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Public Works Agency
Environmental Services Division

FAX (510) 238-7286
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January 12, 2010

Ms. Lourdes Gonzales
Regional Water Quality Control Board –
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Reference: RWQCB Order No. R2-2006-0075, NPDES Permit #CAG912002

Subject: Self-Monitoring Report – Fourth Quarter and Year 2009
Groundwater Remediation at 7101 Edgewater Drive, Oakland, California

Dear Ms. Gonzales:

The City of Oakland is pleased to submit this Self-Monitoring Report, Fourth Quarter and Year 2009, for the groundwater extraction, treatment, and discharge system at the City of Oakland Municipal Services Center located at 7101 Edgewater Drive, Oakland, California. The report has been prepared by LFR Inc. and OTG EnviroEngineering Solutions, Inc. under a consultant service contract with the City of Oakland. No violations of RWQCB Order No. R2-2006-0075 or NPDES Permit #CAG912002 were identified during this reporting period.

Certification

I certify under penalty of law that this document and attachments are prepared under my direction or supervision in accordance with the system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing the violations.

Please contact me at (510)238-6361 if you have questions or comments.

Sincerely

A handwritten signature in blue ink that reads "Gopal Nair".

Gopal Nair
Environmental Program Specialist



An American Public Works Association Accredited Agency

January 11, 2010

Mr. Gopal Nair
Environmental Program Specialist
City of Oakland – PWA/ESD
250 Frank H. Ogawa Plaza, Suite 5301
Oakland, CA 94612

Reference: RWQCB Order No. R2-2006-0075, NPDES Permit #CAG912002

Subject: Self-Monitoring Report – Fourth Quarter and Year 2009
Groundwater Remediation at 7101 Edgewater Drive, Oakland, CA

Dear Mr. Nair:

OTG EnviroEngineering Solutions, Inc. (OTG) is pleased to submit this Self-Monitoring Report, Fourth Quarter and Year 2009, for the groundwater extraction, treatment, and discharge system at the City of Oakland Municipal Services Center located at 7101 Edgewater Drive, Oakland, California. OTG conducted the work under a subcontract to LFR Inc. No violations of RWQCB Order No. R2-2006-0075 or NPDES Permit #CAG912002 were identified during this reporting period.

Certification

“I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

Please contact the undersigned at (510) 465-8982 if you have questions or comments.

Sincerely,
OTG EnviroEngineering Solutions, Inc.



Xinggang Tong, PhD, PE
Project Manager



cc: Mr. Charles Pardini, P.G., LFR Inc.

**SELF-MONITORING REPORT –
FOURTH QUARTER & YEAR 2009
NPDES PERMIT NO. CAG912002**

**GROUNDWATER REMEDIATION AT
CITY OF OAKLAND
MUNICIPAL SERVICES CENTER
7101 EDGEWATER DRIVE
OAKLAND, CALIFORNIA**

Prepared for

**City of Oakland
Public Works Agency
Environmental Services Division
250 Frank H. Ogawa Plaza, Suite 5301
Oakland, CA 94612**

January 11, 2010

Prepared by

OTG
**EnviroEngineering
Solutions, Inc.**

7700 Edgewater Drive, Suite 260
Oakland, CA 94621

under a subcontract to

LFR  **ARCADIS** company

1900 Powell Street, 12th Floor
Emeryville, CA 94608

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1 INTRODUCTION

The City of Oakland Municipal Services Center (MSC) is located at 7101 Edgewater Drive in Oakland, California (the Site; Figure 1). The approximately 17-acre site was originally part of a waterfront tidal marsh complex that was filled between 1950 and 1971. The City of Oakland (the City) leased the land from the Port of Oakland and constructed the MSC around 1972. Bordering the MSC site to the west and to the north is the Martin Luther King Regional Shoreline Park, which is also owned by the Port of Oakland. Damon Slough, which runs through the park, is located to the north, and commercial developments are located to the east and south.

The Site has been the subject of numerous environmental investigations beginning in about 1989. The suspected sources of on-site contamination include releases from underground storage tanks (USTs), gasoline and diesel fuel hydrant systems, and the floor drain waste collection pits formerly located adjacent to Building No. 5. At one time there were 14 petroleum USTs at the site. In addition, some or all of the material used to fill the Site may have been composed of waste material or contaminated fill. A comprehensive investigation conducted by Baseline Environmental Consulting (Baseline) in 2000 identified the existence of free-phase petroleum hydrocarbon product in four separate areas of the Site. These four areas are labeled Plumes A through D on Figure 2. Baseline's investigation is documented in its *Site History and Characterization Report* (Baseline, January 2001).

Groundwater monitoring was conducted quarterly from the fourth quarter of 1989 through the third quarter of 2002, and then semi-annually to the present. Shallow groundwater levels vary between approximately 2 and 10 feet below ground surface (bgs), and are partially subject to tidal influence. Throughout much of the Site, shallow groundwater flows to the southwest - to the nearest shoreline along San Leandro Bay. In the northern portion of the Site, groundwater flows in a more northerly direction toward the curving shoreline and Damon Slough.

Pilot-scale groundwater/soil vapor dual-phase extraction (DPE) tests were conducted in 2002 to assess enhancing the removal of free-phase petroleum product from Plumes A through D (Cambria Environmental Technology, August 13, 2002 and URS Corporation, August 29, 2002). Extracted groundwater was treated on-site through two 2,000-lb granular activated carbon units connected in series and discharged to the on-site storm drain in accordance with a National Pollutant Discharge Elimination System (NPDES) permit granted by the San Francisco Bay Regional Water Quality Control Board (NPDES Permit No. CAG912002). Based on the pilot test results, the City retained Cambria in May 2003 to design a full-scale product recovery and DPE system for Plumes C and D. Cambria's design was revised in October 2005 by Groundwater and Environmental Services (GES) to focus the first phase of product removal on Plume D. The final design drawings were included in Appendix A of the Startup Report (OTG, June 2006). Chemical oxidation and enhanced bioremediation through periodic injections of hydrogen peroxide have been implemented at Plumes A, B and C since July 2004.

In March 2006, the City retained URS Corporation and its subcontractor ERRG to construct GES' redesigned product recovery and DPE system in the Plume D area (first phase). A plan view of the system is presented in Figure 3. Construction was completed in early May 2006. Seven wells within Plume D area (RW-D1 through RW-D5, TBW-5, and RW-1) were connected to the extraction system. On May 22, 2006, the product recovery and groundwater extraction portion of the remediation system (pneumatic pumps) was turned on. On May 14, 2007, the DPE portion of the remediation system was turned on. The second phase included installation of six additional extraction wells (RW-D6 through RW-D11) within the Plume D area in March 2007 (URS, May 2007). They were connected to the DPE system and extraction from these wells commenced on June 11, 2007.

In March 2009, the City initiated the third phase of product removal by retaining LFR Inc. and its subcontractor All Chem Inc. to expand the DPE extraction to Plume C. Six of the eight wells in the Plume C area (RW-C2, RW-C4 through RW-C7, and OB-C1, Figure 3) were connected to the DPE system and extraction from these wells commenced on May 26, 2009.

2. DESCRIPTION OF REMEDIATION SYSTEM

The remediation system consists of extracting liquid (free-phase product and groundwater) and soil vapor from 13 wells in the Plume D area and six wells in the Plume C area, separation of free-phase product from groundwater, treatment of groundwater by activated carbon, discharge of treated water to the local storm drain in accordance with the NPDES permit, treatment of soil vapor, and discharge of treated vapor to the atmosphere in accordance with an air discharge permit. A process and instrumentation diagram of the remediation system is illustrated on Figure 4. Design details were included in Appendix A of the Startup Report (OTG, June 2006).

As described above, a total of 19 wells were connected to the remediation system in three phases: the first phase included seven wells in Plume D area (RW-D1 through RW-D5, TBW-5, and RW-1) and commenced extraction on May 22, 2006; the second phase included six additional wells in Plume D area (RW-D6 through RW-D11), which joined extraction on June 11, 2007; and the third phase included six wells in Plume C area (RW-C2, RW-C4 through RW-C7, and OB-C1), which joined extraction on May 26, 2009. Well locations are shown on Figure 3.

Wells RW-C1 through RW-C7 and RW-D1 through RW-D5 were constructed in December 2001 and wells RW-D6 through RW-D11 were constructed in March 2007, specifically for remediation purposes. Wells RW-1 and TBW-5 were installed during backfilling of the excavation of former fuel hydrant lines in the early 1990s. The first phase wells were equipped with both total fluid recovery pneumatic pumps specifically designed for viscous petroleum product recovery and vacuum lines for liquid and soil vapor extraction (dual-phase extraction, DPE). The pneumatic pumps were manufactured by Clean Environment Equipment in Oakland (Model # AP-Custom). An Ingersoll-Rand air compressor (model # SSR UP6-10) provides compressed air to the pneumatic pumps. The second and the third phase wells were connected only to the DPE system. A Dekker liquid-ring vacuum pump (model #VMX0553K)

that can generate up to 28 inches of mercury vacuum and up to 550 actual cubic feet per minute (ACFM) vapor flow provides necessary vacuum for the DPE system. The pneumatic pumps and the DPE extraction can be operated independently.

The liquid extracted by the pneumatic pumps and the DPE is pumped into an oil/water separator (Model # AGM-3SS-90V, Hydro Quip, Inc.). Recovered oil is contained in 55-gallon drums, which are sent to an off-site oil recycling facility. Groundwater is treated through three (3) granular activated carbon (GAC) units connected in series (Model #ASC-2000, U.S.Filter/Westates Carbons) before being discharged into the local storm drain. Each GAC unit contains 2,000 pounds (lbs) of GAC. Figure 5 illustrates the groundwater treatment portion of the remediation system and identifies sampling ports. The groundwater treatment and discharge system is operated under the NPDES permit number CAG912002.

The soil vapor extracted from the 19 wells is abated by a thermal oxidizer, which is operated between 1,400 and 1,650 degrees Fahrenheit. At low vapor organic concentrations, the thermal oxidizer can be converted to a catalytic oxidizer. Activated carbon can also be used for vapor abatement at low organic concentrations. The vapor abatement system is operated under the permit number 16622 issued by the Bay Area Air Quality Management District (BAAQMD).

3 OPERATIONS AND MAINTENANCE

On May 22, 2006, the pneumatic pumps were turned on to initiate the remediation process. The vacuum extraction portion remained off line. Because the free-phase product appears to be a mixture of gasoline, diesel, and some other highly viscous organics (petroleum tank bottom or coal tar-like material), the vacuum extraction, if turned on, will vaporize gasoline and a portion of the diesel and will make the removal of the viscous product even more difficult. Therefore, the remediation scheme includes first using the pneumatic pumps to remove the free-phase product as much as is practical and achievable, and then using the vacuum extraction system to enhance the removal of the remaining petroleum hydrocarbons.

The volume of free-phase product recovered by the pneumatic pumps decreased steadily from the startup in May 2006 through April 2007. On May 14, 2007, RW-D2, RW-D4 and RW-D5 were switched to vacuum DPE operation, while RW-D1, RW-D3, TBW-5 and RW-1 remained under pneumatic pump extraction. On June 11, 2007, the six newly installed wells (RW-D6 through RW-D11) and the remaining pneumatic extraction wells (RW-D1, RW-D3, TBW-5, and RW-D5) were brought on-line under DPE operations. The pneumatic extraction portion of the remediation system was discontinued. On May 26, 2009, the six extraction wells from Plume C area (RW-C2, RW-C4 through RW-C7, and OB-C1) were also brought on-line under DPE operations.

The remediation system was operated intermittently during the fourth quarter and year 2009 due to extensive maintenance requirements. The highly viscous organic material extracted by the DPE system has progressively clogged various parts of the extraction piping and control system. The radiator was replaced in December 2008, the oil/vapor separation unit was

changed in March 2009, and the oil level sensors and the vapor pressure switch were replaced in April 2009. Routine operations and maintenance (O&M) of the system includes the following tasks:

- a daily check of the liquid level sensors and function of pumps;
- adjusting individual extraction wells to optimize the extraction rate of soil vapor and groundwater within the equipment design range;
- checking and removing oil from the oil/water separator;
- lubricating pumps;
- monitoring system performance;
- and other tasks necessary for maintaining proper functioning of the remediation system.

Monthly, quarterly, semi-annual, and annual groundwater and air samples were collected and analyzed from the system per the NPDES permit and the air permit requirement. Figure 5 shows sampling ports for groundwater sample collection. Air samples were collected from the exhaust and the inlet of the DPE system. Extracted groundwater was measured monthly on-site at the influent (prior to the carbon treatment) and at the effluent (after the carbon treatment) for temperature, pH, and electric conductivity using an Oakton pH/Con 10 meter (Serial #311648) and for turbidity using an Oakton T-100 meter (Serial #316738). Before measurement, the pH probe was calibrated with standard solutions of pH 4.00, 7.00, and 10.00; the electric conductivity probe was calibrated with 1413 ug/cm standard solution; and the turbidity meter was calibrated with standard solutions of 0.02, 20.0, 100, and 800 nephelometric turbidity units (NTUs). The DPE system was operated on vapor extraction mode only and groundwater was not extracted and discharged in November and December, and therefore, influent and effluent monitoring of the groundwater treatment system was not conducted in the last two months of the DPE system operation.

Groundwater samples were analyzed by Curtis & Tompkins, Ltd of Berkeley, California, and air samples were analyzed by Torrent Laboratory, Inc., of Milpitas, California, and ESC Lab Sciences of Mt. Juliet, Tennessee. Groundwater analytical methods are listed in Table 1. The laboratory data were found to be of acceptable quality, with qualifications as noted in the laboratory reports.

4 DISCHARGE MONITORING – FOURTH QUARTER AND YEAR 2009

Field measured data and laboratory analysis results are summarized in the following tables:

- Table 1 – Laboratory Analytical Procedures;
- Table 2 – Operational Data and Field-Measured Parameters;
- Table 3 – Petroleum Hydrocarbon Analytical Data;
- Table 4 – Inorganic Constituents Analytical Data and Fish Bioassay Results;
- Table 5 – Organic Constituents Analytical Data;
- Table 6 – Dual-Phase Extraction Vapor Monitoring Data;

- Table 7 – Petroleum Hydrocarbons Removed through Soil Vapor Extraction; and
- Table 8 – TPH removed through Groundwater Extraction, Floating Product Recovery, and Soil Vapor Extraction.

Significant Results for the Fourth Quarter 2009

- Groundwater extracted from the remediation wells for this reporting period (October 1 through December 31, 2009) totaled 76,150 gallons, which was treated and discharged into the local storm drain, resulting in an average monthly flow rate of 1.76 gallons per minute (gpm) in October, 0 gpm in November, and 0 gpm in December (Table 2). The DPE system was operated on vapor extraction mode only, and groundwater was not extracted and discharged in November and December.
- No separate-phase floating product was recovered during this quarter. Approximately 5.8 pounds (lbs) of total petroleum hydrocarbons (TPH, gasoline plus diesel) was removed through the extracted groundwater (dissolved in groundwater), and 1,204 lbs of TPH was removed through soil vapor (Table 8). The total weight of TPH removed this quarter was 1,210 lbs, of which 99.5% was removed by the DPE through soil vapor extracted and 0.5% was removed through the groundwater. Since the remediation system started in May 2006, a total of 61,634 lbs, or approximately 8,750 gallons, of TPH (plus unknown) has been removed from Plumes C and D (Table 8). The recovered floating product was highly viscous and black in color. Its appearance does not resemble gasoline or diesel.
- Since there was no groundwater extraction and discharge in November and December, monthly monitoring of influent and effluent was only conducted in October. Monthly monitoring results are summarized in Tables 2 and 3; quarterly and annual monitoring results are presented in Tables 4 and 5.
- On-site measured parameters of the effluent (treated groundwater) in October were: pH 7.25, temperature 21.8 °C, conductivity 9.37 mS/cm, and turbidity 5.0 NTU (Table 2).
- TPHg; TPHd; TPHmo; benzene, toluene, ethylbenzene, and xylenes (BTEX); and methyl tertiary-butyl ether (MTBE) in the October effluent sample were all below their respective reporting limits. The reporting limits were 0.5 micrograms per liter (ug/L) for the BTEX constituents, 2.0 ug/L for MTBE, 50 ug/L for TPHg and TPHd, and 300 ug/L for TPHmo (Table 3).
- Concentrations of the influent (after the oil/water separator, but before the carbon treatment) as measured in October were 0.31 milligrams per liter (mg/L) TPHg, 8.9 mg/L TPHd, 2.4 mg/L TPHmo, and 0.0038 mg/L benzene. These concentrations are significantly below their respective concentrations in 2006 and 2007 (Table 3).

Significant Results for Year 2009

- A total of 461,580 gallons of groundwater was extracted from January through December 2009, which was treated and discharged into local storm drain, resulting in an average flow rate of 0.878 gpm. Monthly groundwater extraction rate and volume are presented in Table 2.

- No free-phase floating product was encountered in 2009. A total of 4,255 lbs (or 601 gallons) of TPH (gas + diesel) was removed through groundwater and soil vapor extraction in 2009 (Table 8), of which 99% was removed by the DPE through soil vapor extracted and 1% was removed through the groundwater. This significant reduction of free-phase floating product confirms that the groundwater and soil vapor extraction system has been extremely effective.
- Monitoring of the extracted groundwater was conducted following the requirement of NPDES Permit No. CAG912002. No violations of the NPDES Permit requirements were recorded throughout 2009. Monitoring results are summarized in Tables 1 through 6.
- The effluent (treated groundwater before entering storm drain) had pHs between 7.02 and 7.3, temperatures between 13.0 and 24.6 °C, conductivities between 9.05 and 14.62 mS/cm, and turbidities between 1.8 and 5.0 NTU (Table 2).
- TPHg, TPHd, TPHmo, BTEX, and MTBE in the monthly effluent samples were all below their respective reporting limits. The reporting limit was 0.5 ug/L for BTEX and MTBE (2.0 ug/L for MTBE when using EPA Method 8021B), 50 ug/L for TPHg and TPHd, and 300 ug/L for TPHmo (Table 3).
- No VOCs (by EPA Method 8260) and SVOCs (by EPA Methods 8310 and 8270) were reported in the effluent throughout 2009.
- The rainbow trout survival rate was 95% in the 96-hour static renewal bioassay conducted for the effluent sample collected in the first quarter 2009 (Table 4). After the first year of quarterly testing, the fish bioassay is under annual monitoring schedule for subsequent years of operations.
- The remediation system was shutdown on December 23, 2009.

5 CONCLUSIONS

The results of the monitoring at the Site indicate that the remedial efforts have been highly successful in addressing the presence of free phase petroleum product, and petroleum-impacted groundwater and soil vapor. Free phase petroleum product was not detected in Plume D wells on November 18, 2008 when the DPE system was temporarily shut down and extraction piping was removed from extraction wells for monitoring. Free phase petroleum product was also not detected in Plume C when selected extraction wells were opened for measurement on October 29, 2009. TPHg concentration in the extracted groundwater (influent in Table 3) was reduced from over 50,000 ug/L at the start of the remediation in May 2006 to less than 500 ug/L in October 2009, and benzene concentration was reduced from 6,100 ug/L to 3.8 ug/L in the same period of time. TPHg concentration in the extracted soil vapor was also reduced from the high of 6,018 parts per million by volume (ppmv) in December 2007 to 320 ppmv in December 2009, and benzene concentration was reduced from 33 ppm to 1.4 ppmv in the same time.

The remediation system was shutdown on December 23, 2009. All wells (monitoring wells and remediation wells) will be monitored closely in 2010. The remediation system may be restarted if free phase product is again detected or significant rebound of dissolved concentration of petroleum hydrocarbons is determined.

6 REFERENCES

Baseline Environmental Consulting, *Site History and Characterization*, January 2001

Cambria Environmental Technology, Inc. *TPE Pilot Test and Feasibility Report*, August 13, 2002.

California Regional Water Quality Control Board – San Francisco Bay Region, *Notice of General Permit Coverage for Discharge from the City of Oakland Municipal Service Center located at 7101 Edgewater Drive, Oakland, Alameda County, CA 94621, under the Requirements of Order No. R2-2006-0075, NPDES Permit No. CAG912002 (Fuel General Permit)*, March 12, 2007.

California Regional Water Quality Control Board – San Francisco Bay Region, *Authorization to Discharge Treated Groundwater Under the Requirements of Order No. 01-100, NPDES Permit No. CAG 912002*, April 23, 2002.

OTG EnviroEngineering Solutions, Inc. *Startup Report, Groundwater Remediation at City of Oakland Municipal Services Center*, June 2006

URS Corporation, *Results of Dual-Phase Extraction Pilot Test for Plumes A & B, City of Oakland Municipal Services Center*, August 29, 2002.

URS Corporation, *Extraction Well Installation – City of Oakland Municipal Services Center Site – Plume D*, May 9, 2007.

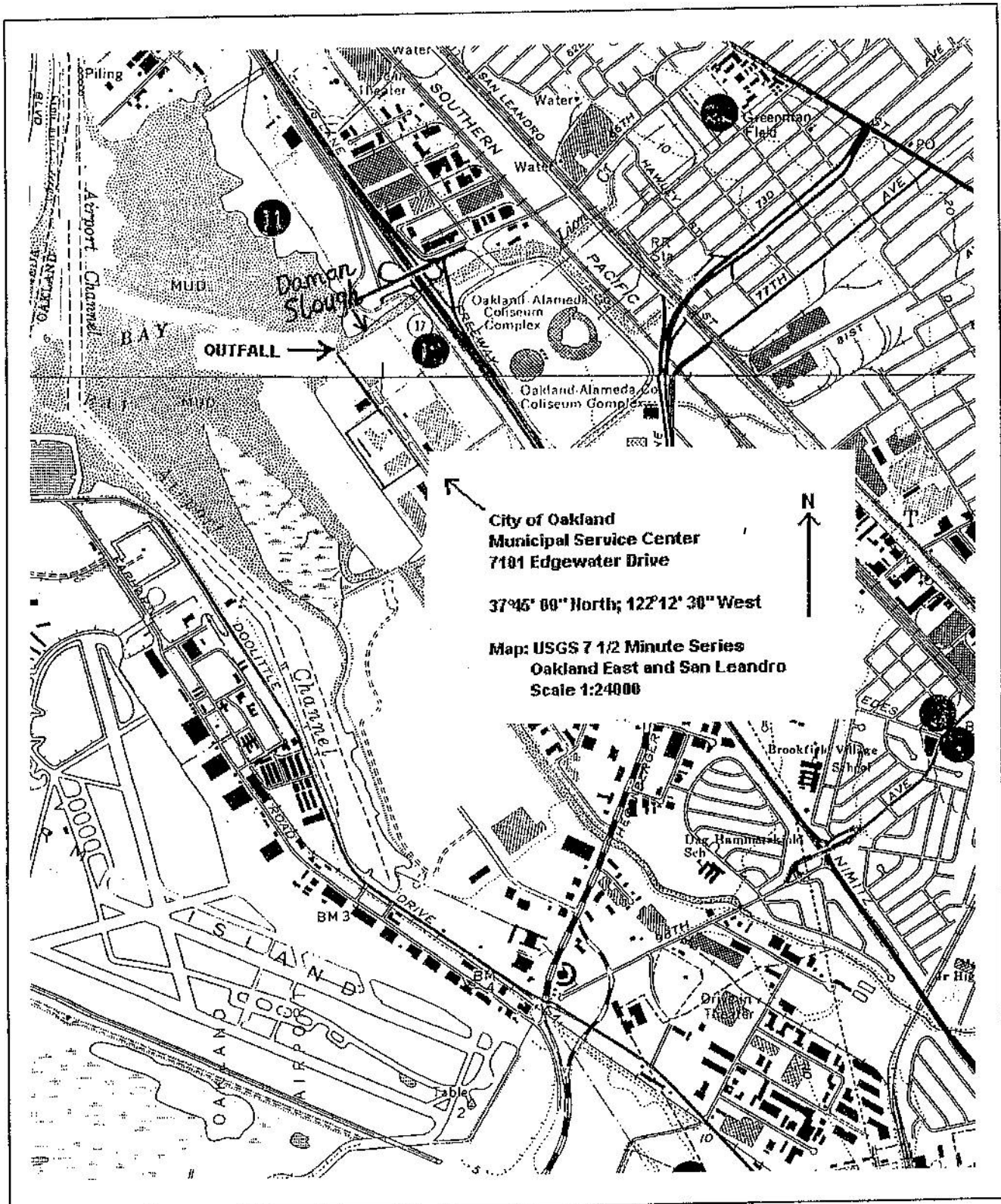


FIGURE 1 SITE LOCATION AND DISCHARGE LOCATION

OTG EnviroEngineering
Solutions, Inc.

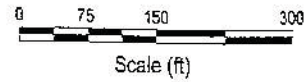
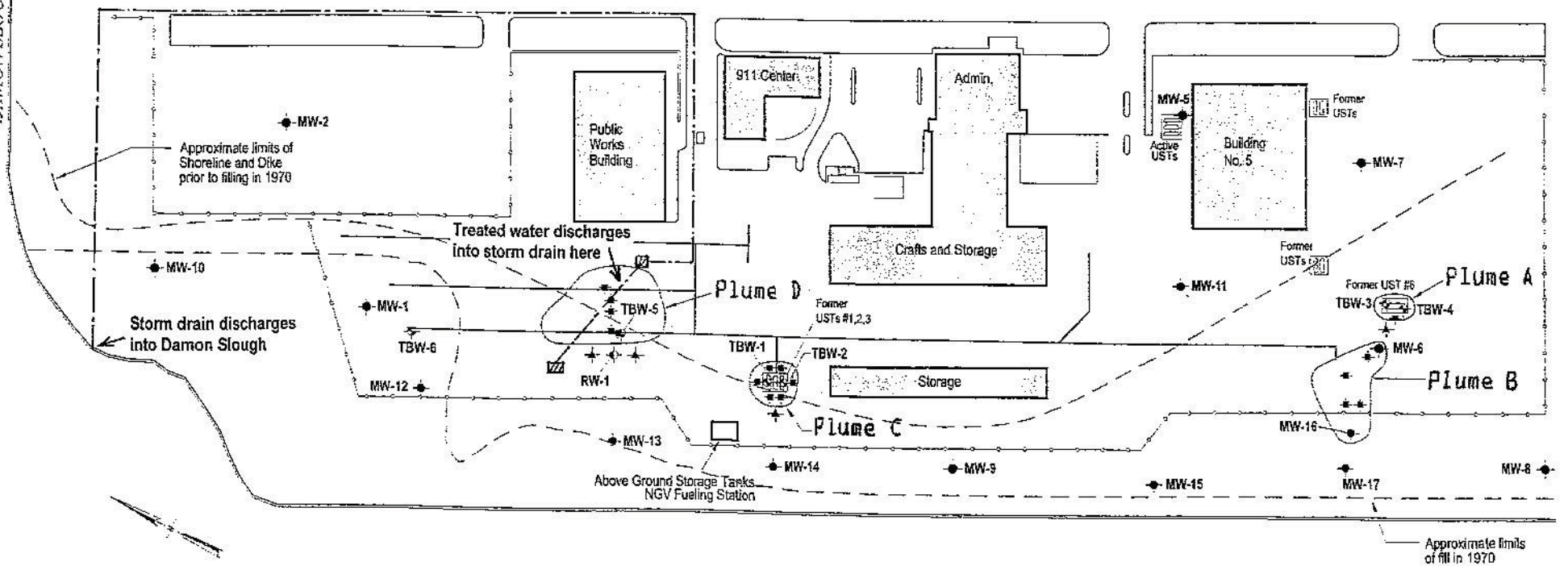
City of Oakland Municipal Service Center
7101 EdgeWater Drive, Oakland, CA

EXPLANATION

- MW-1 ● Monitoring well location
- RW-1 ◐ Remediation well location
- TBW-1 ⊕ Tank Backfill Well
- MW-3 ⊗ Abandoned Well
- Fence
- Former underground piping
- Area of free product on groundwater

DAMON SLOUGH

EDGEWATER DRIVE



SAN LEANDRO BAY

The size of the free-phase product plumes shown in the figure was the size originally identified in December 2000

FIGURE 2 Identification of Free-Phase Petroleum Product Locations

OTG **EnviroEngineering**
Solutions, Inc.

City of Oakland Municipal Services Center
7101 Edgewater Drive, Oakland, CA

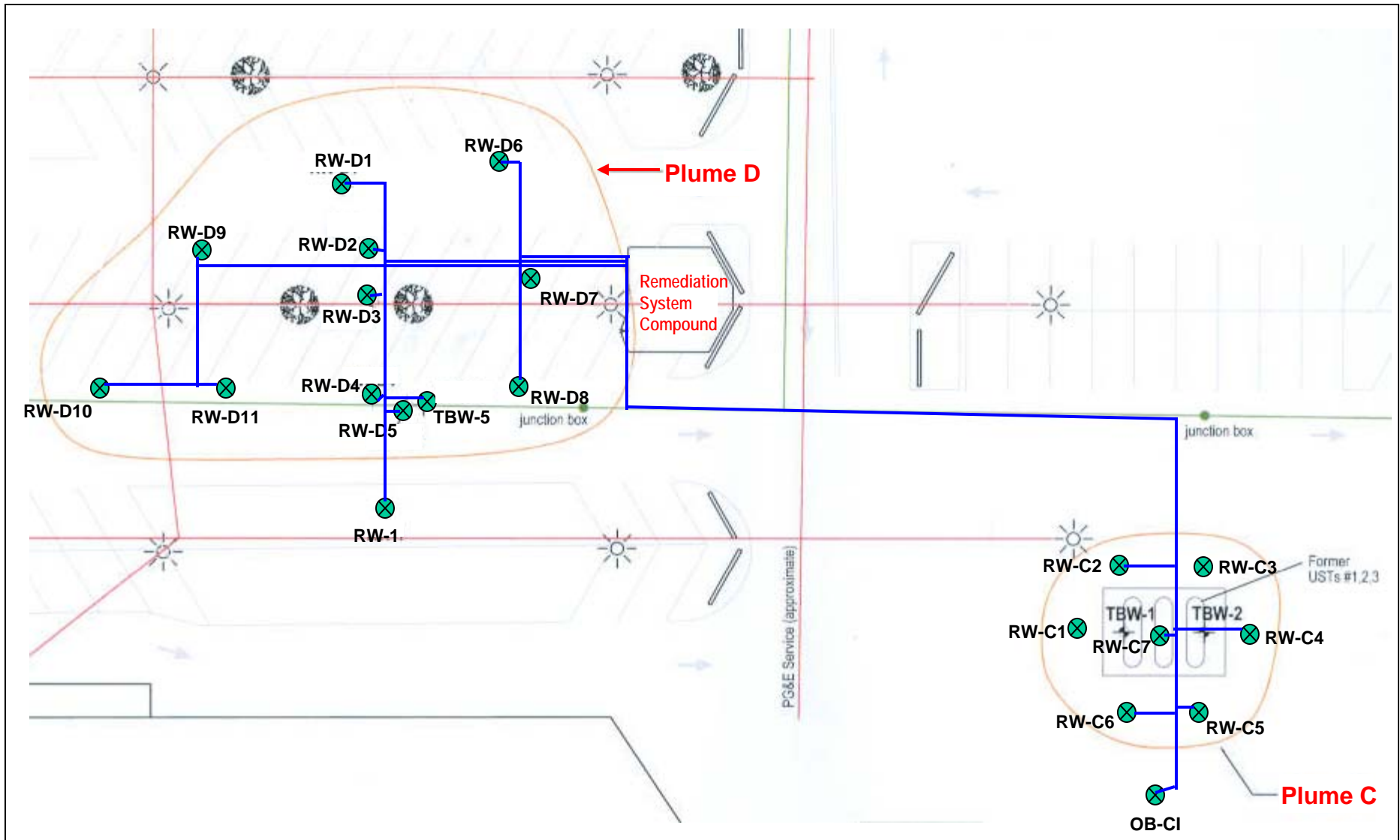
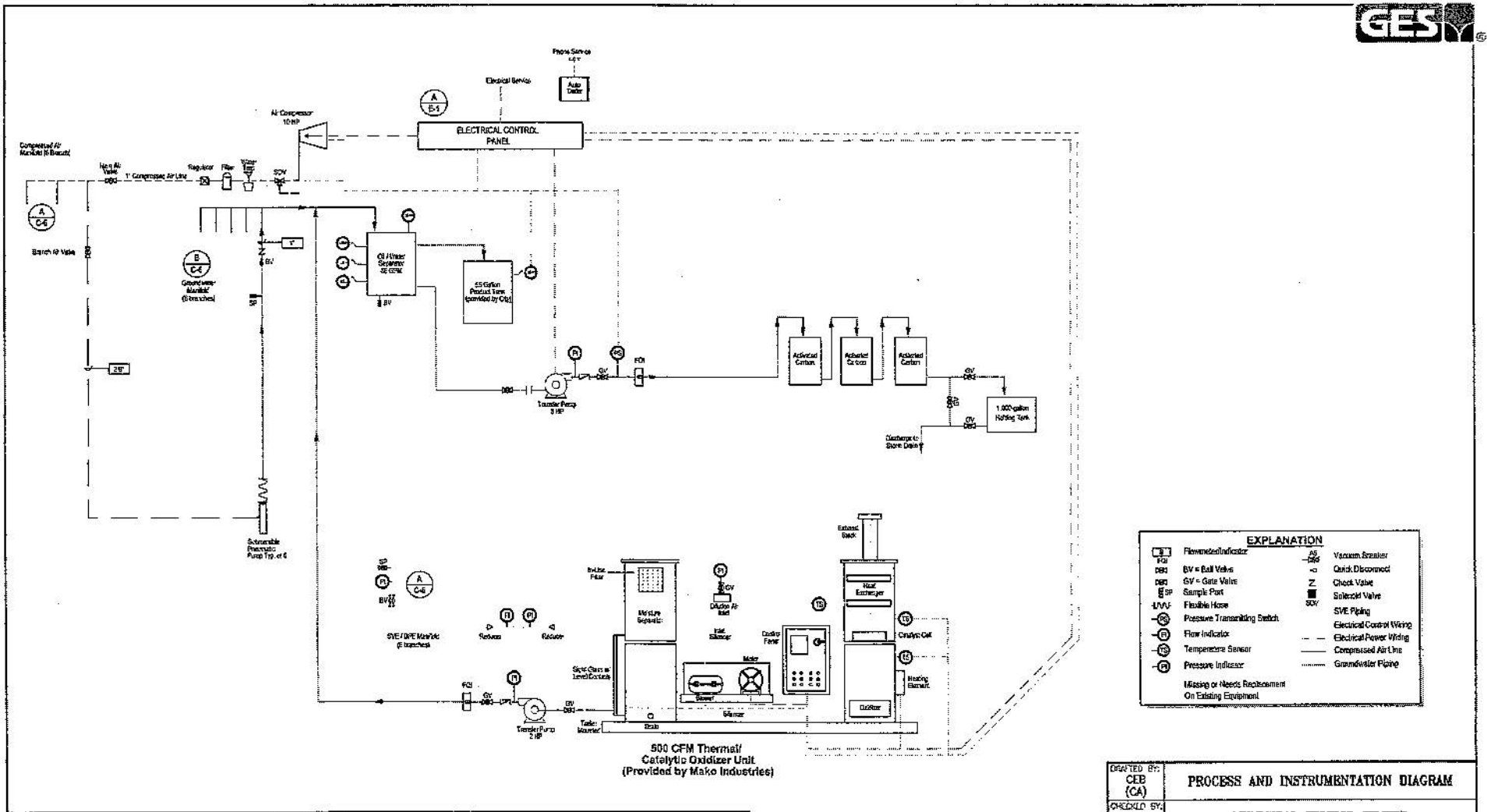


FIGURE 3 Identification of Extraction Wells & Trench Layout



EXPLANATION	
	Flowmeter/Indicator
	BV = Ball Valve
	GV = Gate Valve
	Sample Post
	Flexible Hose
	Pressure Transducing Switch
	Flow Indicator
	Temperature Sensor
	Pressure Indicator
	Vacuum Breaker
	Quick Disconnect
	Check Valve
	Solenoid Valve
	SVE Piping
	Electrical Control Wiring
	Electrical Power Wiring
	Compressed Air Line
	Groundwater Piping

Missing or Needs Replacement On Existing Equipment

DRAFTED BY: CEB (CA)	PROCESS AND INSTRUMENTATION DIAGRAM	
CHECKED BY: GMH	MUNICIPAL SERVICE CENTER 7101 EDGEWATER DRIVE OAKLAND, CALIFORNIA	
REVIEWED BY: NORTH	Groundwater & Environmental Services, Inc. 333 VINCENT ROAD, SUITE 222, PLEASANT HILL, CA 94523	
	NOT TO SCALE	DATE 11-02-05
		FIGURE M-1

FIGURE 4 Remediation System Process & Instrumentation Diagram

OTG EnviroEngineering Solutions, Inc.

City of Oakland Municipal Services Center
7101 Edgewater Drive, Oakland, CA

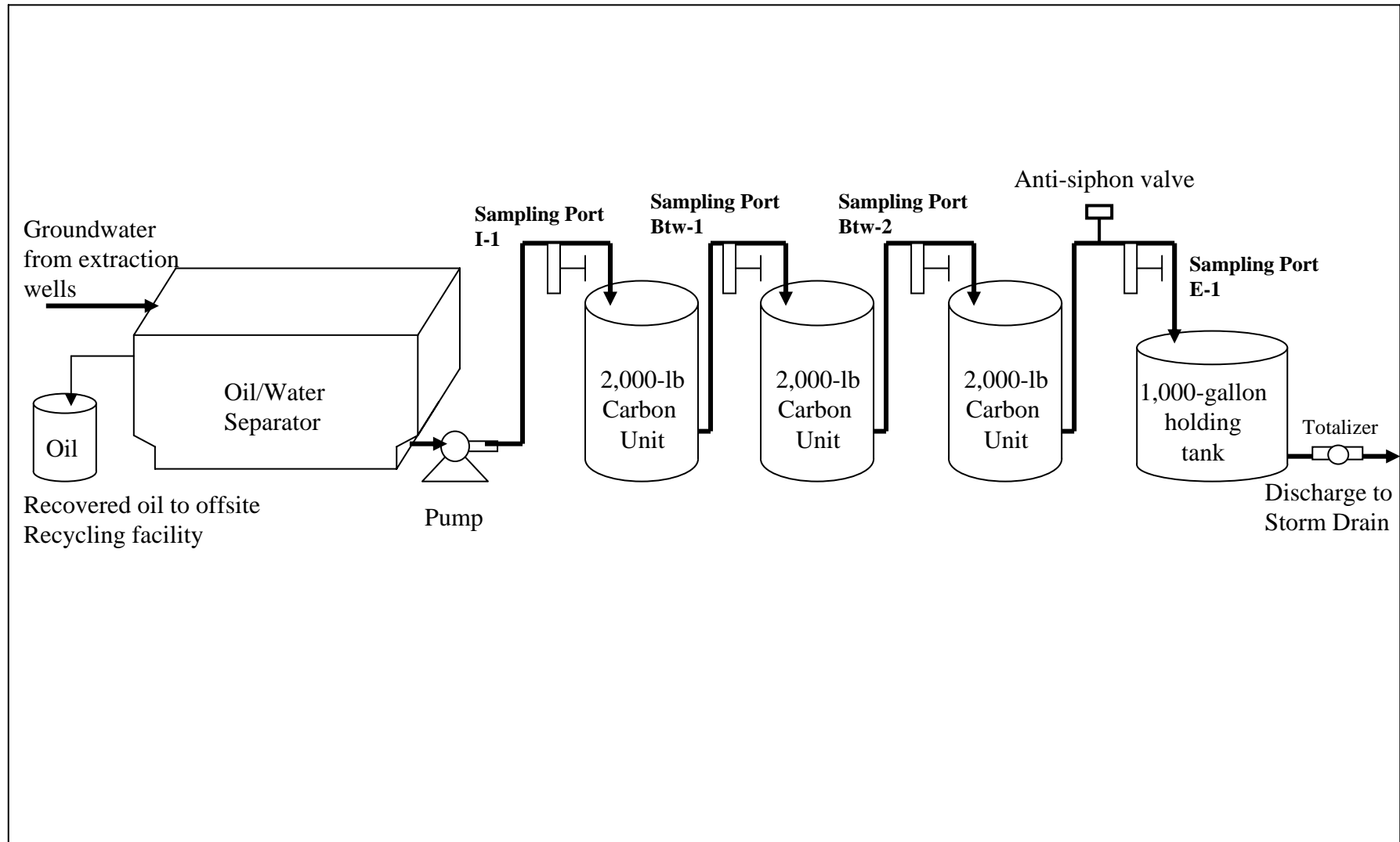


FIGURE 5 Schematic of Groundwater Treatment System and Sampling Locations

June 2006

OTG **EnviroEngineering**
Solutions, Inc.

City of Oakland Municipal Services Center
7101 Edgewater Drive, Oakland, CA

Table 1 - Laboratory Analytical Procedures
City of Oakland Municipal Services Center Groundwater Remediation Project

	5/22/06	5/30/06	6/26/06	7/25/06 & 8/11/06	9/5/06	10/4/06 & 12/6/06	11/8/06	1/19/07 & 2/22/07	3/14/07	4/24/07 5/17 & 6/21	7/27/07
Flow rate	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer
Turbidity	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	--
pH	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site
Temperature	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site
E. conductivity	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site
Fish bioassay			EPA/821/R-02/012		EPA/821/R-02/012		EPA/821/R-02/012		EPA/821/R-02/012		
Benzene	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8021B
Toluene	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8021B
Ethylbenzene	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8021B
Total xylenes	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8021B
MTBE	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8021B
TPHg & TPHd	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B
EDB	--	EPA 8260B	--	--	EPA 8260B	--	--	--	EPA 8260B	--	--
VOCs	--	EPA 8260B	--	--	EPA 8260B	--	--	--	EPA 8260B	--	--
TAME	--	EPA 8260B	--	--	EPA 8260B	--	--	--	EPA 8260B	--	--
DIPE	--	EPA 8260B	--	--	EPA 8260B	--	--	--	EPA 8260B	--	--
ETBE	--	EPA 8260B	--	--	EPA 8260B	--	--	--	EPA 8260B	--	--
TBA	--	EPA 8260B	--	--	EPA 8260B	--	--	--	EPA 8260B	--	--
Ethanol	--	EPA 8015B	--	--	EPA 8260B	--	--	--	EPA 8015B	--	--
Methanol	--	EPA 8015B	--	--	EPA 8015B	--	--	--	EPA 8015B	--	--
SVOCs	--	EPA 625	--	--	EPA 8270C	--	--	--	EPA 8270C	--	--
PAHs	--	EPA 610	--	--	EPA 8310	--	--	--	EPA 8310	--	--
Hardness	SM 2340B	SM 2340B	SM 2340B	--	SM 2340B	--	SM 2340B	--	SM 2340B	--	--
Antimony	EPA 200.8	EPA 200.8	EPA 6020	--	EPA 6020	--	EPA 6020	--	EPA 6020	--	--
Arsenic	EPA 200.8	EPA 200.8	EPA 6020	--	EPA 6020	--	EPA 6020	--	EPA 6020	--	--
Beryllium	EPA 200.8	EPA 200.8	EPA 6020	--	EPA 6020	--	EPA 6020	--	EPA 6020	--	--
Cadmium	EPA 200.8	EPA 200.8	EPA 6020	--	EPA 6020	--	EPA 6020	--	EPA 6020	--	--
Chromium	EPA 200.8	EPA 200.8	EPA 6020	--	EPA 6020	--	EPA 6020	--	EPA 6020	--	--
Cr +6	EPA 7196	EPA 7196	EPA 7199	--	EPA 7199	--	EPA 7199	--	EPA 7199	--	--
Copper	EPA 200.8	EPA 200.8	EPA 6020	--	EPA 6020	--	EPA 6020	--	EPA 6020	--	--
Cyanide	EPA 335.2	EPA 335.2	EPA 335.2	--	EPA 335.2	--	EPA 335.2	--	EPA 335.2	--	--
Lead	EPA 200.8	EPA 200.8	EPA 6020	--	EPA 6020	--	EPA 6020	--	EPA 6020	--	--
Mercury	EPA 245.1	EPA 245.1	EPA 7470A	--	EPA 7470A	--	EPA 7470A	--	EPA 7470A	--	--
Nickel	EPA 200.8	EPA 200.8	EPA 6020	--	EPA 6020	--	EPA 6020	--	EPA 6020	--	--
Selenium	EPA 200.8	EPA 200.8	EPA 6020	--	EPA 6020	--	EPA 6020	--	EPA 6020	--	--
Silver	EPA 200.8	EPA 200.8	EPA 6020	--	EPA 6020	--	EPA 6020	--	EPA 6020	--	--
Thallium	EPA 200.8	EPA 200.8	EPA 6020	--	EPA 6020	--	EPA 6020	--	EPA 6020	--	--
Zinc	EPA 200.8	EPA 200.8	EPA 6020	--	EPA 6020	--	EPA 6020	--	EPA 6020	--	--

Notes:

1. pH, conductivity, and temperature were measured on site using an Oakton pH/Con 10 meter, serial #311648, calibrated daily before use.
2. Turbidity was measured on site using an Oakton T-100 meter, serial #316738, calibrated daily before use.
3. Monthly air samples are analyzed for TPHg and BTEX.

Abbreviations:

BTEX = benzene, toluene, ethylbenzene, and total xylenes
 Cr +6 = chromium-VI
 DIPE = diisopropyl ether
 EDB = ethylene dibromide
 EPA = U.S. Environmental Protection Agency
 ETBE = ethyl tertiary butyl ether
 MTBE = methyl tertiary butyl ether
 PAHs = polycyclic aromatic hydrocarbons

SM = Standard Method
 SVOCs = semivolatle organic compounds
 TAME = tertiary amyl ether
 TBA = tertiary butyl alcohol
 TPHd = total petroleum hydrocarbons quantified as diesel
 TPHg = total petroleum hydrocarbons quantified as gasoline
 VOCs = volatile organic compounds

Table 1 - Laboratory Analytical Procedures
 City of Oakland Municipal Services Center Groundwater Remediation Project

	8/28/07	09/19/07	10/24/07	11/21/07	12/20/07	1/21/08	2/20/08	3/18/08	4/23/08	5/20 & 6/16/08 & 7/22/08	8/21/08
Flow rate	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer
Turbidity	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site
pH	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site
Temperature	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site
E. conductivity	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site
Fish bioassay							EPA/821/R-02/012				
Benzene	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8260B
Toluene	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8260B
Ethylbenzene	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8260B
Total xylenes	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8260B
MTBE	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8260B	EPA 8021B	EPA 8260B
TPHg & TPHd	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B
EDB	EPA 8260B	EPA 8260B	--	--	--	--	--	--	--	--	EPA 8260B
VOCs	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	--	--	--	EPA 8260B
TAME	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	--	--	--	EPA 8260B
DIPE	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	--	--	--	EPA 8260B
ETBE	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	--	--	--	EPA 8260B
TBA	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8260B	--	--	--	EPA 8260B
Ethanol	EPA 8260B	--	--	--	--	--	EPA 8015B	--	--	--	EPA 8015B
Methanol	EPA 8015B	--	--	--	--	--	EPA 8015B	--	--	--	EPA 8015B
SVOCs	EPA 8270C	--	--	--	--	--	EPA 8270C	--	--	--	EPA 8270C
PAHs	EPA 8310	--	--	--	--	--	EPA 8310	--	--	--	EPA 8310
Hardness	--	--	--	--	--	--	SM 2340B	--	--	--	--
Antimony	--	--	--	--	--	--	EPA 6020	--	--	--	--
Arsenic	--	--	--	--	--	--	EPA 6020	--	--	--	--
Beryllium	--	--	--	--	--	--	EPA 6020	--	--	--	--
Cadmium	--	--	--	--	--	--	EPA 6020	--	--	--	--
Chromium	--	--	--	--	--	--	EPA 6020	--	--	--	--
Cr +6	--	--	--	--	--	--	EPA 7199	--	--	--	--
Copper	--	--	--	--	--	--	EPA 6020	--	--	--	--
Cyanide	--	--	--	--	--	--	SM4500CN-E	--	--	--	--
Lead	--	--	--	--	--	--	EPA 6020	--	--	--	--
Mercury	--	--	--	--	--	--	EPA 7470A	--	--	--	--
Nickel	--	--	--	--	--	--	EPA 6020	--	--	--	--
Selenium	--	--	--	--	--	--	EPA 6020	--	--	--	--
Silver	--	--	--	--	--	--	EPA 6020	--	--	--	--
Thallium	--	--	--	--	--	--	EPA 6020	--	--	--	--
Zinc	--	--	--	--	--	--	EPA 6020	--	--	--	--

Table 1 - Laboratory Analytical Procedures
 City of Oakland Municipal Services Center Groundwater Remediation Project

	9/26/08	10/24/08 & 11/14/08	2/9/09	4/24/09 & 5/13/09	6/10/09	7/24/09 & 8/13/09	9/25/09	10/16/09
Flow rate	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer	on-site totalizer
Turbidity	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site
pH	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site
Temperature	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site
E. conductivity	on-site	on-site	on-site	on-site	on-site	on-site	on-site	on-site
Fish bioassay			EPA/821/R-02/012					
Benzene	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B
Toluene	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B
Ethylbenzene	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B
Total xylenes	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B
MTBE	EPA 8260B	EPA 8260B	EPA 8260B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B	EPA 8021B
TPHg & TPHd	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B	EPA 8015B
EDB	EPA 8260B	EPA 8260B	EPA 8260B	--	--	--	--	--
VOCs	EPA 8260B	EPA 8260B	EPA 8260B	--	--	--	--	--
TAME	EPA 8260B	EPA 8260B	EPA 8260B	--	--	--	--	--
DIPE	EPA 8260B	EPA 8260B	EPA 8260B	--	--	--	--	--
ETBE	EPA 8260B	EPA 8260B	EPA 8260B	--	--	--	--	--
TBA	EPA 8260B	EPA 8260B	EPA 8260B	--	--	--	--	--
Ethanol	--	--	EPA 8015B	--	--	--	--	--
Methanol	--	--	EPA 8015B	--	--	--	--	--
SVOCs	--	--	EPA 8270C	--	--	--	--	--
PAHs	--	--	EPA 8310	--	EPA8310	--	EPA8310	--
Hardness	--	--	--	--	--	--	--	--
Antimony	--	--	EPA 6020	--	--	--	--	--
Arsenic	--	--	EPA 6020	--	--	--	--	--
Beryllium	--	--	EPA 6020	--	--	--	--	--
Cadmium	--	--	EPA 6020	--	--	--	--	--
Chromium	--	--	EPA 6020	--	--	--	--	--
Cr +6	--	--	EPA 7199	--	--	--	--	--
Copper	--	--	EPA 6020	--	--	--	--	--
Cyanide	--	--	SM4500CN-E	--	--	--	--	--
Lead	--	--	EPA 6020	--	--	--	--	--
Mercury	--	--	EPA 7470A	--	--	--	--	--
Nickel	--	--	EPA 6020	--	--	--	--	--
Selenium	--	--	EPA 6020	--	--	--	--	--
Silver	--	--	EPA 6020	--	--	--	--	--
Thallium	--	--	EPA 6020	--	--	--	--	--
Zinc	--	--	EPA 6020	--	--	--	--	--

Table 2 - Operational Data and Field-Measured Parameters
 City of Oakland Municipal Services Center Groundwater Remediation Project

Date	Time	Effluent (E-1)				Influent (I-1)			Btw-1	Btw-2	Totalizer Reading (gallons)	Monthly Treated (gallons)	Monthly Ave. Rate (gpm)	Cumulative Floating Product Recovered (gallons)	Notes
		pH	Temp. (°C)	E. cond. (mS/cm)	Turbidity (NTU)	pH	Temp. (°C)	E. cond. (mS/cm)							
5/22/2006	7:00	--	--	--	--	--	--	--	--	--	1,389	--	--	--	Before turn on system
5/22/2006	11:25	8.30	20.4	8.81	0.20	7.12	21.4	10.20	sampled	--	2,050	--	--	--	treated water held in tank
5/22/2006	14:15	--	--	--	--	--	--	--	--	--	2,414	--	--	--	stopped, waiting for analy data
5/24/2006	13:00	--	--	--	--	--	--	--	--	--	2,414	--	--	--	system on, start discharge
5/30/2006	12:30	7.48	19.4	8.25	0.04	6.98	23.1	8.32	sampled	--	14,230	--	--	20	
5/31/2006	10:00	--	--	--	--	--	--	--	--	--	18,980	17,591	1.705	--	
6/2/2006	16:30	--	--	--	--	--	--	--	sampled	sampled	31,080	--	--	--	
6/9/2006	8:30	--	--	--	--	--	--	--	--	--	48,610	--	--	--	
6/16/2006	10:20	--	--	--	--	--	--	--	--	--	67,755	--	--	--	
6/19/2006	9:40	--	--	--	--	--	--	--	--	--	74,670	--	--	--	
6/22/2006	11:00	--	--	--	--	--	--	--	--	--	90,480	--	--	--	
6/26/2006	9:00	7.32	22.3	13.00	0.10	7.37	23.3	13.40	sampled	sampled	106,950	--	--	--	Monthly monitoring
6/30/2006	9:00	--	--	--	--	--	--	--	--	--	122,860	103,880	2.405	100	
7/5/2006	10:00	--	--	--	--	--	--	--	--	--	140,500	--	--	--	Two full drums of product
7/12/2006	9:30	--	--	--	--	--	--	--	sampled	sampled	163,230	--	--	--	
7/19/2006	9:30	--	--	--	--	--	--	--	--	--	182,740	--	--	--	
7/25/2006	9:30	7.35	23.6	12.50	0.04	7.40	24.2	13.10	sampled	--	197,030	--	--	--	Monthly monitoring
7/31/2006	19:30	--	--	--	--	--	--	--	--	--	212,010	89,150	1.997	155	
8/2/2006	19:30	--	--	--	--	--	--	--	--	--	216,790	--	--	165	Three full drums of product
8/9/2006	9:00	--	--	--	--	--	--	--	--	--	233,260	--	--	--	Morgan removed 3 drums product
8/11/2006	9:30	6.95	21.5	12.80	0.10	7.25	22.3	12.60	sampled	sampled	238,380	--	--	--	Monthly monitoring
8/14/2006	8:00	--	--	--	--	--	--	--	--	--	246,180	--	--	--	Lowered pumps in wells
8/17/2006	11:30	--	--	--	--	--	--	--	--	--	255,030	--	--	--	
8/28/2006	11:30	--	--	--	--	--	--	--	--	--	283,080	--	--	--	
9/1/2006	18:30	--	--	--	--	--	--	--	--	--	294,910	82,900	1.801	220	One full drum of product on site
9/5/2006	11:00	7.00	19.7	12.30	0.10	7.10	22.8	11.50	sampled	sampled	301,450	--	--	--	Monthly & Qtrly monitoring
9/9/2006	18:00	--	--	--	--	--	--	--	--	--	310,750	--	--	--	
9/17/2006	13:00	--	--	--	--	--	--	--	--	--	333,310	--	--	--	
9/22/2006	13:30	--	--	--	--	--	--	--	--	--	349,210	--	--	--	
9/27/2006	10:00	--	--	--	--	--	--	--	--	--	364,350	--	--	--	
9/29/2006	15:00	--	--	--	--	--	--	--	--	--	371,290	--	--	--	
10/2/2006	14:30	--	--	--	--	--	--	--	--	--	380,360	85,450	1.925	245	
10/4/2006	11:00	7.10	19.4	12.67	0.04	7.30	21.5	12.22	sampled	sampled	386,160	--	--	--	Monthly monitoring
10/9/2006	13:00	--	--	--	--	--	--	--	--	--	402,090	--	--	--	
10/16/2006	11:00	--	--	--	--	--	--	--	--	--	417,310	--	--	--	
10/23/2006	17:00	--	--	--	--	--	--	--	--	--	436,170	--	--	--	
10/27/2006	18:30	--	--	--	--	--	--	--	--	--	443,640	--	--	--	
10/30/2006	11:00	--	--	--	--	--	--	--	--	--	448,220	--	--	275	Two full drums of product
11/1/2006	10:30	--	--	--	--	--	--	--	--	--	453,340	72,980	1.689	--	
11/8/2006	11:00	7.35	18.6	10.03	0.10	7.03	21.7	10.79	sampled	sampled	461,210	--	--	--	Monthly & quarterly monitoring
11/14/2006	12:30	--	--	--	--	--	--	--	--	--	483,660	--	--	--	
11/20/2006	10:30	--	--	--	--	--	--	--	--	--	487,970	--	--	--	

Table 2 - Operational Data and Field-Measured Parameters
City of Oakland Municipal Services Center Groundwater Remediation Project

Date	Time	Effluent (E-1)				Influent (I-1)			Btw-1	Btw-2	Totalizer Reading (gallons)	Monthly Treated (gallons)	Monthly Ave. Rate (gpm)	Cumulative Floating Product Recovered (gallons)	Notes
		pH	Temp. (°C)	E. cond. (mS/cm)	Turbidity (NTU)	pH	Temp. (°C)	E. cond. (mS/cm)							
12/1/2006	11:30	--	--	--	--	--	--	--	--	--	499,540	46,200	1.069	295	
12/6/2006	11:00	7.10	12.3	15.40	0.08	8.45	14.8	17.70	sampled	sampled	504,500	--	--	--	Monthly monitoring
12/15/2006	10:00	--	--	--	--	--	--	--	--	--	513,050	--	--	--	
12/22/2006	14:30	--	--	--	--	--	--	--	--	--	533,130	--	--	--	
12/27/2006	10:00	--	--	--	--	--	--	--	--	--	540,340	--	--	315	2 full drums plus 40 gal product
1/2/2007	9:00	--	--	--	--	--	--	--	--	--	548,820	49,280	1.073	--	
1/10/2007	11:00	--	--	--	--	--	--	--	--	--	559,230	--	--	--	
1/19/2007	10:00	7.15	9.4	19.90	0.04	8.00	13.5	19.50	sampled	sampled	569,740	--	--	--	Monthly monitoring
1/30/2007	10:00	--	--	--	--	--	--	--	--	--	592,780	--	--	330	3 full drums product on site
2/2/2007	10:00	--	--	--	--	--	--	--	--	--	607,920	59,100	1.322	--	
2/8/2007	16:30	--	--	--	--	--	--	--	--	--	615,000	--	--	--	
2/22/2007	10:00	7.12	13.8	15.50	0.04	7.67	15.2	19.13	sampled	sampled	672,610	--	--	--	Monthly monitoring
2/28/2007	10:30	--	--	--	--	--	--	--	--	--	693,430	85,510	2.282	343	
3/9/2007	10:00	--	--	--	--	--	--	--	--	--	729,160	--	--	--	
3/14/2007	11:30	7.25	17.6	13.34	0.04	7.28	18.2	13.05	sampled	sampled	748,440	--	--	--	Monthly & quarterly monitoring
3/21/2007	12:00	--	--	--	--	--	--	--	--	--	776,540	--	--	--	
3/30/2007	10:00	--	--	--	--	--	--	--	--	--	809,690	116,260	2.693	355	3 full drums+25 gal prod on site
4/2/2007	10:00	--	--	--	--	--	--	--	--	--	819,750	--	--	--	
4/13/2007	10:00	--	--	--	--	--	--	--	--	--	849,540	--	--	--	
4/24/2007	10:00	7.45	15.7	7.10	0.08	7.30	18.6	6.90	sampled	sampled	866,110	--	--	--	
4/30/2007	19:00	--	--	--	--	--	--	--	--	--	875,415	65,725	1.455	360	3 full drums+30 gal prod on site
5/4/2007	10:30	--	--	--	--	--	--	--	--	--	880,280	--	--	--	
5/14/2007	12:00	--	--	--	--	--	--	--	--	--	--	--	--	--	DPE online with D2,D4,D5 wells
5/14/2007	18:00	--	--	--	--	--	--	--	--	--	--	--	--	--	DPE in & out vapor sampling
5/17/2007	11:30	7.22	18.0	14.15	0.04	7.55	19.8	14.54	sampled	sampled	907,175	--	--	--	Monthly monitoring
5/22/2007	11:15	--	--	--	--	--	--	--	--	--	952,055	--	--	--	DPE down for Phase II tie-in
5/31/2007	11:00	--	--	--	--	--	--	--	--	--	954,120	78,705	1.782	364	3 full drums+34 gal prod on site
6/11/2007	10:00	--	--	--	--	--	--	--	--	--	954,920	--	--	--	DPE restart with all wells
6/14/2007	10:00	--	--	--	--	--	--	--	--	--	973,900	--	--	--	
6/21/2007	10:00	7.38	19.2	15.13	0.04	7.45	20.1	15.24	sampled	sampled	991,590	--	--	--	Monthly monitoring
6/26/2007	18:40	--	--	--	--	--	--	--	--	--	1,028,960	--	--	--	DPE in & out vapor sampling
6/29/2007	18:30	--	--	--	--	--	--	--	--	--	1,047,840	93,720	2.220	368	3 full drums+38 gal prod on site
7/3/2007	11:30	--	--	--	--	--	--	--	--	--	1,051,974	--	--	--	DPE down, knockout pump fail
7/11/2007	15:00	--	--	--	--	--	--	--	--	--	1,053,090	--	--	--	Changed knockout tank pump
7/16/2007	8:15	--	--	--	--	--	--	--	--	--	1,095,560	--	--	--	DPE down, insulation worn out
7/19/2007	10:00	--	--	--	--	--	--	--	--	--	1,096,110	--	--	--	DPE unit to factory for repair
7/23/2007	11:00	--	--	--	--	--	--	--	--	--	1,096,610	--	--	--	Removed 6 gal oil fr o/w septr
7/27/2007	9:30	7.16	21.0	11.79	--	7.07	19.4	19.57	sampled	sampled	1,096,780	--	--	--	Monthly monitoring
7/31/2007	13:00	--	--	--	--	--	--	--	--	--	1,097,310	49,470	1.081	374	Re-installed DPE, started at 11a
8/7/2007	19:30	--	--	--	--	--	--	--	--	--	1,118,930	--	--	--	Removed 5 gal oily sludge fr DPE
8/17/2007	10:00	--	--	--	--	--	--	--	--	--	1,147,080	--	--	--	Morgan removed 4 drums product
8/28/2007	11:36	7.08	25.9	18.64	4.60	7.13	25.6	18.55	sampled	sampled	1,198,870	--	--	--	Monthly monitoring

Table 2 - Operational Data and Field-Measured Parameters
 City of Oakland Municipal Services Center Groundwater Remediation Project

Date	Time	Effluent (E-1)				Influent (I-1)			Btw-1	Btw-2	Totalizer Reading (gallons)	Monthly Treated (gallons)	Monthly Ave. Rate (gpm)	Cumulative Floating Product Recovered (gallons)	Notes
		pH	Temp. (°C)	E. cond. (mS/cm)	Turbidity (NTU)	pH	Temp. (°C)	E. cond. (mS/cm)							
8/31/2007	10:30	--	--	--	--	--	--	--	--	--	1,216,800	119,490	2.686	379	
9/7/2007	9:30	--	--	--	--	--	--	--	--	--	1,263,270	--	--	--	
9/14/2007	11:30	--	--	--	--	--	--	--	--	--	1,309,960	--	--	--	Display meter blinks
9/19/2007	10:50	6.96	19.8	18.64	6.92	7.08	20.8	18.65	sampled	sampled	1,340,410	--	--	--	Monthly monitoring
9/26/2007	10:20	--	--	--	--	--	--	--	--	--	1,352,170	--	--	--	Shutdown DPE, T sensor pb1m
9/28/2007	12:00	--	--	--	--	--	--	--	--	--	1,352,690	135,890	3.363	379	only pneumatic pumps on
10/2/2007	12:00	--	--	--	--	--	--	--	--	--	1,353,380	--	--	--	
10/8/2007	17:30	--	--	--	--	--	--	--	--	--	1,354,020	--	--	--	DPE on at 4:30 pm
10/17/2007	11:00	--	--	--	--	--	--	--	--	--	1,394,995	--	--	--	
10/24/2007	14:13	7.08	25.5	14.32	0.66	7.19	29.6	14.23	sampled	sampled	1,406,110	--	--	--	Monthly monitoring
10/31/2007	10:30	--	--	--	--	--	--	--	--	--	1,418,260	65,570	1.382	379	
11/7/2007	11:00	--	--	--	--	--	--	--	--	--	1,427,640	--	--	--	
11/16/2007	10:30	--	--	--	--	--	--	--	--	--	1,500,460	--	--	--	
11/21/2007	10:21	7.10	20.5	OR	0.30	7.04	20.1	OR	sampled	sampled	1,537,150	--	--	--	Monthly monitoring
11/30/2007	9:30	--	--	--	--	--	--	--	--	--	1,584,070	165,810	3.844	379	
12/7/2007	10:30	--	--	--	--	--	--	--	--	--	1,621,980	--	--	--	
12/13/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Shutdown for carbon change
12/14/2007	13:00	--	--	--	--	--	--	--	--	--	--	--	--	--	DPE on at 1:00 pm
12/17/2007	11:15	--	--	--	--	--	--	--	--	--	1,643,760	--	--	--	
12/20/2007	18:30	7.20	15.1	23.50	0.10	7.20	13.7	25.20	sampled	sampled	1,658,560	--	--	--	Monthly monitoring
12/31/2007	9:00	--	--	--	--	--	--	--	--	--	1,685,340	101,270	2.270	379	
1/4/2008	14:30	--	--	--	--	--	--	--	--	--	1,701,860	--	--	--	
1/15/2008	13:00	--	--	--	--	--	--	--	--	--	1,725,190	--	--	--	
1/21/2008	9:30	--	--	--	--	--	--	--	sampled	sampled	1,742,110	--	--	--	Monthly monitoring
1/30/2008	11:30	--	--	--	--	--	--	--	--	--	1,791,840	106,500	2.457	379	
2/1/2008	15:30	--	--	--	--	--	--	--	--	--	1,799,660	--	--	--	
2/11/2008	11:00	--	--	--	--	--	--	--	--	--	1,826,520	--	--	--	
2/20/2008	11:18	6.95	17.4	12.85	1.15	6.99	20.1	12.71	sampled	sampled	1,844,380	--	--	--	Monthly/Annual Monitoring
2/29/2008	10:30	--	--	--	--	--	--	--	--	--	1,862,840	71,000	1.646	379	
3/3/2008	11:30	--	--	--	--	--	--	--	--	--	1,868,500	--	--	--	
3/14/2008	11:00	--	--	--	--	--	--	--	--	--	1,906,770	--	--	--	
3/18/2008	10:25	7.02	18.4	14.01	2.32	6.99	19.1	12.34	sampled	sampled	1,928,330	--	--	--	Monthly monitoring
3/20/2008	11:00	--	--	--	--	--	--	--	--	--	1,939,430	--	--	--	
3/31/2008	9:00	--	--	--	--	--	--	--	--	--	1,990,150	127,310	2.858	379	
4/7/2008	9:00	--	--	--	--	--	--	--	--	--	2,019,060	--	--	--	
4/14/2008	10:00	--	--	--	--	--	--	--	--	--	2,044,990	--	--	--	
4/18/2008	11:00	--	--	--	--	--	--	--	--	--	2,058,850	--	--	--	
4/23/2008	10:35	7.00	18.6	19.62	1.58	7.03	20.0	19.38	sampled	sampled	2,075,700	--	--	--	Monthly monitoring
4/30/2008	10:00	--	--	--	--	--	--	--	--	--	2,082,390	92,240	2.132	379	
5/15/2008	11:00	--	--	--	--	--	--	--	--	--	2,082,540	--	--	--	
5/20/2008	10:45	7.09	20.4	18.87	6.42	7.10	21.2	18.70	sampled	sampled	2,117,920	--	--	--	Monthly monitoring
5/29/2008	10:30	--	--	--	--	--	--	--	--	--	2,135,490	53,100	1.271	379	

Table 2 - Operational Data and Field-Measured Parameters
 City of Oakland Municipal Services Center Groundwater Remediation Project

Date	Time	Effluent (E-1)				Influent (I-1)			Btw-1	Btw-2	Totalizer Reading (gallons)	Monthly Treated (gallons)	Monthly Ave. Rate (gpm)	Cumulative Floating Product Recovered (gallons)	Notes
		pH	Temp. (°C)	E. cond. (mS/cm)	Turbidity (NTU)	pH	Temp. (°C)	E. cond. (mS/cm)							
6/2/2008	10:30	--	--	--	--	--	--	--	--	--	2,153,070	--	--	--	
6/9/2008	10:30	--	--	--	--	--	--	--	--	--	2,167,260	--	--	--	
6/16/2008	10:45	7.08	17.5	19.69	1.37	7.15	19.1	19.33	sampled	sampled	2,190,790	--	--	--	Monthly monitoring
6/30/2008	10:30	--	--	--	--	--	--	--	--	--	2,197,580	62,090	1.347	379	
7/8/2008	10:00										2,211,120				
7/16/2008	11:00										2,222,440				
7/22/2008	15:30	7.11	22.3	17.61	0.50	7.16	27.7	19.92	sampled	sampled	2,235,190				monthly monitoring
7/31/2008	19:00										2,251,160	53,580	1.187	379	
8/11/2008	10:00										2,266,510				
8/21/2008	12:45	7.20	23.9	14.63	1.00	7.24	25.4	15.26	sampled	sampled	2,282,900				monthly monitoring
8/29/2008	11:00										2,286,920	35,760	0.866	379	
9/11/2008	11:00										2,288,400				
9/26/2008	12:20	7.07	23.5	11.49	3.00	7.12	27.3	11.85	sampled	sampled	2,308,430				monthly monitoring
9/30/2008	19:30										2,325,280	38,360	0.823	379	
10/6/2008	11:00										2,325,310				
10/13/2008	17:45										2,339,300				
10/24/2008	13:00	7.05	22.1	11.75	4.00	7.10	25.8	12.22		sampled	2,365,580				monthly monitoring
10/31/2008	18:00										2,375,580	50,300	1.129	379	
11/10/2008	16:30										2,379,380				
11/14/2008	15:00	7.10	20.4	11.55	4.00	7.15	22.6	12.10	sampled	sampled	2,387,290				shutdown aft sampling for overhaul
11/28/2008	10:00										2,387,290	11,710	0.294	379	
12/31/2008	10:00										2,387,290	0	0.000	379	no operation in Dec 08
1/2/2009	15:00										2,387,290				changed 2nd & 3rd carbon vessels
1/20/2009	12:00										2,387,290	0	0.000	379	no operation in Jan 09, repair
2/2/2009	11:30										2,391,110				
2/9/2009	15:30	7.05	13.0	14.62	1.80	7.10	18.9	14.01	sampled	sampled	2,449,360				annual monitoring
2/19/2009	6:15										2,465,280	77,990	1.934	379	shutdown due to fire
3/23/2009	10:00										2,465,280	0	0.000	379	no operation in March, except testing eq
4/6/2009	14:00										2,490,430				restarted on 4/1
4/20/2009	11:30										2,491,360				
4/24/2009	14:00	7.02	20.6	12.08	2.00	7.06	21.9	12.51		sampled	2,506,510				monthly monitoring
5/1/2009	19:00										2,520,290	55,010	1.232	379	
5/6/2009	19:30										2,532,070				
5/13/2009	12:30	7.30	23.8	14.05	2.50	7.70	25.4	13.86		sampled	2,564,550				monthly monitoring
5/19/2009	18:20										2,581,890				
5/29/2009	19:00										2,600,493	80,203	1.989	379	start extraction fr plume C on 5/26
6/8/2009	19:00										2,603,180				
6/10/2009	15:30	7.25	22.1	10.30	3.00	7.70	24.1	8.76		sampled	2,613,255				quarterly monitoring
6/22/2009	10:30										2,615,200				
6/30/2009	19:00										2,635,730	35,237	0.765	379	
7/6/2009	19:30										2,644,590				
7/21/2009	14:45										2,654,240				

Table 2 - Operational Data and Field-Measured Parameters
City of Oakland Municipal Services Center Groundwater Remediation Project

Date	Time	Effluent (E-1)				Influent (I-1)			Btw-1	Btw-2	Totalizer Reading (gallons)	Monthly Treated (gallons)	Monthly Ave. Rate (gpm)	Cumulative Floating Product Recovered (gallons)	Notes
		pH	Temp. (°C)	E. cond. (mS/cm)	Turbidity (NTU)	pH	Temp. (°C)	E. cond. (mS/cm)							
7/24/2009	14:30	7.20	21.7	11.23	2.00	7.70	24.0	9.23		sampled	2,661,790				monthly monitoring
7/31/2009	10:30										2,667,070	31,340	0.710	379	
8/7/2009	11:30										2,682,960				
8/13/2009	15:30	7.25	24.6	9.05	2.50	7.50	26.7	9.12	sampled	sampled	2,708,000				monthly monitoring
8/21/2009	10:00										2,726,490				
8/28/2009	10:00										2,743,530	76,460	1.898	379	
9/14/2009	19:00										2,744,430				removed 5-gal oily sludge fr knockout tank
9/25/2009	13:45	7.10	23.8	12.58	3.00	7.70	25.8	12.69		sampled	2,755,770				quarterly monitoring
9/30/2009	19:00										2,772,720	29,190	0.607	379	
10/2/2009	10:30										2,775,660				
10/12/2009	10:30										2,786,540				cleaned all level sensors
10/16/2009	11:00	7.25	21.8	9.37	5.00	7.55	22.9	9.63		sampled	2,789,170				monthly monitoring
10/23/2009	10:00										2,824,780				
10/30/2009	19:30										2,848,870	76,150	1.762	379	
11/6/2009	15:30										2,848,870				
11/11/2009	16:20										2,848,870				vapor sampling
11/20/2009	14:30										2,848,870				
11/30/2009	16:30										2,848,870	0	0.000	379	
12/8/2009	16:00										2,848,870				
12/16/2009	14:30										2,848,870				vapor sampling
12/23/2009	14:00										2,848,870	0	0.000	379	system shutdown

Abbreviations:

- "--" indicates no value obtained for given field
- °C = degree Celsius
- DPE = dual-phase extraction
- gpm = gallon(s) per minute
- mS/cm = milliSiemen(s) per centimeter
- NTU = nephelometric turbidity unit
- OR = sample was out of range (>19.99 mS/cm)

Table 3 - Petroleum Hydrocarbon Analytical Data
City of Oakland Municipal Services Center Groundwater Remediation Project

Date	Effluent (E-1)								Influent (I-1)							
	TPHg (µg/L)	TPHd (µg/L)	TPHmo (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	TPHg (µg/L)	TPHd (µg/L)	TPHmo (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)
Eff. Limit	50	50	50	5	5	5	5	5								
5/22/06	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	52,000	25,000 (h,l)	--	6,100	5,200	1,200	6,100	ND (100)
5/30/06	ND (50)	130 (y, a1)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	57,000	9,200 (l,y)	--	4,900	5,300	1,100	7,100	ND (36)
6/2/06	--	ND (50)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6/26/06	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	50,000	10,000 (h,l,y)	--	4,800	6,900	1,100	7,200	ND (50)
7/12/06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7/25/06	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	60,000	4,000 (l,y)	--	5,800	8,800	1,100	9,000	ND (80)
8/11/06	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	4.6 (a1a)	59,000	4,100 (l,y)	--	4,900	7,300	930	7,000	ND (100)
9/5/06	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	44,000	4,800 (l,y)	--	4,700	4,800	1,200	5,400	ND (50)
10/4/06	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	42,000	9,100 (h,l,y)	--	5,100	7,300	1,400	6,700	ND (100)
11/8/06	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	32,000	7,800 (h,l,y)	--	3,100	3,800	590	2,880	ND (50)
12/6/06	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	55,000	7,600 (h,l,y)	--	5,800	8,600	820	6,600	ND (50)
1/19/07	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	49,000	3,600 (l,y)	--	3,900	5,400	390	5,900	ND (50)
2/22/07	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	38,000	7,900 (l,y)	--	4,100	4,500	250	5,200	ND (40)
3/14/07	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	32,000	7,800 (h,l,y)	--	2,700	2,900	310	4,100	ND (13)
4/24/07	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	11,000	6,200 (h,l)	1,500 (l)	930	110	26	760	ND (10)
5/17/07	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	84,000	180,000 (h,l,y)	27,000 (l)	1,100	3,100	1,200	8,800	ND (100)
6/21/07	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	8,900	7,700 (h,l,y)	2,900 (l)	460	520	34	1,060	ND (2.0)
7/27/07	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	16,000	9,100 (h,l,y)	--	250	770	ND (2.5)	2,390	ND (10)
8/28/07	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	5,100	8,100 (h,l)	--	130	110	11	620	ND (2.0)
9/19/07	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	3,000	12,000 (h,l)	6,100 (h,l)	78	68	13	230	ND (0.5)
10/24/07	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	1,900	12,000 (y)	2,500	22	10	4.3	144	ND (2.0)
11/21/07	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	3,600	9,000	2,700	120	150	2.8	440	--
12/20/07	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	5,100	25,000	2,200 (y)	160	330	43	750	ND (2.0)
1/21/08	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	14,000	14,000 (y)	1,100	100	360	22	2,250	ND (10)
2/20/08	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (50)	6,100	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
3/18/08	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	2,300	9,000	2,300	43	120	25	430	ND (2.0)
4/23/08	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	2,300	14,000	7,000	19	66	9.7	470	ND (0.5)
5/20/08	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	2,900	20,000	2,500	23	70	11	390	ND (2.0)
6/16/08	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	1,400	6,700	1,100	9	23	9.3	159	ND (2.0)
7/22/08	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	2,300	9,400 (y)	6,300	16	37	5.6	280	ND (2.0)
8/21/08	ND (50)	ND (50)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	1,300	12,000	--	10	15	2.2	137	ND (2.0)
9/26/08	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	1,400	14,000	5,900	18	21	4.4	168	ND (0.5)
10/24/08	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	1,000	10,000	6,800	14	14	4.6	134	ND (0.5)
11/14/08	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	1,000	8,100	3,400	15	15	3	155	ND (0.5)
2/9/09	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	1,400	11,000	2,000	18	26	7.6	240	ND (0.5)
4/24/09	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	1,200	13,000	1,800	22	24	7.7	167	ND (2.0)
5/13/09	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	1,100	17,000	1,400	7.2	14	3.9	135	ND (2.0)
6/10/09	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	980	11,000	2,200	19	3.1	1.5	35	ND (2.0)
7/24/09	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	560	13,000	2,200	2.7	2.5	1.1	14	ND (2.0)
8/13/09	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	530	12,000	2,400	7.7	2	2	26	ND (2.0)
9/25/09	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	440	4,400	480	9.7	2.1	2.1	19	ND (2.0)
10/16/09	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	310	8,900	2,400	3.8	0.94	1	14	ND (2.0)

Table 3 - Petroleum Hydrocarbon Analytical Data
 City of Oakland Municipal Services Center Groundwater Remediation Project

Date	After 1st Carbon Unit (Btw-1)								After 2nd Carbon Unit (Btw-2)							
	TPHg (µg/L)	TPHd (µg/L)	TPHmo (ug/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	TPHg (µg/L)	TPHd (µg/L)	TPHmo (ug/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)
Eff. Limit	50	50		5	5	5	5	5	50	50		5	5	5	5	5
5/22/06	57 (y)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	--	--		--	--	--	--	--
5/30/06	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--		--	--	--	--	--
6/2/06	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	ND (50)		--	--	--	--	--
6/26/06	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
7/12/06	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	3.9 (a2)
7/25/06	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	2.7	--	--		--	--	--	--	--
8/11/06	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	5.1 (a2a)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	5.4 (a2a)
9/5/06	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	--	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
10/4/06	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
11/8/06	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
12/6/06	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
1/19/07	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
2/22/07	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
3/14/07	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	3.9	--	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
4/24/07	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
5/17/07	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
6/21/07	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
7/27/07	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
8/28/07	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	5.6 (a)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
9/19/07	ND (50)	ND (50)*		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	6.7	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
10/24/07	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	7.6	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
11/21/07	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--
12/20/07	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
1/21/08	60 (y)	84 (y)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
2/20/08	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	--	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
3/18/08	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
4/23/08	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
5/20/08	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND(2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
6/16/08	ND (50)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND(2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
7/22/08	92 (y,z)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND(2.0)	78 (y,z)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
8/21/08	55 (y)	ND (50)		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND(2.0)	ND (50)	--		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
9/26/08	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	76 (y,z)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
10/24/08	--	--	--	--	--	--	--	--	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
11/14/08	--	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	74 (y,z)	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
2/9/09	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
4/24/09	--	--	--	--	--	--	--	--	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
5/13/09	--	--	--	--	--	--	--	--	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
6/10/09	--	--	--	--	--	--	--	--	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
7/24/09	--	--	--	--	--	--	--	--	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	0.62	ND (2.0)
8/13/09	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
9/25/09	--	--	--	--	--	--	--	--	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
10/16/09	--	--	--	--	--	--	--	--	ND (50)	ND (50)	ND (300)	ND (0.5)	ND (0.5)	ND (0.5)	0.65	ND (2.0)

Table 3 - Petroleum Hydrocarbon Analytical Data
City of Oakland Municipal Services Center Groundwater Remediation Project

Notes:

- (a1) - false positive detection, confirmed ND on 6/2/06 with samples at E-1, Btw-1, and Btw-2
- (a) - Presence confirmed, but RPD between columns exceeds 40 percent
- (a2) - false positive detection, confirmed ND after the first carbon unit
- (a2a) - false positive detection, confirmed ND with 9/5/06 sample
- (h) - heavier hydrocarbons contributed to the quantitation
- (l) - lighter hydrocarbons contributed to the quantitation
- (y) - sample exhibits chromatographic pattern that does not resemble standard
- (z) - sample exhibits unknown single peak or peaks
- * - Sample analytical result for TPHd was erroneously switched between Btw-1 and Btw-2 in the laboratory report, due to mislabeling in the field.

Abbreviations:

- "-" indicates not analyzed for constituent indicated
- MTBE = methyl tertiary butyl ether
- µg/L = microgram(s) per liter
- ND () = non-detected lab values
- TPHd = total petroleum hydrocarbons quantified as diesel
- TPHg = total petroleum hydrocarbon quantified as gasoline
- TPHmo = total petroleum hydrocarbon quantified as motor oil

Table 4 - Inorganic Constituents Analytical Data and Fish Bioassay Results
City of Oakland Municipal Services Center Groundwater Remediation Project

Constituent	Unit	Eff Limit (<10 gpm)	Effluent (E-1)								2/20/2008	2/9/2009
			5/22/06	5/30/06	6/26/06	9/5/06	11/8/06	3/14/07	8/28/07			
Antimony	µg/L	6	2.30	1.80	0.12	0.13	0.35	0.15	--	0.47 J	1.70	
	g/day	3	0.02137	0.01672	0.00157	0.00138	0.00243	0.00163	--	0.004216		
Arsenic	µg/L	10	36.00	24.00	7.00	3.00	4.30	1.60	--	4.40	10.00	
	g/day	1	0.33444	0.22296	0.09170	0.03177	0.02980	0.01736	--	0.039468		
Beryllium	µg/L	1	ND (0.35)	ND (0.5)	ND (0.055)	ND (0.12)	ND (0.12)	ND (0.17)	--	ND (1.0)	ND (0.1)	
	g/day	3	--	--	--	--	--	--	--	--		
Cadmium	µg/L	0.07	1.00	0.50	ND (0.14)	ND (0.17)	ND (0.17)	0.12	--	0.26 J	0.66 (J)	
	g/day	1	0.00929	0.00465	--	--	--	0.00130	--	0.002332		
Total Cr	µg/L	11	3.10	ND (0.5)	0.62	0.86	0.78	0.61	--	0.25 J	0.28 (J)	
	g/day	2	0.02880	--	0.00812	0.00911	0.00541	0.00662	--	0.002243		
Cr +6	µg/L	11	ND (1.0)	ND (10)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	
	g/day	2	--	--	--	--	--	--	--	--		
Copper	µg/L	3.1	1.30	0.90	1.30	1.50	1.20	ND (0.28)	--	0.70 J	40	
	g/day	3	0.01208	0.00836	0.01703	0.01589	0.00832	--	--	0.006279		
Lead	µg/L	2	ND (0.1)	ND (0.25)	0.26	0.30	0.30	0.75	--	1.70	5.50	
	g/day	5	--	--	0.00341	0.00318	0.00208	0.00814	--	0.015249		
Mercury	µg/L	0.025	ND(0.008)	ND(0.2)	ND (0.2)	ND (0.06)	ND (0.02)	0.06	--	ND (0.2)	0.14 (J)	
	g/day	0.01	--	--	--	--	--	0.00068	--	--		
Nickel	µg/L	8.2	11.00	67.00	15.00	9.60	2.90	1.50	--	8.10	7.20	
	g/day	5	0.10219	0.62243	0.19650	0.10166	0.02010	0.01628	--	0.072657		
Selenium	µg/L	5	3.00	3.00	1.20	ND (0.35)	1.20	ND (0.27)	--	ND (1.0)	0.17 (J)	
	g/day	2	0.02787	0.02787	0.01572	--	0.00832	--	--	--		
Silver	µg/L	1.9	ND (0.02)	ND (0.1)	ND (0.041)	ND (0.07)	ND (0.07)	ND (0.079)	--	ND (1.0)	0.23 (J)	
	g/day	1	--	--	--	--	--	--	--	--		
Thallium	µg/L	0.1	0.06	ND (0.1)	0.21	ND (0.03)	ND (0.03)	ND (0.3)	--	ND (1.0)	ND (0.03)	
	g/day	3	0.00056	--	0.00275	--	--	--	--	--		
Zinc	µg/L	35	2.00	ND (10)	44.00	11.00	1.90	10.00	--	6.40	4.3 (J)	
	g/day	10	0.01858		0.57640	0.11649	0.01317	0.10850	--	0.057408		
Cyanide	µg/L	1	ND (0.8)	ND (3)	ND (10)	ND (10)	ND (10)	ND (10)	--	0.08	ND (10)	
	g/day		--	--	--	--	--	--	--	0.000718		
Hardness	mg/L CaCO ₃		560	960	1,100	1,100	1,500	1,400	--	1,800		
Fish Bioassay -												
% Survival of Rainbow Trout			--	--	100%	100%	100%	100%	--	100%	95%	

Table 4 - Inorganic Constituents Analytical Data and Fish Bioassay Results
 City of Oakland Municipal Services Center Groundwater Remediation Project

Constituent	Unit	Eff Limit (<10 gpm)	Influent (I-1)								2/20/08	2/9/09
			5/22/06	5/30/06	6/26/06	9/5/06	11/8/06	3/14/07	8/28/07			
Antimony	µg/L		ND (60)	ND (1)	--	--	--	1.10	--	0.74 J	1.9	
	g/day	3	--	--	--	--	--	0.01194	--	0.006279		
Arsenic	µg/L		7.20	8.50	--	--	--	5.40	--	6.1	13	
	g/day	1	0.06689	0.07897	--	--	--	0.05859	--	0.054717		
Beryllium	µg/L		ND (2)	ND (1)	--	--	--	ND (0.17)	--	ND (1.0)	ND (0.1)	
	g/day	3	--	--	--	--	--	--	--	--		
Cadmium	µg/L		34.00	10.00	--	--	--	0.33	--	1.6	41	
	g/day	1	0.31586	0.09290	--	--	--	0.00358	--	0.014352		
Total Cr	µg/L		ND (10)	ND (1)	--	--	--	0.91	--	0.72 J	0.89 (J)	
	g/day	2	--	--	--	--	--	0.00987	--	0.006279		
Cr +6	µg/L		ND (0.5)	ND (0.5)	--	--	--	ND (0.5)	--	ND (0.5)	ND (0.5)	
	g/day	2	--	--	--	--	--	--	--	--		
Copper	µg/L		250.00	25.00	--	--	--	ND (0.28)	--	9.2	830	
	g/day	3	2.32250	0.23225	--	--	--	--	--	0.082524		
Lead	µg/L		28.00	21.00	--	--	--	8.10	--	18	150	
	g/day	5	0.26012	0.19509	--	--	--	0.08789	--	0.16146		
Mercury	µg/L		ND (0.2)	ND (0.2)	--	--	--	0.05	--	ND (0.2)	0.25	
	g/day	0.01	--	--	--	--	--	0.00051	--	--		
Nickel	µg/L		68.00	19.00	--	--	--	2.80	--	6.4	130	
	g/day	5	0.63172	0.17651	--	--	--	0.03038	--	0.057408		
Selenium	µg/L		9.40	ND (1)	--	--	--	0.31	--	0.34 J	0.60 (J)	
	g/day	2	0.08733	--	--	--	--	0.00336	--	0.006279		
Silver	µg/L		ND (5)	ND (1)	--	--	--	ND (0.079)	--	ND (1.0)	1.6	
	g/day	1	--	--	--	--	--	--	--	--		
Thallium	µg/L		25.00	ND (1)	--	--	--	ND (0.30)	--	ND (1.0)	ND (0.03)	
	g/day	3	0.23225	--	--	--	--	--	--	--		
Zinc	µg/L		31.00	57.00	--	--	--	23.00	--	37	51	
	g/day	10	0.28799	0.52953	--	--	--	0.24955	--	0.33189		
Cyanide	µg/L		10.00	10.00	--	--	20.00	30.00	--	0.8	ND (10)	
	g/day		0.09290	0.09290	--	--	--	0.32550	--	0.007176		
Abbreviations:												
"--" indicates no value obtained for given field			J = Estimated value, below reporting limit, but above method detection limit									
Cr +6 = chromium-VI			mg/L CaCO ₃ = milligram(s) per liter of calcium carbonate									
g/day = grams per day			µg/L = microgram(s) per liter									
gpm = gallon(s) per minute			ND () = non-detected lab value									

Table 5 - Organic Constituents Analytical Data
 City of Oakland Municipal Services Center Groundwater Remediation Project

	Max Daily Effluent Limit	Effluent (E-1)																				
		5/30/06	9/5/06	3/14/07	8/28/07	9/19/07	10/24/07	11/21/07	12/20/07	1/21/08	2/20/08	3/18/08	4/23/08	5/20/08	6/16/08	8/21/08	9/26/08	10/24/08	11/14/08	2/9/09	6/10/09	9/25/09
VOCs	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Benzene	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Carbon tetrachloride	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)	--	--
Chloroform	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)	--	--
1,1-Dichloroethane	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)	--	--
1,2-Dichloroethane	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--
1,1,2-Trichloroethane	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)	--	--
Ethylbenzene	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Methylene chloride	5	ND (0.5)	ND (0.5)	ND (10)	ND (10)	--	--	--	--	--	ND (10)	--	--	--	--	ND (10)	ND (10)	--	--	ND (10)	--	--
Tetrachloroethene	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)	--	--
Toluene	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
c-1,2-Dichloroethene	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)	--	--
t-1,2-Dichloroethene	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)	--	--
1,1,1-Trichloroethane	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)	--	--
1,1,2-Trichloroethane	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)	--	--
Trichloroethene	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)	--	--
Vinyl chloride	1	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)	--	--
Total xylenes	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
MTBE	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (2.0)	ND (0.5)	ND (2.0)	ND (0.5)	ND (2.0)	ND (2.0)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)
Ethylene dibromide	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--
Trichlorotrifluoroethane	5	ND (5)	ND (5)	ND (5)	ND (1.0)	--	--	--	--	--	--	--	--	--	--	ND (2.0)	ND (2.0)	--	--	ND (5)	--	--
TPHg	50	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
TPHd	50	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
TAME		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--
DIPE		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--
ETBE		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--
TBA		ND (10)	ND (10)	ND (10)	140	140	160	160	ND (10)	ND (10)	ND (10)	--	--	--	--	130	87	120	92	ND (10)	--	--
Ethanol		ND (1,000)	ND (1,000)	ND (1,000)	ND (1,000)	--	--	--	--	--	ND (1,000)	--	--	--	--	ND (1,000)	--	--	--	ND (1,000)	--	--
Methanol		ND (1,000)	ND (1,000)	ND (1,000)	ND (1,000)	--	--	--	--	--	ND (1,000)	--	--	--	--	ND (1,000)	--	--	--	ND (1,000)	--	--
PAHs (EPA 8310 or 610)																						
All analytes		ND (1.0)	ND (0.1)	ND (0.1)	ND (0.1)	--	--	--	--	--	ND (0.1)	--	--	--	--	ND (0.09)	--	--	--	ND (0.1)	ND (0.1)	ND (0.1)
SVOCs (EPA 8270C or 625)																						
All analytes		ND (5.0)	ND (9.4)	ND (9.6)	ND (9.7)	--	ND (0.5)	ND (0.5)	ND (0.5)	--	ND (9.4)	--	--	--	--	ND (9.4)	--	--	--	ND (9.6)	--	--

Table 5 - Organic Constituents Analytical Data
City of Oakland Municipal Services Center Groundwater Remediation Project

Influent (I-1)																						
	5/30/06	9/5/06	3/14/07	8/28/07	9/19/07	10/24/07	11/21/07	12/20/07	1/21/08	2/20/08	3/18/08	4/23/08	5/20/08	6/16/08	8/21/08	9/26/08	10/24/08	11/14/08	2/9/09	6/10/09	9/25/09	
	(µg/L)		(µg/L)		(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)		(µg/L)	(µg/L)	(µg/L)	(ug/L)	(ug/L)	(ug/L)	
VOCs																						
Benzene	4,900	--	2,700	--	78	22	120	160	100	ND (0.5)	43	19	23	9	--	18	14	15	18	19	9.7	
Carbon tetrachloride	ND (36)	--	ND (13)	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)	--	--	
Chloroform	ND (36)	--	ND (13)	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)	--	--	
1,1-Dichloroethane	ND (36)	--	ND (13)	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)	--	--	
1,2-Dichloroethane	ND (36)	--	ND (13)	--	2.2	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	0.6	ND (0.5)	0.7	--	--	
1,1-Dichloroethene	ND (36)	--	ND (13)	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)	--	--	
Ethylbenzene	1,100	--	310	--	13	4.3	2.8	43	22	ND (0.5)	25	9.7	11	9.3	--	4.4	4.6	3	7.6	1.5	2.1	
Methylene chloride	ND (36)	--	ND (250)	--	--	--	--	--	--	ND (10)	--	--	--	--	--	ND (10)	--	--	ND (10)	--	--	
Tetrachloroethene	ND (36)	--	ND (13)	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)	--	--	
Toluene	5,300	--	2,900	--	68	10	150	330	360	ND (0.5)	120	66	70	23	--	21	14	15	26	3.1	2.1	
c-1,2-Dichloroethene	ND (36)	--	ND (13)	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)	--	--	
t-1,2-Dichloroethene	ND (36)	--	ND (13)	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)	--	--	
1,1,1-Trichloroethane	ND (36)	--	ND (13)	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)	--	--	
1,1,2-Trichloroethane	ND (36)	--	ND (13)	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)	--	--	
Trichloroethene	ND (36)	--	ND (13)	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)	--	--	
Vinyl chloride	ND (36)	--	ND (13)	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)	--	--	
Total xylenes	7,100	--	4,100	--	230	144	440	750	2,250	ND (0.5)	430	470	390	159	--	168	134	155	240	35	19	
MTBE	ND (36)	--	ND (13)	--	ND (0.5)	ND (2.0)	--	ND (2.0)	ND (10)	ND (0.5)	ND (2.0)	ND (0.5)	ND (2.0)	ND (2.0)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (2.0)	
Ethylene dibromide	ND (36)	--	ND (13)	--	ND (0.5)	--	--	--	--	--	--	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	
Trichlorotrifluoroethane	ND (360)	--	ND (13)	--	--	--	--	--	--	--	--	--	--	--	--	ND (2.0)	--	--	ND (5)	--	--	
TPHg	57,000	--	32,000	--	3,000	1,900	3,600	5,100	14,000	ND (50)	2,300	2,300	2,900	1,400	--	1,400	1,000	1,000	1,400	980	440	
TPHd	9,200	--	7,800	--	12,000 (h,l)	12,000 (y)	9,000	25,000	14,000	6,100	9,000	14,000	20,000	6,700	--	14,000	10,000	8,100	11,000	11,000	4,400	
TAME	ND (36)	--	ND (13)	--	ND (0.5)	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	
DIPE	ND (36)	--	ND (13)	--	ND (0.5)	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	
ETBE	ND (36)	--	ND (13)	--	ND (0.5)	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	--	
TBA	ND (710)	--	ND (25)	--	40	--	--	--	--	71	--	--	--	--	--	59	58	53	81	--	--	
Ethanol	ND(1,000)	--	ND(1,000)	--	--	--	--	--	--	ND (1,000)	--	--	--	--	--	--	--	--	ND(1,000)	--	--	
Methanol	ND(1,000)	--	ND(1,000)	--	--	--	--	--	--	ND (1,000)	--	--	--	--	--	--	--	--	ND(1,000)	--	--	
Isopropylbenzene	40	--	16	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	0.7	--	--	
Propylbenzene	120	--	36	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	0.7	--	--	1.1	--	--	
1,3,5-Trimethylbenzene	410	--	270	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	36	--	--	58	--	--	
1,2,4-Trimethylbenzene	1,500	--	960	--	--	--	--	--	--	ND (0.5)	--	--	--	--	--	60	--	--	86	--	--	
Naphthalene	370	--	260	--	--	--	--	--	--	ND (2.0)	--	--	--	--	--	16	--	--	22	--	--	
PAHs (EPA 8310 or 610)																						
Benzo(a)anthracene	1.7	--	0.14	--	--	--	--	--	--	ND (0.1)	--	--	--	--	--	--	--	--	ND (0.09)	0.1	0.22	
Benzo(a)pyrene	1.6	--	0.12	--	--	--	--	--	--	0.15	--	--	--	--	--	--	--	--	ND (0.09)	ND (0.09)	0.2	
Benzo(g,h,i)perylene	ND (1.0)	--	0.21	--	--	--	--	--	--	0.44	--	--	--	--	--	--	--	--	ND (0.19)	ND (0.19)	0.34	
Chrysene	2.6	--	0.17	--	--	--	--	--	--	0.13	--	--	--	--	--	--	--	--	ND (0.09)	0.2	0.25	
Fluoranthene	3.8	--	0.63	--	--	--	--	--	--	ND (0.2)	--	--	--	--	--	--	--	--	ND (0.19)	ND (0.19)	0.68	
Naphthalene	130	--	230	--	--	--	--	--	--	ND (0.98)	--	--	--	--	--	--	--	--	13	ND (0.94)	1.3	
Pyrene	3.3	--	0.56	--	--	--	--	--	--	0.28	--	--	--	--	--	--	--	--	0.11	0.45	0.83	
Acenaphthene	ND (1.0)	--	130	--	--	--	--	--	--	ND (0.98)	--	--	--	--	--	--	--	--	33	ND (0.94)	ND (0.95)	
Acenaphthylene	ND (1.0)	--	58	--	--	--	--	--	--	ND (2.0)	--	--	--	--	--	--	--	--	ND (1.9)	ND (1.9)	ND (1.9)	
Fluorene	ND (1.0)	--	6.4	--	--	--	--	--	--	ND (0.2)	--	--	--	--	--	--	--	--	0.72	ND (0.19)	0.38	
Phenanthrene	ND (1.0)	--	1.6	--	--	--	--	--	--	ND (0.1)	--	--	--	--	--	--	--	--	ND (0.09)	ND (0.09)	ND (0.10)	
Anthracene	ND (1.0)	--	0.13	--	--	--	--	--	--	ND (0.1)	--	--	--	--	--	--	--	--	ND (0.09)	ND (0.09)	ND (0.10)	
SVOCs (EPA 8270C or 625)																						
Dimethylphthalate	28	--	ND (97)	--	--	--	--	--	--	ND (.94)	--	--	--	--	--	--	--	--	ND (48)	--	--	
bis(2-Ethylhexyl)phthalate	12	--	ND (97)	--	--	--	--	--	--	ND (.94)	--	--	--	--	--	--	--	--	ND (48)	--	--	
Naphthalene	290	--	160	--	--	--	--	--	--	ND (.94)	--	--	--	--	--	--	--	--	ND (48)	--	--	
Phenol	13	--	270	--	--	--	--	--	--	ND (.94)	--	--	--	--	--	--	--	--	ND (48)	--	--	
All other SVOCs	ND (5)	--	ND (97)	--	--	--	--	--	--	ND (.94)	--	--	--	--	--	--	--	--	ND (48)	--	--	

Table 5 - Organic Constituents Analytical Data
 City of Oakland Municipal Services Center Groundwater Remediation Project

After First Carbon Unit (Btw-1)																				
	Max Daily Effluent Limit	5/30/06	9/5/06	3/14/07	8/28/07	9/19/07	10/24/07	11/21/07	12/20/07	1/21/08	2/20/08	3/18/08	4/23/08	5/20/08	6/16/08	8/21/08	9/26/08	10/24/08	11/14/08	2/9/09
VOCs	(µg/L)	(µg/L)	(µg/L)			(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(ug/L)	(µg/L)	(ug/L)	(µg/L)	(ug/L)
Benzene	5	ND (0.5)	ND (0.5)	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	ND (0.5)	--	ND (0.5)	ND (0.5)
Carbon tetrachloride	5	ND (0.5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)
Chloroform	5	ND (0.5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)
1,1-Dichloroethane	5	ND (0.5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)
1,2-Dichloroethane	5	ND (0.5)	--	--	--	ND (0.5)	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	ND (0.5)	ND (0.5)
1,1-Dichloroethene	5	ND (0.5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)
Ethylbenzene	5	ND (0.5)	ND (0.5)	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	ND (0.5)	--	ND (0.5)	ND (0.5)
Methylene chloride	5	ND (0.5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (10)	--	--	ND (10)
Tetrachloroethene	5	ND (0.5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)
Toluene	5	ND (0.5)	ND (0.5)	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	ND (0.5)	--	ND (0.5)	ND (0.5)
c-1,2-Dichloroethene	5	ND (0.5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)
t-1,2-Dichloroethene	5	ND (0.5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)
1,1,1-Trichloroethane	5	ND (0.5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)
1,1,2-Trichloroethane	5	ND (0.5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)
Trichloroethylene	5	ND (0.5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)
Vinyl chloride	5	ND (0.5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	--	ND (0.5)
Total xylenes	5	ND (0.5)	ND (0.5)	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	--	ND (0.5)	--	ND (0.5)	ND (0.5)
MTBE	13	ND (0.5)	ND (2)	--	--	6.7	7.6	--	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (0.5)	ND (2.0)	ND (2.0)	--	ND (0.5)	--	ND (0.5)	ND (0.5)
Ethylene dibromide	5	ND (0.5)	--	--	--	ND (0.5)	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	ND (0.5)	ND (0.5)
Trichlorotrifluoroethane	5	ND (5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (2.0)	--	--	ND (5)
TPHg	50	ND (50)	ND (50)	--	--	ND (50)	ND (50)	ND (50)	ND (50)	60 (y)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	--	--	--	--	--
TPHd	50	ND (50)	ND (50)	--	--	ND (50)*	ND (50)	ND (50)	ND (50)	84 (y)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	--	--	--	ND (50)	--
TAME		ND (0.5)	--	--	--	ND (0.5)	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	ND (0.5)	ND (0.5)
DIPE		ND (0.5)	--	--	--	ND (0.5)	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	ND (0.5)	ND (0.5)
ETBE		ND (0.5)	--	--	--	ND (0.5)	--	--	--	--	--	--	--	--	--	--	ND (0.5)	--	ND (0.5)	ND (0.5)
TBA		ND (10)	--	--	--	86	--	ND (10)	--	--	--	--	--	--	--	--	70	--	53	67
Ethanol		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methanol		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs (EPA 8310 or 610)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SVOCs (EPA 8270C or 625)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 5 - Organic Constituents Analytical Data
City of Oakland Municipal Services Center Groundwater Remediation Project

		After Second Carbon Unit (Btw-2)																			
	Max Daily Effluent Limit	5/30/06	9/5/06	3/14/07	8/28/07	9/19/07	10/24/07	11/21/07	12/20/07	1/21/08	2/20/08	3/18/08	4/23/08	5/20/08	6/16/08	8/21/08	9/26/08	10/24/08	11/14/08	2/9/2009	
	(µg/L)		(µg/L)	(µg/L)		(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	
VOCs																					
Benzene	5	--	ND (0.5)	ND (0.5)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	
Carbon tetrachloride	5	--	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)		
Chloroform	5	--	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)		
1,1-Dichloroethane	5	--	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)		
1,2-Dichloroethane	5	--	ND (0.5)	ND (0.5)	--	ND (0.5)	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	
1,1-Dichloroethene	5	--	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)		
Ethylbenzene	5	--	ND (0.5)	ND (0.5)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	
Methylene chloride	5	--	ND (0.5)	ND (10)	--	--	--	--	--	ND (10)	--	--	--	--	ND (10)	ND (10)	--	--	ND (10)		
Tetrachloroethene	5	--	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)		
Toluene	5	--	ND (0.5)	ND (0.5)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	
c-1,2-Dichloroethene	5	--	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)		
t-1,2-Dichloroethene	5	--	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)		
1,1,1-Trichloroethane	5	--	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)		
1,1,2-Trichloroethane	5	--	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)		
Trichloroethene	5	--	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)		
Vinyl chloride	5	--	ND (0.5)	ND (0.5)	--	--	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	--	--	ND (0.5)		
Total xylenes	5	--	ND (0.5)	ND (0.5)	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	
MTBE	13	--	ND (0.5)	ND (0.5)	--	ND (0.5)	ND (2.0)	--	ND (2.0)	ND (2.0)	ND (0.5)	ND (2.0)	ND (0.5)	ND (2.0)	ND (2.0)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	
Ethylene dibromide	5	--	ND (0.5)	ND (0.5)	--	ND (0.5)	--	--	--	--	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	
Trichlorotrifluoroethane	5	--	ND (5)	ND (5)	--	--	--	--	--	--	--	--	--	--	ND (2.0)	ND (2.0)	--	--	ND (5)		
TPHg	50	--	--	--	--	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	--	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	76 (y,z)	ND (50)	74 (y,z)	ND (50)	
TPHd	50	--	--	--	--	--	--	--	--	--	--	--	--	--	ND (50)	ND (50)	ND (50)	--	ND (50)		
TAME		--	ND (0.5)	ND (0.5)	--	ND (0.5)	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	
DIPE		--	ND (0.5)	ND (0.5)	--	ND (0.5)	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	
ETBE		--	ND (0.5)	ND (0.5)	--	ND (0.5)	--	--	--	ND (0.5)	--	--	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	
TBA		--	ND (10)	110	--	130	--	--	--	22	--	--	--	--	140	100	99	74	ND (10)		
Ethanol		--	ND(1,000)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Methanol		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
PAHs (EPA 8310 or 610)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SVOCs (EPA 8270C or 625)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Notes:																					
(h) - heavier hydrocarbons contributed to the quantitation																					
(l) - lighter hydrocarbons contributed to the quantitation																					
(y) - sample exhibits chromatographic pattern which does not resemble standard																					
* - Sample analytical results for TPH-d were erroneously switched between Btw-1 and Btw-2 in the laboratory analytical reports due to mislabeling in the field.																					
Abbreviations:																					
"--" indicates not analyzed for constituent indicated		PAHs = polycyclic aromatic hydrocarbons																			
DIPE = diisopropyl ether		SVOCs = semivolatile organic compounds																			
EPA = U.S. Environmental Protection Agency		TAME = tertiary amyl ether																			
ETBE = ethyl tertiary butyl ether		TBA = tertiary butyl alcohol																			
µg/L = microgram(s) per liter		TPHg = total petroleum hydrocarbons quantified as diesel																			
MTBE = methyl tertiary butyl ether		TPHd = total petroleum hydrocarbons quantified as gasoline																			
ND () = non-detected lab value		VOCs = volatile organic compounds																			

Table 6 - Dual-Phase Extraction Vapor Monitoring Data
 City of Oakland Municipal Services Center Groundwater Remediation Project

Date	Time	DPE Run-time Meter Reading (cumulative hr)	Vapor Flow Rate (1) (acfm)	Thermo Oxidizer Temp. (°F)	Vacuum Pump		A-2 Exhaust (Effluent)					A-2 Inlet (Influent)					Notes
					Vacuum (inch Hg)	Discharge Temp (°F)	POC (2) (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Total Xylenes (ppmv)	POC (2) (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Total Xylenes (ppmv)	
5/14/07	12:00	12.5	275	1440	15	160	1.10	0.042	0.028	0.0059	0.021	2000	18.0	21	6.5	21.4	DPE startup
5/17/07	11:25	83.9	276	1448	15	160	--	--	--	--	--	--	--	--	--	--	NPDES sampling
5/22/07	11:15	203.7	284	1551	15	160	--	--	--	--	--	--	--	--	--	--	shutdown @11:30 Phll tie-in
5/31/07	11:00	203.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6/11/07	10:00	204	235	1438	16.5	165	--	--	--	--	--	--	--	--	--	--	re-start with all wells
6/14/07	10:00	276.5	280	1455	15	170	--	--	--	--	--	--	--	--	--	--	--
6/18/07	19:00	276.7	280	1460	11.5	160	--	--	--	--	--	--	--	--	--	--	--
6/21/07	10:00	328.8	276	1450	15	165	--	--	--	--	--	--	--	--	--	--	NPDES sampling
6/26/07	18:40	446.7	288	1454	11.5	160	2.76	0.063	0.060	0.0023	0.018	2410	25.0	35	4.6	28.7	--
6/29/07	18:30	518.5	294	1479	14	160	--	--	--	--	--	--	--	--	--	--	--
7/3/07	11:30	536.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	knockout tank pump down
7/11/07	15:00	536.9	227	1449	17	160	--	--	--	--	--	--	--	--	--	--	changed knockout tank pump
7/16/07	8:15	630	304	1435	13	160	--	--	--	--	--	--	--	--	--	--	DPE down, insulation worn
7/19/07	10:00	630	--	--	--	--	--	--	--	--	--	--	--	--	--	--	DPE unit to factory for repair
7/23/07	11:00	630	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7/27/07	9:30	630	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7/31/07	13:00	633.3	289	1460	14	160	--	--	--	--	--	--	--	--	--	--	re-installed DPE, on at 11am
8/7/07	19:30	669.5	307	1506	13.5	160	--	--	--	--	--	--	--	--	--	--	removed 5 gal oily sludge
8/17/07	10:00	719.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	DPE down, cleaned vac unit
8/28/07	10:00	895.5	297	1518	14	160	1.00	0.046	0.011	0.0008	0.005	3820	27.0	24	3.1	25.4	NPDES & vapor monitoring
8/31/07	10:30	968	298	1465	13.5	160	--	--	--	--	--	--	--	--	--	--	--
9/7/07	9:30	1135	302	1520	13.5	160	--	--	--	--	--	--	--	--	--	--	--
9/14/07	11:30	1305	289	1467	13	160	--	--	--	--	--	--	--	--	--	--	--
9/19/07	10:00	1423.5	Note (3)	1485	10	160	1.40	0.021	0.015	0.0012	0.010	2460	6.6	8.6	1.0	7.5	NPDES & vapor monitoring
9/26/07	10:20	1591.3	--	1446	15	160	--	--	--	--	--	--	--	--	--	--	DPE down, T sensor pblm
9/28/07	12:00	1591.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	only pneumatic pumps on
10/2/07	12:00	1591.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	fixed T sensor
10/8/07	17:30	1592.9	--	1490	15	160	--	--	--	--	--	--	--	--	--	--	fixed data recorder
10/17/07	11:00	1757.3	--	1486	15	160	--	--	--	--	--	--	--	--	--	--	--
10/24/07	14:00	1928	--	1479	15	160	2.40	0.038	0.023	ND (0.00005)	0.011	3700	4.4	ND (0.0005)	ND (0.0005)	1.8	NPDES & vapor monitoring
10/31/07	10:30	2092.1	--	1460	15	160	--	--	--	--	--	--	--	--	--	--	--
11/7/07	11:00	2261.5	--	1458	15	160	--	--	--	--	--	--	--	--	--	--	--
11/16/07	10:30	2476.9	--	1482	15	160	--	--	--	--	--	--	--	--	--	--	--
11/21/07	10:09	2596.4	--	1492	15	160	1.40	0.038	0.040	0.0032	0.020	2500	13.0	35	3.2	24.1	NPDES & vapor monitoring
11/30/07	9:30	2811.8	--	1459	15	160	--	--	--	--	--	--	--	--	--	--	--
12/7/07	10:30	2980.8	--	1512	15	160	--	--	--	--	--	--	--	--	--	--	--
12/13/07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	System shut down for carbon change
12/14/07	13:00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	DPE on line 1:00 pm
12/17/07	11:15	3105.8	--	1466	15	160	--	--	--	--	--	--	--	--	--	--	--
12/20/07	11:00	3184.9	--	1503	15	160	3.11	0.110	0.086	0.0087	0.063	6018	33.0	69	8.6	83.0	NPDES & vapor monitoring
12/31/07	9:00	3439.3	--	1450	15	160	--	--	--	--	--	--	--	--	--	--	--
1/4/08	14:30	3540.8	--	1452	15	160	--	--	--	--	--	--	--	--	--	--	--
1/15/08	13:00	3753.5	--	1452	15	160	--	--	--	--	--	--	--	--	--	--	down on 1/11, restarted
1/21/08	9:30	3894	--	1458	15	160	6.86	0.091	0.190	0.0230	0.282	317	11.0	52	8.5	126.0	NPDES & vapor monitoring
1/30/08	11:30	4112	--	1459	15	160	--	--	--	--	--	--	--	--	--	--	D9 & D11 open only
2/1/08	15:30	4164	--	1460	16	160	--	--	--	--	--	--	--	--	--	--	--
2/11/08	11:00	4399.5	--	1460	15	160	--	--	--	--	--	--	--	--	--	--	D10 & D11 open only
2/20/08	11:30	4616	--	1455	15	160	0.73	0.022	0.011	ND (0.00005)	0.007	273	0.5	ND (0.0005)	ND (0.0005)	0.5	NPDES & vapor monitoring
2/29/08	10:30	4831	--	1460	15	160	--	--	--	--	--	--	--	--	--	--	--

Table 6 - Dual-Phase Extraction Vapor Monitoring Data
 City of Oakland Municipal Services Center Groundwater Remediation Project

Date	Time	DPE Run-time Meter Reading (cumulative hr)	Vapor Flow Rate (1) (acfm)	Thermo Oxidizer Temp. (°F)	Vacuum Pump		A-2 Exhaust (Effluent)					A-2 Inlet (Influent)					Notes	
					Vacuum (inch Hg)	Discharge Temp (°F)	POC (2) (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Total Xylenes (ppmv)	POC (2) (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Total Xylenes (ppmv)		
3/3/08	11:30	4904	--	1462	15	160	--	--	--	--	--	--	--	--	--	--	--	
3/14/08	11:00	5166.5	--	1455	15	160	--	--	--	--	--	--	--	--	--	--	--	D2 & D4 open only
3/18/08	10:00	5261.5	--	1460	15	160	2.00	0.062	0.064	0.0059	0.093	450	5.8	12	1.7	31.9	NPDES & vapor monitoring	
3/20/08	11:00	5310.5	--	1462	15	160	--	--	--	--	--	--	--	--	--	--	--	D2, D4 & D7 open
3/31/08	9:00	5572.5	--	1460	15	160	--	--	--	--	--	--	--	--	--	--	--	
4/7/08	9:00	5740.5	--	1455	15	160	--	--	--	--	--	--	--	--	--	--	--	
4/14/08	10:00	5909.5	--	1452	15	160	--	--	--	--	--	--	--	--	--	--	--	
4/18/08	11:00	6006.5	--	1445	15	160	--	--	--	--	--	--	--	--	--	--	--	
4/24/08	10:30	6126	--	1455	15	160	2.12	0.057	0.055	0.0040	0.109	1280	2.4	10	1.0	42.0		
4/30/08	10:00	6174	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	down for maintenance
5/15/08	11:00	6175	--	1460	15	200	--	--	--	--	--	--	--	--	--	--	--	
5/20/08	10:31	6294.5	--	1460	15.5	180	2.10	0.045	0.043	0.0031	0.091	1200	3.0	9.3	ND (0.0005)	40.0		
5/29/08	10:30	6350.5	--	1461	15	180	--	--	--	--	--	--	--	--	--	--	--	
6/2/08	10:30	6446.5	--	1452	15	180	--	--	--	--	--	--	--	--	--	--	--	
6/9/08	10:30	6552.2	--	1470	15	160	--	--	--	--	--	--	--	--	--	--	--	
6/16/08	10:45	6720.2	--	1463	15	180	2.30	0.026	0.030	0.0023	0.071	790	1.1	3.5	ND (0.0005)	16.4		
6/30/08	10:30	6768.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	down for repair
7/8/08	10:00	6791.3		1450	16	170												frequent overheating
7/16/08	11:00	6805.8		1471	16	160												
7/22/08	15:30	6828.8		1467	17	180	0.61	0.0083	0.011	ND (0.002)	0.031	490	0.65	1.3	0.61	9.1		
7/31/08	19:00	6879.4		1462	17	180												
8/11/08	10:00	6939.3		1471	16	170												
8/21/08	12:45	6972.8		1463	15	170	0.74	0.014	0.0073	ND (0.001)	0.023	430	0.95	1.6	ND (0.1)	9.1		
8/29/08	11:00	6977.4																down for repair
9/11/08	11:00	6978.5		1474	16.5	180												radiator clogged by viscous tar
9/26/08	12:20	7007.6		1460	17	160												
9/30/08	19:30	7035.1																down for repair
10/6/08	11:00	7035.2		1463	16	160												
10/13/08	17:45	7063.3		1475	17	160												
10/24/08	13:00	7112.9		1464	16	160	1.4	0.021	0.01	ND (0.005)	0.03	370	1.2	0.88	ND (0.25)	4.7		
10/31/08	18:00	7130.8																down, oil leak from radiator
11/10/08	16:30	7137.1		1460	17.5	170												
11/14/08	15:00	7147.2		1465	17	180												shutdown aft sampling for overhaul
11/28/08	10:00	7147.2																
12/31/08	10:00	7147.2																
1/2/09	15:00	7147.2																changed 2nd & 3rd gw carbon
1/20/09	12:00	7147.2																
2/2/09	11:30	7150.8		1467	20	170												
2/9/09	15:30	7289.9		1467	18.5	165	0.85	0.016	0.011	0.0008	0.017	540	1.6	1.8	ND (0.25)	9.0		
2/19/09	6:15	7318.65																down due to fire
3/25/09	14:45	7334.5		1466	17.5	170	0.68	0.013	0.010	ND(0.001)	0.015	250	1.1	0.9	0.13	4.5	testing after repair	
4/6/09	14:00	7353.5		1462	18	180												
4/20/09	11:30	7354		1464	18	180												
4/24/09	14:00	7374.9		1468	18.5	170												
5/1/09	19:00	7392.3		1464	22	160												
5/6/09	19:30	7409.2		1466	21	170												
5/13/09	12:30	7483.2		1465	22	180	0.99	0.024	0.019	0.0018	0.040	370	1.1	1.3	0.25	6.1	vapor sampling	
5/19/09	18:20	7518.7		1465	21.5	180												
5/29/09	19:00	7591.7		1459	21	170												start extraction fr plume C, 5/26
6/8/09	19:00	7599.5		1462	20	170												
6/10/09	15:30	7644.2		1464	20	175	2.50	0.035	0.018	ND (0.005)	0.025	790	3.9	0.8	ND (0.25)	6.2	vapor sampling	

Table 6 - Dual-Phase Extraction Vapor Monitoring Data
City of Oakland Municipal Services Center Groundwater Remediation Project

Date	Time	DPE Run-time Meter Reading (cumulative hr)	Vapor Flow Rate (1) (acfm)	Thermo Oxidizer Temp. (°F)	Vacuum Pump		A-2 Exhaust (Effluent)					A-2 Inlet (Influent)					Notes
					Vacuum (inch Hg)	Discharge Temp (°F)	POC (2) (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Total Xylenes (ppmv)	POC (2) (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Total Xylenes (ppmv)	
6/22/09	10:30	7665.5		1459	21	175											
6/30/09	19:00	7747.6															down when arrive on site
7/6/09	19:30	7765.1		1463	20.5	170											
7/21/09	14:45	7862.4		1464	20	170											replaced low oil level sensor
7/24/09	14:30	7933.9		1466	20	170											
7/31/09	10:30	8031.4		1466	20.5	170											
8/7/09	11:30	8200.4		1464	20	180											
8/13/09	15:30	8348.4		1460	20	180	4.60	0.060	0.031	ND (0.005)	0.050	860	3.0	ND (0.25)	ND (0.25)	6.5	vapor sampling
8/21/09	10:00	8535		1467	20	175											
8/28/09	10:00	8702.8		1463	20	190											shutdown for oil replacement
9/14/09	19:00	8707.2		1462	20	175											
9/25/09	13:45	8739		1465	19.5	180											
9/30/09	19:00	8864.3		1465	20	175											
10/2/09	10:30	8903.8		1464	20	180											
10/12/09	10:30	9143.7		1463	20	180											
10/16/09	11:00	9187.8		1466	20	180	9.50	0.110	0.058	ND (0.005)	0.058	440	1.8	ND (0.25)	ND (0.25)	1.9	vapor sampling
10/23/09	10:00	9328.7		1467	19.5	180											
10/30/09	19:30	9424.5		1465	19.5	180											
11/6/09	15:30	9477.5		1463	19	180											
11/11/09	16:20	9598.3		1464	19.5	180	3.50	0.066	0.036	ND (0.008)	0.038	190	0.8	0.4	ND (0.4)	1.5	vapor sampling
11/20/09	14:30	9812.5		1463	19	180											
11/30/09	16:30	9933.5															down for Thanksgiving
12/8/09	16:00	9934		1468	18.5	170											
12/16/09	14:30	10124.1		1467	19	180	4.40	0.090	0.046	ND (0.008)	0.040	320	1.4	0.6	ND (0.4)	1.6	vapor sampling
12/23/09	14:00	10291.2															system shutdown at 2:00 pm

Notes:

Note (1) - Measured at the discharge side of the vacuum pump, the pressure is approximately 1.05 atm.

Note (2) - POC = precursor organic compound measured as TPH volatiles in vapor.

Note (3) - The flow sensor was coated with highly viscous material and resulted in inaccurate readings; vacuum readings were much more stable and accurate.

Abbreviations:

"-" indicates no value obtained for given field
acfm = actual cubic foot per minute
atm = standard atmosphere
DPE = dual-phase extraction

°F = degree Fahrenheit
Hg = mercury
ND () = non-detected lab value
ppmv = parts per million volume

**Table 7 - Petroleum Hydrocarbons Removed through Soil Vapor Extraction
City of Oakland Municipal Services Center Groundwater Remediation Project**

Month	DPE Run Time (hr)	Ave Flow (acfm)	Flow Pressure (atm)	Flow Temp. (°F)	Ave Flow (scfm)	Total Volume (std m ³)	TPHg (ppmv)	TPHg (mg/m ³)	TPHg Removed (lb)	Influent Benzene Conc. (ppmv)	Influent Benzene Conc. (mg/m ³)	Benzene Removed (lb)
May-07	191.2	278	1.05	160	249	80,756	2,000	7,033	1,252	18	58	10
Jun-07	314.8	276	1.05	165	245	130,948	2,410	8,475	2,447	25	81	23
Jul-07	114.8	273	1.05	160	244	47,616	--	10,738	1,127	--	85	9
Aug-07	334.7	301	1.05	160	269	153,062	3,820	13,000	4,387	27	88	30
Sep-07	623.7	530	0.46	75	241	255,000	2,460	8,700	4,891	6.6	21	12
Oct-07	500.4	535	0.5	75	264	224,477	3,700	13,000	6,433	4.4	14	7
Nov-07	719.7	535	0.5	75	264	322,853	2,500	8,750	6,228	13	41	29
Dec-07	627.5	535	0.5	75	264	281,493	6,018	21,200	13,156	33	110	68
Jan-08	672.7	535	0.5	75	264	301,769	3,170	11,140	7,411	11	34	23
Feb-08	719	535	0.5	75	264	322,539	273	960	683	0.46	1.5	1
Mar-08	741.5	535	0.5	75	264	332,633	450	1,600	1,173	5.8	18	13
Apr-08	601.5	535	0.5	75	264	269,830	1,280	4,500	2,677	2.4	7.7	5
May-08	176.5	535	0.5	75	264	79,177	1,200	4,200	733	3	9.5	1.7
Jun-08	417.8	535	0.5	75	264	187,423	790	2,800	1,157	1.1	3.6	1.5
Jul-08	111.1	540	0.45	75	240	45,274	490	1,700	170	0.7	2.1	0.2
Aug-08	98	540	0.45	75	240	39,936	430	1,500	132	1.0	3.1	0.3
Sep-08	57.7	540	0.45	75	240	23,513	430	1,500	78	1.0	3.1	0.2
Oct-08	95.7	550	0.45	75	244	39,721	370	1,300	114	1.2	3.7	0.3
Nov-08	16.4	550	0.43	75	233	6,504	370	1,300	19	1.2	3.7	0.1
Dec-08	0	0	0	75	0	0	0	0	0	0.0	0.0	0.0
Jan-09	0	0	0	75	0	0	0	0	0	0.0	0.0	0.0
Feb-09	171.45	550	0.37	75	201	58,510	540	1,900	245	1.6	5.0	0.6
Mar-09	15.85	550	0.42	75	228	6,140	250	880	12	1.1	3.4	0.0
Apr-09	57.8	545	0.38	75	204	20,074	321	1,130	50	1.1	3.5	0.2
May-09	199.4	550	0.28	75	152	51,496	370	1,300	148	1.1	3.5	0.4
Jun-09	155.9	550	0.33	75	179	47,452	790	2,800	293	3.9	12.0	1.3
Jul-09	283.8	550	0.33	75	179	86,381	825	2,904	553	3.5	11.2	2.1
Aug-09	671.4	550	0.33	75	179	204,356	860	3,027	1,364	3.0	9.6	4.3
Sep-09	161.5	550	0.34	75	185	50,646	860	3,027	338	3.0	9.6	1.1
Oct-09	560.2	550	0.34	75	185	175,677	440	1,500	581	1.8	5.8	2.2
Nov-09	509	550	0.35	75	190	164,316	190	780	283	0.8	2.4	0.9
Dec-09	357.7	550	0.36	75	195	118,772	320	1,300	340	1.4	4.5	1

Notes:

Flow rates from May through August 2007 were recorded by the flow meter at the vacuum discharge side.
Flow rates after August 2007 were based on pump vacuum reading and pump performance chart for acfm.

Abbreviations

"--" indicates not analyzed for constituent indicated

acfm = actual cubic foot per minute

atm = standard atmosphere

DPE = dual-phase extraction

°F = degree Fahrenheit

hr = hours(s)

lb = pound(s)

m³ = cubic meter

mg/m³ = milligram(s) per cubic meter

ppmv = parts per million volume

scfm = standard cubic foot per minute

TPHg = total petroleum hydrocarbons quantified as gasoline

Table 8 - TPH Removed through Groundwater Extraction, Floating Product Recovery, and Soil Vapor Extraction
City of Oakland Municipal Services Center Groundwater Remediation Project

Month	Groundwater	TPHg	TP Hd	Mass Removed through Groundwater Extraction			Floating Product	TPH Removed	Total Monthly	Total Monthly	Cumulative Product Removed	
	Removed	Influent	Influent	As TPHg	As TPHd	Combined	Recovered	By Vapor	Removal	Removal	(floating + dissolved + vapor)	
	(gallons)	(mg/L)	(mg/L)	(lb)	(lb)	(lb)	(gallons)	(lb)	(gallons)	(lb)	(gallons)	(lb)
May-06	17,591	54.5	17.1	7.98	2.50	10.49	20	0	21.48	152	21.48	152
Jun-06	103,880	50	10	43.25	8.65	51.90	80	0	87.33	618	108.81	770
Jul-06	89,150	60	4	44.54	2.97	47.51	65	0	71.71	508	180.53	1,278
Aug-06	82,900	59	4.1	40.73	2.83	43.56	55	0	61.15	433	241.68	1,711
Sep-06	85,450	44	4.8	31.31	3.42	34.72	25	0	29.91	212	271.59	1,922
Oct-06	72,980	42	9.1	25.52	5.53	31.05	30	0	34.39	243	305.97	2,166
Nov-06	46,200	32	7.8	12.31	3.00	15.31	20	0	22.16	157	328.14	2,323
Dec-06	49,280	55	7.6	22.57	3.12	25.69	20	0	23.63	167	351.77	2,490
Jan-07	59,100	49	3.6	24.11	1.77	25.89	15	0	18.66	132	370.42	2,622
Feb-07	85,510	38	7.9	27.06	5.63	32.68	13	0	17.62	125	388.04	2,747
Mar-07	116,260	32	7.8	30.98	7.55	38.53	12	0	17.44	123	405.49	2,870
Apr-07	65,725	11	6.2	6.02	3.39	9.41	5	0	6.33	45	411.82	2,915
May-07	78,705	84	180	55.05	117.97	173.02	4	1,252	205.35	1,453	617.16	4,368
Jun-07	93,720	8.9	7.7	6.95	6.01	12.95	4	2,447	351.50	2,488	968.66	6,856
Jul-07	49,470	16	9.1	6.59	3.75	10.34	6	1,127	166.71	1,180	1,135.37	8,036
Aug-07	119,490	5.1	8.1	5.07	8.06	13.13	5	4,387	626.62	4,435	1,761.99	12,471
Sep-07	135,890	3	12	3.39	13.58	16.97	0	4,891	693.42	4,908	2,455.41	17,379
Oct-07	65,570	1.9	12	1.04	6.55	7.59	0	6,433	909.95	6,441	3,365.36	23,820
Nov-07	165,810	3.6	9	4.97	12.43	17.40	0	6,228	882.37	6,245	4,247.73	30,065
Dec-07	101,270	5.1	25	4.30	21.08	25.38	0	13,156	1862.32	13,181	6,110.05	43,247
Jan-08	106,500	14	14	12.42	12.42	24.83	0	7,411	1050.56	7,436	7,160.61	50,682
Feb-08	71,000	ND (50)	6.1	0.00	3.61	3.61	0	683	97.01	687	7,257.62	51,369
Mar-08	127,310	2.3	9	2.44	9.54	11.98	0	1,173	167.42	1,185	7,425.04	52,554
Apr-08	92,240	2.3	14	1.77	10.75	12.52	0	2,677	379.97	2,689	7,805.01	55,243
May-08	53,100	2.9	20	1.28	8.84	10.13	0	733	105.01	743	7,910.02	55,987
Jun-08	62,092	1.4	6.7	0.72	3.46	4.19	0	1,157	164.05	1,161	8,074.06	57,148
Jul-08	53,580	2.3	9.4	1.03	4.19	5.22	0	170	24.71	175	8,098.77	57,323
Aug-08	35,760	1.3	12	0.39	3.57	3.96	0	132	19.22	136	8,117.99	57,459
Sep-08	38,360	1.4	14	0.45	4.47	4.92	0	78	11.68	83	8,129.67	57,541
Oct-08	50,300	1	10	0.42	4.19	4.61	0	114	16.73	118	8,146.41	57,660
Nov-08	11,710	1	8.1	0.10	0.79	0.89	0	19	2.76	20	8,149.17	57,679
Dec-08	0	0	0	0.00	0.00	0.00	0	0	0.00	0	8,149.17	57,679
Jan-09	0	0	0	0.00	0.00	0.00	0	0	0.00	0	8,149.17	57,679
Feb-09	77,990	1.4	11	0.91	7.14	8.05	0	245	35.76	253	8,184.93	57,933
Mar-09	0	0	0	0.00	0.00	0.00	0	12	1.68	12	8,186.61	57,944
Apr-09	55,010	1.2	13	0.55	5.95	6.50	0	50	7.98	57	8,194.60	58,001
May-09	80,203	1.1	17	0.73	11.35	12.09	0	148	22.56	160	8,217.16	58,161
Jun-09	35,237	0.98	11	0.29	3.23	3.52	0	293	41.88	296	8,259.04	58,457
Jul-09	31,340	0.56	13	0.15	3.39	3.54	0	553	78.63	557	8,337.67	59,014
Aug-09	76,460	0.53	12	0.34	7.64	7.98	0	1,364	193.81	1,372	8,531.48	60,385
Sep-09	29,190	0.44	4.4	0.11	1.07	1.18	0	338	47.92	339	8,579.40	60,725

Table 8 - TPH Removed through Groundwater Extraction, Floating Product Recovery, and Soil Vapor Extraction
City of Oakland Municipal Services Center Groundwater Remediation Project

Month	Groundwater	TPHg	TPHd	Mass Removed through Groundwater Extraction			Floating Product	TPH Removed	Total Monthly	Total Monthly	Cumulative Product Removed	
	Removed	Influent	Influent	As TPHg	As TPHd	Combined	Recovered	By Vapor	Removal	Removal	(floating + dissolved + vapor)	
	(gallons)	(mg/L)	(mg/L)	(lb)	(lb)	(lb)	(gallons)	(lb)	(gallons)	(lb)	(gallons)	(lb)
Oct-09	76,150	0.31	8.9	0.20	5.64	5.84	0	581	82.90	587	8,662.30	61,311
Nov-09	0	0	0	0.00	0.00	0.00	0	283	39.92	283	8,702.22	61,594
Dec-09	0	0	0	0.00	0.00	0.00	0	340	48.09	340	8,750.32	61,934

Note: Morgan Environmental disposed of three 55-gallon drums of recovered product on 8/9/06 and four 55-gallon dums of product on 8/17/07.
Non-detected lab values were reported as half the reporting limit in equations.

Abbreviations:

lb = pounds(s)

mg/L = milligram(s) per liter

TPH = total petroleum hydrocarbons

TPHg= total petroleum hydrocarbons quantified as gasoline

TPHd= total petroleum hydrocarbons quantified as diesel

APPENDIX A

Laboratory Analytical Reports for Groundwater Samples



Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878

2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

**Laboratory Job Number 215778
ANALYTICAL REPORT**

OTG Enviroengineering Solutions, Inc
7700 Edgewater Drive
Oakland, CA 94621

Project : 09OAK06.1000
Location : MSC Remediation
Level : II

Sample ID

Lab ID

E-1

215778-001

BTW-2

215778-002

I-1

215778-003

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature. The results contained in this report meet all requirements of NELAC and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: _____

Project Manager

Date: 10/23/2009

NELAP # 01107CA

CASE NARRATIVE

Laboratory number: 215778
Client: OTG Enviroengineering Solutions, Inc
Project: 09OAK06.1000
Location: MSC Remediation
Request Date: 10/16/09
Samples Received: 10/16/09

This data package contains sample and QC results for three water samples, requested for the above referenced project on 10/16/09. The samples were received cold and intact.

TPH-Purgeables and/or BTXE by GC (EPA 8015B and EPA 8021B):

No analytical problems were encountered.

TPH-Extractables by GC (EPA 8015B):

No analytical problems were encountered.

Curtis & Tompkins, Ltd.

Analytical Laboratory Since 1878
 2323 Fifth Street
 Berkeley, CA 94710
 (510) 486-0900 Phone
 (510) 486-0532 Fax

CHAIN OF CUSTODY

C & T LOGIN #: 215778

Sampler: Xinggang Tong

Report To: Xinggang Tong

Company: OTG Enviro Engineering

Telephone: (510) 465-8982

Fax: email: xtong@otgenw.com

Project No.: 090AK06.1000

Project Name: MSC Remediation

Project P.O.:

Turnaround Time: 5-day

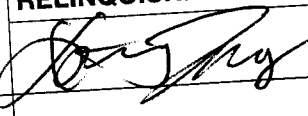
Analysis

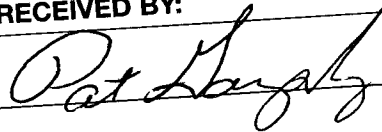
Lab No.	Sample ID.	Sampling Date Time	Matrix			# of Containers	Preservative						
			Soil	Water	Waste		HCL	H ₂ SO ₄	HNO ₃	ICE			
1	E-1	10/16/09, 10:20		X		5		/					
2	BW-2	10/16/09, 10:30		X		5		-					
3	I-1	10/16/09, 10:45		X		5		-					

TPH gas, BTEX & MTBE	TPH diesel & mono with Silica gel cleanup	TPH diesel & mo												
X	X													
X	X													
X		X												

Notes:
 email EDF for
 GeoTracker upload
 Global ID: T0600100375
 Logcode: OTG0

SAMPLE RECEIPT
 Intact Cold
 On Ice Ambient
 Preservative Correct?
 Yes No N/A

RELINQUISHED BY:

 10/16/09 11:30
 DATE / TIME

RECEIVED BY:

 10/16/09 11:30
 DATE / TIME

30417

COOLER RECEIPT CHECKLIST



Curtis & Tompkins, Ltd.

Login # 215778 Date Received 10-16-9 Number of coolers 1
Client OTE Eng. Project MSC REMEDIATION

Date Opened 10-16-9 By (print) S. Evans (sign) [Signature]
Date Logged in [Signature] By (print) [Signature] (sign) [Signature]

1. Did cooler come with a shipping slip (airbill, etc) YES NO
Shipping info

2A. Were custody seals present? ... YES (circle) on cooler on samples NO
How many Name Date

2B. Were custody seals intact upon arrival? YES NO N/A

3. Were custody papers dry and intact when received? YES NO

4. Were custody papers filled out properly (ink, signed, etc)? YES NO

5. Is the project identifiable from custody papers? (If so fill out top of form) YES NO

6. Indicate the packing in cooler: (if other, describe)

- Bubble Wrap, Cloth material, Foam blocks, Cardboard, Bags, Styrofoam, None, Paper towels

7. Temperature documentation:

Type of ice used: Wet Blue/Gel None Temp(°C)

Samples Received on ice & cold without a temperature blank

Samples received on ice directly from the field. Cooling process had begun

8. Were Method 5035 sampling containers present? YES NO

If YES, what time were they transferred to freezer?

9. Did all bottles arrive unbroken/unopened? YES NO

10. Are samples in the appropriate containers for indicated tests? YES NO

11. Are sample labels present, in good condition and complete? YES NO

12. Do the sample labels agree with custody papers? YES NO

13. Was sufficient amount of sample sent for tests requested? YES NO

14. Are the samples appropriately preserved? YES NO N/A

15. Are bubbles > 6mm absent in VOA samples? YES NO N/A

16. Was the client contacted concerning this sample delivery? YES NO

If YES, Who was called? By Date:

COMMENTS

Multiple horizontal lines for handwritten comments.

Batch QC Report
Curtis & Tompkins Laboratories Analytical Report

Lab #:	215778	Location:	MSC Remediation
Client:	OTG Enviroengineering Solutions, Inc	Prep:	EPA 5030B
Project#:	09OAK06.1000	Analysis:	EPA 8021B
Matrix:	Water	Batch#:	156212
Units:	ug/L	Analyzed:	10/19/09
Diln Fac:	1.000		

Type: BS Lab ID: QC517267

Analyte	Spiked	Result	%REC	Limits
MTBE	10.00	10.00	100	36-168
Benzene	10.00	10.47	105	69-121
Toluene	10.00	9.685	97	64-132
Ethylbenzene	10.00	9.704	97	64-136
m,p-Xylenes	10.00	10.27	103	63-138
o-Xylene	10.00	9.986	100	64-135

Surrogate	%REC	Limits
Trifluorotoluene (PID)	79	21-180
Bromofluorobenzene (PID)	79	26-167

Type: BSD Lab ID: QC517268

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
MTBE	10.00	10.06	101	36-168	1	35
Benzene	10.00	10.21	102	69-121	3	24
Toluene	10.00	9.862	99	64-132	2	27
Ethylbenzene	10.00	10.13	101	64-136	4	27
m,p-Xylenes	10.00	10.39	104	63-138	1	32
o-Xylene	10.00	10.37	104	64-135	4	27

Surrogate	%REC	Limits
Trifluorotoluene (PID)	78	21-180
Bromofluorobenzene (PID)	80	26-167

RPD= Relative Percent Difference

Batch QC Report

Curtis & Tompkins Laboratories Analytical Report

Lab #:	215778	Location:	MSC Remediation
Client:	OTG Enviroengineering Solutions, Inc	Prep:	EPA 5030B
Project#:	09OAK06.1000	Analysis:	EPA 8015B
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC517305	Batch#:	156212
Matrix:	Water	Analyzed:	10/19/09
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	1,000	1,131	113	73-121

Surrogate	%REC	Limits
Trifluorotoluene (FID)	123	48-162
Bromofluorobenzene (FID)	101	52-158

Batch QC Report

Curtis & Tompkins Laboratories Analytical Report

Lab #:	215778	Location:	MSC Remediation
Client:	OTG Enviroengineering Solutions, Inc	Prep:	EPA 5030B
Project#:	09OAK06.1000	Analysis:	EPA 8015B
Field ID:	E-1	Diln Fac:	1.000
MSS Lab ID:	215778-001	Batch#:	156212
Matrix:	Water	Sampled:	10/16/09
Units:	ug/L	Received:	10/16/09

Type: MS Analyzed: 10/19/09
 Lab ID: QC517306

Analyte	MSS Result	Spiked	Result	%REC	Limits
Gasoline C7-C12	12.03	2,000	2,123	106	49-129

Surrogate	%REC	Limits
Trifluorotoluene (FID)	119	48-162
Bromofluorobenzene (FID)	110	52-158

Type: MSD Analyzed: 10/20/09
 Lab ID: QC517307

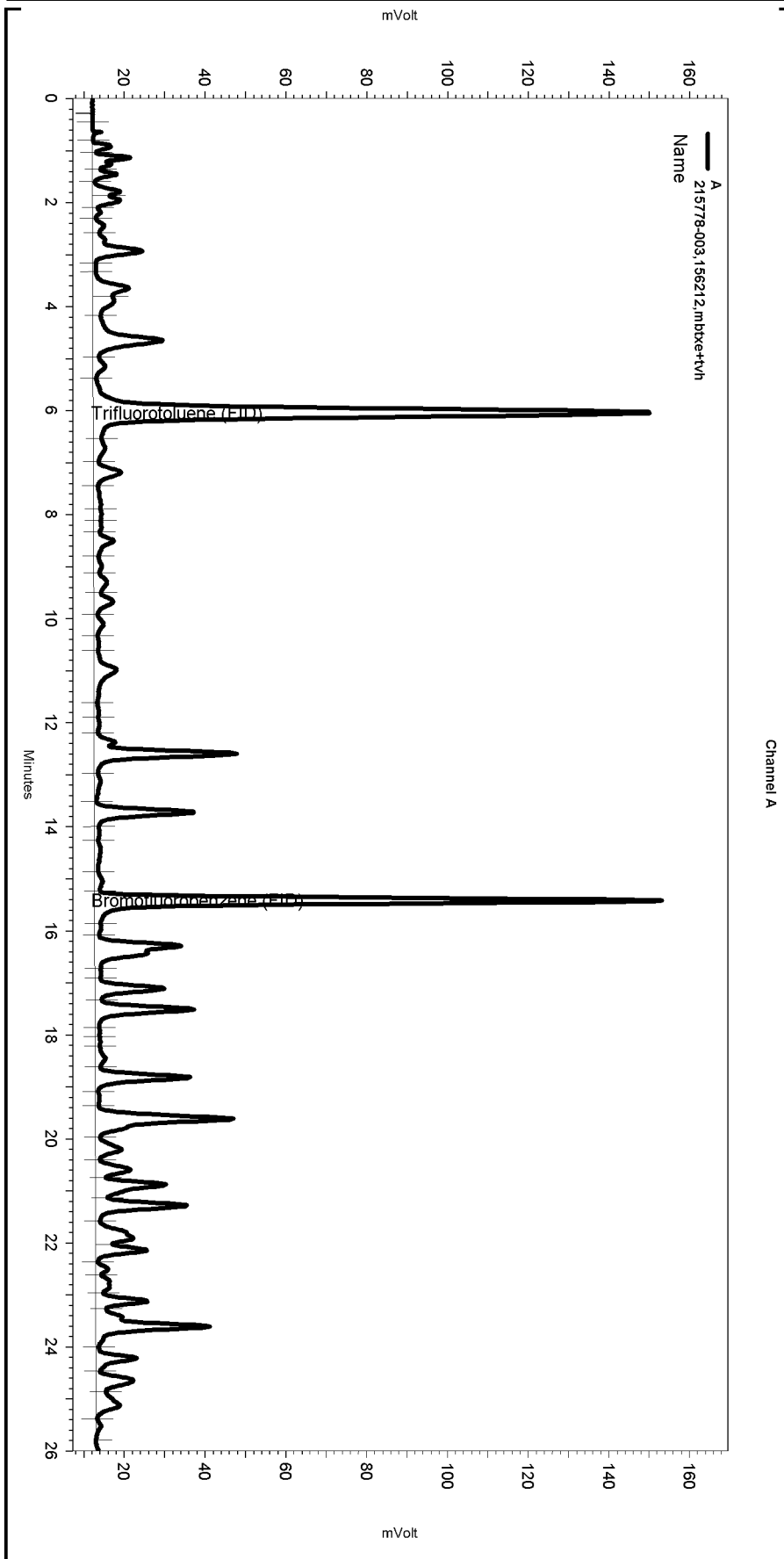
Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	2,000	2,207	110	49-129	4	19

Surrogate	%REC	Limits
Trifluorotoluene (FID)	120	48-162
Bromofluorobenzene (FID)	107	52-158

RPD= Relative Percent Difference

Sequence File: \\Lims\gdrive\ezchrom\Projects\GC07\Sequence\292.seq
 Sample Name: 215778-003,156212,mbtxe+tvh
 Data File: \\Lims\gdrive\ezchrom\Projects\GC07\Data\292_023
 Instrument: GC07 (Offline) Vial: N/A Operator: Tvh 2. Analyst (lims2k3\tvh2)
 Method Name: \\Lims\gdrive\ezchrom\Projects\GC07\Method\TVHBTXE292.met

Software Version 3.1.7
 Run Date: 10/20/2009 1:34:07 AM
 Analysis Date: 10/20/2009 10:04:00 AM
 Sample Amount: 5 Multiplier: 5
 Vial & pH or Core ID: a1.3



---< General Method Parameters >---

No items selected for this section

---< A >---

No items selected for this section

Integration Events

Enabled	Event Type	Start (Minutes)	Stop (Minutes)	Value
Yes	Width	0	0	0.2
Yes	Threshold	0	0	50

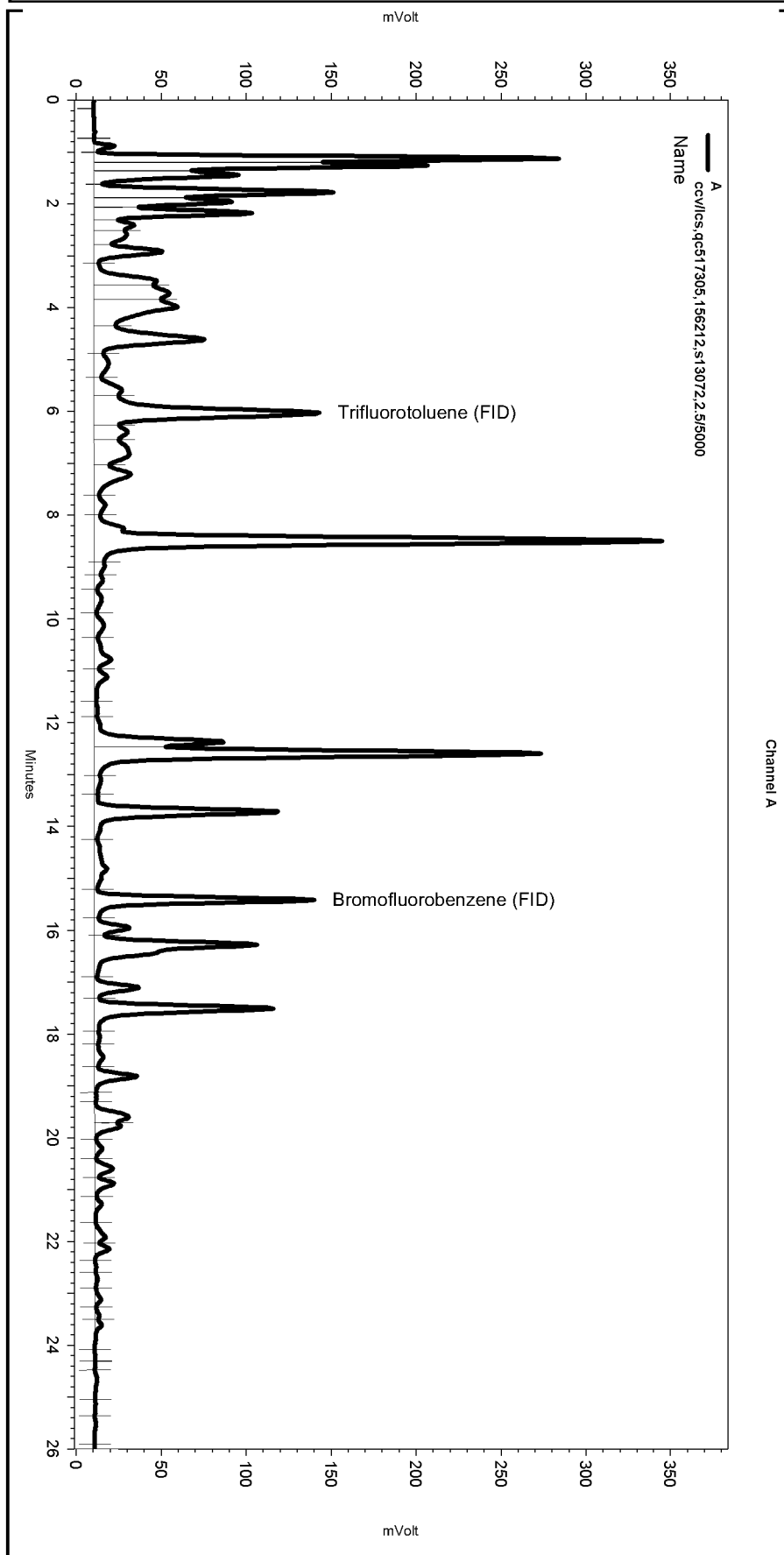
Manual Integration Fixes

Data File: \\Lims\gdrive\ezchrom\Projects\GC07\Data\292_023

Enabled	Event Type	Start (Minutes)	Stop (Minutes)	Value
None				

Sequence File: \\Lims\gdrive\ezchrom\Projects\GC07\Sequence\292.seq
 Sample Name: ccv\lcs,qc517305,156212,s13072,2.5/5000
 Data File: \\Lims\gdrive\ezchrom\Projects\GC07\Data\292_004
 Instrument: GC07 (Offline) Vial: N/A Operator: Tvh 2. Analyst (lms2k3\tvh2)
 Method Name: \\Lims\gdrive\ezchrom\Projects\GC07\Method\lvhbtxe281.met

Software Version 3.1.7
 Run Date: 10/19/2009 10:29:34 AM
 Analysis Date: 10/20/2009 11:38:36 AM
 Sample Amount: 5 Multiplier: 5
 Vial & pH or Core ID: {Data Description}



---< General Method Parameters >---

No items selected for this section

---< A >---

No items selected for this section

Integration Events

Enabled	Event Type	Start (Minutes)	Stop (Minutes)	Value
Yes	Width	0	0	0.2
Yes	Threshold	0	0	50

Manual Integration Fixes

Data File: \\Lims\gdrive\ezchrom\Projects\GC07\Data\292_004

Enabled	Event Type	Start (Minutes)	Stop (Minutes)	Value
None				

Batch QC Report

Total Extractable Hydrocarbons			
Lab #:	215778	Location:	MSC Remediation
Client:	OTG Enviroengineering Solutions, Inc	Prep:	EPA 3520C
Project#:	09OAK06.1000	Analysis:	EPA 8015B
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC517217	Batch#:	156210
Matrix:	Water	Prepared:	10/19/09
Units:	ug/L	Analyzed:	10/20/09

Cleanup Method: EPA 3630C

Analyte	Spiked	Result	%REC	Limits
Diesel C10-C24	2,500	2,237	89	34-144

Surrogate	%REC	Limits
o-Terphenyl	103	39-150

Batch QC Report

Total Extractable Hydrocarbons			
Lab #:	215778	Location:	MSC Remediation
Client:	OTG Enviroengineering Solutions, Inc	Prep:	EPA 3520C
Project#:	09OAK06.1000	Analysis:	EPA 8015B
Field ID:	ZZZZZZZZZZ	Batch#:	156210
MSS Lab ID:	215807-002	Sampled:	10/15/09
Matrix:	Water	Received:	10/16/09
Units:	ug/L	Prepared:	10/19/09
Diln Fac:	1.000	Analyzed:	10/20/09

Type: MS Lab ID: QC517218

Analyte	MSS Result	Spiked	Result	%REC	Limits
Diesel C10-C24	34.33	2,500	2,422	96	21-160

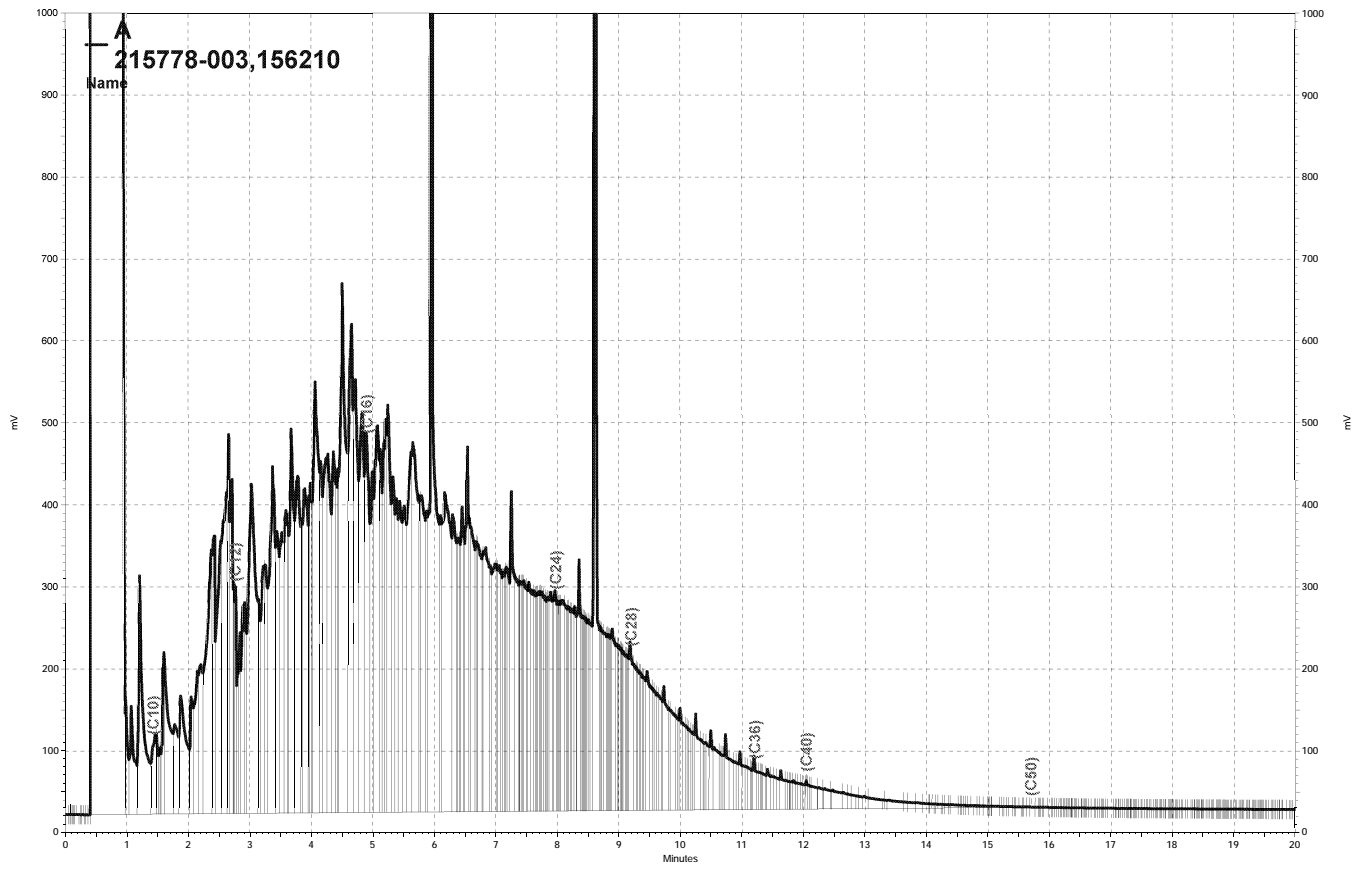
Surrogate	%REC	Limits
o-Terphenyl	106	39-150

Type: MSD Lab ID: QC517219

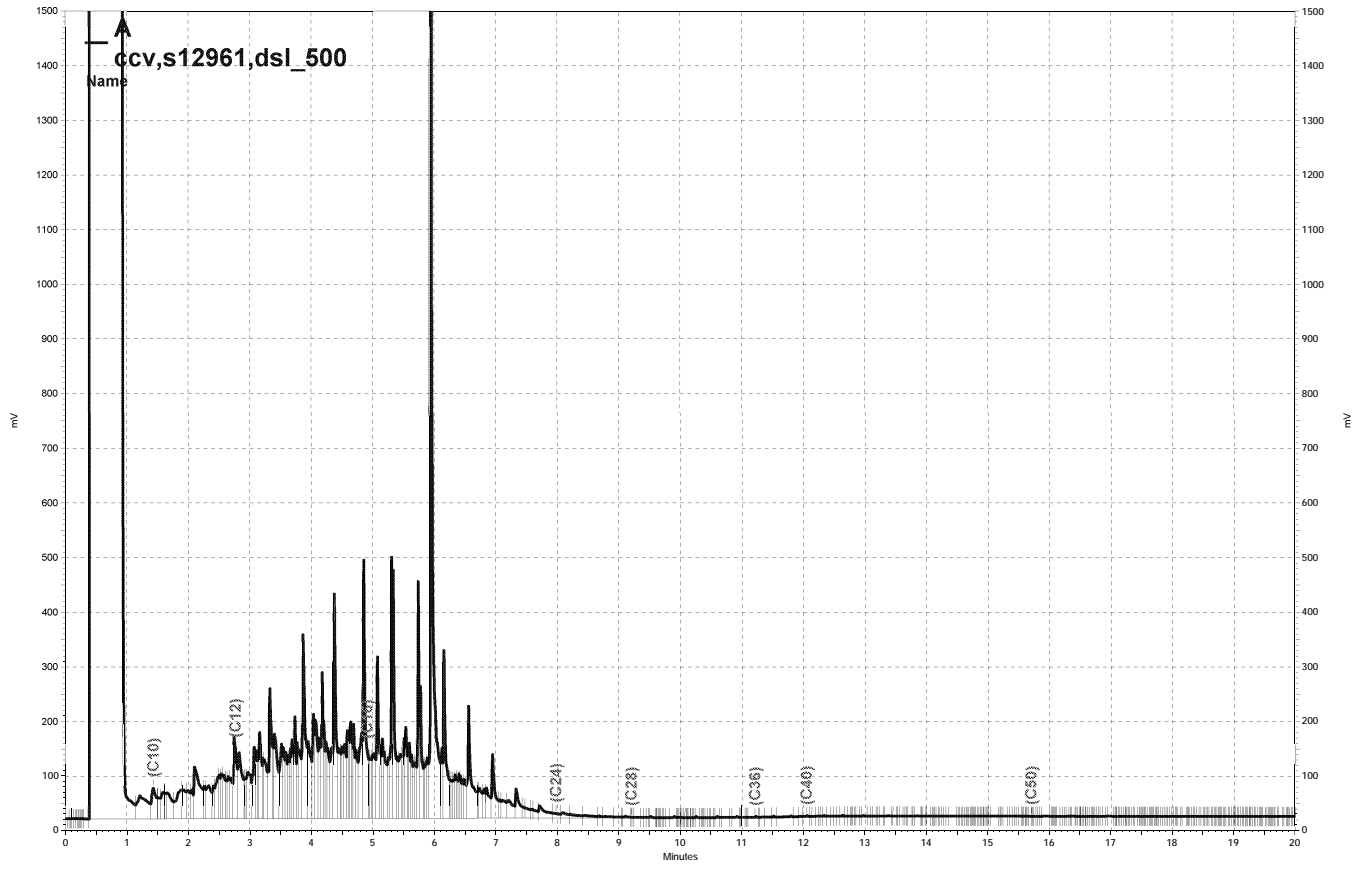
Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Diesel C10-C24	2,500	2,405	95	21-160	1	58

Surrogate	%REC	Limits
o-Terphenyl	105	39-150

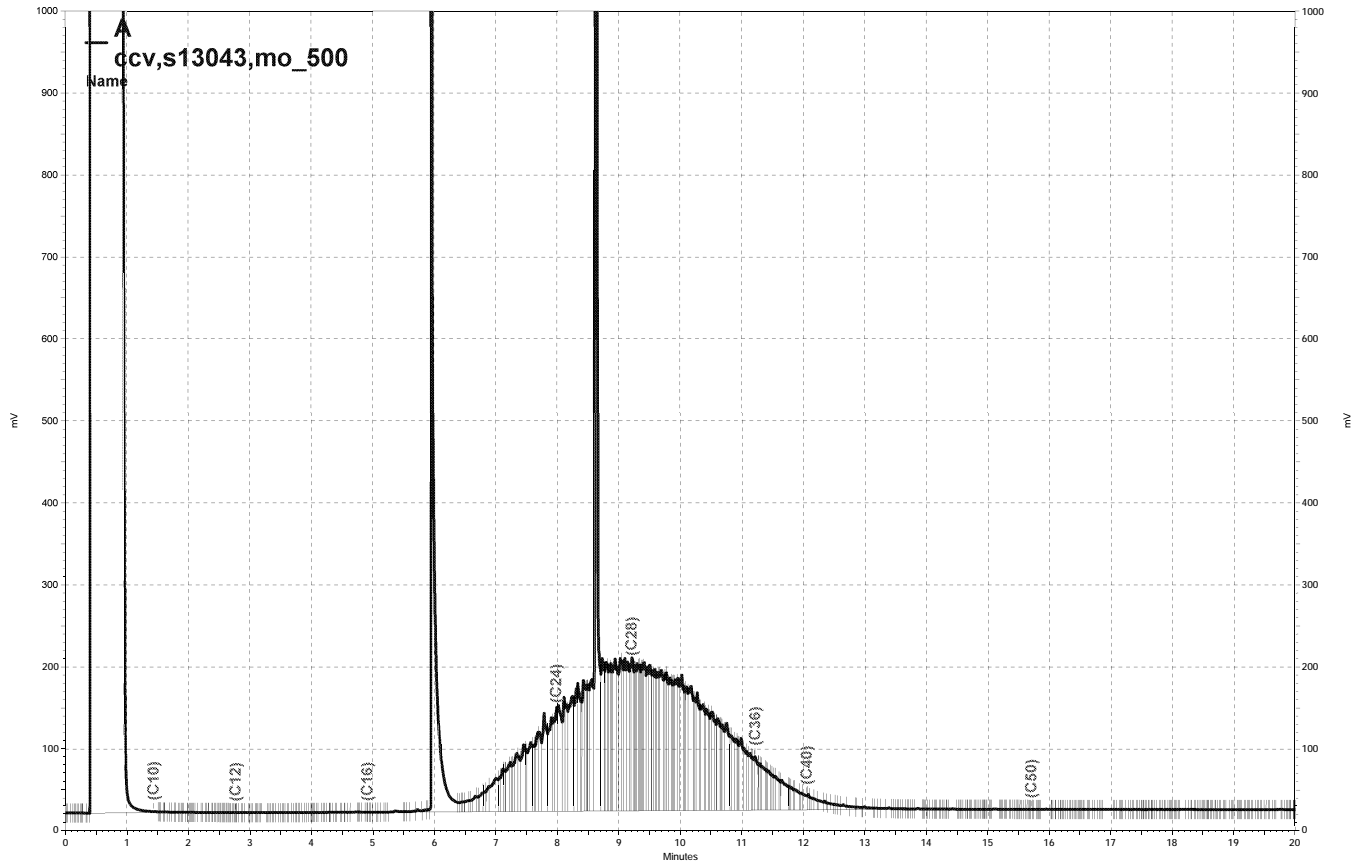
RPD= Relative Percent Difference



\\Lims\gdrive\ezchrom\Projects\GC17A\Data\293a013, A



— \\Lims\gdrive\ezchrom\Projects\GC17A\Data\293a009, A



— \\Lims\gdrive\ezchrom\Projects\GC17A\Data\293a010, A