STELLAR ENVIRONMENTAL SOLUTIONS
2198 SIXTH STREET, BERKELEY, CA 94710
TEL: 510.644.3123 FAX: 510.644.3859

TRANSMITTAL MEMORANDUM

TO: ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY
DEPT. OF ENVIRONMENTAL HEALTH
HAZARDOUS MATERIALS DIVISION
1131 HARBOR BAY PKWY, SUITE 250
ALAMEDA, CA 94502

DATE: 5/6/03

ATTENTION: MR. SCOTT SEERY

FILE: SES-2003-02

SUBJECT: REDWOOD REGIONAL PARK FUEL LEAK SITE

WE ARE SENDING:

- ☒ HEREWITH
- ☐ UNDER SEPARATE COVER
- ☒ VIA MAIL
- ☐ VIA

THE FOLLOWING: FIRST QUARTER 2003 SITE MONITORING REPORT FOR REDWOOD REGIONAL PARK SERVICE YARD SITE – OAKLAND, CALIFORNIA (MAY 2003)

- ☐ AS REQUESTED
- ☐ FOR YOUR APPROVAL
- ☐ FOR REVIEW
- ☒ FOR YOUR USE
- ☐ FOR SIGNATURE
- ☐ FOR YOUR FILES

COPIES TO: K. BURGER (EBRPD)
M. RUGG (FISH & GAME)
R.BREWER (REGIONAL BOARD)

BY: Bruce Rucker BMR

★ **Stellar Environmental Solutions**

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

May 5, 2003

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

Subject: First Quarter 2003 Site Monitoring Report
Redwood Regional Park Service Yard Site – Oakland, California

Dear Mr. Seery:

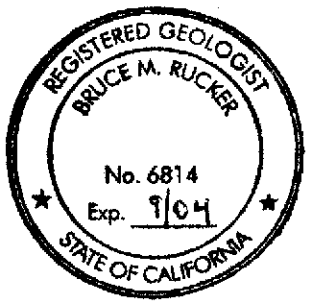
Attached is the referenced Stellar Environmental Solutions, Inc. (SES) report for the underground fuel storage tank site at the Redwood Regional Park Service Yard, located at 7867 Redwood Road, Oakland, California. This project is being conducted for the East Bay Regional Park District, and follows previous site investigation and remediation activities associated with former leaking underground fuel storage tanks, conducted since 1993. The key regulatory agencies for this investigation are the Alameda County Health Care Services Agency, the California 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 2003 (First Quarter 2003) and also evaluates the efficacy of the ORC™ injection corrective action program implemented to address groundwater contamination. If you have any questions regarding this report, please contact Mr. Ken Burger 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

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

FIRST QUARTER 2003
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

May 5, 2003

Project No. 2003-02

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

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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 California 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) in March 2003:

- 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; and
- Evaluating the efficacy of the ORC™ injection corrective action program implemented at the site.

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 the ACHCSA in its January 8, 2001 letter to the EBRPD. Two phases of ORC™ injection have been conducted: September 2001 and July 2002. A total of 25 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.

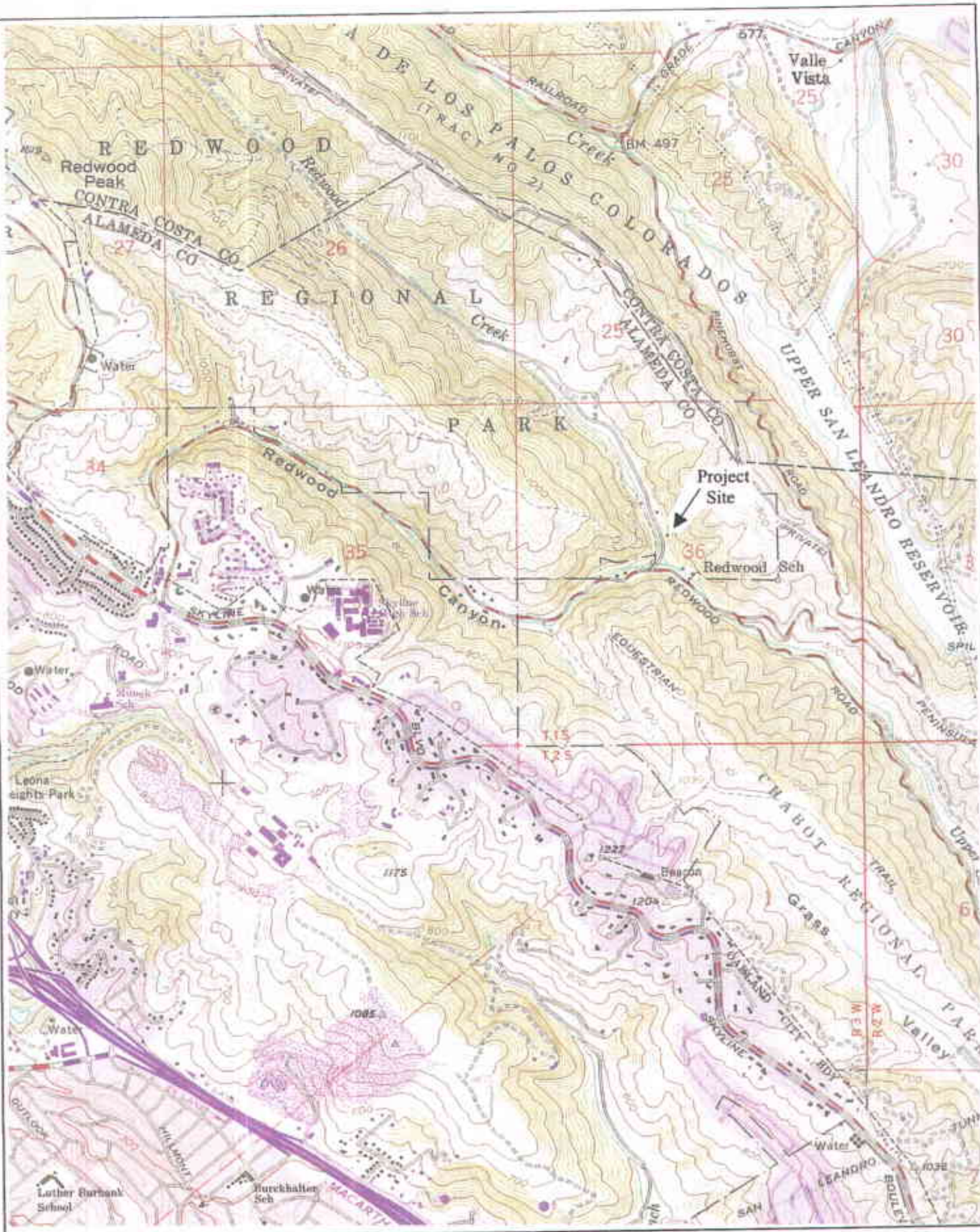
SITE DESCRIPTION

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. 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 latter recommendation has not yet been implemented due to continued concern over potential impacts to Redwood Creek.

Electronic Data Format (EDF) groundwater analytical results from the groundwater monitoring events beginning in the third quarter of 2001 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. Historical site groundwater and surface water analytical results are presented in Appendix C.



N

U.S.G.S. TOPOGRAPHIC MAP SHOWING SITE LOCATION

Redwood Regional Park Service Yard
Oakland, Alameda County, California

By: MJC | NOVEMBER 1997

Figure 1

Stellar Environmental Solutions
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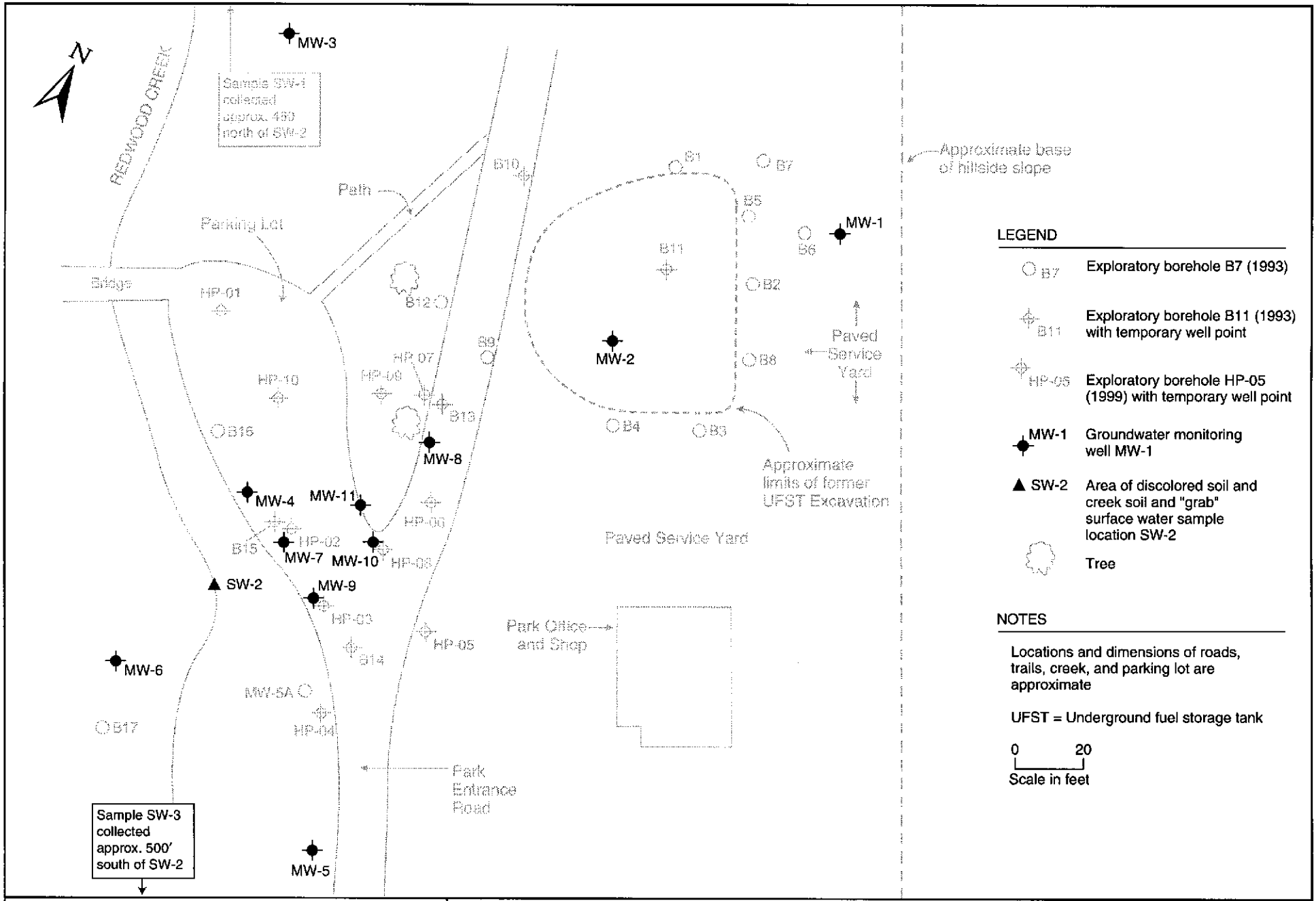


Stellar Environmental Solutions

Geoscience & Engineering Consulting

SITE PLAN AND HISTORICAL SAMPLING LOCATIONS

Redwood Regional Park Service Yard, Oakland, CA

Figure 2

by: MJC

OCTOBER 2002

2001-53-01

2.0 PHYSICAL SETTING

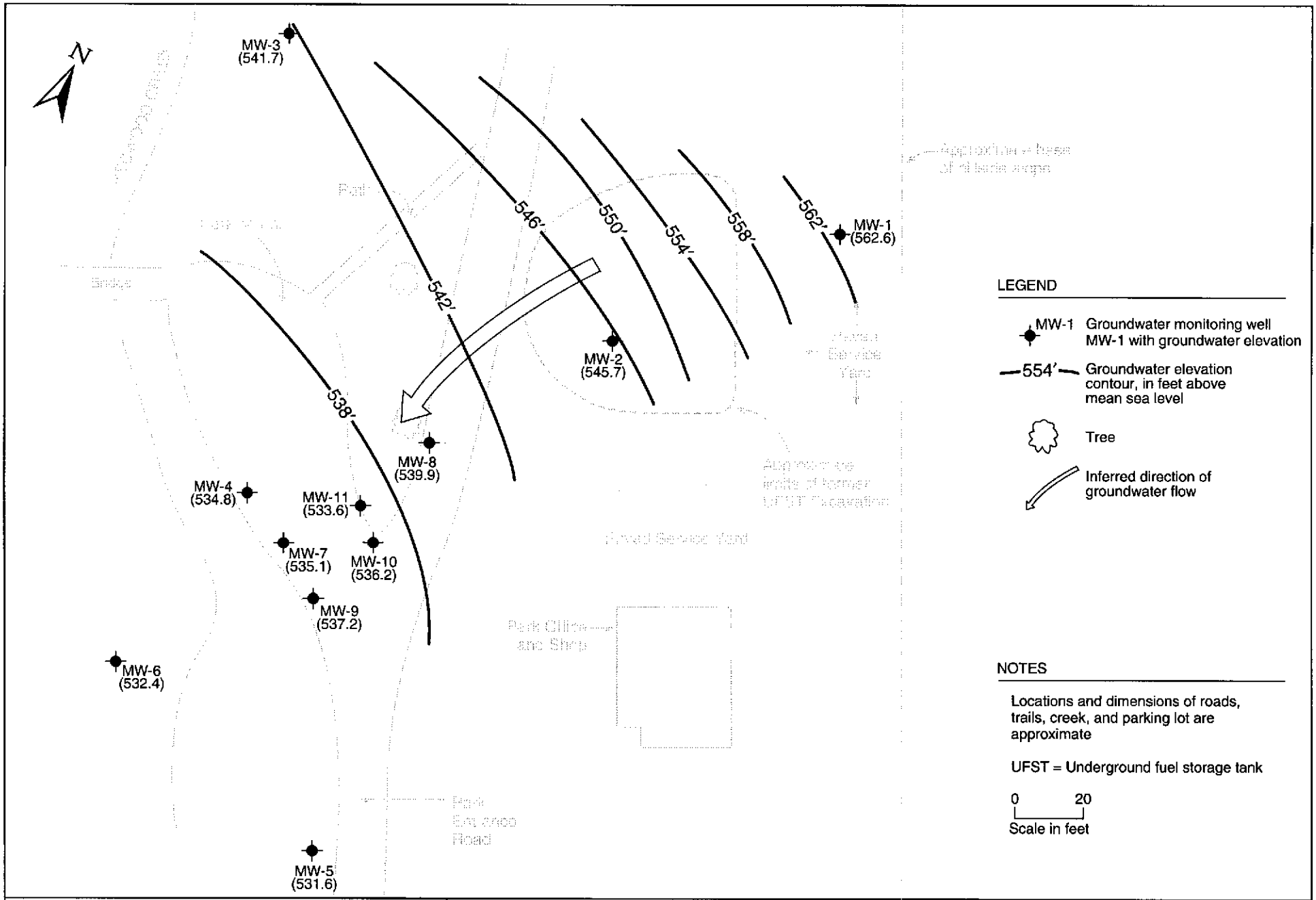
Following is a brief summary of the site hydrogeologic conditions based on geologic logging and water level measurements collected at the site since September 1993. A full discussion is presented in the SES June 1999 report.

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.

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 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 3 is a groundwater elevation map constructed from the current event monitoring well static water levels, and Table 1 (in Section 3.0) summarizes current event groundwater elevation data. The groundwater gradient is relatively steep—approximately 2 feet per foot—between well MW-1 and the former UFST source area, resulting from the topography and the highly disturbed nature of sediments in the landslide debris. Downgradient from (west of) the UFST source area (between MW-2 and Redwood Creek) the groundwater gradient is approximately 0.1 feet per foot. 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 estimated site groundwater velocity at 7 to 10 feet per year using site-specific empirical data, from the date of UST installation in the late 1970s to the date when contamination was first observed in Redwood Creek (1993).



Stellar Environmental Solutions
Geoscience & Engineering Consulting

GROUNDWATER ELEVATION MAP–MARCH 27, 2003
Redwood Regional Park Service Yard, Oakland, CA

Figure 3

by: MJC | APRIL 2003

2003-02-08

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) in the vicinity of the site, and discharges into Upper San Leandro Reservoir located approximately 1 mile southeast of the site.

3.0 CURRENT GROUNDWATER AND SURFACE WATER MONITORING EVENT ACTIVITIES

This section presents the creek surface water and groundwater sampling and analytical methods for the most recent event. 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, and MW-8;
- 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 monitoring/sampling was conducted on March 27, 2003. 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 A contains the groundwater monitoring field records.

GROUNDWATER LEVEL MONITORING AND SAMPLING

Groundwater monitoring well water level measurements, purging, sampling, and field analyses were conducted by Blaine Tech Services under the direct 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
Redwood Regional Park Corporation Yard, Oakland, California

Well	Well Depth	Screened Interval	TOC Elevation	Groundwater Elevation (3/27/03)
MW-1	18	7 to17	565.9	562.6
MW-2	36	20 to 35	566.5	545.7
MW-3	42	7 to 41	560.9	541.7
MW-4	26	10 to 25	548.1	534.8
MW-5	26	10 to 25	547.5	531.6
MW-6	26	10 to 25	545.6	532.4
MW-7	24	9 to24	547.7	535.1
MW-8	23	8 to 23	549.2	539.9
MW-9	26	11 to 26	549.4	537.2
MW-10	26	11 to 26	547.3	536.2
MW-11	26	11 to 26	547.9	533.6

Notes:

TOC = Top of casing.

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

All elevations are feet above USGS mean sea level. Elevations of wells MW 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.

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.

The well development, purge water, and decontamination rinseate (approximately 90 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 it will be transported offsite for proper disposal.

CREEK SURFACE WATER SAMPLING

Surface water sampling was conducted by SES on March 27, 2003. 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 from location

SW-3 (approximately 500 feet downstream from SW-2). In accordance with a previous ACHCSA-approved SES recommendation, upstream sample location SW-1 was not sampled.

At the time of sampling, the creek was flowing upstream and downstream of the sampling locations. Water depths ranged from approximately 6 to 12 inches. At the SW-2 location, where contaminated groundwater discharge to the creek has historically been observed, a petroleum odor was noted, as was an orange algae growing on the saturated portion of the creek bank. 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.

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 Risk-Based Screening Levels (RBSLs) for sites where groundwater is a current or potential drinking water source; and 2) RBSLs for sites where groundwater is not a current or potential drinking water source.

As stipulated in the RBSL document (August 2000, Interim Final), the 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. Environmental Protection Agency, and U.S. Department of Energy. These screening criteria address chronic and acute exposures to aquatic life. As discussed in the RWQCB's RBSL 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 4 shows the current event contaminant analytical results and the inferred limits of the total petroleum hydrocarbons as gasoline (TPHg) groundwater plume. Appendix B contains the certified analytical laboratory report and chain-of-custody records for the current event.

CURRENT EVENT GROUNDWATER RESULTS

Current site groundwater contaminant concentrations exceed their respective groundwater RBSLs (for both cases in which the drinking water resource is and is not threatened)—with the exception of toluene, which does not exceed either set of criteria. 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 well MW-8 (approximately halfway between the former source area and the creek), except for MTBE that was detected at maximum concentrations in further downgradient wells MW-7 and MW-11. The northern and southern edges of the plume appear to be well defined by wells MW-4 and MW-10.

Site-sourced contaminants detected in the surface water sample from location SW-2 included MTBE (2.8 µg/L) and ethylbenzene (0.56 µg/L). No contaminants were detected in the downstream creek sample SW-3.

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, 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.

Table 2
Groundwater and Surface Water Sample
Analytical Results – March 27, 2003
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	**130**	**82**	**39**	*<0.5*	**20**	**4.1**	**16**
MW-4	*<50*	*<50*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<2.0*
MW-7	**10,000**	**3,600**	**210**	**12**	**360**	**143**	**45**
MW-8	**13,000**	**3,500**	**610**	**12**	**1,100**	**958**	*<10*
MW-9	**4,400**	**1,400**	**320**	**6.9**	**400**	**93**	*<2.0*
MW-10	**110**	*<50*	**10**	*<0.5*	**12**	**1.3**	**11**
MW-11	**7,800**	**2,600**	**170**	**4.7**	**530**	**337**	**53**
Groundwater RBSLs [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*	*<50*	*<0.5*	*<0.5*	**0.56**	*<0.5*	**2.8**
SW-3	*<50*	*<50*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<2.0*
Surface Water Screening Levels [a, b]	500	640	46	130	290	13	8,000

Notes:

[a] RWQCB Risk-Based Screening Levels (drinking water resource threatened/not threatened) (RWQCB, 2000).

[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).

Table 3
Groundwater Sample Analytical Results
Natural Attenuation Indicators – March 27, 2003
Redwood Regional Park Corporation Yard, Oakland, California

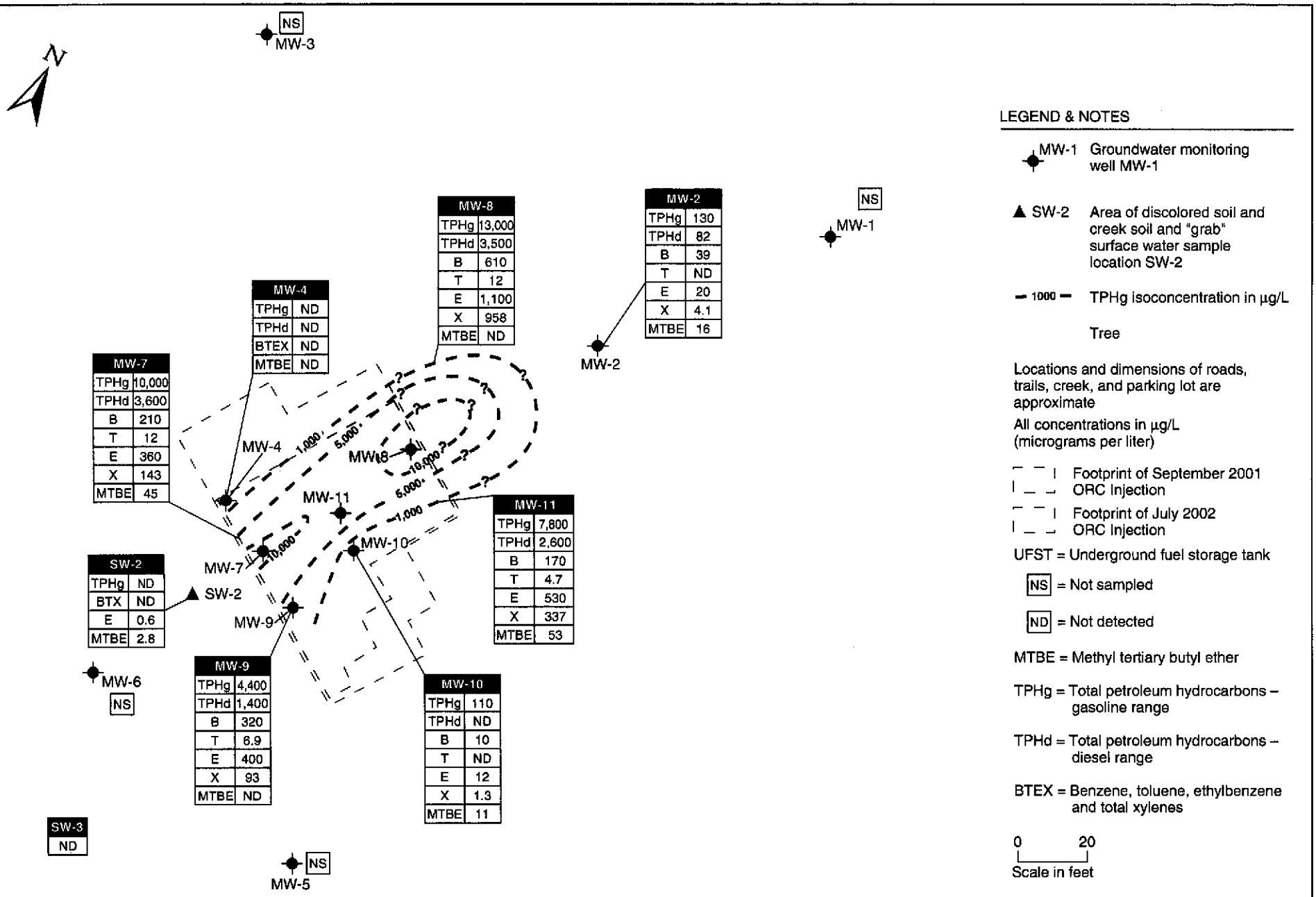
Sample I.D.	Nitrate (as Nitrogen) (mg/L)	Sulfate (mg/L)	Dissolved Oxygen (mg/L)	Ferrous Iron (mg/L)	Redox Potential (milliVolts)
MW-1	NA	NA	1.0	0.0	157
MW-2	NA	NA	1.5	0.2	146
MW-3	<0.05	35	2.7	0.0	141
MW-4	0.28	48	8.6	0.0	125
MW-5	NA	NA	0.5	0.2	142
MW-6	NA	NA	0.7	0.2	134
MW-7	<0.05	<0.5	2.9	4.4	85
MW-8	<0.05	21	0.7	2.2	138
MW-9	<0.05	65	0.4	0.2	40
MW-10	0.22	72	3.2	0.0	139
MW-11	<0.05	10	0.8	3.2	-40

Notes:

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

NA = Not analyzed.

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 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.



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

1000 TPHg 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)

Footprint of September 2001 ORC Injection

Footprint of July 2002 ORC Injection

UFST = Underground fuel storage tank

NS = Not sampled

ND = Not detected

MTBE = Methyl tertiary butyl ether

TPHg = Total petroleum hydrocarbons – gasoline range

TPHd = Total petroleum hydrocarbons – diesel range

BTEX = Benzene, toluene, ethylbenzene and total xylenes

0 20

Scale in feet

Stellar Environmental Solutions

Geoscience & Engineering Consulting

ANALYTICAL RESULTS AND TPH-GAS PLUME—MARCH 27, 2003
Redwood Regional Park Service Yard, Oakland, CA

Figure 4

by: MJC | APRIL 2003

2003-02-07

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.

Current monitoring event DO concentrations ranged from 0.4 mg/L to 8.6 mg/L. 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. The elevated DO concentration in MW-4 may be a function of localized supersaturation at this well resulting from the previous ORC™ injection.

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 4), ORP values ranged from –40 mV to +138 mV. Other monitoring wells showed positive ORP values ranging from +134 mV to +157 mV. Thus, the ORP values showed the expected general inverse correlation with hydrocarbon concentrations; however, ORP values did not specifically correlate with TPHg concentrations in individual monitoring wells.

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 were generally lower 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 B).

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 salient historical findings.

SUMMARY AND CONCLUSIONS

- Groundwater sampling has been conducted approximately on a quarterly basis since November 1994 (25 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 RBSLs (both for cases in which the drinking water resource is and is not threatened)—with the exception of toluene, which does not exceed either set of criteria. 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. There are currently two zones of maximum groundwater contamination (TPHg greater than 10,000 µg/L) centered around wells MW-7 (immediately upgradient of the creek) and MW-8 (approximately 75 feet upgradient of the 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).
- No contaminants were detected in the current event site surface water (creek samples) above screening-level criteria. Contaminants detected in the creek surface water sample below screening-level criteria included ethylbenzene and MTBE, and there continues to be visual evidence of contaminated groundwater discharge at the downgradient creek bank.
- Hydrochemical (contaminant and natural attenuation parameter) trends indicate that the first phase of the ORC™ injection (September 2001) was generally successful in increasing DO

levels and reducing groundwater contaminant concentrations, although the active life of the ORC™ (reported by the vendor to be 6 to 9 months) appears to have been exceeded between the second and third post-injection events in some of the wells. A second phase of the ORC™ injection, conducted in July 2002, appears to have been effective in controlling the lateral limits of the plume, but it has not been effective in reducing the magnitude of contamination within the centerline of the plume. The active life of the ORC™ from the second injection event has likely been exceeded.

- Although previous ORC™ injections have been effective in controlling the lateral limits of the plume, they have not been effective in reducing the magnitude of contamination within the centerline of the plume. Based on historical concentrations in well MW-8, it appears likely that a continued contaminant mass input to the downgradient area (the focus area of the ORC™ corrective action) is migrating from an upgradient "source" (i.e. light non-aqueous phase liquid [LNAPL] petroleum in the unsaturated zone). SES and Regenesis (the manufacturer of ORC™) are currently conducting a critical evaluation of historical data to determine the cost-effectiveness and technical efficacy of performing additional injections with a modified injection design and protocol. SES is also conducting an evaluation of other potentially-viable corrective action strategies that might prove to be more appropriate.

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.
- Complete a critical technical evaluation of the efficacy of the ORC™ corrective action in the Q2 2003 report following the collection and analyses of the June 2003 groundwater monitoring data, and then make a recommendation as to the need for (and most appropriate strategy of) additional corrective action.

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.

WELL GAUGING DATA

Project # 030327-DW-1 Date 3-27-03 Client Stellar Environment Solutions

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					3.30	18.85		Go
mw-2	4					20.77	38.82		
mw-3	4					19.23	44.10		G/WS
mw-4	4					13.26	26.51		
mw-5	4					15.92	26.92		Go
mw-6	4					13.23	27.93		Go
mw-7	2					12.64	25.33		
mw-8	2					9.35	22.21		
mw-9	2					12.24	26.00		
mw-10	2					11.14	28.75		
mw-11	2					14.30	26.00		
* Replaced 2244 ~~key~~ lock on gate w/ 2357 lock									

WELL MONITORING DATA SHEET

Project #: 030327-DW-1	Client: Stellar Envir. Sol. @Redwood Reg. Park Oakland
Sampler: Dave W.	Start Date: 3-27
Well I.D.: MW-1	Well Diameter: 2 3 (4) 6 8 ____
Total Well Depth: 18.85	Depth to Water: 3.30
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
- X Disposable Bailer
- Extraction Port
- Dedicated Tubing
- Other: _____

_____(Gals.) X Gauge only = _____ 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

Did well dewater? Yes No Gallons actually evacuated:

Sampling Time: Sampling Date: 3-27-03

Sample I.D.: Laboratory: Curtis & Tompkins

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

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

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

D.O. (if req'd): $Fe^{+2} = 0$	Pre-purge:	1.0 mg/L	Post-purge:	mg/L
ORP (if req'd):	Pre-purge:	157 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: 030327-MW-1	Client: Stellar Envir. Sol. @ Redwood Reg. Park Oakland
Sampler: Dave W	Start Date: 3-27
Well I.D.: MW-2	Well Diameter: 2 3 (4) 6 8
Total Well Depth: 38.82	Depth to Water: 20.77
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
- X Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other

Sampling Method: Bailer

- X Disposable Bailer
- Extraction Port
- Dedicated Tubing
- Other:

11.7 (Gals.) X 3 = 35.1 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
10:38	58.5	6.8	920	25	12	
10:40	58.8	6.8	937	58	24	
10:43	59.1	6.8	926	286	36	

Did well dewater? Yes (No) Gallons actually evacuated: 36

Sampling Time: 10:48 Sampling Date: 3-27-03

Sample I.D.: MW-2 Laboratory: Curtis & Tompkins

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

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

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

D.O. (if req'd): $Fe^{+2} = 0.2$ (Pre-purge): 1.5 mg/L Post-purge: mg/L

ORP (if req'd): (Pre-purge): 146 mV Post-purge: mV

WELL MONITORING DATA SHEET

Project #: 030327-PW-1	Client: Stellar Envir. Sol. @Redwood Reg. Park Oakland
Sampler: Dave W.	Start Date: 3-27
Well I.D.: MW-3	Well Diameter: 2 3 (4) 6 8 ___
Total Well Depth: 44.10	Depth to Water: 19.23
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

X Disposable Bailer
Extraction Port
Dedicated Tubing
Other: _____

_____(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
Grab sample for Nitrate + Sulfate						
9:15	53.6	7.5	774	16	-	tb

Did well dewater? Yes No Gallons actually evacuated: -

Sampling Time: 9:15 Sampling Date: 3-27-03

Sample I.D.: ~~9:15~~ MW-3 Laboratory: Curtis + Tompkins

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): $Fe^{+2} = 0$	(Pre-purge):	2.7 mg/L	Post-purge:	mg/L
ORP (if req'd):	(Pre-purge):	141 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: 030327-DW-1	Client: Stellar Envir. Sol. @Redwood Reg. Park Oakland
Sampler: Dave W	Start Date: 3-27
Well I.D.: mw-4	Well Diameter: 2 3 (4) 6 8 ___
Total Well Depth: 26.51	Depth to Water: 17.26
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
- X Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other ____

Sampling Method: Bailer

- X Disposable Bailer
- Extraction Port
- Dedicated Tubing
- Other: ____

8.6 (Gals.) X 3 = 25.8 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
11:17	58.8	8.4	750	69	9	
	well dewatered	@ 16	gl.	DTW = 24.72		
14:05	57.6	8.3	714	8	—	DTW = 21.30

Did well dewater? (Yes) No — Gallons actually evacuated: 16

Sampling Time: Nitrate/Sulfate = 11:05, TPHG/etc = 14:05 — Sampling Date: 3-27-03

Sample I.D.: mw-4 — Laboratory: Curtis + Tompkins

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): Fe⁺² = 0	(Pre-purge):	8.6 mg/L	Post-purge:	mg/L
ORP (if req'd):	(Pre-purge):	125 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: 030327-DW-1	Client: Stellar Envir. Sol. @Redwood Reg. Park Oakland
Sampler: Dave W	Start Date: 3-27
Well I.D.: mw-5	Well Diameter: 2 3 (4) 6 8 ____
Total Well Depth: 26.92	Depth to Water: 15.92
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

X Disposable Bailer
Extraction Port
Dedicated Tubing
Other: _____

_____(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

Did well dewater? Yes No Gallons actually evacuated:

Sampling Time: Sampling Date: 3-27-03

Sample I.D.: Laboratory: Curtis + Tompkins

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

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

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

D.O. (if req'd): Fe^{+2} = 0.2	Pre-purge:	0.5 mg/L	Post-purge:	mg/L
ORP (if req'd):	Pre-purge:	142 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: 030327-PW-1	Client: Stellar Envir. Sol. @Redwood Reg. Park Oakland
Sampler: Dave W.	Start Date: 3 27
Well I.D.: MW-6	Well Diameter: 2 3 (4) 6 8 ___
Total Well Depth: 27.93	Depth to Water: 13.23
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

X Disposable Bailer
Extraction Port
Dedicated Tubing
Other: _____

_____(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

Did well dewater? Yes No Gallons actually evacuated:

Sampling Time: Sampling Date: 3-27-03

Sample I.D.: Laboratory: Curtis + Tompkins

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

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

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

D.O. (if req'd): $Fe^{+2} = 0.7$	(Pre-purge):	0.7 mg/L	Post-purge:		mg/L
ORP (if req'd):	(Pre-purge):	134 mV	Post-purge:		mV

WELL MONITORING DATA SHEET

Project #: 030327-MW-1	Client: Stellar Envir. Sol. @Redwood Reg. Park Oakland
Sampler: Dave W.	Start Date: 3-27
Well I.D.: MW-7	Well Diameter: @ 3 4 6 8 ____
Total Well Depth: 25.33	Depth to Water: 12.64
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
- X Middleburg
- Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other____

Sampling Method: Bailer

- X Disposable Bailer
- Extraction Port
- Dedicated Tubing
- Other: ____

2.0 (Gals.) X 3 = ____ 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
12:43	56.8	6.9	912	>200	2	strong gas odor
12:45	56.8	6.8	922	>200	4	
12:48	56.6	6.9	905	>200	6	

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

Sampling Time: Nitrate/Sulfate = 12:38 Others = 12:53 Sampling Date: 3-27-03

Sample I.D.: MW-7 Laboratory: Curtis + Tompkins

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

Equipment Blank I.D.: Duplicate I.D.:

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

D.O. (if req'd): Fe^{+2} = 4.4 (Pre-purge):	2.9 mg/L	Post-purge:		mg/L
ORP (if req'd): (Pre-purge):	85 mV	Post-purge:		mV

WELL MONITORING DATA SHEET

Project #: 030327-MW-1	Client: Stellar Envir. Sol. @Redwood Reg. Park Oakland
Sampler: Dave W.	Start Date: 3-27
Well I.D.: MW-8	Well Diameter: (2) 3 4 6 8 ____
Total Well Depth: 22.21	Depth to Water: 9.35
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
- X Middleburg
- Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other____

Sampling Method: Bailer

- X Disposable Bailer
- Extraction Port
- Dedicated Tubing
- Other: ____

2.1 (Gals.) X 3 = 6.3 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
12:14	56.7	7.2	1000	>200	2.1	gas odor / Brown
12:16	56.9	7.1	1018	>200	4.2	
12:18	57.0	7.1	1029	>200	6.3	getting clearer gas odor very strong

Did well dewater? Yes (No) Gallons actually evacuated: 6.3

Sampling Time: Nitrate/Sulfate = 12:05 others = 12:23 Sampling Date: 3-27-03

Sample I.D.: MW-8 Laboratory: Curtis & Tompkins

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): Fe⁺² = 2.2	Pre-purge:	0.7 mg/L	Post-purge:	mg/L
ORP (if req'd):	Pre-purge:	138 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: 030327-DW-1	Client: Stellar Envir. Sol. @Redwood Reg. Park Oakland
Sampler: Dave W	Start Date: 3-27
Well I.D.: MW-9	Well Diameter: (2) 3 4 6 8 ____
Total Well Depth: 26.00	Depth to Water: 12.24
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
- X Middleburg
- Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other_____

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

2.2 (Gals.) X 3 = 6.6 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
13:41	60.0	8.5	783	>200	2.2	Brown
13:44	59.2	8.4	767	>200	4.4	
13:47	58.7	8.3	787	>200	6.6	

Did well dewater? Yes (No) Gallons actually evacuated: 6.6

Sampling Time: Nitrate/Sulfate = 13:35 Others = 13:52 Sampling Date: 3-27-03

Sample I.D.: MW-9 Laboratory: Curtis + Tompkins

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): FE++ = 0.2	(Pre-purge):	0.4 mg/L	Post-purge:	mg/L
ORP (if req'd):	(Pre-purge):	470 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: 030327-MW-1	Client: Stellar Envir. Sol. @Redwood Reg. Park Oakland
Sampler: Dave W.	Start Date: 3-27
Well I.D.: MW-10	Well Diameter: (2) 3 4 6 8 ___
Total Well Depth: 28.75	Depth to Water: 11.14
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
X Middleburg
Electric Submersible
Waterra
Peristaltic
Extraction Pump
Other_____

Sampling Method: Bailer

X Disposable Bailer
Extraction Port
Dedicated Tubing
Other: _____

2.8 (Gals.) X 3 = 8.4 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
11:41	59.7	8.6	703	199	3	
11:45	58.7	8.5	704	69	6	
11:49	57.9	8.7	721	90	9	

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

Sampling Time: Nitrate/Sulfate = 11:29 Others = 11:54 Sampling Date: 3-27-03

Sample I.D.: MW-10 Laboratory: Curtis & Tompkins

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): Fe^{+2} = 0	(Pre-purge):	3.2 mg/L	Post-purge:	mg/L
ORP (if req'd):	(Pre-purge):	139 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: 030327-BW-1	Client: Stellar Envir. Sol. @Redwood Reg. Park Oakland
Sampler: Dave W	Start Date: 3-27
Well I.D.: MW-11	Well Diameter: (2) 3 4 6 8 ____
Total Well Depth: 26.00	Depth to Water: 14.30
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
- X Middleburg
- Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other____

Sampling Method: Bailer

- X Disposable Bailer
- Extraction Port
- Dedicated Tubing
- Other: ____

1.9 (Gals.) X 3 = 5.7 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
13:16	59.3	6.9	1009	144	2	Odor
13:19	58.7	6.8	1020	>200	4	
13:21	58.3	6.8	1024	>200	6	

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

Sampling Time: Nitrate/Sulfate = 13:00 others = 13:27 Sampling Date: 3-27-03

Sample I.D.: MW-11 Laboratory: Curtis & Tompkins

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

Equipment Blank I.D.: Duplicate I.D.:

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

D.O. (if req'd): Fe⁺² = 3.2	(Pre-purge):	0.8 mg/L	Post-purge:	mg/L
ORP (if req'd):	(Pre-purge):	-40 mV	Post-purge:	mV

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710. Phone (510) 486-0900

A N A L Y T I C A L R E P O R T

Prepared for:

Stellar Environmental Solutions
2198 6th Street
Suite 201
Berkely, CA 94710

Date: 14-APR-03
Lab Job Number: 164435
Project ID: 030327-DW-1
Location: Redwood Regional Park

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

Reviewed by: _____
Project Manager

Reviewed by: _____
Operations Manager

STELLAR ENVIRONMENTAL SOLUTIONS

Chain of Custody Record

164435

Lab job no.:

Date 3-27-03

Page 1 of 2

Laboratory CURTIS & TOMPKINS

Address BERKELEY, CA

Client STELLAR ENV. SOL.

Address 2198 SIXTH ST. BERKELEY, CA

Project Name REDWOOD REGIONAL PARK

Project Number 030327-RW-1

Method of Shipment

Shipment No.

Airbill No.

Cooler No.

Project Manager BRUCE RUCKER

Telephone No. 510-644-3123

Fax No.

Samplers: (Signature) David C. Walter

Analysis Required

Field Sample Number	Location/ Depth	Date	Time	Sample Type	Type/Size of Container	Preservation Temp.	Preservation Chemical	Filtered?	No. of Containers	TPH-G, BTEX & TAME	TPH-D	NITRATE, SULFATE	Remarks
-1 MW-2		3-27	10:48	W			HCl, none		5	X	X		
-2 MW-3			9:15				none		1			X	
-3 MW-4			11:05				none		1			X	
MW-4			14:05				HCl, none		5	X	X		
-4 MW-7			12:38				none		1			X	
MW-7			12:53				HCl, none		5	X	X		
-5 MW-8			12:05				none		1			X	
MW-8			12:27				HCl, none		5	X	X		
-6 MW-9			13:35				none		1			X	
MW-9			12:52				HCl, none		5	X	X		
-7 MW-10			11:09				none		1			X	
MW-10			11:54				HCl, none		5	X	X		

Relinquished by:	Date	Received by:	Date	Relinquished by:	Date	Received by:	Date
Signature David C. Walter	3-27	Signature	3/27/03	Signature		Signature	
Printed David C. Walter	Time 155	Printed	Time 3:15	Printed	Time	Printed	Time
Company BTS		Company C&T		Company		Company	
Reason				Reason			

Comments:

Preservation Correct? ☐ Yes ☐ No ☒ N/A

Received ☐ On Ice ☒ Cold ☐ Ambient ☐ Intact

16943

Chain of Custody Record

Date 3-27-03

Page 2 of 2

Laboratory C+T

Address Berkeley

Client Stellar Env. Sol

Address 2198 Sixth St Berkeley Ca

Project Name Redwood Regional Park

Project Number 030327-DW-1

Method of Shipment

Shipment No.

Airbill No.

Cooler No.

Project Manager Bruce Rucker

Telephone No. 510-644-3123

Fax. No.

Samplers: (Signature) David C Walt

Analysis Required

	Field Sample Number	Location/Depth	Date	Time	Sample Type	Type/Size of Container	Preservation Temp.	Preservation Chemical	Filtered	No. of Containers	TPH-G BTEX&MTBE	TPH-D	NITRATE/SULFATE									Remarks
-8	mw-11		3-27	13:00	W			none		1			X									
	mw-11			13:17				HCL/none		5	X	X										

Relinquished by:	Date	Received by:	Date	Relinquished by:	Date	Received by:	Date
Signature David C Walt	3-27	Signature [signature]	3/27/03	Signature		Signature	
Printed David C Walker	Time	Printed A. Alvarez	Time	Printed	Time	Printed	Time
Company BTS	15:15	Company C+T	3:15	Company		Company	
Reason				Reason			

Relinquished by:	Date	Received by:	Date
Signature		Signature	
Printed	Time	Printed	Time
Company		Company	
Reason			

Comments:

SES-2110 Sixth Street, Berkeley, CA 95710

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	STANDARD		
Matrix:	Water	Sampled:	03/27/03
Units:	ug/L	Received:	03/27/03
Batch#:	80329		

Field ID:	MW-2	Diln Fac:	1.000
Type:	SAMPLE	Analyzed:	03/27/03
Lab ID:	164435-001		

Analyte	Result	RL	Analysis
Gasoline C7-C12	130	50	8015B
MTBE	16	2.0	EPA 8021B
Benzene	39	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	20	0.50	EPA 8021B
m,p-Xylenes	3.4	0.50	EPA 8021B
o-Xylene	0.73	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	99	68-145	8015B
Bromofluorobenzene (FID)	100	66-143	8015B
Trifluorotoluene (PID)	96	53-143	EPA 8021B
Bromofluorobenzene (PID)	100	52-142	EPA 8021B

Field ID:	MW-4	Diln Fac:	1.000
Type:	SAMPLE	Analyzed:	03/27/03
Lab ID:	164435-003		

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

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	101	68-145	8015B
Bromofluorobenzene (FID)	104	66-143	8015B
Trifluorotoluene (PID)	98	53-143	EPA 8021B
Bromofluorobenzene (PID)	104	52-142	EPA 8021B

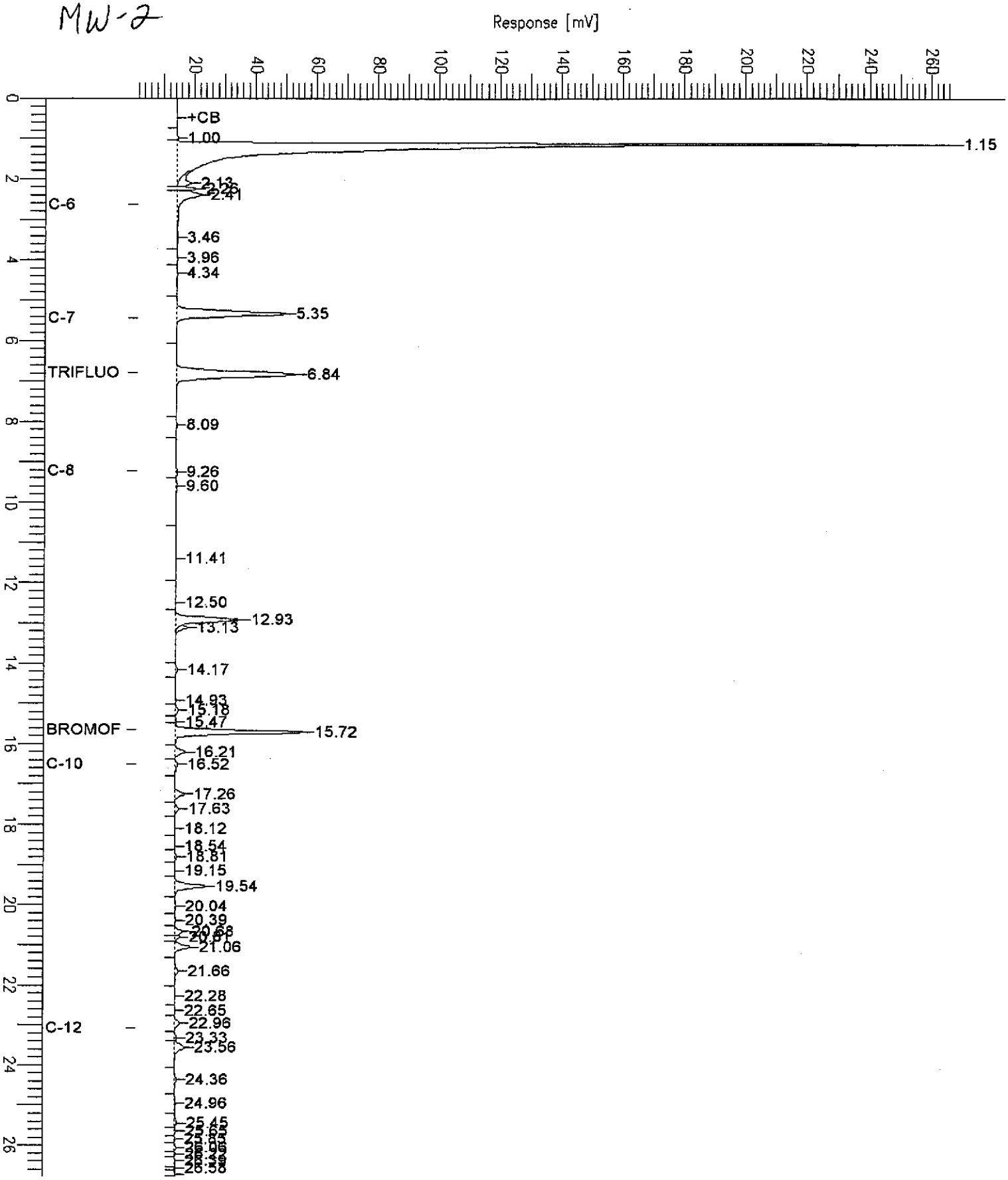
C= Presence confirmed, but RPD between columns exceeds 40%
ND= Not Detected
RL= Reporting Limit

GC19 TVH 'X' Data File (FID)

Sample Name : 164435-001,80329
FileName : G:\GC19\DATA\086x016.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: 1.0 Plot Offset: 2 mV

Sample #: c1 Page 1 of 1
Date : 3/28/03 09:24 AM
Time of Injection: 3/27/03 07:01 PM
Low Point : 1.52 mV High Point : 267.52 mV
Plot Scale: 266.0 mV

MW-2



Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	STANDARD		
Matrix:	Water	Sampled:	03/27/03
Units:	ug/L	Received:	03/27/03
Batch#:	80329		

Field ID:	MW-7	Diln Fac:	5.000
Type:	SAMPLE	Analyzed:	03/27/03
Lab ID:	164435-004		

Analyte	Result	RL	Analysis
Gasoline C7-C12	10,000	250	8015B
MTBE	45 C	10	EPA 8021B
Benzene	210	2.5	EPA 8021B
Toluene	12 C	2.5	EPA 8021B
Ethylbenzene	360	2.5	EPA 8021B
m,p-Xylenes	140	2.5	EPA 8021B
o-Xylene	3.4	2.5	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	114	68-145	8015B
Bromofluorobenzene (FID)	103	66-143	8015B
Trifluorotoluene (PID)	111	53-143	EPA 8021B
Bromofluorobenzene (PID)	101	52-142	EPA 8021B

Field ID:	MW-8	Diln Fac:	5.000
Type:	SAMPLE	Analyzed:	03/27/03
Lab ID:	164435-005		

Analyte	Result	RL	Analysis
Gasoline C7-C12	13,000	250	8015B
MTBE	ND	10	EPA 8021B
Benzene	610	2.5	EPA 8021B
Toluene	12	2.5	EPA 8021B
Ethylbenzene	1,100	2.5	EPA 8021B
m,p-Xylenes	900	2.5	EPA 8021B
o-Xylene	58	2.5	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	123	68-145	8015B
Bromofluorobenzene (FID)	101	66-143	8015B
Trifluorotoluene (PID)	122	53-143	EPA 8021B
Bromofluorobenzene (PID)	101	52-142	EPA 8021B

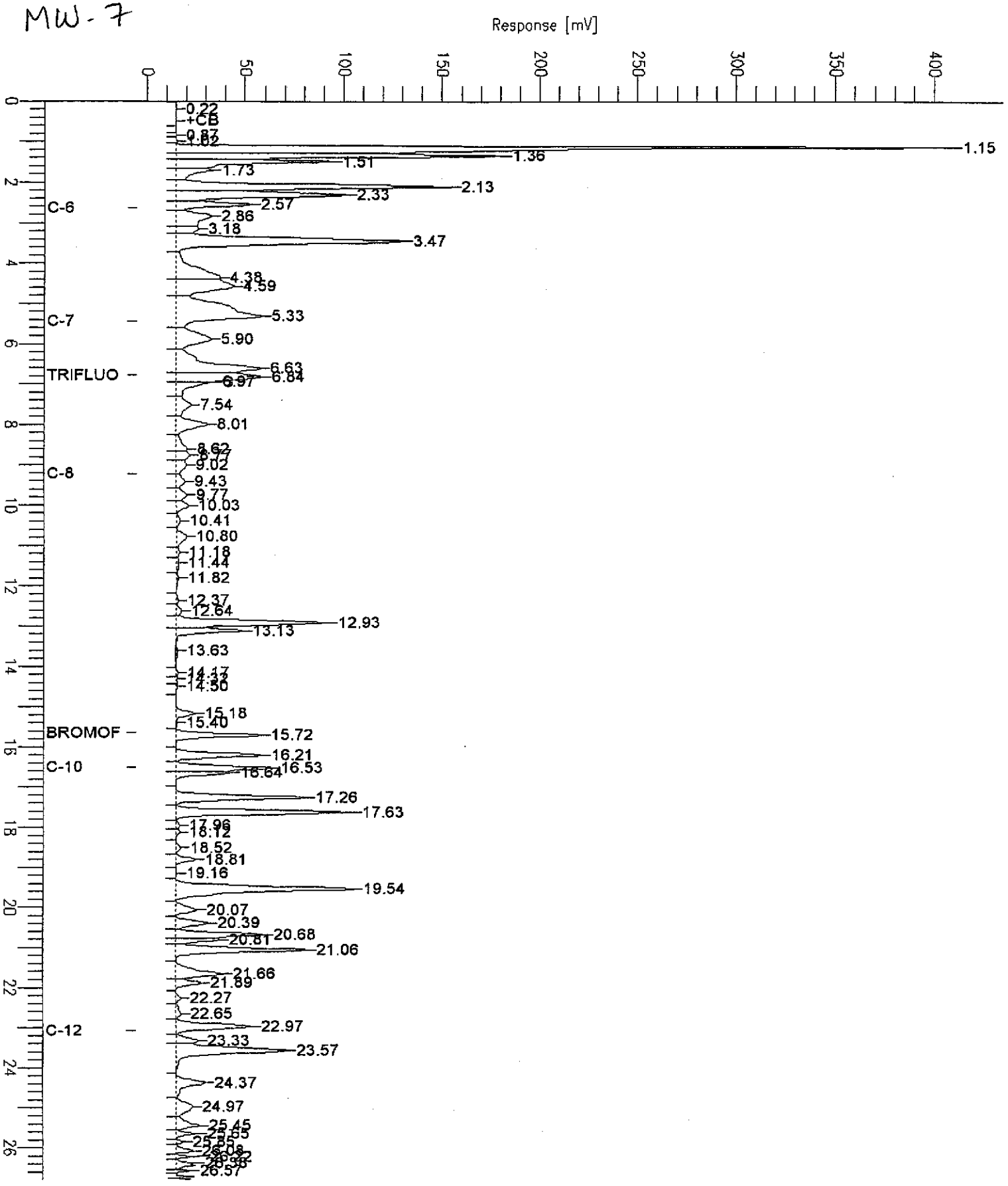
C= Presence confirmed, but RPD between columns exceeds 40%
ND= Not Detected
RL= Reporting Limit

GC19 TVH 'X' Data File (FID)

Sample Name : 164435-004,80329
FileName : G:\GC19\DATA\086X021.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: 1.0 Plot Offset: -5 mV

Sample #: d1 Page 1 of 1
Date : 3/28/03 10:50 AM
Time of Injection: 3/27/03 09:51 PM
Low Point : -5.11 mV High Point : 409.91 mV
Plot Scale: 415.0 mV

MW-7

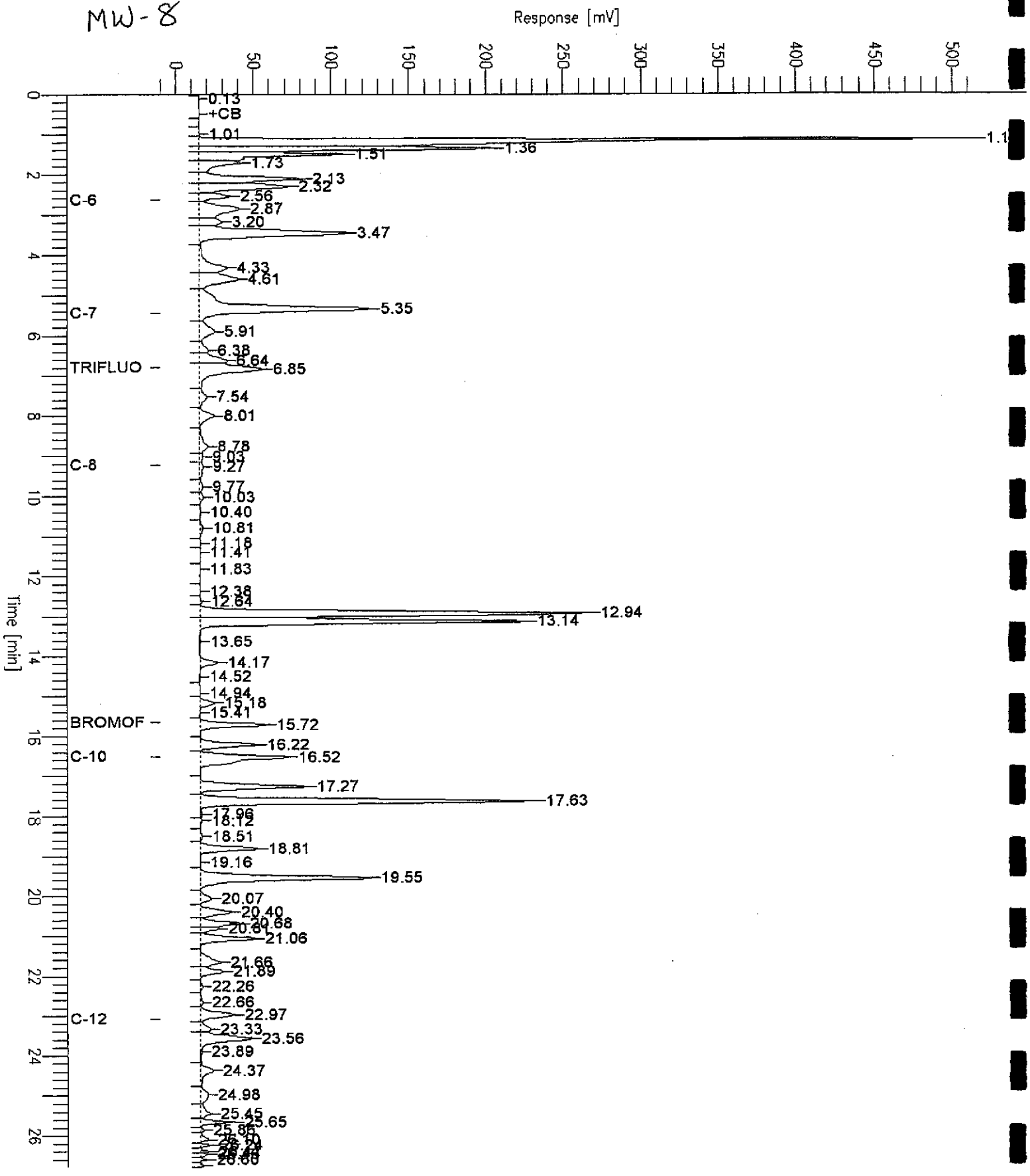


GC19 TVH 'X' Data File (FID)

Sample Name : 164435-005,80329
FileName : G:\GC19\DATA\086x023.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: 1.0 Plot Offset: -10 mV

Sample #: d1 Page 1 of 1
Date : 3/28/03 09:25 AM
Time of Injection: 3/27/03 10:59 PM
Low Point : -10.30 mV High Point : 515.75 mV
Plot Scale: 526.0 mV

MW-8



Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	STANDARD		
Matrix:	Water	Sampled:	03/27/03
Units:	ug/L	Received:	03/27/03
Batch#:	80329		

Field ID: MW-9 Diln Fac: 1.000
Type: SAMPLE Analyzed: 03/27/03
Lab ID: 164435-006

Analyte	Result	RL	Analysis
Gasoline C7-C12	4,400	50	8015B
MTBE	ND	2.0	EPA 8021B
Benzene	320	0.50	EPA 8021B
Toluene	6.9	0.50	EPA 8021B
Ethylbenzene	400	0.50	EPA 8021B
m,p-Xylenes	87	0.50	EPA 8021B
o-Xylene	6.2	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	123	68-145	8015B
Bromofluorobenzene (FID)	108	66-143	8015B
Trifluorotoluene (PID)	120	53-143	EPA 8021B
Bromofluorobenzene (PID)	105	52-142	EPA 8021B

Field ID: MW-10 Diln Fac: 1.000
Type: SAMPLE Analyzed: 03/27/03
Lab ID: 164435-007

Analyte	Result	RL	Analysis
Gasoline C7-C12	110	50	8015B
MTBE	15	2.0	EPA 8021B
Benzene	11	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	12	0.50	EPA 8021B
m,p-Xylenes	1.3	0.50	EPA 8021B
o-Xylene	ND	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	112	68-145	8015B
Bromofluorobenzene (FID)	108	66-143	8015B
Trifluorotoluene (PID)	103	53-143	EPA 8021B
Bromofluorobenzene (PID)	107	52-142	EPA 8021B

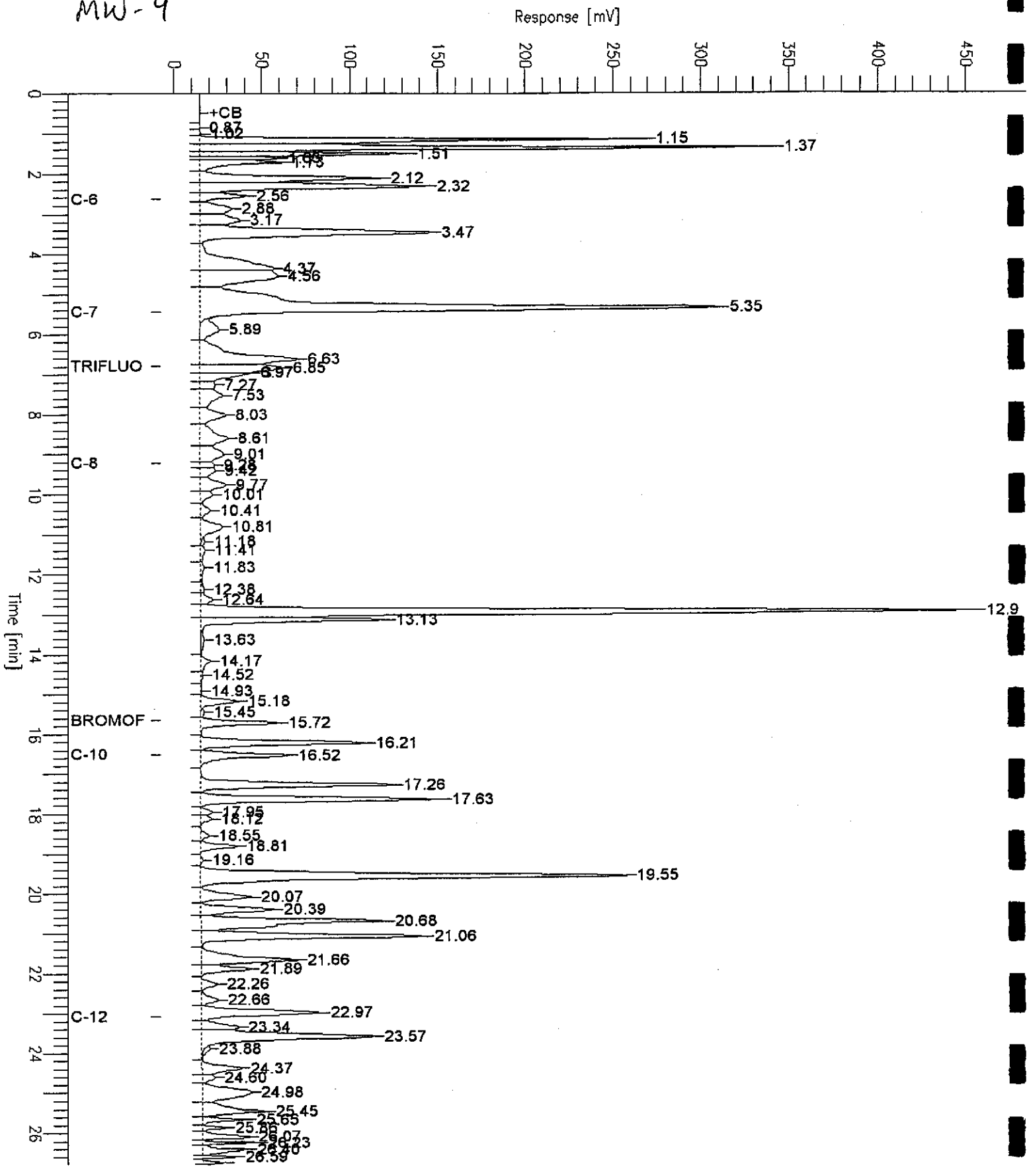
C= Presence confirmed, but RPD between columns exceeds 40%
ND= Not Detected
RL= Reporting Limit

GC19 TVH 'X' Data File (FID)

Sample Name : 164435-006,80329
FileName : G:\GC19\DATA\086X019.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: 1.0 Plot Offset: -8 mV

Sample #: d1 Page 1 of 1
Date : 3/28/03 10:17 AM
Time of Injection: 3/27/03 08:44 PM
Low Point : -7.58 mV High Point : 455.92 mV
Plot Scale: 463.5 mV

MW-9

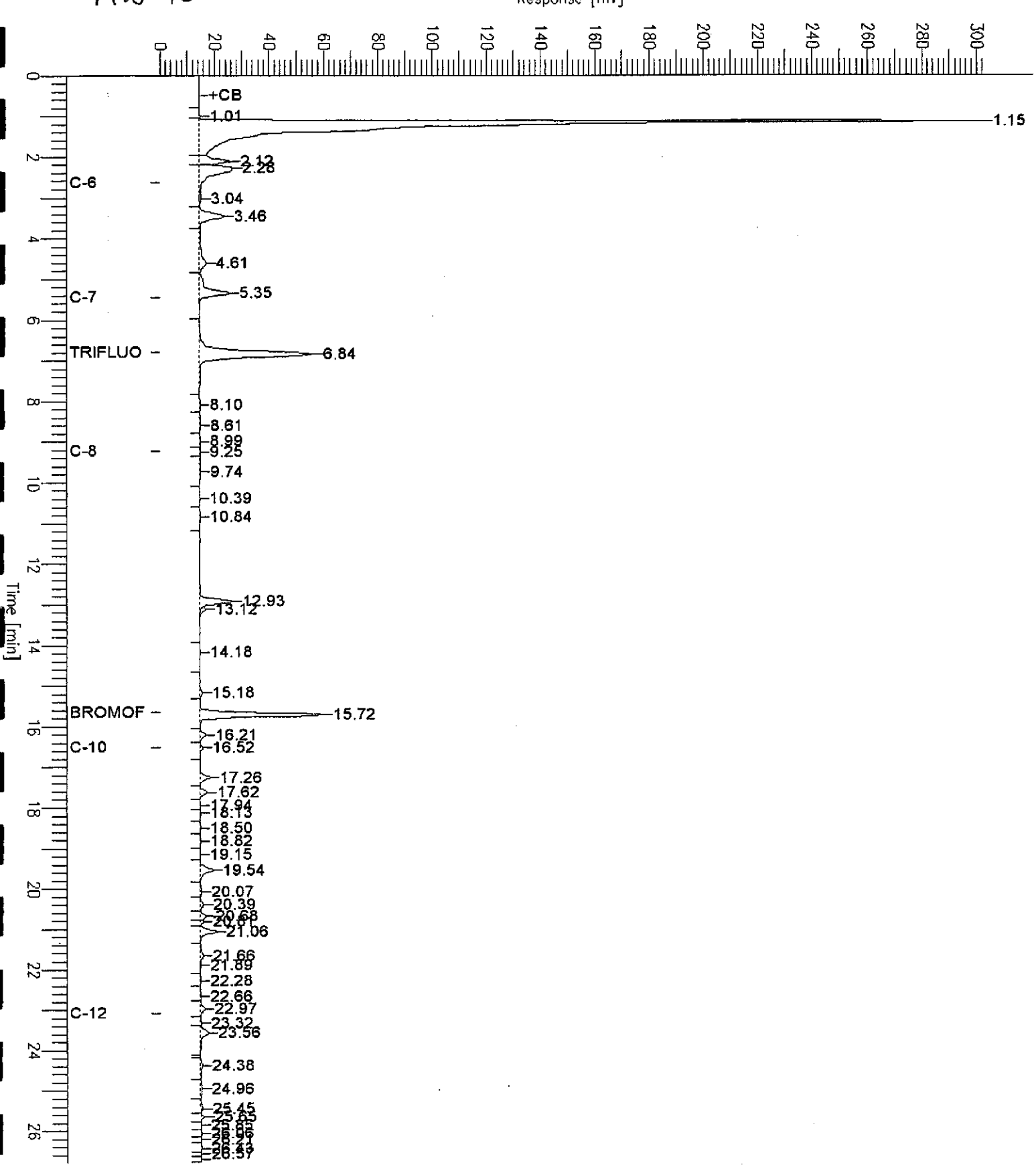


GC19 TVH 'X' Data File (FID)

Sample Name : 164435-007,80329
FileName : G:\GC19\DATA\086x018.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: 1.0 Plot Offset: -0 mV

Sample #: d1 Page 1 of 1
Date : 3/28/03 09:24 AM
Time of Injection: 3/27/03 08:09 PM
Low Point : -0.15 mV High Point : 302.40 mV
Plot Scale: 302.5 mV

MW-10



Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	STANDARD		
Matrix:	Water	Sampled:	03/27/03
Units:	ug/L	Received:	03/27/03
Batch#:	80329		

Field ID:	MW-11	Diln Fac:	5.000
Type:	SAMPLE	Analyzed:	03/28/03
Lab ID:	164435-008		

Analyte	Result	RL	Analysis
Gasoline C7-C12	7,800	250	8015B
MTBE	53 C	10	EPA 8021B
Benzene	170	2.5	EPA 8021B
Toluene	4.7 C	2.5	EPA 8021B
Ethylbenzene	530	2.5	EPA 8021B
m,p-Xylenes	330	2.5	EPA 8021B
o-Xylene	6.8	2.5	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	130	68-145	8015B
Bromofluorobenzene (FID)	102	66-143	8015B
Trifluorotoluene (PID)	105	53-143	EPA 8021B
Bromofluorobenzene (PID)	101	52-142	EPA 8021B

Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC209215	Analyzed:	03/27/03

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

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	93	68-145	8015B
Bromofluorobenzene (FID)	96	66-143	8015B
Trifluorotoluene (PID)	92	53-143	EPA 8021B
Bromofluorobenzene (PID)	97	52-142	EPA 8021B

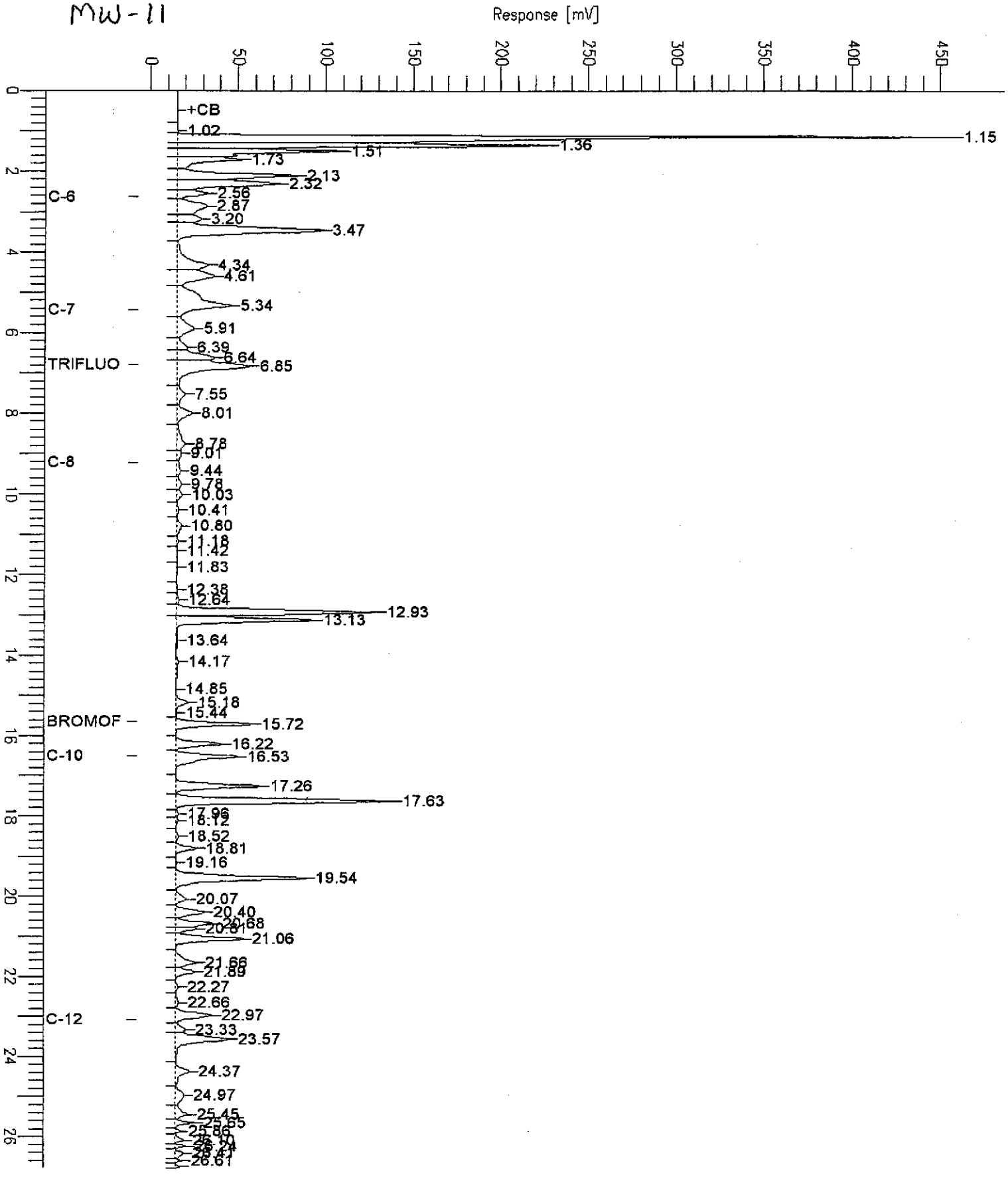
C= Presence confirmed, but RPD between columns exceeds 40%
ND= Not Detected
RL= Reporting Limit

GC19 TVH 'X' Data File (FID)

Sample Name : 164435-008,80329
FileName : G:\GC19\DATA\086x025.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: 1.0 Plot Offset: -7 mV

Sample #: d1 Page 1 of 1
Date : 3/28/03 09:25 AM
Time of Injection: 3/28/03 12:07 AM
Low Point : -7.21 mV High Point : 457.89 mV
Plot Scale: 465.1 mV

MW-11

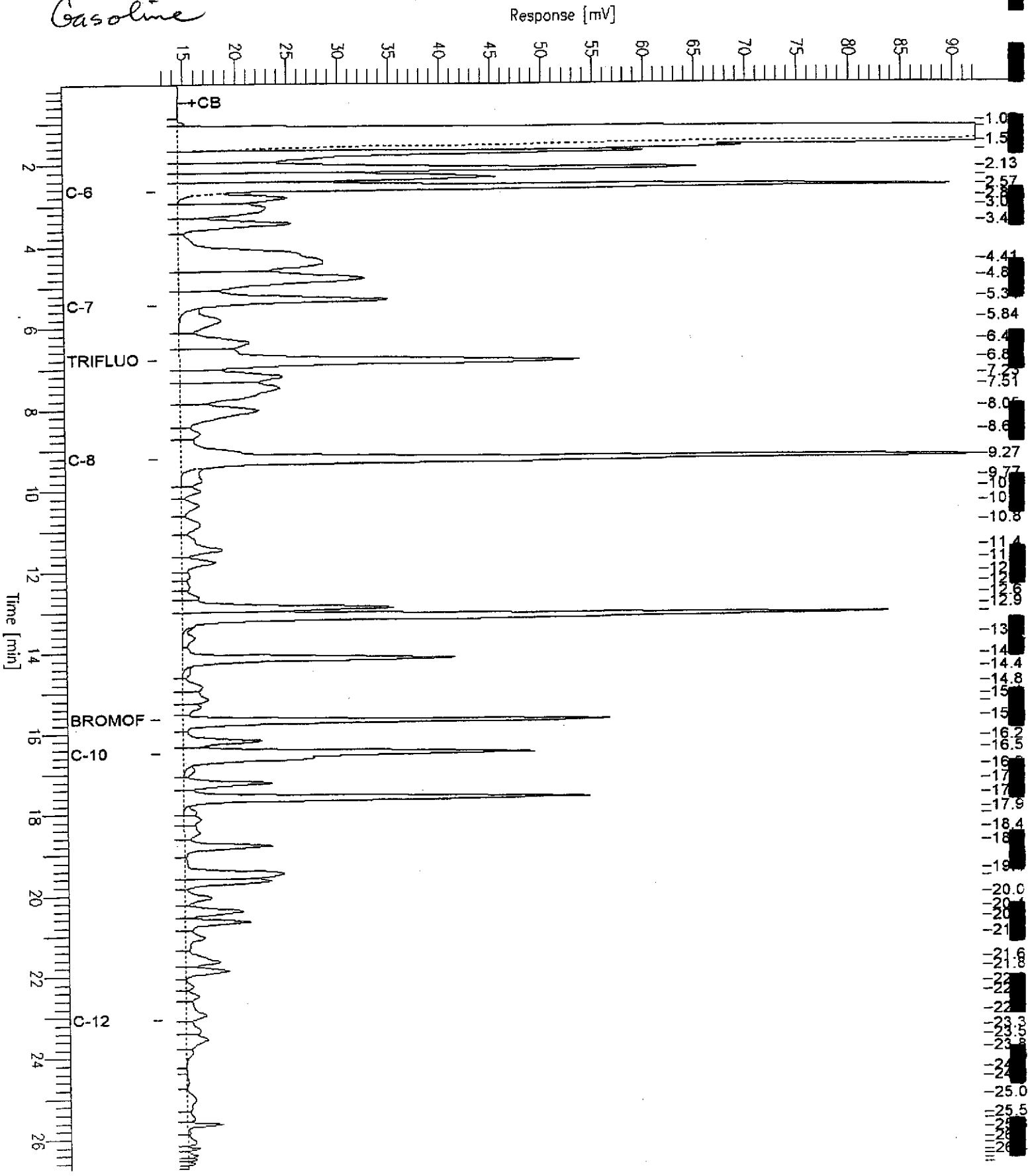


GC19 TVH 'X' Data File (FID)

Sample Name : ccv/lcs,qc209217,80329,03ws0417,2.5/5000
FileName : G:\GC19\DATA\086X002.RAW
Method :
Start Time : 0.07 min End Time : 26.75 min
Scale Factor: 0.0 Plot Offset: 12 mV

Sample #: Page 1 of 1
Date : 3/28/03 11:31 AM
Time of Injection: 3/27/03 10:25 AM
Low Point : 12.31 mV High Point : 92.23 mV
Plot Scale: 79.9 mV

Gasoline



Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	STANDARD	Analysis:	8015B
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC209217	Batch#:	80329
Matrix:	Water	Analyzed:	03/27/03
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	1,000	1,034	103	79-120
MTBE		NA		
Benzene		NA		
Toluene		NA		
Ethylbenzene		NA		
m,p-Xylenes		NA		
o-Xylene		NA		

Surrogate	Result	%REC	Limits
Trifluorotoluene (FID)		114	68-145
Bromofluorobenzene (FID)		99	66-143
Trifluorotoluene (PID)	NA		
Bromofluorobenzene (PID)	NA		

NA= Not Analyzed

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	STANDARD		
Type:	BS	Diln Fac:	1.000
Lab ID:	QC209216	Batch#:	80329
Matrix:	Water	Analyzed:	03/27/03
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits	Analysis
Gasoline C7-C12		NA			
MTBE	10.00	9.876	99	51-125	EPA 8021B
Benzene	10.00	9.958	100	65-122	EPA 8021B
Toluene	10.00	9.457	95	67-121	EPA 8021B
Ethylbenzene	10.00	9.705	97	70-121	EPA 8021B
m,p-Xylenes	20.00	19.65	98	72-125	EPA 8021B
o-Xylene	10.00	10.10	101	73-122	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	95	68-145	8015B
Bromofluorobenzene (FID)	98	66-143	8015B
Trifluorotoluene (PID)	94	53-143	EPA 8021B
Bromofluorobenzene (PID)	99	52-142	EPA 8021B

NA= Not Analyzed

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	STANDARD		
Type:	BSD	Diln Fac:	1.000
Lab ID:	QC209287	Batch#:	80329
Matrix:	Water	Analyzed:	03/27/03
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits	RPD	Lim	Analysis
Gasoline C7-C12		NA					
MTBE	20.00	20.71	104	51-125	5	20	EPA 8021B
Benzene	20.00	19.76	99	65-122	1	20	EPA 8021B
Toluene	20.00	18.69	93	67-121	1	20	EPA 8021B
Ethylbenzene	20.00	19.35	97	70-121	0	20	EPA 8021B
m,p-Xylenes	40.00	38.43	96	72-125	2	20	EPA 8021B
o-Xylene	20.00	20.14	101	73-122	0	20	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	98	68-145	8015B
Bromofluorobenzene (FID)	98	66-143	8015B
Trifluorotoluene (PID)	96	53-143	EPA 8021B
Bromofluorobenzene (PID)	98	52-142	EPA 8021B

NA= Not Analyzed
RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	STANDARD	Analysis:	8015B
Field ID:	ZZZZZZZZZZ	Batch#:	80329
MSS Lab ID:	164425-001	Sampled:	03/27/03
Matrix:	Water	Received:	03/27/03
Units:	ug/L	Analyzed:	03/27/03
Diln Fac:	1.000		

Type: MS Lab ID: QC209285

Analyte	MSS Result	Spiked	Result	%REC	Limit
Gasoline C7-C12	25.91	2,000	2,062	102	67-12
MTBE			NA		
Benzene			NA		
Toluene			NA		
Ethylbenzene			NA		
m,p-Xylenes			NA		
o-Xylene			NA		

Surrogate	Result	%REC	Limits
Trifluorotoluene (FID)		118	68-145
Bromofluorobenzene (FID)		106	66-143
Trifluorotoluene (PID)	NA		
Bromofluorobenzene (PID)	NA		

Type: MSD Lab ID: QC209286

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	2,000	2,082	103	67-120	1	20
MTBE		NA				
Benzene		NA				
Toluene		NA				
Ethylbenzene		NA				
m,p-Xylenes		NA				
o-Xylene		NA				

Surrogate	Result	%REC	Limits
Trifluorotoluene (FID)		117	68-145
Bromofluorobenzene (FID)		106	66-143
Trifluorotoluene (PID)	NA		
Bromofluorobenzene (PID)	NA		

NA= Not Analyzed
RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Total Extractable Hydrocarbons

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	030327-DW-1	Analysis:	EPA 8015B
Matrix:	Water	Sampled:	03/27/03
Units:	ug/L	Received:	03/27/03
Diln Fac:	1.000	Prepared:	03/31/03
Batch#:	80432		

Field ID:	MW-2	Lab ID:	164435-001
Type:	SAMPLE	Analyzed:	04/02/03

Analyte	Result	RL
Diesel C10-C24	82 L Y	50

Surrogate	%REC	Limits
Hexacosane	97	39-137

Field ID:	MW-4	Lab ID:	164435-003
Type:	SAMPLE	Analyzed:	04/02/03

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
Hexacosane	106	39-137

Field ID:	MW-7	Lab ID:	164435-004
Type:	SAMPLE	Analyzed:	04/02/03

Analyte	Result	RL
Diesel C10-C24	3,600 L Y	50

Surrogate	%REC	Limits
Hexacosane	98	39-137

Field ID:	MW-8	Lab ID:	164435-005
Type:	SAMPLE	Analyzed:	04/02/03

Analyte	Result	RL
Diesel C10-C24	3,500 L Y	50

Surrogate	%REC	Limits
Hexacosane	106	39-137

Field ID:	MW-9	Lab ID:	164435-006
Type:	SAMPLE	Analyzed:	04/02/03

Analyte	Result	RL
Diesel C10-C24	1,400 L Y	50

Surrogate	%REC	Limits
Hexacosane	104	39-137

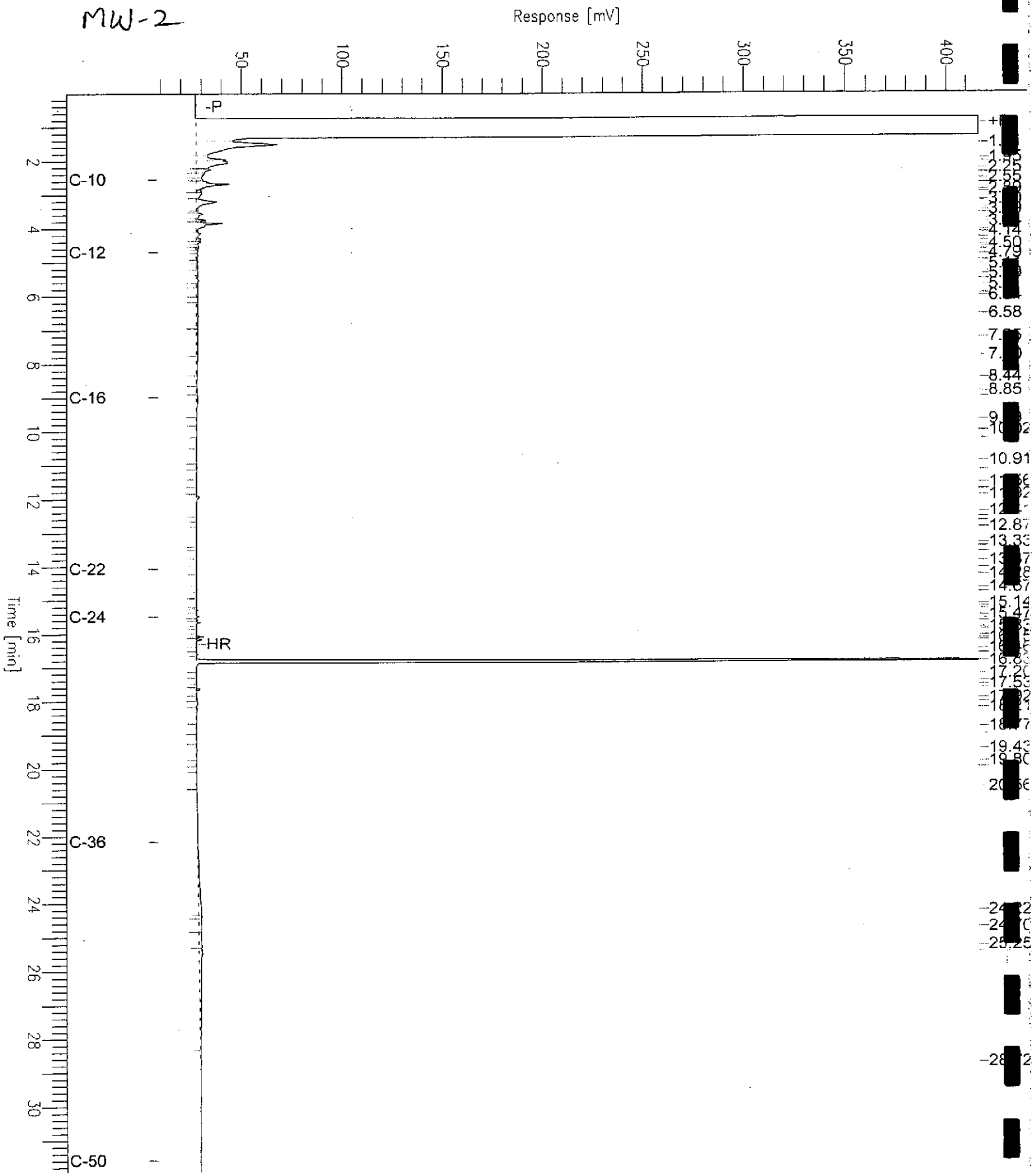
L= Lighter hydrocarbons contributed to the quantitation
Y= Sample exhibits chromatographic pattern which does not resemble standard
ND= Not Detected
RL= Reporting Limit

Chromatogram

Sample Name : 164435-001,80432
FileName : G:\GC11\CHA\090A065.RAW
Method : ATEH084.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 9 mV

Sample #: 80432 Page 1 of 1
Date : 4/2/03 11:55 AM
Time of Injection: 4/2/03 09:00 AM
Low Point : 8.57 mV High Point : 416.21 mV
Plot Scale: 407.6 mV

MW-2

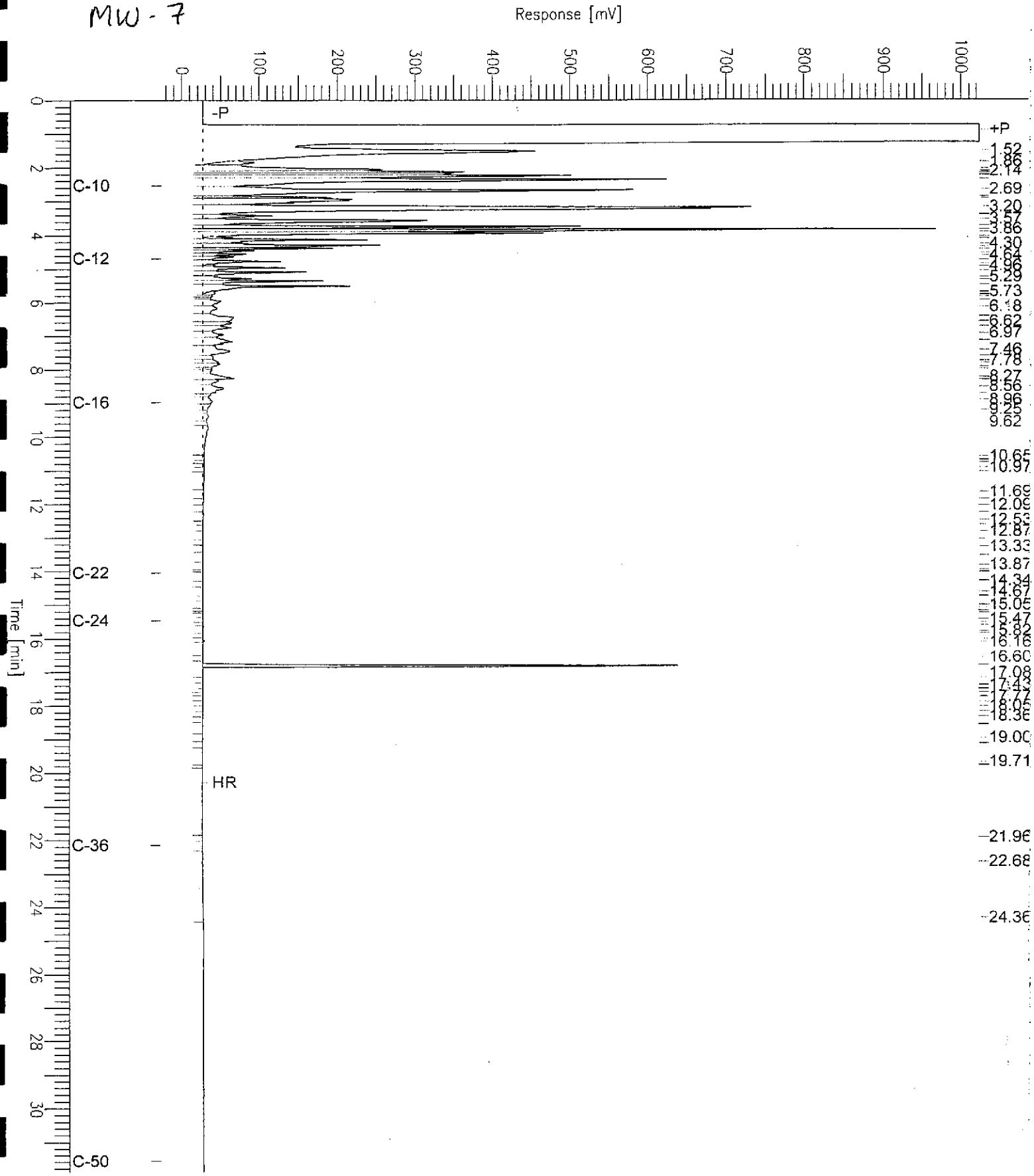


Chromatogram

Sample Name : 164435-004,80432
FileName : G:\GC11\CHA\090A067.RAW
Method : ATEH084.MTH
Start Time : 0.00 min End Time : 31.90 min
Scale Factor: 0.0 Plot Offset: -26 mV

Sample #: 80432 Page 1 of 1
Date : 4/2/03 11:57 AM
Time of Injection: 4/2/03 10:20 AM
Low Point : -25.77 mV High Point : 1024.00 mV
Plot Scale: 1049.8 mV

MW-7

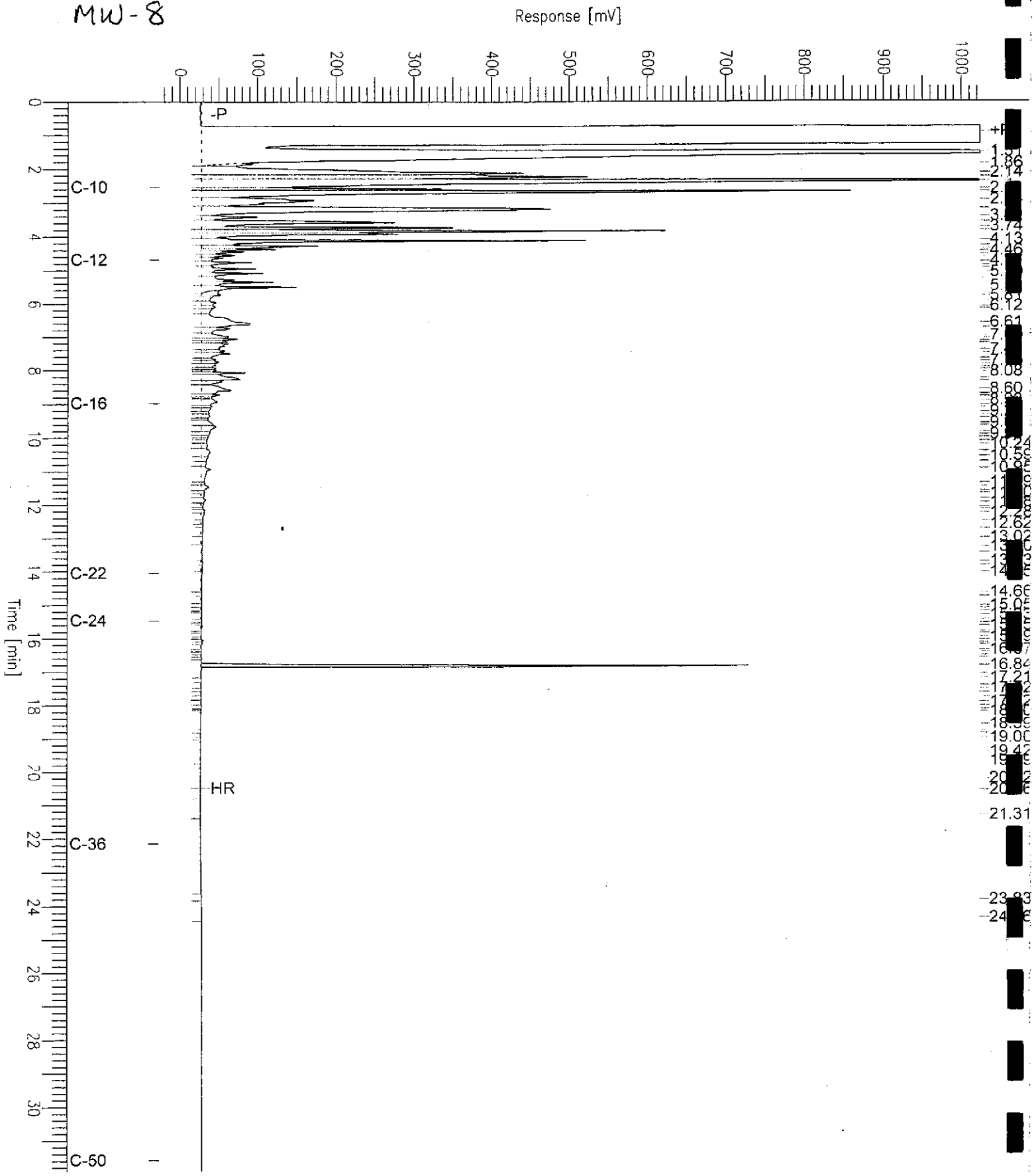


Chromatogram

Sample Name : 164435-005,80432
FileName : G:\GC11\CHA\090A068.RAW
Method : ATEH084.MTH
Start Time : 0.00 min End Time : 31.90 min
Scale Factor: 0.0 Plot Offset: -26 mV

Sample #: 80432 Page 1 of 1
Date : 4/2/03 11:57 AM
Time of Injection: 4/2/03 11:01 AM
Low Point : -26.02 mV High Point : 1024.00 mV
Plot Scale: 1050.0 mV

MW-8

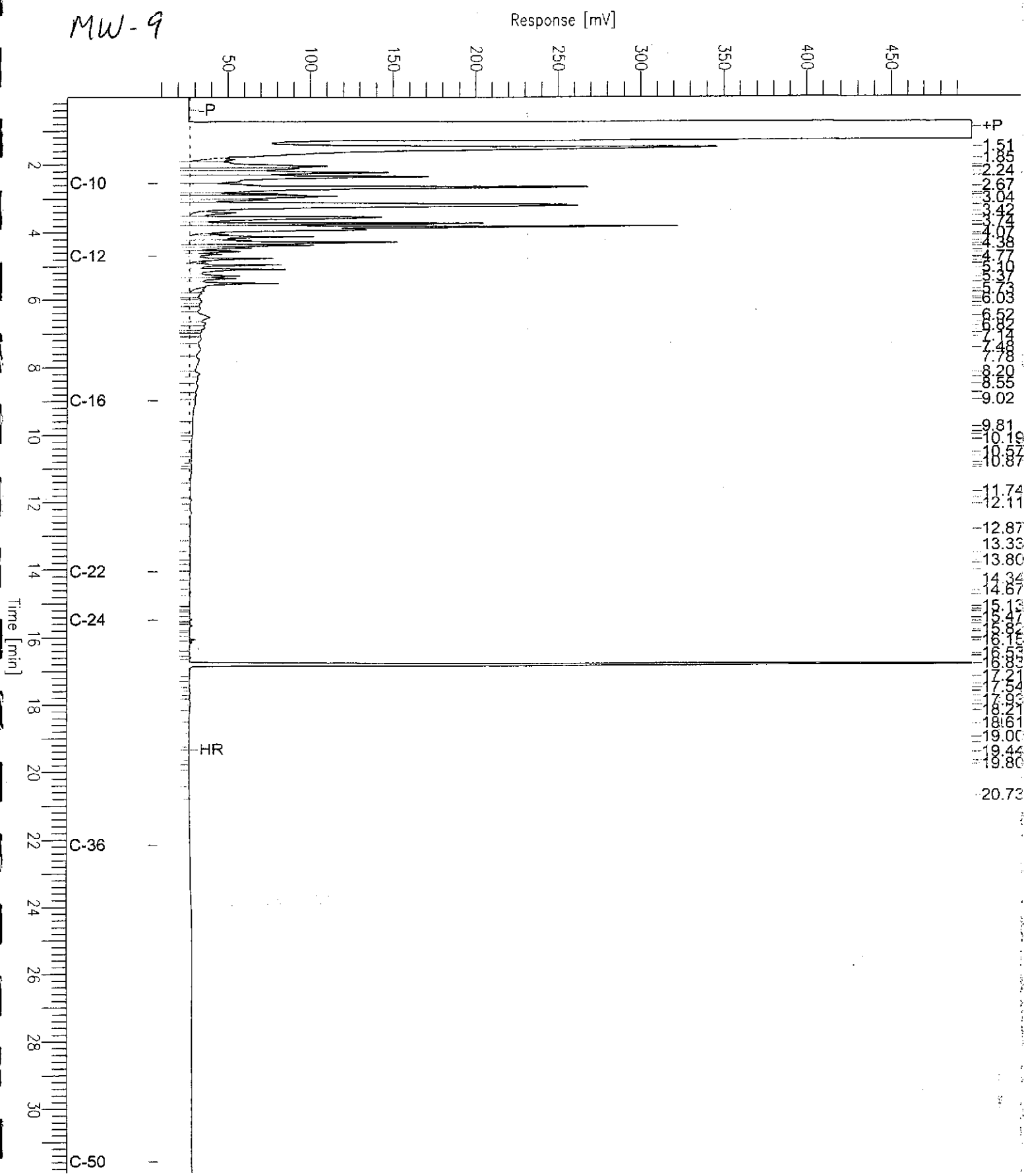


Chromatogram

Sample Name : 164435-006,80432
FileName : G:\GC11\CHA\090A069.RAW
Method : ATEH084.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 8 mV

Sample #: 80432 Page 1 of 1
Date : 4/2/03 12:46 PM
Time of Injection: 4/2/03 11:41 AM
Low Point : 7.79 mV High Point : 498.83 mV
Plot Scale: 491.0 mV

MW-9



Curtis & Tompkins, Ltd.

Total Extractable Hydrocarbons

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	030327-DW-1	Analysis:	EPA 8015B
Matrix:	Water	Sampled:	03/27/03
Units:	ug/L	Received:	03/27/03
Diln Fac:	1.000	Prepared:	03/31/03
Batch#:	80432		

Field ID:	MW-10	Lab ID:	164435-007
Type:	SAMPLE	Analyzed:	04/03/03

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
Hexacosane	92	39-137

Field ID:	MW-11	Lab ID:	164435-008
Type:	SAMPLE	Analyzed:	04/03/03

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

Surrogate	%REC	Limits
Hexacosane	104	39-137

Type:	BLANK	Analyzed:	04/02/03
Lab ID:	QC209620		

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
Hexacosane	102	39-137

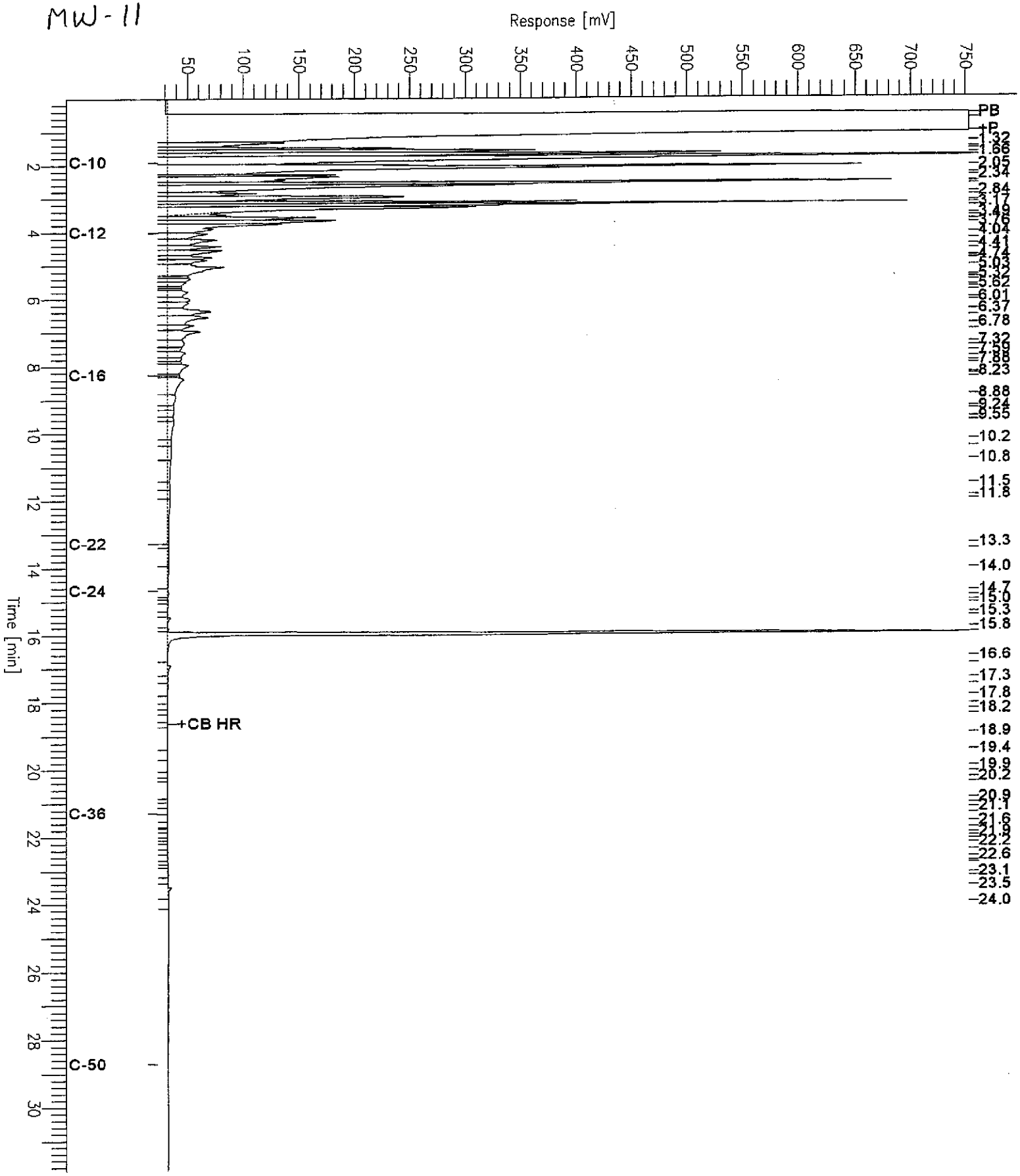
L= Lighter hydrocarbons contributed to the quantitation
Y= Sample exhibits chromatographic pattern which does not resemble standard
ND= Not Detected
RL= Reporting Limit

Chromatogram

Sample Name : 164435-008,80432
FileName : G:\GC15\CHB\091B070.RAW
Method : BTEH091.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 23 mV

Sample #: 80432 Page 1 of 1
Date : 4/4/03 08:35 AM
Time of Injection: 4/3/03 02:48 PM
Low Point : 23.34 mV High Point : 753.14 mV
Plot Scale: 729.8 mV

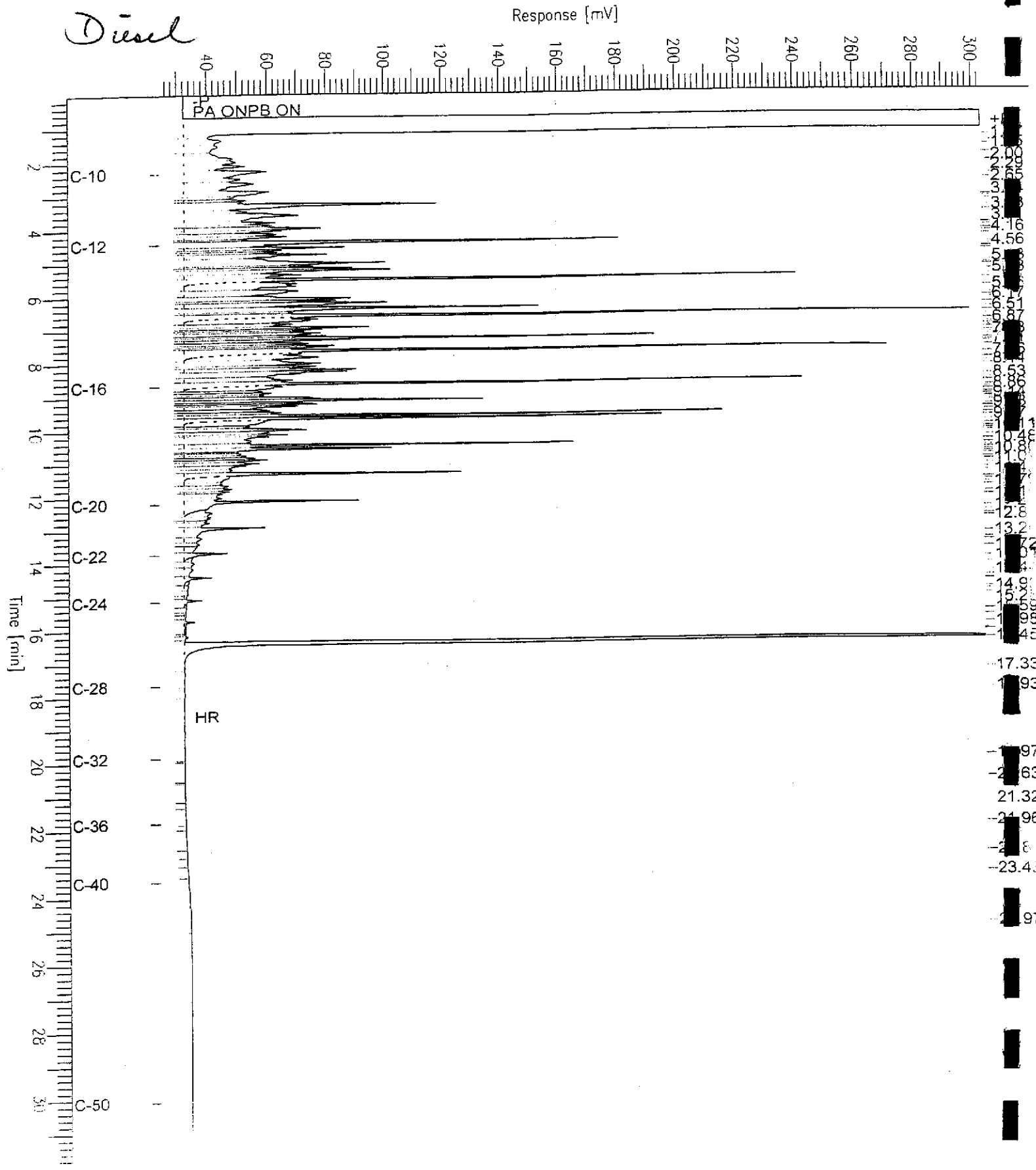
MW-11



Chromatogram

Sample Name : ccv,03ws0276,dsl
FileName : G:\GC13\CHB\090B008.RAW
Method : BTEH083.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 24 mV

Sample #: 500mg/L
Date : 3/31/03 06:37 PM
Time of Injection: 3/31/03 05:52 PM
Low Point : 24.33 mV High Point : 303.00 mV
Plot Scale: 278.7 mV



Curtis & Tompkins, Ltd.

Total Extractable Hydrocarbons

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	030327-DW-1	Analysis:	EPA 8015B
Matrix:	Water	Batch#:	80432
Units:	ug/L	Prepared:	03/31/03
Diln Fac:	1.000	Analyzed:	04/02/03

Type: BS Lab ID: QC209621

Analyte	Spiked	Result	%REC	Limits
Diesel C10-C24	2,500	2,391	96	37-120

Surrogate	%REC	Limits
Hexacosane	104	39-137

Type: BSD Lab ID: QC209622

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Diesel C10-C24	2,500	2,471	99	37-120	3	26

Surrogate	%REC	Limits
Hexacosane	111	39-137

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Nitrate Nitrogen

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Analysis:	EPA 300.0
Project#:	030327-DW-1		
Analyte:	Nitrogen, Nitrate	Batch#:	80412
Matrix:	Water	Sampled:	03/27/03
Units:	mg/L	Received:	03/27/03
Diln Fac:	1.000	Analyzed:	03/28/03

Field ID	Type	Lab ID	Result	RL
MW-3	SAMPLE	164435-002	ND	0.05
MW-4	SAMPLE	164435-003	0.28	0.05
MW-7	SAMPLE	164435-004	ND	0.05
MW-8	SAMPLE	164435-005	ND	0.05
MW-9	SAMPLE	164435-006	ND	0.05
MW-10	SAMPLE	164435-007	0.22	0.05
MW-11	SAMPLE	164435-008	ND	0.05
	BLANK	QC209545	ND	0.05

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Nitrate Nitrogen

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Analysis:	EPA 300.0
Project#:	030327-DW-1		
Analyte:	Nitrogen, Nitrate	Batch#:	80412
Field ID:	ZZZZZZZZZZ	Sampled:	03/17/03
MSS Lab ID:	164236-004	Received:	03/18/03
Matrix:	Water	Analyzed:	03/28/03
Units:	mg/L		

Type	Lab ID	MSS Result	Spiked	Result	%REC	Limits	RPD	Lim	Dil Fac
BS	QC209546		1.000	0.9814	98	90-110			1.000
BSD	QC209547		1.000	0.9556	96	90-110	3	20	1.000
MS	QC209548	8.388	50.00	58.11	99	80-120			100.0
MSD	QC209549		50.00	54.88	93	80-120	6	20	100.0

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Sulfate

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Analysis:	EPA 300.0
Project#:	030327-DW-1		
Analyte:	Sulfate	Sampled:	03/27/03
Matrix:	Water	Received:	03/27/03
Units:	mg/L	Analyzed:	03/28/03
Batch#:	80412		

Field ID	Type	Lab ID	Result	RL	Dil Fac
MW-3	SAMPLE	164435-002	35	0.50	1.000
MW-4	SAMPLE	164435-003	48	0.50	1.000
MW-7	SAMPLE	164435-004	ND	0.50	1.000
MW-8	SAMPLE	164435-005	21	0.50	1.000
MW-9	SAMPLE	164435-006	65	1.0	2.000
MW-10	SAMPLE	164435-007	72	1.0	2.000
MW-11	SAMPLE	164435-008	10	0.50	1.000
	BLANK	QC209545	ND	0.50	1.000

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Sulfate

Lab #:	164435	Location:	Redwood Regional Park
Client:	Stellar Environmental Solutions	Analysis:	EPA 300.0
Project#:	030327-DW-1		
Analyte:	Sulfate	Batch#:	80412
Field ID:	ZZZZZZZZZZ	Sampled:	03/17/03
MSS Lab ID:	164236-004	Received:	03/18/03
Matrix:	Water	Analyzed:	03/28/03
Units:	mg/L		

Type	Lab ID	MSS Result	Spiked	Result	%REC	Limits	RPD	Lim	Dil Fac
BS	QC209546		10.00	9.573	96	90-110			1.000
BSD	QC209547		10.00	9.594	96	90-110	0	20	1.000
MS	QC209548	127.4	500.0	593.9	93	72-125			100.0
MSD	QC209549		500.0	597.5	94	72-125	1	20	100.0

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

A N A L Y T I C A L R E P O R T

Prepared for:

Stellar Environmental Solutions
2198 6th Street
Suite 201
Berkely, CA 94710

Date: 14-APR-03
Lab Job Number: 164425
Project ID: 2003-02
Location: Redwood Park Service Yard

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

Reviewed by: _____
Project Manager

Reviewed by: _____
Operations Manager

CHAIN OF CUSTODY FORM

Curtis & Tompkins, Ltd.
Analytical Laboratory Since 1878
2323 Fifth Street
Berkeley, CA 94710
(510)486-0900 Phone
(510)486-0532 Fax

C&T LOGIN # 164425

Sampler: Bruce Rublin Bruce Rucker

Project No: 2003-08

Report To: Same

Project Name: Redwood Park Service Yard

Company: Stellar Environmental Solutions

Project P.O.:

Telephone: 510-644-3123

Turnaround Time: 5 Day

Fax: 510-644-3859

Laboratory Number	Sample ID.	Sampling Date Time	Matrix: Soil	Matrix: Water	Matrix: Waste	# of Containers	Preservative: HCL	Preservative: H_2SO_4	Preservative: HNO_3	Preservative: ICE	Field Notes	Analyses: TPH-DRO/MTBE	Analyses: TVH (8015)	Analyses: BTEX + MTBE (8020)	Analyses: TEH (8015)
-1	SW-2	3/27/03		X		2	✓			✓	40ml VOAs		X	X	
Factory		835		X		1				✓	1-L amber				X
-2	SW-3	3/27/03		X		2	✓			✓	40 ml VOAs		X	X	
		850		X		1				✓	1-L amber				X
Laboratory Use															

Preservation Correct? ☑ Yes ☐ No ☐ N/A

Received ☐ On Ice ☑ Cold ☐ Ambient ☑ Intact

Notes:

RELINQUISHED BY:	RECEIVED BY:
Bruce M. Rublin 3/27/03 9:25 DATE/TIME	3-27-03 9:25 DATE/TIME
DATE/TIME	DATE/TIME
DATE/TIME	DATE/TIME

Signature

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164425	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2003-02		
Matrix:	Water	Sampled:	03/27/03
Units:	ug/L	Received:	03/27/03
Diln Fac:	1.000	Analyzed:	03/27/03
Batch#:	80329		

Field ID: SW-2 Lab ID: 164425-001
Type: SAMPLE

Analyte	Result	RL	Analysis
Gasoline C7-C12	ND	50	8015B
MTBE	2.8	2.0	EPA 8021B
Benzene	ND	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	0.56	0.50	EPA 8021B
m,p-Xylenes	ND	0.50	EPA 8021B
o-Xylene	ND	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	105	68-145	8015B
Bromofluorobenzene (FID)	105	66-143	8015B
Trifluorotoluene (PID)	101	53-143	EPA 8021B
Bromofluorobenzene (PID)	105	52-142	EPA 8021B

Field ID: SW-3 Lab ID: 164425-002
Type: SAMPLE

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

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	101	68-145	8015B
Bromofluorobenzene (FID)	106	66-143	8015B
Trifluorotoluene (PID)	99	53-143	EPA 8021B
Bromofluorobenzene (PID)	103	52-142	EPA 8021B

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164425	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2003-02		
Matrix:	Water	Sampled:	03/27/03
Units:	ug/L	Received:	03/27/03
Diln Fac:	1.000	Analyzed:	03/27/03
Batch#:	80329		

Type: BLANK Lab ID: QC209215

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

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	93	68-145	8015B
Bromofluorobenzene (FID)	96	66-143	8015B
Trifluorotoluene (PID)	92	53-143	EPA 8021B
Bromofluorobenzene (PID)	97	52-142	EPA 8021B

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164425	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2003-02	Analysis:	8015B
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC209217	Batch#:	80329
Matrix:	Water	Analyzed:	03/27/03
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	1,000	1,034	103	79-120
MTBE		NA		
Benzene		NA		
Toluene		NA		
Ethylbenzene		NA		
m,p-Xylenes		NA		
o-Xylene		NA		

Surrogate	Result	%REC	Limits
Trifluorotoluene (FID)		114	68-145
Bromofluorobenzene (FID)		99	66-143
Trifluorotoluene (PID)	NA		
Bromofluorobenzene (PID)	NA		

NA= Not Analyzed

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164425	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2003-02		
Type:	BS	Diln Fac:	1.000
Lab ID:	QC209216	Batch#:	80329
Matrix:	Water	Analyzed:	03/27/03
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits	Analysis
Gasoline C7-C12		NA			
MTBE	10.00	9.876	99	51-125	EPA 8021B
Benzene	10.00	9.958	100	65-122	EPA 8021B
Toluene	10.00	9.457	95	67-121	EPA 8021B
Ethylbenzene	10.00	9.705	97	70-121	EPA 8021B
m,p-Xylenes	20.00	19.65	98	72-125	EPA 8021B
o-Xylene	10.00	10.10	101	73-122	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	95	68-145	8015B
Bromofluorobenzene (FID)	98	66-143	8015B
Trifluorotoluene (PID)	94	53-143	EPA 8021B
Bromofluorobenzene (PID)	99	52-142	EPA 8021B

NA= Not Analyzed

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164425	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2003-02		
Type:	BSD	Diln Fac:	1.000
Lab ID:	QC209287	Batch#:	80329
Matrix:	Water	Analyzed:	03/27/03
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits	RPD	Lim	Analysis
Gasoline C7-C12		NA					
MTBE	20.00	20.71	104	51-125	5	20	EPA 8021B
Benzene	20.00	19.76	99	65-122	1	20	EPA 8021B
Toluene	20.00	18.69	93	67-121	1	20	EPA 8021B
Ethylbenzene	20.00	19.35	97	70-121	0	20	EPA 8021B
m,p-Xylenes	40.00	38.43	96	72-125	2	20	EPA 8021B
o-Xylene	20.00	20.14	101	73-122	0	20	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	98	68-145	8015B
Bromofluorobenzene (FID)	98	66-143	8015B
Trifluorotoluene (PID)	96	53-143	EPA 8021B
Bromofluorobenzene (PID)	98	52-142	EPA 8021B

NA= Not Analyzed
RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	164425	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2003-02	Analysis:	8015B
Field ID:	SW-2	Batch#:	80329
MSS Lab ID:	164425-001	Sampled:	03/27/03
Matrix:	Water	Received:	03/27/03
Units:	ug/L	Analyzed:	03/27/03
Diln Fac:	1.000		

Type: MS Lab ID: QC209285

Analyte	MSS Result	Spiked	Result	%REC	Limits
Gasoline C7-C12	25.91	2,000	2,062	102	67-120
MTBE			NA		
Benzene			NA		
Toluene			NA		
Ethylbenzene			NA		
m,p-Xylenes			NA		
o-Xylene			NA		

Surrogate	Result	%REC	Limits
Trifluorotoluene (FID)		118	68-145
Bromofluorobenzene (FID)		106	66-143
Trifluorotoluene (PID)	NA		
Bromofluorobenzene (PID)	NA		

Type: MSD Lab ID: QC209286

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	2,000	2,082	103	67-120	1	20
MTBE		NA				
Benzene		NA				
Toluene		NA				
Ethylbenzene		NA				
m,p-Xylenes		NA				
o-Xylene		NA				

Surrogate	Result	%REC	Limits
Trifluorotoluene (FID)		117	68-145
Bromofluorobenzene (FID)		106	66-143
Trifluorotoluene (PID)	NA		
Bromofluorobenzene (PID)	NA		

NA= Not Analyzed
RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Total Extractable Hydrocarbons

Lab #:	164425	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2003-02	Analysis:	EPA 8015B
Matrix:	Water	Sampled:	03/27/03
Units:	ug/L	Received:	03/27/03
Diln Fac:	1.000	Prepared:	04/01/03
Batch#:	80470	Analyzed:	04/03/03

Field ID: SW-2 Lab ID: 164425-001
Type: SAMPLE

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
Hexacosane	102	39-137

Field ID: SW-3 Lab ID: 164425-002
Type: SAMPLE

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
Hexacosane	104	39-137

Type: BLANK Lab ID: QC209772

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
Hexacosane	115	39-137

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Total Extractable Hydrocarbons

Lab #:	164425	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2003-02	Analysis:	EPA 8015B
Matrix:	Water	Batch#:	80470
Units:	ug/L	Prepared:	04/01/03
Diln Fac:	1.000		

Type: BS Analyzed: 04/02/03
Lab ID: QC209773

Analyte	Spiked	Result	%REC	Limits
Diesel C10-C24	2,500	2,718	109	37-120

Surrogate	%REC	Limits
Hexacosane	108	39-137

Type: BSD Analyzed: 04/03/03
Lab ID: QC209774

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Diesel C10-C24	2,500	2,807	112	37-120	3	26

Surrogate	%REC	Limits
Hexacosane	108	39-137

RPD= Relative Percent Difference

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**
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**

NA = Not Analyzed for this constituent

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

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	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	2	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	66.0	5.0

NA = Not Analyzed for this constituent

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*	*< 0.5*	*< 2.0*
22	Jun-02	*< 50*	*< 50*	*< 0.5*	*< 0.5*	*< 0.5*	*< 0.5*	*< 0.5*	*< 2.0*
23	Sep-02	*< 50*	*< 50*	*< 0.5*	*< 0.5*	*< 0.5*	*< 0.5*	*< 0.5*	*< 2.0*
24	Dec-02	*< 50*	*< 50*	*< 0.5*	*< 0.5*	*< 0.5*	*< 0.5*	*< 0.5*	*< 2.0*
25	Mar-03	*< 50*	*< 50*	*< 0.5*	*< 0.5*	*< 0.5*	*< 0.5*	*< 0.5*	*< 2.0*

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									

NA = Not Analyzed for this constituent

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

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*

NA = Not Analyzed for this constituent

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

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

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

NA = Not Analyzed for this constituent

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.									

NA = Not Analyzed for this constituent

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

NA = Not Analyzed for this constituent

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	—	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
12	Dec-99	< 50	<50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2.0
13	Sep-00	NS	NS	NS	NS	NS	NS	—	NS
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	—	< 2.0
16	Sep-01	NS	NS	NS	NS	NS	NS	—	NS
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	—	< 2.0
19	Jun-02	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	**2.4**
20	Sep-02	NS	NS	NS	NS	NS	NS	—	NS
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

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

NA = Not Analyzed for this constituent