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GEOSCIENCE & ENGINEERING CONSULTING

RECEIVED
9:58 am, Mar 10, 2009
Alameda County
Environmental Health

March 9, 2009

Mr. Steven Plunkett
Hazardous Material Specialist
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Subject: Three Month Post-Oxygen Release Compound Injection Verification - Groundwater Sampling Related to Remediation of a Former Heating Oil UFST
387 Orange Street, Oakland, California (Fuel Leak Case No. RO0002921)

Dear Mr. Plunkett:

INTRODUCTION AND SCOPE OF WORK

On behalf of the responsible party (Ms. Mary Kranz), Stellar Environmental Solutions, Inc. (SES) is providing Alameda County Environmental Health Department (ACEH) this report of findings of the verification sampling of the monitoring well at the referenced subject property. This task was conducted in accordance with the SES workplan dated February 11, 2008, and incorporated technical comments from the workplan review letter by Alameda County Health Care Services Agency, Department of Environmental Health (ACEH), dated July 14, 2008.

The objective of this work task was to evaluate the effectiveness of the Advanced Oxygen Releasing Product™ (ORC™) injection that was conducted on November 24, 2008 to remediate groundwater contamination associated with a former leaking 1,000-gallon home heating underground fuel storage tank (UFST) that was located beneath the sidewalk in front of the subject property.

SUBJECT PROPERTY HISTORY

The subject site UFST is typical of historical UFSTs which supplied fuel to a boiler to heat a residential unit before on-demand natural gas became widely used. Such fuel UFSTs were commonly buried beneath the sidewalk near the driveway, as in the case of the subject site UFST. The size of the UFST, 1,000 gallons, is also typical for residential heating oil UFSTs.

The regulatory history of this UFST evaluation project began in approximately October 2005, during the due diligence phase of the sale of the property located at 385 and 387 Orange Street (properties owned by the Ulibarri Estate). A fuel UFST (located between the 385 and 387 Orange Street residences), which was associated with historical fueling of a boiler located within the 387 Orange Street residence, was discovered beneath the sidewalk. As part of the real estate agreement, it was stipulated that the Ulibarri Estate would be responsible for the regulatory closure of the UFST.

In February 2006, Ms. Mary Kranz, executor of the estate of David Ulibarri, retained Clearwater Group to initiate the environmental closure of the historical UFST. While Clearwater Group was originally retained to remove the UFST, the stringent site constraints prompted an application to the Oakland Fire Prevention Bureau to "Abandon/Close in Place" the UFST (Tank Permit Number T-06-0008, granted on February 28, 2006). The closure in-place required that subsurface sampling be conducted to document if any residual contamination remained at concentrations of potential regulatory concern.

An initial site investigation by Clearwater Group in March 2006 documented soil contamination, including a maximum of 15,000 milligrams per kilogram (mg/kg) of total extractable hydrocarbons as diesel (TEHd) and trace amounts of ethylbenzene and total xylenes at a depth of 13.5-14 feet below ground surface (bgs). The ACEH requested in a letter dated December 20, 2006 that the extent of soil contamination and potential groundwater contamination be investigated.

SES was retained by Ms. Mary Kranz and submitted a technical workplan dated January 31, 2007 to address the ACEH concerns. SES implemented the workplan in April 2007. Analytical results from the investigation revealed maximum contaminant concentrations of 100 mg/kg of TEHd in soil at a depth of approximately 18 feet bgs. In groundwater, samples taken from 21-23 feet bgs, immediately adjacent to the presumed location of the UFST and below the fill port and service line end of the UFST, 2,400,000 micrograms per liter (µg/L) of TEHd in groundwater was detected. As in the March 2006 Clearwater Group investigation (in which the maximum concentration in soil was 15,000 mg/kg) the SES April 2007 investigation revealed that soil samples collected adjacent to the UFST fill port had the highest contaminant concentrations.

The results from both of these investigations suggested a localized contaminant source with a steep vertical gradient, as evidenced by the absence of extensive lateral soil contamination and supported by the high level of TEHd detected in groundwater. Lithologic observations indicate moderately permeable soil ranging from fine sand to clayey silt that could promote a steep gradient. The contamination likely resulted from faulty piping, as the highest detected

contamination was in borings closest to the fill port and service line in both the April 2007 and previous March 2006 investigations.

The April 2007 SES investigation concluded that the contaminant source may have entirely moved into groundwater, or if concealed beneath the UFST, would comprise an area of soil estimated to be 20 cubic yards or less. SES recommended that the UFST be removed, along with any associated contaminated soil, and a temporary groundwater monitoring well (extraction point) be installed to remove the contaminant source. This is a key requirement for closure in which significant residual contamination exists above the regulatory Regional Water Quality Control Board (Water Board) Environmental Screening Limits (ESLs), which is the case with the subject property. SES recommended that the UFST and fill piping be removed, and that any contaminated soil beneath it be excavated to the extent possible.

In September 2007, the primary contaminant source (the UFST) and secondary source (the contaminated soil) were removed to the extent practical. A pod of hydrocarbon-impacted soil, estimated to be 10 to 20 cubic yards, located beneath the footprint of the UFST (between 15 and 21 feet bgs) was left in place. This soil could not be directly accessed without disconnecting and temporarily rerouting existing overhead communication and electrical services to many of the neighborhood residences, and utilizing larger excavation equipment.

The soil sample data (with the exception of the one sample showing 15,000 mg/kg of TEHd collected during the 2006 Clearwater Group investigation) suggested that the majority of hydrocarbon contamination had passed through the soil to the underlying groundwater (encountered at about 21 feet bgs). The high TEHd detection in soil appears anomalous, as evidenced by a total of four other soil samples that were collected in an area within two feet of this sample during the UFST removal and previous two boring investigations, which showed TEHd ranging from 2.7 mg/kg to 100 mg/kg.

Based on the previously documented groundwater impact from the UFST, and discussions with ACEH, an effort was made in November 2008 to recover the high concentrations of dissolved and possibly free-floating product and remediate the groundwater contamination. This entailed the installation of a monitoring well in the approximate location of the contaminant "hotspot" and the advancement of three boreholes that were drilled and utilized for the injection of ORC® product in a triangular pattern surrounding the contaminant "hotspot" at a depth interval of 20-25 feet bgs. The ORC® was injected into the subsurface after purging of the monitoring well was conducted. Approximately 75 pounds of product (25 pounds per bore) was introduced to the subsurface for a product treatment design area 20 feet long by 20 feet wide, and 5 feet thick. The November 2008 investigation indicated the light non-aqueous phase liquid (LNAPL)or free-

product in groundwater discovered in bore B1 in April 2007 was likely not as extensive as evidenced by the lower detection of 11,000 µg/L TEHd detected during the baseline sampling of the newly installed monitoring MW-1, located just three feet away. Subsequent purging produced limited volume, however post-purge sampling of monitoring well MW-1 showed an additional decrease in TEHd to 7,500 µg/L.

To evaluate the effectiveness of the November 2008 ORC® application, ACEH required subsequent verification groundwater sampling after one quarter (three months), entailing laboratory analysis and collection of the same field water quality parameters which is the subject of this report.

Attached Figure 1 shows the site location.

FEBRUARY 2009 GROUNDWATER PURGING AND SAMPLING

A groundwater sample was collected from the one site well installation on February 26, 2009, after purging approximately 2.5 gallons of groundwater. The well dewatered after purging approximately 2.5 gallons. After waiting about 30 minutes for the well to recover, a post-purge groundwater sample was immediately collected for laboratory analysis. Groundwater sampling field notes are contained in Attachment B. The following procedures were used at the well:

- Measured the equilibrated water level in the well using an electric water level meter.
- Purged the well with a disposable bailer until it went dry. Aquifer stability parameters (pH, temperature, and electrical conductivity) were taken before purging and after each purged volume. In addition, as requested by ACEH, the natural attenuation parameters of dissolved oxygen, iron ions (total and ferrous), and oxidation-reduction potential (ORP) were measured during development and purging.
- Collected a post-purge groundwater sample for laboratory analysis.
- Delivered the samples to the analytical laboratory.

The groundwater sample was collected utilizing a disposable plastic bailer and transferred to laboratory supplied containers and placed in an ice chest with ice at approximately 4°C and transported to the analytical laboratory under chain-of-custody the same day. Laboratory analysis was conducted by Curtis and Tompkins, Ltd. (of Berkeley, California), an analytical laboratory certified by the State of California Environmental Laboratory Accreditation Program (ELAP).

Approximately 2.5 gallons of groundwater from sampling was placed in labeled, covered, 5-gallon plastic bucket and stored on site for subsequent removal.

ANALYTICAL RESULTS, NATURAL ATTENUATION INDICATORS AND HYDROCHEMICAL TRENDS

This section presents the field and laboratory analytical results of the recent sampling event. Table 1 summarizes the contaminant analytical results and Table 2 summarizes natural attenuation indicator results from the current sampling event. Attachment C contains the certified analytical laboratory report and chain-of-custody records.

Laboratory Analyses

The previous ACEH required analyses that included the fuel oxygenates, lead scavengers, and ethanol have been discontinued because they were not detected. Groundwater samples were analyzed in accordance with current ACEH requirements for the following:

Total extractable hydrocarbons – diesel range (TEHd) by EPA Method 8015M;

Benzene, toluene, ethlybenzene and xylenes (BTEX) and methyl tertiary butyl ether (MTBE) by EPA Method 8260;

Nitrates and sulfates by EPA Method 300.0 (requested by ACEH); and

Methane by EPA Method RSK-175 (requested by ACEH).

The samples were placed in an ice chest with ice at approximately 4°C and transported to the analytical laboratory under chain-of-custody. Laboratory analysis was conducted by Curtis and Tompkins, Ltd. (of Berkeley, California), an analytical laboratory certified by the State of California Environmental Laboratory Accreditation Program.

Analytical Results

The concentration of TEHd at the property monitoring well decreased in this second groundwater monitoring event, being reduced to 2,700 µg/L; a significant lowering trend from the post-purge (7,500 µg/L) and pre-purge (11,000 µg/L) samples collected in November 2008.

Table 1 summarizes the current and historical groundwater analytical results. The distribution of TEHd in groundwater samples collected during this and previous investigations is shown on the attached Figure 2. Attachment C contains the certified analytical laboratory report and chain-of-custody record.

Table 1
Current and Historical Groundwater Analytical Results
387 Orange Street, Oakland, California

Sample ID	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE
April 2007 Hydropunch Grab-Groundwater Samples (a)						
B1	**2,400,000**	ND	ND	ND	ND	NA
B2	**460**	ND	ND	ND	ND	NA
November 17, 2008 Baseline Groundwater Sample						
MW-1	**11,000**	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<2.0*
November 19, 2008 Post-Purge Sample						
MW-1	**7,500**	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<2.0*
February 27, 2009 Groundwater Sample						
MW-1	**2,700**	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<2.0*
ESLs	100	1.0	40	30	20	5.0

Notes: Groundwater concentrations are reported in micrograms per liter (µg/L); MTBE = methyl tertiary-butyl ether; TEHd = total extractable hydrocarbons as diesel; ND = none detected above laboratory reporting limit; NA = not analyzed; ESLs = Water Board Environmental Screening Levels for residential sites where groundwater is a potential drinking water resource (Water Board, 2008); Post-purge = after purging well dry, removal of approximately 1.17 gallons from monitoring well; Samples in **bold-face** type equal or exceed the ESL criteria.

Table 2
Groundwater Well Sample Analytical Results
Natural Attenuation Indicators – November 2008
387 Orange Street, Oakland, California

Sample I.D.	Nitrate (as Nitrogen)	Sulfate	Methane	Dissolved Oxygen [(a)]	Ferrous Iron [(a)]	Redox Potential (milliVolts) [(a)]
Baseline Results - November 17, 2008						
MW-1	2.8	59	*<0.005*	8.06	1.13	48.4
Post-Purge Results – November 19, 2008						
MW-1	3.4	110	0.077	3.13	0.02	250
Verification Sampling – February 26, 2009						
MW-1	2.5	28	*<0.005*	19.86 to >19.99	1.44	-24

Notes: (a) = measurement collected in field; All groundwater concentrations are reported in milligrams per liter (mg/L) unless otherwise stated.

DISCUSSION OF RESULTS AND NATURAL ATTENUATION

The Site Conceptual Model supported by the data collected to date indicates limited leakage occurred at the residential underground fuel storage tank and/or piping that migrated downward without lateral spreading and locally dissolved in the groundwater. The limited nature of the dissolved hydrocarbons suggests a stratigraphic barrier has limited its outward migration. To the extent that downgradient diffusion will occur, natural attenuation should prevail.

Pre-purge and post-purge groundwater samples collected from the monitoring well when it was installed in November 2008 were analyzed for indicators of natural biodegradation of the hydrocarbon contamination or "natural attenuation." Petroleum hydrocarbons require molecular oxygen to efficiently break down the ring structure of specific constituents. Although biodegradation of hydrocarbons can occur under anaerobic conditions, hydrocarbon biodegradation is greatest under aerobic conditions. Aerobic and anaerobic biodegradation processes vary greatly, but frequently the final product of organic chemical degradation is carbon dioxide, methane, or ammonia.

Most hydrocarbon plume conceptual models show biodegradation of petroleum hydrocarbons in groundwater as having a significant role in creating a stable plume and minimizing groundwater plume configuration and concentrations over time (Lawrence Livermore National Laboratory, 1995). Conditions that can render natural attenuation an infeasible or unacceptable remedial strategy include: a nearby sensitive receptor, sufficient residual contamination (in soil or groundwater) such that it is a continued input to groundwater contamination, unfavorable conditions for microbial activity, and/or insufficient distance for the plume to stabilize before migrating to a receptor of concern. As a result of the demonstrated degradability of petroleum hydrocarbons, remediation by natural attenuation has been found to be a viable option for addressing many hydrocarbon plumes. Under favorable conditions, this approach has the potential to eliminate the need for active remediation. However, such natural attenuation only occurs if the concentration of hydrocarbons is low enough to facilitate the infiltration of natural oxygen through the interstitial space around the contamination, supporting the microorganisms for which the contamination is a food source (thus "attenuating" it). The hydrocarbon concentration in soil or groundwater above which natural attenuation is unlikely to take place is still the subject of various research studies.

In general, natural attenuation of petroleum in groundwater is very likely occurring, unless petroleum concentrations are sufficient to overwhelm the biodegradation process (i.e. in the high-concentration area of bore B1 at this site). In these areas, biodegradation processes occur

until one of the process-limiting factors (usually oxygen) is depleted to the point at which biodegradation is not supported. The LNAPL fuel product discovered in bore B1 in April 2007 appears to be limited to a few feet and not substantial enough to inhibit biodegradation as evidenced by the low contaminant detections in monitoring MW-1 during this investigation.

Biodegradation was likely to have been enhanced following excavation and removal of the UFST and associated contaminated soil, and replacement with more permeable backfill material. In addition, the application of the ORC™ product during this investigation has greatly increased the available oxygen for aerobic biodegradation.

Evidence of the historical occurrence and potential for future occurrence of biodegradation can be obtained from analysis of groundwater for biodegradation-indicator parameters that include dissolved oxygen, oxidation-reduction potential (ORP), methane, sulfate, nitrate and ferrous iron analyses.

Dissolved Oxygen

Dissolved oxygen (DO) is the most thermodynamically-favored electron acceptor used in aerobic biodegradation of hydrocarbons. Active aerobic biodegradation of petroleum hydrocarbon compounds requires at least one to two mg/L of DO in groundwater. During aerobic biodegradation, DO levels are reduced in the hydrocarbon plume as respiration occurs. Therefore, DO levels that vary inversely to hydrocarbon concentrations are consistent with the occurrence of aerobic biodegradation.

DO concentrations in MW-1 ranged from 19.86 to >19.99 mg/L (the upper limit of the meter) during this sampling event, an increase in DO from 3.13 to 8.06 mg/L measured in November 2008 showing a significant increase in subsurface oxygen from the ORC™ remedial injection and conditions favorable to continued aerobic biodegradation.

Oxidation-Reduction Potential

The oxidation-reduction potential (ORP, or redox potential) of groundwater is a measure of electron activity, and is an indicator of the relative tendency of a solute species to gain or lose electrons. The ORP of groundwater generally ranges from -400 millivolts (mV) to +800 mV. In oxidizing (aerobic) conditions, the ORP of groundwater is typically positive; in reducing (anaerobic) conditions, the ORP is typically negative (or less positive).

Measurement of ORP during this sampling event ranged from -20 to -44 mV showed a decrease from ORP values that ranged from +48.4 mV to +250 mV during the November 2008 event. This decrease in ORP since the November 2008 event appears contrary to the expected increased

DO from the ORC™ treatment and the measured DO, however it may only be indicative of the mobilization of hydrocarbons during the well purging process. The ORP values measured during this investigation on their own do not indicate aerobic bioremediation is occurring and this parameter will need additional measurement before a trend can be established.

Ferrous Iron, Nitrate, and Sulfate

The presence of nitrate, sulfate, and ferrous iron in monitoring well MW-1 is generally consistent with the DO and ORP data, supporting the conclusion that oxygen is currently enhancing the aerobic biodegradation process. These results indicate that some degree of aerobic degradation is likely occurring at the site; however, no comparable data is yet available to show a discernable trend and/or correlation to hydrocarbon concentration.

Methane

Methanogenesis is often indicative of the anaerobic biodegradation of hydrocarbons. The presence of methane was not detected during this sampling event and only a trace concentration was previously detected in the November 2008 post-purge groundwater sample. This suggests that anaerobic biodegradation is not likely occurring at this site.

Quality Control Sample Analytical Results

Laboratory QC samples (e.g., method blanks, matrix spikes, surrogate spikes, etc.) were analyzed by the laboratory in accordance with requirements of each analytical method. All laboratory QC sample results and sample holding times were within the acceptance limits of the methods (see Appendix C).

REGULATORY CONSIDERATIONS AND ENVIRONMENTAL SCREENING LEVELS

The Water Board has established ESLs for evaluating the likelihood of environmental impact. ESLs are conservative screening-level criteria for soil and groundwater, designed to be generally protective of both drinking water resources and aquatic environments; they incorporate both environmental and human health risk considerations. ESLs are not cleanup criteria (i.e., health-based numerical values or disposal-based values). Rather, they are used as a preliminary guide in determining whether additional remediation and/or investigation may be warranted.

Different ESLs are published for commercial/industrial vs. residential land use, for sites where groundwater is a potential drinking water resource and is not a drinking water resource, and the type of receiving water body. A Water Board-published map of the East Bay shows areas where groundwater is, and is not, a potential drinking water resource.

In our professional opinion, the appropriate ESLs for the subject site are based on:

- Residential land use.
- Groundwater *is* a potential drinking water resource. In our professional opinion, the appropriate ESLs for the subject site are *residential land use* and *groundwater is a potential drinking water resource.* This is based on both the property zoning status and the designation of this area of Oakland as "Zone A – Significant Drinking Water Resource (Water Board, 1999).
- The receiving body for groundwater discharge is an estuary (San Francisco Bay).

The State of California has also promulgated drinking water standards (Maximum Contaminant Levels [MCLs]) for some of the site contaminants. Drinking water standards may also be utilized by regulatory agencies to evaluate the potential risk associated with groundwater contamination. For the site contaminants, MCLs are generally the same as the ESLs (except that there is no MCL for gasoline).

Once ESLs or drinking water standards are exceeded, the need for and type of additional investigative and corrective actions are generally driven by the potential risk associated with the contamination. Minimum regulatory criteria generally applied to fuel leak cases in groundwater include:

- The contaminant source has been removed, including reasonably accessible contaminated soils that pose a long-term impact to groundwater.

This has been achieved at the site with the removal of the UFST and associated contaminated soil, and the November 2008 treatment of the residual mass in the groundwater through the injection of ORC™.

- The extent of residual contamination has been fully characterized, to obtain sufficient lithologic and hydrogeologic understanding (generally referred to as a Site Conceptual Model).

This is considered to have been achieved through the various investigations to date.

- Groundwater wells have been installed and are monitored periodically to evaluate groundwater contaminant concentrations and hydrochemical trends.

To date, one groundwater well has been installed and a baseline sample and 3 month verification sample have showed TEHd at concentrations above regulatory ESLs.

- The stability of the contaminant plume has been evaluated to determine whether it is moving or increasing in concentration.

This is not considered to have been achieved over the course of a year of annual quarterly sampling that the regulator often require to assess seasonal impacts. However, the data collected to date suggests a residual hotspot that is very limited in extent, relatively immobile and the most recent sampling has showed a significant downward contaminant concentration trend.

- A determination has been made as to whether the residual contamination poses an unacceptable risk to sensitive receptors.

This is considered to have been achieved. The groundwater contamination is comprised only of TEHd and does not contain benzene, toluene, ethyl benzene, xylenes, or other compounds that would create a concern for contaminant vapor intrusion, and there are no downgradient sensitive receptors known.

As stated above, ESLs are used as a preliminary guide in determining whether additional remediation or other action is warranted. Exceedance of ESLs may warrant additional actions, such as monitoring plume stability to demonstrate no risk to sensitive receptors in the case of sites where drinking water is not threatened.

GROUNDWATER IMPACTS AND BENEFICIAL USES

How much groundwater contamination impacts the current and projected beneficial use of the groundwater? In general, impacts of contamination on the environment by petroleum products are evaluated on a case-by-case basis by the regulators, with consideration given to Water Board ESLs.

There are no known immediate impacts to the groundwater that affect current beneficial use, although the area of immediate site area is within the "Zone A" designation by Water Board "East Bay Plain Groundwater Basin Beneficial Use Evaluation Report" (Water Board, 1999). The Zone A designation defines the groundwater as a "significant drinking water resource."

Surface Water

The nearest surface water body is Glen Echo Creek, a northeast-southwest trending creek located approximately 1,500 feet northwest to west of the subject property where it becomes culverted prior to emptying into Lake Merritt (located about 0.5 mile south-southwest of the site).

DISCUSSION AND RECOMMENDATIONS

Two additional quarterly groundwater monitoring events (for a total of four consecutive monitoring events) may be required to establish that the groundwater contamination is decreasing or steady state. We recommend following up with ACEH following its receipt of this report, to discuss the requirements to move the site toward regulatory closure.

This report has been prepared for the exclusive use by Ms. Mary Kranz (responsible party), the regulatory agencies, and their authorized assigns and/or representatives. No reliance on this report shall be made by anyone other than those for whom it was prepared. A copy of this report has been electronic uploaded to Alameda County Environmental Health's "ftp" system and the State Water Board's GeoTracker system.

I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report are true and correct to the best of my knowledge. If you have any questions regarding this report, please contact us at (510) 644-3123.

Sincerely,

Henry Pietropaoli, R.G., R.E.A.
Project Manager

Richard S. Makdisi, R.G., R.E.A.
Principal

cc: Ms. Mary Kranz
ACEH "ftp" server
CA Geotracker

REFERENCES

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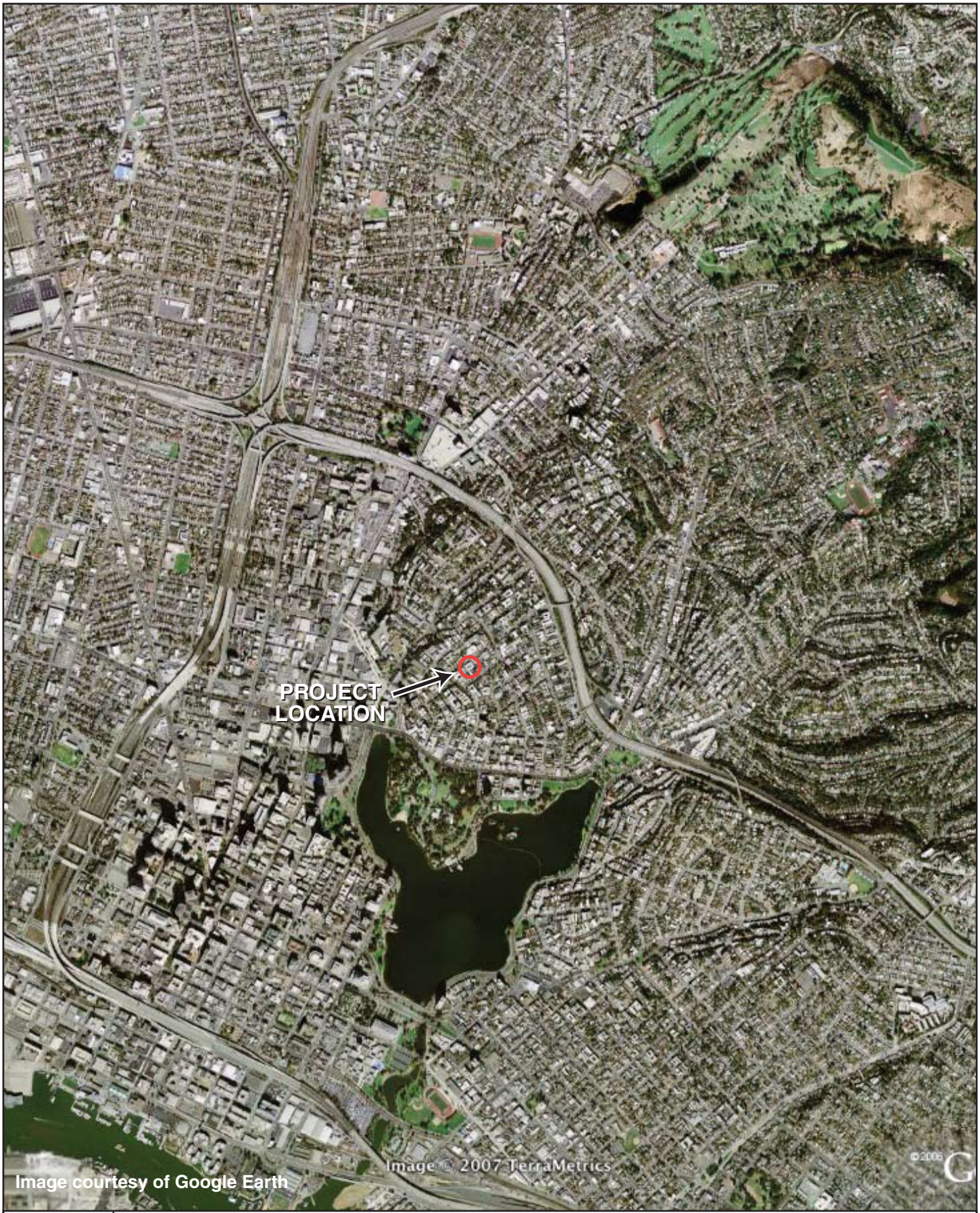
ATTACHMENT A

Figures



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SITE LOCATION ON AERIAL PHOTO

385-387 Orange St. Oakland, CA	By: MJC	SEPTEMBER 2007
	Figure 1	

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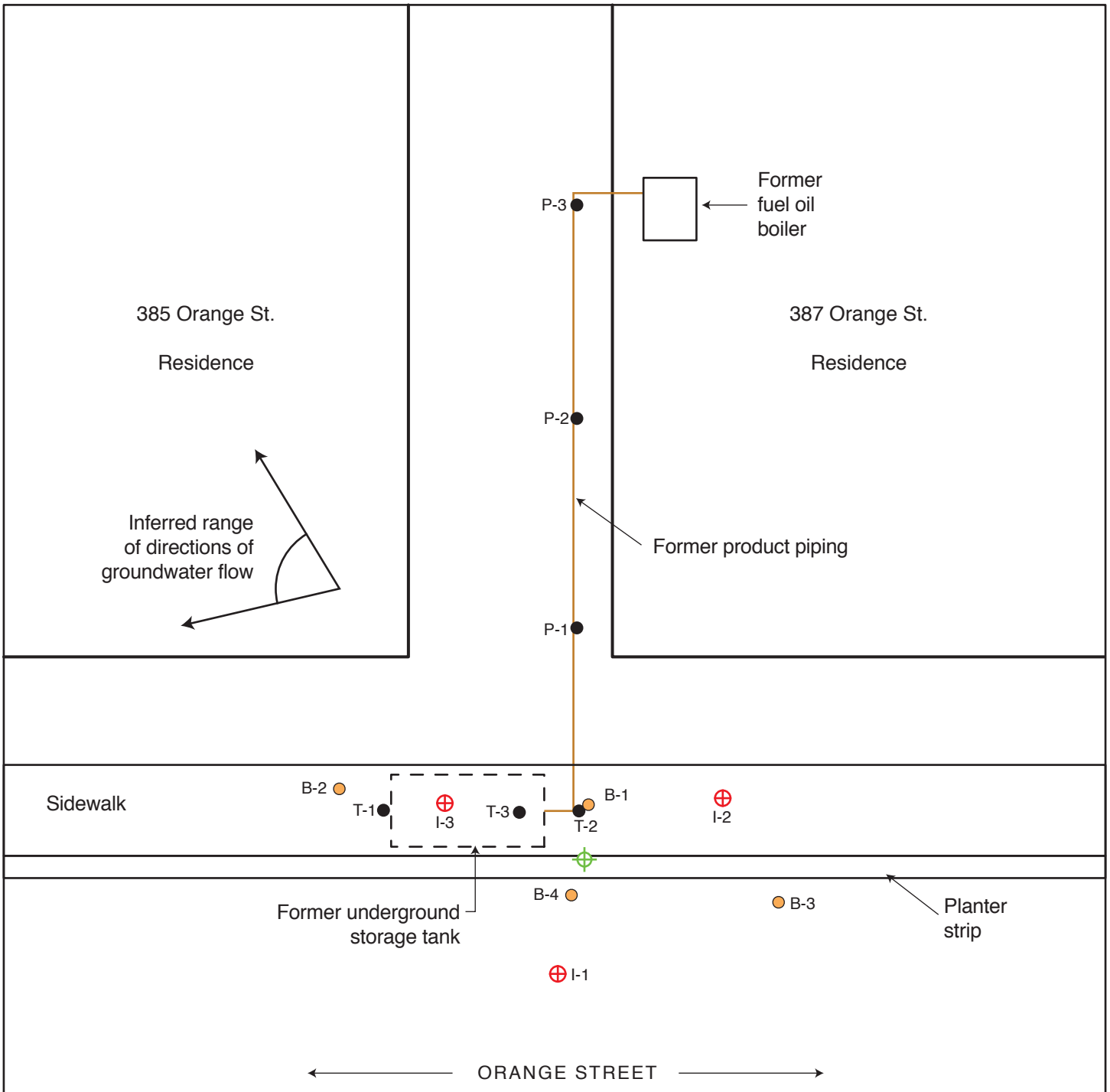
2007-09-01



LEGEND

- I-1 Location of ORC injection point (SES 2008)
- MW-1 Location of monitoring well (SES 2008)
- T-2 Clearwater Group tank sample (2006)
- P-2 Clearwater Group pipeline sample (2006)
- B-1 SES boring (2007)
- Location of former UST (CWG, 2006; SES, 2007)

TPHd=Total petroleum hydrocarbons as diesel concentrations in µg/L

0 10

APPROX. SCALE IN FEET

Modified from original source: Clearwater Group

SITE PLAN SHOWING LOCATIONS OF BORINGS AND MONITORING WELL

387 Orange St. Oakland, CA	By: MJC	DECEMBER 2008
	Figure 2	

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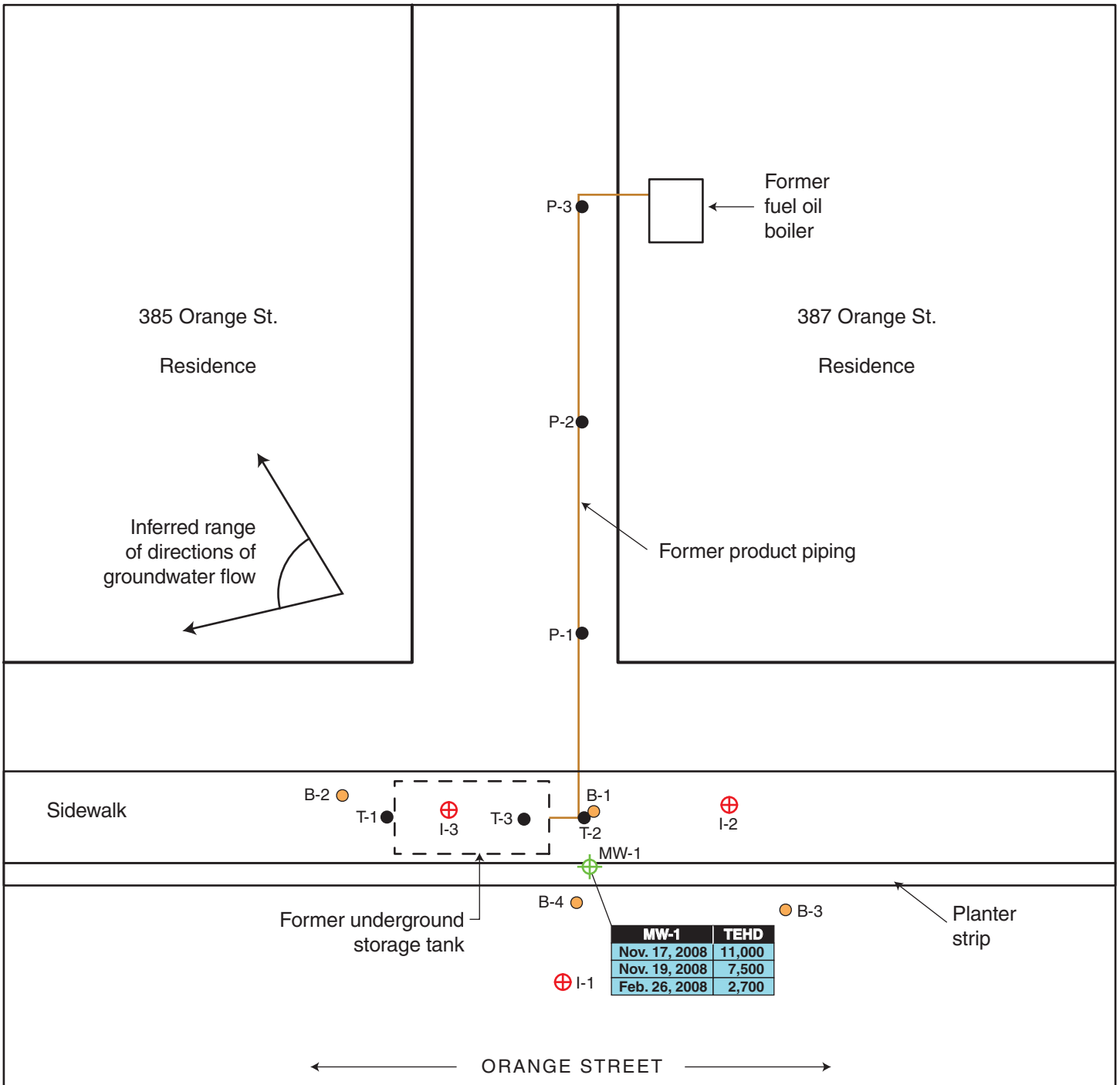
2007-09-17



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- B-1 SES boring (2007)
- Location of former UST (CWG, 2006; SES, 2007)

TPHd=Total petroleum hydrocarbons as diesel concentrations in µg/L

0 10

APPROX. SCALE IN FEET

Modified from original source: Clearwater Group

CONCENTRATION OF TEH-DIESEL IN MONITORING WELL MW-1

387 Orange St. Oakland, CA	By: MJC	MARCH 2009
	Figure 3	

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2007-09-19

ATTACHMENT B

Groundwater Sampling Field Data Sheet

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WELL MONITORING DATA SHEET

Project #: 2007-08	Client: Ulbarri Estate
Sampler: HP	Start Date: 2/26/09
Well I.D.:	Well Diameter: (circle one) (2) 3 4 6 ___
Total Well Depth: 29.07 Before After	Depth to Water: Before 18.02 After
Depth to Free Product:	Thickness of Free Product (feet):
Measurements referenced to: (PVC) Grade	Other:

Well Diameter	VCF	Well Diameter	VCF
1"	0.04	6"	1.47
(2")	0.16	8"	2.61
3"	0.37	10"	4.08
4"	0.65	12"	5.87
5"	1.02	16"	10.43

1.77 (1 Case Volume) x 3 (Specified Volumes) = 5.31 (gallons)

Purging: Bailer
~~Disposable Bailer~~
~~Middleburg~~
Electric Submersible
Extraction Pump
Other ____

Sampling: ~~Bailer~~
~~Disposable~~ Bailer
Extraction Port
Other ____

TIME	TEMP. (F) °C	pH	COND. mS/cm	DO mg/L	ORP mV	VOLUME REMOVED:	Fe 2+ mg/L	Total Fe mg/L	
1330	18.63	11.46	2.35	>19.99	-44	0			
1340	18.60	11.40	2.66	>19.99	-32	1.7			
13.50	18.46	11.20	2.65	19.86	-20	2.3			
1355	18.52	1127	3.11	>19.99	-24	2.5	1.44	2.98	1st
							1.38	>3.00	2nd

Did Well Dewater? If yes, gals. 2.5 Gallons Actually Evacuated: 2.5

Sampling Time: 1410 Sampling Date: 2/26/09

Sample I.D.: MW-1 Laboratory: C+T

Analyzed for: TPH-G (BTEX) (TPH-D) OTHER:
(Circle) methane nitrate sulfate MBTEX

Duplicate I.D.: Cleaning Blank I.D.:

Analyzed for: TPH-G BTEX TPH-D OTHER:
(Circle)

ATTACHMENT C

Certified Laboratory Analytical Results and Chain-of-Custody Record


Curtis & Tompkins, Ltd.
Analytical Laboratories, Since 1878

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

Laboratory Job Number 210305
ANALYTICAL REPORT

Stellar Environmental Solutions	Project : 2007-08
2198 6th Street	Location : Orange Street
Berkeley, CA 94710	Level : II

Sample ID	Lab ID
MW-1	210305-001

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 signatures. 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: _____ Date: 03/06/2009
Project Manager

Signature: _____ Date: 03/09/2009
Senior Program Manager

NELAP # 01107CA

Curtis & Tompkins, Ltd.

CASE NARRATIVE

Laboratory number:	**210305**
Client:	**Stellar Environmental Solutions**
Project:	**2007-08**
Location:	**Orange Street**
Request Date:	**02/26/09**
Samples Received:	**02/26/09**

This data package contains sample and QC results for one water sample, requested for the above referenced project on 02/26/09. The sample was received intact.

TPH-Purgeables and/or BTXE by GC (EPA 8021B):
No analytical problems were encountered.

TPH-Extractables by GC (EPA 8015B):
No analytical problems were encountered.

Dissolved Gases by GC/FID (RSK-175):
No analytical problems were encountered.

Ion Chromatography (EPA 300.0):
No analytical problems were encountered.

210305

Chain of Custody Record

Lab job no. _____

Date _____

Page 1 of 1

Laboratory Curtis and Tompkins, Ltd.
Address 2323 Fifth Street
Berkeley, California 94710
510-486-0900

Method of Shipment Hand Delivery
Shipment No. _____
Airbill No. _____
Cooler No. _____
Project Manager Richard Makdisi
Telephone No. (510) 644-3123
Fax No. (510) 644-3859
Samplers: (Signature) [signature]

Project Owner Ulibarri Estate/Ms. Mary Krantz
Site Address 387 Orange Street
Oakland,CA

Project Name Orange Street
Project Number 2007-08

Field Sample Number	Location/ Depth	Date	Time	Sample Type	Type/Size of Container	Preservation: Cooler	Preservation: Chemical	Filtered	No. of Containers	TPH diesel	mBTEX	Nitrate (300.0)	Sulfate (300.0)	methane (RSK-175)	Remarks
MW-1	—	2/26/09	1410	H_2O	☆ see note	yes	☆	No	8	✓	✓	✓	✓	✓	

Relinquished by:	Date	Received by:	Date	Relinquished by:	Date	Received by:	Date
Signature [signature]	2/26/09	Signature Tracy Babjar	2/26/09	Signature		Signature	
Printed Pietropaoli	Time 3:35	Printed Tracy Babjar	Time 3:35	Printed	Time	Printed	Time
Company Stellar Environmental		Company CDT		Company		Company	

Turnaround Time: 5 Day TAT

Comments: Samples on ice
☆ 6 - 40ml VOA w/ HCl
1 L amber NPres., 1 250ml poly no preserv

Relinquished by:	Date	Received by:	Date
Signature		Signature	
Printed	Time	Printed	Time
Company		Company	

2000-00-01

★ Stellar Environmental Solutions

2198 Sixth Street #201, Berkeley, CA 94710

COOLER RECEIPT CHECKLIST

Curtis & Tompkins, Ltd.

Login # 210305 Date Received 2/26/09 Number of coolers 1
Client Stellar Project Orange Street

Date Opened 2/26/09 By (print) Phuong (sign)
Date Logged in By (print) (sign)

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 ☐ Foam blocks ☐ Bags ☐ None
   ☐ Cloth material ☐ Cardboard ☐ Styrofoam ☐ Paper towels

7. Temperature documentation:

   Type of ice used: ☐ Wet ☑ Blue/Gel ☐ None Temp(°C) 8.5

   ☐ 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

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	210305	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2007-08	Analysis:	EPA 8021B
Field ID:	MW-1	Batch#:	148469
Matrix:	Water	Sampled:	02/26/09
Units:	ug/L	Received:	02/26/09
Diln Fac:	1.000	Analyzed:	03/03/09

Type: SAMPLE Lab ID: 210305-001

Analyte	Result	RL
MTBE	ND	2.0
Benzene	ND	0.50
Toluene	ND	0.50
Ethylbenzene	ND	0.50
m,p-Xylenes	ND	0.50
o-Xylene	ND	0.50

Surrogate	%REC	Limits
Trifluorotoluene (PID)	76	50-140
Bromofluorobenzene (PID)	75	56-132

Type: BLANK Lab ID: QC485667

Analyte	Result	RL
MTBE	ND	2.0
Benzene	ND	0.50
Toluene	ND	0.50
Ethylbenzene	ND	0.50
m,p-Xylenes	ND	0.50
o-Xylene	ND	0.50

Surrogate	%REC	Limits
Trifluorotoluene (PID)	76	50-140
Bromofluorobenzene (PID)	75	56-132

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

Curtis & Tompkins Laboratories Analytical Report

Lab #:	210305	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2007-08	Analysis:	EPA 8021B
Matrix:	Water	Batch#:	148469
Units:	ug/L	Analyzed:	03/03/09
Diln Fac:	1.000		

Type: BS Lab ID: QC485669

Analyte	Spiked	Result	%REC	Limits
MTBE	10.00	10.46	105	53-152
Benzene	10.00	9.057	91	79-120
Toluene	10.00	9.341	93	76-122
Ethylbenzene	10.00	9.597	96	77-125
m,p-Xylenes	10.00	9.473	95	76-126
o-Xylene	10.00	9.372	94	77-126

Surrogate	%REC	Limits
Trifluorotoluene (PID)	73	50-140
Bromofluorobenzene (PID)	73	56-132

Type: BSD Lab ID: QC485670

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
MTBE	10.00	10.15	102	53-152	3	37
Benzene	10.00	9.726	97	79-120	7	20
Toluene	10.00	10.31	103	76-122	10	21
Ethylbenzene	10.00	10.81	108	77-125	12	21
m,p-Xylenes	10.00	10.52	105	76-126	10	23
o-Xylene	10.00	10.58	106	77-126	12	21

Surrogate	%REC	Limits
Trifluorotoluene (PID)	75	50-140
Bromofluorobenzene (PID)	76	56-132

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Total Extractable Hydrocarbons

Lab #:	210305	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2007-08	Analysis:	EPA 8015B
Field ID:	MW-1	Batch#:	148491
Matrix:	Water	Sampled:	02/26/09
Units:	ug/L	Received:	02/26/09
Diln Fac:	1.000	Prepared:	03/03/09

Type: SAMPLE Analyzed: 03/04/09
Lab ID: 210305-001

Analyte	Result	RL
Diesel C10-C24	2,700	50

Surrogate	%REC	Limits
o-Terphenyl	87	61-127

Type: BLANK Analyzed: 03/05/09
Lab ID: QC485758

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
o-Terphenyl	110	61-127

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

Total Extractable Hydrocarbons

Lab #:	210305	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2007-08	Analysis:	EPA 8015B
Matrix:	Water	Batch#:	148491
Units:	ug/L	Prepared:	03/03/09
Diln Fac:	1.000		

Type: BS
Lab ID: QC485759
Analyzed: 03/04/09
Cleanup Method: EPA 3630C

Analyte	Spiked	Result	%REC	Limits
Diesel C10-C24	2,500	2,098	84	50-120

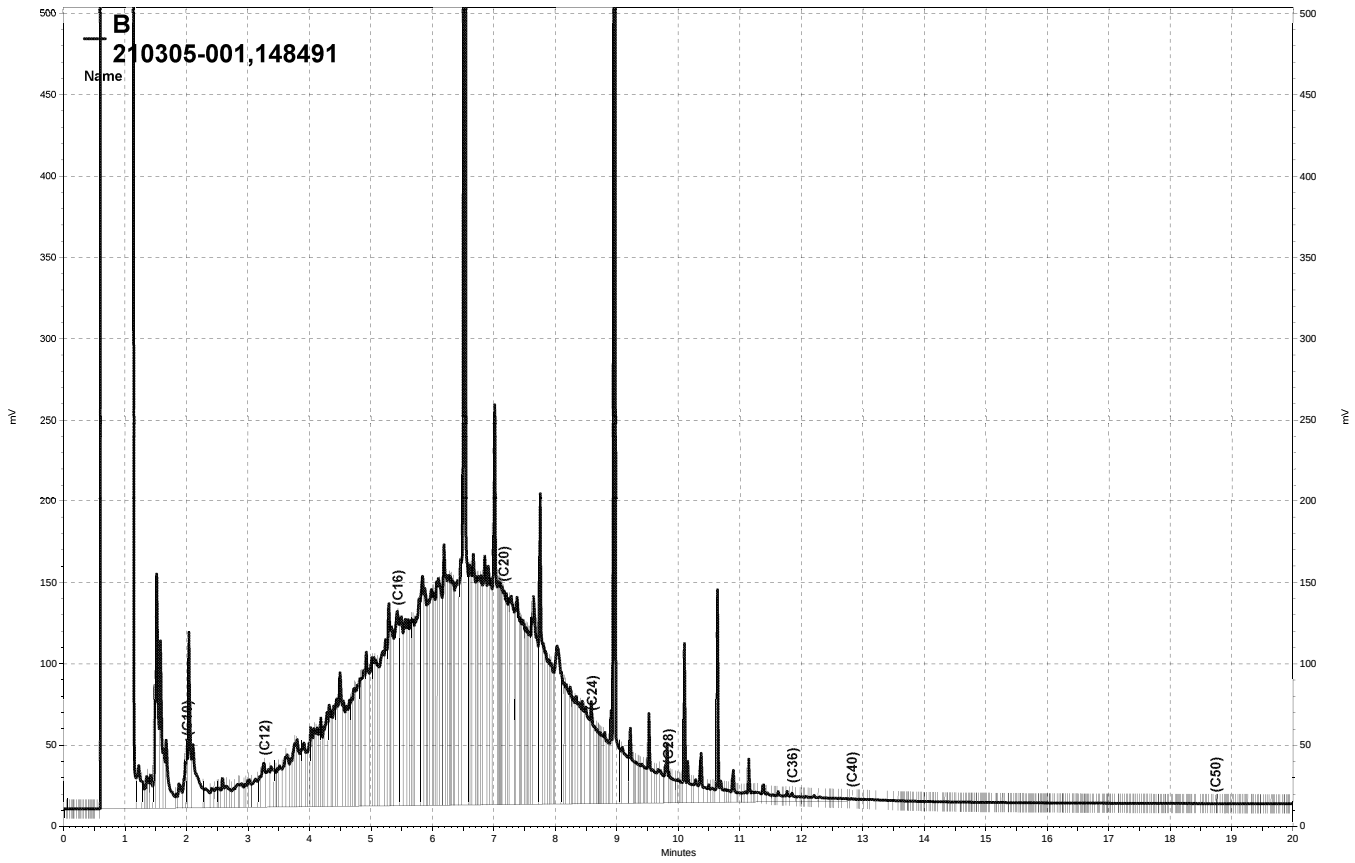
Surrogate	%REC	Limits
o-Terphenyl	106	61-127

Type: BSD
Lab ID: QC485760
Analyzed: 03/05/09
Cleanup Method: EPA 3630C

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Diesel C10-C24	2,500	2,330	93	50-120	10	37

Surrogate	%REC	Limits
o-Terphenyl	119	61-127

RPD= Relative Percent Difference



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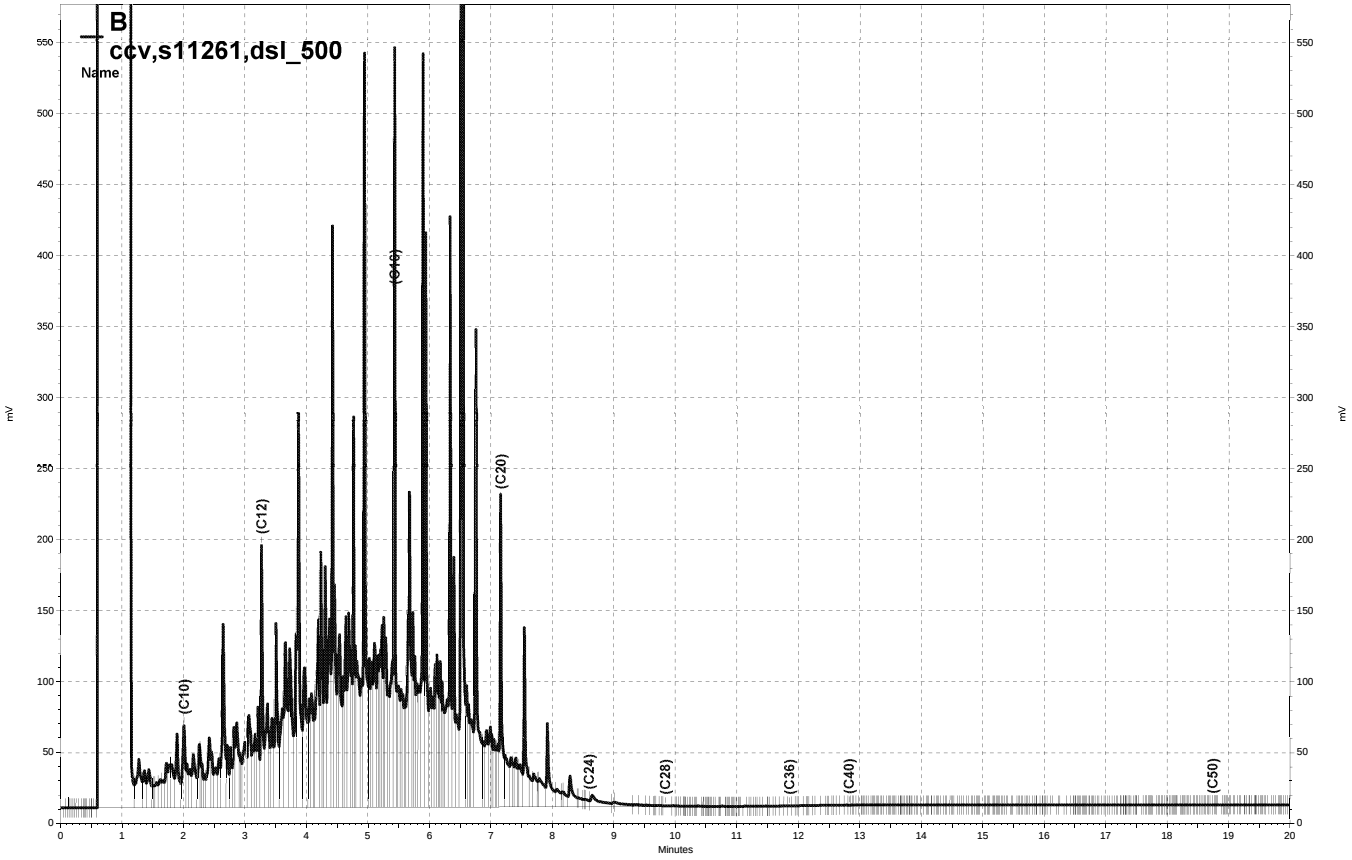

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Curtis & Tompkins, Ltd.

Dissolved Gases

Lab #:	210305	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-08	Analysis:	RSK-175
Analyte:	Methane	Diln Fac:	1.000
Field ID:	MW-1	Batch#:	148302
Matrix:	Water	Sampled:	02/26/09
Units:	mg/L	Received:	02/26/09

Type	Lab ID	Result	RL	Analyzed
SAMPLE	210305-001	ND	0.005	02/28/09
BLANK	QC484965	ND	0.005	02/27/09

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

Dissolved Gases

Lab #:	210305	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-08	Analysis:	RSK-175
Analyte:	Methane	Diln Fac:	1.000
Matrix:	Water	Batch#:	148302
Units:	mg/L	Analyzed:	02/27/09

Type	Lab ID	Spiked	Result	%REC	Limits	RPD	Lim
BS	QC484963	0.6544	0.6990	107	75-120		
BSD	QC484964	0.6544	0.6734	103	75-120	4	20

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	210305	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-08	Analysis:	EPA 300.0
Field ID:	MW-1	Batch#:	148321
Matrix:	Water	Sampled:	02/26/09 14:10
Units:	mg/L	Received:	02/26/09
Diln Fac:	1.000		

Type: SAMPLE Analyzed: 02/26/09 17:12
Lab ID: 210305-001

Analyte	Result	RL
Nitrogen, Nitrate	2.5	0.05
Sulfate	28	0.50

Type: BLANK Analyzed: 02/26/09 13:25
Lab ID: QC485070

Analyte	Result	RL
Nitrogen, Nitrate	ND	0.05
Sulfate	ND	0.50

ND= Not Detected
RL= Reporting Limit

Batch QC Report

Curtis & Tompkins Laboratories Analytical Report

Lab #:	210305	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-08	Analysis:	EPA 300.0
Matrix:	Water	Diln Fac:	1.000
Units:	mg/L	Batch#:	148321

Type: BS Analyzed: 02/26/09 13:43
Lab ID: QC485071

Analyte	Spiked	Result	%REC	Limits
Nitrogen, Nitrate	1.000	0.9821	98	80-120
Sulfate	10.00	9.619	96	80-120

Type: BSD Analyzed: 02/26/09 14:00
Lab ID: QC485072

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Nitrogen, Nitrate	1.000	0.9629	96	80-120	2	20
Sulfate	10.00	9.544	95	80-120	1	20

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Batch QC Report

Curtis & Tompkins Laboratories Analytical Report

Lab #:	210305	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-08	Analysis:	EPA 300.0
Field ID:	MW-1	Diln Fac:	10.00
MSS Lab ID:	210305-001	Batch#:	148321
Matrix:	Water	Sampled:	02/26/09 14:10
Units:	mg/L	Received:	02/26/09

Type: MS Analyzed: 02/26/09 23:38
Lab ID: QC485193

Analyte	MSS Result	Spiked	Result	%REC	Limits
Nitrogen, Nitrate	2.539	5.000	7.276	95	80-120
Sulfate	28.04	50.00	75.37	95	80-120

Type: MSD Analyzed: 02/26/09 23:56
Lab ID: QC485194

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Nitrogen, Nitrate	5.000	7.288	95	80-120	0	20
Sulfate	50.00	75.39	95	80-120	0	20

RPD= Relative Percent Difference