CAMBRIA

December 19, 2001

Mr. Larry Seto
Alameda County Health
Care Services Agency
1131 Harbor Bay Parkway
Alameda, California 94502

DEC 21 2001

4017 | RO 493

Re: **Soil Vapor Extraction Pilot Test Report and Investigation Work Plan**
Shell-branded Service Station
610 Market Street
Oakland, California
Incident # 98995750
Cambria Project # 243-0594

Dear Mr. Seto:

As recommended in our August 29, 2001 *Site Conceptual Model and Pilot Test Report*, Cambria Environmental Technology, Inc. (Cambria) is submitting this *Soil Vapor Extraction Pilot Test Report and Investigation Work Plan* on behalf of Equiva Services LLC (Equiva). The site background, soil vapor extraction (SVE) pilot test summary, and our conclusions and recommendations are presented below.

SITE BACKGROUND

Site Description: The site is a Shell-branded service station located on Market Street, between Sixth and Seventh Streets in Oakland, California (Figure 1). Currently, the site consists of a kiosk, three underground storage tanks (USTs), four dispenser islands and a drive-through car wash facility (Figure 2). The area surrounding the site is primarily of commercial use.

Subsurface Conditions: The site is underlain primarily by silty sands to a total explored depth of 26 feet below grade (fbg). Groundwater depth onsite ranges from approximately 11 to 13 fbg.

1995 Site Renovation: During station renovation activities in August 1995, Weiss Associates (Weiss) of Emeryville, California collected soil samples from beneath the gasoline dispensers and product piping locations. The renovation activities included the replacement of the central and western-most gasoline dispensers and the removal of the eastern-most dispensers and associated piping. Approximately 33 cubic yards of soil were removed during dispenser upgrades, and an additional 15 cubic yards were removed during over-excavation of the southern end of the middle

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dispenser island and the piping of the eastern-most dispenser islands. The details and results of this investigation are summarized in the November 2, 1995 *Dispenser Replacement Sampling* report, prepared by Weiss.

1998 Site Upgrade: In March 1998, site upgrades were performed by Paradiso Mechanical of San Leandro, California (Paradiso). Paradiso added secondary containment to the turbine sumps in the USTs. Cambria inspected the turbine sumps and UST area, and no field indications of petroleum hydrocarbons, such as staining or odor, were observed during the site visit. Based on the field observations, no soil sampling was performed during the site upgrade activities. The details of these activities are summarized in Cambria's *1998 Site Upgrade Inspection Report* dated March 30, 1998.

March 1998 Site Investigation: On March 31, 1998, Cambria conducted a subsurface investigation at the facility which included the installation of three soil borings onsite using a Geoprobe® direct push drill rig. Less than 2 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPHg), benzene, toluene, ethylbenzene, and xylenes (BTEX), and methyl tertiary butyl ether (MTBE) were detected in analyzed soil samples from soil borings SB-A, SB-B, and SB-C. A maximum of 2,100 parts per billion (ppb) TPHg, 490 ppb benzene, and 14,000 ppb MTBE were detected in grab groundwater samples collected from soil borings SB-A and SB-B. Concentrations of TPHg, BTEX, and MTBE were below laboratory detection limits in the grab groundwater sample collected from soil boring SB-C. The details of this investigation are summarized in Cambria's *Subsurface Investigation Report* dated July 1, 1998.

November 1998 Subsurface Investigation: On November 17, 1998, Cambria performed additional subsurface investigation activities which included the installation of three groundwater monitoring wells onsite (MW-1, MW-2, and MW-3). No TPHg, BTEX, or MTBE was reported in analyzed soil samples collected from well MW-1. Up to 8.3 ppm TPHg, 2.9 ppm MTBE and no benzene were detected in the soil samples collected from well MW-2. Up to 1,700 ppm TPHg, 8.3 ppm benzene, and 16 ppm MTBE were detected in soil samples collected from well MW-3. The first groundwater samples collected from the monitoring wells were collected as part of the first quarterly monitoring event (fourth quarter 1998) by Blaine Tech Services of San Jose, California. The details of this investigation are summarized in Cambria's April 20, 1999 *Well Installation Report*.

Groundwater Monitoring: Quarterly groundwater monitoring has been ongoing at this site since the fourth quarter of 1998. Up to 7,490 ppb TPHg, 420 ppb benzene and 167 ppb MTBE have been reported in groundwater samples collected from well MW-1. Well MW-2 has contained up to 101 ppb TPHg, 183 ppb benzene, and 17,000 ppb MTBE. Well MW-3 has contained up to

44,500 ppb TPHg, 1,290 ppb benzene and 610,000 ppb MTBE. The results of quarterly monitoring events are summarized in quarterly monitoring reports prepared by Cambria.

Mobile DVE Vacuum Extraction (DVE) Treatment: From March to October 2000, Cambria coordinated mobile DVE from wells MW-2 and MW-3. DVE removes soil vapors and separate-phase hydrocarbons from the vadose zone and enhances groundwater removal from remediation or monitoring wells. Mobile DVE equipment consists of a dedicated extraction "stinger" installed in the extraction well, a vacuum truck, and a carbon vapor treatment system. Groundwater generated during mobile DVE is stored in the vacuum truck and transported offsite. Vapors extracted during mobile DVE are remediated by the carbon vessels

Mobile Groundwater Extraction (GWE): As recommended in the August 29, 2001 *Site Conceptual Model and Pilot Test Report*, Cambria has coordinated weekly GWE from well MW-3 using a vacuum truck since early August 2001. The cumulative estimated mass of TPHg and MTBE removed through the third quarter 2001, including that removed through previous DVE, is 36.24 pounds and 32.31 pounds, respectively.

SVE PILOT TEST SUMMARY

MTBE is the primary chemical of concern at the site. Previous SVE testing of tank backfill well T-1 suggested a long-term SVE pilot test might achieve favorable results. The pilot test objective was to remove MTBE mass, to evaluate SVE feasibility for longer-term MTBE mass removal, to determine if extracted vapor concentrations would be sustained over a long period of time, and to obtain potential system-design data. Starting on October 8, 2001, Cambria performed long-term (5 day) SVE testing of existing tank backfill well T-1. (designed to fail)

SVE Pilot Test Procedures: Due to anticipated high hydrocarbon vapor concentrations, an internal combustion engine (ICE) was used as the extraction and vapor abatement device during the SVE pilot test. The ICE has an internal controller (Phoenix 1000 auto-fuel controller) that regulates the air-to-fuel ratio, allowing operation at the optimal extraction rate. Throughout the SVE test, Cambria measured applied vacuum, airflow, vapor concentration, and vacuum influence in nearby wells. Vapor samples were collected for laboratory analysis. All samples were analyzed for TPHg and MTBE by EPA Method 8260B.

Pilot Testing Equipment: The test was performed by connecting a Remediation Services International model V3 ICE to the test well for extracting soil vapor. The ICE was powered by the extracted soil vapors, supplemented with liquid propane gas. By burning the extracted soil vapors

as fuel, the ICE also served as a vapor-abatement device. The ICE is equipped with a Phoenix 1000 controller, which measured applied vacuum and vapor-extraction flow rates.

A Horiba model MEXA554JU organic vapor analyzer (OVA) was used to field measure hydrocarbon concentrations in the vapor stream. A Thomas Industries model 907CDC18F vacuum pump was used to collect vapor samples in one-liter tedlar bags. Magnehelic differential pressure gauges were used to monitor vacuum induced in nearby wells.

SVE PILOT TEST RESULTS

The test data is summarized in Tables 1 and 2. Laboratory analytical results are included as Attachment A. Field data sheets are included as Attachment B. Details of the October 2001 test are presented below:

October 8: TPHg, benzene, and MTBE vapor concentrations were reported as 1,100, 11, and 340 parts per million by volume (ppmv), respectively, in the first vapor sample collected at 10:45 hours on October 8, 2001. TPHg, benzene, and MTBE concentrations were reported as 15,000, 140, and 2,600 ppmv, respectively, in the second vapor sample collected at 15:15 hours on October 8, 2001. The high vapor concentrations from the well dictated that the Phoenix controller open the dilution-air flow and limit the well air flow in order to maintain the necessary engine operational air-to-fuel ratio. This operating condition compromised the controller's ability to accurately measure well air flow, and the controller was unable to measure well air flow throughout the day. However, based on the measured well-valve position and well vacuum throughout the day, Cambria estimates an average vapor-extraction flow rate from the well of 2 cubic feet per minute (cfm).

October 9: TPHg and MTBE vapor concentrations were reported as 900 and 2,300 ppmv, respectively, in the vapor sample collected at 9:30 hours on October 9, 2001. The well air flow rate, as measured by the Phoenix controller, averaged 66.6 cfm. The well vacuum averaged 9.8 inches of mercury (inHg), based on an applied vacuum of 18.4 inHg.

October 10: TPHg and MTBE vapor concentrations were reported as 550 and 2,200 ppmv, respectively, in the vapor sample collected at 9:45 hours on October 10, 2001. The well air flow rate averaged 51.6 cfm. The well vacuum averaged 6.6 inHg, based on an applied vacuum of 18.3 inHg.

October 11: TPHg and MTBE vapor concentrations were reported as 630 and 82 ppmv, respectively, in the vapor sample collected at 9:30 hours on October 11, 2001. The well air flow

rate averaged 53.9 cfm. The well vacuum averaged 6.4 inHg, based on an applied vacuum of 18.7 inHg.

October 12: TPHg and MTBE vapor concentrations were reported as 510 and 340 ppmv, respectively, in the first vapor sample collected at 9:05 hours on October 12, 2001. TPHg and MTBE concentrations were reported as 140 and 270 ppmv, respectively, in the second vapor sample collected at 12:45 hours on October 12, 2001. The well air flow rate averaged 46.1 cfm. The well vacuum averaged 4.6 inHg, based on an applied vacuum of 20.0 inHg.

General Observations: Based on operating parameters and vapor sample analytical results collected throughout the week, the TPHg and MTBE vapor-phase mass removal over the test period is estimated at 15.8 and 35.9 pounds, respectively.

Monitoring well MW-3 and backfill well T-2 were used to measure vacuum influence. Well MW-3 is located approximately 15 feet from tank backfill well T-1, and tank backfill well T-2 is located approximately 30 feet from tank backfill well T-1. A maximum vacuum of 0.05 inches of water was measured in well MW-3. A maximum vacuum of 0.15 inches of water was measured in tank backfill well T-2.

A Cambria technician returned to the site on November 19, 2001 and collected a field measurement of hydrocarbon concentration in wells T-1 and T-2 using a photo-ionization detector (PID). Concentrations were 240 ppmv and 459 ppmv in wells T-1 and T-2, respectively, indicating that the hydrocarbon concentrations have remained low since the test was conducted in early October.

CONCLUSIONS

Vapor extraction data from the SVE pilot test suggests vapor-phase recovery is feasible from tank backfill well T-1. Initially, low airflow rates were obtained during the test, likely because the test well yielded considerably high TPHg and MTBE vapor concentrations, and the ICE controller did not allow air flow from the well due to these initially high vapor concentrations. The controller regulates an air-to-fuel ratio necessary to operate the ICE, and the extracted vapor concentrations required considerable dilution air to keep the ICE at the appropriate air-to-fuel ratio. Given the high estimated permeability tank backfill material (pea gravel) within the UST facility, a higher air-flow rate was expected from the formation than the air-flow rate obtained during the first day

of the test. Operation during subsequent days produced higher air-flow rates from the well as the vapor concentrations decreased, supporting the assumption of the availability of a high air-flow rate from the UST facility.

Initial vapor concentrations were high and increased significantly by the end of the first day, indicating the presence of source material within the UST complex available for recovery. Operation of the ICE over the 5-day test period resulted in a decrease of two orders of magnitude in TPHg vapor concentrations (15,000 to 140 ppmv), and an order of magnitude decrease in MTBE vapor concentrations (2,600 to 270 ppmv). Figure 3 illustrates the vapor concentration decrease over the test period, as field measured using a Horiba OVA. Figure 4 illustrates the vapor concentration decrease over the test period, per the vapor-sample analytical data. Follow-up PID measurements indicate that hydrocarbon concentrations have remained low. The sustained decrease in vapor concentrations suggests a depletion of source material within the UST complex. Source area depletion will effectively reduce MTBE plume size in groundwater.

Given the low permeability of the native soil (silty sand) relative to the UST complex backfill material (pea gravel), it is reasonable to assume that vapor extraction was limited mainly to the extents of the UST facility. To determine the effective radius of influence, the applied vacuum was compared to the vacuum observed in the nearby wells. The theoretical radius of influence was estimated according to the steady-state radial distribution equation in *A Practical Approach to the Design, Operation, and Monitoring of In Situ Soil Venting Systems* (P.C. Johnson, C.C. Stanley, M.W. Kemblowski, D.L. Byers, and J.D. Colthart, Groundwater Monitoring and Review, Spring 1990). As shown in Table 2, the theoretical radius of vacuum influence extends to 30.3 feet within the backfill material of the UST complex, and 15 feet in the native soil surrounding the UST complex. During the DVE pilot test conducted on well MW-3 in March 2001, no vacuum influence was observed in tank backfill well T-1, located 15 feet from well MW-3. This data indicates that a greater radius of influence is achieved though vapor extraction from tank backfill wells than through vapor extraction from wells installed in native soil at the site.

The estimated cumulative mass removal of MTBE during the SVE pilot test was approximately 35.9 pounds (Table 1). The cumulative vapor-phase mass removal of MTBE through DVE from wells MW-2 and MW-3 conducted between March and October 2000 and during the one day pilot test in March 2001 (eight events total) was approximately 6.4 pounds. This data indicates that vapor extraction from the tank backfill is much more effective at removing MTBE than vapor extraction from wells installed in native soil at the site.

The estimated cumulative mass removal of MTBE through mobile GWE from wells MW-2 and MW-3 conducted between March and October 2000 and from August 2001 through the third quarter 2001 (20 events total) was approximately 26.1 pounds. This suggests that while groundwater extraction has been effective, vapor extraction from the tank backfill is much more effective in the short-term at removing MTBE than groundwater extraction from monitoring wells. However, groundwater extraction can adequately address the remaining dissolved-phase MTBE.

RECOMMENDATIONS

The SVE pilot test field data indicates that source area remediation is viable through vapor extraction, but limited to the UST complex and a minimal area around the facility. Cambria does not recommend installing a permanent SVE system at this time, however, for the following reasons:

1. Vapor-phase mass removal outside the UST complex appears to be limited by the low permeable soil.
2. It appears that the 5-day SVE pilot test sufficiently removed the hydrocarbon mass available within the UST complex. vapor, not gw.

In summary, a permanent SVE system would neither be effective in remediating source material outside of the UST complex, nor necessary for remediating source material within the UST facility at this time. Cambria instead recommends the following:

1. Evaluate the quarterly monitoring data to observe the effects of mobile GWE and the SVE pilot test on groundwater concentrations.
2. Continue the mobile GWE program from well MW-3 to address potential migration of dissolved-phase MTBE in the groundwater. Cambria also recommends including well MW-2 in the extraction program on a bi-weekly basis. When MTBE concentrations in well MW-3 decrease to less than 50,000 ppb, the extraction frequency from well MW-3 will be decreased to monthly. Groundwater mass removal data will continue to be presented in forthcoming quarterly monitoring reports.
3. Collect monthly field measurements of hydrocarbon concentration in wells T-1 and T-2 using a PID to assess any rebound of hydrocarbons within the UST complex. If hydrocarbon concentrations indicate a considerable rebound, more permanent SVE will be recommended. While a September 4, 2001 Alameda County Health Care Services Agency (ACHCSA) letter requested that additional wells be proposed for SVE should a permanent system be installed, we recommend using tank backfill wells only for a potential permanent system due to the

also take GW samples at T-1 & T-2 & extract if appropriate

greater vacuum influence achieved in the porous pea-gravel of the tank pit and the higher MTBE extraction rates achieved.

4. Perform additional subsurface investigation to define the extent of MTBE at the site as proposed below.

Proposed Subsurface Investigation

As requested in a November 5, 2001 ACHCSA letter, Cambria will proceed with the previously approved downgradient monitoring well installation as described in our November 18, 2000 *Additional Subsurface Investigation Work Plan*. The scope of work includes installing two 4-inch diameter monitoring wells along the southwest edge of 6th Street within the City of Oakland right-of-way. Due to the presence of water, sanitary sewer and storm drain utilities beneath 6th Street in the immediate vicinity of the proposed wells, the wells may be offset slightly from their originally proposed locations. Although the original work plan recommended discrete grab groundwater samples at 5-foot intervals, groundwater samples will be collected after monitoring well installation only. ✓ wp - should sample soil.

A September 4, 2001 ACHCSA letter stated that "it appears that there are secondary sources of contamination, from the dispensers and possibly from the piping" and requested additional well installation near previously installed boring SB-A, located downgradient of a former pump island. The dispensers and associated piping were removed from this pump island and over-excavation was conducted around the piping in 1995 (Attachment C). The maximum TPHg concentration reported in confirmation soil samples collected during over-excavation was 28 ppm. No benzene was reported in any of the confirmation samples collected. With the removal of the dispensers and piping, the primary source of hydrocarbons was removed, and the over-excavation substantially removed any secondary sources remaining in soil. An additional monitoring well near boring SB-A would not be downgradient of any secondary sources, and we believe it is not necessary.

No MTBE result

In addition to the previously proposed work scope, Cambria recommends the installation of three onsite borings to further characterize the plume. One boring will be advanced northwest of the western-most dispenser island, one boring will be advanced southwest of the eastern-most existing pump islands, and one boring will be advanced in the southern corner of the site. Due to the concurrent well installation activities, the borings will be advanced using a drill rig equipped with hollow-stem augers. The borings will be extended to first-encountered groundwater (approximately 12 fbg).

Our complete scope of work for boring and monitoring well installation includes the following tasks:

Utility Location: Cambria will notify Underground Service Alert of our drilling activities.

Site Health and Safety Plan: We will prepare a comprehensive site safety plan to protect site workers. The plan will be kept onsite during field activities and will be reviewed and signed by each site worker.

Permits: We will obtain required permits for advancing the soil borings from the City of Oakland and the Alameda County Public Works Agency.

Soil Borings: Assuming the absence of subsurface and overhead obstructions, Cambria will advance five soil boring in the approximate locations shown on Figure 2 using a drill rig equipped with hollow-stem augers. The offsite borings located within 6th Street will be advanced to approximately 20 fbg and completed as groundwater monitoring wells. The remaining three borings will be advanced to first-encountered groundwater, approximately 12 fbg. Soil samples will be collected at 5-foot intervals and at the capillary fringe zone in all five borings. A grab groundwater sample will be collected at first encountered groundwater in the three onsite borings. The onsite borings will subsequently be backfilled with neat-cement gout and capped to match the existing grade. All collected soil and grab groundwater samples will be transported to a State-approved analytical laboratory. Our standard field procedures for soil borings and monitoring well installation are included as Attachment D.

Groundwater Monitoring Well Installation and Sampling: The groundwater monitoring wells will be constructed of 4-inch diameter PVC and screened with 15 feet of 0.010-inch machined slot. A filter pack consisting of No. 2/12 sand will be installed to 1 to 2 feet above the top of the well screen, which will be overlain by 1 to 2 feet of bentonite, and bentonite-cement grout to the surface. A traffic-rated vault-box will be installed to protect the well. At least 72 hours prior to sampling, the groundwater monitoring wells will be developed by surging and purging at least 10 casing volumes of water. The new wells will be sampled during the next regularly scheduled groundwater monitoring event following installation. Our standard field procedures for monitoring well installation are included as Attachment D.

Chemical Analysis: The grab groundwater samples and selected soil samples will be analyzed by a State-certified analytical laboratory for TPHg, BTEX, and MTBE using EPA Method 8260.

Reporting: Upon receipt of analytical results, we will prepare a report that, at a minimum, will contain:

- A summary of the site background and history;
- Descriptions of the drilling and sampling methods;
- Boring and well logs;

- Tabulated soil and grab groundwater analytical results;
- Analytical reports and chain-of-custody forms;
- MTBE isoconcentrations contours and mass estimates, and
- Cambria's conclusions and recommendations.

Groundwater Monitoring: Following installation, the monitoring wells will be added to the current quarterly monitoring program. Quarterly groundwater samples will be analyzed for TPHg, BTEX and MTBE.

Schedule: Upon receiving written work plan approval, permits will be acquired and the field activities will be scheduled. An investigation report will be submitted approximately 60 days after completing the field activities.

CLOSING

Please call Jacquelyn Jones at (510) 420-3316 if you have any questions.

Sincerely,
Cambria Environmental Technology, Inc.

Jacquelyn L. Jones
Project Geologist

for: Dan Lescure
Project Engineer

Stephan A. Bork, C.E.G, C.H.G.
Associate Hydrogeologist

REGISTERED GEOLOGIST
STEPHAN A. BORK
No. EG 2058
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

Figures:
1 - Vicinity/Area Well Survey Map
2 - Proposed Monitoring Well and Soil Boring Location Map
3 - Horiba OVA Concentrations versus Time
4 - TPHg & MTBE Concentrations versus Time

Tables:
1 - Vapor Extraction – Mass Removal Data
2 - Vapor Extraction – Radius of Influence Data

Attachments:
A - Laboratory Analytical Reports
B - Field Data Sheets
C - Dispenser Over-Excavation Data
D - Standard Field Procedures for Monitoring Well Installation

cc: Karen Petryna, Equiva Services LLC, P.O. Box 7869, Burbank, California 91501-7869
Virginia R. Rawson, Tr., 1860 Tice Creek Dr. #1353, Walnut Creek, CA 94595
Ronald L. & Cathy L. Labatt, P.O. Box 462, Kamiah, ID 83536

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10/05/01

FIGURE 1

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0 1/8 1/4 1/2 1

SCALE : 1" = 1/4 MILE

Shell-branded Service Station
610 Market Street
Oakland, California
Incident #98995750

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Vicinity / Area Well Survey Map

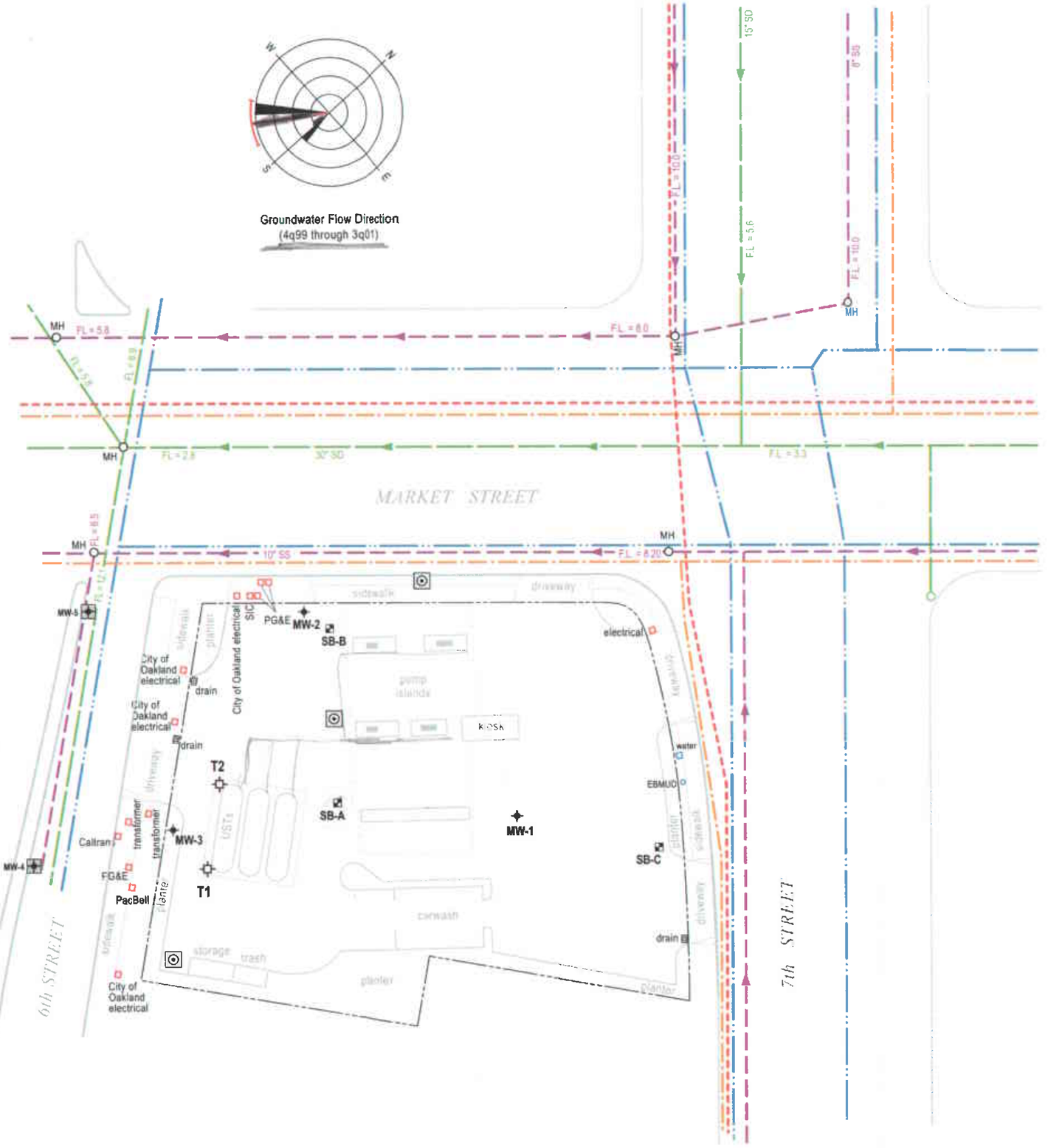
1/2 Mile Radius

12/12/01

EXPLANATION

- MW-4 — Proposed monitoring well location
- Proposed soil boring location
- MW-1 — Monitoring well installed November 17, 1998
- SB-B — Geoprobe boring drilled March 31, 1998
- T1 — Tank backfill well
- Storm Drain line
- Sanitary Sewer line
- Water Main
- Gas line
- Electrical line
- Flow direction
- FL = 5.6 — Flowline elevation, above mean sea level
- MH — Manhole

Groundwater Flow Direction
(4q99 through 3q01)



0 20 40
Scale (ft)

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Proposed Monitoring Well and Soil Boring Location Map

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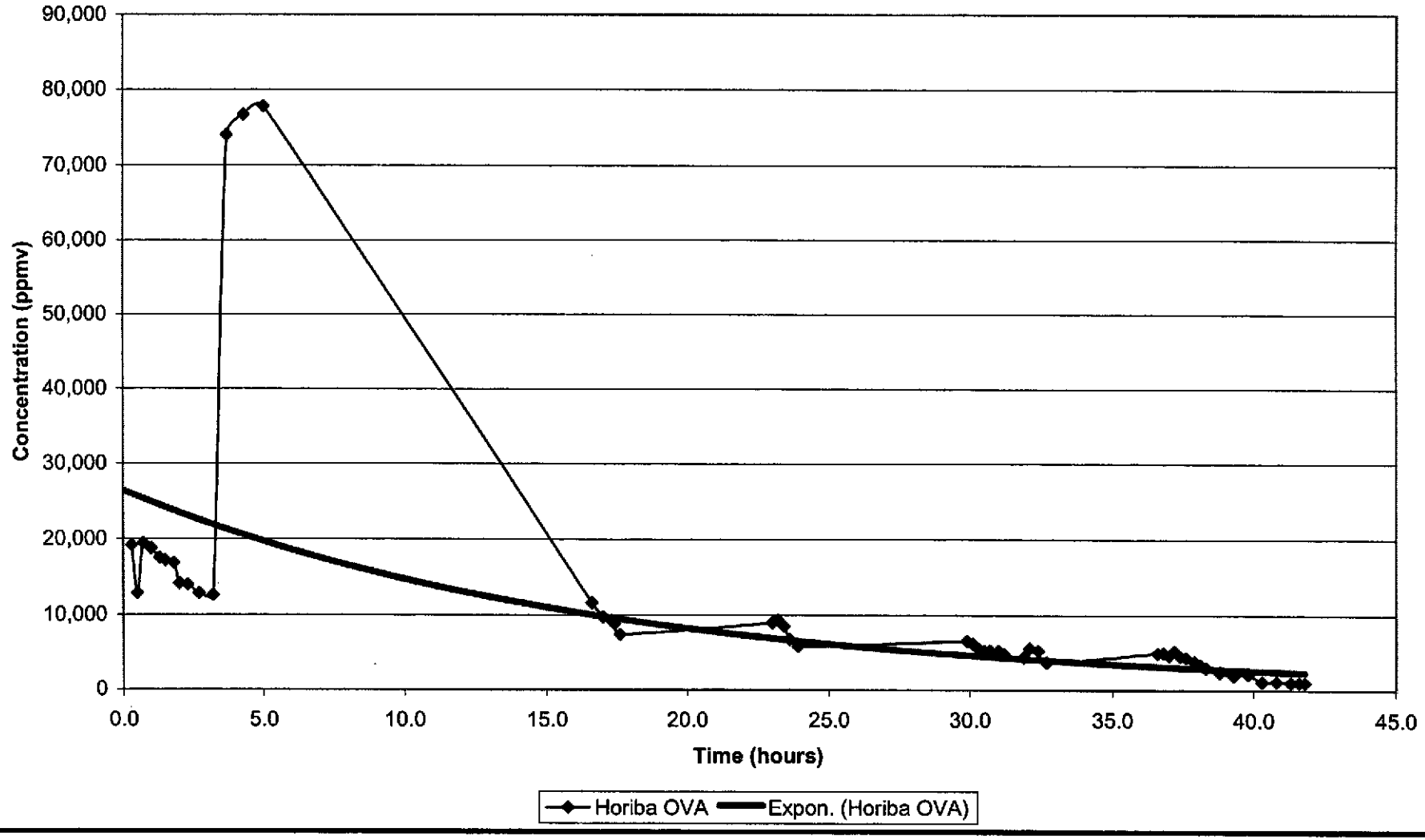
Shell-branded Service Station
610 Market Street
Oakland, California
Incident #98995750

FIGURE
2

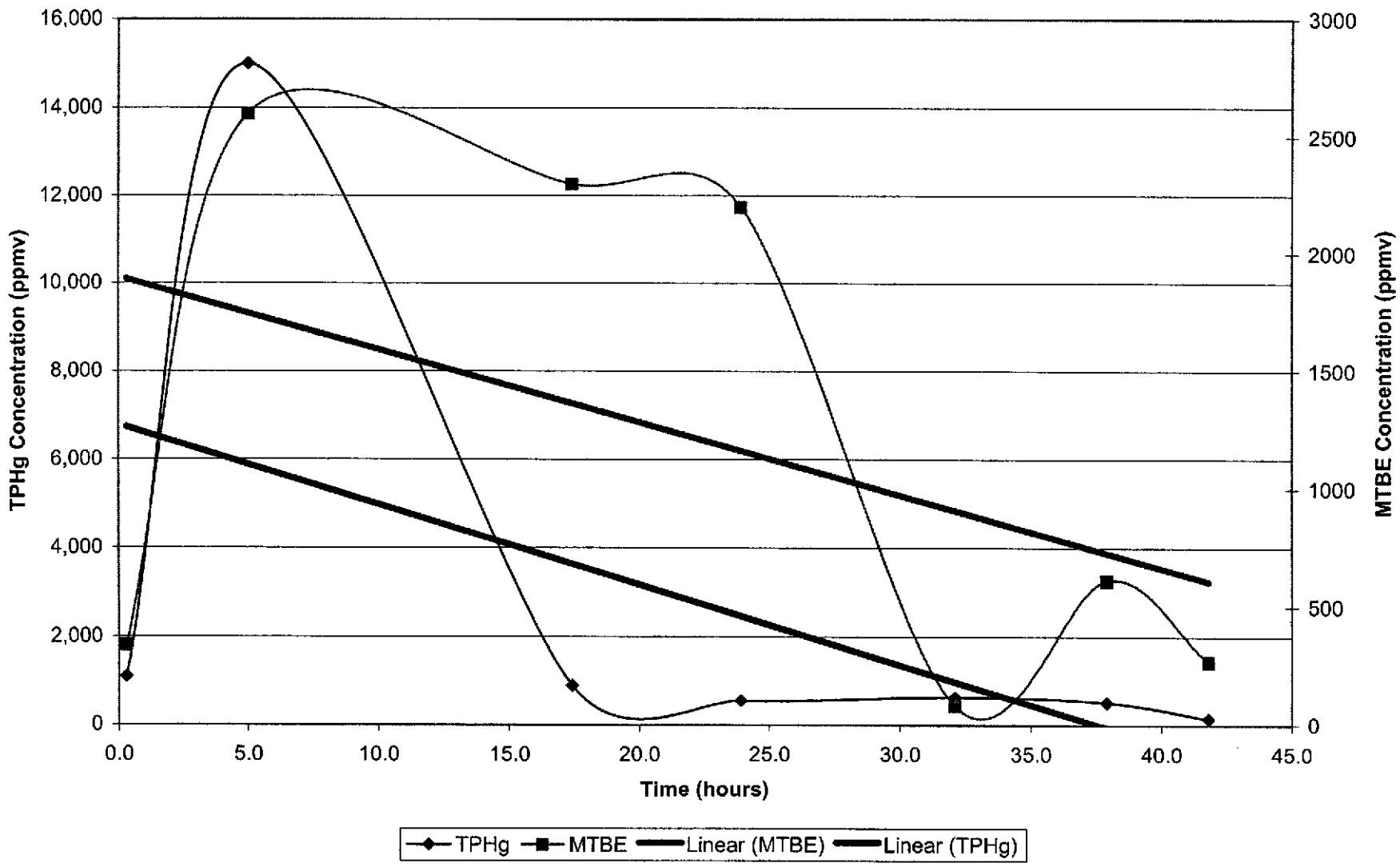
Figure 3
Shell-branded Service Station
610 Market Street
Oakland, California

Tank Backfill Well T-1 Horiba OVA Concentrations vs Time



G:\Oakland 610 Market\Pilot Test\SVE Test Data Table \ Figure 3

Figure 4
Shell-branded Service Station
610 Market Street
Oakland, California



G:\Oakland 610 Market\Pilot Test\SVE Test Data Table \ Figure 4

Table 1: Vapor Extraction - Mass Removal Data - Shell-branded Service Station, Incident #98995750, 610 Market Street, Oakland, California

Date	Hour Meter (hours)	Cumulative Opertion (hours)	System Flow Rate (CFM)	Hydrocarbon Concentrations (Concentrations in ppmv) TPHg	Benzene	MTBE	TPHg Removal Rate (#/hour)	TPHg Cumulative TPHg Removed (#)	Benzene Removal Rate (#/hour)	Benzene Cumulative Benzene Removed (#)	MTBE Removal Rate (#/hour)	MTBE Cumulative MTBE Removed (#)
							TPHg		**Benzene**		**MTBE**	
10/08/01												
10:30	96.2	0.00					0.000	0.000	0.000	0.000	0.000	0.000
10:45	96.5	0.30	2	**1,100**	**11**	**340**	0.029	0.009	0.000	0.000	0.009	0.003
11:00	96.7	0.50	2	12,870			0.029	0.015	0.000	0.000	0.009	0.005
11:15	96.9	0.70	2	19,460			0.029	0.021	0.000	0.000	0.009	0.007
11:30	97.2	1.00	2	18,790			0.029	0.029	0.000	0.000	0.009	0.009
11:45	97.5	1.30	2	17,540			0.029	0.038	0.000	0.000	0.009	0.012
12:00	97.7	1.50	2	17,190			0.029	0.044	0.000	0.000	0.009	0.014
12:15	98	1.80	2	16,850			0.029	0.053	0.000	0.000	0.009	0.017
12:30	98.2	2.00	2	14,170			0.029	0.059	0.000	0.001	0.009	0.019
12:45	98.5	2.30	2	14,020			0.401	0.179	0.003	0.002	0.071	0.040
13:15	98.9	2.70	2	12,880			0.401	0.340	0.003	0.003	0.071	0.068
13:45	99.4	3.20	2	12,650			0.401	0.540	0.003	0.005	0.071	0.104
14:15	99.9	3.70	2	74,000			0.401	0.741	0.003	0.006	0.071	0.140
14:45	100.5	4.30	2	76,680			0.401	0.981	0.003	0.008	0.071	0.182
15:15	101	4.80	2	**15,000**	**140**	**2,600**	0.401	1.18	0.003	0.010	0.071	0.218
10/9/01												
8:45	112.8	16.60	71	11,600			0.854	11.3	0.077	0.924	2.23	26.6
9:00	113.2	17.00	72	9,740			0.866	11.6	0.079	0.956	2.27	27.5
9:15	113.5	17.30	71	9,270			0.854	11.9	0.077	0.979	2.23	28.2
9:30	113.6	17.40	61	**900**	90	**2,300**	0.734	11.9	0.067	0.986	1.92	28.3
9:45	113.8	17.60	58	8,850			0.698	12.1	0.063	0.998	1.82	28.7
10/10/01												
8:45	119.2	23.00	0	8,980			0.000	12.1	0.000	0.998	0.000	28.7

Table 1: Vapor Extraction - Mass Removal Data - Shell-branded Service Station, Incident #98995750, 610 Market Street, Oakland, California

							TPHg		Benzene		MTBE	
Date	Hour Meter (hours)	Cumulative Opertion (hours)	System Flow Rate (CFM)	Hydrocarbon Concentrations (Concentrations in ppmv) TPHg	Benzene	MTBE	TPHg Removal Rate (#/hour)	Cumulative TPHg Removed (#)	Benzene Removal Rate (#/hour)	Cumulative Benzene Removed (#)	MTBE Removal Rate (#/hour)	Cumulative MTBE Removed (#)
9:00	119.4	23.20	1	9,370			0.007	12.1	0.001	0.998	0.030	28.7
9:15	119.6	23.40	12	8,520			0.088	12.1	0.008	1.00	0.361	28.8
9:30	119.8	23.60	42	6,790			0.309	12.2	0.028	1.01	1.26	29.0
9:45	120.1	23.90	45	5,840			0.331	12.3	0.030	1.01	1.35	29.4
12:00	120.7	24.50	79	**550**	55	**2,200**	0.581	12.6	0.053	1.05	2.38	30.9
12:15	120.9	24.70	80				0.588	12.7	0.053	1.06	2.41	31.4
16:00	122.1	25.90	80				0.588	13.4	0.053	1.12	2.41	34.2
10/11/01												
8:15	126.1	29.90	0	6,560			0.000	13.4	0.000	1.12	0.000	34.2
8:30	126.3	30.10	2	6,200			0.017	13.4	0.002	1.12	0.002	34.2
8:45	126.5	30.30	5	5,510			0.042	13.4	0.004	1.12	0.006	34.2
9:00	126.7	30.50	72	5,220			0.606	13.6	0.055	1.13	0.081	34.3
9:15	126.9	30.70	41	5,270			0.345	13.6	0.031	1.14	0.046	34.3
9:30	127.2	31.00	60	**630**	63	**82**	0.505	13.8	0.046	1.15	0.067	34.3
9:45	127.4	31.20	61	4,770			0.514	13.9	0.047	1.16	0.068	34.3
13:30	128.1	31.90	62	4,340			0.522	14.3	0.047	1.20	0.070	34.4
13:45	128.3	32.10	59	5,590			0.497	14.4	0.045	1.20	0.066	34.4
14:00	128.6	32.40	64	5,210			0.539	14.5	0.049	1.22	0.072	34.4
14:15	128.9	32.70	61	3,670			0.514	14.7	0.047	1.23	0.068	34.4
15:30	129	32.80	60				0.505	14.7	0.046	1.24	0.067	34.4
10/12/01												
7:30	132.8	36.60	0	4,910			0.000	14.7	0.000	1.24	0.000	34.4
7:45	133	36.80	2	4,980			0.014	14.7	0.001	1.24	0.017	34.4
8:00	133.2	37.00	22	**510**	51	**610**	0.150	14.7	0.014	1.24	0.184	34.5
8:15	133.4	37.20	30	5,200			0.205	14.8	0.019	1.24	0.250	34.5

Table 1: Vapor Extraction - Mass Removal Data - Shell-branded Service Station, Incident #98995750, 610 Market Street, Oakland, California

Date	Hour Meter (hours)	Cumulative Opertion (hours)	System Flow Rate (CFM)	Hydrocarbon Concentrations (Concentrations in ppmv) TPHg	Benzene	MTBE	TPHg Removal Rate (#/hour)	TPHg Cumulative TPHg Removed (#)	Benzene Removal Rate (#/hour)	Benzene Cumulative Benzene Removed (#)	MTBE Removal Rate (#/hour)	MTBE Cumulative MTBE Removed (#)
							TPHg		**Benzene**		**MTBE**	
8:30	133.6	37.40	41	4,490			0.280	14.8	0.025	1.25	0.342	34.6
8:45	133.8	37.60	53	4,310			0.361	14.9	0.033	1.26	0.442	34.7
9:00	134.1	37.90	58	3,770			0.395	15.0	0.036	1.27	0.484	34.8
9:15	134.3	38.10	58	3,330			0.395	15.1	0.036	1.27	0.484	34.9
9:30	134.5	38.30	62	2,940			0.423	15.2	0.038	1.28	0.517	35.0
10:00	135	38.80	51	2,350			0.348	15.4	0.032	1.30	0.426	35.2
10:30	135.5	39.30	47	1,907			0.320	15.5	0.029	1.31	0.392	35.4
11:00	136	39.80	45	2,130			0.084	15.6	0.008	**1.32**	0.166	35.5
11:30	136.5	40.30	45	1,093			0.084	15.6	0.008	1.32	0.166	35.6
12:00	137	40.80	44	1,116			0.082	15.7	0.007	1.32	0.163	35.7
12:30	137.5	41.30	45	983			0.084	15.7	0.008	1.33	0.166	35.7
12:45	137.8	41.60	45	**140**	14	**270**	0.084	15.7	0.008	1.33	0.166	35.8
13:00	138	41.80	45	956			0.084	15.7	0.008	1.33	0.166	35.8
13:10	138.2	42.00	45				0.084	15.8	0.008	1.33	0.166	35.9
Total Pounds Removed:							**TPHg =**	**15.8**	**Benzene =**	**1.33**	**MTBE =**	**35.9**

Abbreviations and Notes:

CFM = Cubic feet per minute ppmv = Parts per million by volume # = Pounds

First day well concentrations didnnot allow automated well valve to open much casuing flow to be below measuring capability.

Flow estimated at 2 cfm based on measured well vacuum and well valve position.

Bold = Sample concentrations from Lab analysis; Non-Bold = field measured concentrations by a Horiba OVA

TPHG, Benzene, and MTBE analyzed by EPA Method 8015/8020/8260 respectively from 1 liter tedlar bag samples

Second through fifth day benzene concetrations assumed to be 10% of the TPHg concentration.

TPHg / Benzene / MTBE removal rate = Rate based on Bay Area Air Quality Management District's Manual of Procedures for Soil Vapor Extraction dated July 17, 1991.

Table 1: Vapor Extraction - Mass Removal Data - Shell-branded Service Station, Incident #98995750, 610 Market Street, Oakland, California

							TPHg		Benzene		MTBE	
	Hour	Cumulative	System Flow	Hydrocarbon Concentrations			TPHg Removal	Cumulative TPHg	Benzene Removal	Cumulative Benzene	MTBE Removal	Cumulative MTBE
	Meter	Opertion	Rate	TPHg	Benzene	MTBE	Rate	Removed	Rate	Removed	Rate	Removed
Date	(hours)	(hours)	(CFM)	(Concentrations in ppmv)			(#/hour)	(#)	(#/hour)	(#)	(#/hour)	(#)

x 60 min/hour x 1/1,000,000)

Cumulative TPHg / Benzene / MTBE removal = Previous removal rate multiplied by the hour-interval of operation plus the previous total

Table 2: Vapor Extraction - Radius of Influence Data - Shell-branded Service Station, Incident #98995750, 610 Market Street, Oakland, CA

Extraction Well	Monitoring Wells	Rw (ft)	r (ft)	Pw ("H2O gauge)	Pw(abs) (psia)	P(r) ("H2O gauge)	P(r) (psia)	Ri [1] (ft)
T-1	T-2	0.167	30	98	11.156	0.15	14.691	30.3
	MW-3	0.167	15	95	11.264	0.05	14.694	15.0

[1] Based on the steady-state radial pressure distribution equation from "A Practical Approach to the Design, Operation, and Monitoring of In Situ Soil Venting Systems", P.C. Johnson, C.C. Stanley, M.W. Kemblowski, D.L. Byers, and J.D. Cothart, Groundwater Monitor and Review, Spring 1990:

$$Ri = [Rw] / [r/Rw]^{[(1-(Patm/Pw)^2)/((P(r)/Pw)^2)-1)]}$$

Rw = Radius of Extraction Well (feet)
r = Distance of monitoring well from extraction well (feet)
Psia = Pounds per square inch absolute
Pw = Absolute pressure applied at extraction well (psia or inches of water column)
P(r) = Absolute pressure at monitoring well (psia or inches of water column)
Patm = Absolute atmospheric pressure (14.696 psia)
Ri = Radius of Influence (feet)

ATTACHMENT A

Laboratory Analytical Reports

KIFF ANALYTICAL LLC

Report Number : 22789
Date : 10/22/2001

Jaquelyn Jones
Cambria Environmental Technology, Inc.
1144 65th Street, Suite B
Oakland, CA 94608

Subject : 2 Air Samples
Project Name : 610 MARKET ST. OAKLAND, CA.
Project Number :
P.O. Number : 98995750

Dear Ms. Jones,

Chemical analysis of the samples referenced above has been completed. Summaries of the data are contained on the following pages. Sample(s) were received under documented chain-of-custody. US EPA protocols for sample storage and preservation were followed.

Kiff Analytical is certified by the State of California (# 2236). If you have any questions regarding procedures or results, please call me at 530-297-4800.

Sincerely,

Joel Kiff

Joel Kiff

KIFF ANALYTICAL LLC

Report Number : 22789
Date : 10/22/2001

Project Name : **610 MARKET ST. OAKLAND, CA.**
Project Number :

Sample : **T2-A** Matrix : Air Lab Number : 22789-01
Sample Date :10/8/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**11**	0.40	ppmv	EPA 8260B	10/10/2001
Toluene	**0.45**	0.40	ppmv	EPA 8260B	10/10/2001
Ethylbenzene	**< 0.40**	0.40	ppmv	EPA 8260B	10/10/2001
Total Xylenes	**1.1**	0.40	ppmv	EPA 8260B	10/10/2001
Methyl-t-butyl ether	**340**	0.80	ppmv	EPA 8260B	10/10/2001
TPH as Gasoline	**1100**	40	ppmv	EPA 8260B	10/10/2001
Toluene - d8 (Surr)	99.0		% Recovery	EPA 8260B	10/10/2001
4-Bromofluorobenzene (Surr)	102		% Recovery	EPA 8260B	10/10/2001

Sample : **T2-B** Matrix : Air Lab Number : 22789-02
Sample Date :10/8/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**140**	6.7	ppmv	EPA 8260B	10/10/2001
Toluene	**7.2**	6.7	ppmv	EPA 8260B	10/10/2001
Ethylbenzene	**< 6.7**	6.7	ppmv	EPA 8260B	10/10/2001
Total Xylenes	**19**	6.7	ppmv	EPA 8260B	10/10/2001
Methyl-t-butyl ether	**2600**	200	ppmv	EPA 8260B	10/10/2001
TPH as Gasoline	**15000**	670	ppmv	EPA 8260B	10/10/2001
Toluene - d8 (Surr)	99.3		% Recovery	EPA 8260B	10/10/2001
4-Bromofluorobenzene (Surr)	103		% Recovery	EPA 8260B	10/10/2001

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL

720 Olive Drive, Suite D

Davis, CA 95616

(530) 297-4800 (530) 297-4803 fax

EQUIVA Services LLC Chain Of Custody Record

Equiva Project Manager to be invoiced:

☑ SCIENCE & ENGINEERING ☐ TECHNICAL SERVICES ☐ CRMT HOUSTON

KAREN PETRYNA

22789

INCIDENT NUMBER (S&E ONLY): 9 8 9 9 5 7 5 0

SAP or CRMT NUMBER (TS/CRMT):

DATE: 10/8/01

PAGE: 1 of 1

CONSULTANT COMPANY: Cambria Environmental Technology Inc

ADDRESS: 1144 65TH ST. #B

CITY: OAKLAND, CA. 94608

TELEPHONE: (510) 420-3316 FAX: (510) 420-9170 E-MAIL:

SITE ADDRESS (Street and City): 610 MARKET ST. OAKLAND, CA.

PROJECT CONTACT (Report to): JACQUELYN JONES

CONSULTANT PROJECT NO.:

Sampled By: (PRINT) JIMMIE Couch

LAB USE ONLY

TURNAROUND TIME (BUSINESS DAYS): ☒ 10 DAYS ☐ 72 HOURS ☐ 48 HOURS ☐ 24 HOURS ☐ LESS THAN 24 HOURS

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY:

GC/MS MTBE CONFIRMATION: HIGHEST _____ HIGHEST per BORING _____ ALL _____

SPECIAL INSTRUCTIONS OR NOTES: TEMPERATURE ON RECEIPT C°

Report units in ppm/ppb. Provide lowest detection limits.

REQUESTED ANALYSIS

LAB USE ONLY	Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH - Purgeable (8015m)	TPH - Extractable (8015m)	BTEX / MTBE (8021B)	BTEX / MTBE + Oxygenates (8260B)	VOCs Full List + Oxygenates (8260B)	MTBE (8260B) Confirmation, See Note	EPA 5035 Extraction for Volatiles	VOCs Halogenated/Aromatic (8021B)	Ethanol, Methanol (8015B)	Metals (Specify) Cu and Total Pb	TRPH (418.1)	Vapor VOCs BTEX / MTBE (TO-15)	Vapor VOCs Full List (TO-15)	Vapor TPH (ASTM 3415m)	Vapor Fixed Gases (ASTM D1946)	Test for Disposal (4B - 17)	TPHg/BTEX/MTBE (8260B)	pH			FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes
	TZ-A	10/8/01	10:50	AIR	1	X		X																		-01
	TZ-B	↓	3:00	↓	↓	X		X																		-02

Relinquished by: (Signature) Jimmie Couch

Received by: (Signature) SECURED LOCATION

Date: 10/8/01 Time:

Relinquished by: (Signature)

Received by: (Signature)

Date: Time:

Relinquished by: (Signature)

Received by: (Signature) John Cuttle / Kiff Analytical

Date: 100901 Time: 1100

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

10/22/00 Revision

KIFF ANALYTICAL LLC

Report Number : 22811
Date : 10/23/2001

Jaquelyn Jones
Cambria Environmental Technology, Inc.
1144 65th Street, Suite B
Oakland, CA 94608

Subject : 1 Air Sample
Project Name : 610 MARKET ST., OAKLAND
Project Number :
P.O. Number : 98995750

Dear Ms. Jones,

Chemical analysis of the samples referenced above has been completed. Summaries of the data are contained on the following pages. Sample(s) were received under documented chain-of-custody. US EPA protocols for sample storage and preservation were followed.

Kiff Analytical is certified by the State of California (# 2236). If you have any questions regarding procedures or results, please call me at 530-297-4800.

Sincerely,

Joel Kiff

Joel Kiff

KIFF ANALYTICAL LLC

Report Number : 22811
Date : 10/23/2001

Project Name : **610 MARKET ST., OAKLAND**
Project Number :

Sample : **T-2** Matrix : Air Lab Number : 22811-01
Sample Date :10/9/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Methyl-t-butyl ether	**2300**	4.0	ppmv	EPA 8260B	10/11/2001
TPH as Gasoline	**900**	200	ppmv	EPA 8260B	10/11/2001
Toluene - d8 (Surr)	100		% Recovery	EPA 8260B	10/11/2001
4-Bromofluorobenzene (Surr)	102		% Recovery	EPA 8260B	10/11/2001

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL

720 Olive Drive, Suite D

Davis, CA 95616

(530) 297-4800 (530) 297-4803 fax

EQUIVA Services LLC Chain Of Custody Record

Equiva Project Manager to be invoiced: KAREN PETRYNA

☑ SCIENCE & ENGINEERING ☐ TECHNICAL SERVICES ☐ CRMT HOUSTON

22811

INCIDENT NUMBER (S&E ONLY): 9 8 9 9 5 7 5 0

SAP or CRMT NUMBER (TS/CRMT):

DATE: 10/9/01

PAGE: 1 of 1

SAMPLING COMPANY: Cambria Environmental Technology

LOG CODE:

SITE ADDRESS (Street and City): 610 MARKET ST, OAKLAND

GLOBAL ID NO.:

ADDRESS: 1144 65TH ST. #B

EDF DELIVERABLE TO (Responsible Party or Designee): JACQUELYN JONES

PHONE NO.:

E-MAIL:

CONSULTANT PROJECT NO.:

PROJECT CONTACT (Hardcopy or PDF Report to): OAKLAND, CA. 94608

SAMPLER NAME(S) (Print): JIMMIE COUCH

LAB USE ONLY

TELEPHONE: (510) 420-3316 FAX: (510) 420-9170 E-MAIL:

TURNAROUND TIME (BUSINESS DAYS):

☒ 10 DAYS ☐ 5 DAYS ☐ 72 HOURS ☐ 48 HOURS ☐ 24 HOURS ☐ LESS THAN 24 HOURS

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY:

GC/MS MTBE CONFIRMATION: HIGHEST _____ HIGHEST per BORING _____ ALL _____

SPECIAL INSTRUCTIONS OR NOTES: REPORT RESULTS IN PPM/PPB LOWEST DETECTION LIMITS

TEMPERATURE ON RECEIPT C°

REQUESTED ANALYSIS

LAB USE ONLY	Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH - Gas, Purgeable	BTEX	MTBE (8021B - 5ppb RL)	MTBE (8260B - 0.5ppb RL)	Oxygenates (5) by (8260B)	Ethanol (8260B)	Methanol	EDB & 1,2-DCA (8260B)	EPA 5035 Extraction for Volatiles	VOCs Halogenated/Aromatic (8021B)	TRPH (418.1)	Vapor VOCs BTEX / MTBE (TO-15)	Vapor VOCs Full List (TO-15)	Vapor TPH (ASTM 3416m)	Vapor Fixed Gases (ASTM D1946)	Test for Disposal (4B- ____)		TPH - Diesel, Extractable (8015m)		MTBE (8260B) Confirmation, See Note	UST REPORTING REQUIRED
	T-2	10/9/01	9:30	AIR	1	X		X																		01

FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Jimmie Couch	SECURED LOCATION	10/9/01	9:45
	Blanca Brown KIFF	10/10/01	1155

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

10/15/00 Revision

Q&Q Graphics (714) 898-9702

KIFF ANALYTICAL LLC

Report Number : 22823
Date : 10/23/2001

Jaquelyn Jones
Cambria Environmental Technology, Inc.
1144 65th Street, Suite B
Oakland, CA 94608

Subject : 1 Air Sample
Project Name : 610 MARKET ST., OAKLAND
Project Number :
P.O. Number : 98995750

Dear Ms. Jones,

Chemical analysis of the samples referenced above has been completed. Summaries of the data are contained on the following pages. Sample(s) were received under documented chain-of-custody. US EPA protocols for sample storage and preservation were followed.

Kiff Analytical is certified by the State of California (# 2236). If you have any questions regarding procedures or results, please call me at 530-297-4800.

Sincerely,

Joel Kiff

Joel Kiff

KIFF ANALYTICAL LLC

Report Number : 22823
Date : 10/23/2001

Project Name : **610 MARKET ST., OAKLAND**
Project Number :

Sample : **T-2** Matrix : Air Lab Number : 22823-01
Sample Date :10/10/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Methyl-t-butyl ether	**2200**	200	ppmv	EPA 8260B	10/16/2001
TPH as Gasoline	**550**	200	ppmv	EPA 8260B	10/12/2001
Toluene - d8 (Surr)	99.8		% Recovery	EPA 8260B	10/12/2001

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL

720 Olive Drive, Suite D

Davis, CA 95616

(530) 297-4800 (530) 297-4803 fax

EQUIVA Services LLC Chain Of Custody Record

Equiva Project Manager to be Invoiced: KAREN PETRYNA

☒ SCIENCE & ENGINEERING ☐ TECHNICAL SERVICES ☐ CRMT HOUSTON

22-823

INCIDENT NUMBER (S&E ONLY): 9 8 9 9 5 7 5 0

SAP or CRMT NUMBER (TS/CRMT):

DATE: 10/10/01

PAGE: 1 of 1

SAMPLING COMPANY: Cambria Environmental Technology

LOG CODE:

SITE ADDRESS (Street and City): 610 MARKET ST., OAKLAND

GLOBAL ID NO.:

ADDRESS: 1144 65TH ST. #B

EDF DELIVERABLE TO (Responsible Party or Designee): JACQUELYN JONES

PHONE NO.: 420-3316

E-MAIL:

CONSULTANT PROJECT NO.:

PROJECT CONTACT (Hardcopy or PDF Report to): OAKLAND, CA. 94608

SAMPLER NAME(S) (Print): JIMMIE COUCH

LAB USE ONLY

TELEPHONE: (510)420-3316

FAX: (510)420-9170

E-MAIL:

TURNAROUND TIME (BUSINESS DAYS):

☒ 10 DAYS ☐ 5 DAYS ☐ 72 HOURS ☐ 48 HOURS ☐ 24 HOURS ☐ LESS THAN 24 HOURS

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY: _____

GC/MS MTBE CONFIRMATION: HIGHEST _____ HIGHEST per BORING _____ ALL _____

SPECIAL INSTRUCTIONS OR NOTES:

REPORT RESULTS IN PPM/V
PROVIDE LOWEST DETECTION LIMITS

TEMPERATURE ON RECEIPT C°:

REQUESTED ANALYSIS

LAB USE ONLY	Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH - Gas, Purgeable	BTEX	MTBE (8021B - 5ppb RL)	MTBE (8260B - 0.5ppb RL)	Oxygenates (5) by (8260B)	Ethanol (8260B)	Methanol	EDB & 1,2-DCA (8260B)	EPA 5035 Extraction for Volatiles	VOCs Halogenated/Aromatic (8021B)	TRPH (418.1)	Vapor VOCs BTEX / MTBE (TO-15)	Vapor VOCs Full List (TO-15)	Vapor TPH (ASTM 3416m)	Vapor Fixed Gases (ASTM D1946)	Test for Disposal (48-____)		TPH - Diesel, Extractable (8015m)		MTBE (8260B) Confirmation, See Note	UST REPORTING REQUIRED
	T-2	10/10/01	9:45	AIR	1	X		X																		-01

FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes

Relinquished by: (Signature) Jimmie Couch	Received by: (Signature) SECURED LOCATION	Date: 10/10/01	Time: 1:00 pm
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature) John Cuttle / Kiff Analytical	Date: 10 11 01	Time: 1240

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

10/16/00 Revision

O&O Graphic (714) 898-9702

KIFF ANALYTICAL LLC

Report Number : 22850
Date : 10/19/2001

Jaquelyn Jones
Cambria Environmental Technology, Inc.
1144 65th Street, Suite B
Oakland, CA 94608

Subject : 1 Air Sample
Project Name : 610 MARKET ST., OAKLAND, CA
Project Number :
P.O. Number : 98995750

Dear Ms. Jones,

Chemical analysis of the samples referenced above has been completed. Summaries of the data are contained on the following pages. Sample(s) were received under documented chain-of-custody. US EPA protocols for sample storage and preservation were followed.

Kiff Analytical is certified by the State of California (# 2236). If you have any questions regarding procedures or results, please call me at 530-297-4800.

Sincerely,

Joel Kiff

Joel Kiff

KIFF ANALYTICAL LLC

Report Number : 22850

Date : 10/19/2001

Project Name : **610 MARKET ST., OAKLAND, CA**

Project Number :

Sample : **T-2** Matrix : Air Lab Number : 22850-01

Sample Date :10/11/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Methyl-t-butyl ether	**82**	20	ppmv	EPA 8260B	10/13/2001
TPH as Gasoline	**630**	20	ppmv	EPA 8260B	10/13/2001
Toluene - d8 (Surr)	100		% Recovery	EPA 8260B	10/13/2001
4-Bromofluorobenzene (Surr)	97.3		% Recovery	EPA 8260B	10/13/2001

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL

720 Olive Drive, Suite D

Davis, CA 95616

(530) 297-4800 (530) 297-4803 fax

EQUIVA Services LLC Chain Of Custody Record

Equiva Project Manager to be Invoiced: KAREN PETRYNA

☒ SCIENCE & ENGINEERING ☐ TECHNICAL SERVICES ☐ CRMT HOUSTON

22850

INCIDENT NUMBER (S&E ONLY): 9 8 9 9 5 7 5D

SAP or CRMT NUMBER (TS/CRMT):

DATE: 10/11/01

PAGE: 1 of 1

SAMPLING COMPANY: Cambria Environmental Technology

LOG CODE:

SITE ADDRESS (Street and City): 610 MARKET ST., OAKLAND, CA.

GLOBAL ID NO.:

ADDRESS: 1144 65TH ST. #B

EDF DELIVERABLE TO (Responsible Party or Designee): JACQUELYN JONES

PHONE NO.:

E-MAIL:

CONSULTANT PROJECT NO.:

PROJECT CONTACT (Hardcopy or PDF Report to): OAKLAND, CA. 94608

SAMPLER NAME(S) (Print): JIMMIE COUCH

LAB USE ONLY

TELEPHONE: (510) 420-3316 FAX: (510) 420-9170 E-MAIL:

TURNAROUND TIME (BUSINESS DAYS)

☒ 10 DAYS ☐ 5 DAYS ☐ 72 HOURS ☐ 48 HOURS ☐ 24 HOURS ☐ LESS THAN 24 HOURS

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY: _____

GC/MS MTBE CONFIRMATION: HIGHEST _____ HIGHEST per BORING _____ ALL _____

SPECIAL INSTRUCTIONS OR NOTES: REPORT RESULTS IN PPM/V
PROVIDE LOWEST DETECTION LIMITS

TEMPERATURE ON RECEIPT C°

REQUESTED ANALYSIS

LAB USE ONLY	Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH - Gas, Purgeable	BTEX	MTBE (8021B - 5ppb RL)	MTBE (8260B - 0.5ppb RL)	Oxygenates (5) by (8260B)	Ethanol (8260B)	Methanol	EDB & 1,2-DCA (8260B)	EPA 5035 Extraction for Volatiles	VOCs Halogenated/Aromatic (8021B)	TRPH (418.1)	Vapor VOCs BTEX / MTBE (TO-15)	Vapor VOCs Full List (TO-15)	Vapor TPH (ASTM 3416m)	Vapor Fixed Gases (ASTM D1946)	Test for Disposal (4B- ____)		TPH - Diesel, Extractable (8015m)		MTBE (8260B) Confirmation, See Note	UST REPORTING REQUIRED
	T-2	10/11/01	9:30	AIR	1	X		X																		-01

FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes

Relinquished by: (Signature) Jimmie Couch	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature) John Cottle/Kiff Analytical	Date: 101201	Time: 1305

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10/16/00 Revision

Q&Q Graphic (714) 898-8702

KIFF ANALYTICAL LLC

Report Number : 22849
Date : 10/23/2001

Jaquelyn Jones
Cambria Environmental Technology, Inc.
1144 65th Street, Suite B
Oakland, CA 94608

Subject : 2 Air Samples
Project Name : 610 MARKET ST., OAKLAND, CA
Project Number :
P.O. Number : 98995750

Dear Ms. Jones,

Chemical analysis of the samples referenced above has been completed. Summaries of the data are contained on the following pages. Sample(s) were received under documented chain-of-custody. US EPA protocols for sample storage and preservation were followed.

Kiff Analytical is certified by the State of California (# 2236). If you have any questions regarding procedures or results, please call me at 530-297-4800.

Sincerely,

Joel Kiff

Joel Kiff

KIFF ANALYTICAL LLC

Report Number : 22849
Date : 10/23/2001

Project Name : **610 MARKET ST., OAKLAND, CA**
Project Number :

Sample : **T-2A** Matrix : Air Lab Number : 22849-01
Sample Date :10/12/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Methyl-t-butyl ether	**610**	2.0	ppmv	EPA 8260B	10/13/2001
TPH as Gasoline	**510**	100	ppmv	EPA 8260B	10/13/2001
Toluene - d8 (Surr)	99.3		% Recovery	EPA 8260B	10/13/2001
4-Bromofluorobenzene (Surr)	92.0		% Recovery	EPA 8260B	10/13/2001

Sample : **T-2B** Matrix : Air Lab Number : 22849-02
Sample Date :10/12/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Methyl-t-butyl ether	**270**	2.0	ppmv	EPA 8260B	10/13/2001
TPH as Gasoline	**140**	100	ppmv	EPA 8260B	10/13/2001
Toluene - d8 (Surr)	100		% Recovery	EPA 8260B	10/13/2001
4-Bromofluorobenzene (Surr)	90.2		% Recovery	EPA 8260B	10/13/2001

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL

720 Olive Drive, Suite D

Davis, CA 95616

(530) 297-4800 (530) 297-4803 fax

EQUIVA Services LLC Chain Of Custody Record

Equiva Project Manager to be invoiced: KAREN PETRYNA

☒ SCIENCE & ENGINEERING ☐ TECHNICAL SERVICES ☐ CRMT HOUSTON

22849

INCIDENT NUMBER (S&E ONLY): 9 8 9 9 5 7 5 0

SAP or CRMT NUMBER (TS/CRMT):

DATE: 10/12/01

PAGE: 1 of 1

SAMPLING COMPANY: Cambria Environmental Technology	LOG CODE:	SITE ADDRESS (Street and City): 610 MARKET ST., OAKLAND, CA.	GLOBAL ID NO.:
ADDRESS: 1144 65TH ST. #B	EDF DELIVERABLE TO (Responsible Party or Designee): JACQUELYN JONES	PHONE NO.:	E-MAIL:
PROJECT CONTACT (Hardcopy or PDF Report to): OAKLAND, CA. 94608	SAMPLER NAME(S) (Print): JIMMIE COUCH		CONSULTANT PROJECT NO.:
TELEPHONE: (510)420-1916 FAX: (510)420-9170 E-MAIL:			LAB USE ONLY

TURNAROUND TIME (BUSINESS DAYS):
☒ 10 DAYS ☐ 5 DAYS ☐ 72 HOURS ☐ 48 HOURS ☐ 24 HOURS ☐ LESS THAN 24 HOURS

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY: _____

GC/MS MTBE CONFIRMATION: HIGHEST _____ HIGHEST per BORING _____ ALL _____

SPECIAL INSTRUCTIONS OR NOTES: REPORT RESULTS IN PPM/V
PROVIDE LOWEST DETECTION LIMITS

TEMPERATURE ON RECEIPT C°

REQUESTED ANALYSIS

LAB USE ONLY	Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH - Gas, Purgeable	BTEX	MTBE (8021B - 5ppb RL)	MTBE (8260B - 0.5ppb RL)	Oxygenates (5) by (8260B)	Ethanol (8260B)	Methanol	EDB & 1,2-DCA (8260B)	EPA 5035 Extraction for Volatiles	VOCs Halogenated/Aromatic (8021B)	TRPH (418.1)	Vapor VOCs BTEX / MTBE (TO-15)	Vapor VOCs Full List (TO-15)	Vapor TPH (ASTM 3416m)	Vapor Fixed Gases (ASTM D1946)	Test for Disposal (4B-)		TPH - Diesel, Extractable (8015m)		MTBE (8260B) Confirmation, See Note	UST REPORTING REQUIRED
	T-2A	10/12/01	8:00	AIR	1	X		X																		-01
	T-2B	↓	12:45	↓	1	X		X																		-02

FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes

Relinquished by: (Signature) Jimmie Couch	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature) John Cuttle/Kiff Analytical	Date: 101201	Time: 1303

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

10/16/00 Revision

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ATTACHMENT B

Field Data Sheets

CAMBRIA

VAPOR EXTRACTION TEST DATA FORM

Project Name: SHELL-OAKLAND
Project Number:
Technicians: CEO

Date: 10-8-01
Project Address: 610 MARKET, OAKLAND
Equipment: HORIBA

Extraction Well	Time Interval (min)	Stinger depth (fbg)	Hour Meter (hrs)	Eng Vac (in H2O)	Well Vac (in H2O)	Air Flow (cfm)	Fuel Flow (cfm)	Well Flow (cfm)	PID (ppm)	Ext H2O Volume (gal)	T-1 Influence Pt 1 (in H2O)	Pt 2 (in H2O)	MW-3 Pt 3 (in H2O)	Recharge (Time)	(DTW)
T-2			96.2											Wellhead Vacuum (in Hg)	
10:45	0	2'	96.5	21.2	2	63	.2	0	19170	N/A	0		.04	0	26
11:00	15		96.7	21.1	3	62	.1	0	12870		0		.03	0	27
11:15	30		96.9	21.2	3	63	.3	0	19460		0		.0	0	25
11:30	45		97.2	21.2	4	64	.2	0	18790		0		.04	0	26
11:45	60		97.5	20.8	5	63	.3	0	17540		0		.02	0	26
12:00	75		97.7	21	4	63	.3	0	17190		0		0	0	26
12:15	90		98	21.1	3	62	.2	0	16850		0		0	0	27
12:30	105		98.2	20.9	4	64	.2	0	14170		0		.02	0	27
12:45	120		98.5	20.8	3	63	.2	0	14020		0		.02	0	27
1:15	150		98.9	20.9	5	61	.2	0	12880		0		.02	0	28
1:45	180		99.4	20.9	2	68	.2	0	12650		0		.01	0	29
2:15	210		99.9	20.8	3	66	.3	0	14000		0		.01	0	31
2:45	240	↓	100.5	20.6	4	66	.2	0	16680		0		.0	0	33
3:15	270		101	20.1	9	69	0	0	17800		0		.03	0	50

NOTES: AIR SAMPLE TAKEN @ 10:50 T2-A
AIR SAMPLE TAKEN @ 3:00 T2-B

WELL VALVE

CAMBRIA

DAILY FIELD REPORT

Project Name: SHELL-OAKLAND	Cambria Mgr: D.L.	Field Person: JC
Project Number: 243-	Date: 10-8-01	Site Address: 610 MARKET ST. OAKLAND, CA.
General Tasks: 5-DAY DVE TEST		

Time	Activity/Comments	Hours
7:00	MOB	
	- WENT TO HERTZ FOR PROPANE (25 GAL.)	
	- PICKED UP I.C. TRAILER @ SHOP	
8:15	ARR. ON SITE	
	- SET UP	
	- REMOVED TIRE FROM TRAILER	
	STATIC DTW	
	T-2 DRY T-3 DRY T.D. 8'	
	MW-3 12.37 T-4 DRY T.D. 10'	
	T-1 DRY	
	- RECALIBRATED HORIBA	
10:50	AIR SAMPLE TAKEN (T-2A)	

CAMBRIA

DAILY FIELD REPORT

Project Name: SHELL - OAKLAND	Cambria Mgr: D.L.	Field Person: JC
Project Number: 243-	Date: 10/9/01	Site Address: 610 MARKET ST. OAKLAND, CA.
General Tasks: 5-DAY DVE		

Time	Activity/Comments	Hours
	@	
7:45	MOB	
	- DROPPED OFF AIR BAGS FROM 10/8/01 @ SHOP	
8:20	ARR. ON SITE	
	- SYS DOWN ON ARR. / RESTART	
	- PROPANE @ 1/4	
	- ~~MONITOR~~ TAKE AIR SAMPLES @ 9:30	
	- D.L. WILL BRING NEW PROPANE BOTTLE	
	LATER TODAY	
9:45	DE-MOB	
10:00	LV. SITE	
3:25	RETURN TO SITE / PICK-UP PROPANE BOTTLE,	
	TAKE TO HERTZ FOR REFILL	
4:20	BACK @ SITE HR. METER 114.6	
	RESTART UNIT	
4:30	LV. SITE	

CAMBRIA

VAPOR EXTRACTION TEST DATA FORM

Project Name: SHELL - OAKLAND
Project Number:
Technicians: JC

Date: 10/9/01
Project Address: 610 MARKET ST., OAKLAND
Equipment: HONDA

8:45

Extraction Well	Time Interval (min)	Stinger depth (fbg)	Hour Meter (hrs)	Eng Vac (in H2O)	Well Vac (in H2O)	Air Flow (cfm)	Fuel Flow (cfm)	Well Flow (cfm)	PID (ppm)	Ext H2O Volume (gal)	Influence PI 1 (in H2O)	Influence PI 2 (in H2O)	Influence PI 3 (in H2O)	Recharge (Time)	Recharge (DTW)
T-2	0	2'	112.8	17.5	148	7	1.7	71	11600						WELL VALVE
9:00	15	1	113.2	17.5	143	9	1.8	72	9740	NA				Wellhead Vacuum (in H2O)	999
9:15	30		113.5	18.3	132	3	1.8	71	9270						979
9:30	45		113.6	19.2	123	8	1.7	61	8850						537
9:45	60	↓	113.8	19.4	98	9	1.8	58	7410						476
															363

NOTES:

CAMBRIA

VAPOR EXTRACTION TEST DATA FORM

Project Name: SHELL - OAKLAND
Project Number:
Technicians: JC

Date: 10/10/01
Project Address: 610 MARKET ST., OAKLAND
Equipment:

Extraction Well	Time Interval (min)	Stinger depth (fbg)	Hour Meter (hrs)	Eng Vac (in H2O)	Well Vac (in H2O)	Air Flow (cfm)	Fuel Flow (cfm)	Well Flow (cfm)	PID HORIBA (ppm)	Ext H2O Volume (gal)	Influence Pt 1 (in H2O)	Influence Pt 2 (in H2O)	Influence Pt 3 (in H2O)	Recharge (blank)	Recharge WELL VALVE (Bleed)
T-2														Wellhead Vacuum (in Hg)	
8:45	0	2'	119.2	22	2	53	1.9	0	8980	NA				0	23
9:00	15		119.4	22.2	5	50	2	1	9370					0	46
9:15	30		119.6	21.1	16	42	2	12	8520					0	77
9:30	45		119.8	18.5	62	28	2	42	6790					0	192
9:45	60	↓	120.1	17.8	68	30	2	45	5840	↓				0	209
12:00		2'	120.7	16.7	142	4	1.9	79						0	982
12:15			120.9	17.2	144	2	2	80						0	858
	8:45 AM														

NOTES: SYS. DOWN ON ARR. / RESTART
PROPANE @ 60%.
TOOK AIR SAMPLE @ 9:45

12:00 PM
- SYS. DOWN / RESTART
PROPANE @ 25%.
OPENED WELL VALVE TO 999
A.C.T.I. ON SITE PUMPING MW-3

2:40 RETURED TO PICK-UP PROPANE BOTTLE
SYS. DOWN
4:00 RESTART HR. METER @ 122.1

CAMBRIA

VAPOR EXTRACTION TEST DATA FORM

Project Name: SHELL- OAKLAND
Project Number:
Technicians: JC

Date: 10/11/01
Project Address: 610 MARKET ST.
Equipment:

Extraction Well	Time Interval (min)	Stinger depth (fbg)	Hour Meter (hrs)	Eng Vac (in H2O)	Well Vac (in H2O)	Air Flow (cfm)	Fuel Flow (cfm)	Well Flow (cfm)	PID HORIBA (ppm)	Ext H2O Volume (gal)	Influence PI 1 (in H2O)	Influence PI 2 (in H2O)	Influence PI 3 (in H2O)	Recharge (blank)	Recharge WELLVALVE (blank)
T-2														Wellhead Vacuum (in Hg)	
8:15	0	2'	126.1	22.4	0	57	2	0	6560	NA				0	8
8:30	15		126.3	22.2	5	50	1.9	0	6200					0	41
8:45	30		126.5	21.8	8	46	1.9	5	5510					0	52
9:00	45		126.7	16.8	143	8	1.9	72	5220					0	896
9:15	60		126.9	18.4	38	30	1.8	41	5270					0	182
9:30	75		127.2	17.9	103	13	1.7	60	5250					0	300
9:45	90		127.4	18.3	95	10	1.8	61	4770					0	278
1:30	0		128.1	18	96	11	1.9	62	4340					0	284
1:45	15		128.3	18.7	84	9	1.9	59	5590					0	230
2:00	30		128.6	19	100	8	2	64	5210					0	281
2:15	45		128.9	19.2	87	10	2	6.1	3670					0	243
2:30	60														

NOTES: 8:00 ARR. ONSITE / SYS. DOWN / RESTART
- PROPANE @ 50%.
8:55 ADJUSTED WELL VALVE TO 999 / 9:05 SYS. SHUT DOWN
9:10 RECALIBRATED HORIBA
AIR SAMPLE @ 9:30

1:00 ARR. @ SITE, SYS. DOWN HR. METER 127.8 / RESTART
2:20 SYS. SHUT DOWN, MOB & GO TO HERTZ FOR PROPANE REFILL
3:15 ARR. @ SITE W/ NEW PROPANE BOTTLE / RESTART SYS.
3:30 LV. SITE HR METER @ 129

CAMBRIA

VAPOR EXTRACTION TEST DATA FORM

Project Name: SHELL-OAKLAND
Project Number:
Technicians: JR

Date: 10/12/01
Project Address: 610 MARKET ST., OAKLAND
Equipment:

Extraction Well	Time Interval (min)	Stinger depth (fbg)	Hour Meter (hrs)	Eng Vac (in H2O)	Well Vac (in H2O)	Air Flow (cfm)	Fuel Flow (cfm)	Well Flow (cfm)	HORIBA (ppm)	Ext H2O Volume (gal)	Influence Pt 1 (In H2O)	Influence Pt 2 (In H2O)	Influence Pt 3 (In H2O)	Response (ppm)	Response WELL VALVE (ppm)
T-2											MW-3		T-1	Wellhead Vacuum (In Hg) T-2	
7:30	0	2'	132.8	22.4	0	56	2.1	0	4910	NA	0		0	0	3
7:45	15		133	22.6	1	55	2.1	0	4980		0		0	0	22
8:00	30		133.2	21.3	25	30	2	22	4590		0		0	0	106
8:15	45		133.4	21	28	27	2	30	5200		0		.1	0	119
8:30	60		133.6	19.5	62	23	2	41	4490		0		.13	0	178
8:45	75		133.8	17.8	90	20	2	53	4310		.03		.13	0	272
9:00	90		134.1	18.7	95	10	2	58	3770		.05		.14	0	264
9:15	105		134.3	19	93	9	2	58	3330		.03		.14	0	250
9:30	120		134.5	18.7	98	6	2	62	2940		.04		.15	0	259
10:00	150		135	19.9	69	10	2	51	2350		.03		.13	0	189
10:30	180		135.5	20.4	56	11	2.1	47	1907		.02		.13	0	168
11:00	210		136	20.5	52	11	2	45	2130		.02		.14	0	159
11:30	240		136.5	20.8	51	11	2	45	1093		.03		.14	0	156
12:00	270	137	137	20.5	49	11	2	44	1116		.03		.14	0	153
12:30	310	137.5	137.5	20.7	44	11	2	45	983		.04		.13	0	148
12:45	325	137.8	137.8	20.7	46	11	2	45	995		.04		.13	0	150
1:00	340		138	20.9	48	11	2	45	956		.04		.13	0	149
1:10			138.2	OUT	OF PROPANE										

NOTES: AIR SAMPLE ② 8:00 AM (T-2A)
SHUTDOWN ② 9:05
AIR SAMPLE ② 12:45 PM (T-2B)

ATTACHMENT C

Dispenser Over-Excavation Data

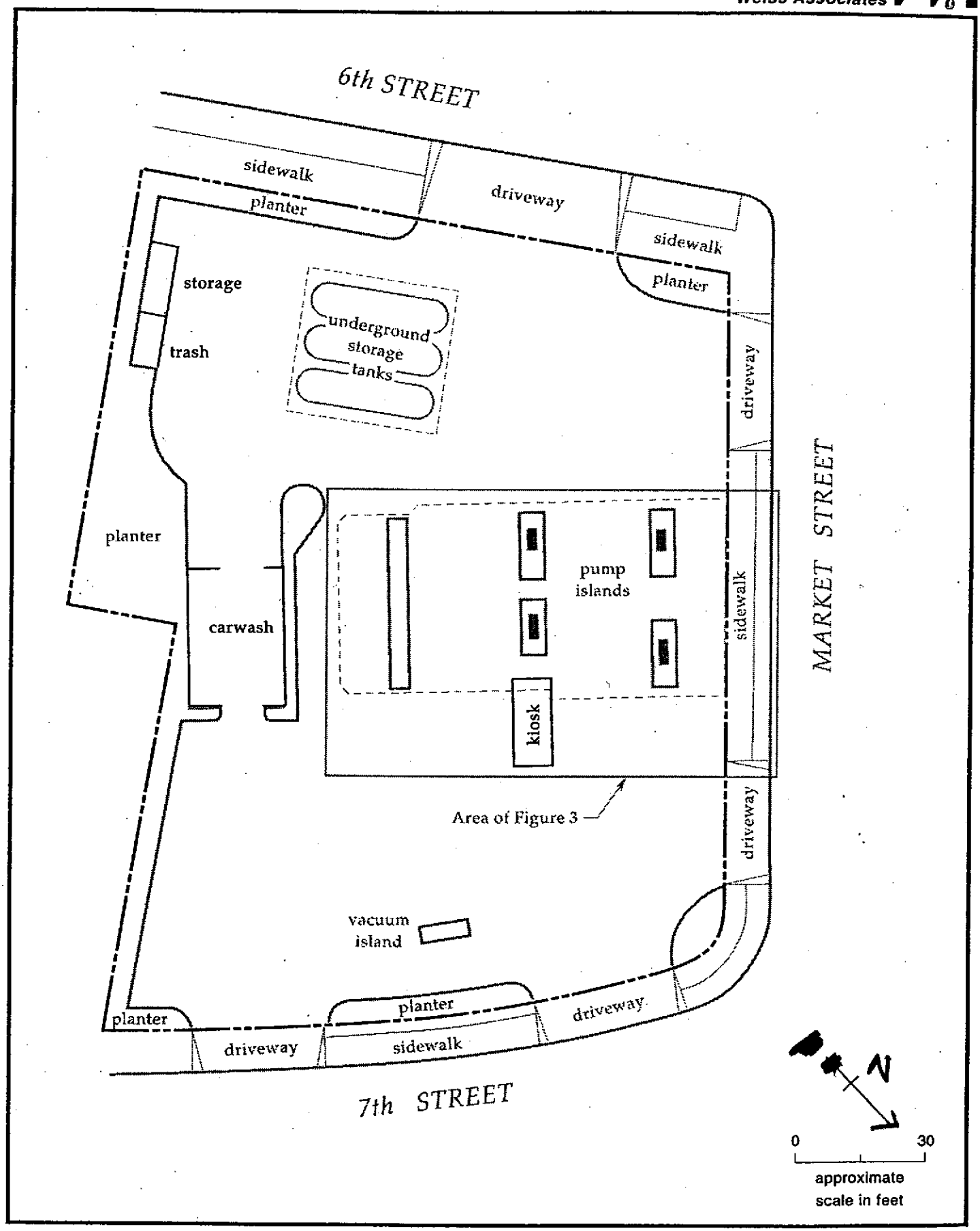

Figure 2. Site Layout - Shell Service Station WIC# 204-5508-5702, 610 Market Street, Oakland, California

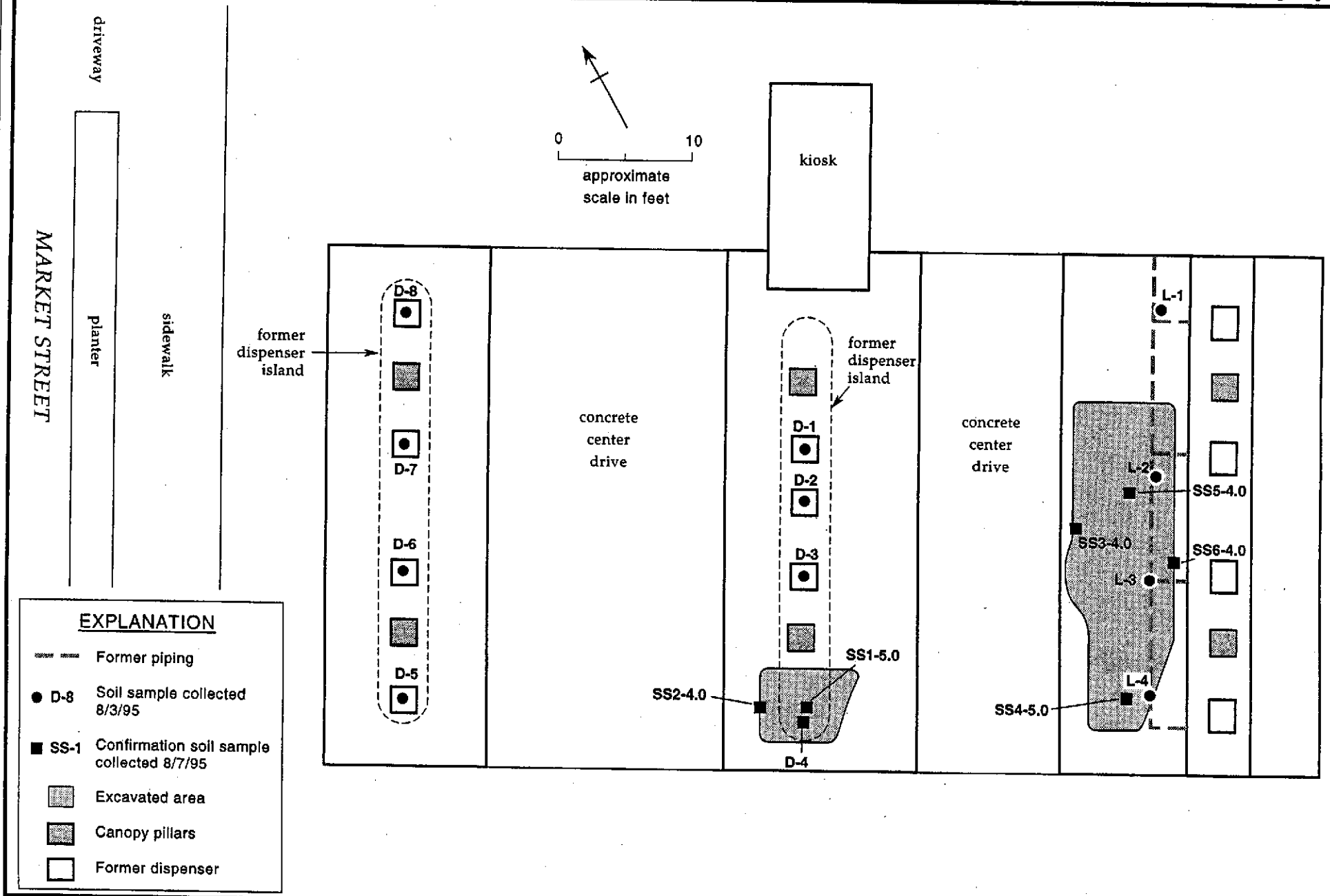

Figure 3. Soil Sample Locations - August 3 and 7, 1995 - Shell Service Station WIC# 204-5508-5702 - 610 Market Street, Oakland, California

S1103-03.ai

11/03/95

Table 1. Analytic Results for Soil - Petroleum Hydrocarbons - Shell Service Station, WIC #204-5508-5702, 610 Market Street, Oakland, California

Sample ID	Date Sampled	Sample Depth (ft)	TPH-G	POG	B	T	E	X
			<——— parts per million (ppm) ———					———>
Initial Soil Samples:								
D-1	08/03/95	2.5	2,700	---	<5.0	130	46	320
D-2	08/03/95	2.5	66	---	<0.050	0.11	0.36	1.9
D-3	08/03/95	2.5	76	---	0.70	4.7	0.79	8.7
D-4	08/03/95	2.5	7.7	---	<0.010	0.017	0.043	0.082
D-5	08/03/95	2.5	33	---	<0.025	0.16	0.10	3.0
D-6	08/03/95	2.5	1,400	---	<5.0	<5.0	<5.0	4.2
D-7	08/03/95	2.5	1,600	---	<2.0	<2.0	3.4	25
D-8	08/03/95	2.5	<1.0	---	<0.005	<0.0072	<0.005	<0.025
L-1	08/03/95	2.5	<1.0	---	<0.005	<0.005	<0.005	<0.005
L-2	08/03/95	2.5	2.2	---	<0.005	0.036	0.0068	<0.064
L-3	08/03/95	2.5	<1.0	---	<0.005	<0.005	<0.005	<0.005
L-4	08/03/95	2.5	<1.0	---	<0.005	<0.005	<0.005	<0.005
Confirmation Soil Samples:								
SS-1	08/07/95	5.0	<1.0	<50	<0.005	<0.005	<0.005	<0.005
SS-2	08/07/95	4.0	<1.0	<50	<0.005	<0.005	<0.005	<0.005
SS-3	08/07/95	4.0	<1.0	<50	<0.005	<0.005	<0.005	<0.005
SS-4	08/07/95	5.0	2.0	220	<0.005	0.0057	0.0076	0.019
SS-5	08/07/95	5.0	10	260	<0.005	<0.005	0.034	0.086
SS-6	08/07/95	4.0	28	170	<0.012	<0.012	<0.029	<0.084

Abbreviations

TPH-G = Total petroleum hydrocarbons as gasoline by Modified EPA Method 8015
POG = Non-Polar Petroleum Oil and Grease by EPA Method 5520 E&F
B = Benzene by EPA Method 8020
T = Toluene by EPA Method 8020
E = Ethylbenzene by EPA Method 8020
X = Xylenes by EPA Method 8020
--- = Not Analyzed
--- = not analyzed

Analytical Laboratory:

Sequoia Analytical of Redwood City, California

j:\shell\1103\reports\sollanal.doc

Table 2. Analytic Results for Soil VOCs, SVOCs, and Various Metals - Shell Service Station, WIC #204-5508-5702, 610 Market Street, Oakland, California

Sample ID	Date Sampled	Sample Depth (ft)	VOCs	SVOCs	Cd	Cr	Pb	Ni	Zn
			< parts per million (ppm) >						
Confirmation Soil Samples:									
SS-1	08/07/95	5.0	ND	ND	<0.050	52	<5.0	39	26
SS-2	08/07/95	4.0	ND	ND	<0.050	36	<5.0	16	11
SS-3	08/07/95	4.0	ND	ND	<0.050	36	10	24	31
SS-4	08/07/95	5.0	ND	ND	<0.050	34	110	21	110
SS-5	08/07/95	5.0	ND	ND	2.9	38	290	25	320
SS-6	08/07/95	4.0	ND	ND	0.86	35	400	22	260

Abbreviations

VOCs = Volatile Organic Compounds by EPA Method 8240
SVOCs = Semi-Volatile Organic Compounds by EPA Method 8240
Cd = Cadmium by EPA Method 6010
Cr = Chromium by EPA Method 6010
Pb = Lead by EPA Method 6010
Ni = Nickel by EPA Method 6010
Zn = Zinc by EPA Method 6010
ND = Not detected between detection limit of 0.02 and 0.05 ppm
<n = Not detected at laboratory detection limit of n ppm

Analytical Laboratory:

Sequoia Analytical of Redwood City, California

ATTACHMENT D

Standard Field Procedures for Monitoring Well Installation

CAMBRIA

STANDARD FIELD PROCEDURES FOR MONITORING WELL INSTALLATION

This document presents standard field methods for drilling and sampling soil borings and 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.

SOIL BORINGS

Objectives

Soil samples are collected to characterize subsurface lithology, assess whether the soils exhibit obvious hydrocarbon or other compound vapor or staining, and to collect samples for analysis at a State-certified laboratory. All borings are logged using the Unified Soil Classification System by a trained geologist working under the supervision of a California Registered Geologist (RG).

Soil Boring and Sampling

Soil borings are typically drilled using hollow-stem augers or direct-push technologies such as the Geoprobe®. Soil samples are collected at least every five ft to characterize the subsurface sediments and for possible chemical analysis. Additional soil samples are collected near the water table and at lithologic changes. Samples are collected using lined split-barrel or equivalent samplers driven into undisturbed sediments at the bottom of the borehole.

Drilling and sampling equipment is steam-cleaned prior to drilling and between borings to prevent cross-contamination. Sampling equipment is washed between samples with trisodium phosphate or an equivalent EPA-approved detergent.

Sample Analysis

Sampling tubes chosen for analysis are trimmed of excess soil and capped with Teflon tape and plastic end caps. Soil samples are labeled and stored at or below 4° C on either crushed or dry ice, depending upon local regulations. Samples are transported under chain-of-custody to a State-certified analytic laboratory.

Field Screening

One of the remaining tubes is partially emptied leaving about one-third of the soil in the tube. The tube is capped with plastic end caps and set aside to allow hydrocarbons to volatilize from the soil. After ten to fifteen minutes, a portable volatile vapor analyzer measures volatile hydrocarbon vapor concentrations in the tube headspace, extracting the vapor through a slit in the cap. Volatile vapor analyzer measurements are used along with the field observations, odors, stratigraphy and groundwater depth to select soil samples for analysis.

Water Sampling

Water samples, if they are collected from the boring, are either collected using a driven Hydropunch® type sampler or are collected from the open borehole using bailers. The groundwater samples 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.

Grouting

If the borings are not completed as wells, the borings are filled to the ground surface with cement grout poured or pumped through a tremie pipe.

MONITORING WELL INSTALLATION, DEVELOPMENT AND SAMPLING

Well Construction and Surveying

Groundwater monitoring wells are installed 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 fee 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 feet 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.

Waste Handling and Disposal

Soil cuttings from drilling activities are usually stockpiled onsite and covered by plastic sheeting. At least three individual soil samples are collected from the stockpiles and composited at the analytic laboratory. The composite sample is analyzed for the same constituents analyzed in the borehole samples. Soil cuttings are transported by licensed waste haulers and disposed in secure, licensed facilities based on the composite analytic results.

Groundwater removed during development and sampling and rinseates are stored onsite in sealed 55-gallon drums. Each drum is labeled with the drum number, date of generation, suspected contents, generator identification and consultant contact. Upon receipt of analytic results, the water is either pumped out using a vacuum truck for transport to a licensed waste treatment/disposal facility or the individual drums are picked up and transported to the waste facility where the drum contents are removed and appropriately disposed.