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GEOSCIENCE & ENGINEERING CONSULTING

May 14, 2010

Ms. Barbara Jakub
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 2010 Groundwater Monitoring Report 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 Ms. Jakub:

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 the findings of this additional groundwater monitoring well sampling at the above referenced subject property. This sampling event was conducted in accordance with the SES workplan dated February 11, 2008 which incorporated technical comments from the workplan review letter by ACEH dated July 14, 2008. This report has been prepared in response to the ACEH email dated April 29, 2010 which was addressed to the responsible party, the property owners, and SES. The email requested an additional groundwater monitoring event to determine the stability and attenuation of the contaminated groundwater at the subject site and to evaluate the effectiveness of the Advanced Oxygen Releasing Product™ (ORC™) injection that was conducted on November 24, 2008.

Stellar Environmental Solutions, Inc.

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 to 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. Groundwater samples taken from 21 to 23 feet bgs, immediately adjacent to the presumed location of the UFST and below the fill port and service line end of the UFST, contained 2,400,000 micrograms per liter ($\mu\text{g/L}$) of TEHd. 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 at 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™. The product was injected 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 ORC™ application after three months showed a decrease in concentration to 2,700 µg/L, and after 6 months showed an additional decrease in concentration to 1,100 µg/L. The August 2009 sampling event showed a slight increase in TEHd concentration, a departure from the decreasing trend in TEHd concentrations seen during the previous three events, possibly suggesting some stabilization of the contamination in the less than 2.0 mg/L concentration range. In addition, natural attenuation indicators continued to show oxidizing aerobic conditions induced by the ORC™ that are favorable to bioremediation.

Groundwater monitoring has shown an overall magnitude decrease in TEHd contaminations; the only contaminant detected at concentrations of regulatory concern that has been historically identified at the site. Because of elevated TEHd and elevated dissolved oxygen (DO) concentrations detected in the August 8, 2009 groundwater sample, ACEH has requested an additional groundwater monitoring event to evaluate the stability and attenuation of the contaminated groundwater; the results of which is the subject of this report.

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

MAY 2010 GROUNDWATER PURGING AND SAMPLING

A groundwater sample was collected from the one site monitoring well on May 5, 2010 after purging approximately 4.6 gallons of groundwater, at which point the well was dewatered. After

waiting about 45 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 DO, 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, transferred to laboratory supplied containers, 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 4.6 gallons of groundwater from sampling was placed in a 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

Previously, ACEH required analyses for total volatile hydrocarbons as gasoline (TVHg), benzene, toluene, ethylbenzene, total xylenes and the fuel oxygenates, lead scavengers, and ethanol; however, these analysis have been discontinued as directed by ACEH.

Groundwater samples were analyzed in accordance with current ACEH requirements, for the following:

- Total extractable hydrocarbons – diesel range (TEHd) and motor oil range (TEHmo) by EPA Method 8015M;

- 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 in this groundwater monitoring event to 2,600 µg/L as compared to the previous detection of 1,700 µg/L in August 2009. However, was slight lower than the 2,700 µg/L TEHd detected in February 2009. The May 2010 monitoring is more comparable to the February 2009 monitoring based on seasonal recharge, because rainfall was significantly diminished in the 2009 drought year compared to the 2010 rainy season which has had sustained rain through April 2010.

The monitoring results are all above the applicable regulatory criteria of 100 µg/L but appear to be stable. The relatively stable trend line can be seen since the pre-purge (11,000 µg/L TEHd) concentrations; with TEHd showing 7,500 µg/L in 2008, followed by 2,700 µg/L in February 2009, 1,100 µg/L in May 2009, 1,700 µg/L in August 2009, and 2,600 µg/L during this May 2010 event.

In addition, ACEH requested an analysis of TEHmo during this event which was detected at a concentration of 1,100 µg/L, above the applicable regulatory criteria of 370 µg/L.

Tables 1 and 2 shows 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 the overall decreasing trendline with the more stable trendline emerging after the post-purging analytical results.

**Table 1 Summary of Historical Groundwater Analytical Results and Depth to Groundwater
387 Orange Street, Oakland, California**

Sample ID	Depth to Groundwater feet BTOC (a)	TEHmo	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE
<i>April 19, 2007 Hydropunch Grab-Groundwater Samples</i>								
B1	21	NA	2,400,000	ND	ND	ND	ND	NA
B2	22	NA	460	ND	ND	ND	ND	NA
<i>November 17, 2008 Baseline Groundwater Sample</i>								
MW-1	18.50	NA	11,000	<0.5	<0.5	<0.5	<0.5	<2.0
<i>November 19, 2008 Post-Purge Sample</i>								
MW-1	26.98	NA	7,500	<0.5	<0.5	<0.5	<0.5	<2.0
<i>February 27, 2009 Groundwater Sample</i>								
MW-1	18.02	NA	2,700	<0.5	<0.5	<0.5	<0.5	<2.0
<i>May 27, 2009 Groundwater Sample</i>								
MW-1	16.06	NA	1,100	<0.5	<0.5	<0.5	<0.5	<2.0
<i>August 27, 2009 Groundwater Sample</i>								
MW-1	17.01	NA	1,700	<0.5	<0.5	<0.5	<0.5	<2.0
<i>May 5, 2010 Groundwater Sample</i>								
MW-1	15.62	1,100	2,600	NA	NA	NA	NA	NA
ESLs	-	370	100	1.0	40	30	20	5.0

Notes:

(a) BTOC = below top of casing; top of casing is 1 foot below ground surface. Initial pre-sampling depths to water in feet or first encountered groundwater for hydropunch samples

TEHmo = total extractable hydrocarbons as motor oil

ESLs = Water Board Environmental Screening Levels for residential sites where groundwater is a potential drinking water resource (Water Board, 2008); Sample concentration values 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

Monitoring Well MW-1: 30 feet deep, screened (0.01 inch slot) from 20 -30 feet bgs

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.	Nitrates	Sulfates	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
Verification Sampling – May 5, 2010						
MW-1	4.4	33	<0.005	15.1	1.09	252

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 in soil 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 (enhanced by

the ORC™) and “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 concentrations of hydrocarbons are 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 DO, 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 15.1 to 18.1 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) 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 +251 to +255 mV showing an increase from the range (+114 to +166 mV) measured during the August 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 five quarterly monitoring events have been conducted. Monitoring has showed an overall magnitude decrease and the trendline is a diminishing one. Although there was an increase in the latest monitoring event, it is essentially at the same concentrations when compared to the February 2009 data, which would be the same seasonal equivalent as this May 2010 data. The last two monitoring events have shown a stabilizing to slightly increasing contaminant trend from the lowering trend previously observed from November 2008 to May 2009. The overall trend

indicates decreasing TEHd but the concentration is still above the regulatory ESLs for both TEHd and TEHmo.

- 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, which regulatory agencies often require to assess seasonal impacts. The data collected to date indicates the location of a residual hotspot that was very limited in extent and relatively immobile. The last four 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 the site is considered to be a low risk based on the low residual concentrations, the groundwater contamination consisting only of TEHd and TEHmo with no measureable methyl tertiary butyl ether, benzene, toluene, ethyl benzene, xylenes, or other compounds that would create a concern for contaminant vapor intrusion. 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

Consecutive quarterly groundwater monitoring events has been conducted at the site since November 2008 with the exception of the period between August 2009 and this May 2010 event, in which the responsible party was waiting for direction from ACEH. The August 2009 and this May 2010 event showed a slightly increasing to stabilizing TEHd concentration trend; a departure from the decreasing TEHd concentration trend seen between the November 2008 to May 2009 events. However, this does suggest some stabilization of the TEHd contamination in the 2,000-3000 µg/L 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 sampling 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. The measured DO concentration of 15.1 mg/L during this latest event indicates that the ORC™ is still active. With the residual concentrations observed to be stabilizing, 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.

The concentration of TEHd in the site monitoring well (MW-1) increased in this groundwater monitoring event to 2,600 µg/L compared to the previous detection of 1,700 µg/L in August 2009, but was slightly below the 2,700 µg/L TEHd detected in February 2009. The May 2010 monitoring is more comparable to the February 2009 monitoring based on seasonal recharge as rainfall was significantly diminished in the 2009 drought year compared to the 2010 rainy season, which has had sustained rain through April 2010.

Ms. Barbara Jakub

May 14, 2010

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SES recommends following up with ACEH following their receipt of this report to discuss issuing a low-risk regulatory closure 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.

We 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,

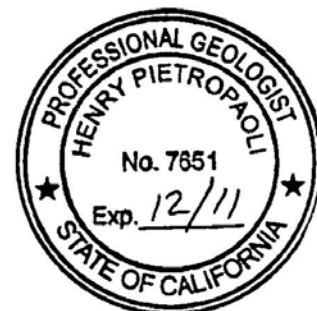


Henry Pietropaoli, R.G., R.E.A.
Project Manager



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

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



Stellar Environmental Solutions, Inc.

REFERENCES

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Stellar Environmental Solutions, Inc. (SES), 2009a. 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.

Stellar Environmental Solutions, Inc. (SES), 2009b. Second Quarter 2009 Groundwater Monitoring Related to Remediation of a Former Heating Oil UFST at 387 Orange Street, Oakland, California. June 5.

Stellar Environmental Solutions, Inc. (SES), 2009c. Third Quarter 2009 Groundwater Monitoring Related to Remediation of a Former Heating Oil UFST at 387 Orange Street, Oakland, California. August 9.

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

ATTACHMENT A

Figures and Graph

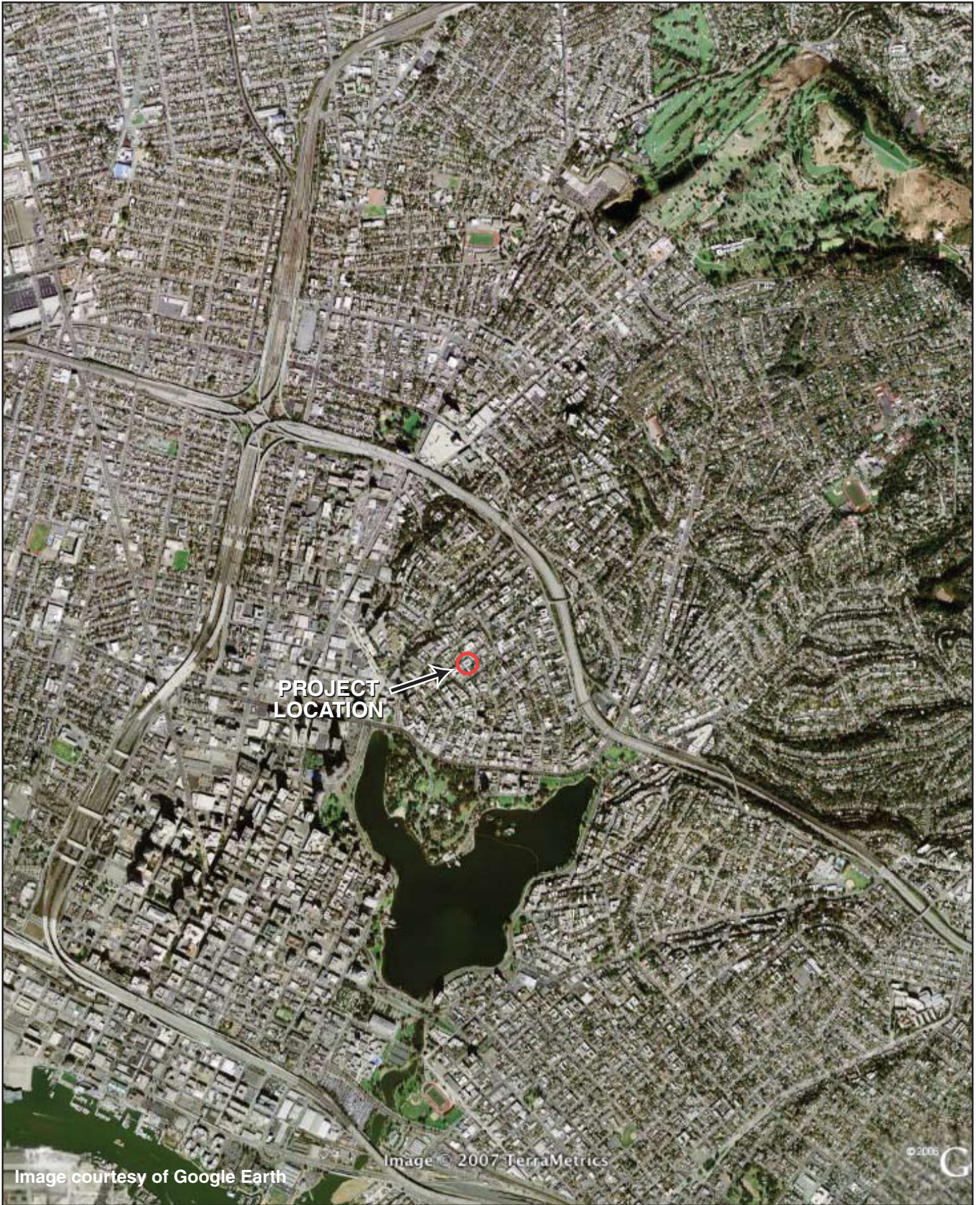


Image courtesy of Google Earth

Image © 2007 TerraMetrics

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SITE LOCATION ON AERIAL PHOTO

385-387 Orange St.
Oakland, CA

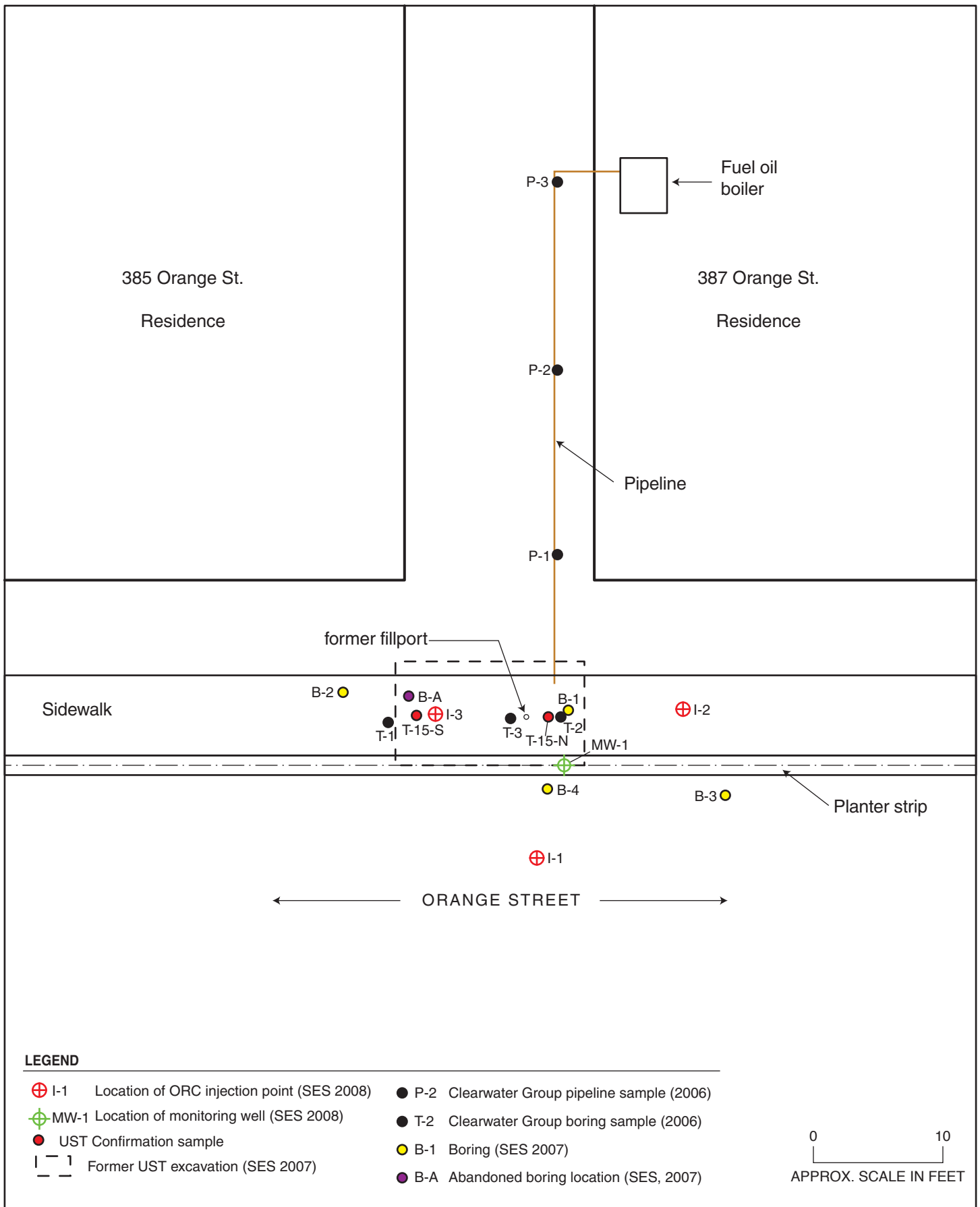
By: MJC

SEPTEMBER 2007

Figure 1



2007-09-01



2007-09-23



SITE PLAN SHOWING LOCATION OF BORINGS, MONITORING WELL AND FORMER UST EXCAVATION

**385-387 Orange St.
Oakland, CA**

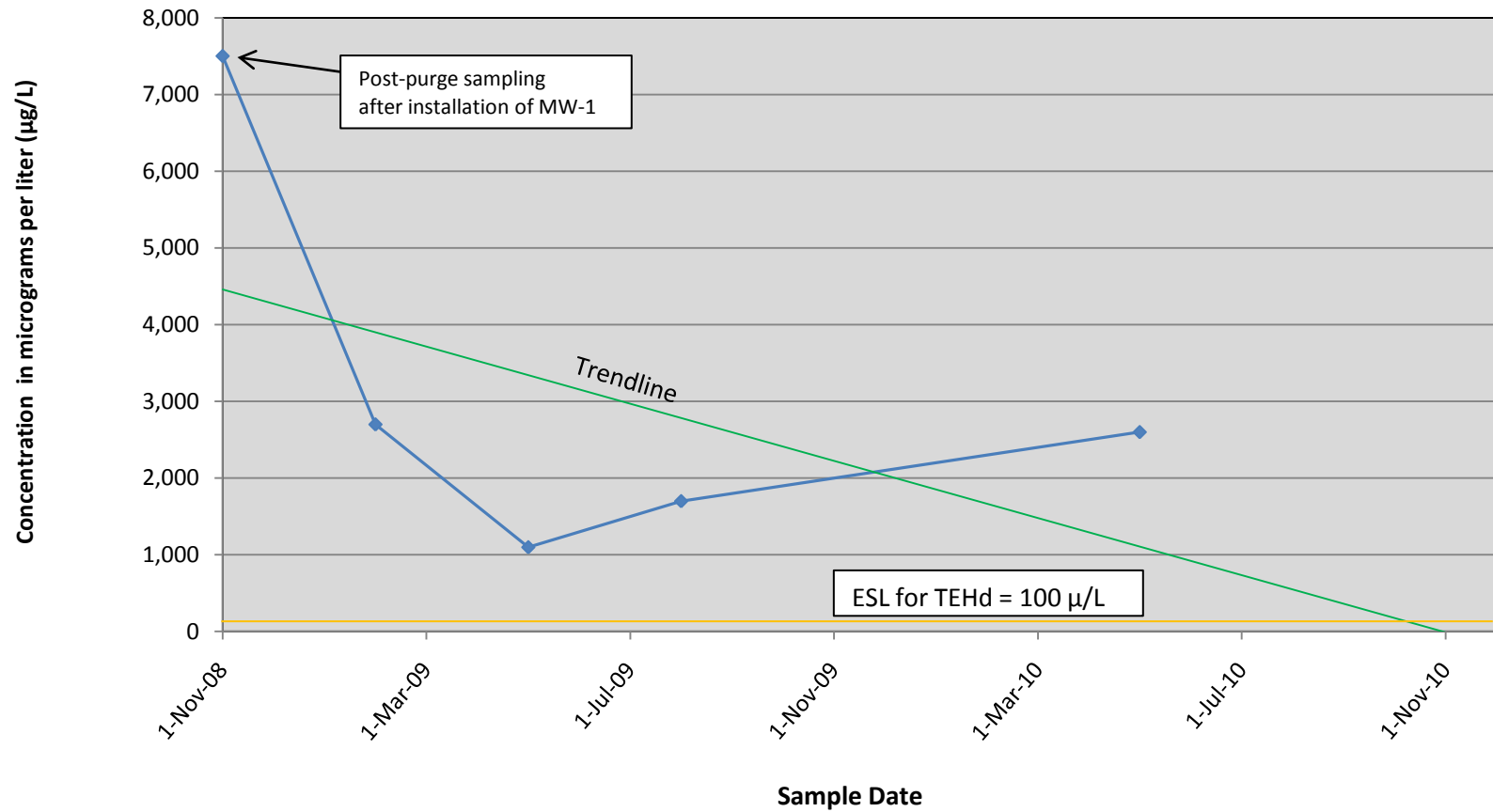
By: **MJC**

MAY 2010

Figure 2



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



ATTACHMENT B

Groundwater Sampling Field Data Sheet

WELL MONITORING DATA SHEET

Project #: 2007-09	Client: Ulibarri Estate
Sampler: H.Pietropaoli	Start Date: 5/5/10
Well I.D.: MW-1	Well Diameter: (circle one) 2 3 4 6 <u> </u>
Total Well Depth: Before 29.55 After	Depth to Water: Before 15.66 After Dry
Depth to Free Product:	Thickness of Free Product (feet):
Measurements referenced to: <u>PVC</u>	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

$$13.89 \times 0.16 = 2.22 \times \underline{3} = \underline{6.66} \text{ gallons}$$

1 Case Volume Specified Volumes = gallons

Purging: Bailer Disposable Bailer Middleburg Electric Submersible Extraction Pump Other _____	Sampling: Bailer <u>Disposable Bailer</u> Extraction Port Other _____
--	--

TIME	TEMP. (c)	pH	COND. mS/cm	DO mg/L	ORP mv	VOLUME REMOVED:	OBSERVATIONS:
1200	19.02	6.81	93	18.1	255	0	Ferrous
1210	18.58	7.01	93	16.2	251	2.2	.97
1220	18.88	7.21	91	15.1	252	4.4	1.09
						6.6	dry @ 4.6 gals

Did Well Dewater? If <u>yes</u> , gals. <u>4.6</u>	Gallons Actually Evacuated:
Sampling Time: <u>1230</u>	Sampling Date: <u>5/5/10</u>
Sample I.D.: MW-1	Laboratory: C&T
Analyzed for: TEHd, TEHmo, methane, nitrate, sulfate	
Duplicate I.D.: _____	Cleaning Blank I.D.: _____

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 219928
ANALYTICAL REPORT**

Stellar Environmental Solutions
2198 6th Street
Berkeley, CA 94710

Project : 2007-09
Location : Orange Street
Level : II

Sample ID
MW-1

Lab ID
219928-001

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: 05/12/2010

NELAP # 01107CA

CASE NARRATIVE

Laboratory number: 219928
Client: Stellar Environmental Solutions
Project: 2007-09
Location: Orange Street
Request Date: 05/05/10
Samples Received: 05/05/10

This data package contains sample and QC results for one water sample, requested for the above referenced project on 05/05/10. The sample was received cold and intact.

TPH-Extractables by GC (EPA 8015B):

No analytical problems were encountered.

Dissolved Gases by GC/FID (RSK-175):

MW-1 (lab # 219928-001) had pH greater than 2. No other analytical problems were encountered.

Ion Chromatography (EPA 300.0):

No analytical problems were encountered.

Chain of Custody Record

Lab job no. 219928
 Date _____
 Page 1 of 1

Laboratory Curtis and Tompkins, Ltd. Method of Shipment Hand Delivery
 Address 2323 Fifth Street Shipment No. _____
Berkeley, California 94710 Airbill No. _____
510-486-0900
 Project Owner Ulibarri Estate/Ms. Mary Krantz Cooler No. _____
 Site Address 387 Orange Street Project Manager Richard Makdisi
Oakland, CA Telephone No. (510) 644-3123
 Project Name Orange Street Fax No. (510) 644-3859
 Project Number 2007-09 Samplers: (Signature) _____

Filtered
 No. of Containers
TEHD (MO) (8015m)
Nitrates (300)
Sulfates (300)
Methane (RSK 175)

Field Sample Number	Location/Depth	Date	Time	Sample Type	Type/Size of Container	Preservation		No	Analysis Required										Remarks							
						Cooler	Chemical		1	2	3	4	5	6	7	8	9	10		11	12					
MW-1	-	5/5/10	1230	H ₂ O	See below	yes	<input checked="" type="checkbox"/>	No	9	X	X	X	X													

Relinquished by: <u>[Signature]</u> Signature _____ Printed <u>Pietrofadi</u> Company <u>Stellar Environmental</u>	Date <u>5/5/10</u> Time <u>1408</u>	Received by: <u>[Signature]</u> Signature _____ Printed <u>Pat Gonzalez</u> Company <u>C&T</u>	Date <u>5/5/10</u> Time <u>1405</u>	Relinquished by: _____ Signature _____ Printed _____ Company _____	Date _____ Time _____	Received by: _____ Signature _____ Printed _____ Company _____	Date _____ Time _____		
Turnaround Time: <u>5 Day TAT</u> Comments: <u>Samples on ice</u> <u>2-250ml amber 1-250ml poly</u>				Relinquished by: _____ Signature _____ Printed _____ Company _____				Received by: _____ Signature _____ Printed _____ Company _____	

3 of 14

101-00-0000

COOLER RECEIPT CHECKLIST



Curtis & Tompkins, Ltd.

Login # 219928 Date Received 5/5/10 Number of coolers 1
Client SES Project ORANGE STREET

Date Opened 5/5/10 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

Blank lines for handwritten comments.

Total Extractable Hydrocarbons			
Lab #:	219928	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2007-09	Analysis:	EPA 8015B
Field ID:	MW-1	Batch#:	162783
Matrix:	Water	Sampled:	05/05/10
Units:	ug/L	Received:	05/05/10
Diln Fac:	1.000	Prepared:	05/06/10

Type: SAMPLE Analyzed: 05/11/10
 Lab ID: 219928-001

Analyte	Result	RL
Diesel C10-C24	2,600	50
Motor Oil C24-C36	1,100	300

Surrogate	%REC	Limits
o-Terphenyl	104	39-150

Type: BLANK Analyzed: 05/07/10
 Lab ID: QC543557

Analyte	Result	RL
Diesel C10-C24	ND	50
Motor Oil C24-C36	ND	300

Surrogate	%REC	Limits
o-Terphenyl	110	39-150

ND= Not Detected
 RL= Reporting Limit

Batch QC Report

Total Extractable Hydrocarbons			
Lab #:	219928	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2007-09	Analysis:	EPA 8015B
Matrix:	Water	Batch#:	162783
Units:	ug/L	Prepared:	05/06/10
Diln Fac:	1.000	Analyzed:	05/07/10

Type: BS Lab ID: QC543558

Analyte	Spiked	Result	%REC	Limits
Diesel C10-C24	2,500	2,742	110	34-144

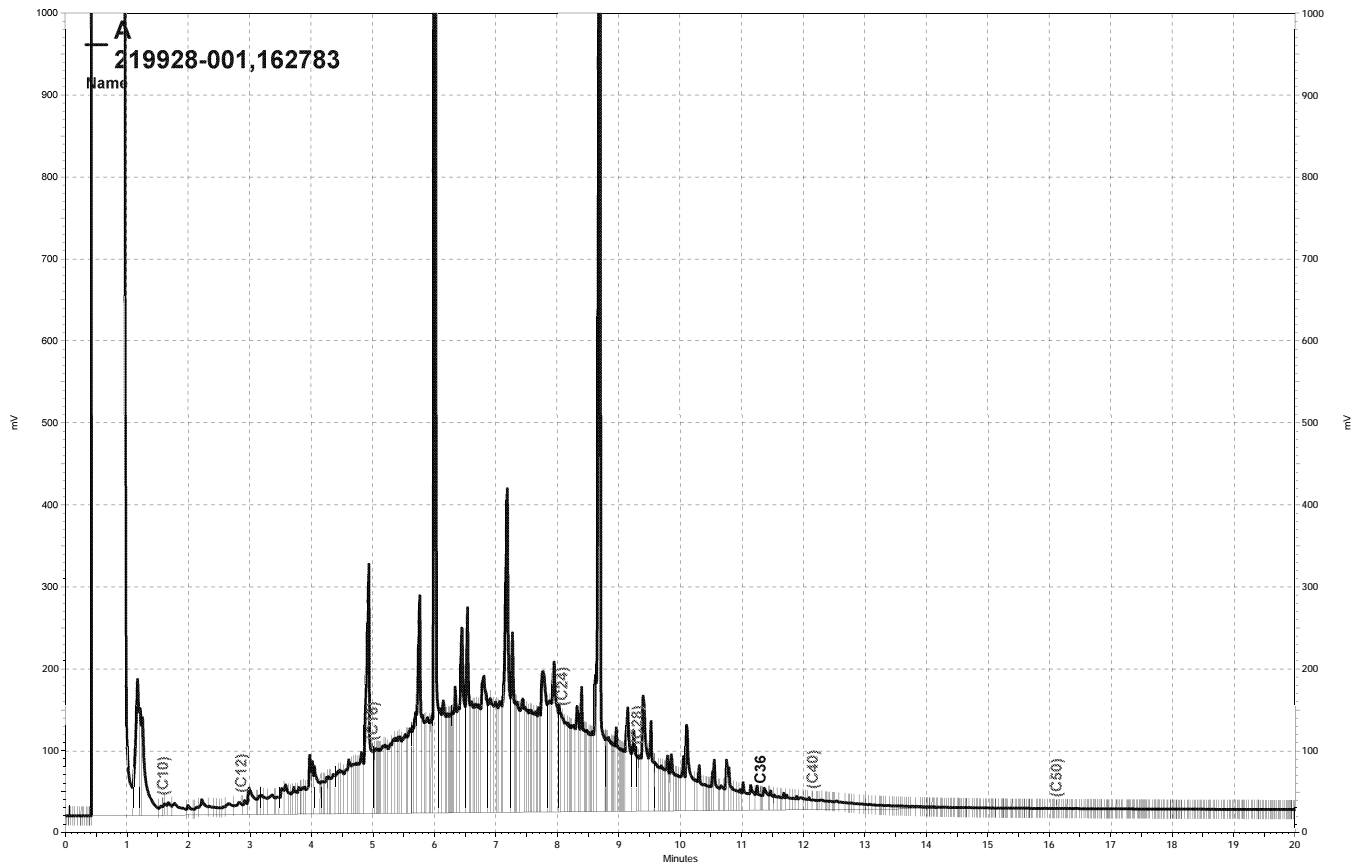
Surrogate	%REC	Limits
o-Terphenyl	117	39-150

Type: BSD Lab ID: QC543559

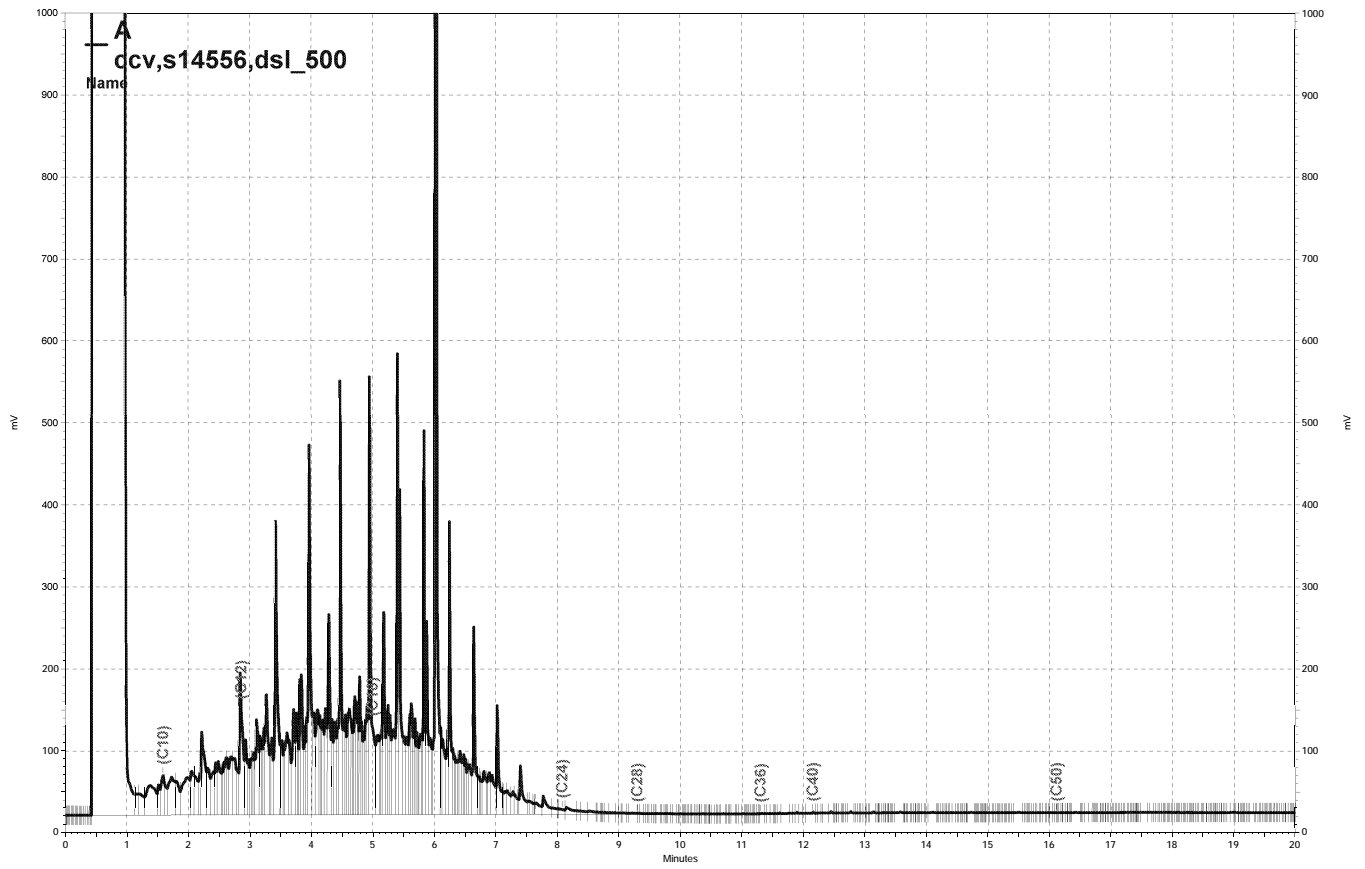
Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Diesel C10-C24	2,500	2,546	102	34-144	7	48

Surrogate	%REC	Limits
o-Terphenyl	109	39-150

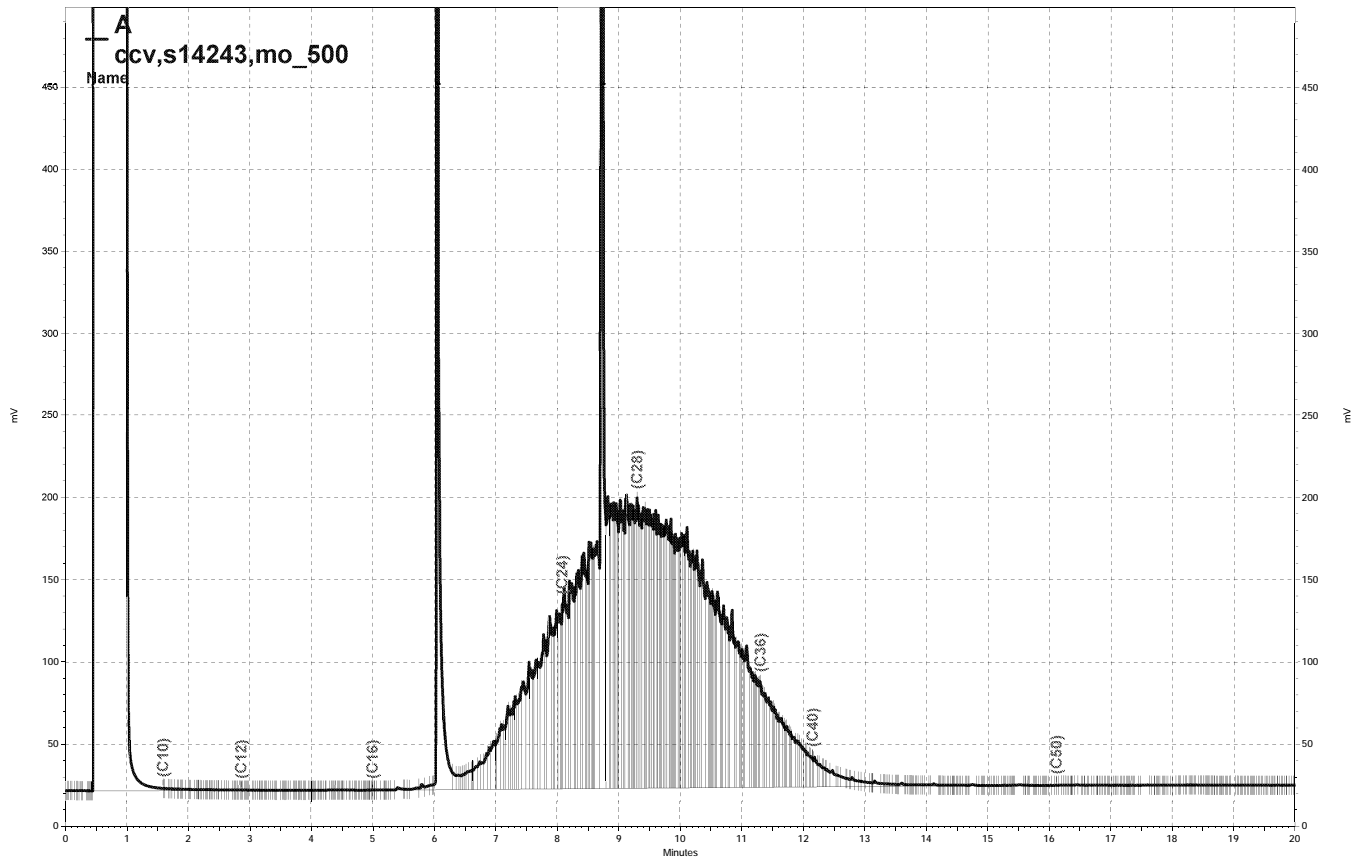
RPD= Relative Percent Difference



\\Lims\gdrive\ezchrom\Projects\GC17A\Data\130a038, A



— \\Lims\gdrive\ezchrom\Projects\GC17A\Data\127a005, A



— \\Lims\gdrive\ezchrom\Projects\GC17A\Data\127a004, A

Dissolved Gases			
Lab #:	219928	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-09	Analysis:	RSK-175
Analyte:	Methane	Batch#:	162859
Field ID:	MW-1	Sampled:	05/05/10
Matrix:	Water	Received:	05/05/10
Units:	mg/L	Analyzed:	05/10/10
Diln Fac:	1.000		

Type	Lab ID	Result	RL
SAMPLE	219928-001	ND	0.005
BLANK	QC543898	ND	0.005

ND= Not Detected
 RL= Reporting Limit

Batch QC Report

Dissolved Gases			
Lab #:	219928	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-09	Analysis:	RSK-175
Analyte:	Methane	Diln Fac:	1.000
Matrix:	Water	Batch#:	162859
Units:	mg/L	Analyzed:	05/10/10

Type	Lab ID	Spiked	Result	%REC	Limits	RPD	Lim
BS	QC543899	0.6544	0.6194	95	67-130		
BSD	QC543900	0.6544	0.6850	105	67-130	10	22

RPD= Relative Percent Difference

Curtis & Tompkins Laboratories Analytical Report

Lab #:	219928	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-09	Analysis:	EPA 300.0
Field ID:	MW-1	Batch#:	162728
Matrix:	Water	Sampled:	05/05/10 12:30
Units:	mg/L	Received:	05/05/10
Diln Fac:	1.000		

Type: SAMPLE Analyzed: 05/05/10 15:43
 Lab ID: 219928-001

Analyte	Result	RL
Nitrogen, Nitrate	4.4	0.05
Sulfate	33	0.50

Type: BLANK Analyzed: 05/05/10 10:40
 Lab ID: QC543354

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 #:	219928	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-09	Analysis:	EPA 300.0
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC543355	Batch#:	162728
Matrix:	Water	Analyzed:	05/05/10 10:57
Units:	mg/L		

Analyte	Spiked	Result	%REC	Limits
Nitrogen, Nitrate	1.000	0.9870	99	89-110
Sulfate	10.00	10.18	102	89-109

Batch QC Report

Curtis & Tompkins Laboratories Analytical Report

Lab #:	219928	Location:	Orange Street
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2007-09	Analysis:	EPA 300.0
Field ID:	MW-1	Diln Fac:	10.00
MSS Lab ID:	219928-001	Batch#:	162728
Matrix:	Water	Sampled:	05/05/10 12:30
Units:	mg/L	Received:	05/05/10

Type: MS Analyzed: 05/05/10 17:14
 Lab ID: QC543357

Analyte	MSS Result	Spiked	Result	%REC	Limits
Nitrogen, Nitrate	4.375	5.000	9.502	103	65-137
Sulfate	32.65	50.00	84.71	104	64-136

Type: MSD Analyzed: 05/05/10 17:32
 Lab ID: QC543358

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Nitrogen, Nitrate	5.000	9.857	110	65-137	4	6
Sulfate	50.00	83.89	102	64-136	1	5

RPD= Relative Percent Difference