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RECEIVED
10:31 am, Sep 10, 2009
Alameda County
Environmental Health

September 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: Third Quarter 2009 Groundwater Monitoring Report (4th Consecutive Quarterly Event) and Petition for Case Closure Related to Remediation of a Former Heating Oil UFST at 387 Orange Street, Oakland, CA (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 third quarter 2009 monitoring report presents the findings of the fourth 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, and post-purge sampling 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 months showed an additional decrease in concentration decrease to 2,700 µg/L and after 6 months showed an additional decrease in concentration decrease to 1,100 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 fourth consecutive sampling of the groundwater monitoring well.

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

AUGUST 2009 GROUNDWATER PURGING AND SAMPLING

A groundwater sample was collected from the one site well installation on August 27, 2009, after purging approximately 2.8 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.

Approximately 2.8 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. Attachment C contains the certified analytical laboratory report and chain-of-custody record.

Laboratory Analytical Methods

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 (ELAP).

Analytical Results

The concentration of TEHd in the site monitoring well (MW-1) increased slightly in this fourth groundwater monitoring event, to 1,700 µg/L; a slight increase from the lowering trend seen over the previous 3 quarters that showed 1,100 µg/L detected in May 2009; 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 laboratory analytical results and natural attenuation indicators, respectively. The distribution of TEHd in groundwater samples collected during this and previous investigations is shown on the attached Figure 3. Attached Figure 4 is a graphical representation showing an overall decreasing trend of TEHd concentration over the last year of monitoring.

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						
B1	**2,400,000**	ND	ND	ND	ND	NA
B2	**460**	ND	ND	ND	ND	NA
November 17, 2008 Baseline Groundwater Samples						
MW-1	**11,000**	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<2.0*
November 19, 2008 Post-Purge Sample (immediately pre-ORC injection)						
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*
August 27, 2009 Groundwater Sample						
MW-1	**1,700**	*<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;

TEHd = total extractable hydrocarbons as diesel;

MTBE = methyl tertiary-butyl ether;

ND = none detected above laboratory reporting limit;

NA = not analyzed;

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

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
Verification Sampling – August 27, 2009						
MW-1	5.5	40	<0.005	18.28	> 3.30	114

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

DISCUSSION OF RESULTS AND ENHANCED NATURAL ATTENUATION INDICATORS

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 and natural biodegradation (enhanced (by the ORC™) 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 within 100's of feet in groundwater, with natural attenuation having a significant role in creating a stable plume and minimizing groundwater plume impacts 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).

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.

The November 2008 ORC™ ® injection was designed to provide sufficient oxygen to enhance the petroleum attenuation and bring down the concentrations such that natural attenuation could take over when the ORC™ activity wore off.

Biodegradation was also 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. The concentration reductions observed since the injection of the ORC® product demonstrate that the attenuation of hydrocarbon concentration is occurring.

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 18.28 to ≥19.99 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+114 to +166 mV and do not show a significant difference from the range (+92 to +228 mV) measured during the May 2009 event, however both events 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 monitoring well has been installed and a baseline sample and a total of 4 consecutive quarterly events have been conducted. Monitoring has showed an overall magnitude decrease over the last year of monitoring with slight increase between the 3rd and 4th monitoring event. The overall trend indicates decreasing TEHd but the concentration is still above the regulatory ESL.

- 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 the last year of quarterly sampling that the regulatory agencies often require to assess seasonal impacts. The data collected to date indicated a residual hotspot that was very limited in extent and relatively immobile. The last 4 consecutive quarterly sampling events have showed a dramatic overall downward TEHd 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 and this is considered to be a low risk site based on the low residual concentrations, the groundwater contamination consisting only of TEHd with no measureable 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.” However, there are no surface water bodies within one half mile of the property.

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

A total of four consecutive groundwater monitoring events have been conducted at the site since November 2008. This fourth event showed a slight increase in TEHd concentration, a departure from the decreasing trend in TPHd concentration seen during the previous 3 events, possibly suggesting some stabilization of the contamination in the < 2.0 mg/L concentration range. There has been an overall magnitude decrease in TEHd contamination over the last year of monitoring, the only contaminant historically identified at the site. The one site monitoring well is located 3 feet from boring B1 where grab groundwater showed a historical high detection of 2,400,000 μg/L TEHd. Natural attenuation indicators continue to show oxidizing aerobic conditions favorable to bioremediation.

The concentrations of residual hydrocarbons from the former heating oil tank have been favorably reduced by the ORC™ injection such that the concentration gradient is not a barrier to future natural attenuation after the ORC™ activity diminishes. With the residual concentrations being below 2.0 mg/L, there being no measurable MTBE or BTEX of vapor intrusion concern, and no downgradient sensitive receptors of any proximity, the site is a good candidate for low risk regulatory closure.

We recommend following up with ACEH following their receipt of this report, to discuss issuing a low risk regulatory closure findings for this site.

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

HENRY PIETROPAOLI
No. 7651
Exp. 12/09

REFERENCES

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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.

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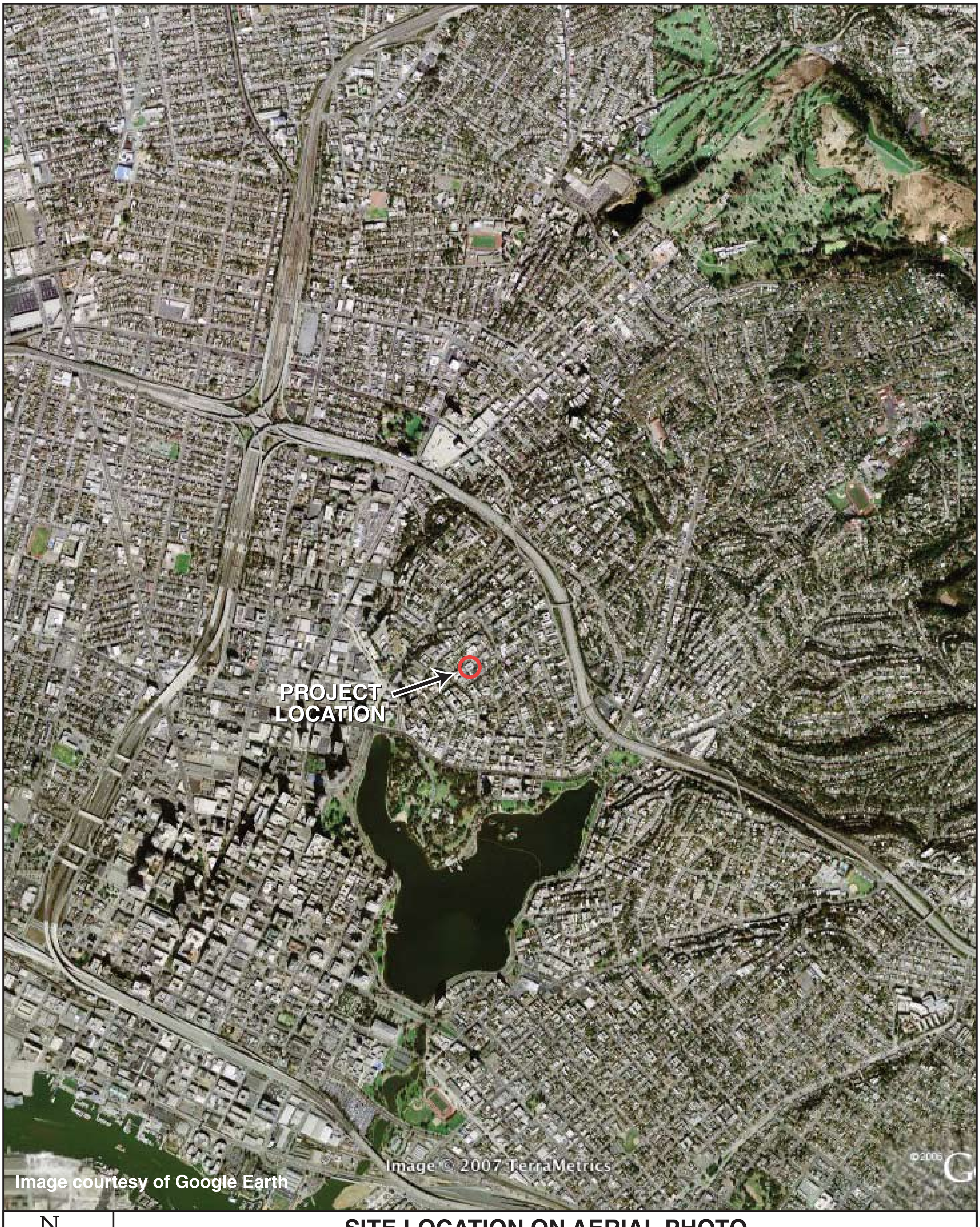
ATTACHMENT A

Figures and Graph



SITE LOCATION ON AERIAL PHOTO

385-387 Orange St.
Oakland, CA

By: MJC

SEPTEMBER 2007

Figure 1

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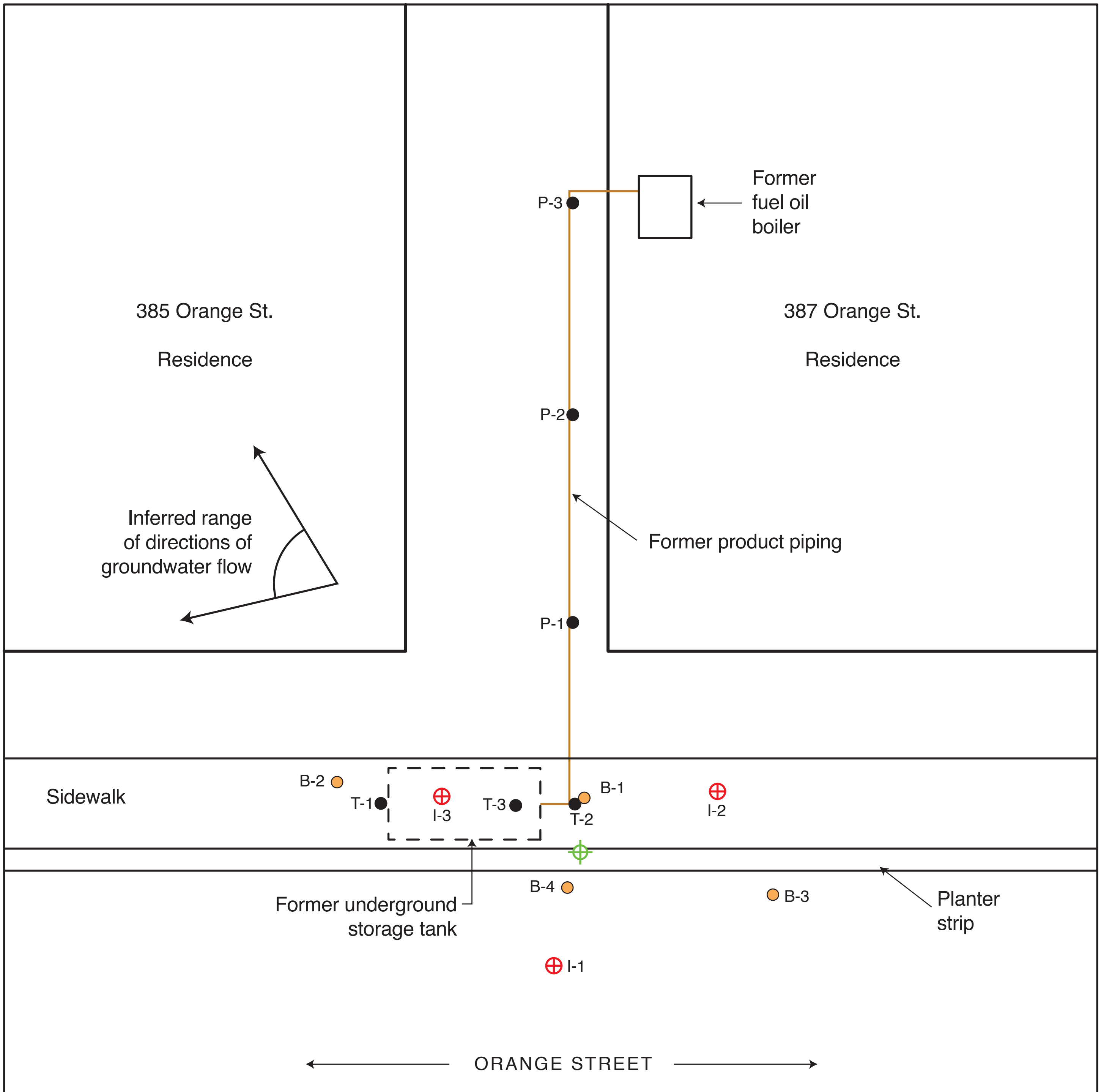
Environmental Solutions, Inc
Geoscience & Engineering Consulting

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

N

387 Orange St.
Oakland, CA

By: MJC

DECEMBER 2008

Figure 2

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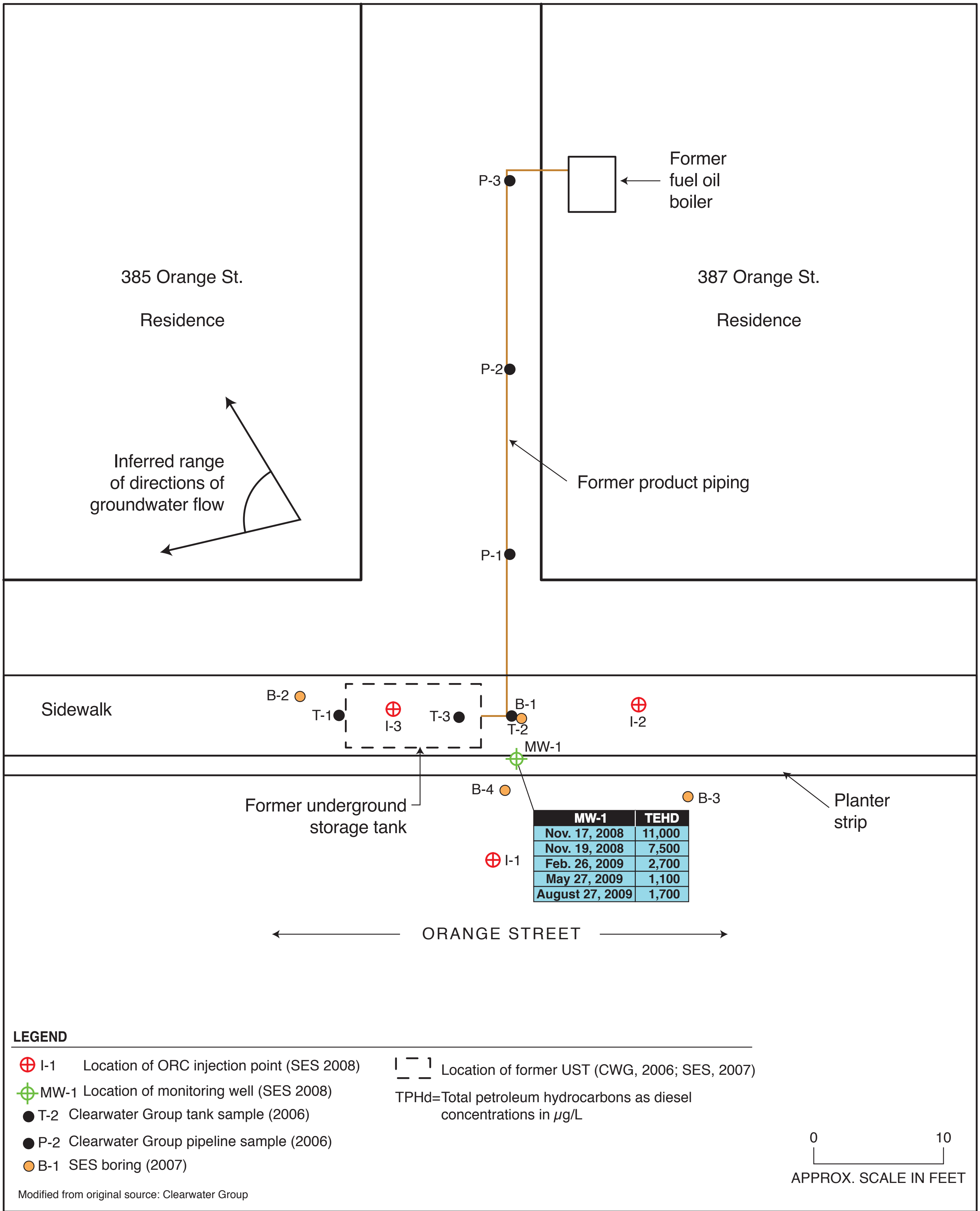
ENVIRONMENTAL SOLUTIONS, INC
GEOSCIENCE & ENGINEERING CONSULTING

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
August 27, 2009	1,700

Modified from original source: Clearwater Group

CONCENTRATION OF TEH-DIESEL IN MONITORING WELL MW-1

387 Orange St.
Oakland, CA

By: MJC

SEPTEMBER 2009

Figure 3

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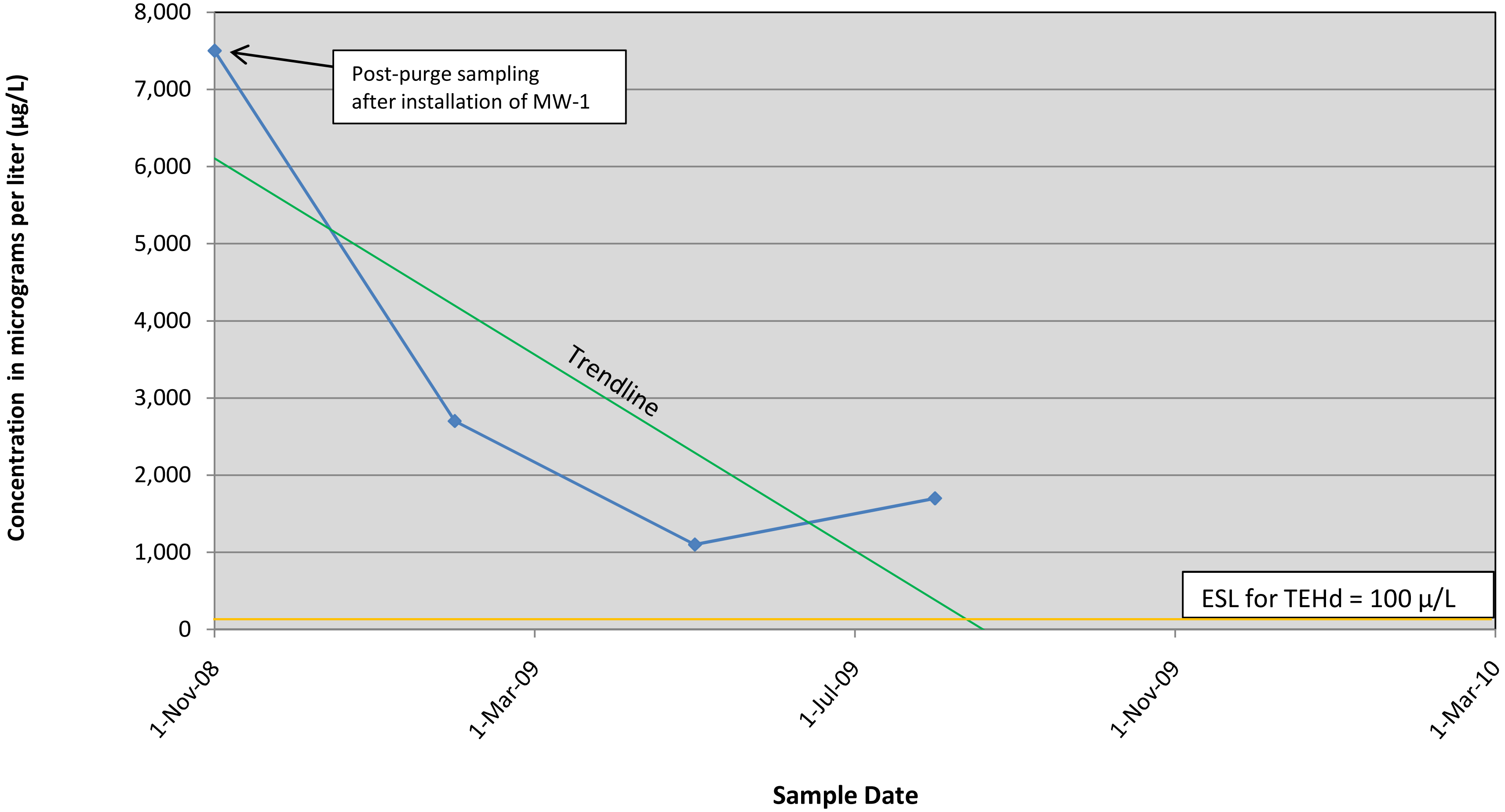
GEOSCIENCE & ENGINEERING CONSULTING

2007-09-21

Figure 4: MW-1 Groundwater Monitoring Analytical Results
Total Extractable Hydrocarbons - Diesel Range
Concentration vs Time



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: 8/27/09
Well I.D.: MW-1	Well Diameter: (circle one) [✓ 2] 3 4 6 ___
Total Well Depth: 29.10 Before ✓ After ✓	Depth to Water: Before 17.01 After Dry
Depth to Free Product: N/A	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

12.09 × 0.16 = 1.93 x ~~2~~ × 3 = 5.79
1 Case Volume Specified Volumes = gallons

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

Sampling: [✓ Bailer]
Disposable Bailer
Extraction Port
Other________

TIME	TEMP. (c)	pH	COND. mS/cm	DO mg/L	ORP mv	VOLUME REMOVED:	OBSERVATIONS: Ferrous	Total Fe
1110	19.16	6.86	1.01	>19.99	164	0	~~1.98~~	~~2~~
1118	18.94	8.16	.902	>19.99	166	2.0		
1130	18.51	8.31	.942	17.92	128	2.5		
1133	18.38	8.30	.909	18.72	162	2.6	1.98	2.02
1140	19.25	8.52	.758	18.28	114	2.8	>3.30	>3.30 turb

Did Well Dewater? If yes, gals. 2.8 Gallons Actually Evacuated: 2.8

Sampling Time: 1200 Sampling Date: 8/27/09

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

Analyzed for: TPH-G BTEX TPH-D OTHER:
(Circle)
TEHd, 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 214466
ANALYTICAL REPORT

Stellar Environmental Solutions
2198 6th Street
Berkeley, CA 94710

Project : 2007-08
Location : Orange Street
Level : II

Sample ID	Lab ID
MW-1	214466-001

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 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: 09/03/2009

NELAP # 01107CA

CASE NARRATIVE

Laboratory number:	**214466**
Client:	**Stellar Environmental Solutions**
Project:	**2007-08**
Location:	**Orange Street**
Request Date:	**08/27/09**
Samples Received:	**08/27/09**

This data package contains sample and QC results for one water sample, requested for the above referenced project on 08/27/09. The sample was received cold and intact.

TPH-Purgeables and/or BTXE by GC (EPA 8021B):
High response was observed for MTBE in the CCV analyzed 09/01/09 22:36; affected data was qualified with "b". No other 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.

Chain of Custody Record

Lab job no. 214466
Date
Page 1 of 1

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

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

Project Name Orange Street
Project Number 2007-08

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)*

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)	Analysis Required					Remarks
MW-1	–	8/27/09	1200	H_2O	☆	yes	☆	No	8	✓	✓	✓	✓	✓						

Relinquished by:	Date	Received by:	Date	Relinquished by:	Date	Received by:	Date
Signature	8/27/09	Signature Pat Gonzalez	8/27	Signature		Signature	
Printed Pietropaoli	Time 1330	Printed Pat Gonzalez	Time 1330	Printed	Time	Printed	Time
Company Stellar Environmental		Company Curtis & Tompkins		Company		Company	

Turnaround Time: 5 Day TAT

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

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

(8)

COOLER RECEIPT CHECKLIST

Curtis & Tompkins, Ltd.

Login # 214466 Date Received 8-27-9 Number of coolers 1
Client STELLAR ENV. Project Vi BARRi ESTATE

Date Opened 8-27-9 By (print) S EVANS (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
☐ Cloth material
☒ Foam blocks
☐ Cardboard
☒ Bags
☐ Styrofoam
☐ None
☐ Paper towels

7. Temperature documentation:
   Type of ice used: ☒ [✓ Wet] ☒ Blue/Gel ☐ None Temp(°C) 8
   ☐ 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 Laboratories Analytical Report

Lab #:	214466	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2007-08	Analysis:	EPA 8021B
Field ID:	MW-1	Batch#:	154459
Matrix:	Water	Sampled:	08/27/09
Units:	ug/L	Received:	08/27/09
Diln Fac:	1.000		

Type: SAMPLE   Analyzed: 09/02/09
Lab ID: 214466-001

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)	86	50-140
Bromofluorobenzene (PID)	94	56-132

Type: BLANK   Analyzed: 09/01/09
Lab ID: QC510168

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)	85	50-140
Bromofluorobenzene (PID)	79	56-132

ND= Not Detected
RL= Reporting Limit

Batch QC Report

Curtis & Tompkins Laboratories Analytical Report

Lab #:	214466	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2007-08	Analysis:	EPA 8021B
Matrix:	Water	Batch#:	154459
Units:	ug/L	Analyzed:	09/01/09
Diln Fac:	1.000		

Type: BS   Lab ID: QC510169

Analyte	Spiked	Result	%REC	Limits
MTBE	10.00	11.03	110	53-152
Benzene	10.00	9.184	92	79-120
Toluene	10.00	10.20	102	76-122
Ethylbenzene	10.00	10.51	105	77-125
m,p-Xylenes	10.00	10.75	107	76-126
o-Xylene	10.00	11.31	113	77-126

Surrogate	%REC	Limits
Trifluorotoluene (PID)	85	50-140
Bromofluorobenzene (PID)	97	56-132

Type: BSD   Lab ID: QC510170

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
MTBE	10.00	10.71 b	107	53-152	3	37
Benzene	10.00	8.697	87	79-120	5	20
Toluene	10.00	9.839	98	76-122	4	21
Ethylbenzene	10.00	10.94	109	77-125	4	21
m,p-Xylenes	10.00	10.11	101	76-126	6	23
o-Xylene	10.00	10.62	106	77-126	6	21

Surrogate	%REC	Limits
Trifluorotoluene (PID)	86	50-140
Bromofluorobenzene (PID)	92	56-132

b= See narrative
RPD= Relative Percent Difference

Total Extractable Hydrocarbons

Lab #:	214466	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2007-08	Analysis:	EPA 8015B
Field ID:	MW-1	Batch#:	154326
Matrix:	Water	Sampled:	08/27/09
Units:	ug/L	Received:	08/27/09
Diln Fac:	1.000	Prepared:	08/27/09

Type: SAMPLE　　Analyzed: 08/29/09
Lab ID: 214466-001

Analyte	Result	RL
Diesel C10-C24	1,700 Y	50

Surrogate	%REC	Limits
o-Terphenyl	107	61-127

Type: BLANK　　Analyzed: 08/30/09
Lab ID: QC509615

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
o-Terphenyl	110	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 #:	214466	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2007-08	Analysis:	EPA 8015B
Matrix:	Water	Batch#:	154326
Units:	ug/L	Prepared:	08/27/09
Diln Fac:	1.000	Analyzed:	08/31/09

Type: BS
Cleanup Method: EPA 3630C
Lab ID: QC509616

Analyte	Spiked	Result	%REC	Limits
Diesel C10-C24	2,500	2,245	90	50-120

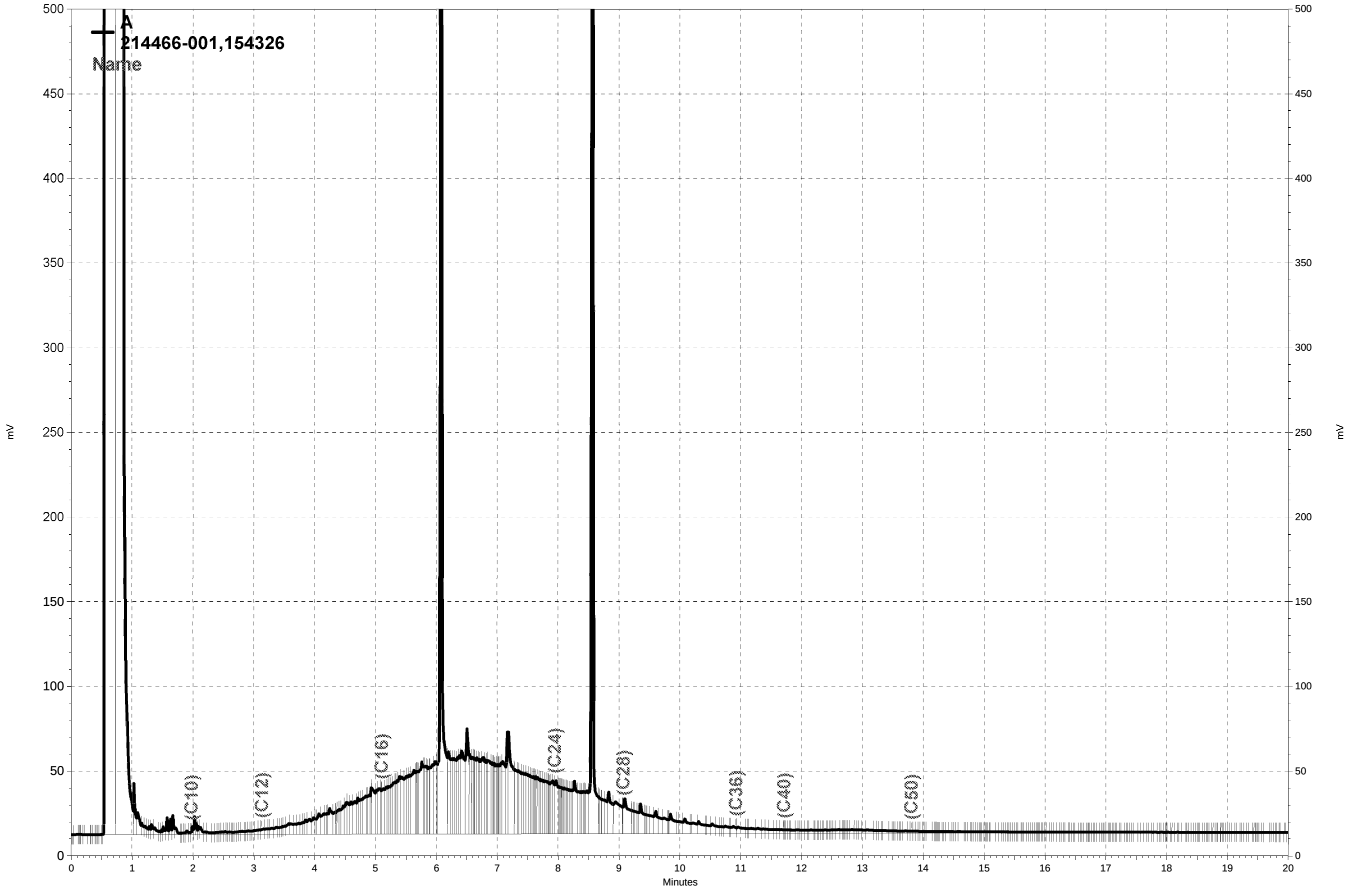
Surrogate	%REC	Limits
o-Terphenyl	97	61-127

Type: BSD
Cleanup Method: EPA 3630C
Lab ID: QC509617

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Diesel C10-C24	2,500	2,296	92	50-120	2	37

Surrogate	%REC	Limits
o-Terphenyl	99	61-127

RPD= Relative Percent Difference



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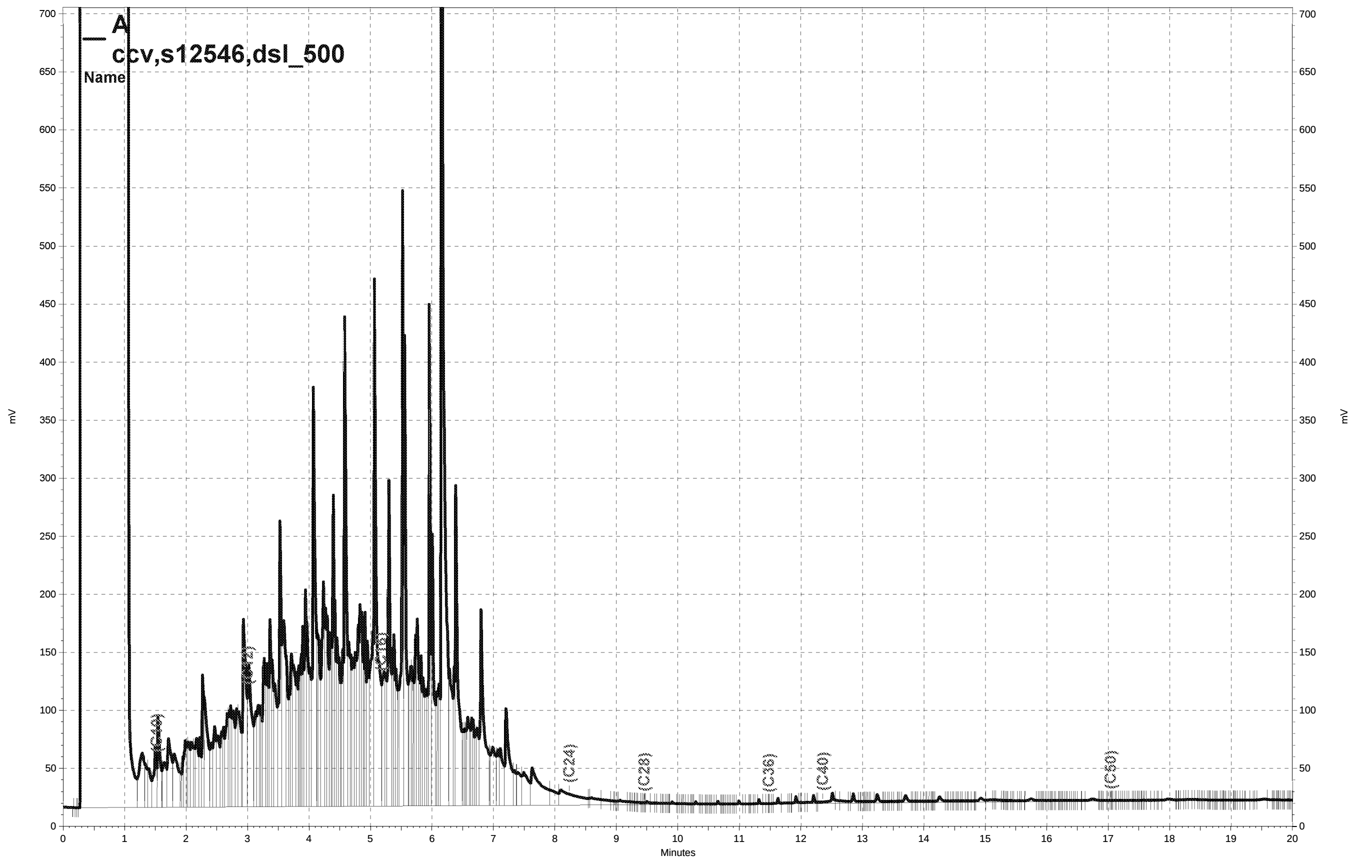

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Dissolved Gases

Lab #:	214466	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-08	Analysis:	RSK-175
Analyte:	Methane	Batch#:	154404
Field ID:	MW-1	Sampled:	08/27/09
Matrix:	Water	Received:	08/27/09
Units:	mg/L	Analyzed:	08/31/09
Diln Fac:	1.000		

Type	Lab ID	Result	RL
SAMPLE	214466-001	ND	0.005
BLANK	QC509934	ND	0.005

ND= Not Detected
RL= Reporting Limit

Batch QC Report

Dissolved Gases

Lab #:	214466	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-08	Analysis:	RSK-175
Analyte:	Methane	Diln Fac:	1.000
Matrix:	Water	Batch#:	154404
Units:	mg/L	Analyzed:	08/31/09

Type	Lab ID	Spiked	Result	%REC	Limits	RPD	Lim
BS	QC509935	0.6544	0.5962	91	75-120		
BSD	QC509936	0.3272	0.3008	92	75-120	1	20

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	214466	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-08	Analysis:	EPA 300.0
Field ID:	MW-1	Batch#:	154286
Matrix:	Water	Sampled:	08/27/09 12:00
Units:	mg/L	Received:	08/27/09

Type: SAMPLE

Lab ID: 214466-001

Analyte	Result	RL	Diln Fac	Analyzed
Nitrogen, Nitrate	5.5	0.10	2.000	08/27/09 16:02
Sulfate	40	0.50	1.000	08/27/09 15:39

Type: BLANK

Diln Fac: 1.000

Lab ID: QC509454

Analyzed: 08/27/09 08:50

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 #:	214466	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#:	154286

Type: BS
Analyzed: 08/27/09 09:07
Lab ID: QC509455

Analyte	Spiked	Result	%REC	Limits
Nitrogen, Nitrate	1.000	0.9922	99	80-120
Sulfate	10.00	9.875	99	80-120

Type: BSD
Analyzed: 08/27/09 09:25
Lab ID: QC509456

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Nitrogen, Nitrate	1.000	0.9933	99	80-120	0	20
Sulfate	10.00	9.857	99	80-120	0	20

RPD= Relative Percent Difference

Batch QC Report

Curtis & Tompkins Laboratories Analytical Report

Lab #:	214466	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-08	Analysis:	EPA 300.0
Field ID:	ZZZZZZZZZZ	Diln Fac:	5.000
MSS Lab ID:	214481-002	Batch#:	154286
Matrix:	Water	Sampled:	08/27/09 09:45
Units:	mg/L	Received:	08/27/09

Type: MS
Analyzed: 08/28/09 00:23
Lab ID: QC509613

Analyte	MSS Result	Spiked	Result	%REC	Limits
Nitrogen, Nitrate	0.3906	2.500	2.895	100	80-120
Sulfate	56.20	25.00	81.40	101	80-120

Type: MSD
Analyzed: 08/28/09 00:41
Lab ID: QC509614

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Nitrogen, Nitrate	2.500	2.966	103	80-120	2	20
Sulfate	25.00	81.23	100	80-120	0	20

RPD= Relative Percent Difference