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TEL: 510.644.3123 ★ FAX: 510.644.3859

JAN 2 3 2002

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: 1/17/02

ATTENTION: SCOTT SEERY

FILE: SES-2001-53

SUBJECT: REDWOOD REGIONAL PARK FUEL LEAK SITE

WE ARE SENDING:

☒ HEREWITH ☐ UNDER SEPARATE COVER

☒ VIA MAIL ☐ VIA

THE FOLLOWING: YEAR 2001 ANNUAL SUMMARY REPORT FOR REDWOOD REGIONAL PARK SERVICE YARD SITE – OAKLAND, CALIFORNIA (NOV. 2001)

☐ 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

★ **Stellar Environmental Solutions**

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

January 15, 2002

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: Year 2001 Annual Summary Report
Redwood Regional Park Service Yard Site – Oakland, California

Dear Mr. Seery:

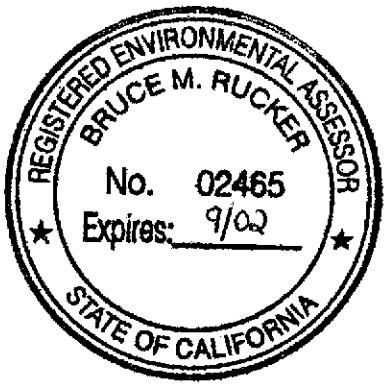
Attached is the Stellar Environmental Solutions (SES) Year 2001 Annual Summary Report for the underground fuel storage tank (UFST) site at the Redwood Regional Park Service Yard, located at 7867 Redwood Road, Oakland, California. This project is being conducted for the East Bay Regional Park District, 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 activities conducted from October through December 2001, including groundwater monitoring and sampling of site wells and surface water sampling. Hydrochemical trends and an initial assessment of the ORC™ injection corrective action are also discussed. 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, 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

YEAR 2001 ANNUAL SUMMARY REPORT

REDWOOD REGIONAL PARK SERVICE YARD OAKLAND, CALIFORNIA

Prepared For:

EAST BAY REGIONAL PARK DISTRICT
OAKLAND, CALIFORNIA

Prepared By:

STELLAR ENVIRONMENTAL SOLUTIONS
2198 SIXTH STREET
BERKELEY, CALIFORNIA 94710

January 15, 2002

Project No. 2001-53

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1.0 INTRODUCTION

PROJECT BACKGROUND AND PREVIOUS ACTIVITIES

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 more 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).

The following phases of site investigation and corrective action have been completed:

- May and June 1993: Site USTs were removed.
- September and October 1993: Initial site characterization (17 exploratory boreholes).
- October 1994: Installation of six groundwater monitoring wells.
- November 1994 to April 1999: Quarterly groundwater and surface water monitoring (14 events).
- April 1999: Additional site characterization (10 exploratory boreholes) and initial instream bioassessment event.
- December 1999 to September 2000: Quarterly groundwater and surface water monitoring (two events).
- December 2000: Installation of two additional groundwater monitoring wells.
- January 2001 to August 2001: Quarterly groundwater and surface water monitoring (three events) and second instream bioassessment event.
- September 2001: Installation of three additional groundwater monitoring wells and injection of ORC™ via 44 exploratory injection boreholes.
- December 2001: Quarterly groundwater and surface water monitoring (one event).

OBJECTIVES AND SCOPE OF WORK

This report discusses activities conducted from October through December 2001, including:

- Collecting water levels in site wells to determine shallow groundwater flow direction;
- Sampling site wells for contaminant concentrations and natural attenuation indicators;
- Collecting surface water samples for contaminant analysis; and
- Evaluating hydrochemical trends and assessing the effectiveness of the ORC™ injection program in the central area of contamination.

Previous SES reports submitted in June 1999 and April 2000 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). The well installations, monitoring, and ORC™ injection activities completed by SES were presented in the October 2001 Well Installation, Site Monitoring, and Corrective Action Report.

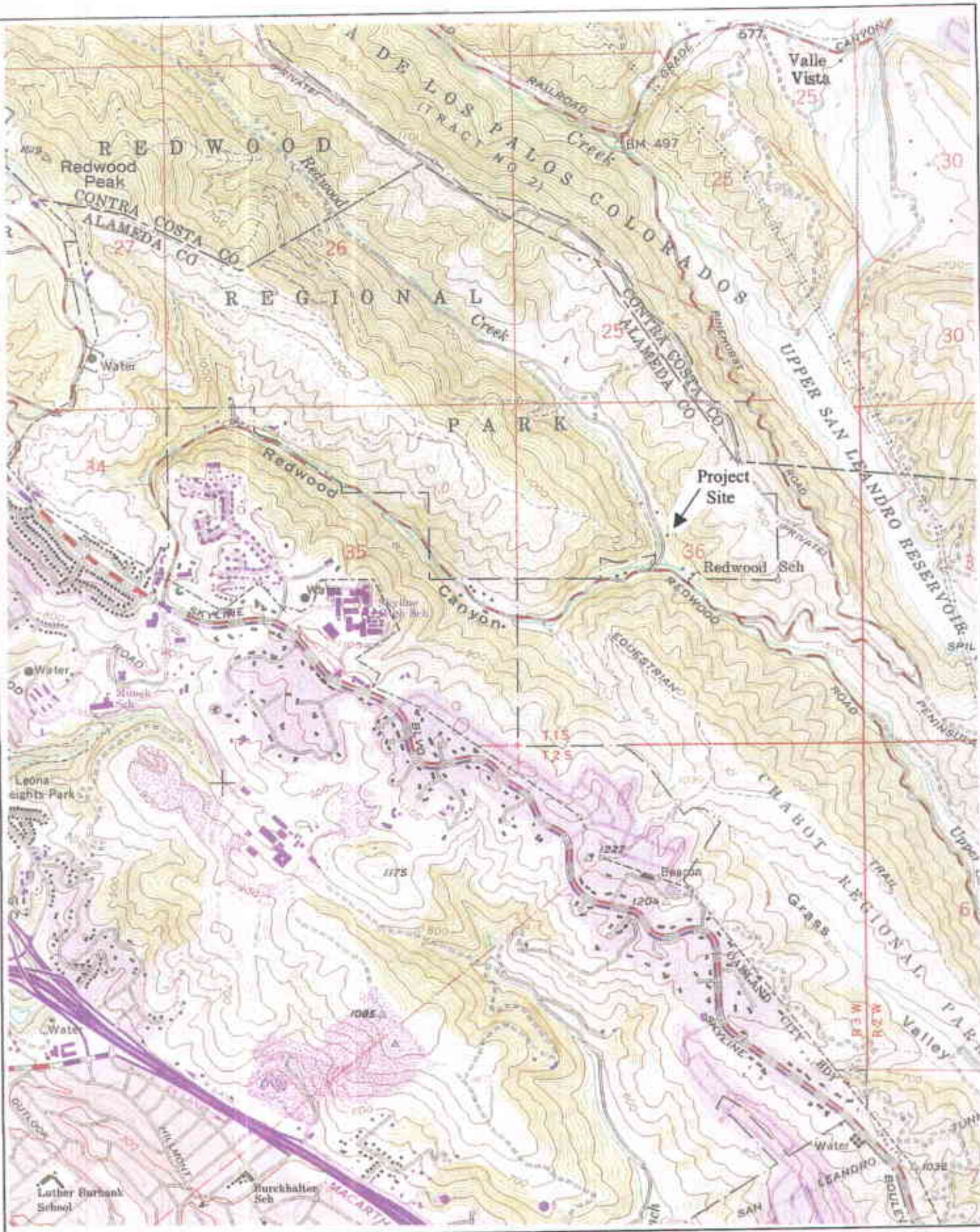
SITE DESCRIPTION

The project site is located at 7867 Redwood Road in Oakland, Alameda County, California. 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 approximately defines the 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 due to concerns over 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.



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

Redwood Regional Park Service Yard
Oakland, Alameda County, California

By: MJC | NOVEMBER 1997

Figure 1

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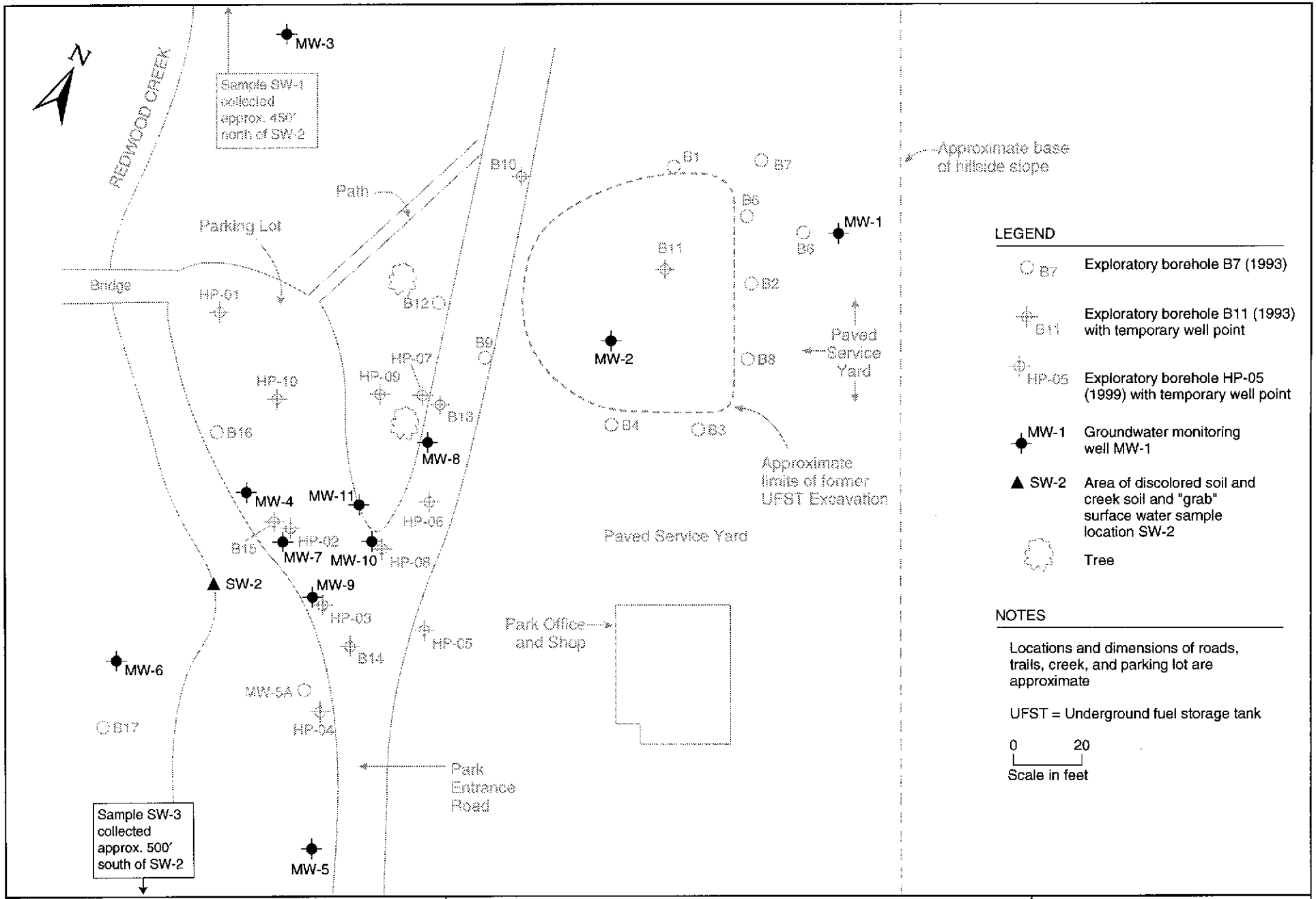

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SITE PLAN AND HISTORICAL SAMPLING LOCATIONS

Redwood Regional Park Service Yard, Oakland, CA

Figure 2

by: MJC

JANUARY 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.

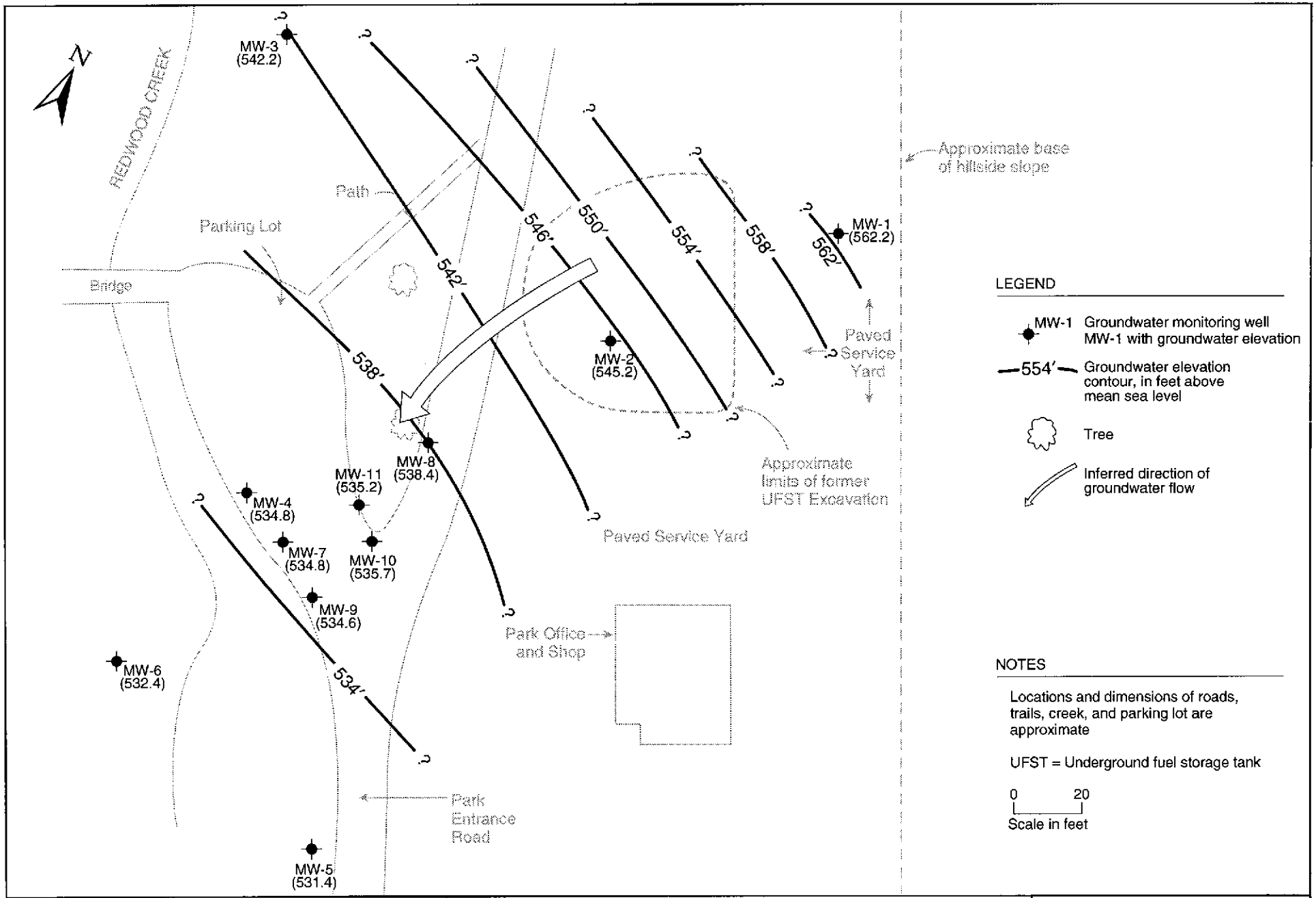
Shallow soil stratigraphy consists of a surficial 3- to 10-foot-thick clayey silt unit underlain by a 5- to 15-foot-thick silty clay unit. In the majority of boreholes, a 5- to 10-foot-thick clayey coarse-grained sand and clayey gravel unit was encountered that laterally grades to a clay or silty clay. 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 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. Local groundwater flow direction has been consistently measured as northeast to southwest.

Figure 3 is a groundwater elevation map constructed from the current event monitoring well static water levels, and Table 1 (in Section 4.0) 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 west-southwest (toward Redwood Creek), which is consistent with site historical groundwater flow direction.

From site-specific empirical data (using the estimated time for UFST-sourced contamination to reach Redwood Creek), a conservative estimate of groundwater velocity within the aquifer material is at 7 to 10 feet per year, with the rate of movement within the clay rich zones being substantially less.

Redwood Creek borders the site to the west, and 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 to 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 that discharges into Upper San Leandro Reservoir, located approximately 1 mile southeast of the site.



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GROUNDWATER ELEVATION MAP–DECEMBER 17, 2001
Redwood Regional Park Service Yard, Oakland, CA

Figure 3

by: MJC | JANUARY 2002

2001-53-16

3.0 DECEMBER 2001 CREEK AND GROUNDWATER SAMPLING

This section presents the creek surface water and groundwater sampling and analytical methods for the current event. Groundwater and surface water analytical results are summarized in Section 4.0. Monitoring and sampling protocols were in accordance with the ACHCSA-approved SES technical workplan (SES 1998a). 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 site wells (MW-1 through MW-11);
- Collecting pre-purge groundwater samples for laboratory analysis of the natural attenuation indicators nitrate and sulfate from monitoring wells MW-3, MW-4, and MW-7 through MW-11;
- Collecting post-purge groundwater samples for laboratory analysis of site contaminants from wells located within the groundwater plume (MW-2, MW-4, and MW-7 through MW-11); and
- Collecting Redwood Creek surface water samples for laboratory analysis from locations SW-2 and SW-3.

Creek sampling and groundwater monitoring/sampling was conducted on December 17, 2001. 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 record.

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).

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

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 (12/01)
MW-1	18	7 to17	565.9	562.2
MW-2	36	20 to 35	566.5	545.2
MW-3	42	7 to 41	560.9	542.2
MW-4	26	10 to 25	548.1	534.8
MW-5	26	10 to 25	547.5	531.4
MW-6	26	10 to 25	545.6	532.4
MW-7	24	9 to24	547.7	534.8
MW-8	23	8 to 23	549.2	538.4
MW-9	26	11 to 26	549.4	534.6
MW-10	26	11 to 26	547.3	535.7
MW-11	26	11 to 26	547.9	535.2

Notes:

TOC = Top of casing.

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

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

of natural attenuation indicators. The wells to be sampled for contaminant analyses were then purged (by bailing and/or pumping) of a minimum 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.

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

CREEK SURFACE WATER SAMPLING

Surface water sampling was conducted by SES on December 17, 2001. 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 location SW-3

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

At the time of sampling, water in the creek was relatively high and flowing briskly between locations SW-2 and SW-3. Creek water depth was approximately 1 to 2 feet. Because of the high water flow, the historically-observed (during low water conditions) petroleum sheen at SW-2 was not evident.

4.0 CURRENT MONITORING EVENT ANALYTICAL RESULTS AND REGULATORY CONSIDERATIONS

This section presents the field and laboratory analytical results of the most recent monitoring event, preceded by a brief summary of regulatory considerations regarding surface water and groundwater contamination. Table 2 and Figure 4 summarize the contaminant analytical results of the current monitoring event; Table 3 summarizes natural attenuation indicator results from the current event. Appendix B contains the certified analytical laboratory report and chain-of-custody record. Section 5.0 contains a detailed discussion of hydrochemical and surface water trends and a preliminary evaluation of the effectiveness of the ORC™ injection corrective action. Appendix C contains a tabular summary of historical groundwater and surface water analytical results and hydrochemical trend plots.

REGULATORY CONSIDERATIONS

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, 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 include one or more components, including ceiling value, human toxicity, indoor air impacts, and aquatic life protection. Exceedance of RBSLs suggests that additional investigation and/or remediation is warranted. While drinking water standards (e.g., Maximum Contaminant Levels [MCLs]) are

Table 2
Groundwater and Surface Water Sample
Analytical Results – December 2001
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	74	69	14	0.76	3.7	3.5	6.6
MW-4	< 50	110	< 0.5	< 0.5	< 0.5	1.2	< 2.0
MW-7	9,100	4,600	89	< 2.5	460	228	< 10
MW-8	3,500	950	69	2.4	310	431	< 4.0
MW-9	9,400	2,700	250	5.1	520	317	< 10
MW-10	< 50	81	< 0.5	< 0.5	< 0.5	< 0.5	25
MW-11	5,800	2,800	280	7.8	500	213	< 10
Groundwater RBSLs [a]	100 / 500	100 / 640	1.0 / 46	40 / 130	30 / 290	13 / 13	5.0 / 1,800
REDWOOD CREEK SURFACE WATER SAMPLES							
SW-2	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0
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).

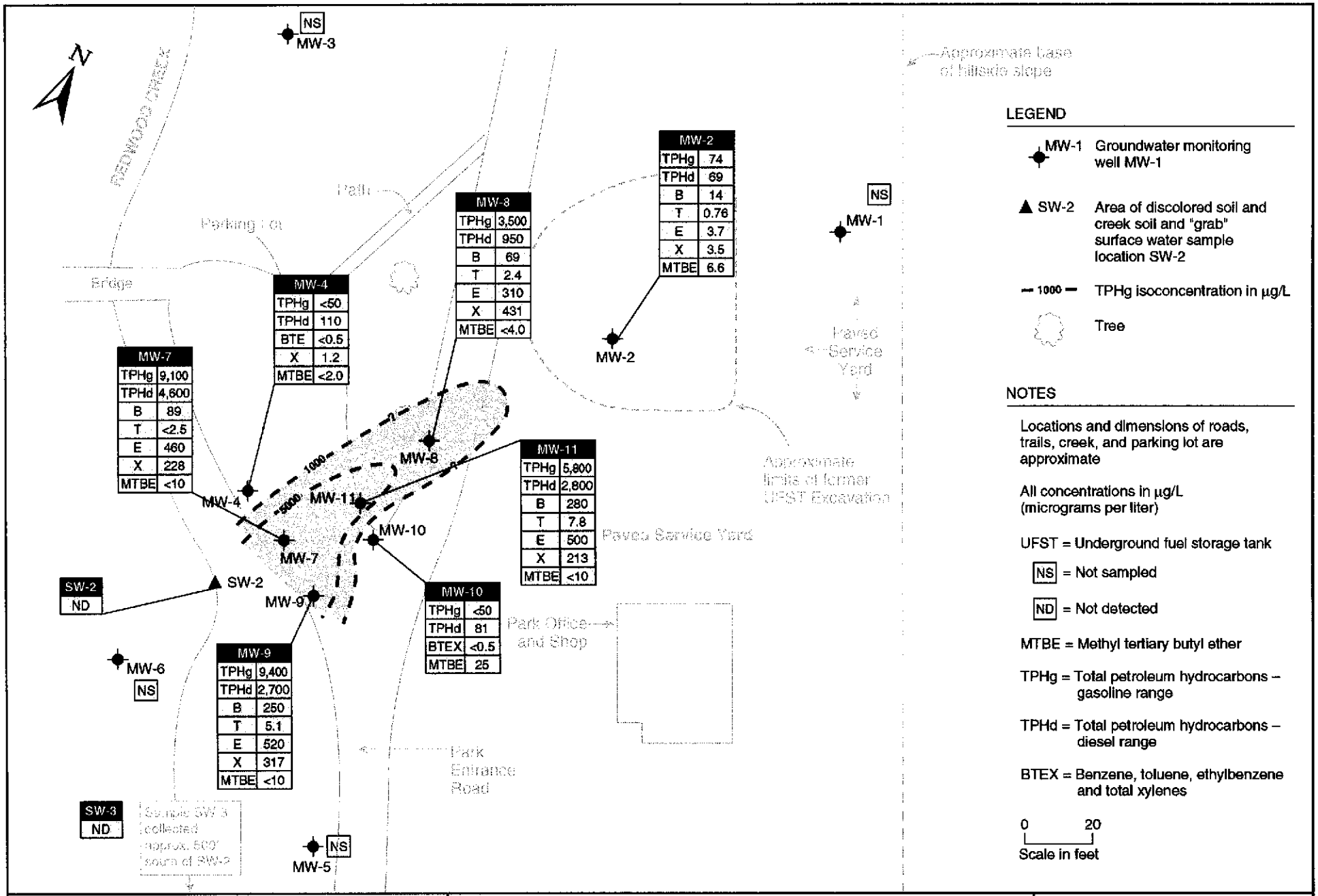
[b] Lowest of chronic and acute surface water criteria published by the State of California, U.S. Environmental Protection Agency, or U.S. Department of Energy.

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).



LEGEND

- 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

NOTES

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

All concentrations in µg/L (micrograms per liter)

UFST = Underground fuel storage tank

NS = Not sampled

ND = Not detected

MTBE = Methyl tertiary butyl ether

TPHg = Total petroleum hydrocarbons – gasoline range

TPHd = Total petroleum hydrocarbons – diesel range

BTEX = Benzene, toluene, ethylbenzene and total xylenes

0 20

Scale in feet

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GROUNDWATER MONITORING WELL AND SURFACE WATER ANALYTICAL RESULTS–DECEMBER, 2001
Redwood Regional Park Service Yard, Oakland, CA

Figure 4

by: MJC | JANUARY 2002

2001-53-17

Table 3
Groundwater Sample Analytical Results
Natural Attenuation Indicators – December 17, 2001
Redwood Regional Park Corporation Yard, Oakland, California

Sample I.D.	Nitrogen (as Nitrate) (mg/L)	Sulfate (mg/L)	Dissolved Oxygen (mg/L)	Ferrous Iron (mg/L)	Redox Potential (milliVolts)
MW-1	NA	NA	2.9	0.2	167
MW-2	NA	NA	3.2	0.5	84
MW-3	0.03	36	2.8	0.1	59
MW-4	0.57	76	9.8	0.4	38
MW-5	NA	NA	2.7	0.4	95
MW-6	NA	NA	2.5	0.4	146
MW-7	< 0.05	15	2.5	3.7	-47
MW-8	< 0.05	85	4.0	0.2	163
MW-9	< 0.05	20	2.4	3.6	-22
MW-10	0.56	61	> 15.0	0.1	48
MW-11	< 0.05	67	2.2	0.0	-51

Notes:

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

NA = Not analyzed.

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 be primarily evaluated within the context of surface water quality criteria.

Surface Water Contamination

As summarized in Table 2, 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 August 2000 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 macro-invertebrate bioassessment events, which documented no measurable impacts.

- As shown on Figure 4, the area of groundwater contamination in excess of screening level criteria appears no greater than 150 feet long and 250 feet wide, and may be less.
- The groundwater contaminant plume has become disconnected from the former source and migrated well beyond the former source area (represented by well MW-2) toward Redwood Creek.
- The zone of greatest contamination is an approximately 60-foot by 60-foot area just upgradient of the three downgradient wells bordering the creek bank. Current and historical data suggest that maximum concentrations for the majority of the contaminants have not yet reached the creek, but will reach the creek within one to two years if unabated. Therefore, continued discharge of elevated concentrations could continue for at least several years.
- While discharge of the hydrocarbon plume to the creek is occurring, no site-sourced contaminants in excess of surface water screening level criteria were detected in either surface water sample.

NATURAL ATTENUATION INDICATORS

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 break down the ring structure of specific constituents. Accordingly, 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 more aggressive remediation. However, such natural attenuation only occurs if the concentration of hydrocarbons is low enough to facilitate the infiltration of natural oxygen through the interstitial space around the contamination, supporting the microorganisms for which the contamination is a food source, thus "attenuating" it. The concentration in soil or groundwater above which natural attenuation is unlikely to take place is still the subject of various research studies. In general, biodegradation of petroleum hydrocarbons in groundwater has a significant role in creating a stable plume and minimizing groundwater plume configuration 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 (ferrous iron, nitrate, and sulfate).

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 2.4 to > 15 mg/L.

The extremely high level of DO in MW-10 (> 15 mg/L) and the relatively low levels of TPH compared to the previous quarter indicate that groundwater in the immediate vicinity has been highly oxygenated due to the recent ORC injection program. Natural attenuation of the contamination is thus being enhanced at that location. In other site wells, there is no direct correlation between DO and TPH concentrations. As discussed in detail in Section 5.0, dissolved oxygen levels generally increased following the September 2001 ORC™ injection program.

Oxidation-Reduction Potential

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

Current monitoring event ORP concentrations ranged from -47 to 167 mV. Of the four wells with pronounced hydrocarbon contamination (MW-7, MW-8, MW-9, and MW-11) the ORP values for three of the wells (MW-7, MW-9, and MW-11) showed the expected inverse correlation with TPH. The ORP value for MW-8 did not show the expected inverse correlation. The wells outside the TPH plume also showed an inverse correlation with TPH (elevated ORP and low to no TPH).

General Mineral Analyses

An inverse relationship between general minerals—including ferrous iron (Fe_2^+), nitrate (NO_3^-), and sulfate (SO_4^{2-})—and hydrocarbon concentrations is also indicative of the occurrence of biodegradation. Specifically, anaerobic degradation and oxidation of compounds is implied where general mineral concentrations are low and TPH concentrations are high.

5.0 HYDROCHEMICAL TRENDS AND EVALUATION OF CORRECTIVE ACTION EFFECTIVENESS

This section evaluates the observed hydrochemical trends with regard to plume stability and migration of the center of contaminant mass toward Redwood Creek. A preliminary evaluation of the effectiveness of the ORC™ injection corrective action is also made. Appendix C contains hydrochemical trend plots for key site contaminants in those site wells with at least 1 year of monitoring data (MW-4, MW-7, and MW-8).

All petroleum-impacted wells showed a decrease in contaminant concentrations relative to the previous quarter (the first monitoring event following the ORC™ injection program), with some exceptions: TPHd increased in well MW-9; ethylbenzene increased slightly in well MW-2; and benzene, ethylbenzene and xylenes increased slightly in well MW-7. A general decrease of contaminant concentrations was expected in the December event due to seasonal impacts of dilution from rainwater recharge. Because only one monitoring event has occurred since the ORC injection program, it is too early to determine the extent to which the decreased contaminant concentrations are also the result of the ORC injection, and if the downward trend will continue.

Three wells within the contaminant plume (MW-4, MW-7, and MW-8) have at least four quarters of analyses for the primary site contaminants (TPHg, TPHd, benzene, and MTBE). Well MW-4 has shown an overall decrease in all contaminant concentrations over the year of monitoring, including a decrease between the pre- and post-ORC injection events. Contaminant concentrations in the most recent event (indicative of wet weather conditions) are well below the concentrations of the previous wet weather event (January 2001). Well MW-8 has shown similar downward trends for all contaminants except TPHd (the concentration of which is equivalent to that measured a year ago). Well MW-7 has shown a downward trend for TPHg and MTBE. Benzene in this well is at approximately the same concentration as a year ago, while TPHd has increased slightly.

Because of the general decrease in contaminant concentrations, the lateral limits of contamination (iscontours) have decreased relative to the previous event, with the center of contaminant mass moving downgradient, toward Redwood Creek.

Appendix C contains a plot showing dissolved oxygen (DO) concentrations in petroleum-impacted wells MW-7 and MW-8 over the first year of monitoring in those wells. A substantial increase in DO is indicated following the September 2001 ORC™ injection program. In the three newer wells (MW-9, MW-10, and MW-11) installed at the time of the ORC program, only MW-10 has shown an increased DO level since the ORC injection. While the data suggest some increase in DO at some locations, there is insufficient data (only one post-injection monitoring event) for a rigorous evaluation of DO trends.

In summary, the December 2001 data show a reduction in both contaminant magnitude and extent compared to the previous years of monitoring results.

Approximately 3 months has passed since the ORC injection. The useful life of injected ORC is generally 6 to 9 months. The effectiveness of the ORC injection program will be better evaluated following the results of the next two monitoring events. If these events continue to show a downward trend of contaminant concentrations, but concentrations remain above screening level criteria, a second (more focused) ORC injection program would be appropriate to effect additional contaminant reductions.

6.0 SUMMARY, CONCLUSIONS AND PROPOSED ACTIONS

SUMMARY AND CONCLUSIONS

- Groundwater sampling has been conducted on an approximately quarterly basis since November 1994 (20 events). A total of 11 site wells are available for monitoring; 7 of the available wells are currently monitored for contamination.

- The first phase of an anticipated two-phase ORC™ injection corrective action program was implemented in September 2001. Approximately 3,000 pounds of ORC™ was injected into 44 boreholes over a 4,400-square foot area of the maximum groundwater contamination. The ORC™ was injected over the full saturated interval (including capillary fringe). The corrective action is designed to facilitate biodegradation within the central area of the plume, with the ultimate objective of reducing or eliminating continued discharge of contaminated groundwater to Redwood Creek.

- Current site groundwater contaminant concentrations exceed their respective groundwater RBSLs (for both cases where 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 groundwater contaminant concentrations for TPHg and TPHd were detected in wells MW-9 and MW-7, respectively (both located at the extreme downgradient edge of the site, immediately upgradient of Redwood Creek). Maxima for other site contaminants were detected in wells MW-10, MW-11, and MW-8 (located at least 50 feet upgradient of Redwood Creek). Concentrations in former source area well MW-2 (approximately 130 feet upgradient of Redwood Creek) are approximately one order of magnitude below downgradient well concentrations.

- The existing well layout fully constrains the lateral extent of groundwater contamination, and the vertical limit is very likely the top of the near-surface (25 to 28 feeet) siltstone bedrock. The saturated interval extends approximately 12 to 15 feet from top of bedrock through the capillary fringe.

- The area of groundwater contamination in excess of screening level criteria is no greater than 150 feet long and 250 feet wide, and is likely to be less.
- The groundwater contaminant plume has become disconnected from the former source and has migrated well beyond the former source area (represented by well MW-2) toward Redwood Creek.
- The zone of greatest contamination is an approximately 60-foot by 60-foot area just upgradient of the three downgradient wells bordering the creek bank. Current and historical data suggest that maximum concentrations for the majority of the contaminants have not yet reached the creek, but will reach the creek within one to two years if unabated. Therefore, continued discharge of elevated concentrations could continue for at least several years.
- No site-sourced contaminants were detected in the two surface water samples.
- In general, petroleum-impacted wells showed a decrease in contaminant concentrations relative to the previous quarter, the first monitoring event following the ORC™ injection program.
- Three wells within the contaminant plume (MW-4, MW-7, and MW-8) have at least four quarters of analyses for the primary site contaminants (TPHg, TPHd, benzene, and MTBE). Well MW-4 has shown an overall decrease in all contaminant concentrations over the year of monitoring, including a decrease between the pre- and post-ORC injection events, although much of this may reflect the natural decrease in concentration associated with winter recharge.
- Contaminant concentrations in the most recent event (indicative of wet weather conditions) are well below the concentrations of the previous wet weather event (January 2001). Well MW-8 has shown similar downward trends for all contaminants except TPHd (the concentration of which is equivalent to that measured a year ago). Well MW-7 has shown a downward trend for TPHg and MTBE. Benzene in this well is at approximately the same concentration as a year ago, while TPHd has increased slightly.
- Because of the general decrease in contaminant concentrations, the lateral limits of contamination (iscontours) have decreased relative to the previous event, with the center of contaminant mass moving downgradient, toward Redwood Creek.
- Following the September 2001 ORC™ injection program, a substantial increase in dissolved oxygen in groundwater is indicated. While the data suggest some increase in DO at some locations, insufficient data (only one post-injection monitoring event) exists for a rigorous evaluation of DO trends.
- Natural attenuation is suggested to be occurring at the site, mainly at the plume margins and former source area. Prior to ORC™ injection, natural attenuation was likely minimal to non-

existent in the higher concentration portion along the centerline of the plume due to limited oxygen content, suggesting that natural attenuation has not historically been sufficient to mitigate impacts to the creek.

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.
- Evaluate the results of the next two quarterly events in the context of the efficacy of the corrective action, and implement the second ORC™ injection phase, if warranted.

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 these activities 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 # 011217-MN1 Date 12/17/01 Client Stuller Env. Solutions

Site Redwood Regional Park Service Yard, 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	D.O.
MW-1	4					3.68	18.85		2.9
MW-2	4					21.28	38.82		3.2
MW-3	4					18.75	44.10		2.8
MW-4	4					13.35	26.51		9.8
MW-5	4					16.15	26.92		2.7
MW-6	4					13.20	27.93		2.5
MW-7	2					12.95	25.33		2.5
MW-8	2					10.80	22.21		4.0
MW-9	2					14.80	26.08		2.4
MW-10	2					11.68	28.75		15.0
MW-11	2					12.71	26.08		2.2

WELL MONITORING DATA SHEET

Project #: Redwood Regional Park Service Yard	Client: Stetler Env. Solutions
Sampler: Mike N	Start Date: 12/17/01
Well I.D.: MW-1	Well Diameter: 2 3 (4) 6 8 ___
Total Well Depth: 18.85	Depth to Water: 3.68
Before: After:	Before: After:
Depth to Free Product:	Thickness of Free Product (feet):
Referenced to: (PVC) Grade	D.O. Meter (if req'd): (YSI) HACH

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

Sampling Method:
- Bailer
- ✓ Disposable Bailer
- Extraction Port
- Dedicated Tubing
- Other: ____

No Purge
____ (Gals.) X ____ = ____ Gals.
1 Case Volume | Specified Volumes | Calculated Volume

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

Time	Temp (°F)	pH	Cond.	Turbidity	Gals. Removed	Observations
929	53.8	6.8	884	22	0	Clear
					Ferrous Iron =	.2

Did well dewater? Yes (No) Gallons actually evacuated: 0

Sampling Time: Sampling Date: 12/17/01

Sample I.D.: MW-1 Laboratory: Curtis & Tompkins

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

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

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

D.O. (if req'd):	(Pre-purge):	2.9 mg/L	Post-purge:	mg/L
ORP (if req'd):	(Pre-purge):	167 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: Redwood Regional Park Service Yard	Client: Stellar Env. Solutions
Sampler: Mike N	Start Date: 12/17/01
Well I.D.: MW-2	Well Diameter: 2 3 (4) 6 8 ___
Total Well Depth: 38.82	Depth to Water: 21.28
Before: After:	Before: After:
Depth to Free Product:	Thickness of Free Product (feet):
Referenced to: (PVC) Grade	D.O. Meter (if req'd): (YSI) HACH

Purge Method:

- Bailer
- Disposable Bailer
- ✓ Middleburg
- ✓ Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other ___

Sampling Method:

- ✓ Bailer
- ✓ Disposable Bailer
- Extraction Port
- Dedicated Tubing
- Other: ___

11.4 (Gals.) X	3	= 34.2 Gals.
1 Case Volume	Specified Volumes	Calculated Volume

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

Time	Temp (°F)	pH	Cond.	Turbidity	Gals. Removed	Observations
957	57.6	7.1	885	106	11.4	cloudy, odor
959	58.2	7.1	896	>200	22.8	" "
1005	58.5	7.1	887	>200	34.2	" "
					Ferrous Iron = .5	

Did well dewater? Yes (No)		Gallons actually evacuated: 34.2	
Sampling Time: 1010		Sampling Date: 12/17/01	
Sample I.D.: MW-2		Laboratory: Curtis & Tom Lims	
Analyzed for: TPH-G BTEX MTBE (TPH-D)		Other: ~~Nitrate~~ Sulfates	
Equipment Blank I.D.:	@ Time	Duplicate I.D.:	
Analyzed for: TPH-G BTEX MTBE TPH-D		Other:	
D.O. (if req'd): (Pre-purge):	3.2 mg/L	Post-purge:	mg/L
ORP (if req'd): (Pre-purge):	84 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: Redwood Regional Park Service Yard	Client: Stetler Env. Solutions
Sampler: Mike K	Start Date: 12/17/01
Well I.D.: MW-3	Well Diameter: 2 3 (4) 6 8 ____
Total Well Depth: 44.10	Depth to Water: 18.75
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 ____

No Purge

Sampling Method:
- Bailer
- ✓ Disposable Bailer
- Extraction Port
- Dedicated Tubing
- Other: ____

16.5 (Gals.) X	3	= 49.5 Gals.
1 Case Volume	Specified Volumes	Calculated Volume

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

Time	Temp (°F)	pH	Cond.	Turbidity	Gals. Removed	Observations
1020	56.7	7.4	623	19	0	clear
					Ferrous Iron = .1	

Did well dewater? Yes (No) Gallons actually evacuated: 0

Sampling Time: 1025 Sampling Date: 12/17/01

Sample I.D.: MW-3 Laboratory: Curtis & Tom Labs

Analyzed for: ~~TPH-G BTEX MTBE TPH-D~~ Other: Nitrate / Sulfates

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

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

D.O. (if req'd):	(Pre-purge):	2.8 mg/L	Post-purge:		mg/L
ORP (if req'd):	(Pre-purge):	59 mV	Post-purge:		mV

WELL MONITORING DATA SHEET

Project #: Redwood Regional Park Service Yard	Client: Stetler Env. Solutions
Sampler: Mike N	Start Date: 12/17/01
Well I.D.: MW-4	Well Diameter: 2 3 (4) 6 8 ___
Total Well Depth: 26.51	Depth to Water: 13.35
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
- Middleburg
- ✓ Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other ____

Sampling Method:

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

8.6 (Gals.) X 3 = 25.8 Gals.
1 Case Volume | Specified Volumes | Calculated Volume

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

Time	Temp (°F)	pH	Cond.	Turbidity	Gals. Removed	Observations
1048	56.0	8.9	816	119	8.6	Cloudy, Brown
1052	56.6	9.0	782	79	17.2	Less cloudy
1055	56.6	9.1	761	68	25.8	"
					Ferrous Iron =	.4

Did well dewater? Yes (No)		Gallons actually evacuated: 25.8	
Sampling Time: 1100		Sampling Date: 12/17/01	
Sample I.D.: MW-4		Laboratory: Curtis & Tomlins	
Analyzed for: TPH-G BTEX MTBE (TPH-D)		Other: Nitrate / Sulfates (Pre-Purge)	
Equipment Blank I.D.: @ Time		Duplicate I.D.:	
Analyzed for: TPH-G BTEX MTBE TPH-D		Other: ✓✓	
D.O. (if req'd): (Pre-purge):	9.8 mg/L	Post-purge:	mg/L
ORP (if req'd): (Pre-purge):	38 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: Redwood Regional Park Service Yard	Client: Stetler Env. Solutions
Sampler: Mike N	Start Date: 12/17/01
Well I.D.: MW-5	Well Diameter: 2 3 (4) 6 8 ___
Total Well Depth: 26.92	Depth to Water: 16.15
Before: After:	Before: After:
Depth to Free Product:	Thickness of Free Product (feet):
Referenced to: (PVC) Grade	D.O. Meter (if req'd): (YSI) HACH

Purge Method:

Bailer
Disposable Bailer
Middleburg
Electric Submersible
Waterra
Peristaltic
Extraction Pump
Other ___

Sampling Method:

Bailer
Disposable Bailer
Extraction Port
Dedicated Tubing
Other: ___

___ (Gals.) X ___ = ___ Gals.
1 Case Volume | Specified Volumes | Calculated Volume

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

Time	Temp (°F)	pH	Cond.	Turbidity	Gals. Removed	Observations
	No purge Sample For Ferrous Iron, D.O. & ORP					
					Ferrous Iron = .4	

Did well dewater? Yes No — Gallons actually evacuated:

Sampling Time: — Sampling Date: 12/17/01

Sample I.D.: MW-5 — Laboratory: Curtis & Tom Lins

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

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

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

D.O. (if req'd):	(Pre-purge):	2.7 mg/L	Post-purge:	mg/L
ORP (if req'd):	(Pre-purge):	95 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: Redwood Regional Park Service Yard	Client: Stetner Env. Solutions
Sampler: Mike N	Start Date: 12/17/01
Well I.D.: MW-6	Well Diameter: 2 3 (4) 6 8 ___
Total Well Depth: 27.93	Depth to Water: 13.20
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 / Waterra
Disposable Bailer / Peristaltic
Middleburg / Extraction Pump
Electric Submersible / Other ___

Sampling Method: Bailer
Disposable Bailer
Extraction Port
Dedicated Tubing
Other: ___

___ (Gals.) X ___ = ___ Gals.
1 Case Volume | Specified Volumes | Calculated Volume

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

Time	Temp (°F)	pH	Cond.	Turbidity	Gals. Removed	Observations
1213	55.3	6.9	564	18	0	Clear
					Ferrous Iron =	.4

Did well dewater? Yes No	Gallons actually evacuated:		
Sampling Time:	Sampling Date: 12/17/01		
Sample I.D.: MW-6	Laboratory: Curtis & Tomlins		
Analyzed for: TPH-G BTEX MTBE (TPH-D)	Other: Nitrate / Sulfates		
Equipment Blank I.D.: @ Time	Duplicate I.D.:		
Analyzed for: TPH-G BTEX MTBE TPH-D	Other:		
D.O. (if req'd): (Pre-purge):	2.5 mg/L	Post-purge:	mg/L
ORP (if req'd): (Pre-purge):	146 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: Redwood Regional Park Service Yard	Client: Stellar Env. Solutions
Sampler: Mike N	Start Date: 12/17/01
Well I.D.: MW-7	Well Diameter: (2) 3 4 6 8 ___
Total Well Depth: 25.33	Depth to Water:
Before: After:	Before: 12.95 After:
Depth to Free Product:	Thickness of Free Product (feet):
Referenced to: (PVC) Grade	D.O. Meter (if req'd): (YSI) HACH

Purge Method:

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

Sampling Method:

- ✓ Bailer
- Disposable Bailer
- Extraction Port
- Dedicated Tubing
- Other: _____

2.0 (Gals.) X 3 = 6.0 Gals.
1 Case Volume | Specified Volumes | Calculated Volume

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

Time	Temp (°F)	pH	Cond.	Turbidity	Gals. Removed	Observations
1341	58.9	6.8	721	7200	2.0	Brown/Grey Cloudy, odor
1344	58.0	6.8	695	7200	4.0	" " " "
1347	57.6	6.8	705	7200	6.0	" " " "
					Ferrous Iron =	3.7

Did well dewater? Yes (No)		Gallons actually evacuated: 6.0	
Sampling Time: 1352		Sampling Date: 12/17/01	
Sample I.D.: MW-7		Laboratory: Curtis & Tom Lins	
Analyzed for: TPH-G BTEX MTBE (TPH-D)		Other: Nitrate / Sulfates (One Purge)	
Equipment Blank I.D.:	@ Time	Duplicate I.D.:	
Analyzed for: TPH-G BTEX MTBE TPH-D		Other:	
D.O. (if req'd): (Pre-purge):	2.5 mg/L	Post-purge:	mg/L
ORP (if req'd): (Pre-purge):	-47 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: Redwood Regional Park Service Yard	Client: Stetner Env. Solutions
Sampler: Mike A	Start Date: 12/17/01
Well I.D.: MW-8	Well Diameter: (2) 3 4 6 8 ___
Total Well Depth: 22.21	Depth to Water: 10.80
Before: After:	Before: After:
Depth to Free Product:	Thickness of Free Product (feet):
Referenced to: (PVC) Grade	D.O. Meter (if req'd): (YSI) HACH

Purge Method:

- Bailer
- ✓ Disposable Bailer
- ✓ Middleburg
- Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other ___

Sampling Method:

- ✓ Bailer
- ✓ Disposable Bailer
- Extraction Port
- Dedicated Tubing
- Other: ___

1.8 (Gals.) X 3 = 5.4 Gals.
1 Case Volume | Specified Volumes | Calculated Volume

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

Time	Temp (°F)	pH	Cond.	Turbidity	Gals. Removed	Observations
1237	58.1	7.3	771	>200	1.8	Silty, brown high turbidity
1240	58.1	7.1	801	>200	3.6	" " odor
1243	58.0	7.1	804	>200	5.4	" " "
					Ferrous Iron =	.2

Did well dewater? Yes (No) Gallons actually evacuated: 5.4

Sampling Time: 1248 Sampling Date: 12/17/01

Sample I.D.: MW-8 Laboratory: Curtis & Tom Lins

Analyzed for: (TPH-G BTEX MTBE TPH-D) Other: Nitrate / Sulfates (Pre Purge)

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

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

D.O. (if req'd):	(Pre-purge):	4.0 mg/L	Post-purge:	mg/L
ORP (if req'd):	(Pre-purge):	163 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: Redwood Regional Park Service Yard	Client: Stetner Env. Solutions
Sampler: Mike N	Start Date: 12/17/01
Well I.D.: MW-9	Well Diameter: (2) 3 4 6 8 ____
Total Well Depth: 26.00	Depth to Water: 14.80
Before: After:	Before: After:
Depth to Free Product:	Thickness of Free Product (feet):
Referenced to: (PVC) Grade	D.O. Meter (if req'd): (YSI) HACH

Purge Method:

- Bailer
- ✓ Disposable Bailer
- ✓ Middleburg
- Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other ____

Sampling Method:

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

1.8 (Gals.) X ____ = 5.4 Gals.
1 Case Volume | Specified Volumes | Calculated Volume

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

Time	Temp (°F)	pH	Cond.	Turbidity	Gals. Removed	Observations
1312	58.4	6.9	892	7200	1.8	Brown, Cloudy odor
1315	58.4	6.9	897	7200	3.6	" " "
1318	58.0	6.8	899	7200	5.4	" " "
~~1323~~						
					Ferrous Iron = 3.6	

Did well dewater? Yes (No) Gallons actually evacuated: 5.4

Sampling Time: 1323 Sampling Date: 12/17/01

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

Analyzed for: TPH-G BTEX MTBE (TPH-D) Other: Nitrate / Sulfates (Pre Purge)

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

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

D.O. (if req'd):	(Pre-purge):	2.4 mg/L	Post-purge:	mg/L
ORP (if req'd):	(Pre-purge):	-22 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: Redwood Regional Park Service Yard	Client: Stetner Env. Solutions
Sampler: Mike N	Start Date: 12/17/01
Well I.D.: MW-10	Well Diameter: (2) 3 4 6 8 ____
Total Well Depth: 28.75	Depth to Water: 11.68
Before: After:	Before: After:
Depth to Free Product:	Thickness of Free Product (feet):
Referenced to: (PVC) Grade	D.O. Meter (if req'd): (YSI) HACH

Purge Method:

- Bailer
- ✓ Disposable Bailer
- Middleburg
- Electric Submersible
- Waterra
- Peristaltic
- Extraction Pump
- Other ____

Sampling Method:

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

2.7 (Gals.) X 3 = 8.1 Gals.
1 Case Volume | Specified Volumes | Calculated Volume

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

Time	Temp (°F)	pH	Cond.	Turbidity	Gals. Removed	Observations
1138	56.9	9.8	867	>200	2.7	Brown, cloudy
1141	57.4	8.9	855	>200	5.4	Increased Turbidity Brown
1145	56.9	9.0	839	>200	8.1	" "
					Ferrous Iron =	.1

Did well dewater? Yes (No) Gallons actually evacuated: 8.1

Sampling Time: 1150 Sampling Date: 12/17/01

Sample I.D.: MW-10 Laboratory: Curtis & Tom Lins

Analyzed for: TPH-G BTEX MTBE (TPH-D) Other: Nitrate / Sulfates (Pre Purge)

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

Analyzed for: TPH-G BTEX MTBE TPH-D Other: N/ triple checked this D.O. reading

D.O. (if req'd):	(Pre-purge):	15.0 mg/L	Post-purge:	mg/L
ORP (if req'd):	(Pre-purge):	48 mV	Post-purge:	mV

WELL MONITORING DATA SHEET

Project #: Redwood Regional Park Service Yard	Client: Stetler Env. Solutions
Sampler: Mike N	Start Date: 12/17/01
Well I.D.: MW-11	Well Diameter: (2) 3 4 6 8 ____
Total Well Depth: 26.00	Depth to Water: 12.71
Before: After:	Before: After:
Depth to Free Product:	Thickness of Free Product (feet):
Referenced to: (PVC) Grade	D.O. Meter (if req'd): (YSI) HACH

Purge Method:

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

Sampling Method:

- ✓ Bailer
- Disposable Bailer
- Extraction Port
- Dedicated Tubing
- Other: _____

2.2 (Gals.) X 3 = 6.6 Gals.
1 Case Volume | Specified Volumes | Calculated Volume

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

Time	Temp (°F)	pH	Cond.	Turbidity	Gals. Removed	Observations
1413	58.6	9.2	758	>200	2.2	Brown, Silty odor
1417	58.0	8.9	892	>200	4.4	" "
1420	57.8	7.8	914	>200	6.6	" "
1423	57.8	7.6	960	>200	8.8	" "
					Ferrous Iron = 0	

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

Sampling Time: 1425 Sampling Date: 12/17/01

Sample I.D.: MW-11 Laboratory: Curtis & Tom Lims

Analyzed for: (TPH-G) BTEX MTBE (TPH-D) Other: Nitrate / Sulfates (Pre-Purge)

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

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

D.O. (if req'd):	(Pre-purge):	2.2 mg/L	Post-purge:	mg/L
ORP (if req'd):	(Pre-purge):	-51 mV	Post-purge:	mV

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

ANALYTICAL REPORT

Prepared for:

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

Date: 11-JAN-02
Lab Job Number: 156131
Project ID: 2001-53
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

Curtis & Tompkins, Ltd.

Laboratory Number: **156131** Receipt Date: **12/17/01**
Client: **Stellar Environmental Solutions**
Project#: **2001-53**
Location: **Redwood Park Service Yard**

CASE NARRATIVE

This hardcopy data package contains sample and QC results for two water samples that were received on December 17, 2001. The samples were received cold and intact.

TVH/BTXE: High Triflurotoluene surrogate recoveries were observed for the matrix spikes of sample CT# 156132-001. This is due to hydrocarbons coeluting with the surrogate peaks. No other analytical problems were encountered.

Total Extractable Hydrocarbons: No analytical problems were encountered.

Chain of Custody Record

Lab Job No. 15613

Date 12/17/01

Page 1 of 1

Laboratory Curtis & Tompkins, Ltd.
Address 2323 Fifth Street
Berkeley CA 94710
510/486-0900

Project Owner East Bay Regional Park District
Site Address 7867 Redwood Rd.
Oakland CA

Project Name Redwood Park Service Yard
Project Number 2001-53

Method of Shipment hand delivered
Shipment No. —
Airbill No. —
Cooler No. —
Project Manager Bruce Rucker
Telephone No. (510) 644-3123
Fax No. (510) 644-3859
Samplers: (Signature) B.M. Rucker

Field Sample Number	Location/ Depth	Date	Time	Sample Type	Type/Size of Container	Preservation: Cooler	Preservation: Chemical	Filtered	No. of Containers	Analysis Required: TVH-gasoline	Analysis Required: BTEX + MTBE	Analysis Required: TEH-diesel	Remarks
SW-2		12/17/01	905	H2O	40 ml VOA	X	HCl		2	X	X		
SW-2		"	"	"	1-L amber glass	X	none		1			X	
SW-3		"	915	"	40 ml VOA	X	HCl		2	X	X		
SW-3		"	"	"	1-L amber glass	X	none		1			X	

Received ☐ On Ice ☒ Cold ☐ Ambient ☐ Intact

Preservation Correct? ☐ Yes ☐ No ☐ N/A

Relinquished by:	Date	Received by:	Date
Signature B.M. Rucker	12/17/01	Signature [illegible]	12/17/01
Printed Bruce M. Rucker	Time 955	Printed Steven E. Stanley	Time 0955
Company Stellar Env. Solns		Company CST	

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

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

Turnaround Time: 2 week OK

Comments:

2000-00-01

★ Stellar Environmental Solutions

2198 Sixth Street #201, Berkeley, CA 94710

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	156131	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53		
Matrix:	Water	Sampled:	12/17/01
Units:	ug/L	Received:	12/20/01
Diln Fac:	1.000	Analyzed:	12/22/01
Batch#:	68989		

Field ID: SW-2 Lab ID: 156131-001
Type: SAMPLE

Analyte	Result	RL	Analysis
Gasoline C7-C12	ND	50	8015B(M)
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)	110	59-135	8015B(M)
Bromofluorobenzene (FID)	106	60-140	8015B(M)
Trifluorotoluene (PID)	84	56-142	EPA 8021B
Bromofluorobenzene (PID)	80	55-149	EPA 8021B

Field ID: SW-3 Lab ID: 156131-002
Type: SAMPLE

Analyte	Result	RL	Analysis
Gasoline C7-C12	ND	50	8015B(M)
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)	108	59-135	8015B(M)
Bromofluorobenzene (FID)	107	60-140	8015B(M)
Trifluorotoluene (PID)	84	56-142	EPA 8021B
Bromofluorobenzene (PID)	80	55-149	EPA 8021B

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Curtis & Tompkins Laboratories Analytical Report

Lab #:	156131	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53		
Matrix:	Water	Sampled:	12/17/01
Units:	ug/L	Received:	12/20/01
Dil'n Fac:	1.000	Analyzed:	12/22/01
Batch#:	68989		

Type: BLANK Lab ID: QC166105

Analyte	Result	RL	Analysis
Gasoline C7-C12	ND	50	8015B(M)
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)	109	59-135	8015B(M)
Bromofluorobenzene (FID)	112	60-140	8015B(M)
Trifluorotoluene (PID)	86	56-142	EPA 8021B
Bromofluorobenzene (PID)	81	55-149	EPA 8021B

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Gasoline by GC/FID CA LUFT

Lab #:	156131	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53	Analysis:	8015B(M)
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC166106	Batch#:	68989
Matrix:	Water	Analyzed:	12/22/01
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	2,000	1,957	98	73-121

Surrogate	%REC	Limits
Trifluorotoluene (FID)	121	59-135
Bromofluorobenzene (FID)	111	60-140

Curtis & Tompkins, Ltd.

Benzene, Toluene, Ethylbenzene, Xylenes

Lab #:	156131	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53	Analysis:	EPA 8021B
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC166109	Batch#:	68989
Matrix:	Water	Analyzed:	12/22/01
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
MTBE	20.00	24.39	122	51-125
Benzene	20.00	19.13	96	67-117
Toluene	20.00	19.76	99	69-117
Ethylbenzene	20.00	20.17	101	68-124
m,p-Xylenes	40.00	40.42	101	70-125
o-Xylene	20.00	21.85	109	65-129

Surrogate	%REC	Limits
Trifluorotoluene (PID)	89	56-142
Bromofluorobenzene (PID)	84	55-149

Curtis & Tompkins, Ltd.

Gasoline by GC/FID CA LUFT

Lab #:	156131	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53	Analysis:	8015B(M)
Field ID:	ZZZZZZZZZZ	Diln Fac:	1.000
MSS Lab ID:	156132-001	Batch#:	68989
Matrix:	Water	Sampled:	12/17/01
Units:	ug/L	Received:	12/20/01

Type: MS
Lab ID: QC166107
Analyzed: 12/27/01

Analyte	MSS Result	Spiked	Result	%REC	Limits
Gasoline C7-C12	49.44	2,000	1,918	93	65-131

Surrogate	%REC	Limits
Trifluorotoluene (FID)	152 *	59-135
Bromofluorobenzene (FID)	114	60-140

Type: MSD
Lab ID: QC166108
Analyzed: 12/28/01

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	2,000	1,953	95	65-131	2	20

Surrogate	%REC	Limits
Trifluorotoluene (FID)	153 *	59-135
Bromofluorobenzene (FID)	112	60-140

*= Value outside of QC limits; see narrative
RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Total Extractable Hydrocarbons

Lab #:	156131	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2001-53	Analysis:	8015B(M)
Matrix:	Water	Sampled:	12/17/01
Units:	ug/L	Received:	12/20/01
Dil'n Fac:	1.000	Prepared:	12/28/01
Batch#:	69105		

Field ID: SW-2
Type: SAMPLE
Lab ID: 156131-001
Analyzed: 12/30/01

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
Hexacosane	95	44-121

Field ID: SW-3
Type: SAMPLE
Lab ID: 156131-002
Analyzed: 12/30/01

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
Hexacosane	97	44-121

Type: BLANK
Lab ID: QC166531
Analyzed: 12/31/01
Cleanup Method: EPA 3630C

Analyte	Result	RL
Diesel C10-C24	ND	50

Surrogate	%REC	Limits
Hexacosane	74	44-121

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Total Extractable Hydrocarbons

Lab #:	156131	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2001-53	Analysis:	8015B(M)
Matrix:	Water	Batch#:	69105
Units:	ug/L	Prepared:	12/28/01
Diln Fac:	1.000	Analyzed:	12/31/01

Type: BS
Lab ID: QC166532

Cleanup Method: EPA 3630C

Analyte	Spiked	Result	%REC	Limits
Diesel C10-C24	2,500	2,117	85	45-110

Surrogate	%REC	Limits
Hexacosane	91	44-121

Type: BSD
Lab ID: QC166533

Cleanup Method: EPA 3630C

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Diesel C10-C24	2,500	1,802	72	45-110	16	22

Surrogate	%REC	Limits
Hexacosane	76	44-121

RPD= Relative Percent Difference

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

ANALYTICAL REPORT

Prepared for:

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

Date: 11-JAN-02
Lab Job Number: 156050
Project ID: 2001-53
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

CA ELAP # 1459

Curtis & Tompkins, Ltd.

Laboratory Number: **156050** Receipt Date: **12/17/01**
Client: **Stellar Environmental Solutions**
Project#: **2001-53**
Location: **Redwood Park Service Yard**

CASE NARRATIVE

This hardcopy data package contains sample and QC results for eight water samples that were received on December 17, 2001. The samples were received cold and intact.

TVH/BTXE: High Triflurotoluene surrogate recoveries were observed in samples MW-8, MW-9 and MW-7 (156050-005, 006 and –007). This is due to hydrocarbons coeluting with the surrogate peaks.

The blank spike surrogate recovery failed low due to an air bubble in the surrogate line. High relative percent difference was observed for MTBE in the BS/BSD for batch #69021. Both recoveries were within criteria. No other analytical problems were encountered.

Total Extractable Hydrocarbons: No analytical problems were encountered.

General Chemistry: No analytical problems were encountered.

[redacted] # Chain of Custody Record [redacted]

Lab job no. ____
Date [redacted]/01[redacted]
Page 1 of 2

Laboratory: Curtis + Tompkins, Ltd.
Address: 2323 Fifth Street
Berkeley CA 94710
510/486-0900

Project Owner: East Bay Regional Park District
Site Address: 7867 Redwood Rd.
Oakland, CA
Project Name: Redwood Park Service Yard
Project Number: 2001-53

Method of Shipment: hand delivery
Shipment No.: /
Airbill No.: /
Cooler No.: /
Project Manager: Bruce Rucker
Telephone No.: (510) 644-3123
Fax No.: (510) 644-3859
Samplers: *(Signature)* [signature]

	Field Sample Number	Location/ Depth	Date	Time	Sample Type	Type/Size of Container	Preservation: Cooler	Preservation: Chemical	Filtered	No. of Containers	TVH + BTEX + MTBE	TEH-diesel	Nitrate + Sulfate	Remarks
-1	MW-3	/	12/17/01	1025	H2O	500 ml Poly	X	none		1			X	
		/	↓		↓		↓							
-2	MW-2	/		1010		40 ml VOAs		HCl		2	X			
	"	/		1010		1-L amber glass		none		1		X		
		/												
-3	MW-4	/		1100		500 ml poly		none		1			X	
	"	/		1100		40 ml VOAs		HCl		2	X			
	"	/		1100		1-L amber glass		none		1		X		
		/												
-4	MW-10	/		1150		500 ml poly		none		1			X	
	"	/		1150		40 ml VOAs		HCl		2	X			
	"	/	↓	1150	↓	1-L amber glass	↓	none		1		X		

Analysis Required

Relinquished by:	Date	Received by:	Date	Relinquished by:	Date	Received by:	Date
Signature [signature]	12/17/01	Signature [signature]		Signature		Signature	
Printed Michael Ninokata	Time	Printed R. Alvarez	Time	Printed	Time	Printed	Time
Company Blaine Tech Services	1535	Company C+T		Company		Company	

Turnaround Time: 2 week OK

Comments:
Sampling conducted by Blaine Tech Services (San Jose, CA)

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

2000-00-01

Curtis & Tompkins, Ltd.

Gasoline by GC/FID CA LUFT

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53	Analysis:	8015B(M)
Matrix:	Water	Sampled:	12/17/01
Units:	ug/L	Received:	12/17/01

Field ID:	MW-8	Diln Fac:	1.000
Type:	SAMPLE	Batch#:	68962
Lab ID:	156050-005	Analyzed:	12/21/01

Analyte	Result	RL
Gasoline C7-C12	3,500	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	200 *	59-135
Bromofluorobenzene (FID)	113	60-140

Field ID:	MW-9	Diln Fac:	1.000
Type:	SAMPLE	Batch#:	68962
Lab ID:	156050-006	Analyzed:	12/21/01

Analyte	Result	RL
Gasoline C7-C12	9,400	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	147 *	59-135
Bromofluorobenzene (FID)	130	60-140

Field ID:	MW-7	Diln Fac:	5.000
Type:	SAMPLE	Batch#:	69021
Lab ID:	156050-007	Analyzed:	12/26/01

Analyte	Result	RL
Gasoline C7-C12	9,100	250

Surrogate	%REC	Limits
Trifluorotoluene (FID)	173 *	59-135
Bromofluorobenzene (FID)	106	60-140

*= Value outside of QC limits; see narrative
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Gasoline by GC/FID CA LUFT

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53	Analysis:	8015B(M)
Matrix:	Water	Sampled:	12/17/01
Units:	ug/L	Received:	12/17/01

Field ID:	MW-11	Diln Fac:	5.000
Type:	SAMPLE	Batch#:	69021
Lab ID:	156050-008	Analyzed:	12/26/01

Analyte	Result	RL
Gasoline C7-C12	5,800	250

Surrogate	%REC	Limits
Trifluorotoluene (FID)	130	59-135
Bromofluorobenzene (FID)	106	60-140

Type:	BLANK	Batch#:	68962
Lab ID:	QC165983	Analyzed:	12/21/01
Diln Fac:	1.000		

Analyte	Result	RL
Gasoline C7-C12	ND	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	106	59-135
Bromofluorobenzene (FID)	107	60-140

Type:	BLANK	Batch#:	69021
Lab ID:	QC166215	Analyzed:	12/26/01
Diln Fac:	1.000		

Analyte	Result	RL
Gasoline C7-C12	ND	50

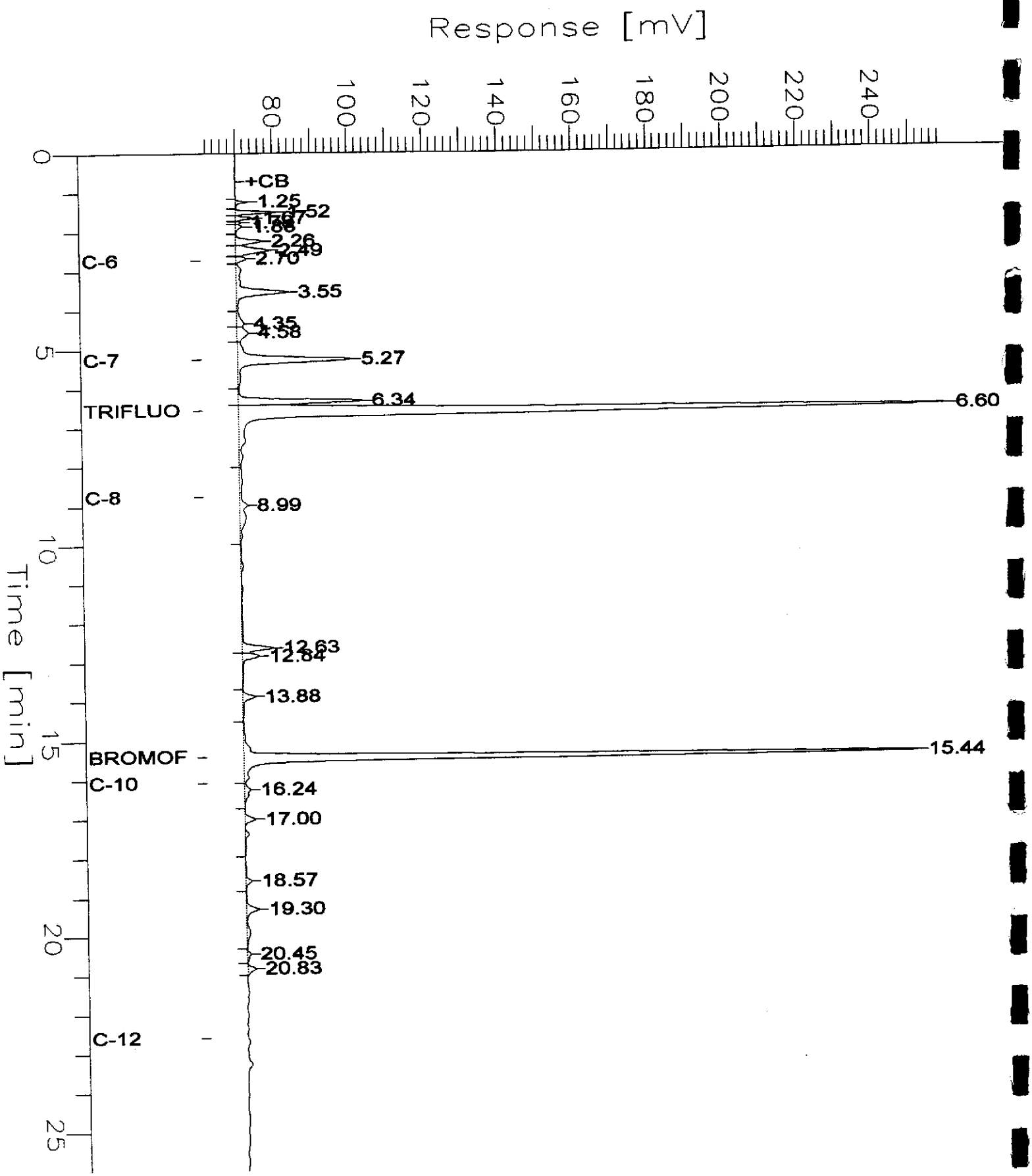
Surrogate	%REC	Limits
Trifluorotoluene (FID)	105	59-135
Bromofluorobenzene (FID)	98	60-140

*= Value outside of QC limits; see narrative
ND= Not Detected
RL= Reporting Limit

GC04 TVH 'J' Data File FID

Sample Name : 156050-002,68962
FileName : g:\gc04\data\355j021.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.00 min
Scale Factor: 1.0 Plot Offset: 60 mV

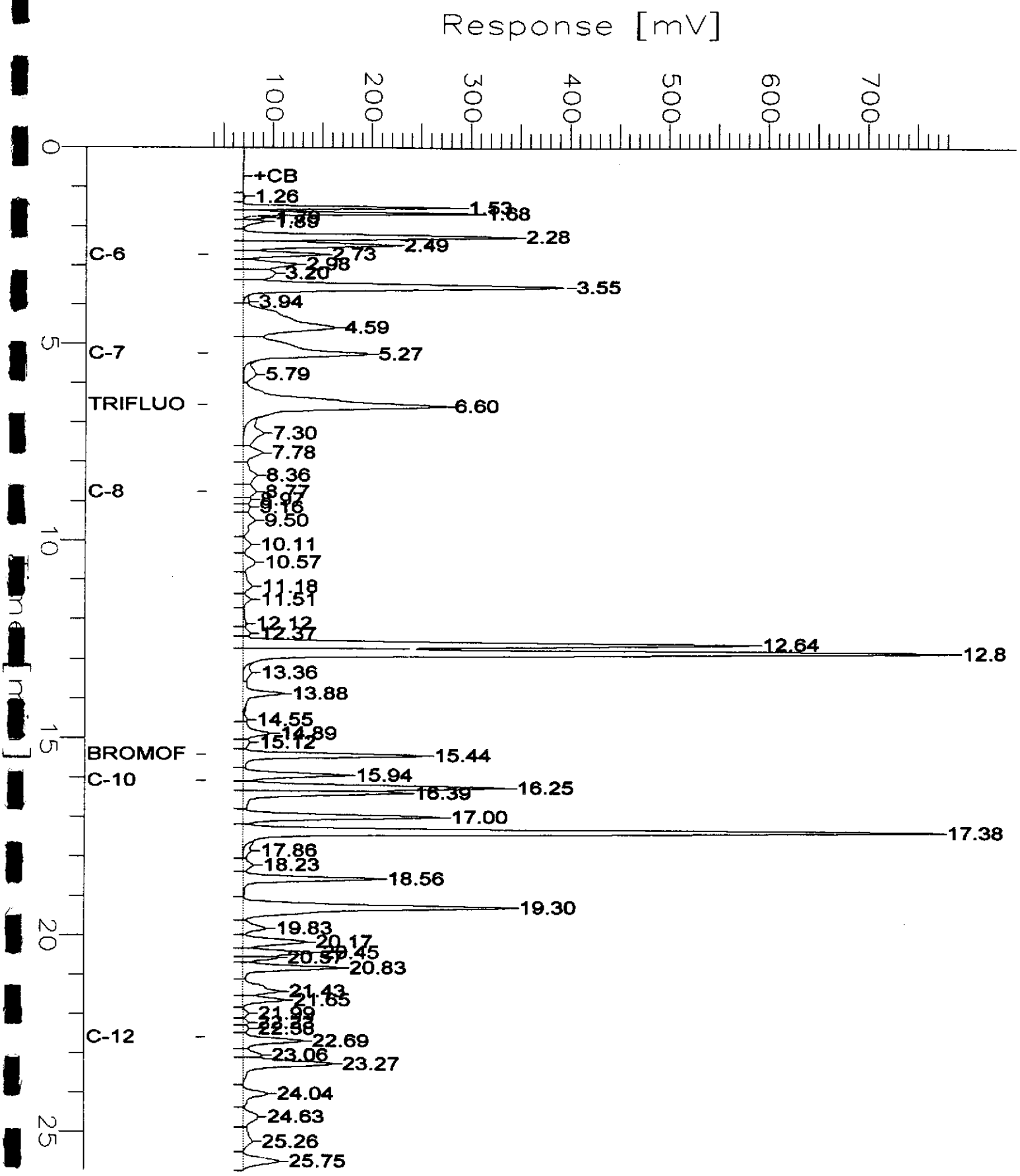
Sample #: c1
Date : 12/22/01 12:53 PM
Time of Injection: 12/21/01 07:23 PM
Low Point : 60.46 mV High Point : 259.68 mV
Plot Scale: 199.2 mV



GC04 TVH 'J' Data File FID

Sample Name : 156050-005,68962
FileName : G:\GC04\DATA\355J024.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.00 min
Scale Factor: 1.0 Plot Offset: 34 mV

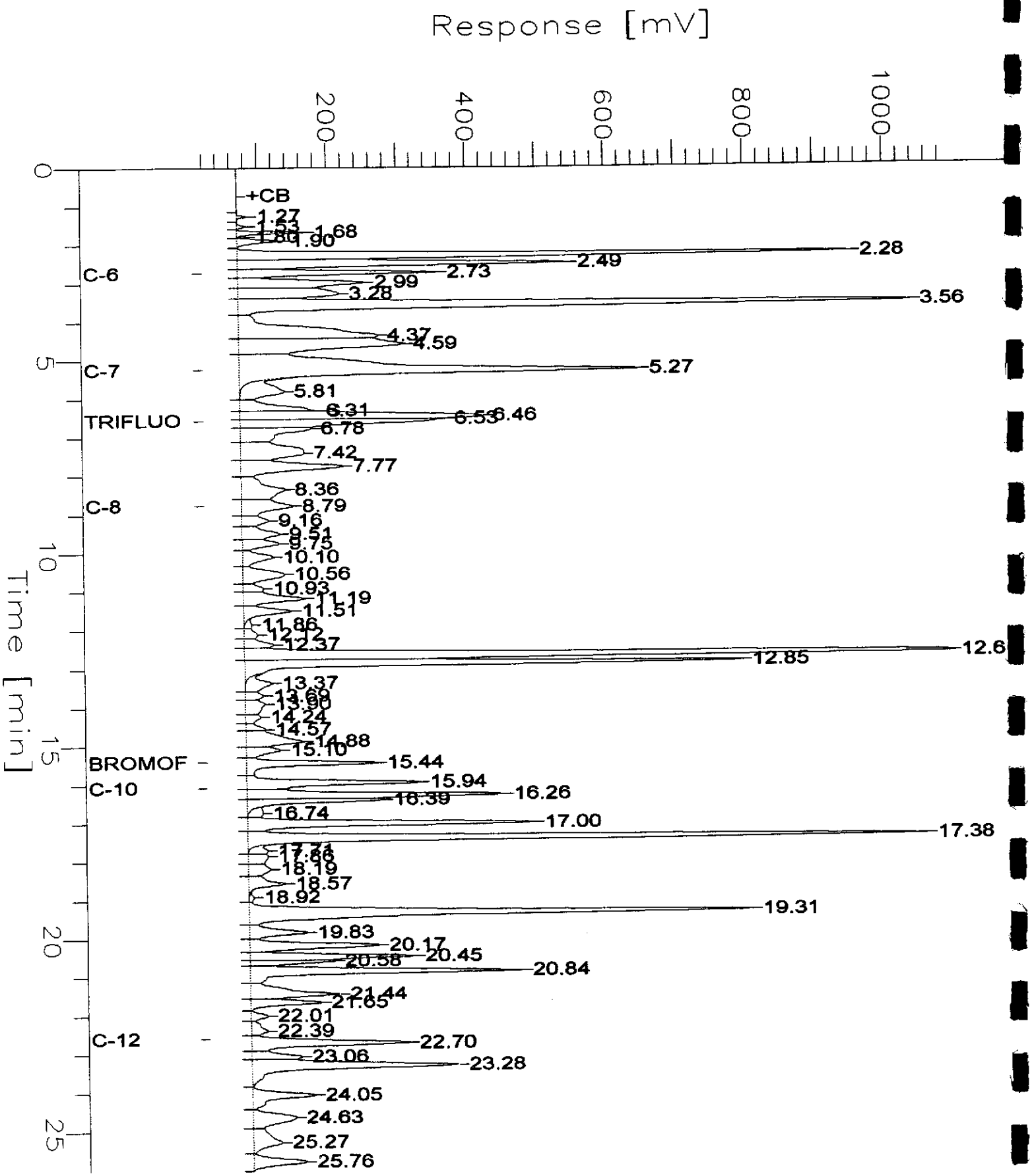
Sample #: c1 Page 1 of 1
Date : 12/22/01 12:04 PM
Time of Injection: 12/21/01 09:10 PM
Low Point : 34.22 mV High Point : 786.49 mV
Plot Scale: 752.3 mV



GC04 TVH 'J' Data File FID

Sample Name : 156050-006,68962
FileName : G:\GC04\DATA\355J028.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.00 min
Scale Factor: 1.0 Plot Offset: 20 mV

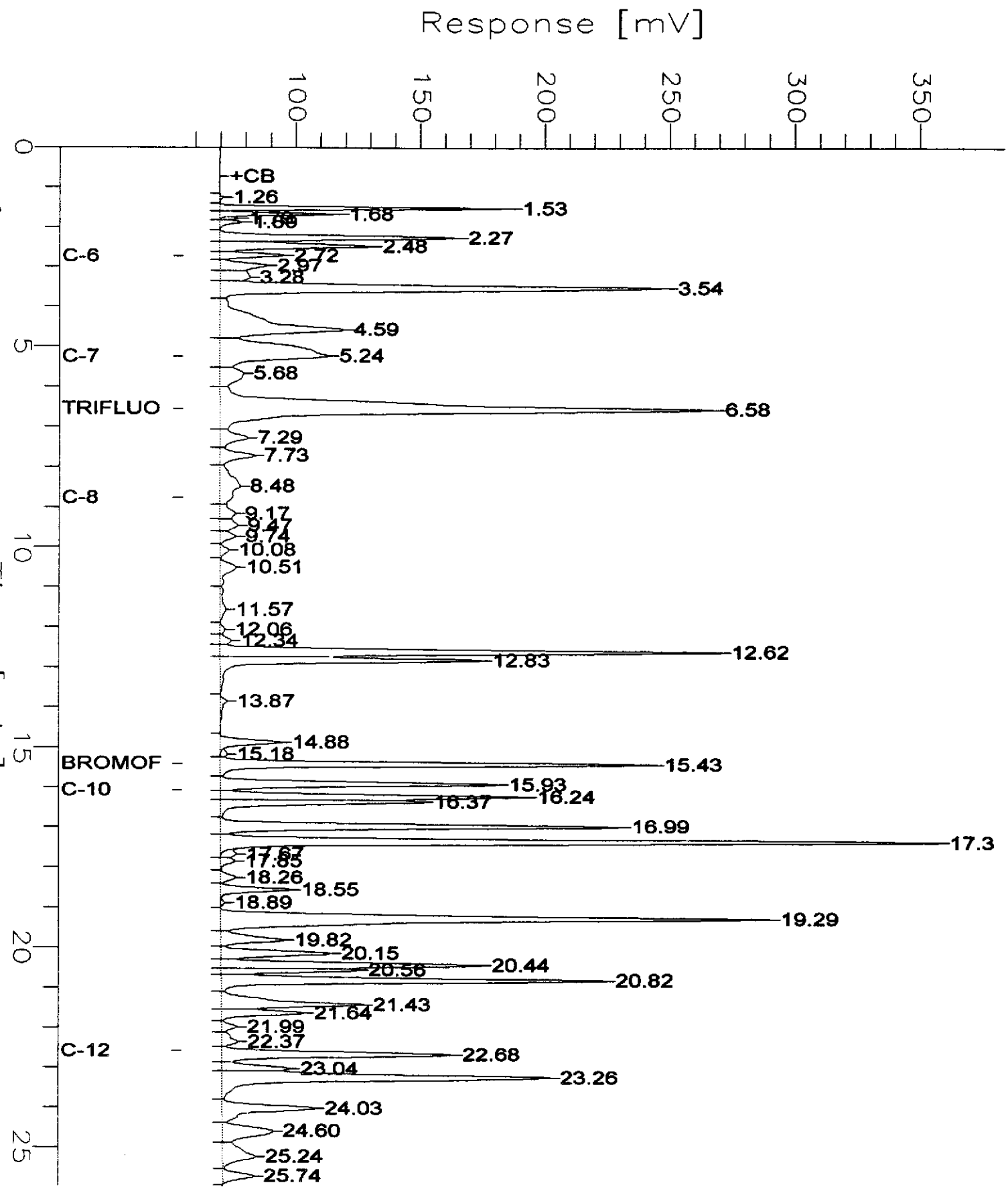
Sample #: c1
Date : 12/26/01 12:14 PM
Time of Injection: 12/21/01 11:33 PM
Low Point : 19.54 mV High Point : 1094.40 mV
Plot Scale: 1074.9 mV



GC04 TVH 'J' Data File FID

Sample Name : 156050-007,69021
[redacted]eName : G:\GC04\DATA\360J010.raw
[redacted]thod : TVHBTXE
Start Time : 0.00 min End Time : 26.00 min
Scale Factor: 1.0 Plot Offset: 55 mV

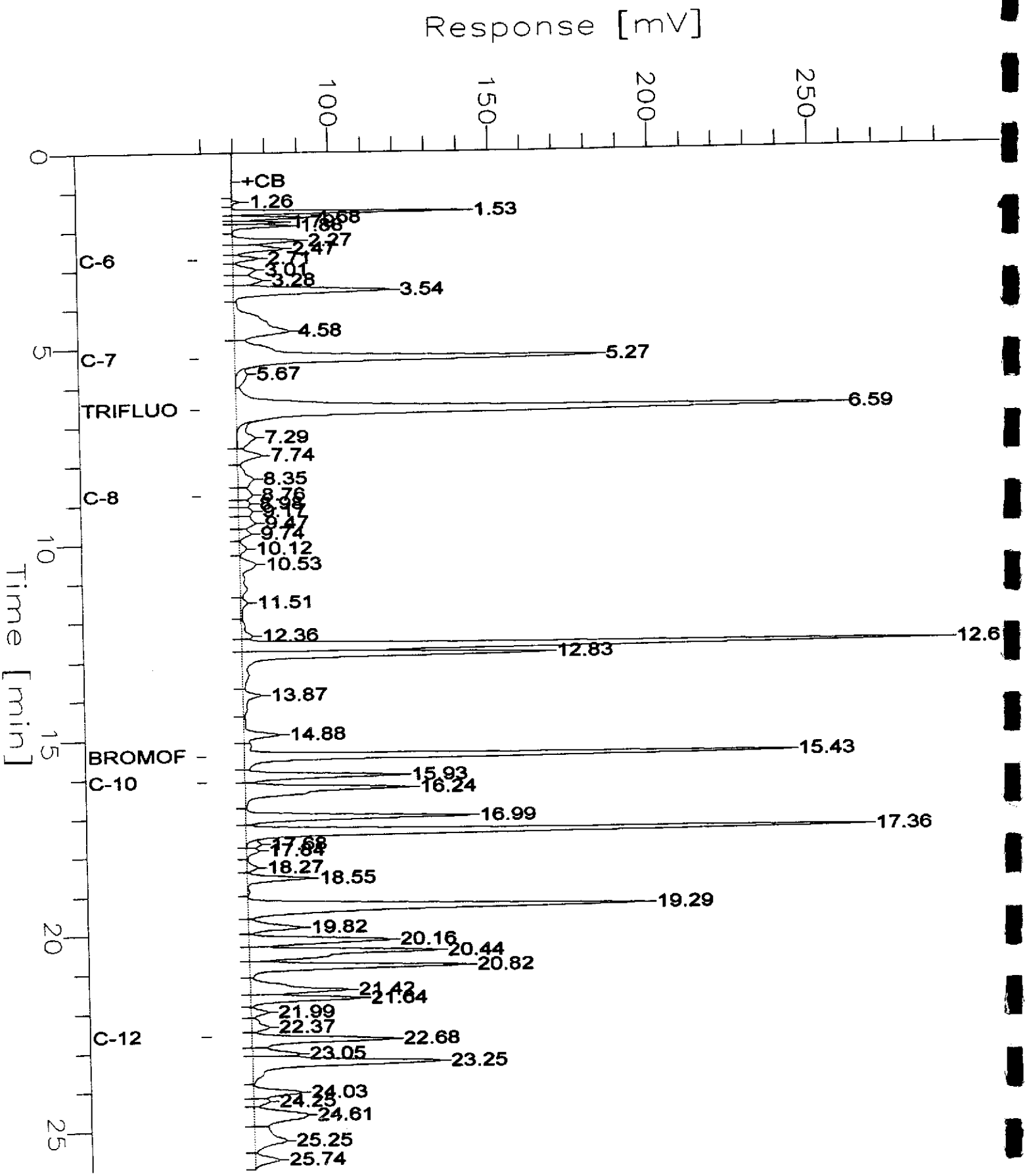
Sample #: C1 Page 1 of 1
Date : 12/27/01 06:38 AM
Time of Injection: 12/26/01 08:01 PM
Low Point : 54.81 mV High Point : 358.53 mV
Plot Scale: 303.7 mV



GC04 TVH 'J' Data File FID

Sample Name : 156050-008,69021
FileName : G:\GC04\DATA\360J011.raw
Method : TVHBTXE
Start Time : 0.00 min
End Time : 26.00 min
Scale Factor: 1.0
Plot Offset: 58 mV

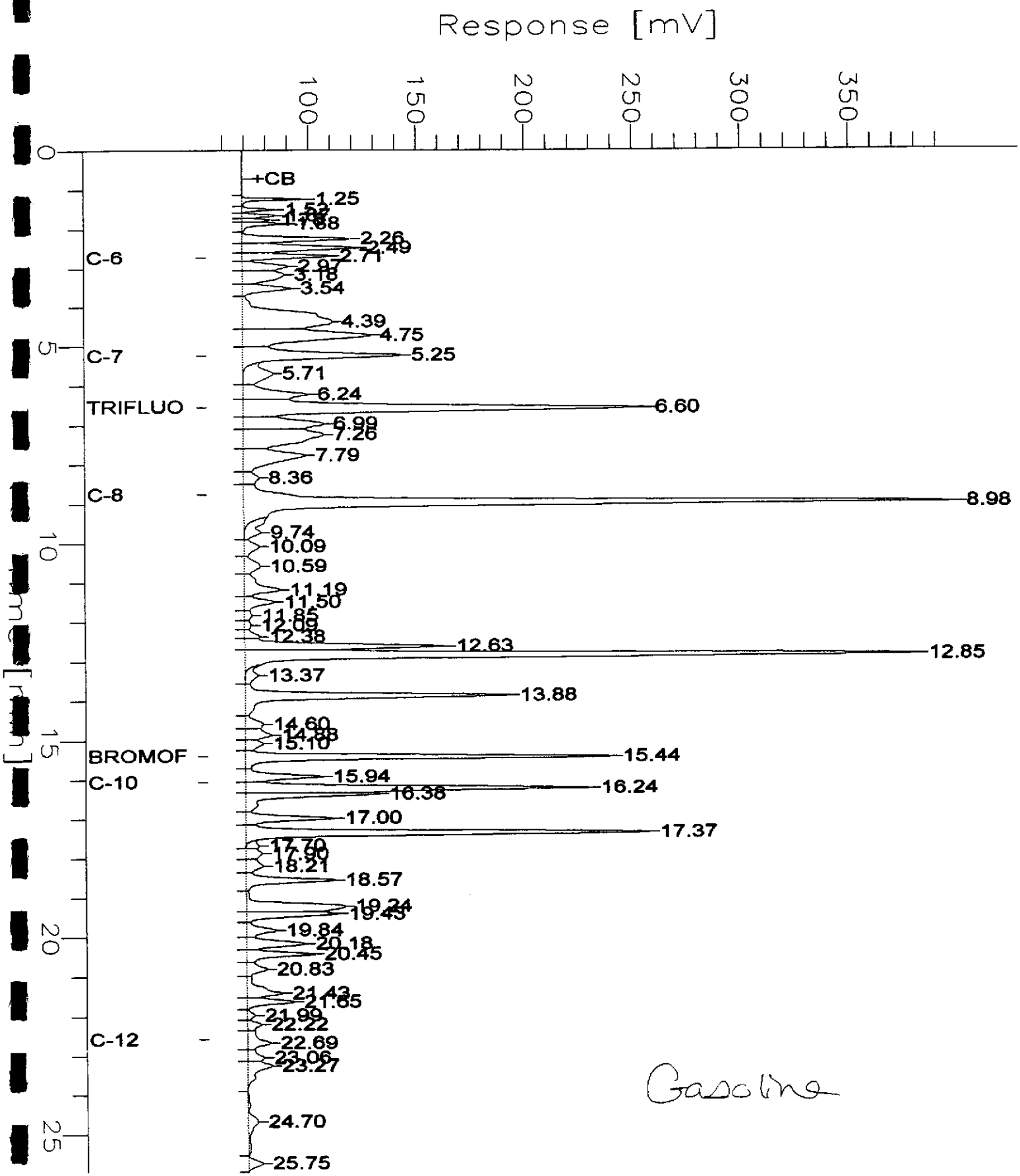
Sample #: C1
Date : 12/27/01 06:21 AM
Time of Injection: 12/26/01 08:36 PM
Low Point : 58.40 mV
High Point : 291.27 mV
Plot Scale: 232.9 mV



GC04 TVH 'J' Data File FID

Sample Name : CCV/LCS,QC165984,68962,01WS2177,5/5000
File Name : G:\GC04\DATA\355J003.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.00 min
Scale Factor: 1.0 Plot Offset: 53 mV

Sample #:
Date : 12/21/01 09:03 AM
Time of Injection: 12/21/01 08:37 AM
Low Point : 52.53 mV High Point : 399.39 mV
Plot Scale: 346.9 mV



Gasoline

Curtis & Tompkins, Ltd.

Benzene, Toluene, Ethylbenzene, Xylenes

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53	Analysis:	EPA 8021B
Matrix:	Water	Sampled:	12/17/01
Units:	ug/L	Received:	12/17/01

Field ID:	MW-2	Diln Fac:	1.000
Type:	SAMPLE	Batch#:	68962
Lab ID:	156050-002	Analyzed:	12/21/01

Analyte	Result	RL
MTBE	6.6	2.0
Benzene	14	0.50
Toluene	0.76	0.50
Ethylbenzene	3.7	0.50
m,p-Xylenes	2.0	0.50
o-Xylene	1.5	0.50

Surrogate	%REC	Limits
Trifluorotoluene (PID)	84	56-142
Bromofluorobenzene (PID)	82	55-149

Field ID:	MW-4	Diln Fac:	1.000
Type:	SAMPLE	Batch#:	68962
Lab ID:	156050-003	Analyzed:	12/21/01

Analyte	Result	RL
MTBE	ND	2.0
Benzene	ND	0.50
Toluene	ND	0.50
Ethylbenzene	ND	0.50
m,p-Xylenes	0.54	0.50
o-Xylene	0.67	0.50

Surrogate	%REC	Limits
Trifluorotoluene (PID)	82	56-142
Bromofluorobenzene (PID)	82	55-149

Field ID:	MW-10	Diln Fac:	1.000
Type:	SAMPLE	Batch#:	68962
Lab ID:	156050-004	Analyzed:	12/21/01

Analyte	Result	RL
MTBE	25	2.0
Benzene	ND	0.50
Toluene	ND	0.50
Ethylbenzene	ND	0.50
m,p-Xylenes	ND	0.50
o-Xylene	ND	0.50

Surrogate	%REC	Limits
Trifluorotoluene (PID)	83	56-142
Bromofluorobenzene (PID)	84	55-149

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Benzene, Toluene, Ethylbenzene, Xylenes

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53	Analysis:	EPA 8021B
Matrix:	Water	Sampled:	12/17/01
Units:	ug/L	Received:	12/17/01

Field ID:	MW-8	Diln Fac:	2.000
Type:	SAMPLE	Batch#:	69021
Lab ID:	156050-005	Analyzed:	12/26/01

Analyte	Result	RL
MTBE	ND	4.0
Benzene	69	1.0
Toluene	2.4	1.0
Ethylbenzene	310	1.0
m,p-Xylenes	410	1.0
o-Xylene	21	1.0

Surrogate	%REC	Limits
Trifluorotoluene (PID)	92	56-142
Bromofluorobenzene (PID)	77	55-149

Field ID:	MW-9	Diln Fac:	5.000
Type:	SAMPLE	Batch#:	69021
Lab ID:	156050-006	Analyzed:	12/26/01

Analyte	Result	RL
MTBE	ND	10
Benzene	250	2.5
Toluene	5.1	2.5
Ethylbenzene	520	2.5
m,p-Xylenes	310	2.5
o-Xylene	7.0	2.5

Surrogate	%REC	Limits
Trifluorotoluene (PID)	95	56-142
Bromofluorobenzene (PID)	75	55-149

Field ID:	MW-7	Diln Fac:	5.000
Type:	SAMPLE	Batch#:	69021
Lab ID:	156050-007	Analyzed:	12/26/01

Analyte	Result	RL
MTBE	ND	10
Benzene	89	2.5
Toluene	ND	2.5
Ethylbenzene	460	2.5
m,p-Xylenes	220	2.5
o-Xylene	8.0	2.5

Surrogate	%REC	Limits
Trifluorotoluene (PID)	100	56-142
Bromofluorobenzene (PID)	79	55-149

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Benzene, Toluene, Ethylbenzene, Xylenes

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53	Analysis:	EPA 8021B
Matrix:	Water	Sampled:	12/17/01
Units:	ug/L	Received:	12/17/01

Field ID:	MW-11	Diln Fac:	5.000
Type:	SAMPLE	Batch#:	69021
Lab ID:	156050-008	Analyzed:	12/26/01

Analyte	Result	RL
MTBE	ND	10
Benzene	280	2.5
Toluene	7.8	2.5
Ethylbenzene	500	2.5
m,p-Xylenes	200	2.5
o-Xylene	13	2.5

Surrogate	%REC	Limits
Trifluorotoluene (PID)	88	56-142
Bromofluorobenzene (PID)	75	55-149

Type:	BLANK	Batch#:	68962
Lab ID:	QC165983	Analyzed:	12/21/01
Diln Fac:	1.000		

Analyte	Result	RL
MTBE	ND	2.0
Benzene	ND	0.50
Toluene	ND	0.50
Ethylbenzene	ND	0.50
m,p-Xylenes	ND	0.50
o-Xylene	ND	0.50

Surrogate	%REC	Limits
Trifluorotoluene (PID)	80	56-142
Bromofluorobenzene (PID)	78	55-149

Type:	BLANK	Batch#:	69021
Lab ID:	QC166215	Analyzed:	12/26/01
Diln Fac:	1.000		

Analyte	Result	RL
MTBE	ND	2.0
Benzene	ND	0.50
Toluene	ND	0.50
Ethylbenzene	ND	0.50
m,p-Xylenes	ND	0.50
o-Xylene	ND	0.50

Surrogate	%REC	Limits
Trifluorotoluene (PID)	78	56-142
Bromofluorobenzene (PID)	74	55-149

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Gasoline by GC/FID CA LUFT

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53	Analysis:	8015B(M)
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC165984	Batch#:	68962
Matrix:	Water	Analyzed:	12/21/01
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	2,000	2,049	102	73-121

Surrogate	%REC	Limits
Trifluorotoluene (FID)	120	59-135
Bromofluorobenzene (FID)	106	60-140

Curtis & Tompkins, Ltd.

Gasoline by GC/FID CA LUFT

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53	Analysis:	8015B(M)
Matrix:	Water	Batch#:	69021
Units:	ug/L	Analyzed:	12/26/01
Diln Fac:	1.000		

Type: BS Lab ID: QC166216

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	2,000	1,933	97	73-121

Surrogate	%REC	Limits
Trifluorotoluene (FID)	123	59-135
Bromofluorobenzene (FID)	102	60-140

Type: BSD Lab ID: QC166217

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	2,000	1,960	98	73-121	1	20

Surrogate	%REC	Limits
Trifluorotoluene (FID)	123	59-135
Bromofluorobenzene (FID)	103	60-140

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Benzene, Toluene, Ethylbenzene, Xylenes

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53	Analysis:	EPA 8021B
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC165985	Batch#:	68962
Matrix:	Water	Analyzed:	12/21/01
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
MTBE	20.00	19.46	97	51-125
Benzene	20.00	18.09	90	67-117
Toluene	20.00	17.33	87	69-117
Ethylbenzene	20.00	19.29	96	68-124
m,p-Xylenes	40.00	37.63	94	70-125
o-Xylene	20.00	19.93	100	65-129

Surrogate	%REC	Limits
Trifluorotoluene (PID)	81	56-142
Bromofluorobenzene (PID)	78	55-149

Curtis & Tompkins, Ltd.

Benzene, Toluene, Ethylbenzene, Xylenes

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53	Analysis:	EPA 8021B
Matrix:	Water	Batch#:	69021
Units:	ug/L	Analyzed:	12/26/01
Diln Fac:	1.000		

Type: BS Lab ID: QC166273

Analyte	Spiked	Result	%REC	Limits
MTBE	20.00	20.08	100	51-125
Benzene	20.00	17.32	87	67-117
Toluene	20.00	17.06	85	69-117
Ethylbenzene	20.00	18.09	90	68-124
m,p-Xylenes	40.00	36.04	90	70-125
o-Xylene	20.00	19.03	95	65-129

Surrogate	%REC	Limits
Trifluorotoluene (PID)	22 *	56-142
Bromofluorobenzene (PID)	21 *	55-149

Type: BSD Lab ID: QC166274

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
MTBE	20.00	13.81	69	51-125	37 *	20
Benzene	20.00	16.73	84	67-117	3	20
Toluene	20.00	16.35	82	69-117	4	20
Ethylbenzene	20.00	18.03	90	68-124	0	20
m,p-Xylenes	40.00	36.08	90	70-125	0	20
o-Xylene	20.00	19.04	95	65-129	0	20

Surrogate	%REC	Limits
Trifluorotoluene (PID)	79	56-142
Bromofluorobenzene (PID)	76	55-149

*= Value outside of QC limits; see narrative
RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Gasoline by GC/FID CA LUFT

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 5030B
Project#:	2001-53	Analysis:	8015B(M)
Field ID:	ZZZZZZZZZZ	Batch#:	68962
MSS Lab ID:	156053-001	Sampled:	12/17/01
Matrix:	Water	Received:	12/17/01
Units:	ug/L	Analyzed:	12/21/01
Diln Fac:	1.000		

Type: MS Lab ID: QC165986

Analyte	MSS Result	Spiked	Result	%REC	Limits
Gasoline C7-C12	<33.00	2,000	2,038	102	65-131

Surrogate	%REC	Limits
Trifluorotoluene (FID)	124	59-135
Bromofluorobenzene (FID)	112	60-140

Type: MSD Lab ID: QC165987

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	2,000	1,982	99	65-131	3	20

Surrogate	%REC	Limits
Trifluorotoluene (FID)	124	59-135
Bromofluorobenzene (FID)	114	60-140

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Total Extractable Hydrocarbons

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2001-53	Analysis:	8015B(M)
Matrix:	Water	Sampled:	12/17/01
Units:	ug/L	Received:	12/17/01
Diln Fac:	1.000	Prepared:	12/28/01
Batch#:	69105	Analyzed:	12/31/01

Field ID: MW-2 Lab ID: 156050-002
Type: SAMPLE

Analyte	Result	RL
Diesel C10-C24	69 Y	50

Surrogate	%REC	Limits
Hexacosane	100	44-121

Field ID: MW-4 Lab ID: 156050-003
Type: SAMPLE

Analyte	Result	RL
Diesel C10-C24	110 Y	50

Surrogate	%REC	Limits
Hexacosane	96	44-121

Field ID: MW-10 Lab ID: 156050-004
Type: SAMPLE

Analyte	Result	RL
Diesel C10-C24	81 Y	50

Surrogate	%REC	Limits
Hexacosane	95	44-121

Field ID: MW-8 Lab ID: 156050-005
Type: SAMPLE

Analyte	Result	RL
Diesel C10-C24	950 L Y	50

Surrogate	%REC	Limits
Hexacosane	85	44-121

Field ID: MW-9 Lab ID: 156050-006
Type: SAMPLE

Analyte	Result	RL
Diesel C10-C24	2,700 L Y	50

Surrogate	%REC	Limits
Hexacosane	93	44-121

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

Curtis & Tompkins, Ltd.

Total Extractable Hydrocarbons

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2001-53	Analysis:	8015B(M)
Matrix:	Water	Sampled:	12/17/01
Units:	ug/L	Received:	12/17/01
Diln Fac:	1.000	Prepared:	12/28/01
Batch#:	69105	Analyzed:	12/31/01

Field ID: MW-7 Lab ID: 156050-007
Type: SAMPLE

Analyte	Result	RL
Diesel C10-C24	4,600 L Y	50

Surrogate	%REC	Limits
Hexacosane	99	44-121

Field ID: MW-11 Lab ID: 156050-008
Type: SAMPLE

Analyte	Result	RL
Diesel C10-C24	2,800 L Y	50

Surrogate	%REC	Limits
Hexacosane	91	44-121

Type: BLANK Cleanup Method: EPA 3630C
Lab ID: QC166531

Analyte	Result	RL
Diesel C10-C24	ND	50

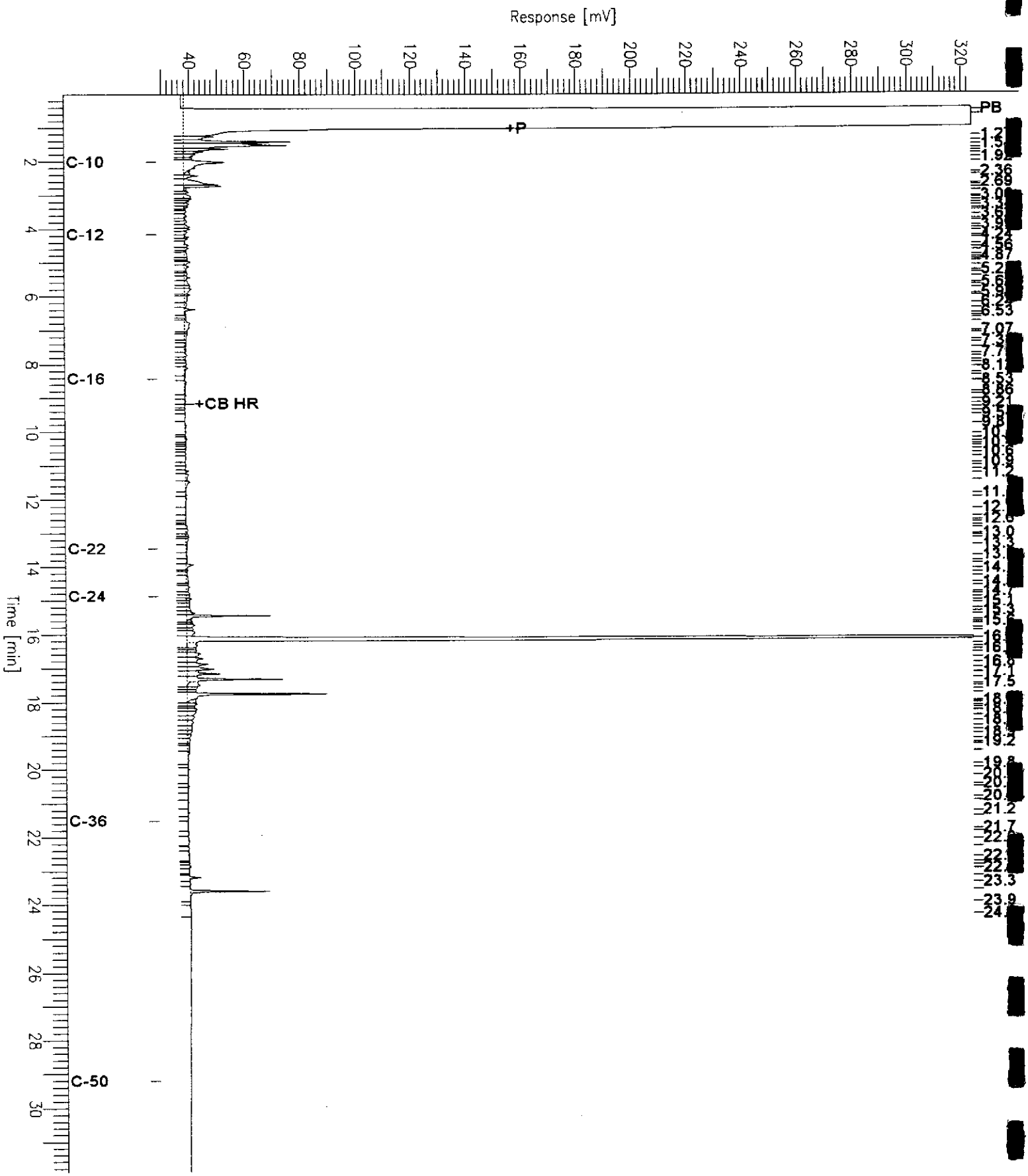
Surrogate	%REC	Limits
Hexacosane	74	44-121

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

Chromatogram

Sample Name : 156050-002,69105
FileName : G:\GC15\CHB\364B023.RAW
Method : BTEH365.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 28 mV

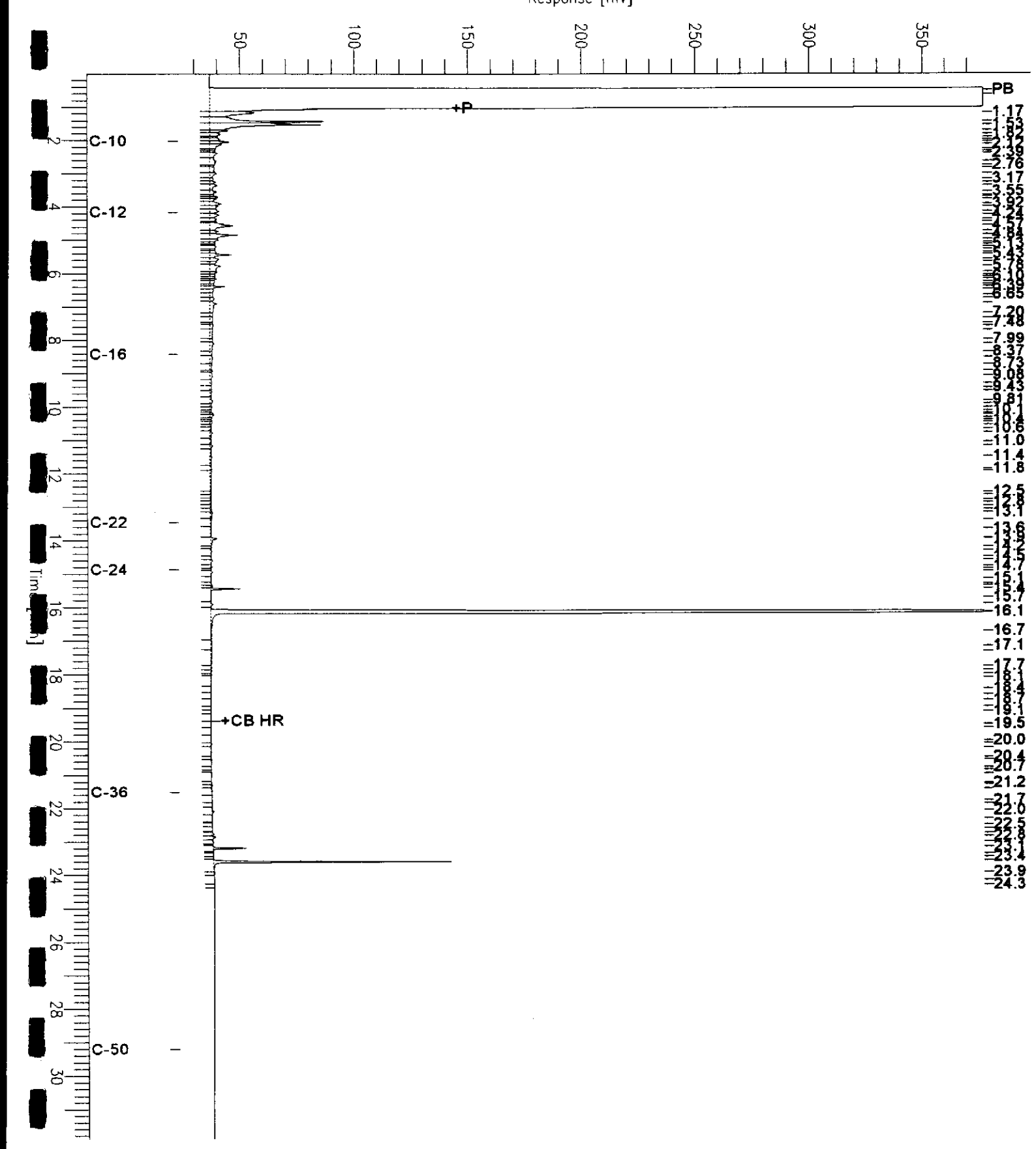
Sample #: 69105
Date : 12/31/2001 03:59 PM
Time of Injection: 12/31/2001 09:44 AM
Low Point : 28.16 mV High Point : 323.76 mV
Plot Scale: 295.6 mV



Chromatogram

Sample Name : 156050-003,69105
FileName : G:\GC15\CHB\364B024.RAW
Method : BTEH365.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 23 mV

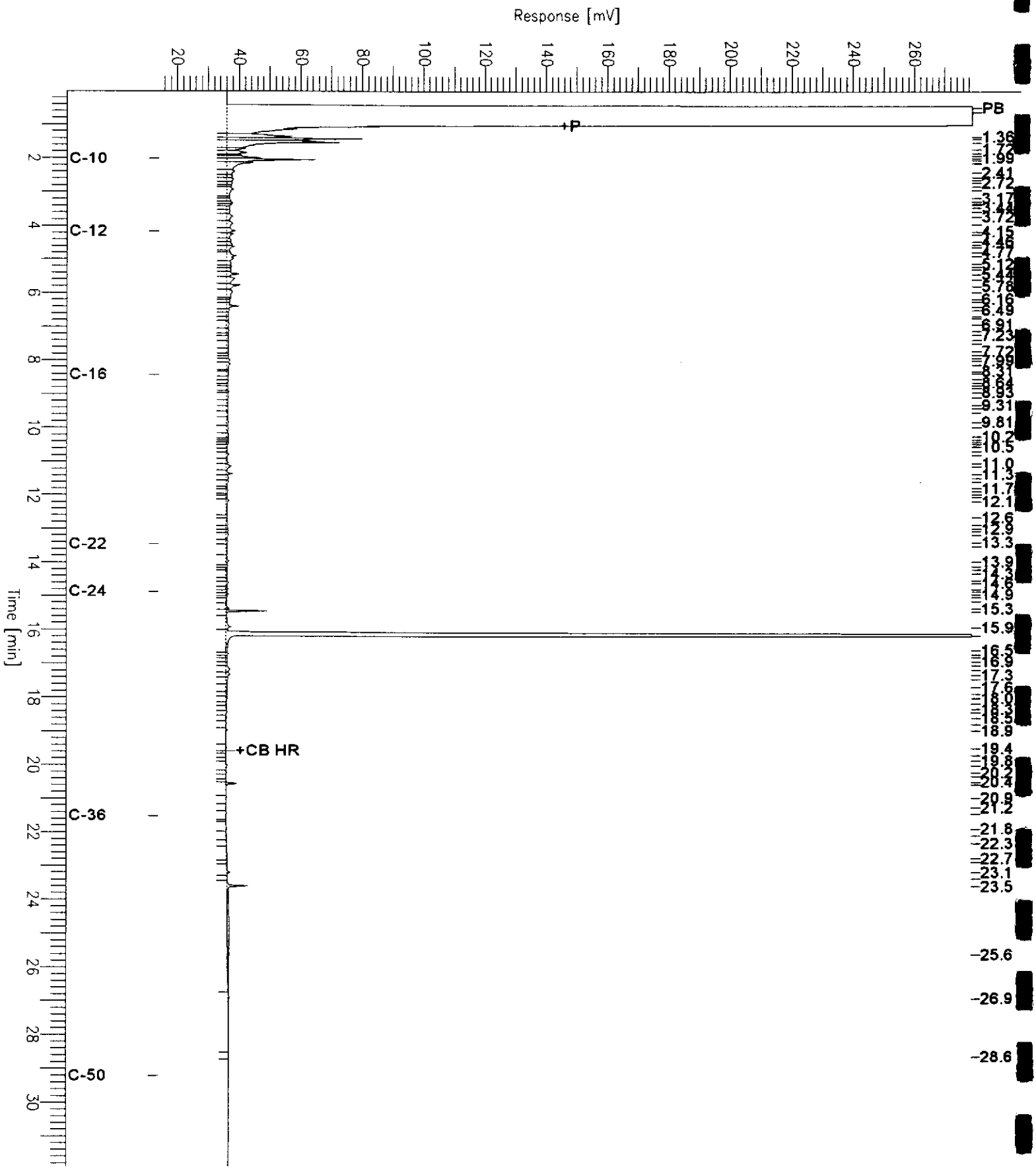
Sample #: 69105 Page 1 of 1
Date : 12/31/2001 04:00 PM
Time of Injection: 12/31/2001 10:24 AM
Low Point : 22.97 mV High Point : 376.89 mV
Plot Scale: 353.9 mV



Chromatogram

Sample Name : 156050-004,69105
FileName : G:\GC15\CHB\364B025.RAW
Method : BTEH365.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 14 mV

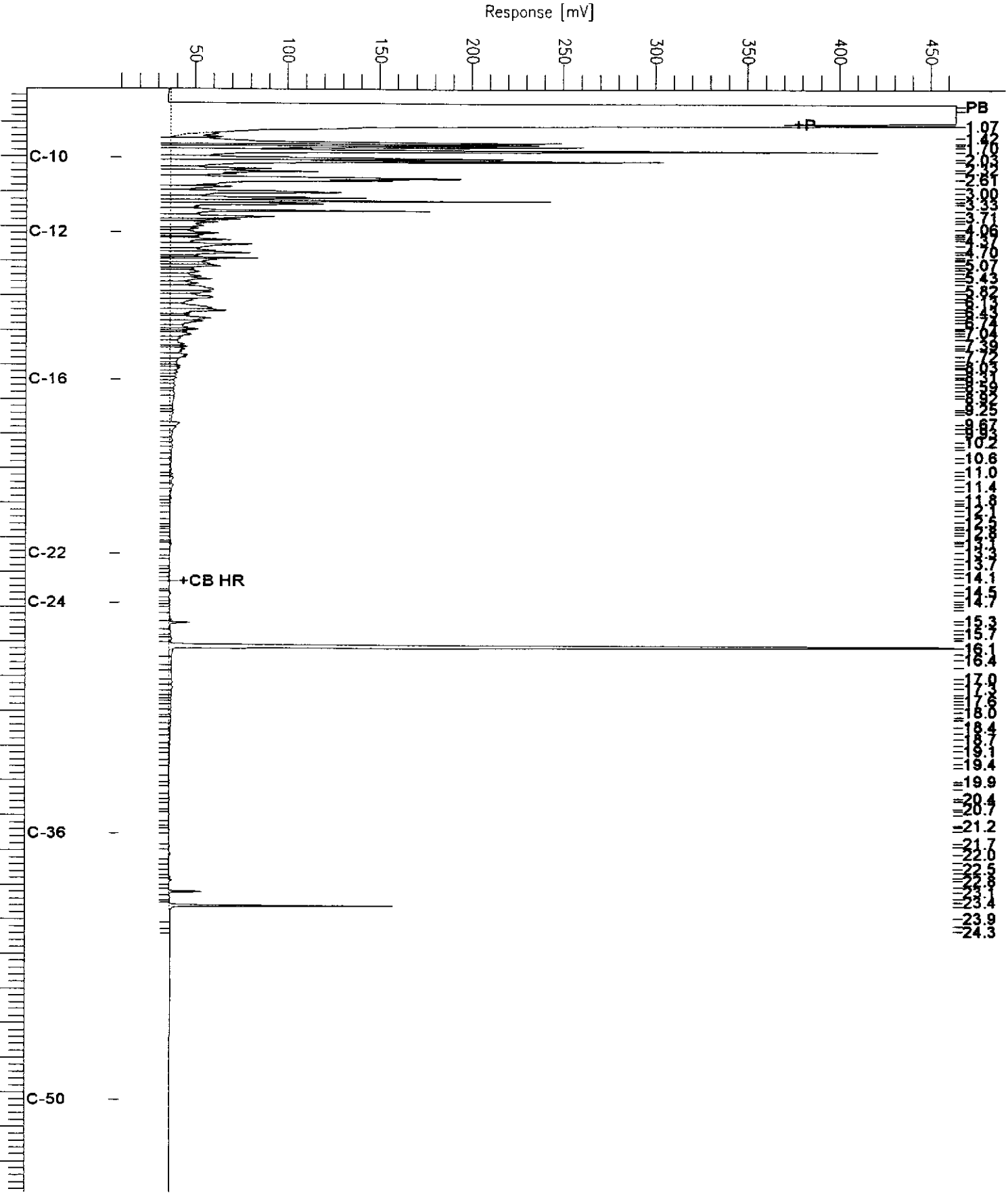
Sample #: 69105 Page 1 of 1
Date : 12/31/2001 04:00 PM
Time of Injection: 12/31/2001 11:05 AM
Low Point : 14.04 mV High Point : 279.18 mV
Plot Scale: 265.1 mV



Chromatogram

Sample Name : 156050-005,69105
FileName : G:\GC15\CHB\364B026.RAW
Method : BTEH365.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 10 mV

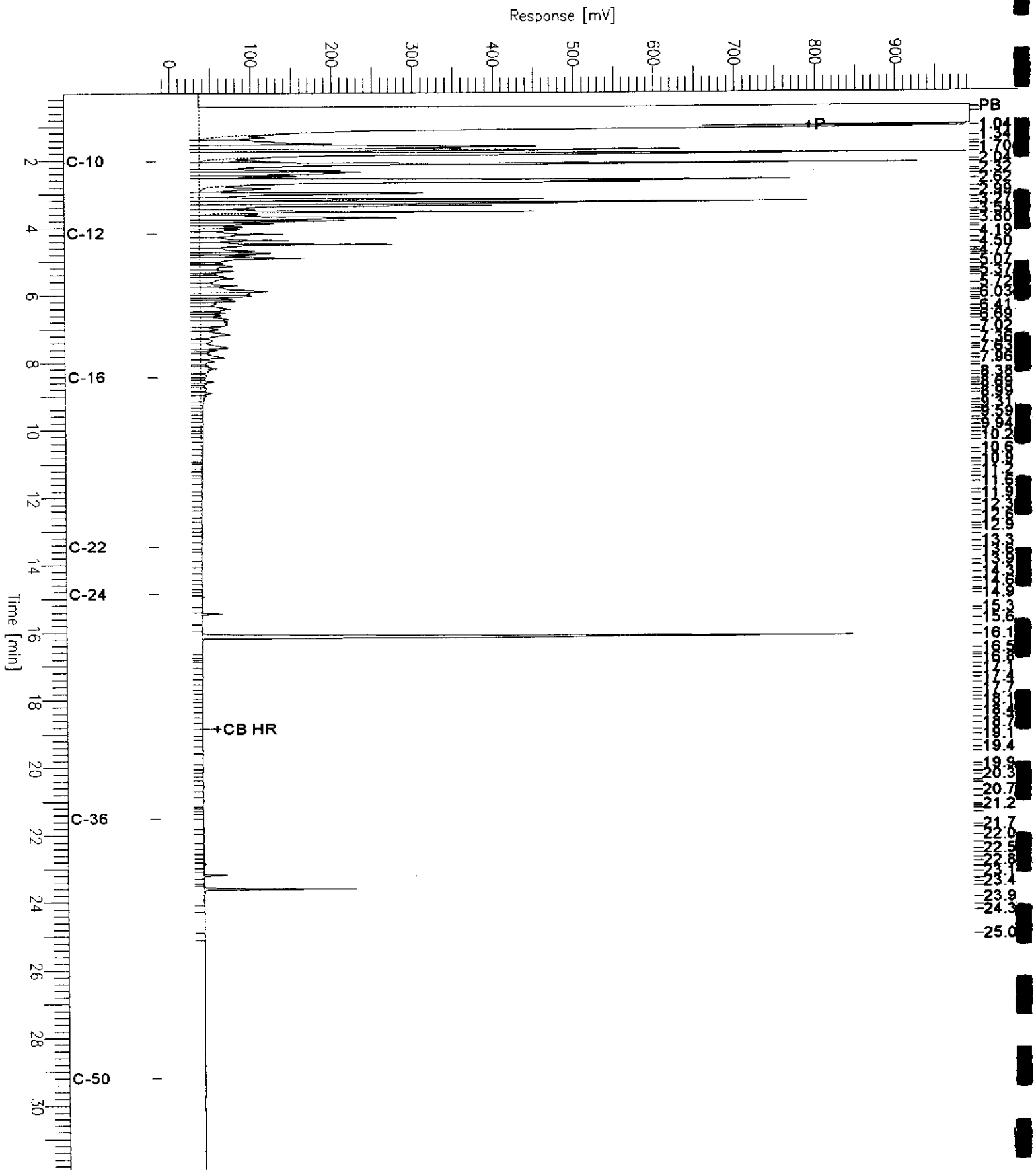
Sample #: 69105 Page 1 of 1
Date : 12/31/2001 04:01 PM
Time of Injection: 12/31/2001 11:46 AM
Low Point : 9.74 mV High Point : 463.69 mV
Plot Scale: 453.9 mV



Chromatogram

Sample Name : 156050-006,69105
FileName : G:\GC15\CHB\364B027.RAW
Method : BTEH365.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: -17 mV

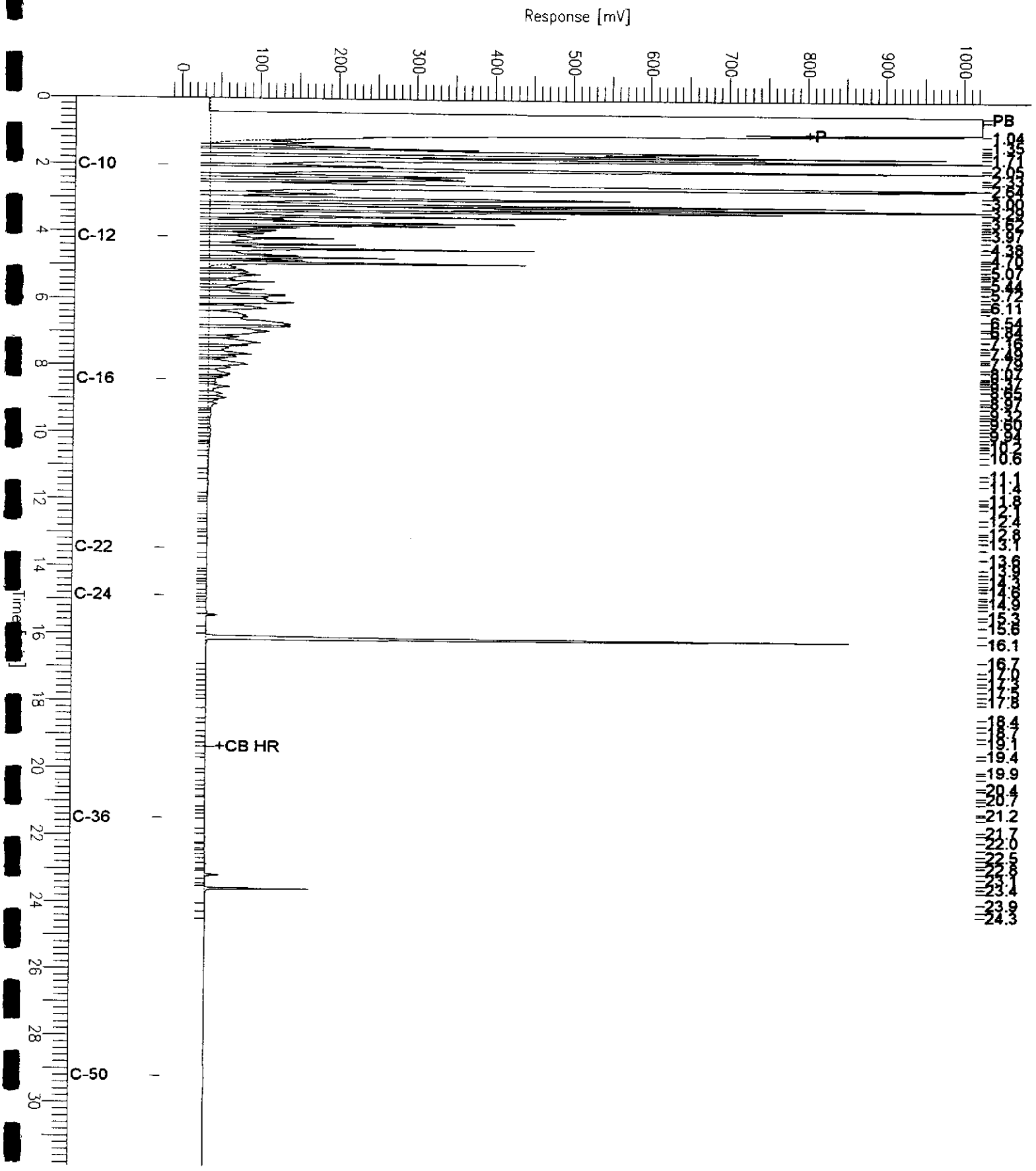
Sample #: 69105
Date : 12/31/2001 04:02 PM
Time of Injection: 12/31/2001 12:26 PM
Low Point : -16.95 mV High Point : 993.47 mV
Plot Scale: 1010.4 mV



Chromatogram

Sample Name : 156050-007,69105
FileName : G:\GC15\CHB\364B034.RAW
Method : BTEH361.MTH
Start Time : 0.00 min End Time : 31.90 min
Scale Factor: 0.0 Plot Offset: -18 mV

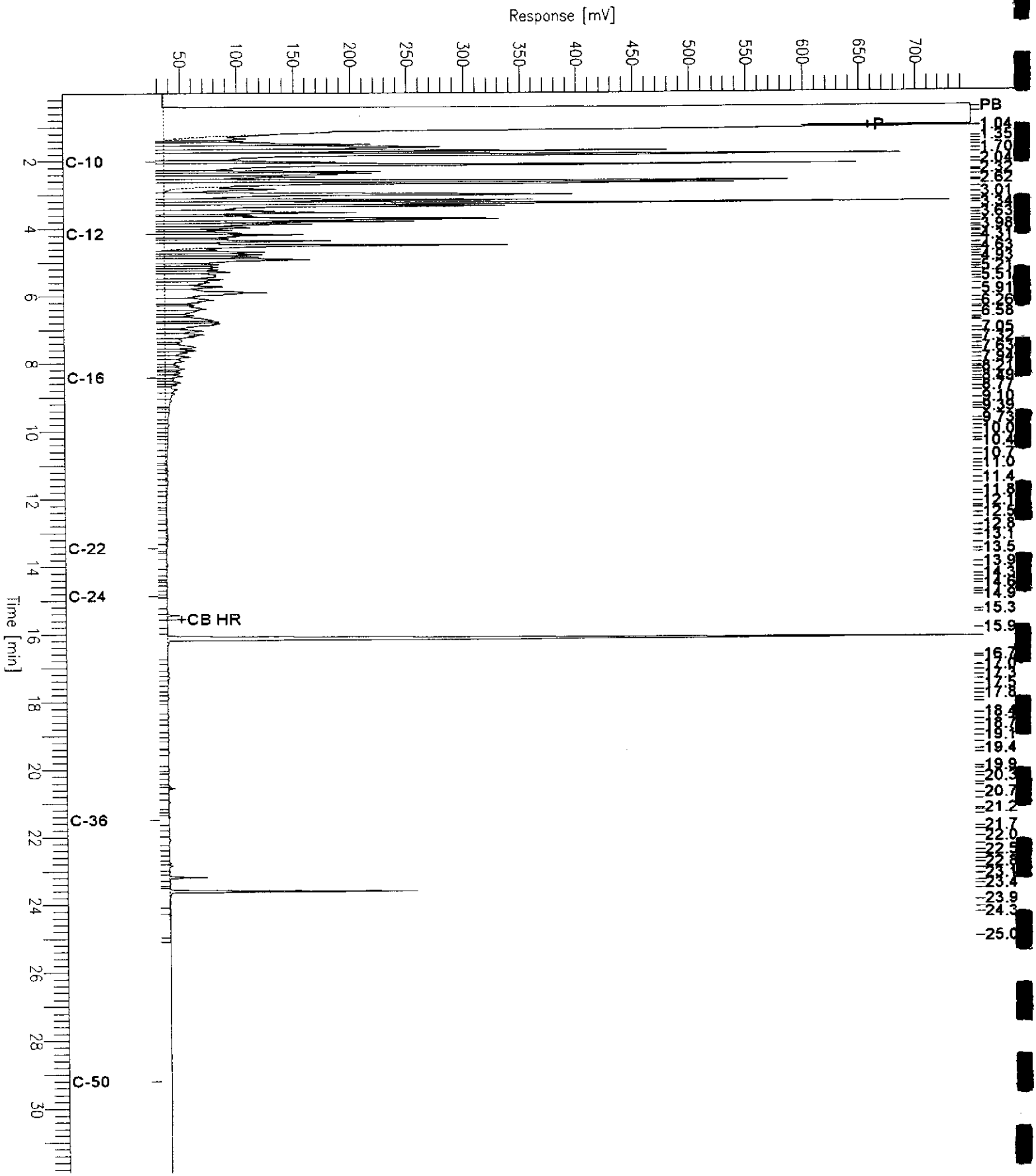
Sample #: 69105
Date : 01/02/2002 11:46 AM
Time of Injection: 12/31/2001 05:20 PM
Low Point : -17.74 mV High Point : 1024.00 mV
Plot Scale: 1041.7 mV



Chromatogram

Sample Name : 156050-008,69105
FileName : G:\GC15\CHB\364B035.RAW
Method : BTEH361.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 29 mV

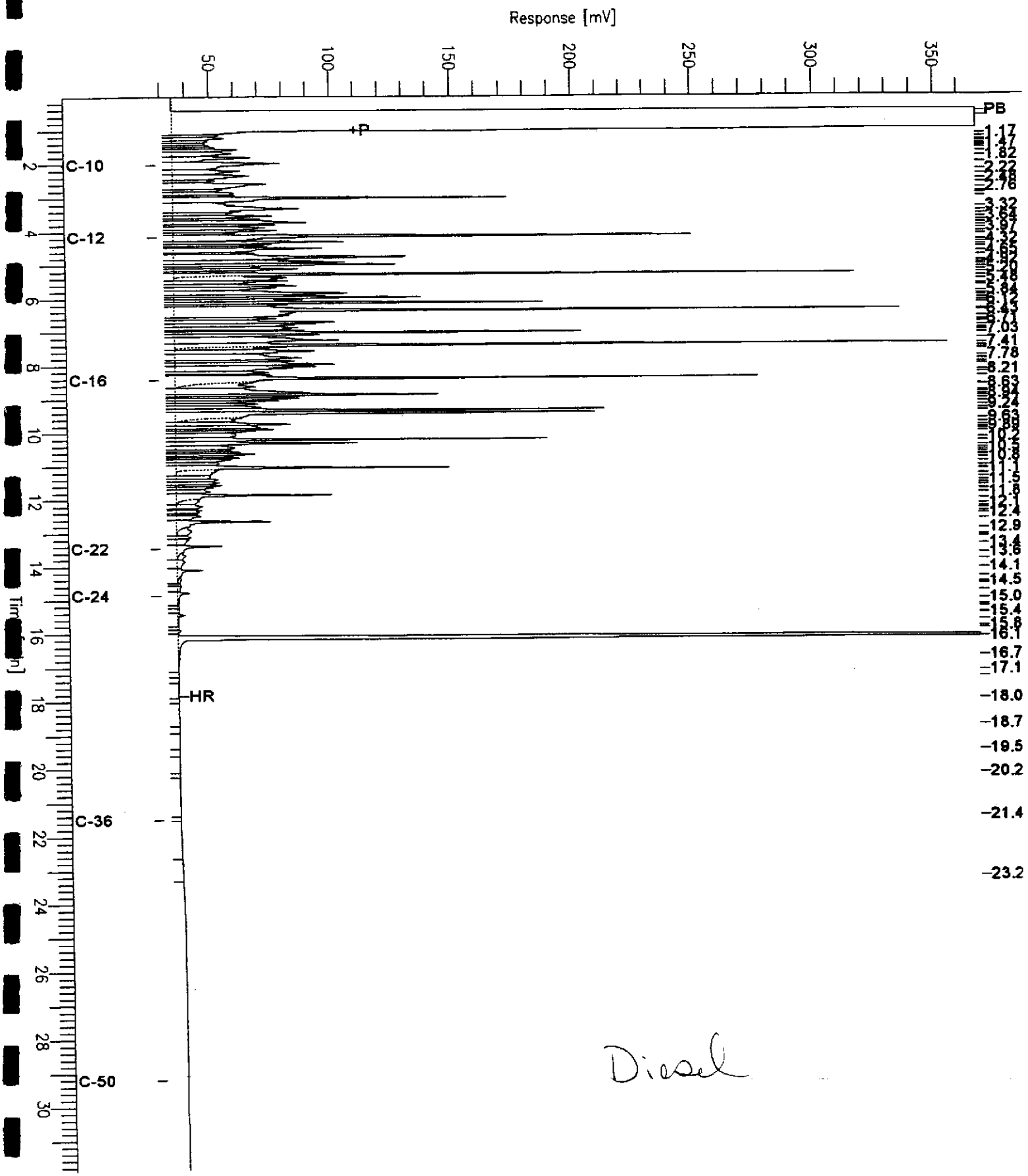
Sample #: 69105 Page 1 of 1
Date : 01/02/2002 11:47 AM
Time of Injection: 12/31/2001 06:01 PM
Low Point : 28.66 mV High Point : 749.41 mV
Plot Scale: 720.8 mV



Chromatogram

Sample Name : ccv,01ws2297,dsl
File Name : G:\GC15\CHB\364B002.RAW
Method : BTEH361.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 28 mV

Sample #: 500mg/L Page 1 of 1
Date : 12/31/2001 07:38 AM
Time of Injection: 12/30/2001 07:33 PM
Low Point : 28.31 mV High Point : 367.88 mV
Plot Scale: 339.6 mV



Diesel

Curtis & Tompkins, Ltd.

Total Extractable Hydrocarbons

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	EPA 3520C
Project#:	2001-53	Analysis:	8015B(M)
Matrix:	Water	Batch#:	69105
Units:	ug/L	Prepared:	12/28/01
Diln Fac:	1.000	Analyzed:	12/31/01

Type: BS
Lab ID: QC166532
Cleanup Method: EPA 3630C

Analyte	Spiked	Result	%REC	Limits
Diesel C10-C24	2,500	2,117	85	45-110

Surrogate	%REC	Limits
Hexacosane	91	44-121

Type: BSD
Lab ID: QC166533
Cleanup Method: EPA 3630C

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Diesel C10-C24	2,500	1,802	72	45-110	16	22

Surrogate	%REC	Limits
Hexacosane	76	44-121

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Nitrate Nitrogen

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2001-53	Analysis:	EPA 300.0
Analyte:	Nitrogen, Nitrate	Batch#:	68862
Matrix:	Water	Sampled:	12/17/01
Units:	mg/L	Received:	12/17/01
Diln Fac:	1.000	Analyzed:	12/18/01

Field ID	Type	Lab ID	Result	RL
MW-3	SAMPLE	156050-001	0.03 J	0.05
MW-4	SAMPLE	156050-003	0.57	0.05
MW-10	SAMPLE	156050-004	0.56	0.05
MW-8	SAMPLE	156050-005	ND	0.05
MW-9	SAMPLE	156050-006	ND	0.05
MW-7	SAMPLE	156050-007	ND	0.05
MW-11	SAMPLE	156050-008	ND	0.05
	BLANK	QC165619	ND	0.05

J= Estimated value
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Sulfate

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2001-53	Analysis:	EPA 300.0
Analyte:	Sulfate	Sampled:	12/17/01
Matrix:	Water	Received:	12/17/01
Units:	mg/L	Analyzed:	12/18/01
Batch#:	68862		

Field ID	Type	Lab ID	Result	RL	Dil'n Fac
MW-3	SAMPLE	156050-001	36	0.50	1.000
MW-4	SAMPLE	156050-003	76	5.0	10.00
MW-10	SAMPLE	156050-004	61	5.0	10.00
MW-8	SAMPLE	156050-005	85	5.0	10.00
MW-9	SAMPLE	156050-006	20	0.50	1.000
MW-7	SAMPLE	156050-007	15	0.50	1.000
MW-11	SAMPLE	156050-008	67	5.0	10.00
	BLANK	QC165619	ND	0.50	1.000

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Nitrate Nitrogen

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2001-53	Analysis:	EPA 300.0
Analyte:	Nitrogen, Nitrate	Batch#:	68862
Field ID:	MW-3	Sampled:	12/17/01
MSS Lab ID:	156050-001	Received:	12/17/01
Matrix:	Water	Analyzed:	12/18/01
Units:	mg/L		

Type	Lab ID	MSS Result	Spiked	Result	%REC	Limits	RPD	Lim	Dil Fac
BS	QC165620		2.000	2.070	104	80-110			1.000
BSD	QC165621		2.000	2.080	104	80-110	0	20	1.000
MS	QC165622	0.03160	10.00	10.20	102	80-111			10.00
MSD	QC165623		10.00	10.12	101	80-111	1	20	10.00

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Sulfate

Lab #:	156050	Location:	Redwood Park Service Yard
Client:	Stellar Environmental Solutions	Prep:	METHOD
Project#:	2001-53	Analysis:	EPA 300.0
Analyte:	Sulfate	Batch#:	68862
Field ID:	MW-3	Sampled:	12/17/01
MSS Lab ID:	156050-001	Received:	12/17/01
Matrix:	Water	Analyzed:	12/18/01
Units:	mg/L		

Type	Lab ID	MSS Result	Spiked	Result	%REC	Limits	RPD	Lim	Dil'n Fac
BS	QC165620		20.00	20.36	102	80-110			1.000
BSD	QC165621		20.00	20.39	102	80-110	0	20	1.000
MS	QC165622	36.37	100.0	137.4	101	71-128			10.00
MSD	QC165623		100.0	134.7	98	71-128	2	20	10.00

RPD= Relative Percent Difference

HISTORICAL GRAB-GROUNDWATER ANALYTICAL RESULTS

REDWOOD REGIONAL PARK SERVICE YARD, OAKLAND, CALIFORNIA

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

Sample ID	TPHg	TPHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
October 1993 Exploratory Borehole Sampling								
B10-GW	*< 50*	**570**	*< 1*	*< 1*	*< 1*	*< 1*	.-	*NA*
B11-GW	**1,400**	**1,300**	**16**	**42**	**33**	**170**	**261**	*NA*
B-13-GW	**810,000**	**2,300,000**	**12,000**	**18,000**	**22,000**	**73,000**	**125,000**	*NA*
B-14-GW	**19,000**	**4,500**	**30**	*< 1*	**350**	**850**	**1,230**	*NA*
B-15-GW	**16,000**	**99,000**	**20**	*< 1*	**330**	**810**	**1,160**	*NA*
April 1999 Exploratory Borehole Sampling								
HP-01-GW	**1,300**	**850**	**< 0.5**	*< 0.5*	*< 0.5*	**0.67**	**0.67**	*< 2*
HP-02-GW	**31,000**	**270,000**	**760**	**12**	**1,100**	**833**	**2,705**	**260**
HP-03-GW	**3,700**	**1,400**	**25**	**0.71**	**130**	**40.5**	**196**	**31**
HP-04-GW	**67**	*< 50*	*< 0.5*	*< 0.5*	*< 0.5*	*< 0.5*	.-	**15**
HP-05-GW	**< 50**	*< 50*	*< 0.5*	*< 0.5*	*< 0.5*	*< 0.5*	.-	**18**
HP-06-GW	**54,000**	**16,000**	**830**	*< 13*	**2,800**	**11,000**	**14,630**	**190**
HP-07-GW	**42,000**	**15,000**	**750**	**49**	**2,500**	**5,290**	**8,589**	**230**
HP-08-GW	**13,000**	**1,900**	**150**	**5.4**	**570**	**931**	**1,656**	**120**
HP-92-GW	**40,000**	**6,700**	**1,700**	**110**	**2,100**	**6,890**	**10,800**	**200**
HP-10-GW	**23,000**	**8,400**	**53**	**3.2**	**600**	**928**	**1,584**	**57**
HP-11-GW	**2,000**	**440**	**30**	**0.85**	**92**	**53.3**	**176**	**31**

NA = Not Analyzed for this constituent

HISTORICAL GROUNDWATER MONITORING WELLS ANALYTICAL RESULTS

REDWOOD REGIONAL PARK SERVICE YARD, OAKLAND, CALIFORNIA

(all concentrations in µg/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	1.24	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	11.6	7.5
15	Dec-99	57	<50	20	0.61	5.9	<0.5	26.5	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	27.4	10.0
19	Aug-01	260	120	30	6.7	1.6	6.4	44.7	27.0
20	Dec-01	74	69	14	0.76	3.7	3.5	22.0	6.6

NA = Not Analyzed for this constituent

(continued)

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	66.5	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	92.9	242	*NA*
8	Feb-97	3,300	*< 50*	120	1.0	150	102.5	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	52.6	143	*NA*
11	Dec-97	1,000	84	4.6	2.7	61	54.2	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	26.9	104	23
14	Apr-99	2,900	710	61	1.2	120	80.4	263	32
15	Dec-99	1,000	430	4	2	26	13.9	45.9	<2
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	64.9	8.4
18	Apr-01	1,700	1,100	4.5	2.8	48	10.7	66.0	5
19	Aug-01	1,300	810	3.2	4.0	29	9.7	45.9	<2
20	Dec-01	*< 50*	110	*< 0.5*	*< 0.5*	*< 0.5*	1.2	1.2	<2

NA = Not Analyzed for this constituent

(continued)

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

(continued)

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	198.2	718	19
4	Dec-01	9,100	4,600	89	*< 2.5*	460	228	777	*< 10*

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*

Well MW-9									
Event	Date	TPHg	TPHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	Sep-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*

Well MW-10									
Event	Date	TPHg	TPHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	Sep-01	550	2,100	17	*< 0.5*	31	43.5	92	40
2	Dec-01	*< 50*	81	*< 0.5*	*< 0.5*	*< 0.5*	*< 0.5*	*< 0.5*	25

(continued)

Well MW-11									
Event	Date	TPHg	TPHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	Sep-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*

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

(all concentrations in µg/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*
11	Apr-99	*< 50*	*<50*	*< 0.5*	*< 0.5*	*< 0.5*	*< 0.5*	—	*< 2*
Samplingat this location discontinued after April 1999.									

NA = Not Analyzed for this constituent

(continued)

Sampling Location SW-2 (Area of 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	12.9	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	10.7	43.6	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
12	Apr-99	81	<50	2.0	< 0.5	2.5	1.3	5.8	2.3
13	Dec-99	1,300	250	10.0	1.0	47	27	85.0	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
16	Apr-01	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2
17	Sep-01	440	200	2.1	< 0.5	17	1.3	20.4	10
18	Dec-01	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	-	< 2

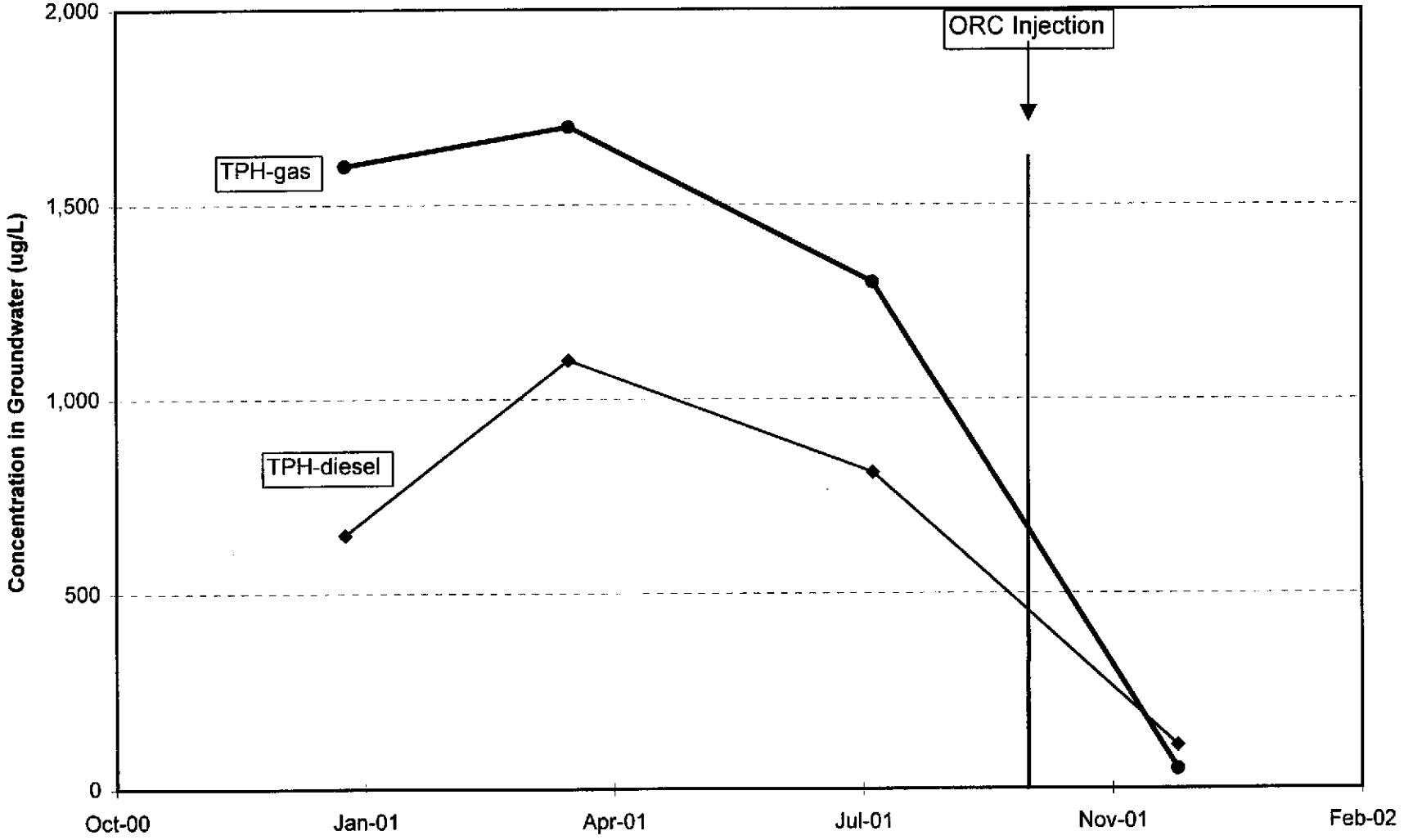
NA = Not Analyzed for this constituent

(continued)

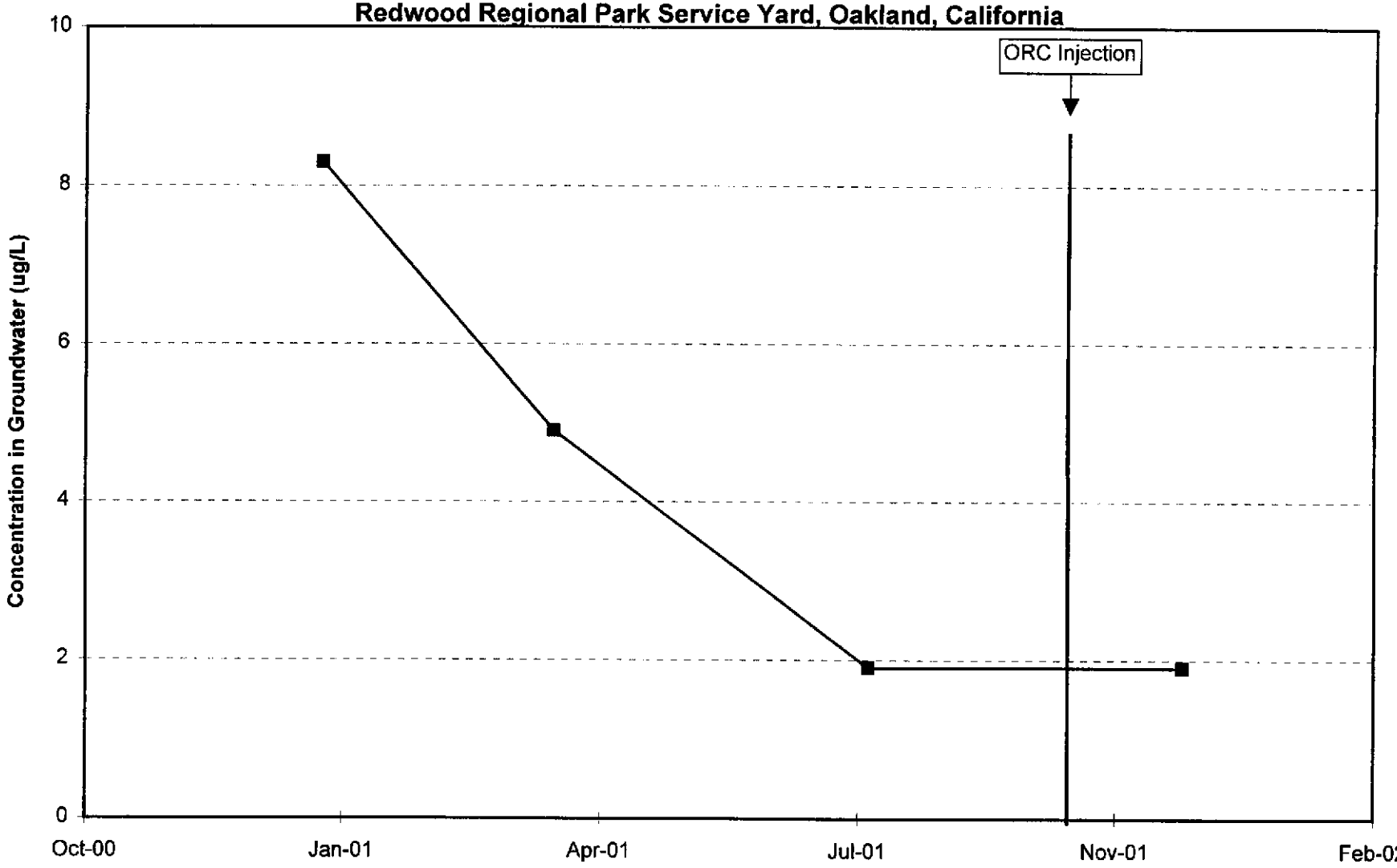
Sampling Location SW-3 (Downstream of Contaminated Groundwater Discharge Location SW-2)									
Event	Date	TPHg	TPHd	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE
1	May-95	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
2	Aug-95	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	—	NA
3	May-96	< 50	74	< 0.5	< 0.5	< 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
11	Apr-99	< 50	<50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2
12	Dec-99	< 50	<50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2
13	Sep-00	NS	NS	NS	NS	NS	NS	—	NS
14	Jan-01	< 50	<50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2
15	Apr-01	< 50	<50	< 0.5	< 0.5	< 0.5	< 0.5	—	< 2
16	Sep-01	NS	NS	NS	NS	NS	NS	—	NS
17	Dec-01	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	-	< 2

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

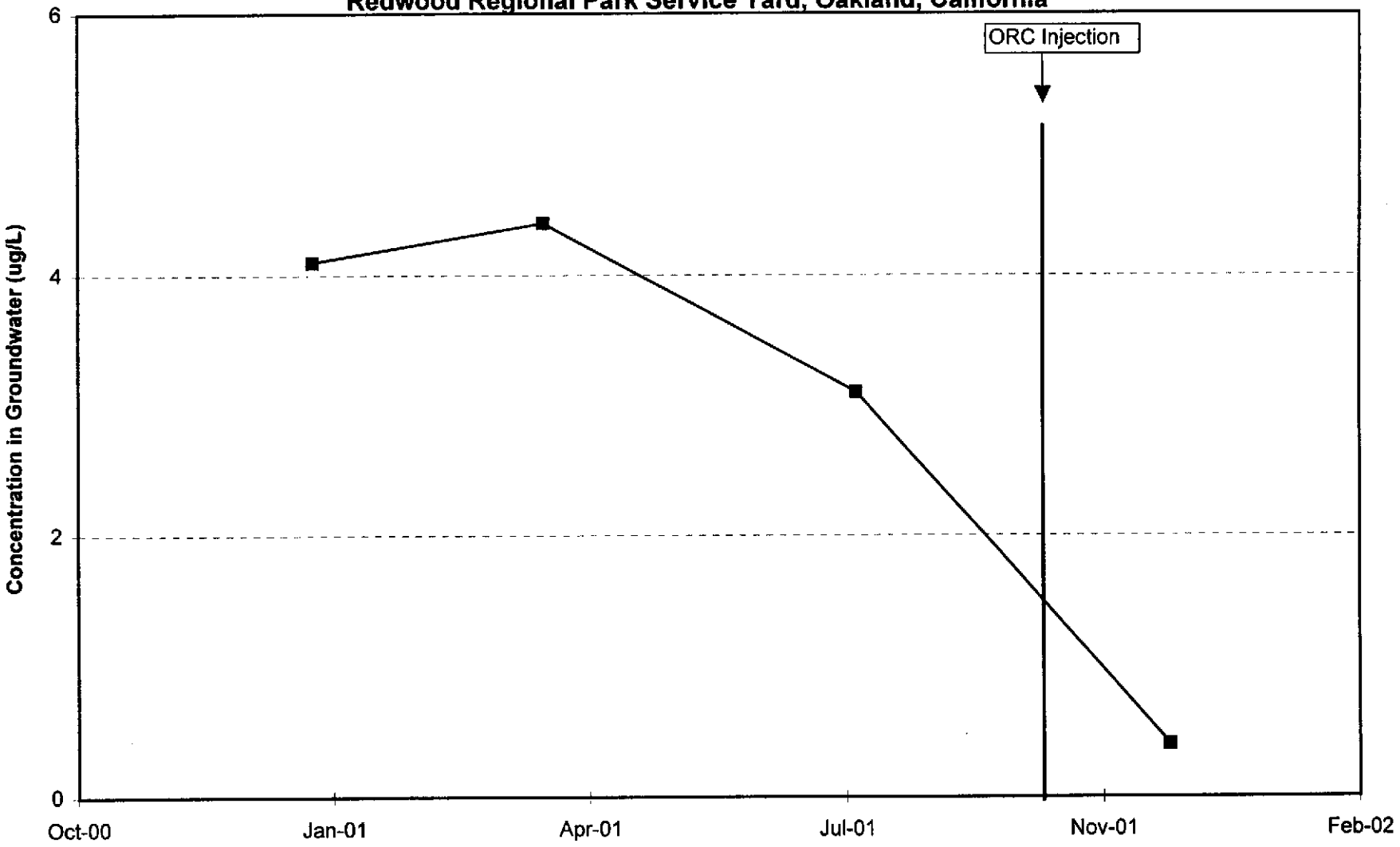
Year 2001 Ground Water Analytical Results: Well MW-4
TPH-gasoline and TPH-diesel
Redwood Regional Park Service Yard, Oakland, California



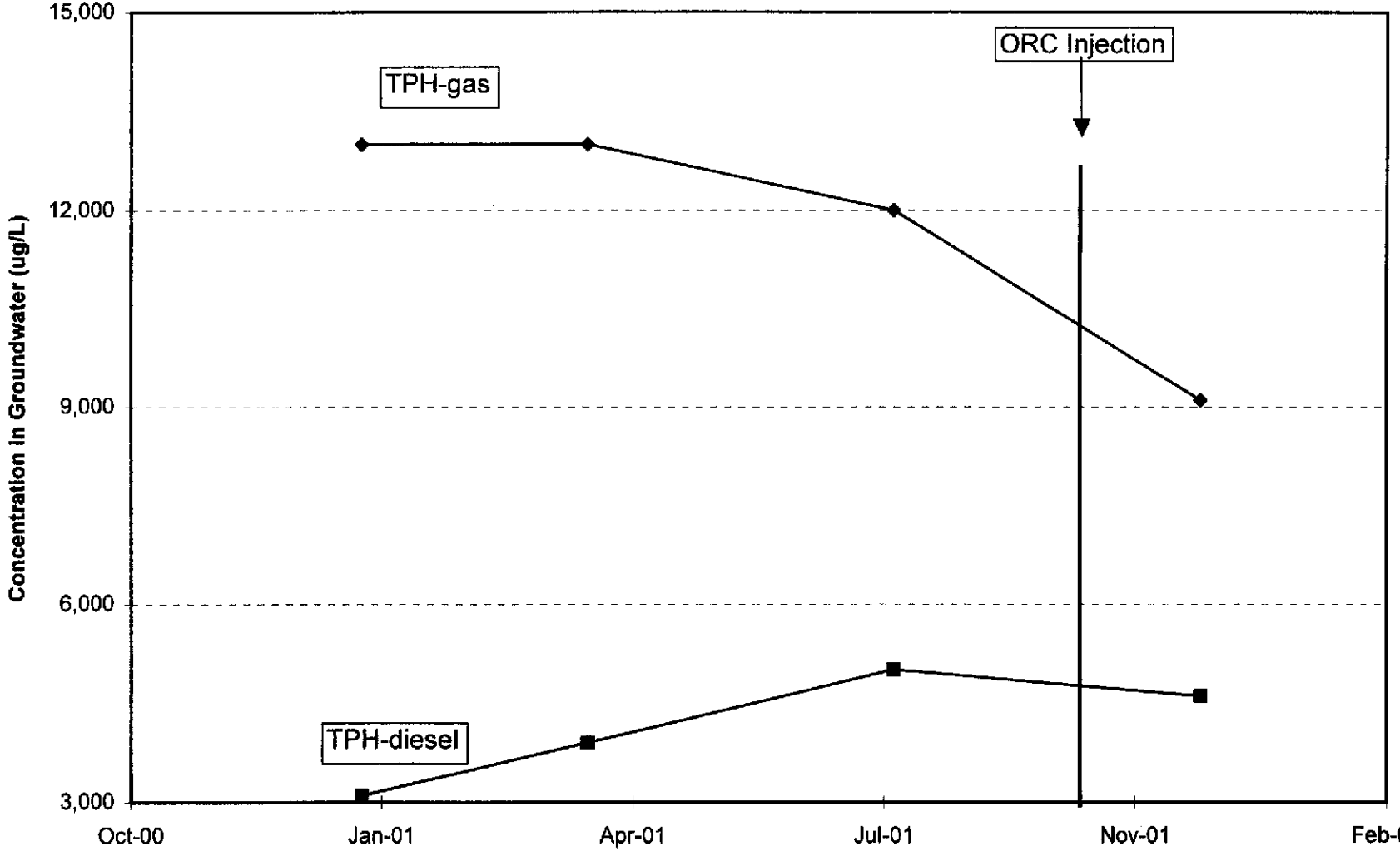
Year 2001 Ground Water Analytical Results: Well MW-4
MTBE
Redwood Regional Park Service Yard, Oakland, California



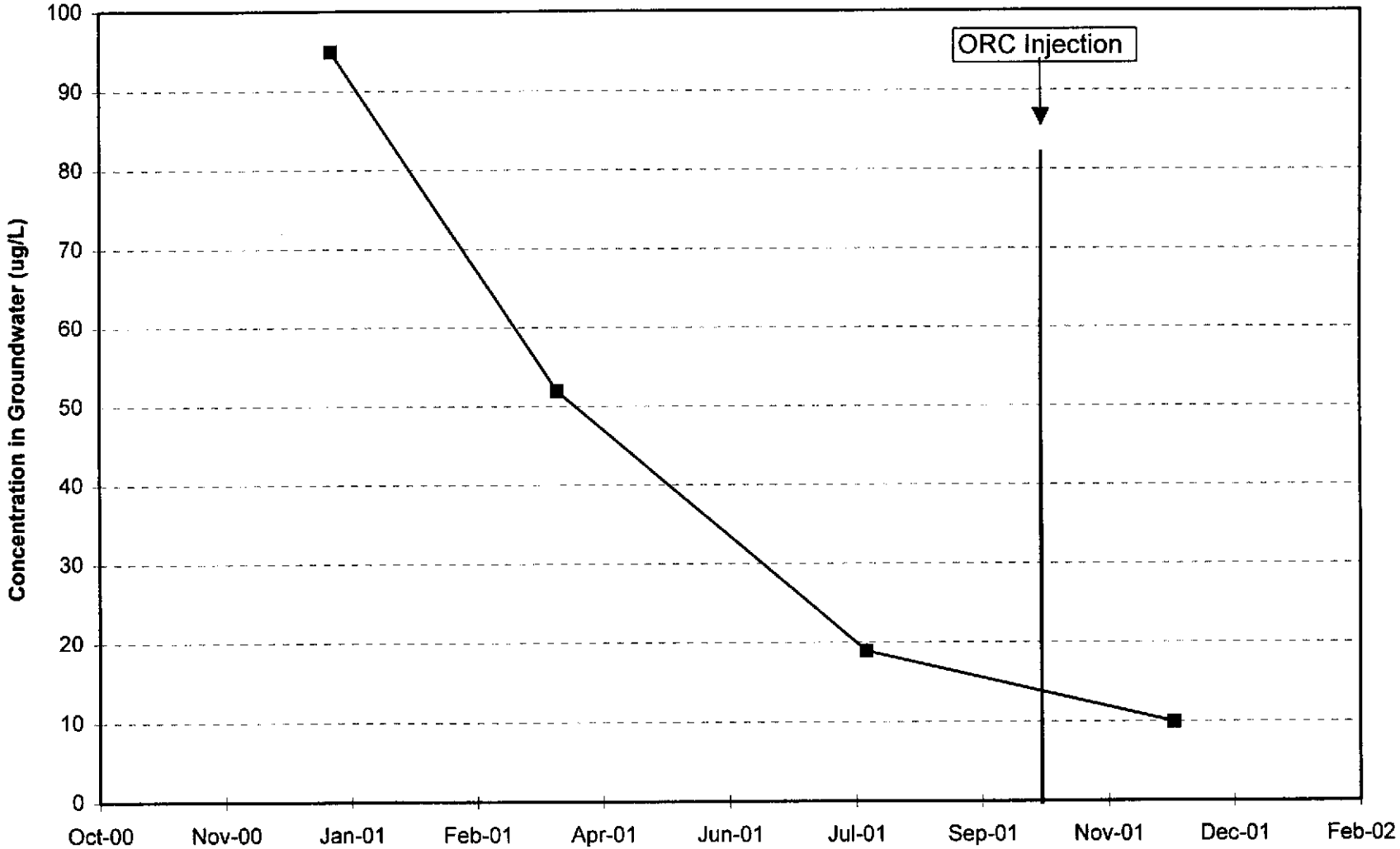
Year 2001 Ground Water Analytical Results: Well MW-4
Benzene
Redwood Regional Park Service Yard, Oakland, California



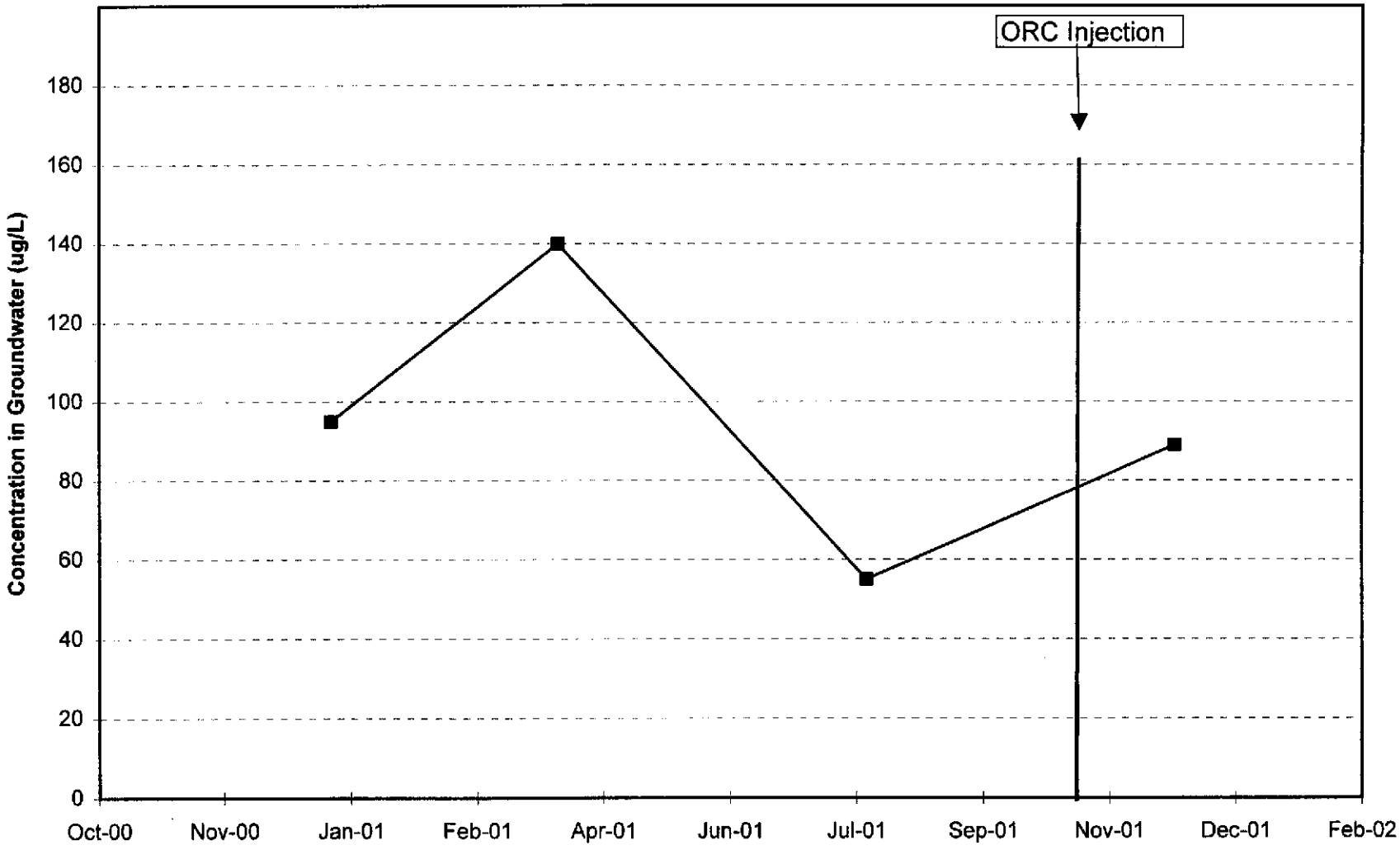
Year 2001 Groundwater Analytical Results: Well MW-7
TPH-gasoline and TPH-Diesel
Redwood Regional Park Service Yard, Oakland, California



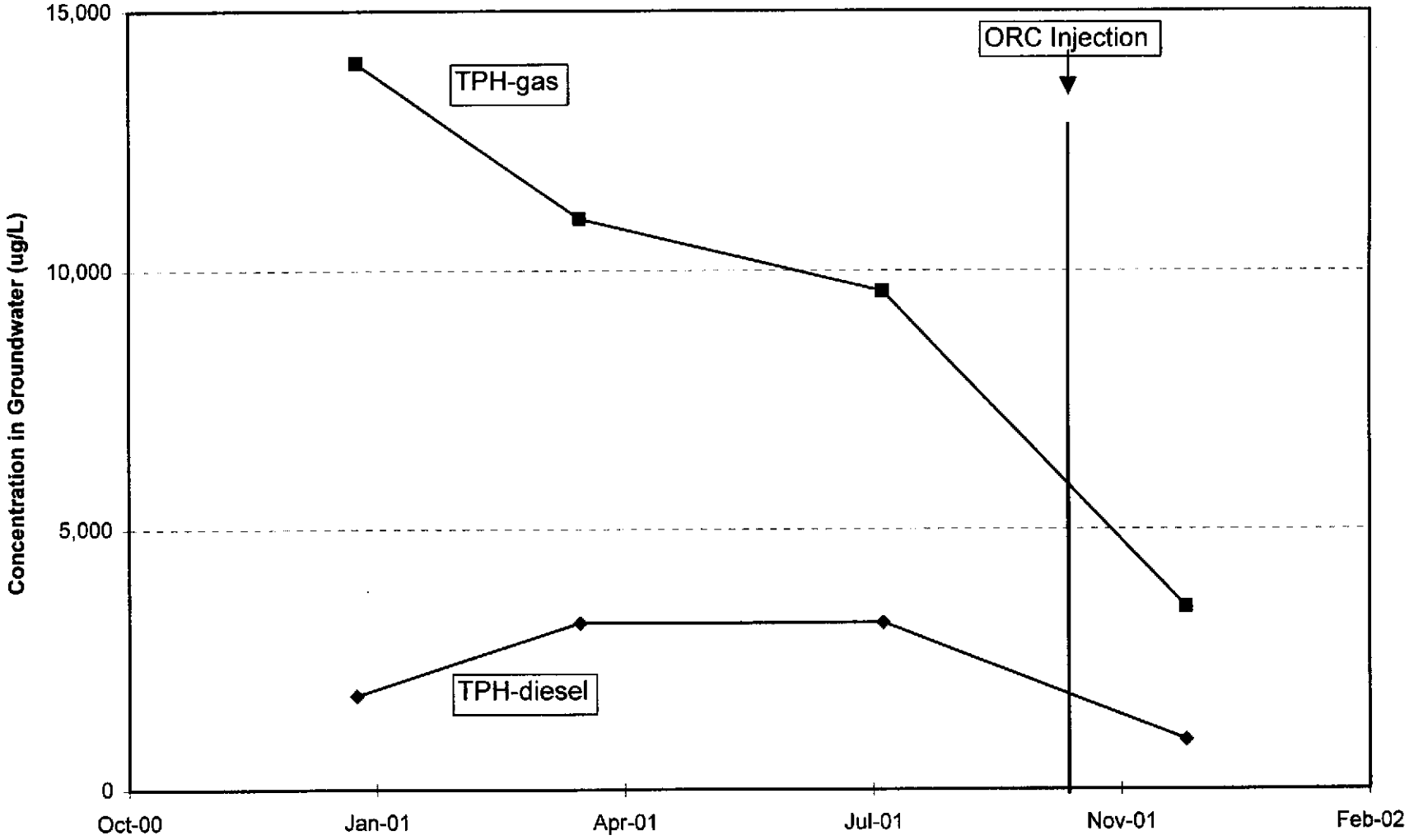
Year 2001 Ground Water Analytical Results: Well MW-7
MTBE
Redwood Regional Park Service Yard, Oakland, California



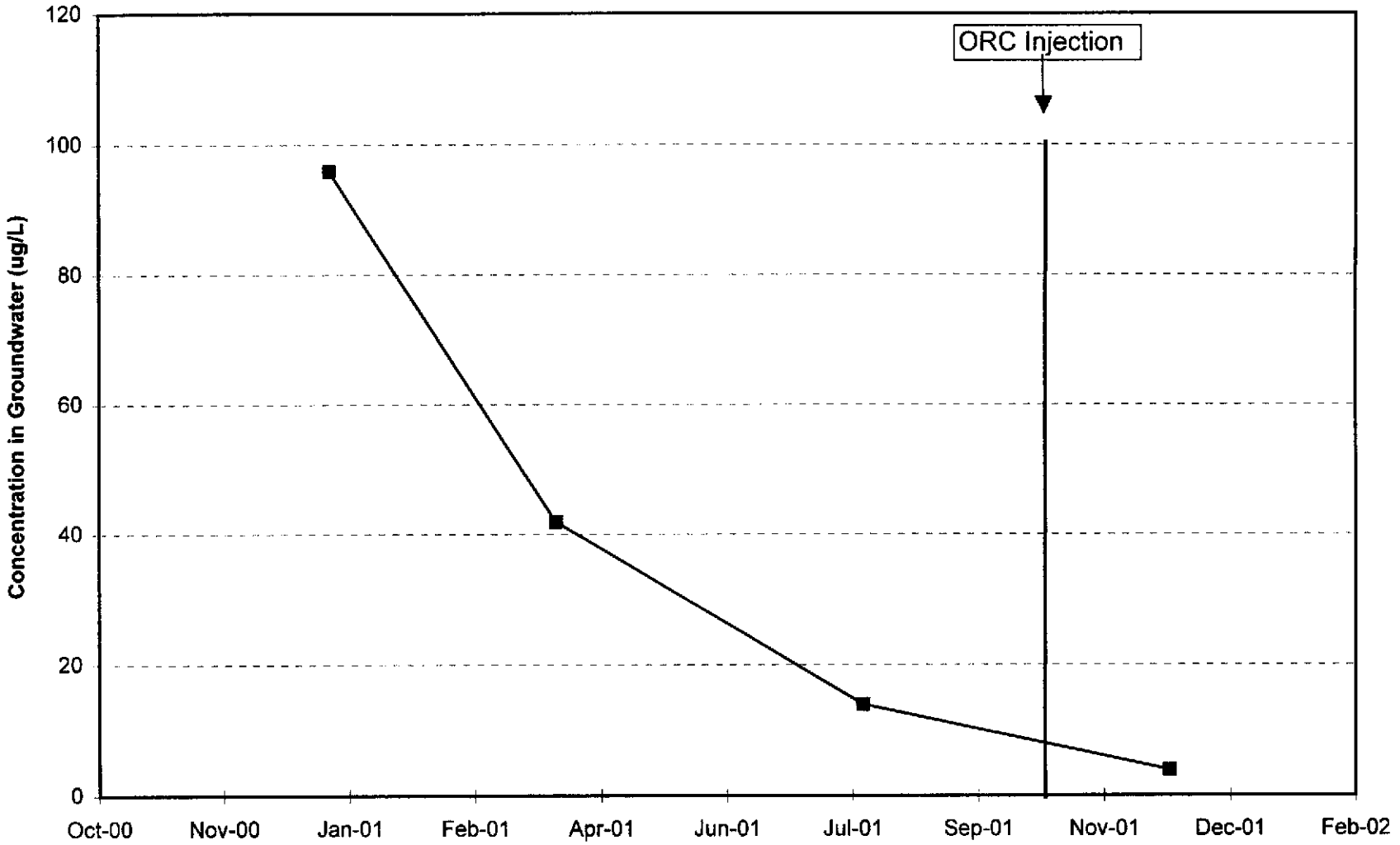
Historical Ground Water Analytical Results: Well MW-7
Benzene
Redwood Regional Park Service Yard, Oakland, California



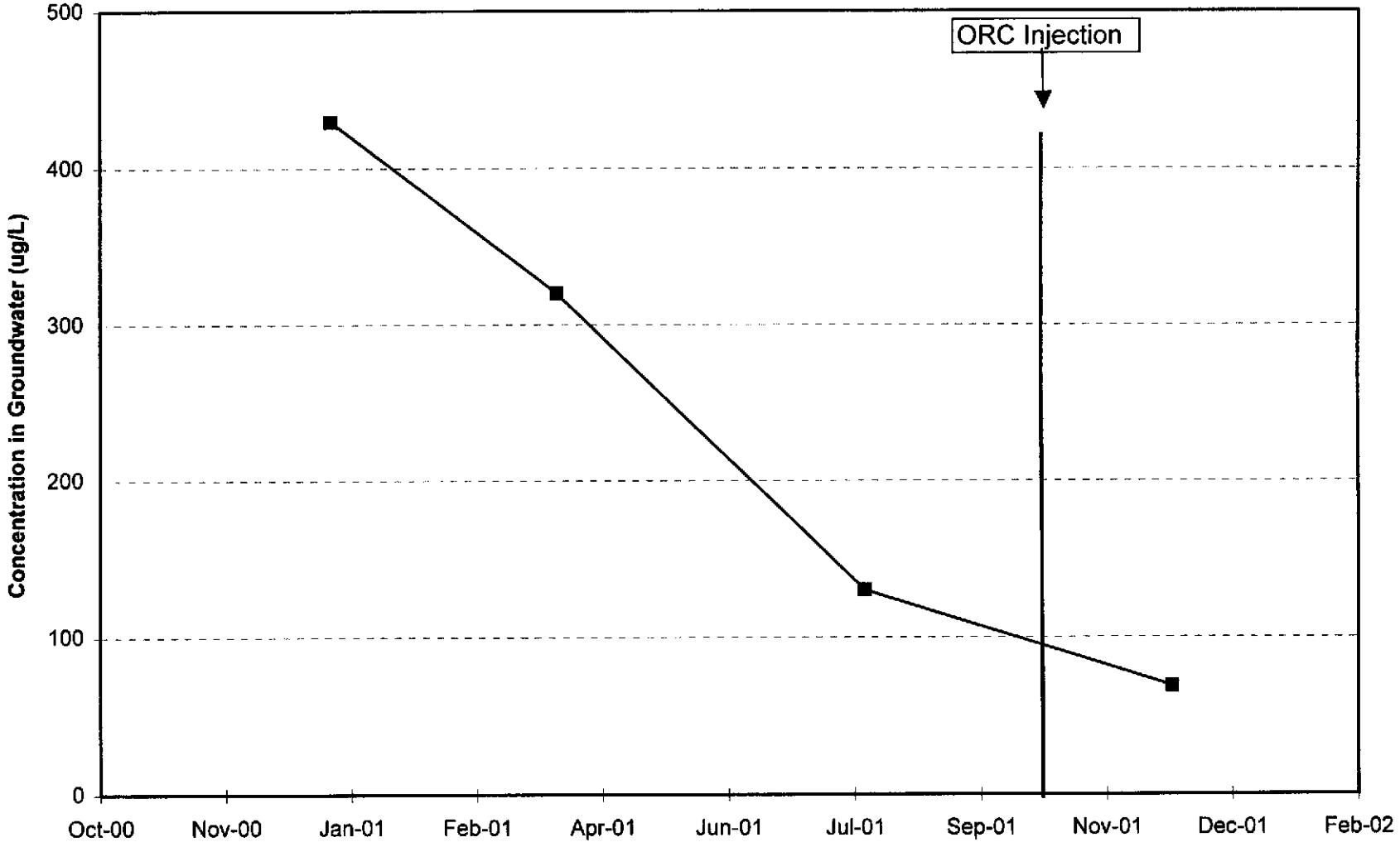
Year 2001 Groundwater Analytical Results: Well MW-8
TPH-gasoline and TPH-diesel
Redwood Regional Park Service Yard, Oakland, California

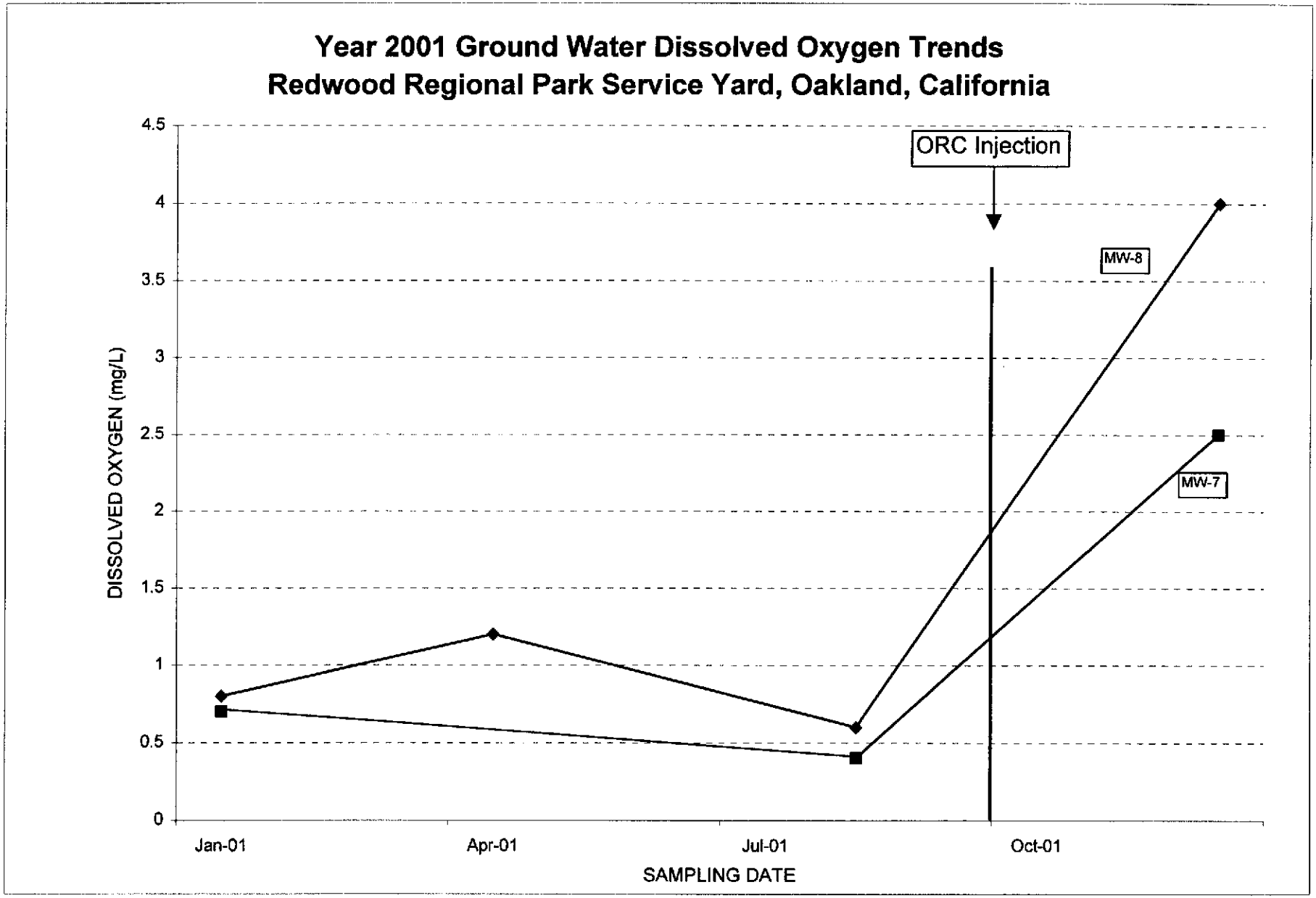


Year 2001 Ground Water Analytical Results: Well MW-8
MTBE
Redwood Regional Park Service Yard, Oakland, California



Historical Ground Water Analytical Results: Well MW-8
Benzene
Redwood Regional Park Service Yard, Oakland, California




Year 2001 Ground Water Dissolved Oxygen Trends
Redwood Regional Park Service Yard, Oakland, California
ORC Injection
MW-8
MW-7
DISSOLVED OXYGEN (mg/L)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Jan-01
Apr-01
Jul-01
Oct-01
SAMPLING DATE