Oakland
All-America City
1993

#3978

CITY OF OAKLAND

ENVIRONMENTAL PROTECTION
00 OCT 17 PM 2:40

DALZIEL BUILDING • 250 FRANK H. OGAWA PLAZA, SUITE 5301 • OAKLAND, CALIFORNIA 94612-2034

Public Works Agency
Environmental Services

FAX (510) 238-7286
TDD (510) 238-7644

October 16, 2000

- FP present in wells being removed by Shannon & Wilson
- TPHg release from actual UST
- off & on site contam
- offsite TPH mo, second quarter?
- addnl reports coming

Mr. Barney Chan
Alameda County Environmental Health Services
1131 Harbor Bay Parkway
Alameda, California 94502-6577

Subject: **Third Quarter 2000 Monitoring Report and**
City of Oakland Municipal Service Center
7101 Edgewater Drive Oakland, California

Dear Mr. Chan:

Enclosed are copies of the Third *Quarter 2000 Monitoring Report* prepared by our consultant, Cambria Environmental Technology Inc. for the City of Oakland Municipal Service Center at 7101 Edgewater Drive.

Please call me at 238-6259, if you have any questions or require additional information.

Sincerely,

Joseph A. Cotton
Environmental Program Specialist

cc: Diane Heinz, Port of Oakland

CAMBRIA

September 26, 2000

Mr. Joseph Cotton
City of Oakland, Public Works Agency
Environmental Services Division
250 Frank H. Ogawa Plaza, Ste. 5301
Oakland, California 94612-2034

Re: **Third Quarter 2000 Monitoring Report**
City of Oakland, Municipal Services Center
7101 Edgewater Drive
Oakland, California
Cambria Project #153-1247-023

Dear Mr. Cotton:

As required by the Alameda County Health Care Services Agency (ACHCSA), Cambria Environmental Technology, Inc. (Cambria) has prepared this third quarter 2000 groundwater monitoring report for the above-referenced site. Presented below are the third quarter 2000 activities and results, conclusions, and the anticipated fourth quarter 2000 activities. Groundwater elevations and hydrocarbon concentrations are presented on Figure 1. Analytic results are tabulated in Table 1, and the laboratory analytical report is included as Attachment A. Well sampling forms, which are completed in the field, are included as Attachment B. Our standard field procedures for sampling monitoring wells are included as Attachment C.

THIRD QUARTER 2000 ACTIVITIES AND RESULTS

On August 24, 2000, Cambria gauged and inspected for separate-phase hydrocarbons (SPH) monitoring wells MW-1, MW-2, and MW-5 through MW-17, and backfill wells TBW-1, TBW-3, TBW-4, TBW-5 and TBW-6 (Figure 1). Wells MW-3 and MW-4 were destroyed during the fourth quarter 1999. On August 24 and 25, per the ACHCSA-approved schedule shown below, Cambria collected groundwater samples from all site monitoring wells in the absence of SPH. Select groundwater samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline (TPHg), TPH as diesel (TPHd), TPH as kerosene (TPHk), TPH as motor oil (TPHmo), benzene, toluene, ethylbenzene and xylenes (BTEX), methyl tertiary butyl ether (MTBE), and select bioparameters at McCampbell Analytical of Pacheco, California, a California state-certified laboratory. Silica gel cleanup was used for the TPHd, TPHmo, and TPHk analyses; results of analyses before and after silica gel cleanup are included in Attachment A. The specific analytes for each well are presented below in Table A.

Oakland, CA
San Ramon, CA
Sonoma, CA
Portland, OR

Cambria Environmental Technology, Inc.

1144 65th Street
Suite B
Oakland, CA 94608
Tel (510) 420-0700
Fax (510) 420-9170

Table A - Well Sampling Protocol

Well	Sampling Frequency	Proposed Analytes
MW-1	1st and 3rd Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/ MTBE*, bioparameters
MW-2	1st and 3rd Quarters	TPHd , TPHg/BTEX/MTBE*, bioparameters
MW-3	Not applicable - destroyed	None - destroyed well
MW-4	Not applicable - destroyed	None - destroyed well
MW-5	1st and 3rd Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-6	1st and 3rd Quarters	TPHd, TPHg/BTEX/MTBE*, bioparameters
MW-7	1st and 3rd Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-8	1st, 2nd, 3rd, and 4th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-9	1st, 2nd, 3rd, and 4th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-10	1st, 2nd, 3rd, and 4th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-11	1st, 2nd, 3rd, and 4th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-12	1st, 2nd, 3rd, and 4th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-13	1st, 2nd, 3rd, and 4th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-14	1st, 2nd, 3rd, and 4th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-15	1st, 2nd, 3rd, and 4th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-16	1st, 2nd, 3rd, and 4th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-17	1st, 2nd, 3rd, and 4th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters

*Any positive results for MTBE will be confirmed by re-analysis using EPA Method 8260, except in MW-5. Confirmation by EPA Method 8260 for MW-5 is not necessary due to positive confirmation results in the third quarter 1993.
Bioparameters = Ferrous iron, ORP, DO, total alkalinity, nitrate, and sulfate and conducted only during 1st and 3rd quarters.

Groundwater Flow Direction

Cambria gauged all monitoring wells and the tank backfill wells within a one-hour period on August 24, 2000. The measurements indicate a northwestern groundwater gradient of 0.016 ft/ft toward Damon Slough in the northern portion of the site, and indicate a southwestern groundwater gradient of 0.012 ft/ft toward San Leandro Bay in the southern portion of the site (Figure 1). The flow directions are generally consistent with historical measurements. Groundwater elevation data are presented in Table 1.

Hydrocarbon Distribution in Groundwater

Diesel in Groundwater: The maximum TPHd concentration detected in groundwater was 44,000 µg/l in tank backfill well TBW-3. The analytical laboratory noted that a lighter-than-water immiscible sheen was present in the groundwater samples from TBW-3. As shown in Table 1, onsite wells MW-5 and MW-12 and the offsite perimeter wells MW-13, MW-14, and MW-15 also contain diesel concentrations this quarter (ranging from 1,000 µg/l to 4,800 µg/l) above the San Francisco Airport Ecological Protection Zone Tier I Standard of 640 µg/l.[1] As described in prior quarterly monitoring reports based on laboratory interpretation of chromatograms, diesel concentrations reported in offsite wells are most likely the lighter end of motor oil present in the wells.

Well MW-5 is located adjacent to the active USTs and Building Number 5, approximately 450 ft from San Leandro Bay. The contaminant plume associated with well MW-5 is defined to non-detect limits by downgradient wells MW-7 and MW-11.

Motor Oil in Groundwater: The maximum TPHmo concentration detected in groundwater was 13,000 µg/l in offsite well MW-13 and in well TBW-3. TPHmo concentrations ranging from 1,300 µg/l to 13,000 µg/l were also detected in the offsite perimeter wells MW-9, MW-10, MW-13, MW-14, and MW-15, and in the onsite well MW-12. As described in prior quarterly monitoring reports based on laboratory interpretation of chromatograms, motor oil concentrations reported in onsite wells are most likely the heavier end of diesel present in the wells.

Gasoline in Groundwater: The maximum TPHg concentration detected was 12,000 µg/l in well MW-5. Among the downgradient offsite wells, a maximum of 180 µg/l TPHg was detected in well MW-9. This concentration is below the San Francisco Airport Ecological Protection Zone Tier I Standard acceptable threshold of 3,700 µg/l.[2] TPHg concentrations appear to be defined in the downgradient and crossgradient directions to within acceptable ecological risk thresholds.

Benzene in Groundwater: A maximum benzene concentration of 220 µg/l was detected in well MW-5, adjacent to the active USTs. This was the only analytic result for benzene this quarter that exceeded the acceptable risk thresholds for both the San Francisco Airport Ecological Protection

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[1] Regional Water Quality Control Board, San Francisco Bay Region (RWQCB-SFBR) *Order No. 99-045* for a similar situation at the San Francisco International Airport. Staff comments dated July 16, 1998, signed by Mr. Steven Morse, Chief of the Toxics Cleanup Division, addressed to the SFIA Consolidated Tenant Group.

[2] Regional Water Quality Control Board, San Francisco Bay Region (RWQCB-SFBR) *Order No. 99-045* for a similar situation at the San Francisco International Airport. Staff comments dated July 16, 1998, signed by Mr. Steven Morse, Chief of the Toxics Cleanup Division, addressed to the SFIA Consolidated Tenant Group.

Zone Tier I Standards[3] and the City of Oakland Risk-Based Tier I[4] guidance thresholds for inhalation of indoor air vapors, of 71 and 110 µg/l, respectively.

MTBE in Groundwater: With the exception of the 1,400 µg/l MTBE detected in well MW-5, no MTBE was detected in any of the groundwater samples collected for this quarter's monitoring. The downgradient extent of the MTBE is defined by the non-detect result for well MW-11, located approximately 150 ft downgradient of well MW-5.

Separate-Phase Hydrocarbons: Separate-phase hydrocarbons (SPH) were detected in monitoring wells MW-6 and MW-16, and in backfill wells TBW-1, TBW-3 (sheen), and TBW-5. However, the extent of SPH is defined in the downgradient direction for each of these areas by wells MW-13, MW-14, and MW-17. Cambria is currently removing SPH from tank backfill well TBW-5 using a pneumatic skimmer. SPH in wells MW-6, MW-16, TBW-1 and TBW-3 are being removed with passive skimmers or hydrocarbon-absorbing "pigs" or "socks."

Bioparameter Analyses Results

Cambria analyzed groundwater samples for ferrous iron, total alkalinity, oxidation reduction potential (ORP), dissolved oxygen (DO), nitrate, and sulfate to assess the present level of intrinsic bio remediation. These bioparameters were quantified in all of the monitoring wells analyzed for hydrocarbons. Table B below presents a summary of the chemical reactions and relationships that indicate whether hydrocarbon biodegradation is occurring. Historical analytical results, including TPHg and TPHd concentrations for comparison, are presented in Table 2. A summary and brief interpretation of analytical results for this quarter's sampling are presented below.

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[3] Ibid.

[4] Spence, L., and Gomez, M. *Oakland Risk-Based Corrective Action: Technical Background Document.* Urban Land Redevelopment Program Technical Advisory Committee. May 17, 1999.

provide data & analysis which lead to these conclusions

Table B - Bioparameter Analysis

Bio-parameter	Description of chemical processes and implications of relationship between hydrocarbon and bioparameter concentrations.	Relationship indicating active bio-degradation	Observed relationship this quarter
ORP	The oxidation-reduction potential (ORP) of groundwater is a measure of electron activity and is an indicator of the relative tendency of a solute species to gain or lose electrons. The ORP of groundwater generally ranges from -400 millivolts (mV) to +800 mV. Under oxidizing conditions the ORP of groundwater is positive, while under reducing conditions the ORP is usually negative. Reducing conditions (negative ORP) suggests that anaerobic biodegradation is occurring. Generally, the ORP of groundwater inside a hydrocarbon plume should be somewhat less than that measured outside the plume.	inverse	inverse
Nitrate	After DO has been depleted in the groundwater, nitrate may be used as an electron acceptor for anaerobic biodegradation. In this denitrification process, nitrate is reduced to nitrite. Reduced nitrate concentrations in the source area compared to the clean area suggests that anaerobic biodegradation is occurring.	inverse	inverse
Sulfate	After DO and nitrate have been depleted in the groundwater, sulfate may be used as an electron acceptor for anaerobic biodegradation. If sulfate concentrations vary inversely with hydrocarbon concentrations, anaerobic biodegradation of fuel hydrocarbons is probably occurring.	inverse	inverse
Ferrous Iron	In some cases ferric iron acts as an electron acceptor during anaerobic biodegradation of petroleum hydrocarbons. In this process, ferric iron is reduced to ferrous iron, which may be soluble in water. Therefore, if the ferrous iron concentrations vary directly with hydrocarbon concentration, anaerobic biodegradation may be occurring.	direct	slightly inverse
Alkalinity	The total alkalinity of groundwater indicates the groundwater's ability to neutralize acid. High alkalinity (high pH) conditions occur when groundwater contains elevated hydroxides, carbonates, and bicarbonates of elements such as calcium, magnesium, sodium, potassium, or ammonia. Since these chemical species are created by the respiration of microorganisms, high alkalinity is an indicator of biological activity. However, these chemical species may also result from the dissolution of rock (especially carbonates) and the transfer of carbon dioxide from the atmosphere. Alkalinity also buffers groundwater pH against acid generation by both aerobic and anaerobic biodegradation processes. Higher alkalinity in the source area as compared to clean areas suggests that aerobic biodegradation is occurring.	direct	inconclusive

Dissolved Oxygen	During aerobic biodegradation, DO levels are reduced as aerobic respiration occurs. DO is the most thermodynamically favored electron acceptor used in aerobic biodegradation of petroleum hydrocarbons. Active aerobic biodegradation of BTEX compounds requires at least 1 ppm DO in groundwater and DO concentrations can be as high as 8 to 13 mg/L in oxygen-saturated groundwater that is free of hydrocarbons. Observed inverse relationships between DO and hydrocarbon concentrations indicate the occurrence of aerobic degradation, provided that at least 1 to 2 mg/L of DO is present in groundwater.	inverse	direct

Overall Interpretation: The best indicator of biodegradation within groundwater at a given site is an observed decreasing trend for dissolved hydrocarbon concentrations. At this site, there are five groundwater monitoring wells (MW-1, MW-2, MW-5, MW-9 and MW-10) with dissolved hydrocarbons and several years of groundwater monitoring data to evaluate. Each of these five wells have stable or decreasing hydrocarbon concentrations (except for TPHmo concentrations in offsite wells MW-9 and MW-10). The decreasing hydrocarbon trends are most significant in wells MW-1 and MW-5, especially for the BTEX compounds. The increasing TPHmo concentrations in offsite wells MW-9 and MW-10 are not likely to be an indication of poor hydrocarbon degradation potential, but the result of hydrocarbon fate and transport in the subsurface. As described in prior reports, an offsite source may be responsible for the TPHmo detected in these wells.

Bioparameter data are secondary indicators of biodegradation and biodegradation potential. As described below, the bioparameter data suggests that natural biodegradation of hydrocarbons is occurring at the site. Historical DO/ORP measurements appear to suggest that aerobic has been occurring, and bioparameter relationships to hydrocarbon concentrations suggest that anaerobic biodegradation has been occurring at the site.

Aerobic Biodegradation: The second best indicator of aerobic biodegradation, or the potential for aerobic biodegradation, is dissolved oxygen (DO). Because DO concentration measurements can vary greatly depending on instrumentation, technique, and temperature, it is important to evaluate data within a given monitoring event as well as data collected over several monitoring events. Well construction and location is also important since wells within permeable materials (such as naturally-occurring units or former excavation areas) may receive more significant groundwater recharge, which could replenish DO concentrations. While the relationship between DO and hydrocarbon concentrations at this site do not exhibit a clear inverse relationship, the magnitude of DO concentrations during some monitoring events suggest that sufficient DO is present to allow biodegradation to occur. Other DO measurements suggest that the DO has been used up by aerobic degradation in the past. And since anaerobic degradation is apparently occurring at this site, aerobic degradation has probably occurred at the site (anaerobic degradation often occurs after aerobic degradation has depleted DO). Finally, while alkalinity concentrations do not exhibit a clear direct

relationship with hydrocarbon concentrations, the elevated alkalinity in some wells could be a function of chemical species created by respiration.

Anaerobic Biodegradation: Analytical results from this quarter indicate that nitrate and sulfate concentrations exhibit an inverse relationship to hydrocarbon concentrations. This observed relationship suggests that anaerobic biodegradation is occurring at the site. In addition, ORP decreased with hydrocarbon concentrations, further supporting the conclusion that anaerobic biodegradation is taking place at the site. However, ferrous iron varies inversely with hydrocarbon concentration.

OTHER THIRD QUARTER 2000 ACTIVITIES

Separate-Phase Hydrocarbon Removal: Free product is actively skimmed from well TBW-5 using a mobile free-product skimmer. Between the second and third quarter 2000 monitoring events, approximately 5 gallons of SPH was skimmed from well TBW-5. During the third quarter 2000 sampling event, an additional 2.5 gallons were manually removed from well TBW-5 using a product bailer. As shown below on Table C, Cambria estimates that a cumulative volume of approximately 66.5 gallons of SPH has been removed from the site. This cumulative volume does not include additional SPH removal achieved by hydrocarbon-absorbing "pigs" or "socks" in wells MW-16 and TBW-1, which became saturated this quarter and were replaced.

Table C - SPH Removal Summary

Hydrocarbon Removal Method	Removal This Quarter (gallons)	Cumulative Removal (gallons)
Active Skimming (TBW-5)	5	63
Manual Bailing (TBW-5)	2.5	3.5
Total Volume Removed to Date:		**66.5 gallons**

Additional Site Assessment: Significant investigation was performed this quarter by Cambria and other consultants (Baseline and Subsurface Consultants) to further delineate the extent of hydrocarbons near site hot spots and along a main storm sewer line, and to better understand the nature and chemical composition of SPH detected in onsite and offsite wells. Results of these investigations will be presented in other reports.

CONCLUSIONS

Cambria offers the following conclusions regarding site activities and this quarter's analytic results.

- Separate-phase hydrocarbon (SPH) recovery efforts are removing free product from the site subsurface, primarily in well TBW-5.
- Ongoing site assessment activities will provide greater information about the nature and lateral extent of hydrocarbons both on and off site, with special emphasis on defining hot spots and SPH areas.
- TPHd concentrations above the San Francisco Airport Ecological Protection Zone Tier I Standard acceptable threshold exist in onsite wells TBW-3, MW-5, and MW-12 and in offsite perimeter wells MW-13, MW-14, and MW-15, although the offsite hydrocarbons reported as diesel are most likely the lighter end of motor oil according to laboratory interpretation.
- The extent of hydrocarbons in groundwater downgradient of well MW-5 and the active USTs appears to attenuate significantly with distance. Its elevated gasoline and diesel concentrations do not appear to be influencing the downgradient perimeter wells or impacting San Leandro Bay.
- Hydrocarbon attenuation is occurring at the site, with evidence that both aerobic and anaerobic biodegradation are taking place.

ANTICIPATED FOURTH QUARTER 2000 ACTIVITIES

Groundwater Monitoring: Cambria will gauge, measure any detected SPH, and collect groundwater samples from site wells in accordance with the ACHCSA-approved schedule presented above. However, as described below, Cambria plans to discontinue bioparameter analyses. Following field activities, Cambria will tabulate the analytic data, contour groundwater elevations, and prepare a quarterly monitoring report.

Separate-Phase Hydrocarbon Removal: Cambria will continue SPH removal using the active free product skimmer in well TBW-5 and manual bailing. Hydrocarbon-absorbing "pigs" or "socks" in wells MW-16 and TBW-1 will be inspected and replaced if saturated.

RECOMMENDATIONS

Cambria recommends discontinuing bioparameter analyses at this site, having already collected bioparameter data on seven separate events since November 1996. However, Cambria does recommend collecting dissolved oxygen readings ~~from all site wells annually~~. In the absence of bioparameter analyses, hydrocarbon concentration trends will be the primary indicator of hydrocarbon biodegradation at the site. Cambria would recommend considering additional bioparameter analyses once SPH removal is complete or if additional data is required to assess remediation by natural attenuation at the site.

CLOSING

If you have any questions or comments regarding this report or anticipated site activities, please call Bob Schultz at (510) 420-3341 or Bob Clark-Riddell at (510) 420-3303.

Sincerely,
Cambria Environmental Technology, Inc.

for

Cathy Bell
Staff Geologist

Bob Clark-Riddell, P.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
ROBERT G. CLARK-RIDDELL
No. C 049629
Exp. Sept 2000
CIVIL
STATE OF CALIFORNIA

Attachments: A - Laboratory Analytical Report
B - Well Sampling Forms
C - Standard Procedures for Monitoring Wells

H:\City of Oakland\Municipal Service Center\QM\3q00\CofO-3q00.wpd

- Compare chromatograms of TPHd in TBW-3 + offsite.
- Compare FP in MW-6 + 16

EXPLANATION

MW-1	Monitoring well location
RW-1	Remediation well location
TBW-1	Tank Backfill Well
MW-3	Abandoned Well
NSV	Not Surveyed
SPH	Separate phase hydrocarbons detected in well, well not sampled
*	Anomalous groundwater elevation, not used in contouring

Well — Monitoring Well Designation
ELEV — Groundwater elevation, feet above mean sea level (msl)
TPHg, TPHd, TPHmo, BENZ — TPHg, TPHd, TPHmo and benzene concentrations in parts per billion (ppb)
0.02 — Approximate groundwater flow direction and gradient
Fence
3.0 — Groundwater elevation contour dashed where inferred

MW-4
MW-3

EDGEWATER DRIVE

DAMON SLOUGH

SAN LEANDRO BAY

911 Center
Admin.
Public Works Building
Crafts and Storage
Storage
Building No. 5
Active USTs
Former USTs
Former UST
TBW-4
TBW-2
RW-1
Above Ground Storage Tanks
NGV Fueling Station

MW-2	MW-10	MW-1	TBW-6	TBW-5	TBW-1	MW-5	MW-11	MW-7	TBW-3	MW-6	MW-12	MW-13	MW-14	MW-9	MW-15	MW-16	MW-17	MW-8
1.56	3.28	4.98	5.15 *	0.60 *	NSV	4.83	5.02	4.40	7.10 *	3.48	2.87	1.12	2.75	2.46	2.14	4.66 *	1.27	2.82
<50	<50	480	<50	SPH	SPH	12,000	110	<50	570	SPH	170	<50	90	180	<50	SPH	<50	<50
170	430	340	320	SPH	SPH	4,800	<50	<50	44,000	SPH	3,500	3,100	1,000	580	1,900	SPH	190	85
440	1,300	<250	<250	SPH	SPH	560	<250	<250	13,000	SPH	5,000	13,000	3,100	2,200	8,600	SPH	610	<250
2.4	1.0	53	<0.5	SPH	SPH	220	5.9	<0.5	4.7	SPH	<0.5	<0.5	6.3	23	1.9	SPH	0.58	<0.5

0 75 150 300
Scale (ft)

FIGURE
1

Groundwater Elevation Contour Map and Hydrocarbon Concentrations
August 24-25, 2000

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Municipal Service Center
7101 Edgewater Drive
Oakland, California

H:\CITY OF OAKLAND\MSC\FIGURES\SDI\SDM03-MF.DWG

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Table 1. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Sample ID/ Date	TOC Elev.	DTW	GW Elev.	BTEX Method	Notes	TPHd	TPHmo	TPHk	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Organic Lead
						<---------- µg/l ---------->									
MW-1															
10/04/89	10.20	---	---	8020		---	---	---	540	65	26	14	22	---	---
10/04/89	10.20	---	---	8240		---	---	---	---	120	46	43	78	---	---
04/27/93	10.20	---	---	8020		---	---	---	<1,000	<1.0	<1.0	<1.0	<1.0	---	---
04/19/95	10.20	---	---	8020		---	---	---	3,200	880	15	23	21	---	---
07/27/95	10.20	4.62	5.58	8020		---	---	---	980	130	3.6	1.4	5.6	---	---
11/20/95	10.20	6.08	4.12	8020		---	---	---	400	99	2.8	1.1	4.6	---	---
02/21/96	10.20	4.62	5.58	8020		---	---	---	1,700	340	8.4	5.3	16	---	---
05/13/96	10.20	4.33	5.87	8020		---	---	---	7,300	2,000	30	42	38	---	---
08/27/96	10.20	5.25	4.95	8020		---	---	---	380	61	2.4	<0.5	4.2	---	---
02/23/98	10.20	1.75	8.45	8020		<50	<500	<50	820	160	4.9	3	9.7	---	---
08/19/98	10.20	4.78	5.42	8020	SGC	1,200	---	---	780	69	4.1	0.84	8.5	<5.0	---
11/11/98	10.20	5.64	4.56	---		---	---	---	---	---	---	---	---	---	---
02/23/99	10.20	3.41	6.79	8020	SGC	1,200	1,600	<50	1,100	190	5	3	12	<5.0	---
05/27/99	10.20	3.96	6.24	---		---	---	---	---	---	---	---	---	---	---
08/24/99	10.20	4.92	5.28	8020	SGC	640	1,900	<50	370	37	0.9	<0.5	1.9	<5.0	---
11/22/99	10.20	5.46	4.74	---		---	---	---	---	---	---	---	---	---	---
01/18/00	10.05	5.41	4.64	---		---	---	---	---	---	---	---	---	---	---
01/19/00	---	---	---	8020	SGC	50	<200	<50	660	43	2.3	1.1	6	<5.0	---
05/11/00	10.05	4.63	5.42	---		---	---	---	---	---	---	---	---	---	---
08/24/00	10.05	5.07	4.98	---		---	---	---	---	---	---	---	---	---	---
08/25/00	---	---	---	8020	SGC	340	<250	290	480	53	1.4	<0.5	2.9	<5.0	---
MW-2															
10/04/89	10.47	---	---	8020		---	---	---	<30	<0.3	<0.3	<0.3	<0.3	---	---
10/04/89	10.47	---	---	8240		---	---	---	---	2	<2.0	<2.0	<2.0	---	---
04/27/93	10.47	---	---	8020		---	---	---	<1,000	<1.0	<1.0	<1.0	<1.0	---	---
04/19/95	10.47	---	---	8020		---	---	---	<50	1.8	<0.5	<0.5	<0.5	---	---
07/27/95	10.47	6.22	4.25	8020		---	---	---	<50	2.3	<0.5	<0.5	<0.5	---	---
11/20/95	10.47	7.49	2.98	8020		---	---	---	<50	2.2	<0.5	<0.5	<0.5	---	---
02/21/96	10.47	6.68	3.79	8020		---	---	---	<50	1.7	<0.5	<0.5	0.5	---	---
05/13/96	10.47	6.32	4.15	8020		---	---	---	---	2	<0.5	<0.5	<0.5	---	---
08/27/96	10.47	6.84	3.63	8020		---	---	---	---	2.4	<0.5	<0.5	<0.5	---	---
02/24/98	10.47	5.44	5.03	8020		<50	<500	<50	---	1.6	<0.5	<0.5	<0.5	---	---
08/19/98	10.47	6.56	3.91	8020	SGC	330	---	---	<50	4.1	3.4	0.8	2.6	<5.0	<100

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Table 1. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Sample ID/ Date	TOC Elev.	DTW	GW Elev.	BTEX Method	Notes	TPHd	TPHmo	TPHk	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Organic Lead
						<---------- µg/l ---------->									
MW-2															
11/11/98	10.47	7.37	3.10	---		---	---	---	---	---	---	---	---	---	---
02/23/99	10.47	8.68	1.79	8020	SGC	200	900	<50	<50	3.5	0.6	0.6	1.2	<5.0	---
05/27/99	10.47	5.20	5.27	---		---	---	---	---	---	---	---	---	---	---
08/24/99	10.47	6.75	3.72	8020	SGC	140	700	<50	<50	2.6	<0.5	<0.5	<0.5	<5.0	---
11/22/99	10.47	7.58	2.89	---		---	---	---	---	---	---	---	---	---	---
01/18/00	10.47	7.41	3.06	8020	SGC	60 A	660	<50	<50	2.1	<0.5	<0.5	<0.5	<5.0	---
05/11/00	10.47	6.43	4.04	---		---	---	---	---	---	---	---	---	---	---
08/24/00	10.47	8.91	1.56	8020	SGC	170	440	130	<50	2.4	<0.5	<0.5	<0.5	<5.0	---
MW-3															
10/04/89	---	---	---	8020		---	---	---	<30	<0.3	<0.3	<0.3	<0.3	---	---
10/04/89	---	---	---	8240		---	---	---	---	<2.0	<2.0	<2.0	<2.0	---	---
02/23/98	---	---	---	---		<50	<500	<50	---	---	---	---	---	---	---
11/11/98	---	5.83	---	---		---	---	---	---	---	---	---	---	---	---
02/23/99	---	---	---	---	Submerged	---	---	---	---	---	---	---	---	---	---
05/27/99	---	1.68	---	---		---	---	---	---	---	---	---	---	---	---
08/24/99	---	4.76	---	---		---	---	---	---	---	---	---	---	---	---
11/22/99	---	6.46	---	---		---	---	---	---	---	---	---	---	---	---
11/22/99	---	---	---	---	Destroyed	---	---	---	---	---	---	---	---	---	---
MW-4															
10/04/89	7.89	---	---	8020		---	---	---	<30	<0.3	<0.3	<0.3	<0.3	---	---
10/04/89	7.89	---	---	8240		---	---	---	---	<2.0	<2.0	<2.0	<2.0	---	---
11/11/98	7.89	6.25	1.64	---		---	---	---	---	---	---	---	---	---	---
02/23/99	7.89	3.10	4.79	---		---	---	---	---	---	---	---	---	---	---
05/27/99	7.89	4.03	3.86	---		---	---	---	---	---	---	---	---	---	---
08/24/99	7.89	5.07	2.82	---		---	---	---	---	---	---	---	---	---	---
11/22/99	7.89	6.32	1.57	---		---	---	---	---	---	---	---	---	---	---
11/22/99	---	---	---	---	Destroyed	---	---	---	---	---	---	---	---	---	---
MW-5															
12/13/91	11.15	---	---	8020		1,900	---	---	13,000	1,500	190	970	2,500	---	---
12/13/91	---	---	---	8020	Dup	---	---	---	16,000	1,400	180	870	2,500	---	---
12/13/91	11.15	---	---	8240		---	---	---	---	1,800	<250	1,000	3,800	---	---

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Table 1. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Sample ID/ Date	TOC Elev.	DTW	GW Elev.	BTEX Method	Notes	TPHd	TPHmo	TPHk	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Organic Lead
						<---------- µg/l ----------									---------->
MW-5															
12/13/91	---	---	---	8240	Dup	---	---	---	---	1,600	<250	980	3,500	---	---
04/27/93	11.15	---	---	8240		12,000	---	---	35,000	2,100	<1.0	1,800	2,700	---	---
04/19/95	11.15	---	---	8240		880	4,700	---	14,000	490	51	610	1,200	---	---
07/27/95	11.15	6.29	4.86	8240		590	5,000	---	22,000	1,300	54	1,500	2,400	---	---
11/20/95	11.15	6.98	4.17	8020		<50	<50	<50	8,900	430	31	610	880	---	---
02/21/96	11.15	5.97	5.18	8020		480	<50	<50	1,000	540	65	700	970	---	---
05/13/96	11.15	6.25	4.90	8020		<50	<50	<50	5,900	430	26	580	760	---	---
05/13/96	---	---	---	8020	Dup	<50	<50	<50	7,300	360	22	49	640	---	---
08/27/96	11.15	6.40	4.75	8020		2,000	<51	<51	6,600	430	27	600	650	---	---
08/27/96	---	---	---	8020	Dup	6,600	<51	<51	6,300	410	25	580	620	---	---
02/23/98	11.15	4.22	6.93	8020		<50	<500	<50	740	19	1.4	41	34	---	---
08/19/98	11.15	6.14	5.01	8020		1,400	<250	1700	5,800	500	25	730	300	5,900	---
08/19/98	11.15	6.14	5.01	8260	SGC	---	---	---	---	---	---	---	---	6,700	---
11/11/98	11.15	6.51	4.64	---		---	---	---	---	---	---	---	---	---	---
02/23/99	11.15	3.59	7.56	8020	SGC	2,000	700	<50	6,700	300	26	800	690	1,600	---
05/27/99	11.15	5.71	5.44	---		---	---	---	---	---	---	---	---	---	---
08/24/99	11.15	6.02	5.13	8020	SGC	220	2,000	<50	2,100 E	190 E	5.5	340 E	78	380 E	---
11/22/99	11.15	6.16	4.99	---		---	---	---	---	---	---	---	---	---	---
01/18/00	11.15	6.60	4.55	---		---	---	---	---	---	---	---	---	---	---
01/19/00	---	---	---	8020	SGC	100	320	<50	3,000	66 E	6.3	400 E	90	(1,300)	---
05/11/00	11.15	5.62	5.53	---		---	---	---	---	---	---	---	---	---	---
08/24/00	11.15	6.32	4.83	8020	SGC	4,800	560	6,600	12,000	220	21	430	91	(1,400)	---
MW-6															
12/13/91	10.98	---	---	8020		520	---	---	780	110	2.7	<2.5	5.5	---	---
12/13/91	10.98	---	---	8240		---	---	---	---	95	5	<5	<5	---	---
04/27/93	10.98	---	---	8020		<1,000	---	---	<1,000	430	4	5	10	---	---
04/19/95	10.98	---	---	8020		6,700	---	---	5,700	40	<0.8	3.9	29	---	---
04/19/95	---	---	---	8020	Dup	3,700	---	---	3,000	310	3.1	2.7	100	---	---
07/27/95	10.98	7.09	3.89	8020		3,900	---	---	6,100	430	15	200	600	---	---
07/27/95	---	---	---	8020	Dup	2,600	---	---	6,300	420	15	200	600	---	---
11/20/95	10.98	7.89	3.09	8020		850	---	---	6,800	160	4.6	8	240	---	---
11/20/95	---	---	---	8020	Dup	---	---	---	3,600	130	11	4.4	200	---	---
02/21/96	10.98	7.40	3.58	8020		1,700	---	---	2,800	230	2.8	3.8	44	---	---

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Table 1. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Sample ID/ Date	TOC Elev.	DTW	GW Elev.	BTEX Method	Notes	TPHd	TPHmo	TPHk	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Organic Lead
						<---------- µg/l ----------									---------->
MW-6															
02/21/96	---	---	---	8020	Dup	2,500	---	---	2,200	280	3	4	4.6	---	---
05/13/96	10.98	7.10	3.88	8020		400	<50	<50	3,100	430	12	5.2	67	---	---
08/27/96	10.98	7.42	3.56	8020		3,100	---	---	4,200	300	9.3	110	110	---	---
08/19/98	10.98	---	---	---	SPH: 0.125 ft	---	---	---	---	---	---	---	---	---	---
11/11/98	10.98	7.09	3.89	---	SPH: 0.05 ft	---	---	---	---	---	---	---	---	---	---
02/23/99	10.98	7.31	3.67	---	SPH: NM	---	---	---	---	---	---	---	---	---	---
05/27/99	10.98	6.91	4.07	---	SPH: 0.20 ft	---	---	---	---	---	---	---	---	---	---
08/24/99	10.98	7.46	3.52	---	SPH: 0.03 ft	---	---	---	---	---	---	---	---	---	---
11/22/99	10.98	7.96	3.02	---	SPH: 0.16 ft	---	---	---	---	---	---	---	---	---	---
01/18/00	10.98	8.08	2.90	---	SPH: 0.19 ft	---	---	---	---	---	---	---	---	---	---
05/11/00	10.98	7.52	3.46	---	SPH: 0.01 ft	---	---	---	---	---	---	---	---	---	---
08/24/00	10.98	7.50	3.48	---	SPH: 0.06 ft	---	---	---	---	---	---	---	---	---	---
MW-7															
12/13/91	11.51	---	---	8020		<50	---	---	<50	<0.5	<0.5	<0.5	<0.5	---	---
12/13/91	11.51	---	---	8240		---	---	---	---	<5	<5	<5	<5	---	---
04/27/93	11.51	---	---	8240		<1,000	---	---	<1,000	<1.0	<1.0	<1.0	<1.0	---	---
04/19/95	11.51	---	---	8240		<50	<1,000	---	<50	<2.0	<2.0	<2.0	<2.0	---	---
07/27/95	11.51	6.87	4.64	8240		<50	<1,000	---	<50	<2.0	<2.0	<2.0	<2.0	---	---
11/20/95	11.51	8.48	3.03	8020		<50	---	---	<50	<0.5	<0.5	<0.5	1.5	---	---
02/21/96	11.51	6.29	5.22	8020		<50	---	---	<50	<0.5	<0.5	<0.5	<0.5	---	---
05/13/96	11.51	6.95	4.56	8020		<50	---	---	---	<0.5	<0.5	<0.5	<0.5	---	---
08/27/96	11.51	6.80	4.71	8020		---	---	---	---	<0.5	<0.5	<0.5	<0.5	---	---
08/19/98	11.51	6.88	4.63	---		---	---	---	---	---	---	---	---	---	---
11/11/98	11.51	7.40	4.11	---		---	---	---	---	---	---	---	---	---	---
02/23/99	11.51	5.57	5.94	8020		<50	<200	<50	80	<0.5	<0.5	<0.5	1	<5.0	---
05/27/99	11.51	6.56	4.95	---		---	---	---	---	---	---	---	---	---	---
08/24/99	11.51	6.29	5.22	8020	SGC	<50	<200	<50	<50	<0.5	<0.5	<0.5	<0.5	5	---
11/22/99	11.51	6.80	4.71	---		---	---	---	---	---	---	---	---	---	---
01/18/00	11.51	7.31	4.20	---		---	---	---	---	---	---	---	---	---	---
01/19/00	11.51	---	---	8020	SGC	<50	<200	<50	54	1.5	1.5	2.4	3.8	<5.0	---
05/11/00	11.51	6.41	5.10	---		---	---	---	---	---	---	---	---	---	---
08/24/00	11.51	7.11	4.40	8020		<50	<250	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---

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Table 1. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Sample ID/ Date	TOC Elev.	DTW	GW Elev.	BTEX Method	Notes	TPHd	TPHmo	TPHk	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Organic Lead
						<---------- µg/l ----------									---------->
MW-8															
11/20/96	12.22	---	---	8020		880	---	---	<50	0.66	<0.5	<0.5	<0.5	---	---
11/20/97	12.22	9.59	2.63	8020		200	---	---	<50	<0.5	<0.5	<0.5	<0.5	2	---
02/24/98	12.22	8.42	3.80	8020		<50	<500	<50	<50	<0.5	<0.5	<0.5	<0.5	---	---
06/08/98	12.22	9.57	2.65	8020		1,200	1,000	<50	<50	<0.5	<0.5	<0.5	<0.5	---	---
08/19/98	12.22	9.49	2.73	8020	SGC	<50	<250	<50	<50	1.6	3.4	1	2.8	<5.0	---
11/11/98	12.22	9.64	2.58	8020	SGC	<50	<200	<50	<50	0.9	0.8	0.6	2.3	<5.0	---
02/23/99	12.22	11.53	0.69	8020		700	1500	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---
05/27/99	12.22	9.65	2.57	8020		<50	<200	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---
08/24/99	12.22	9.62	2.60	8020	SGC	70	<200	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---
11/22/99	12.22	9.64	2.58	8020	SGC	57	<200	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---
01/18/00	12.22	8.31	3.91	8020	SGC	<50	<200	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---
05/11/00	12.22	9.69	2.53	8020	SGC	<50	<200	<50	<50	<0.5	1.3	<0.5	2.1	<5.0	---
08/24/00	12.22	9.40	2.82	---		---	---	---	---	---	---	---	---	---	---
08/25/00	---	---	---	8020	SGC	85	<250	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---
MW-9															
11/20/96	10.77	---	---	8020		1,900	---	---	240	21	0.81	1.8	2.2	---	---
11/20/97	10.77	7.91	2.86	8020		---	---	---	300	20	<0.5	<0.5	1.8	<1.0	---
02/24/98	10.77	6.11	4.66	8020		<50	<500	<50	2,200	540	5.6	1.6	4.9	---	---
06/08/98	10.77	7.14	3.63	8020		1,800	890	<50	840	450	6.1	3.3	5.3	---	---
08/19/98	10.77	7.88	2.89	8020	SGC	190	<250	160	740	370	8.6	0.99	7.3	<5.0	---
11/11/98	10.77	8.23	2.54	8020	SGC	<50	230	<50	700	130	4.3	<0.5	3.9	<5.0	---
02/23/99	10.77	6.65	4.12	8020		1,100	3,700	<50	1,100	620	9.7	1.5	7.7	<5.0	---
05/27/99	10.77	7.70	3.07	8020	SGC	70	300	<50	950	470	11	1.5	9.2	<5.0	---
08/24/99	10.77	8.12	2.65	8020	SGC	890	1,700	<50	290	45	2.8	<0.5	3	<5.0	---
11/22/99	10.77	8.33	2.44	8020	SGC	1,000	6,000	<50	170	12	1.8	<0.5	2	<5.0	---
01/18/00	10.77	8.63	2.14	8020	SGC	200 A	2,300	<50	160	5.7	1.9	0.6	4.2	<5.0	---
05/11/00	10.77	7.70	3.07	8020	SGC	180 A	980	<100	1,050	280	7.0	<2.5	5.9	<25	---
08/24/00	10.77	8.31	2.46	---		---	---	---	---	---	---	---	---	---	---
08/25/00	---	---	---	8020	SGC	580	2,200	170	180	23	2.4	<0.5	2.7	<5.0	---
MW-10															
11/20/96	10.59	---	---	8020		940	---	---	<50	49	0.59	0.54	1.2	---	---
11/20/97	10.59	7.70	2.89	8020		---	---	---	<50	<0.5	<0.5	<0.5	<0.5	---	---

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Table 1. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Sample ID/ Date	TOC Elev.	DTW	GW Elev.	BTEX Method	Notes	TPHd	TPHmo	TPHk	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Organic Lead
						<---------- µg/l ----------									---------->
MW-10															
02/24/98	10.59	4.39	6.20	8020		<50	<500	<50	<50	<0.5	<0.5	<0.5	<0.5	---	---
06/08/98	10.59	6.94	3.65	8020		500	<500	<50	<50	7.3	<0.5	<0.5	<0.5	---	---
08/19/98	10.59	6.99	3.60	8020	SGC	240	520	110	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---
11/11/98	10.59	7.57	3.02	8020	SGC	<50	<200	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---
02/23/99	10.59	5.51	5.08	8020		170	1,200	<50	<50	1.3	<0.5	<0.5	<0.5	<5.0	---
05/27/99	10.59	6.72	3.87	8020	SGC	<50	<200	<50	350	170	1.5	0.5	2.3	<5.0	---
08/24/99	10.59	7.27	3.32	8020	SGC	140	300	<50	380	160 E	<0.5	<0.5	2.6	<5.0	---
11/22/99	10.59	7.71	2.88	8020	SGC	570	3,400	<50	110	5.1	<0.5	<0.5	0.72	<5.0	---
01/18/00	10.59	7.77	2.82	---		---	---	---	---	---	---	---	---	---	---
01/19/00	---	---	---	8020	SGC	120 A,B	1,200	<50	100	<0.5	<0.5	0.8	<0.5	<5.0	---
05/11/00	10.59	7.00	3.59	8020	SGC	110 A	990	<50	145	1.62	0.5	0.5	0.9	<5.0	---
08/24/00	10.59	7.31	3.28	---		---	---	---	---	---	---	---	---	---	---
08/25/00	---	---	---	8020	SGC	430	1,300	110	<50	1.0	<0.5	<0.5	<0.5	<5.0	---
MW-11															
01/18/00	11.60	7.08	4.52	---		---	---	---	---	---	---	---	---	---	---
01/19/00	---	---	---	8020	SGC	<50	500	<50	220	<0.5	<0.5	<0.5	<0.5	<5.0	---
05/11/00	11.60	5.95	5.65	8020	SGC	<50	430	<50	600	23	2.1	18	15	<5.0	---
08/24/00	11.60	6.58	5.02	8020		<50	<250	<50	110	5.9	<0.5	0.73	0.64	<5.0	---
MW-12															
01/18/00	10.43	8.11	2.32	---		---	---	---	---	---	---	---	---	---	---
01/19/00	---	---	---	8020	SGC	1,800 A	11,000	<50	200	<0.5	3.4	1.5	8.4	<5.0	---
05/11/00	10.43	6.78	3.65	8020	SGC	2,400 A	4,900	<100	370	<0.5	<0.5	<0.5	0.9	<5.0	---
08/24/00	10.43	7.56	2.87	---		---	---	---	---	---	---	---	---	---	---
08/25/00	---	---	---	8020	SGC	3,500	5,000	3,700	170	<0.5	<0.5	<0.5	<0.5	<5.0	---
MW-13															
01/18/00	11.34	9.63	1.71	8020	SGC	8,800 A	120,000	<50	<50	<0.5	0.8	<0.5	<0.5	<5.0	---
05/11/00	11.34	10.12	1.22	8020	SGC	11,000 A	110,000	<500	70	1.6	5.4	1.2	7.6	<5.0	---
08/24/00	11.34	10.22	1.12	---		---	---	---	---	---	---	---	---	---	---
08/25/00	---	---	---	8020	SGC	3,100	13,000	1,200	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---

Table 1. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Sample ID/ Date	TOC Elev.	DTW	GW Elev.	BTEX Method	Notes	TPHd	TPHmo	TPHk	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Organic Lead
						<---------- µg/l ---------->									
MW-14															
01/18/00	10.05	7.37	2.68	8020	SGC	1,700 A	22,000	<50	120	<0.5	<0.5	<0.5	<0.5	<5.0	---
05/11/00	10.05	6.73	3.32	8020	SGC	360 A	4,300	<100	120	<0.5	<0.5	0.5	<0.5	<5.0	---
08/24/00	10.05	7.30	2.75	---		---	---	---	---	---	---	---	---	---	---
08/25/00	---	---	---	8020	SGC	1,000	3,100	460	90	6.3	<0.5	<0.5	<0.5	<5.0	---
MW-15															
01/18/00	12.36	10.56	1.80	8020	SGC	12,000 A	89,000	<50	110	3.8	2.1	1	4.6	<5.0	---
05/11/00	12.36	10.03	2.33	8020	SGC	120 A	590	<50	90	0.9	0.9	<0.5	3.3	<5.0	---
08/24/00	12.36	10.22	2.14	---		---	---	---	---	---	---	---	---	---	---
08/25/00	---	---	---	8020	SGC	1,900	8,600	1,000	<50	1.9	<0.5	<0.5	1.5	<5.0	---
MW-16															
01/18/00	13.57	10.22	3.35	---	SPH: 0.1 ft	---	---	---	---	---	---	---	---	---	---
05/11/00	13.57	13.31	0.26	---	SPH: 0.01 ft	---	---	---	---	---	---	---	---	---	---
08/24/00	13.57	8.91	4.66	---	SPH: NM	---	---	---	---	---	---	---	---	---	---
MW-17															
01/18/00	9.86	5.35	4.51	8020	SGC	850 A	21,000	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---
05/11/00	9.86	9.85	0.01	8020	SGC	150 A	2,900	<100	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---
08/24/00	9.86	8.59	1.27	---		---	---	---	---	---	---	---	---	---	---
08/25/00	---	---	---	8020	SGC	190	610	71	<50	0.58	<0.5	<0.5	<0.5	<5.0	---
TBW-1															
02/23/99	---	6.25	---	---	SPH: 0.10 ft	---	---	---	---	---	---	---	---	---	---
05/27/99	---	5.29	---	---	SPH: 0.01 ft	---	---	---	---	---	---	---	---	---	---
08/24/99	---	6.99	---	---	SPH: 0.18 ft	---	---	---	---	---	---	---	---	---	---
11/22/99	---	---	---	---	Inaccessible	---	---	---	---	---	---	---	---	---	---
01/18/00	---	---	---	---	Inaccessible	---	---	---	---	---	---	---	---	---	---
05/11/00	---	6.90	---	---	SPH: 0.10 ft	---	---	---	---	---	---	---	---	---	---
08/24/00	---	7.12	---	---	SPH: NM	---	---	---	---	---	---	---	---	---	---
TBW-3															
08/19/98	---	2.67	---	8020	SGC	810,000	---	---	920	3.2	<0.5	<0.5	0.77	<10	---
08/19/98	---	2.67	---	8260		---	---	---	---	---	---	---	---	<5.0	---

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Table 1. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Sample ID/ Date	TOC Elev.	DTW	GW Elev.	BTEX Method	Notes	TPHd	TPHmo	TPHk	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Organic Lead
						<---------- µg/l ---------->									
TBW-3															
02/23/99	---	1.25	---	8020		3,800	3,000	<50	110	1.6	<0.5	<0.5	<0.5	<5.0	---
05/27/99	---	---	---	---	DTW: NM	---	---	---	---	---	---	---	---	---	---
08/24/99	---	3.25	---	---	SPH globules	---	---	---	---	---	---	---	---	---	---
11/22/99	---	3.68	---	---		---	---	---	---	---	---	---	---	---	---
01/18/00	9.92	3.73	6.19	---	SPH globules	---	---	---	---	---	---	---	---	---	---
05/11/00	9.92	2.07	7.85	---		---	---	---	---	---	---	---	---	---	---
08/24/00	9.92	2.82	7.10	---	SPH: sheen	44,000	13,000	34,000	570	4.7	<0.5	<0.5	<0.5	<5.0	---
TBW-5															
02/23/99	---	9.72	---	---	SPH: 1.45 ft	---	---	---	---	---	---	---	---	---	---
05/27/99	---	7.03	---	---	SPH: 1.13 ft	---	---	---	---	---	---	---	---	---	---
08/24/99	---	6.52	---	---	SPH: 1.33 ft	---	---	---	---	---	---	---	---	---	---
11/22/99	---	8.31	---	---	SPH: 1.29 ft	---	---	---	---	---	---	---	---	---	---
01/18/00	10.22	6.20	4.02	---	SPH: 0.90 ft	---	---	---	---	---	---	---	---	---	---
05/11/00	10.22	9.41	0.81	---	SPH: 0.30 ft	---	---	---	---	---	---	---	---	---	---
08/24/00	10.22	9.62	0.60	---	SPH: 0.26 ft	---	---	---	---	---	---	---	---	---	---
TBW-6															
02/23/99	---	2.09	---	8020		160	600	<50	60	<0.5	<0.5	<0.5	<0.5	<5.0	---
05/27/99	---	3.31	---	---		---	---	---	---	---	---	---	---	---	---
08/24/99	---	7.29	---	8020	SGC	180	400	<50	130	<0.5	<0.5	<0.5	<0.5	<5.0	---
11/22/99	---	4.37	---	---		---	---	---	---	---	---	---	---	---	---
01/18/00	9.49	3.83	5.66	---		---	---	---	---	---	---	---	---	---	---
01/19/00	---	---	---	8020	SGC	55 C	<200	<50	170	0.6	<0.5	<0.5	<0.5	<5.0	---
05/11/00	9.49	2.51	6.98	---		---	---	---	---	---	---	---	---	---	---
08/24/00	9.49	4.34	5.15	---		---	---	---	---	---	---	---	---	---	---
08/25/00	---	---	---	8020	SGC	320	<250	200	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---
Trip Blank															
08/19/98	---	---	---	8020		---	---	---	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---
11/22/99	---	---	---	8020		---	---	---	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---

Table 1. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Sample ID/ Date	TOC Elev.	DTW	GW Elev.	BTEX Method	Notes	TPHd	TPHmo	TPHk	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Organic Lead
						µg/l									

Notes

All concentrations in micrograms per liter (µg/l)

--- = not measured/analyzed

TOC = Top of casing

DTW = Depth to water

GW = Groundwater

BTEX = Benzene, toluene, ethylbenzene, and xylenes - analyzed by EPA Method 8020 or 8240/8260

TPHd = Total petroleum hydrocarbons as diesel - analyzed by Modified EPA Method 8015

TPHmo = Total petroleum hydrocarbons as motor oil - analyzed by Modified EPA Method 8015

TPHk = Total petroleum hydrocarbons as kerosene - analyzed by Modified EPA Method 8015

TPHg = Total petroleum hydrocarbons as gasoline - analyzed by Modified EPA Method 8015

MTBE = Methyl tert-butyl ether - analyzed by EPA method 8020 or 8260. Confirmation 8260 results shown in parentheses

DUP = Duplicate sample

SPH = Separate-phase hydrocarbons; measured thickness

SGC = Silica gel cleanup prior to TPHd, TPHk, or TPHmo analysis

NM = Not measured

TBW = Tank backfill well

A = The analytical laboratory reviewed the data and noted that petroleum hydrocarbons quantified in the diesel range are actually the front end of the motor oil pattern

B = The analytical laboratory reviewed the data and noted that the quantitation in the diesel range show no diesel pattern; the response looks like lower carbon chain compounds close to the gasoline range

C = The analytical laboratory reviewed the data and noted that there is no pattern related to diesel range the peaks are small and random

E = Results are estimated due to concentrations exceeding the calibration ranged

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Table 2. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Sample ID/ Date	Notes	TPHg (µg/l)	TPHd (µg/l)	ORP (mV)	Ferrous Iron	DO-B	DO-A	Nitrate	Sulfate	Total Alkalinity	Sodium	Chloride
		<							(µg/l)			>
Damon Slough												
8/19/98		---	---	---	---	---	---	---	---	---	5,900,000	14,400,000
MW-1												
8/19/98		780	1,200	60	>5,000	9,800	8,470	<1,000	<1,000	1,270,000	1,600,000	3,750,000
2/23/99		1,100	1,200	---	>5,000	---	1,600	<100	<500	1,400,000	---	---
8/24/99		370	640	-64	3,500	---	880	<100	<500	1,300,000	---	---
1/19/00		660	50	-165	2,700	---	590	7,600	<500	1,300,000	---	---
8/25/00		480	340	-100	6,200	---	2,400	22,000	<1,000	1,340,000	---	---
MW-2												
8/19/98		<50	330	120	>5,000	8,630	8,560	<1,000	5,000	215,000	4,700,000	8,000,000
2/23/99		<50	200	50	>5,000	---	1,500	<100	<500	140,000	---	---
8/24/99		<50	140	-34	<5,000	---	140	<100	<500	120,000	---	---
1/18/00		<50	60	78	2,000	---	620	16,000	600	120,000	---	---
8/24/00		<50	170	89	4,800	---	330	44,000	37,000	180,000	---	---
MW-3												
8/19/98		---	---	-170	900	9,330	9,210	<1,000	400,000	3,260,000	14,000,000	23,750,000
MW-4												
8/19/98		---	---	-178	2,600	9,410	8,000	<1,000	280,000	1,700,000	3,600,000	7,000,000
MW-5												
8/19/98		5,800	1,400	75	>5,000	9,430	9,180	<1,000	10,000	820,000	970,000	2,520,000
2/23/99		6,700	2,000	-55	2,100	---	1,800	<100	14,000	400,000	---	---
8/24/99		2,100	220	-54	2,900	---	320	<100	<500	660,000	---	---
1/19/00		3,000	100	-171	4,100	---	420	1,900	21,000	680,000	---	---
8/24/00		12,000	4,800	0	5,000	---	300	15,000	10,000	800,000	---	---
MW-6												
2/23/99	SPH: NM	---	---	115	3,200	---	6,400	<100	<500	1,300,000	---	---
8/24/99	SPH: 0.03 ft	---	---	---	---	---	---	NA	NA	1,100,000	---	---

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Table 2. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Sample ID/ Date	Notes	TPHg (µg/l)	TPHd (µg/l)	ORP (mV)	Ferrous Iron	DO-B	DO-A	Nitrate	Sulfate	Total Alkalinity	Sodium	Chloride
				<					(µg/l)			>
MW-7												
8/19/98		---	---	110	>5,000	8,600	7,860	<1,000	300,000	970,000	920,000	1,800,000
2/23/99		80	<50	75	4,900	---	3,900	<100	190,000	870,000	---	---
8/24/99		<50	<50	-19	4,400	---	450	<100	300,000	760,000	---	---
1/19/00		54	<50	-170	3,100	---	310	6,600	820,000	840,000	---	---
8/24/00		<50	<50	66	1,800	---	210	4,000	176,000	890,000	---	---
MW-8												
11/20/96		<50	880	50	<100 a	500	---	<500	478,000	---	---	7,490,000
11/20/97		<50	200	262	<1,000 a	4,000	---	<50	1,200,000	380,000	---	---
8/19/98		<50	<50	220	3,400	10,180	9,820	<1,000	610,000	490,000	4,300,000	7,500,000
2/23/99		<50	700	75	5,000	---	5,300	<100	150,000	630,000	---	---
8/24/99		<50	70	87	200	---	320	<100	<5,000	320,000	---	---
1/18/00		<50	<50	149	<500	---	223	16,000	1,900,000	270,000	---	---
8/25/00		<50	85	42	1,200	---	1,000	18,000	754,000	530,000	---	---
MW-9												
11/20/96		240	1,900	-73	240 a	---	---	<500	<3,000	---	---	2,230,000
11/20/97		300	1,000	202	<1,000	<1,000	---	<50	1,000	1,300,000	---	---
8/19/98		740	190	275	>5,000	10,150	9,670	<1,000	1,000	1,180,000	820,000	1,400,000
2/23/99		1,100	1,100	-40	4,900	---	1,100	<100	1,200	1,000,000	---	---
8/24/99		290	890	-65	3,300	---	330	<100	<500	950,000	---	---
1/18/00		160	200	48	2,100	---	300	7,600	4,400	980,000	---	---
8/25/00		180	580	-50	4,200	---	150	<1,000	<1,000	1,140,000	---	---
MW-10												
11/20/96		<50	940	-54	<100 a	---	---	<500	52,000	---	---	1,940,000
11/20/97		<50	370	226	<1,000 a	<1,000	---	<50	<100	870,000	---	---
8/19/98		<50	240	68	4,200	10,210	9,840	<1,000	10,000	900,000	330,000	350,000
2/23/99		<50	170	-10	3,000	---	1,900	3,000	71,000	690,000	---	---
8/24/99		380	140	75	1,700	---	760	<100	<500	910,000	---	---
1/19/00		100	120	-161	800	---	650	1,900	<500	940,000	---	---
8/25/00		<50	430	-63	2,800	---	330	<1,000	<1,000	960,000	---	---

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Table 2. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Sample ID/ Date	Notes	TPHg (µg/l)	TPHd (µg/l)	ORP (mV)	Ferrous Iron	DO-B	DO-A	Nitrate	Sulfate	Total Alkalinity	Sodium	Chloride
				<					(µg/l)			>
MW-11												
1/19/00		220	<50	-120	2,600	---	330	<100	26,000	1,800,000	---	---
8/24/00		110	<50	-25	>10,000	---	490	22,000	<1,000	200,000	---	---
MW-12												
1/19/00		200	1,800	170	8,000	---	---	2,400	2,800	920,000	---	---
8/25/00		170	3,500	-148	800	---	3,360	13,000	<1,000	140,000	---	---
MW-13												
1/18/00		<50	8,800	-81	2,300	---	210	300	320,000	850,000	---	---
8/25/00		<50	3,100	-36	1,400	---	210	<1000	332,000	90,000	---	---
MW-14												
1/18/00		120	1,700	90	1,100	---	250	700	3,100	1,100,000	---	---
8/25/00		90	1,000	-23	2,400	---	970	36,000	<1,000	1,080,000	---	---
MW-15												
1/18/00		110	12,000	93	3,100	---	270	9,000	3,900	920,000	---	---
8/25/00		<50	1,900	-79	2,000	---	290	31,000	<1,000	90,000	---	---
MW-17												
1/18/00		<50	850	102	<500	---	230	25,000	1,600	960,000	---	---
8/25/00		<50	190	-54	<500	---	670	31,000	1,140,000	30,000	---	---
San Leandro Bay												
8/19/98		---	---	---	---	---	---	---	---	---	5,700,000	14,400,000
TBW-1												
2/23/99	SPH: 0.10 ft	---	---	---	---	---	---	<100	34,000	420,000	---	---
8/24/99	SPH: 0.18 ft	---	---	---	---	---	---	---	---	550,000	---	---
TBW-3												
8/19/98		920	810,000	135	1,800	6,860	7,000	<1,000	45,000	410,000	91,000	175,000
2/23/99		110	3,800	---	1,900	---	2,400	2,000	49,000	410,000	---	---
8/24/99	SPH globules	---	---	---	---	---	---	2,600	<500	430,000	---	---
8/24/00	SPH: sheen	570	44,000	5	1,000	---	880	<1,000	18,000	380,000	---	---

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Table 2. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Sample ID/ Date	Notes	TPHg (µg/l)	TPHd (µg/l)	ORP (mV)	Ferrous Iron	DO-B	DO-A	Nitrate	Sulfate	Total Alkalinity	Sodium	Chloride
				<					(µg/l)			>
TBW-5												
2/23/99	SPH: 1.45 ft	---	---	---	---	---	---	13,000	1,000	690,000	---	---
8/24/99	SPH: 1.33 ft	---	---	---	---	---	---	NA	NA	600,000	---	---
TBW-6												
2/23/99		60	160	---	<100	---	1,100	<100	58,000	180,000	---	---
8/24/99		130	180	42	<500	---	490	<100	39,000	340,000	---	---
1/19/00		170	55	-161	<500	---	400	1,000	60,000	200,000	---	---
8/25/00		<50	320	136	<500	---	1,120	<1,000	3,700	300,000	---	---
Ideal Relationship with Hydrocarbon Concentrations:				Inverse	Direct	Inverse	Inverse	Inverse	Inverse	Direct		
Most Recent Observed Relationship with Hydrocarbon Concentrations:				Inverse	Inverse	---	Direct	Inverse	Inverse	Inconclusive		

Notes

µg/l = micrograms per liter; all concentrations in µg/l unless otherwise noted
mV = millivolts
TPHg = Total petroleum hydrocarbons as gasoline - analyzed by Modified EPA Method 8015
TPHd = Total petroleum hydrocarbons as diesel - analyzed by Modified EPA Method 8015
ORP = Oxidation/reduction potential
DO = Dissolved oxygen (B = before purging, A= after purging)

--- = not measured/analyzed
SPH = Separate-phase hydrocarbons; measured thickness
NM = Not measured
NA = Not analyzed due to oily content of sample
a = Results for soluble iron

ATTACHMENT A

Laboratory Analytical Report

McCAMPBELL ANALYTICAL INC.
110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
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Cambria Environmental Technology 1144 65th Street, Suite C Oakland, CA 94608	Client Project ID: #153-1247; City of Oakland Municipal Services	Date Sampled: 08/24-08/25/00
		Date Received: 08/28/00
	Client Contact: Bob Schultz	Date Extracted: 08/28-08/30/00
	Client P.O:	Date Analyzed: 08/28-08/30/00

Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline*, with Methyl tert-Butyl Ether* & BTEX*

EPA methods 5030, modified 8015, and 8020 or 602; California RWQCB (SF Bay Region) method GCFID(5030)

Lab ID	Client ID	Matrix	TPH(g)^	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	% Recovery Surrogate
46020	TBW-3	W	570,g,h	ND	4.7	ND	ND	ND	104
46021	TBW-6	W	ND	ND	ND	ND	ND	ND	107
46022	MW-1	W	480,a	ND	53	1.4	ND	2.9	99
46023	MW-2	W	ND	ND	2.4	ND	ND	ND	100
46024	MW-5	W	12,000,a	1200	220	21	430	91	119
46025	MW-7	W	ND	ND	ND	ND	ND	ND	117
46026	MW-8	W	ND	ND	ND	ND	ND	ND	101
46027	MW-9	W	180,a,i	ND	23	2.4	ND	2.7	103
46028	MW-10	W	ND	ND	1.0	ND	ND	ND	105
46029	MW-11	W	110,a	ND	5.9	ND	0.73	0.64	99
46030	MW-12	W	170,j,h,i	ND	ND	ND	ND	ND	102
46031	MW-13	W	ND,i	ND	ND	ND	ND	ND	103
46032	MW-14	W	90,a	ND	6.3	ND	ND	ND	103
46033	MW-15	W	ND	ND	1.9	ND	ND	1.5	100
46034	MW-17	W	ND	ND	0.58	ND	ND	ND	100
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		W	50 ug/l.	5.0	0.5	0.5	0.5	0.5	
		S	1.0 mg/kg	0.05	0.005	0.005	0.005	0.005	

* water and vapor samples are reported in ug/l., wipe samples in ug/wipe, soil and sludge samples in mg/kg, and all TCLP and SPLP extracts in ug/l.

^ cluttered chromatogram; sample peak coelutes with surrogate peak

^The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified gasoline is significant; b) heavier gasoline range compounds are significant(aged gasoline?); c) lighter gasoline range compounds (the most mobile fraction) are significant; d) gasoline range compounds having broad chromatographic peaks are significant; biologically altered gasoline?; e) TPH pattern that does not appear to be derived from gasoline (?); f) one to a few isolated peaks present; g) strongly aged gasoline or diesel range compounds are significant; h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment; j) no recognizable pattern.

DHS Certification No. 1644

Edward Hamilton, Lab Director

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Cambria Environmental Technology 1144 65th Street, Suite C Oakland, CA 94608	Client Project ID: #153-1247; City of Oakland Municipal Services	Date Sampled: 08/24-08/25/00
		Date Received: 08/28/00
	Client Contact: Bob Schultz	Date Extracted: 08/28/00
	Client P.O:	Date Analyzed: 08/30-09/06/00

Diesel Range (C10-C23), Oil-Range (C18+) & Kerosene Range (C9-C18) Extractable Hydrocarbons as Diesel, Motor Oil, & Kerosene with Silica Gel Clean Up*

EPA methods modified 8015, and 3550 or 3510; California RWQCB (SF Bay Region) method GCFID(3550) or GCFID(3510)

Lab ID	Client ID	Matrix	TPH(d)+	TPH(mo)+	TPH(k)-	% Recovery Surrogate
46020	TBW-3	W	44,000,a/e,h	13,000	34,000	103
46021	TBW-6	W	320,a/e	ND	200	104
46022	MW-1	W	340,d,b	ND	290	103
46023	MW-2	W	170,g	440	130	101
46024	MW-5	W	4800,d,g	560	6600	106
46026	MW-8	W	85,b	ND	ND	98
46027	MW-9	W	580,g,i	2200	170	99
46028	MW-10	W	430,g	1300	110	102
46030	MW-12	W	3500,a,g,h,i	5000	3700	100
46031	MW-13	W	3100,g,i	13,000	1200	99
46032	MW-14	W	1000,g,b	3100	460	103
46033	MW-15	W	1900,g	8600	1000	99
46034	MW-17	W	190,g	610	71	102
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		W	50 ug/L	250 ug/L	50 ug/L	
		S	1.0 mg/kg	5.0 mg/kg	1.0 mg/kg	

*water samples are reported in ug/L, wipe samples in ug/wipe, soil and sludge samples in mg/kg, and all TCLP / STLC / SPLP extracts in ug/L

cluttered chromatogram resulting in coeluted surrogate and sample peaks, or; surrogate peak is on elevated baseline, or, surrogate has been diminished by dilution of original extract.

+The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified diesel is significant; b) diesel range compounds are significant; no recognizable pattern, c) aged diesel? is significant); d) gasoline range compounds are significant; e) medium boiling point pattern that does not match diesel (fuel oil?); f) one to a few isolated peaks present; g) oil range compounds are significant; h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment. j) medium boiling point pattern that does not match diesel (stoddard solvent?)

DHS Certification No. 1644

Edward Hamilton, Lab Director

McCAMPBELL ANALYTICAL INC.
110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
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Cambria Environmental Technology 1144 65th Street, Suite C Oakland, CA 94608	Client Project ID: #153-1247; City of Oakland Municipal Services	Date Sampled: 08/24-08/25/00
		Date Received: 08/28/00
	Client Contact: Bob Schultz	Date Extracted: 08/28/00
	Client P.O:	Date Analyzed: 08/28-08/30/00

Diesel Range (C10-C23), Oil-Range (C18+) & Kerosene Range (C9-C18) Extractable Hydrocarbons as Diesel, Motor Oil, & Kerosene* No Silica gel

EPA methods modified 8015, and 3550 or 3510; California RWQCB (SF Bay Region) method GCFID(3550) or GCFID(3510)

Lab ID	Client ID	Matrix	TPH(d)+	TPH(mo)+	TPH(k)+	% Recovery Surrogate
46020	TBW-3	W	54,000,a/e,h	24,000	39,000	100
46021	TBW-6	W	290,a/e	ND	140	114
46022	MW-1	W	200,d,b	ND	180	98
46023	MW-2	W	220,g	420	89	110
46024	MW-5	W	5600,j	1100	5000	89
46025	MW-7	W	ND	ND	ND	98
46026	MW-8	W	120,g	350	51	99
46027	MW-9	W	590,g,i	2400	250	98
46028	MW-10	W	370,g	940	150	102
46029	MW-11	W	ND	ND	ND	85
46030	MW-12	W	4700,a,g,h,i	5900	3800	104
46031	MW-13	W	7700,g,i	44,000	1400	101
46032	MW-14	W	3200,g,b	6200	1700	98
46033	MW-15	W	4600,g	9500	1600	99
46034	MW-17	W	330,g,b	520	140	98
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		W	50 ug/L	250 ug/L	50 ug/L	
		S	1.0 mg/kg	5.0 mg/kg	1.0 mg/kg	

*water samples are reported in ug/L, wipe samples in ug/wipe, soil and sludge samples in mg/kg, and all TCLP / STLC / SPLP extracts in ug/L

* cluttered chromatogram resulting in coeluted surrogate and sample peaks, or; surrogate peak is on elevated baseline, or; surrogate has been diminished by dilution of original extract.

+The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified diesel is significant; b) diesel range compounds are significant; no recognizable pattern; c) aged diesel? is significant); d) gasoline range compounds are significant; e) medium boiling point pattern that does not match diesel (fuel oil?); f) one to a few isolated peaks present; g) oil range compounds are significant; h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment. j) medium boiling point pattern that does not match diesel (stoddard solvent?)

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http://www.mccampbell.com E-mail: main@mccampbell.com

Cambria Environmental Technology 1144 65th Street, Suite C Oakland, CA 94608	Client Project ID: #153-1247; City of Oakland Municipal Services	Date Sampled: 08/24-08/25/00
		Date Received: 08/28/00
	Client Contact: Bob Schultz	Date Extracted: 08/29-08/30/00
	Client P.O:	Date Analyzed: 08/29-08/30/00

Methyl tert-Butyl Ether *

EPA method 8260 modified

Lab ID	Client ID	Matrix	MTBE*	% Recovery Surrogate
46024	MW-5	W	1400	103
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		W	1.0 ug/L	
		S	5.0 ug/kg	

* water samples are reported in ug/L, soil and sludge samples in ug/kg, wipe samples in ug/wipe and all TCLP / STLC / SPLP extracts in ug/L

h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment; j) sample diluted due to high organic content.

DHS Certification No. 1644

Edward Hamilton, Lab Director

GeoAnalytical Laboratories, Inc.

1405 Kansas Avenue Modesto, CA 95351 Phone (209) 572-0900 Fax (209) 572-0916

CERTIFICATE OF ANALYSIS

Date: 8/30/00

Report # L242-06

McCampbell Analytical
110 2nd Avenue South
Pacheco CA 94553

Project: 21696

PO#

Date Rec'd: 8/29/00
Date Started: 8/29/00
Date Completed: 8/30/00

Date Sampled:
Time:
Sampler:

Sample ID	Lab ID	RL	Method	Analyte	Results	Units
TBW-3	L38072	10	SM2320B	Alkalinity	380	mg/L
		1.0	300.0	Nitrate (NO3)	ND	mg/L
		1.0	300.0	Sulfate	18	mg/L
TBW-6	L38073	10	SM2320B	Alkalinity	300	mg/L
		1.0	300.0	Nitrate (NO3)	ND	mg/L
		1.0	300.0	Sulfate	37	mg/L
MW-1	L38074	10	SM2320B	Alkalinity	1340	mg/L
		1.0	300.0	Nitrate (NO3)	22	mg/L
		1.0	300.0	Sulfate	ND	mg/L
MW-2	L38075	10	SM2320B	Alkalinity	180	mg/L
		1.0	300.0	Nitrate (NO3)	44	mg/L
		1.0	300.0	Sulfate	37	mg/L
MW-5	L38076	10	SM2320B	Alkalinity	800	mg/L
		1.0	300.0	Nitrate (NO3)	15	mg/L
		1.0	300.0	Sulfate	10	mg/L
MW-7	L38077	10	SM2320B	Alkalinity	890	mg/L
		1.0	300.0	Nitrate (NO3)	4	mg/L
		1.0	300.0	Sulfate	176	mg/L

Ramiro Salgado
Chemist

Certification # 1157

Donna Keller
Laboratory Director

GeoAnalytical Laboratories, Inc.

1405 Kansas Avenue Modesto, CA 95351 Phone (209) 572-0900 Fax (209) 572-0916

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McCampbell Analytical
110 2nd Avenue South
Pacheco CA 94553

Project: 21696

PO#

Date Rec'd: 8/29/00
Date Started: 8/29/00
Date Completed: 8/30/00

Date Sampled:
Time:
Sampler:

Sample ID	Lab ID	RL	Method	Analyte	Results	Units
MW-8	L38078	10	SM2320B	Alkalinity	530	mg/L
		1.0	300.0	Nitrate (NO3)	18	mg/L
		1.0	300.0	Sulfate	754	mg/L
MW-9	L38079	10	SM2320B	Alkalinity	1140	mg/L
		1.0	300.0	Nitrate (NO3)	ND	mg/L
		1.0	300.0	Sulfate	ND	mg/L
MW-10	L38080	10	SM2320B	Alkalinity	960	mg/L
		1.0	300.0	Nitrate (NO3)	ND	mg/L
		1.0	300.0	Sulfate	ND	mg/L
MW-11	L38081	10	SM2320B	Alkalinity	200	mg/L
		1.0	300.0	Nitrate (NO3)	22	mg/L
		1.0	300.0	Sulfate	ND	mg/L
MW-12	L38082	10	SM2320B	Alkalinity	140	mg/L
		1.0	300.0	Nitrate (NO3)	13	mg/L
		1.0	300.0	Sulfate	ND	mg/L
MW-13	L38083	10	SM2320B	Alkalinity	90	mg/L
		1.0	300.0	Nitrate (NO3)	ND	mg/L
		1.0	300.0	Sulfate	332	mg/L

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CERTIFICATE OF ANALYSIS

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McCampbell Analytical
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Pacheco CA 94553

Project: 21696

PO#

Date Rec'd: 8/29/00
Date Started: 8/29/00
Date Completed: 8/30/00

Date Sampled:
Time:
Sampler:

Sample ID	Lab ID	RL	Method	Analyte	Results	Units
MW-15	L38084	10	SM2320B	Alkalinity	90	mg/L
		1.0	300.0	Nitrate (NO3)	31	mg/L
		1.0	300.0	Sulfate	ND	mg/L
MW-17	L38085	10	SM2320B	Alkalinity	30	mg/L
		1.0	300.0	Nitrate (NO3)	31	mg/L
		1.0	300.0	Sulfate	1140	mg/L

Ramiro Salgado
Chemist

Certification # 1157

Donna Keller
Laboratory Director

ATTACHMENT B

Well Sampling Forms

CAMBRIA

WELL DEPTH MEASUREMENTS

Well ID	Time	Product Depth	Water Depth	Product Thickness	Well Depth	Comments
MW-1	10:41		5.07		15.79'	
MW-2	11:40		8.91		15.69'	
MW-5	11:28		6.32		14.45'	
MW-6	11:30	7.56	7.50	0.06	—	
MW-7	11:25	—	7.11	-	14.35'	
MW-11	11:32		6.58		19.58'	
MW-12	11:00		7.56		15.08'	
TBW-1	11:17		7.12		-	SPH Visally inspected
TBW-3	11:38	2.81	2.82	Sheen	10.85	SPH, V.I.S inspected
TBW-5	11:05	9.36	9.62	.26		Thick Product
TBW-6	10:49		4.34		12.42'	

Project Name: City of Oakland

Project Number: 153-1247

Measured By: CB/JO

Date: 8/24/00

CAMBRIA

WELL DEPTH MEASUREMENTS

Well ID	Time	Product Depth	Water Depth	Product Thickness	Well Depth	Comments
MW-8	11:05		9.40		15.15'	
MW-9	10:47		8.31		17.25'	
MW-10	10:40		7.31		15.20'	
MW-13	10:42		10.22		20.21'	
MW-14	10:45		7.30		15.12'	
MW-15	10:50		10.22		20.65'	
MW-16	10:57		8.91			SPH in well (visual inspection) IP does not measure properly
MW-17	11:02		8.59		19.18'	

Project Name: City of Oakland

Project Number: 153-1247

Measured By: CB/JO

Date: 8/24/00

F:\TEMPLATE\FORMS\FIELD\GW-DEPTH.WPD

CAMBRIA

WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: MW-1
Project Number: **153-1247**	Date: 8/25/00	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 2 **" pvc**
		Technician(s): CB/JO
Initial Depth to Water: 5.07	Total Well Depth: 15.79	Water Column Height: 10.72
Volume/ft: 0.16'	1 Casing Volume: 1.72	3 Casing Volumes: 5.15 gal
Purging Device: **sub pump**	Did Well Dewater?:	Total Gallons Purged: 5.5 gal
Start Purge Time: 2:20	Stop Purge Time: 2:30	Total Time: 10 min

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
223	1.70	24.7	6.90	3999	NP Amb-1 S
226	3.40	23.9	6.90	3999	H_2O Reacted
229	5.10	22.7	6.88	38[illegible]	with HCl

Post-purge DO= 2.40 ug/L

Post-purge ORP= -100 mV

Ferrous Iron= 6.2 ug/L

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-1	8/25	2:40	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
			2 half-liter plastic	**none**	**nitrate, sulfate, alkalinity**	
			2 ambers	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

CAMBRIA

WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: MW-2
Project Number: **153-1247**	Date: ~~8/10/00~~ 8/24	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 2 **" pvc**
		Technician(s): [redacted]/JO/SG
Initial Depth to Water: 8.91	Total Well Depth: 15.69	Water Column Height: 6.78
Volume/ft: 0.16	1 Casing Volume: 1.08	3 Casing Volumes: 3.24
Purging Device: **sub pump**	Did Well Dewater?:	Total Gallons Purged:
Start Purge Time: 12:55	Stop Purge Time: 12:58	Total Time:

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
12:56	1	23.0	5.68	3999	
12:57	2	22.3	5.88	3999	
12:59	3	22.4	6.08	3999	

Post-purge DO= 0.33 ug/L

Post-purge ORP= 189 mV

Ferrous Iron= 4.8 ug/L

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-2	8/24	1:15	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
			2 half-liter plastic	**none**	**nitrate, sulfate, alkalinity**	
			2 ambers	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

CAMBRIA

WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: MW-5
Project Number: **153-1247**	Date: ~~8/8/00~~ 8/24	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 2 **" pvc**
		Technician(s): ~~[redacted]~~/JO/SG
Initial Depth to Water: 6.32	Total Well Depth: 14.45	Water Column Height: 8.13
Volume/ft: 0.16	1 Casing Volume: 1.30	3 Casing Volumes: 3.90
Purging Device: **sub pump**	Did Well Dewater?:	Total Gallons Purged:
Start Purge Time: 2:10	Stop Purge Time: 2:14	Total Time:

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
2:11	1.5	25.8	6.85	3169	
2:13	3	24.9	6.85	3255	
2:15	4	24.6	6.80	3400	

Post-purge DO= 0.30 ug/L

Post-purge ORP= -000 mV

Ferrous Iron= 5.0 ug/L

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-5	08-24-00	2:30	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
			2 half-liter plastic	**none**	**nitrate, sulfate, alkalinity**	
			2 ambers	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

CAMBRIA

WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: MW-7
Project Number: **153-1247**	Date: ~~8/16/00~~ 8/24/00	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 2 " **pvc**
		Technician(s): ~~CB~~/JO/SG
Initial Depth to Water: 7.11	Total Well Depth: 14.35	Water Column Height: 7.24
Volume/ft: 0.16	1 Casing Volume: 1.15	3 Casing Volumes: 3.45 gal
Purging Device: **sub pump**	Did Well Dewater?:	Total Gallons Purged:
Start Purge Time: 1:37	Stop Purge Time: 1:40	Total Time:

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
1:38	1	24.9	6.53	2828	
1:39	2	23.9	6.51	2748	
1:41	3	23.8	6.55	2887	

Post-purge DO= 0.21 ug/L
Post-purge ORP= 66 mV
Ferrous Iron= 1.80 ug/L

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-7	08-24-00	1:50	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
			2 half-liter plastic	**none**	**nitrate, sulfate, alkalinity**	
			2 ambers	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

CAMBRIA

WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: MW-8
Project Number: **153-1247**	Date: ~~8/8/00~~ 8/25/00	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 2 **" pvc**
		Technician(s): CB/JO
Initial Depth to Water: 9.40	Total Well Depth: 15.15	Water Column Height: 5.75
Volume/ft: 0.16	1 Casing Volume: .92	3 Casing Volumes: 2.8
Purging Device: **sub pump**	Did Well Dewater?:	Total Gallons Purged:
Start Purge Time: 12:35	Stop Purge Time: 12:45	Total Time: 10 min

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
12:38	1	25.7	7.62	3999	
12:41	2	22.1	7.51	3999	
12:44	3	21.8	7.60	3999	

Post-purge DO= 1.0 **ug/L**

Post-purge ORP= 042 **mV**

Ferrous Iron= 1.2 **ug/L**

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-8	8/25	12:50	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
↓	↓	↓	~~**2 half liter plastic**~~ 1 AMBER	**none**	**nitrate, sulfate, alkalinity**	
↓	↓	↓	**2 ambers**	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

CAMBRIA

WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: MW-9
Project Number: **153-1247**	Date: 8/25/00	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 2 **" pvc**
		Technician(s): CB/JO
Initial Depth to Water: 8.31'	Total Well Depth: 17.25'	Water Column Height: 8.94
Volume/ft: 0.16	1 Casing Volume: 1.43 gal	3 Casing Volumes: 4.30 gal
Purging Device: **sub pump**	Did Well Dewater?:	Total Gallons Purged:
Start Purge Time: 11:05	Stop Purge Time: 11:15	Total Time: 10 min

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
11:06	1.4	20.5	7.18	3999	H_2O reacted with HCl
11:09	2.8	19.4	7.10	3999	
11:16	4.2	19.4	7.19	3999	

Post-purge DO= 0.15 ug/L

Post-purge ORP= -050 mV

Ferrous Iron= 4.2 ug/L

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-9	8/25	11:20	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
			2 half-liter plastic	**none**	**nitrate, sulfate, alkalinity**	
			2 ambers	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

CAMBRIA

WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: MW-10
Project Number: **153-1247**	Date: 08-24-00	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 2 "pvc 2"
		Technician(s): CB/JO
Initial Depth to Water: 7.31	Total Well Depth: 15.20	Water Column Height: 7.89
Volume/ft: 0.16	1 Casing Volume: 1.26	3 Casing Volumes: 3.78
Purging Device: **sub pump**	Did Well Dewater?:	Total Gallons Purged:
Start Purge Time: 9:20	Stop Purge Time: 9:23	Total Time:

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
9:21	1.5	19.5	7.28	3286	water reacted
9:22	3	19.5	7.34	3462	with HCl
9:24	4	19.5	7.24	3258	

Post-purge DO= 0.33 ug/L

Post-purge ORP= -63 mV

Ferrous Iron= 2.8 ug/L

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-10	08-25-00	9:30	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
↓	↓	↓	**2 half-liter plastic**	**none**	**nitrate, sulfate, alkalinity**	
↓	↓	↓	**2 ambers**	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

CAMBRIA

WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: MW-11
Project Number: **153-1247**	Date: ~~8/8/00~~ 8/24	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 2 **" pvc**
		Technician(s): [redacted]/JO/SG
Initial Depth to Water: 6.58	Total Well Depth: 19.58	Water Column Height: 13.00
Volume/ft: 0.16	1 Casing Volume: 2.08	3 Casing Volumes: 6.24
Purging Device: **sub pump**	Did Well Dewater?:	Total Gallons Purged: 6 gal
Start Purge Time: 2:40	Stop Purge Time: 2:43	Total Time: 10 min

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
2:41	2.5	22.5	6.4	3949	
2:42	3	23.6	6.5	3999	
2:44	5.5	23.6	6.5	3999	

Post-purge DO= 0.49 ug/L

Post-purge ORP= -25 mV

Ferrous Iron= ≈ 10 ug/L

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-11	8/24	2:55	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
↓	↓	↓	**2 half-liter plastic**	**none**	**nitrate, sulfate, alkalinity**	
↓	↓	↓	**2 ambers**	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

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WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: MW-12
Project Number: **153-1247**	Date: 8/25/00	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 2 **" pvc**
		Technician(s): CB/JO
Initial Depth to Water: 7.56	Total Well Depth: 15.08	Water Column Height: 7.52
Volume/ft: 0.16	1 Casing Volume: 1.20	3 Casing Volumes: 3.60
Purging Device: **sub pump**	Did Well Dewater?: N	Total Gallons Purged: ~4
Start Purge Time: 4:10	Stop Purge Time: 4:20	Total Time: 10

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
4:13	1.2	21.3	7.5	3804	
4:16	2.4	21.0	7.4	3828	
4:19	3.6	21.0	7.5	>4000	

Post-purge DO= 3.36 ug/L

Post-purge ORP= -148 mV

Ferrous Iron= 0.8 ug/L

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-12	8/25/00	4:20	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
			2 half-liter plastic	**none**	**nitrate, sulfate, alkalinity**	
			2 ambers	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

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WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: MW-13
Project Number: **153-1247**	Date: 8/25	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 2 **" pvc**
		Technician(s): CB/JO
Initial Depth to Water: 10.22	Total Well Depth: 20.65	Water Column Height: 10.43
Volume/ft: 0.16	1 Casing Volume: 1.67 gal	3 Casing Volumes: 5.00 gal
Purging Device: **sub pump**	Did Well Dewater?: Yes	Total Gallons Purged: 2
Start Purge Time: 10:10	Stop Purge Time: 10:15	Total Time: 5

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
10:11	1.5	19.9	7.10	3999	
	well dewatered				

Post-purge DO= [redacted] 0.2 **ug/L**

Post-purge ORP= -036 **mV**

Ferrous Iron= [redacted] 1.4 **ug/L**

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-13	8/25	1:10	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
			2 half-liter plastic	**none**	**nitrate, sulfate, alkalinity**	
			2 ambers	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

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WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: MW-14
Project Number: **153-1247**	Date: 8/25/00	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 2 **" pvc**
		Technician(s): ~~EB~~/JO SG
Initial Depth to Water: 7.30	Total Well Depth: 15.12'	Water Column Height: 7.82'
Volume/ft: 0.16	1 Casing Volume: 1.25	3 Casing Volumes: 3.75
Purging Device: **sub pump**	Did Well Dewater?:	Total Gallons Purged: 4 gal
Start Purge Time: 10:20	Stop Purge Time: 10:30	Total Time: 10 min

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
10:22	1.3	21.3	7.75	3999	
10:24	2.6	21.7	7.78	3999	
10:31	3.9	21.1	7.77	3996	

Post-purge DO= 0.97 **ug/L**

Post-purge ORP= -023 **mV**

Ferrous Iron= 2.4 **ug/L**

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-14	08-25-00	10:40	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
↓	↓	↓	**2 half-liter plastic**	**none**	**nitrate, sulfate, alkalinity**	
↓	↓	↓	**2 ambers**	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

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WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: MW-15
Project Number: **153-1247**	Date: 8/25/00	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 2 **" pvc**
		Technician(s): CB/JO
Initial Depth to Water: 10.22	Total Well Depth: 20.65	Water Column Height: 10.43
Volume/ft: 0.16	1 Casing Volume: 1.67	3 Casing Volumes: 5.00 gal
Purging Device: **sub pump**	Did Well Dewater?:	Total Gallons Purged: 5 gal
Start Purge Time: 11:30	Stop Purge Time: 11:40	Total Time: 10 min

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
11:31	1.67	22.1	7.36	3999	
11:35	3.33	21.6	7.29	3999	
11:39	5.00	21.9	7.35	3999	

Post-purge DO= 0.29 **ug/L**

Post-purge ORP= -079 **mV**

Ferrous Iron= 2.0 **ug/L**

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-15	08-25-00	11:45	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
			2 half-liter plastic	**none**	**nitrate, sulfate, alkalinity**	
			2 ambers	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

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WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: MW-17
Project Number: **153-1247**	Date: 8/25/00	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 2 " **pvc**
		Technician(s): CB/JO
Initial Depth to Water: 8.59	Total Well Depth: 19.18	Water Column Height: 10.59
Volume/ft:	1 Casing Volume: 1.70	3 Casing Volumes: 5.10
Purging Device: **sub pump**	Did Well Dewater?:	Total Gallons Purged: ~55
Start Purge Time: 1200	Stop Purge Time: 12:10	Total Time:

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
12:02	1.7	21.9	7.36	3995	
12:05	3.4	25.3	7.82	3969	
12:08	5.1	25.9	7.87	3990	

Post-purge DO= 0.67 ug/L

Post-purge ORP= -054 mV

Ferrous Iron= 0.0 ug/L

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-17	8/25/00	12:20	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
			2 half-liter plastic	**none**	**nitrate, sulfate, alkalinity**	
			2 ambers	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

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WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: TBW-3
Project Number: **153-1247**	Date:	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 6 **" pvc**
		Technician(s): CB/JO
Initial Depth to Water: 2.81	Total Well Depth: 10.85	Water Column Height: 8.04
Volume/ft: 1.45	1 Casing Volume: ~12 gal	3 Casing Volumes: 36 gal
Purging Device: **sub pump**	Did Well Dewater?:	Total Gallons Purged: 40 gal
Start Purge Time:	Stop Purge Time:	Total Time:

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
~~447~~ 424	12 ~~gal~~ gal	24.6	7.20	1055	
436	~~12~~ 24	24.3	7.20	625	
448	~~36~~ 36	24.5	7.22	634	

Post-purge DO= 0.88 ug/L

Post-purge ORP= 005 mV

Ferrous Iron= 1.0 ug/L

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
TBW-3	8/25	5:00	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
↓	↓	↓	**2 half-liter plastic**	**none**	**nitrate, sulfate, alkalinity**	
↓			**2 ambers**	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

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WELL SAMPLING FORM

Project Name: **City of Oakland**	Cambria Mgr: **RWS**	Well ID: TBW-6
Project Number: **153-1247**	Date: 8/25/00	Well Yield:
Site Address: **7101 Edgewater Drive Oakland, California**	Sampling Method: **Disposable bailer**	Well Diameter: 6 **" pvc**
		Technician(s): CB/JO
Initial Depth to Water: 4.34	Total Well Depth: 12.42	Water Column Height: 8.08
Volume/ft: 1.47	1 Casing Volume: 11.87	3 Casing Volumes: 35.60
Purging Device: ~~sub pump~~ 4" PVC Bailer	Did Well Dewater?:	Total Gallons Purged:
Start Purge Time: 3:10	Stop Purge Time: 3:39	Total Time:

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
3:17	12	23.2	7.35	638	
3:30	24	22.7	7.18	539	
3:40	36	22.6	7.27	528	

Post-purge DO= 1.12 **ug/L**

Post-purge ORP= 136 **mV**

Ferrous Iron= 0 **ug/L**

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
TBW-6	8/25	3:45	**4 voa's**	**HCL**	**TPHg, BTEX, MTBE**	**8020 8015, confirm MTBE by 8260**
↓	↓		**2 half-liter plastic**	**none**	**nitrate, sulfate, alkalinity**	
↓	↓		**2 ambers**	**none**	**TPHd/TPHk/TPHmo**	**NOTE: silica gel clean up**

ATTACHMENT C

Standard Field Procedures for Monitoring Wells

STANDARD FIELD PROCEDURES FOR MONITORING WELLS

This document describes Cambria Environmental Technology's standard field methods for drilling, installing, developing and sampling groundwater monitoring wells. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

Well Construction and Surveying

Groundwater monitoring wells are installed in soil borings to monitor groundwater quality and determine the groundwater elevation, flow direction and gradient. Well depths and screen lengths are based on groundwater depth, occurrence of hydrocarbons or other compounds in the borehole, stratigraphy and State and local regulatory guidelines. Well screens typically extend 10 to 15 feet below and 5 feet above the static water level at the time of drilling. However, the well screen will generally not extend into or through a clay layer that is at least three feet thick.

Well casing and screen are flush-threaded, Schedule 40 PVC. Screen slot size varies according to the sediments screened, but slots are generally 0.010 or 0.020 inches wide. A rinsed and graded sand occupies the annular space between the boring and the well screen to about one to two ft above the well screen. A two feet thick hydrated bentonite seal separates the sand from the overlying sanitary surface seal composed of Portland type I,II cement.

Well-heads are secured by locking well-caps inside traffic-rated vaults finished flush with the ground surface. A stovepipe may be installed between the well-head and the vault cap for additional security. The well top-of-casing elevation is surveyed with respect to mean sea level and the well is surveyed for horizontal location with respect to an onsite or nearby offsite landmark.

Well Development

Wells are generally developed using a combination of groundwater surging and extraction. Surging agitates the groundwater and dislodges fine sediments from the sand pack. After about ten minutes of surging, groundwater is extracted from the well using bailing, pumping and/or reverse air-lifting through an eductor pipe to remove the sediments from the well. Surging and extraction continue until at least ten well-casing volumes of groundwater are extracted and the sediment volume in the groundwater is negligible. This process usually occurs prior to installing the sanitary surface seal to ensure sand pack stabilization. If development occurs after surface seal installation, then development occurs 24 to 72 hours after seal installation to ensure that the Portland cement has set up correctly.

All equipment is steam-cleaned prior to use and air used for air-lifting is filtered to prevent oil entrained in the compressed air from entering the well. Wells that are developed using air-lift evacuation are not sampled until at least 24 hours after they are developed.

Groundwater Sampling

Depending on local regulatory guidelines, three to four well-casing volumes of groundwater are purged prior to sampling. Purging continues until groundwater pH, conductivity, and temperature have stabilized. Groundwater samples are collected using bailers or pumps and are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4°C, and transported under chain-of-custody to the laboratory. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may be analyzed if non-dedicated sampling equipment is used.