,D	0.12	0.66	0.83	5.8	77	NA	NA	NA
	S-0-5ft-6-A,B,C,D	0.05	0.13	0.22	3.2	55	NA	NA	NA
	S-0-5ft-7-A,B,C,D	0.13	0.4	0.49	4.5	56	NA	NA	NA
	S-0-5ft-8-A,B,C,D	0.05	0.16	0.18	3.1	48	NA	NA	NA
	S-0-5ft-9-A,B,C,D	0.2	1	0.4	3.2	130	NA	NA	NA
	S-0-5ft-10-A,B,C,D	ND(0.05)	ND(0.05)	ND(0.05)	0.09	48	NA	NA	NA
	S-0-5ft-11-A,B,C,D	0.03	0.03	0.05	0.19	28	NA	NA	NA
	S-0-5ft-12-A,B,C,D	0.12	0.13	0.05	0.78	49	NA	NA	NA
	S-0-5ft-13-A,B,C,D	0.05	0.04	0.02	0.12	27	NA	NA	NA
	S-0-5ft-14-A,B,C,D	0.14	0.14	0.1	0.29	42	NA	NA	NA
	S-0-5ft-15-A,B,C,D	0.04	0.07	0.1	0.59	24	NA	NA	NA
	S-0-5ft-16-A,B,C,D	ND(0.1)	0.6	0.8	6.1	73	NA	NA	NA
	S-0-5ft-17-A,B,C,D	0.05	0.22	0.22	1.7	20	NA	NA	NA
	S-0-5ft-18-A,B,C,D	0.019	0.064	0.096	0.8	12	NA	NA	NA
Gas hot spots	S-G-A,B,C,D	0.1	1.1	1	6	52	NA	NA	NA
Site east, 5 to 9.5 feet blow grade	S-5-9.5ft-1-A,B,C,D	0.014	0.064	0.18	1.4	25	NA	NA	NA
	S-5-9.5ft-2-A,B,C,D	0.78	1.5	1.5	7.9	140	NA	NA	NA
	S-5-9.5ft-3-A,B,C,D	D(0.005)	ND(0.005)	ND(0.005)	0.04	2.4	NA	NA	NA
	S-5-9.5ft-4-A,B,C,D	0.056	0.44	0.67	4.2	92	NA	NA	NA
	S-5-9.5ft-5-A,B,C,D	0.064	0.88	0.82	5.1	8.4	NA	NA	NA
	S-5-9.5ft-6-A,B,C,D	0.026	0.16	0.14	1.1	22	NA	NA	NA
	S-5-9.5ft-7-A,B,C,D	0.017	0.13	0.17	1.3	23	NA	NA	NA
Diesel hot spot	S-D-A,B,C,D	NA	NA	NA	NA	NA	3100	NA	NA
Waste oil tank	S-O&G-A,B,C,D	NA	NA	NA	NA	NA	NA	ND(50)	Sb=ND(0.05)
	"	NA	NA	NA	NA	NA	NA	NA	As=0.08
	"	NA	NA	NA	NA	NA	NA	NA	Ba=8.7
	"	NA	NA	NA	NA	NA	NA	NA	Be=ND(0.05)
	"	NA	NA	NA	NA	NA	NA	NA	Cd=ND(0.05)
	"	NA	NA	NA	NA	NA	NA	NA	Cr=0.07
	"	NA	NA	NA	NA	NA	NA	NA	Co=0.16
	"	NA	NA	NA	NA	NA	NA	NA	Cu=0.07
	"	NA	NA	NA	NA	NA	NA	NA	Pb=ND(0.1)
	"	NA	NA	NA	NA	NA	NA	NA	Hg=ND(0.0002)
	"	NA	NA	NA	NA	NA	NA	NA	Mo=ND(0.05)
	"	NA	NA	NA	NA	NA	NA	NA	Ni=0.34
	"	NA	NA	NA	NA	NA	NA	NA	Se=ND(0.05)
	"	NA	NA	NA	NA	NA	NA	NA	Ag=ND(0.01)
"	NA	NA	NA	NA	NA	NA	NA	Tl=ND(0.5)	
"	NA	NA	NA	NA	NA	NA	NA	V=0.34	
"	NA	NA	NA	NA	NA	NA	NA	Zn=0.2	

NOTES:

NA = not available; ND = not detected above the quantification limit given in parenthesis following the ND.

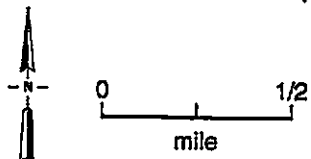
- TRPH = total recoverable petroleum hydrocarbons by Standard Method 5520D&F
- Sb = Antimony, As = Arsenic, Ba = Barium, Be = Beryllium, Cd = Cadmium, Cr = Chromium
Co = Cobalt, Cu = Copper, Pb = Lead, Hg = Mercury, Mo = Molybdenum, Ni = Nickel
Se = Selenium, Ag = Silver, Tl = Thallium, V = Vanadium, Zn = Zinc.

TABLE 5

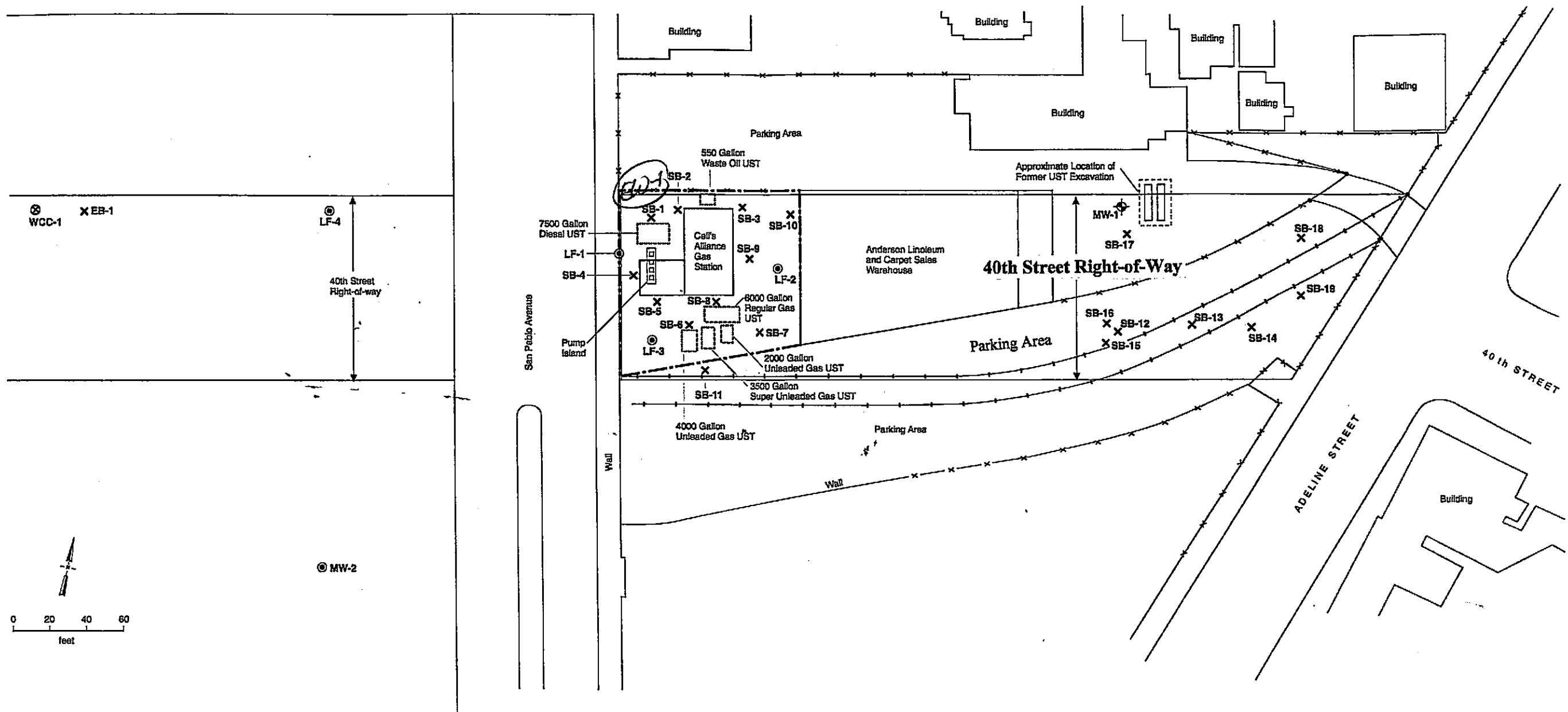
ANALYTICAL RESULTS FOR SOIL SAMPLES COLLECTED FROM SIDE WALLS AND BOTTOM OF THE EXCAVATION PIT
 CELIS ALLIANCE FUEL STATION, EMERYVILLE, CALIFORNIA

Sample ID	Benzene mg/kg	Toluene mg/kg	Ethyl benzene mg/kg	Xylenes mg/kg	TPHg mg/kg	TPHd mg/kg	TRPH (1) mg/kg	Cadmium mg/kg	Chromium (total) mg/kg	Lead mg/kg	Nickel mg/kg	Zinc mg/kg
E-1	0.33	3.5	3.4	16	240	NA	NA	NA	NA	NA	NA	NA
E-2	0.81	3.4	1.8	8.9	170	2	ND(50)	1.4	18	4.3	34	26
E-3	2.9	18	9.2	46	660	NA	NA	NA	NA	NA	NA	NA
E-4	2.6	12	4.9	24	380	5.2	ND(50)	1.4	16	5.6	17	30
N-1	2.6	21	11	57	920	21	ND(50)	2.1	26	6.1	37	40
N-2	0.097	0.83	2.5	11	250	10	ND(50)	1.4	16	2.8	26	23
N-3	0.38	3	3.6	17	390	96	ND(50)	2.6	20	7.3	25	40
N-4	0.16	ND(0.1)	1	1.3	85	310	160	2.1	28	5	25	29
S-1	1.7	6	9.9	41	800	NA	NA	NA	NA	NA	NA	NA
S-2	0.4	0.2	4	12	430	60	ND(50)	2.3	28	7	39	43
S-3	1.4	ND(0.13)	11	1.7	730	NA	NA	NA	NA	NA	NA	NA
S-4	ND(0.5)	ND(0.5)	5.6	13	560	25	ND(50)	1.9	26	8.3	23	30
W-1	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(1.0)	ND(1.0)	ND(50)	2.2	27	8	34	45
W-2	0.34	0.61	2.3	6.9	230	34	ND(50)	2.3	29	5.5	26	42
W-3	0.012	ND(0.01)	0.029	0.043	20	180	ND(50)	1.4	19	5.6	21	27
W-4	ND(0.05)	0.073	0.26	0.99	80	500	150	2	28	6.2	36	38
B-C-1	0.081	0.11	2	8.4	260	68	ND(50)	2.3	31	6.7	29	37
B-C-2	2.4	10	11	49	1000	75	ND(50)	1.3	18	4	19	25
B-C-3	2.2	15	7.3	39	690	29	ND(50)	1.8	27	5.2	25	33
B-O&G-1	2.4	9.9	6.3	27	490	160	ND(50)	2.7	35	8.3	41	39
B-D-1	3.8	1.7	8.1	17	650	18000	15000	1.9	27	7	25	27
B-G-1	0.64	ND(0.5)	6.5	12	540	ND(10)	120	2.9	25	54	21	200

NOTES (1) TRPH = total recoverable petroleum hydrocarbons as determined by Standard Method 5520 E&F
 (2) NA = not available; ND = not detected above the quantification limit given in parenthesis following the ND.



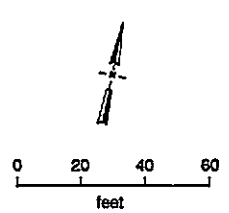
Project No. 941114NA	40th Street UST	SITE LOCATION MAP CELI'S ALLIANCE GAS STATION SITE	Figure 1
Woodward-Clyde Consultants			



WCC-1 X EB-1

LF-4

MW-2

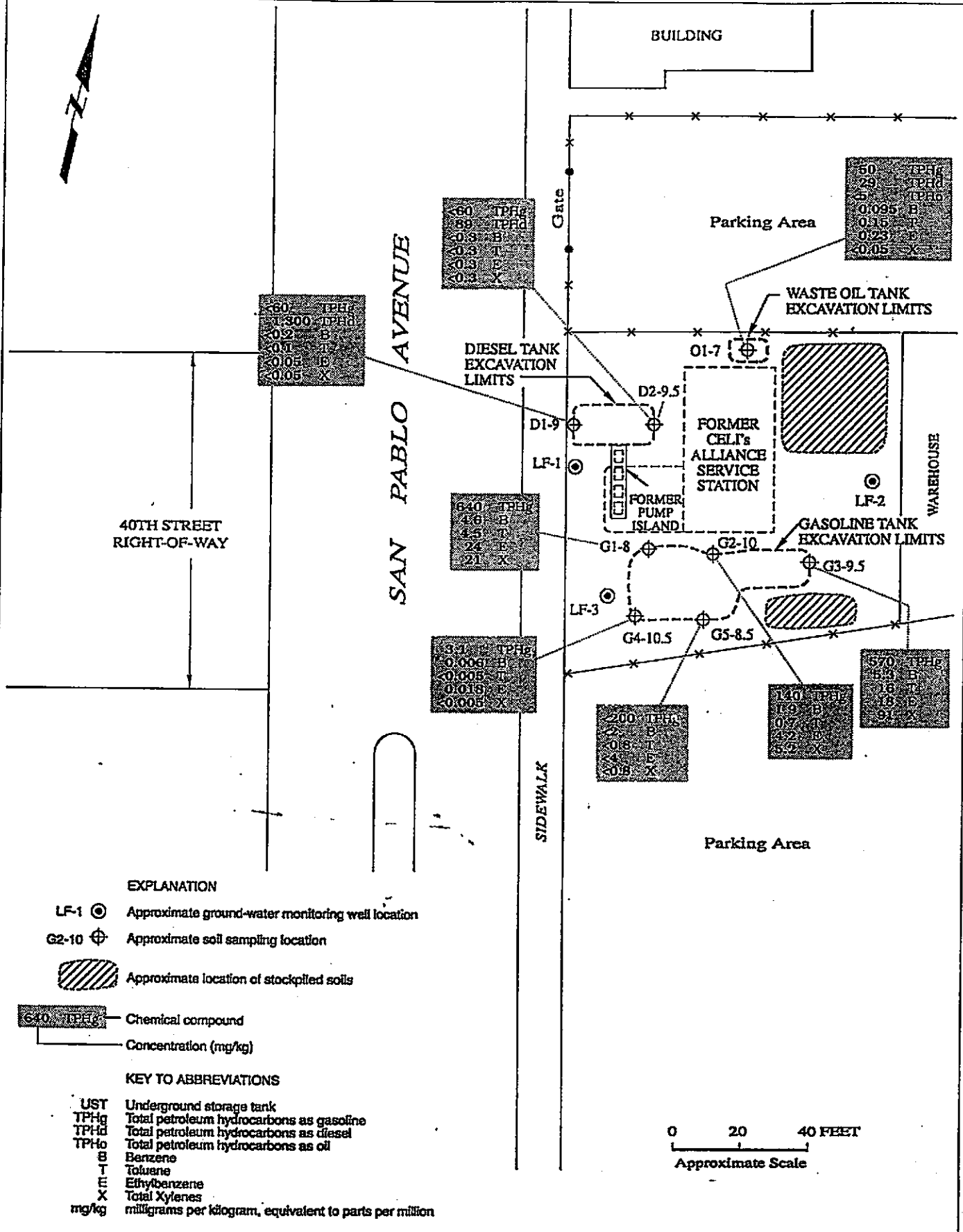


EXPLANATION

- +—+—+— Approximate Location of Former Railroad Tracks
- x Soil Borings by Levine-Fricke
- ⊙ Monitoring Well by Levine-Fricke (LF-1, LF-2, & LF-3 destroyed)
- ⊕ Monitoring Well by SECOR (destroyed)
- ⊗ Proposed Monitoring Well by WCC in 1994 (not installed)

Source: Levine-Fricke (1992) and Woodward-Clyde Consultants (1994)

Project No. 941114NA	40th Street UST	SOIL BORING AND MONITORING WELL LOCATIONS 40TH STREET RIGHT-OF-WAY EMERYVILLE, CALIFORNIA	Figure 2
Woodward-Clyde Consultants			



EXPLANATION

- LF-1 ⊙ Approximate ground-water monitoring well location
- G2-10 ⊕ Approximate soil sampling location



Approximate location of stockpiled soils

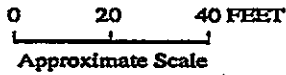


Chemical compound

Concentration (mg/kg)

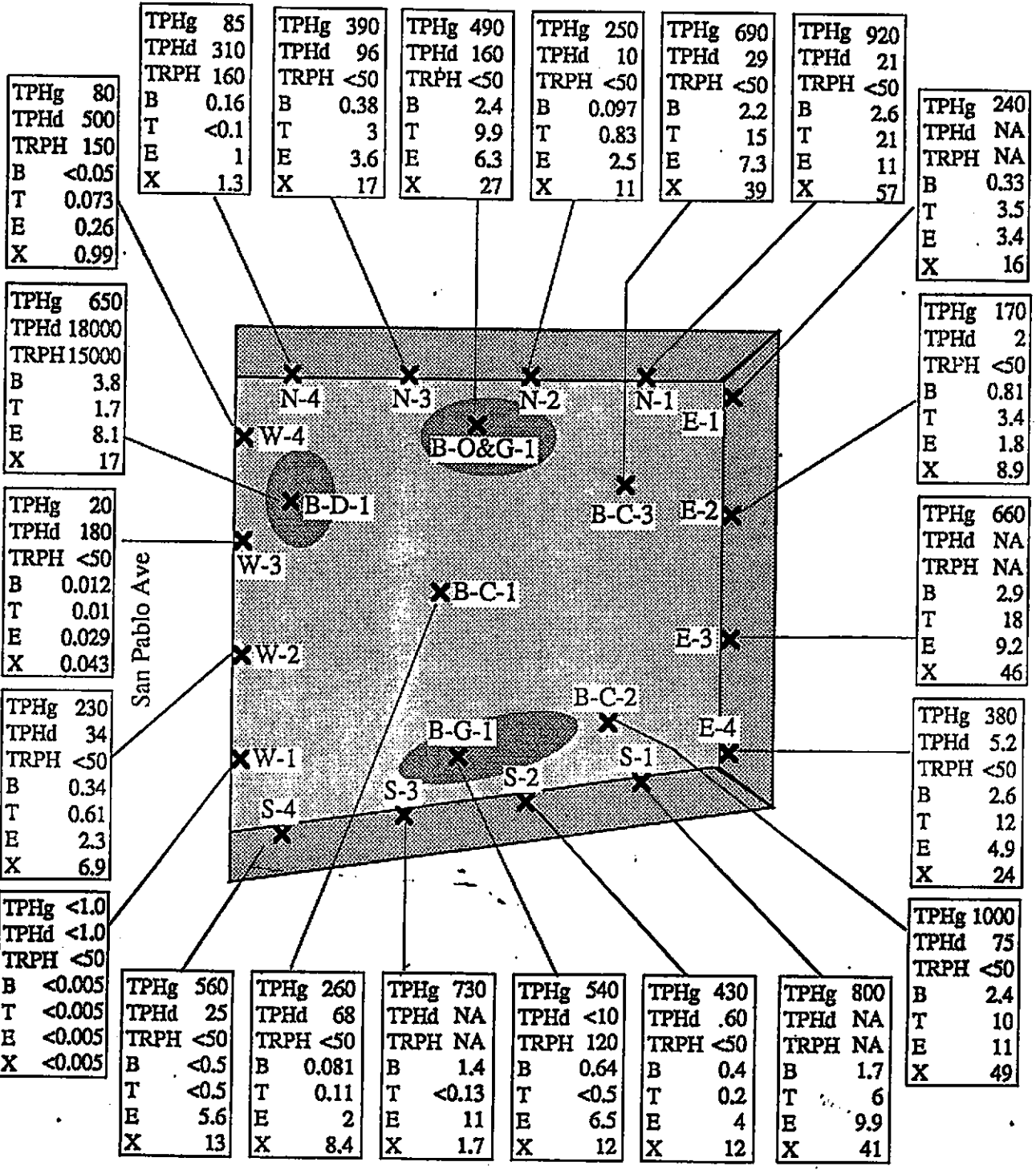
KEY TO ABBREVIATIONS

- UST Underground storage tank
- TPHg Total petroleum hydrocarbons as gasoline
- TPHd Total petroleum hydrocarbons as diesel
- TPHo Total petroleum hydrocarbons as oil
- B Benzene
- T Toluene
- E Ethylbenzene
- X Total Xylenes
- mg/kg milligrams per kilogram, equivalent to parts per million



Source: Reference 7 (Levine-Fricke Report)

Project No. 941114NA	40th Street UST	SITE PLAN SHOWING UST EXCAVATIONS, SAMPLING LOCATIONS AND TPH AND BTEX CONCENTRATIONS	Figure 3
Woodward-Clyde Consultants			



TPHg = total petroleum hydrocarbons as gasoline
 TPHd = total petroleum hydrocarbons as diesel
 TRPH = total recoverable petroleum hydrocarbons

B = benzene
 T = toluene
 E = ethyl benzene
 X = xylenes

Soil samples on side walls were collected 6-in above the bottom floor

Unit of Concentration: mg/kg

Project No. 941114NA	CITY OF EMERYVILLE REDEVELOPMENT AGENCY	SOIL SAMPLING LOCATIONS & ANALYTE CONCENTRATIONS	Figure 4
Woodward-Clyde Consultants		40th Street UST at 4000 San Pablo Avenue	

