STELLAR
ENVIRONMENTAL SOLUTIONS, INC.
2198 Sixth Street, Suite 201·Berkeley, CA 94710
Tel: (510)644-3123 · Fax: (510)644-3859
Geoscience & Engineering Consulting

RECEIVED
10:50 am, Jun 09, 2009
Alameda County
Environmental Health

June 5, 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: Second Quarter 2009 Groundwater Monitoring Related to Remediation of a Former Heating Oil UFST at 387 Orange Street, Oakland, California (Alameda county 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 groundwater monitoring well sampling at the referenced subject property. This task follows the tasks conducted in accordance with the SES workplan dated February 11, 2008 that incorporated technical comments from the workplan review letter by Alameda County Health Care Services Agency, Department of Environmental Health (ACEH), dated July 14, 2008. This report has been prepared in response to verbal discussion between you and Mr. Richard Makdisi of SES where you indicated that ACEH would require a minimum of 4 consecutive groundwater monitoring events to determine the stability and attenuation of the contaminated groundwater at the subject site. This second quarter 2009 monitoring event represents the third consecutive quarterly groundwater monitoring event at the site.

The objective of this work is 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. Subsequent verification groundwater sampling to evaluate the effectiveness of the November 2008 ORC® application after three month showed an additional decrease in concentration decrease to 2,700 µg/L. ACEH indicated they would require a minimum of 4 consecutive quarterly groundwater monitoring events to determine the stability and attenuation of the contaminated groundwater. This report presents the results of the third consecutive sampling of the groundwater monitoring well.

Attached Figures 1 and 2 show the site location and site plan, respectively.

MAY 2009 GROUNDWATER PURGING AND SAMPLING

A groundwater sample was collected from the one site well installation on May 27, 2009, after purging approximately 3.5 gallons of groundwater, at which point the well was dewatered. After waiting about 10 minutes for the well to recover, a post-purge groundwater sample was 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 3.5 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 third groundwater monitoring event, being reduced to 1,100 µg/L; a significant lowering trend from the 2,700 µg/L detected in February 2009 sample and the post-purge (7,500 µg/L) and pre-purge (11,000 µg/L) samples collected in November 2008.

Tables 1 and 2 summarize the current and historical groundwater analytical results.

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

Sample ID	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE
April 19, 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*
May 27, 2009 Groundwater Sample						
MW-1	**1,100**	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<2.0*
ESLs	100	1.0	40	30	20	5.0

Notes:

ESLs = Water Board Environmental Screening Levels for residential sites where groundwater is a potential drinking water resource (Water Board, 2008); Samples in **bold-face** type equal or exceed the ESL criteria.

Post-purge = after purging well dry, removal of approximately 1.17 gallons from monitoring well;

MTBE = methyl tertiary-butyl ether; TEHd = total extractable hydrocarbons as diesel;

ND = none detected above laboratory reporting limit; NA = not analyzed;

Groundwater concentrations are reported in micrograms per liter (µg/L)

The distribution of TEHd in groundwater samples collected during this and previous investigations is shown on the attached Figure 3. Attachment C contains the certified analytical laboratory report and chain-of-custody record.

Table 2
Groundwater Well Sample Analytical Results
Natural Attenuation Indicators
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
Verification Sampling – May 27, 2009						
MW-1	5.4	36	*<0.005*	13.62 – 16.94	0.84	92

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 13.62 – 16.94 mg/L during this sampling event, showing significant available 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 +92 to +228 mV showed a increase from ORP values that ranged from -24 to -44 mV during the February 2009 event. The ORP values measured during the May 2009 event indicate oxidizing aerobic conditions favorable to bioremediation.

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 there is no 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 2 quarterly sampling events have shown a trend of decreasing TEHd but still at a concentration above regulatory ESLs.

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

This is considered to have been achieved over the course of a year of annual quarterly sampling that the regulator often requires 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 MTBE, 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

One additional quarterly groundwater monitoring event (for a total of four consecutive monitoring events) will be conducted in August 2009 at which point conclusions to establish that the groundwater contamination is decreasing or steady state. This event has showed a steady decrease in TPHd concentration, the only contaminant historically detected at this site. 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

PROFESSIONAL GEOLOGIST
HENRY PIETROPAOLI
No. 7651
Exp. 12/09
STATE OF CALIFORNIA

REFERENCES

Alameda County Health Care Services Agency, Department of Environmental Health (ACEH), 2008a. Letter requesting technical workplan for 387 Orange Street, Oakland, California. January 29.

Alameda County Health Care Services Agency, Department of Environmental Health (ACEH), 2008b. Letter with technical comments approving SES technical workplan, dated February 11, 2008 for 387 Orange Street, Oakland, California. July 14.

Burke, D.B., E.J. Helley, and K.R. LaJoie, 1974. Geologic Map of the Flatland Deposits of the Northwestern Part of the San Francisco Bay Region. U.S. Geological Survey.

Clearwater Group, 2006. Interim Underground Storage Tank Investigation Report, 385-387 Orange Street, Oakland, California. March 14.

Lawrence Livermore National Laboratory, 1995. California Leaking Underground Fuel Tank Historical Case Analyses (UCRL-AR-121762).

Regional Water Quality Control Board – San Francisco Bay Region (Water Board), 2008. Environmental Screening Levels for shallow soils and groundwater for residential or commercial areas where groundwater is a potential drinking water source. November 2007, revised May.

Regional Water Quality Control Board – San Francisco Bay Region (Water Board), 1999. East Bay Plains Beneficial Use Study, San Francisco Bay. June 15.

Stellar Environmental Solutions, Inc. (SES), 2007a. Soil and Groundwater Investigation Related to an Existing Heating Oil UST, 387 Orange Street, Oakland, California (Fuel Leak Case No. RO0002921), May 31.

Stellar Environmental Solutions, Inc. (SES), 2007b. Underground Heating Oil Storage Tank Removal Documentation Report, 387 Orange Street, Oakland, California (Fuel Leak Case No. RO0002921). September 26.

Stellar Environmental Solutions, Inc. (SES), 2008a. Workplan for Further Investigation and Interim Remediation Related to Underground Fuel Storage Tank. 387 Orange Street, Oakland, California (Fuel Leak Case No. RO0002921). February 11.

Stellar Environmental Solutions, Inc. (SES), 2008b. Workplan for Further Investigation and Interim Remediation Related to Underground Fuel Storage Tank. 387 Orange Street, Oakland, California (Fuel Leak Case No. RO0002921). February 11

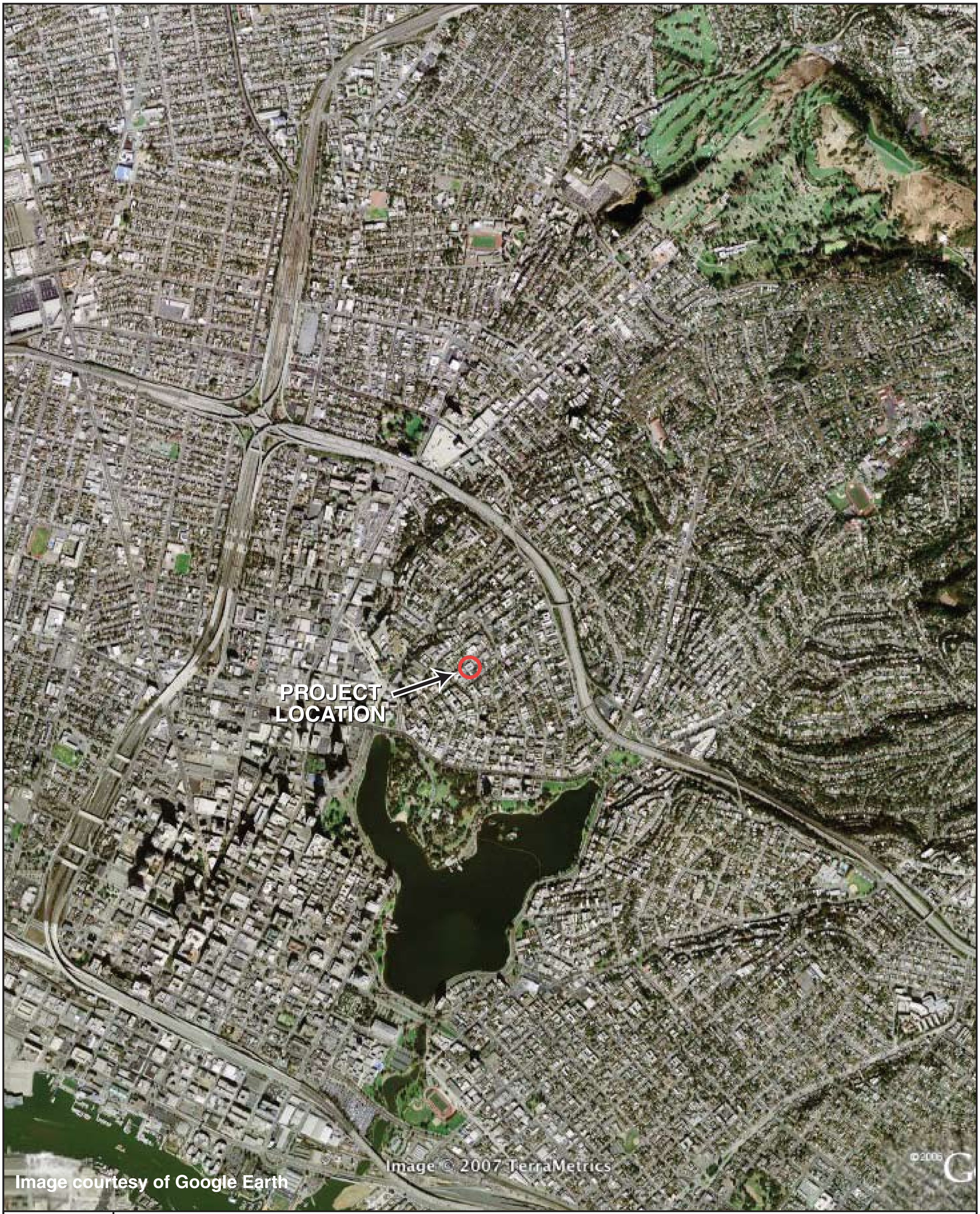
Stellar Environmental Solutions, Inc. (SES), 2008c. Groundwater Remediation Related to a Former Heating Oil UFST. 387 Orange Street, Oakland, California (Fuel Leak Case No. RO0002921) December 11.

Stellar Environmental Solutions, Inc. (SES), 2009. Three Month Post-Oxygen Release Compound Injection Verification - Groundwater Sampling Related to Remediation of a Former Heating Oil UFST at 387 Orange Street, Oakland, California. March 9.

U.S. Geological Survey (USGS), 1959. Oakland West 7.5-minute Quadrangle, 1:24000 Scale, photorevised 1959.

ATTACHMENT A

Figures



SITE LOCATION ON AERIAL PHOTO

385-387 Oranga St.
Oakland, CA

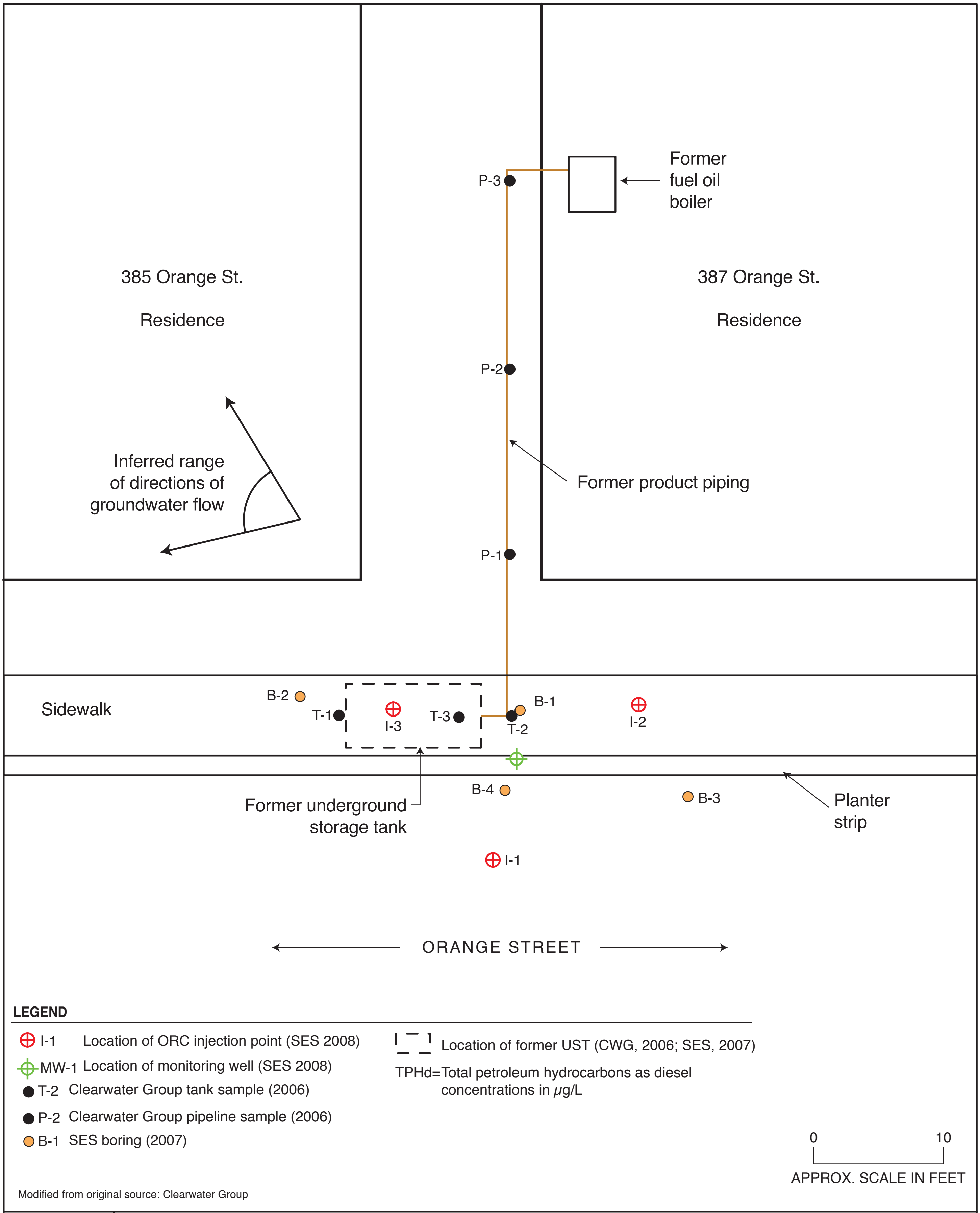
By: MJC

SEPTEMBER 2007

Figure 1

STELLAR
ENVIRONMENTAL SOLUTIONS, INC
GEOSCIENCE & ENGINEERING CONSULTING

2007-09-01



Modified from original source: Clearwater Group

SITE PLAN SHOWING LOCATIONS OF BORINGS AND MONITORING WELL

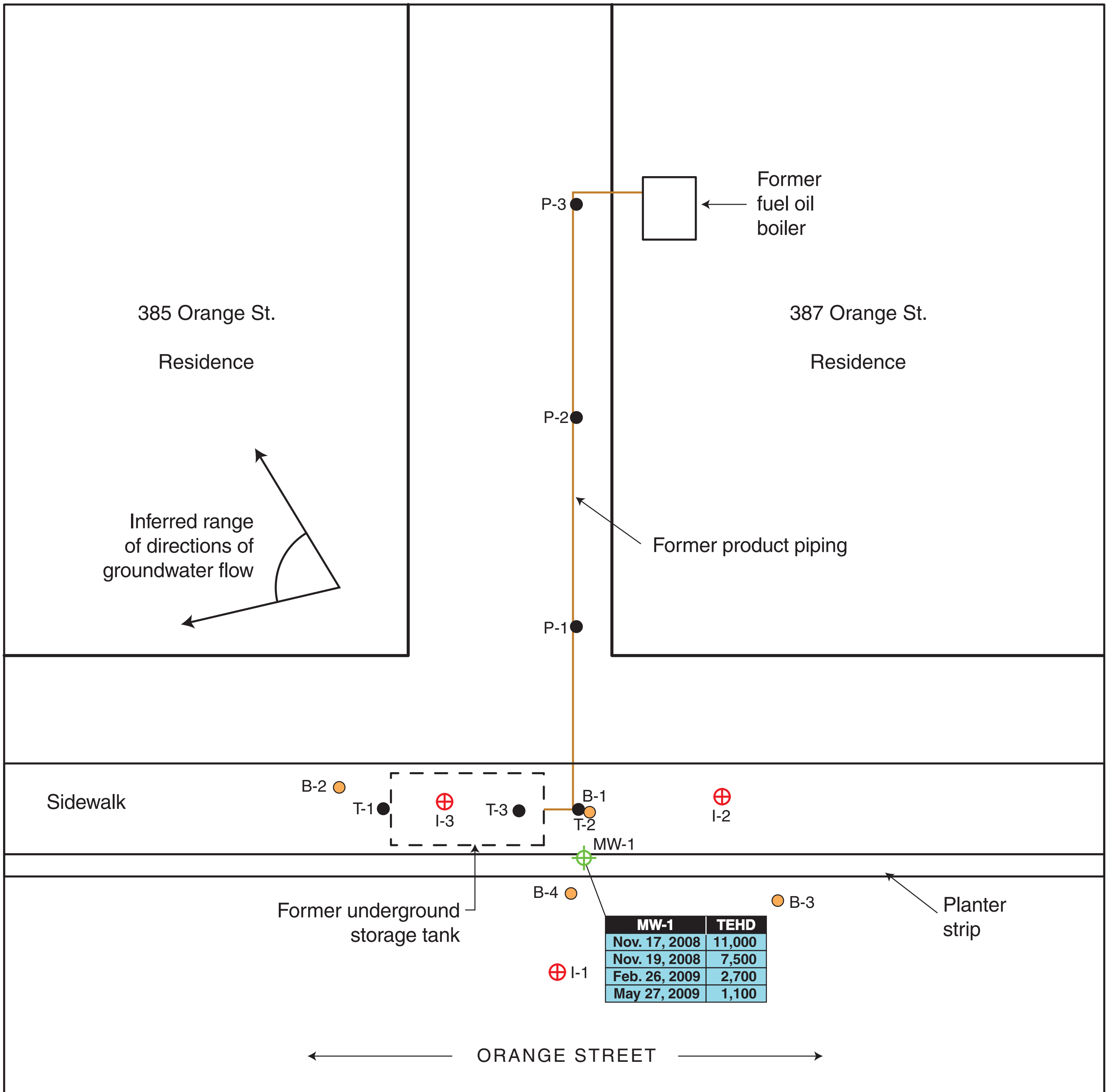
387 Orange St.
Oakland, CA

By: MJC
DECEMBER 2008

Figure 2

STELLAR
ENVIRONMENTAL SOLUTIONS, INC
GEOSCIENCE & ENGINEERING CONSULTING

2007-09-17



MW-1	TEHD
Nov. 17, 2008	11,000
Nov. 19, 2008	7,500
Feb. 26, 2009	2,700
May 27, 2009	1,100

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

CONCENTRATION OF TEH-DIESEL IN MONITORING WELL MW-1

N

387 Orange St.
Oakland, CA

By: MJC **JUNE 2009**

Figure 3

STELLAR
ENVIRONMENTAL SOLUTIONS, INC
GEOSCIENCE & ENGINEERING CONSULTING

2007-09-20

ATTACHMENT B

Groundwater Sampling Field Data Sheet

STELLAR
ENVIRONMENTAL SOLUTIONS, INC.

2198 Sixth Street, Suite 201 · Berkeley, CA 94710
Tel: (510)644-3123 · Fax: (510)644-3859
Geoscience & Engineering Consulting

WELL MONITORING DATA SHEET

Project #: 2007-09
Client: Ulibarri Estate
Sampler: H.Pietropaoli
Start Date: 5/27/09
Well I.D.: MW-1
Well Diameter: (circle one) [✓ 2] 3 4 6 ____
Total Well Depth: Before 29.01 After 29.05
Depth to Water: Before 16.06 After Dry
Depth to Free Product:
Thickness of Free Product (feet):
Measurements referenced to: PVC TOC 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

2.08 x 3 = 6.24
1 Case Volume x Specified Volumes = gallons

Purging: [✓ Bailer]
Disposable Bailer
Middleburg
Electric Submersible
Extraction Pump
Other ____

Sampling: [✓ Bailer]
Disposable Bailer
Extraction Port
Other ____

Ferrous Fe mg/L Total Fe

TIME	TEMP. (c)	pH	COND. mS/cm	DO mg/L	ORP mv	VOLUME REMOVED:	OBSERVATIONS: Fe2+	Total Fe
1400	19.71	7.45	66.7	16.94	228	0		
1405	18.92	8.63	71.0	15.22	211	2.0		
1410	18.95	8.71	69.2	15.53	178	3.0		
1420	18.29	9.52	83.5	13.62	92	3.5	2.19	2.31
	18.90						.84	1.81

Did Well Dewater? If [✓ yes], gals. 3.5 Gallons Actually Evacuated: 3.5
Sampling Time: 1430 Sampling Date: 5/27/09
Sample I.D.: MW-1 Laboratory: C&T
Analyzed for: (Circle) TPH-G BTEX [✓ TPH-D] OTHER: [✓ TEHd, methane, nitrate, sulfate, MBTEX]
Duplicate I.D.: ____ Cleaning Blank I.D.: ____
Analyzed for: (Circle) TPH-G BTEX TPH-D OTHER: ____

ATTACHMENT C

Certified Laboratory Analytical Results and Chain-of-Custody Record

CASE NARRATIVE

Laboratory number:	**212409**
Client:	**Stellar Environmental Solutions**
Project:	**2007-09**
Location:	**Orange Street**
Request Date:	**05/27/09**
Samples Received:	**05/27/09**

This data package contains sample and QC results for one water sample, requested for the above referenced project on 05/27/09. The sample was received cold and 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.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	212409	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2007-09	Analysis:	EPA 8021B
Field ID:	MW-1	Batch#:	151493
Matrix:	Water	Sampled:	05/27/09
Units:	ug/L	Received:	05/27/09
Diln Fac:	1.000	Analyzed:	05/29/09

Type: SAMPLE   Lab ID: 212409-001

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)	97	50-140
Bromofluorobenzene (PID)	95	56-132

Type: BLANK   Lab ID: QC497972

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)	109	50-140
Bromofluorobenzene (PID)	111	56-132

ND= Not Detected
RL= Reporting Limit

Batch QC Report

Curtis & Tompkins Laboratories Analytical Report

Lab #:	212409	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2007-09	Analysis:	EPA 8021B
Matrix:	Water	Batch#:	151493
Units:	ug/L	Analyzed:	05/29/09
Diln Fac:	1.000		

Type: BS   Lab ID: QC497974

Analyte	Spiked	Result	%REC	Limits
MTBE	10.00	11.26	113	53-152
Benzene	10.00	9.387	94	79-120
Toluene	10.00	9.277	93	76-122
Ethylbenzene	10.00	9.784	98	77-125
m,p-Xylenes	10.00	9.711	97	76-126
o-Xylene	10.00	9.561	96	77-126

Surrogate	%REC	Limits
Trifluorotoluene (PID)	97	50-140
Bromofluorobenzene (PID)	100	56-132

Type: BSD   Lab ID: QC497975

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
MTBE	10.00	11.23	112	53-152	0	37
Benzene	10.00	9.651	97	79-120	3	20
Toluene	10.00	9.704	97	76-122	5	21
Ethylbenzene	10.00	10.11	101	77-125	3	21
m,p-Xylenes	10.00	9.995	100	76-126	3	23
o-Xylene	10.00	9.868	99	77-126	3	21

Surrogate	%REC	Limits
Trifluorotoluene (PID)	109	50-140
Bromofluorobenzene (PID)	114	56-132

RPD= Relative Percent Difference

Total Extractable Hydrocarbons

Lab #:	212409	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2007-09	Analysis:	EPA 8015B
Field ID:	MW-1	Sampled:	05/27/09
Matrix:	Water	Received:	05/27/09
Units:	ug/L	Prepared:	05/29/09
Diln Fac:	1.000	Analyzed:	06/01/09
Batch#:	151506		

Type: SAMPLE　　Lab ID: 212409-001

Analyte	Result	RL
Diesel C10-C24	1,100 Y	50

Surrogate	%REC	Limits
o-Terphenyl	85	61-127

Type: BLANK　　Lab ID: QC498037

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
o-Terphenyl	104	61-127

Y= Sample exhibits chromatographic pattern which does not resemble standard
ND= Not Detected
RL= Reporting Limit

Batch QC Report

Total Extractable Hydrocarbons

Lab #:	212409	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2007-09	Analysis:	EPA 8015B
Matrix:	Water	Batch#:	151506
Units:	ug/L	Prepared:	05/29/09
Diln Fac:	1.000	Analyzed:	06/01/09

Type: BS
Lab ID: QC498038
Cleanup Method: EPA 3630C

Analyte	Spiked	Result	%REC	Limits
Diesel C10-C24	2,500	2,048	82	50-120

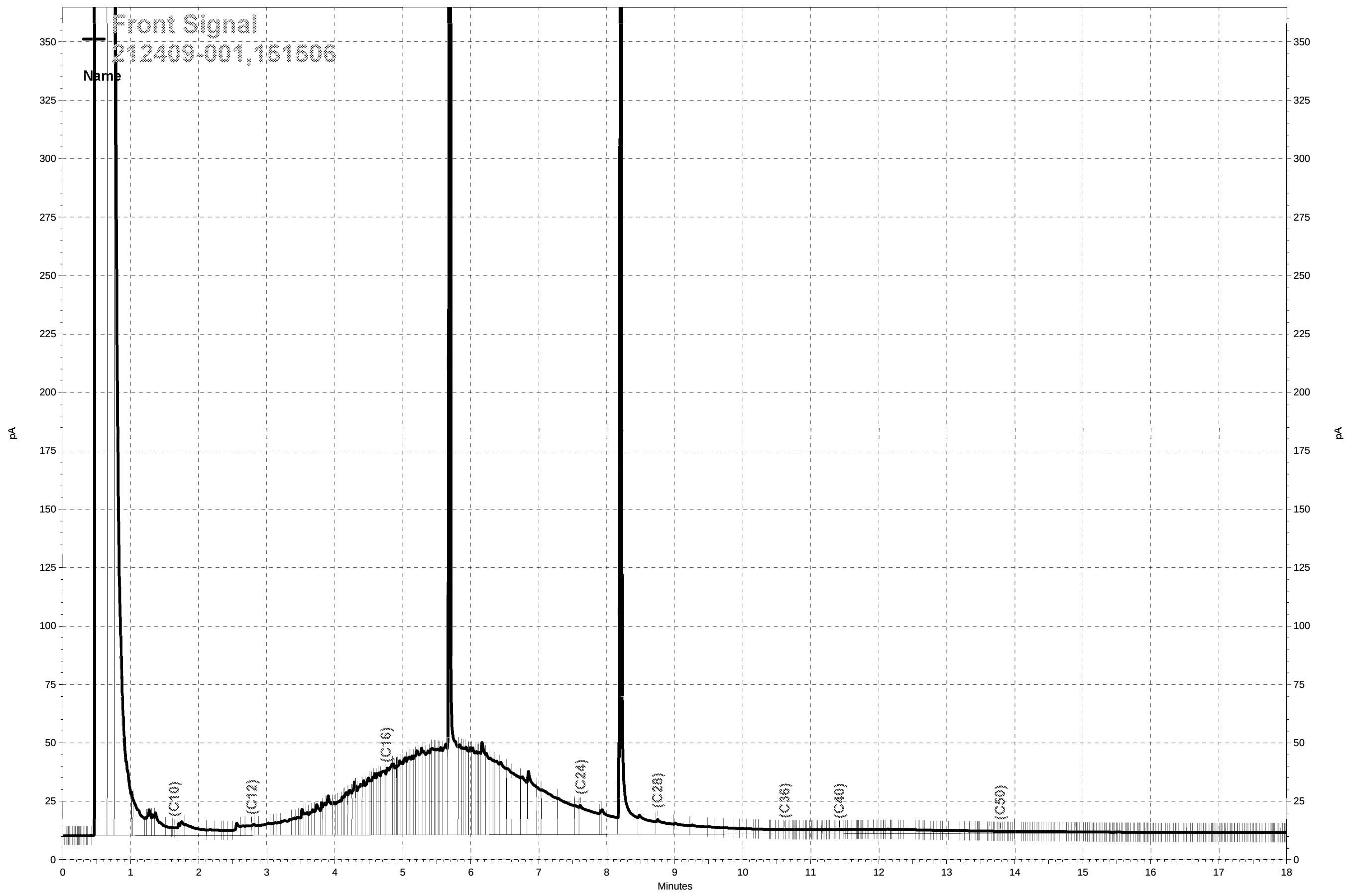
Surrogate	%REC	Limits
o-Terphenyl	87	61-127

Type: BSD
Lab ID: QC498039
Cleanup Method: EPA 3630C

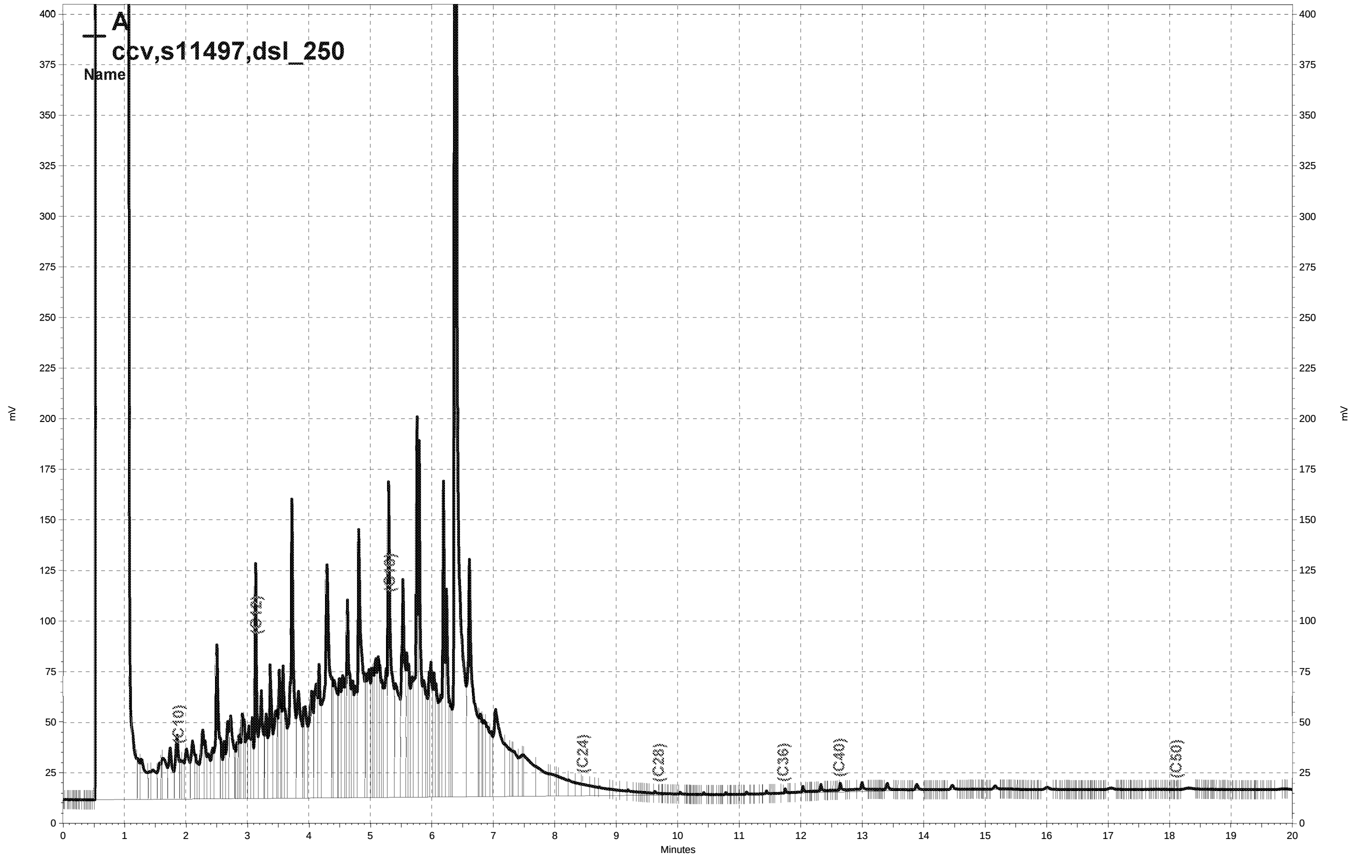
Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Diesel C10-C24	2,500	1,931	77	50-120	6	37

Surrogate	%REC	Limits
o-Terphenyl	83	61-127

RPD= Relative Percent Difference



G:\ezchrom\Projects\GC27\Data\152a010.dat, Front Signal



\\Lims\gdrive\ezchrom\Projects\GC17A\Data\152a004, A

Dissolved Gases

Lab #:	212409	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-09	Analysis:	RSK-175
Analyte:	Methane	Batch#:	151425
Field ID:	MW-1	Sampled:	05/27/09
Matrix:	Water	Received:	05/27/09
Units:	mg/L	Analyzed:	05/28/09
Diln Fac:	1.000		

Type	Lab ID	Result	RL
SAMPLE	212409-001	ND	0.005
BLANK	QC497706	ND	0.005

ND= Not Detected
RL= Reporting Limit

Batch QC Report

Dissolved Gases

Lab #:	212409	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-09	Analysis:	RSK-175
Analyte:	Methane	Diln Fac:	1.000
Matrix:	Water	Batch#:	151425
Units:	mg/L	Analyzed:	05/28/09

Type	Lab ID	Spiked	Result	%REC	Limits	RPD	Lim
BS	QC497704	0.6544	0.5221	80	75-120		
BSD	QC497705	0.6544	0.5809	89	75-120	11	20

RPD= Relative Percent Difference

Curtis & Tompkins Laboratories Analytical Report

Lab #:	212409	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-09	Analysis:	EPA 300.0
Field ID:	MW-1	Batch#:	151391
Matrix:	Water	Sampled:	05/27/09 14:30
Units:	mg/L	Received:	05/27/09

Type: SAMPLE
Lab ID: 212409-001

Analyte	Result	RL	Diln Fac	Analyzed
Nitrogen, Nitrate	5.4	0.10	2.000	05/27/09 16:37
Sulfate	36	0.50	1.000	05/27/09 16:19

Type: BLANK
Diln Fac: 1.000
Lab ID: QC497567
Analyzed: 05/27/09 09:53

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 #:	212409	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-09	Analysis:	EPA 300.0
Matrix:	Water	Diln Fac:	1.000
Units:	mg/L	Batch#:	151391

Type:	BS	Analyzed:	05/27/09 10:10
Lab ID:	QC497568		

Analyte	Spiked	Result	%REC	Limits
Nitrogen, Nitrate	1.000	1.056	106	80-120
Sulfate	10.00	10.55	105	80-120

Type:	BSD	Analyzed:	05/27/09 10:27
Lab ID:	QC497569		

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Nitrogen, Nitrate	1.000	1.046	105	80-120	1	20
Sulfate	10.00	10.53	105	80-120	0	20

RPD= Relative Percent Difference

Batch QC Report

Curtis & Tompkins Laboratories Analytical Report

Lab #:	212409	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-09	Analysis:	EPA 300.0
Field ID:	ZZZZZZZZZZ	Diln Fac:	100.0
MSS Lab ID:	212391-003	Batch#:	151391
Matrix:	Water	Sampled:	05/26/09 14:25
Units:	mg/L	Received:	05/27/09

Type:	MS	Analyzed:	05/27/09 12:52
Lab ID:	QC497595		

Analyte	MSS Result	Spiked	Result	%REC		Limits
Nitrogen, Nitrate	36.13	50.00	91.69	111		80-120
Sulfate	2,890	500.0	3,428	108	NM	80-120

Type:	MSD	Analyzed:	05/27/09 13:09
Lab ID:	QC497596		

Analyte	Spiked	Result	%REC		Limits	RPD	Lim
Nitrogen, Nitrate	50.00	91.79	111		80-120	0	20
Sulfate	500.0	3,432	108	NM	80-120	0	20

NM= Not Meaningful: Sample concentration > 4X spike concentration

RPD= Relative Percent Difference

Chain of Custody Record

Lab job no. 212409
Date 5/27/09
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 Owner Ulibarri Estate/Ms. Mary Krantz
Site Address 387 Orange Street
Oakland,CA

Project Manager Richard Makdisi
Telephone No. (510) 644-3123
Fax No. (510) 644-3859

Project Name Orange Street
Project Number 2007-09

Samplers: *(Signature)*

Field Sample Number	Location/ Depth	Date	Time	Sample Type	Type/Size of Container	Preservation Cooler	Preservation Chemical	Filtered	No. of Containers	TEH d	MBTEX	Nitrate 300.00	Sulfate 300.00	RSK-175 (methane)						Remarks
MW-1	well	5/27/09	1430	H_2O	see below	yes	see below	No	8	X	X	X	X	X						

Relinquished by:	Date	Received by:	Date	Relinquished by:	Date	Received by:	Date
Signature	5/27/09	Signature	5/27	Signature		Signature	
Printed Pietropaoli	Time 1545	Printed Tracy B[illegible]	Time 1545	Printed	Time	Printed	Time
Company Stellar Environmental		Company C&T		Company		Company	

Turnaround Time: 5 Day TAT

Comments: Samples on ice
6-40ml VOA w/ HCL
1-l amber, 1-250ml poly

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

cold intact

COOLER RECEIPT CHECKLIST

Curtis & Tompkins, Ltd.

Login # Z12409 Date Received 5/27/09 Number of coolers 1
Client SES Project ORANGE STREET

Date Opened 5/27/09 By (print) M. VILLANUEVA (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)________

☑ 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

____