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PILOT STUDY DESIGN AND IMPLEMENTATION WORK PLAN EVANDALE AVENUE SOURCES

MIDDLEFIELD-ELLIS-WHISMAN REGIONAL GROUNDWATER REMEDIATION PROGRAM MOUNTAIN VIEW, CALIFORNIA

Prepared by

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Project Number: WR1128A

14 November 2013

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Middlefield-Ellis-Whisman Regional Groundwater Remediation Program Mountain View, California

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1. INTRODUCTION

This Pilot Study Design and Implementation Work Plan (Work Plan) presents a scope of work for conducting an in situ chemical oxidation (ISCO) pilot study in two areas containing elevated concentrations of chlorinated volatile organic compounds (cVOCs) that have been identified along Evandale Avenue, west of the Middlefield-Ellis-Whisman (MEW) study area located in Mountain View, California (Figure 1). Geosyntec Consultants, Inc. (Geosyntec) has prepared this Work Plan on behalf of Schlumberger Technology Corporation (Schlumberger), the MEW Regional Groundwater Remediation Program (RGRP) program coordinator.

A draft version of this Work Plan was submitted to EPA on 15 August 2013 (Geosyntec, 2013d) and EPA provided comments on the draft Work Plan in a letter dated 23 September 2013 (EPA, 2013). This Work Plan has been revised based on the EPA comments and a response to comments table is provided in Appendix A.

1.1 Background

In response to a request from the United States Environmental Protection Agency (EPA), (EPA, 2012), a grab-groundwater sampling program was implemented by the RGRP between November 2012 and February 2013, and the results were presented in the Grab-Groundwater Assessment and Proposed Well Installations Report (Geosyntec, 2013a). During implementation of the grab-groundwater sampling program, two locations on Evandale Avenue were identified as containing elevated concentrations of cVOCs, in particular trichloroethene (TCE).

The locations are referred to as the "CPT-15 Area" and "CPT-21 Area" throughout the remainder of this Work Plan (Figure 2). Because the distribution of cVOCs indicate that the elevated cVOCs result from sources unrelated to cVOC releases at the former facilities of the MEW Companies, the CPT-15 and CPT-21 areas are collectively referred to as the Evandale Avenue Sources. It is the position of the RGRP that it is not responsible to remediate Evandale Avenue Sources. However, the RGRP has agreed to implement this Work Plan provided that the EPA actively investigates other potentially responsible parties.

1.2 Work Plan Organization

The remainder of this Work Plan is organized as follows:

- Section 2, *Conceptual Site Model*, presents a description of the local hydrogeology and cVOC distribution at the CPT-15 and CPT-21 areas;
- Section 3 *Pilot Study Objectives*, summarizes the specific project objectives for the pilot study;
- Section 4, *Design Basis for Pilot Study*, summarizes the results of Site-specific matrix oxidant demand testing, and presents a proposed approach and layout for the pilot study;
- Section 5, *Implementation Work Plan*, provides a work plan for implementing the pilot study scope of work;
- Section 6, *Reporting and Schedule*, summarizes the reports that will be submitted to document the pilot study results and presents a schedule for implementing the pilot study; and
- Section 7, *References*, provides the references cited in this Work Plan.

Tables, figures, and appendices are provided at the end of this Work Plan.

2. SITE CONCEPTUAL MODEL

This section of the Work Plan presents a description of the local hydrogeology and cVOC distribution at the CPT-15 and CPT-21 areas. Full descriptions of the MEW conceptual site model are presented elsewhere (e.g., Geosyntec, 2008; Geosyntec, 2013c), and are not repeated herein.

2.1 Hydrogeology

The CPT-15 and CPT-21 areas have been characterized through a series of cone penetration test (CPT) borings, direct-push borings, and grab-groundwater samples collected between November 2012 and April 2013. The locations of borings advanced in the vicinity of the CPT-15 and CPT-21 areas are shown in Figure 2.

Results from borings advanced between November 2012 and February 2013 were reported in the Grab-Groundwater Assessment and Proposed Well Installation Report (Geosyntec, 2013a). In April 2013, additional borings were advanced as described in the Final Work Plan for Remedy Design Data Collection (Geosyntec, 2013b). A summary of the activities related to the implementation of the Final Work Plan for Remedy Design Data Collection is included as Appendix B of this Work Plan and the sampling results are discussed below.

Approximately east-west and north-south trending cross-sections of the CPT-15 Area are presented in Figure 3 and Figure 4, respectively. An approximately east-west trending cross-section of the CPT-21 Area is presented in Figure 5. The cross-sections include a simplified interpretation of soil lithology based on soil behavior type (SBT) values from CPT logs along with geologic logs from direct-push boring locations. The soil lithology interpretations are generalized into coarser-grained units (i.e., sand and silty sand) and finer-grained units (i.e., silt and clay).

The current groundwater flow direction in the CPT-15 and CPT-21 areas is generally to the northeast towards the groundwater extraction wells located in the central core of the MEW study area. Potentiometric surface contour maps and groundwater hydraulic gradients are presented in the MEW RGRP Annual Progress Reports (e.g., Geosyntec, 2013c).

2.2 cVOC Distribution

cVOC analytical results for samples collected in the vicinity of the CPT-15 and CPT-21 areas are summarized in Table 1. TCE analytical results are posted on the cross-sections (Figure 3, Figure 4, and Figure 5) for grab-groundwater samples collected at the boring locations.

2.2.1 CPT-15 Area

The east-west trending cross-section A-A' (Figure 3) is approximately perpendicular to the regional hydraulic gradient and illustrates the lateral extent of TCE concentrations in the CPT-15 Area.

- The highest concentrations of TCE were detected at location CPT-15 at an approximate depth of 35 feet below ground surface (bgs).
- TCE concentrations decrease significantly to the immediate east and west of CPT-15.
    - To the west, TCE concentrations exceeding 1,000 micrograms per liter (µg/L) were not detected west of CPT-18.
    - To the east, TCE concentrations exceeding 1,000 µg/L were not detected east of CPT-14.
- TCE concentrations decrease with depth, although concentrations of up to 15,000 µg/L were detected at a depth of 56 to 60 feet bgs.

The north-south trending cross-section (Figure 4) illustrates the extent of TCE concentrations in the approximate direction of groundwater flow in the CPT-15 Area.

- Concentrations of TCE in groundwater at depths between approximately 25 and 35 feet bgs decrease downgradient of CPT-15, and concentrations of TCE exceeding 1,000 µg/L were not detected beyond CPT-31, approximately 100 feet north (downgradient) of CPT-15, indicating that the area with elevated TCE concentrations is constrained.
- TCE concentrations of 64,000 µg/L were detected at CPT-31 at a depth of 69 to 71 feet bgs. RGRP groundwater extraction well REG-3B(1) is located downgradient of CPT-31 and screened from 57 to 72 feet bgs. Analysis of groundwater capture zones indicates that TCE in groundwater downgradient of

CPT-15 at depths between 57 and 72 feet bgs has been and continues to be captured by this extraction well (e.g., Geosyntec, 2013c).

2.2.2 CPT-21 Area

The east-west trending cross-section C-C' (Figure 5) illustrates the lateral extent of TCE concentrations in the CPT-21 Area.

- TCE is either not present or only present at low concentrations (approximately 5 to 10 µg/L) in a thin coarse-grained unit present at approximately 15 feet bgs and representing first encountered groundwater.
- The highest concentrations of TCE were detected at CPT-21 at a depth of 19 to 23 feet bgs.
- TCE concentrations decrease significantly to the immediate east and west of CPT-21.
    - To the west, the TCE concentration at soil boring SB-5, located approximately 20 feet west of CPT-21 is 6.1 µg/L.
    - To the east, TCE was not detected at soil boring SB-6, located approximately 20 feet east of CPT-21.
- Samples collected from depth intervals beginning at approximately 40 feet bgs at boring locations CPT-09 and CPT-10 did not contain TCE at concentrations exceeding the Maximum Contaminant Level (MCL) of 5 µg/L.

3. PILOT STUDY OBJECTIVES

The ISCO pilot study will be conducted at the CPT-15 and CPT-21 areas located along Evandale Avenue. Location-specific pilot study objectives have been developed and are as follows:

- CPT-15 Area:
    - Evaluate whether ISCO can be practicably implemented to reduce cVOC mass and/or concentrations at the CPT-15 Area. The performance of the ISCO pilot study will be assessed based on the following:
        - The observed distribution and consumption of oxidant within the pilot study implementation area following three ISCO injection events.
        - The average groundwater cVOC concentration reductions measured in the pilot study implementation area following completion of three ISCO injection events.
- CPT-21 Area:
    - Evaluate whether ISCO can be practicably implemented as an alternative to groundwater extraction and treatment in the CPT-21 Area. The potential use of ISCO as an alternative to groundwater extraction and treatment will be evaluated based on the average groundwater cVOC concentration reductions measured in the pilot study implementation area following completion of up to three ISCO injection events.

It is important to recognize that, even when cVOC mass remains present in the subsurface, the observed cVOC concentrations may be low while permanganate is present in the subsurface. This temporary decrease in concentrations does not represent a sustainable cVOC concentration. Rather, a "rebound" in the cVOC concentrations may be observed following ISCO implementation as residual oxidant is depleted and geochemical conditions return to near baseline (ITRC, 2005). Therefore, evaluation of cVOC concentration reduction at the CPT-15 and CPT-21 areas will be based on observed cVOC concentrations once oxidant has been depleted from the system.

4. DESIGN BASIS FOR PILOT STUDY

The design basis for the ISCO pilot study was developed based on the hydrogeology and cVOC extent at the CPT-15 and CPT-21 areas (Section 2), bench-scale permanganate soil oxidant demand (PSOD) testing results (Appendix C), review of previous pilot studies conducted at MEW sites, and the professional experience of the design engineers.

4.1 Oxidant Selection

Sodium permanganate ($NaMnO_4$) was selected as the chemical oxidant for the ISCO pilot study test based on the following:

- Sodium permanganate is a well-studied chemical oxidant that has been demonstrated to effectively degrade TCE and other chlorinated ethenes (e.g., ITRC, 2005).
- Sodium permanganate is shipped to the site as a liquid compound from which diluted solutions can be prepared onsite by mixing with groundwater or tap water. Other permanganate formulations (e.g., potassium permanganate) are solid, which makes mixing and handling more difficult, particularly in residential areas.

Hexavalent chromium can be generated or introduced during ISCO implementation using permanganate solutions. However, due to the naturally occurring reduced subsurface environment, hexavalent chromium generated during ISCO will attenuate over distance and time following implementation (Siegrist et al., 2011). During previous ISCO injections conducted at the MEW Study Area, concentrations of hexavalent chromium were reportedly below the analytical method detection limit (0.010 milligrams per liter [mg/L]) within 4.5 months following the ISCO injections (PES Environmental, 2001).

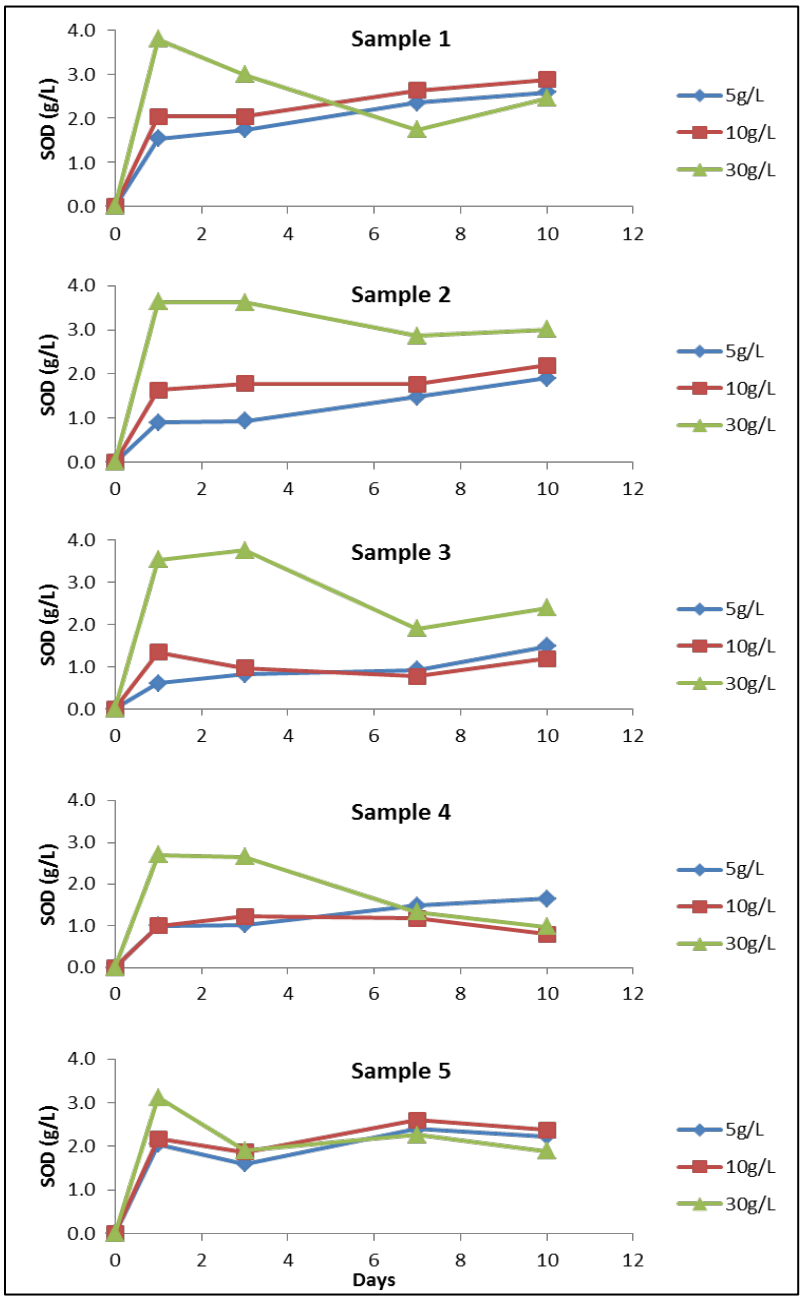
4.2 Permanganate Soil Oxidant Demand Testing

The oxidant dosing is designed to account for the natural soil demand (i.e., oxidant use by naturally occurring organic matter) and cVOC demand (i.e., oxidant use by cVOCs) within the pilot study area. Of the two demands, natural soil demand typically drives the required oxidant dosing and is estimated based on the results of PSOD testing.

Bench-scale PSOD testing was performed in April and May 2013 to evaluate the rate and extent of oxidant consumption by soil and groundwater[1] when treated with permanganate. Soil samples for PSOD testing were collected during implementation of the Final Work Plan for Remedy Design Data Collection (Geosyntec, 2013b). A total of five soil samples were collected from borings SB-5, SB-6, and SB-9 (Figure 2). Four samples were collected from the borings at depth intervals containing coarse-grained soil (sand and silty sand). One soil sample was collected at SB-9 from a depth interval containing fine-grained soil (silt and clay). The PSOD Testing Results Report provided by the testing laboratory is provided in Appendix C and provides details of the PSOD testing methods.

The plots below provide a graph of the cumulative soil oxidant demand (SOD) in units of total grams of permanganate consumed divided by liters of groundwater in the test reactor (g/L) as a function of time in days. For each of the five soil samples that were tested, three graphs are presented, one for each of the initial permanganate doses that was tested (5 g/L, 10 g/L, and 30 g/L). The plots show that most permanganate consumption occurred within the first day of the PSOD tests, with observed permanganate consumption after one day ranging from approximately 1 to 4 g/L. Higher permanganate consumption was observed in the reactors that received highest initial permanganate dose of 30 g/L. The plots also show that permanganate consumption slowed after the first day of the PSOD test, with the cumulative permanganate consumption after 10 days similar to what was observed after one day.

[1] Soil and groundwater samples were collected from the CPT-15 and CPT-21 areas (Appendix C).


Sample 1
Sample 2
Sample 3
Sample 4
Sample 5
SOD (g/L)
Days
5g/L
10g/L
30g/L
0.0
1.0
2.0
3.0
4.0
0
2
4
6
8
10
12

Reaction half-lives ($t_{½}$) for permanganate consumption over the first day and remainder of the PSOD testing, assuming first order reaction kinetics,[2] were calculated for each of the five soil samples and the mean results are summarized below.

Initial Permanganate Concentration (g/L)	Mean Half-Life, Day 0-1 (Days)	Mean Half-Life, Day 1-10 (Days)
5	2.0	19
10	3.1	60
30	4.6	NA[1]

[1] Half-life could not be calculated because an increase in permanganate concentrations was measured between day 1 and day 10.

The cumulative SOD measured during PSOD testing can also be presented on the basis of grams of permanganate consumed per kilograms of soil in the test reactor (g/kg). This provides an estimate of the natural soil oxidant demand (i.e., oxidant use by naturally occurring organic matter) that is used to develop the oxidant dosing design basis. PSOD test results measured on a g/kg basis after 10 days did not vary significantly as a function of the initial permanganate dosing and ranged between 1.3 and 5.5 grams permanganate per kilogram of soil, with a mean 10-day PSOD of 3.4 g/kg for the five soil samples (standard deviation of 1.2 g/kg). No correlation was evident between PSOD and the soil types tested, and PSOD of the finest-grained soil type evaluated (silty clay) was 3.5 g/kg, which was within the range of measured PSOD values. The mean 10-day PSOD of 3.4 g/kg is relatively low, with long-term permanganate natural oxidant demand values ranging from 0.8 g/kg to over 35 g/kg reported in the literature (e.g., Strategic Environmental Research and Development Program [SERDP], 2007).

The results of the PSOD testing indicate that ISCO using permanganate appears to be viable for the CPT-15 and CPT-21 areas, with limited short-term oxidant demand observed over the 10 day testing period, estimated long-term oxidant half-lives on the order of several weeks to several months, and a mean 10 day PSOD value that falls within the low range of values reported for other sites.

[2] The equation for estimating a reaction half-life assuming first order reaction kinetics is: $t_{1/2} = \frac{[t_1 - t_0] \ln 2}{\ln\left[C_1/C_0\right]}$, where C_1 is the concentration at time t_1 and C_0 is the concentration at time t_0.

4.3 Oxidant Dosing

The target permanganate dosing in the CPT-15 and CPT-21 areas for the pilot study is estimated based on the natural soil demand (i.e., oxidant use by naturally occurring organic matter) and cVOC demand (i.e., oxidant use by cVOCs).

Natural soil demand can be estimated based on the results of PSOD testing. As described in Section 4.2, PSOD test results indicated a natural soil permanganate demand of 1.3 to 5.5 g/kg, with a mean PSOD of 3.4 g/kg. However, bench-scale PSOD testing generally overestimates the amount of oxidant consumption during *in situ* applications due to mass transfer related issues arising from differences in system configuration (i.e., batch laboratory tests versus plug-flow application in the field) (Mumford et al., 2005; Siegrist et al., 2011). As a result, a design range of PSOD values of 0.5 to 2.0 g/kg as permanganate (0.7 to 2.7 g/kg as sodium permanganate) was selected for the pilot study design.

Because cVOC permanganate demand is typically small (on the order of 1%) compared to natural soil demand, the target sodium permanganate dose was selected to be equal to the estimated PSOD values (ranging from 0.7 to 2.7 g/kg) for the pilot study design basis. The volume and concentration of sodium permanganate solution injected as part of the pilot study is described in Section 4.6 and was designed to meet this target dosing.

4.4 Injection Rates

Injection rates, volumes, and pressures for the pilot study will be determined in the field based on the results of injection testing that will be conducted in the vicinity of CPT-15 (Section 5.2).

Preliminary pilot study injection rates for pilot study design were estimated based on a review of previously reported injection studies performed at MEW sites (e.g., PES Environmental, 2001; Shaw, 2011, 2012; Weiss, 2008). Previous studies suggest that injections of soluble materials dissolved in water performed using direct-push technology (similar to the planned application of sodium permanganate during the pilot study) have had achievable injection rates ranging from 2 to 12 gallons per minute (gpm).

Based on these studies, a nominal injection rate of 4 gpm at each injection location was selected for design of the CPT-15 and CPT-21 areas pilot study as a realistic injection rate that would result in a relatively low injection pressure.

If design injection rates and volumes cannot be reasonably achieved in the field based on the results of injection testing, the injection rates and oxidant dosing will be modified prior to ISCO injections. Modifications to the design injection rates or dosing, if necessary, would be determined in consultation with EPA. If the injection rate test results are consistent with the design basis, the ISCO injection program would proceed as designed.

4.5 Proposed Implementation Layout

The proposed injection point and performance monitoring network layouts for the pilot study are presented in the following section.

4.5.1 Proposed Injection Point Layouts

The proposed injection layouts for the CPT-15 and CPT-21 areas are described below.

CPT-15 Area

Figure 6 presents the proposed injection point layout for the CPT-15 Area.

ISCO injections will be performed along Evandale Avenue at five injection locations centered on CPT-15, where the highest TCE concentrations (up to 130,000 µg/L) were measured during grab-groundwater sampling. The proposed injection locations were selected based on constraints on the available work locations (i.e., presence of sidewalks, driveways, overhead trees and power lines, and subsurface utility corridors). The injection points spacing is approximately 15 feet on center (Figure 7), with some variation due to constraints on available work locations. The target radius of influence (ROI) for the injections is approximately 11 feet, which would result in a 33 percent overlap between the injection points. The vertical injection interval is 15 to 35 feet bgs based on the groundwater concentrations measured in the CPT-15 Area (Figure 7, Figure 8).

The injection locations may be adjusted based on conditions observed in the field during implementation.

CPT-21 Area

Figure 9 presents the proposed injection point layout for the CPT-21 Area.

ISCO injections will be performed along Evandale Avenue at two injection locations centered on CPT-21, where the highest TCE concentration (up to 4,000 µg/L) was measured during grab-groundwater sampling. The proposed injection locations were selected based on constraints on the available work locations (i.e., presence of sidewalks, driveways, overhead trees and power lines, and subsurface utility corridors). The injection point spacing is approximately 15 feet on center. The target ROI for the injections is 10 feet, which would result in a 33 percent overlap between the injection points. The vertical injection interval is 15 to 25 feet bgs and is based on the groundwater concentrations measured in the CPT-21 Area (Figure 10).

The injection locations may be adjusted based on conditions observed in the field during implementation.

4.5.2 Proposed Performance Monitoring Network Layouts

The proposed performance monitoring networks for the CPT-15 and CPT-21 areas are described below.

CPT-15 Area

The purpose of the performance monitoring is to assess the progress of the pilot study towards meeting the objectives described in Section 3. The proposed monitoring locations were selected in consideration of that purpose, as well as constraints on the available work locations (i.e., access, presence of overhead trees and power lines, and subsurface utility corridors). Figure 6 presents a plan view of the proposed monitoring network for the CPT-15 Area. Figure 8 presents a north-south trending cross-section showing the proposed monitoring well screen intervals along the approximate direction of groundwater flow.

One temporary piezometer will be installed between the proposed ISCO injection locations and the storm sewer, in order to monitor groundwater elevation during the injections to ensure that it remains below the storm sewer elevation. The piezometer will be drilled to first encountered groundwater (approximately 15 to 20 feet bgs).

A transect of temporary monitoring wells consisting of two well clusters will be installed approximately 20 feet downgradient of the injection points to monitor permanganate breakthrough, consumption, and changes in cVOC concentration. Based on the design injection ROI, permanganate is expected to reach the monitoring well transect after one or two injection events. Each well cluster will contain two wells with approximate screen intervals of 15 to 25 and 25 to 35 feet bgs to assess potential changes in pilot study performance as a function of injection depth.

Two additional monitoring well clusters will be installed further downgradient at distances approximately 35 and 60 feet north of the injection points. These well clusters will be used to monitor changes in cVOC concentration further downgradient of the injection locations (although outside the expected injection radius of influence, these wells will also be monitored for potential permanganate breakthrough). The well cluster located 35 feet downgradient of the injection points will contain three wells. Two wells will have approximate screen intervals of 15 to 25 and 25 to 35 feet bgs to assess potential changes in pilot study performance as a function of injection depth. The third well in the cluster will be installed with a deeper screen interval from 65 to 75 feet bgs to evaluate the potential for density-driven downward vertical transport of the injected permanganate solution. The well cluster located 60 feet downgradient of the injection points will contain two wells with approximate screen intervals of 15 to 25 feet bgs and 25 to 35 feet bgs.

Finally, existing MEW groundwater monitoring well 79A will be included in the monitoring well network as a far downgradient monitoring well. Well 79A is located adjacent to Fairchild Drive, approximately 320 feet downgradient the pilot study area near existing groundwater extraction well REG-3B(1). This well will provide long-term monitoring of the area as part of the on-going annual groundwater monitoring program.

CPT-21 Area

As with the CPT-15 Area, the purpose of performance monitoring at the CPT-21 Area is to assess the progress of the pilot study towards meeting the pilot study objectives described in Section 3. However, due to logistical constraints (i.e., access, presence of overhead trees and power lines, and subsurface utility corridors), performance monitoring at the CPT-21 Area will be conducted through collection of grab-groundwater samples.

One temporary piezometer will be installed in the CPT-21 Area between the proposed injection locations and the storm sewer, in order to monitor the groundwater elevation during injections to ensure that it remains below storm sewer elevation. The piezometer will be drilled to first encountered groundwater (approximately 15 to 20 feet bgs).

Approximately one month after each CPT-21 Area injection event, grab-groundwater samples will be collected from up to three boring locations in the vicinity of the injection locations in order to monitor permanganate consumption and changes in cVOC concentration during the pilot study. Grab-groundwater samples will be collected from each location at two depth intervals (approximately 15 to 20 feet bgs and 20 to 25 feet bgs) to assess potential changes in pilot study performance as a function of injection depth.

In addition, a downgradient performance monitoring well will be installed along Fairchild Drive (Figure 9) as part of the Grab-Groundwater Assessment and Proposed Well Installations Report (Geosyntec, 2013a) implementation.

4.6 Proposed Implementation Approach

The ISCO pilot study will consist of installing temporary performance monitoring wells, mixing and injection of sodium permanganate solution, performance monitoring, and data evaluation and reporting. Given the logistical constraints present in the CPT-15 and CPT-21 areas, and in order to allow flexibility between injection events, the ISCO injections will be performed using direct-push technology. The proposed injection approach for the CPT-15 and CPT-21 areas are described in this section of the Work Plan. Details of the proposed ISCO pilot study procedures are described in Section 5.

4.6.1 CPT-15 Area

Three ISCO injection events will be conducted at the CPT-15 Area. The injection events will occur approximately every three months, with pilot study performance monitoring conducted between injections.

The volume of permanganate solution that will be injected at the CPT-15 Area during the first injection event has been developed based on the estimated target dosing described in Section 4.3, the reactive transport of the permanganate that will occur during injections, and the proposed injection location spacing and target vertical depth

intervals described in Section 4.5. At each of the five injection locations, the injections will be performed as follows:

- Over four 5-foot vertical intervals from 15 to 35 feet bgs (i.e., 15 to 20 feet bgs, 20 to 25 feet bgs, etc.);
- The nominal target volume of sodium permanganate solution for the first injection event will be approximately 1,200 gallons per 5-foot interval at each injection location. The target injection volume may be increased to 1,500 gallons per 5-foot interval at each injection location for subsequent injection events based on observed conditions during implementation of the first injection;
- Concentration of sodium permanganate in the injection solution will be 20 g/L;
- Total nominal injection volume will be 24,000 gallons per injection event, corresponding to the injection of 4,000 pounds of sodium permanganate; and
- The sodium permanganate dose during each injection event is approximately 0.7 g/kg. The applied permanganate dose will increase with each subsequent injection event leading to a cumulative applied dose of up to 2.1 g/kg after three injection events.

The injection locations, injection volume, and permanganate dosing will be re-evaluated based on the process monitoring and performance monitoring data collected during the first injection event.

If permanganate surfacing, preferential pathways, or other potentially negative impacts are observed during the injections and cannot be remedied by refinement of the ISCO pilot study design, the USEPA will be notified and additional pilot study injections will not be implemented.

4.6.2 CPT-21 Area

A minimum of two permanganate injections and two post-injection monitoring events will be conducted in the CPT-15 Area prior to conducting injections in the CPT-21 Area. Because performance monitoring of the CPT-21 Area will be limited due to logistical constraints, two injections at the CPT-15 Area will be conducted first and the injection approach at the CPT-21 Area will be refined if necessary based on experience at the CPT-15 Area.

The volume of permanganate solution that will be injected at the CPT-21 Area during the first injection event has been developed based on the estimated target dosing described in Section 4.3, the reactive transport of the permanganate that will occur during injections, and the proposed injection location spacing and target vertical depth intervals described in Section 4.5. At both of the injection locations, injections will be performed as follows:

- Over two 5-foot vertical intervals from 15 to 25 feet bgs (i.e., 15 to 20 feet bgs and 20 to 25 feet bgs);
- Nominal target volume of sodium permanganate solution injected will be approximately 1,200 gallons per 5-foot interval at each injection location. The target injection volume may be increased to 1,500 gallons per 5-foot interval at each injection location for subsequent injection events based on observed conditions during implementation of the first injection;
- Concentration of sodium permanganate in the injection solution will be 20 g/L;
- Total nominal injection volume will be 4,800 gallons per injection event, corresponding to the injection of 800 pounds of sodium permanganate; and
- The sodium permanganate dose during each injection event is approximately 0.7 g/kg. The applied permanganate dose will increase with each subsequent injection event leading to a cumulative applied dose of up to 2.1 g/kg after three injection events.

It is expected that at least two ISCO injection events will be required in the CPT-21 Area to achieve the pilot study objectives. A third injection at the CPT-21 Area may be conducted as part of the pilot study based on performance monitoring results. Potential implementation of the third injection event will be based on the observed permanganate distribution, the observed rate of permanganate consumption, and cVOC concentrations in groundwater samples.

The CPT-21 Area injection events will occur approximately every two months, with performance monitoring conducted approximately one month after each injection event. Upon completion of the pilot test injections, performance monitoring results will be used to establish a post-pilot study monitoring program and frequency. The post-pilot study program will monitor geochemical conditions as they return to baseline.

5. IMPLEMENTATION WORK PLAN

The following section presents a work plan for implementing the CPT-15 and CPT-21 area pilot study.

5.1 Field Preparation

5.1.1 Permitting and Notification

Prior to the start of field activities, the following will be obtained:

- Access agreements for any work to be conducted on private property;
- Encroachment permits from the City of Mountain View for any work to be conducted in public right-of-ways; and
- Drilling permits from the Santa Clara Valley Water District (SCVWD).

The EPA, City of Mountain View, SCVWD, and private property owners in the CPT-21 and CPT-15 areas will be notified of the planned work schedule prior to the start of field activities.

5.1.2 Health and Safety

The existing site-specific health and safety plan (HASP) will be updated to include all field activities associated with the ISCO pilot study implementation. The HASP will contain procedures for hazard identification and mitigation, emergency response including a map of the nearest hospital and emergency contact information, incident reporting, use of appropriate personal protective equipment (PPE), and air monitoring procedures.

Prior to the start of field activities each day, a safety tailgate meeting will be conducted that will include a discussion of the field activities to be performed, safe work practices, identification of potential hazards, use of PPE, decontamination procedures, and emergency response protocols. Health and safety protocols related to permanganate handling are discussed in Section 5.4.1.

5.1.3 Utility Clearance

Boring locations will be marked with white paint and Underground Service Alert (USA) North will be contacted a minimum of 48 hours prior to commencement of drilling activities. Additionally, a private utility locator will perform a geophysical survey in the vicinity of each proposed boring location area to identify potential utilities, pipelines, or other subsurface obstructions prior to drilling.

5.2 Injection Rate Test

An injection rate test using municipal water was conducted downgradient of the CPT-15 Area near monitoring well 79A in September 2013 to facilitate the development of location-specific estimates for the achievable injection rates and pressures within the pilot study area[3]. The location of the injection test is shown on Figure 6.

During the injection rate test, injection tooling was advanced by a C-57 licensed drilling contractor using a direct push drilling rig to the target injection zone. The injection tooling was equipped with an aboveground pressure transducer and flow meter to allow for recording injection rates and pressures. Injection rate tests were conducted at two locations. At the first location, rate tests were conducted at three intervals (17 to 20 feet bgs, 22 to 25 feet bgs, and 29 to 32 feet bgs). At the second location, rate tests were conducted at two intervals (17 to 20 feet bgs and 20 to 32 feet bgs). The intervals were selected based on information obtained from nearby CPT boring logs and contained both primarily coarse-grained (i.e., silty sand and sand) and fine-grained (i.e., silts and clays) materials.

Once each of the target injection test intervals was reached, a step injection rate versus pressure test was conducted. During the step injection tests, potable water was injected through the injection tooling into the subsurface at injection rates similar to those previously observed at MEW and consistent with the ISCO pilot study design basis (Section 4.2.1). During the tests, the injection pressure was increased at each location until a stable injection rate of approximately 1 gpm was achieved. Once a stable injection rate of 1 gpm was achieved, the injection rate was increased in a step-wise manner to a maximum final injection pressure of approximately 15 to 20 pounds per

[3] The injection test was completed in September 2013 based on injection rig availability and Site access.

square inch (psi). After each increase in injection rate and pressure, the injection rate was maintained at a constant rate for a period of at least 5 minutes.

The results of the injection testing will be evaluated against the design basis for the ISCO pilot study (Section 4.2.1) prior to implementing the first ISCO injection event. If the injection rate test results are consistent with the design basis, the ISCO injection program would proceed as designed and the injection test results would be submitted to EPA as part of the Pilot Study Report (Section 6). If the achievable injection rate at the pilot study area differs significantly from the design basis, the injection rates and dosing described in Section 4 may be modified prior to ISCO injections. If modifications to the ISCO injection program are required, the results of the injection rate test will be provided to EPA and changes to the initial ISCO pilot study injection rates or dosing based on the results would be determined in consultation with EPA.

5.3 Temporary Performance Monitoring Well Installation

As described in Section 4.5, a total of nine temporary performance monitoring wells will be installed in the CPT-15 Area at the following locations:

- Two temporary monitoring well clusters will be installed approximately 20 feet downgradient of the injection locations. At each cluster, one temporary monitoring well will be screened from approximately 15 to 25 feet bgs and the other temporary monitoring well will be screened from approximately 25 to 35 feet bgs;
- One temporary monitoring well cluster will be installed approximately 35 feet downgradient of the injection locations. The well cluster will contain three temporary monitoring wells, with approximate screen intervals of 15 to 25, 25 to 35, and 65 to 75 feet bgs; and
- One temporary monitoring well cluster will be installed approximately 60 feet downgradient of the injection locations. The well cluster will contain two temporary monitoring wells, with approximate screen intervals 15 to 25, and 25 to 35 feet bgs.

The proposed temporary performance monitoring well locations are shown in Figure 6 (plan view) and Figure 8 (cross-sectional view).

5.3.1 Well Drilling

The temporary performance monitoring wells will be drilled and installed by a C-57 licensed drilling contractor using the hollow stem auger drilling method.

At each well cluster location, the deepest well will be drilled, logged for geology, and installed first. Since the wells in each cluster will be co-located, the subsequent shallower well or wells will not be logged for geology during drilling and installation. Geologic logging of the hollow stem auger soil cuttings will be conducted by field staff under the direction of a California Professional Geologist using the Unified Soil Classification System. The soil will be field-screened for volatile organic compounds using a photoionization detector (PID) and the readings recorded on the boring logs. All downhole equipment will be decontaminated prior to use and between boring locations.

Once the target depth is reached at each boring, the monitoring well will be constructed through the hollow stem auger casing. The monitoring well casing will consist of 2-inch diameter, Schedule 40 PVC pipe, with 0.020-inch factory-cut, slotted well screen, flush-threaded joints and a bottom cap. The annular space between the borehole wall and well screen for each well will be filled with #3 filter pack sand to a depth of about 3 feet above the top of the well screen. Approximately 2 to 3 feet of bentonite chips or pellets will be placed above the sand pack and hydrated to provide a seal above the filter pack. The remainder of the borehole will be tremie filled with Portland cement to the ground surface in accordance with SCVWD requirements. The surface completions will consist of a flush-mount traffic-rated well box and the tops of the well casings will be fitted with locking expandable-gasket caps.

After installation, the locations and elevations of the temporary performance monitoring wells will be recorded using a Trimble GeoXH handheld global positioning system (GPS) unit, or equivalent.

5.3.2 Well Development

The performance monitoring wells will be developed a minimum of 48 hours following installation. Development will consist of a combination of bailing, surging, and pumping. As described in the MEW QAPP (Canonie, 1991), wells will be developed to remove fine-grained materials from inside the filter pack and casing, to stabilize the filter pack around the well screen, and to produce representative water samples from the

water-bearing zone. Development will be continued until the well is judged to be adequately developed (EPA, 2001).

5.4 Sodium Permanganate Injections

5.4.1 Traffic Control Plan

Traffic and parking will be restricted along the north side of Evandale Avenue during each oxidant injection event. Signs will be posted notifying the public of the traffic and parking restrictions a minimum of 48 hours prior to each injection event.

Figure 11 shows the areas along Evandale Avenue where traffic and parking will be restricted during oxidant injections. Figure 12 presents the generalized traffic control plan that will be implemented during each injection event.

It is anticipated that during each injection event at the CPT-15 Area, traffic will be restricted for a period of five consecutive business days. During each injection event at the CPT-21 Area, traffic will be restricted for a period of three consecutive business days. Restrictions to traffic are not anticipated outside of the injection events.

5.4.2 Materials Handling and Mixing

Sodium permanganate handling will be in compliance with City of Mountain View Fire Department requirements and the *National Fire Protection Association (NFPA) 430: Code for the Storage of Liquid and Solid Oxidizers* (NFPA, 2004). The HASP will include a list of emergency response materials that will be present onsite such as containment materials, adsorbent, neutralizing solution (sodium thiosulfate, $Na_2S_2O_3$), and personal protective equipment.

The project team will receive onsite training in permanganate handling and emergency response. Emergency response supplies and equipment will be staged near the work area in the event of a release and verified daily.

On the first day of each ISCO injection event, the following activities will be conducted as part of the mixing equipment set up:

- Establishment of site control areas (i.e., exclusion zone, decontamination zone, etc.);

- Confirmation of traffic and pedestrian controls around the proposed injection locations; and
- Receipt of sodium permanganate and staging in secondary containment system.

Sodium permanganate will be mixed with water prior to the injection manifold to achieve the target solution concentrations for each area as discussed in Section 4. The sodium permanganate batch mixing will be performed numerous times during the injection activities and will include the following activities:

- Checking safety supplies and donning personal protective equipment;
- Connecting to the water supply and filling the mix tank(s) with water. The mix tank(s) will be located on the injection subcontractor's support truck. The support truck will be parked within restricted traffic zone during injections (Figure 11) and will be demobilized from the area at the end of each day;
- Connecting the sodium permanganate totes to the mix tank(s) and transferring the sodium permanganate solution into the mix tank(s). The sodium permanganate will be stored in 275 gallon intermediate bulk containers (IBCs) located on or immediately adjacent to the injection subcontractor's support truck. The IBC will be placed on the support truck and demobilized from the area at the end of each work day;
- Mixing the mix tank contents, using an electric tank mixer; and
- Sampling the solution for confirmation analysis of permanganate concentration.

5.4.3 Oxidant Borings and Injections

Temporary borings for oxidant injections will be advanced by a C-57 licensed drilling contractor using direct-push drilling. All down-hole equipment will be decontaminated prior to use.

At each location, hollow steel direct-push rods will be advanced to the target injection interval. Injections will be completed in a top-down manner over approximate 5-foot vertical depth intervals at each injection location. At the CPT-15 Area, each injection location will have four target injection intervals: 15 to 20, 20 to 25, 25 to 30 and 30 to 35 feet bgs. At the CPT-21 Area, each injection location will have two target injection

intervals: 15 to 20 and 20 to 25 feet bgs. Multiple injection locations at each area may be manifolded together during the injections.

Sodium permanganate solution will be injected from the aboveground storage tank through an injection line connected to the hollow steel direct push rods. Prior to starting injections, the injection line will be inspected for signs of damage or leaks and connections will be checked. The injection line will be equipped with a mechanical flow totalizer, flow meter, pressure gauge, and flow control valve to monitor the injection volume, rate, and pressure. The maximum operational pressure will be determined based on the results of the injection rate test discussed in Section 5.2.

Design injection volumes and rates are described in Section 4. If possible based on achievable injection rates and pressures, the design volume of permanganate solution will be injected during each oxidant injection event. During each injection, the rate and pressure will be slowly increased from conservatively low values at the start of injections to the design injection rate. The oxidant delivery rate and target injection volume may be adjusted during implementation based on observed field conditions.[4]

If permanganate cannot be delivered under pressures less than the maximum allowable injection pressure at a given injection interval, the oxidant volume that cannot be injected will be re-allocated to either adjacent boreholes or to deeper injection intervals (up to a maximum of 35 feet bgs). The total nominal injection volume (24,000 gallons for CPT-15 and 4,800 gallons for CPT-21) will be injected during each event.

In order to limit the number of boreholes advanced in the pilot study areas and minimize the potential for preferential flow upward through abandoned boreholes, the injection tooling will be left in place while injections are ongoing. At the end of each working day, the injection tooling will be disconnected at the ground surface and each boring location will be covered with a steel trench plate.

Once each injection event is complete, the borings will be tremie grouted from total depth of the boring to ground surface using a concrete-bentonite grout in accordance with Santa Clara County requirements. The ground surface will be completed to match the surrounding surface (i.e., the street surface).

[4] EPA will be notified if there is a need to revise the oxidant delivery rate or target injection volume.

5.4.4 Surfacing and Preferential Pathway Monitoring

As permanganate solution is injected into the subsurface, it will move away from the injection point and can be influenced by natural heterogeneities in the subsurface, bedding and backfill materials associated with buried utilities, and compromised buried utility conduits (i.e., leaking storm sewers). A preferential pathway monitoring program will be implemented to expeditiously identify potential preferential pathways that could influence the movement of permanganate solution during injection activities. Prior to the start of injections, features where permanganate solution could surface (i.e. manholes, storm drains, etc.) will be identified and then monitored prior to and during permanganate injections.

Temporary Piezometer

A temporary piezometer will be installed between the injection locations and the storm sewer in order to ensure the groundwater elevations during the ISCO injections remain below the storm sewer elevation. Hollow steel direct-push rods equipped with a disposable tip and a 10-foot section of slotted polyvinyl chloride (PVC) screen will be pushed to a depth of five feet below the first encountered groundwater (approximately 15 to 20 feet bgs). The steel rods will be retracted approximately ten feet, leaving the stainless steel disposable tip in the ground and exposing the slotted PVC screen. This temporary piezometer will be left in the ground during the injections and used to measure the water level and periodically check for visual evidence (pink or purple color) of permanganate solution. Injection flow rates and pressures may be adjusted based on the rise in water level measured in the temporary piezometer compared to storm drain elevations near the injection areas.

Visual Monitoring

During injection activities, potential preferential pathways in close proximity to the injection wells will be visually monitored for a purple color indicative of the presence of permanganate. Locations of storm sewer manholes and catch basins that could be preferential pathways during injection activities at the CPT-15 and CPT-21 areas are shown in Figure 6 and Figure 9, respectively. These site features will be monitored during injection activities. If a purple color is observed in a potential preferential pathway, the injections will be stopped. In the event that the presence of excess permanganate solution requires neutralization emergency response, procedures will be implemented as discussed in the following section.

5.4.5 Emergency Response Procedures

In the event that the presence of excess permanganate solution requires neutralization or process chemical are spilled during site operations and require neutralization, emergency response procedures will be implemented. Activities involved include the following:

- Stopping the permanganate injections;
- Notifying the Project Manager and Site Safety Officer in accordance with the HASP;
- Notifying the EPA, City of Mountain View, and other local agencies (if necessary) if the spill exceeds the reportable quantity of 100 pounds of permanganate;
- Containment of permanganate solutions;
- Managing any surface seepage of permanganate solutions; and
- Neutralize spilled permanganate using <15% sodium thiosulfate or 3% hydrogen peroxide/household vinegar/water solution.

Prior to injection activities, the RGRP will work with EPA and the City of Mountain View to develop a list of contacts that will be notified in the event of a permanganate spill or release. The contact list will be included in the HASP that will be onsite while field work is underway.

5.5 Sampling and Analysis Plan

The follow section describes the baseline and performance monitoring that will be conducted to evaluate the progress of the pilot study.

5.5.1 Baseline Sampling

A minimum of 72 hours after the completion of well development, baseline groundwater samples will be collected from the CPT-15 Area temporary performance monitoring wells to establish baseline geochemical conditions prior to the implementation of oxidant injections.

During baseline sampling, the temporary performance monitoring wells will be purged three to five casing volumes prior to collection of groundwater samples. The wells will be purged using a submersible pump equipped with new disposable tubing. Water will be pumped through an enclosed flow-through cell fitted with a multi-parameter groundwater meter. Temperature, pH, electrical conductivity, turbidity, dissolved oxygen (DO), and oxidation reduction potential (ORP) will be measured during purging. Groundwater will be purged until the field parameter values stabilize. Groundwater levels will be monitored during purging to confirm that drawdown stabilizes prior to sampling.

Following stabilization of field parameters, groundwater samples will be collected. Samples will be analyzed for the following compounds:

- cVOCs by EPA Method 8260B;
- Total dissolved solids (TDS) by Method SM 2540C;
- Chloride by EPA Method 300.0;
- Dissolved manganese, iron, and chromium by EPA Method 6010B; and
- Dissolved hexavalent chromium [Cr(VI)] by EPA Method 7196.

Groundwater samples will be collected in laboratory-supplied sample containers and labeled with project identification, sample location, analytical parameters, time and date of sampling, and any preservative added to the sample. Samples will be stored in an ice-cooled chest, maintained at approximately 4º C, for transport under chain-of-custody procedures to a State of California-certified laboratory for analysis.

Quality assurance/quality control (QA/QC) samples will be collected for cVOC samples. In accordance with the MEW QAPP, one duplicate, one field blank and one equipment blank will be collected for every 20 groundwater samples collected for cVOC analysis. In addition a laboratory provided trip blank will be included with each cooler containing groundwater samples for cVOC analysis that is sent to the laboratory.

For the CPT-21 Area, the grab-groundwater sampling conducted between November 2012 and April 2013 will serve as the baseline sampling event.

5.5.2 Performance Monitoring

Performance monitoring will be conducted to assess the progress of the pilot study with respect to achieving the pilot study objectives (Section 3). Pilot study effectiveness will be indicated if cVOC degradation is observed following implementation of the pilot study ISCO injections, with cVOCs considered to be degrading if concentrations of TCE are reduced from the baseline sample concentrations. However, the observed cVOC concentrations may be low while permanganate is present in the subsurface with a "rebound" in the cVOC concentrations as residual oxidant is depleted and geochemical conditions return to near baseline (ITRC, 2005). Therefore, evaluation of cVOC concentration reduction at the CPT-15 and CPT-21 areas will be based on observed cVOC concentrations once oxidant has been depleted from the system.

In the CPT-15 Area, three performance monitoring events will be conducted following the first injection event and two performance monitoring events will be conducted following the second and third injection events. During the CPT-15 Area performance monitoring, groundwater samples will be collected at the performance monitoring wells approximately every two weeks. In the CPT-21 Area, performance monitoring grab-groundwater samples will be collected approximately one month after each injection event. The interval between performance monitoring events may be adjusted during implementation based on observed field conditions.[5]

During each performance monitoring event, the performance monitoring wells will be purged three to five casing volumes prior to collection of groundwater samples. The wells will be purged using a submersible pump equipped with new disposable tubing. Water will be pumped through an enclosed flow-through cell fitted with a multi-parameter groundwater meter. Temperature, pH, electrical conductivity, turbidity, dissolved oxygen (DO), and oxidation reduction potential (ORP) will be measured during purging. Groundwater will be purged until the field parameter values stabilize. Groundwater levels will be monitored during purging to confirm that drawdown stabilizes prior to sampling.

[5] EPA will be notified if there is a need to adjust the performance monitoring schedule.

Following stabilization of field parameters, groundwater samples will be collected. Samples collected from the CPT-15 Area wells will be analyzed for the following compounds:

- Quenched cVOCs by EPA Method 8260B;
- Permanganate ion using a commercially available field test kit;
- TDS by Method SM 2540C;
- Chloride by EPA Method 300.0;
- Dissolved total manganese, iron, and chromium by EPA Method 6010B; and
- Dissolved hexavalent chromium [Cr(VI)] by EPA Method 7196. This analysis is subject to interference in the presence of permanganate. If groundwater is pink or purple, samples will not be analyzed for this compound.

Samples collected from the performance monitoring grab-groundwater locations at the CPT-21 Area will be analyzed for the following compounds:

- Quenched cVOCs by EPA Method 8260B; and
- Permanganate ion using a commercially available field test kit.

In order to ensure that residual permanganate in the groundwater (if present) does not further oxidize the cVOCs between sample collection and laboratory analysis, cVOC samples will be quenched in the field immediately following sample collection. The sample preparation for quenched cVOCs involves the addition of approximately 2 to 3 grams of anhydrous manganese sulfate ($MnSO_4$) to a groundwater sample in the field. The groundwater sample is allowed to react with the $MnSO_4$ for approximately ten minutes, after which the sample is decanted into a VOA vial containing hydrochloric acid for transport to the analytical laboratory.

Performance monitoring samples will be collected in laboratory-supplied sample containers and labeled with project identification, sample location, analytical parameters, time and date of sampling, and any preservative added to the sample. Samples will be stored in an ice-cooled chest, maintained at approximately 4º C, for transport under chain-of-custody procedures to a State of California-certified laboratory for analysis.

QA/QC samples will be collected for cVOC samples. In accordance with the MEW QAPP, one duplicate, one field blank and one equipment blank will be collected for every 20 groundwater samples collected for cVOC analysis. In addition a laboratory provided trip blank will be included with each cooler containing groundwater samples for cVOC analysis that is sent to the laboratory.

5.6 Temporary Performance Monitoring Well Destruction Plan

At the conclusion of the pilot study, the temporary performance monitoring wells will be destroyed. The performance monitoring wells will be overdrilled by a C-57 licensed drilling contractor and the well materials removed. The boring will then be grouted to the surface in accordance with County, State and Federal requirements.

5.7 Investigation Derived Waste Management

Water generated during the implementation activities will be neutralized if residual permanganate is present, and then treated and discharged through the North 101 or South 101 RGRP groundwater treatment systems. Soil cuttings will be temporarily stored at one of the treatment systems in 55-gallon drums or roll off bins pending analysis. Following waste profiling, soil cuttings will be disposed of in accordance with Federal and State requirements at an appropriate offsite facility.

6. REPORTING AND SCHEDULE

The following section summarizes the pilot study reporting and presents a schedule for implementing the pilot study.

6.1 Pilot Study Reporting

A Pilot Study Implementation Report will be prepared and submitted to EPA at the conclusion of the Pilot Study. The Pilot Study Implementation Report will include the following:

- A description of activities related to performance monitoring well installation and development, including boring logs and well construction diagrams;
- A summary of the results of the baseline sampling, including data tabulation;
- A summary of the oxidant injection events, including the volume and concentration of oxidant injected, the observed injection rate and pressure, and the results of surfacing and preferential pathways monitoring;
- The results of performance monitoring sampling, including data tabulation and creation of data summary figures;
- A discussion of the performance monitoring results; and
- Recommendations for follow-on work. Follow-on work could potentially include additional ISCO injections, additional monitoring of the pilot study area to assess long-term cVOC concentration trends, or expansion of the MEW groundwater remedy (i.e., groundwater extraction and treatment) to address residual cVOCs in the pilot study area.

6.2 Schedule

A summary of the proposed schedule is as follows:

- 30 November 2013 – EPA approval of work plan.
- December 2013 – EPA development and circulation of a flyer notice to the community of the planned work.
- January to February 2014 – Permitting, installation, development, and baseline sampling of CPT-15 Area performance monitoring wells.

- February through April 2014 – First CPT-15 Area injection event and associated performance monitoring.
- April through June 2014 – Second CPT-15 Area injection event and associated performance monitoring.
- July through August 2014 – Third CPT-15 Area injection event and associated performance monitoring. First CPT-21 Area injection event and associated performance monitoring.
- September through October 2014 – Second CPT-21 Area injection event and associated performance monitoring.
- October through December 2014 – Third CPT-21 Area injection event (if implemented based on performance monitoring data) and associated performance monitoring.
- January and February 2015 – Prepare and submit Pilot Study Implementation Report.

The schedule may be adjusted as needed following EPA review and approval of the work plan, delays in obtaining required access or permits, or due to conditions encountered during field implementation. EPA will be notified if there is a need to adjust the pilot study implementation schedule.

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TABLES

Table 1
CPT-15 and CPT-21 Area cVOC Analytical Results in Groundwater Organic Compounds in Groundwater
Pilot Study Design and Implementation Work Plan
MEW Regional Program
Mountain View, CA

CPT Identification	GPS Coordiates		Sample Depth (ft bgs)[1]	Sample Date	PCE[2]	TCE[3]	cis-DCE[4]	trans-1,2-DCE	1,1-DCE	Vinyl Chloride	1,1,1-TCA[5]	1,1,2-TCA	1,1-DCA[6]	1,2-DCA	Benzene	Toluene	Ethylbenzene	Xylenes, Total	1,2-DCB[7]	1,4-DCB	Freon 113	Other VOCs[8]
	Easting	Northing																				
CPT-01	1547828.024	332633.3149	24-29	11/26/2012	ND	ND	ND	ND	ND	ND	ND	ND	**5.6**	ND	ND	ND	ND	ND	ND	ND	ND	ND
			36-41	11/26/2012	ND	**51**	**1.6**	ND	**1.8**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			42-47	11/26/2012	ND	**40**	**1.4**	ND	**1.6**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-02	1547624.379	332696.1835	21-26	11/26/2012	ND	**7.3**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			37-42	11/26/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-03	1547374.249	332774.8573	17-22	11/27/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			35.5-40.5	11/27/2012	ND	**8.6**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-04	1547155.768	332846.9014	19-24	11/27/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			33-38	11/27/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-05	1547801.971	333088.8454	12-17	11/28/2012	ND	**20**	**1.5**	ND	**0.63**	ND	ND	ND	**0.85**	ND	ND	ND	ND	ND	ND	ND	ND	ND
			26-30	11/28/2012	ND	**980**	**230**	**82**	**7.8**	**1.2**	ND	ND	**6.1**	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-05a	1547801.971	333088.8454	65-69	12/13/2012	ND	**300**	**7.0**	ND	**2.2**	ND	**1.6**	ND	**0.81**	ND	ND	ND	ND	ND	ND	ND	**4.8**	ND
CPT-06	1547449.519	333207.1519	17-21	11/28/2012	ND	**47**	**0.62**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			31-35	11/28/2012	ND	**8.8**	**0.70**	ND	**1.4**	ND	**0.65**	ND	**0.57**	ND	ND	ND	ND	ND	ND	ND	**1.5**	ND
CPT-07	1547692.296	333122.7034	18-22	11/28/2012	**0.92**	**9,600**	**38**	**2.2**	**2.0**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			26-30	11/29/2012	ND	**7,600**	**100**	**7.8**	**1.4**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			56-60	11/29/2012	ND	**15,000**	**40**	**1.3**	**3.3**	**0.51**	**0.97**	ND	**0.80**	ND	ND	ND	ND	ND	ND	ND	**3.3**	ND
CPT-08	1547357.26	333235.7126	21-25	11/29/2012	ND	**3.0**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			33-37	11/29/2012	ND	**17**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.67**	ND
			64-68	11/29/2012	ND	**7.8**	ND	ND	ND	ND	ND	ND	ND	ND	**0.93**	**0.71**	ND	ND	ND	ND	**0.76**	ND
CPT-09	1547119.043	333301.4577	18-22	11/30/2012	ND	**240**	**1.4**	ND	**0.87**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			44-48	11/30/2012	ND	**2.8**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			70-74	12/11/2012	ND	**0.72**	ND	ND	**2.2**	ND	**1.3**	ND	ND	ND	ND	ND	ND	ND	ND	ND	**6.6**	ND
CPT-10	1546874.667	333377.7699	18-22	11/30/2012	ND	**7.2**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			43-47	11/30/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			52-56	11/30/2012	ND	**1.7**	ND	ND	**3.5**	ND	**1.3**	ND	ND	ND	ND	ND	ND	ND	ND	ND	**3.1**	ND
CPT-11	1546675.306	333440.1934	15-19	12/10/2012	ND	**47**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			20-24	12/10/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			30-34	12/10/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			47-50	12/10/2012	ND	**19**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			55-58	12/10/2012	ND	**18**	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.53**	ND	ND	ND	ND	ND	ND
			62-64	12/10/2012	ND	**58**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-13	1547519.366	332728.7768	20-24	12/12/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			28-32	12/12/2012	ND	**1.6**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-14	1547708.264	333117.8065	18-22	12/12/2012	ND	**480**	**1.7**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			26-30	12/12/2012	ND	**1,200**	**17**	**3.8**	**0.93**	ND	ND	ND	**0.50**	ND	ND	ND	ND	ND	ND	ND	**0.78**	ND
			48-52	12/12/2012	ND	**180**	**3.2**	ND	**1.2**	ND	**1.1**	ND	**0.83**	ND	ND	ND	ND	ND	**0.92**	ND	**2.3**	ND
			56-60	12/12/2012	ND	**180**	**3.7**	ND	**1.8**	ND	**1.1**	ND	**0.61**	ND	ND	ND	ND	ND	ND	ND	**3.3**	ND
CPT-15	1547675.213	333127.9898	20-23	12/13/2012	**8.6**	**100,000**	**4,100**	**46**	**23**	**6.6**	ND	**0.68**	**2.3**	ND	ND	**2.6**	**2.5**	**1.4**	ND	**1.7**	ND	ND
			32-36	12/13/2012	**2.3**	**130,000**	**4,600**	**61**	**30**	**13**	ND	ND	**8.6**	ND	ND	**2.4**	**1.7**	**8.0**	ND	ND	**0.67**	ND
			56-60	12/13/2012	ND	**5,000**	**130**	**1.3**	**12**	**1.3**	**0.67**	ND	**3.1**	ND	ND	ND	ND	ND	ND	ND	**5.4**	ND
CPT-18	1547632.492	333141.2382	22-26	12/17/2012	ND	**1,500**	**330**	**79**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			40-44	12/17/2012	ND	**360**	**6.2**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			58-62	12/17/2012	ND	**370**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-19	1547296.249	333255.7417	22-25	12/17/2012	ND	**14**	**0.78**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-20	1547207.818	333283.1396	17-21	12/18/2012	ND	**6.2**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-21	1547010.429	333335.1756	19-23	12/18/2012	ND	**4,000**	**200**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-22	1546943.673	333354.6977	18-22	12/18/2012	ND	**4.5**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-28	1547777.868	333733.4976	17-20	12/21/2012	ND	**52**	**21**	**0.91**	**2.9**	**0.60**	**1.1**	ND	**6.0**	ND	ND	ND	ND	ND	ND	ND	**2.6**	ND
			26-30	12/21/2012	ND	**84**	**290**	**2.0**	**3.7**	ND	ND	ND	**1.8**	ND	ND	ND	ND	ND	ND	ND	**1.4**	ND
			53-56	12/21/2012	**0.63**	**1,800**	**35**	**1.4**	**6.9**	ND	ND	ND	**3.6**	ND	ND	ND	ND	ND	ND	ND	**10**	ND
CPT-29	1548266.045	333654.0844	22-25	12/26/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			34-38	12/26/2012	**13**	**390**	**34**	**3.6**	**5.5**	ND	ND	ND	**10**	ND	ND	ND	ND	ND	**3.8**	ND	**0.70**	ND
			50-54	12/26/2012	**2.6**	**1,400**	**67**	**5.2**	**6.2**	ND	**1.4**	ND	**3.6**	ND	ND	ND	ND	ND	**2.9**	ND	**4.2**	ND
CPT-30	1548004.984	333672.3454	16-18	12/26/2012	ND	**38**	**3.2**	**0.60**	**0.84**	ND	ND	ND	**0.63**	ND	ND	ND	ND	ND	ND	ND	**2.3**	ND
			26-28	12/26/2012	ND	**510**	**55**	**40**	**4.2**	**0.58**	ND	ND	**3.3**	ND	ND	ND	ND	ND	ND	ND	ND	ND
			47-50	12/26/2012	ND	ND	ND	ND	ND	**1.5**	ND	ND	**0.71**	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-31	1547737.926	333196.9112	19-21	12/27/2012	ND	**7,300**	**400**	**3.7**	**3.1**	**2.6**	ND	ND	**1.0**	ND	ND	ND	ND	ND	ND	ND	ND	ND
			38-40	12/27/2012	**1.0**	**650**	**24**	**1.4**	**2.7**	ND	**0.70**	ND	**1.4**	ND	ND	ND	ND	ND	ND	ND	**1.5**	ND
			58-62	12/27/2012	ND	**910**	**4.8**	ND	**2.1**	ND	**1.1**	ND	**0.81**	ND	ND	ND	ND	ND	ND	ND	**3.7**	ND
			69-71	12/27/2012	**1.1**	**64,000**	ND	**97**	**110**	**1.2**	**0.87**	**1.1**	**1.5**	ND	ND	ND	ND	ND	ND	ND	**8.0**	ND
CPT-32	1547817.579	333204.8551	14-16	12/27/2012	ND	**39**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			19-21	12/28/2012	ND	**26**	**0.99**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			28-32	12/28/2012	ND	**120**	**3.7**	**0.62**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			73-76	12/28/2012	ND	**1,100**	**14**	**1.9**	**2.1**	ND	**0.93**	ND	**0.76**	ND	ND	ND	ND	ND	ND	ND	**4.5**	ND
CPT-33	1547835.229	333425.7844	12-16	12/28/2012	ND	**31**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			18-20	12/28/2012	ND	**27**	**0.68**	ND	**0.54**	ND	ND	ND	**0.55**	ND	ND	ND	ND	ND	ND	ND	ND	ND
			28-32	12/28/2012	ND	**1,600**	**97**	**8.0**	**1.5**	ND	ND	ND	**0.90**	ND	ND	ND	ND	ND	ND	ND	ND	ND
			55-59	12/28/2012	ND	**300**	**2,400**	**3.9**	**27**	**1.7**	ND	ND	**15**	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-36	1547792.906	333310.3131	17-21	1/3/2013	ND	**80**	**2.6**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-37	1547844.449	333292.7525	14-18	1/3/2013	ND	**22**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CPT-41	1547546.439	333169.7208	20-24	1/4/2013	ND	**640**	**3.8**	ND	**1.9**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SB-1	1546954.513	333249.9263	19-23	2/13/2013	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**15**	ND	ND	ND	ND	ND	ND
SB-3	1547876.318	333065.1884	15-19	2/14/2013	ND/ND	**300/300**	**0.54/0.54**	ND/ND	**0.91/0.91**	ND/ND	**2.3/2.1**	ND/ND	ND/ND	ND/ND	ND/ND	**56/38**	ND/ND	ND/ND	ND/ND	ND/ND	ND/ND	ND/ND
			29-33	2/14/2013	ND	**150**	**21**	**12**	**2.0**	ND	ND	ND	**1.9**	ND	ND	**9.1**	ND	ND	ND	ND	ND	ND
SB-4	1548026.277	333027.9173	14-18	2/15/2013	**1.6**	**77**	**0.69**	ND	**0.69**	ND	**1.2**	ND	**1.1**	ND	ND	**4.7**	ND	ND	ND	ND	ND	ND
			38-42	2/15/2013	**4.3**	**170**	**420**	**5.3**	**3.2**	**0.73**	ND	ND	**8.0**	ND	ND	**1.7**	ND	ND	**2.5**	ND	ND	ND

Geosyntec
consultants

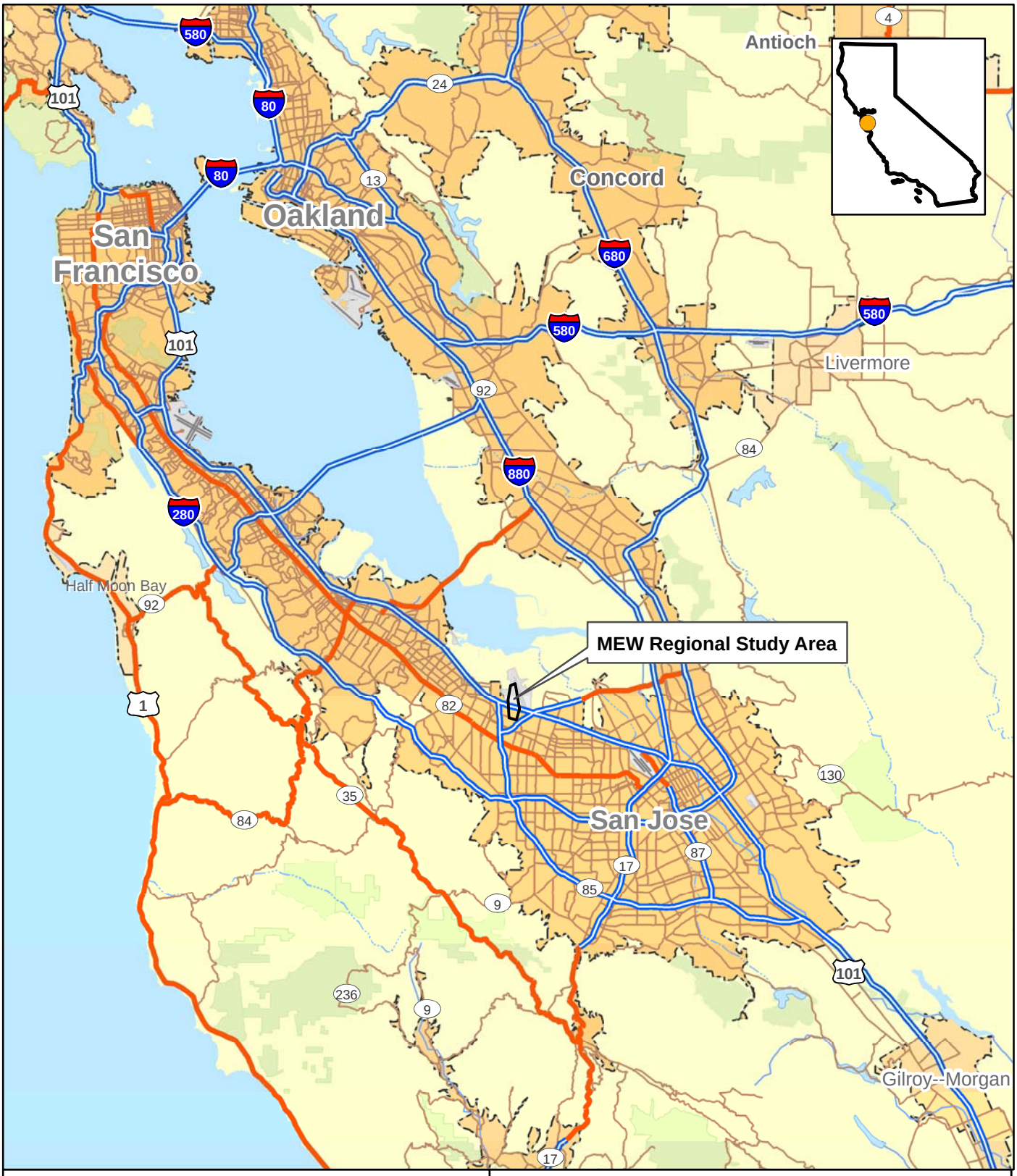
Table 1
CPT-15 and CPT-21 Area cVOC Analytical Results in Groundwater Organic Compounds in Groundwater
Pilot Study Design and Implementation Work Plan
MEW Regional Program
Mountain View, CA

CPT Identification	GPS Coordiates		Sample Depth (ft bgs)[1]	Sample Date	PCE[2]	TCE[3]	cis-DCE[4]	trans-1,2-DCE	1,1-DCE	Vinyl Chloride	1,1,1-TCA[5]	1,1,2-TCA	1,1-DCA[6]	1,2-DCA	Benzene	Toluene	Ethylbenzene	Xylenes, Total	1,2-DCB[7]	1,4-DCB	Freon 113	Other VOCs[8]
	Easting	Northing																				
SB-5	1546986.138	333344.4841	18-22	4/17/2013	ND	**8.1**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SB-6	1547028.499	333331.4401	13-14.5	4/17/2013	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SB-8	1547167.895	333288.314	13.5-14.5	4/17/2013	ND	**6.1**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SB-9	1547685.468	333152.2279	20-23	4/18/2013	ND	**31,000**	**5,100**	**35**	**23**	**26**	ND	ND	**12**	ND	ND	ND	ND	ND	ND	ND	ND	ND
			40-43	4/18/2013	ND	**220**	**270**	**96**	**2.2**	ND	ND	ND	**1.5**	ND	ND	ND	ND	ND	ND	ND	ND	ND
SB-10	1547691.685	333173.7145	20.5-23	4/18/2013	ND	**730**	**620**	**4.8**	**4.1**	**5.5**	ND	ND	**9.7**	ND	ND	ND	ND	ND	ND	ND	ND	ND
			35.5-38.5	4/18/2013	ND	**1,400**	**1,100**	**42**	**53**	**7.8**	ND	ND	**44**	ND	ND	ND	ND	ND	ND	ND	**0.89**	ND

Notes
1. All samples analyzed by EPA Method 8260E
2 All units in micrograms per liter (µg/L)

Abbreviations
1. ft bgs = feet below ground surface
2. PCE = tetrachloroethene
3. TCE = trichloroethene
4. DCE = dichloroethene
5. TCA = trichloroethane
6. DCA = dichloroethane
7. DCB = dichlorobenzene
8. VOCs = volatile organic compounds
9. ND = not detected
10. / = sample result/duplicate sample result

FIGURES



N

0 15 Miles

Site Location Map

MEW Regional Groundwater Remediation Program
Mountain View, California

Geosyntec consultants

Figure **1**

Oakland | November 2013

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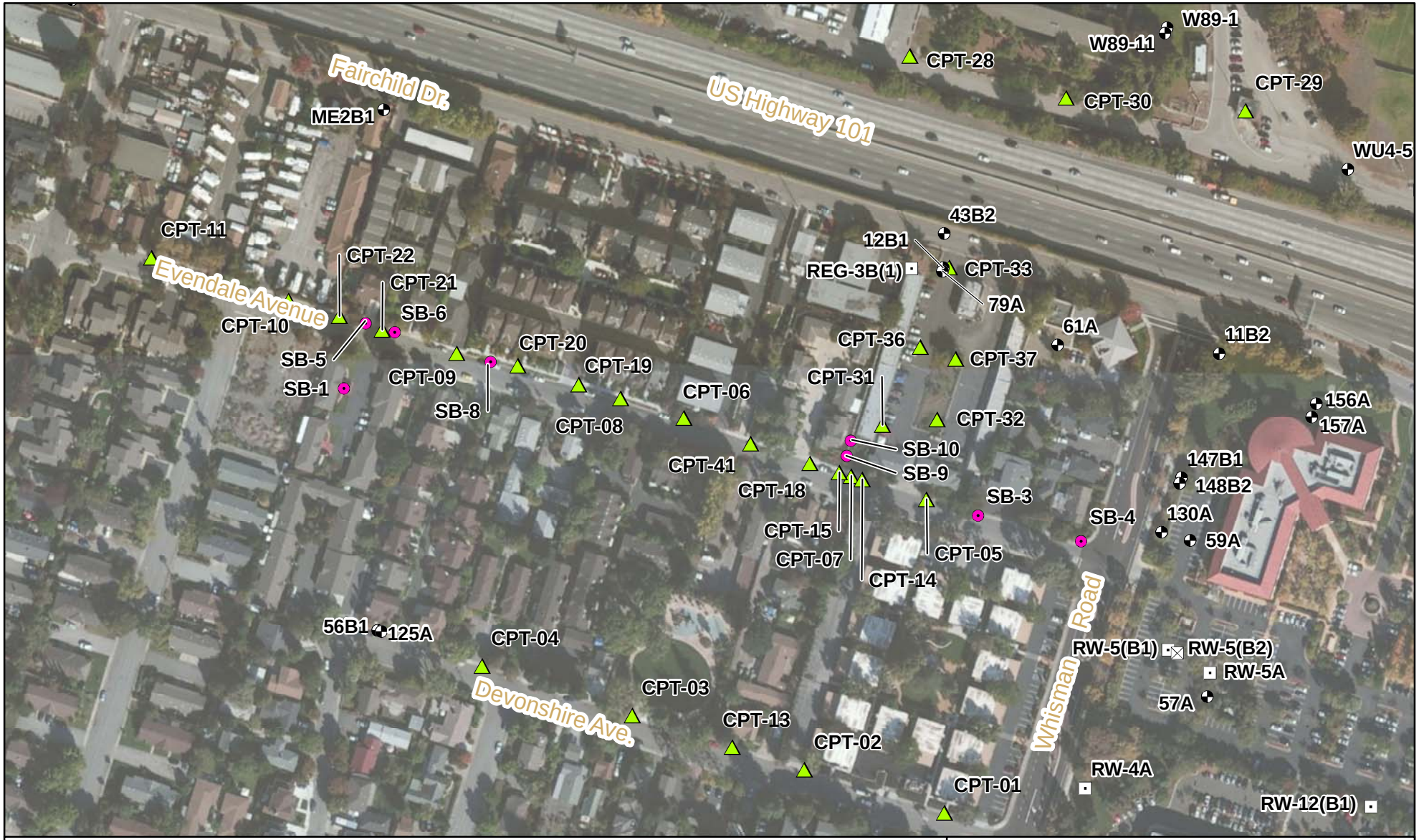

Legend

- Recovery Well On
- Recovery Well Off
- Monitoring Well
- CPT and Grab-Groundwater Location (Geosyntec, 2013)
- Soil Boring and Grab-Groundwater Location (Geosyntec, 2013)

Aerial Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

N

0 400 Feet

Site Investigation Map

MEW Regional Groundwater Remediation Program
Mountain View, California

Geosyntec consultants

Oakland | November 2013

Figure 2

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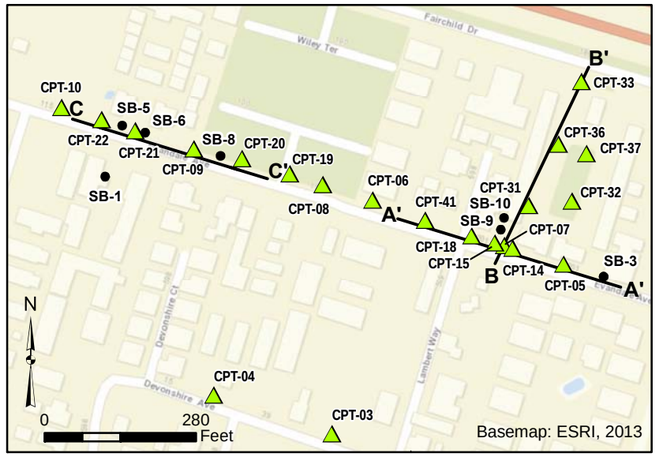

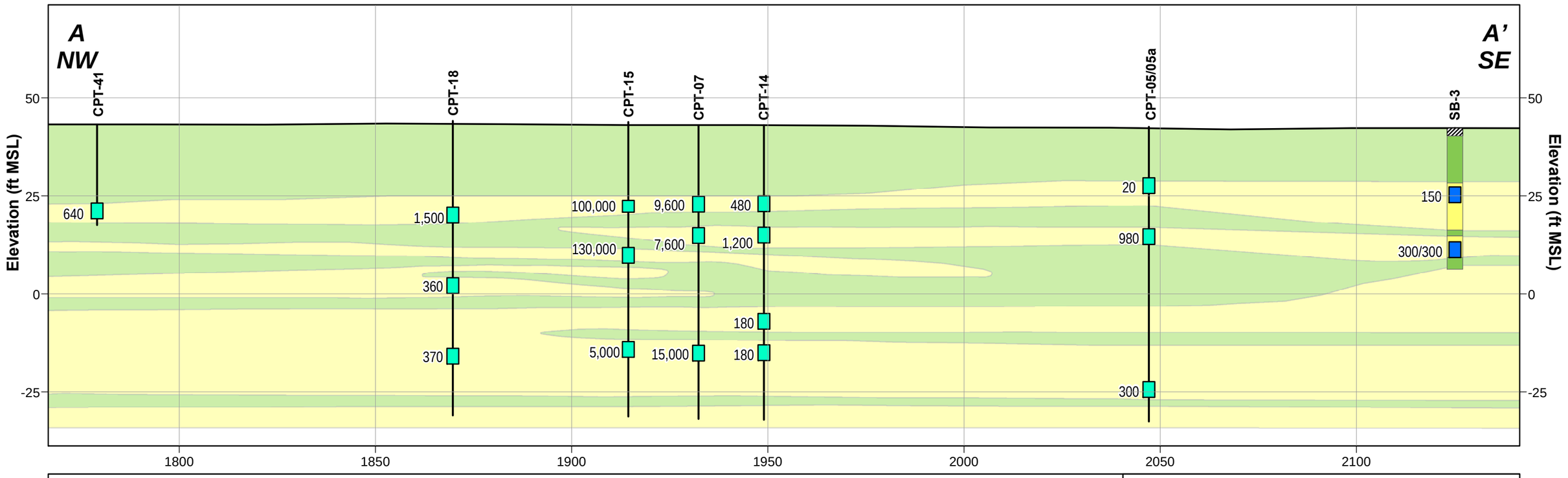

Legend

Lithology Interpretation

- Primarily Coarse-Grained (silty sands, sands, gravels)
- Primarily Fine-Grained (clays, silts)

SB-3 — Soil Boring

Soil Boring Lithology

- Coarse
- Fine
- No Recovery
- Grab Groundwater Sample (Geosyntec, 2013)

150 — TCE Concentration (ug/L)

CPT-41 — CPT or Soil Boring

640 — Grab Groundwater Sample (Geosyntec, 2013)

TCE Concentration (ug/L)

Notes:
Locations are approximate.
Interpretation of lithology based on CPT and soil boring data.
CPT = cone penetration test
TCE = trichloroethene
ug/L = micrograms per liter
ft = feet
ft MSL = feet above mean sea level

25 Feet
0
0 Feet 25

CPT-15 Area
Cross-Section A-A'
MEW Regional Groundwater Remediation Program
Mountain View, California

Geosyntec consultants

Oakland | November 2013

Figure 3

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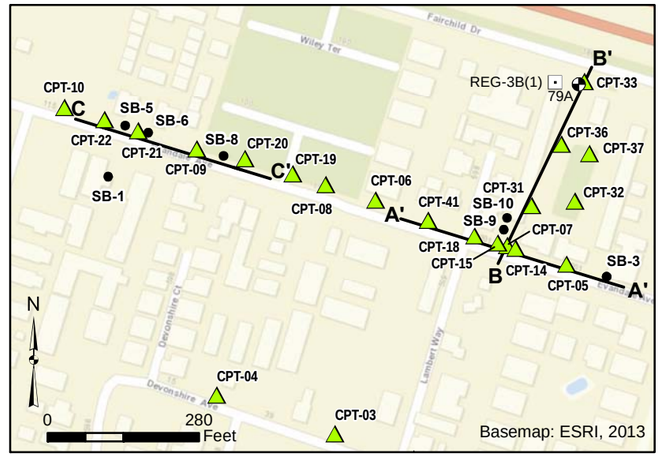

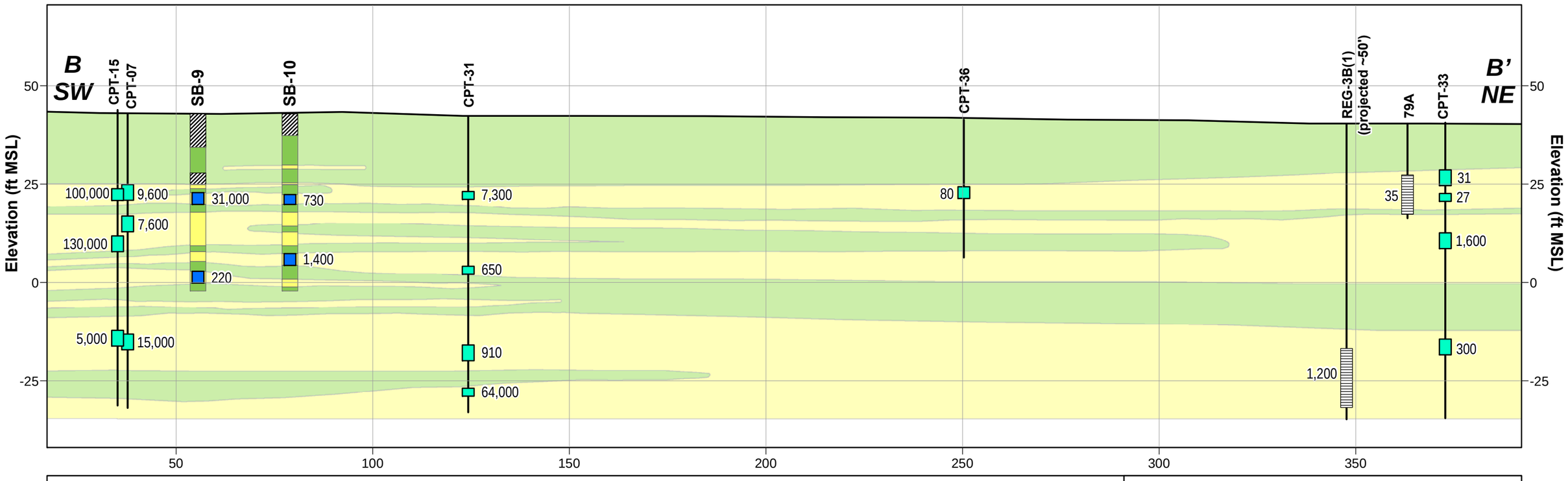

Legend

Lithology Interpretation

- Primarily Coarse-Grained (silty sands, sands, gravels)
- Primarily Fine-Grained (clays, silts)

SB-9 — Soil Boring

Soil Boring Lithology

- Coarse
- Fine
- No Recovery
- Grab Groundwater Sample (Geosyntec, 2013)

220 — TCE Concentration (ug/L)

CPT-31 — CPT

910 — Grab Groundwater Sample (Geosyntec, 2013)

TCE Concentration (ug/L)

REG-3B(1) — Well Boring

Well Screen

1,200 — 2012 TCE Concentration (ug/L)

Notes:
Locations are approximate.
Interpretation of lithology based on CPT and soil boring data.
CPT = cone penetration test
TCE = trichloroethene
ug/L = micrograms per liter
ft = feet
ft MSL = feet above mean sea level

25 Feet
0
Feet
0
25

CPT-15 Area
Cross-Section B-B'

MEW Regional Groundwater Remediation Program
Mountain View, California

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Figure **4**

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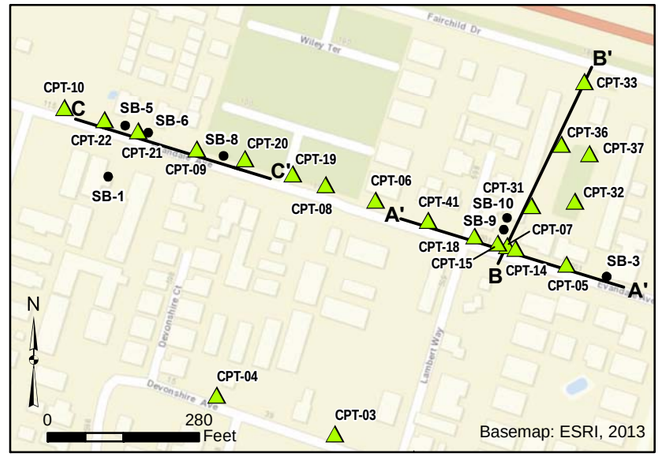

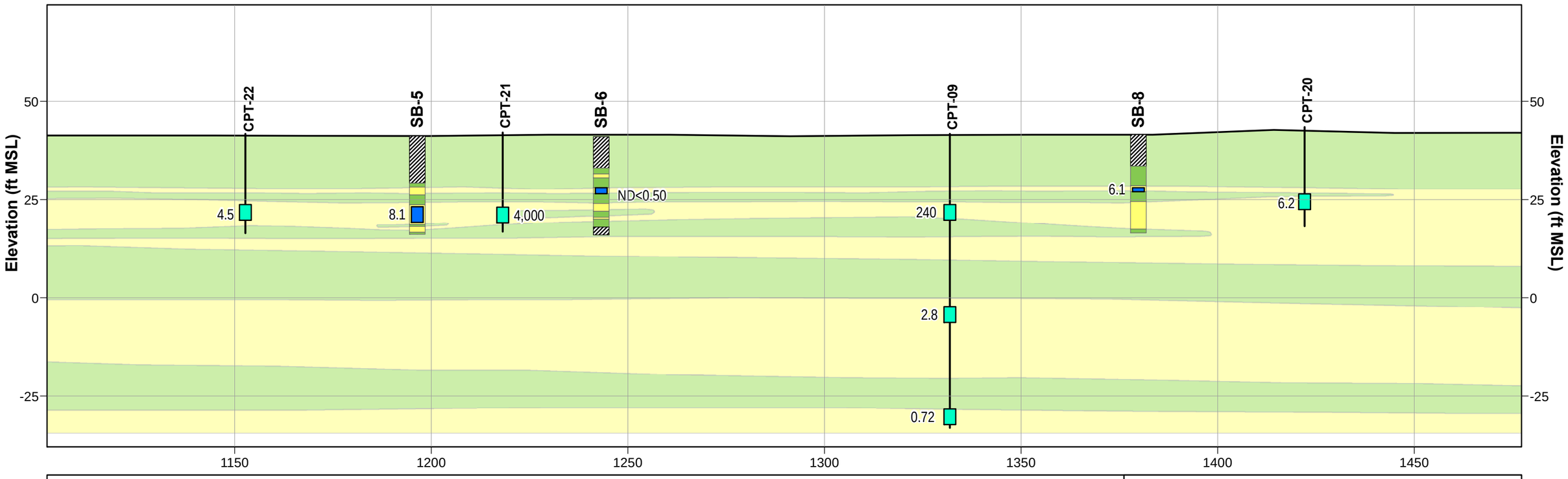

Legend

Lithology Interpretation

- Primarily Coarse-Grained (silty sands, sands, gravels)
- Primarily Fine-Grained (Clays, Silts)

SB-5 — Soil Boring

Soil Boring Lithology

- Coarse
- Fine
- No Recovery

8.1 — Grab Groundwater Sample (Geosyntec, 2013)

TCE Concentration (ug/L)

CPT-22 — CPT

4.5 — Grab Groundwater Sample (Geosyntec, 2013)

TCE Concentration (ug/L)

Notes:
Locations are approximate.
Interpretation of lithology based on CPT and soil boring data.
CPT = cone penetration test
TCE = trichloroethene
ug/L = micrograms per liter
ft = feet
ft MSL = feet above mean sea level

25 Feet 0 — 0 Feet 25

CPT-21 Area
Cross-Section C-C'
MEW Regional Groundwater Remediation Program
Mountain View, California

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Figure **5**

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Abbreveations:
ft: Feet
ft bgs: Feet Below Ground Surface
Aerial Source: USGS High Resolution Orthoimagery, April 2011

Legend

- Abandoned Sanitary Sewer
- Overhead Power Lines
- Underground Gas Line
- Sanitary Sewer Line
- Storm Sewer Line
- Unidentified Underground Line
- Water Distribution Line
- Groundwater Elevation: 1 ft Contour
- Design Extent of Injections
- 228/236 Property Limit

Note: Locations are approximate.

- Proposed temporary monitoring well group screened from 15-25 ft bgs, 25 - 35 ft bgs and 65-75 ft bgs
- Proposed temporary monitoring well group screened from 15-25 ft bgs and 25-35 ft bgs
- Proposed injection point (approximate location)
- Proposed temporary piezometer to monitor injection mounding
- CPT Location (Geosyntec, 2013)
- Soil Borings (Geosyntec, 2013)
- Proposed injection test location (shown in inset)
- Preferential Pathway Monitoring Location

25 12.5 0 25 Fee

N

CPT-15 Area
Injection Locations and Monitoring Well Network
Plan View

MEW Regional Groundwater Remediation Program
Mountain View, California

Geosyntec consultants

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Figure **6**

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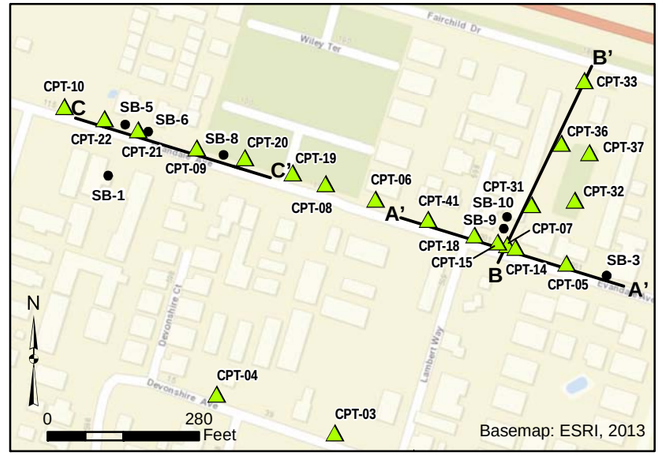

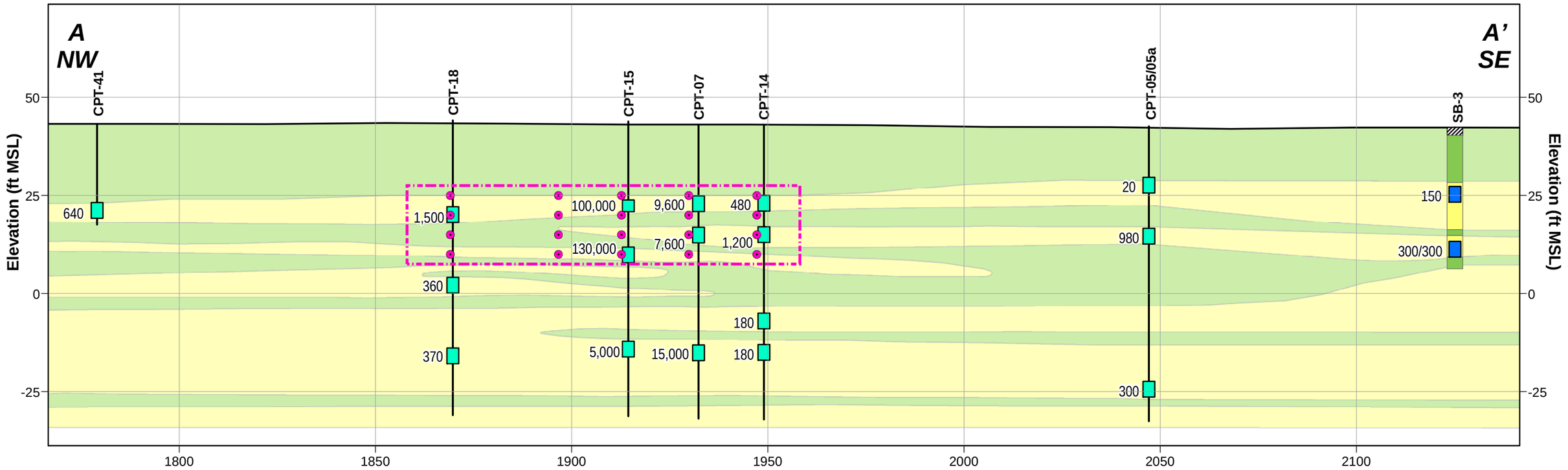

Legend

- Proposed Injection Point
- Design Extent of Injections

Lithology Interpretation

- Primarily Coarse-Grained (silty sands, sands, gravels)
- Primarily Fine-Grained (clays, silts)

SB-3 — Soil Boring

Soil Boring Lithology

- Coarse
- Fine
- No Recovery
- Grab Groundwater Sample (Geosyntec, 2013)

150 — TCE Concentration (ug/L)

CPT-41 — CPT or Soil Boring

640 — Grab Groundwater Sample (Geosyntec, 2013)

TCE Concentration (ug/L)

Notes:
Locations are approximate.
Interpretation of lithology based on CPT and soil boring data.
CPT = cone penetration test
TCE = trichloroethene
ug/L = micrograms per liter
ft = feet
ft MSL = feet above mean sea level

25 Feet
0 Feet 25

CPT-15 Area Injection Locations
A-A' Cross Section

MEW Regional Groundwater Remediation Program
Mountain View, California

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Oakland | November 2013

Figure 7

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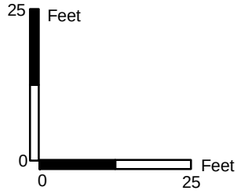

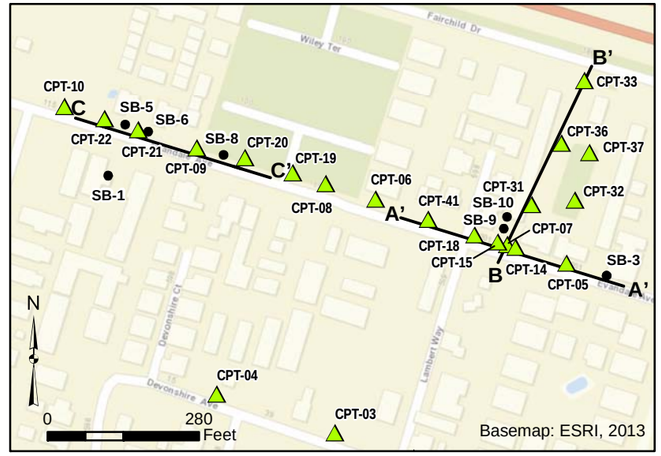

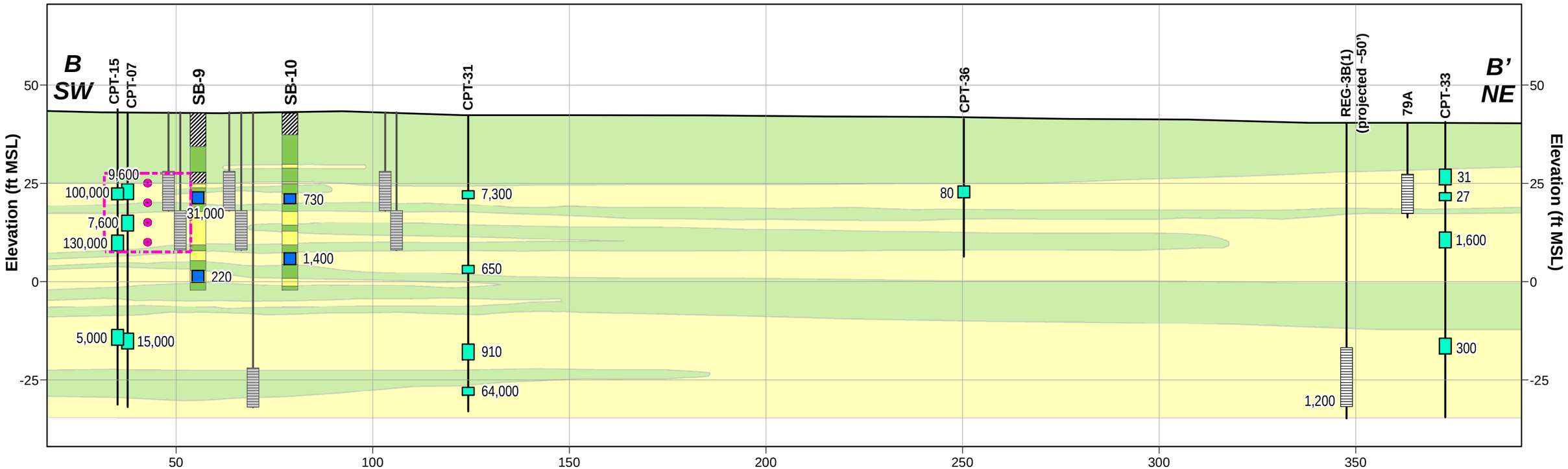

Legend

- Proposed Injection Point
- Design Extent of Injections
- Proposed Well Boring
- Proposed Temporary Monitoring Well Screen Interval

Lithology Interpretation

- Primarily Coarse-Grained (silty sands, sands, gravels)
- Primarily Fine-Grained (clays, silts)

SB-9 — Soil Boring

Soil Boring Lithology

- Coarse
- Fine
- No Recovery

220 — Grab Groundwater Sample (Geosyntec, 2013)

TCE Concentration (ug/L)

CPT-31 — CPT

910 — Grab Groundwater Sample (Geosyntec, 2013)

TCE Concentration (ug/L)

REG-3B(1) — Well Boring

1,200 — Well Screen

2012 TCE Concentration (ug/L)

Notes:
Locations are approximate.
Interpretation of lithology based on CPT and soil boring data.
Locations are approximate.
CPT = cone penetration test
TCE = trichloroethene
ug/L = micrograms per liter
ft = feet
ft MSL = feet above mean sea level

CPT-15 Area Injection Locations and Monitoring Network
B-B' Cross Section

MEW Regional Groundwater Remediation Program
Mountain View, California

Geosyntec consultants

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Figure 8

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Legend

- Proposed Injection Point (Approximate Location)
- Groundwater Elevation: 1 ft Contour
- Proposed Monitoring Well Locations (Geosyntec, 2013a)
- Design Extent of Injections
- Proposed Temporary Piezometer to Monitor Injection Mounding
- CPT Location (Geosyntec, 2013)
- Potential Grab - Groundwater Sample Location - Pilot Study Performance Monitoring
- Preferential Pathway Monitoring Location

50 25 0 50 Feet

Notes:
TCE = Trichloroethene
ug/L = micrograms per liter

CPT-21 Area
Injection Locations and Monitoring Network

MEW Regional Groundwater Remediation Program
Mountain View, California

Geosyntec consultants

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Figure **9**

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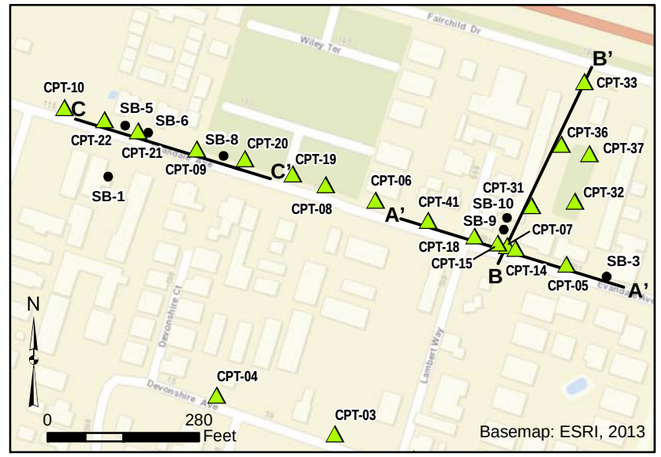

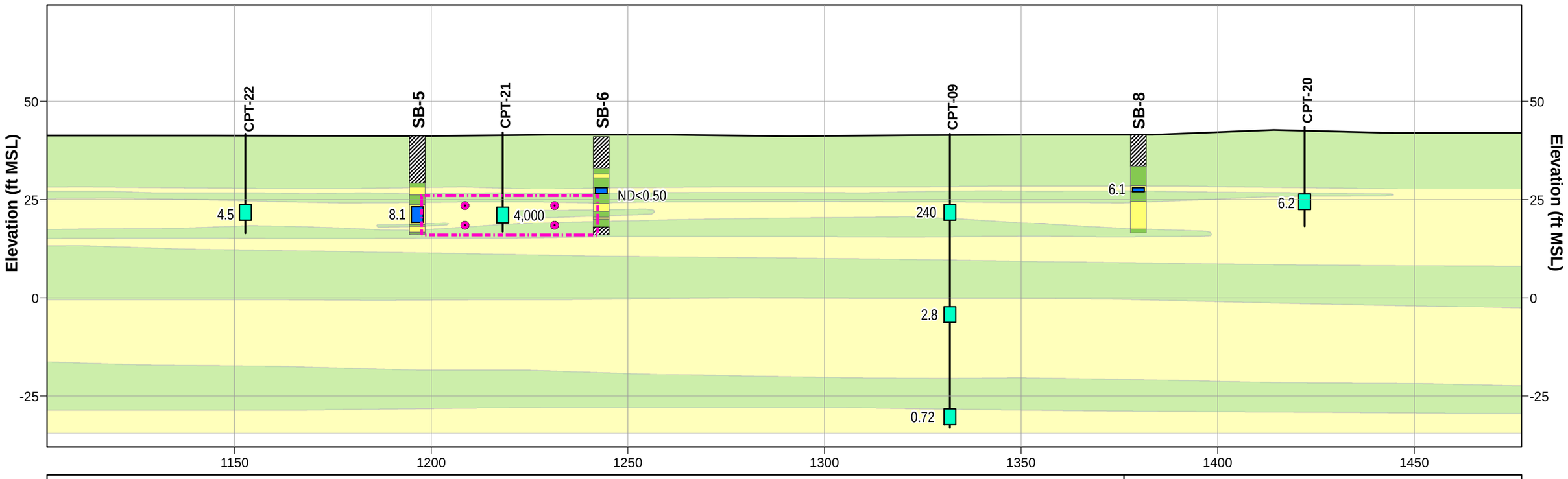

Legend

- Proposed Injection Point
- Design Extent of Injections

Lithology Interpretation

- Primarily Coarse-Grained (silty sands, sands, gravels)
- Primarily Fine-Grained (Clays, Silts)

SB-5 — Soil Boring

Soil Boring Lithology

- Coarse
- Fine
- No Recovery
- Grab Groundwater Sample (Geosyntec, 2013)

8.1 — TCE Concentration (ug/L)

CPT-22 — CPT

- Grab Groundwater Sample (Geosyntec, 2013)

4.5 — TCE Concentration (ug/L)

Notes:
Locations are approximate.
Interpretation of lithology based on CPT and soil boring data.
CPT = cone penetration test
TCE = trichloroethene
ug/L = micrograms per liter
ft = feet
ft MSL = feet above mean sea level

25 Feet
0
0 Feet 25

CPT-21 Area Section Locations
C-C' Cross Section

MEW Regional Groundwater Remediation Program
Mountain View, California

Geosyntec consultants

Oakland | November 2013

Figure **10**

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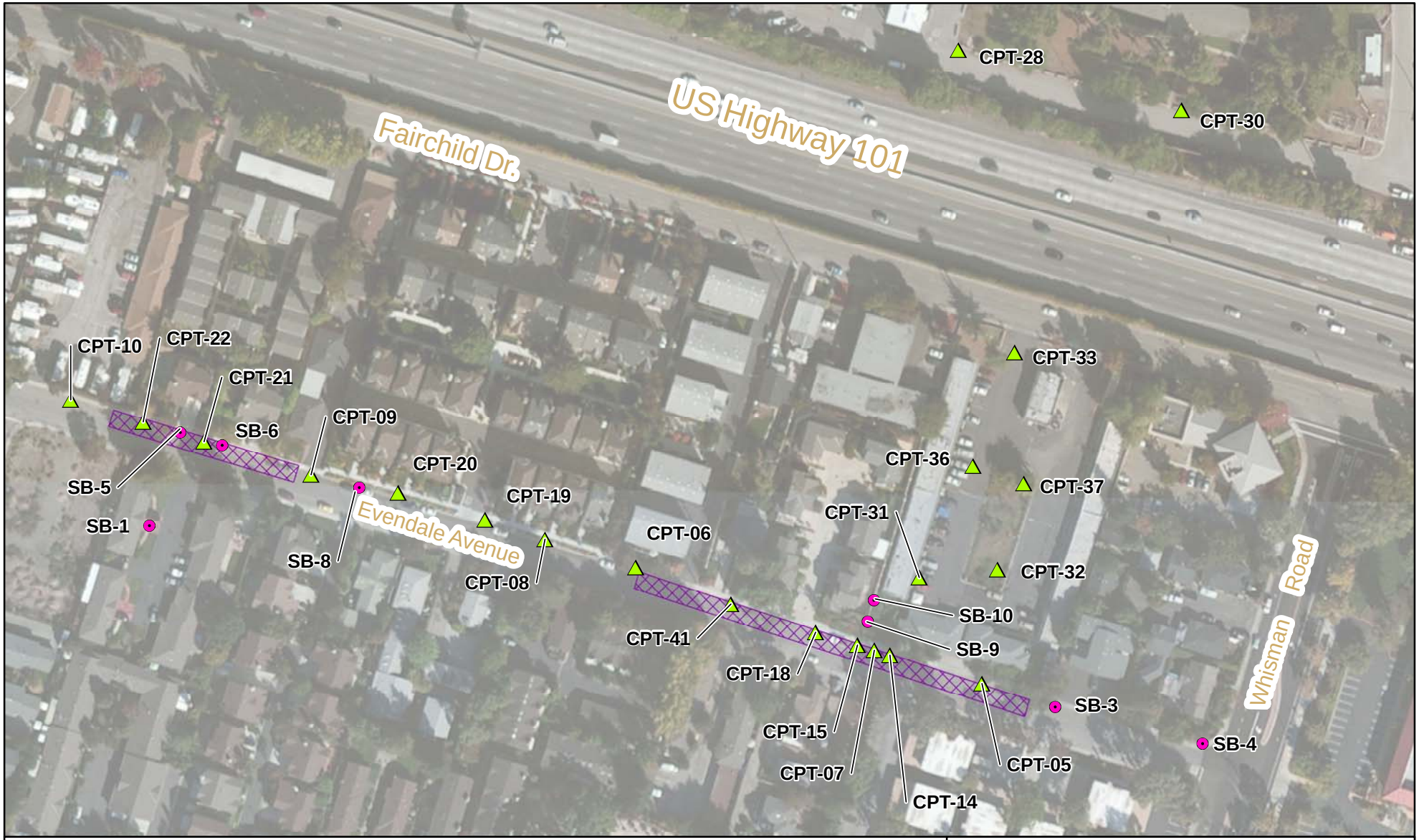

Legend

- CPT and Grab-Groundwater Location (Geosyntec, 2013)
- Soil Boring and Grab-Groundwater Location (Geosyntec, 2013)
- Area of Restrcited Access during Injection Events
  See Figure 12 for traffic control details

N

0 280 Feet

Aerial Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Areas of Restricted Traffic During Investigation Events

MEW Regional Groundwater Remediation Program
Mountain View, California

Geosyntec consultants

Oakland | November 2013

Figure 11

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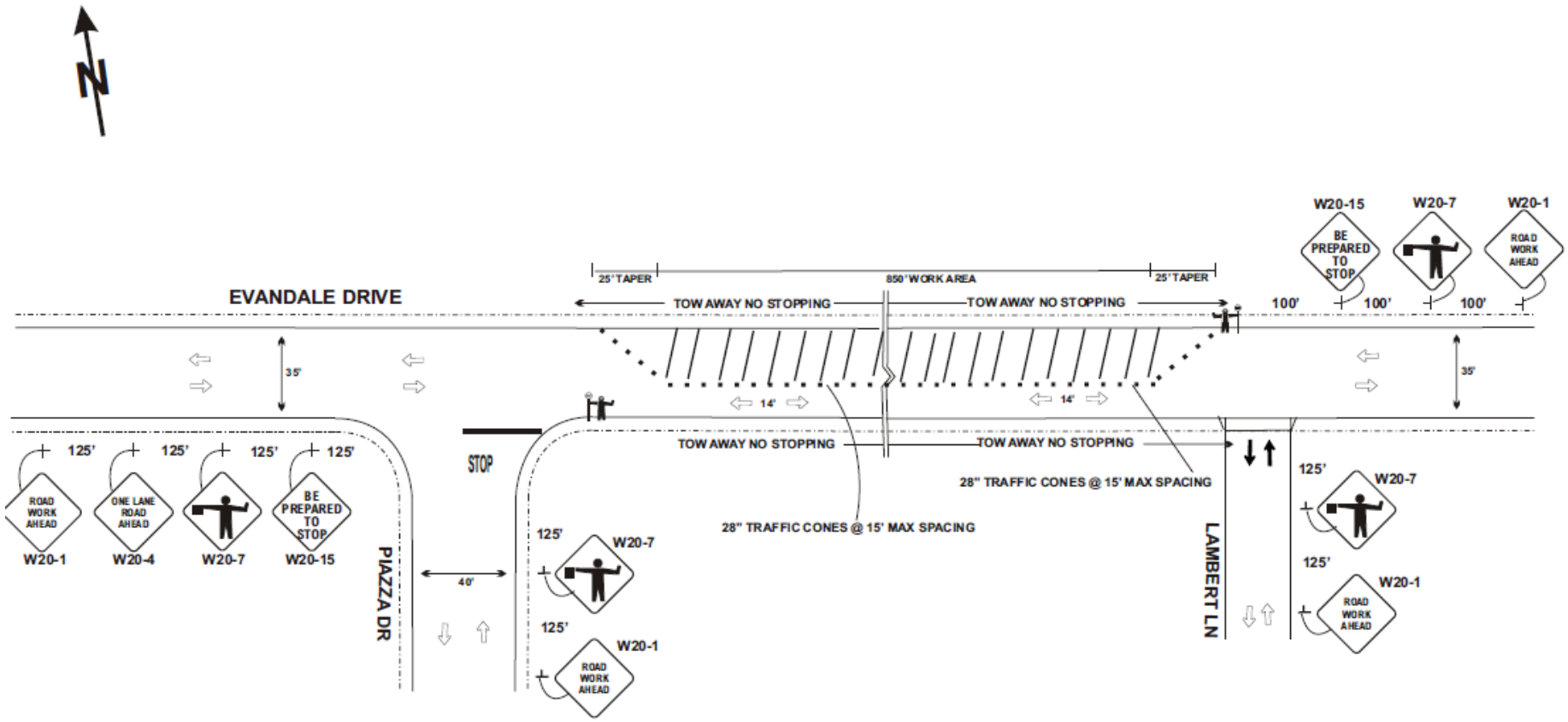

NOTE: MAINTAIN ACCESS TO ALL DRIVEWAYS AT ALL TIMES

Note: Example traffic control plan, closure of north side of Evandale Avenue.

Traffic Control Plan

MEW Regional Groundwater Remediation Program
Mountain View, California

Geosyntec consultants

Oakland | November 2013

Figure **12**

internal info: path, date revised, author

APPENDIX A

Response to EPA Comments on Draft Pilot Study Design and Implementation Work Plan

Response to Comments
Review of Draft Pilot Study Design and Implementation Work Plan
Evandale Avenue Sources
Mountain View, CA

Comment No.	Page No.	Section/Figure/ Table/Appendix	Line No.	Commentator	Comment	Response
GENERAL COMMENTS						
1-1	7	Section 4.1	First paragraph	Penny Reddy (USEPA)	EPA agrees that potassium permanganate is an effective oxidant for in situ chemical oxidation applications and that there are ways to minimize dust generation while preparing the formulations on-site. However, since this is a residential area, EPA requests that the Regional Program consider the use of sodium permanganate to eliminate the potential for dust generation. Handling of both permanganates is discussed further in EPA ORD's comments.	Agreed. The text has been revised to reflect that sodium permanganate will be used.
1-2	14	Section 4.5.2	Figure 6	Penny Reddy (USEPA)	Please assess if the performance monitoring cluster at 20 feet can be moved closer to the CPT-15 Area. As indicated in the comments from the Office of Research and Development, the radius of influence for the pilot test injection is estimated to be approximately 11 feet. It may be important to have a point close enough to evaluate the situation if the permanganate is consumed more quickly. EPA recognizes that above ground power line and utilities in the area may prevent the installation of the performance wells closer to the injection area.	Agreed, however moving the performance monitoring well cluster closer to the CPT-15 injection area is inconsistent with safe off-set distances from known overhead and underground utilities. The monitoring well cluster will be located as close as possible to the injection area based on utility locations and safe work procedures. Please see response to comment number **2-3-3** regarding the expected radius of influence.
1-3	13	Section 4.5.2	Figure 6	Penny Reddy (USEPA)	Please consider a performance monitoring well to the northeast of the injection points located near CPT 18 to evaluate distribution and consumption of the oxidant downgradient of CPT 18.	The direction of the groundwater gradient in the CPT-15 Area is expected to be to the northeast. As a result, the proposed temporary performance monitoring well network is downgradient of the injection points located near CPT-18. However,

Comment No.	Page No.	Section/Figure/ Table/Appendix	Line No.	Commentator	Comment	Response
						RGRP will re-assess the need for an additional temporary performance monitoring well to the northeast after installation and gauging of the proposed well network.
1-4	14	Section 4.5.2	Figure 9	Penny Reddy (USEPA)	A performance monitoring well is needed downgradient of the CPT-21 Area closer to the injection area. Pending the outcome of the CPT-15 Area pilot test, EPA will work with the Regional Program to assess whether there is suitable location closer to and downgradient of the injection area, where property access can be obtained.	Agreed, results of the CPT-15 Area pilot test will be used by RGRP and EPA to further assess the adequacy of the CPT-21 Area performance monitoring plan. If a conclusion of the pilot study is that longer term monitoring is appropriate at the CPT-21 Area to verify effectiveness of the pilot study post-implementation, the RGRP would work with EPA to identify a suitable location for a monitoring well. Please note that a temporary piezometer will be installed within both the CPT-15 and CPT-21 Areas during each injection event. Prior to injections, these piezometers will be monitored for groundwater elevation, permanganate, and cVOCs. Grab groundwater samples will be collected from the temporary piezometer in the CPT-21 Area one month after each injection event is completed and prior to injecting additional permanganate.
1-5	22	Section 5.4.1	Fourth paragraph	Penny Reddy (USEPA)	Please indicate in the text the size of permanganate tank and where it will be staged	The text has been revised to indicate that the sodium permanganate will be stored in 275 gallon intermediate bulk containers (IBC) and located on the injection subcontractor's support truck. During injections, the truck will be parked within the traffic control area shown on Figure 11.

Response to Comments
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Evandale Avenue Sources
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Comment No.	Page No.	Section/Figure/ Table/Appendix	Line No.	Commentator	Comment	Response
						The truck will demobilize from the injection area at the end of each day and will not be parked onsite overnight.
1-6	24	Section 5.4.3	Third paragraph	Penny Reddy (USEPA)	Please include a figure in the work plan that shows the locations of manholes, storm sewer locations and other locations that will be monitored during the pilot test. The Regional Program and EPA will work with the City of Mountain View Department of Public Works to review the figure.	Agreed, Figures 6 (CPT-15) and 9 (CPT-21) have been updated to show the locations of storm sewer manholes and catch basins that will be monitored during the pilot study.
1-7	24	Section 5.4.4	Second Paragraph	Penny Reddy (USEPA)	Although measures will be undertaken to prevent migration of oxidant along potential preferential pathways such as the bedding of sanitary sewer line, in the event that this occurs or there is surfacing of the oxidant on the street, additional contacts may need to be notified than are currently specified in the work plan. EPA will work with the Regional Program and City of Mountain View to develop the appropriate contact list for notification and then what actions, if any are necessary. This information should be included in the work plan and the site-specific health and safety plan.	Agreed, this information will be provided in the health and safety plan. The RGRP will work with EPA and the City of Mountain View to identify and develop incident definitions (based on size and severity) and a list of contacts that will be notified in the event of an incident. The RGRP will work with EPA and the City to coordinate notification and orientation of Certified Unified Program Agencies (CUPA). This language has been added to the Work Plan (Section 5.4.5).
1-8	30	Section 6.2	First paragraph	Penny Reddy (USEPA)	EPA will provide a flyer notice to the community once the work plan is finalized with the schedule of the work. Please allow time in the schedule for preparation of the flyer and distribution.	Agreed, the schedule has been updated to include community notice and preparation.

Response to Comments
Review of Draft Pilot Study Design and Implementation Work Plan
Evandale Avenue Sources
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Comment No.	Page No.	Section/Figure/ Table/Appendix	Line No.	Commentator	Comment	Response
2-1	23	Section 5.4.2	Second Paragraph	Scott G. Huling (USEPA)	It is recommended that all boreholes made during the various investigations be pressure grouted with appropriate cement/bentonite mixture to minimize the potential for future short circuiting and preferential pathways of ground water and injected oxidants.	Each injection boring will be completed with a single drive of the injection tooling. Once each injection boring is complete, the injection tooling will be retracted and the borings will be tremie grouted from total depth to ground surface using a concrete-bentonite grout in accordance with Santa Clara County requirements.
2-2	23	Section 5.4.2	Second Paragraph	Scott G. Huling (USEPA)	The lithology of the site involves multiple layers of coarse and fine grained materials. During injection using the direct push injection tip, it is possible that the encountered injection interval may be fine grained, low permeable materials which may require greater injection pressure for oxidant delivery. Assuming this condition is encountered and is unacceptable, rather than abandoning the location, it is recommended that the injection tip be incrementally advanced to assess whether more permeable materials can be encountered. This could minimize the number of exploratory boring locations and future preferential pathways during full scale deployment.	The work plan methodology is based on injection across the entire depth interval at each location using a 48-inch long injection tool. At each depth interval, the injection volume will be dependent on the encountered permeability. No locations will be abandoned and there will not be a pre-assigned injection volume required at each depth interval. If the planned volume of permanganate cannot be delivered to a vertical injection interval, the excess volume will be re-allocated to either adjacent boreholes or to a deeper injection interval (up to 35 feet bgs). The plan is based on incremental advancement of the tool under all conditions so the recommendation is consistent with the existing plan. The comment makes reference to “future preferential pathways during full scale deployment.” It should be clear from the work plan that the Pilot Study is a “full-scale deployment.” Additional larger-scale deployments at these locations are not anticipated or warranted.

Response to Comments
Review of Draft Pilot Study Design and Implementation Work Plan
Evandale Avenue Sources
Mountain View, CA

Comment No.	Page No.	Section/Figure/ Table/Appendix	Line No.	Commentator	Comment	Response
SPECIFIC COMMENTS						
2-3-1	7	Section 4.1	Third Paragraph	Scott G. Huling (USEPA)	In section 4.1, it was reported that "Other permanganate formulations (e.g., sodium permanganate) are liquid, which makes handling more difficult." Handling of the highly soluble NaMnO4 is generally considered less difficult than the less soluble KMnO4. Specifically, NaMnO4 only requires dilution prior to injection whereas KMnO4(s) requires the transfer of KMnO4(s) to a mixing vessel, mixing, and injection. KMnO4(s) transfer and handling in the neighborhood represents an additional handling step, a potential exposure activity, and a larger footprint that could potentially be avoided. Inadequate mixing can result in the injection of suspended KMnO4(s) in the solution, rather than dissolved KMnO4. This result can lead to various permeability reductions and localized long term MnO4- persistence issues. Given that this ISCO project will be deployed in a heavily commercialized/residential area, it is recommended that the ISCO team re-evaluate the use of KMnO4(s) and re-consider NaMnO4.	Agreed, sodium permanganate will be used rather than off-site pre-mixed potassium permanganate solutions.
2-3-2a	8	Section 4.2	Third Paragraph	Scott G. Huling (USEPA)	A review was conducted of the results presented in the bench scale treatability study (Appendix A). The following information was provided regarding methods and materials.	Agreed, the referenced text was inaccurate and the bench-test report included as Appendix A has been corrected. The updated bench-test report shows that the applied permanganate dose and early time

Comment No.	Page No.	Section/Figure/ Table/Appendix	Line No.	Commentator	Comment	Response
					"Site water was added to the reactors at a volume of 25 mL with 15 mL of deionized water to yield a total of 40 mL … Reactors were amended with 1.0, 2.0 or 6.0 mL of a 300 g/L permanganate stock solution to reach target permanganate concentrations of 5, 10 and 30 g/L respectively. All reactors were sampled for permanganate at time zero and at days 1, 3, 7 and 10." Given this information, it can be concluded that test reactors with 5, 10, and 30 g/L target MnO4- concentrations contained a total volume of 41, 42, and 46 mL and that the calculated initial [MnO4-] should be 7.3, 14.3, and 39.1 g/L. However, the initial measured [MnO4-] reported in the data summary tables occur in the following range of values for the five sets of test reactors (average in parentheses), low 3.98-4.4 g/L (4.2 g/L); medium 7.98-8.42 g/L (8.2 g/L), high 24.2-25.2 g/L (25 g/L). On average, the measured values of the initial [MnO4-] on day 0 were 43%, 43%, and 36% lower than the initial calculated [MnO4-]. Assuming the initial stock solution concentration was used to estimate the oxidant demand, (i.e., using the calculated initial [MnO4-] above), and the measured final 10 day average concentrations reported in Appendix A are used, the average oxidant demand values for the 5, 10, and 30 g/L test reactors is 8.3, 13.4, 32.1 g/kg, respectively. These values are	concentration measurements were consistent. As shown in the updated report, the target permanganate concentrations were 4.7, 9.2 and 25.2 g/L, and the early time concentration measurements were within 10% of the target concentrations. Since the updated early time concentration measurements were consistent with the target concentrations, the early time measurements were therefore used to assess soil oxidant demand.

Comment No.	Page No.	Section/Figure/ Table/Appendix	Line No.	Commentator	Comment	Response
					significantly greater than the values reported in Appendix A. There are two issues associated with these observations, (1) the accurate measure of initial [MnO4-] in the PSOD study, and (2) the design PSOD values used in the pilot study. Accurate Measure Initial [MnO4-]. It is unclear how the 0-day test conditions were conducted, i.e., sampled and analyzed for the initial [MnO4-]. Assuming the 1, 2, and 6 mL of stock MnO4- solution (300 g/L) was amended to day 0 test reactors containing soil, and that the solution was subsequently mixed, sampled and analyzed for MnO4-, it is entirely possible and probable that MnO4- reacted with soil material prior to sampling and analysis of the solution. This would lead to an inaccurate (lower) measure of the initial [MnO4-] in solution, and consequently a lower estimate of PSOD. If this is the case, it is recommended that the oxidant demand be based on the calculated initial MnO4- concentrations above. It is also recommended that clarification be provided regarding the testing procedures and the potential impact on PSOD values as discussed above.	
2-3-2a	8	Section 4.2	Third Paragraph	Scott G. Huling (USEPA)	Design PSOD for Pilot Study. First, it was reported that the bench test values for PSOD are generally greater than actual PSOD values and therefore a design range of 0.5-2.0 g MnO4-/kg was assumed (0.7-2.7 g KMnO4/kg soil) (Section 4.3). This	In developing the design PSOD for the pilot study, we note the following: 1) As discussed in the previous comment, inaccuracies in the Appendix A text have been addressed. As shown in the updated

Comment No.	Page No.	Section/Figure/ Table/Appendix	Line No.	Commentator	Comment	Response
					range of PSOD values was a factor of 2.2-3.6 lower than the measured PSOD values determined in this study. Second, the average calculated oxidant demand in the 5 g/L target concentration above (8.3 g/kg) is greater than the measured values (i.e., 2.34-4.28 g/kg reported in Appendix A. Given the calculations presented above, it appears that the oxidant demand values reported in Section 4.2 is an underestimate of the actual oxidant demand of the soil. Third, the actual design of the injection is based on the low end of the range (0.7 g KMnO4/kg soil). Based on these three observations, it is projected that the proposed oxidant loading is on the low end and the injected oxidant will have a limited impact on the chlorinated volatile organic compounds (CVOCs) in the aquifer/ground water. Generally, PSOD values are used as a screening tool to assess the general oxidant demand conditions of the aquifer. This information can be valuable as a first assessment of the relative quantity of oxidant the may be needed to achieve the treatment objectives, however, extrapolation of PSOD values for the purpose of ISCO field scale deployment involves uncertainties and assumptions. Nevertheless, it is recommended that the ISCO team re-assess the oxidant loading used in the pilot study relative to these	report, once the correct initial dosings are applied, the reported oxidant demands of 2.3 to 4.3 g/kg are accurate. 2) The design range of 0.5 to 2.0 g/kg considers only a single injection event. When a single injection event is considered alone, the applied dose is 2-3 times lower than the PSOD bench-test results. The pilot study design is to apply 2-3 increments of permanganate solution to the target areas (i.e., conduct 2-3 injection events) in order to achieve the total target dosing based on bench-test results. 3) The PSOD value measured is considered a conservative, screening-level dosage value. As described in guidance documents such as ASTM Standard D7262, due to mass transport related issues at the field-scale it is reasonable to assume that the PSOD measured at the bench scale may overestimate the demand exerted in the field. As a result, the low end of the measured PSOD range was selected for PSOD dosing design. While the above factors support the PSOD design, we have re-assessed the oxidant loading for the pilot study and the, the dose of permanganate will be increased by

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					issues, and specifically, that higher [NaMnO4] be considered for the pilot study.	approximately 33 percent by increasing the sodium permanganate concentration from 15 to 20 grams/liter in order ensure that the design dosing near the midpoint (rather than low end) of the design range.
2-3-3	12	Sections 4.5 and 4.6	4.5.1 (Second Paragraph), 4.6.1 (Third Paragraph) and 4.6.2 (Third Paragraph	Scott G. Huling (USEPA)	For the CPT-15 area, the following information was provided regarding the KMnO4 injection: target radius of influence (ROI) for the injections is approximately 11 feet; 5-foot vertical intervals from 15 to 35 feet below ground surface (bgs), nominal target volume of KMnO4 injected will be approximately 1,200 gallons per 5-foot interval at each injection location; [KMnO4] = 15g/L; total nominal injection volume will be 24,000 gallons per injection event; corresponding to the injection of 3,000 pounds of KMnO4. Assuming a cylindrical volume, 5' injection interval, porosity = 0.3, 15 g/L KMnO4, an 11' ROI requires 4260 gallons per interval; 17,050 gallons total/location, 85,260 gallons total per event, and 10,650 lbs KMnO4. Further, assuming 1200 gallons were injected, as proposed, a 5.8' ROI would result (assuming lower porosity (0.2), a 7.1' ROI is estimated). Similar calculations using parameters provided in the report apply to the CPT-21 pilot study injection area. Based on these calculations, the proposed volume of oxidant to be injected will not be delivered to the volume of aquifer	The targeted volume per injection depth/location will be increased from 1,200 to 1,500 gallons. The volume of injected solution will be maximized within the available time and operational controls (i.e., maximum injection pressure and water elevations compared to storm sewer elevations). In addition, the sodium permanganate concentration was increased to 20 g/L from 15 g/L. The comment implies that a pore volume displacement radius assuming a uniform flow field is the sole basis for the volume of injected permanganate. The proposed design considered the potential impact of non-uniform flow, within the pilot study area. The stratigraphy within the pilot study area is highly heterogeneous. As a result, the injected volume is not anticipated to be distributed uniformly over each 5-foot injection interval. This expected non-uniform flow was considered when assessing the design range of volumetric displacement of groundwater. Varying effective porosity between 10 and 20% (to account for fractions of the formation that accept less or no flow) and effective injection interval between 3 and 5

Comment No.	Page No.	Section/Figure/ Table/Appendix	Line No.	Commentator	Comment	Response
					targeted in the design. It is recommended that the ISCO team re-assess the volume of oxidant solution being injected relative to the targeted intervals and zones.	feet results in ROI estimates based on volumetric displacement from 7 to 13 feet for 1,200 gallons and from 8 to14 feet for 1,500 gallons. The target ROI of 11 feet was selected to fall within the estimated range of ROI baed on pore volume displacement calculations.
2-3-4	13	Section 4.5.2	Third and Fourth Paragraph	Scott G. Huling (USEPA)	It was reported that temporary monitoring wells consisting of two well clusters will be installed approximately 20 feet downgradient of the injection points to monitor permanganate breakthrough, consumption, and changes in CVOC concentration. Based on the design injection ROI, permanganate is expected to reach the monitoring well transect after one or two injection events. Two additional monitoring well clusters will be installed further downgradient at distances approximately 35 and 60 feet north of the injection points. Given this information and the comments provided above regarding the low estimates of oxidant concentrations and injection volumes, it may be possible that the proposed distances for monitoring locations are located too far way to provide timely feedback on oxidant transport and fate. It is recommended that the ISCO team re-assess the distances of downgradient monitoring locations in both CPT-15 and -21 test areas.	The proposed temporary piezometers will be monitored for both water elevation and permanganate concentration. These piezometers will be sampled for permanganate and cVOC prior to each injection event to provide additional data within both injection areas.

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					Specifically, it is recommended that at least one well is located within the projected ROI of injection locations.	
2-3-5	26	Section 5.5.2	Last Paragraph	Scott G. Huling (USEPA)	It was reported that the observed CVOC concentrations may be low while permanganate is present in the subsurface with a "rebound" in the CVOC concentrations as residual oxidant is depleted and geochemical conditions return to near baseline. Therefore, evaluation of CVOC concentration reduction at the CPT-15 and CPT-21 areas will be based on observed CVOC concentrations once oxidant has been depleted from the system. This information suggests that ground water samples will not be collected and analyzed if MnO4- is present in the sample. There are advantages to this ground water monitoring approach in achieving the monitoring objectives. However, the MnO4- concentration persists for an extended period of time, ground water samples may contain MnO4- beyond the proposed post-oxidation sampling schedule dates (2-4 weeks after injection). Assuming there is a change in ground water sampling approach and it is determined that ground water samples should be collected/analyzed when MnO4- may still be present (i.e., pink, purple, etc.), it is recommended that the samples be preserved to eliminate the impact of MnO4- on sample quality and analytical instruments. Preservation is specified in the	Agreed, the text has been updated to reflect that samples will be analyzed for both permanganate and cVOCs (after requested preservation - see Section 5.5.2, paragraph 5). Ultimately, evaluation of the pilot study performance will not be completed until the injections have been completed, permanganate has been consumed, and subsurface conditions have equilibrated.

Comment No.	Page No.	Section/Figure/ Table/Appendix	Line No.	Commentator	Comment	Response
					work plan. Preservation guidelines and a detailed critical analysis of these issues are discussed in a recently published journal article (Johnson et al., 2012) and EPA Engineering Issue Paper (Ko et al., 2012). Johnson, K.T., Wickham-St. Germain, M., Ko, S. and Huling, S.G. 2012. "Binary Mixtures of Permanganate and Chlorinated Volatile Organic Compounds in Groundwater Samples: Sample Preservation and Analysis." Ground Water Monit. Remed. 32(3), Summer 84–92. Ko, S., Huling, S.G., and Pivetz, B. 2012. Ground Water Sample Preservation at In-Situ Chemical Oxidation Sites – Recommended Guidelines, EPA Ground Water Issue Paper. US Environmental Protection Agency, National Risk Management Research Laboratory, R.S. Kerr Environmental Research Center, Ada, OK. EPA/600/R-12/049.	
3-1	22	Section 5.4		Peter Strauss (PM Strauss & Associates)	Will traffic be restricted and for how long? Identify for each part of the proposal.	Yes, traffic and parking will be restricted along the north side of Evandale Avenue during each injection event (one week each). It is anticipated that three one-week events will occur in the two areas (CPT-15 and CPT-21) between 7:30AM and 4:00PM. Signs will be posted notifying the public of the traffic and parking restrictions a minimum of 72 hours prior to each injection event.

Comment No.	Page No.	Section/Figure/ Table/Appendix	Line No.	Commentator	Comment	Response
						Figure 11 shows the areas where traffic and parking will be restricted near the CPT-15 and CPT-21 areas. Figure 12 presents the generalized traffic control plan that will be implemented during each injection event.
3-2	22	Section 5.4	Fourth Paragraph	Peter Strauss (PM Strauss & Associates)	Is special care taken to control permanganate dust during mixing? For example, will mixing cease during periods of heavy wind?	Liquid sodium permanganate will be used and therefore there will be no permanganate dust generated.
3-3	22	Section 5.4	Fourth Paragraph	Peter Strauss (PM Strauss & Associates)	Confirm that efforts will be made to control odors.	Liquid sodium permanganate will be used and therefore no on-site mixing will occur. With this method, odors are not expected to be observable. However, site personnel will assess the need to control odors during implementation. .
3-4	1	Section 1.1	Second Paragraph	Peter Strauss (PM Strauss & Associates)	It is possible that the hot spots along Evandale Avenue are not due to sources independent of the Regional Plume sources, as is the position of the MEW Companies. EPA was correct not to rule out subsurface migration along preferential pathways such as storm drains or sewers or other complex groundwater pathways. Many different sources combined to make up the regional plume, and all of these may not have been identified in the early stages of investigation, beginning approximately 30 years ago. The high concentration (64,000 µg/L) of TCE measured at CPT-31 (between Evandale and Fairchild, approximately 200 feet north of CPT-15) at about 70 feet bgs	The RGRP acknowledges this comment from PM Strauss & Associates. The proposed pilot study is designed to address elevated VOCs in shallow groundwater (to a depth of 35 feet bgs).

Comment No.	Page No.	Section/Figure/ Table/Appendix	Line No.	Commentator	Comment	Response
					are much deeper than the CPT-15 hot spot. This raises questions about the shape of this plume. Contamination has apparently moved vertically in this area, as well as horizontally. Past conceptual models of the subsurface have indicated that there may be vertical connections between the different aquifers (e.g., A1, A2, B1). The heterogeneity of the subsurface may have led to the formation of the seemingly non-contiguous Evandale Avenue plume. Further investigation, based on consideration of numerous site conceptual models, may resolve this, but given the age of the plume it might be impossible to come up with a definitive conclusion.	

APPENDIX B

Remedy Design Data Collection Report

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B-1. INTRODUCTION

This appendix has been prepared to document supplemental soil and grab-groundwater sampling that was conducted to collect site-specific data used to design the groundwater remedy for the CPT-15 and CPT-21 areas located along Evandale Avenue west of the Middlefield-Ellis-Whisman (MEW) Study Area (Figure A1). The work described in this appendix is consistent with the scope of work proposed in the *Final Work Plan for Remedy Design Data Collection*[1].

B-2. SOIL AND GRAB-GROUNDWATER SAMPLING PROGRAM

Supplemental soil and grab-groundwater sampling was conducted on 17 and 18 April 2013. The supplemental sampling boring locations are presented in Figure B1.

B-2.1. Pre-Field Activities

Prior to beginning work, an Excavation Permit was obtained from the City of Mountain View. Boring permits were not required from the Santa Clara Valley Water District due to the depth of the borings.

The supplemental sampling boring locations were marked with white paint and Underground Service Alert (USA) was notified of the work more than 48 hours prior to the start of field activities. Additionally, a private utility location survey was conducted at the proposed boring locations to identify subsurface utilities or other obstructions. Some boring locations were modified slightly from those proposed in the work plan if the presence of subsurface or overhead utilities prevented safe operation of the direct-push drilling rig.

All field activities were performed in accordance with the site-specific health and safety plan (HASP). A safety tailgate meeting was held each day prior to the start of field activities and all on-site field personnel signed the HASP acknowledging the discussion of potential hazards.

[1] Geosyntec 2013, Final Work Plan for Remedy Design Data Collection, Middlefield-Ellis-Whisman Regional Groundwater Remediation Program, Mountain View, California. 12 April.

B-2.2. Sample Depths and Locations

The following section summarizes the location and soil and grab-groundwater sampling depths of the supplemental sampling borings.

CPT-21 Area

Samples were collected from three supplemental boring locations on Evandale Avenue in the CPT-21 area:

- Two soil samples and one grab-groundwater sample were collected from boring SB-5, located 22 feet west of CPT-21;
- Two soil samples and one grab-groundwater sample were collected from boring SB-6, located 25 feet east of CPT-21; and,
- One grab-groundwater sample was collected from boring SB-8, located 161 feet east of CPT-21, 48 feet east of CPT-9, and 43 feet west of CPT-20.

Soil and grab-groundwater samples were collected in the A/A1 zone between the first encountered groundwater and 25 feet below ground surface (bgs). The sample depth intervals for grab-groundwater samples are included in Table B1.

CPT-15 Area

Samples were collected from two supplemental boring locations in the CPT-15 area as follows:

- Four soil and two grab-groundwater samples were collected from boring SB-9, located 28 feet north of CPT-15 on the 228 Evandale Avenue property; and
- Two grab-groundwater samples were collected from boring SB-10, located 46 feet north of CPT-15 on the 228 Evandale Avenue property (SB-10).

Soil and grab-groundwater samples were collected in the A/A1 and B1/A2 zones in the CPT-15 remedy area[2]. Samples were collected between the first encountered groundwater and 45 feet bgs[3].

[2] The transition from the A/A1 to B1/A2 zone is considered to occur at 25 feet bgs.
[3] Samples have been previously collected on Evandale Avenue to define the extent of the B1/A2 zone plume in this area.

B-2.3. Direct-Push Borings

All supplemental sampling borings were advanced using a direct-push drill rig. At each location, direct-push drill rods were fitted with vinyl acetate sleeve liners and advanced to the target total boring depth for collection of continuous core samples. The soil cores were logged by field staff under the direction of a California Professional Geologist using the Unified Soil Classification System. The soil was field-screened for the presence of volatile organic compounds (VOCs) using a photoionization detector (PID) and the readings recorded on the boring logs. Geologic logs for the direct-push borings are included in Attachment B1.

The boring logs were used to select soil and grab-groundwater sample depth intervals. The proposed depth intervals were transmitted to EPA prior to collection of samples.

B-2.4. Soil Sampling

Soil samples were collected for permanganate soil oxidant demand (PSOD) bench-scale testing to provide information regarding the rate and extent of oxidant consumption by site soil and groundwater when dosed with permanganate.

The soil sample depth intervals were selected based on geologic logging. Samples were collected from borings SB-5, SB-6, and SB-9 at depth intervals that were representative of the more permeable soil types present in the CPT-15 and CPT-21 areas. Soil samples from the less permeable soil types (silt/clay) present in the CPT-15 area were also collected at SB-9.

Soil samples from the selected intervals were collected by transferring soil from the acetate sleeves into laboratory-provided glass jars. The samples were labeled, placed on ice, and shipped under standard chain-of-custody procedures to the bench-scale testing laboratory.

B-2.5. Grab-Groundwater Sampling

Grab-groundwater samples were collected from borings advanced adjacent to each direct-push boring location. At each location, hollow steel direct-push rods equipped with a disposable tip and a section of slotted polyvinyl chloride (PVC) screen was advanced to the sampling depth interval that was selected based on the geologic logs. Once the bottom of the sampling depth was reached, the rods were retracted approximately 1 to 4 feet, exposing the slotted PVC screen while the disposable tip remained stationary. In locations where samples were collected from multiple depth intervals the shallowest sample was collected first. The rods were then decontaminated

using a steam cleaner in accordance with the MEW Quality Assurance Project Plan (QAPP)[4] before being driven to the next sample depth interval in the boring. This process was repeated between every sample collection depth.

Groundwater samples were collected with a peristaltic pump into laboratory-supplied containers. New polyethylene tubing was used for each groundwater sample. The samples were labeled and placed in coolers with ice, and shipped to the analytical laboratory under chain-of-custody procedures. All samples were analyzed for halogenated VOCs (HVOCs) by EPA Method 8260B. In addition five samples were analyzed for1,4-dioxane by EPA Method 8270C, and total dissolved solids by SM 2540C, and four samples were analyzed for chromium VI by EPA Method 7199. As part of quality assurance/quality control protocol (QA/QC), a trip blank was included and analyzed for VOCs.

Following advancement of the direct-push borings and grab-groundwater sampling, the boreholes were grouted to the surface with a cement mix using a tremie pipe in accordance with SCVWD requirements. Boreholes were completed to match the surrounding surface, and roadways were repaired in accordance with City of Mountain View requirements.

A Trimble GeoXH handheld global positioning system (GPS) unit was used to record the locations of the borings.

B-2.6. Quality Assurance/Quality Control (QA/QC)

QA/QC of all laboratory data was conducted. One trip blank was submitted to the laboratory for analysis. No analytes were detected above the laboratory reporting limits. The laboratory followed media preparation procedures and sample analysis. Based on the results of the QA/QC review, the data are of acceptable quality for analytical parameters.

[4] Canonie Environmental Services Corp. 1991. Quality Assurance Project Plan, Middlefield-Ellis-Whisman Site, Mountain View, California.

B-3. RESULTS

Table B1 presents a summary of the grab-groundwater sample results. Laboratory analytical reports are included in Attachment B2.

PSOD and grab-groundwater sampling results are discussed in the main body of the Treatability Study Design and Implementation Work Plan and are not repeated in this appendix.

TABLES

Geosyntec consultants

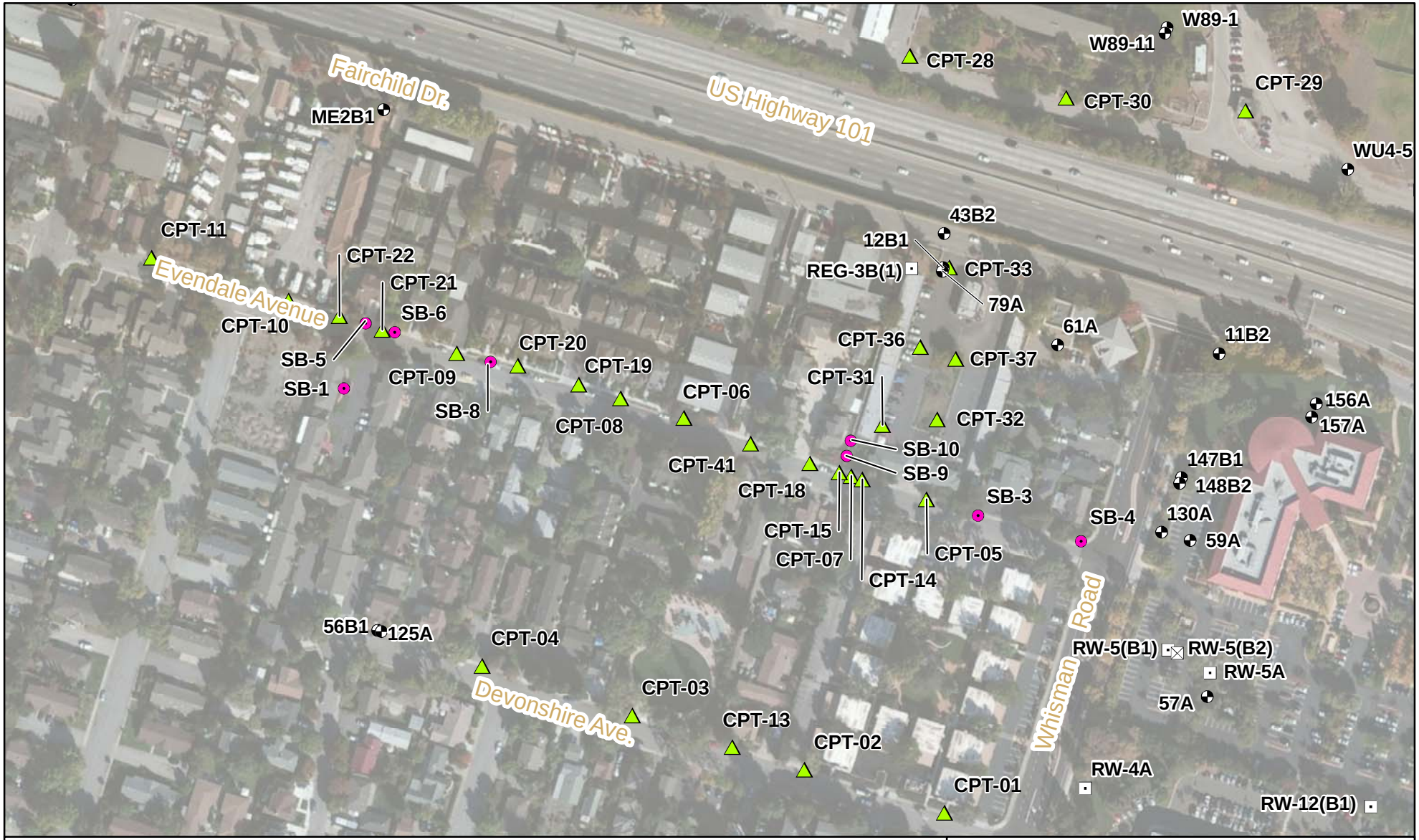
Table B.1
Supplemental Sampling Analytical Results in Groundwater
Grab-Groundwater Assessment and Proposed Well Installations
MEW Regional Program
Mountain View, CA

CPT Identification	GPS Coordinates		Sample Depth (ft bgs)[1]	Sample Date	TCE[2]	cis-DCE[3]	trans-1,2-DCE	1,1-DCE	Vinyl Chloride	1,1-DCA[4]	Freon 113	Other VOCs[5]	1,4-Dioxane	Total Dissolved Solids	Chromium VI	Other VOCs[8]
	Easting	Northing														
SB-5	1546986.138	333344.4841	18-22	4/17/2013	**8.1**	ND	ND	ND	ND	ND	ND	ND	ND	**700**	ND	ND
SB-6	1547028.499	333331.4401	13-14.5	4/17/2013	ND	ND	ND	ND	ND	ND	ND	ND	--	**640**	--	ND
SB-8	1547167.895	333288.314	13.5-14.5	4/17/2013	**6.1**	ND	ND	ND	ND	ND	ND	ND	--	--	--	ND
SB-9	1547685.468	333152.2279	20-23	4/18/2013	**31,000**	**5,100**	**35**	**23**	**26**	**12**	ND	ND	**4.7**	**910**	ND	ND
			40-43	4/18/2013	**220**	**270**	**96**	**2.2**	ND	**1.5**	ND	ND	ND	--	--	ND
SB-10	1547691.685	333173.7145	20.5-23	4/18/2013	**730**	**620**	**4.8**	**4.1**	**5.5**	**9.7**	ND	ND	**6.6**	**810**	ND	ND
			35.5-38.5	4/18/2013	**1,400**	**1,100**	**42**	**53**	**7.8**	**44**	**0.89**	ND	**6.8**	**690**	ND	ND

Notes
1. All VOC samples were analyzed by EPA Method 8260B, 1,4 Dioxane by EPA Method 8270C, total dissolved solids by SM 2540C, and Chromium VI by EPA Method 7199.
2 All units in micrograms per liter (µg/L) except total dissolved solids units in milligrams per liter (mg/L).

Abbreviations
1. ft bgs = feet below ground surface
2. TCE = trichloroethene
3. DCE = dichloroethene
4. DCA = dichloroethane
5. VOCs = volatile organic compounds
6. ND = not detected
7. -- = not analyzed

FIGURES



Legend

- Recovery Well On
- Recovery Well Off
- Monitoring Well
- CPT Location (Geosyntec, 2013)
- Grab Groundwater Location (Geosyntec, 2013)

N

0 400 Feet

Aerial Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Site Investigation Map

MEW Regional Groundwater Remediation Program
Mountain View, California

Geosyntec consultants

Oakland | November 2013

Figure **B1**

P:\GIS\MEW\Project\Regional\2013_EvandaleISCO\Workplan\FigB1_SiteInvestMap.mxd

ATTACHMENT B1

Geologic Logs

Geosyntec consultants
1111 Broadway. 6th Fl
Oakland, CA 94607
Tel: (510) 836-3034
Fax: (510) 836-3036

GS FORM: OAKLAND

LOG OF SB-5

START DATE 4/17/2013 2:15:00 PM
FINISH DATE 4/17/2013 3:30:00 PM
PROJECT MEW
LOCATION Mountain View
PROJECT NUMBER WR1128A
Elevation FT. MSL

DEPTH (ft)	MATERIAL DESCRIPTION SOIL NAME (USCS SYMBOL): Color, Moisture, Grain Size and Percentage, Plasticity, Consistency/Density, Other (Odor, Dry Strength, Mineral Content)	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY (%)	SAMPLES PID READING (ppm)	TIME	COMMENTS
	Hand Augered.								
5									
	Sandy SILT (ML): black (10YR 2/1); moist; fine sand, silt [0,30,70]; medium stiff.					20			
10									
	Poorly graded SAND with gravel (SP); dark grayish brown (10YR 4/2); wet; small gravel, fine to medium sand, fines [15, 80, 5].					100	2.9		▽ Wet at 13'
							2.8		
15	Sandy SILT (ML); dark brown (10 YR 3/4); moist; small gravel, fine to medium sand, silt [10, 40, 50].						2.5		
	Poorly graded SAND with gravel (SP); dark grayish brown (10YR 4/2); wet, small gravel, fine to medium sand, fines [15, 80, 5].					100	2.9		
20	Well graded SAND with gravel (SW); black (10YR 2/1); wet; small gravel, course sand [20, 80, 0].								
	Sandy SILT (ML); dark brown (10 YR 3/4); moist; small gravel, fine to medium sand, silt [10, 40, 50].					100	7.8		
	Poorly graded SAND with gravel (SP); dark grayish brown (10YR 4/2); wet, small gravel, fine to medium sand, fines [15, 80, 5].								
25	Lean CLAY (CL), greenish black (10GY 2.5/1), moist, clay [0, 0, 100], high plasticity, medium stiff.								
	Total Depth = 25'								

CONTRACTOR Vironex
EQUIPMENT
DRILL MTHD Direct Push
DIAMETER (in) 2"
LOGGER MF **REVIEWER** NKG

NORTHING
EASTING
ANGLE Vertical
BEARING ------
PRINTED 06/10/13

REMARKS:

COORDINATE SYSTEM:
SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG NO WELL (OAKLAND) MEW - SB-5 - SB-10.GPJ GEOSNTEC.GDT 6/10/13

Geosyntec consultants
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GS FORM: OAKLAND

LOG OF SB-6

START DATE 4/17/2013 11:50:00 AM
FINISH DATE 4/17/2013 1:00:00 PM
PROJECT MEW
LOCATION Mountain View
PROJECT NUMBER WR1128A
Elevation FT. MSL

DEPTH (ft)	MATERIAL DESCRIPTION SOIL NAME (USCS SYMBOL): Color, Moisture, Grain Size and Percentage, Plasticity, Consistency/Density, Other (Odor, Dry Strength, Mineral Content)	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY (%)	SAMPLES PID READING (ppm)	TIME	COMMENTS
	Hand Augered.								
5									
	Sandy SILT (ML); black (10YR 2/1); moist; fine sand, silt [0, 30, 70]; medium stiff.					100			
10	Well graded SAND (SW); black (10YR 2/1); moist; medium to course sand [0, 100, 0].								
	SILT (ML); brown (10YR 4/3); moist; fine sand, silt [0, 15, 85]; very hard.						1.4		
							2.0		
	Poorly graded SAND with gravel (SP); dark grayish brown (10 YR 4/2); wet; small gravel, medium sand, fines [15, 80, 5].					100	0.7		▽ Wet at 13'
15							1.6		
	SILT (ML); brown (10YR 4/3); moist; fine sand, silt [0, 15, 85]; very hard.						1.3		
	Sandy SILT (ML); brown (10YR 4/3); moist; fine sand, silt [0, 40, 60]; stiff.								
	Poorly graded SAND with gravel (SP); dark grayish brown (10 YR 4/2); wet; small gravel, medium sand, fines [15, 80, 5].					100	2.9		
	SILT with sand (ML); brown (10YR 4/3); wet; small gravel, fine to medium sand, silt [15, 30, 55]; low plasticity; stiff.						1.4		
20	Poorly graded SAND with gravel (SP); dark grayish brown (10 YR 4/2); wet; small gravel, medium sand, fines [15, 80, 5].						2.3		
	Sandy SILT (ML); brown (10YR 4/3); moist; fine sand, silt [0, 40, 60]; stiff.								
	No recovery.					0	2.9		
25	Total Depth = 25'								

CONTRACTOR Vironex
EQUIPMENT
DRILL MTHD Direct Push
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LOGGER MF **REVIEWER** NKG

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LOG OF SB-8

START DATE 4/17/2013 9:15:00 AM
FINISH DATE 4/17/2013 10:00:00 AM
PROJECT MEW
LOCATION Mountain View
PROJECT NUMBER WR1128A
Elevation FT. MSL

DEPTH (ft)	MATERIAL DESCRIPTION SOIL NAME (USCS SYMBOL): Color, Moisture, Grain Size and Percentage, Plasticity, Consistency/Density, Other (Odor, Dry Strength, Mineral Content)	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY (%)	SAMPLES PID READING (ppm)	TIME	COMMENTS
	Hand Augered.								
5									
	Sandy SILT (ML); black (10YR 2/1); moist; fine sand, silt, [0, 30, 70]; medium dense.					100	3.7		
							2.2		
10	Color change to dark gray (10YR 4/4); sand, silt [0, 45, 55].						3.8		
							3.5		
	Sandy SILT with gravel (ML); dark gray (10YR 4/4); moist; small gravel, fine sand, silt [15, 35, 50]; medium stiff.						3.7		
	Poorly graded SAND with silt (SP-SM); dark grayish brown (10YR 4/2); wet; fine sand, silt [0, 80, 20].					100	4.1		▽ Wet at 13.5'
	Well graded GRAVEL with silt (GW-GM); dark gray (10YR 4/1); wet; small gravel, fine sand, silt [85, 5, 10].						4.3		
15	Sandy SILT with gravel (ML); dark gray (10YR 4/4); moist; small gravel, fine sand, silt [15, 35, 50]; medium stiff.						5.4		
							4.7		
	Poorly graded SAND with silt (SP-SM); dark brown (10YR 3/3); moist; fine sand, silt [0, 90, 10].								
	Poorly graded SAND with silt and gravel (SP-SM); dark brown (10YR 3/3); wet; small gravel, fine sand, silt [15, 70, 15].					100			
20							6.3		
	Poorly graded SAND with silt (SP-SM); dark brown (10YR 3/3); moist; fine sand, silt [0, 90, 10].						6.2		
							6.9		
	Poorly graded SAND with silt and gravel (SP-SM); dark brown (10YR 3/3); wet; small gravel, fine sand, silt [15, 70, 15].					100			
	Lean CLAY (CL); greenish black (10GY 2.5/1); dry; clay [0, 0, 100]; high plasticity; medium stiff.						5.5		
25	Total Depth = 25'						7.2		

CONTRACTOR Vironex
EQUIPMENT
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LOGGER MF **REVIEWER** NKG

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GS FORM: OAKLAND

LOG OF SB-9

START DATE 4/18/2013 8:15:00 AM
FINISH DATE 4/18/2013 10:10:00 AM
PROJECT MEW
LOCATION Mountain View
PROJECT NUMBER WR1128A
Elevation FT. MSL

DEPTH (ft)	MATERIAL DESCRIPTION SOIL NAME (USCS SYMBOL): Color, Moisture, Grain Size and Percentage, Plasticity, Consistency/Density, Other (Odor, Dry Strength, Mineral Content)	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY (%)	SAMPLES PID READING (ppm)	TIME	COMMENTS
	Hand Augered.								
10	Lean CLAY (ML); grayish brown (10YR 5/2); moist; clay [0, 0, 100]; medium plasticity; medium stiff.						0.2 0.5 1.4 0.4 1.4		
15	Clayey SAND (SM); olive gray (5Y 5/2); wet; fine sand, clay [0, 70, 30].					20	0.2 0.5		Wet at 18' ▽
20	Lean CLAY (CL); very dark gray (5Y 4/2); moist; fine sand, clay [0, 20, 80]; medium plasticity; soft.								
	Clayey SAND (SM); very dark gray (5Y 4/2); wet; small gravel, fine sand, clay [5, 60, 35]; white (5Y 8/1) color globules, 0.2 to 1.5 cm diameter, 10% throughout.					100	15.4 20.0 1.6		
	Lean CLAY (ML); dark brown (10YR 3/3); moist; clay [0, 0, 100]; medium plasticity; stiff.						2.9		
25	Lean CLAY (CL); very dark gray (5Y 4/2); moist; fine sand, clay [0, 20, 80]; medium plasticity; soft.					100			
	Silty SAND (SM); dark olive gray (5Y 3/2); wet; small gravel, fine sand, silt [5, 75, 20].								
30	Clayey SAND (SM); olive gray (5Y 5/2); moist; fine sand, clay [0, 70, 30].					100	4.0		
	Silty SAND (SM); dark olive gray (5Y 3/2); wet; small gravel, fine sand, silt [5, 75, 20].								

CONTRACTOR Vironex
EQUIPMENT
DRILL MTHD Direct Push
DIAMETER (in) 2"
LOGGER MF **REVIEWER** NKG

NORTHING
EASTING
ANGLE Vertical
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GS FORM: OAKLAND

LOG OF SB-9

START DATE 4/18/2013 8:15:00 AM
FINISH DATE 4/18/2013 10:10:00 AM
PROJECT MEW
LOCATION Mountain View
PROJECT NUMBER WR1128A

Elevation FT. MSL

DEPTH (ft)	MATERIAL DESCRIPTION SOIL NAME (USCS SYMBOL): Color, Moisture, Grain Size and Percentage, Plasticity, Consistency/Density, Other (Odor, Dry Strength, Mineral Content)	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY (%)	SAMPLES PID READING (ppm)	TIME	COMMENTS
	Becomes moist at 32.5'								
	Lean CLAY (CL); greenish black (10GY 2.5/1); moist; clay [0, 0, 100]; medium plasticity; stiff.								
35	Silty SAND (SM); greenish black (10GY 2.5/1); wet; fine sand, silt [0, 70, 30].					100			
	Lean CLAY (CL); greenish black (10GY 2.5/1); moist; clay [0, 0, 100]; medium plasticity; stiff.								
40	Silty SAND (SM); greenish black (10GY 2.5/1); wet; fine sand, silt [0, 70, 30].					100			
	Lean CLAY (CL); greenish black (10GY 2.5/1); dry; clay [0, 0, 100]; medium plasticity; stiff.								
45	Total Depth = 45'								

CONTRACTOR Vironex
EQUIPMENT
DRILL MTHD Direct Push
DIAMETER (in) 2"
LOGGER MF **REVIEWER** NKG

NORTHING
EASTING
ANGLE Vertical
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GS FORM: OAKLAND

LOG OF SB-10

START DATE 4/18/2013 1:05:00 PM
FINISH DATE 4/18/2013 2:25:00 PM
PROJECT MEW
LOCATION Mountain View
PROJECT NUMBER WR1128A

Elevation FT. MSL

DEPTH (ft)	MATERIAL DESCRIPTION SOIL NAME (USCS SYMBOL): Color, Moisture, Grain Size and Percentage, Plasticity, Consistency/Density, Other (Odor, Dry Strength, Mineral Content)	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY (%)	SAMPLES: PID READING (ppm)	TIME	COMMENTS
	Bentonite fill.								
5	Lean CLAY (CL); brown (10YR 4/3); dry; clay [0, 0, 100]; medium plasticity; very stiff.					100			
10						45			
	Well graded GRAVEL with sand (GW); light gray (10Y 7/); dry; small gravel; fine sand [60, 40, 0].					100			
15	Lean CLAY (CL); dark grayish brown (10YR 4/2); moist; small gravel, fine sand, clay [5, 5, 90]; medium plasticity; medium stiff.								
	Well graded GRAVEL with sand (GW); light gray (10Y 7/); dry; small gravel, fine sand [60, 40, 0].					100			
	Sandy lean CLAY (CL); dark grayish brown (25Y 4/2); moist; fine sand, clay [0, 40, 60]; medium plasticity; medium stiff.								
20	Clayey SAND (SC); dark grayish brown (2.5Y 4/2); wet; fine sand, clay [0, 80, 20]; 20.5' to 21.5' 20% white and yellow globules with 0.1 - 1.2 cm diameter, medium plasticity.								▽ Wet at 20.5'. 20.5' to 21.5'
	Silty SAND (SM); dark grayish brown (2.5Y 4/2); wet; fine sand, clay [0, 80, 20].								
	Clayey SAND (SC); dark grayish brown (2.5Y 4/2); wet; fine sand, clay [0, 80, 20].					100			
	Lean CLAY (CL), dark gray (N 4), moist, clay [0, 0, 100], medium plasticity, medium stiff.								
25	Poorly graded SAND with silt (SW-SM); dark gray (2.5Y 4/1); wet; fine sand, silt [0,90,10].					100			
	Lean CLAY (CL); dark gray (N 4); moist; clay [0,0,100], medium plasticity; stiff.								
30	Poorly graded SAND with silt (SW-SM); dark gray (2.5Y 4/1); wet; fine sand, silt [0,90,10].								

CONTRACTOR Vironex
EQUIPMENT
DRILL MTHD Direct Push
DIAMETER (in) 2"
LOGGER MF **REVIEWER** NKG

NORTHING
EASTING
ANGLE Vertical
BEARING ------
PRINTED 06/10/13

REMARKS:

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG NO WELL (OAKLAND) MEW - SB-5 - SB-10.GPJ GEOSNTEC.GDT 6/10/13

Geosyntec consultants
1111 Broadway. 6th Fl
Oakland, CA 94607
Tel: (510) 836-3034
Fax: (510) 836-3036

GS FORM: OAKLAND

LOG OF SB-10

START DATE 4/18/2013 1:05:00 PM
FINISH DATE 4/18/2013 2:25:00 PM
PROJECT MEW
LOCATION Mountain View
PROJECT NUMBER WR1128A
Elevation FT. MSL

DEPTH (ft)	MATERIAL DESCRIPTION (SOIL NAME (USCS SYMBOL): Color, Moisture, Grain Size and Percentage, Plasticity, Consistency/Density, Other (Odor, Dry Strength, Mineral Content))	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY (%)	SAMPLES: PID READING (ppm)	TIME	COMMENTS
	Lean CLAY (CL); dark gray (N 4); moist; clay [0,0,100], medium plasticity; stiff.					100			
35	Poorly graded SAND with silt (SW-SM); dark gray (2.5Y 4/1); wet; fine sand, silt [0,90,10].								
	Lean CLAY (CL); dark gray (N 4); moist; clay [0,0,100], medium plasticity; stiff.					100			
40	Well graded SAND with silt (SW-SM); very dark gray (N 3); wet; fine sand, silt [0, 80. 20].								
	Lean CLAY (CL); very dark gray (N 3); dry; clay [0, 0, 100]; medium plasticity; very stiff					100			
45	Total Depth = 45'								

CONTRACTOR Vironex
EQUIPMENT
DRILL MTHD Direct Push
DIAMETER (in) 2"
LOGGER MF **REVIEWER** NKG

NORTHING
EASTING
ANGLE Vertical
BEARING ------
PRINTED 06/10/13

REMARKS:

COORDINATE SYSTEM:
SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG NO WELL (OAKLAND) MEW - SB-5 - SB-10.GPJ GEOSNTEC.GDT 6/10/13

ATTACHMENT B2

Laboratory Analytical Reports

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-49202-1
Client Project/Site: Regional MEW

For:
Geosyntec Consultants, Inc.
1111 Broadway
6th Floor
Oakland, California 94612

Attn: Mr. Eric Suchomel

Authorized for release by:
4/24/2013 4:22:12 PM

Micah Smith
Project Manager I
micah.smith@testamericainc.com

Table of Contents

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 720-49202-1

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-49202-1

Comments
No additional comments.

Receipt
The samples were received on 4/17/2013 5:30 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.9º C.

GC/MS VOA
Method(s) 8260B: The following sample submitted for volatiles analysis was received with insufficient preservation (pH >2): SB-5 (720-49202-3).

No other analytical or quality issues were noted.

GC/MS Semi VOA
Method(s) 8270C LL: The only surrogate that will be reported for these samples will be 2-Fluorobiphenyl, which is associated to the only target compound, 1,4-Dioxane. The other surrogates requested are either not needed and/or not extracted.

No other analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

General Chemistry
No analytical or quality issues were noted.

Organic Prep
Method(s) 3520C: Insufficient sample volume was available to perform batch matrix spike/matrix spike duplicate (MS/MSD) associated with batch 170520,3520_Base(8270CLL). The laboratory control sample (LCS) was performed in duplicate to provide precision data for this batch.

No other analytical or quality issues were noted.

Detection Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-1

Client Sample ID: SB-8 — Lab Sample ID: 720-49202-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Trichloroethene	6.1		0.50		ug/L	1		8260B	Total/NA

Client Sample ID: SB-6 — Lab Sample ID: 720-49202-2

No Detections.

Client Sample ID: SB-5 — Lab Sample ID: 720-49202-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Trichloroethene	8.1		0.50		ug/L	1		8260B	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Total Dissolved Solids	700		10		mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

Method: 8260B - Volatile Organic Compounds (GC/MS)

Client Sample ID: SB-8
Date Collected: 04/17/13 11:15
Date Received: 04/17/13 17:30

Lab Sample ID: 720-49202-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	ND		0.50		ug/L			04/20/13 04:00	1
1,1-Dichloroethane	ND		0.50		ug/L			04/20/13 04:00	1
Dichlorodifluoromethane	ND		0.50		ug/L			04/20/13 04:00	1
Vinyl chloride	ND		0.50		ug/L			04/20/13 04:00	1
Chloroethane	ND		1.0		ug/L			04/20/13 04:00	1
Trichlorofluoromethane	ND		1.0		ug/L			04/20/13 04:00	1
Methylene Chloride	ND		5.0		ug/L			04/20/13 04:00	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			04/20/13 04:00	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			04/20/13 04:00	1
Chloroform	ND		1.0		ug/L			04/20/13 04:00	1
1,1,1-Trichloroethane	ND		0.50		ug/L			04/20/13 04:00	1
Carbon tetrachloride	ND		0.50		ug/L			04/20/13 04:00	1
1,2-Dichloroethane	ND		0.50		ug/L			04/20/13 04:00	1
Trichloroethene	**6.1**		0.50		ug/L			04/20/13 04:00	1
1,2-Dichloropropane	ND		0.50		ug/L			04/20/13 04:00	1
Dichlorobromomethane	ND		0.50		ug/L			04/20/13 04:00	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			04/20/13 04:00	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			04/20/13 04:00	1
1,1,2-Trichloroethane	ND		0.50		ug/L			04/20/13 04:00	1
Tetrachloroethene	ND		0.50		ug/L			04/20/13 04:00	1
Chlorodibromomethane	ND		0.50		ug/L			04/20/13 04:00	1
Chlorobenzene	ND		0.50		ug/L			04/20/13 04:00	1
Bromoform	ND		1.0		ug/L			04/20/13 04:00	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			04/20/13 04:00	1
1,3-Dichlorobenzene	ND		0.50		ug/L			04/20/13 04:00	1
1,4-Dichlorobenzene	ND		0.50		ug/L			04/20/13 04:00	1
1,2-Dichlorobenzene	ND		0.50		ug/L			04/20/13 04:00	1
Chloromethane	ND		1.0		ug/L			04/20/13 04:00	1
Bromomethane	ND		1.0		ug/L			04/20/13 04:00	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			04/20/13 04:00	1
EDB	ND		0.50		ug/L			04/20/13 04:00	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			04/20/13 04:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*95*		*70 - 130*		*04/20/13 04:00*	*1*
4-Bromofluorobenzene	*88*		*67 - 130*		*04/20/13 04:00*	*1*
1,2-Dichloroethane-d4 (Surr)	*96*		*75 - 138*		*04/20/13 04:00*	*1*

Client Sample ID: SB-6
Date Collected: 04/17/13 13:45
Date Received: 04/17/13 17:30

Lab Sample ID: 720-49202-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	ND		0.50		ug/L			04/20/13 04:31	1
1,1-Dichloroethane	ND		0.50		ug/L			04/20/13 04:31	1
Dichlorodifluoromethane	ND		0.50		ug/L			04/20/13 04:31	1
Vinyl chloride	ND		0.50		ug/L			04/20/13 04:31	1
Chloroethane	ND		1.0		ug/L			04/20/13 04:31	1
Trichlorofluoromethane	ND		1.0		ug/L			04/20/13 04:31	1
Methylene Chloride	ND		5.0		ug/L			04/20/13 04:31	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			04/20/13 04:31	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Client Sample ID: SB-6
Date Collected: 04/17/13 13:45
Date Received: 04/17/13 17:30

Lab Sample ID: 720-49202-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		0.50		ug/L			04/20/13 04:31	1
Chloroform	ND		1.0		ug/L			04/20/13 04:31	1
1,1,1-Trichloroethane	ND		0.50		ug/L			04/20/13 04:31	1
Carbon tetrachloride	ND		0.50		ug/L			04/20/13 04:31	1
1,2-Dichloroethane	ND		0.50		ug/L			04/20/13 04:31	1
Trichloroethene	ND		0.50		ug/L			04/20/13 04:31	1
1,2-Dichloropropane	ND		0.50		ug/L			04/20/13 04:31	1
Dichlorobromomethane	ND		0.50		ug/L			04/20/13 04:31	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			04/20/13 04:31	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			04/20/13 04:31	1
1,1,2-Trichloroethane	ND		0.50		ug/L			04/20/13 04:31	1
Tetrachloroethene	ND		0.50		ug/L			04/20/13 04:31	1
Chlorodibromomethane	ND		0.50		ug/L			04/20/13 04:31	1
Chlorobenzene	ND		0.50		ug/L			04/20/13 04:31	1
Bromoform	ND		1.0		ug/L			04/20/13 04:31	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			04/20/13 04:31	1
1,3-Dichlorobenzene	ND		0.50		ug/L			04/20/13 04:31	1
1,4-Dichlorobenzene	ND		0.50		ug/L			04/20/13 04:31	1
1,2-Dichlorobenzene	ND		0.50		ug/L			04/20/13 04:31	1
Chloromethane	ND		1.0		ug/L			04/20/13 04:31	1
Bromomethane	ND		1.0		ug/L			04/20/13 04:31	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			04/20/13 04:31	1
EDB	ND		0.50		ug/L			04/20/13 04:31	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			04/20/13 04:31	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*99*		*70 - 130*		*04/20/13 04:31*	*1*
4-Bromofluorobenzene	*96*		*67 - 130*		*04/20/13 04:31*	*1*
1,2-Dichloroethane-d4 (Surr)	*96*		*75 - 138*		*04/20/13 04:31*	*1*

Client Sample ID: SB-5
Date Collected: 04/17/13 15:40
Date Received: 04/17/13 17:30

Lab Sample ID: 720-49202-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	ND		0.50		ug/L			04/20/13 05:04	1
1,1-Dichloroethane	ND		0.50		ug/L			04/20/13 05:04	1
Dichlorodifluoromethane	ND		0.50		ug/L			04/20/13 05:04	1
Vinyl chloride	ND		0.50		ug/L			04/20/13 05:04	1
Chloroethane	ND		1.0		ug/L			04/20/13 05:04	1
Trichlorofluoromethane	ND		1.0		ug/L			04/20/13 05:04	1
Methylene Chloride	ND		5.0		ug/L			04/20/13 05:04	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			04/20/13 05:04	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			04/20/13 05:04	1
Chloroform	ND		1.0		ug/L			04/20/13 05:04	1
1,1,1-Trichloroethane	ND		0.50		ug/L			04/20/13 05:04	1
Carbon tetrachloride	ND		0.50		ug/L			04/20/13 05:04	1
1,2-Dichloroethane	ND		0.50		ug/L			04/20/13 05:04	1
Trichloroethene	**8.1**		0.50		ug/L			04/20/13 05:04	1
1,2-Dichloropropane	ND		0.50		ug/L			04/20/13 05:04	1
Dichlorobromomethane	ND		0.50		ug/L			04/20/13 05:04	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Client Sample ID: SB-5
Date Collected: 04/17/13 15:40
Date Received: 04/17/13 17:30

Lab Sample ID: 720-49202-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
trans-1,3-Dichloropropene	ND		0.50		ug/L			04/20/13 05:04	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			04/20/13 05:04	1
1,1,2-Trichloroethane	ND		0.50		ug/L			04/20/13 05:04	1
Tetrachloroethene	ND		0.50		ug/L			04/20/13 05:04	1
Chlorodibromomethane	ND		0.50		ug/L			04/20/13 05:04	1
Chlorobenzene	ND		0.50		ug/L			04/20/13 05:04	1
Bromoform	ND		1.0		ug/L			04/20/13 05:04	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			04/20/13 05:04	1
1,3-Dichlorobenzene	ND		0.50		ug/L			04/20/13 05:04	1
1,4-Dichlorobenzene	ND		0.50		ug/L			04/20/13 05:04	1
1,2-Dichlorobenzene	ND		0.50		ug/L			04/20/13 05:04	1
Chloromethane	ND		1.0		ug/L			04/20/13 05:04	1
Bromomethane	ND		1.0		ug/L			04/20/13 05:04	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			04/20/13 05:04	1
EDB	ND		0.50		ug/L			04/20/13 05:04	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			04/20/13 05:04	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*94*		*70 - 130*		*04/20/13 05:04*	*1*
4-Bromofluorobenzene	*88*		*67 - 130*		*04/20/13 05:04*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*75 - 138*		*04/20/13 05:04*	*1*

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-1

Method: 8270C LL - Semivolatile Organic Compounds by GCMS - Low Levels

Client Sample ID: SB-5
Date Collected: 04/17/13 15:40
Date Received: 04/17/13 17:30

Lab Sample ID: 720-49202-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		1.1		ug/L		04/21/13 11:20	04/23/13 14:03	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*68*		*57 - 120*	*04/21/13 11:20*	*04/23/13 14:03*	*1*

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-1

General Chemistry

Client Sample ID: SB-5
Date Collected: 04/17/13 15:40
Date Received: 04/17/13 17:30

Lab Sample ID: 720-49202-3
Matrix: Water

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	700		10		mg/L			04/19/13 16:46	1

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-1

General Chemistry - Dissolved

Client Sample ID: SB-5
Date Collected: 04/17/13 15:40
Date Received: 04/17/13 17:30

Lab Sample ID: 720-49202-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cr (VI)	ND		0.50		ug/L			04/17/13 19:41	1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 720-134813/3
Matrix: Water
Analysis Batch: 134813

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	ND		0.50		ug/L			04/19/13 19:15	1
1,1-Dichloroethane	ND		0.50		ug/L			04/19/13 19:15	1
Dichlorodifluoromethane	ND		0.50		ug/L			04/19/13 19:15	1
Vinyl chloride	ND		0.50		ug/L			04/19/13 19:15	1
Chloroethane	ND		1.0		ug/L			04/19/13 19:15	1
Trichlorofluoromethane	ND		1.0		ug/L			04/19/13 19:15	1
Methylene Chloride	ND		5.0		ug/L			04/19/13 19:15	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			04/19/13 19:15	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			04/19/13 19:15	1
Chloroform	ND		1.0		ug/L			04/19/13 19:15	1
1,1,1-Trichloroethane	ND		0.50		ug/L			04/19/13 19:15	1
Carbon tetrachloride	ND		0.50		ug/L			04/19/13 19:15	1
1,2-Dichloroethane	ND		0.50		ug/L			04/19/13 19:15	1
Trichloroethene	ND		0.50		ug/L			04/19/13 19:15	1
1,2-Dichloropropane	ND		0.50		ug/L			04/19/13 19:15	1
Dichlorobromomethane	ND		0.50		ug/L			04/19/13 19:15	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			04/19/13 19:15	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			04/19/13 19:15	1
1,1,2-Trichloroethane	ND		0.50		ug/L			04/19/13 19:15	1
Tetrachloroethene	ND		0.50		ug/L			04/19/13 19:15	1
Chlorodibromomethane	ND		0.50		ug/L			04/19/13 19:15	1
Chlorobenzene	ND		0.50		ug/L			04/19/13 19:15	1
Bromoform	ND		1.0		ug/L			04/19/13 19:15	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			04/19/13 19:15	1
1,3-Dichlorobenzene	ND		0.50		ug/L			04/19/13 19:15	1
1,4-Dichlorobenzene	ND		0.50		ug/L			04/19/13 19:15	1
1,2-Dichlorobenzene	ND		0.50		ug/L			04/19/13 19:15	1
Chloromethane	ND		1.0		ug/L			04/19/13 19:15	1
Bromomethane	ND		1.0		ug/L			04/19/13 19:15	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			04/19/13 19:15	1
EDB	ND		0.50		ug/L			04/19/13 19:15	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			04/19/13 19:15	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*106*		*70 - 130*		*04/19/13 19:15*	*1*
4-Bromofluorobenzene	*105*		*67 - 130*		*04/19/13 19:15*	*1*
1,2-Dichloroethane-d4 (Surr)	*87*		*75 - 138*		*04/19/13 19:15*	*1*

Lab Sample ID: LCS 720-134813/4
Matrix: Water
Analysis Batch: 134813

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	25.0	23.5		ug/L		94	64 - 128
1,1-Dichloroethane	25.0	23.5		ug/L		94	70 - 130
Dichlorodifluoromethane	25.0	19.6		ug/L		79	34 - 132
Vinyl chloride	25.0	24.1		ug/L		97	54 - 135
Chloroethane	25.0	24.9		ug/L		100	62 - 138

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 720-134813/4
Matrix: Water
Analysis Batch: 134813

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Trichlorofluoromethane	25.0	24.5		ug/L		98	66 - 132
Methylene Chloride	25.0	22.6		ug/L		90	70 - 147
trans-1,2-Dichloroethene	25.0	24.3		ug/L		97	68 - 130
cis-1,2-Dichloroethene	25.0	25.0		ug/L		100	70 - 130
Chloroform	25.0	23.0		ug/L		92	70 - 130
1,1,1-Trichloroethane	25.0	23.7		ug/L		95	70 - 130
Carbon tetrachloride	25.0	23.5		ug/L		94	70 - 146
1,2-Dichloroethane	25.0	23.4		ug/L		94	61 - 132
Trichloroethene	25.0	25.1		ug/L		100	70 - 130
1,2-Dichloropropane	25.0	25.1		ug/L		100	70 - 130
Dichlorobromomethane	25.0	24.9		ug/L		99	70 - 130
trans-1,3-Dichloropropene	25.0	20.2		ug/L		81	70 - 140
cis-1,3-Dichloropropene	25.0	22.2		ug/L		89	70 - 130
1,1,2-Trichloroethane	25.0	25.9		ug/L		104	70 - 130
Tetrachloroethene	25.0	25.3		ug/L		101	70 - 130
Chlorodibromomethane	25.0	23.6		ug/L		94	70 - 145
Chlorobenzene	25.0	24.3		ug/L		97	70 - 130
Bromoform	25.0	25.8		ug/L		103	68 - 136
1,1,2,2-Tetrachloroethane	25.0	24.2		ug/L		97	70 - 130
1,3-Dichlorobenzene	25.0	26.0		ug/L		104	70 - 130
1,4-Dichlorobenzene	25.0	24.1		ug/L		96	70 - 130
1,2-Dichlorobenzene	25.0	24.8		ug/L		99	70 - 130
Chloromethane	25.0	21.9		ug/L		88	52 - 175
Bromomethane	25.0	24.6		ug/L		98	43 - 151
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	24.2		ug/L		97	42 - 162
EDB	25.0	24.4		ug/L		98	70 - 130
1,2,4-Trichlorobenzene	25.0	26.6		ug/L		107	70 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*125*		*70 - 130*
4-Bromofluorobenzene	*115*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*84*		*75 - 138*

Lab Sample ID: LCSD 720-134813/5
Matrix: Water
Analysis Batch: 134813

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1-Dichloroethene	25.0	23.8		ug/L		95	64 - 128	1	20
1,1-Dichloroethane	25.0	24.4		ug/L		98	70 - 130	4	20
Dichlorodifluoromethane	25.0	19.7		ug/L		79	34 - 132	0	20
Vinyl chloride	25.0	23.5		ug/L		94	54 - 135	3	20
Chloroethane	25.0	24.9		ug/L		100	62 - 138	0	20
Trichlorofluoromethane	25.0	23.4		ug/L		93	66 - 132	5	20
Methylene Chloride	25.0	23.4		ug/L		94	70 - 147	4	20
trans-1,2-Dichloroethene	25.0	25.0		ug/L		100	68 - 130	3	20
cis-1,2-Dichloroethene	25.0	25.9		ug/L		104	70 - 130	4	20

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 720-134813/5
Matrix: Water
Analysis Batch: 134813

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloroform	25.0	23.8		ug/L		95	70 - 130	4	20
1,1,1-Trichloroethane	25.0	24.0		ug/L		96	70 - 130	1	20
Carbon tetrachloride	25.0	23.6		ug/L		95	70 - 146	1	20
1,2-Dichloroethane	25.0	25.2		ug/L		101	61 - 132	7	20
Trichloroethene	25.0	26.5		ug/L		106	70 - 130	6	20
1,2-Dichloropropane	25.0	27.9		ug/L		112	70 - 130	10	20
Dichlorobromomethane	25.0	27.0		ug/L		108	70 - 130	8	20
trans-1,3-Dichloropropene	25.0	24.4		ug/L		98	70 - 140	19	20
cis-1,3-Dichloropropene	25.0	26.5		ug/L		106	70 - 130	18	20
1,1,2-Trichloroethane	25.0	29.5		ug/L		118	70 - 130	13	20
Tetrachloroethene	25.0	26.9		ug/L		108	70 - 130	6	20
Chlorodibromomethane	25.0	26.5		ug/L		106	70 - 145	12	20
Chlorobenzene	25.0	26.2		ug/L		105	70 - 130	8	20
Bromoform	25.0	27.2		ug/L		109	68 - 136	5	20
1,1,2,2-Tetrachloroethane	25.0	26.2		ug/L		105	70 - 130	8	20
1,3-Dichlorobenzene	25.0	28.1		ug/L		112	70 - 130	8	20
1,4-Dichlorobenzene	25.0	26.4		ug/L		106	70 - 130	9	20
1,2-Dichlorobenzene	25.0	26.4		ug/L		106	70 - 130	6	20
Chloromethane	25.0	24.3		ug/L		97	52 - 175	10	20
Bromomethane	25.0	24.3		ug/L		97	43 - 151	1	20
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	24.1		ug/L		96	42 - 162	0	20
EDB	25.0	28.6		ug/L		114	70 - 130	16	20
1,2,4-Trichlorobenzene	25.0	28.5		ug/L		114	70 - 130	7	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*127*		*70 - 130*
4-Bromofluorobenzene	*113*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*84*		*75 - 138*

Method: 8270C LL - Semivolatile Organic Compounds by GCMS - Low Levels

Lab Sample ID: MB 280-170520/1-A
Matrix: Water
Analysis Batch: 170843

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 170520

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		1.0		ug/L		04/21/13 11:20	04/23/13 12:25	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*81*		*57 - 120*	*04/21/13 11:20*	*04/23/13 12:25*	*1*

Lab Sample ID: LCS 280-170520/2-A
Matrix: Water
Analysis Batch: 170843

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 170520

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,4-Dioxane	10.0	5.24		ug/L		52	38 - 120

Method: 8270C LL - Semivolatile Organic Compounds by GCMS - Low Levels (Continued)

Lab Sample ID: LCS 280-170520/2-A
Matrix: Water
Analysis Batch: 170843

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 170520

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2-Fluorobiphenyl	*85*		*57 - 120*

Lab Sample ID: LCSD 280-170520/3-A
Matrix: Water
Analysis Batch: 170843

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 170520

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,4-Dioxane	10.0	5.67		ug/L		57	38 - 120	8	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
2-Fluorobiphenyl	*80*		*57 - 120*

Method: 7199 - Chromium, Hexavalent (IC)

Lab Sample ID: MB 720-135039/1-A
Matrix: Water
Analysis Batch: 134594

Client Sample ID: Method Blank
Prep Type: Dissolved

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cr (VI)	ND		0.50		ug/L			04/17/13 16:59	1

Lab Sample ID: LCS 720-135039/2-A
Matrix: Water
Analysis Batch: 134594

Client Sample ID: Lab Control Sample
Prep Type: Dissolved

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	2.00	1.88		ug/L		94	90 - 110

Lab Sample ID: LCSD 720-135039/3-A
Matrix: Water
Analysis Batch: 134594

Client Sample ID: Lab Control Sample Dup
Prep Type: Dissolved

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cr (VI)	2.00	1.90		ug/L		95	90 - 110	2	20

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 720-134805/2
Matrix: Water
Analysis Batch: 134805

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10		mg/L			04/19/13 16:46	1

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: LCS 720-134805/1
Matrix: Water
Analysis Batch: 134805

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	1030		mg/L		103	85 - 115

GC/MS VOA

Analysis Batch: 134813

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49202-1	SB-8	Total/NA	Water	8260B	
720-49202-2	SB-6	Total/NA	Water	8260B	
720-49202-3	SB-5	Total/NA	Water	8260B	
LCS 720-134813/4	Lab Control Sample	Total/NA	Water	8260B	
LCSD 720-134813/5	Lab Control Sample Dup	Total/NA	Water	8260B	
MB 720-134813/3	Method Blank	Total/NA	Water	8260B	

GC/MS Semi VOA

Prep Batch: 170520

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49202-3	SB-5	Total/NA	Water	3520C	
LCS 280-170520/2-A	Lab Control Sample	Total/NA	Water	3520C	
LCSD 280-170520/3-A	Lab Control Sample Dup	Total/NA	Water	3520C	
MB 280-170520/1-A	Method Blank	Total/NA	Water	3520C	

Analysis Batch: 170843

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49202-3	SB-5	Total/NA	Water	8270C LL	170520
LCS 280-170520/2-A	Lab Control Sample	Total/NA	Water	8270C LL	170520
LCSD 280-170520/3-A	Lab Control Sample Dup	Total/NA	Water	8270C LL	170520
MB 280-170520/1-A	Method Blank	Total/NA	Water	8270C LL	170520

General Chemistry

Analysis Batch: 134594

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49202-3	SB-5	Dissolved	Water	7199	
LCS 720-135039/2-A	Lab Control Sample	Dissolved	Water	7199	
LCSD 720-135039/3-A	Lab Control Sample Dup	Dissolved	Water	7199	
MB 720-135039/1-A	Method Blank	Dissolved	Water	7199	

Analysis Batch: 134805

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49202-3	SB-5	Total/NA	Water	SM 2540C	
LCS 720-134805/1	Lab Control Sample	Total/NA	Water	SM 2540C	
MB 720-134805/2	Method Blank	Total/NA	Water	SM 2540C	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-1

Client Sample ID: SB-8

Lab Sample ID: 720-49202-1

Date Collected: 04/17/13 11:15

Matrix: Water

Date Received: 04/17/13 17:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	134813	04/20/13 04:00	LL	TAL PLS

Client Sample ID: SB-6

Lab Sample ID: 720-49202-2

Date Collected: 04/17/13 13:45

Matrix: Water

Date Received: 04/17/13 17:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	134813	04/20/13 04:31	LL	TAL PLS

Client Sample ID: SB-5

Lab Sample ID: 720-49202-3

Date Collected: 04/17/13 15:40

Matrix: Water

Date Received: 04/17/13 17:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	134813	04/20/13 05:04	LL	TAL PLS
Total/NA	Prep	3520C			170520	04/21/13 11:20	CDC	TAL DEN
Total/NA	Analysis	8270C LL		1	170843	04/23/13 14:03	KGV	TAL DEN
Dissolved	Analysis	7199		1	134594	04/17/13 19:41	EYT	TAL PLS
Total/NA	Analysis	SM 2540C		1	134805	04/19/13 16:46	EYT	TAL PLS

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-1

Laboratory: TestAmerica Pleasanton

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	State Program	9	2496	01-31-14

Laboratory: TestAmerica Denver

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-13
A2LA	ISO/IEC 17025		2907.01	10-31-13
Alaska (UST)	State Program	10	UST-30	04-05-14
Arizona	State Program	9	AZ0713	12-19-13
Arkansas DEQ	State Program	6	88-0687	06-01-13
California	State Program	9	2513	08-31-14
Colorado	State Program	8	N/A	09-30-13
Connecticut	State Program	1	PH-0686	09-30-14
Florida	NELAP	4	E87667	06-30-13
Idaho	State Program	10	CO00026	09-30-13
Illinois	NELAP	5	200017	04-30-13
Iowa	State Program	7	370	12-01-14
Kansas	NELAP	7	E-10166	04-30-13
Louisiana	NELAP	6	30785	06-30-13
Maine	State Program	1	CO0002	03-03-15
Maryland	State Program	3	268	03-31-14
Minnesota	NELAP	5	8-999-405	12-31-13
Nevada	State Program	9	CO0026	07-30-13
New Hampshire	NELAP	1	205310	04-28-13
New Jersey	NELAP	2	CO004	06-30-13
New Mexico	State Program	6	CO00026	06-30-13
New York	NELAP	2	11964	04-01-14
North Carolina DENR	State Program	4	358	12-31-13
North Dakota	State Program	8	R-034	06-30-13
Oklahoma	State Program	6	8614	08-31-13
Oregon	NELAP	10	CO200001	01-16-14
Pennsylvania	NELAP	3	68-00664	07-31-13
South Carolina	State Program	4	72002	06-30-13
Texas	NELAP	6	T104704183-08-TX	09-30-13
USDA	Federal		P330-08-00036	02-08-14
Utah	NELAP	8	QUAN5	06-30-13
Virginia	NELAP	3	460232	06-14-13
Washington	State Program	10	C583	08-03-13
West Virginia DEP	State Program	3	354	11-30-13
Wisconsin	State Program	5	999615430	08-31-13
Wyoming (UST)	A2LA	8		10-31-13

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL PLS
8270C LL	Semivolatile Organic Compounds by GCMS - Low Levels	SW846	TAL DEN
7199	Chromium, Hexavalent (IC)	SW846	TAL PLS
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PLS

Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-49202-1	SB-8	Water	04/17/13 11:15	04/17/13 17:30
720-49202-2	SB-6	Water	04/17/13 13:45	04/17/13 17:30
720-49202-3	SB-5	Water	04/17/13 15:40	04/17/13 17:30

TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
phone 925.484 1919 fax 925.600.3002

720-49202

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

145476

TestAmerica Laboratories, Inc.

4/24/2013

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Eric Suchomel	Site Contact: Morgan Fahlman	Date: 17 April 2013	COC No
Geosyntec Consultants	Tel/Fax: 510.285.2700/510.836.3114	Lab Contact: Michele Smith	Carrier:	1 of ___ COCs
1111 Broadway, 6th Floor	**Analysis Turnaround Time**			**For Lab Use Only:**
Oakland, CA 94607	☐ CALENDAR DAYS ☐ WORKING DAYS			Walk-in Client:
510.285.2700 Phone	TAT if different from Below ___			Lab Sampling:
510.836.3114 FAX	☐ 2 weeks			
Project Name: MEW	☒ 1 week			Job / SDG No.: WR1128A
Site: MEW, Mountain View, CA	☐ 2 days			
PO # WR1128A	☐ 1 day			Sampler: Morgan Fahlman

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	8270C	8260B	1,4-Dioxane	TDS	Chromium VI	Sample Specific Notes:
SB-8	4/17/13	11:15	G	W	3				X				
SB-4	4/17/13	13:45	G	W	4				X				HOLD 250mL container
SB-5	4/17/13	15:40	G	W	8			X	X	X	X	X	

720-49202 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ___

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for ___ Months

Special Instructions/QC Requirements & Comments:

0.9°C

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.. | Cooler Temp. (°C): Obs'd: ___ Corr'd: ___ | Therm ID No.: ___

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
	Geosyntec	4/17/13 16:15		TASR	04/17/13 @ 16:15
Relinquished by:	Company:	Date/Time:	Received by.	Company:	Date/Time:
	TASR	04/17/13 1730			
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:
					4-17-13 1730

Form No. CA-C-WI-002, Rev. 4.1, dated 02/20/2013

Salimpour, Afsaneh

From: Nicole Gotberg [NGotberg@Geosyntec.com]
Sent: Friday, April 19, 2013 11:06 AM
To: Salimpour, Afsaneh; Eric Suchomel
Cc: Morgan Fahlman; John Gallinatti
Subject: RE: Sample Login Confirmation for 720-49233, MEW

Afsaneh,

Per our conversation please make the following revisions to the requested analysis for 720-49233 and 720-49202.

1. Remove the SVOC 8270C analysis, we would only like to run 1,4 Dioxane by 8270C
2. For 8260B only run the halogenated VOC (HVOC) list
3. For the trip blank only run the HVOC analysis

I will have Morgan revise and initial changes on the Chain of Custody forms to be included with the lab reports.

Thanks,
Nicole

Nicole K. Gotberg, P.G.
Professional Geologist

1111 Broadway, 6th Floor
Oakland, CA 94607
Main Phone: 510.836.3034, ext. 2771
Direct Phone: 510.285.2771
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www.geosyntec.com

Geosyntec consultants

engineers | scientists | innovators

720-49202 Chain of Custody

10:41 AM
To: Eric Suchomel; Nicole Gotberg
Subject: Sample Login Confirmation for 720-49233, MEW

Insufficient sample volume was provided for the following sample(s) for the 8270C; 1,4-Dioxane [illegible] analysis: TAL SF TB. Received 2-40ml Hcl voa vials, can only run for 8260B.

AFSANEH SALIMPOUR

TestAmerica Pleasanton
THE LEADER IN ENVIRONMENTAL TESTING

Tel: 925.484.1919
www.testamericainc.com

Reference: [128017]
Attachments: 3

TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
phone 925.484 1919 fax 925.600.3002

720-49202 -rev

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
14547C
TestAmerica Laboratories, Inc.

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Eric Suchomel	Site Contact: Morgan Fahlman	Date: 17 April 2013	COC No
Geosyntec Consultants	Tel/Fax: 510-285-2700/510-836-3114	Lab Contact: Micah Smith	Carrier:	1 of 1 COCs
1111 Broadway, 6th Floor	Analysis Turnaround Time			For Lab Use Only:
Oakland, CA 94607	☐ CALENDAR DAYS ☐ WORKING DAYS			Walk-in Client:
510.285.2700 Phone	TAT if different from Below _____			Lab Sampling:
510.836.3114 FAX	☐ 2 weeks			
Project Name: MEW	☒ 1 week			Job / SDG No.: MR128A
Site: MEW, Mountain View, CA	☐ 2 days			
PO# MR128A	☐ 1 day			Sampler: Morgan Fahlman

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y / N)	8260B (HVOCs)	1,4-Dioxane (8270C)	TDS	Chromium VI	Sample Specific Notes:
SB-8	4/17/13	11:15	G	W	3			X				
SB-6	4/17/13	13:45	G	W	4			X				HOLD 250mL container
SB-5	4/17/13	15:40	G	W	8		X	X	X	X	X	

720-49202 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

0.9°C

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:	Cooler Temp. (°C): Obs'd: _____ Corr'd: _____	Therm ID No.: _____

Relinquished by:	Company: Geosyntec	Date/Time: 4/17/13; 16:15	Received by:	Company: TASP	Date/Time: 04/17/13 @ 16:15
Relinquished by:	Company: TASP	Date/Time: 04/17/13 1730	Received by:	Company:	Date/Time
Relinquished by:	Company:	Date/Time	Received in Laboratory by:	Company:	Date/Time: 4-17-13 1730

Form No. CA-C-WI-002, Rev. 4.1, dated 02/20/2013

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 720-49202-1

Login Number: 49202

List Source: TestAmerica Pleasanton

List Number: 1

Creator: Bullock, Tracy

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 720-49202-1

Login Number: 49202
List Number: 1
Creator: Sanders, Stephanie

List Source: TestAmerica Denver
List Creation: 04/19/13 03:18 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-49202-2
Client Project/Site: Regional MEW

For:
Geosyntec Consultants, Inc.
1111 Broadway
6th Floor
Oakland, California 94612

Attn: Mr. Eric Suchomel

Authorized for release by:
4/30/2013 3:59:21 PM

Micah Smith
Project Manager I
micah.smith@testamericainc.com

Table of Contents

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-2

Job ID: 720-49202-2

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-49202-2

Comments
No additional comments.

Receipt
The samples were received on 4/17/2013 5:30 PM; the samples arrived in good condition, properly preserved and, where required, on ice.
The temperature of the cooler at receipt was 0.9º C.

General Chemistry
No analytical or quality issues were noted.

Detection Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-2

Client Sample ID: SB-6

Lab Sample ID: 720-49202-2

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Total Dissolved Solids	640		10		mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-2

General Chemistry

Client Sample ID: SB-6
Date Collected: 04/17/13 13:45
Date Received: 04/17/13 17:30

Lab Sample ID: 720-49202-2
Matrix: Water

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	640		10		mg/L			04/23/13 18:54	1

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-2

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 720-135058/2
Matrix: Water
Analysis Batch: 135058

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10		mg/L			04/23/13 18:54	1

Lab Sample ID: LCS 720-135058/1
Matrix: Water
Analysis Batch: 135058

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Dissolved Solids			1000	1020		mg/L		102	85 - 115		

Lab Sample ID: 720-49202-2 DU
Matrix: Water
Analysis Batch: 135058

Client Sample ID: SB-6
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Dissolved Solids	640			660		mg/L				4	10

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-2

General Chemistry

Analysis Batch: 135058

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49202-2	SB-6	Total/NA	Water	SM 2540C	
720-49202-2 DU	SB-6	Total/NA	Water	SM 2540C	
LCS 720-135058/1	Lab Control Sample	Total/NA	Water	SM 2540C	
MB 720-135058/2	Method Blank	Total/NA	Water	SM 2540C	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-2

Client Sample ID: SB-6
Date Collected: 04/17/13 13:45
Date Received: 04/17/13 17:30

Lab Sample ID: 720-49202-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	135058	04/23/13 18:54	EYT	TAL PLS

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-2

Laboratory: TestAmerica Pleasanton

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	State Program	9	2496	01-31-14

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-2

Method	Method Description	Protocol	Laboratory
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PLS

Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Regional MEW

TestAmerica Job ID: 720-49202-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-49202-2	SB-6	Water	04/17/13 13:45	04/17/13 17:30

TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
phone 925.484 1919 fax 925.600.3002

720-49202

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

145476

TestAmerica Laboratories, Inc.

4/30/2013

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Eric Suchomel	Site Contact: Morgan Fahlman	Date: 17 April 2013	COC No
Geosyntec Consultants	Tel/Fax: 510.285.2700/510.836.3114	Lab Contact: Michele Smith	Carrier:	1 of ____ COCs
1111 Broadway, 6th Floor	**Analysis Turnaround Time**			**For Lab Use Only:**
Oakland, CA 94607	☐ CALENDAR DAYS ☐ WORKING DAYS			Walk-in Client:
510.285.2700 Phone	TAT if different from Below ____			Lab Sampling:
510.836.3114 FAX	☐ 2 weeks			
Project Name: MEW	☒ 1 week			Job / SDG No.: WR1128A
Site: MEW, Mountain View, CA	☐ 2 days			
PO # WR1128A	☐ 1 day			Sampler: Morgan Fahlman

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	8270C	8260B	1,4-Dioxane	TDS	Chromium VI	Sample Specific Notes:
SB-8	4/17/13	11:15	G	W	3				X				
SB-4	4/17/13	13:45	G	W	4				X				HOLD 250mL container
SB-5	4/17/13	15:40	G	W	8			X	X	X	X	X	

720-49202 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for____ Months

Special Instructions/QC Requirements & Comments:

0.9°C

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No..	Cooler Temp. (°C): Obs'd:____ Corr'd:____ Therm ID No.:____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
	Geosyntec	4/17/13 16:15		TASR	04/17/13 @ 16:15
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
	TASR	04/17/13 1730			
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:
					4-17-13 1730

720-49202-2

Smith, Micah

From: Morgan Fahlman [MFahlman@Geosyntec com]
Sent: Tuesday, April 23, 2013 1.03 PM
To: Smith, Micah
Subject: RE: Sample Login Confirmation for 720-49202, Regional MEW

Thank you, Micah. We would like to run TDS.

Morgan

Morgan Fahlman
Staff Scientist

1111 Broadway
6th Floor
Oakland, CA 94607
Phone: 510.285.2763
Fax: 510.836.3114
www.Geosyntec.com

Geosyntec consultants

From: Smith, Micah [mailto:Micah.Smith@testamericainc.com]
Sent: Tuesday, April 23, 2013 12:59 PM
To: Morgan Fahlman
Subject: RE: Sample Login Confirmation for 720-49202, Regional MEW

No. TDS is 7 days. Hexavalent Cr is 1 day

MICAH SMITH
Project Manager

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

1220 Quarry Lane
Pleasanton, CA 94566
TEL 925.484.1919 ext. 137 | Fax 925.600.3002
micah.smith@testamericainc.com

From: Morgan Fahlman [mailto:MFahlman@Geosyntec.com]
Sent: Tuesday, April 23, 2013 12:56 PM
To: Smith, Micah
Subject: RE: Sample Login Confirmation for 720-49202, Regional MEW

Would it be out of hold time if we ran TDS?

Thank you,

Morgan Fahlman
Staff Scientist

1111 Broadway
6th Floor
Oakland, CA 94607
Phone: 510 285.2763
Fax. 510.836.3114
www.Geosyntec com

Geosyntec consultants

720-49202 Chain of Custody

From: Smith, Micah [mailto:Micah.Smith@testamericainc.com]
Sent: Tuesday, April 23, 2013 12:52 PM
To: Morgan Fahlman
Subject: RE: Sample Login Confirmation for 720-49202, Regional MEW

We can run this sample but it will be out of holding time. Would you like to proceed?
Thanks

MICAH SMITH
Project Manager

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

1220 Quarry Lane
Pleasanton, CA 94566

TEL 925 484.1919 ext. 137 | Fax 925.600.3002
micah smith@testamericainc.com

From: Salimpour, Afsaneh
Sent: Tuesday, April 23, 2013 12:15 PM
To: Smith, Micah
Subject: FW: Sample Login Confirmation for 720-49202, Regional MEW

From: Morgan Fahlman [mailto:MFahlman@Geosyntec.com]
Sent: Tuesday, April 23, 2013 12:08 PM
To: Salimpour, Afsaneh
Subject: *RE: Sample Login Confirmation for 720-49202, Regional MEW*

Hi Afsaneh,

Please run sample SB-6 from 720-49202 for Chromium VI.

Thank you,

Morgan Fahlman
Staff Scientist

1111 Broadway
6th Floor
Oakland, CA 94607
Phone 510.285.2763
Fax: 510.836.3114
www.Geosyntec.com

Geosyntec consultants

From: Nicole Gotberg
Sent: Friday, April 19, 2013 11:07 AM
To: Morgan Fahlman
Subject: FW: Sample Login Confirmation for 720-49202, Regional MEW

Nicole K. Gotberg, P.G.
Professional Geologist

1111 Broadway, 6th Floor
Oakland, CA 94607
Main Phone 510.836.3034, ext. 2771
Direct Phone 510 285 2771
Fax: 510 836 3036
www.geosyntec.com

Geosyntec consultants

From: Salimpour, Afsaneh
[mailto:afsaneh.salimpour@testamericainc.com]

Sent: Friday, April 19, 2013 10:21 AM
To: Eric Suchomel; Nicole Gotberg
Subject: Sample Login Confirmation for 720-49202, Regional MEW

AFSANEH SALIMPOUR

TestAmerica Pleasanton
THE LEADER IN ENVIRONMENTAL TESTING

Tel 925 484.1919
www.testamericainc.com

Reference: [128013]
Attachments: 3

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 720-49202-2

Login Number: 49202

List Source: TestAmerica Pleasanton

List Number: 1

Creator: Bullock, Tracy

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-49233-1
Client Project/Site: MEW

For:
Geosyntec Consultants, Inc.
1111 Broadway
6th Floor
Oakland, California 94612

Attn: Mr. Eric Suchomel

Authorized for release by:
4/25/2013 4:17:31 PM

Micah Smith
Project Manager I
micah.smith@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 720-49233-1

Laboratory: TestAmerica Pleasanton

Narrative

Job Narrative
720-49233-1

Comments
No additional comments.

Receipt
The samples were received on 4/18/2013 7:10 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.9º C.

GC/MS VOA
No analytical or quality issues were noted.

GC/MS Semi VOA
Method(s) 8270C LL: The only surrogate that will be reported for these samples will be 2-Fluorobiphenyl, which is associated to the only target compound, 1,4-Dioxane. The other surrogates requested are either not needed and/or not extracted.

No other analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

General Chemistry
No analytical or quality issues were noted.

Organic Prep
Method(s) 3520C: Insufficient sample volume was available to perform batch matrix spike/matrix spike duplicate (MS/MSD) associated with batch 170520, 3520_Base(8270CLL). The laboratory control sample (LCS) was performed in duplicate to provide precision data for this batch.

Method(s) 3520C: Batch 170520, 3520_Base. These samples contained noticeable amounts of sediment in the container jar.

No other analytical or quality issues were noted.

Detection Summary

Client: Geosyntec Consultants, Inc.
Project/Site: MEW

TestAmerica Job ID: 720-49233-1

Client Sample ID: SB-9-20-23 — Lab Sample ID: 720-49233-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1-Dichloroethene	23		0.50		ug/L	1		8260B	Total/NA
1,1-Dichloroethane	12		0.50		ug/L	1		8260B	Total/NA
Vinyl chloride	26		0.50		ug/L	1		8260B	Total/NA
trans-1,2-Dichloroethene	35		0.50		ug/L	1		8260B	Total/NA
cis-1,2-Dichloroethene	5100		250		ug/L	500		8260B	Total/NA
Trichloroethene	31000		250		ug/L	500		8260B	Total/NA
1,4-Dioxane	4.7		1.1		ug/L	1		8270C LL	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Total Dissolved Solids	910		10		mg/L	1		SM 2540C	Total/NA

Client Sample ID: SB-9-40-43 — Lab Sample ID: 720-49233-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1-Dichloroethene	2.2		0.50		ug/L	1		8260B	Total/NA
1,1-Dichloroethane	1.5		0.50		ug/L	1		8260B	Total/NA
trans-1,2-Dichloroethene	96		0.50		ug/L	1		8260B	Total/NA
cis-1,2-Dichloroethene	270		2.5		ug/L	5		8260B	Total/NA
Trichloroethene	220		2.5		ug/L	5		8260B	Total/NA

Client Sample ID: SB-10-20.5-23 — Lab Sample ID: 720-49233-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1-Dichloroethene	4.1		0.50		ug/L	1		8260B	Total/NA
1,1-Dichloroethane	9.7		0.50		ug/L	1		8260B	Total/NA
Vinyl chloride	5.5		0.50		ug/L	1		8260B	Total/NA
trans-1,2-Dichloroethene	4.8		0.50		ug/L	1		8260B	Total/NA
cis-1,2-Dichloroethene	620		5.0		ug/L	10		8260B	Total/NA
Trichloroethene	730		5.0		ug/L	10		8260B	Total/NA
1,4-Dioxane	6.6		1.2		ug/L	1		8270C LL	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Total Dissolved Solids	810		10		mg/L	1		SM 2540C	Total/NA

Client Sample ID: SB-10-35.5-38.5 — Lab Sample ID: 720-49233-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1-Dichloroethene	53		0.50		ug/L	1		8260B	Total/NA
1,1-Dichloroethane	44		0.50		ug/L	1		8260B	Total/NA
Vinyl chloride	7.8		0.50		ug/L	1		8260B	Total/NA
trans-1,2-Dichloroethene	42		0.50		ug/L	1		8260B	Total/NA
cis-1,2-Dichloroethene	1100		25		ug/L	50		8260B	Total/NA
Trichloroethene	1400		25		ug/L	50		8260B	Total/NA
1,1,2-Trichloro-1,2,2-trifluoroethane	0.89		0.50		ug/L	1		8260B	Total/NA
1,4-Dioxane	6.8		1.2		ug/L	1		8270C LL	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Total Dissolved Solids	690		10		mg/L	1		SM 2540C	Total/NA

Client Sample ID: TAL SF TB — Lab Sample ID: 720-49233-5

No Detections.

This Detection Summary does not include radiochemical test results.

Method: 8260B - Volatile Organic Compounds (GC/MS)

Client Sample ID: SB-9-20-23
Date Collected: 04/18/13 10:45
Date Received: 04/18/13 19:10

Lab Sample ID: 720-49233-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	**23**		0.50		ug/L			04/19/13 17:43	1
1,1-Dichloroethane	**12**		0.50		ug/L			04/19/13 17:43	1
Dichlorodifluoromethane	ND		0.50		ug/L			04/19/13 17:43	1
Vinyl chloride	**26**		0.50		ug/L			04/19/13 17:43	1
Chloroethane	ND		1.0		ug/L			04/19/13 17:43	1
Trichlorofluoromethane	ND		1.0		ug/L			04/19/13 17:43	1
Methylene Chloride	ND		5.0		ug/L			04/19/13 17:43	1
trans-1,2-Dichloroethene	**35**		0.50		ug/L			04/19/13 17:43	1
cis-1,2-Dichloroethene	**5100**		250		ug/L			04/20/13 19:11	500
Chloroform	ND		1.0		ug/L			04/19/13 17:43	1
1,1,1-Trichloroethane	ND		0.50		ug/L			04/19/13 17:43	1
Carbon tetrachloride	ND		0.50		ug/L			04/19/13 17:43	1
1,2-Dichloroethane	ND		0.50		ug/L			04/19/13 17:43	1
Trichloroethene	**31000**		250		ug/L			04/20/13 19:11	500
1,2-Dichloropropane	ND		0.50		ug/L			04/19/13 17:43	1
Dichlorobromomethane	ND		0.50		ug/L			04/19/13 17:43	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			04/19/13 17:43	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			04/19/13 17:43	1
1,1,2-Trichloroethane	ND		0.50		ug/L			04/19/13 17:43	1
Tetrachloroethene	ND		0.50		ug/L			04/19/13 17:43	1
Chlorodibromomethane	ND		0.50		ug/L			04/19/13 17:43	1
Chlorobenzene	ND		0.50		ug/L			04/19/13 17:43	1
Bromoform	ND		1.0		ug/L			04/19/13 17:43	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			04/19/13 17:43	1
1,3-Dichlorobenzene	ND		0.50		ug/L			04/19/13 17:43	1
1,4-Dichlorobenzene	ND		0.50		ug/L			04/19/13 17:43	1
1,2-Dichlorobenzene	ND		0.50		ug/L			04/19/13 17:43	1
Chloromethane	ND		1.0		ug/L			04/19/13 17:43	1
Bromomethane	ND		1.0		ug/L			04/19/13 17:43	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			04/19/13 17:43	1
EDB	ND		0.50		ug/L			04/19/13 17:43	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			04/19/13 17:43	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*96*		*70 - 130*		*04/19/13 17:43*	*1*
Toluene-d8 (Surr)	*95*		*70 - 130*		*04/20/13 19:11*	*500*
4-Bromofluorobenzene	*104*		*67 - 130*		*04/19/13 17:43*	*1*
4-Bromofluorobenzene	*91*		*67 - 130*		*04/20/13 19:11*	*500*
1,2-Dichloroethane-d4 (Surr)	*104*		*75 - 138*		*04/19/13 17:43*	*1*
1,2-Dichloroethane-d4 (Surr)	*107*		*75 - 138*		*04/20/13 19:11*	*500*

Client Sample ID: SB-9-40-43
Date Collected: 04/18/13 12:05
Date Received: 04/18/13 19:10

Lab Sample ID: 720-49233-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	**2.2**		0.50		ug/L			04/19/13 18:11	1
1,1-Dichloroethane	**1.5**		0.50		ug/L			04/19/13 18:11	1
Dichlorodifluoromethane	ND		0.50		ug/L			04/19/13 18:11	1
Vinyl chloride	ND		0.50		ug/L			04/19/13 18:11	1
Chloroethane	ND		1.0		ug/L			04/19/13 18:11	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Client Sample ID: SB-9-40-43
Date Collected: 04/18/13 12:05
Date Received: 04/18/13 19:10

Lab Sample ID: 720-49233-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichlorofluoromethane	ND		1.0		ug/L			04/19/13 18:11	1
Methylene Chloride	ND		5.0		ug/L			04/19/13 18:11	1
trans-1,2-Dichloroethene	**96**		0.50		ug/L			04/19/13 18:11	1
cis-1,2-Dichloroethene	**270**		2.5		ug/L			04/20/13 18:44	5
Chloroform	ND		1.0		ug/L			04/19/13 18:11	1
1,1,1-Trichloroethane	ND		0.50		ug/L			04/19/13 18:11	1
Carbon tetrachloride	ND		0.50		ug/L			04/19/13 18:11	1
1,2-Dichloroethane	ND		0.50		ug/L			04/19/13 18:11	1
Trichloroethene	**220**		2.5		ug/L			04/20/13 18:44	5
1,2-Dichloropropane	ND		0.50		ug/L			04/19/13 18:11	1
Dichlorobromomethane	ND		0.50		ug/L			04/19/13 18:11	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			04/19/13 18:11	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			04/19/13 18:11	1
1,1,2-Trichloroethane	ND		0.50		ug/L			04/19/13 18:11	1
Tetrachloroethene	ND		0.50		ug/L			04/19/13 18:11	1
Chlorodibromomethane	ND		0.50		ug/L			04/19/13 18:11	1
Chlorobenzene	ND		0.50		ug/L			04/19/13 18:11	1
Bromoform	ND		1.0		ug/L			04/19/13 18:11	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			04/19/13 18:11	1
1,3-Dichlorobenzene	ND		0.50		ug/L			04/19/13 18:11	1
1,4-Dichlorobenzene	ND		0.50		ug/L			04/19/13 18:11	1
1,2-Dichlorobenzene	ND		0.50		ug/L			04/19/13 18:11	1
Chloromethane	ND		1.0		ug/L			04/19/13 18:11	1
Bromomethane	ND		1.0		ug/L			04/19/13 18:11	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			04/19/13 18:11	1
EDB	ND		0.50		ug/L			04/19/13 18:11	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			04/19/13 18:11	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*101*		*70 - 130*		*04/19/13 18:11*	*1*
Toluene-d8 (Surr)	*100*		*70 - 130*		*04/20/13 18:44*	*5*
4-Bromofluorobenzene	*104*		*67 - 130*		*04/19/13 18:11*	*1*
4-Bromofluorobenzene	*97*		*67 - 130*		*04/20/13 18:44*	*5*
1,2-Dichloroethane-d4 (Surr)	*105*		*75 - 138*		*04/19/13 18:11*	*1*
1,2-Dichloroethane-d4 (Surr)	*102*		*75 - 138*		*04/20/13 18:44*	*5*

Client Sample ID: SB-10-20.5-23
Date Collected: 04/18/13 14:45
Date Received: 04/18/13 19:10

Lab Sample ID: 720-49233-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	**4.1**		0.50		ug/L			04/19/13 18:40	1
1,1-Dichloroethane	**9.7**		0.50		ug/L			04/19/13 18:40	1
Dichlorodifluoromethane	ND		0.50		ug/L			04/19/13 18:40	1
Vinyl chloride	**5.5**		0.50		ug/L			04/19/13 18:40	1
Chloroethane	ND		1.0		ug/L			04/19/13 18:40	1
Trichlorofluoromethane	ND		1.0		ug/L			04/19/13 18:40	1
Methylene Chloride	ND		5.0		ug/L			04/19/13 18:40	1
trans-1,2-Dichloroethene	**4.8**		0.50		ug/L			04/19/13 18:40	1
cis-1,2-Dichloroethene	**620**		5.0		ug/L			04/20/13 19:13	10
Chloroform	ND		1.0		ug/L			04/19/13 18:40	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Client Sample ID: SB-10-20.5-23
Date Collected: 04/18/13 14:45
Date Received: 04/18/13 19:10

Lab Sample ID: 720-49233-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		0.50		ug/L			04/19/13 18:40	1
Carbon tetrachloride	ND		0.50		ug/L			04/19/13 18:40	1
1,2-Dichloroethane	ND		0.50		ug/L			04/19/13 18:40	1
Trichloroethene	**730**		5.0		ug/L			04/20/13 19:13	10
1,2-Dichloropropane	ND		0.50		ug/L			04/19/13 18:40	1
Dichlorobromomethane	ND		0.50		ug/L			04/19/13 18:40	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			04/19/13 18:40	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			04/19/13 18:40	1
1,1,2-Trichloroethane	ND		0.50		ug/L			04/19/13 18:40	1
Tetrachloroethene	ND		0.50		ug/L			04/19/13 18:40	1
Chlorodibromomethane	ND		0.50		ug/L			04/19/13 18:40	1
Chlorobenzene	ND		0.50		ug/L			04/19/13 18:40	1
Bromoform	ND		1.0		ug/L			04/19/13 18:40	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			04/19/13 18:40	1
1,3-Dichlorobenzene	ND		0.50		ug/L			04/19/13 18:40	1
1,4-Dichlorobenzene	ND		0.50		ug/L			04/19/13 18:40	1
1,2-Dichlorobenzene	ND		0.50		ug/L			04/19/13 18:40	1
Chloromethane	ND		1.0		ug/L			04/19/13 18:40	1
Bromomethane	ND		1.0		ug/L			04/19/13 18:40	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			04/19/13 18:40	1
EDB	ND		0.50		ug/L			04/19/13 18:40	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			04/19/13 18:40	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*101*		*70 - 130*		*04/19/13 18:40*	*1*
Toluene-d8 (Surr)	*100*		*70 - 130*		*04/20/13 19:13*	*10*
4-Bromofluorobenzene	*104*		*67 - 130*		*04/19/13 18:40*	*1*
4-Bromofluorobenzene	*98*		*67 - 130*		*04/20/13 19:13*	*10*
1,2-Dichloroethane-d4 (Surr)	*105*		*75 - 138*		*04/19/13 18:40*	*1*
1,2-Dichloroethane-d4 (Surr)	*101*		*75 - 138*		*04/20/13 19:13*	*10*

Client Sample ID: SB-10-35.5-38.5
Date Collected: 04/18/13 15:40
Date Received: 04/18/13 19:10

Lab Sample ID: 720-49233-4
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	**53**		0.50		ug/L			04/19/13 19:09	1
1,1-Dichloroethane	**44**		0.50		ug/L			04/19/13 19:09	1
Dichlorodifluoromethane	ND		0.50		ug/L			04/19/13 19:09	1
Vinyl chloride	**7.8**		0.50		ug/L			04/19/13 19:09	1
Chloroethane	ND		1.0		ug/L			04/19/13 19:09	1
Trichlorofluoromethane	ND		1.0		ug/L			04/19/13 19:09	1
Methylene Chloride	ND		5.0		ug/L			04/19/13 19:09	1
trans-1,2-Dichloroethene	**42**		0.50		ug/L			04/19/13 19:09	1
cis-1,2-Dichloroethene	**1100**		25		ug/L			04/22/13 13:46	50
Chloroform	ND		1.0		ug/L			04/19/13 19:09	1
1,1,1-Trichloroethane	ND		0.50		ug/L			04/19/13 19:09	1
Carbon tetrachloride	ND		0.50		ug/L			04/19/13 19:09	1
1,2-Dichloroethane	ND		0.50		ug/L			04/19/13 19:09	1
Trichloroethene	**1400**		25		ug/L			04/22/13 13:46	50
1,2-Dichloropropane	ND		0.50		ug/L			04/19/13 19:09	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Client Sample ID: SB-10-35.5-38.5
Date Collected: 04/18/13 15:40
Date Received: 04/18/13 19:10

Lab Sample ID: 720-49233-4
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorobromomethane	ND		0.50		ug/L			04/19/13 19:09	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			04/19/13 19:09	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			04/19/13 19:09	1
1,1,2-Trichloroethane	ND		0.50		ug/L			04/19/13 19:09	1
Tetrachloroethene	ND		0.50		ug/L			04/19/13 19:09	1
Chlorodibromomethane	ND		0.50		ug/L			04/19/13 19:09	1
Chlorobenzene	ND		0.50		ug/L			04/19/13 19:09	1
Bromoform	ND		1.0		ug/L			04/19/13 19:09	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			04/19/13 19:09	1
1,3-Dichlorobenzene	ND		0.50		ug/L			04/19/13 19:09	1
1,4-Dichlorobenzene	ND		0.50		ug/L			04/19/13 19:09	1
1,2-Dichlorobenzene	ND		0.50		ug/L			04/19/13 19:09	1
Chloromethane	ND		1.0		ug/L			04/19/13 19:09	1
Bromomethane	ND		1.0		ug/L			04/19/13 19:09	1
1,1,2-Trichloro-1,2,2-trifluoroethane	**0.89**		0.50		ug/L			04/19/13 19:09	1
EDB	ND		0.50		ug/L			04/19/13 19:09	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			04/19/13 19:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*101*		*70 - 130*		*04/19/13 19:09*	*1*
Toluene-d8 (Surr)	*97*		*70 - 130*		*04/22/13 13:46*	*50*
4-Bromofluorobenzene	*105*		*67 - 130*		*04/19/13 19:09*	*1*
4-Bromofluorobenzene	*94*		*67 - 130*		*04/22/13 13:46*	*50*
1,2-Dichloroethane-d4 (Surr)	*104*		*75 - 138*		*04/19/13 19:09*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*75 - 138*		*04/22/13 13:46*	*50*

Client Sample ID: TAL SF TB
Date Collected: 04/18/13 00:00
Date Received: 04/18/13 19:10

Lab Sample ID: 720-49233-5
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	ND		0.50		ug/L			04/20/13 14:59	1
1,1-Dichloroethane	ND		0.50		ug/L			04/20/13 14:59	1
Dichlorodifluoromethane	ND		0.50		ug/L			04/20/13 14:59	1
Vinyl chloride	ND		0.50		ug/L			04/20/13 14:59	1
Chloroethane	ND		1.0		ug/L			04/20/13 14:59	1
Trichlorofluoromethane	ND		1.0		ug/L			04/20/13 14:59	1
Methylene Chloride	ND		5.0		ug/L			04/20/13 14:59	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			04/20/13 14:59	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			04/20/13 14:59	1
Chloroform	ND		1.0		ug/L			04/20/13 14:59	1
1,1,1-Trichloroethane	ND		0.50		ug/L			04/20/13 14:59	1
Carbon tetrachloride	ND		0.50		ug/L			04/20/13 14:59	1
1,2-Dichloroethane	ND		0.50		ug/L			04/20/13 14:59	1
Trichloroethene	ND		0.50		ug/L			04/20/13 14:59	1
1,2-Dichloropropane	ND		0.50		ug/L			04/20/13 14:59	1
Dichlorobromomethane	ND		0.50		ug/L			04/20/13 14:59	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			04/20/13 14:59	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			04/20/13 14:59	1
1,1,2-Trichloroethane	ND		0.50		ug/L			04/20/13 14:59	1

Client: Geosyntec Consultants, Inc.
Project/Site: MEW

TestAmerica Job ID: 720-49233-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Client Sample ID: TAL SF TB
Date Collected: 04/18/13 00:00
Date Received: 04/18/13 19:10

Lab Sample ID: 720-49233-5
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	ND		0.50		ug/L			04/20/13 14:59	1
Chlorodibromomethane	ND		0.50		ug/L			04/20/13 14:59	1
Chlorobenzene	ND		0.50		ug/L			04/20/13 14:59	1
Bromoform	ND		1.0		ug/L			04/20/13 14:59	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			04/20/13 14:59	1
1,3-Dichlorobenzene	ND		0.50		ug/L			04/20/13 14:59	1
1,4-Dichlorobenzene	ND		0.50		ug/L			04/20/13 14:59	1
1,2-Dichlorobenzene	ND		0.50		ug/L			04/20/13 14:59	1
Chloromethane	ND		1.0		ug/L			04/20/13 14:59	1
Bromomethane	ND		1.0		ug/L			04/20/13 14:59	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			04/20/13 14:59	1
EDB	ND		0.50		ug/L			04/20/13 14:59	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			04/20/13 14:59	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*96*		*70 - 130*		*04/20/13 14:59*	*1*
4-Bromofluorobenzene	*93*		*67 - 130*		*04/20/13 14:59*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*75 - 138*		*04/20/13 14:59*	*1*

Client: Geosyntec Consultants, Inc.
Project/Site: MEW

TestAmerica Job ID: 720-49233-1

Method: 8270C LL - Semivolatile Organic Compounds by GCMS - Low Levels

Client Sample ID: SB-9-20-23 — **Lab Sample ID: 720-49233-1**
Date Collected: 04/18/13 10:45 — **Matrix: Water**
Date Received: 04/18/13 19:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	4.7		1.1		ug/L		04/21/13 11:20	04/23/13 14:36	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*76*		*57 - 120*	*04/21/13 11:20*	*04/23/13 14:36*	*1*

Client Sample ID: SB-9-40-43 — **Lab Sample ID: 720-49233-2**
Date Collected: 04/18/13 12:05 — **Matrix: Water**
Date Received: 04/18/13 19:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		1.1		ug/L		04/21/13 11:20	04/23/13 15:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*75*		*57 - 120*	*04/21/13 11:20*	*04/23/13 15:09*	*1*

Client Sample ID: SB-10-20.5-23 — **Lab Sample ID: 720-49233-3**
Date Collected: 04/18/13 14:45 — **Matrix: Water**
Date Received: 04/18/13 19:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	6.6		1.2		ug/L		04/21/13 11:20	04/23/13 15:42	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*83*		*57 - 120*	*04/21/13 11:20*	*04/23/13 15:42*	*1*

Client Sample ID: SB-10-35.5-38.5 — **Lab Sample ID: 720-49233-4**
Date Collected: 04/18/13 15:40 — **Matrix: Water**
Date Received: 04/18/13 19:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	6.8		1.2		ug/L		04/21/13 11:20	04/23/13 16:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*76*		*57 - 120*	*04/21/13 11:20*	*04/23/13 16:15*	*1*

General Chemistry

Client Sample ID: SB-9-20-23
Date Collected: 04/18/13 10:45
Date Received: 04/18/13 19:10

Lab Sample ID: 720-49233-1
Matrix: Water

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	910		10		mg/L			04/19/13 16:46	1

Client Sample ID: SB-10-20.5-23
Date Collected: 04/18/13 14:45
Date Received: 04/18/13 19:10

Lab Sample ID: 720-49233-3
Matrix: Water

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	810		10		mg/L			04/19/13 16:46	1

Client Sample ID: SB-10-35.5-38.5
Date Collected: 04/18/13 15:40
Date Received: 04/18/13 19:10

Lab Sample ID: 720-49233-4
Matrix: Water

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	690		10		mg/L			04/19/13 16:46	1

Client: Geosyntec Consultants, Inc.
Project/Site: MEW

TestAmerica Job ID: 720-49233-1

General Chemistry - Dissolved

Client Sample ID: SB-9-20-23 — **Lab Sample ID: 720-49233-1**
Date Collected: 04/18/13 10:45 — **Matrix: Water**
Date Received: 04/18/13 19:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cr (VI)	ND		0.50		ug/L			04/18/13 21:46	1

Client Sample ID: SB-10-20.5-23 — **Lab Sample ID: 720-49233-3**
Date Collected: 04/18/13 14:45 — **Matrix: Water**
Date Received: 04/18/13 19:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cr (VI)	ND		0.50		ug/L			04/18/13 21:58	1

Client Sample ID: SB-10-35.5-38.5 — **Lab Sample ID: 720-49233-4**
Date Collected: 04/18/13 15:40 — **Matrix: Water**
Date Received: 04/18/13 19:10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cr (VI)	ND		0.50		ug/L			04/18/13 22:09	1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 720-134740/4
Matrix: Water
Analysis Batch: 134740

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	ND		0.50		ug/L			04/19/13 10:03	1
1,1-Dichloroethane	ND		0.50		ug/L			04/19/13 10:03	1
Dichlorodifluoromethane	ND		0.50		ug/L			04/19/13 10:03	1
Vinyl chloride	ND		0.50		ug/L			04/19/13 10:03	1
Chloroethane	ND		1.0		ug/L			04/19/13 10:03	1
Trichlorofluoromethane	ND		1.0		ug/L			04/19/13 10:03	1
Methylene Chloride	ND		5.0		ug/L			04/19/13 10:03	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			04/19/13 10:03	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			04/19/13 10:03	1
Chloroform	ND		1.0		ug/L			04/19/13 10:03	1
1,1,1-Trichloroethane	ND		0.50		ug/L			04/19/13 10:03	1
Carbon tetrachloride	ND		0.50		ug/L			04/19/13 10:03	1
1,2-Dichloroethane	ND		0.50		ug/L			04/19/13 10:03	1
Trichloroethene	ND		0.50		ug/L			04/19/13 10:03	1
1,2-Dichloropropane	ND		0.50		ug/L			04/19/13 10:03	1
Dichlorobromomethane	ND		0.50		ug/L			04/19/13 10:03	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			04/19/13 10:03	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			04/19/13 10:03	1
1,1,2-Trichloroethane	ND		0.50		ug/L			04/19/13 10:03	1
Tetrachloroethene	ND		0.50		ug/L			04/19/13 10:03	1
Chlorodibromomethane	ND		0.50		ug/L			04/19/13 10:03	1
Chlorobenzene	ND		0.50		ug/L			04/19/13 10:03	1
Bromoform	ND		1.0		ug/L			04/19/13 10:03	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			04/19/13 10:03	1
1,3-Dichlorobenzene	ND		0.50		ug/L			04/19/13 10:03	1
1,4-Dichlorobenzene	ND		0.50		ug/L			04/19/13 10:03	1
1,2-Dichlorobenzene	ND		0.50		ug/L			04/19/13 10:03	1
Chloromethane	ND		1.0		ug/L			04/19/13 10:03	1
Bromomethane	ND		1.0		ug/L			04/19/13 10:03	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			04/19/13 10:03	1
EDB	ND		0.50		ug/L			04/19/13 10:03	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			04/19/13 10:03	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*100*		*70 - 130*		*04/19/13 10:03*	*1*
4-Bromofluorobenzene	*103*		*67 - 130*		*04/19/13 10:03*	*1*
1,2-Dichloroethane-d4 (Surr)	*103*		*75 - 138*		*04/19/13 10:03*	*1*

Lab Sample ID: LCS 720-134740/5
Matrix: Water
Analysis Batch: 134740

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	25.0	22.6		ug/L		90	64 - 128
1,1-Dichloroethane	25.0	24.7		ug/L		99	70 - 130
Dichlorodifluoromethane	25.0	16.3		ug/L		65	34 - 132
Vinyl chloride	25.0	20.9		ug/L		84	54 - 135
Chloroethane	25.0	23.0		ug/L		92	62 - 138

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 720-134740/5
Matrix: Water
Analysis Batch: 134740

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Trichlorofluoromethane	25.0	23.7		ug/L		95	66 - 132
Methylene Chloride	25.0	23.0		ug/L		92	70 - 147
trans-1,2-Dichloroethene	25.0	24.4		ug/L		98	68 - 130
cis-1,2-Dichloroethene	25.0	25.3		ug/L		101	70 - 130
Chloroform	25.0	24.7		ug/L		99	70 - 130
1,1,1-Trichloroethane	25.0	24.6		ug/L		98	70 - 130
Carbon tetrachloride	25.0	25.4		ug/L		102	70 - 146
1,2-Dichloroethane	25.0	25.2		ug/L		101	61 - 132
Trichloroethene	25.0	25.4		ug/L		101	70 - 130
1,2-Dichloropropane	25.0	25.1		ug/L		100	70 - 130
Dichlorobromomethane	25.0	26.5		ug/L		106	70 - 130
trans-1,3-Dichloropropene	25.0	27.6		ug/L		110	70 - 140
cis-1,3-Dichloropropene	25.0	28.7		ug/L		115	70 - 130
1,1,2-Trichloroethane	25.0	25.8		ug/L		103	70 - 130
Tetrachloroethene	25.0	24.6		ug/L		99	70 - 130
Chlorodibromomethane	25.0	27.5		ug/L		110	70 - 145
Chlorobenzene	25.0	24.6		ug/L		98	70 - 130
Bromoform	25.0	27.9		ug/L		112	68 - 136
1,1,2,2-Tetrachloroethane	25.0	25.5		ug/L		102	70 - 130
1,3-Dichlorobenzene	25.0	25.1		ug/L		100	70 - 130
1,4-Dichlorobenzene	25.0	25.0		ug/L		100	70 - 130
1,2-Dichlorobenzene	25.0	25.2		ug/L		101	70 - 130
Chloromethane	25.0	20.8		ug/L		83	52 - 175
Bromomethane	25.0	22.9		ug/L		92	43 - 151
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	25.1		ug/L		100	42 - 162
EDB	25.0	26.8		ug/L		107	70 - 130
1,2,4-Trichlorobenzene	25.0	26.5		ug/L		106	70 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*102*		*70 - 130*
4-Bromofluorobenzene	*96*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*99*		*75 - 138*

Lab Sample ID: LCSD 720-134740/6
Matrix: Water
Analysis Batch: 134740

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1-Dichloroethene	25.0	23.7		ug/L		95	64 - 128	5	20
1,1-Dichloroethane	25.0	24.7		ug/L		99	70 - 130	0	20
Dichlorodifluoromethane	25.0	17.6		ug/L		71	34 - 132	8	20
Vinyl chloride	25.0	21.8		ug/L		87	54 - 135	4	20
Chloroethane	25.0	25.2		ug/L		101	62 - 138	9	20
Trichlorofluoromethane	25.0	25.0		ug/L		100	66 - 132	5	20
Methylene Chloride	25.0	23.9		ug/L		96	70 - 147	4	20
trans-1,2-Dichloroethene	25.0	24.4		ug/L		97	68 - 130	0	20
cis-1,2-Dichloroethene	25.0	25.3		ug/L		101	70 - 130	0	20

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 720-134740/6
Matrix: Water
Analysis Batch: 134740

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloroform			25.0	24.8		ug/L		99	70 - 130	1	20
1,1,1-Trichloroethane			25.0	25.1		ug/L		100	70 - 130	2	20
Carbon tetrachloride			25.0	26.0		ug/L		104	70 - 146	2	20
1,2-Dichloroethane			25.0	25.4		ug/L		101	61 - 132	1	20
Trichloroethene			25.0	25.6		ug/L		102	70 - 130	1	20
1,2-Dichloropropane			25.0	25.3		ug/L		101	70 - 130	1	20
Dichlorobromomethane			25.0	26.9		ug/L		108	70 - 130	2	20
trans-1,3-Dichloropropene			25.0	28.3		ug/L		113	70 - 140	3	20
cis-1,3-Dichloropropene			25.0	29.1		ug/L		116	70 - 130	1	20
1,1,2-Trichloroethane			25.0	26.6		ug/L		106	70 - 130	3	20
Tetrachloroethene			25.0	25.2		ug/L		101	70 - 130	2	20
Chlorodibromomethane			25.0	28.5		ug/L		114	70 - 145	4	20
Chlorobenzene			25.0	24.8		ug/L		99	70 - 130	1	20
Bromoform			25.0	28.8		ug/L		115	68 - 136	3	20
1,1,2,2-Tetrachloroethane			25.0	26.4		ug/L		106	70 - 130	3	20
1,3-Dichlorobenzene			25.0	25.0		ug/L		100	70 - 130	0	20
1,4-Dichlorobenzene			25.0	25.1		ug/L		101	70 - 130	1	20
1,2-Dichlorobenzene			25.0	25.2		ug/L		101	70 - 130	0	20
Chloromethane			25.0	22.2		ug/L		89	52 - 175	6	20
Bromomethane			25.0	25.0		ug/L		100	43 - 151	9	20
1,1,2-Trichloro-1,2,2-trifluoroethane			25.0	26.9		ug/L		108	42 - 162	7	20
EDB			25.0	28.5		ug/L		114	70 - 130	6	20
1,2,4-Trichlorobenzene			25.0	26.9		ug/L		108	70 - 130	2	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*103*		*70 - 130*
4-Bromofluorobenzene	*101*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*102*		*75 - 138*

Lab Sample ID: MB 720-134846/4
Matrix: Water
Analysis Batch: 134846

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	ND		0.50		ug/L			04/20/13 09:50	1
1,1-Dichloroethane	ND		0.50		ug/L			04/20/13 09:50	1
Dichlorodifluoromethane	ND		0.50		ug/L			04/20/13 09:50	1
Vinyl chloride	ND		0.50		ug/L			04/20/13 09:50	1
Chloroethane	ND		1.0		ug/L			04/20/13 09:50	1
Trichlorofluoromethane	ND		1.0		ug/L			04/20/13 09:50	1
Methylene Chloride	ND		5.0		ug/L			04/20/13 09:50	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			04/20/13 09:50	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			04/20/13 09:50	1
Chloroform	ND		1.0		ug/L			04/20/13 09:50	1
1,1,1-Trichloroethane	ND		0.50		ug/L			04/20/13 09:50	1
Carbon tetrachloride	ND		0.50		ug/L			04/20/13 09:50	1
1,2-Dichloroethane	ND		0.50		ug/L			04/20/13 09:50	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 720-134846/4
Matrix: Water
Analysis Batch: 134846

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	ND		0.50		ug/L			04/20/13 09:50	1
1,2-Dichloropropane	ND		0.50		ug/L			04/20/13 09:50	1
Dichlorobromomethane	ND		0.50		ug/L			04/20/13 09:50	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			04/20/13 09:50	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			04/20/13 09:50	1
1,1,2-Trichloroethane	ND		0.50		ug/L			04/20/13 09:50	1
Tetrachloroethene	ND		0.50		ug/L			04/20/13 09:50	1
Chlorodibromomethane	ND		0.50		ug/L			04/20/13 09:50	1
Chlorobenzene	ND		0.50		ug/L			04/20/13 09:50	1
Bromoform	ND		1.0		ug/L			04/20/13 09:50	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			04/20/13 09:50	1
1,3-Dichlorobenzene	ND		0.50		ug/L			04/20/13 09:50	1
1,4-Dichlorobenzene	ND		0.50		ug/L			04/20/13 09:50	1
1,2-Dichlorobenzene	ND		0.50		ug/L			04/20/13 09:50	1
Chloromethane	ND		1.0		ug/L			04/20/13 09:50	1
Bromomethane	ND		1.0		ug/L			04/20/13 09:50	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			04/20/13 09:50	1
EDB	ND		0.50		ug/L			04/20/13 09:50	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			04/20/13 09:50	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*101*		*70 - 130*		*04/20/13 09:50*	*1*
4-Bromofluorobenzene	*101*		*67 - 130*		*04/20/13 09:50*	*1*
1,2-Dichloroethane-d4 (Surr)	*103*		*75 - 138*		*04/20/13 09:50*	*1*

Lab Sample ID: LCS 720-134846/5
Matrix: Water
Analysis Batch: 134846

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	25.0	24.2		ug/L		97	64 - 128
1,1-Dichloroethane	25.0	25.0		ug/L		100	70 - 130
Dichlorodifluoromethane	25.0	20.1		ug/L		80	34 - 132
Vinyl chloride	25.0	24.0		ug/L		96	54 - 135
Chloroethane	25.0	26.9		ug/L		108	62 - 138
Trichlorofluoromethane	25.0	25.7		ug/L		103	66 - 132
Methylene Chloride	25.0	23.9		ug/L		96	70 - 147
trans-1,2-Dichloroethene	25.0	24.6		ug/L		98	68 - 130
cis-1,2-Dichloroethene	25.0	25.8		ug/L		103	70 - 130
Chloroform	25.0	25.2		ug/L		101	70 - 130
1,1,1-Trichloroethane	25.0	25.0		ug/L		100	70 - 130
Carbon tetrachloride	25.0	26.2		ug/L		105	70 - 146
1,2-Dichloroethane	25.0	26.0		ug/L		104	61 - 132
Trichloroethene	25.0	25.8		ug/L		103	70 - 130
1,2-Dichloropropane	25.0	25.7		ug/L		103	70 - 130
Dichlorobromomethane	25.0	27.1		ug/L		108	70 - 130
trans-1,3-Dichloropropene	25.0	28.9		ug/L		116	70 - 140
cis-1,3-Dichloropropene	25.0	29.8		ug/L		119	70 - 130

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 720-134846/5
Matrix: Water
Analysis Batch: 134846

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,2-Trichloroethane	25.0	27.6		ug/L		110	70 - 130
Tetrachloroethene	25.0	25.4		ug/L		102	70 - 130
Chlorodibromomethane	25.0	29.1		ug/L		117	70 - 145
Chlorobenzene	25.0	25.5		ug/L		102	70 - 130
Bromoform	25.0	31.1		ug/L		124	68 - 136
1,1,2,2-Tetrachloroethane	25.0	27.7		ug/L		111	70 - 130
1,3-Dichlorobenzene	25.0	25.2		ug/L		101	70 - 130
1,4-Dichlorobenzene	25.0	25.0		ug/L		100	70 - 130
1,2-Dichlorobenzene	25.0	25.1		ug/L		100	70 - 130
Chloromethane	25.0	24.7		ug/L		99	52 - 175
Bromomethane	25.0	27.4		ug/L		110	43 - 151
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	27.4		ug/L		110	42 - 162
EDB	25.0	29.3		ug/L		117	70 - 130
1,2,4-Trichlorobenzene	25.0	26.3		ug/L		105	70 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*103*		*70 - 130*
4-Bromofluorobenzene	*105*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*103*		*75 - 138*

Lab Sample ID: LCSD 720-134846/6
Matrix: Water
Analysis Batch: 134846

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1-Dichloroethene	25.0	24.2		ug/L		97	64 - 128	0	20
1,1-Dichloroethane	25.0	25.1		ug/L		100	70 - 130	0	20
Dichlorodifluoromethane	25.0	20.4		ug/L		82	34 - 132	1	20
Vinyl chloride	25.0	24.0		ug/L		96	54 - 135	0	20
Chloroethane	25.0	26.4		ug/L		105	62 - 138	2	20
Trichlorofluoromethane	25.0	26.0		ug/L		104	66 - 132	1	20
Methylene Chloride	25.0	23.7		ug/L		95	70 - 147	1	20
trans-1,2-Dichloroethene	25.0	24.8		ug/L		99	68 - 130	1	20
cis-1,2-Dichloroethene	25.0	25.6		ug/L		102	70 - 130	1	20
Chloroform	25.0	25.2		ug/L		101	70 - 130	0	20
1,1,1-Trichloroethane	25.0	25.4		ug/L		101	70 - 130	1	20
Carbon tetrachloride	25.0	26.2		ug/L		105	70 - 146	0	20
1,2-Dichloroethane	25.0	25.5		ug/L		102	61 - 132	2	20
Trichloroethene	25.0	25.7		ug/L		103	70 - 130	1	20
1,2-Dichloropropane	25.0	25.6		ug/L		102	70 - 130	0	20
Dichlorobromomethane	25.0	27.1		ug/L		109	70 - 130	0	20
trans-1,3-Dichloropropene	25.0	28.5		ug/L		114	70 - 140	1	20
cis-1,3-Dichloropropene	25.0	29.5		ug/L		118	70 - 130	1	20
1,1,2-Trichloroethane	25.0	26.9		ug/L		107	70 - 130	3	20
Tetrachloroethene	25.0	25.4		ug/L		102	70 - 130	0	20
Chlorodibromomethane	25.0	28.3		ug/L		113	70 - 145	3	20
Chlorobenzene	25.0	25.6		ug/L		102	70 - 130	0	20

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 720-134846/6
Matrix: Water
Analysis Batch: 134846

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Bromoform			25.0	29.9		ug/L		120	68 - 136	4	20
1,1,2,2-Tetrachloroethane			25.0	26.7		ug/L		107	70 - 130	4	20
1,3-Dichlorobenzene			25.0	25.3		ug/L		101	70 - 130	1	20
1,4-Dichlorobenzene			25.0	25.3		ug/L		101	70 - 130	2	20
1,2-Dichlorobenzene			25.0	25.4		ug/L		102	70 - 130	1	20
Chloromethane			25.0	24.3		ug/L		97	52 - 175	2	20
Bromomethane			25.0	26.6		ug/L		107	43 - 151	3	20
1,1,2-Trichloro-1,2,2-trifluoroethane			25.0	27.6		ug/L		110	42 - 162	1	20
EDB			25.0	28.6		ug/L		114	70 - 130	2	20
1,2,4-Trichlorobenzene			25.0	26.9		ug/L		108	70 - 130	2	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*102*		*70 - 130*
4-Bromofluorobenzene	*104*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*102*		*75 - 138*

Lab Sample ID: MB 720-134847/4
Matrix: Water
Analysis Batch: 134847

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	ND		0.50		ug/L			04/20/13 09:47	1
1,1-Dichloroethane	ND		0.50		ug/L			04/20/13 09:47	1
Dichlorodifluoromethane	ND		0.50		ug/L			04/20/13 09:47	1
Vinyl chloride	ND		0.50		ug/L			04/20/13 09:47	1
Chloroethane	ND		1.0		ug/L			04/20/13 09:47	1
Trichlorofluoromethane	ND		1.0		ug/L			04/20/13 09:47	1
Methylene Chloride	ND		5.0		ug/L			04/20/13 09:47	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			04/20/13 09:47	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			04/20/13 09:47	1
Chloroform	ND		1.0		ug/L			04/20/13 09:47	1
1,1,1-Trichloroethane	ND		0.50		ug/L			04/20/13 09:47	1
Carbon tetrachloride	ND		0.50		ug/L			04/20/13 09:47	1
1,2-Dichloroethane	ND		0.50		ug/L			04/20/13 09:47	1
Trichloroethene	ND		0.50		ug/L			04/20/13 09:47	1
1,2-Dichloropropane	ND		0.50		ug/L			04/20/13 09:47	1
Dichlorobromomethane	ND		0.50		ug/L			04/20/13 09:47	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			04/20/13 09:47	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			04/20/13 09:47	1
1,1,2-Trichloroethane	ND		0.50		ug/L			04/20/13 09:47	1
Tetrachloroethene	ND		0.50		ug/L			04/20/13 09:47	1
Chlorodibromomethane	ND		0.50		ug/L			04/20/13 09:47	1
Chlorobenzene	ND		0.50		ug/L			04/20/13 09:47	1
Bromoform	ND		1.0		ug/L			04/20/13 09:47	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			04/20/13 09:47	1
1,3-Dichlorobenzene	ND		0.50		ug/L			04/20/13 09:47	1
1,4-Dichlorobenzene	ND		0.50		ug/L			04/20/13 09:47	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 720-134847/4
Matrix: Water
Analysis Batch: 134847

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dichlorobenzene	ND		0.50		ug/L			04/20/13 09:47	1
Chloromethane	ND		1.0		ug/L			04/20/13 09:47	1
Bromomethane	ND		1.0		ug/L			04/20/13 09:47	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			04/20/13 09:47	1
EDB	ND		0.50		ug/L			04/20/13 09:47	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			04/20/13 09:47	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*96*		*70 - 130*		*04/20/13 09:47*	*1*
4-Bromofluorobenzene	*92*		*67 - 130*		*04/20/13 09:47*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*75 - 138*		*04/20/13 09:47*	*1*

Lab Sample ID: LCS 720-134847/5
Matrix: Water
Analysis Batch: 134847

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	25.0	21.5		ug/L		86	64 - 128
1,1-Dichloroethane	25.0	22.2		ug/L		89	70 - 130
Dichlorodifluoromethane	25.0	17.2		ug/L		69	34 - 132
Vinyl chloride	25.0	20.6		ug/L		82	54 - 135
Chloroethane	25.0	20.7		ug/L		83	62 - 138
Trichlorofluoromethane	25.0	22.1		ug/L		89	66 - 132
Methylene Chloride	25.0	22.0		ug/L		88	70 - 147
trans-1,2-Dichloroethene	25.0	22.4		ug/L		90	68 - 130
cis-1,2-Dichloroethene	25.0	22.9		ug/L		92	70 - 130
Chloroform	25.0	22.7		ug/L		91	70 - 130
1,1,1-Trichloroethane	25.0	21.6		ug/L		87	70 - 130
Carbon tetrachloride	25.0	23.3		ug/L		93	70 - 146
1,2-Dichloroethane	25.0	22.7		ug/L		91	61 - 132
Trichloroethene	25.0	21.9		ug/L		88	70 - 130
1,2-Dichloropropane	25.0	22.8		ug/L		91	70 - 130
Dichlorobromomethane	25.0	23.9		ug/L		96	70 - 130
trans-1,3-Dichloropropene	25.0	26.1		ug/L		104	70 - 140
cis-1,3-Dichloropropene	25.0	27.5		ug/L		110	70 - 130
1,1,2-Trichloroethane	25.0	22.8		ug/L		91	70 - 130
Tetrachloroethene	25.0	22.7		ug/L		91	70 - 130
Chlorodibromomethane	25.0	24.5		ug/L		98	70 - 145
Chlorobenzene	25.0	22.0		ug/L		88	70 - 130
Bromoform	25.0	24.7		ug/L		99	68 - 136
1,1,2,2-Tetrachloroethane	25.0	21.8		ug/L		87	70 - 130
1,3-Dichlorobenzene	25.0	22.2		ug/L		89	70 - 130
1,4-Dichlorobenzene	25.0	22.4		ug/L		90	70 - 130
1,2-Dichlorobenzene	25.0	22.6		ug/L		90	70 - 130
Chloromethane	25.0	21.1		ug/L		85	52 - 175
Bromomethane	25.0	24.6		ug/L		98	43 - 151
1,1,2-Trichloro-1,2,2-trifluoroetha ne	25.0	22.8		ug/L		91	42 - 162

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 720-134847/5
Matrix: Water
Analysis Batch: 134847

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
EDB			25.0	23.4		ug/L		94	70 - 130		
1,2,4-Trichlorobenzene			25.0	22.4		ug/L		90	70 - 130		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*99*		*70 - 130*
4-Bromofluorobenzene	*96*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*95*		*75 - 138*

Lab Sample ID: LCSD 720-134847/6
Matrix: Water
Analysis Batch: 134847

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1-Dichloroethene			25.0	21.7		ug/L		87	64 - 128	1	20
1,1-Dichloroethane			25.0	22.5		ug/L		90	70 - 130	1	20
Dichlorodifluoromethane			25.0	17.0		ug/L		68	34 - 132	1	20
Vinyl chloride			25.0	20.8		ug/L		83	54 - 135	1	20
Chloroethane			25.0	21.1		ug/L		85	62 - 138	2	20
Trichlorofluoromethane			25.0	21.9		ug/L		88	66 - 132	1	20
Methylene Chloride			25.0	22.7		ug/L		91	70 - 147	3	20
trans-1,2-Dichloroethene			25.0	22.6		ug/L		91	68 - 130	1	20
cis-1,2-Dichloroethene			25.0	23.3		ug/L		93	70 - 130	2	20
Chloroform			25.0	23.0		ug/L		92	70 - 130	1	20
1,1,1-Trichloroethane			25.0	21.7		ug/L		87	70 - 130	0	20
Carbon tetrachloride			25.0	23.2		ug/L		93	70 - 146	0	20
1,2-Dichloroethane			25.0	22.8		ug/L		91	61 - 132	0	20
Trichloroethene			25.0	21.9		ug/L		88	70 - 130	0	20
1,2-Dichloropropane			25.0	22.9		ug/L		92	70 - 130	1	20
Dichlorobromomethane			25.0	24.1		ug/L		96	70 - 130	1	20
trans-1,3-Dichloropropene			25.0	26.9		ug/L		108	70 - 140	3	20
cis-1,3-Dichloropropene			25.0	27.8		ug/L		111	70 - 130	1	20
1,1,2-Trichloroethane			25.0	23.2		ug/L		93	70 - 130	1	20
Tetrachloroethene			25.0	22.7		ug/L		91	70 - 130	0	20
Chlorodibromomethane			25.0	25.2		ug/L		101	70 - 145	3	20
Chlorobenzene			25.0	22.4		ug/L		90	70 - 130	2	20
Bromoform			25.0	25.3		ug/L		101	68 - 136	2	20
1,1,2,2-Tetrachloroethane			25.0	21.7		ug/L		87	70 - 130	0	20
1,3-Dichlorobenzene			25.0	22.6		ug/L		90	70 - 130	2	20
1,4-Dichlorobenzene			25.0	22.7		ug/L		91	70 - 130	1	20
1,2-Dichlorobenzene			25.0	23.0		ug/L		92	70 - 130	2	20
Chloromethane			25.0	21.4		ug/L		86	52 - 175	1	20
Bromomethane			25.0	24.5		ug/L		98	43 - 151	0	20
1,1,2-Trichloro-1,2,2-trifluoroetha ne			25.0	22.6		ug/L		90	42 - 162	1	20
EDB			25.0	23.8		ug/L		95	70 - 130	2	20
1,2,4-Trichlorobenzene			25.0	23.4		ug/L		93	70 - 130	4	20

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 720-134847/6
Matrix: Water
Analysis Batch: 134847

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Toluene-d8 (Surr)	*98*		*70 - 130*
4-Bromofluorobenzene	*98*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*94*		*75 - 138*

Lab Sample ID: MB 720-134880/5
Matrix: Water
Analysis Batch: 134880

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	ND		0.50		ug/L			04/22/13 08:59	1
1,1-Dichloroethane	ND		0.50		ug/L			04/22/13 08:59	1
Dichlorodifluoromethane	ND		0.50		ug/L			04/22/13 08:59	1
Vinyl chloride	ND		0.50		ug/L			04/22/13 08:59	1
Chloroethane	ND		1.0		ug/L			04/22/13 08:59	1
Trichlorofluoromethane	ND		1.0		ug/L			04/22/13 08:59	1
Methylene Chloride	ND		5.0		ug/L			04/22/13 08:59	1
trans-1,2-Dichloroethene	ND		0.50		ug/L			04/22/13 08:59	1
cis-1,2-Dichloroethene	ND		0.50		ug/L			04/22/13 08:59	1
Chloroform	ND		1.0		ug/L			04/22/13 08:59	1
1,1,1-Trichloroethane	ND		0.50		ug/L			04/22/13 08:59	1
Carbon tetrachloride	ND		0.50		ug/L			04/22/13 08:59	1
1,2-Dichloroethane	ND		0.50		ug/L			04/22/13 08:59	1
Trichloroethene	ND		0.50		ug/L			04/22/13 08:59	1
1,2-Dichloropropane	ND		0.50		ug/L			04/22/13 08:59	1
Dichlorobromomethane	ND		0.50		ug/L			04/22/13 08:59	1
trans-1,3-Dichloropropene	ND		0.50		ug/L			04/22/13 08:59	1
cis-1,3-Dichloropropene	ND		0.50		ug/L			04/22/13 08:59	1
1,1,2-Trichloroethane	ND		0.50		ug/L			04/22/13 08:59	1
Tetrachloroethene	ND		0.50		ug/L			04/22/13 08:59	1
Chlorodibromomethane	ND		0.50		ug/L			04/22/13 08:59	1
Chlorobenzene	ND		0.50		ug/L			04/22/13 08:59	1
Bromoform	ND		1.0		ug/L			04/22/13 08:59	1
1,1,2,2-Tetrachloroethane	ND		0.50		ug/L			04/22/13 08:59	1
1,3-Dichlorobenzene	ND		0.50		ug/L			04/22/13 08:59	1
1,4-Dichlorobenzene	ND		0.50		ug/L			04/22/13 08:59	1
1,2-Dichlorobenzene	ND		0.50		ug/L			04/22/13 08:59	1
Chloromethane	ND		1.0		ug/L			04/22/13 08:59	1
Bromomethane	ND		1.0		ug/L			04/22/13 08:59	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.50		ug/L			04/22/13 08:59	1
EDB	ND		0.50		ug/L			04/22/13 08:59	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			04/22/13 08:59	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Toluene-d8 (Surr)	*95*		*70 - 130*		*04/22/13 08:59*	*1*
4-Bromofluorobenzene	*93*		*67 - 130*		*04/22/13 08:59*	*1*
1,2-Dichloroethane-d4 (Surr)	*100*		*75 - 138*		*04/22/13 08:59*	*1*

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 720-134880/6
Matrix: Water
Analysis Batch: 134880

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	25.0	21.4		ug/L		86	64 - 128
1,1-Dichloroethane	25.0	21.5		ug/L		86	70 - 130
Dichlorodifluoromethane	25.0	17.5		ug/L		70	34 - 132
Vinyl chloride	25.0	20.8		ug/L		83	54 - 135
Chloroethane	25.0	20.5		ug/L		82	62 - 138
Trichlorofluoromethane	25.0	23.1		ug/L		92	66 - 132
Methylene Chloride	25.0	21.1		ug/L		84	70 - 147
trans-1,2-Dichloroethene	25.0	21.7		ug/L		87	68 - 130
cis-1,2-Dichloroethene	25.0	22.5		ug/L		90	70 - 130
Chloroform	25.0	22.8		ug/L		91	70 - 130
1,1,1-Trichloroethane	25.0	21.6		ug/L		87	70 - 130
Carbon tetrachloride	25.0	23.3		ug/L		93	70 - 146
1,2-Dichloroethane	25.0	22.8		ug/L		91	61 - 132
Trichloroethene	25.0	21.3		ug/L		85	70 - 130
1,2-Dichloropropane	25.0	21.7		ug/L		87	70 - 130
Dichlorobromomethane	25.0	24.2		ug/L		97	70 - 130
trans-1,3-Dichloropropene	25.0	26.8		ug/L		107	70 - 140
cis-1,3-Dichloropropene	25.0	27.3		ug/L		109	70 - 130
1,1,2-Trichloroethane	25.0	22.1		ug/L		89	70 - 130
Tetrachloroethene	25.0	22.6		ug/L		90	70 - 130
Chlorodibromomethane	25.0	25.5		ug/L		102	70 - 145
Chlorobenzene	25.0	21.6		ug/L		87	70 - 130
Bromoform	25.0	26.4		ug/L		106	68 - 136
1,1,2,2-Tetrachloroethane	25.0	21.8		ug/L		87	70 - 130
1,3-Dichlorobenzene	25.0	21.9		ug/L		87	70 - 130
1,4-Dichlorobenzene	25.0	22.0		ug/L		88	70 - 130
1,2-Dichlorobenzene	25.0	22.2		ug/L		89	70 - 130
Chloromethane	25.0	20.7		ug/L		83	52 - 175
Bromomethane	25.0	24.4		ug/L		98	43 - 151
1,1,2-Trichloro-1,2,2-trifluoroethane	25.0	22.8		ug/L		91	42 - 162
EDB	25.0	23.7		ug/L		95	70 - 130
1,2,4-Trichlorobenzene	25.0	22.3		ug/L		89	70 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*99*		*70 - 130*
4-Bromofluorobenzene	*98*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*98*		*75 - 138*

Lab Sample ID: LCSD 720-134880/7
Matrix: Water
Analysis Batch: 134880

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1-Dichloroethene	25.0	20.3		ug/L		81	64 - 128	5	20
1,1-Dichloroethane	25.0	21.4		ug/L		85	70 - 130	1	20
Dichlorodifluoromethane	25.0	16.5		ug/L		66	34 - 132	6	20
Vinyl chloride	25.0	20.3		ug/L		81	54 - 135	2	20

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 720-134880/7
Matrix: Water
Analysis Batch: 134880

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloroethane			25.0	20.5		ug/L		82	62 - 138	0	20
Trichlorofluoromethane			25.0	22.0		ug/L		88	66 - 132	5	20
Methylene Chloride			25.0	21.2		ug/L		85	70 - 147	1	20
trans-1,2-Dichloroethene			25.0	21.9		ug/L		87	68 - 130	1	20
cis-1,2-Dichloroethene			25.0	22.5		ug/L		90	70 - 130	0	20
Chloroform			25.0	22.5		ug/L		90	70 - 130	1	20
1,1,1-Trichloroethane			25.0	21.9		ug/L		88	70 - 130	1	20
Carbon tetrachloride			25.0	23.5		ug/L		94	70 - 146	1	20
1,2-Dichloroethane			25.0	22.8		ug/L		91	61 - 132	0	20
Trichloroethene			25.0	21.1		ug/L		85	70 - 130	1	20
1,2-Dichloropropane			25.0	22.2		ug/L		89	70 - 130	2	20
Dichlorobromomethane			25.0	24.1		ug/L		97	70 - 130	0	20
trans-1,3-Dichloropropene			25.0	26.9		ug/L		108	70 - 140	0	20
cis-1,3-Dichloropropene			25.0	27.2		ug/L		109	70 - 130	0	20
1,1,2-Trichloroethane			25.0	22.2		ug/L		89	70 - 130	0	20
Tetrachloroethene			25.0	22.0		ug/L		88	70 - 130	2	20
Chlorodibromomethane			25.0	25.4		ug/L		102	70 - 145	0	20
Chlorobenzene			25.0	21.8		ug/L		87	70 - 130	1	20
Bromoform			25.0	26.4		ug/L		106	68 - 136	0	20
1,1,2,2-Tetrachloroethane			25.0	21.6		ug/L		86	70 - 130	1	20
1,3-Dichlorobenzene			25.0	21.9		ug/L		88	70 - 130	0	20
1,4-Dichlorobenzene			25.0	22.2		ug/L		89	70 - 130	1	20
1,2-Dichlorobenzene			25.0	22.4		ug/L		90	70 - 130	1	20
Chloromethane			25.0	20.8		ug/L		83	52 - 175	0	20
Bromomethane			25.0	23.4		ug/L		93	43 - 151	4	20
1,1,2-Trichloro-1,2,2-trifluoroethane			25.0	22.1		ug/L		88	42 - 162	3	20
EDB			25.0	23.3		ug/L		93	70 - 130	1	20
1,2,4-Trichlorobenzene			25.0	22.4		ug/L		90	70 - 130	0	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*99*		*70 - 130*
4-Bromofluorobenzene	*99*		*67 - 130*
1,2-Dichloroethane-d4 (Surr)	*97*		*75 - 138*

Method: 8270C LL - Semivolatile Organic Compounds by GCMS - Low Levels

Lab Sample ID: MB 280-170520/1-A
Matrix: Water
Analysis Batch: 170843

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 170520

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		1.0		ug/L		04/21/13 11:20	04/23/13 12:25	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*81*		*57 - 120*	*04/21/13 11:20*	*04/23/13 12:25*	*1*

Method: 8270C LL - Semivolatile Organic Compounds by GCMS - Low Levels (Continued)

Lab Sample ID: LCS 280-170520/2-A
Matrix: Water
Analysis Batch: 170843

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 170520

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
1,4-Dioxane			10.0	5.24		ug/L		52	38 - 120		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2-Fluorobiphenyl	*85*		*57 - 120*

Lab Sample ID: LCSD 280-170520/3-A
Matrix: Water
Analysis Batch: 170843

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 170520

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,4-Dioxane			10.0	5.67		ug/L		57	38 - 120	8	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
2-Fluorobiphenyl	*80*		*57 - 120*

Method: 7199 - Chromium, Hexavalent (IC)

Lab Sample ID: MB 720-135127/1-A
Matrix: Water
Analysis Batch: 134726

Client Sample ID: Method Blank
Prep Type: Dissolved

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cr (VI)	ND		0.50		ug/L			04/18/13 21:17	1

Lab Sample ID: LCS 720-135127/2-A
Matrix: Water
Analysis Batch: 134726

Client Sample ID: Lab Control Sample
Prep Type: Dissolved

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Cr (VI)			2.00	1.88		ug/L		94	90 - 110		

Lab Sample ID: 720-49233-4 MS
Matrix: Water
Analysis Batch: 134726

Client Sample ID: SB-10-35.5-38.5
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Cr (VI)	ND		2.00	1.92		ug/L		96	80 - 120		

Lab Sample ID: 720-49233-4 MSD
Matrix: Water
Analysis Batch: 134726

Client Sample ID: SB-10-35.5-38.5
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cr (VI)	ND		2.00	1.93		ug/L		96	80 - 120	0	20

Client: Geosyntec Consultants, Inc.
Project/Site: MEW

TestAmerica Job ID: 720-49233-1

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 720-134805/2
Matrix: Water
Analysis Batch: 134805

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10		mg/L			04/19/13 16:46	1

Lab Sample ID: LCS 720-134805/1
Matrix: Water
Analysis Batch: 134805

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Dissolved Solids			1000	1030		mg/L		103	85 - 115		

Lab Sample ID: 720-49233-4 DU
Matrix: Water
Analysis Batch: 134805

Client Sample ID: SB-10-35.5-38.5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Dissolved Solids	690			700		mg/L				1	10

GC/MS VOA

Analysis Batch: 134740

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49233-1	SB-9-20-23	Total/NA	Water	8260B	
720-49233-2	SB-9-40-43	Total/NA	Water	8260B	
720-49233-3	SB-10-20.5-23	Total/NA	Water	8260B	
720-49233-4	SB-10-35.5-38.5	Total/NA	Water	8260B	
LCS 720-134740/5	Lab Control Sample	Total/NA	Water	8260B	
LCSD 720-134740/6	Lab Control Sample Dup	Total/NA	Water	8260B	
MB 720-134740/4	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 134846

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49233-2	SB-9-40-43	Total/NA	Water	8260B	
720-49233-3	SB-10-20.5-23	Total/NA	Water	8260B	
LCS 720-134846/5	Lab Control Sample	Total/NA	Water	8260B	
LCSD 720-134846/6	Lab Control Sample Dup	Total/NA	Water	8260B	
MB 720-134846/4	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 134847

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49233-1	SB-9-20-23	Total/NA	Water	8260B	
720-49233-5	TAL SF TB	Total/NA	Water	8260B	
LCS 720-134847/5	Lab Control Sample	Total/NA	Water	8260B	
LCSD 720-134847/6	Lab Control Sample Dup	Total/NA	Water	8260B	
MB 720-134847/4	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 134880

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49233-4	SB-10-35.5-38.5	Total/NA	Water	8260B	
LCS 720-134880/6	Lab Control Sample	Total/NA	Water	8260B	
LCSD 720-134880/7	Lab Control Sample Dup	Total/NA	Water	8260B	
MB 720-134880/5	Method Blank	Total/NA	Water	8260B	

GC/MS Semi VOA

Prep Batch: 170520

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49233-1	SB-9-20-23	Total/NA	Water	3520C	
720-49233-2	SB-9-40-43	Total/NA	Water	3520C	
720-49233-3	SB-10-20.5-23	Total/NA	Water	3520C	
720-49233-4	SB-10-35.5-38.5	Total/NA	Water	3520C	
LCS 280-170520/2-A	Lab Control Sample	Total/NA	Water	3520C	
LCSD 280-170520/3-A	Lab Control Sample Dup	Total/NA	Water	3520C	
MB 280-170520/1-A	Method Blank	Total/NA	Water	3520C	

Analysis Batch: 170843

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49233-1	SB-9-20-23	Total/NA	Water	8270C LL	170520
720-49233-2	SB-9-40-43	Total/NA	Water	8270C LL	170520
720-49233-3	SB-10-20.5-23	Total/NA	Water	8270C LL	170520
720-49233-4	SB-10-35.5-38.5	Total/NA	Water	8270C LL	170520
LCS 280-170520/2-A	Lab Control Sample	Total/NA	Water	8270C LL	170520

GC/MS Semi VOA (Continued)

Analysis Batch: 170843 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCSD 280-170520/3-A	Lab Control Sample Dup	Total/NA	Water	8270C LL	170520
MB 280-170520/1-A	Method Blank	Total/NA	Water	8270C LL	170520

General Chemistry

Analysis Batch: 134726

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49233-1	SB-9-20-23	Dissolved	Water	7199	
720-49233-3	SB-10-20.5-23	Dissolved	Water	7199	
720-49233-4	SB-10-35.5-38.5	Dissolved	Water	7199	
720-49233-4 MS	SB-10-35.5-38.5	Dissolved	Water	7199	
720-49233-4 MSD	SB-10-35.5-38.5	Dissolved	Water	7199	
LCS 720-135127/2-A	Lab Control Sample	Dissolved	Water	7199	
MB 720-135127/1-A	Method Blank	Dissolved	Water	7199	

Analysis Batch: 134805

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-49233-1	SB-9-20-23	Total/NA	Water	SM 2540C	
720-49233-3	SB-10-20.5-23	Total/NA	Water	SM 2540C	
720-49233-4	SB-10-35.5-38.5	Total/NA	Water	SM 2540C	
720-49233-4 DU	SB-10-35.5-38.5	Total/NA	Water	SM 2540C	
LCS 720-134805/1	Lab Control Sample	Total/NA	Water	SM 2540C	
MB 720-134805/2	Method Blank	Total/NA	Water	SM 2540C	

Client Sample ID: SB-9-20-23

Lab Sample ID: 720-49233-1

Date Collected: 04/18/13 10:45

Matrix: Water

Date Received: 04/18/13 19:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	134740	04/19/13 17:43	AC	TAL PLS
Total/NA	Analysis	8260B		500	134847	04/20/13 19:11	AC	TAL PLS
Total/NA	Prep	3520C			170520	04/21/13 11:20	CDC	TAL DEN
Total/NA	Analysis	8270C LL		1	170843	04/23/13 14:36	KGV	TAL DEN
Dissolved	Analysis	7199		1	134726	04/18/13 21:46	EYT	TAL PLS
Total/NA	Analysis	SM 2540C		1	134805	04/19/13 16:46	EYT	TAL PLS

Client Sample ID: SB-9-40-43

Lab Sample ID: 720-49233-2

Date Collected: 04/18/13 12:05

Matrix: Water

Date Received: 04/18/13 19:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	134740	04/19/13 18:11	AC	TAL PLS
Total/NA	Analysis	8260B		5	134846	04/20/13 18:44	AC	TAL PLS
Total/NA	Prep	3520C			170520	04/21/13 11:20	CDC	TAL DEN
Total/NA	Analysis	8270C LL		1	170843	04/23/13 15:09	KGV	TAL DEN

Client Sample ID: SB-10-20.5-23

Lab Sample ID: 720-49233-3

Date Collected: 04/18/13 14:45

Matrix: Water

Date Received: 04/18/13 19:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	134740	04/19/13 18:40	AC	TAL PLS
Total/NA	Analysis	8260B		10	134846	04/20/13 19:13	AC	TAL PLS
Total/NA	Prep	3520C			170520	04/21/13 11:20	CDC	TAL DEN
Total/NA	Analysis	8270C LL		1	170843	04/23/13 15:42	KGV	TAL DEN
Dissolved	Analysis	7199		1	134726	04/18/13 21:58	EYT	TAL PLS
Total/NA	Analysis	SM 2540C		1	134805	04/19/13 16:46	EYT	TAL PLS

Client Sample ID: SB-10-35.5-38.5

Lab Sample ID: 720-49233-4

Date Collected: 04/18/13 15:40

Matrix: Water

Date Received: 04/18/13 19:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	134740	04/19/13 19:09	AC	TAL PLS
Total/NA	Analysis	8260B		50	134880	04/22/13 13:46	AC	TAL PLS
Total/NA	Prep	3520C			170520	04/21/13 11:20	CDC	TAL DEN
Total/NA	Analysis	8270C LL		1	170843	04/23/13 16:15	KGV	TAL DEN
Dissolved	Analysis	7199		1	134726	04/18/13 22:09	EYT	TAL PLS
Total/NA	Analysis	SM 2540C		1	134805	04/19/13 16:46	EYT	TAL PLS

Client: Geosyntec Consultants, Inc.
Project/Site: MEW

TestAmerica Job ID: 720-49233-1

Client Sample ID: TAL SF TB
Date Collected: 04/18/13 00:00
Date Received: 04/18/13 19:10

Lab Sample ID: 720-49233-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	134847	04/20/13 14:59	AC	TAL PLS

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: MEW

TestAmerica Job ID: 720-49233-1

Laboratory: TestAmerica Pleasanton

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	State Program	9	2496	01-31-14

Laboratory: TestAmerica Denver

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-13
A2LA	ISO/IEC 17025		2907.01	10-31-13
Alaska (UST)	State Program	10	UST-30	04-05-14
Arizona	State Program	9	AZ0713	12-19-13
Arkansas DEQ	State Program	6	88-0687	06-01-13
California	State Program	9	2513	08-31-14
Colorado	State Program	8	N/A	09-30-13
Connecticut	State Program	1	PH-0686	09-30-14
Florida	NELAP	4	E87667	06-30-13
Idaho	State Program	10	CO00026	09-30-13
Illinois	NELAP	5	200017	04-30-13
Iowa	State Program	7	370	12-01-14
Kansas	NELAP	7	E-10166	04-30-13
Louisiana	NELAP	6	30785	06-30-13
Maine	State Program	1	CO0002	03-03-15
Maryland	State Program	3	268	03-31-14
Minnesota	NELAP	5	8-999-405	12-31-13
Nevada	State Program	9	CO0026	07-30-13
New Hampshire	NELAP	1	205310	04-28-13
New Jersey	NELAP	2	CO004	06-30-13
New Mexico	State Program	6	CO00026	06-30-13
New York	NELAP	2	11964	04-01-14
North Carolina DENR	State Program	4	358	12-31-13
North Dakota	State Program	8	R-034	06-30-13
Oklahoma	State Program	6	8614	08-31-13
Oregon	NELAP	10	CO200001	01-16-14
Pennsylvania	NELAP	3	68-00664	07-31-13
South Carolina	State Program	4	72002	06-30-13
Texas	NELAP	6	T104704183-08-TX	09-30-13
USDA	Federal		P330-08-00036	02-08-14
Utah	NELAP	8	QUAN5	06-30-13
Virginia	NELAP	3	460232	06-14-13
Washington	State Program	10	C583	08-03-13
West Virginia DEP	State Program	3	354	11-30-13
Wisconsin	State Program	5	999615430	08-31-13
Wyoming (UST)	A2LA	8		10-31-13

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: MEW

TestAmerica Job ID: 720-49233-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL PLS
8270C LL	Semivolatile Organic Compounds by GCMS - Low Levels	SW846	TAL DEN
7199	Chromium, Hexavalent (IC)	SW846	TAL PLS
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PLS

Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

TAL PLS = TestAmerica Pleasanton, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: MEW

TestAmerica Job ID: 720-49233-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-49233-1	SB-9-20-23	Water	04/18/13 10:45	04/18/13 19:10
720-49233-2	SB-9-40-43	Water	04/18/13 12:05	04/18/13 19:10
720-49233-3	SB-10-20.5-23	Water	04/18/13 14:45	04/18/13 19:10
720-49233-4	SB-10-35.5-38.5	Water	04/18/13 15:40	04/18/13 19:10
720-49233-5	TAL SF TB	Water	04/18/13 00:00	04/18/13 19:10

TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
phone 925.484.1919 fax 925.600.3002

720-49233

Chain of Custody Record

145502

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

4/25/2013

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Eric Suchomel	Site Contact: Morgan Fahlman	Date: 18 April 2013	COC No:
Geosyntec Consultants	Tel/Fax: (510)285-2700/510-836-3114	Lab Contact: Micah Smith	Carrier:	1 of 1 COCs
1111 Broadway, 6th Floor	Analysis Turnaround Time			For Lab Use Only:
Oakland, CA 94607	☐ CALENDAR DAYS ☐ WORKING DAYS			Walk-in Client:
510.285.2700 Phone	TAT if different from Below _____			Lab Sampling:
510.836.3114 FAX	☐ 2 weeks			
Project Name: MEW	☒ 1 week			Job / SDG No.:
Site: MEW	☐ 2 days			
PO# WR11284	☐ 1 day			Sampler: Morgan Fahlman

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	8260B	8270C	TDS	Chromium VI	1,4-Dioxane	Sample Specific Notes:
SB-9-20-23	4/18/13	10:45	G	W	8			X	X	X	X	X	
SB-9-40-43	4/18/13	12:05	G	W	4			X				X	
SB-10-20.5-23	4/18/13	14:45	G	W	7			X	X	X	X	X	
SB-10-35.5-38.5	4/18/13	15:40	G	W	9			X	X	X	X	X	
TAL SF TB			G	W	2			X	X	X	X	X	

720-49233 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for_____ Months

Special Instructions/QC Requirements & Comments:

3.9°C

Custody Seals Intact	☐ Yes ☐ No	Custody Seal No :		Cooler Temp (°C): Obs'd._____ Corr'd._____ Therm ID No.:_____		
Relinquished by:	Company: Geosyntec	Date/Time: 4/18/13; 17:40	Received by:	Company: TASF	Date/Time: 04/18/13@ 1740	
Relinquished by:	Company: TASF	Date/Time: 04/18/13@ 1910	Received by:	Company: TASF	Date/Time: 4/18/13 1910	
Relinquished by:	Company:	Date/Time:	Received in Laboratory by	Company:	Date/Time:	

Salimpour, Afsaneh

From: Nicole Gotberg [NGotberg@Geosyntec.com]
Sent: Friday, April 19, 2013 11:06 AM
To: Salimpour, Afsaneh; Eric Suchomel
Cc: Morgan Fahlman; John Gallinatti
Subject: RE: Sample Login Confirmation for 720-49233, MEW

Afsaneh,

Per our conversation please make the following revisions to the requested analysis for 720-49233 and 720-49202.

1. Remove the SVOC 8270C analysis, we would only like to run 1,4 Dioxane by 8270C
2. For 8260B only run the halogenated VOC (HVOC) list
3. For the trip blank only run the HVOC analysis

I will have Morgan revise and initial changes on the Chain of Custody forms to be included with the lab reports.

Thanks,
Nicole

Nicole K. Gotberg, P.G.
Professional Geologist

1111 Broadway, 6th Floor
Oakland, CA 94607
Main Phone: 510.836.3034, ext. 2771
Direct Phone: 510.285.2771
Fax. 510.836.3036
www.geosyntec.com

Geosyntec consultants
engineers | scientists | innovators

10:41 AM
To: Eric Suchomel; Nicole Gotberg
Subject: Sample Login Confirmation for 720-49233, MEW

Insufficient sample volume was provided for the following sample(s) for the 8270C; 1,4-Dioxane, TDS, CrVI analysis: TAL SF TB. Received 2-40ml Hcl voa vials, can only run for 8260B.

AFSANEH SALIMPOUR

TestAmerica Pleasanton
THE LEADER IN ENVIRONMENTAL TESTING

Tel: 925.484.1919
www.testamericainc.com

720-49233 Chain of Custody

Reference: [128017]
Attachments: 3

TestAmerica Pleasanton
1220 Quarry Lane
Pleasanton, CA 94566
phone 925.484.1919 fax 925.600.3002

Chain of Custody Record

720-49233-rev

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.

145502

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Eric Suchomel	Site Contact: Morgan Fahlman	Date: 18 April 2013	COC No:
Geosyntec Consultants	Tel/Fax: (510)285-2750 / 510-836-3114	Lab Contact: Micah Smith	Carrier:	1 of 1 COCs
1111 Broadway, 6th Floor	Analysis Turnaround Time			For Lab Use Only:
Oakland, CA 94607	☐ CALENDAR DAYS ☐ WORKING DAYS			Walk-in Client:
510.285.2700 Phone	TAT if different from Below			Lab Sampling:
510.836.3114 FAX	☐ 2 weeks			Job / SDG No.:
Project Name: MCW	☒ 1 week			
Site: MCW	☐ 2 days			Sampler: Morgan Fahlman
PO# WR112BA	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	8260B (HVOCs) MF 2/22/18	8270C MF 2/22/18	TDS	Chromium VI	1,4-Dioxane (8270C)	Sample Specific Notes:
SB-9-20-23	4/18/13	10:45	G	W	8			X	X	X	X	X	
SB-9-40-43	4/18/13	12:05	G	W	4			X				X	
SB-10-20.5-23	4/18/13	14:45	G	W	7			X	X	X	X	X	
SB-10-35.5-38.5	4/18/13	15:40	G	W	9			X	X	X	X	X	
TAL SF TB			G	W	2			X	X	X	X	X	MF 2/22/13

720-49233 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

3.9°C

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:	Cooler Temp (°C): Obs'd. _____ Corr'd. _____ Therm ID No.: _____			
Relinquished by:	Company: Geosyntec	Date/Time: 4/18/13 17:40	Received by:	Company: TASF	Date/Time: 04/18/13 1740
Relinquished by:	Company: TASF	Date/Time: 04/18/13 1910	Received by:	Company: TASF	Date/Time: 4/18/13 1910
Relinquished by:	Company:	Date/Time:	Received in Laboratory by	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.1, dated 02/20/2013

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 720-49233-1

Login Number: 49233

List Source: TestAmerica Pleasanton

List Number: 1

Creator: Bullock, Tracy

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	False	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 720-49233-1

Login Number: 49233
List Number: 1
Creator: Wheeler, Virginia L

List Source: TestAmerica Denver
List Creation: 04/20/13 12:10 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX C

Permanganate Soil Oxidant Demand Testing Results Report

SiREM
Leading Science · Lasting Solutions

130 Research Lane, Ste 2
Guelph ON N1G 5G3
(519) 822-2265

Natural Oxidant Demand Test (Permanganate) Certificate of Analysis

Customer : Geosyntec Consultants
Eric Suchomel

SiREM Reference #: S-2811_Revised

Project: MEW

Report Issued: October 23, 2013

Customer Reference #: WR1128A

Data Files: S-2811_NOD

Site Sampling Date: April 17, 2013

Test Results Summary:

Treatment	Customer Sample ID	Measured Natural Oxidant Demand (g/kg) MnO_4	Calculated Natural Oxidant Demand (g/kg) $KMnO_4$	Calculated Natural Oxidant Demand (g/kg) $NaMnO_4$
Location 1 4.7 g/L	SB-5 23-23.5	4.39	5.83	5.23
Location 1 9.2 g/L	SB-5 23-23.5	4.85	6.45	5.79
Location 1 25.2 g/L	SB-5 23-23.5	4.46	5.93	5.32
Location 2 4.7 g/L	SB-6 19.5-20	3.15	4.18	3.76
Location 2 9.2 g/L	SB-6 19.5-20	3.65	4.85	4.35
Location 2 25.2 g/L	SB-6 19.5-20	5.51	7.32	6.57
Location 3 4.7 g/L	SB-5 22.5-23	2.40	3.19	2.86
Location 3 9.2 g/L	SB-5 22.5-23	1.97	2.62	2.35
Location 3 25.2 g/L	SB-5 22.5-23	4.26	5.66	5.08
Location 4 4.7 g/L	SB-6 20-20.5	2.63	3.50	3.14
Location 4 9.2 g/L	SB-6 20-20.5	1.33	1.77	1.59
Location 4 25.2 g/L	SB-6 20-20.5	1.80	2.39	2.15
Location 5 4.7 g/L	SB-9 20-21	3.53	4.69	4.21
Location 5 9.2 g/L	SB-9 20-21	3.87	5.15	4.62
Location 5 25.2 g/L	SB-9 20-21	3.38	4.49	4.03

Notes:
-NOD-Natural oxidant demand
-NOD based on 10 day incubation and reported as grams of specified oxidant per kilogram of sediment.
-MnO_4- permanganate
-$KMnO_4$- potassium permanganate
-$NaMnO_4$- sodium permanganate
-$NaMnO_4$ and KMnO4 values are calculated from the MnO_4 NOD and the relative molecular weights of the compounds

Analyst: Kela Bartle
Kela Bartle, B.Sc.
Laboratory Technician

Reviewed by: Sandra Dworatzek
Sandra Dworatzek, M.Sc.
Senior Manager

Case Narrative

Twelve jars of soil and four jars of groundwater were received from Geosyntec on April 22, 2013. The samples arrived in good condition at a temperature of 3°C and were stored at 4°C upon arrival. Oxidant demand testing commenced on April 26, 2013.

Reactor Construction Details

Reactors were constructed by adding 25 grams (g) (wet weight) of geological material into 110 millilitres (mL) screw cap Boston round amber bottles. Site water was added to the reactors at a volume of 25 mL with 15 mL of Deionized water to yield a total of 40 mL. Reactors were constructed for 5 locations chosen by Geosyntec to be SB-5 23-23.5, SB-6 19.5-20, SB-5 22.5-23, SB-6 20-20.5 and SB-9 20-21 with groundwater labeled SB-5 18-22 for locations 1 through 4 and SB-9 20-23 for location 5. Each location was analyzed at 3 different concentrations of permanganate and in triplicate for a total of 45 reactors.

Reactors were then amended with 1.0, 2.0 or 6.0 mL of a 193 g/L permanganate stock solution to reach target permanganate concentrations of 4.7, 9.2 and 25.2 g/L respectively. All reactors were sampled for permanganate at time zero and at days 1, 3, 7 and 10.

Analysis of Permanganate

Samples were collected from the control and treatment reactors using disposable 5 mL plastic syringes for analysis of permanganate. Permanganate concentration was quantified colorimetrically using a UV/VIS spectrophotometer (Biochrom Ultraspec 1000). Samples (3 mL) were collected from batch reactors, filtered through a 0.45 micron syringe filter and diluted as required so that absorbance readings at 525 nanometers (nm) were less than 2.0 absorbance units. A five point calibration curve was prepared using known concentrations of a standardized permanganate solution at each analysis event. The method detection limit was 0.79 milligrams per liter (mg/L).

Detailed Test Results:

Appendix A provides back up data for the test samples.

APPENDIX A: Detailed Test Results

Lab ID	Client ID
Sample:	SB-5 23-23.5

Initial Concentration (g/L)	3.98	Target:	4.8
Volume of Permangante Solution added	1.00		
Volume of Site groundwater	39.61		
Total Initial Reactor Volume (mL)	40.61		
Average Mass of Soil (g)	23.97		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	3.9	4.0	4.1	4.0	0.13	0.16	0.00	0.00
1	2.2	2.7	2.5	2.5	0.28	0.10	0.06	2.60
3	1.9	2.7	2.3	2.3	0.40	0.09	0.07	2.94
7	1.6	1.9	1.4	1.6	0.25	0.07	0.10	3.98
10	1.3	1.6	1.2	1.4	0.21	0.06	0.11	4.39

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-5 23-23.5

Initial Concentration (g/L)	8.17	Target:	9.3
Volume of Permangante Solution added	2.00		
Volume of Site groundwater	39.55		
Volume of Solution (mL)	41.55		
Average Mass of Soil (g)	24.65		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	8.2	8.1	8.2	8.2	0.06	0.34	0.00	0.00
1	5.9	6.1	6.5	6.1	0.28	0.25	0.08	3.43
3	5.6	5.9	7.0	6.1	0.73	0.25	0.08	3.43
7	5.1	4.9	6.6	5.5	0.93	0.23	0.11	4.44
10	4.6	4.8	6.5	5.3	1.04	0.22	0.12	4.85

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-5 23-23.5

Initial Concentration (g/L)	24.22	Target:	25.4
Volume of Permangante Solution added	6.00		
Volume of Site groundwater	39.64		
Volume of Solution (mL)	45.64		
Average Mass of Soil (g)	25.05		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	24.1	24.4	24.2	24.2	0.13	1.11	0.00	0.00
1	20.3	20.4	20.7	20.4	0.24	0.93	0.17	6.89
3	20.9	21.5	21.3	21.2	0.31	0.97	0.14	5.44
7	21.9	23.5	22.1	22.5	0.84	1.03	0.08	3.16
10	20.9	22.9	21.6	21.8	1.01	0.99	0.11	4.46

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-6 19.5-20

Initial Concentration (g/L)	4.15	Target:	4.7
Volume of Permangante Solution ad	1.00		
Volume of Site groundwater	39.70		
Volume of Solution (mL)	40.70		
Average Mass of Soil (g)	24.62		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	4.2	4.1	4.3	4.2	0.10	0.17	0.00	0.00
1	3.5	3.3	3.0	3.3	0.25	0.13	0.04	1.49
3	3.4	3.2	3.1	3.2	0.16	0.13	0.04	1.54
7	2.8	2.6	2.7	2.7	0.08	0.11	0.06	2.45
10	2.4	2.2	2.1	2.2	0.13	0.09	0.08	3.15

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-6 19.5-20

Initial Concentration (g/L)	8.27	Target:	9.3
Volume of Permangante Solution ad	2.00		
Volume of Site groundwater	39.60		
Volume of Solution (mL)	41.60		
Average Mass of Soil (g)	25.03		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	8.0	8.5	8.4	8.3	0.24	0.34	0.00	0.00
1	6.6	6.9	6.5	6.6	0.19	0.28	0.07	2.71
3	6.0	6.9	6.6	6.5	0.45	0.27	0.07	2.96
7	6.7	6.7	6.2	6.5	0.30	0.27	0.07	2.94
10	6.1	6.3	5.8	6.1	0.26	0.25	0.09	3.65

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-6 19.5-20

Initial Concentration (g/L)	24.27	Target:	25.4
Volume of Permangante Solution ad	6.00		
Volume of Site groundwater	39.59		
Volume of Solution (mL)	45.59		
Average Mass of Soil (g)	24.90		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	24.3	24.4	24.1	24.3	0.15	1.11	0.00	0.00
1	20.4	21.0	20.5	20.6	0.32	0.94	0.17	6.65
3	20.1	21.8	20.1	20.7	0.95	0.94	0.16	6.62
7	21.3	21.7	21.3	21.4	0.26	0.98	0.13	5.25
10	21.0	21.6	21.2	21.3	0.29	0.97	0.14	5.51

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-5 22.5-23

Initial Concentration (g/L)	4.38	Target:	4.7
Volume of Permangante Solution added	1.00		
Volume of Site groundwater	39.80		
Volume of Solution (mL)	40.80		
Average Mass of Soil (g)	25.07		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	4.4	4.4	4.4	4.4	0.03	0.18	0.00	0.00
1	3.8	3.8	3.8	3.8	0.03	0.15	0.02	0.98
3	3.4	3.7	3.7	3.6	0.19	0.15	0.03	1.33
7	3.5	3.5	3.5	3.5	0.03	0.14	0.04	1.49
10	2.6	3.2	3.0	2.9	0.32	0.12	0.06	2.40

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-5 22.5-23

Initial Concentration (g/L)	8.42	Target:	9.2
Volume of Permangante Solution added	2.00		
Volume of Site groundwater	39.94		
Volume of Solution (mL)	41.94		
Average Mass of Soil (g)	25.32		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	8.3	8.6	8.4	8.4	0.13	0.35	0.00	0.00
1	7.0	7.1	7.2	7.1	0.13	0.30	0.06	2.21
3	6.5	8.0	8.0	7.5	0.87	0.31	0.04	1.60
7	7.7	7.8	7.6	7.7	0.10	0.32	0.03	1.27
10	7.1	7.3	7.2	7.2	0.13	0.30	0.05	1.97

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-5 22.5-23

Initial Concentration (g/L)	24.78	Target:	25.5
Volume of Permangante Solution added	6.00		
Volume of Site groundwater	39.45		
Volume of Solution (mL)	45.45		
Average Mass of Soil (g)	25.47		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	25.2	24.7	24.5	24.8	0.37	1.13	0.00	0.00
1	20.5	21.7	21.6	21.3	0.69	0.97	0.16	6.31
3	20.6	20.7	21.9	21.0	0.75	0.96	0.17	6.69
7	23.2	22.2	23.3	22.9	0.59	1.04	0.09	3.39
10	23.4	20.7	23.1	22.4	1.47	1.02	0.11	4.26

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-6 20-20.5

Initial Concentration (g/L)	4.13	Target:	4.8
Volume of Permangante Solution ad	1.00		
Volume of Site groundwater	39.51		
Volume of Solution (mL)	40.51		
Average Mass of Soil (g)	25.38		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	4.1	4.1	4.3	4.1	0.14	0.17	0.00	0.00
1	3.1	3.1	3.3	3.1	0.10	0.13	0.04	1.60
3	3.6	2.8	3.0	3.1	0.40	0.13	0.04	1.65
7	2.6	2.7	2.7	2.7	0.05	0.11	0.06	2.37
10	2.4	2.1	2.9	2.5	0.36	0.10	0.07	2.63

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-6 20-20.5

Initial Concentration (g/L)	7.98	Target:	9.3
Volume of Permangante Solution added	2.00		
Volume of Site groundwater	39.45		
Volume of Solution (mL)	41.45		
Average Mass of Soil (g)	25.08		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	8.0	8.1	7.9	8.0	0.13	0.33	0.00	0.00
1	6.5	7.2	7.3	7.0	0.43	0.29	0.04	1.65
3	7.0	6.6	6.7	6.8	0.18	0.28	0.05	2.04
7	7.0	6.8	6.7	6.8	0.18	0.28	0.05	1.96
10	7.5	7.0	7.0	7.2	0.28	0.30	0.03	1.33

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-6 20-20.5

Initial Concentration (g/L)	23.37	Target:	25.3
Volume of Permangante Solution added	6.00		
Volume of Site groundwater	39.84		
Volume of Solution (mL)	45.84		
Average Mass of Soil (g)	25.12		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	23.9	23.0	23.3	23.4	0.44	1.07	0.00	0.00
1	20.8	20.3	20.9	20.7	0.32	0.95	0.12	4.93
3	20.7	20.3	21.3	20.7	0.50	0.95	0.12	4.84
7	22.3	21.7	22.1	22.0	0.31	1.01	0.06	2.43
10	22.7	22.2	22.2	22.4	0.28	1.03	0.05	1.80

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-9 20-21

Initial Concentration (g/L)	4.40	Target:	4.8
Volume of Permangante Solution ad	1.00		
Volume of Site groundwater	39.27		
Volume of Solution (mL)	40.27		
Average Mass of Soil (g)	25.37		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	4.4	4.5	4.3	4.4	0.10	0.18	0.00	0.00
1	2.3	2.2	2.7	2.4	0.26	0.09	0.08	3.25
3	2.7	2.8	3.0	2.8	0.13	0.11	0.06	2.54
7	1.9	2.3	1.9	2.0	0.22	0.08	0.10	3.81
10	2.1	2.3	2.1	2.2	0.15	0.09	0.09	3.53

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-9 20-21

Initial Concentration (g/L)	8.38	Target:	9.4
Volume of Permangante Solution added	2.00		
Volume of Site groundwater	39.11		
Volume of Solution (mL)	41.11		
Average Mass of Soil (g)	25.25		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	8.3	8.6	8.3	8.4	0.19	0.34	0.00	0.00
1	6.1	5.9	6.7	6.2	0.43	0.26	0.09	3.53
3	6.4	6.7	6.5	6.5	0.13	0.27	0.08	3.04
7	5.6	6.0	5.8	5.8	0.18	0.24	0.11	4.23
10	5.9	6.2	6.0	6.0	0.16	0.25	0.10	3.87

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment

Lab ID	Client ID
Sample:	SB-9 20-21

Initial Concentration (g/L)	22.50	Target:	25.6
Volume of Permangante Solution added	6.00		
Volume of Site groundwater	39.18		
Volume of Solution (mL)	45.18		
Average Mass of Soil (g)	25.25		

Incubation Time (days)	Concentration of MnO_4 (g/L)					Remaining MnO_4 (g)	Consumed MnO_4(g)	Oxidant Demand (g/kg)
	Rep.1	Rep. 2	Rep. 3	Average	SD			
0	22.4	21.9	23.3	22.5	0.71	1.02	0.00	0.00
1	19.4	20.0	18.9	19.4	0.55	0.88	0.14	5.58
3	20.1	20.4	21.3	20.6	0.62	0.93	0.09	3.40
7	19.8	20.2	20.8	20.2	0.53	0.91	0.10	4.06
10	20.0	20.9	20.9	20.6	0.53	0.93	0.09	3.38

Notes:

g - grams
g/kg - grams of MnO_4 per kilogram of soil
g/L - grams of MnO_4 per liter
MnO4 - permanganate
mg - milligram
mL - milliliter
SD - standard deviation
ST - soil treatment