RO-028

location of USTs
Fig 5-1 & 5 not consistent
w/ others

Received via email 12/27/01

SITE INVESTIGATION REPORT
4701 Martin Luther King, Jr. Way
Oakland, California

August 2001

Prepared for

Children's Hospital of Oakland
747 52nd Street
Oakland, CA 94609

Prepared by

World Environmental Services & Technology, Inc.
828 Mission Avenue, 2nd Floor
San Rafael, CA 94901
415/460-6770 Fax 415/460-6771
main@w-e-s-t.com

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

SIGNATURE PAGE

All engineering information, conclusions, and recommendations contained in this report have been prepared by a California Professional Engineer. All hydrogeologic and geologic information, conclusions, and recommendations contained in this report have been prepared by a California Registered Geologist.

Peter M. Krasnoff
California Registered Civil Engineer (44031)

Date

Peter E. Morris
California Registered Geologist (7084)

Date

1.0 INTRODUCTION

This Site Investigation report (SI) has been prepared by World Environmental Services and Technology, Inc. (WEST) on behalf of Children's Hospital for the property located at 4701 Martin Luther King, Jr., Way in Oakland, California ("the Site"; Figure 1-1). Samples collected during the removal of the three underground storage tanks (USTs) in 1990 and off-site investigations revealed the presence of petroleum hydrocarbons in soil and groundwater at and in the vicinity of the Site.

Based on the soil and groundwater results, the Alameda County Environmental Health Services (ACEHS) requested that investigations be performed to "delineate the extent of soil and possible groundwater contamination at the site... to determine an appropriate course of action to the remediate the site, if deemed necessary."

1.1 BACKGROUND

The Site consists of a gated and fenced parking lot for Children's Hospital. Children's Hospital was developed in the 1990's located adjacent to 47th Street and Martin Luther King Way in Oakland, California (Figure 1-1). From the 1930s until conversion to a parking lot, a two-story commercial building was present on the Site. In October 1990, three USTs containing petroleum hydrocarbons were removed from the beneath the sidewalk adjacent to the Site. Soil samples collected from the UST excavations revealed the detection of petroleum hydrocarbons.

Environmental investigations of the three former USTs at 4629 Martin Luther King Jr. Way (4629 MLK), located to the south of the Site, have revealed the presence of petroleum hydrocarbons in soil and groundwater. Based on the presence of the petroleum hydrocarbons in soil and groundwater both on and off-site, the ACHCSA requested further investigation to characterize impacts and evaluate remedial options. This SI presents the results of investigations performed to delineate impacts to soil and groundwater.

2.0 SITE DESCRIPTION

2.1 SITE DESCRIPTION

The Site is located along 47th Street, approximately 50 feet northwest of the intersection with Martin Luther King, Jr., Way in Oakland, California (Figure 2-1). The approximately one-half acre Site is located on two adjoining parcels identified as Alameda County Assessor's Parcel Numbers 013-1163-007 and 013-1163-009. The northern boundary of these two parcels overlies Temescal Creek. In the 1930s, a two-story commercial building was built on the Site. In the 1990s, the Site was redeveloped as a gated and fenced parking lot for the Children's Hospital. Portions of the sidewalk adjacent to the Site along 47th Street appear to have been replaced. The former USTs were located beneath the sidewalk adjacent to 47th Street (Figure 2-1).

2.2 GEOLOGY AND HYDROGEOLOGY

2.2.1 Regional Geologic Setting

The Site is located within the Coast Ranges geomorphic province, which is characterized by a series of parallel, northwesterly-trending, folded and faulted mountain chains. In this part of the providence, the gentle low-lying topography is composed of reworked marine and non-marine sedimentary deposits derived from steeply inclined hills located to the east of the Site. Quaternary (2 to 3 million years ago to the present) uplift resulted in the geologically recent formation of Bay Area hills and valleys including the East Bay hills. The uplift has caused erosion of the mountains and hills with accompanying deposition in the valleys.

2.2.2 Site Geology

The geologic materials encountered at the Site and neighboring property consist of silty clays, clays, sandy silts and sandy clays from ground surface to approximately 10 feet below ground

surface. Sandy and gravelly clays, and clayey sands and gravels are present between approximately 10 feet to 30 below ground surface.

2.2.3 Site Hydrogeology

Groundwater was encountered between 20 feet and 25 feet below ground surface in the four soil borings installed by WEST and six soil borings advanced at 4629 MLK (SCI, 1993). Advanced Assessment and Remediation Services of Concord, California, measured depth to groundwater in four monitoring wells installed at the 4629 MLK property as part of a groundwater quarterly monitoring program. On February 7, 2000, the depth to groundwater was measured to be approximately 15 feet below ground surface and the groundwater gradient at this property appears to be directed towards the south to southwest. A review of previous quarterly groundwater measurements show that depth to groundwater has fluctuated between approximately 15 to 22 feet below ground surface between December 1998 and February 2000. The groundwater gradient has been consistent during this period. However, based upon topography in the area, the groundwater gradient direction is inferred to be towards the west and San Francisco Bay. Temescal Creek is located beneath the Site and flows east to west toward the San Francisco Bay.

3.0 SUMMARY OF INVESTIGATIONS

Consistent with the requirements of California Code of Regulations, Title 23 Waters, Division 3, Water Resources Control Board, Chapter 16 Underground Storage Tank Regulations, a series of site investigations have been performed to assess the nature, vertical and lateral extent of the release, and to evaluate cleanup requirements.

3.1 PREVIOUS INVESTIGATIONS

Investigations conducted at the Site between 1989 and 1990 included a site assessment, collection of soil samples and the removal of underground storage tanks and associated piping. Additional investigations conducted on the property across 47th Street at 4629 Martin Luther King Way, between 1993 and 2000 included soil and groundwater sampling, groundwater monitoring well installation, and quarterly monitoring. A discussion of these investigations and their findings is presented below. A summary of analytical results from the previous investigations is included in Tables 3-1 and 3-2 and on Figures 3-1 and 3-2.

3.1.1 Site Assessment

Robert Gils Associates, Inc. (RGA), of Emeryville, California, conducted an initial site assessment of the Site on November 27, 1989. The results of the site assessment identified asbestos containing materials within the existing building at the Site. In addition, underground storage tanks were identified as being located beneath the sidewalk along 47th Street adjacent to the Site as well as a hydraulic lift within the building that was used by a current occupant for auto repair operations.

3.1.2 Soil Sampling

In December 1989, RGA advanced three soil borings at the Site to evaluate soil contamination associated with the underground fuel tanks. RGA collected seven soil samples from the three

borings at approximately 5 feet and 12 feet below ground surface. One soil boring was located east and two soil borings were located west of the approximate location of an UST. One soil sample (3194), collected from stained soil observed in one of the borings was submitted for chemical analysis of total petroleum hydrocarbons as gasoline (TPHg) and diesel (TPHd), and benzene, toluene, ethyl benzene, and xylenes (BTEX). Analytical results did not reveal concentrations of TPHg, TPHd, or BTEX above their respective detection limits of 5 milligrams per kilogram (mg/kg), 10 mg/kg, and 0.1 mg/kg (Table 3-1).

3.1.3 UST Removal

On October 9, 1990, three USTs were removed from the Site by Tom Daniels Excavating, Inc., of Danville, California, under the supervision of Aqua Terra Technologies of Walnut Creek, California. One gasoline UST with a capacity of 2,000 gallons and two heating oil USTs with capacities of 2,000 gallons and 500 gallons were removed from the Site. One excavation was advanced to remove the gasoline UST and a separate excavation was advanced to remove both heating oil USTs (Figure 3-1). The USTs were transported off-site by H&H Environmental Services for recycling by Schnitzer Steel of Oakland, California.

Four soil samples were collected from the sidewalls of the UST excavations. Two soil samples (TSA1 and TSA2) were collected from the gasoline UST excavation and two soil samples (TSB and TSC) were collected from the heating oil UST and analyzed for TPHg, TPHd, and benzene, toluene, ethyl benzene, and xylenes. TPHg and TPHd were detected up to 590 mg/kg and 1,100 mg/kg, respectively, from the soil samples collected from the UST excavations. Toluene, ethyl benzene, and xylenes were detected in soil samples up to 1.5 mg/kg, 7.8 mg/kg, and 9.3 mg/kg, respectively. Benzene was not detected above laboratory reporting limits (Table 3-1).

On October 17, 1990, additional soil samples were collected from the sidewalls of the two UST excavations following excavation to approximately 19 feet below ground surface. Analytical results of the additional sidewall soil samples revealed concentrations of TPHg up to 2,700

mg/kg, toluene up to 0.05 mg/kg, ethyl benzene up to 15 mg/kg, and xylenes up to 55 mg/kg (Table 3-1). Benzene was not reported above the laboratory detection limit in the additional soil samples collected from the excavations (Table 3-1).

3.1.4 Investigations of Properties in the Vicinity of the Site

3.1.4.1 PRELIMINARY FUEL OIL CONTAMINATION ASSESSMENT

Subsurface Consultants, Inc., of Oakland, California (SCI) conducted a soil investigation in the vicinity of underground storage tanks associated with the property located at 4629 MLK in May 1993 (Figure 3-1). Three former heating oil USTs were located beneath the sidewalk along 47th Street adjacent to 4629 MLK property and two former gasoline USTs were also located at 4629 MLK, approximately 40 feet east of the former heating USTs (Figure 3-1). SCI advanced nine soil borings in the vicinity of the USTs. Results of soil field screening using a photo-ionization detector for organic compounds revealed total organic compound concentrations up to 10,000 parts per million at a depth of approximately 20 feet below ground surface. Twenty soil samples were collected between 11.5 feet and 30.5 feet below ground surface from the nine soil borings and submitted for chemical analysis for total extractable hydrocarbons as diesel and total oil and grease (SCI, 1993).

Analytical results revealed concentrations of oil and grease up to 760 mg/kg and total extractable petroleum hydrocarbons as diesel up to 1,700 mg/kg in soil boring 3 at 21 feet below ground surface (Table 3-1). Groundwater was encountered within the soil borings between approximately 23 feet and 27 feet below ground surface.

3.1.4.2 GROUNDWATER MONITORING

Quarterly groundwater monitoring has been conducted at 4629 MLK since December 1998. On February 7, 2000, Advanced Assessment and Remediation Services of Concord, California (AARS) performed quarterly groundwater monitoring of four monitoring wells (MW-1 through

MW-4) located at 4629 MLK (AARS, 2000). The groundwater samples were analyzed for BTEX, TPHg, TPHd, and TPH as motor oil (TPHmo) by Priority Environmental Labs of Milpitas, California.

Petroleum odors and sheen was observed during well purging activities from groundwater extracted from monitoring wells MW-1, MW-3, and MW-4 (Figure 3-2). Analytical results of the groundwater samples collected during quarterly monitoring activities revealed concentrations of TPHg, TPHd, and TPHmo up to 2,100 micrograms per liter (µg/l), 920 µg/l, and 3,800 µg/l, respectively. Analytical results from the groundwater sample collected from MW-4 revealed concentrations of benzene, toluene, ethyl benzene, and xylenes up to 3.4 µg/l, 2.2 µg/l, 8.9 µg/l, and 29 µg/l, respectively (Table 3-2).

3.2 RECENT INVESTIGATIONS AT THE SITE

A preliminary site assessment (PSA) and soil and groundwater investigation was conducted in 2000. The PSA included the review of available records regarding soil and groundwater characterization at the Site and neighboring properties, discussions with property owner representatives regarding Site activities, and a review of available historical aerial photographs.

Based on the results of the PSA, a soil and groundwater investigation was conducted, which included installation of four soil borings (SB-1 through SB-4) and collection of soil and grab groundwater samples for chemical analysis (Figure 3-2).

3.2.1 Preliminary Site Assessment

A PSA was conducted in 2000 to obtain information regarding a release of petroleum hydrocarbons from three former USTs at the Site and impacts to soil and groundwater from releases of petroleum hydrocarbons from neighboring properties. Available records were reviewed regarding the release of petroleum hydrocarbons from three former USTs at the Site and releases at neighboring properties.

A review of historical aerial photographs was conducted to identify historical Site conditions. Interviews with Children's Hospital personnel were conducted to obtain additional information regarding the location of the three former USTs at the Site and conditions at a neighboring property, 4629 MLK, regarding releases of petroleum hydrocarbons. Children's Hospital personnel identified areas where the sidewalk had been repaired in the vicinity of the former USTs along 47th Street.

Additional information provided by Children's Hospital personnel included soil boring logs from investigations performed by SCI at the 4629 MLK property. A review of the soil boring logs indicated the presence of petroleum hydrocarbon odors and the presence of oil in soil samples collected during installation of these borings.

3.2.1.1 SOIL BORING INSTALLATION

On June 27, 2000, four soil borings (SB-1 through SB-4) were installed in the vicinity of the three former underground storage tanks located at the Site (Figure 3-2). The soil borings were advanced by Gregg Drilling of Martinez, California a C-57 licensed contractor using hydraulic direct push equipment. Soil samples were collected at 5-foot intervals between 5 feet and 25 feet below ground surface. The soil core samples were also field screened using a photo-ionization detector (PID) to monitor for total organic compounds as vapor.

The soil collected from the borings revealed that the upper 15 feet consists of clays, silty clays, with minor amounts of sands and gravels, and exhibits a brown to dark brown color. Below 15 feet, soil characteristics consisted of greenish-gray to light brown color, sandy clays, gravelly clays, sandy gravels and clayey sands with a strong petroleum odor observed in all soil borings except SB-3. Copies of the soil boring logs are included in Appendix B.

3.2.1.2 SOIL SAMPLING

Twenty soil samples were collected from the four soil borings during the investigation activities. The soil samples were collected in acetate liners, capped with Teflon sheets and plastic caps, labeled and placed in cooler with ice. The soil samples were then transported to a California State-certified analytical laboratory under USEPA Chain-of-custody protocols.

One soil sample collected from soil boring SB-3 at a depth of 15 feet below ground surface was submitted for analysis of total organic carbon using EPA Method 9060. The analytical result for the soil sample collected from SB-3 revealed a concentration of total organic carbon at 637 mg/kg (Table 3-1). Based on communication with representatives of the ACHSA, additional analyses were not performed.

Visual observations of soil samples collected from soil borings SB-1, SB-2, and SB-4, indicated the presence of petroleum hydrocarbons. The soil samples displayed a greenish gray color and petroleum odors between 15 and 32 feet below ground surface. No staining or odors were observed in soil samples collected from soil boring SB-3.

3.2.1.3 GRAB GROUNDWATER SAMPLING

Four grab groundwater samples were collected from the four soil borings installed at the Site (Figure 3-2). The four grab groundwater samples were collected from the soil borings through a polyvinyl chloride (PVC) ¾-inch diameter casing with slotted screen placed within the boring. A stainless steel bailer was lowered within the PVC casing to collect the grab groundwater samples. The grab groundwater samples were decanted from the stainless steel bailer into pre-cleaned laboratory supplied sample containers. Once the sample containers were filled, they were labeled and placed in cooler with ice for transportation to a California State-certified analytical laboratory.

Field observations of the groundwater indicated a petroleum odor. A sheen was observed during collection of the grab groundwater samples from SB-1, SB-2, and SB-4. No sheen or odor was observed in grab groundwater samples collected from SB-3.

The grab groundwater samples were transported to Chromalab of Pleasanton, California under USEPA chain-of-custody protocols. The grab groundwater samples were submitted for chemical analysis for total petroleum hydrocarbons as gasoline (TPHg), as diesel (TPHd), and as motor oil (TPHmo) by EPA Method 8015 modified, volatile organic compounds including methyl tert butyl ether (MTBE), benzene, toluene, ethyl benzene, and xylenes by EPA Method 8260B. Grab groundwater samples submitted for volatile organic compound analysis were collected in pre-preserved 40-milliliter vials with zero-head space.

3.2.1.4 GRAB GROUNDWATER ANALYTICAL RESULTS

Laboratory analytical results revealed concentrations of TPHg up to 24,000 µg/l and TPHd up to 150,000 µg/l in the groundwater sample collected from SB-4 (Table 3-2). The analytical result also revealed TPHmo was detected in one sample, SB-2, at a concentration of 5,900 µg/l. Concentrations of toluene, ethyl benzene, and xylenes were also detected above laboratory reporting limits in the grab groundwater ample collected from SB-2 at 1.3 µg/l, 0.52 µg/l, and 6.7 µg/l, respectively (Table 3-2).

Concentrations of TPHg, TPHd, TPHmo, MTBE, and BTEX compounds were not reported above laboratory reporting limits from the grab groundwater sample collected from SB-3 (Table 3-2). Copies of laboratory data certificates and chain-of-custody forms are included in Appendix A. Geologic soil boring logs describing the subsurface soils encountered at the Site are included in Appendix B.

4.0 SUMMARY OF FINDINGS

Environmental site assessments identified suspected and recognized environmental conditions associated with historical use of the Site. Due to these conditions, a soil and groundwater investigation was performed to characterize the extent and nature of impacts to Site soil and groundwater in the vicinity of the former gasoline and heating oil USTs located at the Site, and previous investigations conducted at an adjacent site.

In lieu of site-specific risk based or regulatory evaluations, guidance or screening levels can be used to identify conditions of potential concern. The California Regional Water Quality Control Board – San Francisco Region (Regional Board) has summarized potentially applicable risk based screening levels (RBSLs) in their *Application of Risk Based Screening Levels and Decision Making to Sites with Impacted Soil and Groundwater*, Interim-Final, August, 2000. The following presents a discussion of the results of the investigations relative to potentially relevant screening level criteria.

- The soil samples collected from the excavations of the former USTs revealed the presence of TPHg and TPHd up to 2,700 mg/kg and 1,100 mg/kg, respectively, above the RBSLs of 100 mg/kg for both TPHg and TPHd. Based on this characterization, remedial actions to protect groundwater and human health in the vicinity of the former USTs appear to be warranted.

- Three of the four grab groundwater samples collected in the vicinity of the former gasoline UST from borings SB-1, SB-2 and SB-4 revealed TPHg, TPHd, TPHmo, toluene, ethyl benzene, and xylenes in groundwater up to 24,000 µg/l, 150,000 µg/l, and 5,900 µg/l, respectively, above the RBSL of 100 µg/l.

- Benzene was not detected in groundwater above laboratory reporting limits. Analytical results from the grab groundwater sample collected from SB-3 did not reveal

concentrations of petroleum hydrocarbons or BTEX compounds above laboratory reporting limits.

- Field observations of soil core samples from soil boring SB-1, SB-2, and SB-4 revealed the presence of stained soil and petroleum odors in soil between the depth s of 15 feet and 32 feet below ground surface. Groundwater was encountered between 23 and 27 feet below ground surface within the four soil borings.

5.0 RECOMMENDATIONS

Based on the results of the SI and a request from the ACEHS, recommendations for Site closure include the following:

- Installation of three groundwater monitoring wells to characterize groundwater flow direction and gradient in the vicinity of the former USTs and Temescal Creek (Figure 5-1).

- Collection of soil samples during groundwater monitoring well installation to characterize residual concentrations of petroleum hydrocarbons within the unsaturated soil at the Site.

- Submittal of a Corrective Action Plan that presents an evaluation of alternatives to address impacts from petroleum hydrocarbons in soil and groundwater.

6.0 REFERENCES

Advanced Assessment and Remediation Services, *Quarterly Groundwater Monitoring and Sampling Report, 4629 Martin Luther King Jr. Way, Oakland, California*, February 25, 2000 (AARS, 2000).

California Regional Water Quality Control Board – San Francisco Bay. *Application of Risk-Based Screening Levels and Corrective Action to Sites with Contaminated Soil and Groundwater, Volume 1: Summary Tier 1 Lookup Tables (DRAFT).* April 2000.

California Regional Water Quality Control Board – San Francisco Bay. *Regional Board Supplemental Instructions to State Water Board December 8, 1995, Interim Guidance on Required Cleanup oat Low-Risk Fuel Sites.* January 5, 1996.

California Regional Water Quality Control Board – Central Valley. *A Compilation of Water Quality Goals.* March 1995.

California Regional Water Quality Control Board - San Francisco Bay Region. *Memorandum - Regional Board Supplemental Instructions to State Water Board December 8, 1995, Interim Guidance on Required Cleanup at Low-Risk Fuel Sites*, January 5, 1996.

California Regional Water Quality Control Board - San Francisco Bay Region. *San Francisco Basin – Water Quality Control Plan*, June 21, 1995.

City of Oakland. *Urban Land Redevelopment Guidance Document.* January 1, 2000.

Lawrence Livermore National Laboratory. *Recommendations to Improve the Cleanup Processes for California's Leaking Underground Fuel Tanks.* October 16, 1995.

Lawrence Livermore National Laboratory. *Groundwater Investigation and Remediation, LLNL Environmental Report for 1998.* 1998.

State Water Resources Control Board. *Leaking Underground Fuel Tank Field Manual: Guidelines for Site Assessment, Cleanup, and Underground Storage Tank Regulations.* October 1989, Revision.

State Water Resources Control Board. *California Underground Storage Tank Regulations, CCR Title 23, Division 3, Chapter 16, Article 11.* May 1994.

State Water Resources Control Board. *Resolution No. 1021b, (Draft) Policy for Investigation and Cleanup of Petroleum Discharges to Soil and Groundwater.* November 1996b.

Subsurface Consultants, Inc., *Preliminary Fuel Oil Contamination Assessment, 4629 Martin Luther King, Jr., Way, Oakland, California*, November 4, 1993 (SCI, 1993)

United States Environmental Protection Agency (USEPA), *Region 9 Preliminary Remediation Goals (PRGs) 2000,* August, 2000.

United States Geological Survey. *Preliminary Geological Map Emphasizing Bedrock Formations in Alameda County California: Derived from the Digital Database Open File Report 96-252.* R.W. Graymer, D.L. Jones, E.E. Brabb, 1996.

United States Geological Survey. Quaternary Geology of Alameda County, and Surrounding Areas: Derived form the Digital Database Open-File Report 97-97, Helley, E.J., and Graymer, R.W, 1997.

7.0 DISTRIBUTION LIST

James Jackson
Children's Hospital
747 52nd Street
Oakland, CA 94609

eva chu
Alameda County Environmental Health Services
1131 Harbor Bay Parkway, 2nd Floor
Alameda, CA 94502

Ms. Leah Goldberg
Hanson, Bridgett, Marcus, Vlahos & Rudy, LLP
333 Market Street, 2nd Floor
San Francisco, CA 94105

TABLE 3-1
SUMMARY OF SOIL ANALYTICAL RESULTS
Children's Hospital
4701 Martin Luther King, Jr., Way
Oakland, California

Sample I.D.	Date Sampled	Location	TPHog	TPHd	TPHg	Benzene	Toluene	Ethyl Benzene	Xylenes
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
3194 [1]	12/7/89	Adjacent to USTs	--	<10	<5.0	<0.1	<0.1	<0.1	<0.1
TSA1	10/9/90	Gasoline UST pit	--	--	5.0	<0.005	0.017	0.039	0.061
TSA2	10/9/90	Gasoline UST pit	--	--	590	<0.005	1.5	7.8	9.3
TSB	10/9/90	Heating Oil UST pit	--	1,100	38	<0.005	<0.005	0.13	1.0
TSC	10/9/90	Heating Oil UST pit	--	<10.0	<0.05	<0.005	<0.005	<0.005	<0.005
TSA	10/17/90	Gasoline UST pit	--	--	530	<0.05	<0.05	5.0	9.0
TSB	10/17/90	Gasoline UST pit	--	--	2,700	<0.1	<0.1	15	55
TSC	10/17/90	Gasoline UST pit	--	--	1,300	<0.05	0.05	10	22
TSD	10/17/90	Gasoline UST pit	--	--	770	<0.025	<0.025	5.0	10
1	1993	11.5	<50	<1.0	--	--	--	--	--
		20	<50	6.0	--	--	--	--	--
2	1993	15	<50	14	--	--	--	--	--
		23	<50	570	--	--	--	--	--
3	1993	18	380	310	--	--	--	--	--
		21	160	1,700	--	--	--	--	--
		25	--	190	--	--	--	--	--
4	1993	21	<50	80	--	--	--	--	--
		31	<50	<1.0	--	--	--	--	--
5	1993	21	<50	<1.0	--	--	--	--	--
		27.5	<50	<1.0	--	--	--	--	--
		30.5	<50	<1.0	--	--	--	--	--
6	1993	21	<50	16	--	--	--	--	--
		27.5	<50	<1.0	--	--	--	--	--
7	1993	21.5	140	170	--	--	--	--	--
		25	<50	<1.0	--	--	--	--	--
8	1993	19	540	750	--	--	--	--	--
		24.5	<50	<1.0	--	--	--	--	--
9	1993	22	<50	2.0	--	--	--	--	--
		25	<50	<1.0	--	--	--	--	--
RBSLs			1000	100	100	0.045	2.6	2.5	1

Notes:

Samples TSA through TSD were collected from the sidewalls of UST excavations.

TPHg: Total petroleum hydrocarbons as gasoline

TPHd: Total petroleum hydrocarbons as diesel

-- not analyzed

RBSLs- California Regional Water Quality Control Board-San Francisco Bay Region, Risk-Based Screening Levels, 2000

TABLE 3-2
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
Children's Hospital
4701 Martin Luther King, Jr., Way
Oakland, California

Sample Location	Date Sampled	TPHg	TPHd	TPHmo	Benzene	Toluene	Ethyl Benzene	Xylenes	MTBE	Iron[1]		Field Observations
		(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	Total	Soluble	
MW-1	2/7/2000	89	76	900	ND	ND	0.9	2.8	ND	--	--	Sheen and odor observed
MW-2	2/7/2000	ND	ND	ND	ND	ND	ND	ND	ND	--	--	No sheen or odor observed
MW-3	2/7/2000	910	180	1,400	2.6	1.4	5.5	14	ND	--	--	Sheen and odor observed
MW-4	2/7/2000	2,100	920	3,800	3.4	2.2	8.9	29	ND	--	--	Sheen and odor observed
SB-1	6/27/2000	8,500	5,500	<610	<10	<10	<10	<10	<100	--	--	Sheen and odor observed
SB-2	6/27/2000	340	15,000	5,900	<0.5	1.3	0.52	6.7	<5.0	--	--	Sheen and odor observed
SB-3	6/27/2000	<50	<69	<690	<0.5	<0.5	<0.5	<0.5	<5.0	1100	<0.1	No sheen or odor observed
SB-4	6/27/2000	24,000	150,000	<50,000	<5.0	<5.0	<5.0	<5.0	<50	370	<0.1	Sheen and odor observed
RBSLs		100	100	100	1	40	30	13	5			

NOTE:
µg/l -micrograms per liter
1– Concentrations reported in milligrams pe liter (mg/l)
TPHg -total petroleum hydrocarbons as gasoline
TPHd -total petroleum hydrocarbons as diesel
TPHmo -total petroleum hydrocarbons as motor oil
MTBE -methyl tert butyl ether
ND- Not detected above laboratory reporting limits
RBSLs- California Regional Water Quality Control Board-San Francisco Bay Region, Risk-Based Screening Levels, 2000

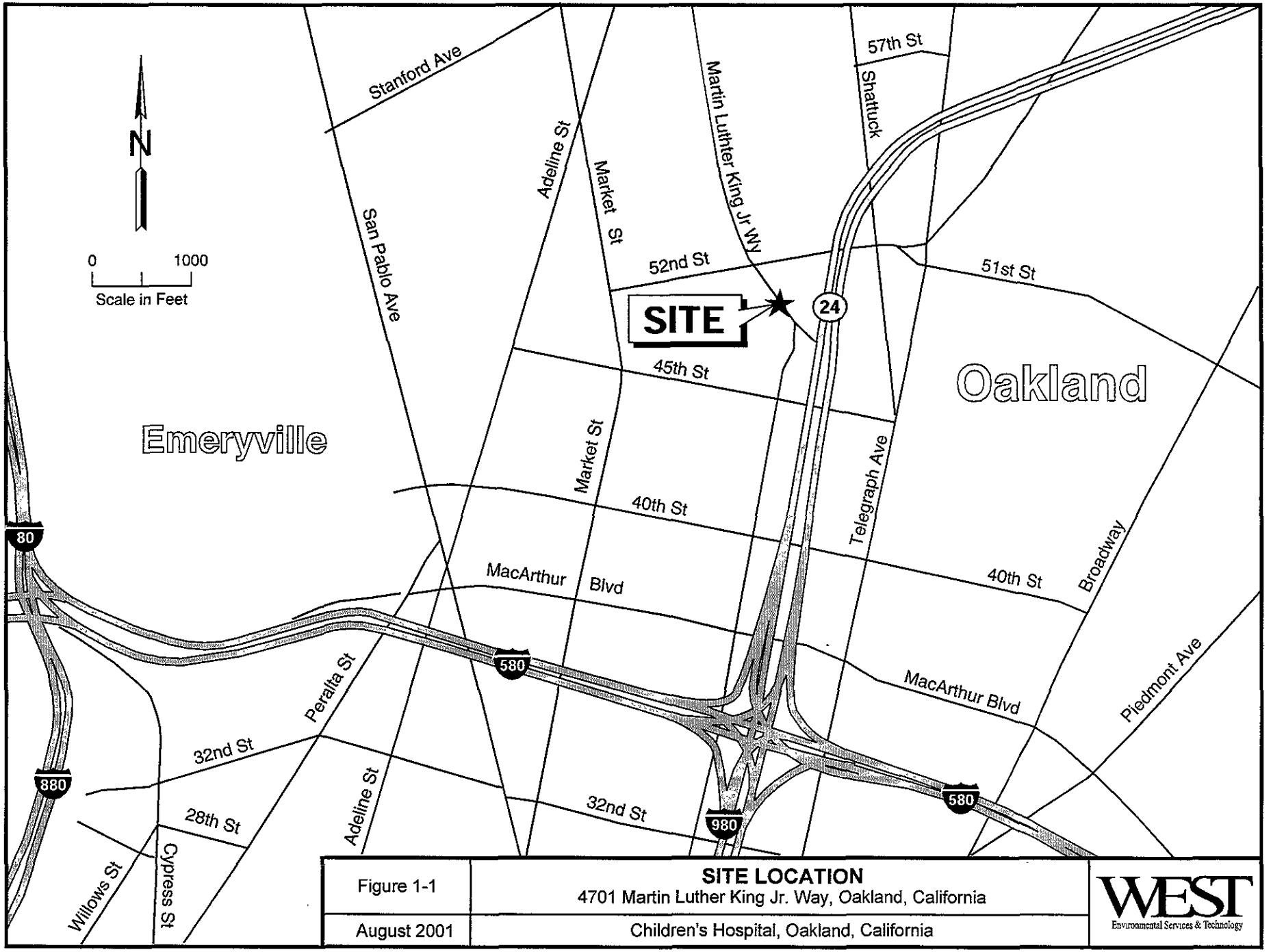


Figure 1-1	**SITE LOCATION** 4701 Martin Luther King Jr. Way, Oakland, California	WEST Environmental Services & Technology
August 2001	Children's Hospital, Oakland, California	

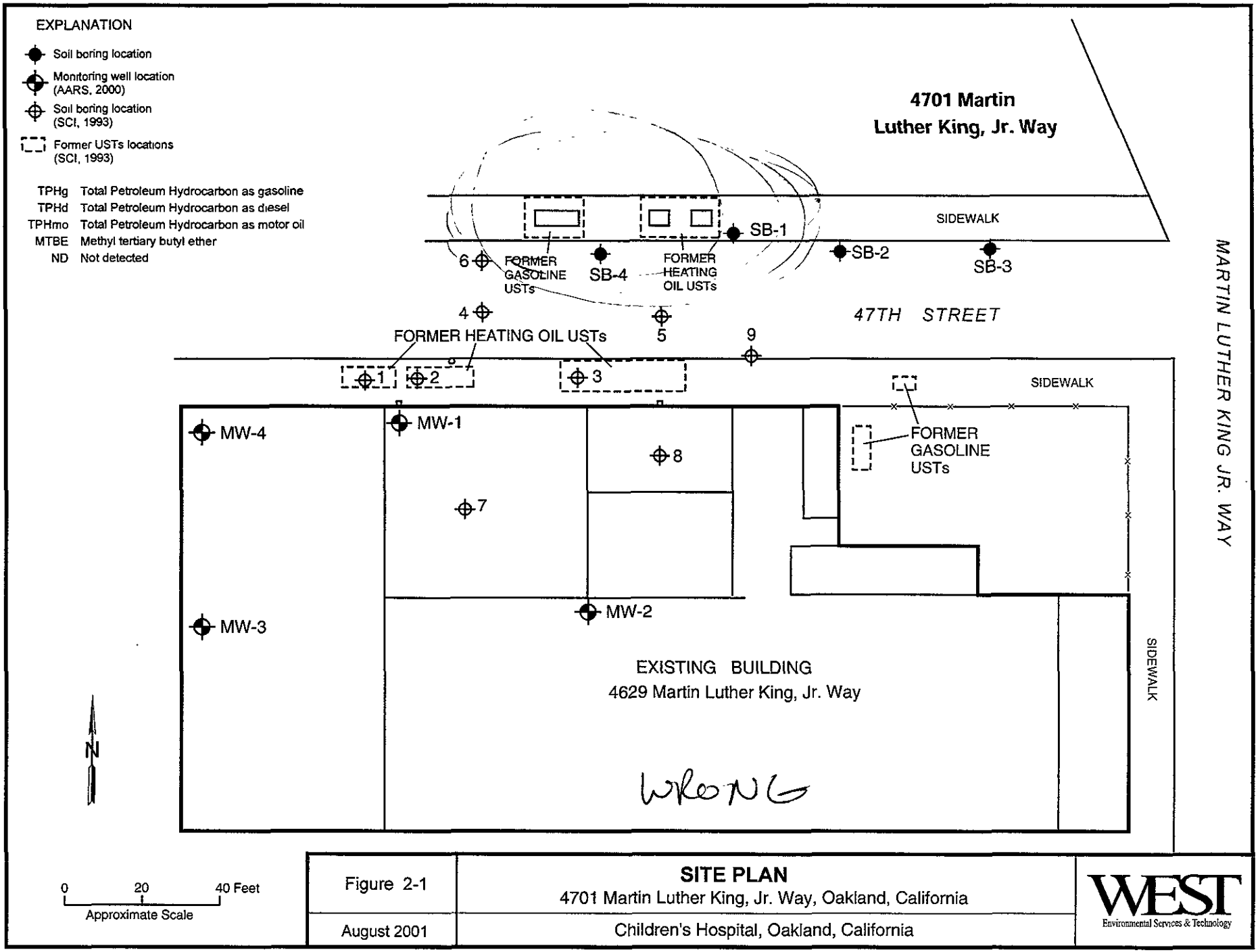


Figure 2-1	**SITE PLAN** 4701 Martin Luther King, Jr. Way, Oakland, California	WEST Environmental Services & Technology
August 2001	Children's Hospital, Oakland, California	

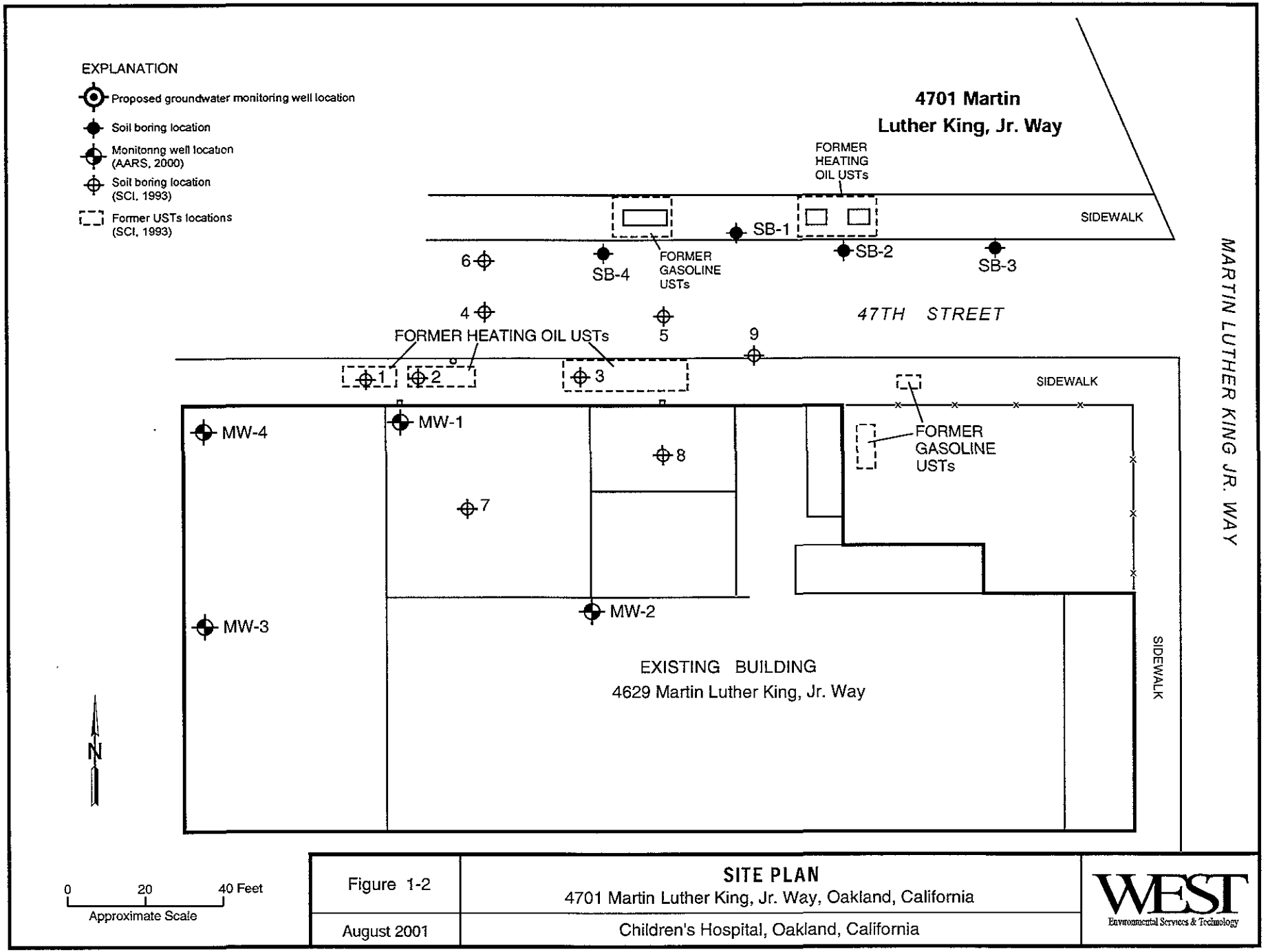


Figure 1-2	**SITE PLAN** 4701 Martin Luther King, Jr. Way, Oakland, California	WEST Environmental Services & Technology
August 2001	Children's Hospital, Oakland, California	

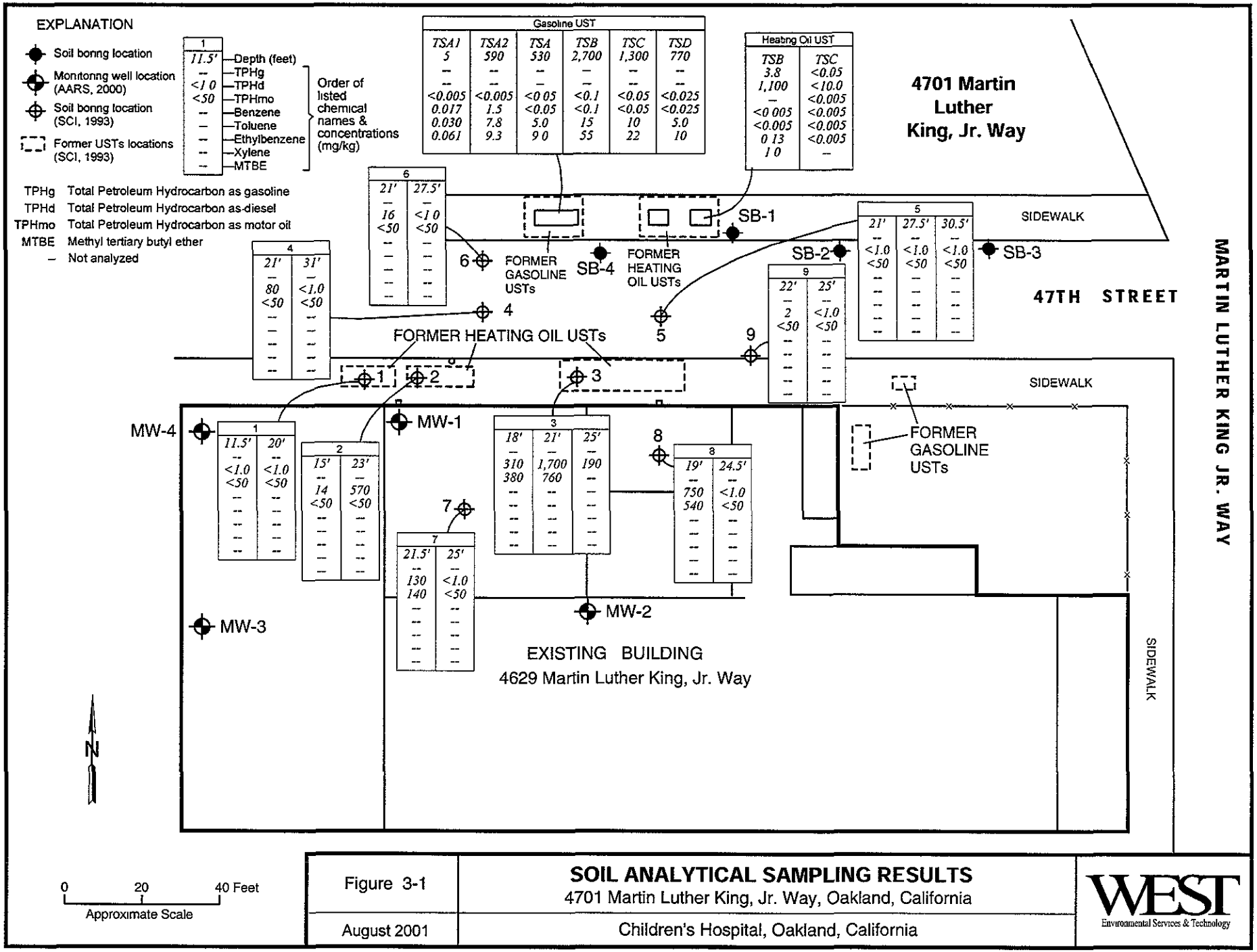


Figure 3-1	**SOIL ANALYTICAL SAMPLING RESULTS** 4701 Martin Luther King, Jr. Way, Oakland, California	WEST Environmental Services & Technology
August 2001	Children's Hospital, Oakland, California	

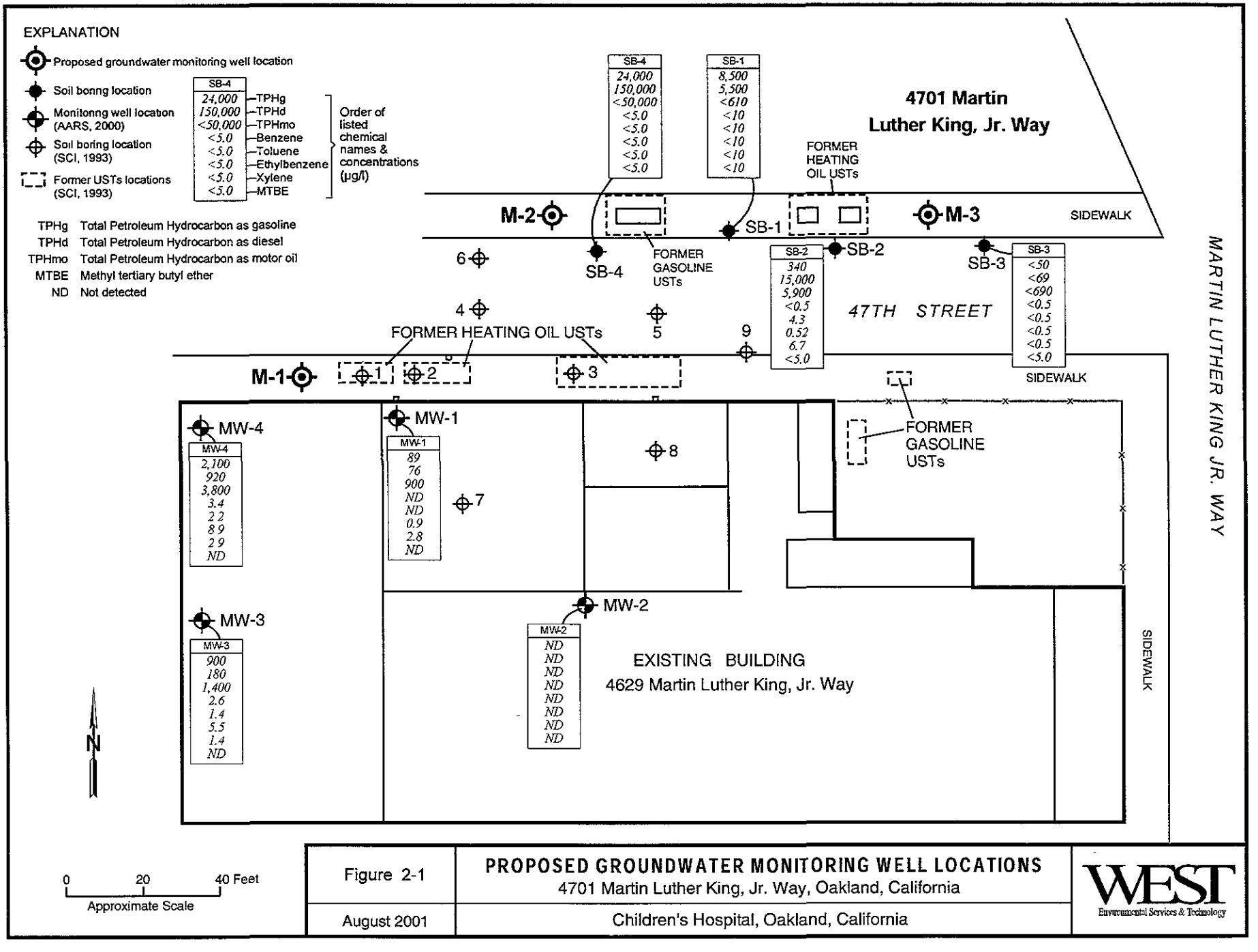


Figure 2-1	**PROPOSED GROUNDWATER MONITORING WELL LOCATIONS** 4701 Martin Luther King, Jr. Way, Oakland, California	WEST Environmental Services & Technology
August 2001	Children's Hospital, Oakland, California	

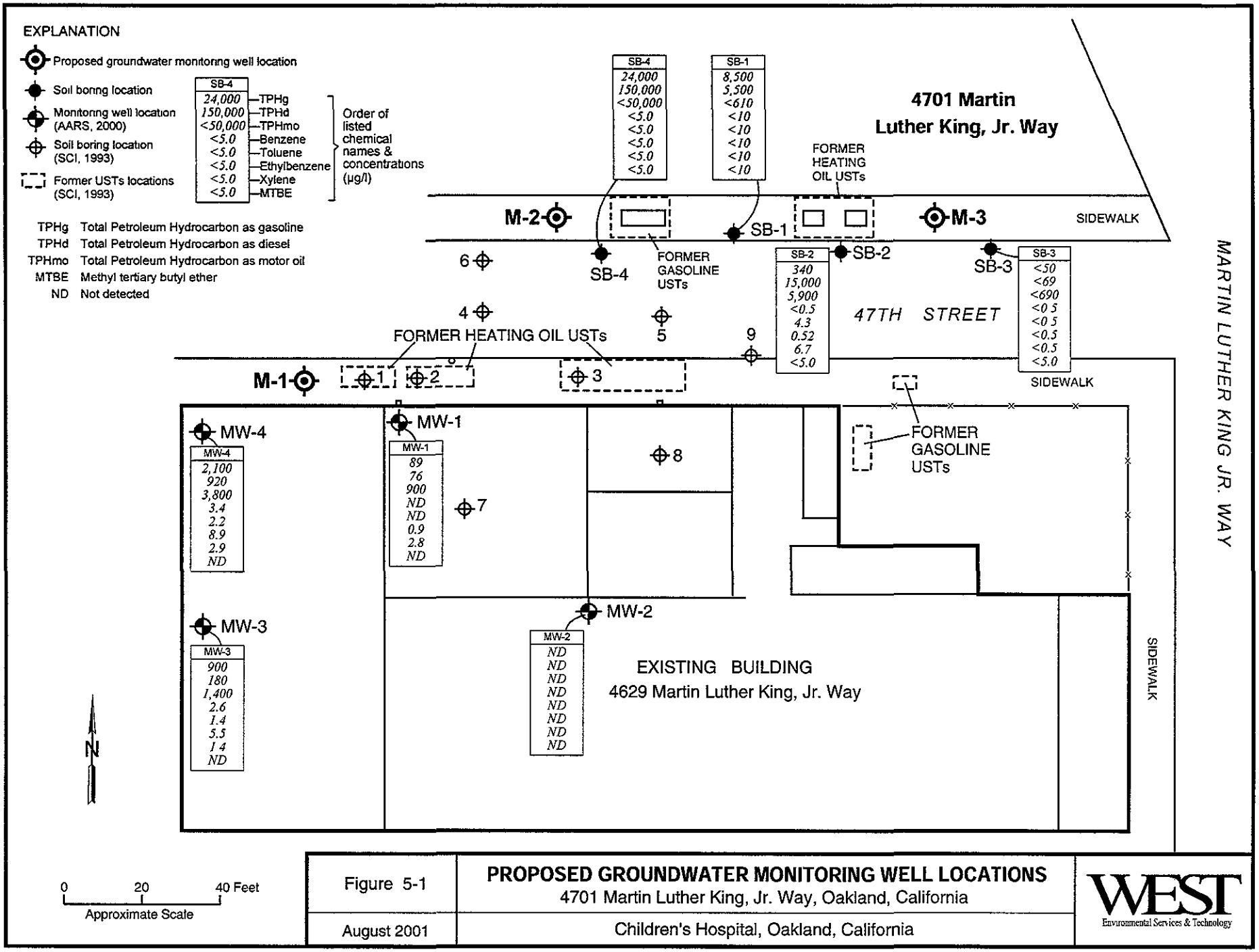


Figure 5-1	**PROPOSED GROUNDWATER MONITORING WELL LOCATIONS** 4701 Martin Luther King, Jr. Way, Oakland, California	WEST Environmental Services & Technology
August 2001	Children's Hospital, Oakland, California	

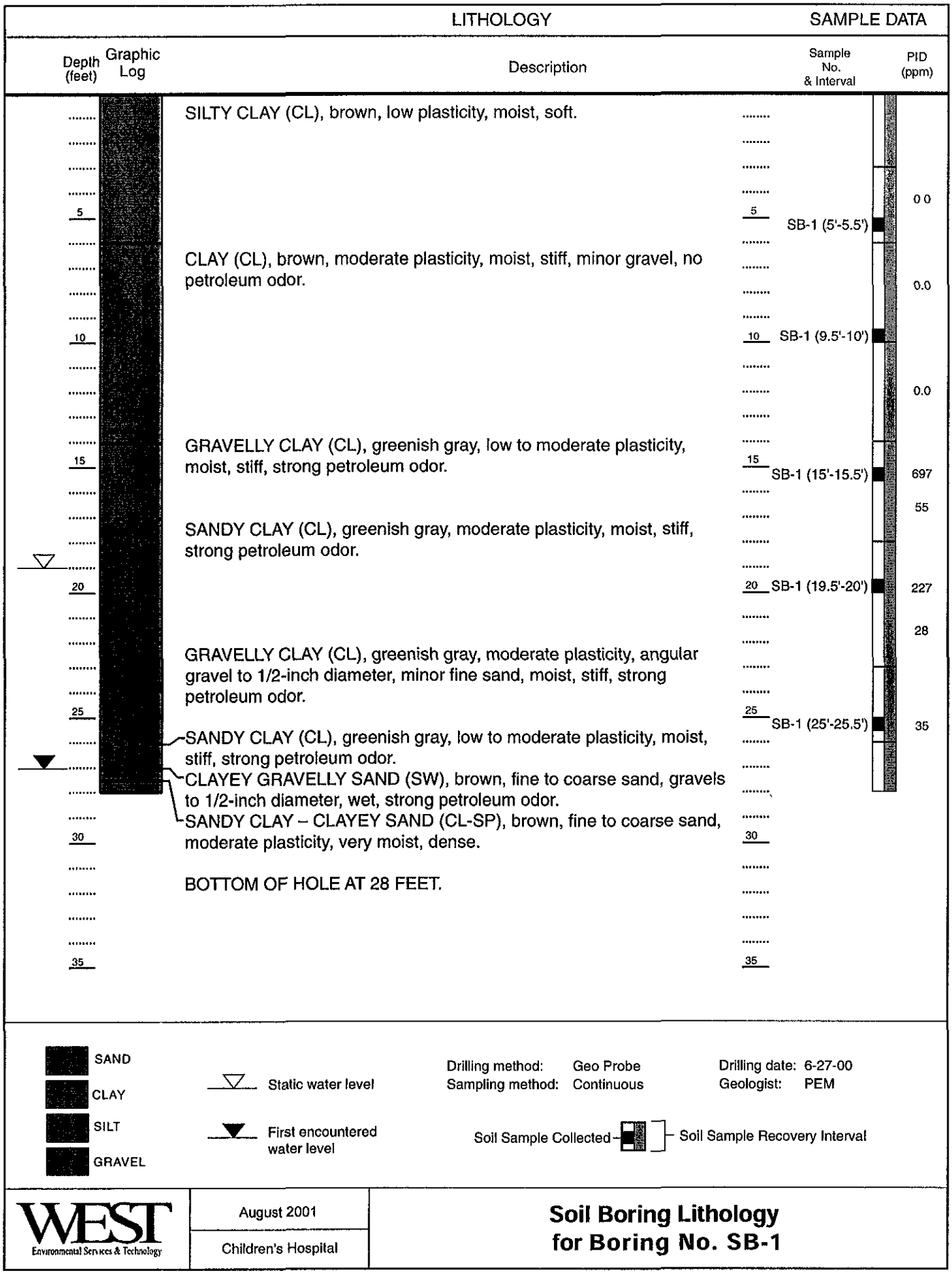
APPENDIX A

LABORATORY ANALYTICAL DATA SHEETS

AND CHAIN-OF-CUSTODY FORMS

APPENDIX B

BORING LOGS


LITHOLOGY
SAMPLE DATA
Depth (feet)
Graphic Log
Description
Sample No. & Interval
PID (ppm)
SILTY CLAY (CL), brown, low plasticity, moist, soft.
CLAY (CL), brown, moderate plasticity, moist, stiff, minor gravel, no petroleum odor.
GRAVELLY CLAY (CL), greenish gray, low to moderate plasticity, moist, stiff, strong petroleum odor.
SANDY CLAY (CL), greenish gray, moderate plasticity, moist, stiff, strong petroleum odor.
GRAVELLY CLAY (CL), greenish gray, moderate plasticity, angular gravel to 1/2-inch diameter, minor fine sand, moist, stiff, strong petroleum odor.
SANDY CLAY (CL), greenish gray, low to moderate plasticity, moist, stiff, strong petroleum odor.
CLAYEY GRAVELLY SAND (SW), brown, fine to coarse sand, gravels to 1/2-inch diameter, wet, strong petroleum odor.
SANDY CLAY – CLAYEY SAND (CL-SP), brown, fine to coarse sand, moderate plasticity, very moist, dense.
BOTTOM OF HOLE AT 28 FEET.
SB-1 (5'-5.5')
SB-1 (9.5'-10')
SB-1 (15'-15.5')
SB-1 (19.5'-20')
SB-1 (25'-25.5')
0.0
0.0
0.0
697
55
227
28
35
SAND
CLAY
SILT
GRAVEL
Static water level
First encountered water level
Drilling method: Geo Probe
Sampling method: Continuous
Drilling date: 6-27-00
Geologist: PEM
Soil Sample Collected
Soil Sample Recovery Interval
WEST
Environmental Services & Technology
August 2001
Children's Hospital
Soil Boring Lithology for Boring No. SB-1

Depth (feet)	Graphic Log	Description	Sample No. & Interval	PID (ppm)
		LITHOLOGY		SAMPLE DATA
		ASPHALT / CONCRETE.		
		SILTY GRAVELLY CLAY (CL), brown to dark brown, low to moderate plasticity, damp to moist, stiff.		
5		SANDY SILT (ML), dark brown, low plasticity, fine to coarse sand, damp, stiff.	SB-2 (5'-5.5')	0.0
10		CLAY (CL), brown, moderate plasticity, with trace sand, moist, stiff, no petroleum odor.	SB-2 (10'-10.5')	0.0
15			SB-2 (15'-15.5')	
		SILTY CLAY (CL), light gray to brown, mottled, low to moderate plasticity, minor fine sand, damp to moist, stiff, no petroleum odor.		0.0
▽ 20		SANDY CLAY (CL), greenish gray with light gray mottling, low to moderate plasticity, minor gravel, iron-oxide filled rootholes, moist, stiff. Gravelly sandy clay lens at 20 feet.		0.0
			SB-2 (23.5'-24')	134
▼ 25		CLAYEY SANDY GRAVEL (GP), greenish gray, gravels to 2-inch diameter, angular, fine to coarse sand, low plasticity, wet at 25 feet, stiff, petroleum odor, with sheen on water.		
		BOTTOM OF HOLE AT 27 FEET.		
30				
35				

SAND
CLAY
SILT
GRAVEL

▽ Static water level

▼ First encountered water level

Drilling method: Geo Probe
Sampling method: Continuous

Drilling date: 6-27-00
Geologist: PEM

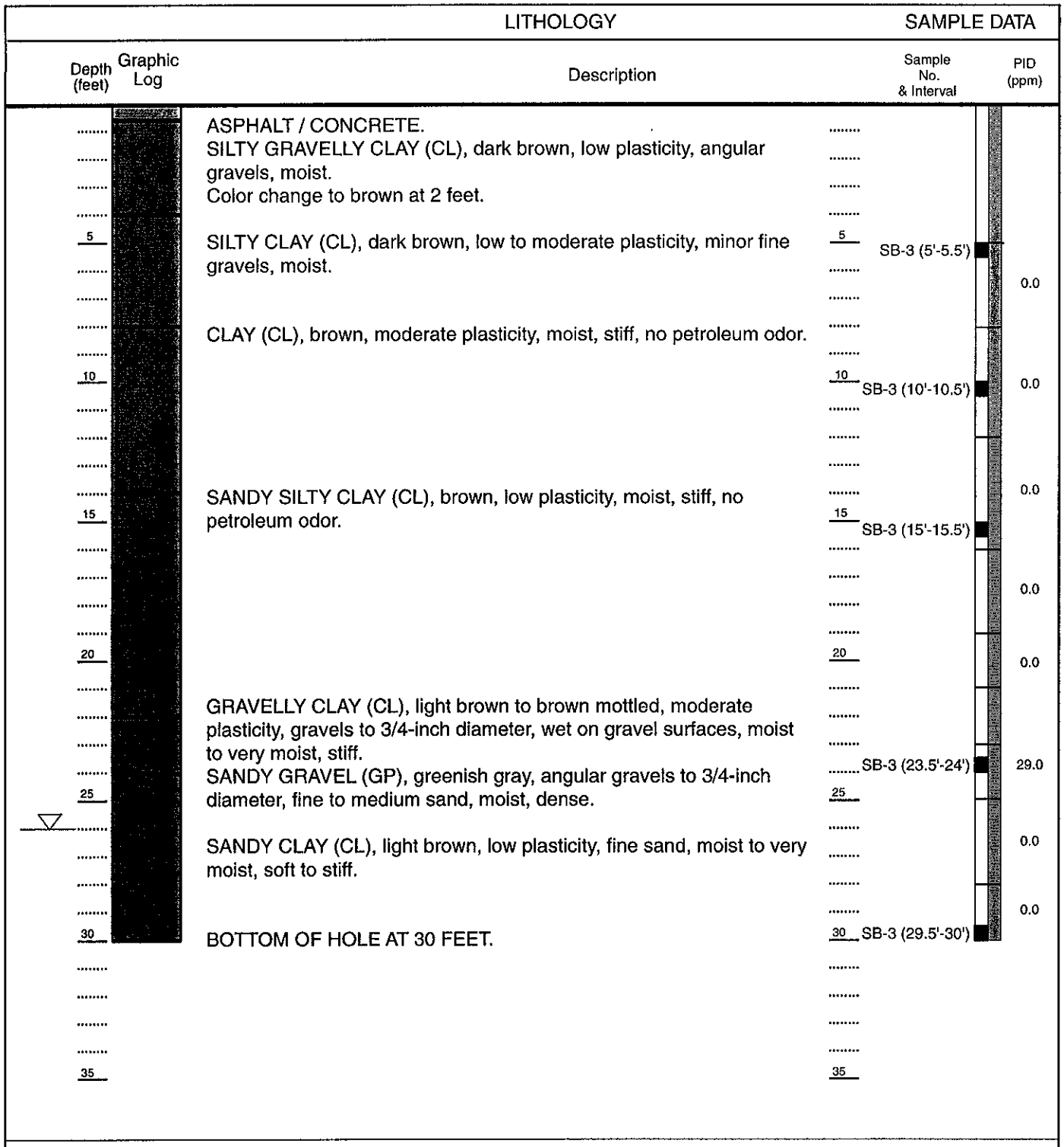
Soil Sample Collected — Soil Sample Recovery Interval

WEST Environmental Services & Technology

August 2001

Children's Hospital

Soil Boring Lithology for Boring No. SB-2

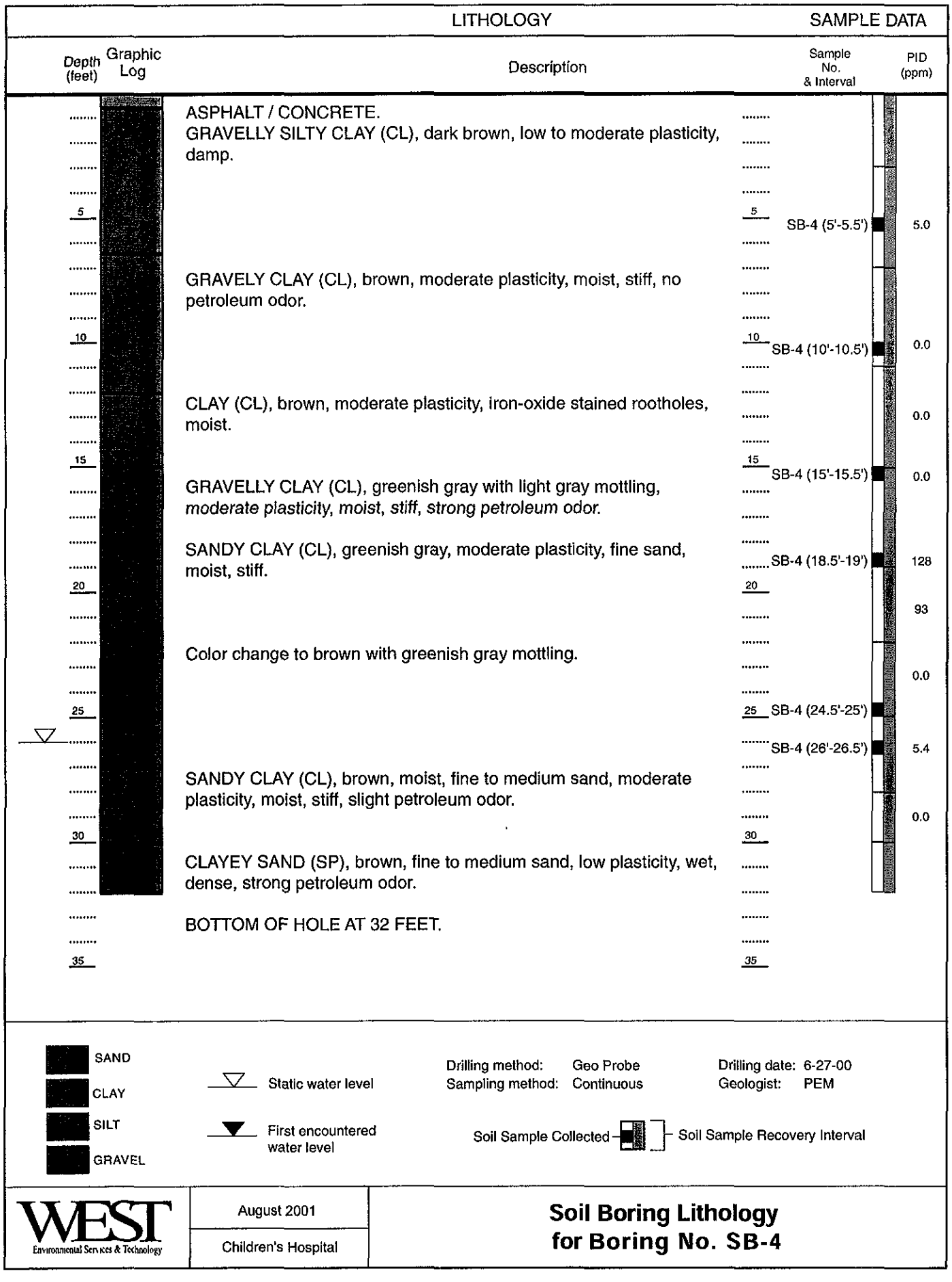


WEST Environmental Services & Technology

August 2001

Children's Hospital

Soil Boring Lithology for Boring No. SB-3



WEST Environmental Services & Technology

August 2001

Children's Hospital

Soil Boring Lithology for Boring No. SB-4