Iris - Cambria
Environmental, JV

September 27, 2001

Mr. Douglas Herman
Associate Port Environmental Scientist
Port of Oakland
EH&SC Department
530 Water Street
Oakland, California 94607

Re: Workplan Addendum
Gray & Reynolds Development Site
Embarcadero Cove
1275 Embarcadero
Oakland, California

Dear Mr. Herman:

As requested by the Port of Oakland, Iris-Cambria Environmental JV (Iris-Cambria) has prepared this addendum (Workplan Addendum) to the August 13, 2001 *Soil and Groundwater Investigation and Workplan* (the Workplan) prepared by Baseline Environmental Consulting (Baseline) for the property at 1275 Embarcadero, Oakland, California (the Site). The purpose of this Workplan Addendum is to propose final locations for a monitoring well network for the Site.

PROJECT BACKGROUND

For the purposes of the current and proposed investigation, the Site is defined as the property at 1275 Embarcadero, Oakland, California, although the Workplan covered several sites in the industrial and commercial area of Embarcadero Cove in Oakland, California. Currently, a parking lot and a vacant former restaurant occupy the Site. The Port of Oakland (the Port) is the owner of the Site, and Gray & Reynolds has proposed commercial redevelopment the Site.

During the investigations to be completed under the Workplan and Workplan Addendum, the Port expects to characterize soil and groundwater conditions to support site redevelopment activities and to obtain a No Further Action letter from the Alameda County Health Care Services Agency relating to chemicals detected in the subsurface. The investigation will further define the extent and magnitude of petroleum hydrocarbons, including total petroleum hydrocarbons in the gasoline, diesel and motor oil ranges (TPHg, TPHd, TPHmo), benzene, toluene, ethylbenzene, and xylenes (BTEX); methyl tert-butly ether (MTBE); and semi-volatile organic compounds (SVOCs). (Metals?)

Iris Environmental • 1615 Broadway, Ste. 1003 • Oakland, CA 94612 • t. 510.834.4747 • f. 510.834.4199
Cambria Environmental • 1144 65th Street, Ste. B • Oakland, CA 94608 • t. 510.420.0700 • f. 510.420.9170

Past investigations have been completed at the Site, including an environmental assessment report completed by Henshaw Associates and dated April 23, 2001. In their environmental assessment, they reported that an underground storage tank (UST) had been removed from the Site. Requested copies of Sanborn maps + any historical info of UST.

Baseline (Baseline August 13, 2001) completed three borings to groundwater (SB-1, SB-1A, and SB-2) and six shallow borings (RN-A1, A2, A3, A4, B1, and B2) to assess soil and groundwater conditions beneath the Site. Baseline reported encountering groundwater between approximately 5 and 8 feet (ft) below ground surface (bgs) across the Site and the following subsurface conditions:

- Gravelly fill to 2 ft bgs;
- A buried concrete/asphalt foundation at several locations at approximately 2 to 2.5 ft bgs;
- Poorly sorted sand (fill material) between approximately 2.5 and 5 ft bgs; and
- Silty sand to silty clay of moderate to very low estimated permeability beneath the fill to the total explored depth of 11 ft bgs.

RESULTS OF THE AUGUST AND SEPTEMBER 2001 IRIS-CAMBRIA INVESTIGATION

Consistent with the Workplan, Iris-Cambria completed soil borings using direct push technology. Also consistent with the Workplan, Iris-Cambria performed magnetometer and ground penetrating radar (GPR) surveys of the Site to investigate the limits of a subsurface foundation(s) encountered in several site borings. A backhoe was used to investigate subsurface anomalies identified by the magnetometer and ground penetrating radar (GPR) surveys. Results of these activities and our initial conclusions and recommendations are presented below.

Request copy of GPR survey

Soil and Grab Groundwater Sampling

On August 30, 2001, Iris-Cambria collected soil and grab groundwater samples from five borings (SB-A, SB-B, SB-D, SB-E and SB-F). A sixth boring (SB-C) could not be completed due to subsurface obstacles. Soil and groundwater samples were submitted for analysis for petroleum hydrocarbons, MTBE and SVOCs. Petroleum hydrocarbons were quantified as BTEX, TPHg, TPHd and TPHmo. The locations of the Iris-Cambria borings are shown on Figure 1. Soil and groundwater analytical results are summarized in Tables 1, 2, 3 and 4. The tables and figures

also summarize results of a former investigation completed by Baseline (Baseline August 13, 2001).

Chemical compounds detected in soil samples collected from borings SB-A, SB-B, SB-D, SB-E and SB-F included TPHg, TPHd, TPHmo, benzene, toluene and xylenes. Neither MTBE nor any SVOCs were detected in soils during this investigation. The maximum chemical detections in soils found during the Iris-Cambria investigation were: 0.021 milligrams per kilogram (mg/kg) benzene, 0.01 mg/kg toluene, non-detect ethylbenzene, 0.026 mg/kg xylenes, 2.5 mg/kg TPHg, 4.6 mg/kg TPHd, and 16 mg/kg TPHmo.

Figure 1 presents a summary of groundwater sampling results that currently exist for the Site. Groundwater concentrations of TPHd, TPHg, TPHmo, and benzene are presented on Figure 1. The maximum chemical detections in groundwater found during the Iris-Cambria investigation were: 3,200 micrograms per liter (µg/L) benzene, 750 µg/L toluene, 1,200 µg/L ethylbenzene, 3,600 µg/L xylenes, 39,000 µg/L TPHg, 5,800 µg/L TPHd, and 7,200 µg/L TPHmo. MTBE was not detected. Three SVOCs were detected in groundwater including fluoranthene (11 µg/L), naphthalene (370 µg/L) and pyrene (11 µg/L).

Investigation procedures, boring logs, and laboratory data sheets will be presented in the final soil and groundwater investigation report prepared upon completion of well installation, sampling and testing.

Subsurface Feature Investigation (Surveying and Test Pits)

Iris-Cambria performed magnetometer and GPR surveys of the Site to investigate the limits of a subsurface foundation(s) previously encountered at the Site, and to clear proposed boring locations for drilling. During the geophysical surveys (magnetometer and GPR) and utility locating activities, Foresite Utility Locators and Norcal Geophysical identified four subsurface anomalies (see Figure 1 for locations). The geophysical signatures from anomalies 1 and 2 were similar to those typically seen from underground storage tanks (USTs). Anomalies 3 and 4 appeared to be buried debris. To investigate the geophysical anomalies, Iris-Cambria field staff oversaw exploration activities using a backhoe on September 17, 2001. No USTs were found by the backhoe.

At anomaly 1 soil was excavated to approximately 6 ft bgs. Rebar and wires were encountered in the excavation between 2 and 4 ft bgs. Also, a concrete foundation was partially detected at 2 ft bgs at this location. The foundation was cut or broken on the eastern side of the excavation, and missing entirely in the rest of the excavation area. It appears that anomaly 1 was the likely

what records?

location of a former UST that was reportedly removed in 1970 (Henshaw 2001). Consistent with records showing the UST removal in 1970, the backhoe excavations completed by Iris-Cambria at anomaly 1 showed that there is no UST at that location now; and furthermore, that anomaly 1 was very likely the USTs former location.

At anomaly 2, rebar was unearthed prior to encountering a concrete foundation at 2 ft bgs. Anomaly 3 was not excavated because it was very close to anomaly 1 and because excavation at anomaly 1 indicated a UST had previously been removed. In addition, the geophysical signature for anomaly 3 suggested that this anomaly consisted of buried debris. At anomaly 4, soil was excavated to approximately 2 ft bgs, where a hubcap was unearthed. This finding was consistent with the geophysical signature of buried debris.

The geophysical tools were ineffective in delineating the extent of the subsurface foundation at the Site. Existing and future boring data will be used to map the extent of the subsurface foundation. Additional test pits may be necessary to delineate the subsurface foundation depending on the needs of the developer and future redevelopment constraints. Additional efforts to delineate the extent of the subsurface foundation will be reported under separate cover.

INITIAL CONCLUSIONS AND RECOMMENDATIONS

Soils

Based on Iris-Cambria and on Baseline data, maximum chemical concentrations in soil were detected near anomaly 1, the likely location of a former UST at the Site (Baseline detected 500 mg/kg in boring SB-1A at 5 ft bgs). All other detection of chemical compounds in soils at the Site were limited and found at low concentrations. Soils were sampled between 1 and 8 ft bgs because groundwater is shallow at the Site. Except for sample SB-1A-5, all ranges of TPH in soil were less than 5 mg/kg and benzene was at or below 0.021 mg/kg. These data suggest that groundwater is the principal medium that has been impacted at the Site.

Groundwater

Current site data suggest that chemicals in groundwater are restricted to the northeastern portion of the Site, near the likely former UST location identified as anomaly 1 during the geophysical survey. Chemical concentrations detected in groundwater attenuate rapidly between the location of anomaly 1 and the Bay. All ranges of TPH and benzene were used to illustrate the distribution of chemical constituents in local groundwater as shown on Figure 1. These are the

most commonly detected compounds and the compounds detected at the highest concentrations at the Site. All detections are reported on the associated data tables (Tables 3 and 4).

The extent of chemical detections appear generally well defined and decline rapidly to the south, west and east of the likely former UST location. This pattern of attenuation away from the likely former UST location will be confirmed by installation and sampling of monitoring wells at the Site. The additional monitoring well installation and proposed boring are discussed below.

Groundwater Flow Direction

Generally, groundwater is expected to flow south-southeast from the Site toward the Bay, consistent with the overall topography in the site vicinity. However, the topography in the northeastern portion of the Site (near boring SB-1) slopes downward to the north, suggesting that there could be some local deviations from the overall groundwater flow pattern. Additionally subsurface conduits (including storm sewer piping) beneath Embarcadero could be affecting local groundwater flow patterns. Groundwater elevation data from the proposed monitoring wells will be used to map local groundwater flow patterns at the Site.

PROPOSED MONITORING WELL AND BORING LOCATIONS

Consistent with the Workplan, Iris-Cambria proposes to install four groundwater monitoring wells at the Site. Iris-Cambria has revised the proposed monitoring well locations (MW-1 through MW-4) based on the results of the data from the August and September 2001 investigation. The revised proposed monitoring well locations are shown on Figure 1. Our rationale for the placement of the wells shown on Figure 1 is presented below. The well installation and sampling procedures were previously presented in the August 2001 Baseline Workplan prepared for the Site.

Rationale for Monitoring Well Placement:

Monitoring well locations were selected to further define the extent of chemical compounds in groundwater at and surrounding the location of the likely former UST at the Site. Furthermore, monitoring wells locations were selected to provide groundwater elevation data that will be used to understand local groundwater flow patterns. Proposed monitoring well nomenclature is as follows.

Well MW-1 - Potential Source Area Well: Iris-Cambria proposes installation of monitoring well MW-1 near SB-1. This is the location where elevated chemical concentrations were

most commonly detected compounds and the compounds detected at the highest concentrations at the Site. All detections are reported on the associated data tables (Tables 3 and 4).

The extent of chemical detections appear generally well defined and decline rapidly to the south, west and east of the likely former UST location. This pattern of attenuation away from the likely former UST location will be confirmed by installation and sampling of monitoring wells at the Site. The additional monitoring well installation and proposed boring are discussed below.

Groundwater Flow Direction

Generally, groundwater is expected to flow south-southeast from the Site toward the Bay, consistent with the overall topography in the site vicinity. However, the topography in the northeastern portion of the Site (near boring SB-1) slopes downward to the north, suggesting that there could be some local deviations from the overall groundwater flow pattern. Additionally subsurface conduits (including storm sewer piping) beneath Embarcadero could be affecting local groundwater flow patterns. Groundwater elevation data from the proposed monitoring wells will be used to map local groundwater flow patterns at the Site.

can this be confirmed?

PROPOSED MONITORING WELL AND BORING LOCATIONS

Consistent with the Workplan, Iris-Cambria proposes to install four groundwater monitoring wells at the Site. Iris-Cambria has revised the proposed monitoring well locations (MW-1 through MW-4) based on the results of the data from the August and September 2001 investigation. The revised proposed monitoring well locations are shown on Figure 1. Our rationale for the placement of the wells shown on Figure 1 is presented below. The well installation and sampling procedures were previously presented in the August 2001 Baseline Workplan prepared for the Site.

Rationale for Monitoring Well Placement

Monitoring well locations were selected to further define the extent of chemical compounds in groundwater at and surrounding the location of the likely former UST at the Site. Furthermore, monitoring wells locations were selected to provide groundwater elevation data that will be used to understand local groundwater flow patterns. Proposed monitoring well nomenclature is as follows.

Well MW-1 - Potential Source Area Well: Iris-Cambria proposes installation of monitoring well MW-1 near SB-1. This is the location where elevated chemical concentrations were

detected in groundwater during the initial phase of investigation. This is the location that appears to have been the site of the former UST reportedly removed from the Site in 1970.

Well MW-2 - South-southwest of Well MW-1: Monitoring well MW-2 will be installed south-southwest of MW-1. Installation of well MW-2 will be approximately 50 ft from the likely former UST location to assess the extent of chemical migration toward the Bay.

Well MW-3 - West of the Well MW-1: To further define chemical detections found during the initial phase of investigation, monitoring well MW-3 will be installed approximately 50 ft west of proposed monitoring well MW-1.

Well MW-4 - North-northeast of Well MW-1: This proposed well location will serve many purposes. Proposed well MW-4 will further define the extent of chemical concentrations to the north-northeast of well MW-1. Located adjacent to the storm sewer, well MW-4 will help assess whether the storm sewer is contributing to chemical migration at the Site. Because the topography northeast of well MW-1 slopes away from the Bay, well MW-4 will provide groundwater elevation data to estimate the groundwater flow direction in this portion of the Site.

We are prepared to begin fieldwork upon receipt of your approval of this Workplan Addendum. If you have any questions or comments, please feel free to contact Bob Schultz at (510) 420-3341 or Bob Clark-Riddell at (510) 420-3303. Thank you in advance for your consideration.

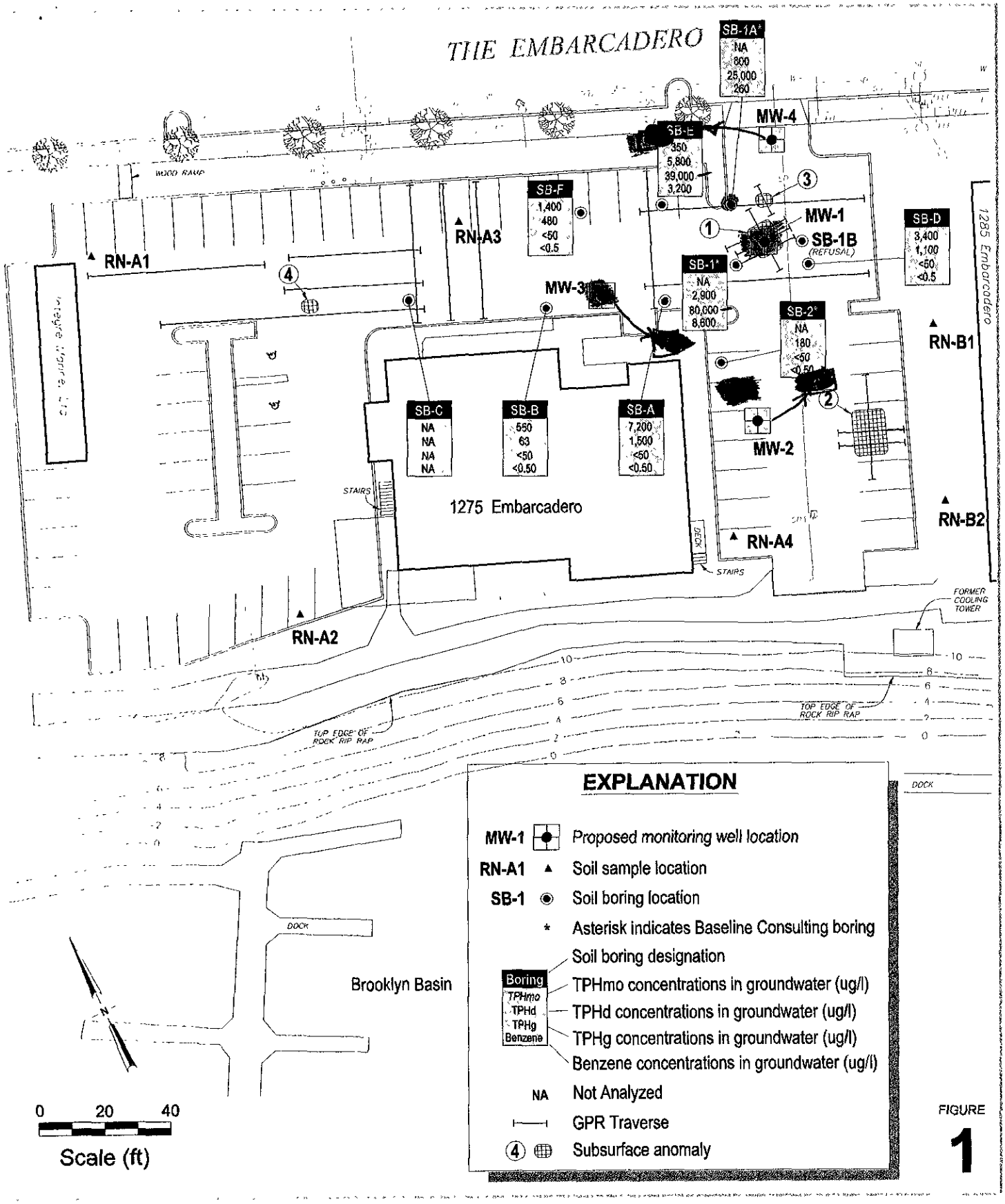
Sincerely,
Iris-Cambria Environmental JV

Robert W. Schultz, R.G.
Senior Project Geologist

Adrienne LaPierre
Principal Toxicologist

Figures: 1 – Hydrocarbon Concentrations in Groundwater and Proposed Monitoring Well and Boring Locations

Tables: 1 – Soil Analytical Data – Lighter Range Petroleum Hydrocarbons and MTBE – 1275 Embarcadero, Oakland, CA
2 – Soil Analytical Data – Heavier Range Petroleum Hydrocarbons and SVOCs – 1275 Embarcadero, Oakland, CA
3 – Groundwater Analytical Data – Lighter Range Petroleum Hydrocarbons and MTBE – 1275 Embarcadero, Oakland, CA
4 – Groundwater Analytical Data - Heavier Range Petroleum Hydrocarbons and SVOCs – 1275 Embarcadero, Oakland, CA



H:\PORT OF OAKLAND\EMBARCADERO COVE\FIGURES\HC-CONCS.DWG

FIGURE
1

Port of Oakland
Embarcadero Cove
Oakland, California

CAMBRIA

Hydrocarbon Concentrations in Grab Groundwater and Proposed Monitoring Well Locations

CAMBRIA

Table 1: Soil Analytical Data - Lighter Range Petroleum Hydrocarbons and MTBE - 1275 Embarcadero, Oakland, CA

Sample ID	Date Sampled	Sample Depth (ft)	TPH(g)	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
			mg/kg					
Baseline Samples								
RN-A1-1.5	05/01/01	1.5	--	< 0 005	< 0.005	< 0.005	< 0 005	< 1.0
RN-A2-1.0	05/01/01	1.0	--	< 0.005	< 0.005	< 0 005	< 0.005	< 1 0
RN-A3-0.5	05/01/01	0.5	--	< 0.005	< 0.005	< 0.005	< 0 005	< 1.0
RN-A4-1.0	05/01/01	1.0	--	< 0.005	< 0 005	< 0 005	< 0.005	< 1 0
RN-B1-1.0	05/01/01	1.0	--	< 0.005	< 0.005	< 0 005	< 0 005	< 1.0
RN-B2-1.0	05/01/01	1.0	--	< 0.005	< 0.005	< 0.005	< 0.005	< 1 0
SB-1-0.75	05/01/01	0.75	< 1.1	< 0.0056	< 0.0056	< 0.0056	< 0 0056	--
SB-1-3.0	05/01/01	3 0	< 1 0	0.013	< 0 0052	< 0.0052	< 0.0052	--
SB-1A-0	05/02/01	0.0	< 1.1	< 0.0054	< 0.0054	< 0 0054	< 0 0054	--
SB-1A-5	05/02/01	5.0	500	< 0.130	1.1	5.0	12 0 a	--
SB-1B-1	05/02/01	1 0	< 1 0	< 0.005	< 0 005	< 0 005	0.0074 a	--
SB-2-1.0	05/01/01	1.0	< 98	< 0.0049	< 0.0049	< 0.0049	< 0.0049	--
SB-2-4.0	05/01/01	4.0	< 1.1	< 0.0054	< 0 0054	< 0.0054	< 0 0054	--
Cambria Samples								
SB-A-3.5	08/30/01	3.5	< 1.0	< 0.005	< 0 005	< 0 005	< 0 005	< 1 0
SB-B-3.5	08/30/01	3.5	< 1 0	< 0.005	< 0.005	< 0.005	< 0.005	< 1.0
SB-D-3.5	08/30/01	3.5	< 1.0	< 0.005	< 0.005	< 0.005	< 0 005	< 1 0
SB-E-3.5	08/30/01	3.5	1.4	0.014	0.0080	< 0.005	0.026	< 0.05
SB-F-3.5	08/30/01	3.5	2.5	0 021	0.010	< 0.005	0 005	< 0.05

Abbreviations and Methods:

mg/kg = Milligrams per kilogram, equivalent to parts per million (ppm)

-- = Not available, not analyzed, or does not apply

TPHg = Total petroleum hydrocarbons as gasoline by modified EPA Method 8015

Benzene, toluene, ethylbenzene, and xylenes by EPA Method 8020

MTBE = Methyl tert-butyl ether by EPA Method 8020

Notes:

Only those compounds above laboratory reporting limits are shown

a = Only m,p - Xylenes are reported; see analytical results for o - Xylenes

CAMBRIA

Table 2: Soil Analytical Data - Heavier Range Petroleum Hydrocarbons and SVOCs - 1275 Embarcadero, Oakland, CA

Sample ID	Date Sampled	Sample Depth (ft)	TPH(d)	TPH(mo)	bis(2-ethylhexyl) phthalate	Fluoranthene	2 - methyl naphthalene	Naphthalene	Pyrene
			←			mg/kg			→
Baseline Samples									
RN-A1-1.5	05/01/01	1.5	--	--	--	--	--	< 0 0046	--
RN-A2-1.0	05/01/01	1.0	--	--	--	--	--	< 0 005	--
RN-A3-0.5	05/01/01	0.5	--	--	--	--	--	< 0.005	--
RN-A4-1.0	05/01/01	1.0	--	--	--	--	--	< 0.0046	--
RN-B1-1.0	05/01/01	1.0	--	--	--	--	--	< 0.0049	--
RN-B2-1.0	05/01/01	1.0	--	--	--	--	--	< 0.0047	--
SB-1-0.75	05/01/01	0.75	62	--	< 0.33	< 0.33	< 0 33	< 0 33	< 0.33
SB-1-3.0	05/01/01	3.0	13	--	0 61	< 0 33	< 0 33	< 0 33	< 0.33
SB-1A-0	05/02/01	0.0	240	--	< 6 60	< 6.60	< 6 60	< 6 60	< 6 60
SB-1A-5	05/02/01	5.0	40	--	< 0.33	< 0 33	2 2	2 2	< 0.33
SB-1B-1	05/02/01	1.0	60	--	--	--	--	--	--
SB-2-1.0	05/01/01	1.0	43	--	< 0 33	< 0.33	< 0 33	< 0 33	< 0.33
SB-2-4.0	05/01/01	4.0	43	--	< 0.33	< 0 33	< 0 33	< 0.33	< 0.33
Cambria Samples									
SB-A-3.5	08/30/01	3.5	1.4	5 2	--	< 0 25	--	< 0.25	< 0.25
SB-B-3.5	08/30/01	3.5	< 1.0	< 5.0	--	< 0.062	--	< 0 062	< 0.062
SB-D-3.5	08/30/01	3.5	< 1.0	< 5.0	--	< 0 062	--	< 0.062	< 0 062
SB-E-3.5	08/30/01	3.5	2.4	6.1	--	< 0.062	--	< 0 062	< 0.062
SB-F-3.5	08/30/01	3.5	4.6	16	--	< 0 25	--	< 0 25	< 0.25

Abbreviations and Methods:

mg/kg = Milligrams per kilogram, equivalent to parts per million (ppm)

-- = Not available, not analyzed, or does not apply

TPHd = total petroleum hydrocarbons as diesel by EPA method 8015

TPHd analyses with silica gel clean-up prior to extraction

TPHmo = total petroleum hydrocarbons as motor oil by EPA method 8015

SVOC = semi volatile organic compound

Notes:

Only those compounds above laboratory reporting limits are shown

CAMBRIA

Table 3: Groundwater Analytical Data - Lighter Range Petroleum Hydrocarbons and MTBE - 1275 Embarcadero, Oakland, CA

Sample ID	Date Sampled	Depth to Water (ft bgs)	TPH(g)	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
			µg/L					
Baseline Samples								
SB-1	05/01/01	6.9	80,000	8,600	8,200	3,900	11,000 a	--
SB-1A	05/02/01	6.2	25,000	260	170	760	1,900 a	--
SB-2	05/01/01	5 2	< 50	< 0.5	< 0 5	< 0.5	< 0 5	--
Cambria Samples								
SB-A	08/30/01	8 0	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0
SB-B	08/30/01	7.0	< 50	< 0.5	< 0 5	< 0.5	< 0 5	< 5 0
SB-D	08/30/01	6.5	< 50	< 0 5	< 0.5	< 0 5	< 0.5	< 5 0
SB-E	08/30/01	6.0	39,000	3,200	750	1,200	3,600	< 200
SB-F	08/30/01	6 5	< 50	< 0.5	< 0.5	< 0.5	< 0 5	< 5.0

Abbreviations and Methods:

µg/L = micrograms per liter, equivalent to parts per billion (ppb)

-- = Not available, not analyzed, or does not apply

ft bgs = feet below ground surface

TPHg = Total petroleum hydrocarbons as gasoline by modified EPA Method 8015

Benzene, toluene, ethylbenzene, and xylenes by EPA Method 8020

MTBE = Methyl tert-butyl ether by EPA Method 8020

Notes:

Only those compounds above laboratory reporting limits are shown

a = Only m,p - Xylenes are reported; see analytical results for o - Xylenes

CAMBRIA

Table 4: Groundwater Analytical Data - Heavier Range Petroleum Hydrocarbons and SVOCs - 1275 Embarcadero, Oakland, CA

Sample ID	Date Sampled	Depth to Water (ft bgs)	TPH(d)	TPH(mo)	bis(2-ethylhexyl) phthalate	Fluoranthene	2 - methyl naphthalene	Naphthalene	Pyrene
					µg/L				
Baseline Samples									
SB-1	05/01/01	6.9	2,900	--	< 94	< 94	260	610	< 94
SB-1A	05/02/01	6.2	800	--	<9 6	<9 6	130	170	<9.6
SB-2	05/01/01	5.2	180	--	< 9.7	< 9 7	< 9 7	< 9 7	< 9.7
Cambria Samples									
SB-A	08/30/01	8.0	1,500	7,200	--	< 10	--	< 10	< 10
SB-B	08/30/01	7.0	63	550	--	< 10	--	< 10	< 10
SB-D	08/30/01	6.5	1,100	3,400	--	11	--	< 10	11
SB-E	08/30/01	6 0	5,800	350	--	< 50	--	370	< 50
SB-F	08/30/01	6.5	480	1,400	--	< 10	--	< 10	< 10

Abbreviations and Methods:

µg/L = micrograms per liter, equivalent to parts per billion (ppb)

-- = Not available, not analyzed, or does not apply

ft bgs = feet below ground surface

TPHd = total petroleum hydrocarbons as diesel by EPA method 8015

TPHd analyses with silica gel clean-up prior to extraction

TPHmo = total petroleum hydrocarbons as motor oil by EPA method 8015

SVOC = semi volatile organic compound

SVOC analyses performed by EPA Method 8270C

Notes:

Only those compounds above laboratory reporting limits are shown