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February 23, 2005

Bob Schultz  
Alameda County Environmental Health  
1311 Harbor Bay Pkwy, Ste 250  
Alameda, California 94502-6577

Alameda County  
Environmental Health  
FEB 28 2005

**Subject: Express Gas & Mart,  
2951 High Street, Oakland, California**

Dear Mr. Schultz:

Enclosed is the *Quarterly Monitoring Report, First Quarter 2005* for the subject LUFT site. Per your verbal approval, the verification monitoring program was started on January 3, 2005. On this same date the ozone sparge system was permanently turned off. Two rounds of verification monitoring have now been completed. All constituents of concern are significantly below site specific threshold levels (SSTLs). The site no longer poses a potential threat to groundwater quality. Pursuant to the *Verification Monitoring Plan*, if concentrations of all constituents of concern remain below their respective SSTLs for two more verification monitoring events, we recommend that the LUFT case be closed.

Please call me at (925) 937-1759 if you have any questions or comments in regard to this report.

Very truly yours,

**Cook Environmental Services, Inc.**



Tim Cook, P.E., CEG  
Principal

cc: Aziz Kandahari, Express Gas & Mart  
Chuck Headlee, SFRWQCB

**QUARTERLY MONITORING REPORT**  
**First Quarter 2005**

**PROJECT SITE:**  
**Express Gas & Mart**  
**2951 High Street**  
**Oakland, California 94619**

**PREPARED FOR:**  
**Mr. Aziz Kandahari**  
**Himalaya Trading Company**  
**2951 High Street**  
**Oakland, California 94619**

**SUBMITTED TO:**  
**Alameda County Health Care Services**  
**Environmental Health Services**  
**1131 Harbor Bay Parkway, Suite 250**  
**Alameda, California 94502**

**PREPARED BY:**  
**Cook Environmental Services, Inc.**  
**271 Las Juntas Way**  
**Walnut Creek, California 94597**

**Project No. 1004**

**February 23, 2005**

Alameda County  
Environmental Health Services  
FEB 28 2005

# PROFESSIONAL CERTIFICATION

## QUARTERLY MONITORING REPORT

*First Quarter 2005*

**Express Gas & Mart  
2951 High Street  
Oakland, California 94619**

**Cook Environmental Services, Inc.**

**Project No. 1004**

**February 23, 2005**

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The conclusions presented in this document are professional opinions based solely upon the stated scope of work and the interpretation of available information as described herein. Such information may include third party data that either has not, or could not be independently verified. Cook Environmental Services, Inc. recognizes that the limited scope of services performed in execution of this investigation may not be appropriate to satisfy the needs or requirements of other potential users, including public agencies not directly involved. Any use or reuse of this document or the findings, conclusions, and recommendations presented herein is at the sole risk of said user.



Tim Cook, P.E., CEG  
Principal



## INTRODUCTION

This report presents the results of the first quarter 2005 groundwater monitoring at Express Gas & Mart, located at 2951 High Street in Oakland, California (the "Site"). The sampling described herein is part of an ongoing characterization and remediation of subsurface contamination that was caused by accidental releases from underground storage tanks (USTs) that were replaced in 2001. The contaminant investigation and corrective action are being conducted by Cook Environmental Services, Inc. on behalf of the responsible party, Mr. Aziz Kandahari. The local oversight program (LOP) agency overseeing this case is Alameda County Environmental Health (ACEH). Quarterly groundwater monitoring was conducted on January 3, 2005. This sampling event also represents the first round of verification monitoring. The second round of verification monitoring was conducted on February 3, 2005. This report also contains operational information for an ozone-sparging (OS) system that began operating at the Site on April 14, 2004.

## PHYSICAL SETTING

### *Site Location*

The Site is a retail gasoline station and convenience store located on the corner of High Street and Penniman Avenue, in southeastern Oakland, California. The Site location is shown on **Figure 1** and Site features are depicted on **Figure 2**. Neighboring land use is commercial and residential.

### *Topography and Drainage*

The Site is located about 3½ miles east of San Francisco Bay. The Site location is near the base of the Oakland Hills, at a surface elevation of approximately 132 feet above mean sea level (amsl). Hilly topography occurs directly south and east of the Site. The ground surface at the Site slopes gently toward High Street, but the regional topography slopes southwesterly from the Oakland Hills. The nearest surface water body is Peralta Creek, located approximately ½ mile north-northeast of the Site.

### *Geology and Soils*

The Site area is located on an alluvial apron that extends northwest and southeast between the San Francisco Bay on the west and the Diablo Range on the east. The active Hayward Fault forms a structural boundary between the alluvial apron and the Diablo Range. Surficial sediments are Holocene-age alluvial fan and fluvial deposits (Helley, E.J. and Graymer, R.W., 1997). These sediments are gravelly sand and sandy gravel that grade into sand and silty clay. The nearby hilly areas directly south and east of the Site are underlain by similar, though older, deposits of Pleistocene age.

Soil borings were drilled and sampled and monitoring wells were installed at the Site in March and April 2003. Soils encountered in the 25-foot deep borings were gravelly to sandy silts with some interbedded silts, sandy clays and silty fine sands. Groundwater was observed in two of the four borings, at depths of 16 feet below grade (fbg) and 4 fbg. The latter boring was drilled offsite, within the High Street right-of-way.

### *Groundwater*

The Site is within the San Francisco Bay regional watershed. The Quaternary alluvial deposits of the region host beneficial use aquifers. Slightly less than half the region's water supply is derived from groundwater. The balance is obtained from imported surface water. The water bearing unit at the Site is primarily gravelly clay. The porosity of the water bearing zone is secondary. Groundwater moves primarily through fractures in the gravelly clay. Static water levels in the onsite monitoring wells range from about 5 to 9 fbg, depending upon the season. Water level data indicate the direction of groundwater flow is southerly. Field measurements of specific conductance (SC) among the monitoring wells range from approximately 400 to 2,000 microsiemens, suggesting that the groundwater quality is variable.

## **PROJECT BACKGROUND**

Groundwater monitoring has been conducted periodically at the Site since early 1995. Groundwater quality has been impacted by petroleum hydrocarbons such as benzene, toluene, ethylbenzene, xylenes (BTEX), and methyl tert-butyl ether (MtBE). A report by Aqua Science Engineers, Inc. (ASE), dated November 14, 2000, indicates that 2,550 pounds of oxygen releasing compound (ORC<sup>®</sup>) slurry was injected into borings along the northern and eastern side of the former USTs in June 1997. The ORC<sup>®</sup> apparently increased the dissolved oxygen (DO) concentrations in the five nearby monitoring wells for approximately one year. Contaminant concentrations decreased slightly in well MW-5 during that period. ORC<sup>®</sup> socks were installed in wells MW-4 and MW-5 in August 1998 after the DO concentrations declined. The ORC<sup>®</sup> socks were removed in September 2000 after proving ineffective at reducing petroleum hydrocarbon concentrations in groundwater.

A Tier 2 Risk-Based Corrective Action (RBCA) analysis was performed for the Site by Mr. Christopher Palmer in August 1997. The RBCA was conducted to develop site-specific threshold levels for petroleum hydrocarbon contaminants in soil and groundwater (SSTLs are listed in **Table 3**). The RBCA was reviewed and commented on by Alameda County. Alameda County approved the RBCA in a letter dated October 21, 1997.

On February 28, 2001, soil samples were collected along a product line leading to the fuel dispensers in front of the convenience mart during the installation of new dispensers. All of the soil samples yielded detectable concentrations of petroleum hydrocarbons. Total petroleum hydrocarbons as gasoline (TPH-g) was detected at concentrations ranging from 71 milligrams per kilogram (mg/kg) to 3,600 mg/kg. A *Site Investigation Workplan* dated March 26, 2001 was

submitted to the ACEH. The work plan described methods and procedures to conduct a soil and groundwater investigation around the fuel dispensers. The ACEH approved the work plan and requested that the USTs and contaminated soils be removed and disposed.

Six soil borings were drilled and sampled in late April 2001. Sample results from the borings yielded TPH-g concentrations in soil up to 4,000 mg/kg and in groundwater up to 78,000 micrograms per liter ( $\mu\text{g/L}$ ), confirming that petroleum hydrocarbons had impacted soil and groundwater. The dispenser pumps, product lines, and four steel gasoline USTs were excavated and removed from the Site by W.A. Craig, Inc. in May 2001. The USTs were inspected and appeared to be in good condition. However, soil samples from the base and the sides of the UST excavation yielded TPH-g concentrations up to 1,700 mg/kg on the west sidewall of the excavation at 8 fbg. W.A. Craig, Inc. excavated approximately 3,700 tons of hydrocarbon contaminated soil between May 9 and September 27, 2001. The soil was disposed of at the B&J Class II Landfill in Vacaville, California. The excavation area is shown on **Figure 2**.

Following Site restoration and re-opening of the Express Gas & Mart, little additional activity occurred until March 2003, when four new monitoring wells were installed to replace wells removed during excavation. Monitoring well construction information is summarized in **Table 1**. Quarterly groundwater monitoring was resumed in April 2003. The wells had not been sampled since the September 2000 sampling reported by ASE. The April 2003 analytical data indicated that MtBE was above the SSTL of 8,400  $\mu\text{g/L}$  in wells MW-5 and MW-7.

Based on the April 2003 groundwater sampling results, W.A. Craig, Inc. recommended corrective action to remediate the subsurface contamination at the Site to below SSTLs. A *Feasibility Study/Corrective Action Plan* dated July 28, 2003 and an *Addendum to Corrective Action Plan* dated September 10, 2003 were submitted to ACEH. The ACEH approved the installation of an OS system in a letter dated February 18, 2004.

An OS system consisting of ten ozone-spargers and a control panel began operating on April 14, 2004. Prior to startup, monitoring wells MW-5, MW-7, MW-8, and MW-9 were purged and sampled to determine baseline concentrations. Except for brief periods of mechanical failure or maintenance, the system operated continuously from April 14, 2004 until January 4, 2005.

This quarter, wells were sampled on January 4, 2005. Repairs to the OS system were made on November 18 and 19, 2004. Concentrations in all eight Site monitoring wells have remained below the SSTLs since May 13, 2004. The OS system is responsible for reducing these concentrations. Tim Cook of Cook Environmental Services, Inc. called Bob Schultz of ACEH on November 19, 2004 to discuss necessary steps for Site closure. Mr. Schultz requested a *Verification Monitoring Work Plan* to describe methods and procedures to ensure the Site is no longer a risk to groundwater quality. This work plan was submitted to ACEH on November 26, 2004. Mr. Schultz conditionally approved the work plan during a phone conversation on January 19, 2005. The OS system was turned off and verification monitoring began on January 4, 2005.

## SCOPE OF WORK

The scope of work performed during this quarter included the following tasks:

- Maintained the California State Water Resources Control Board Geographical Environmental Information Management System (GeoTracker) database;
- Performed repairs and maintenance on the ozone sparge system;
- Measured static water levels in eight monitoring wells;
- Purged and sampled groundwater from eight monitoring wells;
- Collected field measurements from eight monitoring wells including water level, DO concentrations, temperature, pH, and specific conductance;
- Analyzed the groundwater samples for TPH-g, BTEX, MtBE, DIPE, EtBE, tAME, tBA, methanol, ethanol, EDB, and DCA (see *Laboratory Analyses* section of this report for chemical names and analytical methods used);
- Prepared a *Verification Monitoring Work Plan*;
- Shut down the OS system;
- Implemented the Verification Monitoring Program; and
- Prepared this *Quarterly Groundwater Monitoring Report*.

## OZONE-SPARGE SYSTEM

### *OS System Description*

The design and layout of the OS remediation system were described in the *Feasibility Study/Corrective Action Plan* dated July 28, 2003 and *Addendum to Corrective Action Plan* dated September 10, 2003. A C-Sparger™ OS system purchased from Kerfoot Technology, Inc. operated 10 sparge points. OS points SP-1 through SP-10 were installed by Resonant Sonic International (RSI, C-57 license number 802334) on March 24-26, 2004. Sparge point locations are shown on **Figure 2**. The borings were advanced by a sonic drill rig to a maximum depth of 37 fbg using 7-inch diameter casing. Sparge point construction details are summarized in **Table 1**. Initial startup of the system occurred on April 14, 2004. The ozone generator creates ozone by ionizing oxygen with the aid of an oxygen concentrator.

The operating schedule is controlled by an electronic timer. The sparge points receive ozone one at a time for a programmed number of minutes. The timer cycles through all ten sparge points and then has a "rest" period to allow the compressor to cool. After the rest period, a new cycle starts. This process is repeated several times each day. The OS system can deliver ozone at a

flow rate of approximately 3 cubic feet per minute (cfm) at a pressure of 50 pounds per square inch (psi). This delivery pressure is usually sufficient to overcome the hydraulic head and other resistive forces at the sparge point. When the system is operating, approximately 5 grams of ozone per hour are injected into the subsurface.

The OS sparge point is a 30-inch long, 2-inch diameter, porous PVC diffuser. A 3/4-inch diameter PVC riser extends from the sparge point up to within 12 inches of ground surface. Fine-grained "sugar sand" (#60) was placed in the annular space of the borehole around each of the sparge points. The tiny pores of the sparge point and the fine-grained filter pack create microbubbles that promote ozone diffusion. A 2-foot thick bentonite seal was placed above the sand filter pack and hydrated prior to grouting the remainder of the annulus with Portland type I/II neat cement. A traffic-rated vault set slightly above grade protects the top of each sparge well.

### *OS System Operation and Maintenance*

Cook Environmental Services visited the Site six times from November 17 2004 through January 4, 2005, to ensure that the OS system was running normally and to monitor the operating pressures. On November 17 it was observed that sparge points SP-8 and SP-9 were not operational since the tubing from the ozone generator to these sparge points was missing. In the previous Quarterly Monitoring Report, W.A. Craig, Inc reported that the line for SP-8 had been replaced. This line had not been replaced.

The following day the sparge lines to SP-8 and SP-9 were replaced and all of the sparge line connections were checked for leakage. In addition there was a major leak at the wellhead in sparge point SP-2. The fittings and check valve in SP-2 were replaced on November 20 and all stations on OS system were operational. On November 29, the client called Cook Environmental Services to report that the system was running non-stop without taking a break to cool down. A site visit was conducted and it was determined that the oxygen concentrator and not the OS system was working non-stop. The oxygen concentrator is designed for uninterrupted operation. All pressures and times were checked and the system was found to be fully operational. The system operated properly until it was shut down on January 4, 2005 with the consent of the ACEH. Field data sheets that include the operating pressures and the operation time for each sparge point is included in **Appendix A**.

## **FIELD PROCEDURES**

### *Groundwater Level Measurements*

Cook Environmental Services measured water levels in Site monitoring wells on January 3, 2005 using an electronic water level indicator. Water levels were recorded on monitoring well sampling logs included in **Appendix B**. Prior to taking the measurements, the wells were uncapped and water levels were allowed to equilibrate with atmospheric pressure for at least 30



minutes. Water level measurements were referenced to the surveyed top of the well casings. The depth-to-water measurements were used to calculate the standing water volume and the amount of water to be purged prior to collecting a sample. The depth to water and surveyed wellhead elevations are also used to determine the static groundwater elevations and flow direction.

### ***Purging and Sampling***

Cook Environmental Services purged and sampled all eight Site monitoring wells on January 3, 2005. At least three well casing volumes were purged from each well before collecting groundwater samples. Wells were purged using clean disposable polyethylene bailers. The DO concentration, pH, temperature, and SC of the groundwater were intermittently monitored with portable instrumentation during purging. Field measurements were recorded on the monitoring well sampling logs in **Appendix B**.

Upon completion of purging activities, a groundwater sample was collected from each well with a dedicated disposable bailer. The groundwater samples were decanted from the bailer into laboratory-supplied, 40-ml volatile organic analysis (VOA) vials preserved with hydrochloric acid. Care was taken to ensure that the vials were completely filled to avoid headspace volatilization of dissolved petroleum hydrocarbons. Each sample vial was labeled with the well ID. Samples were stored on ice and submitted under chain-of-custody control to McCampbell Analytical Inc. of Pacheco, California (DHS certification number 1644).

Samples were analyzed for TPH-g using EPA Method 8015C (modified), for BTEX and MtBE using EPA Method 8021B, and for MtBE, di-isopropyl ether (DIPE), ethyl tert-butyl ether (EtBE), tert-amyl methyl ether (tAME), tert-butyl alcohol (tBA), methanol, ethanol, 1,2-dibromoethane (ethylene dibromide or EDB), and 1,2-dichloroethane (DCA) using EPA Method 8260B. Discussions in this report cite MtBE concentrations determined by EPA Method 8260B, which is considered a more accurate analysis than Method 8021B.

### ***Verification Monitoring***

Cook Environmental Services purged and sampled four monitoring wells (MW-3, MW-5, MW-7 and MW-8) on February 3, 2005. These wells are the closest wells to the source area and represent the most likely wells to experience a "rebound" of contaminants after the treatment system is turned off. These wells were selected as verification monitoring wells in the *Verification Monitoring Work Plan* submitted to ACEH on November 26, 2004. The treatment system was turned off on January 3, 2005.

At least three well casing volumes were purged from each well before collecting groundwater samples. Wells were purged using clean disposable polyethylene bailers. The DO concentration, pH, temperature, and SC of the groundwater were intermittently monitored with

portable instrumentation during purging. Field measurements were recorded on the monitoring well sampling logs in **Appendix B**.

Samples were collected using the same field and laboratory procedures described in the previous section.

## DATA EVALUATION

### *Groundwater Levels and Elevations*

Water level data for Site monitoring wells is summarized in **Table 2**. The surveyed top-of-casing (TOC) elevations and the depth to water measurements were used to calculate groundwater elevations in the monitoring wells. The water level in well MW-7 was depressed due to high pressure from a nearby sparge point. This water level is not indicative of the static water level in this well. The static water levels in wells, excluding MW-7, ranged from 2.12 feet below TOC in MW-1 to 5.30 feet below TOC in MW-9. Groundwater elevations, excluding MW-7, ranged from 122.59 feet above mean sea level (msl) in well MW-10 to 129.52 feet above msl in MW-1. Excluding well MW-7, groundwater elevations increased an average of 3.66 feet since the last quarterly monitoring event on October 1, 2004. Groundwater elevations are shown on **Figure 3**. The groundwater gradient was calculated using static water elevations in wells MW-3, MW-8, and MW-9. On January 3, 2005 the groundwater flow direction was S 6° W with a gradient of 0.038 feet per foot (ft/ft). On October 1, 2004 the groundwater flow direction was S 31° W with a gradient of 0.024 feet per foot (ft/ft).

The groundwater flow and gradient this quarter are consistent with previous monitoring events. Hydrographs for all eight monitoring wells are presented on **Figure 4**.

### *Quarterly Groundwater Monitoring Results*

The only petroleum hydrocarbons detected in Site wells this quarter were TPH-g, MtBE and 1,2-DCA. TPH-g was only detected in well MW-10 and 1,2-DCA was detected only in well MW-7. MtBE was detected in wells MW-1, MW-3, MW-5, MW-7, MW-8, MW-9 and MW-10. Concentrations of all constituents of concern were below their respective SSTLs. Groundwater analytical results are summarized in **Table 3**. Laboratory analytical reports are included in **Appendix C**.

The highest MtBE concentration was 1,700 µg/L and was observed in well MW-10, which is approximately 70 feet downgradient of the Site. This concentration is considerably below the SSTL for MtBE, which is 8,400 µg/L. MtBE concentrations in the monitoring wells on January 3, 2005 are shown on **Figure 5**. Since startup of the OS system, petroleum hydrocarbon concentrations in the wells closest to the former USTs that previously yielded the highest hydrocarbon concentrations (wells MW-5, MW-7, and MW-9) have shown a remarkable decrease. MtBE in MW-5 this quarter was 2.2 µg/L compared to 1.7 µg/L on October 1, 2004.

The MtBE concentration in well MW-7 was 130  $\mu\text{g/L}$  having decreased from 2,300  $\mu\text{g/L}$  on October 1, 2004. Graphs of MtBE concentrations in wells MW-3, MW-5, MW-7 and MW-8 are shown on **Figure 6**. Concentrations in wells MW-1 and MW-3 have decreased two orders of magnitude since the OS system began operation. MtBE in well MW-8 decreased to 330  $\mu\text{g/L}$  from its record high of 450  $\mu\text{g/L}$  last October. Graphs of MtBE concentrations in wells MW-1, MW-9 and MW-10) are shown on **Figure 7**.

BTEX constituents were not detected in any Site monitoring well this quarter. 1,2-DCA was detected in well MW-7 at 3.2  $\mu\text{g/L}$ . Perhaps 1,2-DCA was present previous to this date but at concentrations that were below the elevated detection level for this constituent in previous sampling events. Previously benzene had been detected in wells MW-5 and MW-7 at concentrations above the SSTL of 34  $\mu\text{g/L}$ . Benzene was not detected above the laboratory detection limit of 0.5  $\mu\text{g/L}$  in any well this quarter. A graph of benzene concentrations versus time in wells MW-5 and MW-7 is shown on **Figure 8**.

Only one well yielded detectable TPH-g this quarter. Well MW-10 yielded 62  $\mu\text{g/L}$ , which is consistent with the previous quarter's results for this same well at 67  $\mu\text{g/L}$ . Before the installation of the OS system, wells MW-5, MW-7, and MW-10 consistently yielded detectable TPH-g concentrations. The baseline TPH-g concentration in well MW-5 was 6,600  $\mu\text{g/L}$ , but TPH-g has not been detected in this well since then. The baseline TPH-g concentration in well MW-7 was 8,900  $\mu\text{g/L}$ .

Baseline DO concentrations were measured in wells MW-1, MW-3, MW-5, MW-7, MW-8, and MW-9 on April 14, 2004. The average baseline DO concentration was approximately 0.21 milligrams per liter (mg/L). The average DO concentration in these wells on October 1 was 4.30 mg/L. The DO in Site wells this quarter ranged from 0.93 mg/L in well MW-8 to 9.25 mg/L in well MW-5. Prior to the installation of the OS system the highest recorded DO concentration was 2.75 mg/L in offsite well MW-10. DO concentrations in wells MW-1, MW-3, MW-5, MW-7, and MW-9 remain significantly above baseline concentrations, which suggest that the residual DO is from the OS system. DO concentrations in the monitoring wells are summarized in **Table 4**.

### ***Verification Monitoring Results***

Verification monitoring samples were collected from four wells on February 3, 2005, one month after the OS system had been turned off. MtBE concentrations in the four verification monitoring wells are compared to samples collected on January 3, 2005. MtBE in well MW-3 decreased from 49  $\mu\text{g/L}$  to 4.9  $\mu\text{g/L}$ ; in well MW-5 the concentration increased slightly from 2.2  $\mu\text{g/L}$  to 4.2  $\mu\text{g/L}$ ; in well MW-7 the concentration decreased from 130  $\mu\text{g/L}$  to 4.5  $\mu\text{g/L}$ ; and in well MW-8 the concentration increased slightly from 330  $\mu\text{g/L}$  to 360  $\mu\text{g/L}$ .

MtBE concentrations in all four verification monitoring wells were at least one order of magnitude below the SSTL of 8,400  $\mu\text{g/L}$ .

### ***GeoTracker Requirements***

All chemical analysis data were submitted electronically to the GeoTracker database as required by AB2886 (Water Code Sections 13195-13198). Electronic analytical reports (EDF files) are prepared and formatted by the laboratory and submitted by Cook Environmental Services. Groundwater elevations in Site wells (GEO\_WELL file) were also submitted. This complete report with figures and tables will be submitted to the RWQCB in PDF format. The RWQCB will submit the PDF file to the GeoTracker database.

## **CONCLUSIONS**

The OS system began operation on April 14, 2004 and ceased operation on January 3, 2005. Verification monitoring began on January 3 in accordance with the *Verification Monitoring Work Plan* to ensure that concentrations of constituents of concern remain below SSTLs. The second round of verification monitoring took place on February 3, 2005.

On January 3, 2005 the direction of groundwater flow was S  $6^\circ$  W with a gradient of 0.038 feet per foot (ft/ft). This is consistent with previous measurements. The groundwater elevation in well MW-7 was depressed by the OS system. The reason for this is the increase in pressure from the OS system.

MtBE was the principal constituent of concern in groundwater at the Site. Constituents of concern have remained below their respective SSTLs since May 26, 2004. Groundwater monitoring on January 4, 2005 and verification monitoring on February 3, 2005 verified that constituents of concern remain below SSTLs for the fifth and sixth straight sampling events. Benzene was not detected in any wells this quarter. MtBE in well MW-7 was at a record low (130  $\mu\text{g/L}$ ) on January 3, 2005 and dropped further (4.5  $\mu\text{g/L}$ ) on February 3, 2005..

DO concentrations remain substantially above baseline levels in wells MW-3, MW-5, MW-7 and MW-9. The increased DO concentrations indicate that residual oxygen from the OS system is causing aerobic degradation of the remaining dissolved hydrocarbons in the subsurface.

## **RECOMMENDATIONS**

If concentrations of all constituents of concern remain below their respective SSTLs for two more consecutive months, we recommend that the Site be closed.

# TABLES

**Table 1**  
**Monitoring and Ozone-sparge Well Construction Information**  
**2951 High Street**  
**Oakland, California**

Well ID	Date Installed	Casing Diameter (inches)	Total Depth (fbg)	Screened Interval (fbg)	Water-Bearing Unit	Top of Casing Elevation (feet amsl)	Northing (feet)	Easting (feet)
MW-1	2/95	2	25	N/A	N/A	131.64	2,112,552.39	6,070,038.16
MW-3	2/95	2	25	N/A	N/A	131.05	2,112,539.60	6,070,048.55
MW-5	12/9/1996	2	30	5-30	N/A	131.99	2,112,582.04	6,070,083.59
MW-6	1/7/1997	2	30	5-30	N/A	132.58	2,112,662.53	6,070,113.49
MW-7	3/24/2003	2	25	15-25	gravelly sandy silt	130.93	2,112,533.18	6,070,106.31
MW-8	3/24/2003	2	25	15-25	gravelly sandy silt	131.15	2,112,527.86	6,070,153.72
MW-9	3/25/2003	2	25	15-25	silty gravelly sand	130.00	2,112,484.75	6,070,065.55
MW-10	4/4/2003	2	25	15-25	sandy silt	127.19	2,112,393.29	6,069,984.72
SP-1	3/25/2004	3/4	37	30.5-33	clayey sand	130.39	2,112,529.17	6,070,105.65
SP-2	3/25/2004	3/4	31	26.5-29	sandy clay	130.07	2,112,534.87	6,070,118.37
SP-3	3/24/2004	3/4	32	28.5-31	gravelly sandy clay	130.66	2,112,541.87	6,070,131.76
SP-4	3/25/2004	3/4	33	14.5-17	gravelly sandy clay	130.51	2,112,541.66	6,070,102.66
SP-5	3/26/2004	3/4	30	20-22.5	clayey gravelly sand	130.55	2,112,553.75	6,070,115.66
SP-6	3/26/2004	3/4	30	21.5-24	clayey sandy gravel	130.88	2,112,564.81	6,070,106.43
SP-7	3/26/2004	3/4	30	25.5-28	gravelly sand	131.20	2,112,575.20	6,070,106.74
SP-8	3/26/2004	3/4	31	28.5-31	gravelly sandy clay	130.98	2,112,569.95	6,070,091.53
SP-9	3/25/2004	3/4	33	25-27.5	clayey sand	130.85	2,112,562.57	6,070,080.59
SP-10	3/26/2004	3/4	30	21.5-24	gravelly clay	131.23	2,112,578.47	6,070,085.11

**Notes:**

MW denotes monitoring wells. SP denotes sparge wells.

fbg = feet below grade; amsl = above mean sea level; N/A = data not available.

Monitoring wells surveyed by Virgil Chavez Land Surveying on April 15, 2003.

Ozone-sparge wells surveyed by Virgil Chavez Land Surveying on April 22, 2004.

MW-1, MW-3, MW-5, and MW-6 were installed by Aqua Science Engineers, Inc.

MW-7, MW-8, MW-9, MW-10, and SP-1 through SP-10 were installed by W.A. Craig, Inc.

**Table 2**  
**Groundwater Levels and Elevations in Monitoring Wells**  
**2951 High Street**  
**Oakland, California**

Well ID	Date	TOC Elevation	DTW	Groundwater Elevation
MW-1	04/04/03	131.64	5.07	126.57
	07/16/03		7.32	124.32
	10/28/03		9.16	122.48
	01/13/04		4.03	127.61
	04/14/04		5.37	126.27
	04/29/04		5.55	126.09
	05/13/04		6.24	125.40
	05/26/04		6.61	125.03
	06/10/04		7.08	124.56
	07/08/04		7.49	124.15
	10/01/04		8.38	123.26
	01/03/05		2.12	129.52
MW-3	04/04/03	131.05	5.86	125.19
	07/16/03		7.86	123.19
	10/28/03		9.43	121.62
	01/13/04		5.76	125.29
	04/14/04		6.72	124.33
	04/29/04		6.81	124.24
	05/13/04		7.62	123.43
	05/26/04		7.80	123.25
	06/10/04		8.17	122.88
	07/08/04		8.34	122.71
	10/01/04		9.41	121.64
	01/03/05		4.19	126.86
MW-5	04/04/03	131.99	6.94	125.05
	07/16/03		8.17	123.82
	10/28/03		9.43	122.56
	01/13/04		6.27	125.72
	04/14/04		6.79	125.20
	04/29/04		7.35	124.64
	05/13/04		7.71	124.28
	05/26/04		7.66	124.33
	06/10/04		8.11	123.88
	07/08/04		8.38	123.61
	10/01/04		8.83	123.16
	01/03/05		4.96	127.03
MW-6	04/04/03	132.58	5.13	127.45
	07/16/03		7.99	124.59
	10/28/03		9.18	123.40
	01/13/04		5.97	126.61
	04/29/04		7.05	125.53
	07/08/04		8.01	124.57
	10/01/04		8.59	123.99
	01/03/05		4.25	127.74

**Table 2**  
**Groundwater Levels and Elevations in Monitoring Wells**  
**2951 High Street**  
**Oakland, California**

Well ID	Date	TOC Elevation	DTW	Groundwater Elevation	
MW-7	04/04/03	130.93	7.06	123.87	
	07/16/03		8.11	122.82	
	10/28/03		9.25	121.68	
	01/13/04		6.80	124.13	
	04/14/04		7.30	123.63	
	04/29/04		*	20.80	110.13
	05/13/04		*	17.51	113.42
	05/26/04		*	18.79	112.14
	06/10/04		*	19.41	111.52
	07/08/04		*	13.92	117.01
	10/01/04		*	19.61	111.32
	01/03/05	*	7.25	123.68	
MW-8	04/04/03	131.15	6.60	124.55	
	07/16/03		7.79	123.36	
	10/28/03		8.83	122.32	
	01/13/04		6.02	125.13	
	04/14/04		6.90	124.25	
	04/29/04		7.25	123.90	
	05/13/04		7.52	123.63	
	05/26/04		7.71	123.44	
	06/10/04		7.89	123.26	
	07/08/04		7.45	123.70	
	10/01/04		8.46	122.69	
	01/03/05		4.40	126.75	
MW-9	04/04/03	130.00	7.35	122.65	
	07/16/03		8.50	121.50	
	10/28/03		9.56	120.44	
	01/13/04		6.83	123.17	
	04/14/04		7.61	122.39	
	04/29/04		8.23	121.77	
	05/13/04		8.25	121.75	
	05/26/04		8.44	121.56	
	06/10/04		8.71	121.29	
	07/08/04		8.68	121.32	
	10/01/04		9.29	120.71	
	01/03/05		5.30	124.70	
MW-10	04/23/03	127.19	7.06	120.13	
	07/16/03		7.72	119.47	
	10/28/03		8.61	118.58	
	01/13/04		6.15	121.04	
	04/29/04		7.09	120.10	
	07/08/04		7.84	119.35	
	10/01/04		8.25	118.94	
	01/03/05		4.60	122.59	

**Notes:**

Elevations are in feet above mean sea level.

TOC, Top of casing. DTW, Depth to water in feet below TOC.

\* Water level in MW-7 is affected by ozone sparging.



**Table 3**  
**Analytical Results for Groundwater Samples**  
**2951 High Street**  
**Oakland, California**

Well ID	Date	TPH-g	benzene	toluene	ethyl-benzene	xylenes	MIBE	DIPE	EtBE	tAME	tBA	methanol	ethanol	EDB	DCA
MW-1	02/23/95	<50	<0.5	<0.5	<0.5	<0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT
	05/26/95	<50	<0.5	<0.5	<0.5	<0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT
	08/23/95	<50	<0.5	<0.5	<0.5	<0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT
	04/04/03	<50	<0.5	<0.5	<0.5	<0.5	270	<5	<5	<5	<50	<5,000	<500	<5	<5
	07/16/03	<50	<0.5	<0.5	<0.5	<0.5	420	<10	<10	<10	<100	<10,000	<1,000	<10	<10
	10/28/03	<50	<0.5	<0.5	<0.5	<0.5	1,200	<50	<50	<50	<500	<50,000	<5,000	<50	<50
	01/13/04	58	0.85	<0.5	3.1	8.4	380	<0.5	<0.5	<0.5	<5.0	<50	<5	<0.5	<0.5
	04/29/04	<50	<0.5	<0.5	<0.5	<0.5	260	<5	<5	<5	<50	<5,000	<500	<5	<5
	07/08/04	<50	<0.5	<0.5	<0.5	<1.0	341	<0.5	<1	<1	<10	NT	<100	<1.0	<0.5
	10/01/04	<50	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	<5.0	<500	<50	<0.5	<0.5
	01/03/05	<50	<0.5	<0.5	<0.5	<0.5	33	<0.5	<0.5	<0.5	<5.0	<500	<50	<0.5	<0.5
MW-3	02/23/95	<50	<0.5	<0.5	<0.5	<0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT
	05/26/95	<50	<0.5	<0.5	<0.5	<0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT
	08/23/95	<50	<0.5	<0.5	<0.5	<0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT
	04/04/03	<50	<0.5	<0.5	<0.5	<0.5	1,600	<25	<25	<25	<250	<25,000	<2,500	<25	<25
	07/16/03	<50	<0.5	<0.5	<0.5	<0.5	1,200	<50	<50	<50	<500	<50,000	<5,000	<50	<50
	10/28/03	<50	<0.5	<0.5	<0.5	<0.5	1,400	<50	<50	<50	<500	<50,000	<5,000	<50	<50
	01/13/04	<200	<2	<2	<2	<2	790	<2	<2	<2	<20	<200	<20	<2	<2
	04/29/04	<50	<0.5	<0.5	<0.5	<0.5	140	<5	<5	<5	<50	<5,000	<500	<5	<5
	07/08/04	<50	<0.5	<0.5	<0.5	<1.0	24.3	<0.5	<1	<1	<10	NT	<100	<1.0	<0.5
	10/01/04	<50	<0.5	<0.5	<0.5	<0.5	4.0	<0.5	<0.5	<0.5	<5.0	<500	<50	<0.5	<0.5
	01/03/05	<50	<0.5	<0.5	<0.5	<0.5	49	<1.0	<1.0	<1.0	<10	<1000	<100	<1.0	<1.0
02/03/05	<50	<0.5	<0.5	<0.5	<0.5	4.9	<0.5	<0.5	<0.5	<5.0	<500	<50	<0.5	<0.5	
MW-5	12/13/96	3,600	180	350	81	510	430	NT	NT	NT	NT	NT	NT	NT	NT
	03/27/97	120,000	28,000	16,000	2,600	10,000	64,000	NT	NT	NT	NT	NT	NT	NT	NT
	06/27/97	6,300	10,000	2,400	290	4,500	43,000	NT	NT	NT	NT	NT	NT	NT	NT
	09/22/97	<50,000	7.9	3.3	0.6	3.3	30,000	NT	NT	NT	NT	NT	NT	NT	NT
	12/06/97	<5,000	33	12	<5	7.3	33,000	NT	NT	NT	NT	NT	NT	NT	NT
	03/23/98	29,000	150	160	130	320	34,000	NT	NT	NT	NT	NT	NT	NT	NT
	06/10/98	53,000	7,000	2,400	540	3,400	67,000	NT	NT	NT	NT	NT	NT	NT	NT
	07/23/98	36,000	1,000	270	<120	740	51,000	NT	NT	NT	NT	NT	NT	NT	NT
	09/16/98	56,000	3,400	1,300	430	1,800	84,000	NT	NT	NT	NT	NT	NT	NT	NT
	11/23/98	63,000	5,700	2,900	500	2,200	87,000	NT	NT	NT	NT	NT	NT	NT	NT
	03/05/99	42,000	<250	<250	<250	<250	38,000	NT	NT	NT	NT	NT	NT	NT	NT
	06/17/99	37,000	510	85	5.6	89	61,000	NT	NT	NT	NT	NT	NT	NT	NT
	09/15/99	54,000	8,500	1,800	420	2,400	55,000	NT	NT	NT	NT	NT	NT	NT	NT

**Table 3**  
**Analytical Results for Groundwater Samples**  
**2951 High Street**  
**Oakland, California**

Well ID	Date	TPH-g	benzene	toluene	ethyl-benzene	xylenes	MtBE	DIPE	EiBE	tAME	tBA	methanol	ethanol	EDB	DCA
MW-5 (cont.)	12/09/99	34,000	1,600	230	130	570	33,000	NT	NT	NT	NT	NT	NT	NT	NT
	03/06/00	21,000	7,800	870	440	2,100	30,000	NT	NT	NT	NT	NT	NT	NT	NT
	06/07/00	<50,000	11,000	890	570	3,000	68,000	NT	NT	NT	NT	NT	NT	NT	NT
	09/18/00	40,000	4,900	<250	<250	1,700	46,000	NT	NT	NT	NT	NT	NT	NT	NT
	04/04/03	1,800	560	<5.0	<5.0	30	19,000	<330	<330	<330	<3,300	<330,000	<33,000	<330	<330
	07/16/03	2,800	1,000	<5	10	80	16,000	<200	<200	<200	<2,000	<200,000	<20,000	<200	<200
	10/28/03	740	290	<5.0	<5.0	7.2	14,000	<170	<170	<170	<1,700	<170,000	<17,000	<170	<170
	01/13/04	<500	48	<5	<5	<5	2,000	<5	<5	<5	<50	<500	<50	<5	<5
	04/14/04	6,600	2,700	<50	<50	260	20,000	<500	<500	<500	<5,000	<500,000	<50,000	<500	<500
	04/29/04	<500	6.3	<5	<5	7.8	11,000	<250	<250	<250	<2,500	<250,000	<25,000	<250	<250
	05/13/04	<50	<0.5	<0.5	<0.5	<0.5	3,000	<50	<50	<50	<500	<50,000	<5,000	<50	<50
	05/26/04	<50	<0.5	<0.5	<0.5	<0.5	460	<10	<10	<10	<100	<10,000	<1,000	<10	<10
	06/10/04	<50	<0.5	<0.5	<0.5	<0.5	38	<0.5	<0.5	<0.5	<5.0	<50	<5.0	<0.5	<0.5
	07/08/04	<50	1.5	<0.5	<0.5	<1.0	9.6	<0.5	<1	<1	<10	NT	<100	<1.0	<0.5
10/01/04	<50	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	<5.0	<500	<50	<0.5	<0.5	
01/03/05	<50	<0.5	<0.5	<0.5	<0.5	2.2	<0.5	<0.5	<0.5	<5.0	<500	<50	<0.5	<0.5	
02/03/05	<50	<0.5	<0.5	<0.5	<0.5	4.2	<0.5	<0.5	<0.5	<5.0	<500	<50	<0.5	<0.5	
MW-6	01/13/97	<50	<0.5	<0.5	<0.5	<0.5	<5	NT	NT	NT	NT	NT	NT	NT	NT
	03/27/97	<50	<0.5	<0.5	<0.5	<0.5	<5	NT	NT	NT	NT	NT	NT	NT	NT
	06/27/97	<50	<0.5	<0.5	<0.5	<0.5	<5	NT	NT	NT	NT	NT	NT	NT	NT
	09/22/97	<50	<0.5	<0.5	<0.5	<0.5	24	NT	NT	NT	NT	NT	NT	NT	NT
	12/06/97	94	<0.5	<0.5	<0.5	<0.5	<5	NT	NT	NT	NT	NT	NT	NT	NT
	03/23/98	<50	<0.5	<0.5	<0.5	<0.5	<5	NT	NT	NT	NT	NT	NT	NT	NT
	06/10/98	<50	<0.5	<0.5	<0.5	<0.5	<5	NT	NT	NT	NT	NT	NT	NT	NT
	07/23/98	<50	<0.5	<0.5	<0.5	<0.5	<5	NT	NT	NT	NT	NT	NT	NT	NT
	09/16/98	<50	<0.5	<0.5	<0.5	<0.5	<5	NT	NT	NT	NT	NT	NT	NT	NT
	03/05/99	55	<0.5	0.92	0.5	1.3	<5	NT	NT	NT	NT	NT	NT	NT	NT
	06/17/99	<50	<0.5	<0.5	<0.5	<0.5	8.0	NT	NT	NT	NT	NT	NT	NT	NT
	09/15/99	<50	<0.5	<0.5	<0.5	<0.5	<5	NT	NT	NT	NT	NT	NT	NT	NT
	12/09/99	<50	<0.5	<0.5	<0.5	<0.5	<5	NT	NT	NT	NT	NT	NT	NT	NT
	03/06/00	<50	<0.5	<0.5	<0.5	<0.5	<5	NT	NT	NT	NT	NT	NT	NT	NT
	06/07/00	<50	<0.5	<0.5	<0.5	<0.5	<5	NT	NT	NT	NT	NT	NT	NT	NT
	04/04/03	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0	<500	<50	<0.5	<0.5
	07/16/03	<50	<0.5	<0.5	<0.5	<0.5	0.54	<0.5	<0.5	<0.5	<5	<500	<50	<0.5	<0.5
	10/28/03	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<500	<50	<0.5	<0.5
	01/13/04	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<50	<5	<0.5	<0.5
	04/29/04	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<500	<50	<0.5	<0.5
07/08/04	<50	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1	<1	<10	NT	<100	<1.0	<0.5	
10/01/04	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<500	<50	<0.5	<0.5	
01/03/05	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<500	<50	<0.5	<0.5	

**Table 3**  
**Analytical Results for Groundwater Samples**  
**2951 High Street**  
**Oakland, California**

Well ID	Date	TPH-g	benzene	toluene	ethyl-benzene	xylene	MtBE	DIPE	EtBE	tAME	tBA	methanol	ethanol	EDB	DCA
MW-7	04/04/03	1,400	54	27	15	180	26,000	<500	<500	<500	<5,000	<500,000	<50,000	<500	<500
	07/16/03	18,000	1,100	630	1,100	2,000	13,000	<200	<200	<200	<2,000	<200,000	<20,000	<200	<200
	10/28/03	10,000	750	370	750	1,000	17,000	<500	<500	<500	<5,000	<500,000	<50,000	<500	<500
	01/13/04	7,200	430	150	560	550	22,000	<50	<50	<50	<500	<5000	<500	<50	<50
	04/14/04	8,900	520	360	640	1,100	21,000	<500	<500	<500	<5,000	<500,000	<50,000	<500	<500
	* 04/29/04	<500	<5	<5	<5	12	12,000	<250	<250	<250	<2,500	<250,000	<25,000	<250	<250
	05/13/04	660	<5.0	28	25	120	10,000	<170	<170	<170	<1,700	<170,000	<17,000	<170	<170
	05/26/04	380	<2.5	15	15	79	7,600	<200	<200	<200	<2,000	<200,000	<20,000	<200	<200
	06/10/04	<1,000	<10	<10	<10	<10	4,900	<10	<10	<10	300	<10,000	<100	<10	<10
	07/08/04	67	<0.5	<0.5	1.3	10	1,040	<0.5	<1	<1	<10	NT	<100	<1.0	<0.5
	10/01/04	85	<0.5	<0.5	0.63	6.0	2,300	<50	<50	<50	<500	<50,000	<5,000	<50	<50
	01/03/05	<50	<0.5	<0.5	<0.5	<0.5	130	<2.5	<2.5	<2.5	<25	<2500	<250	<2.5	3.2
02/03/05	<50	<0.5	<0.5	<0.5	<0.5	4.5	<0.5	<0.5	<0.5	<5	<500	<50	<0.5	2.9	
MW-8	04/04/03	<50	<0.5	<0.5	<0.5	<0.5	230	<5	<5	<5	<50	<5,000	<500	<5	<5
	07/16/03	<50	<0.5	<0.5	<0.5	<0.5	340	<5	<5	<5	<50	<5,000	<500	<5	<5
	10/28/03	<50	<0.5	<0.5	<0.5	<0.5	250	<5.0	<5.0	<5.0	<50	<5,000	<500	<5	<5.0
	01/13/04	<50	<0.5	<0.5	<0.5	<0.5	140	<0.5	<0.5	<0.5	<5.0	<50	<5	<0.5	<0.5
	04/14/04	<50	<0.5	<0.5	<0.5	<0.5	260	<5	<5	<5	<50	<5,000	<500	<5	<5
	* 04/29/04	<50	<0.5	<0.5	<0.5	<0.5	130	<5	<5	<5	<50	<5,000	<500	<5	<5
	05/13/04	<50	<0.5	<0.5	<0.5	<0.5	110	<2.5	<2.5	<2.5	<25	<2,500	<250	<2.5	<2.5
	05/26/04	<50	<0.5	<0.5	<0.5	<0.5	150	<2.5	<2.5	<2.5	<25	<2,500	<250	<2.5	<2.5
	06/10/04	<50	<0.5	<0.5	<0.5	<0.5	290	<0.5	<0.5	<0.5	<5.0	<50	<5.0	<0.5	<0.5
	07/08/04	<50	<0.5	<0.5	<0.5	<1.0	395	<0.5	<1	<1	<10	NT	<100	<1.0	<0.5
	10/01/04	<50	<0.5	<0.5	<0.5	<0.5	450	<10	<10	<10	<100	<10,000	<5.0	<0.5	<0.5
	01/03/05	<50	<0.5	<0.5	<0.5	<0.5	330	<5	<5	<5	<50	<5,000	<500	<5	<5
02/03/05	<50	<0.5	<0.5	<0.5	<0.5	360	<5	<5	<5	53	<5,000	<500	<5	<5	

**Table 3**  
**Analytical Results for Groundwater Samples**  
**2951 High Street**  
**Oakland, California**

Well ID	Date	TPH-g	benzene	toluene	ethyl-benzene	xylenes	MtBE	DIPE	EtBE	tAME	tBA	methanol	ethanol	EDB	DCA
MW-9	04/04/03	<50	<0.5	<0.5	<0.5	<0.5	85	<1.5	<1.5	<1.5	<12	<1,200	<120	<1.5	2
	07/16/03	<50	<0.5	<0.5	<0.5	<0.5	170	<2.5	<2.5	3	27	<2,500	<250	<2.5	<2.5
	10/28/03	<50	<0.5	<0.5	<0.5	<0.5	230	<5.0	<5.0	<5.0	57	<5,000	<500	<5.0	<5.0
	01/13/04	<50	<0.5	<0.5	<0.5	<0.5	55	<0.5	<0.5	0.72	5.8	<50	<5	<0.5	1
	04/14/04	<50	<0.5	<0.5	<0.5	<0.5	58	<1	<1	<1	<10	<1,000	<100	<1	<1
	* 04/29/04	<50	<0.5	<0.5	<0.5	<0.5	4.7	<0.5	<0.5	<0.5	<5	<500	<50	<0.5	0.63
	05/13/04	<50	<0.5	<0.5	<0.5	<0.5	5.9	<0.5	<0.5	<0.5	<5.0	<50	<5.0	<0.5	0.66
	05/26/04	<50	<0.5	<0.5	<0.5	<0.5	2.5	<0.5	<0.5	<0.5	<5.0	<500	<50	<0.5	0.53
	06/10/04	<50	<0.5	<0.5	<0.5	<0.5	14	<0.5	<0.5	<0.5	<5.0	<50	<5.0	<0.5	0.60
	07/08/04	<50	<0.5	<0.5	<0.5	<1.0	7.3	<0.5	<1	<1	<10	NT	<100	<1.0	<0.5
	10/01/04	<50	<0.5	<0.5	<0.5	<0.5	2.1	<0.5	<0.5	<0.5	<5.0	<500	<50	<0.5	<0.5
01/03/05	<50	<0.5	<0.5	<0.5	<0.5	4.0	<0.5	<0.5	<0.5	<5.0	<500	<50	<0.5	<0.5	
MW-10	04/23/03	79	<0.5	<0.5	<0.5	<0.5	1,900	<25	<25	58	<250	<25,000	<2,500	<25	<25
	07/16/03	73	20	<0.5	<0.5	<0.5	1,100	<20	<20	39	<200	<20,000	<2,000	<20	<20
	10/28/03	76	<0.5	<0.5	<0.5	<0.5	1,900	<50	<50	<50	<500	<50,000	<5,000	<50	<50
	01/13/04	<500	<5	<5	<5	<5	2,300	<5	<5	72	<50	<500	<50	<5	<5
	* 04/29/04	54	<0.5	<0.5	<0.5	<0.5	1,000	<17	<17	24	<170	<17,000	<1,700	<17	<17
	07/08/04	76	<0.5	<0.5	<0.5	<1.0	1,650	<0.5	<1	37	211	NT	<100	<1.0	<0.5
	10/01/04	67	<0.5	<0.5	<0.5	<0.5	1,500	<50	<50	<50	<500	<50,000	<5,000	<50	<50
	01/03/05	62	<0.5	<0.5	<0.5	<0.5	1,700	<25	<25	<25	<250	<25,000	<2,500	<25	<25
SSTL	NE	34	270	180	470	8,400	NE	NE	NE	NE	NE	NE	NE	NE	

**Notes:**

SSTLs are site-specific target levels developed for the site by Aqua Science Engineers, Inc. in 1997. **Bold** concentrations exceed the SSTL.

Concentrations are micrograms per liter (ug/L). NE, SSTL not established for this compound. NT, analyte not tested.

Data prior to April 2003 are from *Groundwater Monitoring Report for September 2000 Sampling* by Aqua Science Engineers, Inc. dated 11/14/2000.

\* First sampling event after the OS system was started up on April 14, 2004.

\*\* Oxygen Release Compound (ORC) was injected into borings on the south side of MW-5 in late June 1997.

\*\*\* ORC socks were placed in MW-5 in August 1998 and removed in September 2000.

TPH-g total petroleum hydrocarbons as gasoline

EtBE ethyl tert-butyl ether

EDB ethylene dibromide (1,2-dibromoethane)

MtBE methyl tert-butyl ether

tAME tert-amyl methyl ether

DCA 1,2-dichloroethane

DIPE di-isopropyl ether

tBA tert-butyl alcohol

**Table 4**  
**Field Measurements of Dissolved Oxygen and Temperature**  
**2951 High Street**  
**Oakland, California**

Well ID	Date	DO (mg/L)	Temperature (Celsius)	% Oxygen Saturation
MW-1  *	04/04/03	0.64	18.5	6.7%
	07/16/03	0.82	18.5	8.6%
	10/28/03	0.51	19.3	5.5%
	01/13/04	0.17	19.3	1.8%
	04/14/04	0.23	18.4	2.4%
	04/29/04	0.56	18.1	5.9%
	05/13/04	0.70	18.4	7.4%
	05/26/04	0.40	18.5	4.2%
	06/10/04	1.42	18.5	15.0%
	07/08/04	0.71	18.7	7.5%
	10/01/04	1.97	19.5	21.2%
	01/03/05	2.06	19.2	22.0%
MW-3  *	04/04/03	0.78	18.8	8.3%
	07/16/03	2.13	18.8	22.6%
	10/28/03	0.67	19.1	7.2%
	01/13/04	0.25	19.3	2.7%
	04/14/04	0.17	18.6	1.8%
	04/29/04	6.52	18.0	68.1%
	05/13/04	5.87	18.5	61.9%
	05/26/04	2.76	18.5	29.1%
	06/10/04	6.12	18.5	64.5%
	07/08/04	0.76	18.7	8.0%
	10/01/04	3.45	19.3	37.0%
	01/03/05	2.71	19.2	29.0%
MW-5  *	04/04/03	0.70	19.2	7.5%
	07/16/03	NA	NA	NA
	10/28/03	0.83	19.70	9.0%
	01/13/04	0.57	19.80	6.2%
	04/14/04	0.32	19.70	3.5%
	04/29/04	9.83	19.50	105.8%
	05/13/04	10.89	19.50	117.2%
	05/26/04	10.50	19.50	113.0%
	06/10/04	14.14	19.50	152.1%
	07/08/04	11.46	19.40	123.0%
	10/01/04	12.67	19.50	136.3%
	01/03/05	9.25	20.10	100.7%
MW-6  *	04/04/03	NA	NA	NA
	07/16/03	0.54	19.1	5.8%
	10/28/03	1.26	19.3	13.5%
	01/13/04	0.27	19.4	2.9%
	04/29/04	1.37	18.7	14.5%
	07/08/04	0.31	19.8	3.4%
	10/01/04	0.27	19.3	2.9%
	01/03/05	1.30	19.1	13.9%

**Table 4**  
**Field Measurements of Dissolved Oxygen and Temperature**  
**2951 High Street**  
**Oakland, California**

Well ID	Date	DO (mg/L)	Temperature (Celsius)	% Oxygen Saturation
MW-7	04/04/03	0.97	20.1	10.6%
	07/16/03	0.69	19.8	7.5%
	10/28/03	0.49	20.5	5.4%
	01/13/04	0.14	20.5	1.5%
	04/14/04	0.17	20.2	1.9%
	* 04/29/04	7.34	20.0	79.8%
	05/13/04	10.60	19.9	115.0%
	05/26/04	13.73	19.9	148.9%
	06/10/04	13.16	19.9	142.7%
	07/08/04	10.50	20.0	114.1%
	10/01/04	9.12	20.6	100.4%
01/03/05	7.52	20.1	81.9%	
MW-8	04/04/03	1.50	20.8	16.6%
	07/16/03	0.78	20.5	8.6%
	10/28/03	0.41	21.3	4.6%
	01/13/04	0.58	21.4	6.5%
	04/14/04	0.20	20.6	2.2%
	* 04/29/04	1.10	20.1	12.0%
	05/13/04	1.15	20.4	12.6%
	05/26/04	0.64	20.5	7.0%
	06/10/04	0.22	20.5	2.4%
	07/08/04	0.22	20.5	2.4%
	10/01/04	0.12	21.3	1.3%
01/03/05	0.93	20.9	10.3%	
MW-9	04/04/03	1.30	20.4	14.2%
	07/16/03	0.82	20.1	8.9%
	10/28/03	0.41	20.4	4.5%
	01/13/04	0.11	20.5	1.2%
	04/14/04	0.14	20.2	1.5%
	* 04/29/04	10.02	20.2	109.3%
	05/13/04	10.91	20.0	118.6%
	05/26/04	6.16	19.9	66.8%
	06/10/04	5.84	19.9	63.3%
	07/08/04	3.99	19.9	43.3%
	10/01/04	3.30	20.3	36.1%
01/03/05	3.33	19.5	35.8%	
MW-10	04/23/03	2.75	19.1	29.3%
	07/16/03	1.00	19.2	10.7%
	10/28/03	0.55	19.6	5.9%
	01/13/04	0.13	19.7	1.4%
	* 04/29/04	0.19	18.7	2.0%
	07/08/04	0.19	19	2.0%
	10/01/04	0.14	19.4	1.5%
	01/03/05	1.27	18.3	13.3%

Notes: DO, Dissolved oxygen concentration in milligrams per liter.

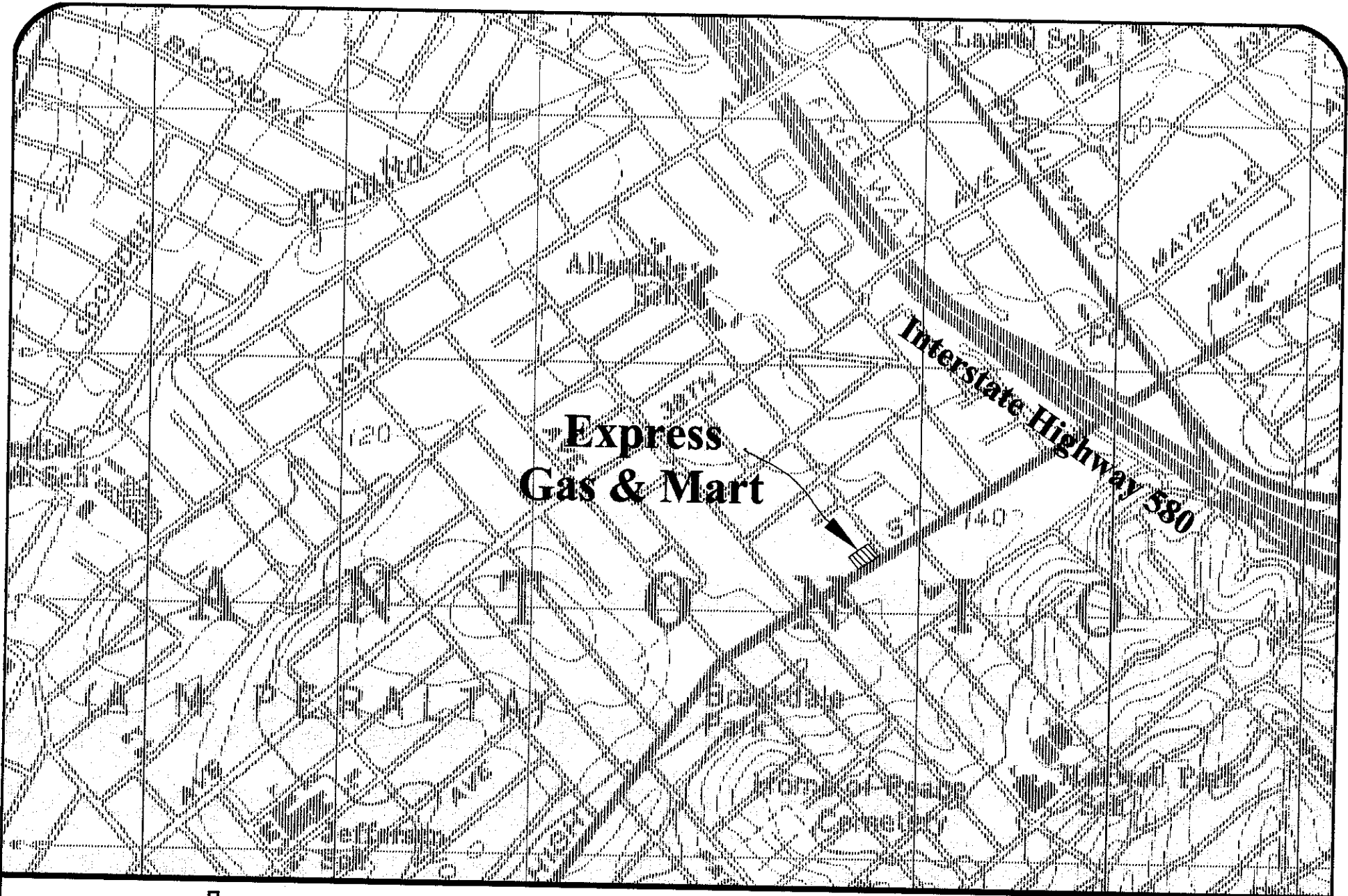
Formula for calculating % saturation =  $C / (-0.1883 * T + 12.967)$ , where

C is the DO concentration in mg/L and T is the temperature in degrees Celsius.

\* First sampling event after the OS system was started up on April 14, 2004.

N/A No data available.

# FIGURES



**cook**

### Site Location Map

Express Gas & Mart  
2951 High Street  
Oakland, California



Project #: 1004

Date: 2/10/05






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Figure:

**1**

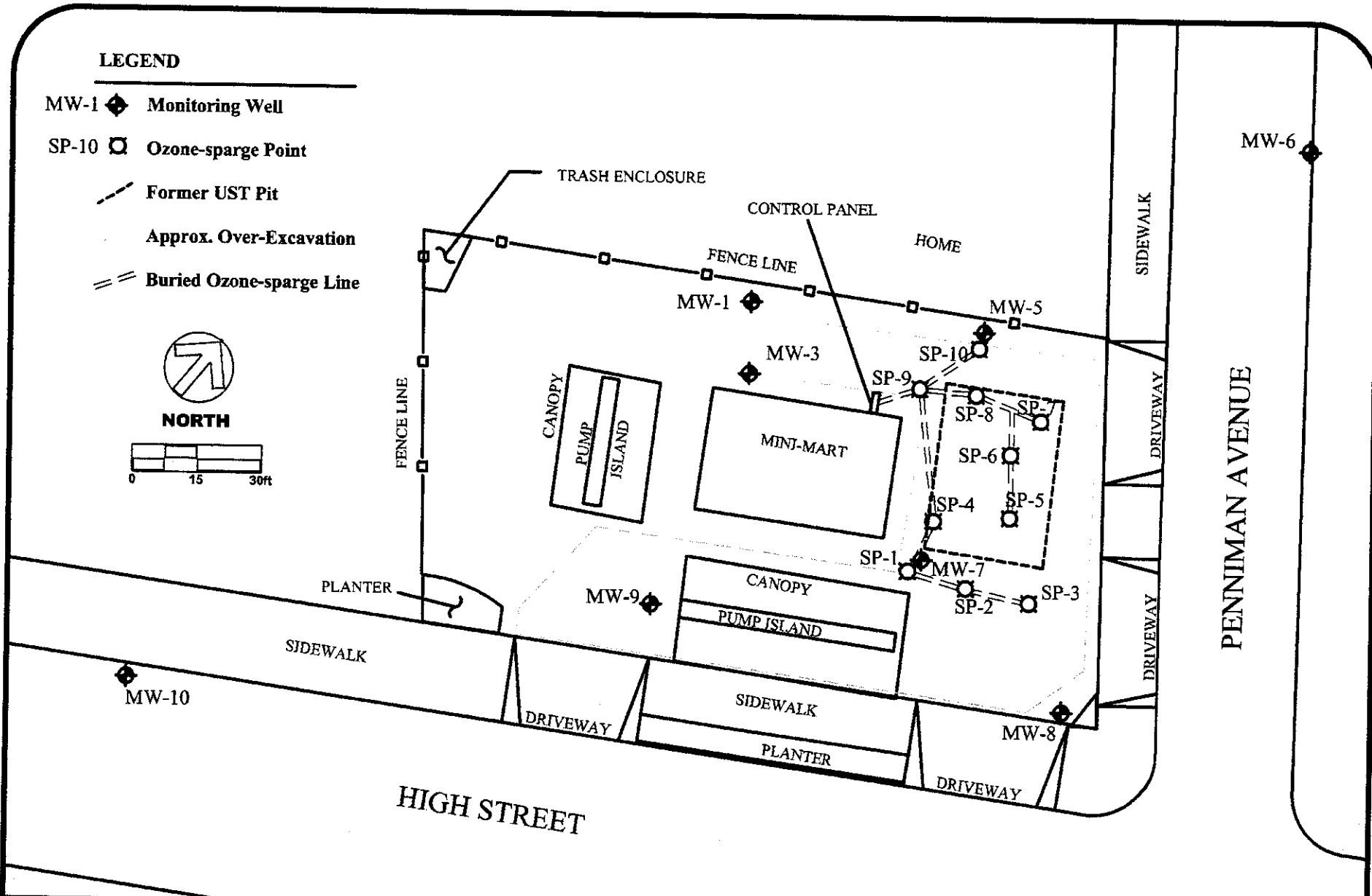
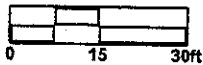


**LEGEND**

- MW-1  Monitoring Well
- SP-10  Ozone-surge Point
-  Former UST Pit
-  Approx. Over-Excavation
-  Buried Ozone-surge Line



**NORTH**



**cook**  
 Environmental & Engineering  
 1000 Lakeside Drive  
 Oakland, CA 94612  
 (415) 764-1000  
 www.cook-engineering.com

**Site Features**

Express Gas & Mart  
 2951 High Street  
 Oakland, California

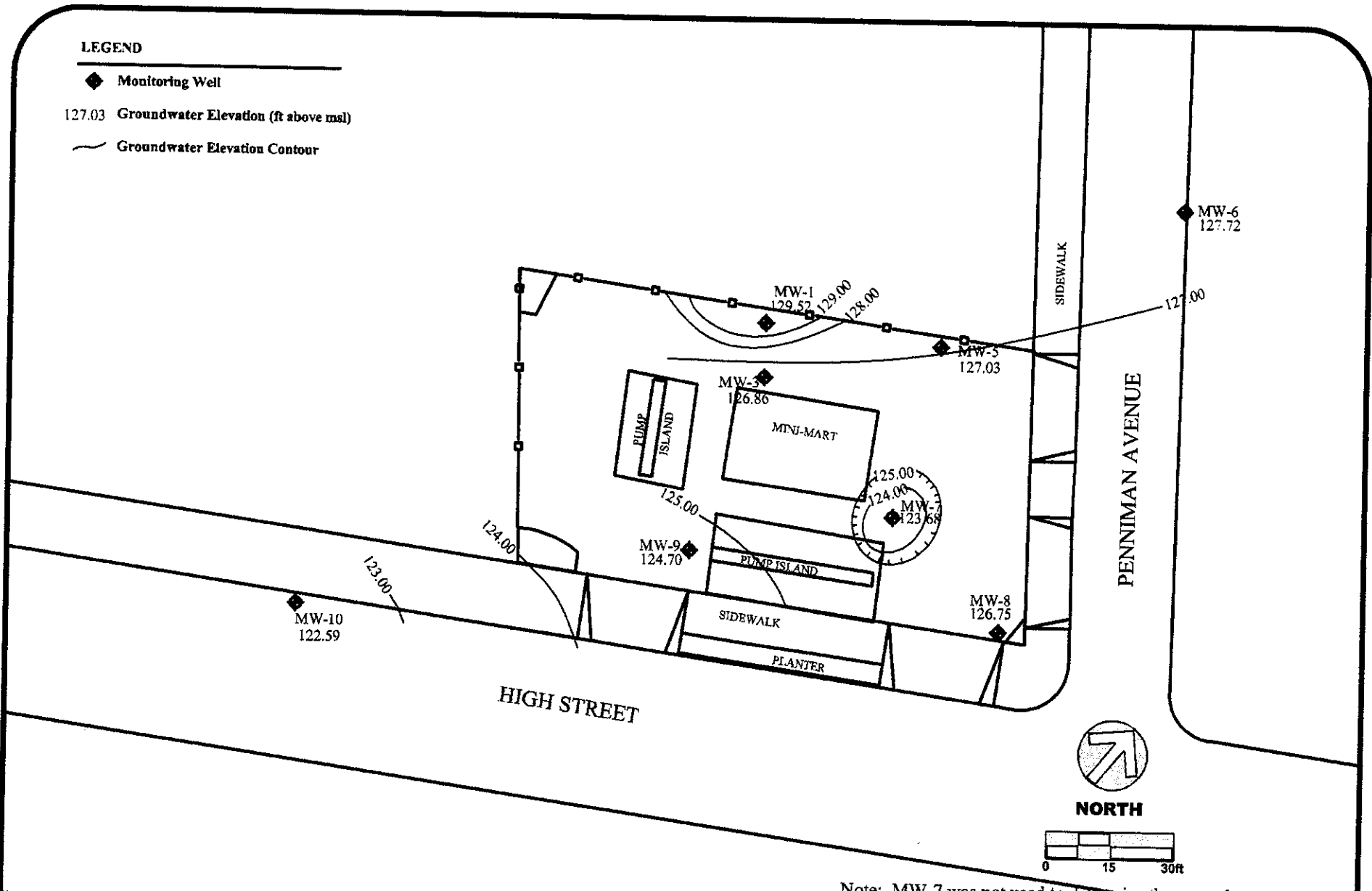
Project #: 1004	Figure:
Date: 2/10/05	2
Scale: 1"=30'	

**LEGEND**

◆ Monitoring Well

127.03 Groundwater Elevation (ft above msl)

— Groundwater Elevation Contour



Note: MW-7 was not used to determine the groundwater gradient.

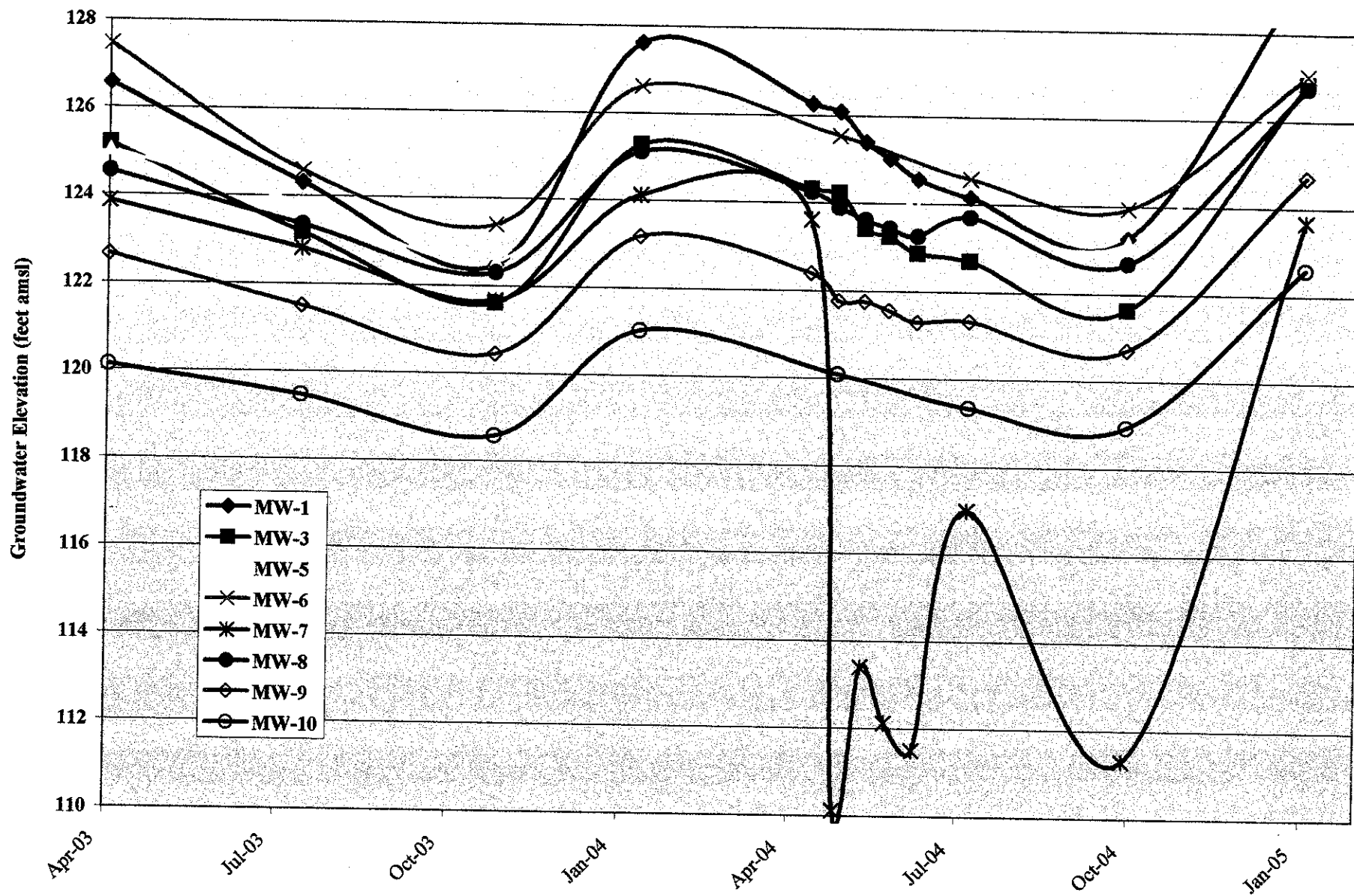
**cook**  
 CONSULTING ENGINEERS  
 1000 BAY STREET  
 OAKLAND, CALIFORNIA 94612  
 TEL: 415.764.2200  
 FAX: 415.764.2201  
 WWW.COOKENGINEERS.COM

**Groundwater Elevations on  
 January 3, 2005**

Express Gas & Mart  
 2951 High Street  
 Oakland, California

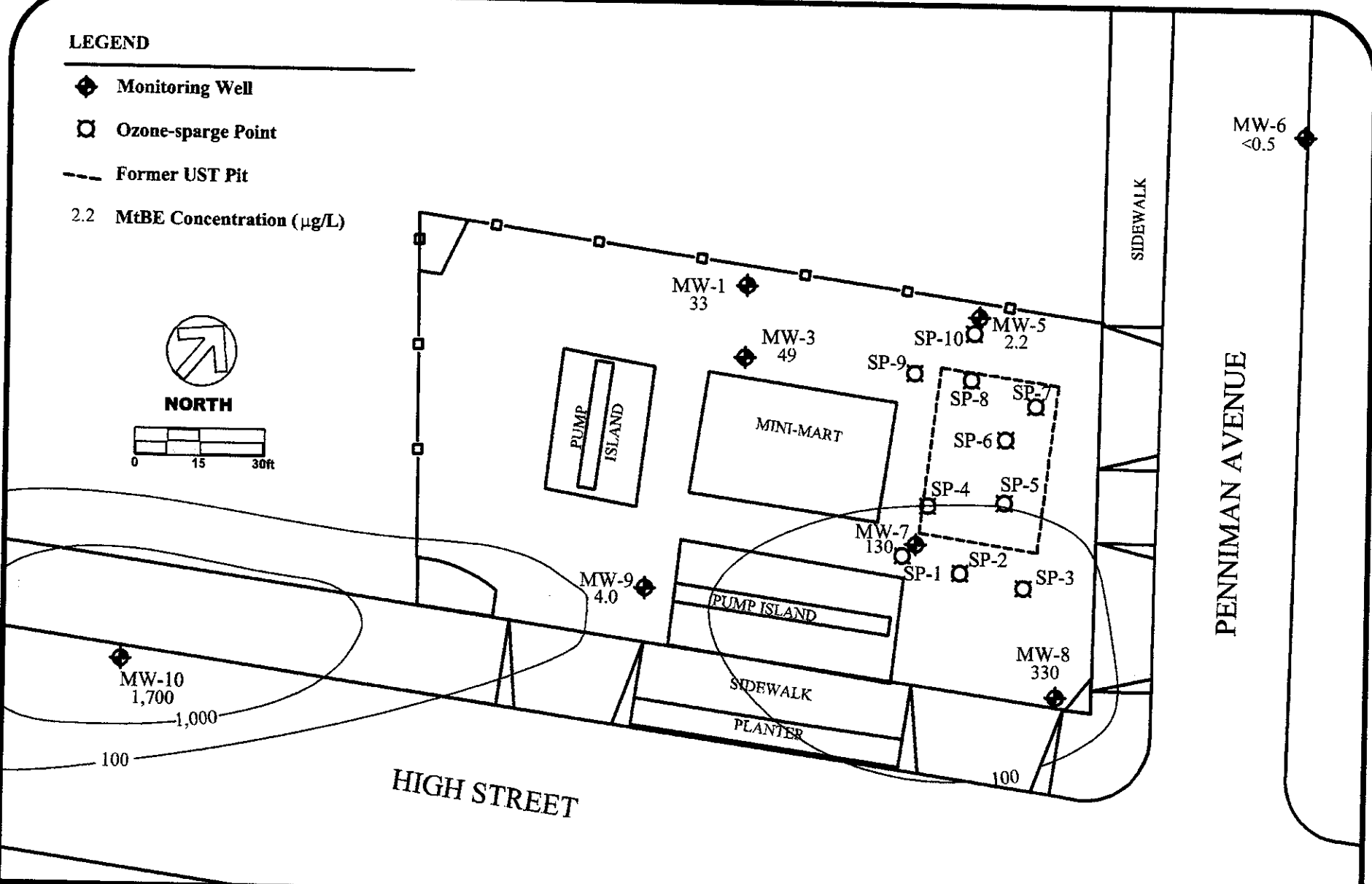
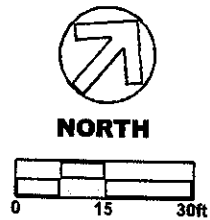
Project #: 1004	Figure: <b>3</b>
Date: 2/10/05	
Scale: 1"=30'	

**Figure 4**  
**Monitoring Well Hydrograph**  
**2951 High Street, Oakland, California**



**LEGEND**

- ◆ Monitoring Well
- Ozone-sparge Point
- - - Former UST Pit
- 2.2 MtBE Concentration ( $\mu\text{g/L}$ )



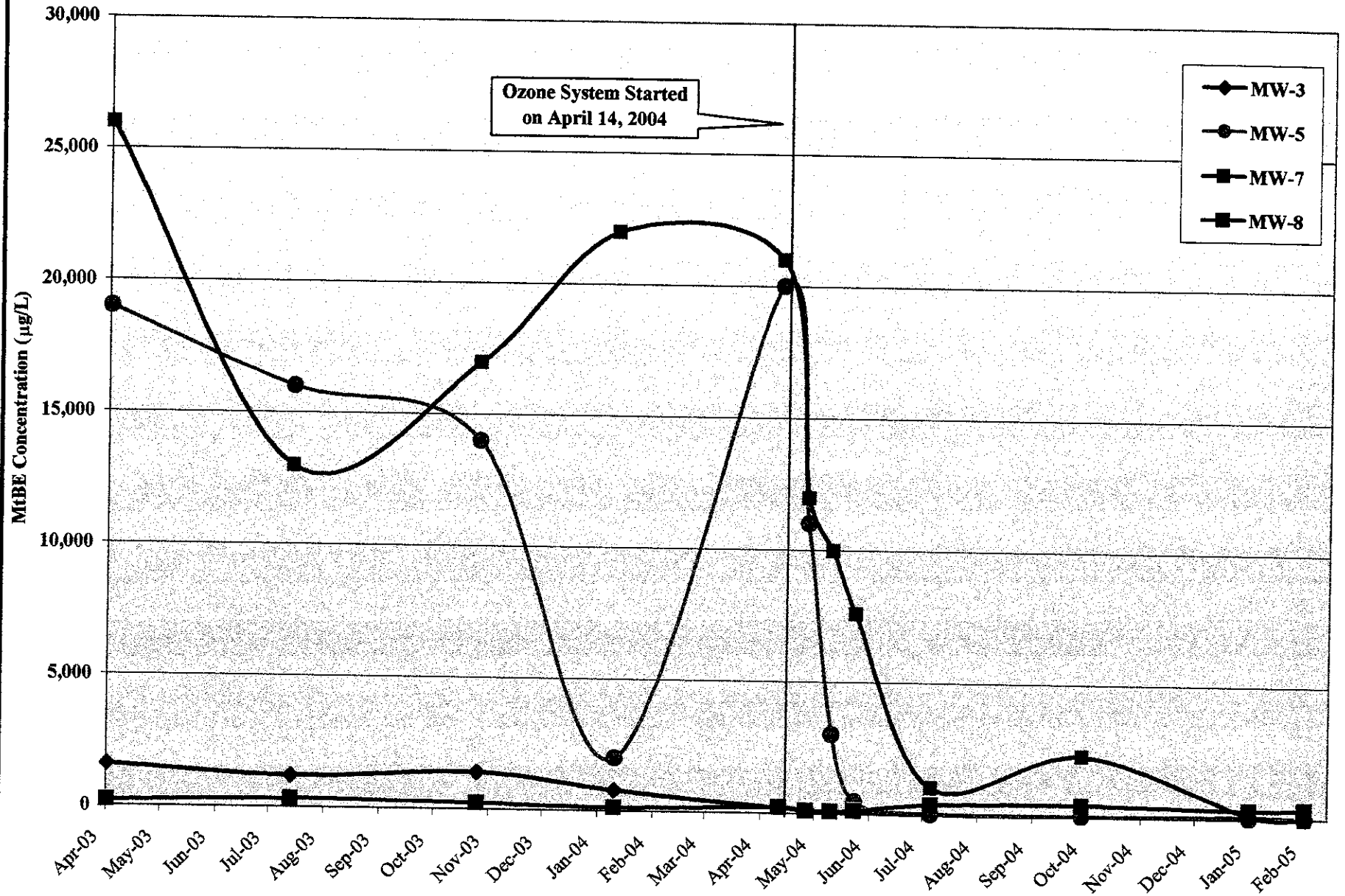
**cook**  
 CONSULTING  
 1000 Lakeside Drive  
 Oakland, CA 94612  
 (415) 764-2200  
 www.cookconsulting.com

**MtBE Concentrations in Groundwater  
 on January 3, 2005**

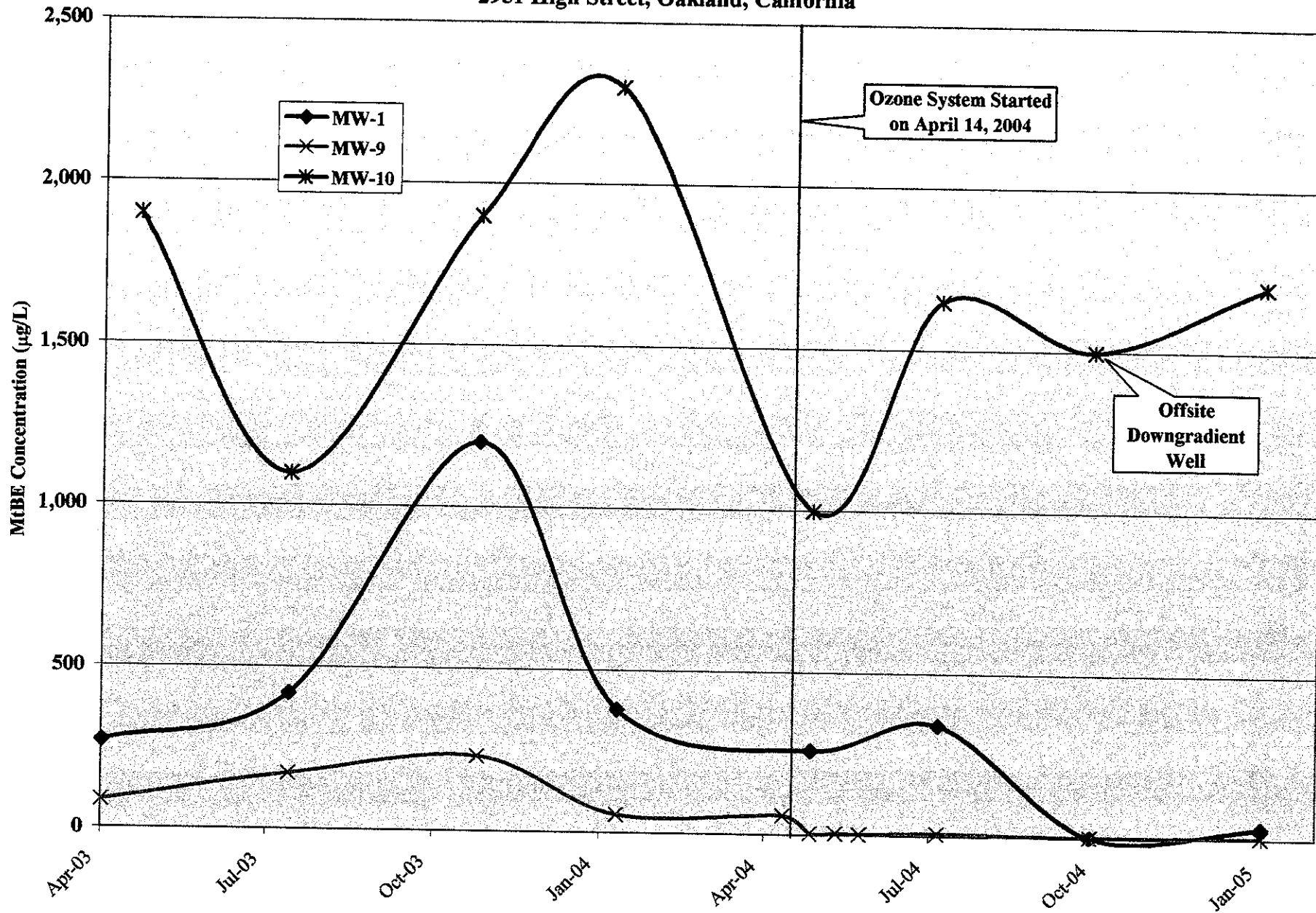
Express Gas & Mart  
 2951 High Street  
 Oakland, California

Project #: 1004	<b>5</b>
Date: 2/10/05	
Scale: 1"=30'	

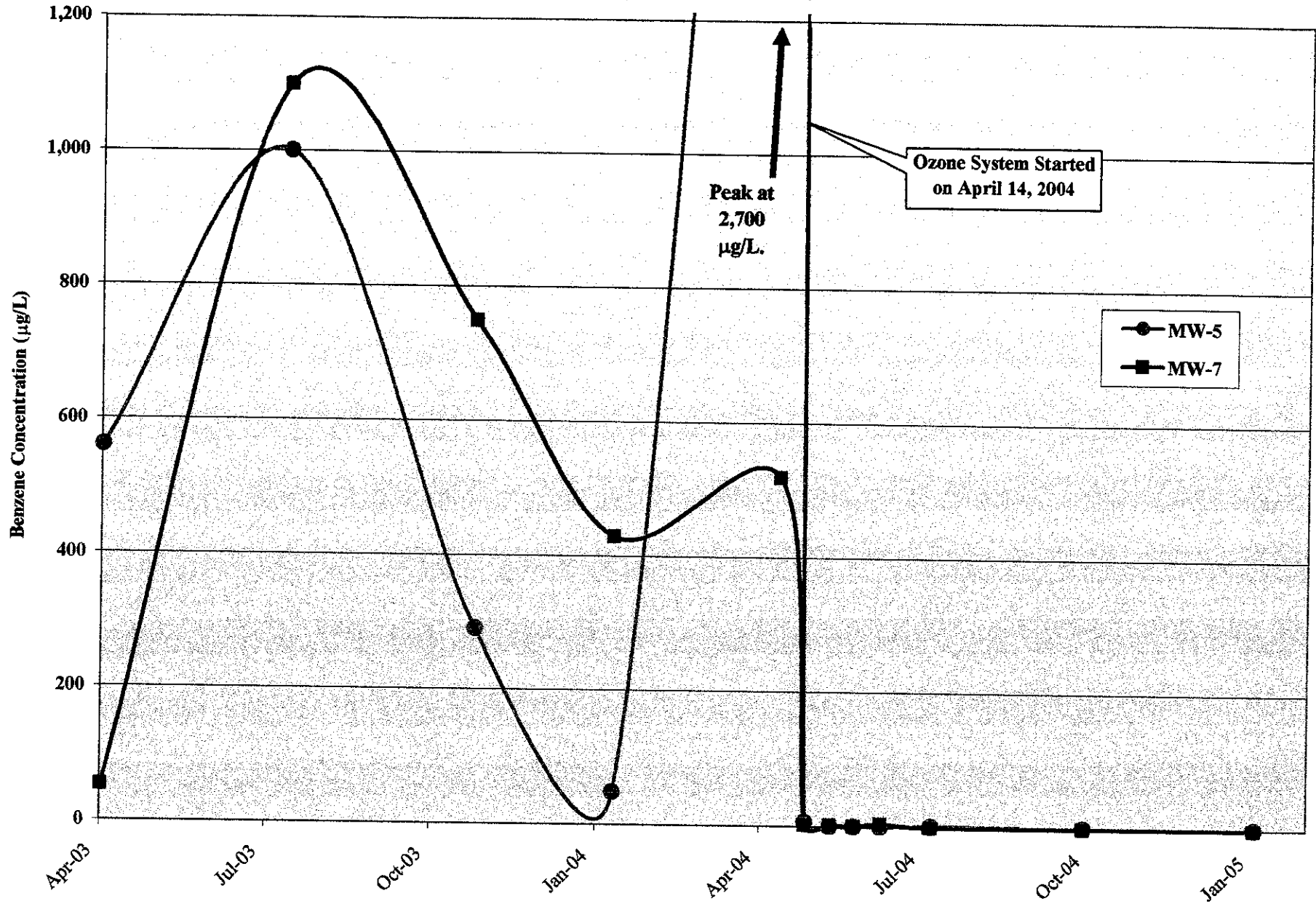
**Figure 6**  
**MtBE Concentrations versus time in Wells MW-3, MW-5, MW-7 and MW-8**  
**2951 High Street, Oakland, California**



**Figure 7**  
**MtBE Concentrations versus time in Wells MW-1, MW-9 and MW-10**  
**2951 High Street, Oakland, California**



**Figure 8**  
**Benzene Concentrations versus time in Wells MW-5 and MW-7**  
**2951 High Street, Oakland, California**



# **APPENDIX A**

## **Ozone Sparge Point Operating Pressures**



**Ozone Sparge Point Pressures  
2951 High Street, Oakland, California**

Sparge Point	Date	Pressure (psi)
SP-1	04/15/04	44
	04/29/04	30
	04/29/04	30
	05/04/04	28
	05/13/04	39
	05/17/04	37
	05/26/04	37
	06/10/04	39
	07/08/04	37.5
	07/16/04	37
	07/30/04	36
	08/19/04	36.5
	09/01/04	41
	09/02/04	39
	09/08/04	42
	09/15/04	37
	09/22/04	32
	10/01/04	38
11/17/04	39	
11/29/04	36	
Mean		36.8
Δ		-3.0
SP-2	04/15/04	44
	04/29/04	24
	04/29/04	37
	05/04/04	36
	05/13/04	40
	05/17/04	40
	05/26/04	39
	06/10/04	38
	07/08/04	40.5
	07/16/04	38
	07/30/04	38
	08/19/04	38.5
	09/01/04	42
	09/02/04	39
	09/08/04	43
	09/15/04	37
	09/22/04	36
	10/01/04	37
11/17/04	38	
11/29/04	39	
Mean		38.2
Δ		1.0

**Ozone Sparge Point Pressures  
2951 High Street, Oakland, California**

Sparge Point	Date	Pressure (psi)
SP-3	04/15/04	38
	04/29/04	23
	04/29/04	38
	05/04/04	34
	05/13/04	29
	05/17/04	29
	05/26/04	28
	06/10/04	31.5
	07/08/04	46
	07/16/04	34
	07/30/04	33
SP-3 continued	08/19/04	34
	09/01/04	49
	09/02/04	42
	09/08/04	41
	09/15/04	35
	09/22/04	34
	10/01/04	35
	11/17/04	39
	11/29/04	40
Mean		35.6
Δ		1.0
SP-4	04/15/04	28
	04/29/04	17
	04/29/04	24
	05/04/04	27
	05/13/04	25
	05/17/04	25
	05/26/04	26.5
	06/10/04	26
	07/08/04	33
	07/16/04	26.5
	07/30/04	26
	08/19/04	29
	09/01/04	28
	09/02/04	32
	09/08/04	37
	09/15/04	29
	09/22/04	34
10/01/04	26	
11/17/04	28	
	11/29/04	28
Mean		27.8
Δ		0.0

**Ozone Sparge Point Pressures  
2951 High Street, Oakland, California**

Sparge Point	Date	Pressure (psi)
SP-5	04/15/04	n/a
	04/29/04	n/a
	04/29/04	47
	05/04/04	54
	05/13/04	49
	05/17/04	49
	05/26/04	49
	06/10/04	40
	07/08/04	48
	07/16/04	38
	07/30/04	38
	08/19/04	45
	09/01/04	49
	09/02/04	44
	09/08/04	44
	09/15/04	20
	09/22/04	19
10/01/04	19	
11/17/04	42	
11/29/04	42	
Mean		40.9
$\Delta$		0.0
SP-6	04/15/04	30
	04/29/04	17
	04/29/04	22
	05/04/04	24
	05/13/04	24
	05/17/04	24
	05/26/04	24
	06/10/04	22
	07/08/04	26
	07/16/04	23
	07/30/04	27
	08/19/04	28
	09/01/04	31
	09/02/04	30
	09/08/04	32
	09/15/04	13
	09/22/04	37.5
10/01/04	41	
11/17/04	47	
11/29/04	48	
Mean		28.5
$\Delta$		1.0

**Ozone Sparge Point Pressures  
2951 High Street, Oakland, California**

Sparge Point	Date	Pressure (psi)
SP-7	04/15/04	34
	04/29/04	26
	04/29/04	41
	05/04/04	40
	05/13/04	33
	05/17/04	33
	05/26/04	38
	06/10/04	36
	07/08/04	36
	07/16/04	36
	07/30/04	n/a
	08/19/04	44
	09/01/04	44
	09/02/04	42.5
	09/08/04	42.5
	09/15/04	44.5
	09/22/04	45
10/01/04	47	
11/17/04	43	
11/29/04	38	
Mean		39.1
Δ		-5.0
SP-8	04/15/04	50
	04/29/04	26
	04/29/04	42
	05/04/04	43
	05/13/04	40
	05/17/04	41
	05/26/04	39
	06/10/04	39
	07/08/04	46
	07/16/04	41
	07/30/04	n/a
SP-8 continued	08/19/04	40
	09/01/04	0
	09/02/04	42
	09/08/04	43
	09/15/04	41
	09/22/04	36
	10/01/04	37
	11/18/04	43
11/29/04	40	
Mean		38.4
Δ		-3.0

# **APPENDIX B**

## **Monitoring Well Sampling Logs**

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**COOK ENVIRONMENTAL SERVICE  
MONITORING WELL SAMPLING LOG**

Site Name: ~~Debra~~ High Street

Job # ~~1004~~ 1004

Date: ~~12/15/2004~~ 1/4/05

Sampler: T. Cook

Well ID: MW-1

Well Diameter 2"

Column 22.69

Well Depth 24.81

Depth to Water 2.12

Casing Volume 3.85

3 Casing Volumes 11.57

(2" well = col height \* 0.17 gal/ft, 4" well = 0.66 gal/ft)

Purge Method: bailer

Sample Method bailer

Time	Gallons Purged	Temp C	pH	SC (uS)	Turbidity (NTU)	DO (mg/L)	Comments
1446	3	17.8	6.98	938		1.67	
1452	5	18.8	6.61	687		1.58	
1456	7	19.0	6.50	725		2.05	
1502	11	19.2	6.51	640		2.06	

**COOK ENVIRONMENTAL SERVICES  
MONITORING WELL SAMPLING LOG**

Site Name: High Street Job # 1004  
 Date: 1/1/05 Sampler: T. Cook  
 Well ID: MW-3 Well Diameter 2" Column 20.65  
 Well Depth 24.84 Depth to Water 4.19  
 Casing Volume 3.51 3 Casing Volumes 10.53  
 (2" well = col height \* 0.17 gal/ft, 4" well = 0.66 gal/ft)

Purge Method: bailee Sample Method bailee

Time	Gallons Purged	Temp C	pH	SC (uS)	Turbidity (NTU)	DO (mg/L)	Comments
1520	3	17.1	6.82	418		6.02	
1526	5	18.3	6.63	429		6.10	
1531	8	18.8	6.45	457		3.23	
1540	11.5	19.2	6.51	458		2.71	

**COOK ENVIRONMENTAL SERVICE  
MONITORING WELL SAMPLING LOG**

Site Name: Berhosa High Street

Job # ~~1004~~ 1004

Date: ~~12/18/04~~ 1/04/05

Sampler: T. Cook

Well ID: MW-5

Well Diameter 2"

Column 22.12

Well Depth 27.08

Depth to Water 4.96

Casing Volume 3.76

3 Casing Volumes 11.28

(2" well = col height \* 0.17 gal/ft, 4" well = 0.66 gal/ft)

Purge Method: bailer

Sample Method bailer

Time	Gallons Purged	Temp C	pH	SC (uS)	Turbidity (NTU)	DO (mg/L)	Comments
1355	3	20.5	8.42	1334		7.08	
1404	5	21.2	8.63	1251		7.50	
1411	7	21.2	8.57	1350		7.28	
1420	10	20.4	8.76	1280		9.05	
1425	11.5	20.1	8.81	1180		9.25	



**COOK ENVIRONMENTAL SERVICES  
MONITORING WELL SAMPLING LOG**

Site Name: High Street

Job # 1004

Date: 1/4/05

Sampler: T. Cook

Well ID: MW-6

Well Diameter 2"

Column 24.35

Well Depth 28.60

Depth to Water 4.25

Casing Volume 4.13

3 Casing Volumes 12.41

(2" well = col height \* 0.17 gal/ft, 4" well = 0.66 gal/ft)

Purge Method: bauler

Sample Method bauler

Time	Gallons Purged	Temp C	pH	SC (uS)	Turbidity (NTU)	DO (mg/L)	Comments
1300	2	17.8	6.56	583	—	2.02	
1309	5	19.3	6.88	545	—	2.01	
1315	7	19.4	6.87	499	—	1.42	
1324	10	19.1	6.85	500	—	1.30	
1327	12	19.3	6.89	505	—		

**COOK ENVIRONMENTAL SERVICES  
MONITORING WELL SAMPLING LOG**

Site Name: High Street Job # 1004

Date: 1/4/05 Sampler: T. Cook

Well ID: MW-7 Well Diameter 2" Column 17.76

Well Depth 25.01 Depth to Water 7.25\* TAKEN 40 min after opening, STILL RISING

Casing Volume 3.02 3 Casing Volumes 9.05  
 (2" well = col height \* 0.17 gal/ft, 4" well = 0.66 gal/ft)

Purge Method: bailee Sample Method bailee

Time	Gallons Purged	Temp C	pH	SC (uS)	Turbidity (NTU)	DO (mg/L)	Comments
1556	3	18.2	7.18	289	—	7.08	
1603	5	20.0	7.43	293		6.89	
1610	7	17.3	7.53	296		7.30	
1614	9	20.1	7.49	291		7.52	

**COOK ENVIRONMENTAL SERVICES  
MONITORING WELL SAMPLING LOG**

Site Name: High Street Job # 1004

Date: 4/4/05 Sampler: T. Cook

Well ID: MW-8 Well Diameter 2" Column 20.88

Well Depth 25.28 Depth to Water 4.40

Casing Volume 3.59 3 Casing Volumes 10.69  
 (2" well = col height \* 0.17 gal/ft, 4" well = 0.66 gal/ft)

Purge Method: BAK bailer Sample Method bailer

Time	Gallons Purged	Temp C	pH	SC (uS)	Turbidity (NTU)	DO (mg/L)	Comments
1635	2	18.9	6.83	418	—	2.50	
1642	5	20.7	6.66	439		1.17	
1645	7	21.0	6.66	428		1.17	
1655	10	20.9	6.67	432		0.93	

**COOK ENVIRONMENTAL SERVICES  
MONITORING WELL SAMPLING LOG**

Site Name: High Street Job # 1004

Date: 1/4/05 Sampler: T. Cook

Well ID: MW-9 Well Diameter 2" Column 20.02

Well Depth 25.32 Depth to Water 5.30

Casing Volume 3.40 3 Casing Volumes 10.21  
 (2" well = col height \* 0.17 gal/ft, 4" well = 0.66 gal/ft)

Purge Method: bailee Sample Method bailee

Time	Gallons Purged	Temp C	pH	SC (uS)	Turbidity (NTU)	DO (mg/L)	Comments
1723	5	18.8	6.99	719		4.05	
1734	7	19.7	6.90	768		3.21	
1745	10	19.8	7.08	783		3.80	
1750	10.2	19.50	6.99	733		3.33	

**COOK ENVIRONMENTAL SERVICES  
MONITORING WELL SAMPLING LOG**

Site Name: High Street Job # 1004  
 Date: 1/4/09 Sampler: T. Cook

Well ID: MW-10 Well Diameter 2" Column 20.35  
 Well Depth 24.95 Depth to Water 4.60

Casing Volume 3.46 3 Casing Volumes 10.37  
 (2" well = col height \* 0.17 gal/ft, 4" well = 0.66 gal/ft)

Purge Method: bailed Sample Method bailed

Time	Gallons Purged	Temp C	pH	SC (uS)	Turbidity (NTU)	DO (mg/L)	Comments
1815	2	16.1	7.04	467	—	<del>2.73</del> 1.49	
1819	5	18.5	6.90	475		1.34	
1830	7	18.5	6.92	480		1.25	
1835	10	18.3	6.98	478		1.27	

**COOK ENVIRONMENTAL SERVICES  
MONITORING WELL SAMPLING LOG**

Site Name: High Street Job # 1004  
 Date: 2-3-05 Sampler: T. Cook

Well ID: MW-3 Well Diameter 2" Column 1943

Well Depth 24.89 Depth to Water 5.11

Casing Volume 3.3 3 Casing Volumes 9.9  
 (2" well = col height \* 0.17 gal/ft, 4" well = 0.66 gal/ft)

Purge Method: bailer Sample Method bailer

Time	Gallons Purged	Temp C	pH	SC (uS)	Turbidity (NTU)	DO (mg/L)	Comments
1520	3	16.9	6.00	489		7.9	
1525	6	18.3	6.47	489		3.0	
1535	10	18.7	6.44	497		3.2	

INSTN T DO %  
 19.2 2.6 28.6

sampled @ 1540

**COOK ENVIRONMENTAL SERVICES  
MONITORING WELL SAMPLING LOG**

Site Name: High Street

Job # 1004

Date: 2-3-05

Sampler: T. Cook

Well ID: MW-8

Well Diameter 2"

Column 19.5

Well Depth 25.28

Depth to Water 5.78

Casing Volume 3.81

3 Casing Volumes 9.9

(2" well = col height \* 0.17 gal/ft, 4" well = 0.66 gal/ft)

Purge Method: baller

Sample Method baller

Time	Gallons Purged	Temp C	pH	SC (uS)	Turbidity (NTU)	DO (mg/L)	Comments
12:03	3	19.6	6.62	538		1.6	clear, no odor
12:09	6	20.8	6.63	491		1.0	less clear
12:16	9	21.0	6.63	472		1.3	mod turbid, no odor

INSTTU DO      Temp    DO    %SAT  
                         21.2    0.2    2%

sampled @ 12:18

**COOK ENVIRONMENTAL SERVICES  
MONITORING WELL SAMPLING LOG**

Site Name: High Street

Job # 1004

Date: 2-3-05

Sampler: T. Cook

Well ID: MW-5

Well Diameter 2"

Column 21.17

Well Depth 27.08

Depth to Water 5.91

Casing Volume 3.59

3 Casing Volumes 10.8

(2" well = col height \* 0.17 gal/ft, 4" well = 0.66 gal/ft)

Purge Method: bailed

Sample Method bailed

Time	Gallons Purged	Temp C	pH	SC (uS)	Turbidity (NTU)	DO (mg/L)	Comments
1445	3	18.8	8.40	1135	—	9.1	
1450	6	20.3	8.59	1189	—	11.8	
1500	10	20.0	8.64	1142	—	16.1	

INSTD      T      DO      %  
                 20.2    13.5    146



**COOK ENVIRONMENTAL SERVICES  
MONITORING WELL SAMPLING LOG**

Site Name: High Street

Job # 1004

Date: 2-3-05

Sampler: T. Cook

Well ID: MW-7

Well Diameter 2"

Column 13.6

Well Depth 25.01

Depth to Water 11.41\* well under pressure, not fully recovered

Casing Volume 2.31 3 Casing Volumes 6.9  
 (2" well = col height \* 0.17 gal/ft, 4" well = 0.66 gal/ft)

Purge Method: bailer

Sample Method bailer

Time	Gallons Purged	Temp C	pH	SC (uS)	Turbidity (NTU)	DO (mg/L)	Comments
1410	3	20.2	7.43	365	—	10.0	Turbid.
1415	5	20.0	7.37	367	—	9.0	
1420	7	20.1	7.50	361	—	8.8	

INS RTU      Temp      DO      SAT %  
                  20.7      11.1      100

Sampled @ 1423

# **APPENDIX C**

## **Laboratory Analytical Reports**

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**McC Campbell Analytical, Inc.**

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560  
Telephone : 925-798-1620 Fax : 925-798-1622  
Website: www.mcccampbell.com E-mail: main@mcccampbell.com

Cook Environmental Services, Inc 271 Las Juntas Way Walnut Creek, CA 94596	Client Project ID: #1004; High Street	Date Sampled: 01/04/05
		Date Received: 01/04/05
	Client Contact: Tim Cook	Date Reported: 01/10/05
	Client P.O.:	Date Completed: 01/10/05

**WorkOrder: 0501020**

January 10, 2005

Dear Tim:

Enclosed are:

- 1). the results of 8 analyzed samples from your **#1004; High Street project**,
- 2). a QC report for the above samples
- 3). a copy of the chain of custody, and
- 4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits. If you have any questions please contact me. McC Campbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Yours truly,

Angela Rydelius, Lab Manager





# McC Campbell Analytical, Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560  
 Telephone : 925-798-1620 Fax : 925-798-1622  
 Website: www.mcccampbell.com E-mail: main@mcccampbell.com

Cook Environmental Services, Inc 271 Las Juntas Way Walnut Creek, CA 94596	Client Project ID: #1004; High Street	Date Sampled: 01/04/05
		Date Received: 01/04/05
	Client Contact: Tim Cook	Date Extracted: 01/07/05
	Client P.O.:	Date Analyzed: 01/07/05

### Oxygenated Volatile Organics + EDB and 1,2-DCA by P&T and GC/MS\*

Extraction Method: SW5030B

Analytical Method: SW8260B

Work Order: 0501020

Lab ID	0501020-001B	0501020-002B	0501020-003B	0501020-004B	Reporting Limit for DF =1	
Client ID	MW-1	MW-3	MW-5	MW-6		
Matrix	W	W	W	W		
DF	1	2	1	1		

Compound	Concentration				S	W
					ug/kg	ug/L
tert-Amyl methyl ether (TAME)	ND	ND<1.0	ND	ND	NA	0.5
t-Butyl alcohol (TBA)	ND	ND<10	ND	ND	NA	5.0
1,2-Dibromoethane (EDB)	ND	ND<1.0	ND	ND	NA	0.5
1,2-Dichloroethane (1,2-DCA)	ND	ND<1.0	ND	ND	NA	0.5
Diisopropyl ether (DIPE)	ND	ND<1.0	ND	ND	NA	0.5
Ethanol	ND	ND<100	ND	ND	NA	50
Ethyl tert-butyl ether (ETBE)	ND	ND<1.0	ND	ND	NA	0.5
Methanol	ND	ND<1000	ND	ND	NA	500
Methyl-t-butyl ether (MTBE)	33	49	2.2	ND	NA	0.5

### Surrogate Recoveries (%)

%SS1:	108	105	103	106
Comments				

\* water and vapor samples and all TCLP & SPLP extracts are reported in µg/L, soil/sludge/solid samples in µg/kg, wipe samples in µg/wipe, product/oil/non-aqueous liquid samples in mg/L.

ND means not detected above the reporting limit; N/A means analyte not applicable to this analysis.

# surrogate diluted out of range or surrogate coelutes with another peak.

h) lighter than water immiscible sheen/product is present; i) liquid sample that contains greater than ~1 vol. % sediment; j) sample diluted due to high organic content.



# McC Campbell Analytical, Inc.

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 Website: www.mcccampbell.com E-mail: main@mcccampbell.com

Cook Environmental Services, Inc  
 271 Las Juntas Way  
 Walnut Creek, CA 94596

Client Project ID: #1004; High Street

Date Sampled: 01/04/05

Date Received: 01/04/05

Client Contact: Tim Cook

Date Extracted: 01/07/05

Client P.O.:

Date Analyzed: 01/07/05

## Oxygenated Volatile Organics + EDB and 1,2-DCA by P&T and GC/MS\*

Extraction Method: SW5030B

Analytical Method: SW8260B

Work Order: 0501020

Lab ID	0501020-005B	0501020-006B	0501020-007B	0501020-008B	Reporting Limit for DF=1	
Client ID	MW-7	MW-8	MW-9	MW-10	S	W
Matrix	W	W	W	W		
DF	5	10	1	50		

Compound	Concentration				ug/kg	ug/L
	tert-Amyl methyl ether (TAME)	ND<2.5	ND<5.0	ND	ND<25	NA
t-Butyl alcohol (TBA)	ND<25	ND<50	ND	ND<250	NA	5.0
1,2-Dibromoethane (EDB)	ND<2.5	ND<5.0	ND	ND<25	NA	0.5
1,2-Dichloroethane (1,2-DCA)	3.2	ND<5.0	ND	ND<25	NA	0.5
Diisopropyl ether (DIPE)	ND<2.5	ND<5.0	ND	ND<25	NA	0.5
Ethanol	ND<250	ND<500	ND	ND<2500	NA	50
Ethyl tert-butyl ether (ETBE)	ND<2.5	ND<5.0	ND	ND<25	NA	0.5
Methanol	ND<2500	ND<5000	ND	ND<25,000	NA	500
Methyl-t-butyl ether (MTBE)	130	330	4.0	1700	NA	0.5

### Surrogate Recoveries (%)

%SS1:	107	103	102	102	
Comments	i				

\* water and vapor samples and all TCLP & SPLP extracts are reported in µg/L, soil/sludge/solid samples in µg/kg, wipe samples in µg/wipe, product/oil/non-aqueous liquid samples in mg/L.

ND means not detected above the reporting limit; N/A means analyte not applicable to this analysis.

# surrogate diluted out of range or surrogate coelutes with another peak.

h) lighter than water immiscible sheen/product is present; i) liquid sample that contains greater than ~1 vol. % sediment; j) sample diluted due to high organic content.



### QC SUMMARY REPORT FOR SW8021B/8015Cm

W.O. Sample Matrix: Water

QC Matrix: Water

WorkOrder: 0501020

EPA Method: SW8021B/8015Cm		Extraction: SW5030B		BatchID: 14552			Spiked Sample ID: 0501016-003A			
Analyte	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	MS / MSD	LCS / LCSD
TPH(btex) <sup>£</sup>	ND	60	101	104	2.82	87.3	86.5	0.936	70 - 130	70 - 130
MTBE	ND	10	94.6	101	6.12	85.8	89.9	4.67	70 - 130	70 - 130
Benzene	ND	10	101	107	6.03	89.8	91	1.26	70 - 130	70 - 130
Toluene	ND	10	101	107	5.49	94.8	95.7	0.931	70 - 130	70 - 130
Ethylbenzene	ND	10	108	113	4.76	98.4	99.6	1.18	70 - 130	70 - 130
Xylenes	ND	30	95.7	100	4.43	100	100	0	70 - 130	70 - 130
%SS:	112	10	109	112	3.08	97	97	0	70 - 130	70 - 130

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:  
NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

% Recovery = 100 \* (MS-Sample) / (Amount Spiked); RPD = 100 \* (MS - MSD) / ((MS + MSD) / 2).

\* MS / MSD spike recoveries and / or %RPD may fall outside of laboratory acceptance criteria due to one or more of the following reasons: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) the spiked sample's matrix interferes with the spike recovery.

£ TPH(btex) = sum of BTEX areas from the FID.

# cluttered chromatogram; sample peak coelutes with surrogate peak.

N/A = not applicable or not enough sample to perform matrix spike and matrix spike duplicate.

NR = analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content.



McC Campbell Analytical, Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560  
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Website: www.mccampbell.com E-mail: main@mccampbell.com

### QC SUMMARY REPORT FOR SW8021B/8015Cm

W.O. Sample Matrix: Water

QC Matrix: Water

WorkOrder: 0501020

Analyte	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	MS / MSD	LCS / LCSD
TPH(btex) <sup>£</sup>	ND	60	102	100	1.22	102	103	0.873	70 - 130	70 - 130
MTBE	ND	10	94.5	98.8	4.51	102	103	0.992	70 - 130	70 - 130
Benzene	ND	10	101	103	1.47	107	107	0	70 - 130	70 - 130
Toluene	ND	10	102	103	0.766	107	105	1.43	70 - 130	70 - 130
Ethylbenzene	ND	10	109	109	0	113	111	1.93	70 - 130	70 - 130
Xylenes	ND	30	96.7	96.3	0.345	100	100	0	70 - 130	70 - 130
%SS:	108	10	108	109	0.768	109	108	0.620	70 - 130	70 - 130

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:  
NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

% Recovery = 100 \* (MS-Sample) / (Amount Spiked); RPD = 100 \* (MS - MSD) / ((MS + MSD) / 2).

\* MS / MSD spike recoveries and / or %RPD may fall outside of laboratory acceptance criteria due to one or more of the following reasons: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) the spiked sample's matrix interferes with the spike recovery.

£ TPH(btex) = sum of BTEX areas from the FID.

# cluttered chromatogram; sample peak coelutes with surrogate peak.

N/A = not applicable or not enough sample to perform matrix spike and matrix spike duplicate.

NR = analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content.





QC SUMMARY REPORT FOR SW8260B

W.O. Sample Matrix: Water

QC Matrix: Water

WorkOrder: 0501020

EPA Method: SW8260B		Extraction: SW5030B			BatchID: 14557		Spiked Sample ID: 0501023-011B			
Analyte	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	MS / MSD	LCS / LCSD
tert-Amyl methyl ether (TAME)	ND	10	100	102	1.73	86.5	95.9	10.3	70 - 130	70 - 130
t-Butyl alcohol (TBA)	ND	50	94	93	1.13	98.1	103	4.57	70 - 130	70 - 130
1,2-Dibromoethane (EDB)	ND	10	119	118	0.826	107	119	10.9	70 - 130	70 - 130
1,2-Dichloroethane (1,2-DCA)	ND	10	108	107	0.544	98.5	109	10.1	70 - 130	70 - 130
Diisopropyl ether (DIPE)	ND	10	119	119	0	103	111	7.65	70 - 130	70 - 130
Ethanol	ND	500	98.1	101	2.59	99.9	98.3	1.64	70 - 130	70 - 130
Ethyl tert-butyl ether (ETBE)	ND	10	113	112	0.660	102	111	8.95	70 - 130	70 - 130
Methanol	ND	2500	99.6	102	2.01	92.7	98.8	6.36	70 - 130	70 - 130
Methyl-t-butyl ether (MTBE)	ND	10	116	116	0	96.9	110	12.3	70 - 130	70 - 130
%SSI:	105	10	101	102	0.646	102	104	1.74	70 - 130	70 - 130

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:  
NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

% Recovery = 100 \* (MS-Sample) / (Amount Spiked); RPD = 100 \* (MS - MSD) / ((MS + MSD) / 2).

\* MS / MSD spike recoveries and / or %RPD may fall outside of laboratory acceptance criteria due to one or more of the following reasons: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) the spiked sample's matrix interferes with the spike recovery.

N/A = not enough sample to perform matrix spike and matrix spike duplicate.

NR = analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content.

Laboratory extraction solvents such as methylene chloride and acetone may occasionally appear in the method blank at low levels.







# McC Campbell Analytical, Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560  
Telephone : 925-798-1620 Fax : 925-798-1622  
Website: www.mccampbell.com E-mail: main@mccampbell.com

Cook Environmental Services, Inc 271 Las Juntas Way Walnut Creek, CA 94596	Client Project ID: #1004; High Street	Date Sampled: 02/03/05
		Date Received: 02/03/05
	Client Contact: Tim Cook	Date Reported: 02/10/05
	Client P.O.:	Date Completed: 02/10/05

**WorkOrder: 0502072**

February 10, 2005

Dear Tim:

Enclosed are:

- 1). the results of 4 analyzed samples from your **#1004; High Street project**,
- 2). a QC report for the above samples
- 3). a copy of the chain of custody, and
- 4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits. If you have any questions please contact me. McC Campbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Yours truly,

Angela Rydelius, Lab Manager





# McC Campbell Analytical, Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560  
 Telephone : 925-798-1620 Fax : 925-798-1622  
 Website: www.mcccampbell.com E-mail: main@mcccampbell.com

Cook Environmental Services, Inc 271 Las Juntas Way Walnut Creek, CA 94596	Client Project ID: #1004; High Street	Date Sampled: 02/03/05
		Date Received: 02/03/05
	Client Contact: Tim Cook	Date Extracted: 02/03/05
	Client P.O.:	Date Analyzed: 02/03/05

## Oxygenated Volatile Organics + EDB and 1,2-DCA by P&T and GC/MS\*

Extraction Method: SW5030B

Analytical Method: SW8260B

Work Order: 0502072

Lab ID	0502072-001A	0502072-002A	0502072-003A	0502072-004A	Reporting Limit for DF = 1	
Client ID	MW-3	MW-5	MW-7	MW-8		
Matrix	W	W	W	W		
DF	1	1	1	10		

Compound	Concentration				S	W
					ug/kg	ug/L
tert-Amyl methyl ether (TAME)	ND	ND	ND	ND<5.0	NA	0.5
t-Butyl alcohol (TBA)	ND	ND	ND	53	NA	5.0
1,2-Dibromoethane (EDB)	ND	ND	ND	ND<5.0	NA	0.5
1,2-Dichloroethane (1,2-DCA)	ND	ND	2.9	ND<5.0	NA	0.5
Diisopropyl ether (DIPE)	ND	ND	ND	ND<5.0	NA	0.5
Ethanol	ND	ND	ND	ND<500	NA	50
Ethyl tert-butyl ether (ETBE)	ND	ND	ND	ND<5.0	NA	0.5
Methanol	ND	ND	ND	ND<5000	NA	500
Methyl-t-butyl ether (MTBE)	4.9	4.2	4.5	360	NA	0.5

### Surrogate Recoveries (%)

%SS1:	104	105	105	105	
Comments					

\* water and vapor samples are reported in µg/L, soil/sludge/solid samples in mg/kg, product/oil/non-aqueous liquid samples and all TCLP & SPL extracts are reported in mg/L, wipe samples in µg/wipe.

ND means not detected above the reporting limit; N/A means analyte not applicable to this analysis.

# surrogate diluted out of range or surrogate coelutes with another peak.

h) lighter than water immiscible sheen/product is present; i) liquid sample that contains greater than ~1 vol. % sediment; j) sample diluted due to high organic content/matrix interference; k) reporting limit near, but not identical to our standard reporting limit due to variable Encore sample weight; m) reporting limit raised due to insufficient sample amount; n) results are reported on a dry weight basis; p) see attached narrative.



QC SUMMARY REPORT FOR SW8021B/8015Cm

W.O. Sample Matrix: Water

QC Matrix: Water

WorkOrder: 0502072

Analyte	Sample µg/L	Spiked µg/L	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
			% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	MS / MSD	LCS / LCSD
TPH(btex) <sup>£</sup>	ND	60	94.2	109	14.4	92.8	91.9	0.982	70 - 130	70 - 130
MTBE	ND	10	90.3	95.7	5.81	96.8	100	3.40	70 - 130	70 - 130
Benzene	ND	10	105	109	3.84	105	97.9	6.69	70 - 130	70 - 130
Toluene	ND	10	102	107	5.33	104	91.7	12.9	70 - 130	70 - 130
Ethylbenzene	ND	10	104	117	11.7	102	102	0	70 - 130	70 - 130
Xylenes	ND	30	90.7	95.7	5.37	90.3	90.7	0.368	70 - 130	70 - 130
%SS:	110	10	112	113	0.829	115	110	4.46	70 - 130	70 - 130

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:  
NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

% Recovery = 100 \* (MS-Sample) / (Amount Spiked); RPD = 100 \* (MS - MSD) / ((MS + MSD) / 2).

\* MS / MSD spike recoveries and / or %RPD may fall outside of laboratory acceptance criteria due to one or more of the following reasons: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) the spiked sample's matrix interferes with the spike recovery.

£ TPH(btex) = sum of BTEX areas from the FID.

# cluttered chromatogram; sample peak coelutes with surrogate peak.

N/A = not applicable or not enough sample to perform matrix spike and matrix spike duplicate.

NR = analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content.



### QC SUMMARY REPORT FOR SW8260B

W.O. Sample Matrix: Water

QC Matrix: Water

WorkOrder: 0502072

Analyte	EPA Method: SW8260B		Extraction: SW5030B			BatchID: 14902		Spiked Sample ID: 0502054-002B		
	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	MS / MSD	LCS / LCSD
tert-Amyl methyl ether (TAME)	0.5884	10	82.9	89.8	7.42	110	95.8	14.2	70 - 130	70 - 130
t-Butyl alcohol (TBA)	ND	50	88.1	89.7	1.85	102	98.7	3.05	70 - 130	70 - 130
1,2-Dibromoethane (EDB)	ND	10	111	108	2.83	120	120	0	70 - 130	70 - 130
1,2-Dichloroethane (1,2-DCA)	ND	10	103	104	0.848	116	111	4.58	70 - 130	70 - 130
Diisopropyl ether (DIPE)	ND	10	107	109	1.93	109	113	3.37	70 - 130	70 - 130
Ethanol	ND	500	103	106	2.70	98.7	104	5.24	70 - 130	70 - 130
Ethyl tert-butyl ether (ETBE)	ND	10	103	104	1.27	116	111	3.99	70 - 130	70 - 130
Methanol	ND	2500	101	101	0	100	101	0.525	70 - 130	70 - 130
Methyl-t-butyl ether (MTBE)	ND	10	97.1	98.4	1.27	115	107	7.08	70 - 130	70 - 130
%SS1:	99	10	105	106	0.341	107	104	2.40	70 - 130	70 - 130

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:  
NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.  
 $\% \text{ Recovery} = 100 * (\text{MS} - \text{Sample}) / (\text{Amount Spiked})$ ;  $\text{RPD} = 100 * (\text{MS} - \text{MSD}) / ((\text{MS} + \text{MSD}) / 2)$ .  
 \* MS / MSD spike recoveries and / or %RPD may fall outside of laboratory acceptance criteria due to one or more of the following reasons: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) the spiked sample's matrix interferes with the spike recovery.  
 N/A = not enough sample to perform matrix spike and matrix spike duplicate.  
 NR = analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content.  
 Laboratory extraction solvents such as methylene chloride and acetone may occasionally appear in the method blank at low levels.

QA/QC Officer





