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**FIRST SEMIANNUAL 2016  
GROUNDWATER MONITORING REPORT  
AND PRB EVALUATION**

**REDWOOD REGIONAL PARK  
SERVICE YARD  
OAKLAND, CALIFORNIA**

*Prepared for:*

**EAST BAY REGIONAL PARK DISTRICT  
OAKLAND, CALIFORNIA**

**April 2016**

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SERVICE YARD  
OAKLAND, CALIFORNIA**

*Prepared for:*

**EAST BAY REGIONAL PARK DISTRICT  
OAKLAND, CALIFORNIA**

*Prepared by:*

**STELLAR ENVIRONMENTAL SOLUTIONS, INC.  
2198 SIXTH STREET  
BERKELEY, CALIFORNIA 94710**

**April 30, 2016**

Project No. 2016-02

April 30, 2016

Ms. Dilan Roe.  
Local Oversight Program  
Alameda County Department of Environmental Health  
1131 Harbor Bay Parkway, Suite 250  
Alameda, California 94502

Subject: First Semiannual 2016 Groundwater Monitoring and PRB Evaluation Report of the Redwood Regional Park Service Yard Site – Oakland, California (ACEH Fuel Leak Case No. RO0000246)

Dear Ms. Roe:

Attached is the referenced report for the underground fuel storage tank (UFST) site at the Redwood Regional Park Service Yard, located at 7867 Redwood Road, Oakland, California. This project is being conducted for the East Bay Regional Park District (EBRPD), and follows previous site investigation and remediation activities (conducted since 1993) associated with former leaking UFSTs. The key regulatory agencies for this investigation are the Alameda County Department of Environmental Health, the Regional Water Quality Control Board, and the California Department of Fish and Game.

This report summarizes the First Semiannual 2016 groundwater and surface water monitoring and sampling conducted on March 21, 2016. In addition to the activities typically conducted during a monitoring event, the water quality parameters including oxygen demand, dissolved oxygen and oxygen reduction potential were taken to assess the effectiveness of the Permeable Reactive Barrier (PRB) that was installed in November 2013.

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

Sincerely,



Richard S. Makdisi, P.G.  
Principal Geochemist/President



Matt Graul, Stewardship Manager  
East Bay Regional Park District

cc: State of California GeoTracker database  
Alameda County Department of Environmental Health 'ftp' system



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# **1.0 INTRODUCTION**

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## **PROJECT BACKGROUND**

The subject property is the East Bay Regional Park District (EBRPD) Redwood Regional Park Service Yard located at 7867 Redwood Road in Oakland, Alameda County, California. The site has undergone extensive site investigations and remediation since 1993 to address subsurface contamination caused by leakage from one or both former underground fuel storage tanks (UFSTs) that contained gasoline and diesel fuel. The Alameda County Department of Environmental Health (ACEH) has provided regulatory oversight of the investigation since its inception (ACEH Fuel Leak Case No. RO0000246). Other regulatory agencies with historical involvement in site review include the Regional Water Quality Control Board (Water Board) and the California Department of Fish and Game (CDFG). This report presents the first semiannual 2016 groundwater monitoring report along with the annual trend analyses and recommendations for future work.

## **OBJECTIVES AND SCOPE OF WORK**

The overall objective of site monitoring and the latest remedial action is to continue trying to reduce the site residual hydrocarbons. Historical remedial efforts have shown that residual hydrocarbons entrained in subsurface material and/or stratigraphic traps are continuing to release significant amounts of hydrocarbons into the groundwater. This report discusses the following scheduled activities coordinated by Stellar Environmental Solutions, Inc. (Stellar Environmental) for the first 2016 semiannual period from January 1, 2016 to June 30, 2016:

- Collecting water levels in site wells to determine shallow groundwater flow direction
- Sampling site wells for contaminant analysis and natural attenuation indicators
- Collecting surface water samples for contaminant analysis

## **HISTORICAL CORRECTIVE ACTIONS AND INVESTIGATIONS**

Other Stellar Environmental reports have discussed previous site remediation and investigations, site geology and hydrogeology, residual site contamination, conceptual model for contaminant fate and transport, and hydrochemical trends and plume stability. The References section of this report lists all technical reports for the site.

The general phases of site work included:

- An October 2000 Feasibility Study report for the site, submitted to ACEH, which provided detailed analyses of the regulatory implications of the site contamination and an assessment of viable corrective actions (Stellar Environmental, 2000d).
- Two instream bioassessment events, conducted in April 1999 and January 2000, to evaluate potential impacts to stream biota associated with the site contamination. No impacts were documented.
- Additional monitoring well installations and corrective action by ORC™ injection—proposed by Stellar Environmental and approved by ACEH in its January 8, 2001 letter to the EBRPD. Two phases of ORC™ injection were conducted: in September 2001 and July 2002.
- A total of 63 groundwater monitoring events have been conducted since project inception (February 1994). A total of 12 groundwater monitoring wells are currently available for monitoring.
- A bioventing pilot test conducted in September and October 2004 to evaluate the feasibility of this corrective action strategy, and installation of the full-scale bioventing system in November and December 2005. Bioventing well VW-3 was decommissioned, and two additional bioventing wells (VW-4 and VW-5) were installed on March 4, 2008. Bioventing activities conducted to date have been discussed in bioventing-specific technical reports, and updates were provided in groundwater monitoring progress reports as they relate to this ongoing program.
- An ORC™ injection pilot test, conducted by Stellar Environmental on March 10, 2009, to control historical high levels of hydrocarbons contamination that began to appear in September 2007 in source well MW-2.
- A Remedial Action Workplan (RAW), dated August 20, 2009, prepared by Stellar Environmental in response to a letter from ACEH. ACEH approved the RAW in a letter (dated October 2, 2009) to the EBRPD.
- An ORC™ injection conducted over the full footprint of plume during First Quarter 2010 (on February 1-2), followed by 30-day post-injection monitoring and sampling of key site wells (on March 2).
- Conversion of surface and groundwater monitoring frequency from quarterly to semiannual by ACEH at the request of Stellar Environmental on behalf of Park District occurred in June 2011.
- In concurrence with ACEH, the site bioventing system having accomplished its' design purpose, was discontinued on July 18, 2011.

- The RAW, dated November 28, 2011, prepared by Stellar Environmental. ACEH approved the PRB RAW in a subsequent letter, dated December 29, 2011 and the PRB was installed in November 2013 and followed with a 30-day post-installation monitoring of key downgradient site wells in December 2013.

## **SITE DESCRIPTION**

The site slopes to the west—from an elevation of approximately 564 feet above mean sea level at the eastern edge of the service yard to approximately 530 feet above mean sea level at Redwood Creek, which defines the approximate western edge of the project site with regard to this investigation.

Figure 1 shows the location of the project site. Figure 2 presents the site plan.

## **REGULATORY OVERSIGHT**

The lead regulatory agency for the site investigation and remediation is ACEH (Case No. RO0000246), with oversight provided by the Water Board (GeoTracker Global ID T0600100489). The CDFG is also involved with regard to surface water quality impacts to Redwood Creek. No surface water quality impacts to aquatic organisms were found. The ACEH-approved revisions to the site monitoring program as of this date include:

- Discontinuing hydrochemical sampling and analysis in wells MW-1, MW-3, MW-5, and MW-6.
- Discontinuing creek surface water sampling at upstream location SW-1.
- Conversion of surface and groundwater monitoring frequency from quarterly to semiannual by ACEH, at the request of Stellar Environmental on behalf of Park District occurred in June 2011.
- Shut down of the site bioventing system in June 2011.
- Design and implementation of PRB workplan.

The site is in compliance with State Water Resources Control Board's GeoTracker requirements for uploading electronic data and reports. In addition, electronic copies of technical documentation reports published since Second Quarter 2005 have been uploaded to ACEH's file transfer protocol (ftp) system. Per ACEH's October 31, 2005 directive entitled "Miscellaneous Administrative Topics and Procedures," effective January 31, 2006, paper copies of reports will no longer be provided to ACEH.





3-D TopoQuads Copyright © 1999 DeLorme Yarmouth, ME 04096 Source Data: USGS 750 ft Scale: 1 : 25,000 Detail: 13-0 Datum: WGS84



**SITE LOCATION ON U.S.G.S. TOPOGRAPHIC MAP**

Redwood Reg. Park  
Service Yard, Oakland, CA

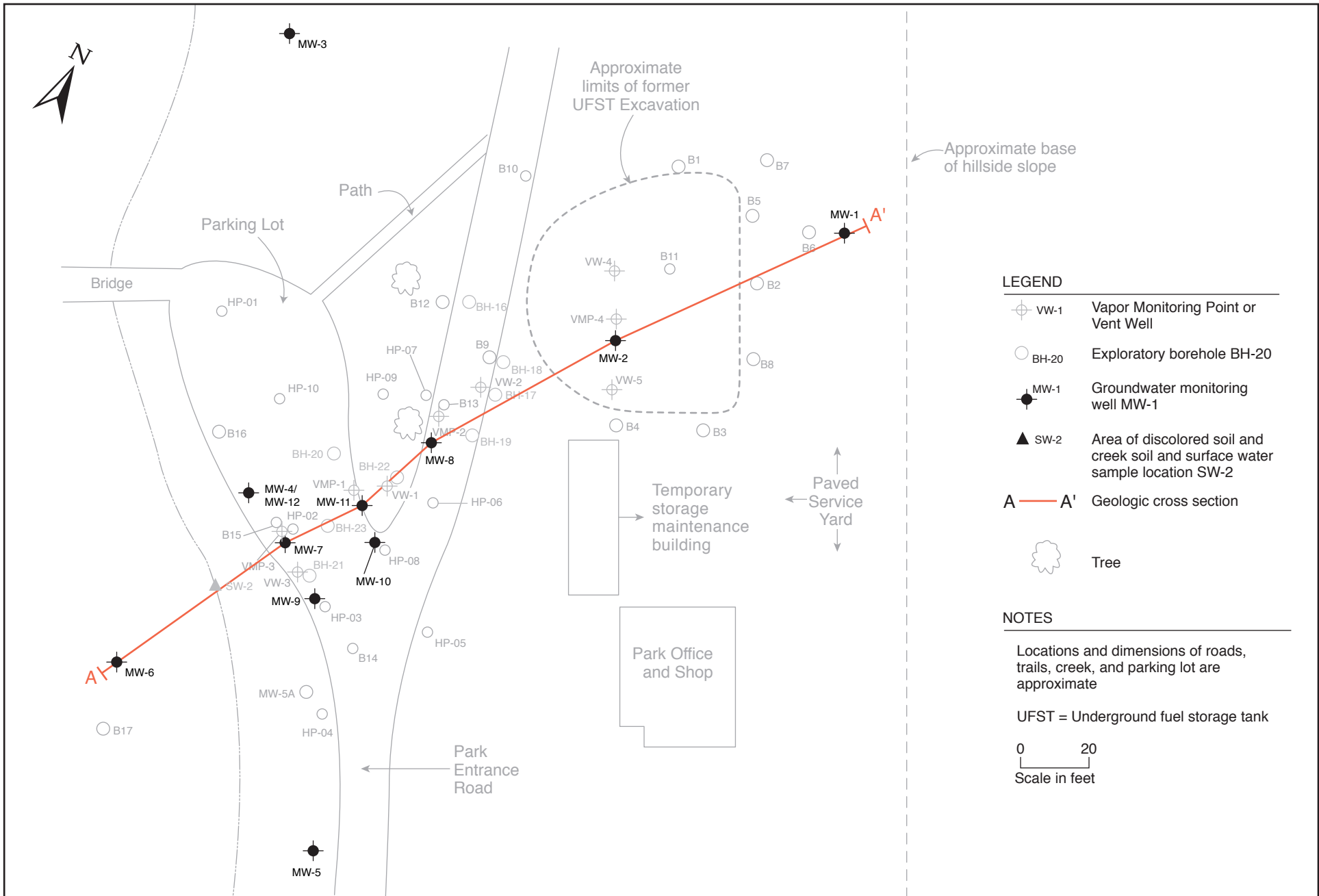
By: MJC

APRIL 2015

**Figure 1**



2015-02-01



**LEGEND**

	Vapor Monitoring Point or Vent Well
	Exploratory borehole BH-20
	Groundwater monitoring well MW-1
	Area of discolored soil and creek soil and surface water sample location SW-2
	Geologic cross section
	Tree

**NOTES**

Locations and dimensions of roads, trails, creek, and parking lot are approximate

UFST = Underground fuel storage tank

0 20  
Scale in feet

2015-02-02



**SITE PLAN SHOWING HISTORICAL BORINGS, WELLS AND GEOLOGIC CROSS-SECTION LOCATIONS**  
**Redwood Regional Park Service Yard, Oakland, CA**

**Figure 2**  
 by: MJC      APRIL 2015

## **2.0 PHYSICAL SETTING**

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This section discusses the site hydrogeologic conditions based on geologic logging and water level measurements collected at the site since September 1993. Previous Stellar Environmental reports have included detailed discussions of site lithologic and hydrogeologic conditions. In May 2004, ACEH requested, via email, an additional evaluation of site lithology—specifically, the preparation of multiple geologic cross-sections both parallel and perpendicular to the contaminant plume's long axis (Stellar Environmental 2004c). These additional geologic cross-sections have been presented in previous reports.

### **SITE LITHOLOGY**

Figure 3 shows the location of geologic cross-section (A-A') along the long axis of the groundwater contaminant plume (i.e., along local groundwater flow direction). The cross-section represented by Figure 4 shows the generalized subsurface features, the inferred thickness of the saturated soil contamination zone and the location of the permeable reactive barrier treatment wall. The PRB shown on the cross-section was constructed with the inoculated treatment zone located from 10-22 feet bgs which correlates to an elevation ranging from 525.5 – 537.5 feet amsl.

Shallow soil stratigraphy consists of a surficial 3- to 10-foot-thick clayey silt unit underlain by a 5- to 15-foot-thick silty clay unit. In the majority of boreholes, a 5- to 10-foot-thick clayey coarse-grained sand and clayey gravel unit that laterally grades to a clay or silty clay was encountered. This unit overlies a weathered siltstone at the base of the observed soil profile. Soils in the vicinity of MW-1 are inferred to be landslide debris.

A previous Stellar Environmental report (Stellar Environmental, 2004c) presented a bedrock surface isopleth map (elevation contours for the top of the bedrock surface) in the contaminant plume area. The isopleth map indicates the bedrock surface slopes steeply, approximately 0.3 feet/foot from east to west (toward Redwood Creek) in the upgradient portion of the site (from the service yard to under the entrance road), then slopes gently from east to west in the downgradient portion of the site (under the gravel parking area) toward Redwood Creek.

This general gradient corresponds to the local groundwater flow direction. On the southern side of the plume area, bedrock slopes gently from south to north (the opposite of the general topographic gradient). Bedrock topography on the northern side of the plume cannot be determined from the available data.

In the central and downgradient portions of the groundwater contaminant plume (under the entrance road and the parking area), the bedrock surface has local, fairly steep elevation highs and lows, expressing a hummocky surface. Bedrock elevations vary by up to 10 feet over distances of less than 20 feet in this area. Local bedrock elevation highs are observed at upgradient location BH-13 and at downgradient location B15/HP-02. Intervening elevation lows create troughs that trend north-south in the central portion of the plume and east-west in the downgradient portion of the plume.

The bedrock surface (and overlying unconsolidated sediment lithology) suggests that the bedrock surface may have at one time undergone channel erosion from a paleostream(s) flowing sub-parallel to present-day Redwood Creek. Because groundwater flows in the unconsolidated sediments that directly overlie the bedrock surface, it is likely that the hummocky bedrock surface affects local groundwater depth and flow direction. This is an important hydrogeologic control that should be considered if groundwater-specific corrective action is contemplated.

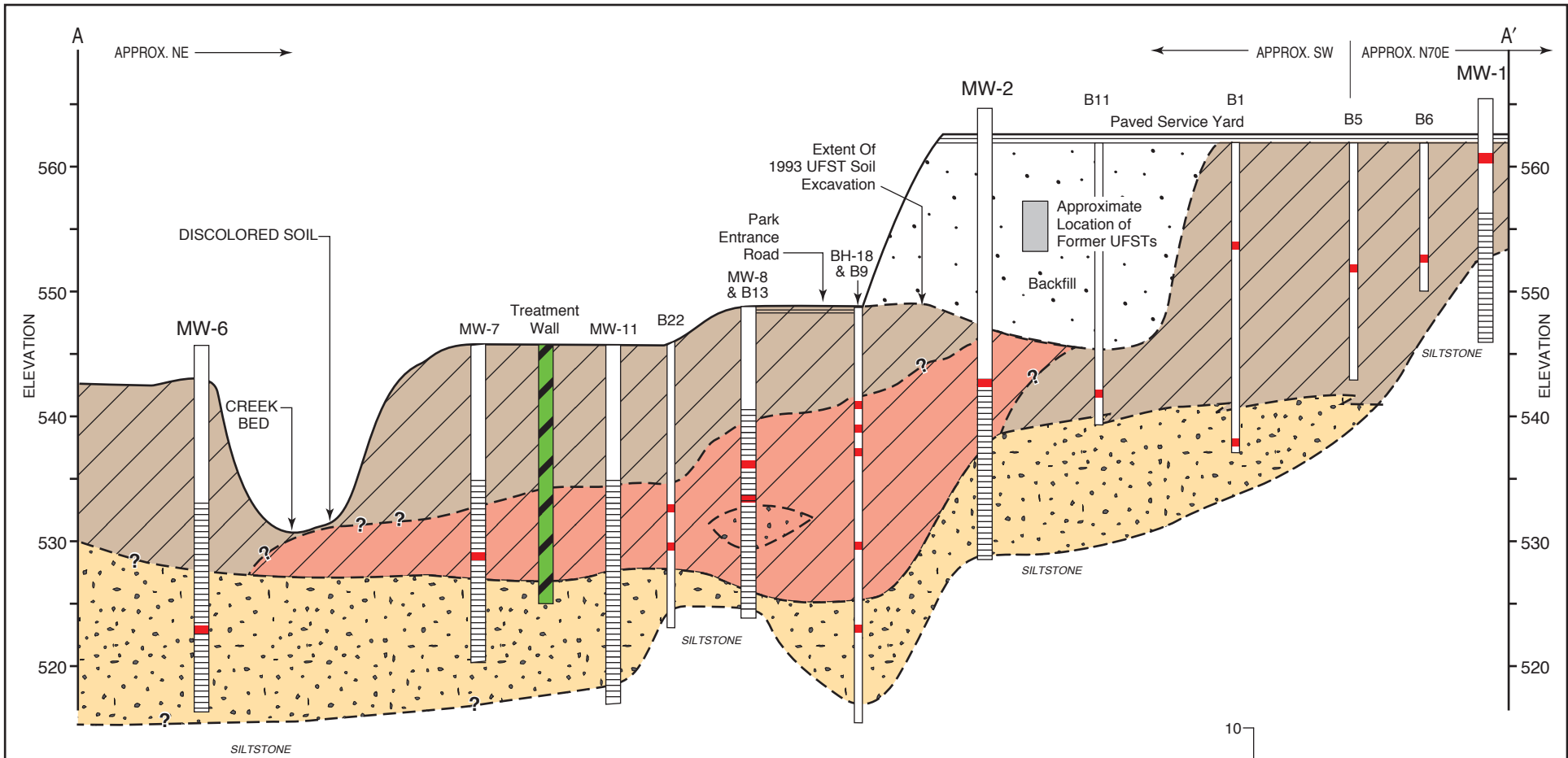
## **HYDROGEOLOGY**

Groundwater at the site occurs under unconfined and semi-confined conditions, generally within the clayey, silty, sand-gravel zone. The top of this zone varies between approximately 12 and 19 feet below ground surface (bgs); the bottom of the water-bearing zone (approximately 25 to 28 feet bgs) corresponds to the top of the siltstone bedrock unit. Seasonal fluctuations in groundwater depth create a capillary fringe of several feet that is saturated in the rainy period (late fall through early spring) and unsaturated during the remainder of the year. The thickness of the saturated zone plus the capillary fringe varies between approximately 10 and 15 feet in the area of contamination. Local perched water zones have been observed well above the top of the capillary fringe. Consistent with the bedrock isopleth map showing an elevation depression in the vicinity of MW-11, historical groundwater elevations in MW-11 are sporadically lower than in the surrounding area. As discussed in the previous subsection, local groundwater flow direction likely is more variable than expressed by groundwater monitoring well data, due to local variations in bedrock surface topography.

We estimate a site groundwater velocity of 7 to 10 feet per year, using general look-up tables for permeability characteristics for the site-specific lithologic data obtained from site investigations. This velocity estimate is conservatively low, but does meet minimum-distance-traveled criteria from the date when contamination was first observed in Redwood Creek (1993) relative to the time of the UST installations (late 1970s). Locally, however, the groundwater velocity could vary significantly. Calculating the specific hydraulic conductivity critical to accurately estimating site-specific groundwater velocity would require direct testing of the water-bearing zone through a slug or pumping test.

Redwood Creek, which borders the site to the west, is a seasonal creek known for occurrence of rainbow trout. Creek flow in the vicinity of the site shows significant seasonal variation, with little to no flow during the summer and fall dry season, and vigorous flow with depths exceeding 1 foot during the winter and spring wet season. The creek is a gaining stream (i.e., it is recharged by groundwater seeps and springs) in the vicinity of the site, and discharges into Upper San Leandro Reservoir located approximately 1 mile southeast of the site. During low-flow conditions, the groundwater table is below the creek bed in most locations (including the area of historical contaminated groundwater discharge); consequently, there is little to no observable creek flow at these times.

The following groundwater gradient information is based on the monitoring data contained in Section 4.0 of this report. In the upgradient portion of the site (between well MW-1 and MW-2, in landslide debris and the former UFST excavation backfill) the groundwater gradient was measured at approximately 0.25 feet per foot. Downgradient from (west of) the UFST source area (between MW-2 and Redwood Creek) the groundwater gradient was approximately 0.104 feet per foot. The average groundwater elevation was 4.23 feet higher than the previous (September 2015) event, with the greatest increase of 5.42 feet measured in MW-10. The direction of shallow groundwater flow during the current event was to the west-southwest (toward Redwood Creek), which is consistent with historical site groundwater flow direction.

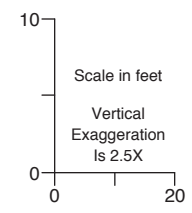


**LEGEND**

- |    |   |      |   |
|----|---|------|---|
| B1 | Exploratory Boring B1                                     | MW-1 | Monitoring Well MW-1                                      |
|    | Location of soil sample collected for laboratory analysis |      | Location of soil sample collected for laboratory analysis |
|    | Silt/clay   |      | Well screen interval                                      |
|    | Sand/gravel   |      | Backfill  |
|    | Area of saturated zone soil contamination                 |      |   |

**NOTES**

- Locations and dimensions of roads, trails and parking lot are approximate
- UFST = Underground fuel storage tank
- UFSTs not drawn to scale
- All elevations are expressed as feet above mean sea level (MSL)
- Well casing and boring widths not to scale
- Some borings projected into cross section (see Figure 2)



2015-02-03



**CROSS SECTION A-A' SHOWING LOCATION OF TREATMENT WALL  
Redwood Regional Park Service Yard, Oakland, CA**

**Figure 3**  
by: MJC      APRIL 2015

### **3.0 REGULATORY CONSIDERATIONS**

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This section summarizes the regulatory considerations with regard to surface water and groundwater contamination. There are no ACEH or Water Board cleanup orders for the site, although all site work has been conducted under oversight of these agencies.

#### **GROUNDWATER CONTAMINATION**

As specified in the Water Board's *San Francisco Bay Region Water Quality Control Plan* (Water Board, 1995), all groundwater is considered a potential source of drinking water unless otherwise approved by the Water Board, and is also assumed to ultimately discharge to a surface water body and potentially impact aquatic organisms. While it is likely that site groundwater would satisfy geology-related criteria for exclusion as a drinking water source (excessive total dissolved solids and/or insufficient sustained yield), Water Board approval for this exclusion has not been obtained for the site. As summarized in Table 3 (in Section 5.0), site groundwater contaminant levels are compared to the Water Board Tier 1 Environmental Screening Level (ESL) criteria for residential sites where groundwater is a current or potential drinking water source (Water Board, 2013).

As stipulated in the ESL guidance, ESLs are not cleanup criteria; rather, they are conservative screening-level criteria designed to be protective of both drinking water resources and aquatic environments in general. The groundwater ESLs are composed of multiple components, including ceiling value, human toxicity, indoor air impacts, and aquatic life protection. Exceedance of ESLs suggests that additional investigation and/or remediation is warranted. While drinking water standards [e.g., Maximum Contaminant Levels (MCLs)] are published for the site contaminants of concern. ACEH has indicated that impacts to nearby Redwood Creek are of primary importance, and that site target cleanup standards should be evaluated primarily in the context of surface water quality criteria.

#### **SURFACE WATER CONTAMINATION**

As summarized in Table 3 (in Section 5.0), site surface water contaminant levels are compared to the Water Board December 2013 ESL for fresh water habitat. As discussed in the ESL document (Water Board, 2013), benthic communities at the groundwater/surface water interface (e.g., at site groundwater discharge location SW-2) are assumed to be exposed to the full concentration of groundwater contamination prior to dilution/mixing with the surface water).

This was also a fundamental assumption in the instream benthic macro-invertebrate bioassessment events, which documented no measurable impacts.

Historical surface water sampling in the immediate vicinity of contaminated groundwater discharge (SW-2) has sporadically documented petroleum contamination, usually in periods of low stream flow, and generally at concentrations several orders of magnitude less than adjacent (within 20 feet) groundwater monitoring well concentrations. It is likely that mixing/dilution between groundwater and surface water precludes obtaining an “instantaneous discharge” surface water sample that is wholly representative of groundwater contamination at the discharge location. Therefore, the most conservative assumption is that surface water contamination at the groundwater/surface water interface is equivalent to the upgradient groundwater contamination (e.g., site downgradient wells MW-7, MW-9, and MW-12).

While site target cleanup standards for groundwater have not been determined, it is likely that no further action will be required by regulatory agencies when groundwater (and surface water) contaminant concentrations are all below their respective screening level criteria. Residual contaminant concentrations in excess of screening level criteria might be acceptable to regulatory agencies if a more detailed risk assessment (e.g., Tier 2 and/or Tier 3) demonstrates that no significant impacts are likely.



## **4.0 FIRST SEMIANNUAL 2016 ACTIVITIES**

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This section presents the creek surface water and groundwater sampling procedures and methods for the groundwater monitoring event (First Semiannual 2016), conducted on March 21, 2016, along with the analytical results. Groundwater sampling was conducted in accordance with State of California guidelines for sampling dissolved analytes in groundwater associated with leaking UFSTs (State Water Resources Control Board, 1989), and followed the methods and protocols approved by ACEH in the Stellar Environmental workplan (Stellar Environmental, 1998a).

The current monitoring period activities included:

- Measuring static water levels in all 12 site wells;
- Collecting post-purge groundwater samples for laboratory analysis of site contaminants and as well as the water quality parameters pH, temperature, conductivity, and turbidity during purging from wells located within (or potentially within) the groundwater plume (MW-2, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, SW-2 and SW-3);
- Collecting Redwood Creek surface water samples for laboratory analysis from locations SW-2 and SW-3; and
- Continue post-purge measurement of dissolved oxygen (DO) and redox to evaluate the effect of the permeable reactive barrier (PRB) that was installed across the distal contaminant plume. In addition, Stellar Environmental also analyzed wells MW-7, MW-9 and MW-12, located directly downgradient of the PRB, for alternate electron acceptors including nitrates, sulfates, biological oxygen demand (BOD), and chemical oxygen demand (COD) to evaluate the effect of PRB after installation;

The locations of all site monitoring wells and creek water sampling locations are shown on Figure 2 (in Section 1.0). Appendix A contains historical groundwater elevation data. Appendix B contains the groundwater monitoring field records for the current event.

Well construction information and the March 2016 groundwater elevation data are summarized in Table 1. Figure 4 is a groundwater elevation map constructed from the current event monitoring well groundwater elevation data.

**Table 1**  
**Groundwater Monitoring Well Construction**  
**and Groundwater Elevation Data – March 21, 2016**

Well	Well Depth	Screened Interval	TOC Elevation	Groundwater Depth (bgs)	Groundwater Elevation
MW-1	18	7 to 17	565.83	-0.35	563.95
MW-2	36	20 to 35	566.42	18.84	545.26
MW-3	42	7 to 41	560.81	17.95	539.95
MW-5	26	10 to 25	547.41	11.98	533.22
MW-6	26	10 to 25	545.43	8.84	534.16
MW-7	24	9 to 24	547.56	10.74	535.76
MW-8	23	8 to 23	549.13	11.19	537.81
MW-9	26	11 to 26	549.28	11.42	535.58
MW-10	26	11 to 26	547.22	10.04	537.56
MW-11	26	11 to 26	547.75	8.75	537.45
MW-12	25	10 to 25	544.67	9.51	536.69

Notes:

All measurements expressed in feet

TOC = top of casing

bgs = below ground surface

Wells MW-1 through MW-6 are 4-inch diameter; all other wells are 2-inch diameter.

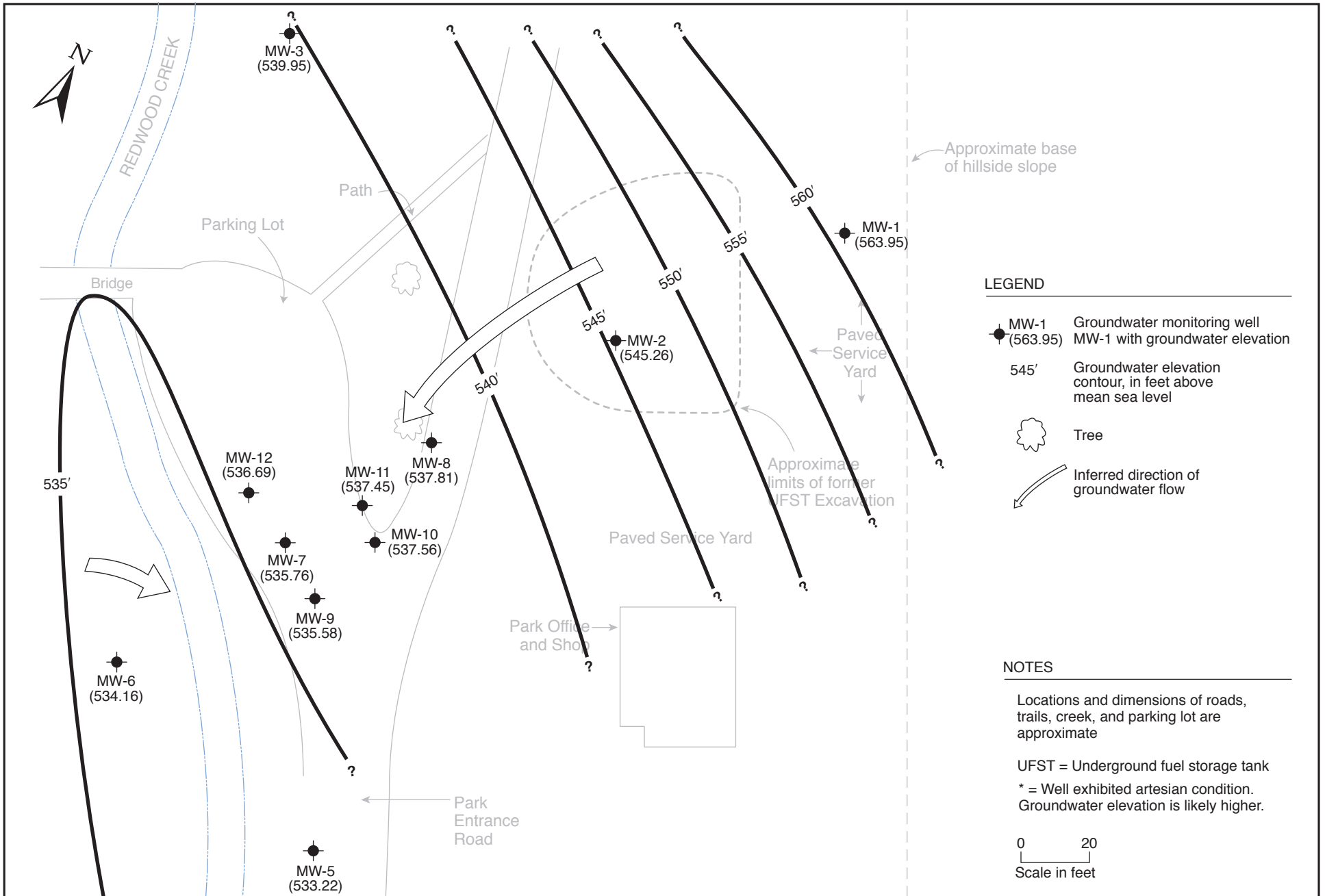
All elevations are expressed in feet above mean sea level (amsl). (U.S. Geological Survey)

The PRB inoculated treatment zone is located from 10-22 feet bgs which correlates to an elevation ranging from 525.5 – 537.5 feet amsl

## GROUNDWATER MONITORING AND SAMPLING

Groundwater monitoring well water level measurements, purging, sampling, and field measurements were conducted by Blaine Tech Services under the supervision of Stellar Environmental personnel. As the first task of the monitoring event, static water levels were measured using an electric water level indicator. The wells to be sampled for contaminant analyses were then purged (by bailing and/or pumping) of three wetted casing volumes. Aquifer stability parameters (temperature, pH, electrical conductivity and turbidity) were measured after each purged casing volume to ensure that representative formation water would be sampled. To minimize the potential for cross-contamination, wells were purged and sampled in order of increasing contamination (based on the analytical results of the previous event).

The sampling-derived purge water and decontamination rinseate (approximately 56.75 gallons) from the current event was containerized in the onsite above-ground storage tank. Purge water is accumulated in the onsite tank until it is full, at which time the water is transported offsite for proper disposal.



2016-02-02

## CREEK SURFACE WATER SAMPLING

Surface water sampling was conducted by Blaine Tech Services under the supervision of Stellar Environmental personnel on March 21, 2016. Surface water samples were collected from Redwood Creek location SW-2 (immediately downgradient of the former UFST source area and within the area of documented creek bank soil contamination) and at SW-3 (located approximately 500 feet downstream of the SW-2 location). In accordance with a previous Stellar Environmental recommendation approved by ACEH, upstream sample location SW-1 is no longer part of the surface water sampling program.

## BIOVENTING-RELATED ACTIVITIES

On July 18, 2011, in concurrence with ACEH, the site bioventing system, having accomplished its' design purpose, was discontinued.

## PERMEABLE REACTIVE BARRIER (PRB) MONITORING INDICATORS

The permeable reactive barrier (PRB), installed on November 20, 2013, was designed to treat and/or intercept accessible subsurface groundwater hydrocarbon contamination. Alternate electron acceptors were measured during this monitoring and sampling event in wells MW-7, MW-9 and MW-12 located downgradient of the PRB location; which included nitrates, sulfates, biological oxygen demand (BOD), and chemical oxygen demand (COD) to track the effect of the oxygen release product (Adventus EHC-O™) utilization. One concern about the use of Adventus EHC-O™ is that other non-hydrocarbon-utilizing microorganisms will use the product as well, without the benefit of hydrocarbon reduction occurring as effectively. The oxygen demand exerted by extraneous oxygen sinks, such as nitrates and sulfates can then be estimated to evaluate its equivalent to the oxygen demand exerted by the contaminants of concern.

Table 2 includes the results of these additional analyses that have been collected in site monitoring wells located immediately downgradient of the proposed PRB.

**Table 2**  
**Analytical Results of Electron Acceptors and Oxygen Demand**  
**in Downgradient Wells – March 21, 2016**

Location	Analytical Concentrations (mg/L)			
	Nitrates	Sulfates	BOD	COD
MW-7	0.31	36	<5.0	15
MW-9	<0.05	22	8.7	26
MW-12	<0.05	49	<5.0	14

Notes: COD = Chemical oxygen demand; BOD = biochemical oxygen demand;

## **Dissolved Oxygen**

DO is the most thermodynamically favored electron acceptor used in aerobic biodegradation of hydrocarbons. Active aerobic biodegradation of petroleum hydrocarbon compounds requires at least one to two milligrams per liter (mg/L) of DO in groundwater. During aerobic biodegradation, DO levels are reduced in the hydrocarbon plume as respiration occurs. Therefore, DO levels that vary inversely to hydrocarbon concentrations are consistent with the occurrence of aerobic biodegradation. However, no significant reduction of total hydrocarbons has been recorded so far.

Monitoring wells MW-7, MW-9 and MW12, downgradient of the PRB, of which MW-7 and MW-9 currently show the highest concentrations of hydrocarbons. The DO at wells MW-9 and MW-7 are relatively low (0.79 – 1.19 mg/L) showing an inverse relationship to hydrocarbons that suggests there is active aerobic biodegradation as the PRB is designed to promote.

## **Oxidation-Reduction Potential**

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

Measurement of the baseline ORP during this sampling event ranged from -13 to -36 mV in wells MW-7, MW-9 and MW-12 located within 15 feet downgradient of the PRB and from -31 to -34 in wells MW-10 and MW-11, respectfully, located within 15 feet upgradient of the PRB, respectfully. As with the DO, the ORP trend is monitored to evaluate the effectiveness of the PRB. Measurements collected during the March 2016 monitoring event are included in Table 3.

## **GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS**

The semiannual monitoring event was conducted on March 21 2016. Table 3 summarizes the analytical laboratory results of site contaminants. Figure 5 shows the distribution of contaminants and the inferred limits of the groundwater contaminant plume. Appendix C contains the certified analytical laboratory report and chain-of-custody record. Appendix D summarizes the historical groundwater and surface water analytical results.

First Semiannual 2016 groundwater contaminant concentrations were as follows: The ESL for TVHg for residential areas where groundwater is a drinking water resource was exceeded in four of the seven wells sampled and was exceeded for TEHd in five of the seven wells sampled. Benzene was detected in wells MW-8 and MW-9 but the ESL was only exceeded only in well MW-9. Toluene was not detected above the laboratory detection limit in any of the seven wells

sampled. Ethylbenzene was detected in wells MW-7, MW-8, MW-9 and MW-11 but above the ESL only in well MW-9. Well MW-7 contained both the maximum TVHg and TEHd concentrations in site groundwater, but TVHg in MW-7 was also at a historic low concentration this March 2016 event. Total xylenes were detected in wells MW-8 and MW-11 but below the ESL in both wells. MTBE was not detected in any of the wells, however in well MW-9 the laboratory detection limit was above the ESL and thus this result is indeterminate.

Well MW-7 contained both the maximum TVHg and TEHd concentrations in groundwater. MW-7 is located in the downgradient central area of the plume, adjacent to Redwood Creek. The northern edge of the downgradient edge of the plume is defined by well MW-12. The southern edge of the plume in the downgradient area is defined by well MW-5.

No contaminants were detected above their respective laboratory detection limits in either surface water sample location SW-2 or SW-3 during this March 2016 sampling event.

## **REACTIVE BARRIER EFFECTIVENESS**

The PRB has had disappointing results as being an effective reactive barrier that clearly shows a significant and sustained reduction of hydrocarbons in at the two keys wells, MW-7 and MW-9, downgradient of the PRB. The main active ingredient in Adventus EHC-O™ is calcium peroxide. The optimal pH for hydrocarbon reduction is between seven and nine. The groundwater measured in site wells during this event had a post-purge pH range of 6.06 to 7.22, only partially within the optimum range. Under these conditions, the Adventus EHC-O™ remedy product should still react effectively to release hydrogen peroxide and oxygen.

This initial chemical oxidation to take place starts the breakup of the contaminants in groundwater as they reach and reactive within the PRB. The oxygen is released slowly but at a high enough level that is designed to assist bioremediation for several years. However, the data has not showing any significant reduction in the hydrocarbon compounds at the two keys wells, MW-7 and MW-9, downgradient of the PRB. And with the effective principal reaction timeframe of the EHC-O™ at around two years, the timeframe for reaction has run out. The drought over the previous two years may be in part responsible for not recharging the area to the full height that the EHC-O™ was introduced.

**Table 3**  
**Groundwater and Surface Water Samples**  
**Analytical Results –March 21, 2016**

Location	Dissolved Oxygen	ORP	Contaminant Concentrations						
			TEHd	TVHg	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE
<b>GROUNDWATER SAMPLES</b>									
MW-2	1.03	-51	<50	<50	<0.5	<0.5	<0.5	<0.5	<2.0
MW-7	1.19	-13	<b>850</b>	<b>1,500</b>	<0.5	<0.5	12	<0.5	<2.0
MW-8	0.91	-42	<b>290</b>	<b>170</b>	0.53	<0.5	3.6	5.52	2.5
MW-9	0.79	-23	<b>2,600</b>	<b>4,000</b>	<b>18</b>	<8.3	<b>84</b>	<8.3	<b>&lt;33</b>
MW-10	0.84	-31	<b>110</b>	90	<0.5	<0.5	<0.5	<0.5	<2.0
MW-11	0.83	-34	<b>610</b>	<b>720</b>	<0.5	<0.5	6.1	3.0	<2.0
MW-12	0.86	-36	<50	<50	<0.5	<0.5	<0.5	<0.5	<2.0
<b>Groundwater ESLs <sup>(a)</sup></b>			100	100	1.0	40	13	20	5.0
<b>REDWOOD CREEK SURFACE WATER SAMPLES</b>									
SW-2	0.26	-21	<50	<50	<0.5	<0.5	<0.5	<0.5	<2.0
SW-3	NS	NS	<50	<50	<0.5	<0.5	<0.5	<0.5	<2.0
<b>Surface Water Screening Levels <sup>(b)</sup></b>			100	100	1.0	40	13	20	5.0

Notes:

<sup>(a)</sup> ESLs = Water Board Environmental Screening Levels (where groundwater is a potential drinking water resource) (Water Board, 2016).

<sup>(b)</sup> Water Board Surface Water Screening Levels for freshwater habitats (Water Board, 2013).

Samples in **bold-face type** exceed the ESLs and/or surface water screening levels where groundwater is a potential drinking water resource. Analytical results shown as < and indicate a non-detection or less than the laboratory detection limit.

NS = not sampled

MTBE = methyl tertiary-butyl ether

TVHg = total volatile hydrocarbons – gasoline range

TEHd = total extractable hydrocarbons – diesel range

ORP = redox or oxidation reduction potential measured in millivolts (mV)












All contaminant concentrations are expressed in micrograms per liter (µg/L), equivalent to parts per billion.

Dissolved oxygen concentrations are expressed in milligrams per liter (mg/L); post-purge measurement in all wells.

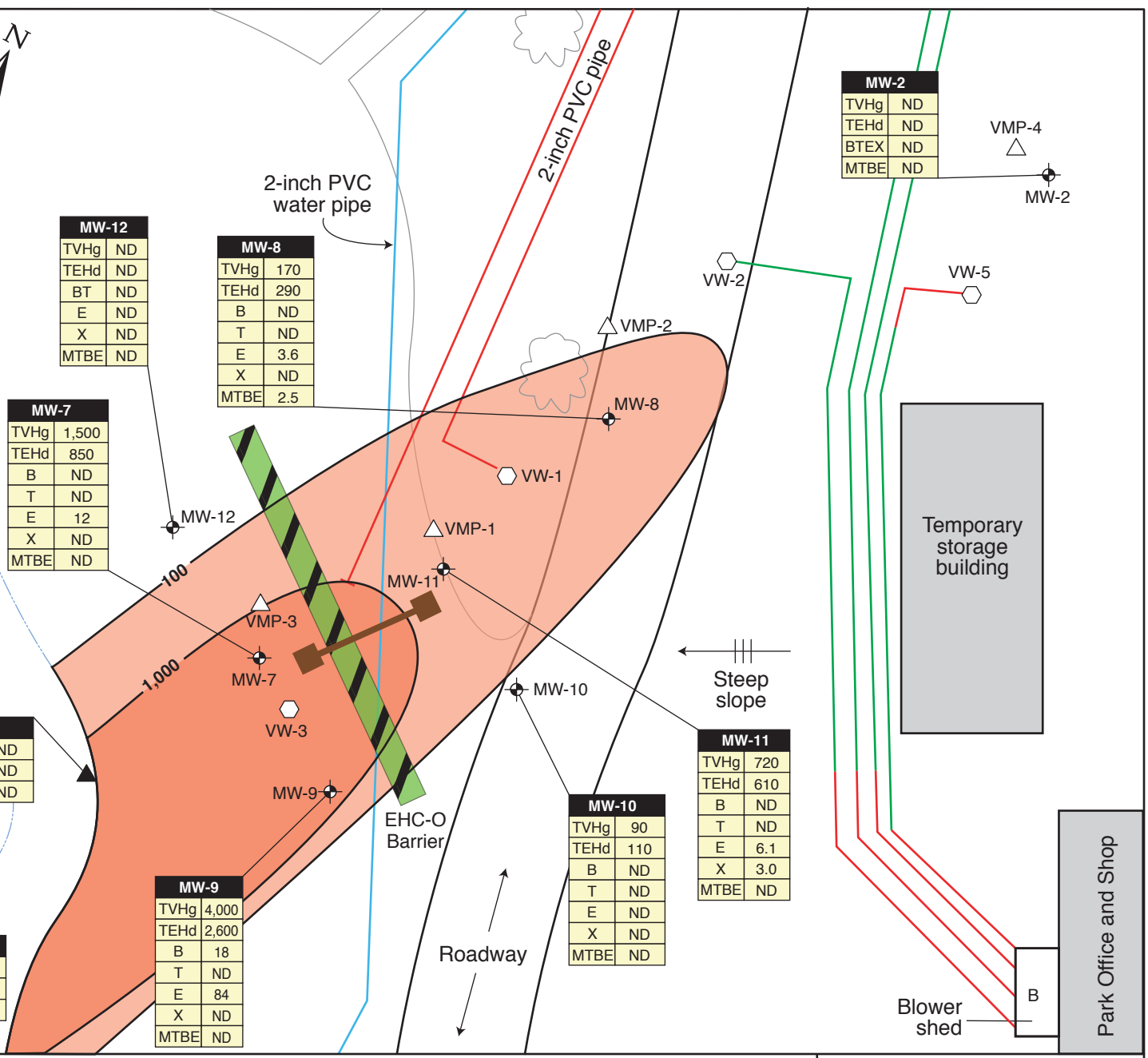
**QUALITY CONTROL SAMPLE ANALYTICAL RESULTS**

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

**LEGEND**

-  PRB
  -  MW-1 Groundwater monitoring well
  -  VW-1 Vent well
  -  VMP-1 Vapor monitoring point
  -  TVH<sub>g</sub> and TEH<sub>d</sub> isoconcentration in µg/L
  -  Blower location
  -  Air distribution piping (below ground); above ground in green
  -  Capped pipe
  -  Gate
  -  Tree
  -  ND = Not detected
  - MTBE = Methyl tertiary butyl ether
  - TVH<sub>g</sub> = Total volatile hydrocarbons – gasoline range
  - TEH<sub>d</sub> = Total extractable hydrocarbons – diesel range
  - BTEX = Benzene, toluene, ethylbenzene and total xylenes
- All concentrations in µg/L (micrograms per liter)

0 18  
Approx. scale in feet



MW-12	
TVH <sub>g</sub>	ND
TEH <sub>d</sub>	ND
BT	ND
E	ND
X	ND
MTBE	ND

MW-8	
TVH <sub>g</sub>	170
TEH <sub>d</sub>	290
B	ND
T	ND
E	3.6
X	ND
MTBE	2.5

MW-7	
TVH <sub>g</sub>	1,500
TEH <sub>d</sub>	850
B	ND
T	ND
E	12
X	ND
MTBE	ND

SW-2	
TVH <sub>g</sub>	ND
TEH <sub>d</sub>	ND
BTEX	ND

SW-3	
TVH <sub>g</sub>	ND
TEH <sub>d</sub>	ND
BTEX	ND

MW-9	
TVH <sub>g</sub>	4,000
TEH <sub>d</sub>	2,600
B	18
T	ND
E	84
X	ND
MTBE	ND

MW-10	
TVH <sub>g</sub>	90
TEH <sub>d</sub>	110
B	ND
T	ND
E	ND
X	ND
MTBE	ND

MW-11	
TVH <sub>g</sub>	720
TEH <sub>d</sub>	610
B	ND
T	ND
E	6.1
X	3.0
MTBE	ND

MW-2	
TVH <sub>g</sub>	ND
TEH <sub>d</sub>	ND
BTEX	ND
MTBE	ND

**PLAN VIEW OF REMEDIAL EHC-O PRB TREATMENT WALL & TPH PLUME – MARCH 21, 2016**  
7867 Redwood Rd, Oakland, CA

**Figure 5**

by: MJC

APRIL 2016



## **5.0 SUMMARY, CONCLUSIONS AND PROPOSED ACTIONS**

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The following conclusions and proposed actions are based on the findings of the current event activities, as well as on salient historical data.

### **SUMMARY AND CONCLUSIONS**

- Groundwater sampling has been conducted on an approximately quarterly basis from November 1994 to June 2011 and on a semiannual basis since September 2011. A total of twelve site wells are available for monitoring; seven of the available wells are currently monitored for contamination.
- Site contaminants of concern include gasoline, diesel, BTEX, and MTBE. Current groundwater concentrations exceed regulatory screening levels for gasoline, diesel, benzene and ethylbenzene in groundwater.
- The primary environmental risk is discharge of contaminated groundwater to the adjacent Redwood Creek. An in-stream bioassessment conducted in 1999 to 2000 concluded that there were no direct impacts to the surface water benthic macro-invertebrate community; however, groundwater contamination is sporadically detected in surface water samples, and there is historical visual evidence of plume discharge at the creek/groundwater interface. Surface water samples have sporadically exceeded surface water ESL criteria for gasoline, diesel, benzene, total xylenes, and ethylbenzene but generally only under low creek flow conditions.
- The existing well layout adequately constrains the lateral extent of groundwater contamination, and the vertical limit is very likely the top of the near-surface (25 to 28 feet) siltstone bedrock. The saturated interval extends approximately 12 to 15 feet from top of bedrock through the capillary fringe. Groundwater elevations fluctuate seasonally, creating a capillary fringe that varies seasonally in thickness.
- The plume of groundwater contamination above screening levels appears to be approximately 130 feet long and approximately 50 feet wide. The zone of greatest contamination (greater than 1,000 µg/L of TVHg) is currently centered around wells MW-7 and MW-9 in the downgradient area of the plume. However, prior to March 2010, the greatest contamination was observed in MW-2, the historical source area well.
- The contaminant plume has historically appeared neither stable and reducing, the groundwater contaminant concentrations fluctuate seasonally, and the center of mass of

the contaminant plume (represented by maximum concentrations) has alternated between the upgradient, mid-plume, and downgradient wells. Contaminants in upgradient source area well MW-2 have steadily decreased since March 2010 following the in-situ bioremediation compound injection event with no contaminant detections this March 2016 event.

- Historical remedial efforts indicate that residual hydrocarbons entrained in subsurface material and/or stratigraphic traps are continuing to release significant amounts of hydrocarbons into the groundwater. The dissolved fraction that results from this release forms a recalcitrant plume that still daylight at the Redwood Creek interface.
- A September 2003 exploratory borehole program confirmed that sorbed-phase contamination in the seasonally unsaturated zone is a primary source of long-term contaminant contribution to the groundwater plume. Reduction/removal of this contamination will be necessary to eliminate continued discharge of contaminated groundwater to Redwood Creek, and to ultimately obtain site closure.
- First Semiannual 2016 groundwater contaminant concentrations exceeded the groundwater ESLs for TVHg in four of the seven wells sampled and for TEHd in five of the seven wells sampled. Benzene was detected in two wells but exceeded its ESL in only well MW-9. Toluene was not detected above the laboratory detection limit in any of the seven wells. Ethylbenzene was detected in wells MW-7, MW-8, MW-9 and MW-11 but exceeded its ESL only in well MW-9. Xylenes were detected in wells MW-8 and MW-11 but below the ESL in both wells. MTBE was detected only in well MW-8 and below the ESL.
- The current March 2016 event showed a general decrease in contaminant concentrations in downgradient wells MW-7, MW-9 and MW-12 (located below the PRB) with a historic low concentration of TVHg detected in MW-7 and no detections in MW-12. Well MW-9 contained both the maximum TVHg and TEHd concentrations in groundwater but was within historical range.
- No contaminants were detected above their respective laboratory detection limits in either surface water sample location SW-2 or SW-3 during this March 2015 sampling event.

## **PROPOSED ACTIONS**

The EBRPD proposes to implement the following actions to address the current site conditions and regulatory concerns:

- Continue the semiannual monitoring to evaluate if any hydrochemical changes occur with the PRB in response to the high 2016 rainfall year. Continue with additional testing of site chemical parameters in downgradient wells MW-7, MW-9, and MW-12, to track the effect of the oxygen release product utilization and to investigate whether microbial

biodegradation activity is occurring preferentially in natural site constituents in competition with the target residual hydrocarbons.

- The effectiveness of the PRB has expired, thus we recommend discontinuing analysis for the additional site chemical parameters that was conducted to track the effect of the oxygen release product utilization in key wells; MW-7, MW-9, MW-11 and MW-12.
- Continue to inform regulators of site progress and seek their concurrence with proposed actions.
- Continue to make the required electronic data and report uploads to the State of California GeoTracker database, and upload an electronic copy of technical reports to ACEH's ftp database.

## 6.0 REFERENCES

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- Parsons Engineering Science (Parsons), 1998. Quarterly Progress Report 11, Redwood Regional Park Service Yard, Oakland, California. January 28.
- Parsons Engineering Science (Parsons), 1997a. Quarterly Progress Report 7, Redwood Regional Park Service Yard, Oakland, California. January 31.
- Parsons Engineering Science (Parsons), 1997b. Quarterly Progress Report 8 and Annual Summary Assessment, Redwood Regional Park Service Yard, Oakland, California. April 4.
- Parsons Engineering Science (Parsons), 1997c. Quarterly Progress Report 9, Redwood Regional Park Service Yard, Oakland, California. June 30.
- Parsons Engineering Science (Parsons), 1997d. Quarterly Progress Report 10, Redwood Regional Park Service Yard, Oakland, California. September 22.
- Parsons Engineering Science (Parsons), 1996a. Quarterly Progress Report 5, Redwood Regional Park Service Yard, Oakland, California. June 6.
- Parsons Engineering Science (Parsons), 1996b. Quarterly Progress Report 6, Redwood Regional Park Service Yard, Oakland, California. September 24.
- Parsons Engineering Science (Parsons), 1995a. Quarterly Progress Report 2, Redwood Regional Park Service Yard, Oakland, California. March 8.
- Parsons Engineering Science (Parsons), 1995b. Quarterly Progress Report 3, Redwood Regional Park Service Yard, Oakland, California. June 23.
- Parsons Engineering Science (Parsons), 1995c. Quarterly Progress Report 4 and Annual Summary Assessment (November 1994 - August 1995), Redwood Regional Park Service Yard, Oakland, California. November 13.
- Parsons Engineering Science (Parsons), 1994a. Creek and Soil Sampling at Redwood Regional Park, Oakland, California. March 2.

- Parsons Engineering Science (Parsons), 1994b. Creek Surface Water at Redwood Regional Park, Oakland, California. May 13.
- Parsons Engineering Science (Parsons), 1994c. Workplan for Groundwater Characterization Program at East Bay Regional Park Service Yard, Oakland, California. August 17.
- Parsons Engineering Science (Parsons), 1994d. Quarterly Progress Report 1, Redwood Regional Park Service Yard, Oakland, California. December 28.
- Parsons Engineering Science (Parsons), 1993a. Closure of Underground Fuel Storage Tanks and Initial Site Characterization at Redwood Regional Park Service Yard, Oakland, California. December 16.
- Parsons Engineering Science (Parsons), 1993b. Workplan for Site Characterization at East Bay Regional Park District, Redwood Regional Park Corporation Yard, Oakland, Alameda County, California. September 3.
- Regional Water Quality Control Board, San Francisco Bay Region (Water Board), 2013. Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater and Surface Water Screening Levels for Freshwater Aquatic Habitats. , 2008 Revised May 2013.
- Regional Water Quality Control Board, San Francisco Bay Region (Water Board), 1995. San Francisco Bay Region Water Quality Control Plan.
- State Water Resources Control Board, 2012. Leaking Underground Fuel Tank Field Manual: Guidelines for Site Assessment, Cleanup, and Underground Storage Tank Closure. State of California Leaking Underground Fuel Tank Task Force. September.
- Stellar Environmental Solutions, Inc. (Stellar Environmental), 2016. Second Semiannual 2015 Groundwater Monitoring, Permeable Reactive Barrier Evaluation and Annual Summary Report Redwood Regional Park Service Yard Site. March 1.
- Stellar Environmental Solutions, Inc. (Stellar Environmental), 2015b. First Semiannual 2015 Groundwater Monitoring and PRB Evaluation Report of the Redwood Regional Park Service Yard Site – Oakland, California (ACEH Fuel Leak Case No. RO0000246). April 21.
- Stellar Environmental Solutions, Inc. (Stellar Environmental), 2014. Second Semiannual 2014 Groundwater and Permeable Reactive Barrier Monitoring, and Annual Summary Report Redwood Regional Park Service Yard Site – Oakland, California (ACEH Fuel Leak Case No. RO0000246). December 19.

- Stellar Environmental Solutions, Inc. (Stellar Environmental), 2014. First Semiannual 2014 Groundwater Monitoring, Permeable Reactive Barrier Evaluation. Redwood Regional Park Service Yard Site. April 1.
- Stellar Environmental Solutions, Inc. (Stellar Environmental), 2013. Second Semiannual 2013 Groundwater Monitoring, Permeable Barrier Installation, and Annual Summary Report, Redwood Regional Park Service Yard Site, Oakland, California. January 21.
- Stellar Environmental Solutions, Inc. (Stellar Environmental), 2013. First Semiannual 2013 Groundwater and Surface Water Monitoring Report, Redwood Regional Park Service Yard Site, Oakland, California. May 8.
- Stellar Environmental Solutions, Inc. (Stellar Environmental), 2012a. Second Semiannual Groundwater Monitoring Report and Annual Summary Report, Redwood Regional Park Service Yard, Oakland, California. November 13.
- Stellar Environmental Solutions, Inc. (Stellar Environmental), 2012b. First Semiannual Groundwater Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. May 8.
- Stellar Environmental Solutions, Inc. (Stellar Environmental), 2011a. Remedial Action Workplan for Installation of a Permeable Reactive Barrier for Hydrocarbon Contamination Treatment, Redwood Regional Park Service Yard 7867 Redwood Road, Oakland, California. November 28.
- Stellar Environmental Solutions, Inc. (Stellar Environmental), 2011b. Second Semiannual 2011 Groundwater Monitoring Report and Annual Summary Report, Redwood Regional Park Service Yard, Oakland, California. October 19.
- Stellar Environmental Solutions, Inc. (Stellar Environmental), 2011b. First Quarter 2011 Groundwater Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. April 22.
- Stellar Environmental Solutions, Inc. (Stellar Environmental), 2011c. Fourth Quarter 2010 Groundwater Monitoring and Annual Summary Report, Redwood Regional Park Service Yard, Oakland, California. January 28.
- Stellar Environmental Solutions, Inc. (Stellar Environmental), 2010a. Third Quarter 2010 Groundwater Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. November 8.

Stellar Environmental Solutions, Inc. (Stellar Environmental), 2010b. Second Quarter 2010 Groundwater Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. July 12.

Stellar Environmental Solutions, Inc. (Stellar Environmental), 2010c. First Quarter 2010 Groundwater Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. April 20.

Stellar Environmental Solutions, Inc. (SES), 2009a. Fourth Quarter 2008 Groundwater Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. January 15.

Stellar Environmental Solutions, Inc. (SES), 2009b. First Quarter 2009 Groundwater Monitoring and Oxygen Release Compound ORC™ Treatment Corrective Action Report, Redwood Regional Park Service Yard, Oakland, California. April 10.

Stellar Environmental Solutions, Inc. (SES), 2009c. Second Quarter 2009 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. July 1.

Stellar Environmental Solutions, Inc. (SES), 2009d. Third Quarter 2009 Groundwater Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. October 20.

Stellar Environmental Solutions, Inc. (SES), 2009e. Workplan for Insitu Injection. Redwood Regional Park Service Yard, Oakland, California. August 20.

Stellar Environmental Solutions, Inc. (SES), 2008a. Fourth Quarter 2007 Groundwater Monitoring and Annual Summary Report, Redwood Regional Park Service Yard, Oakland, California. January 8.

Stellar Environmental Solutions, Inc. (SES), 2008b. First Quarter 2008 Groundwater Monitoring and Annual Summary Report, Redwood Regional Park Service Yard, Oakland, California. April 29.

Stellar Environmental Solutions, Inc. (SES), 2008c. Second Quarter 2008 Groundwater Monitoring and Annual Summary Report, Redwood Regional Park Service Yard, Oakland, California. July 15.

Stellar Environmental Solutions, Inc. (SES), 2008d. Third Quarter 2008 Groundwater Monitoring and Annual Summary Report, Redwood Regional Park Service Yard, Oakland, California. October 7.

Stellar Environmental Solutions, Inc. (SES), 2007a. First Quarter 2007 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. April 25.

Stellar Environmental Solutions, Inc. (SES), 2007b. Second Quarter 2007 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. July 9.

Stellar Environmental Solutions, Inc. (SES), 2007c. Third Quarter 2007 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. October 9.

Stellar Environmental Solutions, Inc. (SES), 2006a. Fourth Quarter 2005 Groundwater Monitoring and Annual Summary Report, Redwood Regional Park Service Yard, Oakland, California. January 20.

Stellar Environmental Solutions, Inc. (SES), 2006b. First Quarter 2006 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. April 21.

Stellar Environmental Solutions, Inc. (SES), 2006c. Second Quarter 2006 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. July 5.

Stellar Environmental Solutions, Inc. (SES), 2006d. Third Quarter 2006 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. November 21.

Stellar Environmental Solutions, Inc. (SES), 2005a. First Quarter 2005 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. March 31.

Stellar Environmental Solutions, Inc. (SES), 2005b. Second Quarter 2005 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. July 12.

Stellar Environmental Solutions, Inc. (SES), 2005c. Third Quarter 2005 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. October 13.

Stellar Environmental Solutions, Inc. (SES), 2005d. Fourth Quarter 2004 Groundwater Monitoring and Annual Summary Report, Redwood Regional Park Service Yard, Oakland, California. January 24.

Stellar Environmental Solutions, Inc. (SES), 2004a. Year 2003 Annual Summary Report, Redwood Regional Park Service Yard, Oakland, California. January 15.

Stellar Environmental Solutions, Inc. (SES), 2004b. First Quarter 2004 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. April 14.



Stellar Environmental Solutions, Inc. (SES), 2004c. Second Quarter 2004 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. July 16.

Stellar Environmental Solutions, Inc. (SES), 2004d. Third Quarter 2004 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. October 12.

Stellar Environmental Solutions, Inc. (SES), 2003a. Year 2002 Annual Summary Report, Redwood Regional Park Service Yard, Oakland, California. January 27.

Stellar Environmental Solutions, Inc. (SES), 2003b. First Quarter 2003 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. May 5.

Stellar Environmental Solutions, Inc. (SES), 2003c. Second Quarter 2003 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. July 29.

Stellar Environmental Solutions, Inc. (SES), 2003d. Third Quarter 2003 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. October 3.

Stellar Environmental Solutions, Inc. (SES), 2002a. First Quarter 2002 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. April 16.

Stellar Environmental Solutions, Inc. (SES), 2002b. Second Quarter 2002 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. July 23.

Stellar Environmental Solutions, Inc. (SES), 2002c. Third Quarter 2002 Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. October 14.

Stellar Environmental Solutions, Inc. (SES), 2001a. Monitoring Well Installation and Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. February 8.

Stellar Environmental Solutions, Inc. (SES), 2001b. Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. May 4.

Stellar Environmental Solutions, Inc. (SES), 2001c. Well Installation, Site Monitoring, and Corrective Action Report, Redwood Regional Park Service Yard, Oakland, California. October 26.

Stellar Environmental Solutions, Inc. (SES), 2000a. Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. April 21.

Stellar Environmental Solutions, Inc. (SES), 2000b. Workplan for Groundwater Monitoring Well Installations, Redwood Regional Park Service Yard, Oakland, California. October 19.

Stellar Environmental Solutions, Inc. (SES), 2000c. Site Monitoring Report, Redwood Regional Park Service Yard, Oakland, California. October 19.

Stellar Environmental Solutions, Inc. (SES), 2000d. Site Feasibility Study Report, Redwood Regional Park Service Yard, Oakland, California. October 20.

Stellar Environmental Solutions, Inc. (SES), 1999a. Workplan for Subsurface Investigation, Redwood Regional Park Service Yard, Oakland, California. April 8.

Stellar Environmental Solutions, Inc. (SES), 1999b. Residual Contamination Investigation and Remedial Action Assessment Report, Redwood Regional Park Service Yard, Oakland, California. June 9.

Stellar Environmental Solutions, Inc. (SES), 1998a. Workplan for Continued Site Investigation and Closure Assessment, Redwood Regional Park Service Yard, Oakland, California. October 9.

Stellar Environmental Solutions, Inc. (SES), 1998b. Site Investigation and Closure Assessment Report, Redwood Regional Park Service Yard, Oakland, California. December 4.

## **10.0 LIMITATIONS**

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This report has been prepared for the exclusive use of the East Bay Regional Park District, its authorized representatives, and the regulatory agencies. No reliance on this report shall be made by anyone other than those for whom it was prepared.

The findings and conclusions presented in this report are based on the review of previous investigators' findings at the site, as well as onsite activities conducted by SES since September 1998. This report has been prepared in accordance with generally accepted methodologies and standards of practice. The SES personnel who performed this work are qualified to perform such investigations and have accurately reported the information available, but cannot attest to the validity of that information. No warranty, expressed or implied, is made as to the findings, conclusions, and recommendations included in the report.

The findings of this report are valid as of the present. Site conditions may change with the passage of time, natural processes, or human intervention, which can invalidate the findings and conclusions presented in this report. As such, this report should be considered a reflection of the current site conditions as based on site characterization and corrective actions completed.

## **APPENDIX A**

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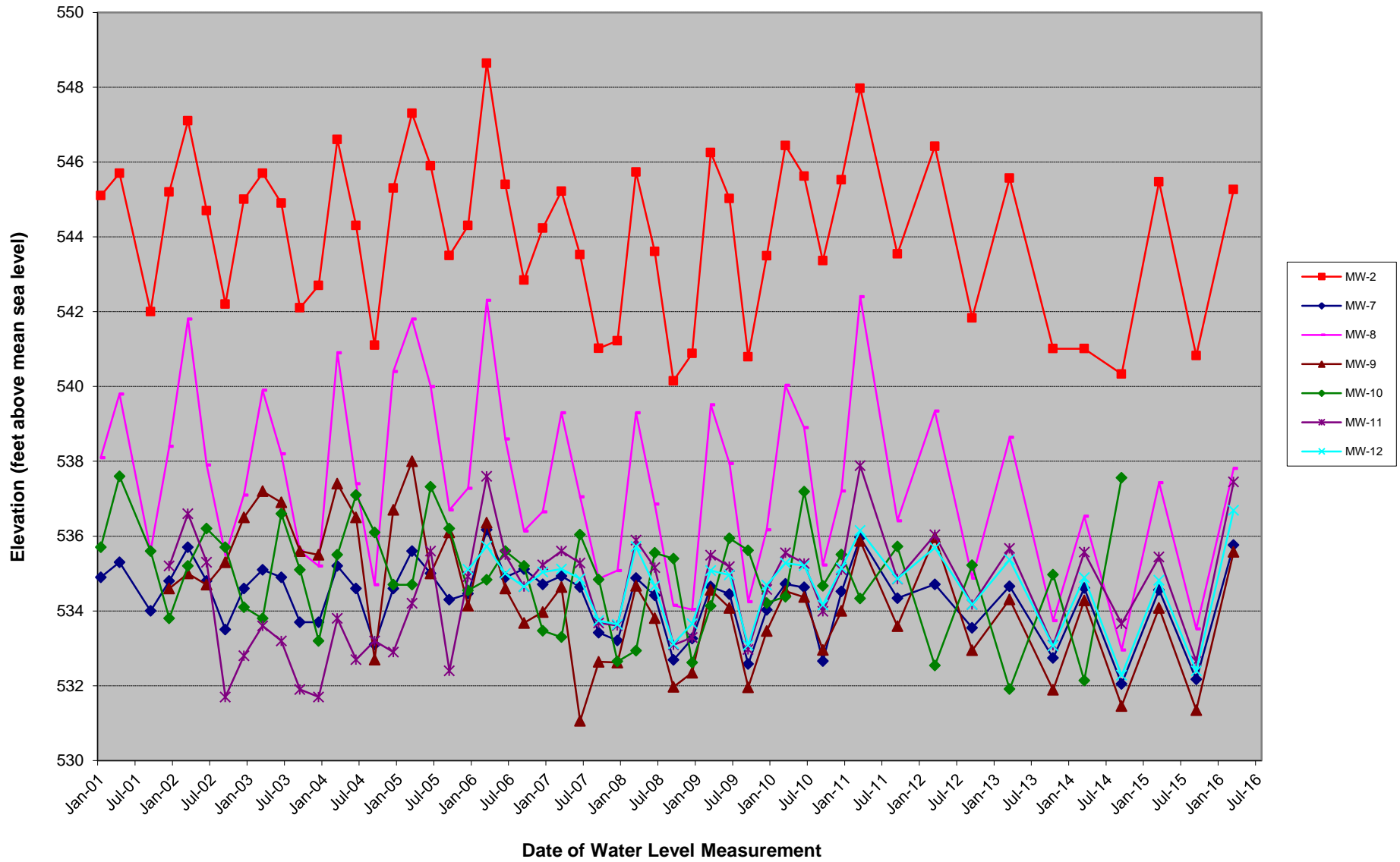
### **Historical Groundwater Monitoring Well Water Level Data**

**HISTORICAL GROUNDWATER ELEVATIONS IN MONITORING WELLS  
REDWOOD REGIONAL PARK SERVICE YARD  
7867 REDWOOD ROAD, OAKLAND, CALIFORNIA**

Well I.D.	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12
<b>TOC Elevation (a)</b>	565.83	566.42	560.81	548.10	547.41	545.43	547.56	549.13	549.28	547.22	547.75	544.67
<b>Date Monitored</b>	<b>Groundwater Elevations (feet above mean sea level)</b>											
09/18/98	563.7	544.2	540.8	534.5	531.1	531.4						
04/06/99	565.2	546.9	542.3	535.6	532.3	532.9						
12/20/99	562.9	544.7	541.5	534.9	531.2	532.2						
09/28/00	562.8	542.7	538.3	532.2	530.9	532.0						
01/11/01	562.9	545.1	541.7	535.0	531.2	532.3	534.9	538.1				
04/13/01	562.1	545.7	541.7	535.1	531.5	532.4	535.3	539.8				
09/01/01	560.9	542.0	537.7	533.9	530.7	531.8	534.0	535.6				
12/17/01	562.2	545.2	542.2	534.8	531.4	532.4	534.8	538.4	534.6	535.7	535.2	
03/14/02	563.0	547.1	542.2	535.5	532.4	533.3	535.7	541.8	535.0	537.6	536.6	
06/18/02	562.1	544.7	541.1	534.6	531.2	532.2	534.8	537.9	534.7	535.6	535.3	
09/24/02	561.4	542.2	537.3	533.5	530.6	531.8	533.5	535.5	535.3	533.8	531.7	
12/18/02	562.4	545.0	542.0	534.8	531.5	532.5	534.6	537.1	536.5	535.2	532.8	
03/27/03	562.6	545.7	541.7	534.8	531.6	532.4	535.1	539.9	537.2	536.2	533.6	
06/19/03	562.3	544.9	541.5	534.8	531.3	532.3	534.9	538.2	536.9	535.7	533.2	
09/10/03	561.6	542.1	537.9	533.8	530.8	531.9	533.7	535.6	535.6	534.1	531.9	
12/10/03	562.4	542.7	537.6	533.7	530.9	531.9	533.7	535.2	535.5	533.8	531.7	
03/18/04	563.1	546.6	541.9	535.0	531.7	532.4	535.2	540.9	537.4	536.6	533.8	
06/17/04	562.1	544.3	540.7	534.3	531.0	532.1	534.6	537.4	536.5	535.1	532.7	
09/21/04	561.5	541.1	536.5	533.1	530.5	531.6	533.1	534.7	532.7	533.2	533.2	
12/14/04	562.2	545.3	541.7	534.7	531.4	532.2	534.6	540.4	536.7	535.5	532.9	
03/16/05	563.8	547.3	541.7	535.3	532.4	532.8	535.6	541.8	538.0	537.1	534.2	
06/15/05	562.9	545.9	541.6	535.0	531.7	532.5	535.0	540.0	535.0	536.1	535.6	
09/13/05	562.3	543.5	539.7	534.4	530.9	532.2	534.3	536.7	536.1	534.7	532.4	
12/15/05	562.2	544.3	541.4	(b)	531.0	532.2	534.5	537.3	534.1	534.7	534.9	535.1
03/30/06	565.8	548.6	542.7	(b)	533.9	534.4	536.2	542.3	536.4	537.3	537.6	535.7
06/20/06	563.6	545.4	541.6	(b)	531.5	532.5	534.9	538.6	534.6	536.2	535.5	535.0
09/29/06	561.9	542.8	539.0	(b)	530.7	532.1	535.1	536.1	533.7	534.6	534.7	534.7
12/14/06	562.9	544.2	541.5	(b)	531.1	532.3	534.7	536.7	534.0	534.8	535.2	535.0
03/21/07	562.5	545.2	541.7	(b)	531.4	532.4	534.9	539.3	534.6	535.6	535.6	535.1
06/20/07	561.5	543.5	540.8	(b)	531.0	532.4	534.6	537.1	531.1	535.2	535.3	534.9
9/14/2007	560.71	541.02	536.99	(b)	530.46	531.58	533.42	534.86	532.64	533.47	533.68	533.74
12/6/2007	560.62	541.22	536.85	(b)	530.68	531.48	533.21	535.08	532.62	533.3	533.61	533.64
3/14/2008	561.76	545.73	541.63	(b)	531.34	532.30	534.88	539.30	534.67	536.04	535.89	535.72
6/13/2008	560.92	543.61	540.6	(b)	530.83	532.02	534.42	536.86	533.81	534.84	535.16	534.67
9/18/2008	560.43	540.15	536.41	(b)	529.85	531.11	532.69	534.15	531.97	532.65	533.09	533.12
12/17/2008	561.11	540.88	536.77	(b)	530.68	531.67	533.26	534.04	532.35	532.94	533.29	533.66
3/16/2009	561.84	546.25	539.51	(b)	531.63	532.58	534.65	539.51	534.56	535.55	535.49	535.08
6/10/2009	561.05	545.02	541.38	(b)	531.02	532.08	534.45	537.94	534.08	535.40	535.18	534.96
9/25/2009	560.00	540.79	536.33	(b)	529.98	Dry	532.58	534.25	531.96	532.62	532.97	533.08
12/21/2009	560.93	543.49	541.22	(b)	530.96	532.06	534.03	536.17	533.46	534.13	534.57	534.69
3/29/2010	561.48	546.44	541.59	(b)	531.52	532.58	534.72	540.03	534.53	535.94	535.55	535.28
6/22/2010	561.17	545.62	541.40	(b)	531.26	532.41	534.63	538.90	534.37	535.62	535.27	535.21
9/28/2010	560.32	543.36	537.91	(b)	530.6	532.02	532.66	535.23	532.96	534.21	533.99	534.16
12/16/2010	561.33	545.52	541.51	(b)	531.11	532.31	534.52	537.21	534.00	534.38	535.10	535.15
3/23/2011	563.68	547.97	542.49	(b)	532.78	534.43	535.96	542.40	535.87	537.19	537.88	536.15
9/23/2011	561.03	543.54	539.52	(b)	530.81	532.31	534.34	536.41	533.59	534.67	534.85	534.86
3/22/2012	562.25	546.42	542.02	(b)	531.83	533.13	534.71	539.34	535.97	535.51	536.03	535.69
9/19/2012	560.93	541.83	537.53	(b)	530.6	531.91	533.55	534.88	532.95	534.33	534.17	534.17
3/14/2013	561.80	545.57	541.74	(b)	531.01	532.11	534.66	538.64	534.31	535.72	535.67	535.37
10/3/2013	560.95	541.01	536.21	(b)	530.02	531.14	532.74	533.74	531.89	532.54	533.08	533.06
3/10/2014	561.68	541.01	541.67	(b)	531.99	532.02	534.61	536.53	534.28	535.22	535.57	534.89
9/19/2014	560.40	540.33	535.53	(b)	529.31	530.50	532.05	532.96	531.46	531.91	533.66	532.28
3/23/2015	561.41	545.47	541.46	(b)	531.01	532.09	534.56	537.43	534.08	534.97	535.44	534.82
9/24/2015	560.26	540.82	535.79	(b)	529.34	530.39	532.17	533.52	531.35	532.14	532.65	532.4
3/21/2016	563.95	545.26	539.95	(b)	533.22	534.16	535.76	537.81	535.58	537.56	537.45	536.69

TOC = Top of well Casing  
(a) TOC Elevations resurveyed on December 15, 2005 in accordance GeoTracker requirements.  
(b) Well decommissioned and replaced by MW-12 in December 2005.  
NM = not measured

**Figure 4: Historical Groundwater Elevations in Site Wells  
Redwood Regional Park Service Yard - Oakland, California**



## **APPENDIX B**

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### **Groundwater Monitoring Field Documentation**

## WELL GAUGING DATA

Project # 160321-DS1 Date 3-21-16 Client Stellar

Site Redwood Regional Park service yard

Well ID	(in.) Well Size Time	Time Well Size (in.)	Sheen / Odor	Depth to Immisible Liquid (ft.)	Thickness of Immisible Liquid (ft.)	Volume of Immiscibles Removed (ml)	Depth to water (ft.)	Depth to well bottom (ft.)	Survey Point: TOB or TOC	Notes
MW-7	2	0850	No				11.80	29.35	↓	
MW-11	2	0854	No				10.30	28.79		
MW-9	2	0857	No				13.70	30.20		
MW-12	2	0859	No				7.98	23.80		
MW-8	2	0902	No				11.32	22.25		
MW-2	4	0908	No				21.16	37.55		
MW-10	2	0913	No				9.66	28.36		
MW-1	4	0916	No				1.88	19.20		
MW-3	4	0918	No				20.86	45.05		
MW-6	4	0921	No				11.27	27.55		
MW-5	4	0924	No				14.19	26.96		↓



# WELLHEAD INSPECTION CHECKLIST

Client Stellar env. Date 3-21-16

Site Address Redwood Regional Park service yard

Job Number 160321-DS1 Technician PS

Well ID	Well Inspected - No Corrective Action Required	Water Bailed From Wellbox	Wellbox Components Cleaned	Cap Replaced	Lock Replaced	Other Action Taken (explain below)	Well Not Inspected (explain below)	Repair Order Submitted
MW-2	✓							
MW-7	✓							
MW-8	✓							
MW-9	✓							
MW-10	✓							
MW-11	✓							
MW-12	✓							
SW-2	✓							
SW-3	✓							
MW-1	✓							
MW-3	✓							
MW-4	✓							
MW-5	✓							

NOTES: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



# WELL MONITORING DATA SHEET

Project #: <u>160321-DS1</u>	Client: <u>Stellar</u>
Sampler: <u>DS</u>	Date: <u>3-21-16</u>
Well I.D.: <u>MW-2</u>	Well Diameter: 2 3 <u>(4)</u> 6 8 _____
Total Well Depth (TD): <u>37.55</u>	Depth to Water (DTW): <u>21.16</u>
Depth to Free Product: <u>-</u>	Thickness of Free Product (feet): <u>-</u>
Referenced to: <u>(PVC)</u> Grade	D.O. Meter (if req'd): <u>(YSI)</u> HACH
DTW with 80% Recharge [(Height of Water Column x 0.20) + DTW]: <u>24.43</u>	

Purge Method: <u>Bailer</u>	Waterra	Sampling Method: <u>Bailer</u>
<u>Disposable Bailer</u>	Peristaltic	<u>(Disposable Bailer)</u>
<u>Positive Air Displacement</u>	Extraction Pump	Extraction Port
<u>Electric Submersible</u>	Other _____	Dedicated Tubing
		Other: _____

10.50 (Gals.) X 3 = 31.5 Gals.  
 1 Case Volume      Specified Volumes      Calculated Volume

Well Diameter	Multiplier	Well Diameter	Multiplier
1"	0.04	4"	0.65
2"	0.16	6"	1.47
3"	0.37	Other	radius <sup>2</sup> * 0.163

Time	Temp (°F or °C)	pH	Cond. (mS or µS)	Turbidity (NTUs)	Gals. Removed	Observations
1023	55.8	6.61	772	>1000	10.50	cloudy
*	well dewatered @ 11 gallons					
1248	56.1	6.37	752.1	26	grab	clear

Did well dewater? (Yes) No      Gallons actually evacuated: 11

Sampling Date: 3-21-16      Sampling Time: 1248      Depth to Water: 29.83 (2-hour)

Sample I.D.: MW-2      Laboratory: Kiff CalScience Other CAT

Analyzed for: TPH-G BTEX MTBE TPH-D Oxygenates (5) Other: See COL

EB I.D. (if applicable): @ \_\_\_\_\_ Time      Duplicate I.D. (if applicable): \_\_\_\_\_

Analyzed for: TPH-G BTEX MTBE TPH-D Oxygenates (5) Other: \_\_\_\_\_

D.O. (if req'd):	Pre-purge:	mg/L	Post-purge:	mg/L
				<u>1.03</u>
O.R.P. (if req'd):	Pre-purge:	mV	Post-purge:	mV
				<u>-51</u>

## WELL MONITORING DATA SHEET

Project #: 160321-DS1	Client: Stellar
Sampler: DS	Date: 3-21-16
Well I.D.: MW-7	Well Diameter: (2) 3 4 6 8 _____
Total Well Depth (TD): 25.35	Depth to Water (DTW): 11.80
Depth to Free Product:	Thickness of Free Product (feet):
Referenced to: (PVC) Grade	D.O. Meter (if req'd): (YSI) HACH
DTW with 80% Recharge [(Height of Water Column x 0.20) + DTW]: 14.51	

Purge Method: Bailer	Watterra	Sampling Method: Bailer
(Disposable Bailer)	Peristaltic	(Disposable Bailer)
Positive Air Displacement	Extraction Pump	Extraction Port
Electric Submersible	Other _____	Dedicated Tubing
		Other: _____

$2.20 \text{ (Gals.)} \times 3 = 6.60 \text{ Gals.}$ I Case Volume      Specified Volumes      Calculated Volume	<table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <thead> <tr> <th>Well Diameter</th> <th>Multiplier</th> <th>Well Diameter</th> <th>Multiplier</th> </tr> </thead> <tbody> <tr> <td>1"</td> <td>0.04</td> <td>4"</td> <td>0.65</td> </tr> <tr> <td>2"</td> <td>0.16</td> <td>6"</td> <td>1.47</td> </tr> <tr> <td>3"</td> <td>0.37</td> <td>Other</td> <td>radius<sup>2</sup> * 0.163</td> </tr> </tbody> </table>	Well Diameter	Multiplier	Well Diameter	Multiplier	1"	0.04	4"	0.65	2"	0.16	6"	1.47	3"	0.37	Other	radius <sup>2</sup> * 0.163
Well Diameter	Multiplier	Well Diameter	Multiplier														
1"	0.04	4"	0.65														
2"	0.16	6"	1.47														
3"	0.37	Other	radius <sup>2</sup> * 0.163														

Time	Temp (°F or °C)	pH	Cond. (mS or (μS))	Turbidity (NTUs)	Gals. Removed	Observations
0930	55.8	6.61	1126	13	2.20	clear
0933	55.6	6.52	1107	8	4.40	↓
0936	55.5	6.48	1096	6	6.60	

Did well dewater?    Yes    **(No)**      Gallons actually evacuated: 6.60

Sampling Date: 3-21-16    Sampling Time: 0940    Depth to Water: 11.95

Sample I.D.: MW-7      Laboratory: Kiff    CalScience    Other:   C&T  

Analyzed for: TPH-G    BTEX    MTBE    TPH-D    Oxygenates (5)    Other:   see COC  

EB I.D. (if applicable):      @      Time      Duplicate I.D. (if applicable):

Analyzed for: TPH-G    BTEX    MTBE    TPH-D    Oxygenates (5)    Other:

D.O. (if req'd):	Pre-purge:	mg/L	Post-purge:	mg/L
				1.19
O.R.P. (if req'd):	Pre-purge:	mV	Post-purge:	mV
				-13

## WELL MONITORING DATA SHEET

Project #: <u>160321-DS1</u>	Client: <u>Stellar</u>
Sampler: <u>DS</u>	Date: <u>3-21-14</u>
Well I.D.: <u>MW-8</u>	Well Diameter: <u>(2)</u> 3 4 6 8
Total Well Depth (TD): <u>22.25</u>	Depth to Water (DTW): <u>11.32</u>
Depth to Free Product: _____	Thickness of Free Product (feet): _____
Referenced to: <u>PVC</u> Grade	D.O. Meter (if req'd): <u>YSI</u> HACH
DTW with 80% Recharge [(Height of Water Column x 0.20) + DTW]: <u>13.50</u>	

Purge Method: <u>Bailer</u> <u>Disposable Bailer</u> Positive Air Displacement Electric Submersible	Waterra Peristaltic Extraction Pump Other _____	Sampling Method: <u>Bailer</u> <u>Disposable Bailer</u> Extraction Port Dedicated Tubing Other: _____
--	--	---

<u>1.75</u> (Gals.) X	<u>3</u>	= <u>5.25</u> Gals.
I Case Volume	Specified Volumes	Calculated Volume

Well Diameter	Multiplier	Well Diameter	Multiplier
1"	0.04	4"	0.65
2"	0.16	6"	1.47
3"	0.37	Other	radius <sup>2</sup> * 0.163

Time	Temp (°F or °C)	pH	Cond. (mS or µS)	Turbidity (NTUs)	Gals. Removed	Observations
1200	56.0	7.22	862.7	140	1.75	cloudy
1205	55.9	7.03	843.2	109	3.80	↓
1210	56.0	6.97	834.8	98	5.25	↓

Did well dewater? Yes  No  Gallons actually evacuated: 5.25

Sampling Date: 3-21-14 Sampling Time: 1213 Depth to Water: 11.07

Sample I.D.: MW-8 Laboratory: Kiff CalScience Other CAT

Analyzed for: TPH-G BTEX MTBE TPH-D Oxygenates (5) Other: see COC

EB I.D. (if applicable): \_\_\_\_\_ @ \_\_\_\_\_ Time Duplicate I.D. (if applicable): \_\_\_\_\_

Analyzed for: TPH-G BTEX MTBE TPH-D Oxygenates (5) Other: \_\_\_\_\_

D.O. (if req'd):	Pre-purge:	mg/L	Post-purge:	0.91 mg/L
O.R.P. (if req'd):	Pre-purge:	mV	Post-purge:	-42 mV

## WELL MONITORING DATA SHEET

Project #: <u>160321-DS1</u>	Client: <u>Stellar</u>
Sampler: <u>DS</u>	Date: <u>3-21-16</u>
Well I.D.: <u>MW-9</u>	Well Diameter: <u>(2)</u> 3 4 6 8 _____
Total Well Depth (TD): <u>30.20</u>	Depth to Water (DTW): <u>13.70</u>
Depth to Free Product: <u>—</u>	Thickness of Free Product (feet): <u>—</u>
Referenced to: <u>PVC</u> Grade	D.O. Meter (if req'd): <u>YSI</u> HACH
DTW with 80% Recharge [(Height of Water Column x 0.20) + DTW]: <u>17.0</u>	

Purge Method: <u>Bailer</u> <u>Disposable Bailer</u> <u>Positive Air Displacement</u> <u>Electric Submersible</u>	Watterra <u>Peristaltic</u> <u>Extraction Pump</u> Other _____	Sampling Method: <u>Bailer</u> <u>Disposable Bailer</u> <u>Extraction Port</u> <u>Dedicated Tubing</u> Other: _____
--	---	---

<u>2.70</u> (Gals.) X <u>3</u> = <u>8.1</u> Gals.
1 Case Volume      Specified Volumes      Calculated Volume

Well Diameter	Multiplier	Well Diameter	Multiplier
1"	0.04	4"	0.65
2"	0.16	6"	1.47
3"	0.37	Other	radius <sup>2</sup> * 0.163

Time	Temp (F or °C)	pH	Cond. (mS or µS)	Turbidity (NTUs)	Gals. Removed	Observations
1037	56.3	6.86	919.3	103	2.70	cloudy
1041	56.4	6.57	960.3	94	5.40	↓
1045	56.5	6.48	971.2	80	8.10	↓

Did well dewater?    Yes    (No)                      Gallons actually evacuated: 8.10

Sampling Date: 3-21-16    Sampling Time: 1050                      Depth to Water: 14.12

Sample I.D.: MW-9                      Laboratory:    Kiff    CalScience    Other C&T

Analyzed for:    TPH-G    BTEX    MTBE    TPH-D    Oxygenates (5)    Other: see WOC

EB I.D. (if applicable):                      @                      Time                      Duplicate I.D. (if applicable):

Analyzed for:    TPH-G    BTEX    MTBE    TPH-D    Oxygenates (5)    Other:

D.O. (if req'd):	Pre-purge:	mg/L	Post-purge:	0.79 mg/L
O.R.P. (if req'd):	Pre-purge:	mV	Post-purge:	-23 mV

## WELL MONITORING DATA SHEET

Project #: <u>160321-DS1</u>	Client: <u>Stellar</u>
Sampler: <u>DS</u>	Date: <u>3-21-16</u>
Well I.D.: <u>MW-10</u>	Well Diameter: <u>(2)</u> 3 4 6 8 _____
Total Well Depth (TD): <u>28.34</u>	Depth to Water (DTW): <u>9.66</u>
Depth to Free Product: <u>-</u>	Thickness of Free Product (feet): <u>-</u>
Referenced to: <u>(PVC)</u> Grade	D.O. Meter (if req'd): <u>YSI</u> HACH
DTW with 80% Recharge [(Height of Water Column x 0.20) + DTW]: <u>13.40</u>	

Purge Method: Bailer      Waterra      Sampling Method: Bailer  
~~Disposable Bailer~~      Peristaltic      ~~Disposable Bailer~~  
 Positive Air Displacement      Extraction Pump      Extraction Port  
 Electric Submersible      Other \_\_\_\_\_      Dedicated Tubing

Other: \_\_\_\_\_

<u>3</u> (Gals.) X <u>3</u> = <u>9</u> Gals. I Case Volume      Specified Volumes      Calculated Volume	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Well Diameter</th> <th>Multiplier</th> <th>Well Diameter</th> <th>Multiplier</th> </tr> </thead> <tbody> <tr> <td>1"</td> <td>0.04</td> <td>4"</td> <td>0.65</td> </tr> <tr> <td>2"</td> <td>0.16</td> <td>6"</td> <td>1.47</td> </tr> <tr> <td>3"</td> <td>0.37</td> <td>Other</td> <td>radius<sup>2</sup> * 0.163</td> </tr> </tbody> </table>	Well Diameter	Multiplier	Well Diameter	Multiplier	1"	0.04	4"	0.65	2"	0.16	6"	1.47	3"	0.37	Other	radius <sup>2</sup> * 0.163
Well Diameter	Multiplier	Well Diameter	Multiplier														
1"	0.04	4"	0.65														
2"	0.16	6"	1.47														
3"	0.37	Other	radius <sup>2</sup> * 0.163														

Time	Temp (°F or °C)	pH	Cond. (mS or µS)	Turbidity (NTUs)	Gals. Removed	Observations
<u>1220</u>	<u>56.4</u>	<u>6.09</u>	<u>817.6</u>	<u>60</u>	<u>3</u>	<u>cloudy</u>
<u>1223</u>	<u>56.6</u>	<u>6.12</u>	<u>807.2</u>	<u>48</u>	<u>6</u>	<u>clear</u>
<u>1227</u>	<u>56.7</u>	<u>6.13</u>	<u>803.0</u>	<u>45</u>	<u>9</u>	<u>clear</u>

Did well dewater?    Yes    (No)      Gallons actually evacuated: 9

Sampling Date: 3-21-16    Sampling Time: 1230    Depth to Water: 10.09

Sample I.D.: MW-10      Laboratory:    Kiff    CalScience    Other: CIT

Analyzed for:    TPH-G    BTEX    MTBE    TPH-D    Oxygenates (5)    Other: See COC

EB I.D. (if applicable):      @      Time      Duplicate I.D. (if applicable):

Analyzed for:    TPH-G    BTEX    MTBE    TPH-D    Oxygenates (5)    Other:

D.O. (if req'd):	Pre-purge:	mg/L	Post-purge:	mg/L
O.R.P. (if req'd):	Pre-purge:	mV	Post-purge:	mV
				<u>0.84</u>
				<u>-31</u>

## WELL MONITORING DATA SHEET

Project #: <u>160321-DS1</u>	Client: <u>Stellar</u>
Sampler: <u>DS</u>	Date: <u>3-21-16</u>
Well I.D.: <u>MW-11</u>	Well Diameter: <u>(2)</u> 3 4 6 8
Total Well Depth (TD): <u>28.79</u>	Depth to Water (DTW): <u>10.30</u>
Depth to Free Product: <u>-</u>	Thickness of Free Product (feet): <u>-</u>
Referenced to: <u>PVC</u> Grade	D.O. Meter (if req'd): <u>YSI</u> HACH
DTW with 80% Recharge [(Height of Water Column x 0.20) + DTW]: <u>13.99</u>	

Purge Method: Bailer      Waterra      Sampling Method: Bailer  
Disposable Bailer      Peristaltic      Disposable Bailer  
 Positive Air Displacement      Extraction Pump      Extraction Port  
 Electric Submersible      Other \_\_\_\_\_      Dedicated Tubing

Other: \_\_\_\_\_

<u>3.0</u> (Gals.) X	<u>3</u> =	<u>9.0</u> Gals.
1 Case Volume	Specified Volumes	Calculated Volume

Well Diameter	Multiplier	Well Diameter	Multiplier
1"	0.04	4"	0.65
2"	0.16	6"	1.47
3"	0.37	Other	radius <sup>2</sup> * 0.163

Time	Temp (°F or °C)	pH	Cond (mS or µS)	Turbidity (NTUs)	Gals. Removed	Observations
<u>1005</u>	<u>55.7</u>	<u>6.85</u>	<u>838.2</u>	<u>27</u>	<u>3.0</u>	<u>cloudy</u>
<u>1009</u>	<u>55.9</u>	<u>6.42</u>	<u>814.7</u>	<u>51</u>	<u>6.0</u>	<u>clear</u>
<u>1012</u>	<u>55.9</u>	<u>6.32</u>	<u>803.1</u>	<u>40</u>	<u>9.0</u>	<u>↓</u>

Did well dewater?    Yes    (No)      Gallons actually evacuated: 9.0

Sampling Date: 3-21-16    Sampling Time: 1015    Depth to Water: 10.56

Sample I.D.: MW-11      Laboratory:    Kiff    CalScience    Other CT

Analyzed for:    TPH-G    BTEX    MTBE    TPH-D    Oxygenates (5)    Other: see WCL

EB I.D. (if applicable):      @      Time      Duplicate I.D. (if applicable):

Analyzed for:    TPH-G    BTEX    MTBE    TPH-D    Oxygenates (5)    Other:

D.O. (if req'd):	Pre-purge:	mg/L	Post-purge:	mg/L
				<u>0.83</u>
O.R.P. (if req'd):	Pre-purge:	mV	Post-purge:	mV
				<u>-34</u>



## WELL MONITORING DATA SHEET

Project #: 100321-081	Client: Stellar
Sampler: DS	Date: 3-21-10
Well I.D.: MW-12	Well Diameter: (2) 3 4 6 8
Total Well Depth (TD): 23.80	Depth to Water (DTW): 7.98
Depth to Free Product: -	Thickness of Free Product (feet): -
Referenced to: (PVC) Grade	D.O. Meter (if req'd): (YSI) HACH
DTW with 80% Recharge [(Height of Water Column x 0.20) + DTW]: 11.14	

Purge Method: Bailer	Watrerra	Sampling Method: Bailer
<del>Disposable Bailer</del>	Peristaltic	<del>Disposable Bailer</del>
Positive Air Displacement	Extraction Pump	Extraction Port
Electric Submersible	Other _____	Dedicated Tubing
		Other: _____

$2.6$ (Gals.) X $3$ = $7.8$ Gals. 1 Case Volume      Specified Volumes      Calculated Volume	<table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <thead> <tr> <th>Well Diameter</th> <th>Multiplier</th> <th>Well Diameter</th> <th>Multiplier</th> </tr> </thead> <tbody> <tr> <td>1"</td> <td>0.04</td> <td>4"</td> <td>0.65</td> </tr> <tr> <td>2"</td> <td>0.16</td> <td>6"</td> <td>1.47</td> </tr> <tr> <td>3"</td> <td>0.37</td> <td>Other</td> <td>radius<sup>2</sup> * 0.163</td> </tr> </tbody> </table>	Well Diameter	Multiplier	Well Diameter	Multiplier	1"	0.04	4"	0.65	2"	0.16	6"	1.47	3"	0.37	Other	radius <sup>2</sup> * 0.163
Well Diameter	Multiplier	Well Diameter	Multiplier														
1"	0.04	4"	0.65														
2"	0.16	6"	1.47														
3"	0.37	Other	radius <sup>2</sup> * 0.163														

Time	Temp (°F) or °C	pH	Cond. (mS or µS)	Turbidity (NTUs)	Gals. Removed	Observations
1101	56.4	6.77	805.3	93	2.4	cloudy
1106	56.0	6.72	763.0	81	5.2	↓
1111	56.0	6.70	751.7	69	7.8	↓

Did well dewater?    Yes     No    Gallons actually evacuated: 7.8

Sampling Date: 3-21-10    Sampling Time: 1115    Depth to Water: 8.92

Sample I.D.: MW-12    Laboratory: Kiff    CalScience    Other: CST

Analyzed for: TPH-G    BTEX    MTBE    TPH-D    Oxygenates (5)    Other: see VOC

EB I.D. (if applicable): @ Time    Duplicate I.D. (if applicable):

Analyzed for: TPH-G    BTEX    MTBE    TPH-D    Oxygenates (5)    Other:

D.O. (if req'd):	Pre-purge:	mg/L	Post-purge:	mg/L
O.R.P. (if req'd):	Pre-purge:	mV	Post-purge:	mV
			0.86	
			-360	



# WELL MONITORING DATA SHEET

Project #: <u>100321-DS1</u>	Client: <u>Stellar</u>
Sampler: <u>DS</u>	Date: <u>3-21-16</u>
Well I.D.: <u>SW-3</u>	Well Diameter: <u>2 3 4 6 8</u> <u>in well</u>
Total Well Depth (TD): <u>-</u>	Depth to Water (DTW): <u>-</u>
Depth to Free Product: <u>-</u>	Thickness of Free Product (feet): <u>-</u>
Referenced to: <u>PVC</u> Grade	D.O. Meter (if req'd): <u>YSI</u> HACH
DTW with 80% Recharge [(Height of Water Column x 0.20) + DTW]:	

Purge Method:  Bailer  Waterra  Disposable Bailer  Peristaltic  Positive Air Displacement  Extraction Pump  Electric Submersible  Other \_\_\_\_\_

Sampling Method:  Bailer  Disposable Bailer  Extraction Port  Dedicated Tubing  
Other: Surface water

_____ (Gals.) X _____ = _____ Gals. 1 Case Volume      Specified Volumes      Calculated Volume	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Well Diameter</th> <th>Multiplier</th> <th>Well Diameter</th> <th>Multiplier</th> </tr> </thead> <tbody> <tr> <td>1"</td> <td>0.04</td> <td>4"</td> <td>0.65</td> </tr> <tr> <td>2"</td> <td>0.16</td> <td>6"</td> <td>1.47</td> </tr> <tr> <td>3"</td> <td>0.37</td> <td>Other</td> <td>radius<sup>2</sup> * 0.163</td> </tr> </tbody> </table>	Well Diameter	Multiplier	Well Diameter	Multiplier	1"	0.04	4"	0.65	2"	0.16	6"	1.47	3"	0.37	Other	radius <sup>2</sup> * 0.163
Well Diameter	Multiplier	Well Diameter	Multiplier														
1"	0.04	4"	0.65														
2"	0.16	6"	1.47														
3"	0.37	Other	radius <sup>2</sup> * 0.163														

Time	Temp (°F or °C)	pH	Cond. (mS or µS)	Turbidity (NTUs)	Gals. Removed	Observations
1300	54.4	7.60	437.7	32	GRAB	clear

Did well dewater? Yes  No  Gallons actually evacuated: GRAB

Sampling Date: 3-21-16 Sampling Time: 1300 Depth to Water: -

Sample I.D.: SW-3 Laboratory: Kiff CalScience Other: HT

Analyzed for: TPH-G BTEX MTBE TPH-D Oxygenates (5) Other: see OC

EB I.D. (if applicable): \_\_\_\_\_ @ \_\_\_\_\_ Time Duplicate I.D. (if applicable): \_\_\_\_\_

Analyzed for: TPH-G BTEX MTBE TPH-D Oxygenates (5) Other: \_\_\_\_\_

D.O. (if req'd):	Pre-purge:	mg/L	Post-purge:	mg/L
------------------	------------	------	-------------	------

O.R.P. (if req'd):	Pre-purge:	mV	Post-purge:	mV
--------------------	------------	----	-------------	----

# Chain of Custody Record

Lab job no. \_\_\_\_\_  
 Date 3-21-16  
 Page 1 of 1

Laboratory Curtis and Tompkins, Ltd. Method of Shipment Hand Delivery  
 Address 2323 Fifth Street Shipment No. \_\_\_\_\_  
Berkeley, California 94710  
 510-486-0900 Airbill No. \_\_\_\_\_  
 Project Owner East Bay Regional Park District Cooler No. \_\_\_\_\_  
 Site Address 7867 Redwood Road Project Manager Richard Makdisi  
Oakland, California Telephone No. (510) 644-3123  
 Project Name Redwood Regional Park Fax No. (510) 644-3859  
 Project Number 2013-02 Samplers: (Signature) [Signature]

Field Sample Number	Location/Depth	Date	Time	Sample Type	Type/Size of Container	Analysis Required										Remarks	
						Filtered	No. of Containers	TPH-G	TPH-D	TPH-BTEX	NITRATE	SULFATE	BOD	COD			
SW-3	Creek	3/21/16	1300	W		X	X	X	X								
SW-2	Creek		1240	W		X	X	X	X								
MW-2			1248	W		X	X	X	X								
MW-10			1230	W		X	X	X	X								
MW-8			1213	W		X	X	X	X								
MW-12			1115	W		X	X	X	X	X	X	X	X	X	X	X	X
MW-9			1050	W		X	X	X	X	X	X	X	X	X	X	X	X
MW-11			1015	W		X	X	X	X								
MW-7			0940	W		X	X	X	X	X	X	X	X	X	X	X	X

Relinquished by: Signature: <u>[Signature]</u> Printed: <u>Damir</u> Company: <u>Stellar Environmental</u>	Date: <u>3/21/16</u> Time: <u>14:00</u>	Received by: Signature: <u>[Signature]</u> Printed: <u>Pat Gonzalez</u> Company: <u>C&amp;T</u>	Date: <u>3/21/16</u> Time: <u>14:00</u>	Relinquished by: Signature: _____ Printed: _____ Company: _____	Date: _____ Time: _____	Received by: Signature: _____ Printed: _____ Company: _____	Date: _____ Time: _____			
Turnaround Time: <u>5 Day TAT</u> Comments: <u>Samples on ice</u>				Relinquished by: Signature: _____ Printed: _____ Company: _____				Date: _____ Time: _____	Received by: Signature: _____ Printed: _____ Company: _____	Date: _____ Time: _____

2005-00-01

## **APPENDIX C**

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### **Analytical Laboratory Report and Chain-of-Custody Record**



**Curtis & Tompkins, Ltd.**  
Analytical Laboratories, Since 1878





Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878

2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

Laboratory Job Number 275296  
ANALYTICAL REPORT

Stellar Environmental Solutions  
2198 6th Street  
Berkeley, CA 94710

Project : 2013-02.  
Location : Redwood Regional Park  
Level : II

<u>Sample ID</u>	<u>Lab ID</u>
SW-3	275296-001
SW-2	275296-002
MW-2	275296-003
MW-10	275296-004
MW-8	275296-005
MW-12	275296-006
MW-9	275296-007
MW-11	275296-008
MW-7	275296-009

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature. The results contained in this report meet all requirements of NELAC and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: \_\_\_\_\_

Date: 04/04/2016

Will Rice  
Project Manager  
will.rice@ctberk.com

## CASE NARRATIVE

Laboratory number: 275296  
Client: Stellar Environmental Solutions  
Project: 2013-02.  
Location: Redwood Regional Park  
Request Date: 03/21/16  
Samples Received: 03/21/16

This data package contains sample and QC results for nine water samples, requested for the above referenced project on 03/21/16. The samples were received cold and intact.

**TPH-Purgeables and/or BTXE by GC (EPA 8015B and EPA 8021B):**

MW-9 (lab # 275296-007) was diluted due to client history of high non-target or organic acid interference. No other analytical problems were encountered.

**TPH-Extractables by GC (EPA 8015B):**

No analytical problems were encountered.

**Ion Chromatography (EPA 300.0):**

No analytical problems were encountered.

**Chemical Oxygen Demand (SM5220D):**

No analytical problems were encountered.

**Biochemical Oxygen Demand (SM5210B):**

High recovery was observed for biochemical oxygen demand in the BSD for batch 233358; the associated RPD was within limits. No other analytical problems were encountered.



275296  
Chain of Custody Record

Lab job no. 3-21-16  
Date 3-21-16  
Page 1 of 1

Laboratory Curtis and Tompkins, Ltd. Method of Shipment Hand Delivery  
Address 2323 Fifth Street Shipment No. \_\_\_\_\_  
Berkeley, California 94710  
510-486-0900 Airbill No. \_\_\_\_\_  
Cooler No. \_\_\_\_\_  
Project Owner East Bay Regional Park District Project Manager Richard Makdisi  
Site Address 7867 Redwood Road Telephone No. (510) 644-3123  
Oakland, California Fax No. (510) 644-3859  
Project Name Redwood Regional Park Samplers: (Signature) [Signature]  
Project Number 2013-02

Field Sample Number	Location/Depth	Date	Time	Sample Type	Type/Size of Container	Preservation		Analysis Required						Remarks		
						Cooler	Chemical	Filtered	No. of Containers	TPH-G	TPH-D	MINOR	SULFATE		BOD	COD
1	SW-3	Creek	3/21/16	1300	W		X	X	X	X						
2	SW-2	Creek	1240	W		X	X	X	X							
3	MW-2		1248	W		X	X	X	X							
4	MW-10		1230	W		X	X	X	X							
5	MW-8		1213	W		X	X	X	X							
6	MW-12		1115	W		X	X	X	X	X	X	X	X			
7	MW-9		1050	W		X	X	X	X	X	X	X	X			
8	MW-11		1015	W		X	X	X	X							
9	MW-7		0940	W		X	X	X	X	X	X	X	X			

Relinquished by: <u>[Signature]</u> Signature _____ Printed <u>Dom Sit</u> Company <u>Stellar Environmental</u>	Date <u>3/21/16</u> Time <u>14:00</u>	Received by: <u>[Signature]</u> Signature _____ Printed <u>Pet Gonzalez</u> Company <u>C&amp;T</u>	Date <u>3/21/16</u> Time <u>14:00</u>	Relinquished by: _____ Signature _____ Printed _____ Company _____	Date _____ Time _____	Received by: _____ Signature _____ Printed _____ Company _____	Date _____ Time _____			
Turnaround Time: <u>5 Day TAT</u> Comments: <u>Samples on ice</u>				Relinquished by: _____ Signature _____ Printed _____ Company _____				Date _____ Time _____	Received by: _____ Signature _____ Printed _____ Company _____	Date _____ Time _____

2000-00-01

COOLER RECEIPT CHECKLIST



Curtis & Tompkins, Ltd.

Login # 275296 Date Received 3/21/16 Number of coolers 2
Client Stellar Environmental Project Redwood Regional Park
Date Opened 3/21 By (print) SL (sign) [Signature]
Date Logged in [Signature] By (print) [Signature] (sign) [Signature]

1. Did cooler come with a shipping slip (airbill, etc) YES NO
Shipping info

2A. Were custody seals present? ... YES (circle) on cooler on samples NO
How many Name Date

2B. Were custody seals intact upon arrival? YES NO N/A

3. Were custody papers dry and intact when received? YES NO

4. Were custody papers filled out properly (ink, signed, etc)? YES NO

5. Is the project identifiable from custody papers? (If so fill out top of form) YES NO

6. Indicate the packing in cooler: (if other, describe)

- Bubble Wrap, Cloth material, Foam blocks, Cardboard, Bags, Styrofoam, None, Paper towels

7. Temperature documentation: \* Notify PM if temperature exceeds 6°C

Type of ice used: Wet Blue/Gel None Temp(°C) 5.9, 5.3

Temperature blank(s) included? Thermometer# 4 IR Gun# B

Samples received on ice directly from the field. Cooling process had begun

8. Were Method 5035 sampling containers present? YES NO
If YES, what time were they transferred to freezer?

9. Did all bottles arrive unbroken/unopened? YES NO

10. Are there any missing / extra samples? YES NO

11. Are samples in the appropriate containers for indicated tests? YES NO

12. Are sample labels present, in good condition and complete? YES NO

13. Do the sample labels agree with custody papers? YES NO

14. Was sufficient amount of sample sent for tests requested? YES NO

15. Are the samples appropriately preserved? YES NO N/A

16. Did you check preservatives for all bottles for each sample? YES NO N/A

17. Did you document your preservative check? (pH strip lot# 405541812 ) YES NO N/A

18. Did you change the hold time in LIMS for unpreserved VOAs? YES NO N/A

19. Did you change the hold time in LIMS for preserved terracores? YES NO N/A

20. Are bubbles > 6mm absent in VOA samples? YES NO N/A

21. Was the client contacted concerning this sample delivery? YES NO

If YES, Who was called? By Date:

COMMENTS

Curtis & Tompkins Sample Preservation for 275296

Sample	pH: <2	>9	>12	Other
-006a	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
d	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
e	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
f	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
g	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
h	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
-007a	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
d	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
e	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
f	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
g	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
h	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
-009a	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
d	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
e	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
f	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
g	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
h	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Analyst: SL  
 Date: 8/21/16



Client Sample ID : MW-9

Laboratory Sample ID :

275296-007

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Gasoline C7-C12	4,000	Y	830	ug/L	As Recd	16.67	EPA 8015B	EPA 5030B
Benzene	18		8.3	ug/L	As Recd	16.67	EPA 8021B	EPA 5030B
Ethylbenzene	84		8.3	ug/L	As Recd	16.67	EPA 8021B	EPA 5030B
Diesel C10-C24	2,600	Y	50	ug/L	As Recd	1.000	EPA 8015B	EPA 3520C
Sulfate	22		0.50	mg/L	TOTAL	1.000	EPA 300.0	METHOD
Biochemical Oxygen Demand	8.7		5.0	mg/L	TOTAL	1.000	SM5210B	METHOD
Chemical Oxygen Demand	26		10	mg/L	TOTAL	1.000	SM5220D	METHOD

Client Sample ID : MW-11

Laboratory Sample ID :

275296-008

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Gasoline C7-C12	720	Y	50	ug/L	As Recd	1.000	EPA 8015B	EPA 5030B
Ethylbenzene	6.1		0.50	ug/L	As Recd	1.000	EPA 8021B	EPA 5030B
Diesel C10-C24	610	Y	49	ug/L	As Recd	1.000	EPA 8015B	EPA 3520C

Client Sample ID : MW-7

Laboratory Sample ID :

275296-009

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Gasoline C7-C12	1,500	Y	50	ug/L	As Recd	1.000	EPA 8015B	EPA 5030B
Ethylbenzene	12		0.50	ug/L	As Recd	1.000	EPA 8021B	EPA 5030B
Diesel C10-C24	850	Y	50	ug/L	As Recd	1.000	EPA 8015B	EPA 3520C
Nitrogen, Nitrate	0.31		0.05	mg/L	TOTAL	1.000	EPA 300.0	METHOD
Sulfate	36		0.50	mg/L	TOTAL	1.000	EPA 300.0	METHOD
Chemical Oxygen Demand	15		10	mg/L	TOTAL	1.000	SM5220D	METHOD

C = Presence confirmed, but RPD between columns exceeds 40%

Y = Sample exhibits chromatographic pattern which does not resemble standard

**Curtis & Tompkins Laboratories Analytical Report**

Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2013-02.		
Matrix:	Water	Sampled:	03/21/16
Units:	ug/L	Received:	03/21/16
Batch#:	233276		

Field ID:	SW-3	Diln Fac:	1.000
Type:	SAMPLE	Analyzed:	03/21/16
Lab ID:	275296-001		

Analyte	Result	RL	Analysis
Gasoline C7-C12	ND	50	EPA 8015B
MTBE	ND	2.0	EPA 8021B
Benzene	ND	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	ND	0.50	EPA 8021B
m,p-Xylenes	ND	0.50	EPA 8021B
o-Xylene	ND	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Bromofluorobenzene (FID)	110	80-132	EPA 8015B
Bromofluorobenzene (PID)	108	71-141	EPA 8021B

Field ID:	SW-2	Diln Fac:	1.000
Type:	SAMPLE	Analyzed:	03/21/16
Lab ID:	275296-002		

Analyte	Result	RL	Analysis
Gasoline C7-C12	ND	50	EPA 8015B
MTBE	ND	2.0	EPA 8021B
Benzene	ND	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	ND	0.50	EPA 8021B
m,p-Xylenes	ND	0.50	EPA 8021B
o-Xylene	ND	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Bromofluorobenzene (FID)	111	80-132	EPA 8015B
Bromofluorobenzene (PID)	111	71-141	EPA 8021B

C= Presence confirmed, but RPD between columns exceeds 40%  
 Y= Sample exhibits chromatographic pattern which does not resemble standard  
 ND= Not Detected  
 RL= Reporting Limit



**Curtis & Tompkins Laboratories Analytical Report**

Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2013-02.		
Matrix:	Water	Sampled:	03/21/16
Units:	ug/L	Received:	03/21/16
Batch#:	233276		

Field ID: MW-8 Diln Fac: 1.000  
 Type: SAMPLE Analyzed: 03/21/16  
 Lab ID: 275296-005

Analyte	Result	RL	Analysis
Gasoline C7-C12	170	50	EPA 8015B
MTBE	2.5	2.0	EPA 8021B
Benzene	0.53 C	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	3.6	0.50	EPA 8021B
m,p-Xylenes	4.9	0.50	EPA 8021B
o-Xylene	0.62	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Bromofluorobenzene (FID)	111	80-132	EPA 8015B
Bromofluorobenzene (PID)	111	71-141	EPA 8021B

Field ID: MW-12 Diln Fac: 1.000  
 Type: SAMPLE Analyzed: 03/22/16  
 Lab ID: 275296-006

Analyte	Result	RL	Analysis
Gasoline C7-C12	ND	50	EPA 8015B
MTBE	ND	2.0	EPA 8021B
Benzene	ND	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	ND	0.50	EPA 8021B
m,p-Xylenes	ND	0.50	EPA 8021B
o-Xylene	ND	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Bromofluorobenzene (FID)	107	80-132	EPA 8015B
Bromofluorobenzene (PID)	110	71-141	EPA 8021B

C= Presence confirmed, but RPD between columns exceeds 40%  
 Y= Sample exhibits chromatographic pattern which does not resemble standard  
 ND= Not Detected  
 RL= Reporting Limit







Batch QC Report

**Curtis & Tompkins Laboratories Analytical Report**

Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2013-02.	Analysis:	EPA 8015B
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC828220	Batch#:	233276
Matrix:	Water	Analyzed:	03/21/16
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	1,000	1,136	114	80-120

Surrogate	%REC	Limits
Bromofluorobenzene (FID)	108	80-132

## Batch QC Report

**Curtis & Tompkins Laboratories Analytical Report**

Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2013-02.	Analysis:	EPA 8021B
Matrix:	Water	Batch#:	233276
Units:	ug/L	Analyzed:	03/21/16
Diln Fac:	1.000		

Type: BS Lab ID: QC828222

Analyte	Spiked	Result	%REC	Limits
MTBE	10.00	10.55	105	74-137
Benzene	10.00	10.14	101	80-120
Toluene	10.00	9.686	97	80-120
Ethylbenzene	10.00	10.05	100	80-120
m,p-Xylenes	10.00	10.45	105	80-120
o-Xylene	10.00	10.46	105	80-120

Surrogate	%REC	Limits
Bromofluorobenzene (PID)	105	71-141

Type: BSD Lab ID: QC828223

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
MTBE	10.00	11.32	113	74-137	7	37
Benzene	10.00	10.86	109	80-120	7	20
Toluene	10.00	10.42	104	80-120	7	20
Ethylbenzene	10.00	10.62	106	80-120	6	20
m,p-Xylenes	10.00	10.98	110	80-120	5	20
o-Xylene	10.00	10.94	109	80-120	5	20

Surrogate	%REC	Limits
Bromofluorobenzene (PID)	112	71-141

RPD= Relative Percent Difference

## Batch QC Report

**Curtis & Tompkins Laboratories Analytical Report**

Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2013-02.	Analysis:	EPA 8015B
Field ID:	ZZZZZZZZZZ	Batch#:	233276
MSS Lab ID:	275280-001	Sampled:	03/19/16
Matrix:	Water	Received:	03/21/16
Units:	ug/L	Analyzed:	03/21/16
Diln Fac:	1.000		

Type: MS Lab ID: QC828224

Analyte	MSS Result	Spiked	Result	%REC	Limits
Gasoline C7-C12	30.65	2,000	2,011	99	76-120

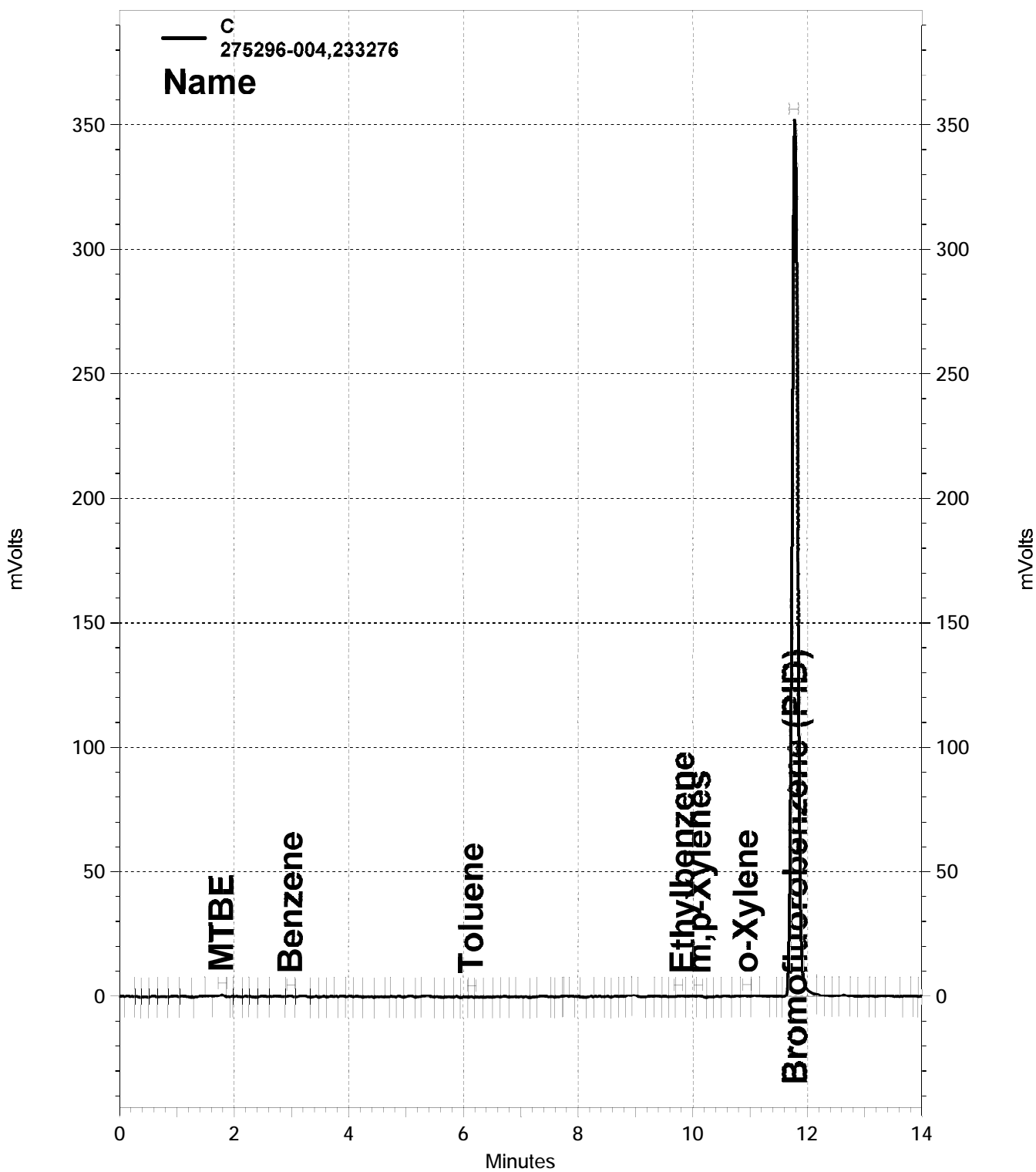
Surrogate	%REC	Limits
Bromofluorobenzene (FID)	110	80-132

Type: MSD Lab ID: QC828225

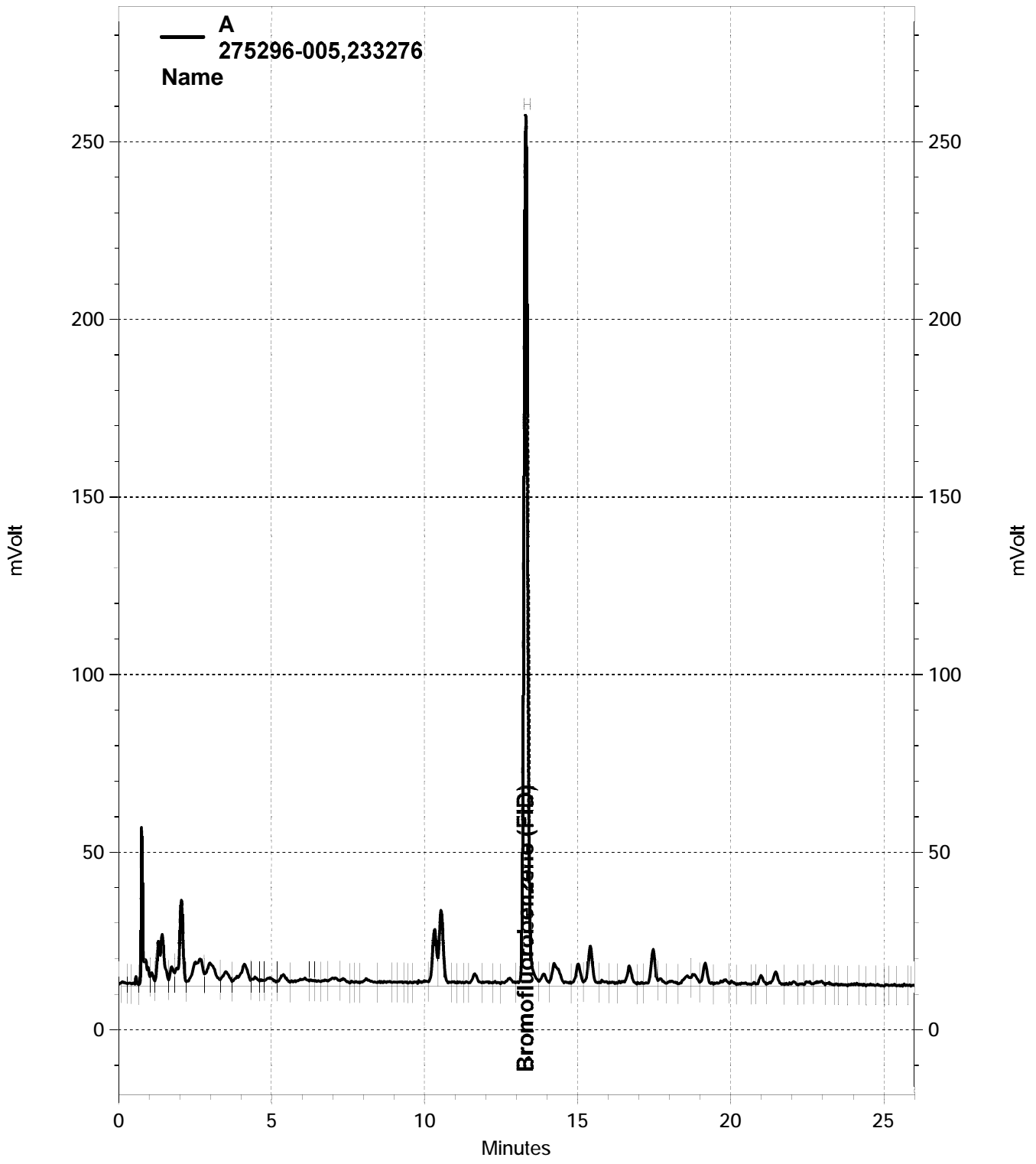
Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	2,000	2,106	104	76-120	5	20

Surrogate	%REC	Limits
Bromofluorobenzene (FID)	112	80-132

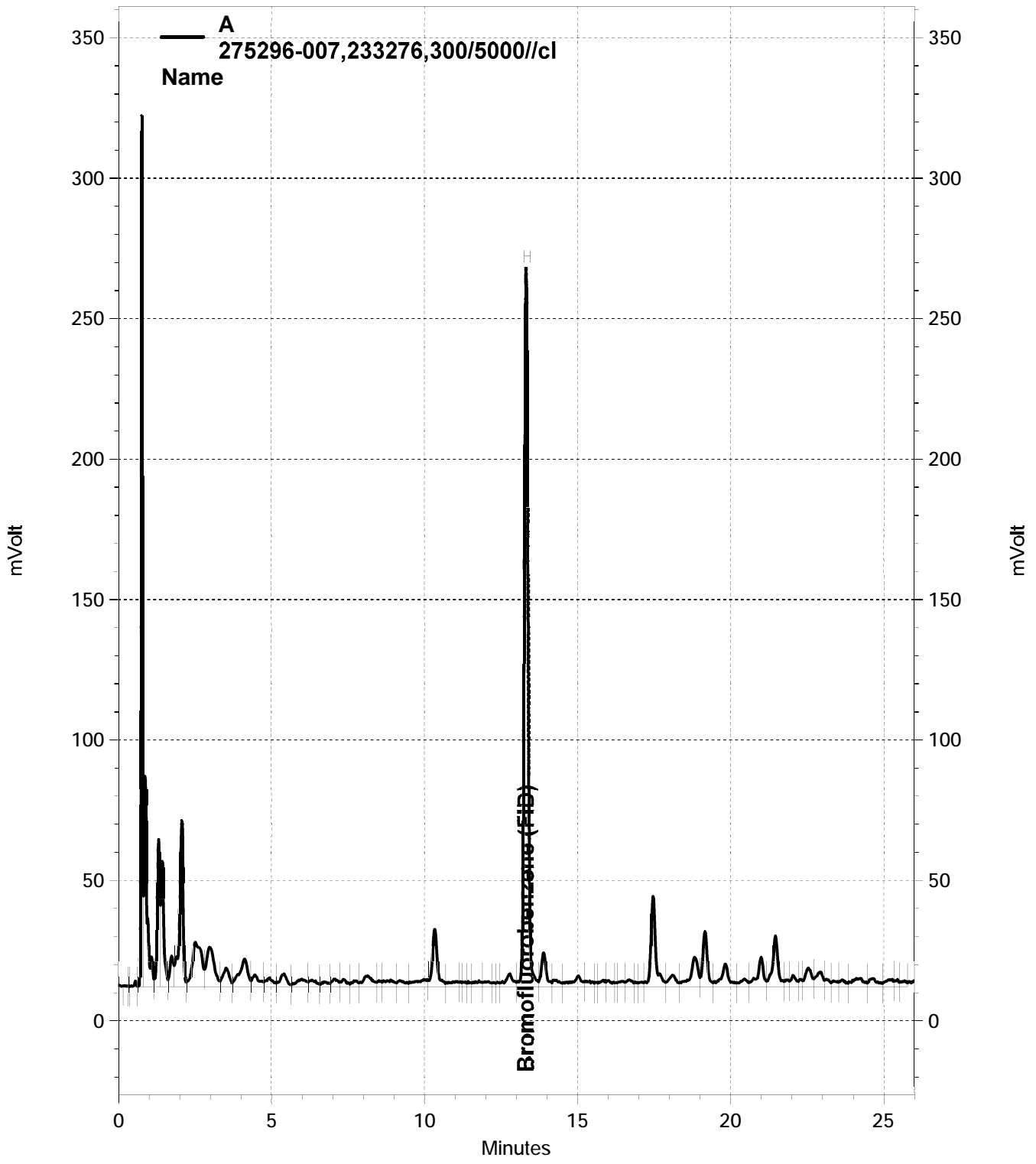
RPD= Relative Percent Difference



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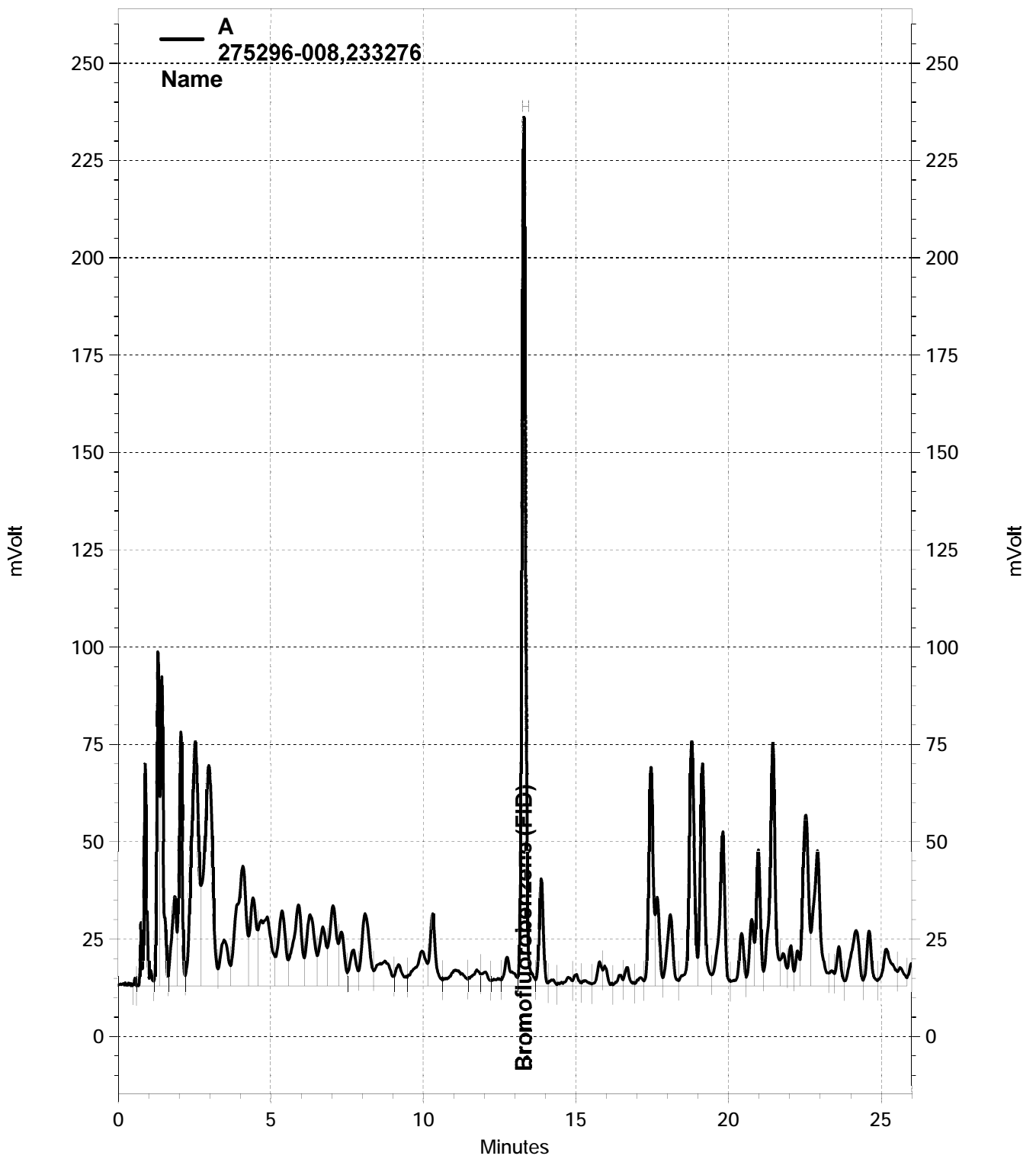


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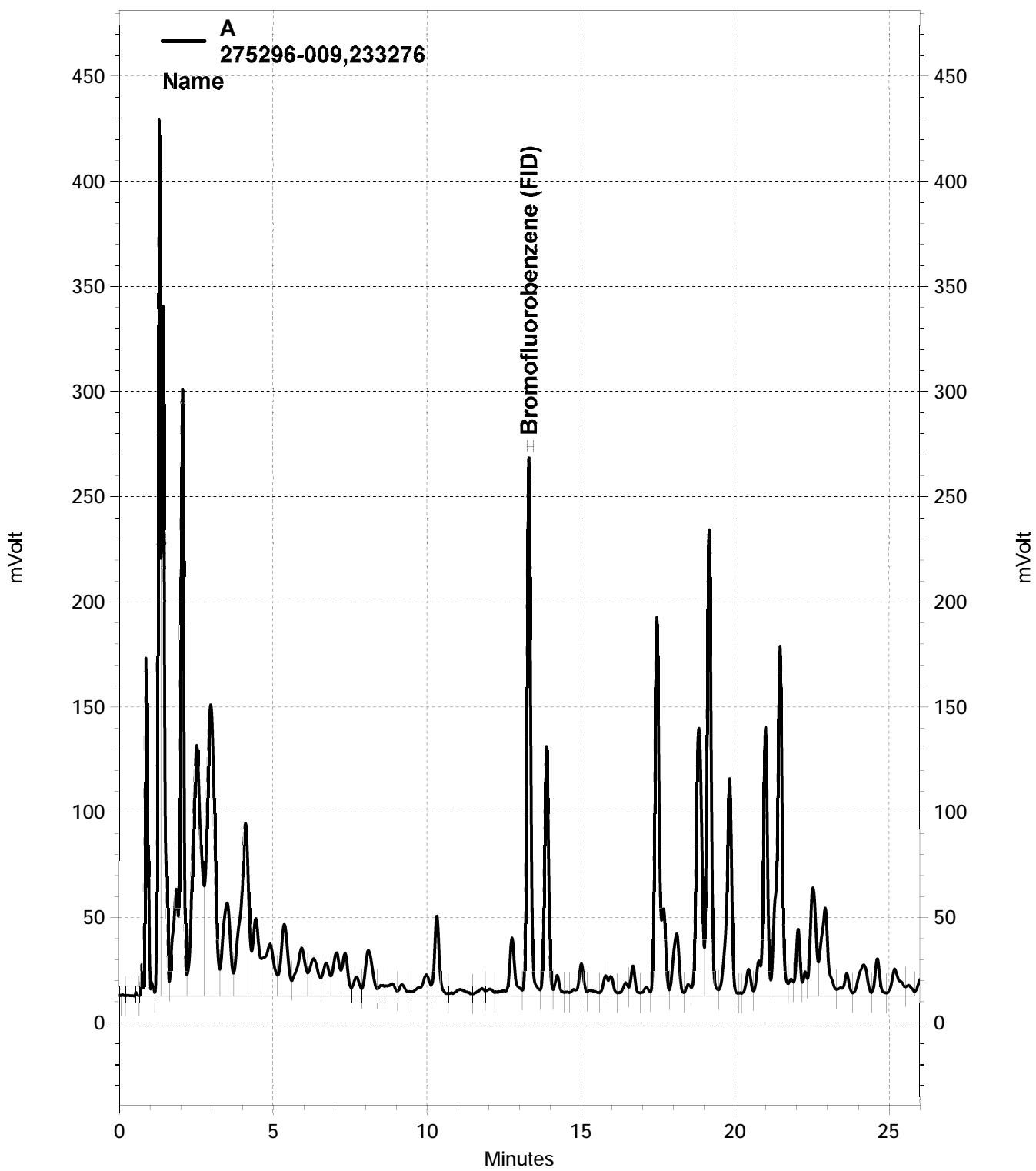


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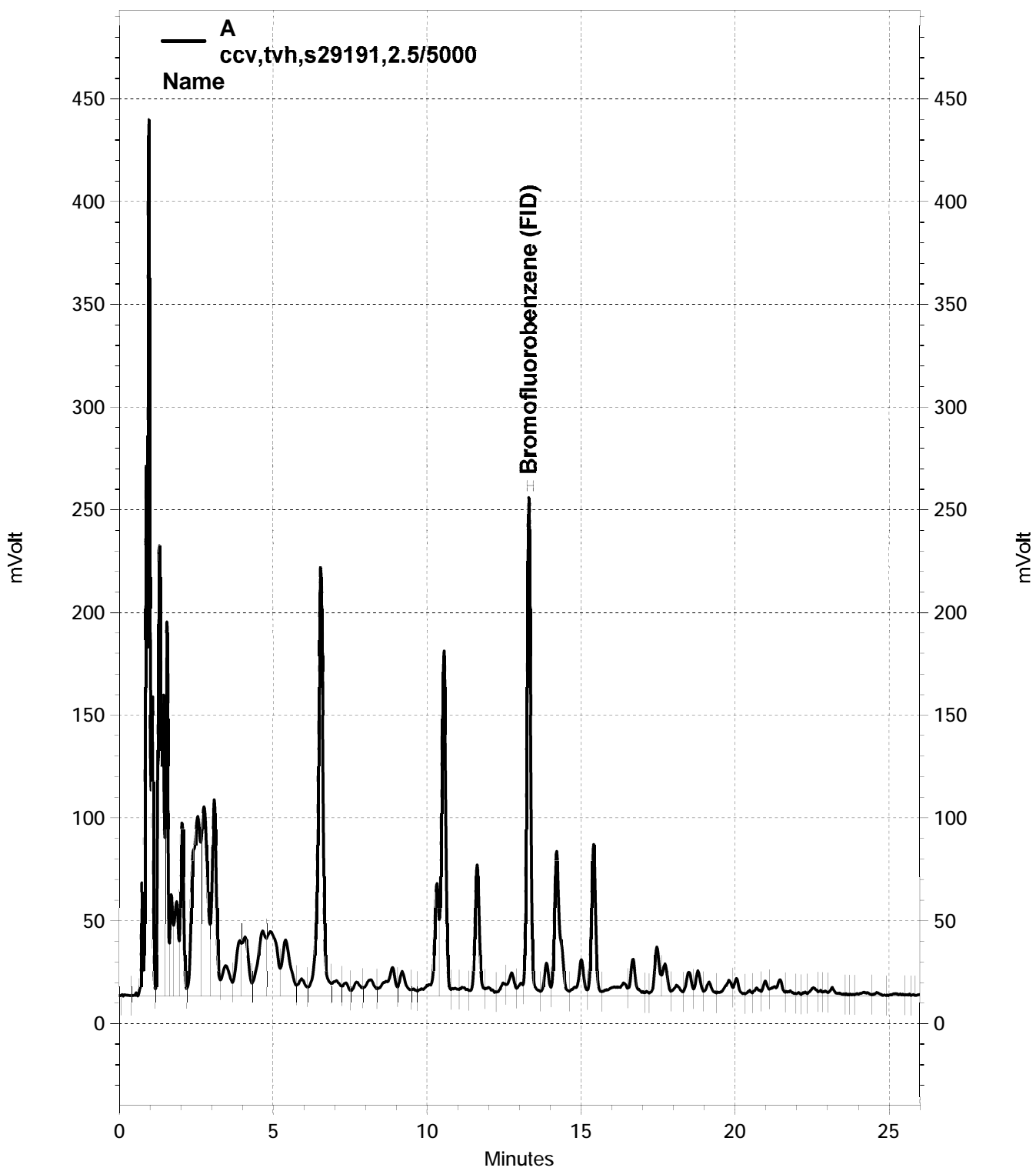




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### Total Extractable Hydrocarbons

Lab #: 275296	Location: Redwood Regional Park
Client: Stellar Environmental Solutions	Prep: EPA 3520C
Project#: 2013-02.	Analysis: EPA 8015B
Matrix: Water	Sampled: 03/21/16
Units: ug/L	Received: 03/21/16
Diln Fac: 1.000	

Field ID: SW-3	Batch#: 233431
Type: SAMPLE	Prepared: 03/24/16
Lab ID: 275296-001	Analyzed: 03/29/16

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
o-Terphenyl	103	67-136

Field ID: SW-2	Batch#: 233431
Type: SAMPLE	Prepared: 03/24/16
Lab ID: 275296-002	Analyzed: 03/29/16

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
o-Terphenyl	92	67-136

Field ID: MW-2	Batch#: 233431
Type: SAMPLE	Prepared: 03/24/16
Lab ID: 275296-003	Analyzed: 03/29/16

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
o-Terphenyl	105	67-136

Field ID: MW-10	Batch#: 233431
Type: SAMPLE	Prepared: 03/24/16
Lab ID: 275296-004	Analyzed: 03/29/16

Analyte	Result	RL
Diesel C10-C24	110 Y	50

Surrogate	%REC	Limits
o-Terphenyl	100	67-136

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

**Total Extractable Hydrocarbons**

Lab #: 275296	Location: Redwood Regional Park
Client: Stellar Environmental Solutions	Prep: EPA 3520C
Project#: 2013-02.	Analysis: EPA 8015B
Matrix: Water	Sampled: 03/21/16
Units: ug/L	Received: 03/21/16
Diln Fac: 1.000	

Field ID: MW-8	Batch#: 233431
Type: SAMPLE	Prepared: 03/24/16
Lab ID: 275296-005	Analyzed: 03/29/16

Analyte	Result	RL
Diesel C10-C24	290 Y	50

Surrogate	%REC	Limits
o-Terphenyl	101	67-136

Field ID: MW-12	Batch#: 233431
Type: SAMPLE	Prepared: 03/24/16
Lab ID: 275296-006	Analyzed: 03/29/16

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
o-Terphenyl	102	67-136

Field ID: MW-9	Batch#: 233473
Type: SAMPLE	Prepared: 03/28/16
Lab ID: 275296-007	Analyzed: 03/29/16

Analyte	Result	RL
Diesel C10-C24	2,600 Y	50

Surrogate	%REC	Limits
o-Terphenyl	113	67-136

Field ID: MW-11	Batch#: 233629
Type: SAMPLE	Prepared: 03/31/16
Lab ID: 275296-008	Analyzed: 04/04/16

Analyte	Result	RL
Diesel C10-C24	610 Y	49

Surrogate	%REC	Limits
o-Terphenyl	94	67-136

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



## Batch QC Report

Total Extractable Hydrocarbons			
Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2013-02.	Analysis:	EPA 8015B
Matrix:	Water	Batch#:	233431
Units:	ug/L	Prepared:	03/24/16
Diln Fac:	1.000	Analyzed:	03/29/16

Type: BS Cleanup Method: EPA 3630C  
 Lab ID: QC828851

Analyte	Spiked	Result	%REC	Limits
Diesel C10-C24	2,500	1,977	79	60-121

Surrogate	%REC	Limits
o-Terphenyl	94	67-136

Type: BSD Cleanup Method: EPA 3630C  
 Lab ID: QC828852

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Diesel C10-C24	2,500	1,917	77	60-121	3	32

Surrogate	%REC	Limits
o-Terphenyl	88	67-136

RPD= Relative Percent Difference

## Batch QC Report

Total Extractable Hydrocarbons			
Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2013-02.	Analysis:	EPA 8015B
Matrix:	Water	Batch#:	233473
Units:	ug/L	Prepared:	03/28/16
Diln Fac:	1.000	Analyzed:	03/29/16

Type: BS Lab ID: QC829016

Analyte	Spiked	Result	%REC	Limits
Diesel C10-C24	2,500	2,348	94	60-121

Surrogate	%REC	Limits
o-Terphenyl	107	67-136

Type: BSD Lab ID: QC829017

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Diesel C10-C24	2,500	2,388	96	60-121	2	32

Surrogate	%REC	Limits
o-Terphenyl	107	67-136

RPD= Relative Percent Difference



## Batch QC Report

Total Extractable Hydrocarbons			
Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2013-02.	Analysis:	EPA 8015B
Matrix:	Water	Batch#:	233629
Units:	ug/L	Prepared:	03/31/16
Diln Fac:	1.000	Analyzed:	04/04/16

Type: BS Cleanup Method: EPA 3630C  
 Lab ID: QC829648

Analyte	Spiked	Result	%REC	Limits
Diesel C10-C24	2,500	2,243	90	60-121

Surrogate	%REC	Limits
o-Terphenyl	96	67-136

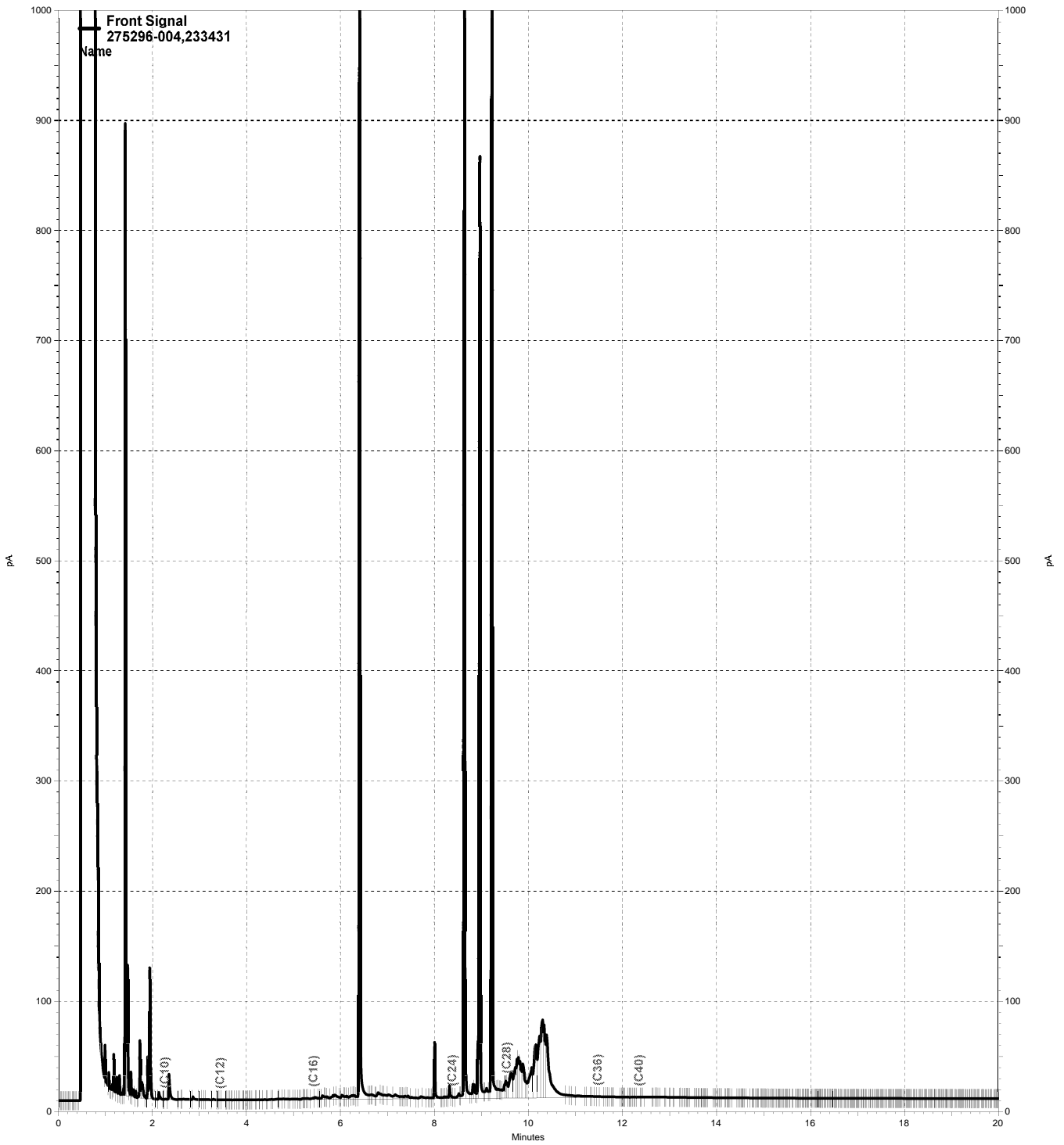
Type: BSD Cleanup Method: EPA 3630C  
 Lab ID: QC829649

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Diesel C10-C24	2,500	1,900	76	60-121	17	32

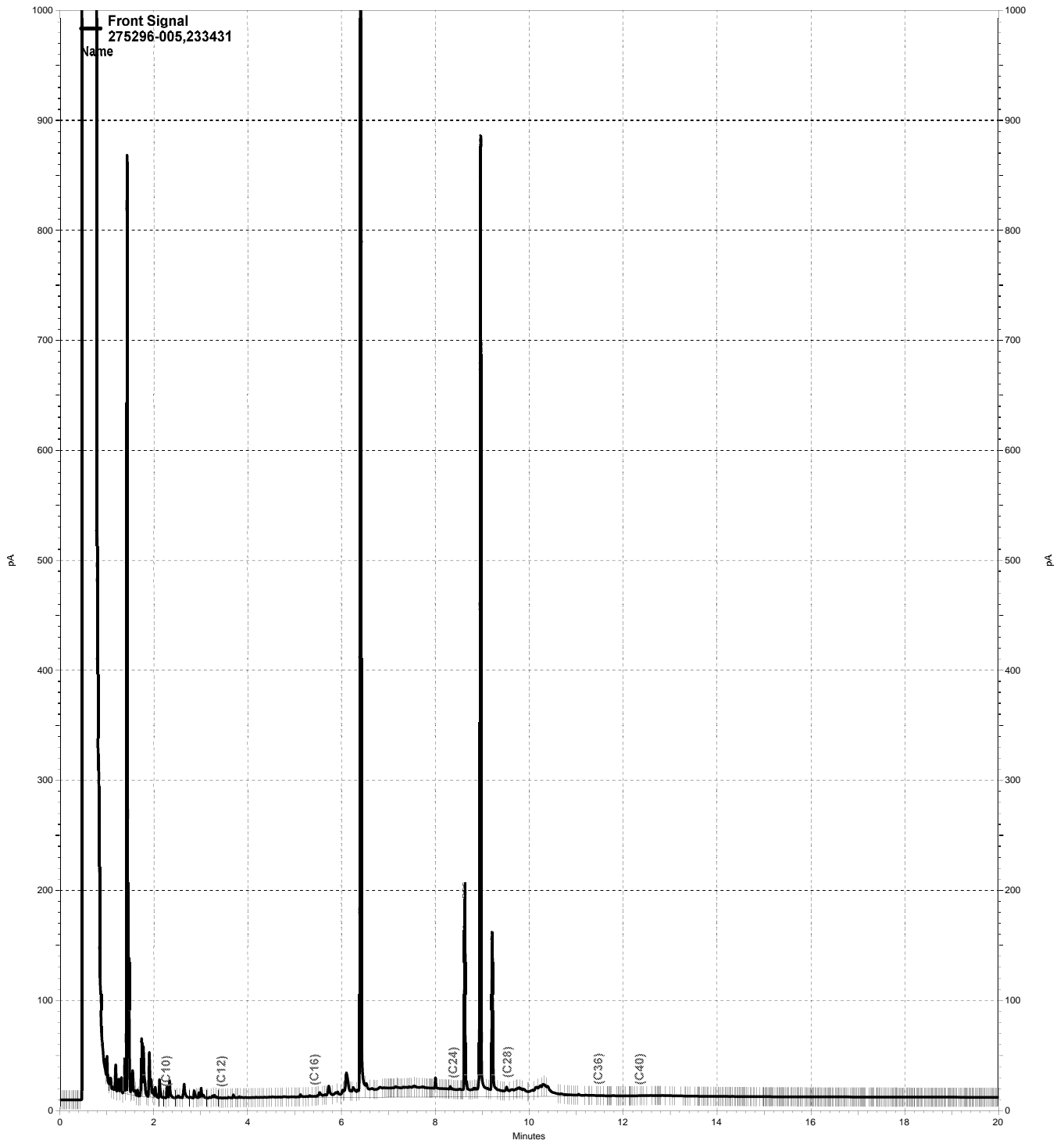
  

Surrogate	%REC	Limits
o-Terphenyl	79	67-136

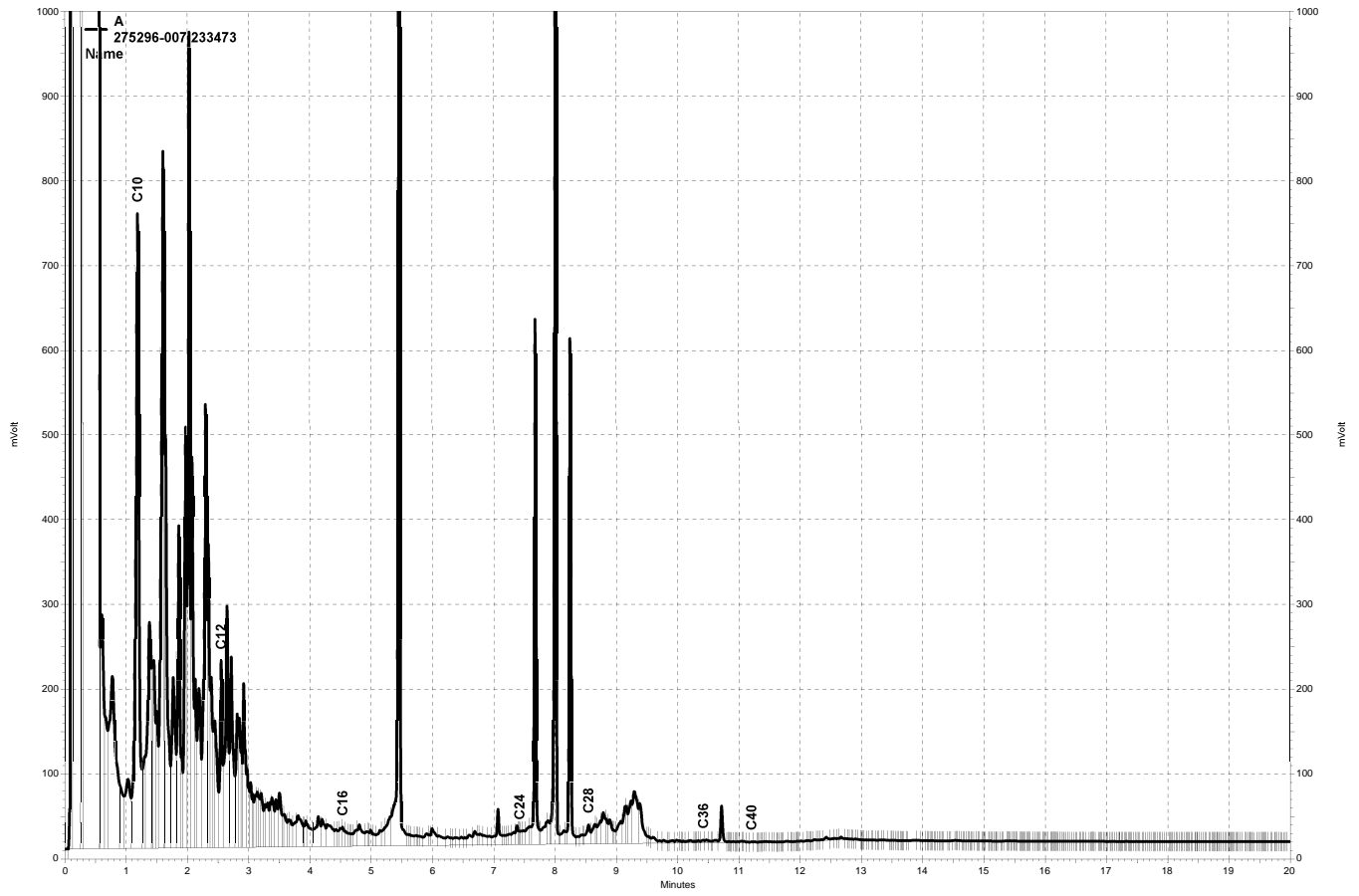
RPD= Relative Percent Difference



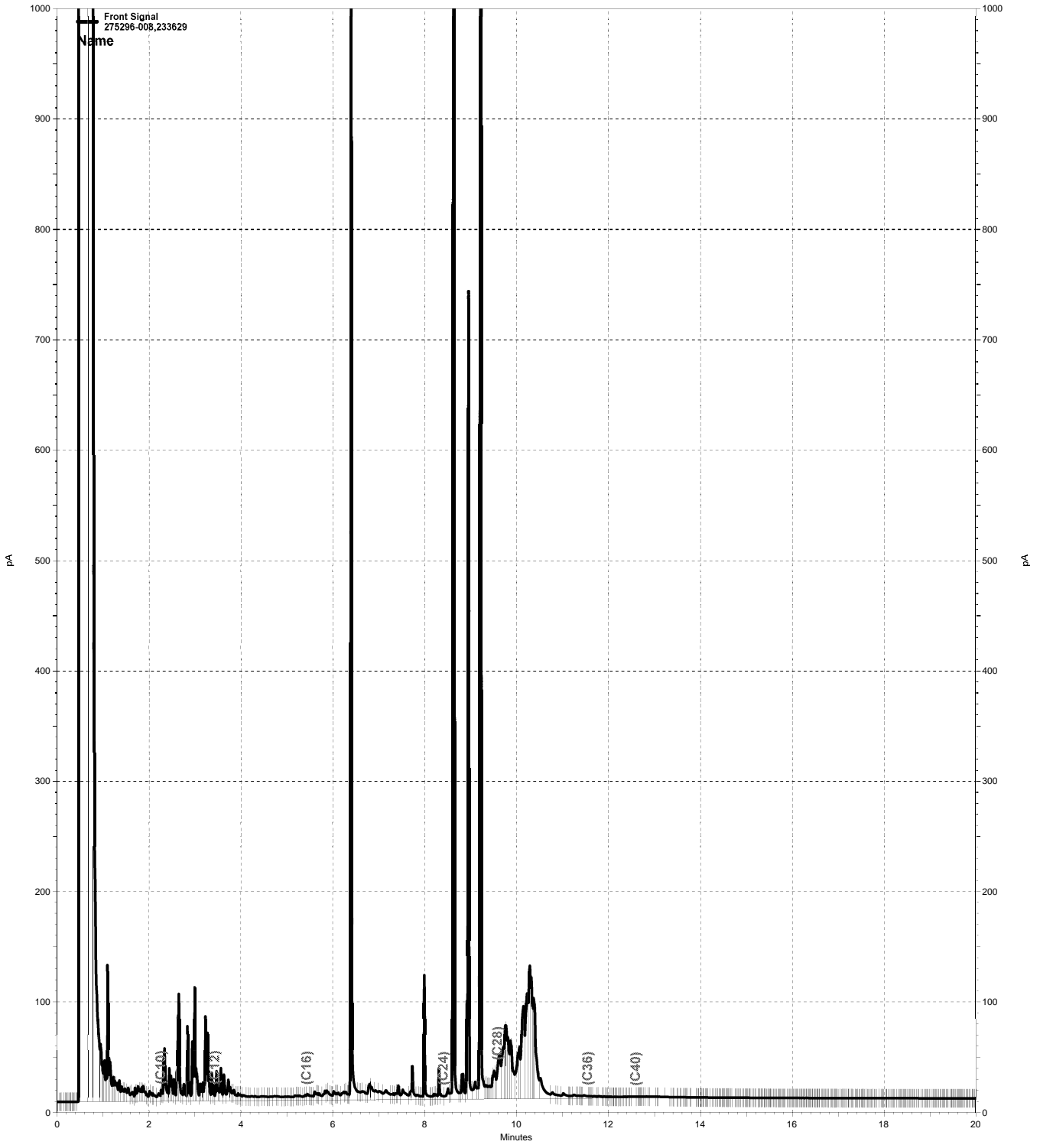
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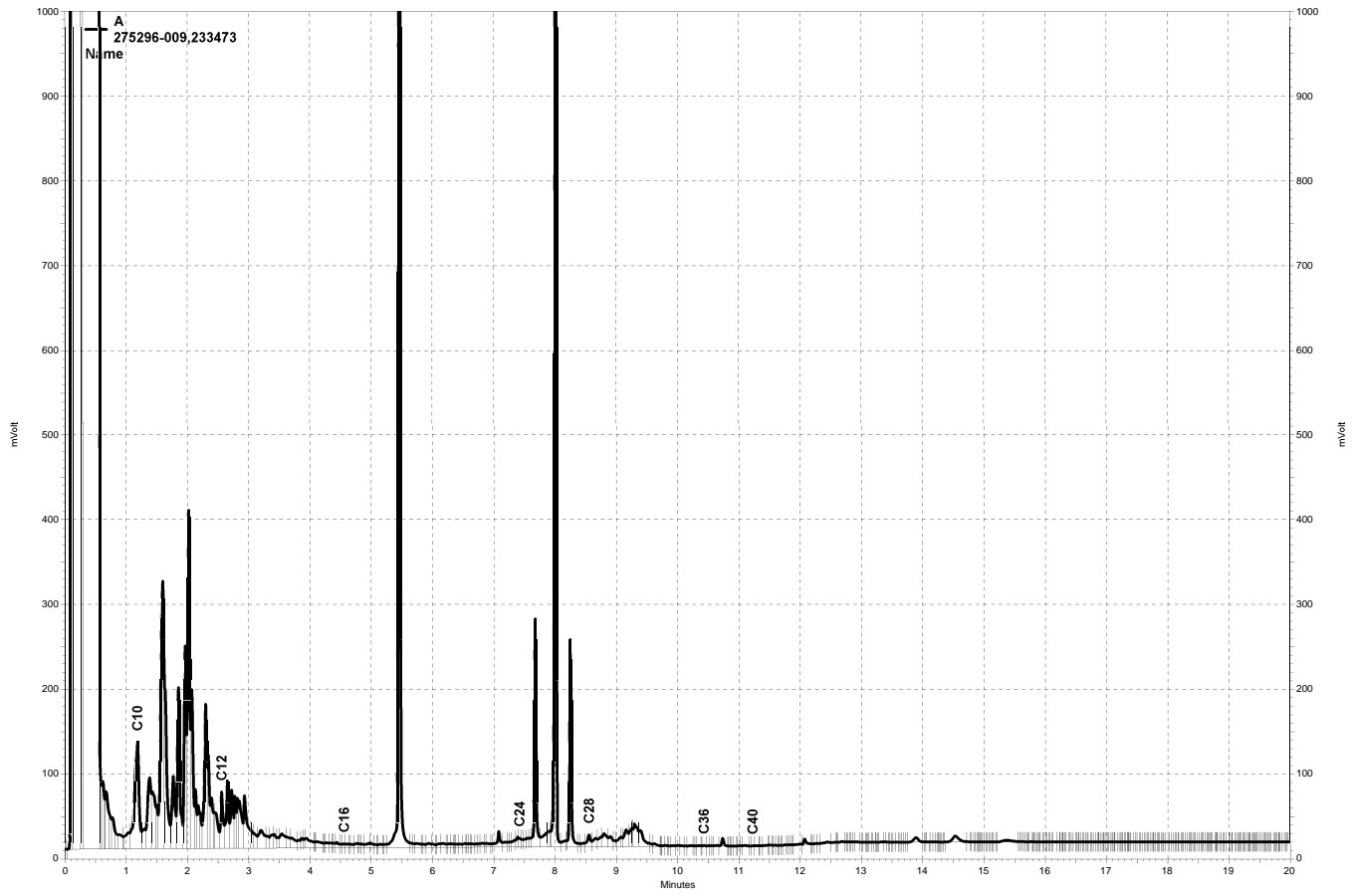
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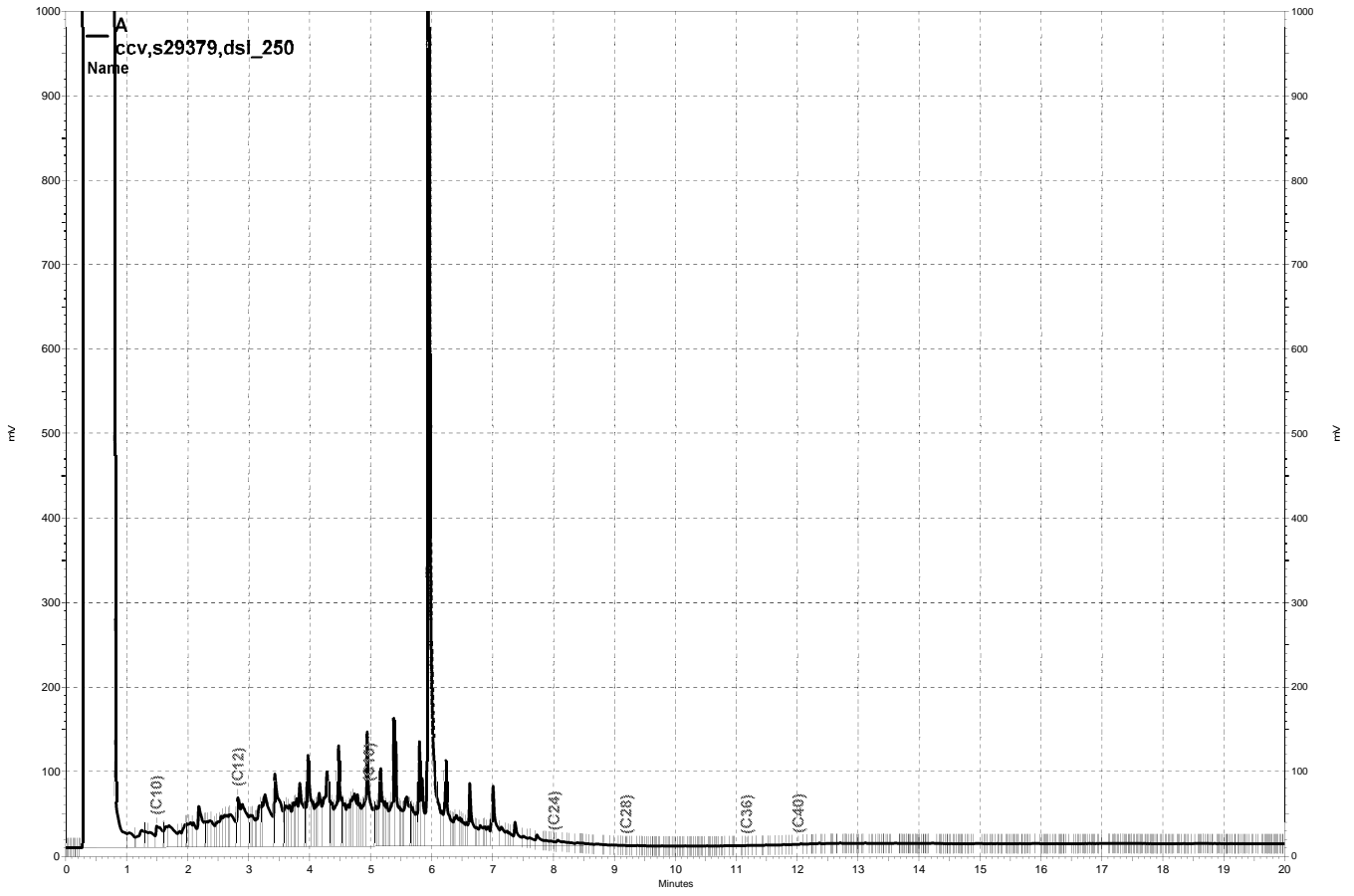
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Batch QC Report

**Curtis & Tompkins Laboratories Analytical Report**

Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2013-02.	Analysis:	EPA 300.0
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC828276	Batch#:	233291
Matrix:	Water	Analyzed:	03/21/16 13:35
Units:	mg/L		

Analyte	Spiked	Result	%REC	Limits
Nitrogen, Nitrate	1.000	0.9204	92	80-120
Sulfate	10.00	9.334	93	80-120

## Batch QC Report

**Curtis & Tompkins Laboratories Analytical Report**

Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2013-02.	Analysis:	EPA 300.0
Field ID:	MW-12	Diln Fac:	5.000
MSS Lab ID:	275296-006	Batch#:	233291
Matrix:	Water	Sampled:	03/21/16 11:15
Units:	mg/L	Received:	03/21/16

Type: MS Analyzed: 03/21/16 18:21  
 Lab ID: QC828293

Analyte	MSS Result	Spiked	Result	%REC	Limits
Nitrogen, Nitrate	<0.01127	2.500	2.340	94	80-120
Sulfate	49.42	25.00	72.38	92	80-120

Type: MSD Analyzed: 03/21/16 18:39  
 Lab ID: QC828294

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Nitrogen, Nitrate	2.500	2.322	93	80-120	1	20
Sulfate	25.00	71.30	88	80-120	1	20

RPD= Relative Percent Difference

Biochemical Oxygen Demand			
Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2013-02.	Analysis:	SM5210B
Analyte:	Biochemical Oxygen Demand	Batch#:	233358
Matrix:	Water	Received:	03/21/16
Units:	mg/L	Prepared:	03/23/16 09:40
Diln Fac:	1.000	Analyzed:	03/28/16 11:36

Field ID	Type	Lab ID	Result	RL	Sampled
MW-12	SAMPLE	275296-006	ND	5.0	03/21/16 11:15
MW-9	SAMPLE	275296-007	8.7	5.0	03/21/16 10:50
MW-7	SAMPLE	275296-009	ND	5.0	03/21/16 09:40
	BLANK	QC828549	ND	5.0	

ND= Not Detected  
 RL= Reporting Limit

## Batch QC Report

Biochemical Oxygen Demand			
Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2013-02.	Analysis:	SM5210B
Analyte:	Biochemical Oxygen Demand	Batch#:	233358
Field ID:	MW-9	Sampled:	03/21/16 10:50
MSS Lab ID:	275296-007	Received:	03/21/16
Matrix:	Water	Prepared:	03/23/16 09:40
Units:	mg/L	Analyzed:	03/28/16 11:36
Diln Fac:	1.000		

Type	Lab ID	MSS Result	Spiked	Result	RL	%REC	Limits	RPD	Lim
BS	QC828550		198.0	222.8		113	85-115		
BSD	QC828551		198.0	229.3		116 *	85-115	3	20
SDUP	QC828552	8.700		9.000	5.000			4	26

\*= Value outside of QC limits; see narrative

RL= Reporting Limit

RPD= Relative Percent Difference

Chemical Oxygen Demand			
Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2013-02.	Analysis:	SM5220D
Analyte:	Chemical Oxygen Demand	Batch#:	233402
Matrix:	Water	Received:	03/21/16
Units:	mg/L	Prepared:	03/24/16 12:12
Diln Fac:	1.000	Analyzed:	03/24/16 14:12

Field ID	Type	Lab ID	Result	RL	Sampled
MW-12	SAMPLE	275296-006	14	10	03/21/16 11:15
MW-9	SAMPLE	275296-007	26	10	03/21/16 10:50
MW-7	SAMPLE	275296-009	15	10	03/21/16 09:40
	BLANK	QC828736	ND	10	

ND= Not Detected  
 RL= Reporting Limit

## Batch QC Report

Chemical Oxygen Demand			
Lab #:	275296	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2013-02.	Analysis:	SM5220D
Analyte:	Chemical Oxygen Demand	Batch#:	233402
Field ID:	MW-7	Sampled:	03/21/16 09:40
MSS Lab ID:	275296-009	Received:	03/21/16
Matrix:	Water	Prepared:	03/24/16 12:12
Units:	mg/L	Analyzed:	03/24/16 14:12
Diln Fac:	1.000		

Type	Lab ID	MSS Result	Spiked	Result	%REC	Limits	RPD	Lim
LCS	QC828737		50.00	49.96	100	90-110		
MS	QC828738	14.86	100.0	110.3	95	57-126		
MSD	QC828739		100.0	113.8	99	57-126	3	20

RPD= Relative Percent Difference

## **APPENDIX D**

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### **Historical Analytical Results**

**HISTORICAL GROUNDWATER MONITORING WELLS ANALYTICAL RESULTS**  
**REDWOOD REGIONAL PARK SERVICE YARD, OAKLAND, CALIFORNIA**  
(all concentrations in ug/L, equivalent to parts per billion [ppb])

Well MW-2									
Event	Date	TVHg	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	Nov-94	66	< 50	3.4	< 0.5	< 0.5	0.9	4.3	NA
2	Feb-95	89	< 50	18	2.4	1.7	7.5	30	NA
3	May-95	< 50	< 50	3.9	< 0.5	1.6	2.5	8.0	NA
4	Aug-95	< 50	< 50	5.7	< 0.5	< 0.5	< 0.5	5.7	NA
5	May-96	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
6	Aug-96	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
7	Dec-96	< 50	< 50	6.3	< 0.5	1.6	< 0.5	7.9	NA
8	Feb-97	< 50	< 50	0.69	< 0.5	0.55	< 0.5	1.2	NA
9	May-97	67	< 50	8.9	< 0.5	5.1	< 1.0	14	NA
10	Aug-97	< 50	< 50	4.5	< 0.5	1.1	< 0.5	5.6	NA
11	Dec-97	61	< 50	21	< 0.5	6.5	3.9	31	NA
12	Feb-98	2,000	200	270	92	150	600	1,112	NA
13	Sep-98	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	7.0
14	Apr-99	82	710	4.2	< 0.5	3.4	4.0	12	7.5
15	Dec-99	57	< 50	20	0.6	5.9	< 0.5	27	4.5
16	Sep-00	< 50	< 50	0.72	< 0.5	< 0.5	< 0.5	0.7	7.9
17	Jan-01	51	< 50	8.3	< 0.5	1.5	< 0.5	9.8	8.0
18	Apr-01	110	< 50	10	< 0.5	11	6.4	27	10
19	Aug-01	260	120	30	6.7	1.6	6.4	45	27
20	Dec-01	74	69	14	0.8	3.7	3.5	22	6.6
21	Mar-02	< 50	< 50	2.3	0.51	1.9	1.3	8.3	8.2
22	Jun-02	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	7.7
23	Sep-02	98	< 50	5.0	< 0.5	< 0.5	< 0.5	—	13
24	Dec-02	< 50	< 50	4.3	< 0.5	< 0.5	< 0.5	—	< 2.0
25	Mar-03	130	82	39	< 0.5	20	4.1	63	16
26	Jun-03	< 50	< 50	1.9	< 0.5	< 0.5	< 0.5	1.9	8.7
27	Sep-03	120	< 50	8.6	0.51	0.53	< 0.5	9.6	23
28	Dec-03	282	< 100	4.3	1.6	1.3	1.2	8.4	9.4
29	Mar-04	374	< 100	81	1.2	36	7.3	126	18
30	Jun-04	< 50	< 50	0.75	< 0.5	< 0.5	< 0.5	< 0.5	15
31	Sep-04	200	< 50	23	< 0.5	< 0.5	0.70	24	16
32	Dec-04	80	< 50	14	< 0.5	2.9	0.72	18	20
33	Mar-05	190	68	27	< 0.5	14	11	52	26
34	Jun-05	68	< 50	7.1	< 0.5	6.9	1.8	16	24
35	Sep-05	< 50	< 50	2.5	< 0.5	< 0.5	< 1.0	2.5	23
36	Dec-05	< 50	< 50	3.9	< 0.5	< 0.5	< 1.0	3.9	23
37	Mar-06	1300	300	77	4.4	91	250	422	18
38	Jun-06	< 50	60	< 0.5	< 0.5	< 0.5	< 1.0	—	17
39	Sep-06	270	52	31	< 0.5	15	6.69	53	17
40	Dec-06	< 50	< 50	2.1	< 0.5	< 0.5	< 0.5	2	16
41	Mar-07	59	< 50	4	< 0.5	< 0.5	< 0.5	< 0.5	14
42	Jun-07	< 50	< 50	3.5	< 0.5	< 0.5	< 0.5	3.5	8
43	Sep-07	2,600	260	160	44	86	431	721	15
44	Dec-07	16,000	5,800	23	91	230	2,420	2764	16
44a	Jan-08	480	200	1.1	3.2	5.5	68	77.8	11
45	Mar-08	20,000	24,000	21	39	300	2,620	2980	13
45a	Apr-08	800	640	2.6	2.1	13	155	172.7	13
46a	May-08	7,100	3,900	14	8.8	140	710	872.8	11
46	Jun-08	5,700	1,000	9.4	5.2	80	550	644.6	11
46a	Jul-08	6,400	2,200	13	5.1	140	570	728.1	2.9
46b	Jul-08	390	55	1.3	0.77	4.6	44.4	51.07	9
46c	Aug-08	28,000	7,100	12	19	260	2,740	3031	< 20
46d	Aug-08	8,700	2,700	5.7	7.4	130	900.0	1043.1	3.5
47	Sep-08	40,000	9,100	1.6	< 0.5	110	910.0	1021.6	9.5
48	Dec-08	9,200	2,200	0.52	< 0.5	< 0.5	201.0	201.52	12
49	Mar-09	3,100	37,000	1.1	1.4	7.9	35.0	45.4	14
50	May-09	5,000	15,000	1.5	< 0.5	9.8	39.0	50	13
51	Jun-09	2,400	8,000	5.4	< 0.5	11	20.2	36.6	13
52	Aug-09	1,900	3,100	1.6	1.8	11	23.8	38.2	7.1
53	Sep-09	1,400	1,800	< 0.5	< 0.5	< 0.5	4.2	4.24	12
54	Dec-09	590	1,800	< 0.5	< 0.5	1.2	1.2	2.4	3.6



Well MW-2 Continued

Well MW-2									
55	Mar-10	1,900	3,200	<0.5	<0.5	<0.5	2.2	2.2	2.2
56	Mar-10	2,000	4,300	<0.5	<0.5	<0.5	3.5	3.45	<2.0
57	Jun-10	1,300	2,400	<0.5	<0.5	<0.5	1.7	-	<2.0
58	Sep-10	910	<50	<0.5	<0.5	<0.5	1.5	1.45	<2.0
59	Dec-10	910	1,600	<0.5	<0.5	<0.5	<0.5	<0.5	2.6
60	Mar-11	860	1,100	<0.5	<0.5	<0.5	<0.5	—	3.1
61	Sep-11	780	810	<0.5	<0.5	<0.5	<0.5	—	<2.0
62	Mar-12	460	610	<0.5	<0.5	<0.5	<0.5	—	<2.0
63	Sep-12	160	190	<0.5	<0.5	<0.5	<0.5	—	<2.0
64	Mar-13	470	810	<0.5	<0.5	<0.5	<0.5	—	<2.0
65	Oct-13	120	67	<0.5	<0.5	<0.5	<0.5	—	2.3
66	Mar-14	320	290	<0.5	<0.5	<0.5	<0.5	—	<2.0
67	Sep-14	610	480	<0.5	1	4.7	1.9	7.6	3.7
68	Mar-15	370	450	<0.5	<0.5	<0.5	<0.5	—	<2.0
69	Sep-15	790	980	<0.5	0.6	<0.5	3.3	—	<2.0
70	Mar-16	< 50	< 50	<0.5	<0.5	<0.5	<0.5	—	<2.0

Well MW-4									
Event	Date	TVHg	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	Nov-94	2,600	230	120	4.8	150	88	363	NA
2	Feb-95	11,000	330	420	17	440	460	1,337	NA
3	May-95	7,200	440	300	13	390	330	1,033	NA
4	Aug-95	1,800	240	65	6.8	89	67	227	NA
5	May-96	1,100	140	51	< 0.5	< 0.5	47	98	NA
6	Aug-96	3,700	120	63	2.0	200	144	409	NA
7	Dec-96	2,700	240	19	< 0.5	130	93	242	NA
8	Feb-97	3,300	< 50	120	1.0	150	103	374	NA
9	May-97	490	< 50	2.6	6.7	6.4	6.7	22	NA
10	Aug-97	1,900	150	8.6	3.5	78	53	143	NA
11	Dec-97	1,000	84	4.6	2.7	61	54	123	NA
12	Feb-98	5,300	340	110	24	320	402	856	NA
13	Sep-98	1,800	< 50	8.9	< 0.5	68	27	104	23
14	Apr-99	2,900	710	61	1.2	120	80	263	32
15	Dec-99	1,000	430	4.0	2.0	26	14	46	< 2.0
16	Sep-00	570	380	< 0.5	< 0.5	16	4.1	20	2.4
17	Jan-01	1,600	650	4.2	0.89	46	13.8	65	8.4
18	Apr-01	1,700	1,100	4.5	2.8	48	10.7	66	5.0
19	Aug-01	1,300	810	3.2	4.0	29	9.7	46	< 2.0
20	Dec-01	< 50	110	< 0.5	< 0.5	< 0.5	1.2	< 2.0	< 2.0
21	Mar-02	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2.0
22	Jun-02	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2.0
23	Sep-02	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2.0
24	Dec-02	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2.0
25	Mar-03	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2.0
26	Jun-03	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2.0
27	Sep-03	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2.0
28	Dec-03	< 50	< 100	< 0.3	< 0.3	< 0.3	< 0.6	—	< 5.0
29	Mar-04	< 50	< 100	< 0.3	< 0.3	< 0.3	< 0.6	—	< 5.0
30	Jun-04	< 50	2,500	< 0.3	< 0.3	< 0.3	< 0.6	—	< 5.0
31	Sep-04	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	—	< 2.0
32	Dec-04	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	—	< 2.0
33	Mar-05	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	—	< 2.0
34	Jun-05	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	—	< 2.0
35	Sep-05	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	—	< 2.0

Groundwater monitoring in this well discontinued with Alameda County Health Care Services Agency approval.

Well MW-5									
Event	Date	TVHg	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	Nov-94	50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
2	Feb-95	70	< 50	0.6	< 0.5	< 0.5	< 0.5	0.6	NA
3	May-95	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
4	Aug-95	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
5	May-96	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
6	Aug-96	80	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
7	Dec-96	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
8	Feb-97	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
9	May-97	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
10	Aug-97	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
11	Dec-97	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
12	Feb-98	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
13	Sep-98	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2

Groundwater monitoring in this well discontinued in 1998 with Alameda County Health Care Services Agency approval.

Subsequent groundwater monitoring conducted to confirm plume's southern limit

14	Jun-04	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	5.9
15	Sep-04	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	—	< 2.0

Well MW-7									
Event	Date	TVHg	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	Jan-01	13,000	3,100	95	4	500	289	888	95
2	Apr-01	13,000	3,900	140	< 0.5	530	278	948	52
3	Aug-01	12,000	5,000	55	25	440	198	718	19
4	Dec-01	9,100	4,600	89	< 2.5	460	228	777	< 10
5	Mar-02	8,700	3,900	220	6.2	450	191	867	200
6	Jun-02	9,300	3,500	210	6.3	380	155	751	18
7	Sep-02	9,600	3,900	180	< 0.5	380	160	720	< 2.0
8	Dec-02	9,600	3,700	110	< 0.5	400	189	699	< 2.0
9	Mar-03	10,000	3,600	210	12	360	143	725	45
10	Jun-03	9,300	4,200	190	< 10	250	130	570	200
11	Sep-03	10,000	3,300	150	11	300	136	597	< 2.0
12	Dec-03	9,140	1,100	62	45	295	184	586	89
13	Mar-04	8,170	600	104	41	306	129	580	84
14	Jun-04	9,200	2,700	150	< 0.5	290	91	531	< 2.0
15	Sep-04	9,700	3,400	98	< 0.5	300	125	523	< 2.0
16	Dec-04	8200	4,000	95	< 0.5	290	124	509	< 2.0
17	Mar-05	10,000	4,300	150	< 0.5	370	71	591	< 2.0
18	Jun-05	10,000	3,300	210	< 1.0	410	56	676	< 4.0
19	Sep-05	7,600	2,700	110	< 1.0	310	54	474	< 4.0
20	Dec-05	2,900	3,300	31	< 1.0	140	41	212	< 4.0
21	Mar-06	6,800	3,000	110	< 1.0	280	42	432	110
22	Jun-06	6,900	3,600	63	< 2.5	290	43	396	< 10
23	Sep-06	7,900	3,600	64	< 0.5	260	58	382	49
24	Dec-06	7,300	2,400	50	< 0.5	220	42	312	< 2.0
25	Mar-07	6,200	2,900	34	< 0.5	190	15	239	< 2.0
26	Jun-07	6,800	3,000	30	< 1.0	160	27	217	< 4.0
27	Sep-07	6,400	3,000	< 0.5	< 0.5	170	43	213	< 2.0
28	Dec-07	4,800	2,800	< 0.5	< 0.5	100	26.5	126.5	2.7
30	Mar-08	5,400	5,900	21	< 0.5	150	15	186	51
31	Jun-08	4,800	3,500	55	< 0.5	140	7.0	202	< 2.0
32	Sep-08	6,400	2,800	22	< 0.5	100	9.3	131	< 2.0
33	Dec-08	3,500	3,600	5	< 0.5	100	9.1	114	< 2.0
34	Mar-09	5,100	6,700	19	< 0.5	140	12.3	171	51
35	Jun-09	4,600	5,400	40	< 0.5	140	5.1	185	260
36	Sep-09	4,400	4,700	< 0.5	< 0.5	96	5.6	102	3.5
37	Dec-09	4,900	4,500	< 0.5	< 0.5	90	2.9	93	57.0
38	Mar-10	5,300	4,300	17	< 0.5	110	2.6	130	16.0
39	Mar-10	2,600	6,100	11	< 0.5	76	4.5	92	< 2.0
40	Jun-10	5,800	5,000	20	< 0.5	140	9.9	170	< 2.0
41	Sep-10	6,300	4,100	< 0.5	< 0.5	93	6.0	99	69.0
42	Dec-10	5,400	3,500	< 0.5	< 0.5	99	9.2	108	87.0
43	Mar-11	5,500	3,400	11	< 0.5	94	8.5	114	< 2.0
44	Sep-11	5,800	3,300	< 0.5	< 0.5	97	3.1	100	< 2.0
45	Mar-12	6,400	3,500	< 0.5	< 0.5	110	5.6	116	< 2.0
46	Sep-12	5,700	3,000	< 0.5	< 0.5	84	< 0.5	84	< 2.0
47	Mar-13	6,000	3,300	< 0.5	< 0.5	82	< 0.5	82	< 2.0
48	Oct-13	6,400	6,000	35	< 0.5	75	5.10	115	< 2.0
49	Dec-13	6,000	4,200	< 0.5	< 0.5	100	< 0.5	100	< 2.0
50	Mar-14	7,500	4,900	< 0.5	< 0.5	130	2.0	132	< 2.0
51	Jun-14	3,400	9,100	< 0.5	< 0.5	170	6.9	177	< 2.0
52	Sep-14	6,500	6,000	< 0.5	< 0.5	150	5.1	155	< 2.0
53	Mar-15	7,700	3,200	< 0.5	< 0.5	91	< 0.5	91	< 2.0
54	Sep-15	6,800	2,800	< 0.5	< 0.5	85	< 0.5	85	< 2.0
55	Dec-15	4,700	2,100	< 0.5	< 0.5	64	< 0.5	64	43
56	Mar-16	1,500	850	< 0.5	< 0.5	12	< 0.5	12	< 2.0

Well MW-8									
Event	Date	TVHg	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	Jan-01	14,000	1,800	430	17	360	1230	2,037	96
2	Apr-01	11,000	3,200	320	13	560	1,163	2,056	42
3	Aug-01	9,600	3,200	130	14	470	463	1,077	14
4	Dec-01	3,500	950	69	2.4	310	431	812	< 4.0
5	Mar-02	14,000	3,800	650	17	1,200	1,510	3,377	240
6	Jun-02	2,900	1,100	70	2.0	170	148	390	19
7	Sep-02	1,000	420	22	< 0.5	64	50	136	< 2.0
8	Dec-02	3,300	290	67	< 0.5	190	203	460	< 2.0
9	Mar-03	13,000	3,500	610	12	1,100	958	2,680	< 10
10	Jun-03	7,900	2,200	370	7.4	620	562	1,559	< 4.0
11	Sep-03	3,600	400	120	3.3	300	221	644	< 2.0
12	Dec-03	485	100	19	1.5	26	36	83	< 5.0
13	Mar-04	16,000	900	592	24	1,060	1,870	3,546	90
14	Jun-04	5,900	990	260	9.9	460	390	1,120	< 10
15	Sep-04	2,000	360	100	< 2.5	180	102	382	< 10
16	Dec-04	15,000	4,000	840	21	1,200	1,520	3,581	< 10
17	Mar-05	24,000	7,100	840	51	1,800	2,410	5,101	< 10
18	Jun-05	33,000	5,700	930	39	2,500	3,860	7,329	< 20
19	Sep-05	5,600	1,200	270	6.6	400	390	1,067	< 20
20	Dec-05	3,700	1,300	110	< 5.0	320	356	786	< 20
21	Mar-06	22,000	4,300	550	30	1,800	2,380	4,760	< 20
22	Jun-06	19,000	5,000	500	28	1,800	1,897	4,225	< 20
23	Sep-06	9,000	820	170	7.7	730	539	1,447	< 10
24	Dec-06	4,400	800	75	4.2	320	246	645	< 2.0
25	Mar-07	15,000	4,500	340	19	1,300	1,275	2,934	< 20
26	Jun-07	10,000	3,500	220	11	670	675	1,576	< 4.0
27	Sep-07	9,400	3,400	200	6.9	1,000	773	1,980	< 8.0
28	Dec-07	1,200	500	15	0.88	95	57.7	168.58	< 2.0
30	Mar-08	11,000	13,000	150	13	1,100	950.0	2,213	76
31	Jun-08	2,000	1,700	27	2.5	190	113.2	333	< 2.0
32	Sep-08	5,500	4,400	89	3.9	630	194.4	917	< 2.0
33	Dec-08	520	400	1.5	< 0.5	20	4.4	26	4.5
34	Mar-09	4,600	7,300	55	< 5.0	410	639.0	1,104	< 20
35	Jun-09	2,100	3,400	32	< 0.5	260	80.8	373	55
36	Sep-09	440	1,700	2.8	< 0.5	33	2.7	39	3.7
37	Dec-09	560	540	1.5	< 0.5	39	7.1	48	4.2
38	Mar-10	220	270	0.8	< 0.5	14	3.1	18	3.9
39	Mar-10	3,400	5,700	28.0	< 0.5	340	255.7	624	< 2.0
40	Jun-10	4,700	4,200	27.0	2.9	400	103.2	533	27
41	Sep-10	900	1,300	2.9	< 0.5	22	< 2.5	25	< 10
42	Dec-10	180	260	< 0.5	< 0.5	5	1.0	6.4	7.2
43	Mar-11	6,000	5,900	39	< 0.5	510	431.0	980.0	< 2.0
44	Sep-11	1,700	1,200	7	0.9	120	12.2	139.7	< 2.0
45	Mar-12	1,200	790	11	0.9	< 0.5	99.0	110.9	< 2.0
46	Sep-12	730	430	4.7	< 0.5	45	3.8	53.5	9.2
47	Mar-13	840	690	5.6	< 0.5	47	9.9	62.51	15
48	Oct-13	150	140	< 0.5	< 0.5	3.3	< 0.5	3.3	< 2.0
49	Mar-14	79	120	< 0.5	< 0.5	2.1	< 0.5	2.1	11
50	Sep-14	57	66	< 0.5	< 0.5	1.5	0.66	2.16	11
51	Mar-15	190	68	< 0.5	< 0.5	1.6	< 0.5	1.6	11
52	Sep-15	< 50	97	< 0.5	< 0.5	< 0.5	< 0.5	0	6
53	Mar-16	170	290	0.53	< 0.5	3.6	5.52	9.65	3

Well MW-9									
Event	Date	TVHg	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	Aug-01	11,000	170	340	13	720	616	1,689	48
2	Dec-01	9,400	2,700	250	5.1	520	317	1,092	< 10
3	Mar-02	1,700	300	53	4.2	120	67	244	20
4	Jun-02	11,000	2,500	200	16	600	509	1,325	85
5	Sep-02	3,600	2,800	440	11	260	39	750	< 4.0
6	Dec-02	7,000	3,500	380	9.5	730	147	1,266	< 10
7	Mar-03	4,400	1,400	320	6.9	400	93	820	< 2.0
8	Jun-03	7,600	1,600	490	10	620	167	1,287	< 4.0
9	Sep-03	8,300	2,900	420	14	870	200	1,504	< 10
10	Dec-03	7,080	700	287	31	901	255	1,474	< 10
11	Mar-04	3,550	600	122	15	313	84	534	35
12	Jun-04	6,800	1,700	350	< 2.5	620	99	1,069	< 10
13	Sep-04	7,100	1,900	160	8.1	600	406	1,174	< 10
14	Dec-04	4,700	2,800	160	< 2.5	470	< 0.5	630	< 10
15	Mar-05	4,200	1,600	97	< 2.5	310	42	449	< 10
16	Jun-05	9,900	2,000	170	< 2.5	590	359	1,119	< 10
17	Sep-05	3,600	1,200	250	< 0.5	330	36	616	< 2.0
18	Dec-05	8,700	1,500	150	4	650	551	1,355	< 4.0
19	Mar-06	3,600	880	37	< 1.0	210	165	412	< 4.0
20	Jun-06	3,200	1,300	39	< 1.0	220	144	403	4.2
21	Sep-06	12,000	3,300	130	8	850	604	1,592	< 1.0
22	Dec-06	12,000	2,800	140	9.4	880	634	1,663	< 10
23	Mar-07	9,600	2,900	120	8.7	780	453	1,362	< 10
24	Jun-07	7,100	2,200	75	5.2	480	298	858	< 4.0
25	Sep-07	4,500	2,100	60	3.8	420	227	710	< 4.0
26	Dec-07	6,200	2,000	51	< 0.5	340	128.8	519.8	< 2.0
27	Mar-08	6,400	3,500	67	5.2	480	177.6	724.6	38
28	Jun-08	10,000	3,400	89	< 2.5	510	231.0	830.0	< 10
29	Sep-08	4,800	2,700	53	< 0.5	250	66.4	369.4	< 2.0
30	Dec-08	4,300	2,300	45	< 0.5	330	39.1	414.1	< 2.0
31	Mar-09	4,000	2,200	< 2.0	< 0.5	160	34.9	194.9	< 2.0
32	Jun-09	4,100	3,600	62	< 0.5	280	41.7	383.7	160
33	Sep-09	2,200	2,900	15	< 0.5	110	11.8	136.8	< 2.0
34	Dec-09	2,500	4,000	27	< 0.5	170	8.7	205.7	< 2.0
35	Mar-10	3,300	2,600	15	< 0.5	140	12.0	167.0	8.6
36	Mar-10	2,500	3,400	16	< 0.5	70	15.4	101.4	2.1
37	Jun-10	1,700	1,300	13	< 0.5	48	4.9	65.9	11
38	Sep-10	13,000	2,900	43	< 0.5	300	47.9	390.9	43
39	Dec-10	3,900	2,400	32	< 0.5	240	20.5	292.5	82
40	Mar-11	700	680	1.6	< 0.5	10	3.5	15.1	14
41	Sep-11	2,600	1,900	12	< 0.5	160	10.2	182.2	< 2.0
42	Mar-12	1,100	940	9	< 0.5	25	1.6	35.6	< 2.0
43	Sep-12	10,000	8,600	25	< 0.5	260	19.0	304.0	< 2.0
44	Mar-13	4,000	2,400	9.1	< 0.5	73	9.7	91.8	< 2.0
45	Oct-13	3,200	1,500	20	< 0.5	51	6.6	77.6	< 2.0
49	Dec-13	3,000	2,700	22	< 0.5	120	4.6	147	< 2.0
50	Mar-14	3,100	5,200	49	< 0.5	420	83	552	< 2.0
51	Jun-14	12,000	2,600	54	< 0.5	610	160	824	< 2.0
52	Sep-14	17,000	5,800	65	13.0	51	204	333	< 2.0
53	Mar-15	4,300	2,000	24	< 0.5	150	19	193	< 2.0
54	Sep-15	3,000	950	25	< 0.5	59	3	87	46
55	Dec-15	2,700	1,400	9.6	< 0.5	< 8.3	< 8.3	10	< 33
56	Mar-16	4,000	2,600	18.0	< 8.3	84	< 8.3	102	< 33

Well MW-10									
Event	Date	TVHg	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	Aug-01	550	2,100	17	< 0.5	31	44	92	40
2	Dec-01	< 50	81	< 0.5	< 0.5	< 0.5	< 0.5	—	25
3	Mar-02	< 50	< 50	0.61	< 0.5	< 0.5	< 0.5	0.61	6.0
4	Jun-02	< 50	< 50	0.59	< 0.5	0.58	< 0.5	1.2	9.0
5	Sep-02	160	120	10	< 0.5	6.7	3.6	20	26
6	Dec-02	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	16
7	Mar-03	110	< 50	11	< 0.5	12	1.3	24	15
8	Jun-03	110	< 50	9.6	< 0.5	6.8	< 0.5	16	9.0
9	Sep-03	< 50	< 50	1.1	< 0.5	1.5	< 0.5	2.6	7.0
10	Dec-03	162	< 100	6.9	< 0.3	8.0	< 0.6	15	9.9
11	Mar-04	94	< 100	2.8	< 0.3	5.7	7.0	16	< 5.0
12	Jun-04	150	56	11	< 0.5	12	< 0.5	23	15
13	Sep-04	< 50	< 50	1.6	< 0.5	1.9	< 1.0	3.5	5.8
14	Dec-04	64	< 50	3.7	< 0.5	3.7	0.7	8.1	10
15	Mar-05	95	98	8.3	< 0.5	7.7	0.77	17	13
16	Jun-05	150	57	14	< 0.5	10	1.0	25	< 2.0
17	Sep-05	87	< 50	5.0	< 0.5	3.6	< 1.0	8.6	< 2.0
18	Dec-05	< 50	< 50	1.2	< 0.5	< 0.5	< 1.0	1.2	7.8
19	Mar-06	58	71	3.2	< 0.5	2.2	< 1.0	5.4	8.8
20	Jun-06	73	140	4.9	< 0.5	2.5	< 1.0	7.4	5.3
21	Sep-06	88	51	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	9.6
22	Dec-06	< 50	< 50	0.61	< 0.5	0.55	< 0.5	1.2	3.7
23	Mar-07	57	< 50	3.6	< 0.5	2.2	< 0.5	5.8	3.1
24	Jun-07	60	65	2.4	< 0.5	1.6	< 0.5	4.0	4.0
25	Sep-07	84	< 50	3.6	< 0.5	2.3	0.52	6.4	3.6
26	Dec-07	130	67	0.77	< 0.5	340	0.83	341.6	< 2.0
27	Mar-08	78	170	1.7	< 0.5	3.1	0.97	5.8	2.4
28	Jun-08	230	320	12	< 0.5	9.9	3.50	25.4	< 2.0
29	Sep-08	80	< 50	1.6	< 0.5	0.52	< 0.5	2.1	3.0
30	Dec-08	< 50	66	0.89	< 0.5	< 0.5	< 0.5	0.9	2.1
31	Mar-09	76	230	< 2.0	< 0.5	1.4	< 0.5	1.4	< 2.0
32	Jun-09	72	120	2.0	< 0.5	4.4	1.3	7.7	< 2.0
33	Sep-09	74	220	1.6	< 0.5	< 0.5	< 0.5	1.6	< 2.0
34	Dec-09	72	150	0.6	< 0.5	1.6	1.2	3.4	< 2.0
36	Mar-10	63	280	1.3	< 0.5	48	< 0.5	49.3	< 2.0
37	Jun-10	110	340	1.4	< 0.5	2.6	0.74	4.7	2.4
38	Sep-10	140	360	2.1	< 0.5	1.4	< 0.5	3.5	4.3
39	Dec-10	80	440	< 0.5	< 0.5	0.69	< 0.5	0.7	4.1
40	Mar-11	170	1,200	1.0	< 0.5	3.7	1.8	6.5	6.3
41	Sep-11	150	220	0.8	< 0.5	1.9	1	3.7	< 2.0
42	Mar-12	80	92	0.81	< 0.5	1.5	< 0.5	2.3	3.4
43	Sep-12	170	200	< 0.5	< 0.5	2	0.94	2.9	< 2.0
44	Mar-13	310	58	< 0.5	< 0.5	7.3	7.94	15.2	< 2.0
45	Oct-13	69	< 50	< 0.5	< 0.5	0.84	< 0.5	0.8	4.8
46	Dec-13	< 52	220	< 0.5	0.61	2	1.5	4.1	3.7
47	Mar-14	< 50	87	< 0.5	< 0.5	0.51	< 0.5	0.5	3.7
48	Jun-14	55	< 50	< 0.5	0.61	2	1.5	4.1	< 2.0
49	Sep-14	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	0.0	4.5
50	Mar-15	61	< 49	< 0.5	< 0.5	< 0.5	< 0.5	0.0	3.3
51	Sep-15	< 50	< 49	< 0.5	< 0.5	< 0.5	< 0.5	0.0	2.6
52	Dec-15	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	0.0	2.6
53	Mar-16	90	110	< 0.5	< 0.5	< 0.5	< 0.5	0.0	< 2.0

Well MW-11									
Event	Date	TVHg	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	Aug-01	17,000	7,800	390	17	820	344	1,571	< 10
2	Dec-01	5,800	2,800	280	7.8	500	213	1,001	< 10
3	Mar-02	100	94	< 0.5	< 0.5	0.64	< 0.5	0.64	2.4
4	Jun-02	8,200	2,600	570	13	560	170	1,313	< 4
5	Sep-02	12,000	4,400	330	13	880	654	1,877	< 10
6	Dec-02	18,000	4,500	420	< 2.5	1,100	912	2,432	< 10
7	Mar-03	7,800	2,600	170	4.7	530	337	1,042	53
8	Jun-03	14,000	3,800	250	< 2.5	870	693	1,813	< 10
9	Sep-03	10,000	3,000	250	9.9	700	527	1,487	< 4
10	Dec-03	15,000	1,100	314	60	1,070	802	2,246	173
11	Mar-04	4,900	400	72	17	342	233	664	61
12	Jun-04	10,000	2,300	210	2.8	690	514	1,417	< 10
13	Sep-04	7,200	2,300	340	< 2.5	840	75	1,255	< 10
14	Dec-04	11,000	3,900	180	5.1	780	695	1,660	< 10
15	Mar-05	4,600	1,900	69	< 2.5	300	206	575	< 10
16	Jun-05	1,400	590	85	< 0.5	110	8.2	203	< 2.0
17	Sep-05	12,000	3,100	220	< 1.0	840	762	1,822	< 4.0
18	Dec-05	2,500	2,100	120	< 2.5	260	16	396	< 10
19	Mar-06	2,200	1,300	27	< 2.5	130	5.2	162	< 10
20	Jun-06	3,700	1,900	170	< 1.0	230	14	414	< 4.0
21	Sep-06	3,600	2,100	80	< 0.5	230	8.8	319	< 2.0
22	Dec-06	6,000	3,500	83	< 1.0	260	16.4	359	< 4.0
23	Mar-07	4,500	1,900	110	< 0.5	170	7.9	288	< 2.0
24	Jun-07	4,300	2,200	120	< 0.5	140	6.6	267	< 4.0
25	Sep-07	5,500	2,700	86	< 0.5	180	16.1	282	< 2.0
26	Dec-07	7,100	4,000	68	< 0.5	140	14	222	35
27	Mar-08	5,300	4,000	130	< 0.5	120	13	263	8.8
28	Jun-08	3,600	4,200	190	< 0.5	140	11	341	< 2.0
29	Sep-08	7,300	4,600	130	< 0.5	110	4.5	245	< 2.0
30	Dec-08	2,800	1,600	93	< 0.5	82	0.69	176	< 2.0
31	Mar-09	4,100	4,600	18	< 0.5	82	8	108	8.0
32	Jun-09	2,100	2,700	38	< 0.5	80	3.3	121	3.3
33	Sep-09	830	2,400	11	< 0.5	19	< 0.5	30	< 2.0
34	Dec-09	2,200	3,100	19	< 0.5	46	0.78	66	14.0
35	Mar-10	2,300	2,500	13	< 0.5	59	0.79	73	3.4
36	Mar-10	1,500	3,400	12	< 0.5	48	< 0.5	60	< 2.0
37	Jun-10	2,000	3,500	14	< 0.5	42	0.92	57	7.9
38	Sep-10	3,000	2,200	18	< 0.5	41	0.55	60	8.0
39	Dec-10	1,800	2,900	13	< 0.5	49	1.9	64	15.0
40	Mar-11	180	1,600	< 0.5	< 0.5	1.2	< 0.5	1.2	6.9
41	Sep-11	2,200	2,500	12	< 0.5	44	2.2	58.2	< 2.0
42	Mar-12	1,300	1,200	8.7	< 0.5	29	< 0.5	37.7	< 2.0
43	Sep-12	2,400	1,800	7.7	< 0.5	29	< 0.5	36.7	< 2.0
44	Mar-13	1,500	1,900	4.8	< 0.5	22	< 0.5	26.8	< 2.0
45	Oct-13	3,000	1,600	14	< 0.5	35	< 0.5	49	< 2.0
46	Dec-13	2,500	2,000	< 0.5	13	< 0.5	0.68	13.7	< 2.0
47	Mar-14	3,000	2,800	13	< 0.5	34	< 0.5	47.0	< 2.0
48	Jun-14	2,300	1,400	6	< 0.5	20	6.1	32.1	< 2.0
49	Sep-14	190	3,400	6.8	< 0.5	26	< 0.5	32.8	3.7
50	Mar-15	1,300	1,500	< 0.5	< 0.5	8.4	< 0.5	8.4	< 2.0
51	Sep-15	2,500	1,800	< 0.5	< 0.5	25	< 0.5	25.0	24.0
52	Dec-15	3,100	1,600	< 0.5	< 0.5	30	< 0.5	30.0	< 2.0
53	Mar-16	720	610	< 0.5	< 0.5	6.1	< 0.5	6.1	< 2.0

Well MW-12									
Event	Date	TVHg	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	Dec-05	1,300	700	< 0.5	< 0.5	33	5.6	39	< 2.0
2	Mar-06	1,100	540	<0.5	<0.5	8.5	1.5	10	49
3	Jun-06	680	400	<0.5	<0.5	5.8	1.4	7.2	< 2.0
4	Sep-06	910	480	<0.5	<0.5	9.9	1.5	11.4	21
5	Dec-06	770	230	< 0.5	< 0.5	7.4	2.0	9.4	< 2.0
6	Mar-07	390	110	< 0.5	< 0.5	1.7	1.7	3.4	< 2.0
7	Jun-07	590	280	<0.5	<0.5	4.5	0.9	5.4	< 2.0
8	Sep-07	390	180	<0.5	<0.5	2.4	2.4	4.8	< 2.0
9	Dec-07	210	140	<0.5	<0.5	2.1	1.3	3.4	< 2.0
10	Mar-08	720	500	<0.5	4.4	9.0	2.8	16.2	< 2.0
11	Jun-08	220	50	<0.5	<0.5	2.0	<0.5	2.0	< 2.0
12	Sep-08	370	95	<0.5	<0.5	2.8	0.98	3.8	< 2.0
13	Dec-08	93	170	<0.5	<0.5	0.76	<0.5	0.8	< 2.0
14	Mar-09	180	130	<0.5	<0.5	1.70	<0.5	1.7	< 2.0
15	Jun-09	300	280	< 0.5	< 0.5	4.60	< 0.5	4.6	< 2.0
16	Sep-09	330	270	<0.5	<0.5	2.30	<0.5	2.3	< 2.0
17	Dec-09	76	170	<0.5	<0.5	<0.5	<0.5	0.0	< 2.0
18	Mar-10	240	380	<0.5	<0.5	2.7	<0.5	2.7	< 2.0
19	Jun-10	540	370	<0.5	<0.5	3.5	0.92	4.4	7.9
20	Sep-10	380	220	<0.5	<0.5	1.7	<0.5	1.7	8
21	Dec-10	320	350	<0.5	<0.5	1.5	<0.5	1.5	3.9
22	Mar-11	290	450	<0.5	0.74	1.3	<0.5	2.0	11
23	Sep-11	530	340	<0.5	<0.5	2.2	<0.5	2.2	< 2.0
24	Mar-12	410	240	<0.5	<0.5	1.9	<0.5	1.9	< 2.0
25	Sep-12	340	210	<0.5	<0.5	1.1	<0.5	1.1	< 2.0
26	Mar-13	430	200	<0.5	<0.5	1.2	<0.5	1.2	7.1
27	Oct-13	350	200	<0.5	<0.5	0.92	<0.5	0.92	< 2.0
28	Dec-13	290	210	<0.5	<0.5	0.68	<0.5	0.68	2.5
29	Mar-14	<50	62	<0.5	<0.5	<0.5	<0.5	0	2.8
30	Jun-14	2,300	190	<0.5	<0.5	0.65	<0.5	0.65	< 2.0
31	Sep-14	2,500	130	<0.5	6.8	26	<0.5	32.8	< 2.0
32	Mar-15	<50	<49	<0.5	<0.5	<0.5	<0.5	0	< 2.0
33	Sep-15	<50	91	<0.5	<0.5	<0.5	<0.5	0	< 2.0
34	Dec-15	<50	<49	<0.5	<0.5	<0.5	<0.5	0	2.1
35	Mar-16	<50	<50	<0.5	<0.5	<0.5	<0.5	0	< 2.0



HISTORICAL SURFACE WATER ANALYTICAL RESULTS										
REDWOOD REGIONAL PARK SERVICE YARD, OAKLAND, CALIFORNIA										
(all concentrations in ug/L, equivalent to parts per billion (ppb))										
Surface Water Sampling Location SW-1 (Upstream of Contaminated Groundwater Discharge Location SW-2)										
Event	Date	TVHg	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE	
1	Feb-94	50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
2	May-95	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
3	May-96	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
4	Aug-96	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
5	Dec-96	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
6	Feb-97	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
7	Aug-97	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
8	Dec-97	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
9	Feb-98	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
10	Sep-98	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2.0
11	Apr-99	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2.0

Sampling at this location discontinued after April 1999 with Alameda County Health Services Agency approval.

Surface Water Sampling Location SW-2 (Area of Historical Contaminated Groundwater Discharge)										
Event	Date	TVHg	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE	
1	Feb-94	130	< 50	1.9	< 0.5	4.4	3.2	9.5		NA
2	May-95	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
3	Aug-95	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
4	May-96	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
5	Aug-96	200	< 50	7.5	< 0.5	5.4	< 0.5	13		NA
6	Dec-96	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
7	Feb-97	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
8	Aug-97	350	130	13	0.89	19	11	44		NA
9	Dec-97	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
10	Feb-98	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
11	Sep-98	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
12	Apr-99	81	< 50	2.0	< 0.5	2.5	1.3	5.8		2.3
13	Dec-99	1,300	250	10	1.0	47	27	85		2.2
14	Sep-00	160	100	2.1	< 0.5	5.2	1.9	9.2		3.4
15	Jan-01	< 50	< 50	< 0.5	< 0.5	0.53	< 0.5	0.5		< 2.0
16	Apr-01	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
17	Sep-01	440	200	2.1	< 0.5	17	1.3	20		10
18	Dec-01	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
19	Mar-02	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
20	Jun-02	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
21	Sep-02	220	590	10	< 0.5	13	< 0.5	23		< 2.0
22	Dec-02	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
23	Mar-03	< 50	< 50	< 0.5	< 0.5	0.56	< 0.5	0.56		2.8
24	Jun-03	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
25	Sep-03	190	92	2.1	< 0.5	4.2	< 0.5	6.3		< 2.0
26	Dec-03	86	< 100	< 0.3	< 0.3	< 0.3	< 0.6	< 0.6	< 0.6	< 5.0
27	Mar-04	< 50	< 100	< 0.3	< 0.3	1.1	< 0.6	1.1		< 5.0
28	Jun-04	< 50	< 50	< 0.5	< 0.5	0.83	< 0.5	0.83		< 2.0
29	Sep-04	260	370	4.4	< 0.5	6.3	< 1.0	11		< 2.0
30	Dec-04	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	1.0		< 2.0
31	Mar-05	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 1.0	< 2.0
32	Jun-05	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 1.0	< 2.0
33	Sep-05	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 1.0	< 2.0
34	Dec-05	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 1.0	< 2.0
35	Mar-06	< 50	62	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 1.0	< 2.0
36	Jun-06	< 50	110	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 1.0	< 2.0
37	Sep-06	62	94	< 0.5	< 0.5	0.81	< 0.5	0.8		< 2.0
38	Dec-06	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 1.0	< 2.0
39	Mar-07	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 1.0	< 2.0
40	Jun-07	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 2.0
41	Sep-07	< 50	77	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 2.0
42	Dec-07	130	430	< 0.5	< 0.5	1.5	< 0.5	1.5		< 2.0
43	Mar-08	< 50	130	< 0.5	< 0.5	< 0.5	0.61	0.61		< 2.0
44	Jun-08	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
45	Sep-08	530	690	< 0.5	< 0.5	4.3	< 0.5	4.3		< 2.0
46	Dec-08	< 50	83	< 5.0	< 5.0	< 5.0	< 5.0	< 0.5		< 2.0

Surface Water Sampling Location SW-2 Continued

47	Mar-09	<50	<50	<0.5	<0.5	<0.5	<0.5	<1.0	<2.0
48	Jun-09	<50	<50	<5.0	<5.0	<5.0	<5.0	<0.5	<2.0
49	Sep-09	110	220	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0
50	Dec-09	<50	<50	<5.0	<5.0	<5.0	<5.0	<0.5	<2.0
51	Mar-10	<50	<50	<5.0	<5.0	<5.0	<5.0	<0.5	<2.0
52	Jun-10	<50	240	<5.0	<5.0	<5.0	<5.0	<0.5	<2.0
53	Sep-10	<50	66	<5.0	<5.0	<5.0	<5.0	<0.5	<2.0
54	Dec-10	<50	<50	<0.5	<0.5	<0.5	<5.0	<0.5	NA
55	Mar-11	<50	<50	<0.5	<0.5	<0.5	<5.0	<0.5	NA
56	Sep-11	<50	<50	<0.5	<0.5	<0.5	<5.0	<0.5	NA
57	Mar-12	<50	<50	<0.5	<0.5	<0.5	<5.0	<0.5	<2.0
58	Sep-12	<50	<50	<0.5	<0.5	<0.5	<5.0	<0.5	<2.0
59	Mar-13	<50	<50	<0.5	<0.5	<0.5	<5.0	<0.5	<2.0
60	Oct-13	<50	930	<0.5	<0.5	<0.5	<5.0	<0.5	4.8
61	Mar-14	<50	<49	<0.5	<0.5	<0.5	<5.0	<0.5	<2.0
62	Sep-14	NS	NS	NS	NS	NS	NS	NS	NS
63	Mar-15	<50	<51	<0.5	<0.5	<0.5	<5.0	<0.5	<2.0
64	Sep-15	NS	NS	NS	NS	NS	NS	NS	NS
65	Mar-16	<50	<50	<0.5	<0.5	<0.5	<5.0	<0.5	<2.0

Surface Water Sampling Location SW-3 (Downstream of Contaminated Groundwater Discharge Location SW-2)									
Event	Date	TVHg	TEHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	May-95	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
2	Aug-95	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
3	May-96	< 50	74	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
4	Aug-96	69	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
5	Dec-96	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
6	Feb-97	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
7	Aug-97	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
8	Dec-97	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
9	Feb-98	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
10	Sep-98	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
11	Apr-99	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
12	Dec-99	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
13	Sep-00	NS	NS	NS	NS	NS	NS	NS	NS
14	Jan-01	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
15	Apr-01	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
16	Sep-01	NS	NS	NS	NS	NS	NS	< 0.5	NS
17	Dec-01	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
18	Mar-02	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
19	Jun-02	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.4
20	Sep-02	NS	NS	NS	NS	NS	NS	NS	NS
21	Dec-02	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
22	Mar-03	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
23	Jun-03	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
24	Sep-03	NS	NS	NS	NS	NS	NS	NS	NS
25	Dec-03	60	< 100	< 0.3	< 0.3	< 0.3	< 0.6	< 0.6	< 5.0
26	Mar-04	< 50	< 100	< 0.3	< 0.3	< 0.6	< 0.6	< 0.6	< 5.0
27	Jun-04	NS	NS	NS	NS	NS	NS	NS	NS
28	Sep-04	NS	NS	NS	NS	NS	NS	NS	NS
29	Dec-04	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 2.0
30	Mar-05	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 2.0
31	Jun-05	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 2.0
32	Sep-05	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 2.0
33	Dec-05	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 2.0
34	Mar-06	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 2.0
35	Jun-06	< 50	120	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 2.0
36	Sep-06	< 50	120	< 0.5	< 0.5	< 0.5	< 0.5	0.5	7.8
37	Dec-06	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 2.0
38	Mar-07	< 50	< 50	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	3.3
39	Jun-07	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	0.5	< 2.0
40	Sep-07	NS	NS	NS	NS	NS	NS	NS	NS
41	Dec-07	NS	NS	NS	NS	NS	NS	NS	NS
42	Mar-08	< 50	200	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
43	Jun-08	< 50	55	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
44	Sep-08	NS	NS	NS	NS	NS	NS	NS	NS
45	Dec-08	< 50	360	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0
46	Mar-09	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	0.5	< 2.0
47	Jun-09	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
48	Sep-09	NS	NS	NS	NS	NS	NS	NS	NS
49	Dec-09	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
50	Mar-10	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
51	Jun-10	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
52	Sep-10	NS	NS	NS	NS	NS	NS	NS	NS
53	Dec-10	< 50	< 50	< 0.5	0.57	< 0.5	0.81	1.4	NA
54	Mar-11	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
55	Sep-11	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA
57	Mar-12	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
58	Sep-12	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
59	Mar-13	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
60	Oct-13	NS	NS	NS	NS	NS	NS	NS	NS
61	Mar-14	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
62	Sep-14	NS	NS	NS	NS	NS	NS	NS	NS
63	Mar-15	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
64	Sep-15	NS	NS	NS	NS	NS	NS	NS	NS
65	Mar-16	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0

NS = Not Sampled (no surface water present during sampling event)