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February 22, 2005



Mr. Amir Gholami
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

Re: **Remediation Work Plan**
Former Exxon Service Station
3055 35th Avenue
Oakland, California
Cambria Project #130-0105

Dear Mr. Gholami,

On behalf of Mr. Lynn Worthington of Golden Empire Properties, Cambria Environmental Technology, Inc. (Cambria) has prepared this *Remediation Work Plan* for the above referenced site. In-situ chemical oxidation using ozone is being proposed as an interim remedial alternative to cleanup the remaining hydrocarbons beneath the site.

Please call me at (510) 420-3361, if you have any questions regarding this report.

Sincerely,
**Cambria Environmental Technology, Inc.**

Subbarao Nagulapaty
Project Engineer

Attachment: Remediation Work Plan

cc: Mr. Lynn Worthington, Golden Empire Properties, Inc. 5942 MacArthur Boulevard, Suite B, Oakland, California 94605

**Cambria Environmental Technology, Inc.**

5900 Hollis Street
Suite A
Emeryville, CA 94608
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# REMEDIATION WORK PLAN

**Former Exxon Service Station**
**3055 35th Avenue**
**Oakland, California**
**Cambria Project #130-0105**

**February 22, 2005**

Prepared For:

Mr. Lynn Worthington
Golden Empire Properties, Inc.
5942 MacArthur Boulevard, Suite B
Oakland, California 94605

Prepared By:

Cambria Environmental Technology, Inc.
5900 Hollis Street, Suite A
Emeryville, California 94608

REGISTERED GEOLOGIST • RONALD A. SCHEELE • No. 6842 • STATE OF CALIFORNIA

Subbarao Nagulapaty
Project Engineer

Ron Scheele, R.G.
Senior Geologist

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# REMEDIATION WORK PLAN

**Former Exxon Service Station**
**3055 35th Avenue**
**Oakland, California**

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# REMEDIATION WORK PLAN

**Former Exxon Service Station**
**3055 35th Avenue**
**Oakland, California**
**Cambria Project #130-0105**

**February 22, 2005**

## 1.0 INTRODUCTION

On behalf of Mr. Lynn Worthington of Golden Empire Properties, Inc., Cambria Environmental Technology, Inc. (Cambria) has prepared this *Remediation Work Plan* for the above-referenced site per the Alameda County Health Care Services Agency's (ACHCSA) letter dated December 8, 2004 (Appendix A). Presented in the work plan are the site background, hydrocarbon distribution, proposed remedial alternative, reporting, and schedule.

## 2.0 SITE BACKGROUND

### 2.1 Site Description

The site is a former Exxon Service Station located at the northeast corner of 35th Avenue and School Street in Oakland, California (Figure 1). Currently, the site is an unpaved vacant lot situated within a mixed commercial and residential setting approximately 3 blocks west of the 580 Freeway. The topography in the area slopes generally westward towards the Oakland Inner Harbor and San Francisco Bay. The nearest surface water is Peralta Creek, located approximately 0.1 miles north of the site.

An active Unocal 76 (former British Petroleum) service station is located on 35th Avenue, one block east of the site. A former Texaco station is located across School Street immediately east of the site. Texaco's underground storage tanks were removed about 22 years ago. No soil samples were collected during the tank removal and no investigation has been conducted at the former Texaco site.

### 2.2 Site Geology and Hydrogeology

The site lithology is heterogeneous consisting of interbedded lenses of silty gravel, sands, silty sands, and sandy silts and clays to the maximum explored depth of 30 feet. The clayey soils are generally stiff and very plastic. Local base rock backfill is present in the excavations related to the former underground storage tanks (USTs) and pump islands.

Static groundwater levels have ranged from approximately 8 to 17 ft below grade surface (bgs) during the past ten years of quarterly groundwater monitoring. Groundwater beneath the site flows primarily towards the southwest.

## 2.3 Summary of Previous Work

***October 1990 Geotechnical Investigation:*** In October 1990, Geotechnical Engineering Inc. of Fremont, California, drilled two soil borings at the site for an pre-construction engineering analysis. No samples were collected for hydrocarbon analysis.

***January 1991 Tank Removal:*** In January 1991, Pacific Excavators removed two 4,000-gallon USTs, two 6,000-gallon gasoline USTs, and one 500-gallon waste oil UST from the site. According to a September 24, 1992 report prepared by Consolidated Technologies of San Jose, California (CT), soil samples were collected during the tank removal, but were not analyzed or reported by Pacific Excavators (CT, 1992).

***November 1991 Subsurface Investigation:*** In November 1991, CT drilled twelve soil borings (B-1 to B-12) to depths up to 35 ft bgs (Figure 1). Total petroleum hydrocarbons as gasoline (TPHg) concentrations were detected in soil samples collected from 11 of the 12 soil borings up to 2,100 milligrams per kilogram (mg/kg). No total petroleum hydrocarbons as diesel (TPHd) or oil and grease (O&G) concentrations were detected in boring B-7, which is immediately down gradient of the former waste oil tank.

***May 1994 Subsurface Investigation:*** Between May 5 and 9, 1994, Cambria drilled seven soil borings (SB-A through SB-G) and installed three onsite monitoring wells (MW-1 through MW-3). TPHg concentrations were detected in six of the seven soil borings at concentrations up to 2,900 mg/kg. TPHg and benzene concentrations were detected in groundwater at maximum concentrations of 130,000 and 22,000 parts per billion (ppb), respectively. Historical soil analytical data are presented as Table 1.

***Remedial Testing:*** In July 1996, Cambria conducted a series of remedial tests involving soil vapor extraction (SVE), SVE combined with air sparging (AS), and SVE combined with aquifer pumping. Using an internal combustion engine, vacuums up to 150 inches of water were applied to each test well (MW-1 through MW-3) for a period ranging from 20 to 45 minutes. Very low air flow rates of 0.06, 0.36 and 0.40 cubic feet per minute were achieved from test wells MW-1, MW-2, and MW-3,

respectively. TPHg soil vapor concentrations collected from each well at the end of the test ranged from less than 250 parts per million by volume (ppmv) in test wells MW-1 and MW-2, and greater than 10,000 ppmv in test well MW-3. No significant increases in air flow or soil vapor concentrations were observed when SVE was combined with AS. When SVE was combined with aquifer dewatering (0.5 gpm), the air flow rate from MW-2 increased significantly to 15 cfm, however, no corresponding increase in soil vapor concentrations was observed. No vacuum radius of influence or groundwater drawdown influence was observed in any well. The generally low air and groundwater flow rates were indicative of low permeability soils. Results of the remedial testing also indicated that SVE and/or AS with vacuums up to 150 inches of water, would not be effective in removing hydrocarbons from the subsurface soils. However, dewatering combined with SVE could enhance remedial efforts.

***February 1997 Plume Definition:*** On February 26, 1997, Cambria installed one additional onsite monitoring well (MW-4) at the site (Figure 1). TPHg was detected in soil at a maximum concentration of 150 mg/kg at 15 ft bgs. TPHg and benzene concentrations were detected in groundwater at concentrations of 47,000 and 11,000 parts per billion (ppb), respectively.

***August 1998 Monitoring Well Installation:*** In August 1998, Cambria installed ten dual phase extraction remediation wells (RW-5 through RW-14) onsite. Additionally, two soil borings (B-1 and B-2) were advanced up-gradient of the site along School Street. Due to low soil permeability, no groundwater entered the borehole preventing the collection of a groundwater sample. No soil samples were collected during the geoprobe groundwater sampling activities and no hydrocarbon odors were observed.

***August 1999 Hydrogen Peroxide Injections:*** On August 5, 1999, Cambria injected between 7 and 12 gallons of 7.5% hydrogen peroxide ($H_2O_2$) solution into each of the fourteen site monitoring/remediation wells. Dissolved oxygen (DO) concentrations in groundwater beneath the site did not vary as a result of $H_2O_2$ injection. Also, no reduction in dissolved phase hydrocarbon concentrations beneath the site was observed.

***September 2000 Dual-Phase Vacuum Extraction:*** In September 2000, Cambria installed dual-phase Extraction (DPE) remediation system which incorporated 14 remediation wells. The DPE system utilized a positive displacement blower to simultaneously extract liquid/dissolved-phase and vapor phase hydrocarbons from the subsurface. Vapor phase hydrocarbons were destroyed by catalytic oxidizer and discharged to the atmosphere under a Bay Area Air Quality Management District (BAAQMD) air discharge permit. Due to ongoing maintenance issues, the catalytic oxidizer was replaced in March 2001. Dissolved phase hydrocarbons were treated by filtration through granulated

activated carbon vessels and discharged into the sanitary sewer under an East Bay Municipal Utility District (EBMUD) discharge permit.

***August 2002 DPE System Upgrade:*** In August 2002, the DPE system was upgraded with a liquid ring vacuum pump capable of generating a higher vacuum to maximize hydrocarbon removal.

***Groundwater Monitoring:*** Quarterly groundwater monitoring and sampling has been performed at the site since May 1994. Historical groundwater analytical data is presented as Table 2.

## 3.0 HYDROCARBON DISTRIBUTION

### 3.1 Hydrocarbons in Soil

Gasoline-range hydrocarbons were detected in a majority of the onsite borings drilled during previous investigations. The highest hydrocarbon concentrations in soil are present in the vicinity southwest of the former underground gasoline storage tanks and the southernmost pump island (Figure 1 and Table 1). Hydrocarbon-impacted soil is present within a smear zone extending from 8 to 27 ft bgs with the highest hydrocarbon concentrations at approximately 15 ft bgs.

### 3.2 Hydrocarbons in Groundwater

Gasoline-range hydrocarbons were detected in all four onsite monitoring wells and a majority of the remediation wells. The highest hydrocarbon concentrations in groundwater are present, primarily in the vicinity southwest of the former underground gasoline storage tanks and the southernmost pump island (Figure 1 and Table 1).

## 4.0 PROPOSED REMEDIAL ALTERNATIVE

In October 2004, Cambria requested and received approval from ACHCSA to shutdown the DPE remediation system due to low influent hydrocarbon concentrations and asymptotic hydrocarbon removal rates. To help reduce the remaining hydrocarbons concentrations in groundwater and achieve remediation cleanup goals, Cambria has proposed an alternative remedial approach consisting of in-situ chemical oxidation (ISCO) using ozone.

### 4.1 ISCO Using Ozone

Ozone is a strong chemical oxidizer that will, upon contact, "oxidize" or destroy any hydrocarbons present within the subsurface. Unlike many other chemical oxidizers, ozone is a gas which enables it to migrate more easily through fine grained soils. To maximize mass transfer to groundwater, ozone is commonly injected into sparge wells where small fine bubbles of ozone are generated and dispersed through the subsurface. This favorable delivery method allows for the oxidation of hydrocarbons impacted soil trapped below the groundwater. ISCO using ozone is rapidly becoming a preferred method to remediate hydrocarbons in low permeability soils.

### 4.2 Interim Remedial Activities

To evaluate the effectiveness of ISCO using ozone, Cambria is proposing to first conduct interim remedial activities covering only a portion of the site. A sparge point network consisting of seven points (SP-1 through SP-7) will be installed near the southernmost former pump island (Figure 2). Ozone injection will be conducted for approximately three months. Existing monitoring wells (MW-2, RW-11, and RW-12) will be used to monitor the zone of influence and groundwater quality. Based on the results of these activities, Cambria will determine if and how this remedial alternative should be expanded to cleanup the entire site.

#### 4.2.1 Ozone Sparge Wells

Prior to the installation of the sparge points, the following activities will be performed:

***Site Health and Safety Plan:*** A comprehensive site safety plan will be prepared to protect site workers. The plan will be kept onsite during all field activities and signed by each site worker.

***Permits:*** Drilling permits will be obtained from the Alameda County Public Works Agency for installation of the proposed sparge points. Building permits will be obtained from City of Oakland Building Department, if needed, for installing the ozone generator system.

***Subsurface Utility Clearance:*** The proposed sparge point locations will be marked and Underground Service Alert will be notified of Cambria's activities. A subsurface utility locating contractor may be used to clear each sparge point location, if necessary.

***Sparge Point Installation:*** Seven sparge points (SP-1 through SP-7) will be installed using six-inch diameter hollow-stem augers. The sparge points will be installed at two different depths to facilitate the transfer of ozone into the subsurface and in contact with the remaining hydrocarbons. Three borings will be drilled to 20 ft bgs and converted into a sparge point (SP-1 through SP-3). The sparge points will be constructed of two-inch diameter stainless steel casing with 0.010-inch wire wrapped screen from 15 to 20 ft bgs. Four deeper borings will be drilled to 28 ft bgs and converted into sparge points (SP-4 through SP-7). The sparge points will be constructed of 2-inch diameter stainless steel casing with 0.010-inch wire wrapped screen from 23 to 28 ft bgs. A sand pack will be placed across each screen interval and overlaid with a bentonite and cement grout seal.

### 4.2.2 Baseline Groundwater Sampling

Injecting ozone will likely influence the geochemistry of the groundwater beneath the site. Cambria anticipates that over the short-term, dissolved oxygen (DO) and oxidation-reduction potential (ORP) levels will increase in the monitoring wells. To establish a baseline for the groundwater parameters prior to initiating ozone injection activities, groundwater samples and field readings will be collected from wells MW-2, RW-11, and RW-12. The following table summarizes the baseline groundwater sampling parameters and associated rationale.

**Baseline Analyses and Rationale**

| Parameter | Analysis | Rationale |
|---|---|---|
| Dissolved Oxygen (DO) | Field Reading | Increased DO concentrations can indicate the radius of influence from ozone injection. DO is an oxidation-reduction potential indicator and is the preferred electron acceptor used in aerobic biodegradation of petroleum hydrocarbons. |
| pH | Field Reading | Changing pH levels can provide an indication of the type of reaction mechanism (direct ozonation or hydroxyl radical) that is occurring beneath the site. Usually pH does not change appreciably as both reaction mechanisms occur simultaneously and balance the pH. |
| Temperature | Field Reading | Elevated temperature provides an indication that exothermic chemical oxidation reaction occurring in the subsurface. |
| ORP | Field Reading | Provides a relative measure of oxidation-reduction conditions and can be calibrated to indicate likely oxidation-reduction reactions. |
| Alkalinity | SM 2320B | A general geochemical parameter used to evaluate buffering capacity of aquifer and can assist with the sizing of a full scale ozone injection system. |

| Baseline Analyses and Rationale | | |
|---|---|---|
| Parameter | Analysis | Rationale |
| Chemical Oxygen Demand (COD) | EPA Method 410.1 | A general geochemical parameter used to evaluate oxidation-reduction potential and can assist with the sizing of a full scale ozone injection system. |
| Total Organic Carbon (TOC) | EPA Method 415.1 | Provides a measurement of the amount of carbon/energy source beneath the site which can drive ozone demand and affect the sizing of a full scale ozone injection system. |
| CAM 17 Metals | EPA Method 200.7 | May be used to evaluate the potential for metal precipitation or migration. |
| TPHg, TPHd | EPA Method 8015M | Carbon and energy source. Concentration trend data provides evidence of success for ISCO using ozone. |
| BTEX, MTBE | EPA Method 8020 | Carbon and energy source. Concentration trend data provides evidence of success for ISCO using ozone. |

### 4.2.3 ISCO Ozone System

An electronically controlled ozone generator will be connected to the onsite electrical service. The ozone generator will be capable of generating approximately 1 pound/day of ozone. The sparge point wellheads will be constructed to enable connection of threaded or quick-connect fittings. Aboveground flexible tubing composed of Teflon or an equivalent ozone resistant material will connect the sparge points with a manifold on the outlet of the ozone generator. Each branch on the manifold will include valves and gauges to adjust the ozone injection flow rate and pressure.

### 4.2.4 System Operations and Monitoring

Ozone will be injected at approximately 0.5 to 5 cfm depending upon the permeability of the soil. Ozone injection will be alternated on a weekly basis between the shallow and deeper sparge points to facilitate mass transfer of ozone through the subsurface. The interim remediation system will be monitored weekly during the first month of operation and monthly thereafter.

Various parameters will be measured before, during, and after ozone injection. At each sparge point (SP-1 through SP-7), the pressure, flow rate, temperature, pH, and DO will be recorded prior to system startup, after one week, and then monthly thereafter. At each monitoring well (MW-2, RW-11, and RW-12), the depth to water, temperature, pH, and DO will be recorded prior to system startup, after one week, and then monthly thereafter. Groundwater samples will also be collected prior to startup, after one week and then every month thereafter and analyzed for TPHd, TPHg, BTEX, MtBE, and CAM 17 metals. Adjustments to the monitoring schedule may be made based on conditions

encountered in the field.

## 5.0 REPORTING

Following the completion of field activities, the effectiveness of interim remediation will be evaluated based on the reduction in dissolved-phase hydrocarbon concentrations in groundwater and evidence of increased biological activity beneath the site. A full-scale remediation system may be proposed if the results of interim remediation appear favorable. Cambria will prepare and submit an *Interim Remediation Evaluation Report* to the ACHCSA. which, at a minimum, will contain:

- Summary and evaluation of the interim remediation activities;
- Tabulated field parameter data, and analytical results;
- Individual well concentration trend plots for the observation wells;
- Analytical reports and chain-of-custody forms; and
- Recommendations for future activities.

## 6.0 SCHEDULE

Upon receiving written work plan approval from the ACHCSA, Cambria will commence implementation of the *Workplan.* Cambria will submit an *Interim Remediation Evaluation Report* to ACHCSA within approximately 6 weeks following the completion of field activities.

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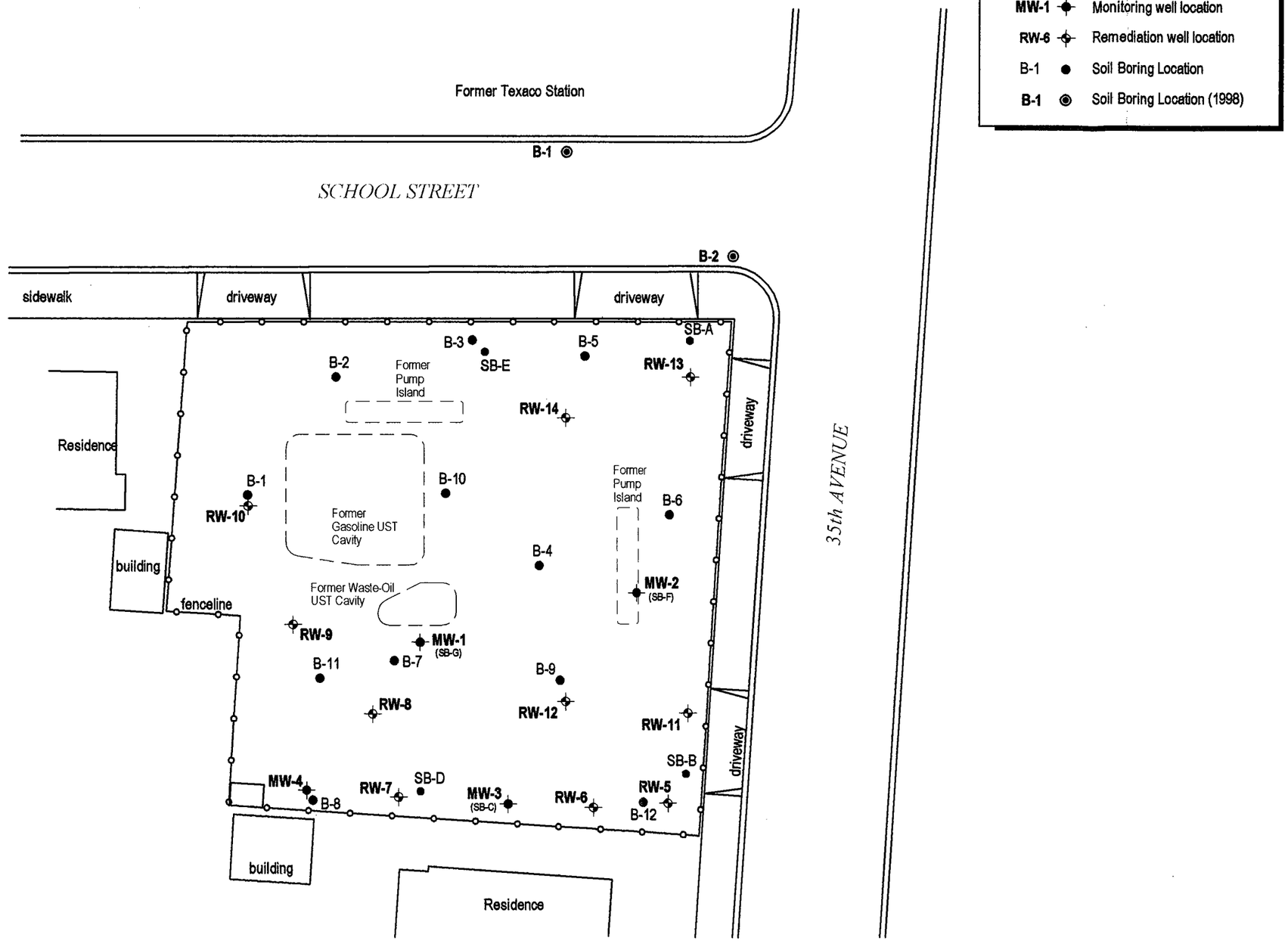


FIGURE
1

Site Plan
February 8, 2005

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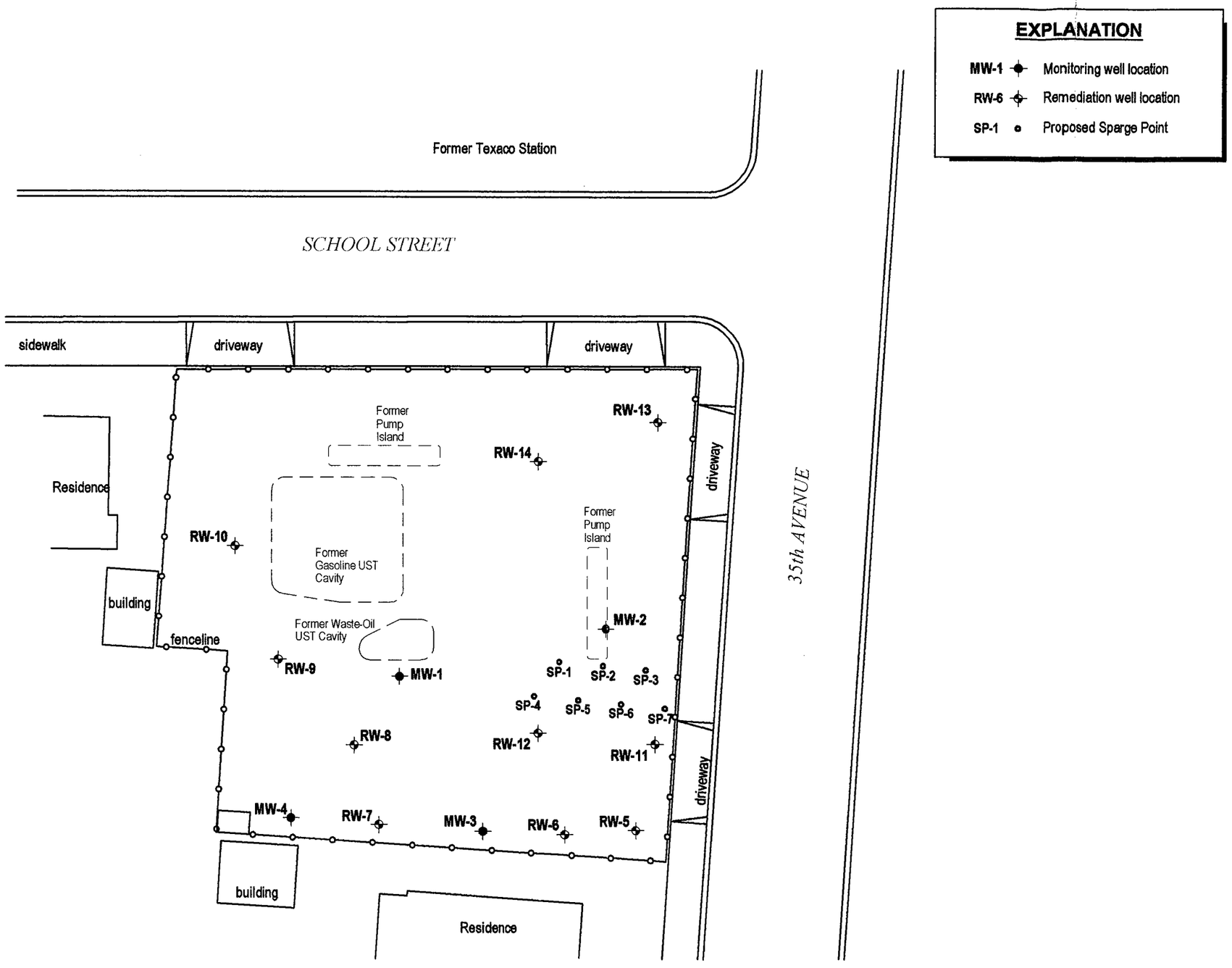
Former Exxon Station
3055 35th Avenue
Oakland, California

H:\WORTHINGTON\FIGURES\2005\MAP Fig 1.DWG




Source: Virgil Chavez Land Surveying

FIGURE
2

**Proposed Sparge Points Location Map**

February 8, 2005

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**Former Exxon Station**
3055 35th Avenue
Oakland, California

H:\WORTHINGTON\FIGURES\2005\MAP Fig 2.DWG

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**Table 1. Soil Analytical Data** - Former Exxon Service Station, 3055 35th Avenue, Oakland, California

| Sample ID | Date Sampled | Sample Depth (ft) | GW Depth (ft) | TPHg | TPHd | Benzene | Toluene | Ethylbenzene | Xylenes | MTBE | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | <---------- Concentrations in mg/kg ----------> | | | | | | | |
| B1 | 11/5/91 | 20 | --- | 1,500 | --- | 56 | 44 | 24 | 140 | --- | |
| B2 | 11/5/91 | 15 | --- | 290 | --- | 0.057 | 1.3 | 3.8 | 17 | --- | |
| B3 | 11/6/91 | 20 | --- | 130 | --- | 1.9 | 4.7 | 2.4 | 19 | --- | |
| B5 | 11/6/91 | 15 | --- | 660 | --- | 1.8 | 4.1 | 8.9 | 29 | --- | |
| B6 | 11/6/91 | 15 | --- | 1,200 | --- | 6.6 | 21 | 18 | 98 | --- | |
| B7 | 11/6/91 | 15 | --- | 2,100 | <1.0 | 28 | 100 | 38 | 290 | --- | |
| B9 | 11/6/91 | 15 | --- | 480 | --- | 5.9 | 23 | 8.9 | 72 | --- | |
| B10 | 11/6/91 | 20 | --- | 260 | --- | 7.3 | 21 | 6.6 | 54 | --- | |
| SB-A | 5/5/94 | 11 | 14.5 | 3.4 | 4.2 | <10 | 0.0072 | 0.0015 | 0.015 | 0.031 | a |
| | 5/5/94 | 16 | --- | 1,600 | 620 | <1,000 | 1.8 | 3.4 | 17 | 54 | a |
| SB-B | 5/6/94 | 11 | 15.0 | 170 | 52 | <100 | 0.45 | 2.5 | 1.7 | 11 | a |
| | 5/6/94 | 16 | --- | 940 | 120 | <100 | 6.3 | 28 | 12 | 70 | a |
| SB-C | 5/6/94 | 11 | 13.9 | 25 | 6.7 | <10 | 0.22 | 0.62 | 0.49 | 2.1 | a |
| (MW-3) | 5/6/94 | 16 | --- | 490 | 280 | <500 | 1.9 | 14 | 7.4 | 42 | a |
| SB-D | 5/6/94 | 11 | 19.5 | <1 | 5.2 | <10 | <0.0025 | <0.0025 | <0.0025 | <0.0025 | |
| | 5/6/94 | 16 | --- | <1 | <1 | <10 | <0.0025 | <0.0025 | <0.0025 | <0.0025 | |
| SB-E | 5/9/94 | 11 | dry boring | 220 | 56 | <10 | 0.55 | 2.1 | 1.7 | 2.8 | a |
| | 5/9/94 | 16 | | 3.8 | 1.4 | <10 | 0.19 | 0.20 | 0.059 | 0.20 | a |
| SB-F | 5/9/94 | 11 | 13.3 | 370 | 57 | <10 | <0.25 | <0.25 | 3.9 | 6.2 | a |
| (MW-2) | 5/9/94 | 15 | --- | 2,900 | 450 | <100 | 24 | 41 | 48 | 196 | a |
| SB-G | 5/9/94 | 11 | 14.5 | 20 | 18 | <10 | 0.061 | 0.014 | 0.093 | 0.34 | a |
| (MW-1) | 5/9/94 | 15 | --- | 390 | 52 | <10 | 1.4 | 6.1 | 3.9 | 16 | b |
| MW-4-10 | 2/26/97 | 10 | --- | 64 | 62 | 0.24 | 1.1 | 0.7 | 2.6 | <0.2 | c,d |
| MW-4-15 | 2/26/97 | 15 | --- | 530 | 150 | 5.1 | 18 | 8.4 | 39 | 5.4 | c,d |

**Abbreviations:**

ft = feet

GW = Groundwater

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

TPHd = Total petroleum hydrocarbons as diesel by modified EPA Method 8015

Benzene, Toluene, Ethylbenzene, and Xylenes by EPA Method 8020

MTBE = Methyl Tertiary Butyl Ether by EPA Method 8020

mg/kg = milligrams per kilogram

**Notes:**

(a) The positive TPHd response appears to be a lighter hydrocarbon than diesel

(b) The positive TPHd result has an atypical chromatographic pattern

(c) Unmodified or weakly modified gasoline is significant (TPHg)

(d) Gasoline range compounds are significant (TPHd)

**Table 2. Groundwater Elevations and Analytical Data** - Former Exxon Service Station, 3055 35th Avenue, Oakland, California

| Well ID | Date | GW | SPH | GW | TPHg | TPHd | TPHmo | Benzene | Toluene | Ethylbenzene | Xylenes | MTBE | DO | TPE System |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *TOC* | | Depth (ft) | (ft) | Elev. (ft) | <---------- Concentrations in micrograms per liter (µg/L) ----------> | | | | | | | | (mg/L) | Status |
| MW-1 | 5/25/94 | 16.79 | Sheen | 84.06 | 120,000 | 25,000 | <50,000 | 22,000 | 17,000 | 2,800 | 16,000 | --- | --- | |
| *100.85* | 7/19/94 | 20.77 | --- | 80.08 | --- | --- | --- | --- | --- | --- | --- | --- | --- | |
| | 8/18/94 | 21.04 | Sheen | 79.81 | 925,000 | --- | --- | 16,500 | 6,200 | 1,000 | 9,400 | --- | --- | |
| | 11/11/94 | 15.80 | --- | 85.05 | 57,000 | --- | --- | 14,000 | 4,400 | 1,400 | 6,400 | --- | --- | |
| | 2/27/95 | 15.53 | --- | 85.32 | 45,000 | --- | --- | 2,900 | 2,500 | 760 | 4,100 | --- | --- | |
| | 5/23/95 | 15.29 | --- | 85.56 | 22,000 | --- | --- | 9,900 | 990 | 790 | 2,000 | --- | --- | |
| | 8/22/95 | 20.90 | --- | 79.95 | 23,000 | --- | --- | 6,900 | 340 | 1,200 | 1,900 | --- | --- | |
| | 11/29/95 | 22.19 | --- | 78.66 | 37,000 | --- | --- | 9,900 | 530 | 1,600 | 2,900 | --- | --- | |
| | 2/21/96 | 11.69 | --- | 89.16 | 33,000 | 4,300 | --- | 10,000 | 480 | 1,000 | 1,800 | 3,300 | --- | |
| | 5/21/96 | 14.62 | --- | 86.23 | 36,000 | 8,500 | --- | 8,500 | 1,400 | 1,300 | 2,800 | 1,900 | --- | |
| | 8/22/96 | 22.30 | --- | 78.55 | 41,000 | 6,200 | --- | 8,600 | 1,300 | 1,500 | 2,900 | <200 | 8.0 | |
| | 11/27/96 | 17.24 | Sheen | 83.61 | 38,000 | 6,100 | --- | 9,600 | 950 | 1,600 | 3,100 | <400 | 5.6 | |
| | 3/20/97 | 16.65 | --- | 84.20 | 33,000 | 10,000 | --- | 6,100 | 560 | 970 | 2,200 | <400 | 8.5 | |
| | 6/25/97 | 19.77 | --- | 81.08 | 31,000 | 7,400[a] | --- | 7,400 | 440 | 890 | 1,800 | <400 | 3.7 | |
| | 9/17/97 | 20.12 | --- | 80.73 | 32,000[d] | 3,500[e] | --- | 9,100 | 550 | 1,000 | 2,000 | <1,000 | 2.1 | |
| | 12/22/97 | 12.95 | --- | 87.90 | 26,000[d] | 5,800[e] | --- | 7,900 | 370 | 920 | 1,500 | <790 | 0.7 | |
| | 3/18/98 | 12.34 | Sheen | 88.51 | 30,000[d] | 4,200[e,f] | --- | 7,800 | 820 | 840 | 2,000 | <1,100 | 1.3 | |
| | 7/14/98 | 17.34 | --- | 83.51 | 41,000[d] | 8,900[e,f] | --- | 8,200 | 1,100 | 1,200 | 3,000 | <200 | 1.8 | |
| | 9/30/98 | 19.90 | --- | 80.95 | 37,000 | 3,300 | --- | 11,000 | 950 | 1,200 | 2,800 | <20 | 2.0 | |
| | 12/8/98 | 15.62 | --- | 85.23 | 22,000 | 3,700 | --- | 3,000 | 1,200 | 730 | 3,100 | <900 | --- | |
| | 3/29/99 | 11.98 | --- | 88.87 | 36,000[d] | 6,800[e] | --- | 12,000 | 750 | 1,300 | 2,400 | 950 | 0.50 | |
| | 6/29/99 | 20.77 | --- | 80.08 | 28,000[d] | 3,500[e] | --- | 7,300 | 420 | 810 | 1,700 | <1,300 | 0.10 | |
| | 9/28/99 | 19.68 | --- | 81.17 | 13,000[d] | 3,600[e,f] | --- | 3,200 | 130 | 320 | 1,100 | <210 | 0.55 | |
| | 12/10/99 | 17.02 | --- | 83.83 | 25,000[d] | 2,900[e,f] | --- | 5,400 | 130 | 620 | 1,400 | <1,000 | 1.03 | |
| | 3/23/00 | 12.76 | --- | 88.09 | 21,000[d] | 3,300[f] | --- | 4,700 | 140 | 470 | 1,100 | <350 | --- | |
| | 9/7/00 | 19.45 | --- | 81.40 | 40,000[d,g] | 12,000[e,g] | --- | 3,700 | 1,400 | 910 | 4,900 | <50 | 0.17 | |
| | 12/5/00 | 18.60 | --- | 82.25 | 26,000[a] | 3,400[e] | --- | 7,900 | 150 | 580 | 810 | <300 | 0.35 | Not operating |
| | 3/7/01 | 16.19 | --- | 84.66 | 13,000 | 2,400 | --- | 2,700 | 43 | 69 | 300 | <100 | 0.49 | Not operating |
| | 6/6/01 | 18.47 | --- | 82.38 | 19,000 | 4,000 | --- | 4,500 | 130 | 270 | 430 | <400 | 0.39 | Not operating |
| | 8/30/01 | 21.70 | --- | 79.15 | 8,800[a] | 1,400[d] | --- | 2,100 | 45 | 91 | 240 | <130 | 0.27 | Operating |
| | 12/7/01 | 26.55 | --- | 74.30 | 8,700[d] | 1,900[e,f] | --- | 1,300 | 160 | 38 | 730 | <20 | 0.59 | Operating |
| | 3/11/02 | 17.13 | --- | 83.72 | 9,400[d] | 1,400[e] | --- | 2,100 | 200 | 74 | 470 | <20 | 0.39 | Operating |
| | 6/10/02 | 24.10 | --- | 76.75 | 4,200[d] | 900[e,k] | --- | 830 | 170 | 110 | 460 | <100 | --- | Operating |
| | 9/26/02 | 20.30 | --- | 80.55 | 7,000[d] | 1,300[e,f,k] | --- | 1,300 | 190 | 200 | 760 | <100 | 0.70 | Operating |
| | 11/21/02 | 21.55 | --- | 79.30 | 83,000[d,g] | 200,000[e,g] | --- | 7,100 | 1,700 | 3,000 | 13,000 | <1,000 | 0.49 | Operating |
| | 1/13/03 | 14.80 | --- | 86.05 | 20,000[d] | 5,300[e,f] | --- | 2,300 | 480 | 300 | 2,100 | <500 | 0.33 | Not operating |
| | 4/25/03 | 20.90 | --- | 79.95 | 4,200[d] | 320[e] | --- | 580 | 81 | 59 | 470 | <50 | --- | Operating |
| | 5/30/03 | 16.65 | --- | 84.20 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | 9/3/03 | 24.16 | --- | 76.69 | 14,000[d] | 36,000[e,f] | --- | 300 | 50 | 33 | 480 | <50 | --- | Operating |
| | 12/2/03 | 24.12 | --- | 76.73 | 7,100[d,g] | 9,300[e,f,g] | --- | 1,400 | 230 | 160 | 820 | <100 | --- | Operating |
| | 3/18/04 | 17.70 | --- | 83.15 | 3,600[d] | 1,100[e,f] | --- | 650 | 59 | 38 | 370 | <90 | --- | Operating |
| *167.02* | 6/16/04 | 19.20 | --- | 147.82 | 8,100[d] | 2,300[e,f] | --- | 1,500 | 69 | 22 | 1,000 | <100 | --- | Not operating |
| | 9/27/04 | 23.07 | --- | 143.95 | 7,800[d] | 1,700[e] | --- | 1,800 | 110 | 120 | 670 | <180 | 0.28 | Not operating |
| | **12/27/04** | **17.04** | **---** | **149.98** | **10,000[d]** | **1,400[e]** | **---** | **2,400** | **170** | **170** | **1,500** | **<120** | **0.41** | Not operating |

**Table 2. Groundwater Elevations and Analytical Data** - Former Exxon Service Station, 3055 35th Avenue, Oakland, California

| Well ID | Date | GW | SPH | GW | TPHg | TPHd | TPHmo | Benzene | Toluene | Ethylbenzene | Xylenes | MTBE | DO | TPE System |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *TOC* | | Depth (ft) | (ft) | Elev. (ft) | <---------- Concentrations in micrograms per liter (µg/L) ----------> | | | | | | | | (mg/L) | Status |
| MW-2 | 5/25/94 | 15.65 | --- | 84.35 | 61,000 | 6,900 | <5,000 | 9,900 | 7,400 | 960 | 4,600 | --- | --- | |
| *100.00* | 7/19/94 | 19.81 | --- | 80.19 | --- | --- | --- | --- | --- | --- | --- | --- | --- | |
| | 8/18/94 | 20.37 | --- | 79.63 | 88,000 | --- | --- | 10,750 | 10,500 | 1,850 | 9,600 | --- | --- | |
| | 11/11/94 | 15.52 | --- | 84.48 | 54,000 | --- | --- | 5,900 | 6,700 | 1,300 | 7,500 | --- | --- | |
| | 2/27/95 | 14.46 | Sheen | 85.54 | 44,000 | --- | --- | 5,100 | 5,300 | 930 | 6,400 | --- | --- | |
| | 5/23/95 | 14.17 | --- | 85.83 | 33,000 | --- | --- | 8,200 | 5,600 | 900 | 6,600 | --- | --- | |
| | 8/22/95 | 19.80 | --- | 80.20 | 38,000 | --- | --- | 6,400 | 5,000 | 1,100 | 5,600 | --- | --- | |
| | 11/29/95 | 21.05 | --- | 78.95 | 46,000 | --- | --- | 7,100 | 5,300 | 1,300 | 6,000 | --- | --- | |
| | 2/21/96 | 10.53 | --- | 89.47 | 59,000 | --- | --- | 8,000 | 6,000 | 1,800 | 8,900 | 4,500 | --- | |
| | 5/21/96 | 13.47 | --- | 86.53 | 51,000 | 3,400 | --- | 8,200 | 5,200 | 1,300 | 6,600 | 2,400 | --- | |
| | 8/22/96 | 19.12 | --- | 80.88 | 37,000 | 5,700 | --- | 5,100 | 3,500 | 960 | 4,500 | <200 | 3.0 | |
| | 11/27/96 | 16.61 | Sheen | 83.39 | 54,000 | 10,000 | --- | 9,800 | 7,000 | 1,800 | 7,900 | <2,000 | 3.1 | |
| | 3/20/97 | 15.39 | --- | 84.61 | 27,000 | 6,100 | --- | 3,700 | 2,300 | 580 | 2,800 | <400 | 8.1 | |
| | 6/25/97 | 18.62 | --- | 81.38 | 42,000 | 7,800[b] | --- | 7,400 | 3,800 | 1,200 | 5,700 | <200 | 0.9 | |
| | 9/17/97 | 19.05 | Sheen | 80.95 | 41,000[d] | 8,900[e] | --- | 5,200 | 3,400 | 1,300 | 5,900 | <700 | 1.2 | |
| | 12/22/97 | 14.09 | --- | 85.91 | 47,000[d] | 6,100[e] | --- | 8,500 | 4,600 | 1,800 | 8,400 | <1,200 | 1.2 | |
| | 3/18/98 | 10.83 | Sheen | 89.17 | 58,000[d] | 7,000[e,f] | --- | 9,300 | 6,100 | 1,800 | 8,200 | <1,100 | 1.1 | |
| | 7/14/98 | 16.07 | --- | 83.93 | 42,000[d] | 5,300[e,f] | --- | 6,000 | 3,000 | 1,000 | 4,800 | <200 | 1.5 | |
| | 9/30/98 | 18.71 | --- | 81.29 | 22,000 | 2,400 | --- | 3,600 | 1,300 | 720 | 3,200 | <30 | 1.8 | |
| | 12/8/98 | 14.80 | --- | 85.20 | 32,000 | 3,100 | --- | 9,200 | 680 | 1,100 | 2,300 | <2,000 | --- | |
| | 3/29/99 | 11.81 | --- | 88.19 | 28,000[d] | 7,500[e,f] | --- | 4,400 | 1,600 | 950 | 4,100 | 410 | 1.86 | |
| | 6/29/99 | 19.54 | --- | 80.46 | 28,000[d] | 3,300[e] | --- | 3,500 | 1,100 | 690 | 3,100 | <1,000 | 0.41 | |
| | 9/28/99 | 18.61 | --- | 81.39 | 15,000[d] | 3,400[e,f] | --- | 1,200 | 540 | 230 | 2,300 | <36 | 1.18 | |
| | 12/10/99 | 16.53 | --- | 83.47 | 17,000[d] | 2,500[e,f] | --- | 1,300 | 780 | 420 | 2,700 | <40 | 0.17 | |
| | 3/23/00 | 13.56 | --- | 86.44 | 25,000[d] | 3,100[i] | --- | 1,900 | 1,100 | 660 | 3,700 | <500 | --- | |
| | 9/7/00 | 18.25 | --- | 81.75 | 62,000[d,g] | 32,000[e,g] | --- | 5,300 | 2,300 | 1,500 | 8,400 | <100 | 0.39 | |
| | 12/5/00 | 17.45 | --- | 82.55 | 60,000[d,g] | 87,000[e,f,g] | --- | 5,100 | 2,200 | 1,600 | 9,000 | <200 | 0.31 | Not operating |
| | 3/7/01 | 15.68 | --- | 84.32 | 34,000 | 3,900 | --- | 1,200 | 770 | 620 | 4,300 | <200 | 0.44 | Not operating |
| | 6/6/01 | 17.51 | --- | 82.49 | 110,000 | 48,000 | --- | 14,000 | 9,000 | 1,900 | 12,000 | <950 | 0.24 | Not operating |
| | 8/30/01 | 21.00 | --- | 79.00 | 43,000[a,h] | 15,000[d,h] | --- | 3,100 | 720 | 980 | 5,500 | <200 | --- | Operating |
| | 12/7/01 | 24.45 | --- | 75.55 | 4,100[d] | 750[e,f] | --- | 510 | 88 | 8.2 | 580 | <20 | 0.47 | Operating |
| | 3/11/02 | 16.95 | --- | 83.05 | 4,700[d] | 590[e] | --- | 1,200 | 150 | 30 | 310 | <50 | 0.24 | Operating |
| | 6/10/02 | 18.59 | --- | 81.41 | 14,000[d] | 2,000[e] | --- | 2,600 | 710 | 150 | 2,000 | <800 | --- | Operating |
| | 9/26/02 | 20.39 | --- | 79.61 | 4,800[d] | 660[e] | --- | 770 | 200 | 140 | 740 | <50 | 0.29 | Operating |
| | 11/21/02 | 18.75 | --- | 81.25 | 210,000[d,g] | 350,000[e,g] | --- | 14,000 | 23,000 | 4,400 | 28,000 | <1,700 | 0.43 | Operating |
| | 1/13/03 | 13.60 | --- | 86.40 | 32,000[d,g] | 14,000[e,f,g,k] | --- | 4,500 | 1,600 | 920 | 3,600 | <1000 | 0.39 | Not operating |
| | 4/25/03 | 19.05 | --- | 80.95 | 3,800[d] | 310[e] | --- | 460 | 78 | 72 | 410 | 310 | --- | Operating |
| | 5/30/03 | 15.23 | --- | 84.77 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | 9/3/03 | 23.57 | --- | 76.43 | 2,900[d] | 2,300[e] | --- | 240 | 57 | 68 | 380 | 770 | --- | Operating |
| | 12/2/03 | 23.17 | --- | 76.83 | 2,400[d,g] | 3,300[e,f,g] | --- | 91 | 20 | 14 | 250 | 890 | --- | Operating |
| | 3/18/04 | 15.78 | --- | 84.22 | 4,200[d] | 870[e,f] | --- | 730 | 89 | <5.0 | 480 | 2,300 | --- | Operating |
| *166.14* | 6/16/04 | 18.15 | --- | 147.99 | 15,000[d] | 9,800[e,f] | --- | 800 | 210 | 290 | 1,800 | 2,000 | --- | Not operating |
| | 9/27/04 | 27.55** | --- | 138.59 | 770[d] | 1,000[e,f,k] | --- | 20 | 7.9 | 10 | 140 | 1,600 | 0.79 | Operating |
| | **12/27/04** | **16.81** | **---** | **149.33** | **17,000[d]** | **3,800[e,f]** | **---** | **1,300** | **370** | **540** | **3,800** | **620** | **0.94** | Not operating |

**Table 2. Groundwater Elevations and Analytical Data** - Former Exxon Service Station, 3055 35th Avenue, Oakland, California

| Well ID | Date | GW | SPH | GW | TPHg | TPHd | TPHmo | Benzene | Toluene | Ethylbenzene | Xylenes | MTBE | DO | TPE System |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *TOC* | | Depth (ft) | (ft) | Elev. (ft) | <---------- Concentrations in micrograms per liter (µg/L) ----------> | | | | | | | | (mg/L) | Status |
| MW-3 | 5/25/94 | 13.93 | Sheen | 82.94 | 56,000 | 14,000 | <50,000 | 14,000 | 14,000 | 1,300 | 11,000 | --- | --- | |
| *96.87* | 7/19/94 | 17.04 | --- | 79.83 | --- | --- | --- | --- | --- | --- | --- | --- | --- | |
| | 8/18/94 | 17.75 | --- | 79.12 | 116,000 | --- | --- | 28,300 | 26,000 | 2,400 | 15,000 | --- | --- | |
| | 11/11/94 | 17.80 | --- | 79.07 | 89,000 | --- | --- | 1,600 | 1,900 | 1,900 | 14,000 | --- | --- | |
| | 2/27/95 | 11.86 | Sheen | 85.01 | 250,000 | --- | --- | 22,000 | 26,000 | 7,800 | 21,000 | --- | --- | |
| | 5/23/95 | 11.60 | Sheen | 85.27 | 310,000 | --- | --- | 18,000 | 17,000 | 4,500 | 2,800 | --- | --- | |
| | 8/22/95 | 17.10 | --- | 79.77 | 74,000 | --- | --- | 14,000 | 13,000 | 1,900 | 11,000 | --- | --- | |
| | 11/29/95 | 16.34 | --- | 80.53 | 220,000 | --- | --- | 25,000 | 25,000 | 3,500 | 19,000 | --- | --- | |
| | 2/21/96 | 7.92 | --- | 88.95 | 60,000 | --- | --- | 10,000 | 7,800 | 1,500 | 8,800 | 3,400 | --- | |
| | 5/21/96 | 10.86 | Sheen | 86.01 | 69,000 | 13,000 | --- | 17,000 | 9,400 | 1,700 | 9,400 | 2,600 | --- | |
| | 8/22/96 | 16.50 | --- | 80.37 | 94,000 | 16,000 | --- | 17,000 | 15,000 | 2,100 | 12,000 | 330 | 2.0 | |
| | 11/27/96 | 13.47 | Sheen | 83.40 | 82,000 | 24,000 | --- | 14,000 | 13,000 | 2,400 | 13,000 | <1,000 | 2.4 | |
| | 3/20/97 | 12.86 | --- | 84.01 | 56,000 | 11,000 | --- | 9,900 | 6,900 | 1,300 | 8,000 | 3,500 | 9.0 | |
| | 6/25/97 | 15.98 | --- | 80.89 | 49,000 | 7,700[b] | --- | 9,700 | 7,100 | 1,300 | 7,000 | 220 | 5.8 | |
| | 9/17/97 | 16.34 | Sheen | 80.53 | 78,000[d] | 15,000[e] | --- | 11,000 | 9,900 | 1,800 | 10,000 | <1,200 | 0.7 | |
| | 12/22/97 | 10.71 | Sheen | 86.16 | 49,000[d] | 14,000[e] | --- | 7,300 | 5,300 | 1,400 | 7,500 | <1,100 | 3.1 | |
| | 3/18/98 | 8.41 | Sheen | 88.46 | 120,000[d] | 20,000[e,f] | --- | 21,000 | 19,000 | 2,600 | 15,000 | <1,600 | 1.6 | |
| | 7/14/98 | 13.51 | --- | 83.36 | 94,000[d,g] | 65,000[e,f,g] | --- | 18,000 | 14,000 | 1,900 | 11,000 | <1,400 | 1.8 | |
| | 9/30/98 | 16.14 | --- | 80.73 | 91,000 | 9,800 | --- | 17,000 | 13,000 | 2,100 | 12,000 | <1300 | 2.0 | |
| | 12/8/98 | 11.20 | --- | 85.67 | 51,000 | 4,200 | --- | 8,000 | 6,800 | 1,400 | 7,500 | <1,100 | --- | |
| | 3/29/99 | 7.95 | --- | 88.92 | 39,000[d] | 4,600[e] | --- | 8,900 | 4,400 | 940 | 4,500 | 810 | 0.56 | |
| | 6/29/99 | 16.98 | --- | 79.89 | 71,000[d] | 6,900[e] | --- | 12,000 | 7,300 | 1,400 | 8,400 | <1,700 | 0.19 | |
| | 9/28/99 | 15.99 | --- | 80.88 | 60,000[d] | 7,800[e] | --- | 9,400 | 9,200 | 1,000 | 9,900 | 200 | 0.53 | |
| | 12/10/99 | 13.31 | --- | 83.56 | 53,000[d] | 5,300[e,f] | --- | 8,000 | 6,400 | 1,100 | 8,100 | <200 | 0.48 | |
| | 3/23/00 | 8.98 | --- | 87.89 | 77,000[d,g] | 11,000[e,j] | --- | 10,000 | 9,400 | 1,600 | 11,000 | <430 | --- | |
| | 9/7/00 | 15.61 | --- | 81.26 | 100,000[d,g] | 19,000[e,f,g] | --- | 17,000 | 12,000 | 1,600 | 11,000 | <500 | --- | |
| | 12/5/00 | 14.80 | --- | 82.07 | 110,000[d,g] | 17,000[e,g] | --- | 17,000 | 11,000 | 1,900 | 12,000 | <750 | 0.37 | Not operating |
| | 3/7/01 | 14.27 | --- | 82.60 | 60,000 | 13,000 | --- | 7,000 | 4,600 | 900 | 7,100 | <350 | 0.49 | Not operating |
| | 6/6/01 | 14.88 | --- | 81.99 | 43,000 | 12,000 | --- | 3,000 | 1,000 | 770 | 5,200 | <400 | 1.71 | Not operating |
| | 8/30/01 | 12.43 | --- | 84.44 | 95,000[a,h] | 190,000[d,h] | --- | 6,900 | 10,000 | 2,700 | 15,000 | <250 | 0.24 | Operating |
| | 12/7/01 | 24.65 | --- | 72.22 | 25,000[d] | 3,900[e,f] | --- | 2,500 | 1,700 | 64 | 2,200 | <200 | 0.19 | Operating |
| | 3/11/02 | 14.69 | --- | 82.18 | 30,000[d] | 2,800[f,e,k] | --- | 5,000 | 2,400 | 190 | 1,800 | <1,300 | 0.30 | Operating |
| | 6/10/02 | 22.94 | --- | 73.93 | 9,000[d] | 990[e,k] | --- | 1,800 | 1,300 | 96 | 1,000 | <300 | --- | Operating |
| | 9/26/02 | 18.85 | --- | 78.02 | 50,000[d,g] | 130,000[e,g] | --- | 3,900 | 5,400 | 820 | 6,600 | <500 | 0.19 | Operating |
| | 11/21/02 | 17.85 | 0.05 | 79.06 | 37,000[d,g] | 120,000[e,g] | --- | 4,000 | 660 | 1,200 | 5,100 | <1,700 | 0.28 | Operating |
| | 1/13/03 | 11.43 | --- | 85.44 | 21,000[d,g] | 6,300[e,f,g,k] | --- | 2,400 | 2,300 | 390 | 3,000 | <500 | 0.31 | Not operating |
| | 4/25/03 | 18.30 | --- | 78.57 | 12,000[d] | 1,200[e] | --- | 1,800 | 850 | 150 | 1,200 | <500 | --- | Operating |
| | 5/30/03 | 13.30 | --- | 83.57 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | 9/3/03 | 21.65 | --- | 75.22 | 8,100[d] | 3,300[e] | --- | 220 | 170 | 66 | 560 | <50 | --- | Operating |
| | 12/2/03 | 17.70 | --- | 79.17 | 30,000[d,g] | 8,400[e,f,g] | --- | 2,900 | 2,100 | 530 | 3,600 | <500 | --- | Operating |
| | 3/18/04 | 16.49 | --- | 80.38 | 15,000[d] | 2,300[e,f] | --- | 2,600 | 990 | 260 | 1,700 | <300 | --- | Operating |
| *162.94* | 6/16/04 | 15.40 | --- | 147.54 | 23,000[d] | 8,800[e,f] | --- | 2,100 | 1,300 | 360 | 2,800 | <1,000 | --- | Operating |
| | 9/27/04 | 23.65 | --- | 139.29 | 5,200[d] | 1,700[e,f] | --- | 430 | 220 | 100 | 680 | 250 | 0.55 | Operating |
| | **12/27/04** | **14.58** | **---** | **148.36** | **32,000[d,g]** | **24,000[e,f,g,k]** | **---** | **4,400** | **2,800** | **650** | **4,800** | **<250** | **0.71** | Not operating |

**Table 2. Groundwater Elevations and Analytical Data** - Former Exxon Service Station, 3055 35th Avenue, Oakland, California

| Well ID | Date | GW | SPH | GW | TPHg | TPHd | TPHmo | Benzene | Toluene | Ethylbenzene | Xylenes | MTBE | DO | TPE System |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *TOC* | | Depth (ft) | (ft) | Elev. (ft) | <---------- Concentrations in micrograms per liter (µg/L) ----------> | | | | | | | | (mg/L) | Status |
| MW-4 | 3/20/97 | 13.75 | --- | 83.59 | 47,000 | 3,100 | --- | 11,000 | 4,500 | 1,100 | 5,200 | 3,400 | 8.4 | |
| *97.34* | 6/25/97 | 16.15 | --- | 81.19 | 61,000 | 5,800[b] | --- | 16,000 | 6,100 | 1,500 | 5,900 | 780[c] | 1.4 | |
| | 9/17/97 | 17.10 | --- | 80.24 | 60,000[d] | 4,400[e] | --- | 17,000 | 4,900 | 1,500 | 5,700 | <1,500 | 1.5 | |
| | 12/22/97 | 9.21 | --- | 88.13 | 43,000[d] | 3,100[e] | --- | 13,000 | 3,900 | 1,100 | 4,200 | <960 | 3.7 | |
| | 3/18/98 | 9.54 | --- | 87.80 | 58,000[d] | 5,500[e,f] | --- | 14,000 | 4,700 | 1,400 | 5,700 | <1,200 | 0.8 | |
| | 7/14/98 | 14.15 | --- | 83.19 | 73,000[d] | 2,900[e,f] | --- | 22,000 | 7,000 | 1,800 | 7,300 | <200 | 1.0 | |
| | 9/30/98 | 16.84 | --- | 80.50 | 39,000 | 2,100 | --- | 12,000 | 2,700 | 1,000 | 3,400 | 510 | 1.1 | |
| | 12/8/98 | 13.45 | --- | 83.89 | 27,000 | 1,600 | --- | 8,900 | 1,600 | 730 | 2,300 | <1,500 | --- | |
| | 3/29/99 | 9.10 | --- | 88.24 | 48,000[d] | 2,400[e,h] | --- | 15,000 | 3,000 | 1,300 | 5,000 | 1,300 | 1.32 | |
| | 06/29/99* | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |
| | 9/28/99 | 16.58 | --- | 80.76 | 24,000[d] | 3,200[e,f] | --- | 7,500 | 1,200 | 190 | 2,200 | 210 | 14.29[g] | |
| | 12/10/99 | 13.99 | --- | 83.35 | 47,000[d] | 3,100[e,f] | --- | 12,000 | 1,800 | 1,000 | 4,400 | <100 | 0.62 | |
| | 3/23/00 | 10.22 | --- | 87.12 | 40,000[d] | 3,100[e,f] | --- | 11,000 | 1,600 | 910 | 3,100 | 690 | --- | |
| | 9/7/00 | 16.40 | --- | 80.94 | 43,000[d] | 5,900[e] | --- | 10,000 | 1,100 | 1,100 | 3,400 | <450 | 1.04 | |
| | 12/5/00 | 15.55 | --- | 81.79 | 69,000[d,g] | 2,600[e,g] | --- | 16,000 | 1,300 | 1,300 | 3,400 | <200 | 0.35 | Not operating |
| | 3/20/01 | 14.03 | --- | 83.31 | 46,000 | --- | --- | 13,000 | 1,000 | 900 | 2,800 | <350 | 0.39 | Not operating |
| | 6/6/01 | 15.49 | --- | 81.85 | 75,000 | 5,400 | --- | 22,000 | 1,800 | 1,900 | 6,400 | <1,200 | 2.22 | Not operating |
| | 8/30/01 | 18.00 | --- | 79.34 | 43,000[e] | 3,200[d] | --- | 6,400 | 630 | 510 | 2,600 | <200 | 0.32 | Operating |
| | 12/7/01 | 23.45 | --- | 73.89 | 32,000[d,g] | 11,000[e,f,g] | --- | 4,500 | 740 | 310 | 2,300 | <200 | 0.21 | Operating |
| | 3/11/02 | 14.95 | --- | 82.39 | 15,000[d] | 1,600[e,f,k] | --- | 3,700 | 500 | 92 | 790 | <500 | 0.30 | Operating |
| | 6/10/02 | 22.30 | --- | 75.04 | 9,400[d] | 3,400[e] | --- | 1,400 | 50 | <5.0 | 690 | <200 | --- | Operating |
| | 9/26/02 | 17.93 | --- | 79.41 | 21,000[d] | 800[e] | --- | 3,300 | 1,300 | 450 | 2,900 | <500 | 0.24 | Operating |
| | 11/21/02 | 17.55 | --- | 79.79 | 5,700[d] | 2,400[e,k] | --- | 1,400 | 290 | 63 | 640 | 550 | --- | Operating |
| | 1/13/03 | 11.75 | --- | 85.59 | 35,000[d,g] | 15,000[e,f,g,k] | --- | 5,100 | 1,500 | 510 | 4,500 | <800 | 0.28 | Not operating |
| | 4/25/03 | 19.37 | --- | 77.97 | 6,600[d] | 2,200[e,f] | --- | 960 | 130 | 100 | 560 | <170 | --- | Operating |
| | 5/30/03 | 13.56 | --- | 83.78 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | 9/3/03 | 21.65 | --- | 75.69 | 29,000[d] | 27,000[e,f] | --- | 2,200 | 380 | 280 | 2,300 | 65 | --- | Operating |
| | 12/2/03 | 19.17 | --- | 78.17 | 13,000[d] | 5,800[e,f] | --- | 1,300 | 180 | 120 | 1,900 | <250 | --- | Operating |
| | 3/18/04 | 14.92 | --- | 82.42 | 5,300[d] | 1,500[e] | --- | 1,300 | 55 | 37 | 440 | <180 | --- | Operating |
| *163.49* | 6/16/04 | 16.02 | --- | 147.47 | 9,100[d] | 3,400[e,f] | --- | 940 | 96 | 120 | 800 | <50 | --- | Not operating |
| | 9/27/04 | 19.93 | --- | 143.56 | 1,300[d] | 980[e,f,k] | --- | 140 | 10 | 11 | 81 | <50 | 0.68 | Not operating |
| | **12/27/04** | **14.79** | **---** | **148.70** | **10,000[d,g]** | **5,300[e,f,g,k]** | **---** | **1,000** | **99** | **34** | **1,600** | **<50** | **0.74** | Not operating |
| RW-5 | 01/13/03 | 10.20 | --- | 152.14 | 14,000 | 3,000 | --- | 2,100 | 750 | 300 | 1,800 | 950 | 0.17 | --- |
| *162.34* | 03/18/04 | 14.48 | --- | 147.86 | 12,000 | --- | --- | 2,000 | 380 | 190 | 1,500 | 830 | --- | --- |
| | 6/16/04 | 14.73 | --- | 147.61 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | 9/27/04 | 25.55** | --- | 136.79 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Operating |
| | **12/27/04** | **10.45** | **---** | **151.89** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | Not operating |
| RW-6 | 03/11/02 | --- | --- | --- | 14,000 | 3,100 | --- | 970 | 520 | 170 | 2,200 | <130 | --- | --- |
| *162.36* | 01/13/03 | 10.35 | --- | 152.01 | 15,000 | 2,900 | --- | 2,200 | 1,200 | 130 | 2,200 | 440 | 0.24 | --- |
| | 03/18/04 | 11.47 | --- | 150.89 | 8,500 | --- | --- | 1,300 | 260 | 71 | 990 | 1,300 | --- | --- |
| | 6/16/04 | 14.80 | --- | 147.56 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | 9/27/04 | 18.46 | --- | 143.90 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | **12/27/04** | **9.82** | **---** | **152.54** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | Not operating |

**Table 2. Groundwater Elevations and Analytical Data** - Former Exxon Service Station, 3055 35th Avenue, Oakland, California

| Well ID | Date | GW | SPH | GW | TPHg | TPHd | TPHmo | Benzene | Toluene | Ethylbenzene | Xylenes | MTBE | DO | TPE System |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *TOC* | | Depth (ft) | (ft) | Elev. (ft) | <---------- Concentrations in micrograms per liter (µg/L) ----------> | | | | | | | | (mg/L) | Status |
| RW-7 | 03/11/02 | --- | --- | --- | <50 | <50 | --- | <0.5 | <0.5 | <0.5 | <0.5 | <5.0 | | --- |
| *162.72* | 01/13/03 | 10.95 | --- | 151.77 | <50 | 67 | --- | <0.5 | <0.5 | <0.5 | <0.5 | <5.0 | 0.22 | --- |
| | 03/18/04 | 15.33 | --- | -- | 250 | --- | --- | 66 | 4.8 | 3.2 | 10 | <15 | --- | --- |
| | 6/16/04 | 15.22 | --- | 147.50 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | 9/27/04 | 18.98 | --- | 143.74 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | **12/27/04** | **9.85** | **---** | **152.87** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | Not operating |
| RW-8 | 03/11/02 | --- | --- | --- | 1,300 | 80 | --- | 620 | 11 | 15 | 14 | <60 | --- | --- |
| *164.13* | 01/13/03 | 12.80 | --- | 151.33 | 390 | 56 | --- | 150 | 11 | 4.1 | 4.1 | 13 | 0.31 | --- |
| | 03/18/04 | 15.34 | --- | 148.79 | 760 | --- | --- | 310 | 9.9 | 11 | 16 | <25 | --- | --- |
| | 6/16/04 | 16.41 | --- | 147.72 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | 9/27/04 | 19.74 | --- | 144.39 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | **12/27/04** | **12.32** | **---** | **151.81** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | Not operating |
| RW-9 | 03/11/02 | --- | --- | --- | 12000 | 880 | --- | 3,400 | 230 | 78 | 1,300 | <240 | --- | --- |
| *163.86* | 01/13/03 | 11.85 | --- | 152.01 | 23000 | 2000 | --- | 7,700 | 610 | 310 | 310 | <500 | 0.39 | --- |
| | 03/18/04 | 13.69 | --- | 150.17 | 2300 | --- | --- | 770 | 32 | 15 | 200 | <50 | --- | --- |
| | 6/16/04 | 16.03 | --- | 147.83 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | 9/27/04 | 19.83 | --- | 144.03 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | **12/27/04** | **24.88** | **---** | **138.98** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | Not operating |
| RW-10 | 03/11/02 | --- | --- | --- | 12,000 | 740 | --- | 3,900 | 150 | 110 | 1,100 | <270 | --- | --- |
| *163.02* | 01/13/03 | 10.75 | --- | 152.27 | 4,300 | 330 | --- | 1,500 | 43 | 98 | 98 | <100 | 0.41 | --- |
| | 03/18/04 | 13.13 | --- | 149.89 | 5,800 | --- | --- | 2,400 | 11 | <10 | 110 | <300 | --- | --- |
| | 6/16/04 | 15.03 | --- | 147.99 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | 9/27/04 | 18.35 | --- | 144.67 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | **12/27/04** | **19.39** | **---** | **143.63** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | Not operating |
| RW-11 | 03/11/02 | --- | --- | --- | 260 | <50 | --- | 34 | 5.3 | 8.1 | 48 | <5.0 | --- | --- |
| *162.57* | 01/13/03 | 9.80 | --- | 152.77 | 5,300 | 2,700 | --- | 490 | 110 | 120 | 120 | 180 | 0.24 | --- |
| | 03/18/04 | 12.45 | --- | 150.12 | 9,300 | --- | --- | 980 | 120 | 180 | 770 | 2,000 | --- | --- |
| | 6/16/04 | 14.75 | --- | 147.82 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | 9/27/04 | 18.44 | --- | 144.13 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | **12/27/04** | **10.07** | **---** | **152.50** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | Not operating |
| RW-12 | 03/11/02 | --- | --- | --- | 13,000 | 900 | --- | 4,500 | 130 | 130 | 270 | <5.0 | --- | --- |
| *163.06* | 01/13/03 | 10.90 | --- | 152.16 | 4,100 | 1,800 | --- | 1,000 | 130 | 99 | 99 | <100 | 0.21 | --- |
| | 03/18/04 | 13.63 | --- | 149.43 | 17,000 | --- | --- | 2,700 | 960 | 230 | 1,500 | 1,400 | --- | --- |
| | 6/16/04 | 15.30 | --- | 147.76 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | 9/27/04 | 19.09 | --- | 143.97 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | **12/27/04** | **10.85** | **---** | **152.21** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | Not operating |
| RW-13 | 03/11/02 | --- | --- | --- | 830 | 79 | --- | 190 | 13 | 13 | 34 | <5.0 | --- | --- |
| *164.34* | 01/13/03 | 11.20 | --- | 153.14 | 210 | 92 | --- | 54 | 2.0 | 2.7 | 2.7 | <5.0 | 0.35 | --- |
| | 03/18/04 | 13.45 | --- | 150.89 | 150 | --- | --- | 47 | 1.0 | 2.1 | 1.5 | <5.0 | --- | --- |
| | 6/16/04 | 15.83 | --- | 148.51 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |

**Table 2. Groundwater Elevations and Analytical Data** - Former Exxon Service Station, 3055 35th Avenue, Oakland, California

| Well ID | Date | GW | SPH | GW | TPHg | TPHd | TPHmo | Benzene | Toluene | Ethylbenzene | Xylenes | MTBE | DO | TPE System |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *TOC* | | Depth (ft) | (ft) | Elev. (ft) | <---------- Concentrations in micrograms per liter (µg/L) ----------> | | | | | | | | (mg/L) | Status |
| RW-13 | 9/27/04 | 19.55 | --- | 144.79 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| *(Contd.)* | **12/27/04** | **18.12** | **---** | **146.22** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | Not operating |
| RW-14 | 03/11/02 | --- | --- | --- | 270 | 82 | --- | 44 | 0.99 | <0.5 | 4.2 | <5.0 | --- | --- |
| *163.76* | 01/13/03 | 11.00 | --- | 152.76 | 3700 | 6800 | --- | 230 | 77 | 91 | 91 | <50 | 0.38 | --- |
| | 03/18/04 | 12.81 | --- | 150.95 | 220 | --- | --- | 42 | 1.4 | 0.99 | 5.2 | <5.0 | --- | --- |
| | 6/16/04 | 15.41 | --- | 148.35 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | 9/27/04 | 19.20 | --- | 144.56 | --- | --- | --- | --- | --- | --- | --- | --- | --- | Not operating |
| | **12/27/04** | **12.62** | **---** | **151.14** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | **---** | Not operating |

**Abbreviations:**

TOC = Top of casing elevation measured in feet relative to surveyor's datum.

All site wells were re-surveyed by Virgil Chavez Land Surveying on June 2, 2004 to the CA State Coordinate System, Zone III (NAD83). Benchmark elevation = 177.397 feet (NGVD 29)

GW Depth = Groundwater depth measured from TOC.

GW Elev. = Groundwater elevation

ft = Measured in feet

SPH = Separate-phase hydrocarbons depth measured from TOC.

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

TPHd = Total petroleum hydrocarbons as diesel by modified EPA Method 8015

TPHmo = Total petroleum hydrocarbons as motor oil by modified EPA Method 8015

Benzene, Toluene, Ethylbenzene, and Xylenes by EPA Method 8020

MTBE = Methyl Tertiary Butyl Ether by EPA Method 8020

DO = Dissolved oxygen

µg/L = Micrograms per liter, equivalent to parts per billion in water

mg/L = Milligrams per liter, equivalent to parts per million in water

TPE = Two-phase extraction

--- = Not observed/not analyzed

* = Well inaccessible during site visit

** = No water in well due to system operating in well, value reflects total well depth.

# = abnormally high reading due to added hydrogen peroxide

**Notes:**

a = Result has an atypical pattern for diesel analysis

b = Result appears to be a lighter hydrocarbon than diesel

c = There is a >40% difference between primary and confirmation analysis

d = Unmodified or weakly modified gasoline is significant

e = Gasoline range compounds are significant

f = Diesel range compounds are significant; no recognizable pattern

g = Lighter than water immiscible sheen is present

h = One to a few isolated peaks present

i = Medium boiling point pattern does not match diesel (stoddard solvent)

j = Aged diesel is significant

k = Oil range compounds are significant

# Appendix A

# Agency Correspondence

ALAMEDA COUNTY
**HEALTH CARE SERVICES**
AGENCY
DAVID J. KEARS, Agency Director

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
(510) 567-6700
FAX (510) 337-9335

December 8, 2004

Lynn Worthington
Golden Empire Properties, Inc.
5942 MacArthur Boulevard, Suite B
Oakland, California 94605-1653

Dear Mr. Worthington:

Subject: Fuel Leak Case No. RO0000271; Exxon Station, 3055 35th Ave., Oakland, CA

Alameda County Environmental Health staff has reviewed "Remediation System Shutdown Notification" dated September 30, 2004 by Cambria Environmental Technology, Inc. This letter asks for a request to prepare a work plan to implement an alternative remedial technique from the Corrective Action Plan (CAP) dated April 8, 1998 by Cambria Environmental Technology, Inc.

TECHNICAL COMMENTS

Work plan to implement an alternative remedial technique - Please submit.

TECHNICAL REPORT REQUEST

Please submit the following technical reports to Alameda County Environmental Health (Attention: Don Hwang), according to the following schedule:

Work plan – February 8, 2004

If you have any questions, please call me at (510) 567-6746.

Sincerely,

Don Hwang
Hazardous Materials Specialist
Local Oversight Program

C: Subbarao Nagulapaty, Cambria Environmental Technology, Inc., 5900 Hollis St., Suite A, Emeryville, CA *94608*
Donna Drogos
Files