**STELLAR ENVIRONMENTAL SOLUTIONS, INC.**
2198 SIXTH STREET, BERKELEY, CA 94710
TEL: 510.644.3123 ★ FAX: 510.644.3859



| **TRANSMITTAL MEMORANDUM** | | |
|---|---|---|
| TO: ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY<br>DEPT. OF ENVIRONMENTAL HEALTH<br>HAZARDOUS MATERIALS DIVISION<br>1131 HARBOR BAY PKWY, SUITE 250<br>ALAMEDA, CA 94502 | | DATE: APRIL 16, 2004 |
| ATTENTION: MR. SCOTT SEERY | | FILE: SES-2004-02 |
| SUBJECT: REDWOOD REGIONAL PARK FUEL LEAK SITE | | |
| | | |
| WE ARE SENDING: | ☐ HEREWITH | ☐ UNDER SEPARATE COVER |
| | ☐ VIA MAIL | ☐ VIA |
| THE FOLLOWING: | FIRST QUARTER 2004 GROUNDWATER MONITORING REPORT FOR REDWOOD REGIONAL PARK SERVICE YARD SITE – OAKLAND, CALIFORNIA (APRIL 2004) | |
| | ☐ AS REQUESTED | ☐ FOR YOUR APPROVAL |
| | ☐ FOR REVIEW | ☐ FOR YOUR USE |
| | ☐ FOR SIGNATURE | ☐ FOR YOUR FILES |
| | | |
| COPIES TO: N. FUJITA (EBRPD)<br>M. RUGG (FISH & GAME)<br>R. BREWER (REGIONAL BOARD) | | BY: Bruce Rucker |
| | | |
| | | |

★ **Stellar Environmental Solutions**

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

April 14, 2004

Mr. Scott O. Seery - Hazardous Materials Specialist
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502



Subject: First Quarter 2004 Site Monitoring Report
Redwood Regional Park Service Yard Site – Oakland, California

Dear Mr. Seery:

Attached is the referenced Stellar Environmental Solutions, Inc. (SES) report for the underground fuel storage tank 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, and follows previous site investigation and remediation activities (conducted since 1993) associated with former leaking underground fuel storage tanks. The key regulatory agencies for this investigation are the Alameda County Department of Environmental Health (Alameda County Health), the Regional Water Quality Control Board, and the California Department of Fish and Game.

This report summarizes groundwater and surface monitoring and sampling activities conducted in March 2004 (First Quarter 2004), and makes recommendations for future corrective action measures. Following the conclusion of the previous quarter, the EBRPD and Alameda County Health agreed to proceed with a bioventing pilot test and full-scale bioventing system design, with full scale implementation when the technical feasibility and design specifications are confirmed. Those activities will be reported in separate (from ongoing groundwater and surface water monitoring quarterly reports) technical submittals. If you have any questions regarding this report, please contact Mr. Neal Fujita of the East Bay Regional Park District, or contact us directly at (510) 644-3123.

Sincerely,

Bruce M. Rucker

Bruce M. Rucker, R.G., R.E.A.
Project Manager

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

REGISTERED ENVIRONMENTAL ASSESSOR
BRUCE M. RUCKER
No. 02465
Expires: 6/04
STATE OF CALIFORNIA

cc: Michael Rugg, California Department of Fish and Game
Roger Brewer, California Regional Water Quality Control Board
Neal Fujita, East Bay Regional Park District

# FIRST QUARTER 2004
# SITE MONITORING REPORT

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

*Prepared for:*

EAST BAY REGIONAL PARK DISTRICT
P.O. BOX 5381
OAKLAND, CALIFORNIA 94605

*Prepared by:*

STELLAR ENVIRONMENTAL SOLUTIONS
2198 SIXTH STREET
BERKELEY, CALIFORNIA 94710

April 14, 2004

Project No. 2004-02

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# 1.0 INTRODUCTION

## 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 site investigations and remediation since 1993 to address subsurface contamination caused by leakage from one or both of two former underground fuel storage tanks (UFSTs) that contained gasoline and diesel fuel. The Alameda County Health Care Services Agency (ACHCSA) has provided regulatory oversight of the investigation since its inception. Other regulatory agencies with historical involvement in site review include the Regional Water Quality Control Board (RWQCB) and the California Department of Fish and Game (CDFG).

## OBJECTIVES AND SCOPE OF WORK

This report discusses the following activities conducted/coordinated by Stellar Environmental Solutions, Inc. (SES) between January 1 and March 31, 2004:

- 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;
- Mitigating purge water tank release; and
- Performing further evaluation of bioventing as a corrective action.

This quarterly report presents the usual groundwater and surface water data collected, along with an identification of data trends. SES also completed some focused analyses on the efficacy of the bioventing, in response to verbal and email comments by Scott Seery of ACHCSA following his review of the Year 2003 Annual Summary Report (SES, 2004a) in which the proposed corrective action of bioventing technology was presented. Proposing to treat the residual mass in the soil—which bioventing does—followed the evaluation of the apparent limitations of the ORC™ (groundwater) corrective action to date.

An exploratory borehole program was conducted in late September 2003 to address data gaps and corroborate that a significant hydrocarbon mass still resides in the soil, and that this soil

contamination contributes to the dissolved-phase groundwater contamination seasonally. Based on the data gap evaluation, in a separate letter of findings to ACHCSA (SES, 2003e), EBRPD proposed to conduct additional corrective action via installation and operation of a bioventing system. ACHCSA subsequently requested that a bioventing feasibility evaluation be conducted using established U.S. EPA protocols. The findings of our evaluation were summarized in the SES findings report (SES, 2004b), which confirmed that bioventing is the most appropriate strategy to achieve the technical objective. As of the date of this report, ACHCSA has not responded to the proposed strategy, although a meeting (with ACHCSA, EBRPD, and SES) is scheduled in mid-April 2004 to discuss the strategy.

Previous SES reports (see References section) have provided a full discussion of previous site remediation and investigations; site geology and hydrogeology; residual site contamination; conceptual model for contaminant fate and transport; and evaluation of hydrochemical trends and plume stability. An October 2000 Feasibility Study report for the site, submitted to ACHCSA, provided detailed analyses of the regulatory implications of the site contamination and an assessment of viable corrective actions (SES, 2000d). Additional monitoring well installations and corrective action by ORC™ injection proposed by SES were approved by ACHCSA in its January 8, 2001 letter to EBRPD. Two phases of ORC™ injection have been conducted: September 2001 and July 2002. A total of 29 groundwater monitoring events have been conducted on a quarterly basis since inception (November 1994), and a total of 11 groundwater monitoring wells are currently available for monitoring.

## SITE DESCRIPTION

Figure 1 shows the location of the project site. The site slopes to the west, from an elevation of approximately 564 feet above mean sea level (amsl) at the eastern edge of the service yard to approximately 545 feet amsl at Redwood Creek which defines the approximate western edge of the project site with regard to this investigation. Figure 2 shows the site plan.

## REGULATORY OVERSIGHT

The lead regulatory agency for the site investigation and remediation is ACHCSA, with oversight provided by the RWQCB. The CDFG is also involved with regard to water quality impacts to Redwood Creek. All workplans and reports are submitted to these agencies. The most recent ACHCSA directive regarding the site (letter dated January 8, 2001) approved the ORC™ injection corrective action and requested continued quarterly groundwater monitoring and sampling. As discussed above, EBPRD is awaiting approval from ACHCSA to implement the proposed bioventing remedy.



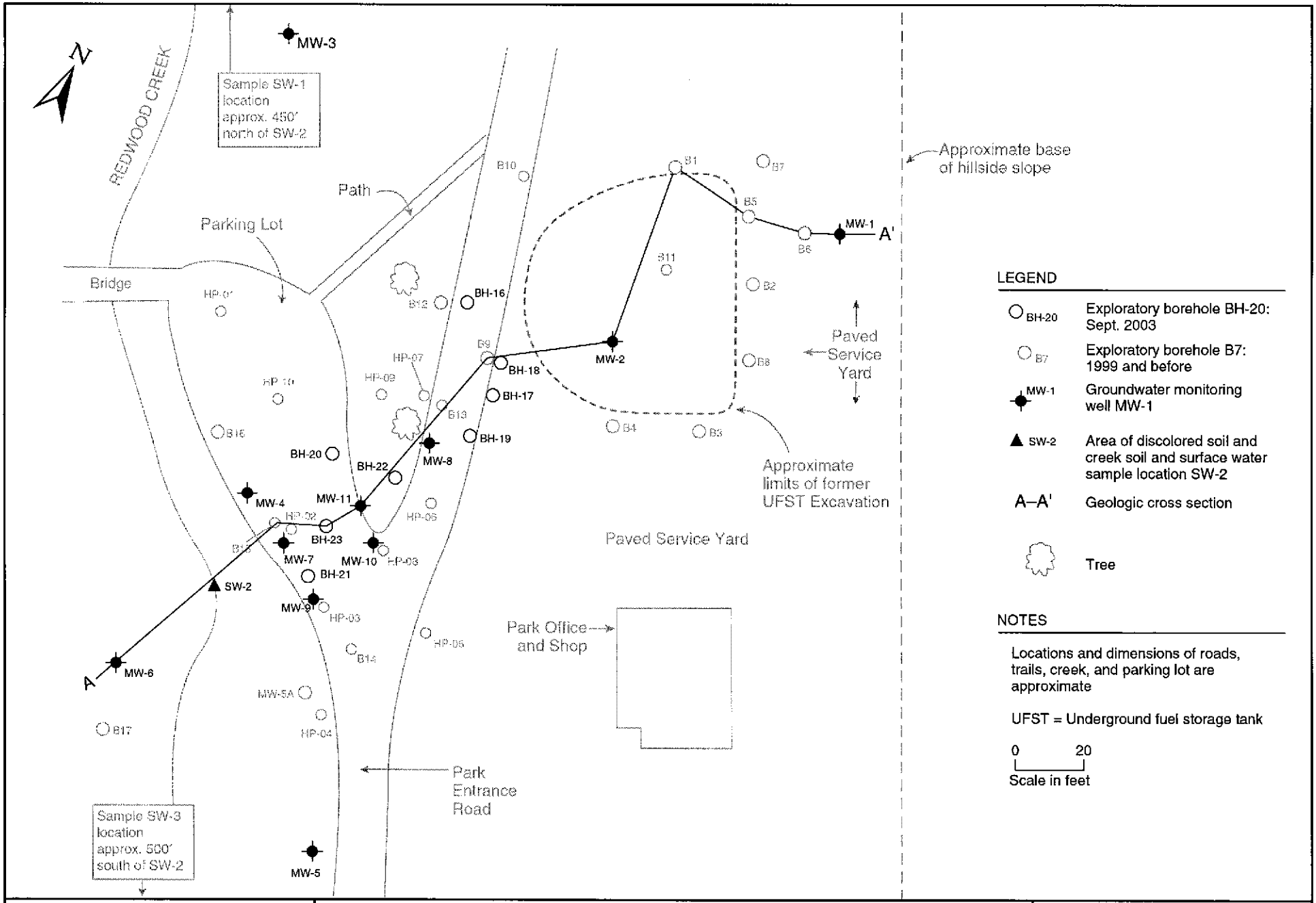

750 ft Scale 1 : 25,000 Detail: 13-0 Datum: WGS84

N

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

| | | | |
|---|---|---|---|
| Redwood Reg. Park Service Yard<br>Oakland, CA | By: MJC | APRIL 2004 | ★ Stellar Environmental Solutions, Inc.<br>Geoscience & Engineering Consulting |
| | Figure 1 | | |

2004-02-01




LEGEND

| | |
|---|---|
| BH-20 | Exploratory borehole BH-20: Sept. 2003 |
| B7 | Exploratory borehole B7: 1999 and before |
| MW-1 | Groundwater monitoring well MW-1 |
| SW-2 | Area of discolored soil and creek soil and surface water sample location SW-2 |
| A–A' | 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

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# SITE PLAN AND HISTORICAL SAMPLING LOCATIONS
## Redwood Regional Park Service Yard, Oakland, CA

**Figure 2**

by: MJC | APRIL 2004

2003-02-38

Historical ACHCSA-approved revisions to the groundwater sampling program have included: 1) discontinuing hydrochemical sampling and analysis in wells MW-1, MW-3, MW-5, and MW-6; 2) discontinuing creek surface water sampling at upstream location SW-1; and 3) reducing the frequency of creek surface water sampling from quarterly to semi-annually (ACHCSA, 1996). The EBPRD has pro-actively elected to not implement the latter approved revision due to continued concern over potential impacts to Redwood Creek.

Since 2001, Electronic Data Format (EDF) groundwater analytical results, well construction and water level data, and site maps have been successfully uploaded to the State of California Water Resources Control Board's GeoTracker database, in accordance with that agency's requirements for EDF submittals.

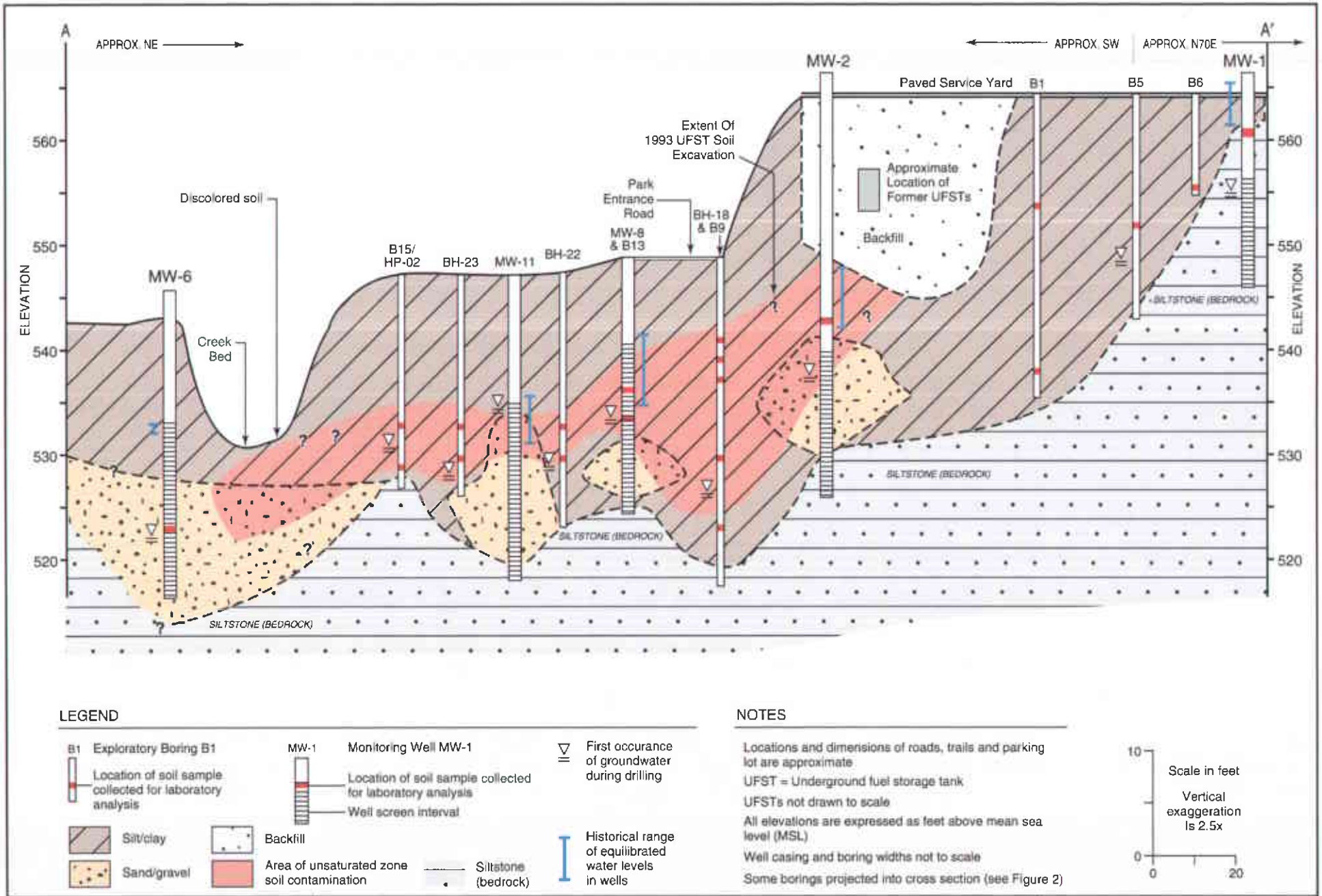
## 2.0 PHYSICAL SETTING

This section discusses the site hydrogeologic conditions based on geologic logging and water level measurements collected at the site since September 1993. This summary of the site geology, lithology, and hydrogeology also includes additional detail, not previously presented, to address ACHCSA's request that the bedrock surface be mapped and the contaminant plume distribution be analyzed more closely in light of lithologic controls. To address ACHCSA's request, SES updated and modified a cross-section along the long axis of the plume and completed an isopleth (bedrock surface) map, as discussed below.

Figure 3 is a geologic cross-section along the longitudinal axis of the plume. 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.

Figure 4 shows a bedrock surface isopleth map (elevation contours for the top of the bedrock surface) in the contaminant plume area. The bedrock surface has a general slope to the west-southwest (toward Redwood Creek), but shows local, elongate depressions and ridges roughly perpendicular to the general gradient. Figures 3 and 4 together illustrate the elevation depressions in the vicinity of MW-11, with another depression at the location of BH-18. The isopleth depressions suggest that the bedrock surface may have at one time undergone channel erosion from a paleostream(s) flowing roughly parallel to present-day Redwood Creek.

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), and 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 which is saturated in the rainy period (late fall through early

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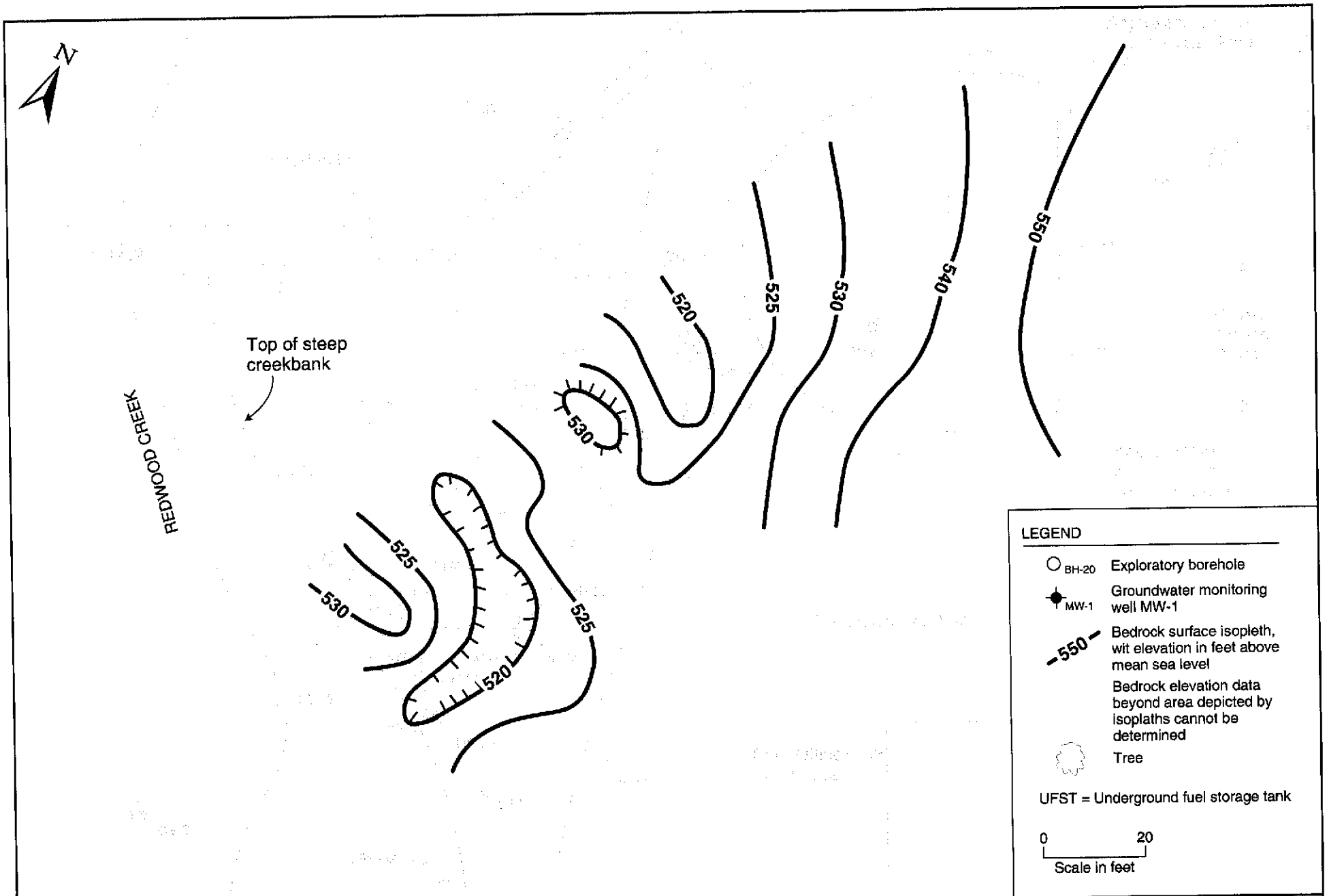
# Cross Section A-A'
## Redwood Regional Park Service Yard, Oakland, CA

**Figure 3**

by: MJC | APRIL 2004

2003-02-39

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# BEDROCK SURFACE ISOPLETH MAP
## Redwood Regional Park Service Yard, Oakland, CA

**Figure 4**

by: MJC | APRIL 2004

2003-02-37

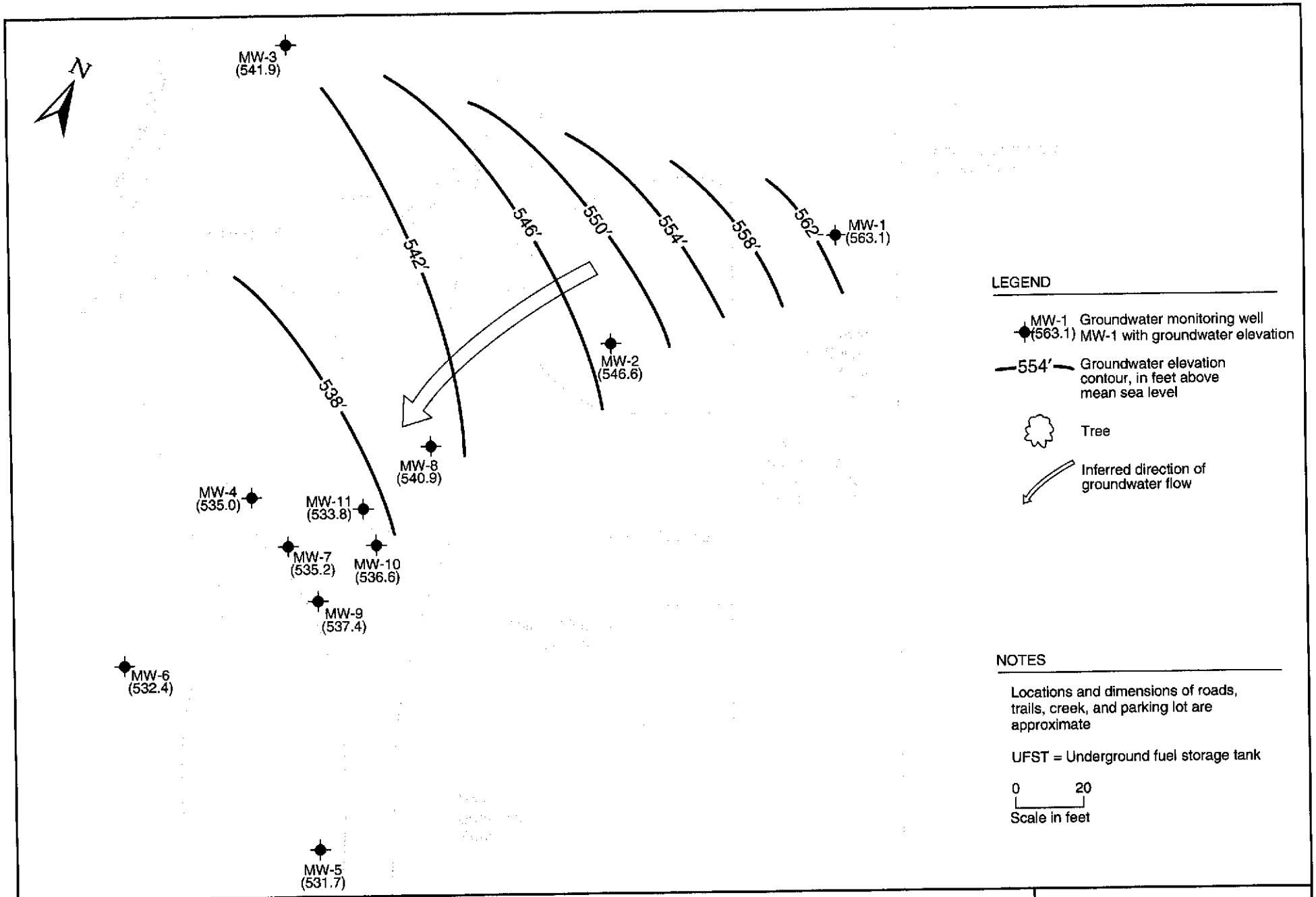
spring) and unsaturated during the remainder of the year. The thickness of the saturated zone plus the capillary fringe varies between approximately 10 and 15 feet in the area of contamination. Local perched water zones have been observed well above the top of the capillary fringe.

Figure 5 is a groundwater elevation map constructed from the current event monitoring well static water levels. Table 1 (in Section 3.0) summarizes current event groundwater elevation data. Appendix A contains historical groundwater elevation data. Consistent with the bedrock isopleth map showing an elevation depression in the vicinity of MW-11, historical groundwater elevations in MW-11 are generally lower than the surrounding area.

In the upgradient portion of the site (between well MW-1 and the former UFST source area, in landslide debris), the groundwater gradient is approximately 0.2 feet per foot (ft/ft). Downgradient from (west of) the UFST source area (between MW-2 and Redwood Creek), the groundwater gradient is approximately 0.1 ft/ft. 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.

We assume a site groundwater velocity at 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 likely conservatively low, but does meet minimum-distance-traveled criteria from the date when contamination was first observed in Redwood Creek (1993) relative to when the USTs were installed in the late 1970s. However, locally, the groundwater velocity could vary significantly. To calculate the specific hydraulic conductivity critical to an accurate site-specific groundwater velocity estimate would require direct testing of the water bearing zone through a slug or pump test.

Redwood Creek, which borders the site to the west, is a seasonal creek known for the 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 creekbed in most locations (including the area of historical contaminated groundwater discharge); therefore, there is little to no observable creek flow.

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# GROUNDWATER ELEVATION MAP–MARCH 18, 2004
## Redwood Regional Park Service Yard, Oakland, CA

**Figure 5**

by: MJC | APRIL 2004

2003-02-35

# 3.0 Q1-2004 GROUNDWATER AND SURFACE WATER MONITORING EVENT ACTIVITIES

This section presents the creek surface water and groundwater sampling and analytical methods for the first quarter monitoring event of March 2004. Groundwater and surface water analytical results are summarized in Section 5.0. Monitoring and sampling protocols were in accordance with the ACHCSA-approved SES technical workplan (SES 1998a). Current event activities included:

- Measuring static water levels and field analyzing pre-purge groundwater samples for indicators of natural attenuation (dissolved oxygen, ferrous iron, and redox potential) in all 11 site wells;
- Collecting pre-purge groundwater samples for laboratory analysis of the natural attenuation indicators nitrate and sulfate from monitoring wells MW-3, MW-4, MW-7, MW-8, MW-9, MW-10, and MW-11;
- Collecting post-purge groundwater samples for laboratory analysis of site contaminants from wells located within the groundwater plume (MW-2, MW-4, MW-7, MW-8, MW-9, MW-10, and MW-11); and
- Collecting Redwood Creek surface water samples for laboratory analysis from locations SW-2 and SW-3).

Creek sampling and groundwater monitoring/sampling was conducted on March 18, 2004. Creek sampling was conducted by the SES project manager. The locations of all site monitoring wells and creek water sampling locations are shown on Figure 2. Well construction information and water level data are summarized in Table 1. Appendix B contains the groundwater monitoring field records for the current event.

## GROUNDWATER LEVEL MONITORING AND SAMPLING

Groundwater monitoring well water level measurements, purging, sampling, and field analyses were conducted by Blaine Tech Services under the supervision of SES personnel. Groundwater sampling was conducted in accordance with State of California guidelines for sampling dissolved analytes in groundwater associated with leaking UFSTs (RWQCB, 1989), and followed the methods and protocols approved by the ACHCSA in the SES 1998 workplan (SES, 1998a).

**Table 1**
**Groundwater Monitoring Well Construction and**
**Groundwater Elevation Data – March 18, 2004 Monitoring Event**
**Redwood Regional Park Corporation Yard, Oakland, California**

| Well | Well Depth | Screened Interval | TOC Elevation | Groundwater Depth[a] | Groundwater Elevation[b] |
|---|---|---|---|---|---|
| MW-1 | 18 | 7 to17 | 565.9 | 2.76 | 563.1 |
| MW-2 | 36 | 20 to 35 | 566.5 | 19.88 | 546.6 |
| MW-3 | 42 | 7 to 41 | 560.9 | 19.02 | 541.9 |
| MW-4 | 26 | 10 to 25 | 548.1 | 13.15 | 535.0 |
| MW-5 | 26 | 10 to 25 | 547.5 | 15.85 | 531.7 |
| MW-6 | 26 | 10 to 25 | 545.6 | 13.19 | 532.4 |
| MW-7 | 24 | 9 to24 | 547.7 | 12.50 | 535.2 |
| MW-8 | 23 | 8 to 23 | 549.2 | 8.27 | 540.9 |
| MW-9 | 26 | 11 to 26 | 549.4 | 12.00 | 537.4 |
| MW-10 | 26 | 11 to 26 | 547.3 | 10.76 | 536.6 |
| MW-11 | 26 | 11 to 26 | 547.9 | 14.10 | 533.8 |

Notes:

[a] Depths are in feet bgs adjacent to the well.

[b] All elevations are feet above USGS mean sea level. Elevations of wells MW-1 through MW-6 were surveyed by EBRPD relative to USGS Benchmark No. JHF-49. Wells MW-7 through MW-11 were surveyed by a licensed land surveyor using existing site wells as datum.

TOC = Top of casing.

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

As the first task of the monitoring event, static water levels were measured using an electric water level indicator. Pre-purge groundwater samples were then collected for field and laboratory analysis of natural attenuation indicators. 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, and electrical conductivity) 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 previous quarter analytical results).

The well development, purge water, and decontamination rinseate (approximately 100 gallons) from the current event was containerized in the onsite plastic tank. Purge water from future events will continue to be accumulated in the onsite tank until it is full, at which time the water will be transported offsite for proper disposal.

## CREEK SURFACE WATER SAMPLING

Surface water sampling was conducted by SES on March 18, 2004. 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 SW-3 (approximately 500 feet downstream of the SW-2 location). In accordance with a previous ACHCSA-approved SES recommendation, upstream sample location SW-1 is no longer part of the surface water sampling program.

At the time of sampling, the creek was flowing briskly at sampling location SW-2; water depth was approximately 1 foot. At this location, where contaminated groundwater discharge to the creek has historically been observed, an orange algae was observed growing on the saturated portion of the creek bank. There was no visible petroleum sheen associated with the algae in the current event. It is likely that this algae is utilizing the petroleum as a carbon source, and is therefore a good indicator of the presence of petroleum contamination. However, neither petroleum sheen nor odor were evident on the water surface.

## MITIGATION OF THE PURGE WATER TANK RELEASE

On March 11, 2004, an EBPRD vehicle struck the water storage tank used to store the purge water collected from the groundwater monitoring wells, creating a crack near the tank bottom. At the time, the tank contained approximately 825 gallons of water from the nine previous sampling events. While no analytical sample had been collected from that water, a tank sample (collected when the tank was full for disposal profiling) contained 55 µg/L diesel and no detectable gasoline, BTEX, or MTBE. A replacement tank was procured and delivered to the site on March 15, 2004, at which time the remaining water (approximately 700 gallons) in the damaged tank was pumped into the new tank. Therefore, the release has been stopped.

We estimate that approximately 125 gallons of low-level fuel-contaminated water was released to the ground surface (asphalt under the tank and open ground within 2 feet of the tank). That water either infiltrated into the adjacent open ground and/or evaporated. The EBRPD notified the following agencies by telephone immediately after the discovery of the release: RWQCB, ACHCSA, California Department of Fish and Game, and the California Office of Emergency Services. On March 16, EBRPD submitted a follow-up letter of notification, addressed to Scott Seery of ACHCSA and copied to RWQCB.

We consider that this release has no significant adverse impact on the environment based on the following: 1) the release was of a small quantity; 2) there were low concentrations of the released water relative to current in situ groundwater concentrations farther downgradient; 3) at least some of the water evaporated on the asphalt (rather than infiltrating); 4) the released water was the same

water that was previously in-ground and was removed during ongoing groundwater monitoring; and 5) the release occurred at the fully upgradient portion of the contaminant plume such that any infiltrating contamination would be observable in the downgradient network of groundwater monitoring wells.

# 4.0 REGULATORY CONSIDERATIONS

The following is a summary of regulatory considerations regarding surface water and groundwater contamination. There are no ACHCSA or RWQCB cleanup orders for the site, although all site work has been conducted under oversight of these agencies.

## GROUNDWATER CONTAMINATION

As specified in the RWQCB's *San Francisco Bay Region Water Quality Control Plan*, all groundwaters are considered potential sources of drinking water unless otherwise approved by the RWQCB, and are 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), RWQCB approval for this exclusion has not been obtained for the site. As summarized in Table 2 (Section 5.0), site groundwater contaminant levels are compared to two sets of criteria: 1) RWQCB Tier 1 Environmental Screening Levels (ESLs) for sites where groundwater is a current or potential drinking water source; and 2) ESLs for sites where groundwater is not a current or potential drinking water source.

As stipulated in the ESL document (July 2003), the risk-based screening levels (RBSLs) 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 RBSLs are composed of multiple components, including ceiling value, human toxicity, indoor air impacts, and aquatic life protection. Excedance of RBSLs 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, the ACHCSA has indicated that impacts to nearby Redwood Creek are of primary importance, and that site target cleanup standards should primarily be evaluated in the context of surface water quality criteria.

## SURFACE WATER CONTAMINATION

As summarized in Table 2 (Section 5.0), site surface water contaminant levels are compared to the most stringent screening level criteria published by the State of California, U.S. EPA, and U.S. Department of Energy. These screening criteria address chronic and acute exposures to aquatic life. As discussed in the RWQCB's ESL document, 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 macroinvertebrate 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-4, MW-7, and MW-9).

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.

# 5.0 MONITORING EVENT ANALYTICAL RESULTS

This section presents the field and laboratory analytical results of the most recent monitoring event. Table 2 summarizes the contaminant analytical results of the current monitoring event, and Table 3 summarizes natural attenuation indicator results from the current event. Figure 6 shows the current event contaminant analytical results and the inferred limits of the total petroleum hydrocarbons as gasoline (TPHg) groundwater plume. Appendix C contains the certified analytical laboratory report and chain-of-custody records for the current event. Appendix D contains a summary of historical groundwater and surface analytical results.

## CURRENT EVENT GROUNDWATER AND SURFACE WATER RESULTS

Current quarter site groundwater contaminant concentrations exceed their respective groundwater ESLs (for both cases in which the drinking water resource is and is not threatened)—with the exception of toluene and MTBE, which do not exceed their respective values for groundwater that is not a drinking source. Site groundwater contaminant concentrations also exceed all surface water screening levels, with the exception of toluene and MTBE.

Maximum or near maximum groundwater contaminant concentrations were detected in wells MW-7 (adjacent to the creek bed) and MW-8 (located approximately one half the distance between the former source area and the creek). Somewhat lower concentrations were detected in the farther downgradient well MW-9, and in well MW-11 downgradient of MW-8. The northern and southern edges of the plume in the downgradient area of the plume appear to be well defined by wells MW-4 and MW-10.

The surface water sample collected from location SW-2 had a detectable concentration of only toluene (1.1 µg/L), which does not exceed the established regulatory surface water screening levels.

## CURRENT EVENT NATURAL ATTENUATION PARAMETERS RESULTS

Pre-purge groundwater samples from selected wells were collected and analyzed for indicators of the natural biodegradation of the hydrocarbon contamination or "natural attenuation." Petroleum hydrocarbons require molecular oxygen to efficiently break down the ring structure of specific constituents. Although biodegradation of hydrocarbons can occur under anaerobic conditions,

## Table 2
## Groundwater and Surface Water Sample
## Analytical Results – March 18, 2004
## Redwood Regional Park Corporation Yard, Oakland, California

| Compound | Concentrations in µg/L | | | | | | |
|---|---|---|---|---|---|---|---|
| | TPHg | TPHd | Benzene | Toluene | Ethyl-benzene | Total Xylenes | MTBE |
| **GROUNDWATER SAMPLES** | | | | | | | |
| MW-2 | **374** | *<100* | **81** | **1.2** | **36** | **7.3** | **18** |
| MW-4 | *<50* | *<100* | *<0.3* | *<0.3* | *<0.3* | *<0.6* | *<5.0* |
| MW-7 | **8,170** | **600** | **104** | **41** | **306** | **129** | **84** |
| MW-8 | **16,000** | **900** | **592** | **24** | **1,060** | **1,870** | **90** |
| MW-9 | **3,550** | **600** | **122** | **15** | **313** | **84** | **35** |
| MW-10 | **94** | *<100* | **2.8** | *<0.3* | **5.7** | **7.0** | *<5.0* |
| MW-11 | **4,900** | **400** | **72** | **17** | **342** | **233** | **61** |
| **Groundwater ESLs** [a] | 100 / 500 | 100 / 640 | 1.0 / 46 | 40 / 130 | 30 / 290 | 13 / 13 | 5 / 1,800 |
| **REDWOOD CREEK SURFACE WATER SAMPLES** | | | | | | | |
| SW-2 | *<50* | *<100* | *<0.3* | *<0.3* | **1.1** | *<0.6* | *<5.0* |
| SW-3 | *<50* | *<100* | *<0.3* | *<0.3* | *<0.6* | *<0.6* | *<5.0* |
| **Surface Water Screening Levels** [a, b] | 500 | 100 | 46 | 130 | 290 | 13 | 8,000 |

Notes:

[a] RWQCB Environmental Screening Levels (drinking water resource threatened/not threatened) (RWQCB, 2003).

[b] Lowest of chronic and acute surface water criteria published by the State of California, U.S. Environmental Protection Agency, or U.S. Department of Energy.

MTBE = Methyl *tertiary*-butyl ether.

TPHg = Total petroleum hydrocarbons - gasoline range (equivalent to total volatile hydrocarbons – gasoline range).

TPHd = Total petroleum hydrocarbons - diesel range (equivalent to total extractable hydrocarbons – diesel range).

µg/L = Micrograms per liter, equivalent to parts per billion (ppb).

hydrocarbon biodegradation is greatest under aerobic conditions. As a result of the demonstrated degradability of petroleum hydrocarbons, remediation by natural attenuation has been found to be a viable option for addressing many hydrocarbon plumes, replacing the need for active remediation.

However, such natural attenuation only occurs if the concentration of hydrocarbons is low enough to facilitate the infiltration of natural oxygen through the interstitial space around the contamination, supporting the microorganisms for which the contamination is a food source (thus "attenuating" it). The concentration in soil or groundwater above which natural attenuation is unlikely to take place is still the subject of various research studies. In general, biodegradation of petroleum hydrocarbons in

**Table 3**
**Groundwater Sample Analytical Results**
**Natural Attenuation Indicators – March 18, 2004**
**Redwood Regional Park Corporation Yard, Oakland, California**

| Sample I.D. | Nitrate (as Nitrogen) (mg/L) | Sulfate (mg/L) | Dissolved Oxygen (mg/L) | Ferrous Iron (mg/L) | Redox Potential (milliVolts) |
|---|---|---|---|---|---|
| MW-1 | NA | NA | 2.7 | 0.1 | 101 |
| MW-2 | NA | NA | 2.5 | 0.0 | 149 |
| MW-3 | *<0.44* | 36 | 3.6 | 0.4 | 190 |
| MW-4 | 1.3 | 58 | 9.2 | 0.1 | 163 |
| MW-5 | NA | NA | 1.2 | 0.0 | 127 |
| MW-6 | NA | NA | 1.9 | 0.2 | 122 |
| MW-7 | *<0.44* | *<1.0* | 1.4 | 1.2 | 124 |
| MW-8 | *<0.44* | 13 | 2.0 | 2.6 | 122 |
| MW-9 | *<0.44* | 64 | 2.6 | 1.0 | 127 |
| MW-10 | 0.5 | 80 | 2.8 | 0.1 | 158 |
| MW-11 | *<0.44* | 42 | 1.8 | 2.2 | 120 |

Notes:

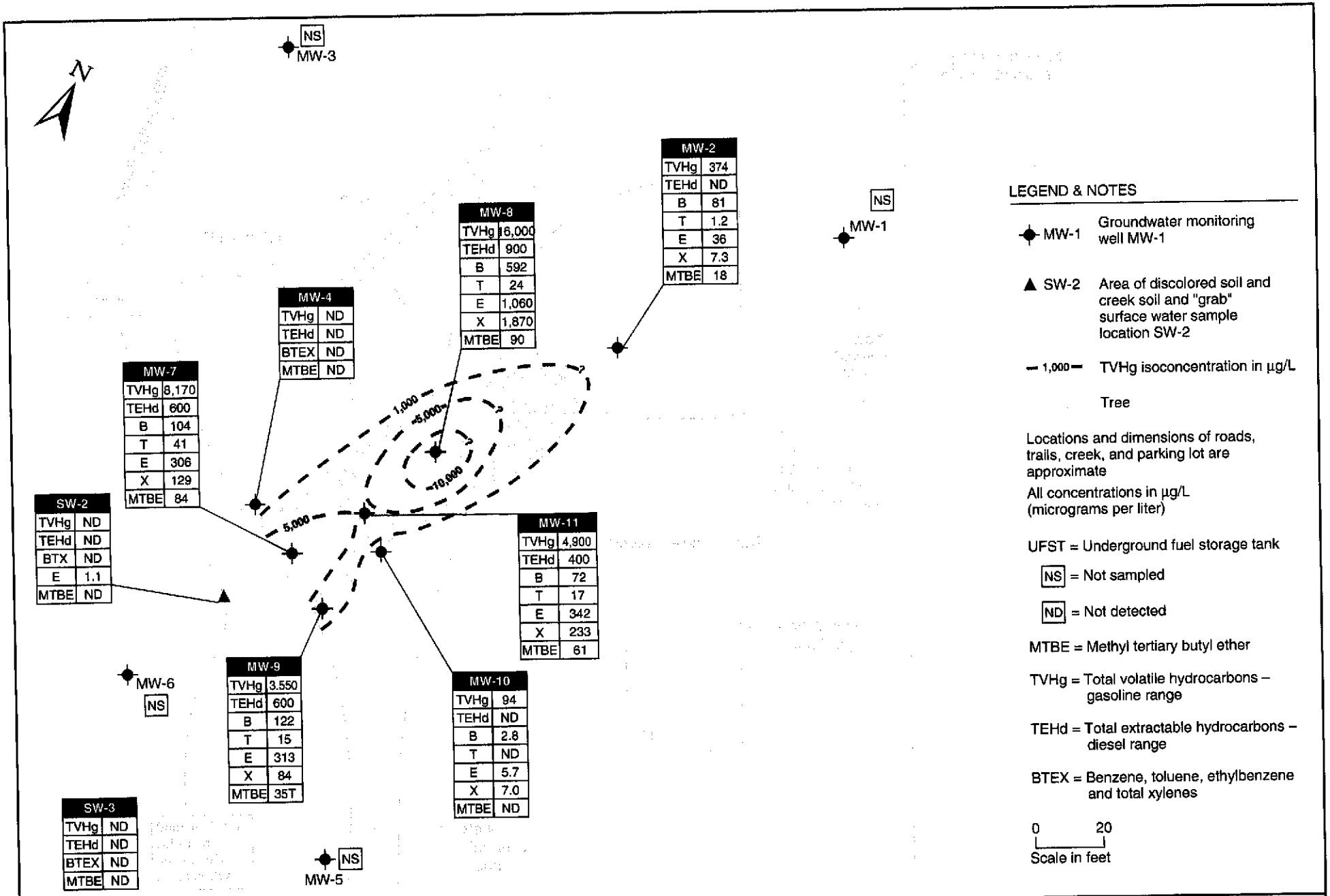
mg/L = Milligrams per liter, equivalent to parts per million (ppm).

NA = Not analyzed.

groundwater has a significant role in creating a stable plume and minimizing groundwater contaminant plume extent and concentrations over time. Evidence of the historical occurrence and potential for future occurrence of biodegradation can be obtained from analysis of groundwater for specific biodegradation-indicator parameters, including dissolved oxygen, oxidation-reduction potential (ORP), and general mineral analyses.

### Dissolved Oxygen

Dissolved oxygen (DO) is the most thermodynamically-favored electron acceptor used in aerobic biodegradation of hydrocarbons. Active aerobic biodegradation of petroleum hydrocarbon compounds requires at least 1 to 2 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.




LEGEND & NOTES

MW-1 Groundwater monitoring well MW-1

SW-2 Area of discolored soil and creek soil and "grab" surface water sample location SW-2

1,000 TVHg isoconcentration in µg/L

Tree

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

All concentrations in µg/L (micrograms per liter)

UFST = Underground fuel storage tank

NS = Not sampled

ND = Not detected

MTBE = Methyl tertiary butyl ether

TVHg = Total volatile hydrocarbons – gasoline range

TEHd = Total extractable hydrocarbons – diesel range

BTEX = Benzene, toluene, ethylbenzene and total xylenes

0 20
Scale in feet

Stellar Environmental Solutions, Inc.
Geoscience & Engineering Consulting

**ANALYTICAL RESULTS AND GASOLINE PLUME—MARCH 2004**
**Redwood Regional Park Service Yard, Oakland, CA**

**Figure 6**

by: MJC | APRIL 2004

2003-02-36

Current monitoring event DO concentrations ranged from 1.2 mg/L to 3.6 mg/L, with one well (MW-4) at 9.2 mg/L. The elevated DO concentration in this well may be a function of localized supersaturation resulting from the previous ORC™ injection. There was no clear correlation between DO and hydrocarbon concentrations in the current event; however, in general, monitoring wells upgradient and crossgradient of the plume had higher DO concentrations than monitoring wells within and downgradient of the plume. This trend is to be expected when oxygen is currently limiting hydrocarbon biodegradation.

**Oxidation-Reduction Potential**

The oxidation-reduction potential (ORP, or redox potential) of groundwater is a measure of electron activity, and is an indicator of the relative tendency of a solute species to gain or lose electrons. The ORP of groundwater generally ranges from -400 millivolts (mV) to +800 mV. In oxidizing (aerobic) conditions, the ORP of groundwater is typically positive; in reducing (anaerobic) conditions, the ORP is typically negative (or less positive). Therefore, groundwater ORP values inside a hydrocarbon plume are typically less than those measured outside the plume.

For this monitoring event, for the four monitoring wells within the 1,000-µg/L TPHg contour (MW-7, MW-8, MW-9, and MW-11) (see Figure 6), ORP values ranged from +120 mV to +127 mV. Other monitoring wells showed positive ORP values ranging from +101 mV to +190 mV. The ORP values did not exhibit the expected general inverse correlation with hydrocarbon concentrations during this event relative to previous events.

**General Mineral Analyses**

An inverse relationship between general minerals—including ferrous iron, nitrate, and sulfate—and hydrocarbon concentrations is indicative of the occurrence of anaerobic biodegradation. Specifically, anaerobic degradation of hydrocarbon compounds is indicated when DO concentrations are low (less than 1.0 mg/L), ORP is low (less than 50 mV), and general mineral concentrations are below background.

In the current site monitoring event, for the four wells within the 1,000-µg/L TPHg contour, nitrate concentrations was not detected and ferrous iron concentrations were generally higher than for other monitoring wells. These results indicate that some degree of anaerobic degradation is likely occurring within the plume. The results are also consistent with the DO and ORP data, supporting the conclusion that oxygen is currently limiting the more efficient aerobic biodegradation process. Sulfate concentration showed no discernable trend, indicating that anaerobic biodegradation is probably within the iron-reducing redox environment rather than the sulfate-reducing environment.

## QUALITY CONTROL SAMPLE ANALYTICAL RESULTS

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

# 6.0 SUMMARY, CONCLUSIONS AND PROPOSED ACTIONS

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

## SUMMARY AND CONCLUSIONS

- Groundwater sampling has been conducted approximately on a quarterly basis since November 1994 (29 events in the original wells). The existing well layout fully constrains the lateral extent of groundwater contamination, and the vertical (lowest) limit is very likely the top of the siltstone bedrock. The saturated interval extends approximately 12 to 15 feet from top of bedrock upward through the capillary fringe.

- Current site groundwater contaminant concentrations exceed their respective groundwater ESLs (both for cases in which the drinking water resource is and is not threatened)—with the exception of toluene and MTBE, which exceed only the more conservative criterion. Site groundwater contaminant concentrations also exceed all surface water screening levels, with the exception of toluene and MTBE.

- Historical monitoring data indicate that the groundwater contaminant plume has become disconnected from the former source, and has migrated well beyond the former source area (represented by well MW-2) toward Redwood Creek. The area of groundwater contamination in excess of screening level criteria appears to be no greater than 100 feet long by 40 feet wide, significantly less than the area of contamination that existed prior to the ORC™ injections. Maximum groundwater concentrations for the majority of the contaminants have reached the most downgradient wells (just upgradient of the creek), and the plume appears to have stabilized (maximum site contaminant concentrations have not increased in recent sampling events).

- The only contaminant detected in the current event site surface water (creek samples) was toluene; however, the detected contaminant concentration is not above the established regulatory surface water screening levels.

- Hydrochemical (contaminant and natural attenuation parameter) trends indicate that the two ORC™ injection phases (in September 2001 and July 2002) were generally successful in increasing DO levels and reducing groundwater contaminant concentrations, but additional seasonal dissolved phase hydrocarbon input eventually causes contaminant concentrations

within the centerline of the plume to rebound. Residual groundwater concentrations exceed groundwater and surface water screening-level criteria, and the active life of the previously-injected ORC™ product has been exceeded.

- Evaluation of the bedrock surface in the contaminant plume area shows local topographic elongate depressions and ridges roughly perpendicular to the general gradient, that are likely paleochannels parallel to the current course of Redwood Creek. Such depressions can influence the Site Conceptual Model (SCM) as regards both site-specific hydrology and hydrochemistry and will be important considerations if groundwater-specific corrective actions are contemplated in the future.
- As discussed in detail in our previous 2003 Annual Summary Report, the available data indicate that continued contaminant mass input is occurring within the centerline portions of the plume and potentially from sources upgradient of MW-8, possibly from residual light non-aqueous phase liquid in the capillary fringe/unsaturated zone. Any additional corrective action to prevent contaminated groundwater discharge to Redwood Creek would need to address the potential sources of continuing mass input to the plume. The exploratory borehole program conducted in September 2003 confirmed that unsaturated zone residual soil contamination is a primary source of continued groundwater contamination.
- The purge water storage tank containing 825 gallons of water from previous sampling events was struck by a vehicle and damaged with the result that approximately 125 gallons of low-level fuel-contaminated water was released to the ground surface (asphalt under the tank and open ground within 2 feet of the tank). The remaining water in the tank was transferred to a new tank. We consider that this release has had no significant adverse impact on the environment.

## PROPOSED ACTIONS

The EBRPD proposes to implement the following actions to address regulatory concerns:

- Continue the quarterly program of creek and groundwater sampling and reporting; and
- Implement the proposed bioventing pilot test and prepare a full-scale system design, when approved by ACHCSA.

# 7.0 REFERENCES AND BIBLIOGRAPHY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# 8.0 LIMITATIONS

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 provides neither a certification nor guarantee that the property is free of hazardous substance contamination. This report has been prepared in accordance with generally accepted methodologies and standards of practice. The SES personnel who performed this limited remedial investigation 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 the investigation and remediation completed.

# 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TOC Elevation | 565.90 | 566.50 | 560.90 | 548.10 | 547.50 | 545.60 | 547.70 | 549.20 | 549.40 | 547.30 | 547.90 |
| Date Monitored | Groundwater Elevations (feet above mean sea level) | | | | | | | | | | |
| September 18, 1998 | 563.72 | 544.19 | 540.80 | 534.51 | 531.06 | 545.60 | | | | | |
| April 6, 1999 | 565.15 | 546.90 | 542.25 | 535.59 | 532.30 | 532.88 | | | | | |
| December 20, 1999 | 562.90 | 544.70 | 541.46 | 534.89 | 531.16 | 532.22 | | | | | |
| September 28, 2000 | 562.80 | 542.74 | 538.34 | 532.21 | 530.90 | 531.95 | | | | | |
| January 11, 2001 | 562.90 | 545.10 | 541.70 | 535.00 | 531.20 | 532.30 | 534.90 | 538.10 | | | |
| April 13, 2001 | 562.10 | 545.70 | 541.70 | 535.10 | 531.50 | 532.40 | 535.30 | 539.80 | | | |
| September 1, 2001 | 560.90 | 542.00 | 537.70 | 533.90 | 530.70 | 531.80 | 534.00 | 535.60 | | | |
| December 17, 2001 | 562.20 | 545.20 | 542.20 | 534.80 | 531.40 | 532.40 | 534.80 | 538.40 | 534.60 | 535.70 | 535.20 |
| March 14, 2002 | 563.00 | 547.10 | 542.20 | 535.50 | 532.40 | 533.30 | 535.70 | 541.80 | 535.00 | 537.60 | 536.60 |
| June 18, 2002 | 562.10 | 544.70 | 541.10 | 534.60 | 531.20 | 532.20 | 534.80 | 537.90 | 534.70 | 535.60 | 535.30 |
| September 24, 2002 | 561.40 | 542.20 | 537.30 | 533.50 | 530.60 | 531.80 | 533.50 | 535.50 | 535.30 | 533.80 | 531.70 |
| December 18, 2002 | 562.40 | 545.00 | 542.00 | 534.80 | 531.50 | 532.50 | 534.60 | 537.10 | 536.50 | 535.20 | 532.80 |
| March 27, 2003 | 562.60 | 545.70 | 541.70 | 534.80 | 531.60 | 532.40 | 535.10 | 539.90 | 537.20 | 536.20 | 533.60 |
| June 19, 2003 | 562.30 | 544.90 | 541.50 | 534.80 | 531.30 | 532.30 | 534.90 | 538.20 | 536.90 | 535.70 | 533.20 |
| September 10, 2003 | 561.60 | 542.10 | 537.90 | 533.80 | 530.80 | 531.90 | 533.70 | 535.60 | 535.60 | 534.10 | 531.90 |
| December 10, 2003 | 562.40 | 542.70 | 537.60 | 533.70 | 530.90 | 531.90 | 533.70 | 535.20 | 535.50 | 533.80 | 531.70 |
| March 18, 2004 | 563.10 | 546.60 | 541.90 | 535.00 | 531.70 | 532.40 | 535.20 | 540.90 | 537.40 | 536.60 | 533.80 |

Notes:

TOC = Top of well Casing

# WELLHEAD INSPECTION CHECKLIST



Client Stellar Date 3/18/04

Site Address Redwood Regional Park Oakland

Job Number 040318-AC1 Technician AC

| 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 | X | | | | | | | |
| MW-4 | X | | | | | | | |
| MW-7 | X | | | | | | | |
| MW-8 | | X | | | | | | |
| MW-9 | X | | | | | | | |
| MW-10 | X | | | | | | | |
| MW-11 | X | | | | | | | |
| MW-1 | X | | | | | | | |
| MW-3 | X | | | | | | | |
| MW-5 | X | | | | | | | |
| MW-6 | X | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

NOTES:

# WELL GAUGING DATA

Project # 040318-AC1 Date 3/18/04 Client Stellar

Site Redwood Regional Park, Oakland

| Well ID | Well Size (in.) | Sheen / Odor | Depth to Immiscible Liquid (ft.) | Thickness of Immiscible Liquid (ft.) | Volume of Immiscibles Removed (ml) | Depth to water (ft.) | Depth to well bottom (ft.) | Survey Point: TOB or TOC | |
|---|---|---|---|---|---|---|---|---|---|
| MW-1 | 4 | | | | | 2.76 | 19.15 | TOC | |
| MW-2 | 4 | | | | | 19.88 | 38.95 | | P |
| MW-3 | 4 | | | | | 19.02 | 45.13 | | |
| MW-4 | 4 | | | | | 13.15 | 26.45 | | P |
| MW-5 | 4 | | | | | 15.85 | 27.05 | | |
| MW-6 | 4 | | | | | 13.19 | 27.50 | | |
| MW-7 | 2 | | | | | 12.50 | 25.43 | | P |
| MW-8 | 2 | | | | | 8.27 | 22.26 | | P |
| MW-9 | 2 | | | | | 12.00 | 26.30 | | P |
| MW-10 | 2 | | | | | 10.76 | 28.40 | | P |
| MW-11 | 2 | | | | | 14.10 | 30.30 | ↓ | P |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

# WELL MONITORING DATA SHEET

| | |
|---|---|
| Project #: 040318-Ac1 | Client: Stellar |
| Sampler: Ac | Start Date: 3/18/04 |
| Well I.D.: MW-1 | Well Diameter: 2 3 (4) 6 8 ____ |
| Total Well Depth: 19.15 | Depth to Water: 2.76 |
| Before: After: | Before: After: |
| Depth to Free Product: | Thickness of Free Product (feet): |
| Referenced to: (PVC) Grade | D.O. Meter (if req'd): (YSI) HACH |

Purge Method:
- Bailer
- Disposable Bailer
- Middleburg
- Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other_____

Sampling Method: Bailer
- (Disposable Bailer)
- Extraction Port
- Dedicated Tubing
- Other: _____

Field Analysis
_____(Gals.) X _____ = _____
Gals.

| Well Diameter | Multiplier | Well Diameter | Multiplier |
|---|---|---|---|
| 1" | 0.04 | 4" | 0.65 |
| 2" | 0.16 | 6" | 1.47 |
| 3" | 0.37 | Other | radius$^2$ * 0.163 |

| Time | Temp. (°F or °C) | pH | Conductivity (mS or µS) | Turbidity (NTU) | Gals. Removed | Observations |
|---|---|---|---|---|---|---|
| 1030 | — | — | — | — | — | $Fe^{2+}$: 0.1 mg/L |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Did well dewater? Yes No — Gallons actually evacuated:

Sampling Time: — Sampling Date: 3/18/04

Sample I.D.: MW-1 — Laboratory: Associated

Analyzed for: ~~TPH-G~~ ~~BTEX~~ ~~MTBE~~ ~~TPH-D~~ (Ac) — Other: Nitrate/Sulfate (Ac)

Equipment Blank I.D.: @ Time — Duplicate I.D.:

Analyzed for: TPH-G BTEX MTBE TPH-D — Other:

| | | | | | |
|---|---|---|---|---|---|
| D.O. (if req'd): | (Pre-purge): | 2.7 mg/L | Post-purge: | | mg/L |
| ORP (if req'd): | (Pre-purge): | 101 mV | Post-purge: | | mV |

# WELL MONITORING DATA SHEET

| | |
|---|---|
| Project #: 040318-Ac1 | Client: Stellar |
| Sampler: Ac | Start Date: 3/18/04 |
| Well I.D.: MW-2 | Well Diameter: 2 3 (4) 6 8 ____ |
| Total Well Depth: 38.95 | Depth to Water: 19.88 |
| Before: After: | Before: After: |
| Depth to Free Product: | Thickness of Free Product (feet): |
| Referenced to: (PVC) Grade | D.O. Meter (if req'd): (YSI) HACH |

Purge Method:
- Bailer
- Disposable Bailer
- Middleburg
- (Electric Submersible)
- Waterra
- Peristaltic
- Extraction Pump
- Other_____

Sampling Method: Bailer
- (Disposable Bailer)
- Extraction Port
- Dedicated Tubing
- Other: _____

| Well Diameter | Multiplier | Well Diameter | Multiplier |
|---|---|---|---|
| 1" | 0.04 | 4" | 0.65 |
| 2" | 0.16 | 6" | 1.47 |
| 3" | 0.37 | Other | radius² * 0.163 |

12.5 (Gals.) X 3 = 37.5 Gals.

| Time | Temp. (°F or °C) | pH | Conductivity (mS or (µS)) | Turbidity (NTU) | Gals. Removed | Observations |
|---|---|---|---|---|---|---|
| 1122 | 66.5 | 7.7 | 857 | 111 | 12.5 | $Fe^{2+}$: 0.0 mg/L |
| 1125 | 63.5 | 7.4 | 880 | 86 | 25 | |
| 1128 | 63.6 | 7.4 | 879 | 69 | 37.5 | |
| | | | | | | |
| | | | | | | |

Did well dewater? Yes (No) Gallons actually evacuated: 37.5

Sampling Time: 1135 Sampling Date: 3/18/04

Sample I.D.: MW-2 Laboratory: Associated

Analyzed for: (TPH-G) (BTEX) (MTBE) (TPH-D) Other: ~~Nitrate/Sulfate~~ Ac

Equipment Blank I.D.: @ Time Duplicate I.D.:

Analyzed for: TPH-G BTEX MTBE TPH-D Other:

| | | | | | |
|---|---|---|---|---|---|
| D.O. (if req'd): | (Pre-purge): | 2.5 mg/L | Post-purge: | | mg/L |
| ORP (if req'd): | (Pre-purge): | 149 mV | Post-purge: | | mV |

# WELL MONITORING DATA SHEET

| | |
|---|---|
| Project #: 040318-Ac1 | Client: Stellar |
| Sampler: Ac | Start Date: 3/18/04 |
| Well I.D.: MW-3 | Well Diameter: 2 3 (4) 6 8 ____ |
| Total Well Depth: 45.13 | Depth to Water: 19.02 |
| Before: After: | Before: After: |
| Depth to Free Product: | Thickness of Free Product (feet): |
| Referenced to: (PVC) Grade | D.O. Meter (if req'd): (YSI) HACH |

Purge Method:
- Bailer
- Disposable Bailer
- Middleburg
- Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other_____

Sampling Method: Bailer
- (Disposable Bailer)
- Extraction Port
- Dedicated Tubing
- Other: _____

Field Analysis

_____(Gals.) X _____ = _____
Gals.

| Well Diameter | Multiplier | Well Diameter | Multiplier |
|---|---|---|---|
| 1" | 0.04 | 4" | 0.65 |
| 2" | 0.16 | 6" | 1.47 |
| 3" | 0.37 | Other | radius$^2$ * 0.163 |

| Time | Temp. (°F or °C) | pH | Conductivity (mS or µS) | Turbidity (NTU) | Gals. Removed | Observations |
|---|---|---|---|---|---|---|
| 0815 | — | — | — | — | — | $Fe^{2+}$: 0.4 mg/L |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

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

Sampling Time: 0815 Sampling Date: 3/18/04

Sample I.D.: MW-3 Laboratory: Associated

Analyzed for: ~~TPH-G~~ ~~BTEX~~ ~~MTBE~~ ~~TPH-D~~ (Ac) Other: Nitrate/Sulfate

Equipment Blank I.D.: @ Time Duplicate I.D.:

Analyzed for: TPH-G BTEX MTBE TPH-D Other:

| | | | | | |
|---|---|---|---|---|---|
| D.O. (if req'd): | (Pre-purge): | 3.6 | mg/L | Post-purge: | mg/L |
| ORP (if req'd): | (Pre-purge): | 190 | mV | Post-purge: | mV |

# WELL MONITORING DATA SHEET

| | |
|---|---|
| Project #: 040318-Ac1 | Client: Stellar |
| Sampler: Ac | Start Date: 3/18/04 |
| Well I.D.: MW-4 | Well Diameter: 2 3 (4) 6 8 ____ |
| Total Well Depth: 26.45 | Depth to Water: 13.15 |
| Before: After: | Before: After: |
| Depth to Free Product: | Thickness of Free Product (feet): |
| Referenced to: (PVC) Grade | D.O. Meter (if req'd): (YSI) HACH |

Purge Method:
- Bailer
- Disposable Bailer
- Middleburg
- (Electric Submersible)
- Waterra
- Peristaltic
- Extraction Pump
- Other_____

Sampling Method: Bailer
- (Disposable Bailer)
- Extraction Port
- Dedicated Tubing
- Other: _____

9 (Gals.) X 3 = 27 Gals.

| Well Diameter | Multiplier | Well Diameter | Multiplier |
|---|---|---|---|
| 1" | 0.04 | 4" | 0.65 |
| 2" | 0.16 | 6" | 1.47 |
| 3" | 0.37 | Other | radius² * 0.163 |

| Time | Temp. (°F or °C) | pH | Conductivity (mS or µS) | Turbidity (NTU) | Gals. Removed | Observations |
|---|---|---|---|---|---|---|
| 1036 | 63.3 | 8.6 | 787 | 60 | 9 | $Fe^{2+}$: 0.1 mg/L |
| | Well dewatered @ | | | | 13 gal | DTW = 24.89 |
| 1045 | 61.6 | 8.8 | 760 | 65 | — | DTW = 15.68 |
| | | | | | | |
| | | | | | | |

Did well dewater? (Yes) No — Gallons actually evacuated: 13

Sampling Time: 1045 — Sampling Date: 3/18/04

Sample I.D.: MW-4 — Laboratory: Associated

Analyzed for: (TPH-G) (BTEX) (MTBE) (TPH-D) — Other: Nitrate/Sulfate

Equipment Blank I.D.: @ Time — Duplicate I.D.:

Analyzed for: TPH-G BTEX MTBE TPH-D — Other:

| | | | | |
|---|---|---|---|---|
| D.O. (if req'd): | (Pre-purge): | 9.2 mg/L | Post-purge: | mg/L |
| ORP (if req'd): | (Pre-purge): | 163 mV | Post-purge: | mV |

# WELL MONITORING DATA SHEET

| | |
|---|---|
| Project #: 040318-Ac1 | Client: Stellar |
| Sampler: Ac | Start Date: 3/18/04 |
| Well I.D.: MW-5 | Well Diameter: 2 3 (4) 6 8 ___ |
| Total Well Depth: 27.05 | Depth to Water: 15.85 |
| Before: After: | Before: After: |
| Depth to Free Product: | Thickness of Free Product (feet): |
| Referenced to: (PVC) Grade | D.O. Meter (if req'd): (YSI) HACH |

Purge Method:

- Bailer
- Disposable Bailer
- Middleburg
- Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other_____

Sampling Method: Bailer

- (Disposable Bailer)
- Extraction Port
- Dedicated Tubing
- Other: _____

Field Analysis
_____(Gals.) X _____ = _____
Gals.

| Well Diameter | Multiplier | Well Diameter | Multiplier |
|---|---|---|---|
| 1" | 0.04 | 4" | 0.65 |
| 2" | 0.16 | 6" | 1.47 |
| 3" | 0.37 | Other | radius$^2$ * 0.163 |

| Time | Temp. (°F or °C) | pH | Conductivity (mS or µS) | Turbidity (NTU) | Gals. Removed | Observations |
|---|---|---|---|---|---|---|
| 1015 | — | — | — | — | — | $Fe^{2+}$: 0.0 mg/L |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Did well dewater? Yes No Gallons actually evacuated:

Sampling Time: Sampling Date: 3/18/04

Sample I.D.: MW-5 Laboratory: Associated

Analyzed for: ~~TPH-G~~ ~~BTEX~~ ~~MTBE~~ ~~TPH-D~~ (Ac) Other: ~~Nitrate/Sulfate~~ (Ac)

Equipment Blank I.D.: @ Time Duplicate I.D.:

Analyzed for: TPH-G BTEX MTBE TPH-D Other:

| | | | | | |
|---|---|---|---|---|---|
| D.O. (if req'd): | (Pre-purge): | 1.2 mg/L | Post-purge: | | mg/L |
| ORP (if req'd): | (Pre-purge): | 127 mV | Post-purge: | | mV |

# WELL MONITORING DATA SHEET

| | |
|---|---|
| Project #: 040318-Ac1 | Client: Stellar |
| Sampler: Ac | Start Date: 3/18/04 |
| Well I.D.: MW-6 | Well Diameter: 2 3 (4) 6 8 ____ |
| Total Well Depth: 27.50 | Depth to Water: 13.19 |
| Before: After: | Before: After: |
| Depth to Free Product: | Thickness of Free Product (feet): |
| Referenced to: (PVC) Grade | D.O. Meter (if req'd): (YSI) HACH |

Purge Method:

- Bailer
- Disposable Bailer
- Middleburg
- Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other_____

Sampling Method: Bailer

- (Disposable Bailer)
- Extraction Port
- Dedicated Tubing
- Other: _____

Field Analysis _____(Gals.) X _____ = _____ Gals.

| Well Diameter | Multiplier | Well Diameter | Multiplier |
|---|---|---|---|
| 1" | 0.04 | 4" | 0.65 |
| 2" | 0.16 | 6" | 1.47 |
| 3" | 0.37 | Other | radius² * 0.163 |

| Time | Temp. (°F or °C) | pH | Conductivity (mS or µS) | Turbidity (NTU) | Gals. Removed | Observations |
|---|---|---|---|---|---|---|
| 1000 | — | — | — | — | — | $Fe^{2+}$: 0.2 mg/L |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Did well dewater? Yes No Gallons actually evacuated:

Sampling Time: Sampling Date: 3/18/04

Sample I.D.: MW-6 Laboratory: Associated

Analyzed for: ~~TPH-G~~ ~~BTEX~~ ~~MTBE~~ (Ac) ~~TPH-D~~ Other: ~~Nitrate/Sulfate~~ Ac

Equipment Blank I.D.: @ Time Duplicate I.D.:

Analyzed for: TPH-G BTEX MTBE TPH-D Other:

| | | | | |
|---|---|---|---|---|
| D.O. (if req'd): | (Pre-purge): | 1.9 mg/L | Post-purge: | mg/L |
| ORP (if req'd): | (Pre-purge): | 122 mV | Post-purge: | mV |

# WELL MONITORING DATA SHEET

| | |
|---|---|
| Project #: 040318-Ac1 | Client: Stellar |
| Sampler: Ac | Start Date: 3/18/04 |
| Well I.D.: MW-7 | Well Diameter: (2) 3 4 6 8 ___ |
| Total Well Depth: 25.43 | Depth to Water: 12.50 |
| Before: After: | Before: After: |
| Depth to Free Product: | Thickness of Free Product (feet): |
| Referenced to: (PVC) Grade | D.O. Meter (if req'd): (YSI) HACH |

Purge Method:

Bailer
(Disposable Bailer)
Middleburg
Electric Submersible
Waterra
Peristaltic
Extraction Pump
Other_____

Sampling Method: Bailer
(Disposable Bailer)
Extraction Port
Dedicated Tubing
Other: _____

| Well Diameter | Multiplier | Well Diameter | Multiplier |
|---|---|---|---|
| 1" | 0.04 | 4" | 0.65 |
| 2" | 0.16 | 6" | 1.47 |
| 3" | 0.37 | Other | radius² * 0.163 |

2 (Gals.) X 3 = 6 Gals.

| Time | Temp. (°F or °C) | pH | Conductivity (mS or (µS)) | Turbidity (NTU) | Gals. Removed | Observations |
|---|---|---|---|---|---|---|
| 1234 | 64.8 | 7.1 | 895 | 36 | 2 | $Fe^{2+}$: 1.2 mg/L |
| 1236 | 64.3 | 7.1 | 864 | 51 | 4 | odor |
| 1238 | 64.3 | 7.0 | 880 | 47 | 6 | odor |
| | | | | | | |
| | | | | | | |

Did well dewater? Yes (No) Gallons actually evacuated: 6

Sampling Time: 1240 Sampling Date: 3/18/04

Sample I.D.: MW-7 Laboratory: Associated

Analyzed for: (TPH-G) (BTEX) (MTBE) (TPH-D) Other: Nitrate/Sulfate

Equipment Blank I.D.: @ Time Duplicate I.D.:

Analyzed for: TPH-G BTEX MTBE TPH-D Other:

| | | | | | |
|---|---|---|---|---|---|
| D.O. (if req'd): | (Pre-purge): | 1.4 mg/L | Post-purge: | | mg/L |
| ORP (if req'd): | (Pre-purge): | 124 mV | Post-purge: | | mV |

# WELL MONITORING DATA SHEET

| | |
|---|---|
| Project #: 040318-AC1 | Client: Stellar |
| Sampler: AC | Start Date: 3/18/04 |
| Well I.D.: MW-8 | Well Diameter: (2) 3 4 6 8 ___ |
| Total Well Depth: 27.26 | Depth to Water: 8.27 |
| Before: After: | Before: After: |
| Depth to Free Product: | Thickness of Free Product (feet): |
| Referenced to: (PVC) Grade | D.O. Meter (if req'd): (YSI) HACH |

Purge Method:
- Bailer
- (Disposable Bailer)
- Middleburg
- Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other_____

Sampling Method: Bailer
- (Disposable Bailer)
- Extraction Port
- Dedicated Tubing
- Other: _____

| Well Diameter | Multiplier | Well Diameter | Multiplier |
|---|---|---|---|
| 1" | 0.04 | 4" | 0.65 |
| 2" | 0.16 | 6" | 1.47 |
| 3" | 0.37 | Other | radius² * 0.163 |

2.25 (Gals.) X 3 = 6.75 Gals.

| Time | Temp. (°F or °C) | pH | Conductivity (mS or µS) | Turbidity (NTU) | Gals. Removed | Observations |
|---|---|---|---|---|---|---|
| 1146 | 65.1 | 7.3 | 1768 | 265 | 2.25 | $Fe^{2+}$: 2.6 mg/L |
| 1149 | 64.8 | 7.1 | 1739 | 295 | 4.5 | odor |
| 1152 | 64.0 | 7.1 | 1754 | 371 | 6.75 | odor |
| | | | | | | |
| | | | | | | |

Did well dewater? Yes (No) Gallons actually evacuated: 6.75

Sampling Time: 1200 Sampling Date: 3/18/04

Sample I.D.: MW-8 Laboratory: Associated

Analyzed for: (TPH-G) (BTEX) (MTBE) (TPH-D) Other: Nitrate/Sulfate

Equipment Blank I.D.: @ Time Duplicate I.D.:

Analyzed for: TPH-G BTEX MTBE TPH-D Other:

| | | | | |
|---|---|---|---|---|
| D.O. (if req'd): | (Pre-purge): | 2.0 mg/L | Post-purge: | mg/L |
| ORP (if req'd): | (Pre-purge): | 122 mV | Post-purge: | mV |

# WELL MONITORING DATA SHEET

| | |
|---|---|
| Project #: 040318-Ac1 | Client: Stellar |
| Sampler: Ac | Start Date: 3/18/04 |
| Well I.D.: MW-9 | Well Diameter: (2) 3 4 6 8 ____ |
| Total Well Depth: 26.30 | Depth to Water: 12.00 |
| Before: After: | Before: After: |
| Depth to Free Product: | Thickness of Free Product (feet): |
| Referenced to: (PVC) Grade | D.O. Meter (if req'd): (YSI) HACH |

Purge Method:

Bailer
(Disposable Bailer)
Middleburg
Electric Submersible
Waterra
Peristaltic
Extraction Pump
Other_____

Sampling Method: Bailer
(Disposable Bailer)
Extraction Port
Dedicated Tubing
Other: _____

| Well Diameter | Multiplier | Well Diameter | Multiplier |
|---|---|---|---|
| 1" | 0.04 | 4" | 0.65 |
| 2" | 0.16 | 6" | 1.47 |
| 3" | 0.37 | Other | radius$^2$ * 0.163 |

2.25 (Gals.) X 3 = 6.75 Gals.

| Time | Temp. (°F or °C) | pH | Conductivity (mS or (µS)) | Turbidity (NTU) | Gals. Removed | Observations |
|---|---|---|---|---|---|---|
| 1209 | 64.8 | 7.2 | 899 | 68 | 2.25 | $Fe^{2+}$: 1.0 mg/L |
| 1213 | 64.7 | 7.1 | 870 | 107 | 4.5 | |
| 1217 | 66.1 | 7.2 | 868 | 74 | 6.75 | odor |
| | | | | | | |
| | | | | | | |

Did well dewater? Yes (No) Gallons actually evacuated: 6.75

Sampling Time: 1225 Sampling Date: 3/18/04

Sample I.D.: MW-9 Laboratory: Associated

Analyzed for: (TPH-G) (BTEX) (MTBE) (TPH-D) Other: Nitrate/Sulfate

Equipment Blank I.D.: @ Time Duplicate I.D.:

Analyzed for: TPH-G BTEX MTBE TPH-D Other:

| | | | | | |
|---|---|---|---|---|---|
| D.O. (if req'd): | (Pre-purge): | 2.6 mg/L | Post-purge: | | mg/L |
| ORP (if req'd): | (Pre-purge): | 127 mV | Post-purge: | | mV |

# WELL MONITORING DATA SHEET

| | |
|---|---|
| Project #: 040318-Ac1 | Client: Stellar |
| Sampler: Ac | Start Date: 3/18/04 |
| Well I.D.: MW-10 | Well Diameter: (2) 3 4 6 8 ____ |
| Total Well Depth: 28.40 | Depth to Water: 10.76 |
| Before: After: | Before: After: |
| Depth to Free Product: | Thickness of Free Product (feet): |
| Referenced to: (PVC) Grade | D.O. Meter (if req'd): (YSI) HACH |

Purge Method:
- Bailer
- (Disposable Bailer)
- Middleburg
- Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other_____

Sampling Method: Bailer
- (Disposable Bailer)
- Extraction Port
- Dedicated Tubing
- Other: _____

3 (Gals.) X 3 = 9 Gals.

| Well Diameter | Multiplier | Well Diameter | Multiplier |
|---|---|---|---|
| 1" | 0.04 | 4" | 0.65 |
| 2" | 0.16 | 6" | 1.47 |
| 3" | 0.37 | Other | radius² * 0.163 |

| Time | Temp. (°F or °C) | pH | Conductivity (mS or (µS)) | Turbidity (NTU) | Gals. Removed | Observations |
|---|---|---|---|---|---|---|
| 1055 | 68.7 | 8.6 | 709 | 189 | 3 | $Fe^{2+}$: 0.1 mg/L |
| 1059 | 69.3 | 8.6 | 712 | 266 | 6 | |
| 1103 | 69.4 | 8.7 | 682 | 370 | 9 | |
| | | | | | | |
| | | | | | | |

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

Sampling Time: 1110 Sampling Date: 3/18/04

Sample I.D.: MW-10 Laboratory: Associated

Analyzed for: (TPH-G) (BTEX) (MTBE) (TPH-D) Other: Nitrate/Sulfate

Equipment Blank I.D.: @ Time Duplicate I.D.:

Analyzed for: TPH-G BTEX MTBE TPH-D Other:

| | | | | |
|---|---|---|---|---|
| D.O. (if req'd): | (Pre-purge): | 2.8 mg/L | Post-purge: | mg/L |
| ORP (if req'd): | (Pre-purge): | 158 mV | Post-purge: | mV |

# WELL MONITORING DATA SHEET

| | |
|---|---|
| Project #: 040318-AC1 | Client: Stellar |
| Sampler: AC | Start Date: 3/18/04 |
| Well I.D.: MW-11 | Well Diameter: (2) 3 4 6 8 ____ |
| Total Well Depth: 30.30 | Depth to Water: 14.10 |
| Before: After: | Before: After: |
| Depth to Free Product: | Thickness of Free Product (feet): |
| Referenced to: (PVC) Grade | D.O. Meter (if req'd): (YSI) HACH |

Purge Method:

Bailer
(Disposable Bailer)
Middleburg
Electric Submersible
Waterra
Peristaltic
Extraction Pump
Other_____

Sampling Method: Bailer
(Disposable Bailer)
Extraction Port
Dedicated Tubing
Other: _____

| Well Diameter | Multiplier | Well Diameter | Multiplier |
|---|---|---|---|
| 1" | 0.04 | 4" | 0.65 |
| 2" | 0.16 | 6" | 1.47 |
| 3" | 0.37 | Other | radius$^2$ * 0.163 |

2.5 (Gals.) X 3 = 7.5 Gals.

| Time | Temp. (°F or °C) | pH | Conductivity (mS or µS) | Turbidity (NTU) | Gals. Removed | Observations |
|---|---|---|---|---|---|---|
| 1251 | 63.0 | 7.2 | 1076 | 108 | 2.5 | $Fe^{2+}$: 2.2 mg/L |
| 1254 | 63.4 | 7.1 | 938 | 79 | 5 | odor |
| 1258 | 63.2 | 7.2 | 904 | 62 | 7.5 | odor |
| | | | | | | |
| | | | | | | |

Did well dewater? Yes (No) Gallons actually evacuated: 7.5

Sampling Time: 1305 Sampling Date: 3/18/04

Sample I.D.: MW-11 Laboratory: Associated

Analyzed for: (TPH-G) (BTEX) (MTBE) (TPH-D) Other: Nitrate/Sulfate

Equipment Blank I.D.: @ Time Duplicate I.D.:

Analyzed for: TPH-G BTEX MTBE TPH-D Other:

| | | | | |
|---|---|---|---|---|
| D.O. (if req'd): | (Pre-purge): | 1.8 mg/L | Post-purge: | mg/L |
| ORP (if req'd): | (Pre-purge): | 120 mV | Post-purge: | mV |

**ASSOCIATED LABORATORIES**
806 North Batavia - Orange, California 92868 - 714/771-6900 FAX 714/538-1209

CLIENT Stellar Environmental Solutions (10503)
ATTN: Bruce Rucker
2198 Sixth Street
#201
Berkeley, CA 94710

LAB REQUEST 126423
REPORTED 03/29/2004
RECEIVED 03/19/2004

PROJECT #2004-04
Redwood Regional Park

SUBMITTER Client

COMMENTS

This laboratory request covers the following listed samples which were analyzed for the parameters indicated on the attached Analytical Result Report. All analyses were conducted using the appropriate methods as indicated on the report. This cover letter is an integral part of the final report.

| Order No. | Client Sample Identification |
|---|---|
| 506958 | SW-2 |
| 506959 | SW-3 |
| 506960 | MW-2 |
| 506961 | MW-3 |
| 506962 | MW-4 |
| 506963 | MW-7 |
| 506964 | MW-8 |
| 506965 | MW-9 |
| 506966 | MW-10 |
| 506967 | MW-11 |
| 506968 | Laboratory Method Blank |

Thank you for the opportunity to be of service to your company. Please feel free to call if there are any questions regarding this report or if we can be of further service.

ASSOCIATED LABORATORIES by,

Edward S. Behare, Ph.D.
Vice President

*NOTE: Unless notified in writing , all samples will be discarded by appropriate disposal protocol 30 days from date reported.*



*TESTING & CONSULTING*
*Chemical*
*Microbiological*
*Environmental*

**Order #:** 506958 **Client Sample ID:** SW-2

**Matrix:** WATER

**Date Sampled:** 03/18/2004
**Time Sampled:** 08:00

| Method | Analyte | Result | DF | EQL | MDL | Units | Date/Analyst |
|---|---|---|---|---|---|---|---|
| 8021B/AVO | Benzene | ND | 1 | 0.3 | 0.04 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Ethyl benzene | 1.1 | 1 | 0.3 | 0.02 | ug/L | 03/22/04 LZ |
| TPH-DHS | Gasoline | ND | 1 | 50 | 15 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Methyl t - butyl ether | ND | 1 | 5 | 0.03 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Toluene | ND | 1 | 0.3 | 0.02 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Xylene (total) | ND | 1 | 0.6 | 0.06 | ug/L | 03/22/04 LZ |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8021B/AVO | a,a,a-Trifluorotoluene | 93 | | | | % | 70 - 130 |
| TPH-DHS | a,a,a-Trifluorotoluene | 93 | | | | % | 55 - 200 |
| 8015 | TEPH Diesel | ND | 1 | 0.1 | 0.040 | mg/L | 03/28/04 AF |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8015 | o-Terphenyl (sur) | 111 | | | | % | 55 - 200 |

EQL = Estimated Quantitation Limit, MDL = Method detection limit, DF = Dilution Factor
ND = Not detected below indicated MDL, J=Trace, S=Surrogate Outside Control Limits

**Order #:** 506959 **Client Sample ID:** SW-3

**Matrix:** WATER

**Date Sampled:** 03/18/2004
**Time Sampled:** 08:25

| Method | Analyte | Result | DF | EQL | MDL | Units | Date/Analyst |
|---|---|---|---|---|---|---|---|
| 8021B/AVO | Benzene | ND | 1 | 0.3 | 0.04 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Ethyl benzene | ND | 1 | 0.3 | 0.02 | ug/L | 03/22/04 LZ |
| TPH-DHS | Gasoline | ND | 1 | 50 | 15 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Methyl t - butyl ether | ND | 1 | 5 | 0.03 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Toluene | ND | 1 | 0.3 | 0.02 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Xylene (total) | ND | 1 | 0.6 | 0.06 | ug/L | 03/22/04 LZ |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8021B/AVO | a,a,a-Trifluorotoluene | 92 | | | | % | 70 - 130 |
| TPH-DHS | a,a,a-Trifluorotoluene | 92 | | | | % | 55 - 200 |
| 8015 | TEPH Diesel | ND | 1 | 0.1 | 0.040 | mg/L | 03/28/04 AF |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8015 | o-Terphenyl (sur) | 115 | | | | % | 55 - 200 |

EQL = Estimated Quantitation Limit, MDL = Method detection limit, DF = Dilution Factor
ND = Not detected below indicated MDL, J=Trace, S=Surrogate Outside Control Limits

**Order #:** 506960 **Client Sample ID:** MW-2

**Matrix:** WATER

**Date Sampled:** 03/18/2004
**Time Sampled:** 11:35

| Method | Analyte | Result | DF | EQL | MDL | Units | Date/Analyst |
|---|---|---|---|---|---|---|---|
| 8021B/AVO | Benzene | 81 | 2 | 0.6 | 0.04 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Ethyl benzene | 36 | 1 | 0.3 | 0.02 | ug/L | 03/22/04 LZ |
| TPH-DHS | Gasoline | 374 | 1 | 50 | 15 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Methyl t - butyl ether | 18 | 1 | 5 | 0.03 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Toluene | 1.2 | 1 | 0.3 | 0.02 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Xylene (total) | 7.3 | 1 | 0.6 | 0.06 | ug/L | 03/22/04 LZ |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| TPH-DHS | a,a,a-Trifluorotoluene | 104 | | | | % | 55 - 200 |
| 8021B/AVO | a,a,a-Trifluorotoluene | 104 | | | | % | 70 - 130 |
| 8015 | TEPH Diesel | ND | 1 | 0.1 | 0.040 | mg/L | 03/28/04 AF |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8015 | o-Terphenyl (sur) | 111 | | | | % | 55 - 200 |

EQL = Estimated Quantitation Limit, MDL = Method detection limit, DF = Dilution Factor
ND = Not detected below indicated MDL, J=Trace, S=Surrogate Outside Control Limits

**Order #:** 506961 **Client Sample ID:** MW-3

**Matrix:** WATER

**Date Sampled:** 03/18/2004
**Time Sampled:** 08:15

| Method | Analyte | Result | DF | EQL | MDL | Units | Date/Analyst |
|---|---|---|---|---|---|---|---|
| 300.0 | Nitrate (as NO3) | ND | 1 | 0.44 | 0.19 | mg/L | 03/19/04 BGS |
| 300.0 | Sulfate | 36 | 1 | 1.0 | 0.34 | mg/L | 03/19/04 BGS |

EQL = Estimated Quantitation Limit, MDL = Method detection limit, DF = Dilution Factor
ND = Not detected below indicated MDL, J=Trace, S=Surrogate Outside Control Limits

**Order #:** 506962 **Client Sample ID:** MW-4

**Matrix:** WATER

**Date Sampled:** 03/18/2004
**Time Sampled:** 10:45

| Method | Analyte | Result | DF | EQL | MDL | Units | Date/Analyst |
|---|---|---|---|---|---|---|---|
| 300.0 | Nitrate (as NO3) | 1.3 | 1 | 0.44 | 0.19 | mg/L | 03/19/04 BGS |
| 300.0 | Sulfate | 58 | 1 | 1.0 | 0.34 | mg/L | 03/19/04 BGS |
| 8021B/AVO | Benzene | ND | 1 | 0.3 | 0.04 | ug/L | 03/23/04 LZ |
| 8021B/AVO | Ethyl benzene | ND | 1 | 0.3 | 0.02 | ug/L | 03/23/04 LZ |
| TPH-DHS | Gasoline | ND | 1 | 50 | 15 | ug/L | 03/23/04 LZ |
| 8021B/AVO | Methyl t - butyl ether | ND | 1 | 5 | 0.03 | ug/L | 03/23/04 LZ |
| 8021B/AVO | Toluene | ND | 1 | 0.3 | 0.02 | ug/L | 03/23/04 LZ |
| 8021B/AVO | Xylene (total) | ND | 1 | 0.6 | 0.06 | ug/L | 03/23/04 LZ |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8021B/AVO | a,a,a-Trifluorotoluene | 93 | | | | % | 70 - 130 |
| TPH-DHS | a,a,a-Trifluorotoluene | 93 | | | | % | 55 - 200 |
| 8015 | TEPH Diesel | ND | 1 | 0.1 | 0.040 | mg/L | 03/28/04 AF |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8015 | o-Terphenyl (sur) | 112 | | | | % | 55 - 200 |

EQL = Estimated Quantitation Limit, MDL = Method detection limit, DF = Dilution Factor
ND = Not detected below indicated MDL, J=Trace, S=Surrogate Outside Control Limits

**Order #:** 506963 **Client Sample ID:** MW-7

**Matrix:** WATER

**Date Sampled:** 03/18/2004
**Time Sampled:** 12:40

| Method | Analyte | Result | DF | EQL | MDL | Units | Date/Analyst |
|---|---|---|---|---|---|---|---|
| 300.0 | Nitrate (as NO3) | ND | 1 | 0.44 | 0.19 | mg/L | 03/19/04 BGS |
| 300.0 | Sulfate | ND | 1 | 1.0 | 0.34 | mg/L | 03/19/04 BGS |
| 8021B/AVO | Benzene | 104 | 5 | 1.5 | 0.04 | ug/L | 03/23/04 LZ |
| 8021B/AVO | Ethyl benzene | 306 | 50 | 15.0 | 0.02 | ug/L | 03/23/04 LZ |
| TPH-DHS | Gasoline | 8170 | 5 | 250.0 | 15 | ug/L | 03/23/04 LZ |
| 8021B/AVO | Methyl t - butyl ether | 84 | 5 | 25.0 | 0.03 | ug/L | 03/23/04 LZ |
| 8021B/AVO | Toluene | 41 | 5 | 1.5 | 0.02 | ug/L | 03/23/04 LZ |
| 8021B/AVO | Xylene (total) | 129 | 5 | 3.0 | 0.06 | ug/L | 03/23/04 LZ |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8021B/AVO | a,a,a-Trifluorotoluene | 139 S | | | | % | 70 - 130 |
| TPH-DHS | a,a,a-Trifluorotoluene | 139 | | | | % | 55 - 200 |
| 8015 | TEPH Diesel | 0.6 | 1 | 0.1 | 0.040 | mg/L | 03/27/04 AF |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8015 | o-Terphenyl (sur) | 90 | | | | % | 55 - 200 |

EQL = Estimated Quantitation Limit, MDL = Method detection limit, DF = Dilution Factor
ND = Not detected below indicated MDL, J=Trace, S=Surrogate Outside Control Limits

**Order #:** 506964 **Client Sample ID:** MW-8

**Matrix:** WATER

**Date Sampled:** 03/18/2004
**Time Sampled:** 12:00

| Method | Analyte | Result | DF | EQL | MDL | Units | Date/Analyst |
|---|---|---|---|---|---|---|---|
| 300.0 | Nitrate (as NO3) | ND | 1 | 0.44 | 0.19 | mg/L | 03/19/04 BGS |
| 300.0 | Sulfate | 13 | 1 | 1.0 | 0.34 | mg/L | 03/19/04 BGS |
| 8021B/AVO | Benzene | 592 | 10 | 3.0 | 0.04 | ug/L | 03/23/04 LZ |
| 8021B/AVO | Ethyl benzene | 1060 | 50 | 15.0 | 0.02 | ug/L | 03/23/04 LZ |
| TPH-DHS | Gasoline | 16000 | 10 | 500.0 | 15 | ug/L | 03/23/04 LZ |
| 8021B/AVO | Methyl t - butyl ether | 90 | 10 | 50.0 | 0.03 | ug/L | 03/23/04 LZ |
| 8021B/AVO | Toluene | 24 | 10 | 3.0 | 0.02 | ug/L | 03/23/04 LZ |
| 8021B/AVO | Xylene (total) | 1870 | 50 | 30.0 | 0.06 | ug/L | 03/23/04 LZ |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| TPH-DHS | a,a,a-Trifluorotoluene | 147 | | | | % | 55 - 200 |
| 8021B/AVO | a,a,a-Trifluorotoluene | 147 S | | | | % | 70 - 130 |
| 8015 | TEPH Diesel | 0.9 | 1 | 0.1 | 0.040 | mg/L | 03/27/04 AF |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8015 | o-Terphenyl (sur) | 110 | | | | % | 55 - 200 |

EQL = Estimated Quantitation Limit, MDL = Method detection limit, DF = Dilution Factor
ND = Not detected below indicated MDL, J=Trace, S=Surrogate Outside Control Limits

**Order #:** 506965 **Client Sample ID:** MW-9

**Matrix:** WATER

**Date Sampled:** 03/18/2004
**Time Sampled:** 12:25

| Method | Analyte | Result | DF | EQL | MDL | Units | Date/Analyst |
|---|---|---|---|---|---|---|---|
| 300.0 | Nitrate (as NO3) | ND | 1 | 0.44 | 0.19 | mg/L | 03/19/04 BGS |
| 300.0 | Sulfate | 64 | 1 | 1.0 | 0.34 | mg/L | 03/19/04 BGS |
| 8021B/AVO | Benzene | 122 | 20 | 6.0 | 0.04 | ug/L | 03/24/04 LZ |
| 8021B/AVO | Ethyl benzene | 313 | 20 | 6.0 | 0.02 | ug/L | 03/24/04 LZ |
| TPH-DHS | Gasoline | 3550 | 1 | 50 | 15 | ug/L | 03/24/04 LZ |
| 8021B/AVO | Methyl t - butyl ether | 35 | 1 | 5 | 0.03 | ug/L | 03/24/04 LZ |
| 8021B/AVO | Toluene | 15 | 1 | 0.3 | 0.02 | ug/L | 03/24/04 LZ |
| 8021B/AVO | Xylene (total) | 84 | 20 | 12.0 | 0.06 | ug/L | 03/24/04 LZ |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8021B/AVO | a,a,a-Trifluorotoluene | 109 | | | | % | 70 - 130 |
| TPH-DHS | a,a,a-Trifluorotoluene | 150 | | | | % | 55 - 200 |
| 8015 | TEPH Diesel | 0.6 | 1 | 0.1 | 0.040 | mg/L | 03/27/04 AF |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8015 | o-Terphenyl (sur) | 107 | | | | % | 55 - 200 |

EQL = Estimated Quantitation Limit, MDL = Method detection limit, DF = Dilution Factor
ND = Not detected below indicated MDL, J=Trace, S=Surrogate Outside Control Limits

**Order #:** 506966 **Client Sample ID:** MW-10

**Matrix:** WATER

**Date Sampled:** 03/18/2004
**Time Sampled:** 11:10

| Method | Analyte | Result | DF | EQL | MDL | Units | Date/Analyst |
|---|---|---|---|---|---|---|---|
| 300.0 | Nitrate (as NO3) | 0.5 | 1 | 0.44 | 0.19 | mg/L | 03/19/04 BGS |
| 300.0 | Sulfate | 80 | 1 | 1.0 | 0.34 | mg/L | 03/19/04 BGS |
| 8021B/AVO | Benzene | 2.8 | 1 | 0.3 | 0.04 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Ethyl benzene | 5.7 | 1 | 0.3 | 0.02 | ug/L | 03/22/04 LZ |
| TPH-DHS | Gasoline | 94 | 1 | 50 | 15 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Methyl t - butyl ether | ND | 1 | 5 | 0.03 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Toluene | ND | 1 | 0.3 | 0.02 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Xylene (total) | 7.0 | 1 | 0.6 | 0.06 | ug/L | 03/22/04 LZ |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8021B/AVO | a,a,a-Trifluorotoluene | 93 | | | | % | 70 - 130 |
| TPH-DHS | a,a,a-Trifluorotoluene | 93 | | | | % | 55 - 200 |
| 8015 | TEPH Diesel | ND | 1 | 0.1 | 0.040 | mg/L | 03/27/04 AF |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8015 | o-Terphenyl (sur) | 103 | | | | % | 55 - 200 |

EQL = Estimated Quantitation Limit, MDL = Method detection limit, DF = Dilution Factor
ND = Not detected below indicated MDL, J=Trace, S=Surrogate Outside Control Limits

**Order #:** 506967 **Client Sample ID:** MW-11

**Matrix:** WATER

**Date Sampled:** 03/18/2004
**Time Sampled:** 13:05

| Method | Analyte | Result | DF | EQL | MDL | Units | Date/Analyst |
|---|---|---|---|---|---|---|---|
| 300.0 | Nitrate (as NO3) | ND | 1 | 0.44 | 0.19 | mg/L | 03/19/04 BGS |
| 300.0 | Sulfate | 42 | 1 | 1.0 | 0.34 | mg/L | 03/19/04 BGS |
| 8021B/AVO | Benzene | 72 | 5 | 1.5 | 0.04 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Ethyl benzene | 342 | 5 | 1.5 | 0.02 | ug/L | 03/22/04 LZ |
| TPH-DHS | Gasoline | 4900 | 5 | 250.0 | 15 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Methyl t - butyl ether | 61 | 5 | 25.0 | 0.03 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Toluene | 17 | 5 | 1.5 | 0.02 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Xylene (total) | 233 | 5 | 3.0 | 0.06 | ug/L | 03/22/04 LZ |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| TPH-DHS | a,a,a-Trifluorotoluene | 157 | | | | % | 55 - 200 |
| 8021B/AVO | a,a,a-Trifluorotoluene | 157 S | | | | % | 70 - 130 |
| 8015 | TEPH Diesel | 0.4 | 1 | 0.1 | 0.040 | mg/L | 03/27/04 AF |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8015 | o-Terphenyl (sur) | 107 | | | | % | 55 - 200 |

EQL = Estimated Quantitation Limit, MDL = Method detection limit, DF = Dilution Factor
ND = Not detected below indicated MDL, J=Trace, S=Surrogate Outside Control Limits

**Order #:** 506968 **Client Sample ID**: Laboratory Method Blank

**Matrix:** WATER

| Method | Analyte | Result | DF | EQL | MDL | Units | Date/Analyst |
|---|---|---|---|---|---|---|---|
| 300.0 | Nitrate (as NO3) | ND | 1 | 0.44 | 0.19 | mg/L | 03/19/04 BGS |
| 300.0 | Sulfate | ND | 1 | 1.0 | 0.34 | mg/L | 03/19/04 BGS |
| 8021B/AVO | Benzene | ND | 1 | 0.3 | 0.04 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Ethyl benzene | ND | 1 | 0.3 | 0.02 | ug/L | 03/22/04 LZ |
| TPH-DHS | Gasoline | ND | 1 | 50 | 15 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Methyl t - butyl ether | ND | 1 | 5 | 0.03 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Toluene | ND | 1 | 0.3 | 0.02 | ug/L | 03/22/04 LZ |
| 8021B/AVO | Xylene (total) | ND | 1 | 0.6 | 0.06 | ug/L | 03/22/04 LZ |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8021B/AVO | a,a,a-Trifluorotoluene | | | | | % | 70 - 130 |
| 8015 | TEPH Diesel | ND | 1 | 0.1 | 0.040 | mg/L | 03/27/04 AF |
| **Surrogates** | | | | | | **Units** | **Control Limits** |
| 8015 | o-Terphenyl (sur) | 114 | | | | % | 55 - 200 |

EQL = Estimated Quantitation Limit, MDL = Method detection limit, DF = Dilution Factor
ND = Not detected below indicated MDL, J=Trace, S=Surrogate Outside Control Limits

# ASSOCIATED LABORATORIES
## QA REPORT FORM

QC Sample : LR 126401-506844

Matrix: WATER

Prep.Date: 03/19/04

Analysis Date: 03/19/04

Lab ID#'s in Batch: LR 126401, 126391, 126393, 126395, 126323, 126324, 126325, 126326, 126423
LR 126300

### MATRIX SPIKE / MATRIX SPIKE DUPLICATE RESULT

REPORTING UNITS = mg/L

| Test | Method | Sample Result | Spike Added | Matrix Spike | Matrix Spike Dup | %Rec MS | %Rec MSD | RPD |
|---|---|---|---|---|---|---|---|---|
| CL | 300.0 | 39 | 200 | 232 | 231 | 97 | 96 | 0 |
| SO4 | 300.0 | 10 | 200 | 208 | 207 | 99 | 99 | 0 |
| NO3 | 300.0 | 1 | 100 | 101 | 100 | 100 | 98 | 1 |
| NO2 | 300.0 | ND | 100 | 99 | 100 | 99 | 100 | 1 |

*RPD = Relative Percent Difference of Matrix Spike and Matrix Spike Dup*
*%REC-MS & MSD = Percent Recovery of Matrix Spike & Matrix Spike Duplicate*

*%Rec Limits = 80 - 120*
*RPD Limits = 20*

### PREPARATION BLANK / LAB CONTROL SAMPLE RESULTS

| Test | Method | PREP BLK | LCS | | | | |
|---|---|---|---|---|---|---|---|
| | | Value | Result | True | %Rec | L.Limit | H.Limit |
| CL | 300.0 | ND | 51 | 50 | 101 | 90% | 110% |
| SO4 | 300.0 | ND | 51 | 50 | 101 | 90% | 110% |
| NO3 | 300.0 | ND | 24.6 | 25 | 98 | 90% | 110% |
| NO2 | 300.0 | ND | 4.9 | 5 | 98 | 90% | 110% |

*VALUE = Preparation Blank Value; ND = Not-Detected*
*LCS = Lab Control Sample Result*
*TRUE = True Value of LCS*
*L.LIMIT / H.LIMIT = LCS Control Limits*

ASSOCIATED LABORATORIES
**LCS REPORT FORM**

QC Sample: LCS/LCSD

Matrix: WATER

Extraction Method : 3510 B

Prep. Date: 03/25/04

Analysis Date: 03/27/04

ID#'s in Batch: LR 126423, 126562, 126567, 126568, 126660

Reporting Units = mg/L

**PREPARATION BLANK / LAB CONTROL SAMPLE RESULTS**

| | | | PREP BLK | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Value | Result | True | %Rec | L.Limit | H.Limit |
| Test | Method | LCS | ND | 1.00 | 1 | 100 | 70% | 130% |
| DIESEL | 8015D | LCSD | ND | 1.26 | 1 | 126 | 70% | 130% |

*LCS Result = Lab Control Sample Result*
*True = True Value of LCS*
*L.Limit / H.Limit = LCS Control Limits*

**SURROGATE RECOVERY**

| Sample No. | O-Terphenyl |
|---|---|
| QC Limit | 55-200 |
| Method Blank | 114 |
| LCS | 144 |
| LCSD | 163 |

ASSOCIATED LABORATORIES
**QA REPORT FORM**

QC Sample: LCS / LCSD

Matrix: WATER

Prep. Date: 03/22/04

Analysis Date: 03/22/04-03/23/04

ID#'s in Batch: LR 126423, 126455, 126410, 126411

Reporting Units = ug/L

**PREPARATION BLANK / LAB CONTROL SAMPLE RESULTS**

| | | | PREP BLK | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Value | Result | True | %Rec | L.Limit | H.Limit |
| Test | Method | LCS | ND | 465 | 500 | 93 | 80% | 120% |
| TPH | 8015M-G | LCSD | ND | 481 | 500 | 96 | 80% | 120% |

*LCS Result = Lab Control Sample Result*
*True = True Value of LCS*
*L.Limit / H.Limit = LCS Control Limits*

**SURROGATE RECOVERY**

| Sample No. | AAA-TFT |
|---|---|
| QC Limit | 55-200 |
| Method Blank | 92 |
| LCS | 144 |
| LCSD | 147 |

*AAA-TFT = a,a,a-Trifluorotoluene*

ASSOCIATED LABORATORIES

# LCS REPORT FORM

QC Sample: LCS / LCSD

Matrix: WATER

Prep. Date: 03/22/04

Analysis Date: 03/22/04-03/23/04

LAB ID#'s in Batch: LR 126455, 126423

REPORTING UNITS = ug/L

## PREPARATION BLANK / LAB CONTROL SAMPLE RESULTS

| Test | Method | PREP. BLK | LCS | | | LCSD | |
|---|---|---|---|---|---|---|---|
| | | Value | Result | TRUE | %Rec | Result | %Rec |
| Benzene | 8021 | ND | 19.70 | 20 | 99 | 20.10 | 101 |
| Toluene | 8021 | ND | 19.60 | 20 | 98 | 19.80 | 99 |
| Ethylbenzene | 8021 | ND | 19.90 | 20 | 100 | 20.20 | 101 |
| Xylenes | 8021 | ND | 57.60 | 60 | 96 | 58.60 | 98 |

*LCS = Lab Control Sample Result*

*TRUE = True Value of LCS*

*L.LIMIT / H.LIMIT = LCS Control Limits*

| L.Limit | H.Limit |
|---|---|
| 80% | 120% |

## SURROGATE RECOVERY

| Sample No. | AAA-TFT |
|---|---|
| QC Limit | 55-200 |
| Method Blank | 92 |
| LCS | 94 |
| LCSD | 100 |

*AAA-TFT = a,a,a-Trifluorotoluene*

ASSOCIATED LABORATORIES
806 North Batavia - Orange, California 92868-1225 - 714/771-6900 FAX 714/538-1209

# Cooler Receipt Form

Client: Stellar Env Project: /

Date Cooler Received: 3/19 Date Cooler Opened: 3/19

Was cooler scanned for presence of radioactivity ? Yes/No
If yes was radioactivity results above 25 cpm ? Yes/No

Was a shipper's packing slip attached to the cooler ? Yes/No

If the cooler had custody seal(s), were thy signed and intact ? Yes/No/Na

Was the cooler packed with: Ice x Ice Packs ____ Bubble wrap ____
Styrofoam ____ Paper ____ None ____ Other ____

Cooler Temperature: 1.8°C *
*cooler needs to be received @ 4°C with an acceptable range of 2°- 6 °C

If samples were hand delivered do they meet the temp. criteria, which should be @ 4°C with an acceptable range of 2°- 6 °C ? Yes/No

If no explain: ____

Were all samples sealed in plastic bags ? Yes/No

Did all samples arrive intact ? If no, indicate below. Yes/No

Were all samples labeled correctly ? (ID's Dates, Times) If no, indicate below. Yes/No

Can the tests required be ran with the provided containers, If no indicate below. Yes/No

Was sufficient sample volume sent for all containers ? Yes/No

Were any VOA vials received with head space ? Yes/No/Na

Was the correct preservatives used ? Yes/No/Na
If no, see the pH log for a list of samples containers regarding pH

Any other important information: ____

Receiving Department: W Date: 3/19

# Chain of Custody Record

126423

Lab job no. _____
Date 3/18/04
Page _____ of _____

Laboratory: Associated Labs
Address: 806 N. Batavia, Orange CA
Method of Shipment: Golden State Courier
Shipment No. –
Airbill No. –
Cooler No. –
Project Owner: Stellar Env. Sol.
Site Address: 7867 Redwood Rd. Oakland, CA
Project Name: Redwood Regional Park
Project Number: 0404-04
Project Manager: Bruce Ruder
Telephone No.: (510) 644-3123
Fax No.: (510) 644-3859
Samplers: (Signature) B.M. Ruder Ron Costa

SES

| Field Sample Number | Location/ Depth | Date | Time | Sample Type | Type/Size of Container | Preservation: Cooler | Preservation: Chemical | Filtered | No. of Containers | TPH-g, BTEX, MTBE | TPH-D | Nitrate + Sulfate | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SW-2 | Redwood Creek | 3/18/04 | 800 | $H_2O$ | 3 VOAs + 1-L amber | | | | 4 | X | X | | |
| SW-3 | " " | | 805 | $H_2O$ | " " | | | | 4 | X | X | | |
| MW-2 | M. Wells | | 1135 | | 3 VOAs + 1 Amber | | | | 4 | X | X | | |
| MW-3 | | | 0815 | | 1 Poly | | | | 1 | | | X | |
| MW-4 | | | 1045 | | 3 VOAs, 1 Amb, 1 Poly | | | | 5 | X | X | X | |
| MW-7 | | | 1240 | | 3 VOAs, 1 Amb, 1 Poly | | | | 5 | X | X | X | |
| MW-8 | | | 1200 | | | | | | 5 | X | X | X | |
| MW-9 | | | 1225 | | | | | | 5 | X | X | X | |
| MW-10 | | | 1110 | | | | | | 5 | X | X | X | |
| MW-11 | | | 1305 | | | | | | 5 | X | X | X | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| Relinquished by | Date | Received by | Date | Relinquished by | Date | Received by | Date |
|---|---|---|---|---|---|---|---|
| Signature: Ron Costa | 3/18/04 | Signature: B.M. Ruder | 3/18/04 | Signature: B.M. Ruder | 3/18/04 | Signature: | 3/19 |
| Printed: Aaron Costa | Time: | Printed: Bruce Ruder | Time: | Printed: Bruce Ruder | Time: | Printed: Aaron | Time: 10:15 |
| Company: Blaine Tech Services | 1425 | Company: Stellar Env. Solutions | 1425 | Company: Stellar Env. Solutions | 1615 | Company: Associates Lab | |

Turnaround Time: _____

Comments: *Nitrate/Sulfate Samples Taken "Pre Purge" *
SW-2 + -3" Sampled by Bruce Ruder
Groundwater samples collected by Blaine Tech Services

| Relinquished by | Date | Received by | Date |
|---|---|---|---|
| Signature: | | Signature: 3-19-04 | 11:50 |
| Printed: | Time: | Printed: | Time: |
| Company: | | Company: | |

2000-00-01

★ Stellar Environmental Solutions

2198 Sixth Street #201, Berkeley, CA 94710

**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 | TPHg | TPHd | 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 | 29.6 | NA |
| 3 | May-95 | < 50 | < 50 | 3.9 | < 0.5 | 1.6 | 2.5 | 8 | 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 | 31.4 | 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 | 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 |

| Well MW-2 (continued) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Event | Date | TPHg | TPHd | Benzene | Toluene | Ethylbenzene | Total Xylenes | Total BTEX | MTBE |
| 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 | 23.0 |
| 28 | Dec-03 | 282 | <100 | 4.3 | 1.6 | 1.3 | 1.2 | 8.4 | 9.4 |
| 29 | Mar-04 | 374 | <100 | 81.0 | 1.2 | 36 | 7.3 | 126 | 18.0 |

| Well MW-4 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Event | Date | TPHg | TPHd | 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 | 45.9 | < 2.0 |
| 16 | Sep-00 | 570 | 380 | < 0.5 | < 0.5 | 16 | 4.1 | 20.1 | 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 |

| Well MW-4 (continued) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Event | Date | TPHg | TPHd | Benzene | Toluene | Ethylbenzene | Total Xylenes | Total BTEX | MTBE |
| 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 | 1.2 | < 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 |

| Well MW-5 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Event | Date | TPHg | TPHd | 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 with Alameda County Health Care Services Agency approval | | | | | | | | | |

| Well MW-7 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Event | Date | TPHg | TPHd | 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 | 188.9 | 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 |

| Well MW-8 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Event | Date | TPHg | TPHd | 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 |

| Well MW-9 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Event | Date | TPHg | TPHd | 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 |

| Well MW-10 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Event | Date | TPHg | TPHd | 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* | 3 | 7.0 |
| 10 | Dec-03 | 162 | *<100* | 6.9 | *<0.3* | 8 | *<0.6* | 15 | 9.9 |
| 11 | Mar-04 | 94 | *<100* | 2.8 | *<0.3* | 5.7 | 7 | 16 | *<5.0* |

| Well MW-11 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Event | Date | TPHg | TPHd | 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 | 1100 | 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 | 3000 | 250 | 9.9 | 700 | 527 | 1,487 | < 4 |
| 10 | Dec-03 | 15,000 | 1,100 | 314 | 60 | 1070 | 802 | 2,246 | 173 |
| 11 | Mar-04 | 4,900 | 400 | 72 | 17 | 342 | 233 | 664 | 61 |

## HISTORICAL SURFACE WATER ANALYTICAL RESULTS
## REDWOOD REGIONAL PARK SERVICE YARD, OAKLAND, CALIFORNIA

(all concentrations in ug/L, equivalent to parts per billion [ppb])

| Sampling Location SW-1 (Upstream of Contaminated Groundwater Discharge Location SW-2) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Event** | **Date** | **TPHg** | **TPHd** | **Benzene** | **Toluene** | **Ethylbenzene** | **Total Xylenes** | **Total BTEX** | **MTBE** |
| 1 | Feb-94 | 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 2 | May-95 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 3 | May-96 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 4 | Aug-96 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 5 | Dec-96 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 6 | Feb-97 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 7 | Aug-97 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 8 | Dec-97 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 9 | Feb-98 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 10 | Sep-98 | < 50 | <50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | < 2.0 |
| 11 | Apr-99 | < 50 | <50 | < 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. | | | | | | | | | |

| Sampling Location SW-2 (Area of Historical Contaminated Groundwater Discharge) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Event | Date | TPHg | TPHd | 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 | — | NA |
| 3 | Aug-95 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 4 | May-96 | < 50 | < 50 | < 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 | — | NA |
| 7 | Feb-97 | < 50 | < 50 | < 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 | — | NA |
| 10 | Feb-98 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 11 | Sep-98 | < 50 | <50 | < 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 | — | < 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 | - | < 2.0 |
| 19 | Mar-02 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | - | < 2.0 |
| 20 | Jun-02 | < 50 | < 50 | < 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 | - | < 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 | - | < 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 | - | < 5.0 |
| 27 | Mar-04 | <50 | <100 | <0.3 | <0.3 | 1.1 | <0.6 | 1.1 | < 5.0 |

| Sampling Location SW-3 (Downstream of Contaminated Groundwater Discharge Location SW-2) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Event | Date | TPHg | TPHd | Benzene | Toluene | Ethylbenzene | Total Xylenes | Total BTEX | MTBE |
| 1 | May-95 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 2 | Aug-95 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 3 | May-96 | < 50 | 74 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 4 | Aug-96 | 69 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 5 | Dec-96 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 6 | Feb-97 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 7 | Aug-97 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 8 | Dec-97 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NA |
| 9 | Feb-98 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | < 2.0 |
| 10 | Sep-98 | < 50 | <50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | < 2.0 |
| 11 | Apr-99 | < 50 | <50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | < 2.0 |
| 12 | Dec-99 | < 50 | <50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NS |
| 13 | Sep-00 | NS | NS | NS | NS | NS | NS | — | < 2.0 |
| 14 | Jan-01 | < 50 | <50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | < 2.0 |
| 15 | Apr-01 | < 50 | <50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NS |
| 16 | Sep-01 | NS | NS | NS | NS | NS | NS | — | < 2.0 |
| 17 | Dec-01 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | < 2.0 |
| 18 | Mar-02 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | 2.4 |
| 19 | Jun-02 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | — | NS |
| 20 | Sep-02 | NS | NS | NS | NS | NS | NS | - | < 2.0 |
| 21 | Dec-02 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | - | < 2.0 |
| 22 | Mar-03 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | - | < 2.0 |
| 23 | Jun-03 | < 50 | < 50 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | - | NS |
| 24 | Sep-03 | NS | NS | NS | NS | NS | NS | — | < 5.0 |
| 25 | Dec-03 | 60 | < 100 | < 0.3 | < 0.3 | < 0.3 | < 0.6 | - | < 5.0 |
| 26 | Mar-04 | <50 | <100 | <0.3 | <0.3 | <0.6 | <0.6 | - | |

NA = Not Analyzed for this Constituent
NS = Not Sampled (no surface water present during sampling event)