



## Memorandum

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Alameda County  
Environmental Health

**Date:** April 5, 2004

**To:** Matt Field  
JS Bay Center Associates

Robert Wyatt  
Allen Matkins Leck Gamble & Mallory, LLP

**From:** Will Mast & Robert Creps  
PES Environmental, Inc.

**Subject:** Status Report  
Investigation of Subsurface Petroleum Hydrocarbon Residuals  
Bay Center Apartments  
Christie Avenue and 64<sup>th</sup> Street  
Emeryville, California

**PES Project:** 241.055.01.002

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On behalf of JS Bay Center, PES Environmental, Inc. (PES) recently conducted investigations at the Bay Center Apartments Phase I, located at Christie Avenue and 64th Street in Emeryville, California ("Site"). The investigations were conducted in several phases to assess the site for the presence of separate-phase product and overall groundwater conditions. In addition, PES conducted investigations to locate missing monitoring wells MW-1 and MW-2, and compiled historical analytical data and maps of prior sampling locations.

This memorandum describes the sampling methods employed during the investigation, presents tabulated results of historical and recent testing, and provides figures showing the sampling locations.

### INVESTIGATION FOR MISSING WELLS

A drawing prepared during construction of the Bay Center Apartments Phase II, located immediately east of the subject property, appeared to indicate that wells MW-1 and MW-2 had been retained and protected for future groundwater monitoring activities (Harding Lawson Associates, 1994). PES utilized this map and inspected the property to assess for the presence of the wells. It appeared that the wells, if present, were likely beneath the vegetative topsoil within landscaping areas in the alley between Bay Center Apartments Phase I and Phase II.

Several methods were used to evaluate for wells MW-1 and MW-2. Initially, a narrow-diameter fiberglass probe was used to penetrate the soil surface at numerous points in the

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vicinity of the mapped well locations. Given the presence of shallow-rooted birch trees in the vicinity, the results of the probing effort were inconclusive. Subsequently, a hand-held metal detector was used over an approximate 300 square foot area in the vicinity of each mapped well location. Given the presence of irrigation piping and valves, as well as the presence of metallic objects within the shallow fill, the metal detector sounded at numerous locations. One of the locations where the metal detector sounded corresponded with the mapped location of well MW-2. That location was selected for excavation with hand tools.

Using shovel and picks, surficial vegetation was removed and the soil was excavated to a depth of up to 3 feet over an area of 2.5 feet in diameter. Fill materials containing brick and metal were encountered, as well as tree roots and rocks up to 1-foot diameter. Using the construction drawing to identify the probable location of MW-1, excavation activities were repeated at well MW-1. Substantial chunks of asphalt were encountered at this location.

No evidence of monitoring well casings, Christy boxes or other monitoring well features were encountered at either location. At the mapped and excavated location of MW-2, an area consisting primarily of concrete was encountered at the bottom of the excavation area. However, given the presence of nearby irrigation boxes and large rocks, it was not possible to expose the full extent of this feature. Furthermore, it could not be determined whether the concrete was debris or intact and possible representative of backfilling of the well bore after casing removal. Each excavation area was subsequently backfilled using the removed materials.

## **SUBSURFACE INVESTIGATION**

### **Temporary Well Casing Installation**

On March 1 and March 5, 2004, under PES' supervision our subcontractor, Resonant Sonic International (RSI) of Woodland, California, installed four temporary well casings at the site. The locations of the temporary wells (MW-7 through MW-10) are shown on Plate 2.

Prior to initiating drilling activities, PES retained ForeSite of Pleasant Hill, California, to clear the boring locations of subsurface utilities. As an additional precaution, the first few feet of each boring were advanced using hand auger equipment. At approximately 3 feet below ground surface (bgs) at each location, a hard gravel layer was present. This layer was penetrated using the Geoprobe® direct-push drilling rig. The rig advanced a four-foot long, 2-inch diameter Macro-Core sampler with acetate liners to collect continuous soil samples. The lithology of each borehole was logged according to the Unified Soil Classification System (USCS). Additionally, soil samples from each lithologic interval were placed in Ziploc®-style

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baggies, allowed to sit for a period of 15 to 20 minutes, and screened for volatile organic compounds (VOCs) using a photoionization detector (PID). Lithologic logs, including the PID screening results, are provided in Appendix A.

Three of the borings were advanced to 20 feet bgs. One boring (well MW-8) was terminated at 16 feet bgs because: (1) significant quantities of separate-phase petroleum product was present; (2) ample groundwater and evidence of a significant water-bearing zone were present in the soil samples; and (3) a potential confining clay layer was observed at approximately 15 feet bgs.

At each monitoring well, ¾-inch slotted PVC casing was installed from the bottom of the boring to 5 feet bgs. Blank ¾-inch casing was installed from 5 feet bgs to the surface. RMC Lonestar #2/12 sand was placed from the bottom of each borehole to 4 feet bgs. A bentonite pellet seal was placed from 3 to 4 feet bgs. A cement seal was placed from approximately 1 to 3 feet bgs. Each well was completed with a 5-inch diameter Christy box set in concrete to match the surrounding ground surface. Well construction details are summarized in Table 1.

### Subsurface Conditions

The subsurface soil consisted mostly of fill with silt, sand and gravel and fragments of brick, glass, and metal to approximately 16 feet bgs. Native silts and clays were encountered beneath this depth in the three 20-foot borings. Groundwater was generally encountered at 8 to 12 feet bgs. Free product was encountered in wells MW-8 and MW-10.

## **WELL SAMPLING ACTIVITIES**

### Well Development and Sampling

Blaine Tech Services (Blaine Tech) of San Jose, California, was retained to develop and sample the historical wells on January 21, 2004. Well MW-E was not developed or sampled due to a bent casing at approximately 3 feet bgs. Additionally, well MW-3 was not developed or sampled due to the presence of viscous "tar-like" product in the bottom of the well casing. Monitoring wells MW-4, MW-5 and MW-6 were each surged for 15 minutes using a 2-inch surge block. After surging, ten casing volumes of groundwater was purged from each well using positive air displacement. Water quality parameters including temperature, pH, conductivity, and turbidity were logged at regular intervals. After purging was complete, samples were collected from the three wells using new disposable bailers and decanted into laboratory supplied sample containers.

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Groundwater samples were analyzed for benzene, toluene, ethylbenzene and xylenes (BTEX), methyl tert-butyl ether (MTBE) and total petroleum hydrocarbons quantified as gasoline (TPHg) by U.S. EPA Test Method 8260), and total petroleum hydrocarbons quantified as diesel and motor oil (TPHd and TPHmo) by U.S. EPA Test Method 8015M. Analytical results for groundwater are summarized in Table 2.

Well MW-E was developed by Blaine Tech on February 11, 2003. Blaine Tech repeatedly raised and lowered new ½-inch diameter flexible tubing equipped with a check valve to trap water in the tubing as it was being raised and permitting water to enter the tubing as it was being lowered. The motion of the ½-inch tubing within the ¾-inch well allowed the well casing to be simultaneously surged and purged. Approximately 10 casing volumes of groundwater was removed. Also on February 11, Blaine Tech attempted to sample the product in wells MW-3 and RW-1. It was not possible to collect a product sample at well MW-3 because the material was settled on the bottom of the well and was too dense or tarry for the available sampling equipment. Blaine Tech collected a product sample from RW-1 by straining product off the sides of a disposable bailer into laboratory-supplied sample containers. That sample was analyzed for BTEX, MTBE, TPHg, TPHd and TPHmo by the methods described above. Analytical results for groundwater are summarized in Table 2, and product results are summarized in Table 3.

The temporary well casings (MW-7 through MW-10) were developed by Blaine Tech on March 10, 2004 using the ½-inch diameter flexible tubing and check valve method previously employed at MW-E. Approximately 10 casing volumes of groundwater was removed from each well. Well MW-7 dewatered twice during development; the three other wells did not dewater. During development, Blaine Tech recorded water quality parameters including: temperature, pH, electrical conductivity, and turbidity for wells MW-7 and MW-9. Due to the presence of free product that would have fouled the instrument probes, these parameters were not recorded for MW-8 and MW-10. Blaine Tech did make visual observations of water quality for all wells. The water from all wells was noted as turbid, with dark gray fine silt, with a heavy product sheen noted for wells MW-8 and MW-10.

On March 12, 2004, Blaine Tech returned to the site to collect groundwater and product samples, as appropriate, from the new temporary well casings. Grab samples of the product from wells MW-8 and MW-10 were collected before the wells were purged and groundwater samples were collected. Wells MW-7 through MW-9 were purged of three casing volumes of groundwater and sampled using disposable tubing fitted with a check valve. Well MW-10 was purged and sampled with a disposable bailer. The product and groundwater samples were analyzed for BTEX, MTBE and TPHg by the methods described above.

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In addition, a grab groundwater sample and product sample were from well MW-3. To collect the product sample, Blaine Tech used a peristaltic pump to fill a length of ½-inch tubing with product; however, the pump lacked sufficient suction to bring the material all the way to the surface. Blaine Tech scraped the product from the tubing into a laboratory supplied sample container. Blaine Tech also collected a grab groundwater sample from Well MW-E using the peristaltic pump. The product sample from well MW-3 was analyzed for BTEX, MTBE, TPHg, TPHd and TPHmo by the methods described above. The groundwater samples from wells MW-E and MW-3 were analyzed for BTEX, MTBE, and TPHg by the methods described above. Analytical results for groundwater are summarized in Table 2, and product results are summarized in Table 3.

Because insufficient sample volume was collected, Blaine Tech returned to the site on March 16, 2004 to collect additional groundwater sample volume from wells MW-7, MW-8, MW-9, MW-10, MW-3, and MW-E for analysis of TPHmo (TPHd was also quantified).

The results of groundwater samples are presented in Table 2, and results of product samples are presented in Table 3.

#### Well Surveying and Water-Level Gauging

Chapman Land Surveying Inc. of Concord, California, surveyed the top of casing elevations for all monitoring and recovery wells with respect to NAD 83 Datum. Blaine Tech conducted several rounds of water level gauging during sampling events in between January and March 2004. The depth to water/product, product thickness, and calculated water-level elevations for the monitoring wells from the various gauging events are presented in Table 4.

Separate-phase hydrocarbons were observed floating on the water in wells MW-8, MW-10, and RW-1. In addition, an unknown separate-phase hydrocarbon was observed at a depth of approximately 22 feet bgs.

#### Analytical Laboratory Testing Results

Current analytical results for groundwater and product testing are summarized in Tables 2 and 3, respectively. Petroleum hydrocarbons were detected in groundwater samples at the nine wells sampled. Concentrations were significantly lower in wells where no separate-phase product was observed, as expected. In wells MW-3 through MW-6, located around the perimeter of the site, concentrations of BTEX compounds ranged from non-detect to 1.6 µg/L. Concentrations for these compounds in wells MW-7, MW-10, and MW-E, located near the separate phase product but not containing product, ranged as follows: up to 340 µg/l benzene; up to 100 µg/L toluene; up to 14 µg/L ethylbenzene; and up to 56 µg/L total xylenes. MTBE

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was detected in one sample (MW-3) at a concentration of 0.97  $\mu\text{g/L}$ . Concentrations of total petroleum hydrocarbons quantified as gasoline (TPH-g) generally followed the same distribution pattern as benzene, with the exception of MW-3.

Total petroleum hydrocarbons quantified as diesel (TPH-d) were detected in the nine wells where groundwater samples were collected. TPH-d concentrations ranged from 190 micrograms per liter ( $\mu\text{g/L}$ ) in well MW-4 to 2,700  $\mu\text{g/L}$  in well MW-7, in wells where no separate-phase product was observed. In wells with product, the concentration of TPH-d ranged up to 840,000  $\mu\text{g/L}$  (MW-10). Concentrations of TPH quantified as motor oil generally reflected the same trends.

## **COMPILATION OF HISTORICAL ANALYTICAL DATA & MAPS**

Since approximately 1986, several subsurface investigations have occurred at the site to assess soil and groundwater conditions related to prior use of the site as a trucking facility. Historical analytical laboratory results for groundwater are summarized in Tables 5 and 6, and historical results for soil are summarized in Tables 7 and 8. A compilation of soil and groundwater sampling locations at the subject site is shown on Plate 1. Additionally, the approximate locations of the UST excavation areas are shown. However, it should be noted that among the historical environmental reports, there are sometimes wide discrepancies in the dimensions and configuration of the site and tank excavation areas.

Attachments: Table 1 – Construction Details – Existing Wells  
Table 2 – Summary of Analytical Results for Groundwater Samples  
Table 3 – Summary of Analytical Results for Product Samples  
Table 4 – Current Water-Level Elevation Data  
Table 5 – Summary of Historical Analytical Results for Water Samples - TPH, VOCs, Pesticides  
Table 6 – Summary of Historical Analytical Results for Water Samples - Metals & PAHs  
Table 7 – Summary of Historical Analytical Results for Soil Samples – TPH & VOCs  
Table 8 – Summary of Historical Analytical Results for Soil Samples - Metals & PAHs  
Plate 1 – Site Plan  
Appendix A – Logs of Monitoring Wells

**TABLES**

**Table 1**  
**Construction Details - Existing Wells**  
**Bay Center Apartments - Phase I**  
**Emeryville, California**

<b>Well Number</b>	<b>Date Installed</b>	<b>Diameter (in.)</b>	<b>TD (ft. bgs)</b>	<b>Screen (ft. bgs)</b>	<b>Comments</b>
MW-1	12/15/1988	2	25	5 to 20	missing
MW-2	12/15/1988	2	25	5 to 20	missing
MW-3	12/15/1988	2	25	5 to 20	
MW-4	12/16/1988	2	25	5 to 20	
MW-5	12/16/1988	2	25	5 to 20	
MW-6	12/16/1988	2	25	5 to 20	
MW-7	3/1/2004	0.75	20	5 to 15	
MW-8	3/1/2004	0.75	15.6	5 to 16	
MW-9	3/1/2004	0.75	19.1	5 to 15	
MW-10	3/5/2004	0.75	19.7	5 to 20	
MW-E	12/8/1986	2	47	7 to 40	
RW-1	unknown	10	30	? to ?	no well log or construction details found



**Table 2**  
**Summary of Analytical Results for Groundwater Samples**  
**Bay Center Apartments - Phase I**  
**Emeryville, California**

Sample Location	Date Sampled	TPH-d (µg/L)	TPH-mo (µg/L)	TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)
MW-E	3/12/2004	610	NA	810	340	6.1	2.2	7.7	ND (1.0)
	3/16/2004	470	ND (500)	NA	NA	NA	NA	NA	NA
MW-3	3/12/2004	1,600	NA	440	ND (0.5)	ND (0.5)	1.5	ND (1.0)	0.97
	3/16/2004	3,400	3,900	NA	NA	NA	NA	NA	NA
MW-4	1/21/2004	190	ND (500)	ND (50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.50)
MW-5	1/21/2004	830	ND (500)	ND (50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.50)
MW-6	1/21/2004	200	ND (500)	ND (50)	1.1	0.87	ND (0.50)	1.6	ND (0.50)
MW-7	3/12/2004	2,700	NA	490	240	100	14	56	ND (2.5)
	3/16/2004	1,600	1,900	NA	NA	NA	NA	NA	NA
MW-8	3/12/2004	32,000	NA	51,000	19,000	720	2,400	3,300	ND (50)
	3/16/2004	140,000	56,000	NA	NA	NA	NA	NA	NA
MW-9	3/12/2004	890	NA	95	4.7	0.68	ND (0.50)	ND (1.0)	ND (0.50)
	3/16/2004	1,300	1,500	NA	NA	NA	NA	NA	NA
MW-10	3/12/2004	72,000	NA	14,000	4,000	77	200	120	ND (50)
	3/16/2004	840,000	ND (100,000)	NA	NA	NA	NA	NA	NA

**Notes:**

TPH-d = Total petroleum hydrocarbons quantified as diesel.

TPH-mo = Total petroleum hydrocarbons quantified as motor oil.

TPH-g = Total petroleum hydrocarbons quantified as gasoline.

MTBE = Methyl tert-butyl ether.

µg/L = Micrograms per liter.

ND (500) = Not detected at or above the indicated laboratory reporting limit.

NA = Not applicable.

**Table 3**  
**Summary of Analytical Results for Product Samples**  
**Bay Center Apartments - Phase I**  
**Emeryville, California**

<b>Sample Location</b>	<b>Date Sampled</b>	<b>TPH-d (mg/kg)</b>	<b>TPH-mo (mg/kg)</b>	<b>TPH-g (mg/kg)</b>	<b>Benzene (mg/kg)</b>	<b>Toluene (mg/kg)</b>	<b>Ethyl-benzene (mg/kg)</b>	<b>Total Xylenes (mg/kg)</b>	<b>MTBE (mg/kg)</b>
MW-3	3/12/2004	180,000	270,000	130,000	ND (250)	ND (250)	ND (250)	ND (250)	ND (250)
MW-8	3/12/2004	230,000	48,000	200,000	1,800	ND (500)	ND (500)	2,200	2,900
MW-10	3/12/2004	550,000	ND (60,000)	250,000	3,100	ND (500)	810	ND (500)	ND (500)
RW-1	2/11/2004	300,000	230,000	230,000	ND (500)	ND (500)	1,700	1,300	ND (500)

**Notes:**

TPH-d = Total petroleum hydrocarbons quantified as diesel.

TPH-mo = Total petroleum hydrocarbons quantified as motor oil.

TPH-g = Total petroleum hydrocarbons quantified as gasoline.

MTBE = Methyl tert-butyl ether.

mg/kg = Milligrams per kilogram.

ND (500) = Not detected at or above the indicated laboratory reporting limit.

NA = Not applicable.

**Table 4**  
**Current Water-Level Elevation Data**  
**Bay Center Apartments - Phase I**  
**Emeryville, California**

Well Number	Date Measured	Top of Casing Elevation (feet MSL)	Depth to Immiscible Liquid (feet)	Thickness of Immiscible Liquid (feet)	Depth to Water (feet)	Water-Level Elevation (feet MSL)	Comments
MW-3	1/21/2004	16.96	--	--	8.10	8.86	thick tar at ~22 ft. bgs product at well bottom product at well bottom heavy sheen
	2/11/2004		22.12	--	7.90	9.06	
	3/12/2004		NM	--	8.04	8.92	
	3/16/2004		--	--	9.47	7.49	
MW-4	1/21/2004	16.74	--	--	7.04	9.70	
	3/12/2004		--	--	6.90	9.84	
MW-5	1/21/2004	17.11	--	--	8.23	8.88	
	3/12/2004		--	--	9.10	8.01	
MW-6	1/21/2004	17.22	--	--	6.70	10.52	
	3/12/2004		--	--	6.51	10.71	
MW-7	3/10/2004	18.09	--	--	9.98	8.11	pre-well development
	3/12/2004		--	--	9.93	8.16	
	3/16/2004		--	--	10.04	8.05	
MW-8	3/10/2004	18.25	9.79	1.83	11.62	6.63 *	pre-well development
	3/12/2004		8.15	1.17	9.32	8.93 *	
	3/16/2004		--	--	10.02	8.23 *	
MW-9	3/10/2004	18.27	--	--	9.39	8.88	pre-well development
	3/12/2004		--	--	9.38	8.89	
	3/16/2004		--	--	9.42	8.85	
MW-10	3/10/2004	18.21	8.82	0.04	8.86	9.35 *	pre-well development
	3/12/2004		8.24	1.63	9.87	8.34 *	
	3/16/2004		--	--	9.50	8.71 *	

**Table 4  
Current Water-Level Elevation Data  
Bay Center Apartments - Phase I  
Emeryville, California**

Well Number	Date Measured	Top of Casing Elevation (feet MSL)	Depth to Immiscible Liquid (feet)	Thickness of Immiscible Liquid (feet)	Depth to Water (feet)	Water-Level Elevation (feet MSL)	Comments
MW-E	1/21/2004	17.80	--	--	9.95	7.85	
	2/11/2004		--	--	9.90	7.90	
	3/12/2004		--	--	9.92	7.88	
	3/16/2004		--	--	9.90	7.90	
RW-1	1/21/2004	18.32	9.00	1.22	10.22	8.10 *	
	2/11/2004		9.04	0.89	9.93	8.39 *	
	3/12/2004		5.62	1.58	7.20	11.12 *	

**Note:**

Top of casing elevations referenced to mean sea level (MSL), based on preliminary surveyor's report dated March 29, 2004.

SPH - Separate-phase hydrocarbon.

NM - Not measured.

Table 5  
 Summary of Historical Analytical Results for Water Samples - TPH, VOCs, Pesticides  
 Bay Center Apartments - Phase I  
 Emeryville, California

Sampling ID	Date	Source	Total Petroleum Hydrocarbons (mg/L)				Volatile Organic Compounds (mg/L)				Pesticide/PCBs (mg/L)							
			TPH (undifferentiated)	TPH-g	TPH-mo	TPH-d	Benzene	Toluene	Ethylbenzene	Xylenes	DDE	DDD	DDT	A-BHC	B-BHC	G-BHC	D-BHC	PCB
"B"	08/27/86	(1)	0.15	--	--	--	0.002	0.006	NR	0.007	--	--	--	--	--	--	--	
"C"	08/27/86	(1)	0.11	--	--	--	<0.001	0.004	NR	0.005	--	--	--	--	--	--	--	
"D"	08/27/86	(1)	<0.05	--	--	--	<0.001	0.003	NR	0.003	--	--	--	--	--	--	--	
"E"	08/27/86	(1)	<0.05	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
"F"	08/27/86	(1)	2.1	--	--	--	0.068	0.005	NR	0.005	--	--	--	--	--	--	--	
"G"	08/27/86	(1)	3.1	--	--	--	0.052	0.003	NR	0.003	--	--	--	--	--	--	--	
"H"	08/27/86	(1)	<0.05	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
"J"	08/27/86	(1)	<0.05	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
"K"	08/27/86	(1)	7.4	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
"L"	08/27/86	(1)	<0.05	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
#15.5	08/27/86	(1)	<0.05	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
#16	08/27/86	(1)	8.6	--	--	--	<0.001	0.007	NR	5.1	--	--	--	--	--	--	--	
#17	08/27/86	(1)	<0.05	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
#18	08/27/86	(1)	<0.05	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
#21.5	08/27/86	(1)	59	--	--	--	0.009	0.011	NR	0.03	--	--	--	--	--	--	--	
#22	08/27/86	(1)	7.9	--	--	--	<0.001	0.008	NR	0.009	--	--	--	--	--	--	--	
#23	08/27/86	(1)	3.3	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
#26.5	08/27/86	(1)	<0.05	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
#27	08/27/86	(1)	0.54	--	--	--	<0.001	0.014	NR	0.058	--	--	--	--	--	--	--	
#30	08/27/86	(1)	10.2	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
#4	08/27/86	(1)	<0.05	--	--	--	<0.001	<0.003	NR	<0.012	--	--	--	--	--	--	--	
#5	08/27/86	(1)	<0.05	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
#5.5	08/27/86	(1)	<0.05	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
#6	08/27/86	(1)	<0.05	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
#7	08/27/86	(1)	<0.05	--	--	--	<0.001	<0.001	NR	<0.001	--	--	--	--	--	--	--	
MWA	08/27/86	(2)	--	--	--	--	41,000	4,200	NR	22,000	NR	NR	1.1	NR	NR	NR	NR	7.2
W 9	08/27/86	(2)	--	--	--	--	9	NR	NR	NR	NR	NR	1.58	NR	NR	NR	NR	NR
MW-1	05/05/89	(5)	--	24	--	13	16	2.1	0.3	1.2	--	--	--	--	--	--	--	
MW-1	02/06/91	(6)	--	22	--	<0.01	6.8	3.5	0.41	2	--	--	--	--	--	--	--	
MW-1	12/27-28/88	(5)	--	17	--	0.38	8.6	0.94	0.25	0.57	--	--	--	--	--	--	--	
MW-2	05/05/89	(5)	--	0.018	--	0.04	<0.0005	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	
MW-2	02/06/91	(6)	--	<0.01	--	0.83	<0.0003	<0.0003	<0.0003	<0.0006	--	--	--	--	--	--	--	
MW-2	12/27-28/88	(5)	--	0.022	--	0.072	<0.0005	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	
MW-3	05/05/89	(5)	--	1.8	--	0.11	0.064	0.25	0.61	0.11	--	--	--	--	--	--	--	
MW-3	12/27-28/88	(5)	--	4.2	--	4.2	0.077	1.4	0.14	0.56	--	--	--	--	--	--	--	
MW-3P (sludge)	12/28/89	(5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-4	05/05/89	(5)	--	0.018	--	0.06	0.001	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	
MW-4	02/06/91	(6)	--	<0.01	--	<0.01	<0.0003	<0.0003	<0.0003	<0.0006	--	--	--	--	--	--	--	
MW-4	12/27-28/88	(5)	--	0.1	--	<0.01	0.002	0.001	<0.0005	0.002	--	--	--	--	--	--	--	
MW-5	05/05/89	(5)	--	0.005	--	0.09	0.001	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	

**Table 5**  
**Summary of Historical Analytical Results for Water Samples - TPH, VOCs, Pesticides**  
**Bay Center Apartments - Phase I**  
**Emeryville, California**

Sampling ID	Date	Source	Total Petroleum Hydrocarbons (mg/L)				Volatile Organic Compounds (mg/L)				Pesticide/PCBs (mg/L)							
			TPH (undifferentiated)	TPH-g	TPH-mo	TPH-d	Benzene	Toluene	Ethylbenzene	Xylenes	DDE	DDD	DDT	A-BHC	B-BHC	G-BHC	D-BHC	PCB
MW-5	02/06/91	(6)	--	<0.01	--	0.58	0.006	<0.0003	<0.0003	<0.0006	--	--	--	--	--	--	--	--
MW-5	12/27-28/88	(5)	--	0.89	--	0.53	<0.001	<0.001	0.001	0.003	--	--	--	--	--	--	--	--
MW-6	05/05/89	(5)	--	0.031	--	0.14	0.001	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	--
MW-6	02/06/91	(6)	--	0.04	--	0.13	0.008	<0.0003	<0.0003	<0.0006	--	--	--	--	--	--	--	--
MW-6	12/27-28/88	(5)	--	0.052	--	<0.01	0.001	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	--
MW-E	05/05/89	(5)	--	5.4	--	0.1	3.2	0.69	0.097	0.33	--	--	--	--	--	--	--	--
B-1	03/16/92	(7)	--	ND	0.57	0.17	ND	ND	ND	ND	--	--	--	--	--	--	--	--
B-2	03/16/92	(7)	--	0.48	0.33	0.25	0.075	ND	0.005	ND	--	--	--	--	--	--	--	--
F	08/30/87	(4)	--	<0.0005	<1	--	<0.0005	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	--
G	08/30/87	(4)	--	<0.0005	<1	--	<0.0005	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	--
H	08/30/87	(4)	--	0.0719	<1	--	0.0109	0.0065	0.0079	0.0303	--	--	--	--	--	--	--	--
I	08/30/87	(4)	--	<0.0005	<1	--	<0.0005	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	--
J	08/30/87	(4)	--	<0.0005	<1	--	<0.0005	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	--
K	08/30/87	(4)	--	<0.0005	<1	--	<0.0005	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	--
L	08/30/87	(4)	--	<0.0005	<1	--	<0.0005	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	--
MW-A	08/20/86	(3)	--	--	--	--	41000	22000	4200		0.29	0.33	0.48	4.4		0.27		7.2
MW-B	08/20/86	(3)	--	--	--	--	ND	ND	ND		0.31	0.51	0.15	4.6	0.12	0.048	0.25	ND
MW-B	12/30/86	(3)	--	--	--	--	ND	ND	ND		--	--	--	--	--	--	--	--
MW-C	12/19/86	(3)	--	--	--	--	0.061	0.085	0.089		--	--	--	--	--	--	--	--
MW-C	Pre 12/86	(3)	--	--	--	--	22000	ND	ND		0.75	0.42	0.41	0.19	ND	ND	ND	ND
MW-D	12/19/86	(3)	--	--	--	--	ND	ND	ND		--	--	--	--	--	--	--	--
MW-E	12/19/86	(3)	--	--	--	--	4.4	6.6	1.7		--	--	--	--	--	--	--	--
RW	09/02/87	(4)	--	93.724	335	--	47.687	10.14	1.534	7.199	--	--	--	--	--	--	--	--
W-15	08/20/86	(2)	--	--	--	--	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
HMW-1	12/29/89	(7)	--	0.1	<0.01	--	<0.005	<0.005	<0.005	<0.01	--	--	--	--	--	--	--	--
HMW-1	03/24/90	(7)	--	0.085	<0.01	--	<0.0003	<0.0003	<0.0003	0.0003	--	--	--	--	--	--	--	--
HMW-1	04/03/91	(7)	--	<0.03	<5.0	--	<0.0003	<0.0003	<0.0003	<0.0003	--	--	--	--	--	--	--	--
HMW-1	04/01/92	(7)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HMW-2	12/29/89	(7)	--	0.1	12	--	<0.005	<0.005	<0.005	<0.01	--	--	--	--	--	--	--	--
HMW-2	03/24/90	(7)	--	0.05	4.2	--	<0.0003	<0.0003	<0.0003	<0.0004	--	--	--	--	--	--	--	--
HMW-2	04/03/91	(7)	--	<0.03	47	--	<0.0003	<0.0003	<0.0003	<0.0003	--	--	--	--	--	--	--	--
HMW-2	04/01/92	(7)	--	<0.03	5	--	<0.0003	<0.0003	<0.0003	<0.0003	--	--	--	--	--	--	--	--
HMW-3	12/29/89	(7)	--	<0.1	2	--	<0.005	<0.005	<0.005	<0.01	--	--	--	--	--	--	--	--
HMW-3	03/24/90	(7)	--	<0.03	4.8	--	<0.0003	<0.0003	<0.0003	<0.0004	--	--	--	--	--	--	--	--
HMW-3	04/03/91	(7)	--	<0.03	5.8	--	<0.0003	<0.0003	<0.0003	<0.0003	--	--	--	--	--	--	--	--
HMW-3	04/01/92	(7)	--	<0.03	<5.0	--	<0.0003	<0.0003	<0.0003	<0.0003	--	--	--	--	--	--	--	--
HMW-4	03/24/90	(7)	--	0.04	4.2	--	0.004	0.002	<0.0003	0.0005	--	--	--	--	--	--	--	--
HMW-4	04/03/91	(7)	--	<0.03	87	--	<0.0003	<0.0003	<0.0003	<0.0003	--	--	--	--	--	--	--	--
HMW-4	04/01/92	(7)	--	<0.03	49	--	<0.0003	<0.0003	<0.0003	<0.0003	--	--	--	--	--	--	--	--
HMW-5	03/24/90	(7)	--	<0.03	<0.1	--	<0.0003	<0.0003	<0.0003	<0.0003	--	--	--	--	--	--	--	--

**Table 5**  
**Summary of Historical Analytical Results for Water Samples - TPH, VOCs, Pesticides**  
**Bay Center Apartments - Phase I**  
**Emeryville, California**

Sampling ID	Date	Source	Total Petroleum Hydrocarbons (mg/L)				Volatile Organic Compounds (mg/L)				Pesticide/PCBs (mg/L)							
			TPH (undifferentiated)	TPH-g	TPH-mo	TPH-d	Benzene	Toluene	Ethylbenzene	Xylenes	DDE	DDD	DDT	A-BHC	B-BHC	G-BHC	D-BHC	PCB
HMW-5	04/03/91	(7)	--	<0.03	10	--	<0.0003	<0.0003	<0.0003	<0.0003	--	--	--	--	--	--	--	--
HMW-5	04/01/92	(7)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HMW-6	03/24/90	(7)	--	0.04	12	--	0.004	<0.0003	<0.0003	<0.0003	--	--	--	--	--	--	--	--
HMW-6	04/03/91	(7)	--	<0.03	28	--	<0.0003	<0.0003	<0.0003	<0.0003	--	--	--	--	--	--	--	--
HMW-6	08/08/91	(7)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HMW-6	11/21/91	(7)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HMW-6	02/12/92	(7)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HMW-6	04/01/92	(7)	--	<0.03	13	--	0.0007	<0.0003	<0.0003	0.00037	--	--	--	--	--	--	--	--

**Notes:**

mg/L = Milligrams per liter.

TPH-d = Total petroleum hydrocarbons quantified as diesel.

TPH-mo = Total petroleum hydrocarbons quantified as motor oil.

TPH-g = Total petroleum hydrocarbons quantified as gasoline.

-- = Not applicable.

- (1) Aqua Science Engineers, Inc. A Proposal for Installing a Fuel Contamination Recovery System at The Bay Center Project, Emeryville, CA. August 27, 1986.
- (2) Earth Metrics Inc. Soil and Groundwater Contamination Characterization, Bay Center Project, Emeryville, CA. August 20, 1986.
- (3) Groundwater Technology, Inc. Subsurface Hydrocarbon Investigation for the Bay Center Project, Emeryville, CA. March 17, 1987.
- (4) Groundwater Technology, Inc. Report of Further Subsurface Hydrocarbon Investigation. September 1, 1987.
- (5) Groundwater Technology, Inc. Well Replacement and Groundwater Assessment Report, Emeryville, CA. June, 1989.
- (6) Groundwater Technology, Inc. A Quarterly Status Report for the Bay Center Project, Emeryville, CA. April 15, 1991.
- (7) Harding Lawson Associates. Results of Soil and Groundwater Investigation: 1.5-acre portion of The Bay Center Site, Emeryville, CA. May 6, 1992









**Table 7**  
**Summary of Historical Analytical Results for Soil Samples - TPH & VOCs**  
**Bay Center Apartments - Phase I**  
**Emeryville, California**

Sampling ID (depth)	Date	Source	Total Petroleum Hydrocarbons (mg/kg)			Volatile Organic Compounds (mg/kg)			
			TPH-g	TPH-mo	TPH-d	Benzene	Toluene	Ethylbenzene	Xylenes
B-1 (5.0')	03/16/92	(7)	ND	290	95	ND	ND	ND	ND
B-1 (20.0')	03/16/92	(7)	ND	1.5	ND	ND	ND	ND	ND
B-2 (17.5')	03/16/92	(7)	ND	350	140	ND	ND	ND	ND
B-2 (25.0')	03/16/92	(7)	ND	2.6	ND	ND	ND	ND	ND
K-11 (10-15')	09/30/92	(8)	22	180	ND	0.045	0.027	0.36	0.41
K8-13(10-15')	09/30/92	(8)	150	290	ND	0.74	1.9	2.2	4.6
HMW-1 (5.5')	12/01/89	(7)	1	80	<10	ND	0.42	ND	ND
HMW-2 (5.5')	12/01/89	(7)	1	280	<80	ND	0.36	ND	ND
HMW-3 (5.5')	12/01/89	(7)	0.4	640	<10	ND	0.05	ND	ND
HMW-3 (10.5')	12/01/89	(7)	<300	3600	320	ND	0.51	ND	ND

**Notes:**

ND = Not detected; detection limit not specified in report

TPH-d = Total petroleum hydrocarbons quantified as diesel.

TPH-mo = Total petroleum hydrocarbons quantified as motor oil.

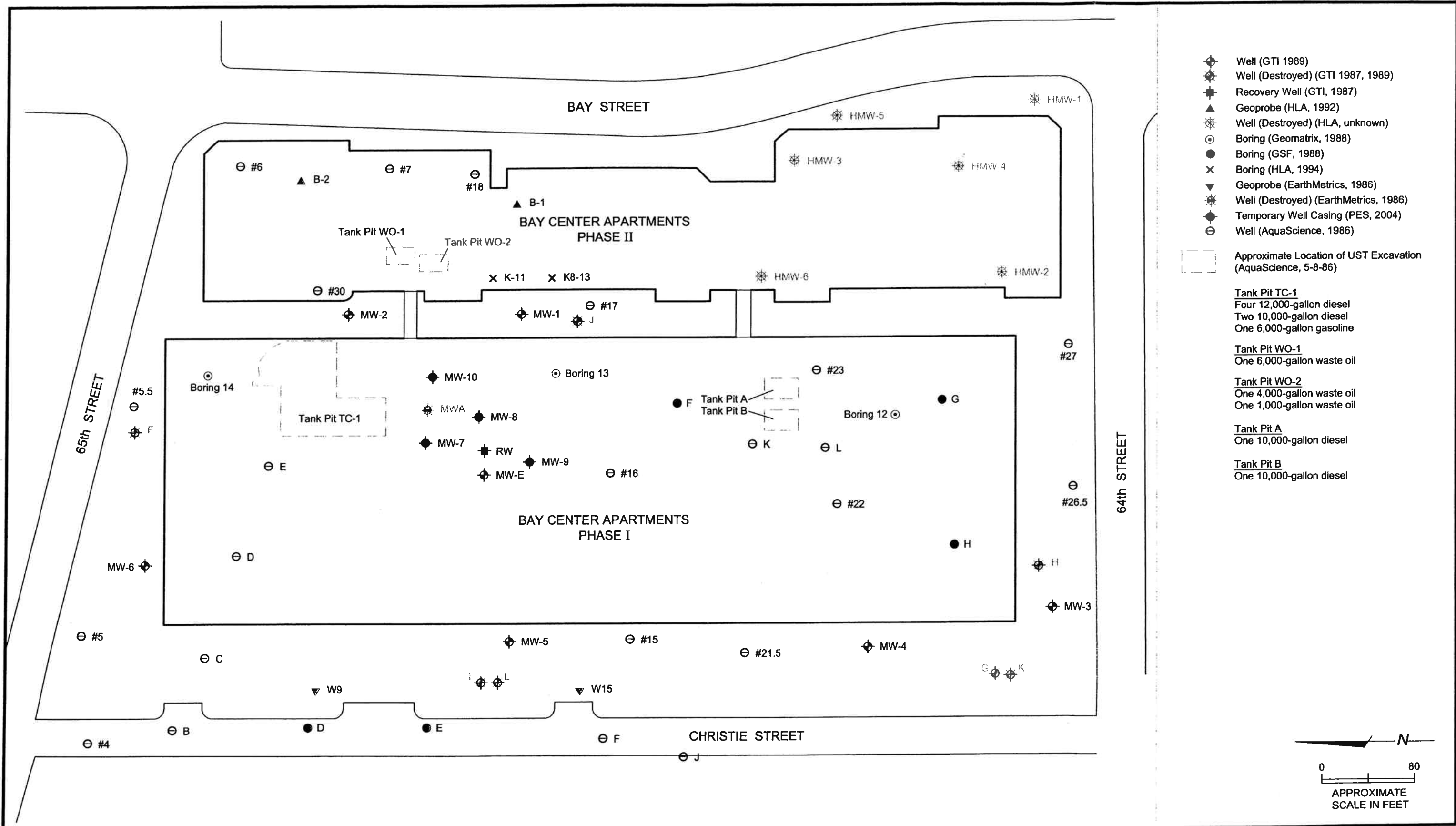
TPH-g = Total petroleum hydrocarbons quantified as gasoline.

(7) Harding Lawson Associates. Results of Soil and Groundwater Investigation: 1.5-acre portion of The Bay Center Site, Emeryville, CA. May 6, 1992

(8) Harding Lawson Associates. Results of Services During Construction, EmeryBay Apartments - Phase II, Emeryville, CA. May 19, 1994.



**PLATE**



- ⊕ Well (GTI 1989)
- ⊕ Well (Destroyed) (GTI 1987, 1989)
- ⊕ Recovery Well (GTI, 1987)
- ▲ Geoprobe (HLA, 1992)
- ⊕ Well (Destroyed) (HLA, unknown)
- ⊕ Boring (Geomatrix, 1988)
- Boring (GSF, 1988)
- × Boring (HLA, 1994)
- ▼ Geoprobe (EarthMetrics, 1986)
- ⊕ Well (Destroyed) (EarthMetrics, 1986)
- ⊕ Temporary Well Casing (PES, 2004)
- ⊕ Well (AquaScience, 1986)

⊕ Approximate Location of UST Excavation (AquaScience, 5-8-86)

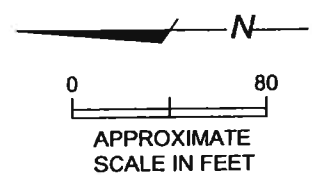
Tank Pit TC-1  
 Four 12,000-gallon diesel  
 Two 10,000-gallon diesel  
 One 6,000-gallon gasoline

Tank Pit WO-1  
 One 6,000-gallon waste oil

Tank Pit WO-2  
 One 4,000-gallon waste oil  
 One 1,000-gallon waste oil

Tank Pit A  
 One 10,000-gallon diesel

Tank Pit B  
 One 10,000-gallon diesel



**APPENDIX A**

**LOGS OF MONITORING WELLS**

USCS CHART BAYCENTER.GPJ PES\_ENV.GDT 4/6/04

MAJOR DIVISIONS				TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LESS THAN 15% FINES	GW	WELL-GRADED GRAVELS WITH OR WITHOUT SAND
			GP	POORLY-GRADED GRAVELS WITH OR WITHOUT SAND
		GRAVELS WITH 15% OR MORE FINES	GM	SILTY GRAVELS WITH OR WITHOUT SAND
			GC	CLAYEY GRAVELS WITH OR WITHOUT SAND
	SANDS MORE THAN HALF COARSE FRACTION IS FINER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 15% FINES	SW	WELL-GRADED SANDS WITH OR WITHOUT GRAVEL
			SP	POORLY-GRADED SANDS WITH OR WITHOUT GRAVEL
		SANDS WITH 15% OR MORE FINES	SM	SILTY SANDS WITH OR WITHOUT GRAVEL
			SC	CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS	ML	INORGANIC SILTS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL	
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL	
		OL	ORGANIC SILTS OR CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL	
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%	MH	INORGANIC SILTS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL	
		CH	INORGANIC CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL	
		OH	ORGANIC SILTS OR CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL	
HIGHLY ORGANIC SOILS		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	

**ABBREVIATION KEY**

- PID (PPM) - Photo Ionization Detector readings in parts per million from field headspace sample screening.
- BLOWS/6" - Blows required to drive sampler 6 inches as indicated on the logs using sample drive hammer weight of 140 pounds falling 30 inches.
- 2.5YR 6/2 - Soil Color according to Munsell Soil Color Charts (1994 Revised Edition)
- feet MSL - feet above Mean Seal Level
- feet BGS - feet below ground surface

**SYMBOLS KEY**

- No Soil Sample Recovered
- Partial Soil Sample Recovered
- Undisturbed Soil Sample Recovered
- Soil Sample Submitted for Laboratory Analysis
- ⊕ Hydropunch Sample
- ▽ First Encountered Groundwater Level
- ▽ Piezometric Groundwater level



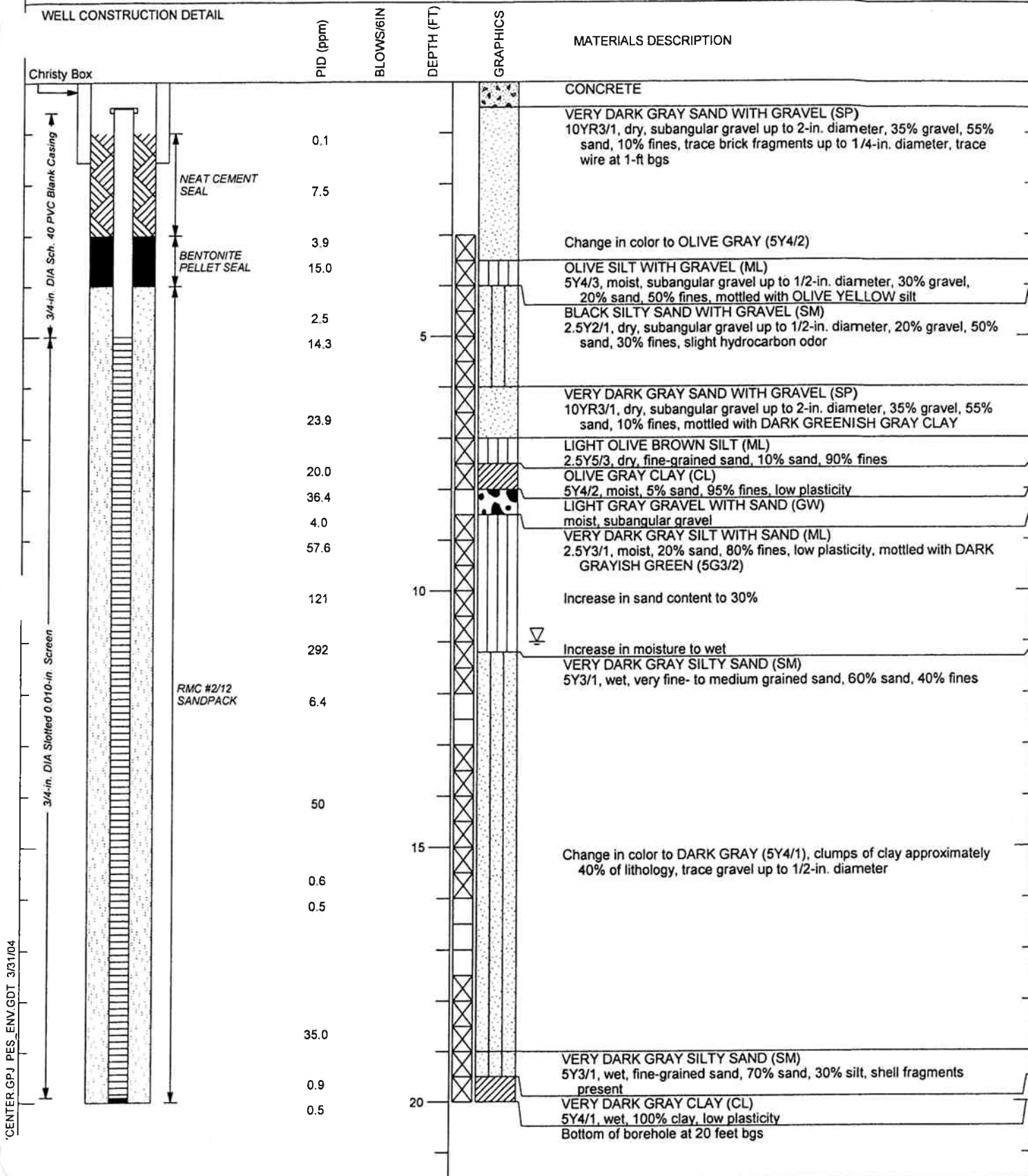
**PES Environmental, Inc.**  
Engineering & Environmental Services

**Unified Soil Classification System Chart**  
Bay Center Apartments  
64th and Christie, Emeryville, CA

PLATE

**A-0**



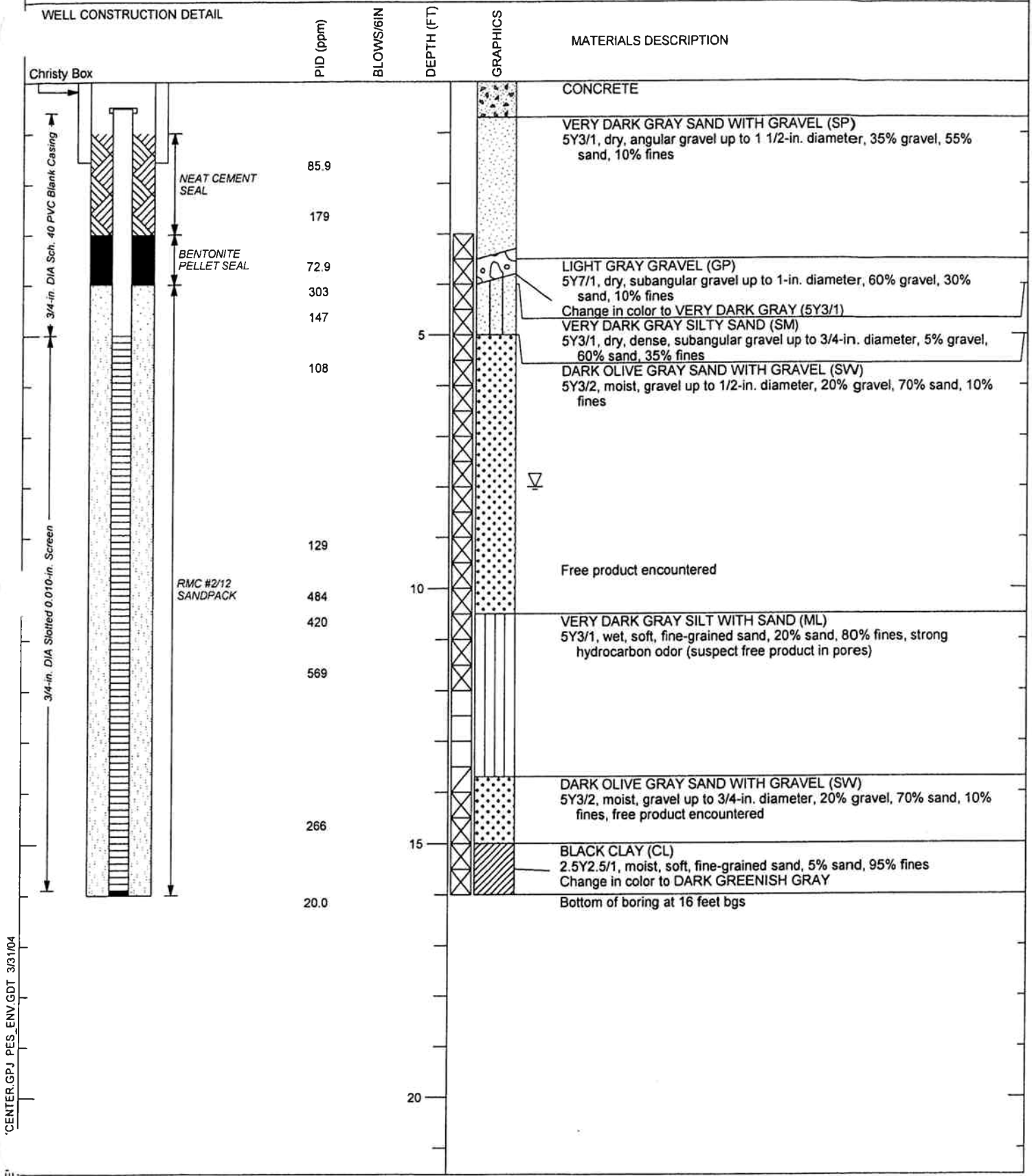


LOG OF BORING#WE CENTER.GPJ PES\_ENV.GDT 3/31/04

PROJECT Bay Center Apartments  
 LOCATION 64th and Christie, Emeryville, CA  
 JOB NUMBER 241.055.01.002  
 GEOLOGIST/ENGINEER Ann Loomis  
 DRILL RIG Geoprobe 5400

DIAMETER OF HOLE 2.5 in.  
 TOTAL DEPTH OF HOLE 20 ft.  
 DATE STARTED 3/1/04  
 DATE COMPLETED 3/1/04

PLATE  
**A-1**

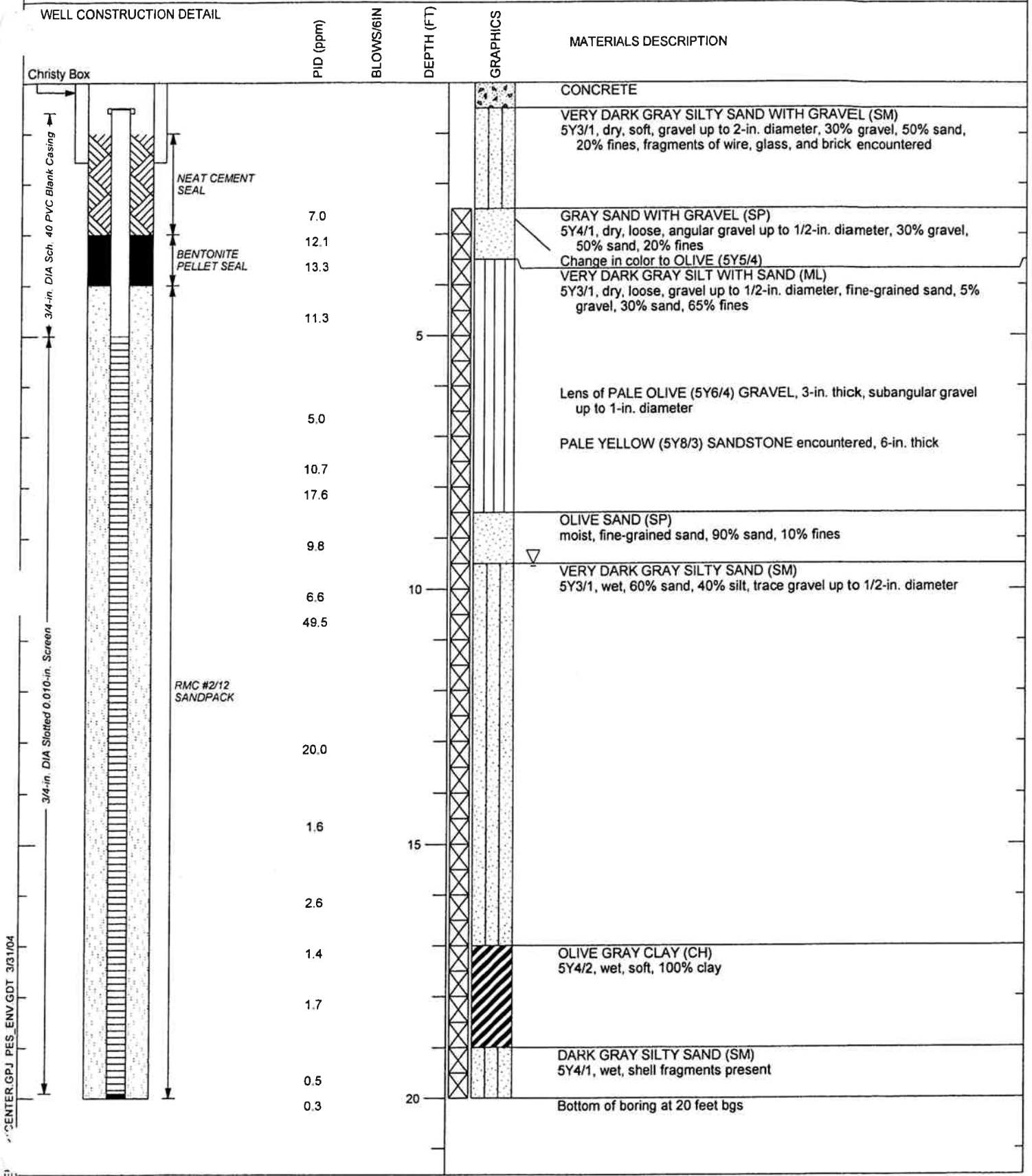


LOG OF BORING#WV CENTER.GPJ PES\_ENV.GDT 3/31/04

PROJECT Bay Center Apartments  
 LOCATION 64th and Christie, Emeryville, CA  
 JOB NUMBER 241.055.01.002  
 GEOLOGIST/ENGINEER Ann Loomis  
 DRILL RIG Geoprobe 5400

DIAMETER OF HOLE 2.5 in.  
 TOTAL DEPTH OF HOLE 16 ft.  
 DATE STARTED 3/1/04  
 DATE COMPLETED 3/1/04

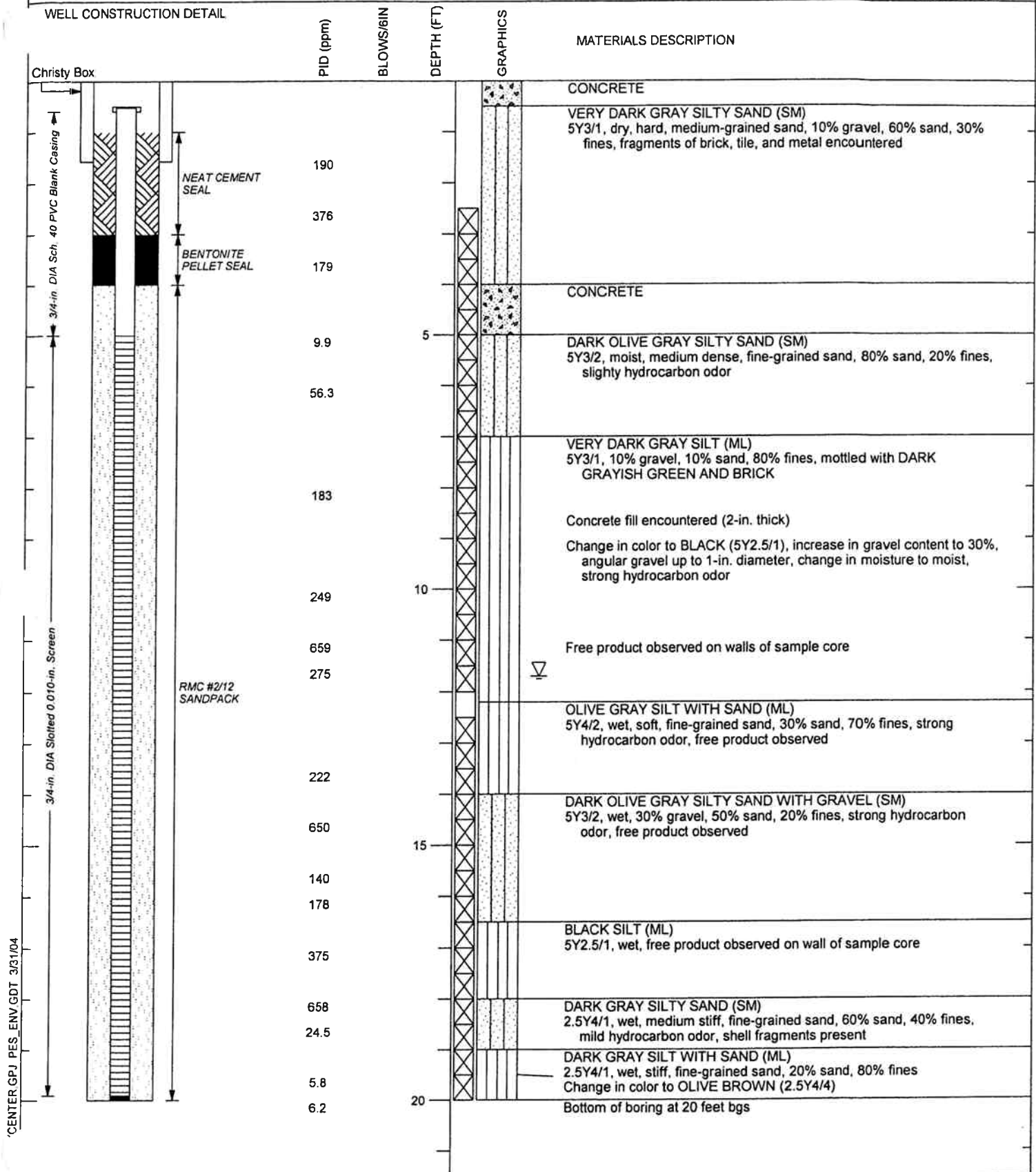
PLATE  
**A-2**



LOG OF BORING/MW/ CENTER.GPJ PES\_ENV.GDT 3/31/04

PROJECT	Bay Center Apartments	DIAMETER OF HOLE	2.5 in.
LOCATION	64th and Christie, Emeryville, CA	TOTAL DEPTH OF HOLE	20 ft.
JOB NUMBER	241.055.01.002	DATE STARTED	3/1/04
GEOLOGIST/ENGINEER	Ann Loomis	DATE COMPLETED	3/1/04
DRILL RIG	Geoprobe 5400		

PLATE  
**A-3**



LOG OF BORING#WE1  
CENTER GPJ PES\_ENV\_GDT 3/31/04

PROJECT Bay Center Apartments  
 LOCATION 64th and Christie, Emeryville, CA  
 JOB NUMBER 241.055.01.002  
 GEOLOGIST/ENGINEER Ann Loomis  
 DRILL RIG Geoprobe 5400

DIAMETER OF HOLE 2.5 in.  
 TOTAL DEPTH OF HOLE 20 ft.  
 DATE STARTED 3/5/04  
 DATE COMPLETED 3/5/04

PLATE  
**A-4**