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September 12, 2002

Alameda County  
SEP 16 2002  
Environmental Health

Mr. Barney M. Chan  
Alameda County  
Department of Environmental Health Services  
1131 Harbor Bay Parkway, Suite 250  
Alameda, California 94502-6577

Subject: **StID#3337**  
Site Address: 3609 International Blvd., Oakland, California

Dear Mr. Chan:

A copy of SOMA's "Third Quarter 2002 Groundwater Monitoring and Remediation System Operation Report" for the subject property is enclosed.

Thank you for your time in reviewing our report. If you have any questions or comments, please call me at (925) 244-6600.

Sincerely,

Mansour Sepehr, Ph.D., P.E.  
Principal Hydrogeologist

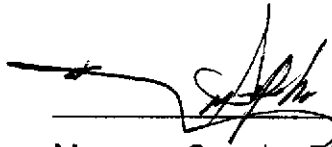


Enclosure

cc: Mr. Abolghassem Razi w/enclosure  
Tony's Express Auto Service

**Certification**

This report has been prepared by SOMA Environmental Engineering, Inc. on behalf of Mr. Abolghassem Razi, the property owner of 3609 International Boulevard, Oakland, California, to comply with the Alameda County Department of Environmental Health Service's requirements for the Third Quarter 2002 groundwater monitoring event.

  
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Mansour Sepehr, Ph.D., P.E.  
Principal Hydrogeologist



**Alameda County**  
**SEP 16 2002**  
**Environmental Health**

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## 1.0 Introduction

This report has been prepared by SOMA Environmental Engineering, Inc. (SOMA) on behalf of Mr. Abolghassem Razi, the owner of Tony's Express Auto Service. The property is located at 3609 International Boulevard at the intersection of 36<sup>th</sup> Avenue in Oakland, California (the "Site"), as shown in Figure 1.

The Site is located in an area where the surrounding properties are primarily commercial businesses and residential housing. The Site currently houses a gasoline service station and convenience store. During Third Quarter 2002, the station was remodeled and several hydraulic hoists were removed. The station currently no longer has an auto repair facility. Figure 2 shows the location of the main service station, dispenser islands, underground storage tanks (USTs), the on-site and off-site groundwater monitoring wells, and neighboring properties.

This report summarizes the results of the Third Quarter 2002 groundwater monitoring event conducted on July 30, 2002 at the Site. Included in this report are the bioattenuation parameters measured in the field for each groundwater sample. Also, included in this report are the results of the laboratory analysis of the groundwater samples, which were analyzed for:

- Total petroleum hydrocarbons as gasoline (TPH-g)
- Benzene, toluene, ethylbenzene, total xylenes (collectively referred to as BTEX)
- Methyl tertiary Butyl Ether (MtBE)

These activities were performed in accordance with the general guidelines of the Regional Water Quality Control Board (RWQCB) and the Alameda County Environmental Health Services (ACEHS).

This report also describes the operation of the groundwater extraction system installed by SOMA in December 1999, as well as the operation of the vapor extraction system, which was installed by SOMA in July 2000. The locations of the groundwater extraction system and the vapor extraction system are displayed in Figure 2.

## **1.1 Background**

The environmental investigation at the subject property started in 1992, when Mr. Razi, the property owner, retained Soil Tech Engineering, Inc. (STE) of San Jose to conduct a limited subsurface investigation. The purpose of STE's investigation was to determine whether or not the soil near the product lines and USTs had been impacted with petroleum hydrocarbons.

In July 1993, STE removed one single-walled 10,000-gallon gasoline tank and one single-walled 6,000-gallon gasoline tank along with a 550-gallon waste oil tank from the Site. Three double-walled USTs replaced these tanks. Currently, there is one 10,000-gallon double-walled gasoline tank and two 6,000-gallon double-walled gasoline tanks beneath the Site. The locations of the USTs are shown in Figure 2.

In December 1997, Mr. Razi retained Western Geo-Engineers (WEGE) to conduct additional investigations and perform groundwater monitoring on a quarterly basis. The results of the WEGE groundwater monitoring events indicated elevated levels of petroleum hydrocarbons and MtBE in the groundwater. The historical groundwater elevation data and chemical data including TPH-g, BTEX and MtBE concentrations reported by STE and WEGE are included in Tables 2 and 6 of this report.

In April 1999, Mr. Razi retained SOMA to conduct groundwater monitoring, risk-based corrective action (RBCA), a corrective action plan (CAP), as well as soil

and groundwater remediation at the Site. The results of the RBCA study indicated that the Site is a high-risk groundwater site; therefore, the soil and groundwater in on and off-site areas warranted remedial actions. The source of the petroleum hydrocarbons in the groundwater was believed to have been the former USTs, which were used to store gasoline at the Site. The results of the CAP study indicated that the installation of a French drain combined with a vapor extraction system would be the most cost effective alternative for the Site's remediation.

In late August 1999, SOMA installed a French drain and groundwater treatment system to prevent further migration of the chemically impacted groundwater. This treatment system has been in operation since early December 1999.

In July 2000, following approval from the ACEHS, SOMA installed a vapor extraction system as recommended in our CAP document, dated July 1, 1999.

In January 2002, Environmental Fabric removed old product dispensers and installed new ones in the fuel islands.

## **1.2 Site Hydrogeology**

Previous investigations have shown that groundwater is encountered at depths of approximately 10 to 11 feet beneath the Site. Figure 2 shows the location of the on-site and off-site groundwater monitoring wells. Prior to the operation of the French drain, groundwater was found to flow from the north to the south with an average gradient of 0.014 feet/feet. When the groundwater extraction system is in operation, the groundwater flows towards the French drain. The capture zone of the drain has extended downgradient past well MW-10.

Based on the results of a pumping test conducted by SOMA, the hydraulic conductivity of the saturated sediments ranges from 1.5 to 18.3 feet per day.



Assuming that the effective porosity of the saturated sediments is 0.35, the groundwater flow velocity ranges from 22 to 267 feet per year.

## **2.0 Field Activities**

On July 30, 2002, SOMA's field crew conducted a groundwater monitoring event in accordance with the procedures and guidelines of the RWQCB, San Francisco Bay Region. During this groundwater monitoring event, a total of eight on-site (MW-1 to MW-8) monitoring wells, three off-site (MW-10, MW-11, and MW-12) monitoring wells, and three French drain risers were measured for depth to groundwater.

The depth to groundwater at each monitoring well and riser was measured from the top of the casing to the nearest 0.01 foot using an electric sounder. The top of the casing elevation data and the depth to groundwater at each monitoring well and riser were used to calculate the groundwater elevation. Kier Wright Civil Engineers Surveyors, Inc. surveyed the wells and risers on August 9, 2002. With the exception of monitoring well MW-11, which could not be accessed due to obstacles preventing the proper use of surveying equipment, the top of casing elevations were based on the survey data measured at this time. The elevation data was based on an assumed datum of 14.20 NAVD88. Appendix A includes the survey data.

Prior to the collection of samples, each well was purged using a battery operated 2-inch diameter pump (Model ES-60 DC). During the purging activities, in order to obtain accurate measurements of groundwater parameters and especially to avoid the intrusion of oxygen from ambient air into the groundwater samples, field measurements were conducted in-situ (i.e., down-hole inside each monitoring well). The pH, temperature, electric conductivity (EC), turbidity, and Oxygen Reduction Potential (ORP) were measured in-situ using a Horiba, Model

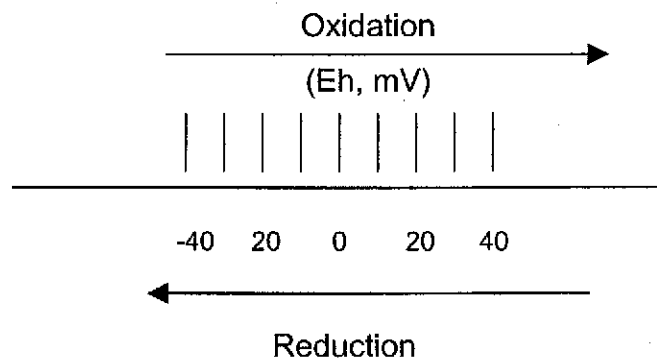
U-22 multi-parameter instrument. The Horiba, Model U-22 was calibrated at the Site using standard solutions and procedures provided by the manufacturer. Dissolved oxygen (DO) was measured with a dissolved oxygen meter, YSI Model 50B; see the field notes in Appendix A for details of the field measurements. The instrument was calibrated at the Site according to a procedure provided by the manufacturer and prescribed by Taras *et.al.* (1975). Details of the calibration and measurement procedures can be found in the instrument's handbook.

The Horiba U-22 portable microprocessor-based turbidity probe provides lab-grade accuracy, even in the field. The unit of measure adopted by the ISO Standard is the Formazine Turbidity Unit (FTU), which is identical to the Nephelometric Turbidity Unit (NTU). It has been found that there is a strong correlation between the turbidity level and the biological oxygen demand of natural water bodies. Turbidity is an indicator and, as such, does not reveal the presence or quantity of specific pollutants in the groundwater. It does, however, provide general information on the extent of the suspended solids in the groundwater.

The Horiba U-22's ORP electrode was used to measure the ORP of the groundwater samples. Oxidation is a process in which a molecule or ion loses one or several electrons. Reduction is a process by which a molecule or ion gains one or several electrons. The ORP, or Eh, is a measure of the potential for these processes to occur. The unit of Eh, which is commonly referred to as the Redox potential, is the Volt or m-Volt. The most important Redox reaction in petroleum contaminated groundwater is the oxidation of petroleum hydrocarbons in the presence of bacteria and free molecular oxygen. Because the solubility of O<sub>2</sub> in water is low (9 mg/L at 25 °C and 11 mg/L at 5 °C), and because the rate of O<sub>2</sub> replenishment in subsurface environments is limited, oxidation of only a small amount of petroleum hydrocarbons can result in the consumption of all the DO.

When all the DO in the groundwater is consumed, oxidation of petroleum

hydrocarbons can still occur, but the oxidizing agents (i.e., the constituents that undergo reduction) are then  $\text{Fe}(\text{OH})_3$ ,  $\text{SO}_4^{2-}$ ,  $\text{NO}_3^-$ ,  $\text{MnO}_2$ , and others (Freeze and Cherry, 1979). As these oxidizing agents are consumed, the groundwater environment becomes more and more reduced. If the process proceeds far enough, the environment may become so strongly reduced that the petroleum hydrocarbons may undergo anaerobic degradation, resulting in the production of methane and carbon dioxide. The concept of oxidation and reduction in terms of changes in oxidation states is illustrated below:



The purging continued until the parameters for pH, temperature, EC, DO, turbidity, and Redox stabilized, or three casing volumes were purged. The groundwater samples were also tested on-site for  $\text{Fe}^{+2}$ ,  $\text{SO}_4^{-2}$ , and  $\text{NO}_3^-$ -N concentrations once stabilization occurred.

$\text{Fe}^{+2}$ ,  $\text{SO}_4^{-2}$ ,  $\text{NO}_3^-$ -N were measured colorimetrically using the Hach Colorimeter Model 890. The Hach Model 890 Colorimeter is a microprocessor-controlled photometer suitable for colorimetric testing in the laboratory or the field. The required reagents for each specific test are provided in AccuVac ampuls.

$\text{Fe}^{+2}$  was measured colorimetrically using Method 8146 (1,10-phenanthroline Method). The 1,10-phenanthroline indicator in Ferrous Iron Reagent reacts with  $\text{Fe}^{+2}$  in the sample to form an orange color. The intensity of the orange color is proportional to the iron concentration.

$\text{SO}_4^{-2}$  was measured colorimetrically using Method 8051 of Sulfa Ver 4 Method. Sulfate ions in the sample react with barium in the Sulfa Ver 4 Sulfate Reagent to form insoluble barium sulfate. The amount of turbidity formed is proportional to the sulfate concentration. The Sulfa Ver 4 also contains a stabilizing agent to hold the barium sulfate in suspension.

$\text{NO}_3^{-}\text{-N}$  was measured colorimetrically using Method 8039: the Cadmium Reduction Method. Cadmium metal in the Nitra Ver 5 Nitrate Reagent reduces nitrates present in the sample to nitrite; the nitrite ion reacts in an acidic medium with sulfanilic acid to form an intermediate diazonium salt, which couples with getistic acid to form an amber-colored product. The intensity of the color is proportional to nitrate-N concentration in the sample.

For sampling purposes, after purging, a disposable polyethylene bailer was used to collect sufficient samples from each monitoring well for laboratory analyses. The groundwater sample was transferred into three 40-mL VOA vials, which had been prepared with HCl preservative. The vials were sealed properly to prevent the development of any air bubbles within the headspace area. After the groundwater samples were collected, they were placed on ice, in a cooler and maintained at 4°C. A chain of custody (COC) form was written for each sample and was placed along with the samples in the cooler. The following day, July 31, 2002, SOMA's field crew delivered the groundwater samples to Curtis & Tompkins, Ltd. Laboratory in Berkeley, California.

### **3.0 Laboratory Analysis**

Curtis & Tompkins, Ltd., a state certified laboratory, analyzed the groundwater samples for TPH-g, BTEX and MtBE. TPH-g was prepared using EPA Method 5030B and measured using EPA Method 8015B(M). EPA Method 8021B was

used to measure BTEX and MtBE concentrations. Detections of MtBE were confirmed using EPA Method 8260B.

#### **4.0 Results**

The following sections provide the results of field measurements and laboratory analyses for the July 30, 2002 groundwater monitoring event.

##### **4.1 Field Measurements**

Table 1 presents the calculated groundwater elevations at each groundwater monitoring well and riser. No free product was detected in any of the monitoring wells. The calculated groundwater elevation data was used to evaluate the impact of the French drain and determine the extent of the groundwater extraction capture zone. The groundwater elevation data presented in Table 1 is based on survey data measured by Kier Wright Civil Engineers Surveyors, Inc. on August 9, 2002. No survey was conducted for monitoring well MW-11; surveying equipment could not be set-up due to obstacles around this well.

As Table 1 shows, depths to groundwater in the monitoring wells ranged from 10.93 feet in monitoring wells MW-10 and MW-12 to 13.28 feet in monitoring well MW-6. The corresponding groundwater elevations, with the exception of monitoring well MW-11 which will be surveyed at a later date, ranged from 25.78 feet in monitoring well MW-10 to 28.22 feet in monitoring well MW-5. Depths to groundwater inside the risers ranged from 11.79 feet in the west riser to 12.81 feet in the east riser. The corresponding groundwater elevations ranged from 27.25 feet in the east riser to 27.42 feet in the center riser.

Table 2 shows the historical groundwater elevations at different groundwater

monitoring wells and the French drain risers. As previously mentioned the monitoring wells and French drain risers, with the exception of monitoring well MW-11, were resurveyed on August 9, 2002. The new survey was conducted to comply with an Electronically Deliverable Format (EDF) request made by the State Water Resources Control Board (SWRCB) Database. Due to the new survey data, further monitoring events will be needed to better determine groundwater elevation trends.

The groundwater elevation contour map, depicted in feet, as measured on July 30, 2002 is displayed in Figure 3. As Figure 3 shows, in general, the groundwater flows toward the southwest, at an average gradient of 0.005 feet/foot.

Table 3 summarizes the field measurements of physical and chemical properties of groundwater samples collected from the groundwater monitoring wells at the time of sampling. The pH measurements ranged from 6.43 in monitoring well MW-12 to 9.03 in monitoring well MW-8. The temperature measurements ranged from 18.85 °C in monitoring well MW-4 to 20.62 °C in monitoring well MW-7. EC ranged from 757 µS/cm in monitoring well MW-7 to 1,250 µS/cm in monitoring well MW-3.

The groundwater biodegradation parameters for this monitoring event, as well as, previous monitoring events, are shown in Table 4. DO concentrations were detected in all of the monitoring wells during the Third Quarter 2002 monitoring event. The concentration contour map for DO during the Third Quarter 2002 is displayed in Figure 4. The lowest DO concentration was detected off-site in monitoring well MW-10 at 0.09 mg/L, the highest DO concentration was detected on-site in monitoring well MW-4 at 4.47 mg/L. The generally low oxygen contents may suggest the presence of anaerobic biodegradation processes in this groundwater system. Based on the low off-site DO readings, petroleum hydrocarbons may have undergone an anaerobic degradation in these off-site

wells.

Turbidity of the groundwater samples ranged from 1.7 NTU in monitoring well MW-12 to 157.0 NTU in monitoring well MW-8. The Redox potential in the groundwater samples ranged from -125 mV in monitoring well MW-3 to +57 mV in monitoring well MW-2. Monitoring wells MW-1, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, MW-11, and MW-12 showed strongly reduced conditions, while monitoring wells MW-2 and MW-10 were the only monitoring wells to show a strongly oxidized condition. The low oxygen levels in combination with the positive Redox potentials, suggest the presence of weak aerobic oxidation of the petroleum hydrocarbons. Oxygen-depleted environments with strongly reduced conditions depict anaerobic processes utilizing alternate electron acceptors for oxidation of petroleum hydrocarbons. Possible alternate electron acceptors include nitrate, iron (III) and sulfate (Lovley *et. al.*, 1994). Under strongly reduced conditions and a lack of other terminal electron acceptors, the occurrence of methanogenesis, which is production of methane gas, is quite possible.

Ferrous iron was detected in all of the groundwater samples. Ferrous iron concentrations ranged from 0.16 mg/L in monitoring well MW-4 to 3.3 mg/L in monitoring wells MW-3 and MW-6. High concentrations of ferrous iron in groundwater are a good indication of biological activities. The contour map of ferrous iron concentrations in the groundwater as measured on July 30, 2002 is displayed in Figure 5. As Figure 5 shows, high ferrous iron concentrations were detected in the vicinity of the USTs in monitoring well MW-3, as well as monitoring well MW-6, and off-site in monitoring well MW-12. The presence of high ferrous iron concentrations in combination with low concentrations of other electron receptors, such as DO, sulfate, and nitrate is indicative of anaerobic biodegradation beneath the Site.

Sulfate concentrations were detected in all groundwater samples, with the

exception of groundwater samples taken from monitoring wells MW-1, MW-3 and MW-12. Detected sulfate concentrations ranged from 1 mg/L in monitoring well MW-8 to 50 mg/L in monitoring well MW-2. Sulfate concentrations decreased in monitoring wells MW-5, MW-8, and MW-12. Sulfate-depleted subsurface contaminated environments may reveal a strong demand by microorganisms for a source of terminal electron acceptors for oxidizing contaminant hydrocarbons (Lovley *et. al.*, 1994). The contour map of sulfate concentrations in the groundwater as measured on July 30, 2002 is displayed in Figure 6. As shown in Figure 6, sulfate concentrations were below the measurable specifications of the equipment in monitoring wells MW-1 and MW-3, which are in the vicinity of the USTs, and off-site in monitoring well MW-12. The highest on-site sulfate concentration was measured in monitoring well MW-2 at 50 mg/L, near the fuel islands, while the highest off-site concentration was measured in monitoring well MW-11 at 31 mg/L.

During this monitoring event, nitrate was detected in monitoring wells MW-4, MW-5, MW-6, MW-11 and MW-12, with concentrations ranging from 0.7 mg/L in monitoring well MW-4 to 11 mg/L in monitoring well MW-6. The low levels of DO and consumption of nitrate in many of the wells may suggest that, under the observed anaerobic conditions, nitrate may have been consumed as a source of terminal electron acceptors by microorganisms (Lovley *et. al.*, 1994). The contour map of nitrate concentrations in the groundwater is displayed in Figure 7. As Figure 7 shows, nitrate was below the measurable specifications of the equipment in the vicinity of the USTs, the dispenser islands in monitoring well MW-2, and off-site in monitoring well MW-10. The highest on-site sulfate concentration was detected in monitoring well MW-6, while the highest off-site concentration was detected in monitoring well MW-11 at 6.7 mg/L.

As discussed before, in this contaminated groundwater system beneath the Site, most of the electron receptors have been consumed by microorganisms, as a



result, methanogenesis, may be the only remaining route of natural biodegradation. Therefore, to enhance the biodegradation processes we highly recommend the injection of concentrated solutions of terminal electron receptors into the groundwater in the vicinity of the contaminated wells.

The field notes for the physical, chemical and biodegradation parameters are shown in Appendix A.

#### **4.2 Laboratory Analysis**

Table 5 presents the results of the laboratory analyses on the groundwater samples collected on July 30, 2002. The results indicate that on-site monitoring wells MW-1 and MW-3 are the most impacted locations. These monitoring wells are in the vicinity of the USTs.

As shown in Table 5, TPH-g was detected in all of the groundwater samples. TPH-g ranged in concentration from 110 µg/L in monitoring well MW-5 to 45,000 µg/L in monitoring well MW-3. A high TPH-g concentration was also detected in monitoring well MW-1, which is in the vicinity of the USTs. The contour map of TPH-g concentrations in the groundwater is displayed in Figure 8. As Figure 8 shows, high TPH-g concentrations were detected in the vicinity of the USTs, in monitoring wells MW-1 and MW-3. TPH-g was also detected in all off-site monitoring wells, where the highest TPH-g concentration was detected in monitoring well MW-12 at 2,200 µg/L.

As shown in Table 5, the following trends were observed for BTEX analytes during this monitoring event. All BTEX analytes, with the exception of a slight trace of ethylbenzene, were below the laboratory reporting limit for monitoring well MW-5. Toluene was below the laboratory reporting limit also for monitoring wells MW-11 and MW-12. The highest benzene concentration was detected in

monitoring well MW-3 at 8,900 µg/L. The highest toluene concentration was detected in monitoring well MW-1 at 2,500 µg/L. Ethylbenzene was detected in all of the monitoring wells, and ranged in concentration from 0.61 µg/L in monitoring well MW-11 to 1,600 µg/L in monitoring well MW-3. A high ethylbenzene concentration was also detected in monitoring well MW-6 at 1,400 µg/L. The highest total xylenes concentration was detected in monitoring well MW-3 at 5,600 µg/L, however, high concentrations were also detected in monitoring wells MW-1 and MW-6 at 4,400 µg/L and 3,770 µg/L, respectively. The contour map of benzene concentrations in the groundwater is displayed in Figure 9. As Figure 9 shows, the highest benzene concentration was detected in the vicinity of the USTs, in monitoring well MW-3. High benzene concentrations were also detected in monitoring wells MW-1 and MW-6.

As shown in Table 5, MtBE was reported using both EPA Methods 8260B and 8021B. MtBE was below the laboratory reporting limit for monitoring wells MW-2, MW-4, MW-6, and MW-11, and confirmed below the laboratory reporting limit in monitoring well MW-5. The highest MtBE concentration was detected in monitoring well MW-1. The contour map of MtBE concentrations, based on EPA Method 8260B, in the groundwater is displayed in Figure 10. As Figure 10 shows, the highest MtBE concentration was detected in the vicinity of the USTs, in monitoring well MW-1. MtBE has also migrated as far off-site as monitoring well MW-12. This can be attributed to the southwesterly groundwater flow direction and the solubility of MtBE.

The laboratory report for the Third Quarter 2002 monitoring event is included as Appendix B.

Table 6 shows the historical groundwater analytical data. Since the previous monitoring event the following concentration trends have been observed. TPH-g decreased in all monitoring wells with the exception of monitoring well MW-6. In

general, all BTEX analytes decreased in all of the monitoring wells, with the exception of the following; benzene which increased in monitoring well MW-3, toluene increased in MW-8, and MW-6 where all BTEX analytes increased. MtBE has significantly decreased in monitoring well MW-1, as well as in monitoring well MW-3, and only slightly increased in monitoring wells MW-7 and MW-12.

## **5.0 Groundwater Treatment System Operation**

The treatment system began operation on December 9, 1999. Since that time, 1,641,650 gallons of groundwater has been treated and discharged into the East Bay Municipal Utility District (EBMUD) sewer system under the existing discharge permit (as of August 23, 2002).

As required by the discharge permit and the ACEHS, sampling of the groundwater treatment system has been performed on a routine basis. The effluent sampling and maintenance of the system was performed on a weekly basis from the start of the system's operation to the end of July 2000. In August 2000, maintenance of the system continued weekly, but sampling was performed on a monthly basis. The results from the first effluent testing were used to acquire a discharge permit from EBMUD.

A total of 29,250 gallons of chemically impacted groundwater has been treated since the beginning of the Third Quarter 2002 (July 2002). The effluent passing both Granulated Active Carbon (GAC) units is regularly being sampled for chemical analysis. The schedule for refurbishing the GAC units is based on the analytical results of the samples. The first GAC unit was refurbished as soon as traces of chemicals broke through the unit. The second GAC unit is serving as a polishing unit and is always kept highly active. This procedure ensures that the effluent discharging into the EBMUD sewer system has non-detectable levels of contaminants. A schematic diagram of the groundwater remediation system is

displayed in Figure 11.

Table 7 presents the total volume and chemical composition of GAC-1 and effluent treated at the Site. Table 7 shows that all the effluent samples have maintained compliance with the permit. The laboratory reports for the treatment system are included as Appendix C of this report.

In the beginning of July 2002, the solenoid valve which shutdown the compressor during high water level conditions was removed from the system. The valve was deemed to be ineffective and jammed easily during the compressor's operation.

The cumulative weight of TPH-g and MtBE extracted from the groundwater since the installation of the treatment system is displayed in Figure 12. As Figure 12 shows, an approximate total of 157 pounds of TPH-g and 62 pounds of MtBE have been removed during the operation of the treatment system, from start-up to date.

## **6.0 Vapor Extraction System Operation**

The Vapor Extraction System (VES) consists of 6 vapor extraction wells, a de-moisturizing unit, a blower and four drums of GAC filters. The VES began operation on July 24, 2000. Since then, during its working days, the system has extracted and treated more than 3,000,000 liters per day of soil gas. When the system first began to operate, the influent had a concentration of 394 parts per million on volumetric basis (ppmv) petroleum hydrocarbons. However, it gradually decreased to 68 ppmv after 31 days of operation. On January 4, 2001, due to extremely low influent concentrations (i.e., less than 10 ppm of hydrocarbons), the soil vapor extraction (SVE) system was turned off.

On October 23, 2001, the system was inspected for operation and it was determined that all four GACs were not in good enough condition to re-start the

system. On October 25, 2001, one of the four GACs was replaced with a new one, and on October 29, 2001 the three of remaining GAC units were replaced. The system was then under continuous operation and extracted over 80 cubic feet per minute (CFM) of contaminated air from the vadose zone. On November 21, 2001 due to the low concentration of contaminants in the influent (i.e., less than 10 ppmv of hydrocarbons) the system was turned off. In February 2002, the system was inspected for operation and it was determined that the blower was not functioning. The blower was repaired and installed on February 15, 2002. On the same day, the four old GACs were replaced with four new ones and the system was turned on. The system was shut down on March 7, 2002, due to low influent readings caused by the saturated soil conditions on-site. The system was turned back on June 12, 2002 and has been operational, with the exception of the time period from August 15 to August 23, 2002 due to low influent readings. The total mass of petroleum hydrocarbons removed by the VES is shown in Table 8. As of August 26, 2002, the VES has removed 398.43 pounds of petroleum hydrocarbons from the vadose zone beneath the Site.

## **7.0 Conclusions and Recommendations**

The findings of the Third Quarter 2002 groundwater monitoring event can be summarized as follows:

1. The groundwater flows toward the southwest, at an average gradient of 0.005 feet/feet.
2. The wells and French drain risers were re-surveyed during the Third Quarter 2002. The surveying was conducted to comply with EDF requirements as required by the SWRCB.
3. The following groundwater biodegradation parameter trends were

observed during the Third Quarter 2002 monitoring event. The lowest DO concentration was detected off-site in monitoring well MW-10 at 0.09 mg/L; the highest DO concentration was detected on-site in monitoring well MW-4. The low oxygen contents may suggest the presence of anaerobic biodegradation processes in this groundwater system. Based on the low off-site DO readings, petroleum hydrocarbons may have undergone an anaerobic degradation in these off-site wells.

4. High ferrous iron concentrations were detected in the vicinity of the USTs in monitoring well MW-3, as well as monitoring well MW-6, and off-site in monitoring well MW-12. The presence of high ferrous iron concentrations in combination with low concentrations of other electron receptors, such as DO, sulfate, and nitrate is indicative of anaerobic biodegradation beneath the Site.
5. Sulfate concentrations were below the measurable specifications of the equipment in monitoring wells MW-1 and MW-3, which are in the vicinity of the USTs, and off-site in monitoring well MW-12. The highest on-site sulfate concentration was measured in monitoring well MW-2 at 50 mg/L, near the fuel islands, while the highest off-site concentration was measured in monitoring well MW-11 at 31 mg/L.
6. Nitrate was below the measurable specifications of the equipment in the vicinity of the USTs, the dispenser islands in monitoring well MW-2, and off-site in monitoring well MW-10. The highest on-site sulfate concentration was detected in monitoring well MW-6, while the highest off-site concentration was detected in monitoring well MW-11 at 6.7 mg/L.
7. In the contaminated groundwater system beneath the Site, microorganisms have consumed most of the electron receptors, such as

sulfate and nitrate; as a result, methanogenesis may be the only remaining route of natural biodegradation. Therefore, to enhance the biodegradation processes we highly recommend the injection of concentrated solutions of terminal electron receptors into the groundwater in the vicinity of the contaminated wells.

8. The highest concentrations of TPH-g, benzene, and MtBE were detected in the vicinity of the USTs as shown in Figures 8, 9, and 10. TPH-g and benzene were detected in all off-site monitoring wells. MtBE was detected in all off-site monitoring wells with exception of monitoring well MW-11.
9. TPH-g decreased in all monitoring wells with the exception of monitoring well MW-6.
10. BTEX analytes decreased in all of the monitoring wells, with the exception of the following; benzene which increased in monitoring well MW-3, and toluene increased in MW-8, and MW-6 where all BTEX analytes increased.
11. MtBE significantly decreased in monitoring wells MW-1 and MW-3, and only slightly increased in monitoring wells MW-7 and MW-12.
12. The treatment system began operation on December 9, 1999. Since that time, 1,641,650 gallons of groundwater has been treated and discharged into EBMUD's sewer system under the existing discharge permit (as of August 23, 2002).
13. All effluent samples have maintained compliance with the permit, with all contaminant concentrations remaining below the allowable discharge requirements.

14. As Figure 12 shows, approximately 157 pounds of TPH-g and 62 pounds of MtBE have been removed during the operation of the treatment system, over its entire life to date.

15. As of August 26, 2002, the VES has removed 398.43 pounds of petroleum hydrocarbons from the vadose zone beneath the Site.



## 8.0 Report Limitations

This report is the summary of work done by SOMA including observations and descriptions of the Site's conditions. It includes the analytical results produced by Curtis & Tompkins Laboratories as well as the summaries of data produced by previous environmental consultants. The number and location of the wells were selected to provide the required information, but may not be completely representative of the entire Site's conditions. All conclusions and recommendations are based on the results of the laboratory analysis. Conclusions beyond those specifically stated in this document should not be inferred from this report.

SOMA warrants that the services provided were done in accordance with the generally accepted practices in the environmental engineering and consulting field at the time of this sampling.

## 9.0 References

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# TABLES

**Table 1**  
**Groundwater Elevation Data, July 30, 2002**  
**3609 International Boulevard, Oakland, California**

<b>Monitoring Well</b>	<b>Top of Casing Elevation <sup>1</sup> (feet)</b>	<b>Depth to Groundwater (feet)</b>	<b>Groundwater Elevation (feet)</b>	<b>Free Product</b>
MW-1	40.11	12.80	27.31	ND
MW-2	40.71	12.70	28.01	ND
MW-3	40.91	13.25	27.66	ND
MW-4	40.01	12.62	27.39	ND
MW-5	41.16	12.94	28.22	ND
MW-6	40.92	13.28	27.64	ND
MW-7	39.94	12.15	27.79	ND
MW-8	39.38	11.79	27.59	ND
MW-10	36.71	10.93	25.78	ND
MW-11	NM	12.39	NM	ND
MW-12	36.84	10.93	25.91	ND
F.D. Center	39.35	11.93	27.42	ND
F.D. East	40.06	12.81	27.25	ND
F.D. West	39.16	11.79	27.37	ND

Notes:

ND: Not detected in monitoring well.

F.D. Center : French drain center riser.

F.D. East : French drain east riser.

F.D. West : French drain west riser.

<sup>1</sup> Top of casing elevations were re-surveyed to comply with the EDF requirements for electronic reporting of data to the State Water Resources Control Board Database on August 9, 2002.

NM: MW-11 was not surveyed due to obstacles around the well which prevented the use of survey equipment



Notes:

<sup>1</sup>Top of casing elevations were re-surveyed to comply with the EDF requirements for electronic reporting of data to the State Water Resources Control Board Database on August 9, 2002.

NM: Not Measured

NA: Not Applicable, Well/Drain did not exist at time of sampling

FDC: French drain center riser.

FDE: French drain east riser.

FDW: French drain west riser.



**Table 3**  
**Field Measurements of Physical and Chemical Properties**  
**of Groundwater at Time of Sampling, July 30, 2002**  
**3609 International Blvd., Oakland, CA**

<b>Monitoring Well</b>	<b>pH</b>	<b>Temp (°C)</b>	<b>EC (uS/cm)</b>
MW-1	6.93	19.93	984
MW-2	6.88	20.19	881
MW-3	6.68	19.97	1250
MW-4	6.79	18.85	834
MW-5	6.93	20.30	920
MW-6	6.83	19.46	926
MW-7	7.12	20.62	757
MW-8	9.03	19.56	932
MW-10	6.62	20.03	920
MW-11	6.78	18.92	945
MW-12	6.43	19.36	940

**Table 4**  
**Groundwater Biodegradation Parameters**  
**3609 International Boulevard, Oakland, California**

Well	Date	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Redox Potential (mV)	Ferrous Iron (mg/L)	Sulfate (mg/L)	Nitrate (mg/L)
MW-1	July 30, 2002	2.37	24.8	-102	2.13	0	0.0
	May 7, 2002	0.00	287	-81	3.09	0	0.0
	February 21, 2002	0.00	153	-16	3.06	0	0.0
	November 19, 2001	0.36	17.2	-54	1.89	41	0.6
	August 8, 2001	1.71	200	-35	2.18	23	0.0
	May 22, 2001	1.36	40.9	32.5	0.34	21	0.0
	March 13, 2001	0.53	66	-4.7	0.50	80	4.4
	November 2, 2000	0.56	18	-39.4	1.14	33	0.0
	August 9, 2000	0.32	219	-40	1.70	0	0.0
	May 31, 2000	0.30	30	-37	0.57	0	2.8
	February 7, 2000	0.77	NM	-74	3.30	1	0.0
	November 9, 1999	0.20	NM	NM	5.10	26	0.0
	August 23, 1999	1.40	NM	NM	2.67	8	0.0
	June 10, 1999	0.14	NM	NM	3.17	1	0
December 30, 1997	0.50	NM	NM	3.04	<1	<0.1	
MW-2	July 30, 2002	0.37	111.0	57	0.43	50.0	0.0
	May 7, 2002	0.00	65.1	-46	0.64	35.0	0.6
	February 21, 2002	1.46	41	131	0.36	45.0	0.8
	November 19, 2001	0.78	105	13	1.18	33.0	0.0
	August 8, 2001	2.03	0	160	0.09	51.0	7.4
	May 22, 2001	0.80	160	274	0.71	25.0	0.0
	March 13, 2001	0.89	24.15	117.9	0.10	80.0	6.8
	November 2, 2000	1.35	ND	111	0.69	7.9	0.0
	August 9, 2000	0.76	1,000	-74	0.72	0.0	5.4
	May 31, 2000	0.80	30.9	-55	0.18	54.0	2.5
	February 7, 2000	1.12	NM	-20	0.15	55.0	6.2
	November 9, 1999	0.80	NM	NM	1.00	55.0	0.9
	August 23, 1999	0.70	NM	NM	0.62	60.0	1.0
	June 10, 1999	0.44	NM	NM	0.55	40.0	0.7
June 30, 1998	3.20	NM	NM	0.50	14.0	<0.1	
December 30, 1997	<0.1	NM	NM	3.35	<1	<0.1	
MW-3	July 30, 2002	0.31	40.1	-125	3.30	0	0.0
	May 7, 2002	0.00	218	-148	50	0	0
	February 21, 2002	0	0.3	-61	6.80	0	0
	November 19, 2001	NA	NA	NA	NA	NA	NA
	August 8, 2001	1.17	28	-54	7.00	11	0.7
	May 22, 2001	0.08	98	-32	6.72	16	0.2
	March 13, 2001	0.62	26.91	-60	2.66	0	0.0
	November 2, 2000	0.83	4,816	-94	4.10	28	0.0
	August 9, 2000	0.40	123	-72	6.10	0	0.0
	May 31, 2000	0.45	188	-117	7.80	4	0.0
	February 7, 2000	0.70	NM	-82	3.60	140	0.0
	November 9, 1999	0.61	NM	NM	3.50	0	0.0
	August 23, 1999	0.80	NM	NM	3.90	0	0.0
	June 10, 1999	0.42	NM	NM	3.10	0	0.0
June 30, 1998	2.00	NM	NM	0.37	77	0.1	

**Table 4**  
**Groundwater Biodegradation Parameters**  
**3609 International Boulevard, Oakland, California**

Well	Date	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Redox Potential (mV)	Ferrous Iron (mg/L)	Sulfate (mg/L)	Nitrate (mg/L)
MW-4	July 30, 2002	4.47	6.3	-34	0.16	38	0.7
	May 7, 2002	0.00	9.7	-26	1.05	30	0.0
	February 21, 2002	1.12	707	-26	3.90	4	0.0
	November 19, 2001	0.56	58.7	-108	3.20	37	0.0
	August 8, 2001	1.54	320	320	0.09	30	6.0
	May 22, 2001	1.27	50	193.9	0.47	31	0.1
	March 13, 2001	0.72	190	9.4	0.51	48	3.2
	November 2, 2000	0.60	ND	-39	0.00	45	4.5
	August 9, 2000	0.46	83	-50	0.32	14	1.0
	May 31, 2000	0.50	26.8	-40	0.25	40	0.5
	February 7, 2000	1.30	NM	-31	1.56	1	0.0
	November 9, 1999	0.12	NM	NM	0.99	23	0.5
	August 23, 1999	0.15	NM	NM	0.67	28	0.5
	June 10, 1999	0.15	NM	NM	0.81	10	0.4
	June 30, 1998	1.30	NM	NM	0.93	7	0.9
December 30, 1997	<0.1	NM	NM	0.39	42	4.5	
MW-5	July 30, 2002	0.37	27.5	-43	0.28	38	0.8
	May 7, 2002	0.00	45	-23	0.64	54	7.2
	February 21, 2002	2.65	34.2	104	0.69	67	0.0
	November 19, 2001	1.10	8.5	-33	1.05	27	3.5
	August 8, 2001	1.35	300	103	0.73	37	0.2
	May 22, 2001	1.20	593	167	1.10	13	14.8
	March 13, 2001	1.01	35.36	34.2	0.33	45	1.0
	November 2, 2000	0.56	ND	49	1.02	31	6.5
	August 9, 2000	1.97	490	80	0.00	26	0.0
	May 31, 2000	0.48	27.2	-25	0.35	50	0.0
	February 7, 2000	0.90	NM	18	0.64	47	0.0
	November 9, 1999	0.27	NM	NM	0.72	32	2.0
	August 23, 1999	0.75	NM	NM	1.19	45	2.4
	June 10, 1999	0.25	NM	NM	0.34	33	2.5
	June 30, 1998	0.60	NM	NM	0.50	6	1.6
December 30, 1997	<0.1	NM	NM	0.94	18	0.3	
MW-6	July 30, 2002	1.39	127.0	-58	3.30	36	11.0
	May 7, 2002	0.00	263	-110	2.25	23	0.0
	February 21, 2002	0.54	149	-40	6.20	41	0.0
	November 19, 2001	NA	NA	NA	NA	NA	NA
	August 8, 2001	NA	NA	NA	NA	NA	NA
	May 22, 2001	0.12	413	-9.5	1.30	17	0.0
	March 13, 2001	0.75	83	-42.1	2.63	79	1.3
	November 2, 2000	0.80	618	-34	2.65	16	0.0
	August 9, 2000	0.65	1,000	-33	4.10	0	2.5
	May 31, 2000	0.72	111	-62	3.27	0	0.0
	February 7, 2000	1.25	NM	-51	3.02	0	0.0
	November 9, 1999	0.22	NM	NM	7.00	0	0.0
	August 23, 1999	0.55	NM	NM	3.30	9	0.0
	June 10, 1999	0.61	NM	NM	2.52	23	0.0
	June 30, 1998	2.50	NM	NM	0.40	4	0.7
December 30, 1997	<0.1	NM	NM	0.30	5	<0.1	

**Table 4**  
**Groundwater Biodegradation Parameters**  
**3609 International Boulevard, Oakland, California**

Well	Date	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Redox Potential (mV)	Ferrous Iron (mg/L)	Sulfate (mg/L)	Nitrate (mg/L)
MW-7	July 30, 2002	1.15	16.6	-64	0.68	28	0.0
	May 7, 2002	0.00	531	-62	1.79	20	0.0
	February 21, 2002	0.26	118	-6	1.77	0	0.0
	November 19, 2001	0.98	8.9	-14	1.14	21	0.0
	August 8, 2001	1.62	140	-18	0.51	13	0.0
	May 22, 2001	1.71	49.8	56	0.79	12	0.0
	March 13, 2001	0.79	110	-10.4	3.30	40	0.0
	November 2, 2000	0.58	ND	-11.6	0.27	30	3.5
	August 9, 2000	0.26	131	-33	0.95	17	0.0
	May 31, 2000	0.30	34.9	-52	0.72	28	0.0
	February 7, 2000	0.91	NM	-19	0.53	41	0.0
	November 9, 1999	0.14	NM	NM	0.99	25	0.0
	August 23, 1999	0.65	NM	NM	1.40	20	0.0
	June 10, 1999	0.15	NM	NM	0.19	22	0.0
	June 30, 1998	1.00	NM	NM	0.78	4	0.5
December 30, 1997	1.20	NM	NM	0.23	32	0.2	
MW-8	July 30, 2002	0.18	157.0	-124	1.38	1	0.0
	May 7, 2002	0.00	308	-113	0.80	2	0.0
	February 21, 2002	0.00	567	-64	3.08	0	0.0
	November 19, 2001	0.46	53.5	-142	>3.3	1	0.0
	August 8, 2001	1.24	990	-62	1.50	25	0.8
	May 22, 2001	1.16	179	-8.8	3.30	5	0.0
	March 13, 2001	0.48	110	-76	3.30	12	2.1
	November 2, 2000	-	350	-104.9	7.33	16	-
	August 9, 2000	0.50	94	-91	3.30	7	0.0
	May 31, 2000	0.45	13	-95	3.30	0	0.0
	February 7, 2000	0.65	NM	-90	3.46	0	0.0
	November 9, 1999	0.38	NM	NM	8.90	0	0.0
	August 23, 1999	0.20	NM	NM	8.20	13	0.0
	June 10, 1999	0.10	NM	NM	4.70	0	0.0
	June 30, 1998	1.30	NM	NM	2.82	3	<0.1
December 30, 1997	2.50	NM	NM	3.35	<1	0.1	
MW-10	July 30, 2002	0.09	12.7	34	0.18	25	0.0
	May 7, 2002	0.00	123	19	0.00	18	0.0
	February 21, 2002	0.15	12.6	85	0.49	4	0.0
	November 19, 2001	0.89	3	45	0.99	12	2.7
	August 8, 2001	1.56	19.6	52	0.00	11	0.0
	May 22, 2001	1.76	19.56	105	0.10	13	1.7
	March 13, 2001	0.65	32.11	28	0.23	0	0.0
	November 2, 2000	0.53	ND	26.7	0.42	13	1.3
	August 9, 2000	0.45	116	19	0.40	0	0.0
	May 31, 2000	0.40	22.4	17	0.29	0	0.0
	February 7, 2000	0.82	NM	55	0.00	0	0.0
	November 9, 1999	0.44	NM	NM	0.37	12	0.0
	August 23, 1999	0.50	NM	NM	0.52	9	0.0
	June 10, 1999	0.20	NM	NM	0.25	0	0.0
	June 30, 1998	0.90	NM	NM	0.38	<1	<0.1
December 30, 1997	<0.1	NM	NM	2.21	<1	0.3	

**Table 4**  
**Groundwater Biodegradation Parameters**  
**3609 International Boulevard, Oakland, California**

Well	Date	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Redox Potential (mV)	Ferrous Iron (mg/L)	Sulfate (mg/L)	Nitrate (mg/L)
MW-11	July 30, 2002	0.21	6.8	-22	0.18	31	6.7
	May 7, 2002	0.00	155	-29	0.49	28	4.6
	February 21, 2002	2.52	168	31	0.00	40	0.0
	November 19, 2001	0.72	8.4	-18	2.30	30	1.0
	August 8, 2001	NA	NA	NA	NA	NA	NA
	May 22, 2001	2.13	32.3	40.5	0.53	20	0.0
	March 13, 2001	0.79	111	114.7	0.34	78	0.0
	November 2, 2000	0.60	ND	17	0.44	21	1.5
	August 9, 2000	0.48	42	10	0.80	0	1.5
	May 31, 2000	0.50	12	-15	0.69	10	5.2
	February 7, 2000	1.10	NM	-14	0.75	24	0.0
	November 9, 1999	0.22	NM	NM	0.06	21	0.0
	August 23, 1999	0.60	NM	NM	0.92	52	0.0
	June 10, 1999	0.19	NM	NM	0.28	0	0.0
	June 30, 1998	2.20	NM	NM	0.15	6	1.2
December 30, 1997	<0.1	NM	NM	0.32	35	3.5	
MW-12	July 30, 2002	0.29	1.7	-60	2.37	0	3.3
	May 7, 2002	0.00	53.1	-67	2.00	13	0.0
	February 21, 2002	0.56	4.9	-6	1.43	0	0.0
	November 19, 2001	0.92	20	-72	2.29	2	0.0
	August 8, 2001	1.66	72	3	2.46	0	0.0
	May 22, 2001	1.76	6.28	-18.9	2.38	0	1.9
	March 13, 2001	0.64	8.42	-5.6	1.44	0	0.0
	November 2, 2000	0.60	19	12	1.93	6	0.0
	August 9, 2000	0.31	56	-48	2.84	0	0.0
	May 31, 2000	0.29	7.7	-54	2.11	0	0.0
	February 7, 2000	0.62	NM	-42	1.53	0	0.0
	November 9, 1999	0.34	NM	NM	2.21	9	3.1

Notes:

NA: Not analyzed, MW-3 not analyzed on November 19, 2001 due to free product,  
 MW-6 not analyzed on November 19, 2001, well was inaccessible due to property obstacles.  
 ND: Not Detected  
 NM: Not Measured  
 OL: Outside the Limits of the measuring instrumentation

**Table 5**  
**Groundwater Analytical Data, July 30, 2002**  
**3609 International Boulevard, Oakland, California**

Monitoring Well	TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-Benzene (µg/L)	Total Xylenes (µg/L)	MtBE <sup>1</sup> (µg/L) 8260B/8021B
MW-1	29,000	2,400	2,500	920	4,400	13,000/15,000
MW-2	180	11	6.3	9.4	27	<2.0
MW-3	45,000	8,900	1,700	1,600	5,600	2,600/3,200
MW-4	450	20	24	19	74	<2.0
MW-5	110	<0.5	<0.5	0.77	<0.5	<0.5/4.1
MW-6	24,000	1,000	410	1,400	3,770	<20
MW-7	270	5.3	1.3 C	2.3	8.1	46 / 35
MW-8	8,400	340	78	530	517	1,200/1,400
MW-10	160	26	0.55	8.1	1	72 / 63
MW-11	120	5.6	<0.5	0.61	0.53	<2.0
MW-12	2,200	57	<0.5	11	2.6	100 / 110

Notes:

< : Not detected above laboratory reporting limits.

C : Presence confirmed, but confirmation concentration differed by more than a factor of two.

<sup>1</sup> MtBE was analyzed using the EPA Method 8021B and confirmed using 8260B.

**Table 6**  
**Historical Groundwater Analytical Data**  
3609 International Boulevard, Oakland, California

Monitoring Well	Date	TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-Benzene (µg/L)	Total Xylenes (µg/L)	MtBE <sup>1</sup> (µg/L) 8260B/8021B
MW-1	7/30/02	29,000	2,400	2,500	920	4,400	13,000/15,000
	5/7/02	53,000	4,400	5,100	1300	7,000	32,000
	2/21/02	260,000	3,700	12,000	3,700	19,200	23,000
	11/19/01	41,000	2,700	5,100	1,000	4,570	74,000
	8/8/01	14,820	852	342	568	1,606	2,000
	5/22/01	4,900	310	81	82	388	150
	3/13/01	14,570	1,005	440	108	2,030	16
	11/2/00	7,050	435	52	ND	689	10
	8/9/00	11,000	638	<5	<5	<5	17.1
	5/31/00	15,610	610	350	310	1,400	<5
	2/7/00	40,000	2,280	1,380	8	6,130	47
	11/9/99	10,000	693	15	<5	3,471	50
	8/23/99	19,750	678	483	893	2,938	38
	6/10/99	25,000	1,110	1,460	1,330	5,265	77
	3/16/99	17,000	480	860	850	3,000	190
	12/16/98	65,000	2,500	2,400	2,300	9,500	160
	12/30/97	27,000	2,300	2,100	1,400	5,100	NA
	4/10/97	NA	NA	NA	NA	NA	NA
	12/9/96	NA	NA	NA	NA	NA	NA
	4/3/96	31,000	98	120	63	170	NA
	1/3/96	30,000	71	73	50	120	NA
	10/2/95	59,000	140	130	140	390	NA
	6/5/95	21,000	950	650	570	150	NA
3/6/95	32,000	190	160	150	490	NA	
12/2/94	80,000	3,800	6,600	2,300	11,000	NA	
10/5/94	320,000	24,000	21,000	2,600	15,000	NA	
MW-2	7/30/02	180	11	6.3	9.4	27	<2.0
	5/7/02	1,800	31	140	110	348	<2
	2/21/02	1,700	26	180	95	360	<2
	11/19/01	470	13	64	22	83	14
	8/8/01	125	4	4	3	11	ND
	5/22/01	870	37	75	55	179	2.7
	3/13/01	932	18	34	1.3	225	ND
	11/2/00	ND	ND	ND	ND	ND	ND
	8/9/00	<50	<5	<5	<5	<5	<5
	5/31/00	2,930	130	330	130	570	<5
	2/7/00	6,400	372	639	46	134	8
	11/9/99	<50	<5	<5	<5	<5	<5
	8/23/99	60	6	9	4	11	ND
	6/10/99	3,500	290	428	211	744	ND
	3/16/99	7,600	730	830	610	1,900	55
	12/16/98	26,000	1,400	1,600	880	9,500	<5
	9/29/98	29,000	290	180	160	360	<0.5
	6/30/98	25,000	2,000	2,000	1,300	4,300	NA
	12/30/97	35,000	4,900	4,900	1,600	7,000	NA
	4/10/97	53,000	150	110	37	0	ND
	12/9/96	6,200	11	7	2	14	ND
	4/3/96	27,000	0	92	44	13	NA
	1/3/96	46,000	160	130	93	240	NA
10/2/95	46,000	160	130	93	240	NA	
6/5/95	8,000	220	330	350	660	NA	
3/6/95	490	3	3	3	1	NA	
12/2/94	42,000	1,700	2,200	1,200	3,600	NA	

**Table 6**  
**Historical Groundwater Analytical Data**  
**3609 International Boulevard, Oakland, California**

Monitoring Well	Date	TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-Benzene (µg/L)	Total Xylenes (µg/L)	MtBE <sup>1</sup> (µg/L) 8260B/8021B
MW-3	7/30/02	45,000	8,900	1,700	1,600	5,600	2,600/3,200
	5/7/02	54,000	6,700	3,200	1,800	7,100	9,100
	2/21/02	62,000	6,000	7,600	1,900	9,200	12,000
	11/19/01	NA	NA	NA	NA	NA	NA
	8/8/01	41,750	3,485	2,670	1,255	5,420	52
	5/22/01	44,000	5,400	3,100	1,400	6,400	200
	3/13/01	14,754	2,250	140	ND	1,284	110
	11/2/00	48,000	6,789	4,816	676	7,258	83
	8/9/00	76,000	8,900	5,636	883	7,356	176
	5/31/00	68,000	15,000	8,900	1,500	7,400	<5
	2/7/00	44,000	6,090	3,360	<5	5,780	276
	11/9/99	26,000	3,218	1,319	<5	6,697	126
	8/23/99	64,000	7,484	8,052	1,744	9,749	141
	6/10/99	46,000	8,245	6,425	1,015	7,173	274
	3/16/99	45,000	4,100	6,400	1,000	6,100	470
	12/16/98	51,000	5,700	3,900	1,200	6,300	410
	1/3/96	150,000	510	410	210	650	NA
	10/2/95	150,000	510	410	210	65	NA
	6/5/95	350,000	20,000	42,000	5,800	36,000	NA
	3/6/95	350,000	20,000	42,000	5,800	36,000	NA
12/2/94	250,000	19,000	22,000	4,400	28,000	NA	
10/5/94	3,000,000	190,000	740,000	310,000	130,000	NA	
MW-4	7/30/02	450	20	24	19	74	<2.0
	5/7/02	570	72	29	27	74	<2
	2/21/02	450	63	4.1	22	28.7	<2
	11/19/01	670	180	5	17	53	ND
	8/8/01	133	12	2.2	3.9	9	ND
	5/22/01	80	12	1.9	4.1	9.8	ND
	3/13/01	62	ND	ND	3.2	8.7	ND
	11/2/00	ND	5.30	ND	ND	8	ND
	8/9/00	370	5.08	<5	<5	<5	<5
	5/31/00	552	42	19	16	67	<5
	2/7/00	7,800	1,200	61	<5	781	<5
	11/9/99	<50	<5	<5	<5	<5	<5
	8/23/99	660	497	41	54	145	6
	6/10/99	1,000	298	44	19	64	13
	3/16/99	600	200	35	19	56	11
	12/16/98	1,400	590	33	28	94	24
	9/29/98	6,200	910	77	68	200	18
	6/30/98	1,700	780	160	54	200	NA
	12/30/97	2,300	410	270	100	1,500	NA
	4/10/97	ND	ND	ND	ND	ND	ND
12/9/96	4,000	14	6	4	12	ND	
4/3/96	1,900	12	8	5	14	NA	
1/3/96	9,300	230	110	10	29	NA	
10/2/95	9,300	23	11	10	29	NA	



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**Historical Groundwater Analytical Data**  
**3609 International Boulevard, Oakland, California**

Monitoring Well	Date	TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-Benzene (µg/L)	Total Xylenes (µg/L)	MtBE <sup>1</sup> (µg/L) 8260B/8021B
MW-5	7/30/02	110	<0.5	<0.5	0.77	<0.5	<0.5/4.1
	5/7/02	160	<0.5	0.78C	2.0	2.15	2.3
	2/21/02	290	3.5	2	6.2	6.2	< 0.5
	11/19/01	920	17	160	26	135	40
	8/8/01	258	1	1.1	3.4	7.3	1.4
	5/22/01	180	ND	ND	2.1	0.57	4.4
	3/13/01	382	6.1	1.9	6.6	5.9	ND
	11/2/00	ND	ND	ND	ND	ND	ND
	8/9/00	<50	<5	<5	<5	<5	<5
	5/31/00	627.4	7.4	24	12	32.4	<5
	2/7/00	70	<5	<5	<5	7	<5
	11/9/99	<50	<5	<5	<5	<5	<5
	8/23/99	120	ND	4	ND	4	ND
	6/10/99	270	4	3	6	4	ND
	3/16/99	650	3	1	16	2	10
	12/16/98	1,400	1	1	ND	2	ND
	9/29/98	270	2	1	3	3	<.5
	6/30/98	400	<5	<5	15	<10	NA
	12/30/97	790	82	66	59	160	NA
	4/10/97	NA	NA	NA	NA	NA	NA
12/9/96	NA	NA	NA	NA	NA	NA	
4/3/96	780	1	1	5	4	NA	
1/3/96	1,500	1	1	4	5	NA	
10/2/95	1,500	1	1	4	5	NA	
MW-6	7/30/02	24,000	1,000	410	1,400	3,770	<20
	5/7/02	10,000	400	160	470	970	<2
	2/21/02	14,000	440	180	750	1,020	<10
	11/19/01	NA	NA	NA	NA	NA	NA
	8/8/01	NA	NA	NA	NA	NA	NA
	5/22/01	27,000	760	450	1,600	4,270	ND
	3/13/01	15,637	713	459	238	2,363	ND
	11/2/00	19,000	1,387	618	ND	5,250	ND
	8/9/00	24,000	1,306	870	<5	5,162	<5
	5/31/00	21,700	1,700	1,200	17	3,600	<5
	2/7/00	17,000	1,360	521	<5	4,150	6
	11/9/99	40,000	1,084	130	<5	10,940	<5
	8/23/99	42,000	3,806	3,649	1,554	7,996	10
	6/10/99	18,500	2,060	1,650	735	3,170	ND
	3/16/99	37,000	3,900	4,300	1,600	7,000	180
1/3/96	120,000	350	310	200	610	NA	
10/2/95	120,000	350	310	200	610	NA	

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**Historical Groundwater Analytical Data**  
**3609 International Boulevard, Oakland, California**

Monitoring Well	Date	TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-Benzene (µg/L)	Total Xylenes (µg/L)	MtBE <sup>1</sup> (µg/L) 8260B/8021B
MW-7	7/30/02	270	5.3	1.3 C	2.3	8.1	46 / 35
	5/7/02	560	15	28.0	9.2	44.0	37
	2/21/02	380	<0.5	2.5	2	3.8	78
	11/19/01	1,700	24	220	41	205	69
	8/8/01	610	3.7	3	6.2	18.9	10
	5/22/01	370	ND	9.1	1.3	2.3	28
	3/13/01	82	0.97	ND	0.76	ND	78
	11/2/00	50	ND	ND	ND	ND	9.1
	8/9/00	80	<5	<5	<5	<5	11.7
	5/31/00	494.9	4.9	22	4.2	21.9	29
	2/7/00	80	<5	<5	<5	<5	23
	11/9/99	290	<5	9	<5	<5	12
	8/23/99	570	5	10	ND	ND	ND
	6/10/99	320	3	7	4	3	26
	3/16/99	300	3	1	1	1	62
	12/16/98	990	5	10	5	20	160
	9/29/98	1,800	1	1	1	2	68
	6/30/98	620	4	<5	9	<10	NA
	12/30/97	1,400	130	98	75	200	NA
	4/10/97	NA	NA	NA	NA	NA	NA
12/9/96	NA	NA	NA	NA	NA	NA	
4/3/96	1,900	2	3	5	7	NA	
1/3/96	3,300	9	12	17	45	NA	
10/2/95	NA	10	12	17	NA	3,300	
MW-8	7/30/02	8,400	340	78	530	517	1,200/1,400
	5/7/02	9,000	360	56	560	622	2,100
	2/21/02	240,000	1,400	<25	4,200	6,560	<100
	11/19/01	13,000	600	270	750	1,200	400
	8/8/01	5,620	153	46	373	345	174
	5/22/01	3,100	110	28	140	194	410
	3/13/01	2,360	81	16	71	270	221
	11/2/00	3,000	278	350	209	980	21
	8/9/00	22,000	632	5.38	<5	2,686	37.3
	5/31/00	25,940	940	130	1,600	3,960	75
	2/7/00	44,200	1,080	617	<5	4,160	240
	11/9/99	10,500	92	<5	<5	3,414	769
	8/23/99	58,000	5,379	2,438	3,001	6,960	639
	6/10/99	39,500	3,610	1,635	2,175	5,913	988
	3/16/99	22,000	1,800	470	2,000	2,000	820
	12/16/98	61,000	6,300	1,700	2,200	4,400	1,300
	6/30/98	54,000	4,600	2,800	3,500	7,300	NA
	12/30/97	28,000	6,000	1,600	2,100	4,700	NA
	4/10/97	24,000	86	55	50	100	ND
	12/9/96	27,000	88	43	44	80	ND
4/3/96	58,000	250	170	140	330	NA	
1/3/96	94,000	310	250	180	480	NA	
10/2/95	94,000	310	250	180	480	NA	

**Table 6**  
**Historical Groundwater Analytical Data**  
**3609 International Boulevard, Oakland, California**

Monitoring Well	Date	TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-Benzene (µg/L)	Total Xylenes (µg/L)	MtBE <sup>1</sup> (µg/L) 8260B/8021B
MW-10	7/30/02	160	26	0.55	8.1	1.0	72 / 63
	5/7/02	3,400	660	13	260	48.0	270
	2/21/02	4,700	1,100	20	370	63.7	500
	11/19/01	3,500	900	260	310	258	410
	8/8/01	242	35	1	11	2	64
	5/22/01	2,900	630	11	200	31	270
	3/13/01	4,935	969	18	41	72	630
	11/2/00	ND	ND	ND	ND	ND	145
	8/9/00	6,800	1,055	26	54	53.8	1,283
	5/31/00	4,400	1,500	25	390	107.1	580
	2/7/00	<50	<5	<5	<5	<5	448
	11/9/99	2,950	1,134	20	<5	70	652
	8/23/99	3,250	2,135	97	600	248	1,800
	6/10/99	4,200	1,168	34	264	154	1,195
	3/16/99	4,100	15	28	420	250	2,800
	12/16/98	8,700	3,800	51	790	420	1,800
	9/29/98	9,900	5,400	66	970	620	2,600
	12/30/97	10,000	5,300	76	1,100	780	NA
	4/10/97	1,000	21	9	3	3	ND
MW-11	7/30/02	120	5.8	<0.5	0.61	0.53	<2.0
	5/7/02	280	16	3	7.6	7.6	<2
	2/21/02	560	34	20	32	37.3	< 0.5
	11/19/01	300	7.9	26	5.1	28.9	ND
	8/8/01	NS	NS	NS	NS	NS	NS
	5/22/01	280	12	8.3	3.3	9.8	12
	3/13/01	273	8.6	2.1	10	14	ND
	11/2/00	60	ND	ND	ND	ND	ND
	8/9/00	590	10.5	5.94	<5	7.75	<5
	5/31/00	477	27	13	9.5	29.0	<5
	2/7/00	700	20	15	<5	35	<5
	11/9/99	<50	<5	<5	<5	<5	<5
	8/23/99	170	4	4	ND	6	ND
	6/10/99	4,600	1,240	35	290	159	1,291
	3/16/99	710	30	6	53	84	8
	12/16/98	650	27	4	25	33	>0.5
	9/29/98	170	7	1	4	9	22
	6/30/98	1,100	45	24	71	100	NA
	12/30/97	710	66	97	59	190	NA
4/10/97	ND	ND	ND	ND	ND	ND	

**Table 6**  
**Historical Groundwater Analytical Data**  
**3609 International Boulevard, Oakland, California**

Monitoring Well	Date	TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-Benzene (µg/L)	Total Xylenes (µg/L)	MIBE <sup>1</sup> (µg/L) 8260B/8021B
MW-12	7/30/02	2,200	57	<0.5	11.0	2.6	100 / 110
	5/7/02	2,700	74	<0.5	20.0	5.1	94
	2/21/02	2,500	77	<0.5	5.7	7.4	95
	11/19/01	3,000	81	69	13	73	120
	8/8/01	2,090	71	1.8	3	4	142
	5/22/01	31,000	1,200	ND	95	165	1,900
	3/13/01	1,517	13	5.6	5.5	11	214
	11/2/00	1,010	9.3	19.0	ND	7.40	215
	8/9/00	1,730	15.4	12.4	<5	<5	185
	5/31/00	3,930	230	10	34	12	200
	2/7/00	4,000	351	37	<5	24	513
	11/9/99	80	<5	<5	<5	<5	229

Notes:

<sup>1</sup> MIBE was analyzed using the EPA Method 8021B and confirmed using 8260B.

ND, < : Not Detected above laboratory reporting limits.

NA: Not Analyzed

<sup>c</sup> Presence confirmed, but confirmation concentration differed by more than a factor of two.

NS: Not Sampled

**Table 7**  
**Total Volume of Water Treated and GAC-1 and Effluent Chemistry**  
 3609 International Boulevard, Oakland, California

Month	Date	Meter Reading (gallons)	Lab Results For Effluent <sup>1</sup> and GAC-1 (concentrations in µg/L)					
			MtBE <sup>2</sup>	TPH-g	Benzene	Toluene	Ethyl benzene	Total Xylenes
<b>2002</b>								
<u>August</u>	8/23/2002	1,641,650	1.0 < 0.5	< 50 < 50	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5
<u>July</u>	7/23/2002	1,632,834	< 5.0 < 5.0	< 50 < 50	< 5.0 < 5.0	< 5.0 < 5.0	< 5.0 < 5.0	< 5.0 < 5.0
<u>June</u>	6/24/2002	1,610,050	1.7 < 0.5	< 50 < 50	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5
<u>May</u>	5/30/2002	1,571,630	< 0.5 < 0.5	< 50 < 50	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5
<u>April</u>	4/24/2002	1,528,740	< 0.5 < 0.5	< 50 < 50	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5
<u>February</u>	2/27/2002	1,449,830	< 0.5 1.1	< 50 < 50	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5
<u>January</u>	1/22/2002	1,381,370	< 2.0 < 2.0	< 50 < 50	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5
<b>2001</b>								
<u>December</u>	12/12/2001	1,311,340	ND ND	ND ND	ND ND	ND ND	ND ND	ND ND
<u>November</u>	11/2/2001	1,272,660	ND 0.6	ND ND	ND ND	ND ND	ND ND	ND ND
<u>September</u>	9/28/2001	NA	ND ND	ND ND	ND ND	ND ND	ND ND	ND ND
<u>August</u>	8/22/2001	1,243,100	ND ND	ND ND	ND ND	ND ND	ND ND	ND ND
<u>July</u>	7/26/2001	1,227,270	ND ND	ND ND	ND ND	ND ND	ND ND	ND ND
	7/11/2001	1,226,730	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
<u>June</u>	6/29/2001	1,224,600	NA ND	NA ND	NA ND	NA ND	NA ND	NA ND
	6/16/2001	1,216,580	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
	6/7/2001	1,216,580	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA

**Table 7**  
**Total Volume of Water Treated and GAC-1 and Effluent Chemistry**  
 3609 International Boulevard, Oakland, California

Month	Date	Meter Reading (gallons)	Lab Results For Effluent <sup>1</sup> and GAC-1 (concentrations in µg/L)					
			MtBE <sup>2</sup>	TPH-g	Benzene	Toluene	Ethyl benzene	Total Xylenes
<b>May</b>	5/30/2001	1,205,198	NA	NA	NA	NA	NA	NA
		1,205,198	NA	NA	NA	NA	NA	NA
	5/23/2001	1,194,390	NA	NA	NA	NA	NA	NA
		1,194,390	NA	NA	NA	NA	NA	NA
	5/17/2001	1,182,360	ND	ND	ND	ND	ND	ND
		1,182,360	ND	ND	ND	ND	ND	ND
	5/10/2001	1,166,850	NA	NA	NA	NA	NA	NA
		1,166,850	NA	NA	NA	NA	NA	NA
	5/5/2001	1,151,600	NA	NA	NA	NA	NA	NA
		1,151,600	NA	NA	NA	NA	NA	NA
<b>April</b>	4/28/2001	1,135,690	NA	NA	NA	NA	NA	NA
		1,135,690	NA	NA	NA	NA	NA	NA
	4/21/2001	1,113,570	NA	NA	NA	NA	NA	NA
		1,113,570	NA	NA	NA	NA	NA	NA
	4/11/2001	1,082,700	NA	ND	ND	ND	ND	ND
		1,082,700	ND	ND	ND	ND	ND	ND
	4/6/2001	1,065,540	NA	NA	NA	NA	NA	NA
		1,065,540	NA	NA	NA	NA	NA	NA
<b>March</b>	3/29/2001	1,036,330	NA	NA	NA	NA	NA	NA
			NA	NA	NA	NA	NA	NA
	3/21/2001	1,036,070	NA	NA	NA	NA	NA	NA
		1,036,070	NA	NA	NA	NA	NA	NA
	3/17/2001	1,035,100	NA	NA	NA	NA	NA	NA
		1,035,100	NA	NA	NA	NA	NA	NA
	3/13/2001	1,032,500	ND	ND	ND	ND	ND	ND
		1,032,500	NA	NA	NA	NA	NA	NA
	3/2/2001	996,520	NA	NA	NA	NA	NA	NA
		996,520	NA	NA	NA	NA	NA	NA
<b>February</b>	2/10/2001	975,490	System shut down for maintenance and cleaning.					
<b>January</b>	1/29/2001	957,880	ND	ND	ND	ND	ND	ND
	1/29/2001	957,880	ND	ND	ND	ND	ND	ND
<b>2000</b>								
<b>December</b>	12/5/2000	883,000	ND	ND	ND	ND	ND	ND
	12/5/2000	883,000	ND	ND	ND	ND	ND	ND

**Table 7**  
**Total Volume of Water Treated and GAC-1 and Effluent Chemistry**  
 3609 International Boulevard, Oakland, California

Month	Date	Meter Reading (gallons)	Lab Results For Effluent <sup>1</sup> and GAC-1 (concentrations in µg/L)					
			MTBE <sup>2</sup>	TPH-g	Benzene	Toluene	Ethyl benzene	Total Xylenes
<b>November</b>	11/24/2000		ND	ND	ND	ND	ND	ND
	11/24/2000		ND	ND	ND	ND	ND	ND
	11/1/2000	842,000	ND	ND	ND	ND	ND	ND
	11/1/2000	842,000	ND	ND	ND	ND	ND	ND
<b>October</b>	10/1/2000	809,000	ND	ND	ND	ND	ND	ND
	10/1/2000	809,000	ND	ND	ND	ND	ND	ND
<b>August</b>	8/24/2000	778,000	ND	ND	ND	ND	ND	ND
<b>July</b>	7/26/2000	726,000	ND	ND	ND	ND	ND	ND
	7/19/2000	718,000	ND	ND	ND	ND	ND	ND
	7/13/2000	712,000	ND	ND	ND	ND	ND	ND
	7/7/2000	706,000	ND	ND	ND	ND	ND	ND
<b>June</b>	06/29/00	700,000	ND	ND	ND	ND	ND	ND
	06/21/00	682,220	ND	ND	ND	ND	ND	ND
	06/16/00	669,720	ND	ND	ND	ND	ND	ND
	06/10/00	651,200	ND	ND	ND	ND	ND	ND
<b>May</b>	05/31/00	629,000	ND	ND	ND	ND	ND	ND
	05/23/00	603,700	ND	ND	ND	ND	ND	ND
	05/18/00	570,000	ND	ND	ND	ND	ND	ND
	05/10/00	530,400	ND	ND	ND	ND	ND	ND
<b>April</b>	04/30/00	488,300	ND	ND	ND	ND	ND	ND
	04/18/00	485,300	ND	ND	ND	ND	ND	0.51
	04/10/00	440,200	ND	ND	ND	ND	ND	ND
	04/04/00	390,100	ND	ND	ND	ND	ND	ND
<b>March</b>	03/24/00	388,000	ND	ND	ND	ND	ND	ND
	03/17/00	357,100	ND	ND	ND	ND	ND	ND
	03/10/00	329,000	ND	ND	ND	ND	ND	ND
	03/03/00	300,000						
<b>February</b>	02/25/00	274,000	ND	ND	ND	ND	ND	ND
	02/18/00	233,000	ND	ND	ND	ND	ND	ND
	02/11/00	190,000	ND	ND	ND	ND	ND	ND
	02/04/00	160,800	ND	ND	ND	ND	ND	ND
<b>January</b>	01/28/00	130,600	ND	ND	ND	ND	ND	ND
	01/21/00	103,435	ND	ND	ND	ND	ND	ND
	01/14/00	83,500	185	ND	ND	ND	ND	ND
<b>1999</b>								
<b>December</b>	12/23/99	51,680	1486	NA	ND	ND	ND	ND
	12/23/99	51,680	ND	NA	ND	ND	ND	ND
	12/16/99	30,450	963	NA	ND	ND	ND	ND
	12/16/99	30,450	ND	NA	ND	ND	ND	ND
	12/09/99	9,000	230	ND	ND	ND	ND	ND

**Pumping began on December 6, 1999**

Notes:

<sup>1</sup> Effluent is equivalent to PSP#1.

<sup>2</sup> MTBE was detected using EPA Method 8260B.

ND, <: Not Detected above laboratory reporting limits.

NA: Not Analyzed

**Table 8**  
**Total Mass of Petroleum Hydrocarbons Removed by Vapor Extraction System**  
**3609 International Boulevard, Oakland, California**

Date	Time	PID (ppmv)		Flow Rate (cfm)	Time Elapsed (Hours)	Air Flow (Liters)	Mass Removed <sup>1</sup> (Pounds)
		Influent	Effluent				
7/24/00	5:00	394	0	85	0	0	0.00
7/25/00	5:15	38	2	95	24	3,914,096	1.01
7/26/00	5:05	207	1	80	48	3,228,121	4.52
7/27/00	9:00	160	5	92	64	2,500,944	2.71
7/28/00	4:30	141	7	87	96	4,656,139	4.44
7/29/00	1:30	225	8	85	117	3,032,734	4.62
7/30/00	9:00	226	12	85	136	2,816,110	4.31
7/31/00	3:00	141	5	85	166	4,332,478	4.13
8/1/00	5:00	135	4	80	192	3,533,942	3.23
8/2/00	4:00	80	4	80	215	3,126,180	1.69
8/3/00	5:00	60	5	85	240	3,610,398	1.47
8/4/00	3:00	57	4	85	262	3,177,150	1.23
8/5/00	2:00	97	8	87	285	3,399,721	2.23
8/6/00	12:00	114	8	80	307	2,990,259	2.31
8/7/00	12:00	93	9	85	331	3,465,982	2.18
8/8/00	4:30	152	10	85	360	4,115,854	4.23
8/10/00	10:00	173	1	85	377	2,527,279	2.96
8/11/00	7:00	78	4	70	410	3,924,715	2.07
8/12/00	9:00	100	6	70	424	1,665,031	1.13
8/13/00	5:00	107	9	70	456	3,805,784	2.75
8/14/00	12:30	122	5	70	476	2,319,150	1.91
8/15/00	6:00	103	12	70	505	3,508,457	2.44
8/16/00	12:30	112	0	70	524	2,200,219	1.67
8/18/00	9:00	90	0	75	568	5,670,449	3.45
8/21/00	12:00	74	5	80	643	10,194,065	5.10
8/24/00	12:00	68	13	80	712	9,378,540	4.31
8/27/00	12:30	68.5	2	80	785	9,854,263	4.57
8/31/00	1:30	52	6	80	882	13,184,324	4.64
9/4/00	12:30	54	5	80	977	12,912,482	4.72
9/7/00	12:00	55	3	80	1,048	9,718,342	3.62
9/11/00	4:30 <sup>2</sup>	141	0	80	1,149	13,660,047	13.03
9/14/00	9:30	56	5	80	1,214	8,834,856	3.35
9/18/00	2:00	46	9.5	80	1,314	13,660,047	4.25



**Table 8**  
**Total Mass of Petroleum Hydrocarbons Removed by Vapor Extraction System**  
**3609 International Boulevard, Oakland, California**

Date	Time	PID (ppmv)		Flow Rate (cfm)	Time Elapsed (Hours)	Air Flow (Liters)	Mass Removed <sup>1</sup> (Pounds)
		Influent	Effluent				
9/18/00	4:30 <sup>3</sup>	34	0	80	1,317	339,802	0.08
9/21/00	4:30	43	1	80	1,389	9,786,302	2.85
9/25/00	5:30	55	6	80	1,486	13,184,324	4.91
9/28/00	9:00	47.5	7.5	80	1,550	8,766,896	2.82
10/1/00	1:00	38.5	6	80	1,626	10,329,986	2.69
10/5/00	3:00 <sup>4</sup>	28.5	3	80	1,724	13,320,245	2.57
10/5/00	5:00	36	0	80	1,726	271,842	0.07
10/8/00	3:00	28.5	3	80	1,796	9,514,460	1.83
10/14/00	3:00	24.5	2.5	80	1,940	19,572,604	3.24
10/17/00	2:00	36.5	3.5	80	2,011	9,650,381	2.38
10/20/00	8:30	18.5	3.5	80	2,078	9,038,737	1.13
10/25/00	2:00	38	3.7	80	2,203	17,058,068	4.39
10/29/00	10:00	35	4	80	2,295	12,504,719	2.96
11/2/00	4:00	30.5	4	80	2,397	13,863,928	2.86
11/7/00	4:00	30	6	80	2,517	16,310,504	3.31
11/19/00	12:00	92.7	5.5	80	2,801	38,601,525	24.20
11/24/00	13:30	25	6.5	80	2,923	16,514,385	2.79
11/29/00	15:00	14.5	3.5	80	3,044	16,514,385	1.62
12/4/00	16:30	10.7	1	80	3,190	19,776,486	1.43
12/13/00	15:30	24	3	80	3,405	29,222,986	4.74
12/28/00	14:30	10	6	85	3,764	51,845,314	3.51
1/4/2001 <sup>5</sup>	14:00	8.7	3.7	85	3,907	20,723,684	1.22
8/8/01	15:00	217	0	85	3,907	0	0
9/6/01	12:00	85	0	85	4,048	20,362,644	11.71
9/13/01	16:00	186	8	85	4,220	24,839,538	31.26
9/18/01	15:00	184	9	85	4,344	17,907,574	22.29
9/21/2001 <sup>6</sup>		--	--	--	4,344	0	0
10/12/01 <sup>7</sup>		--	--	--	4,344	0	0
10/23/01	17:00	114	58	87	4,344	0	0
10/25/01 <sup>4</sup>	15:00	133	0	85	4,390	6,643,132	5.98
10/29/2001 <sup>8</sup>	13:20	569	0	85	4,485	13,647,304	52.53
11/7/01	15:30	177	0	87	4,679	28,675,904	34.34
11/16/01	15:00	117	0	87	4,894	31,853,904	25.21
11/21/01 <sup>9</sup>	12:00	85	72	87	5,011	17,294,231	9.94
2/15/02 <sup>10</sup>	16:30	49	0	80	5,011.5	67,960	0.02

**Table 8**  
**Total Mass of Petroleum Hydrocarbons Removed by Vapor Extraction System**  
**3609 International Boulevard, Oakland, California**

Date	Time	PID (ppmv)		Flow Rate (cfm)	Time Elapsed (Hours)	Air Flow (Liters)	Mass Removed <sup>1</sup> (Pounds)
		Influent	Effluent				
2/16/02	15:45	50	0	80	5,035	3,160,160	1.07
2/21/02	16:00	37	4	80	5,155	16,344,484	4.09
2/27/02	10:30	11	0	83	5,294	19,530,979	1.45
3/7/02 <sup>11</sup>	12:20	10		80	5,488	26,429,812	1.79
6/12/2002 <sup>12</sup>	16:15	53	2	75	NA	NA	NA
6/17/02	11:00	28	2	80	114.75	15,593,148	0.96
6/24/02	11:20	24	3.1	80	168.33	22,866,400	1.21
7/5/02	13:25	20	5	80	264.09	35,873,552	1.58
7/11/02	15:30	26	8.0	80	144.09	19,572,752	1.12
7/23/02	10:10	28	7.5	83	287.78	40,557,673	2.50
8/9/02	12:20	7.5	0	80	408.09	55,434,983	0.91
8/15/2002 <sup>11</sup>	15:00	7.0	1	80	144.11	19,575,902	0.30
8/23/2002 <sup>13</sup>	15:20	NA	NA	NA	NA	NA	NA
8/26/02	11:15	14.0	2.0	80	71.83	9,757,387	0.30
<b>Total Mass of Petroleum Hydrocarbons Removed =</b>							<b>398.43</b>
<b>Average Daily Removal Rate (pounds / day)=</b>							<b>0.52</b>

Notes:

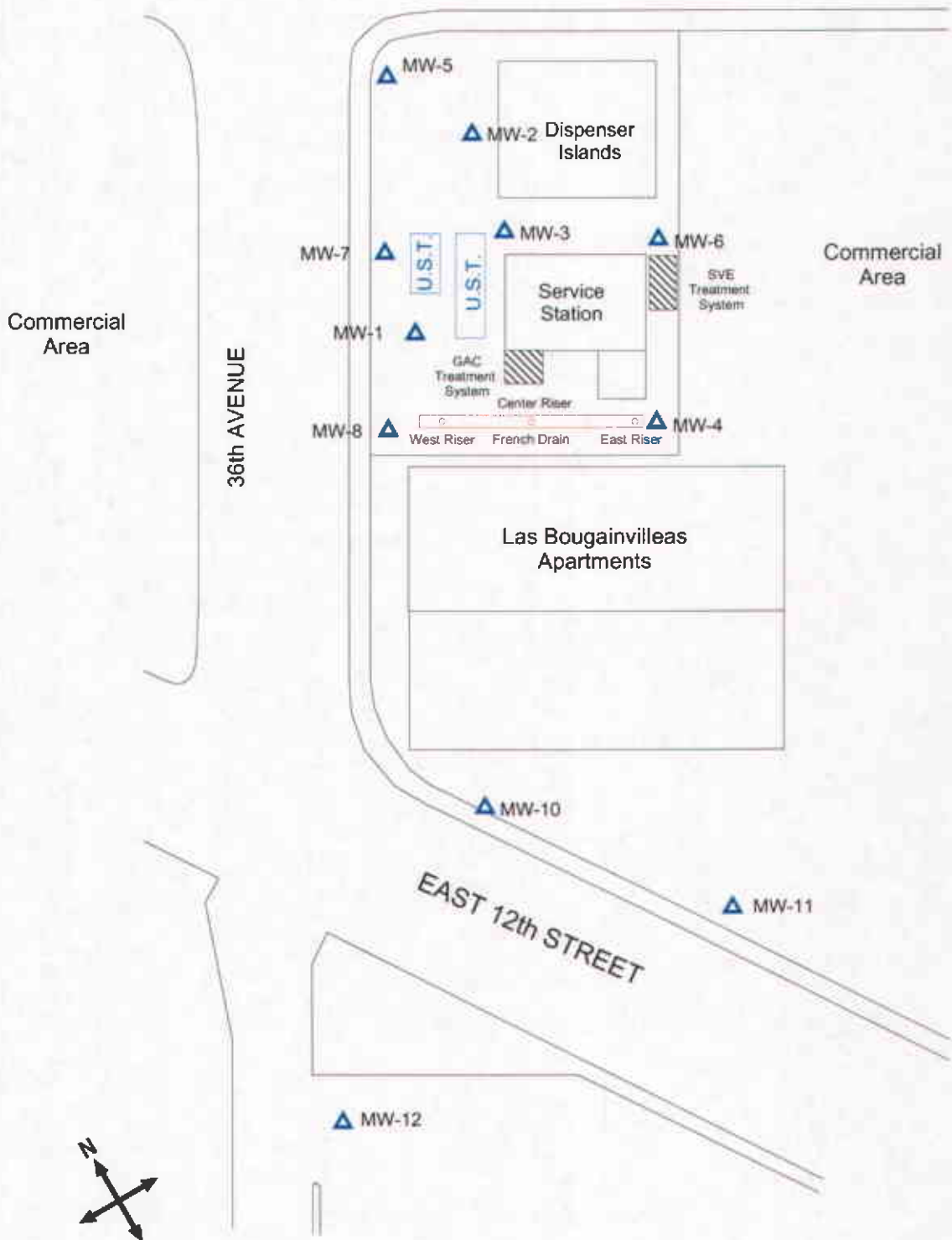
- <sup>1</sup> The representative molecular weight of hydrocarbons was assumed to be 78 gram/mole and used the measured temperature of Vapor (36 °C) in converting ppm-v to ppm on mass basis.
- <sup>2</sup> System accidentally shut down from main box, readings taken 30 minutes after startup.
- <sup>3</sup> GAC Replaced
- <sup>4</sup> GAC-1 removed, new GAC installed at effluent end
- <sup>5</sup> SVE System turned off for rainy season due to low influent concentrations
- <sup>6</sup> system down, hoses disconnected and GAC moved for replacement
- <sup>7</sup> system down for electrical repair
- <sup>8</sup> Carbon change-out of three drums, moved new effluent drum on 10/25/01 to GAC-1
- <sup>9</sup> system shut-down due to high effluent value
- <sup>10</sup> System re-started (since November 21, 2001), installed new 4-55 gallon vapor phase carbon vessels repaired blower
- <sup>11</sup> System was shut-down due to low influent reading
- <sup>12</sup> System was restarted on 6/12/02
- <sup>13</sup> System was re-started but no readings were taken

# FIGURES



Figure 1: Site vicinity map.

INTERNATIONAL BLVD



36th AVENUE

Commercial Area

Commercial Area

Las Bougainvilleas Apartments

EAST 12th STREET

scale in feet

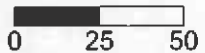


Figure 2: Site map showing location of groundwater monitoring wells and french drain.

INTERNATIONAL BLVD

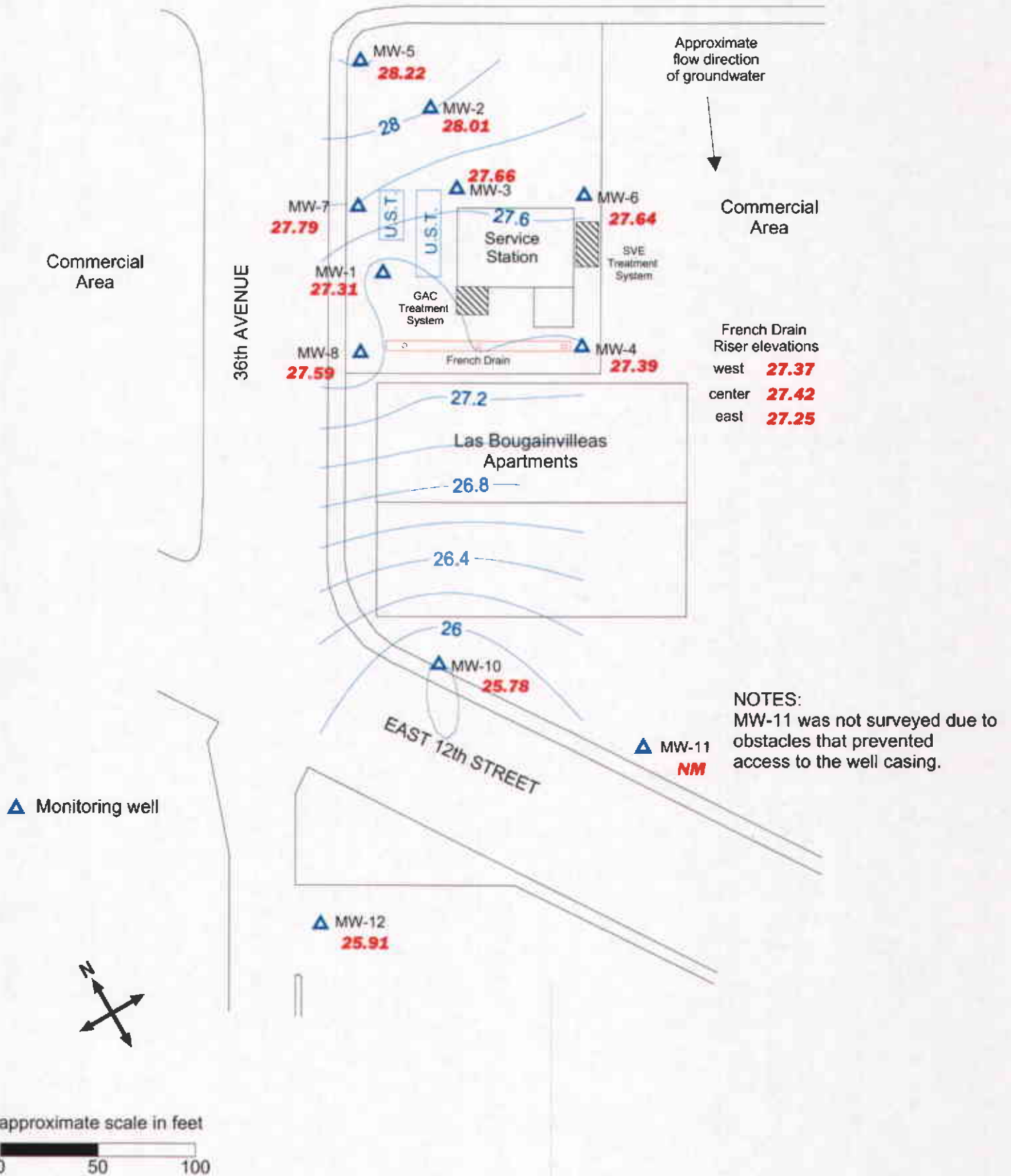


Figure 3: Groundwater elevation contour map in feet, July 30, 2002.

INTERNATIONAL BLVD

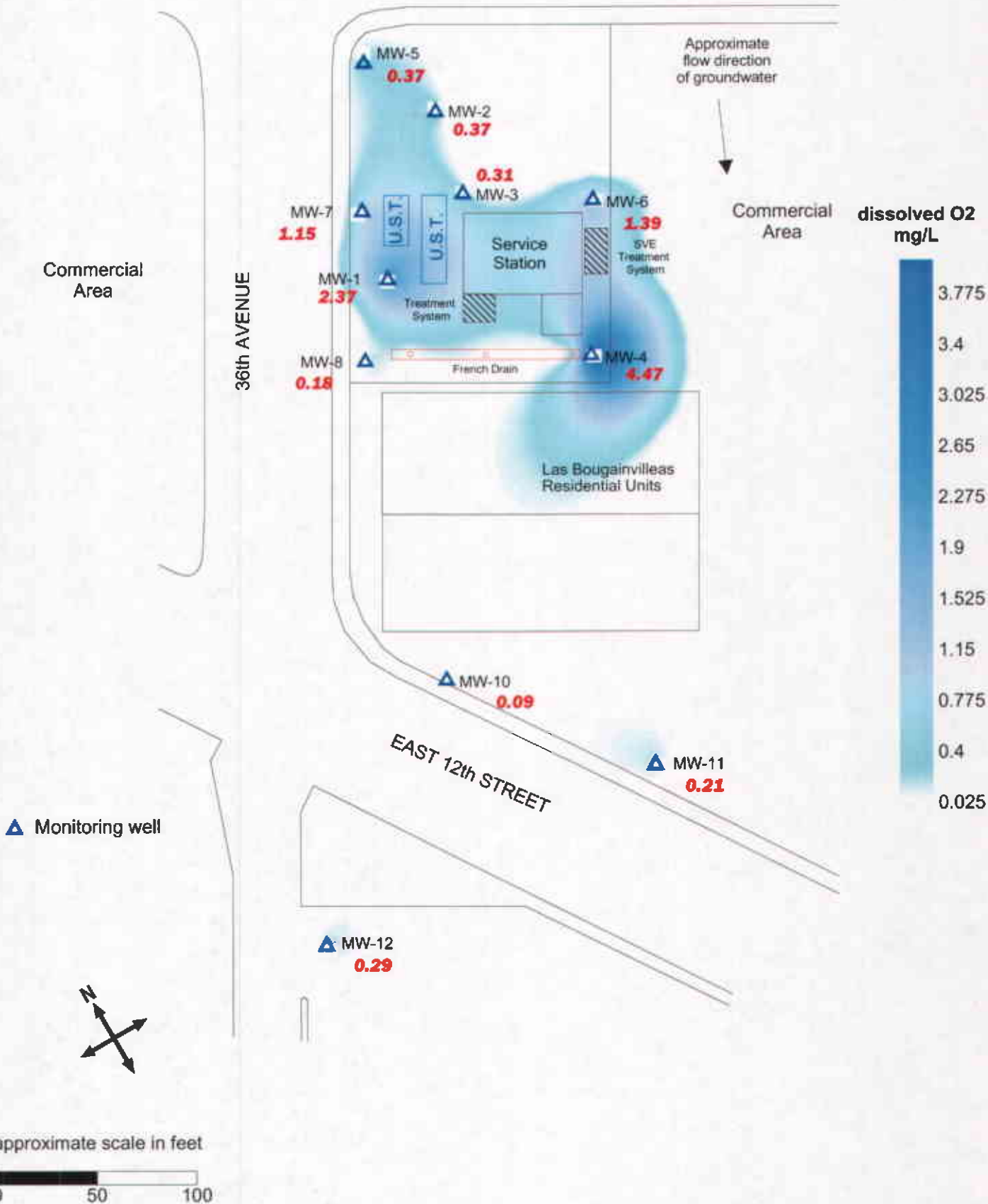


Figure 4: Contour map of Dissolved Oxygen concentrations in groundwater. July 30, 2002.

INTERNATIONAL BLVD

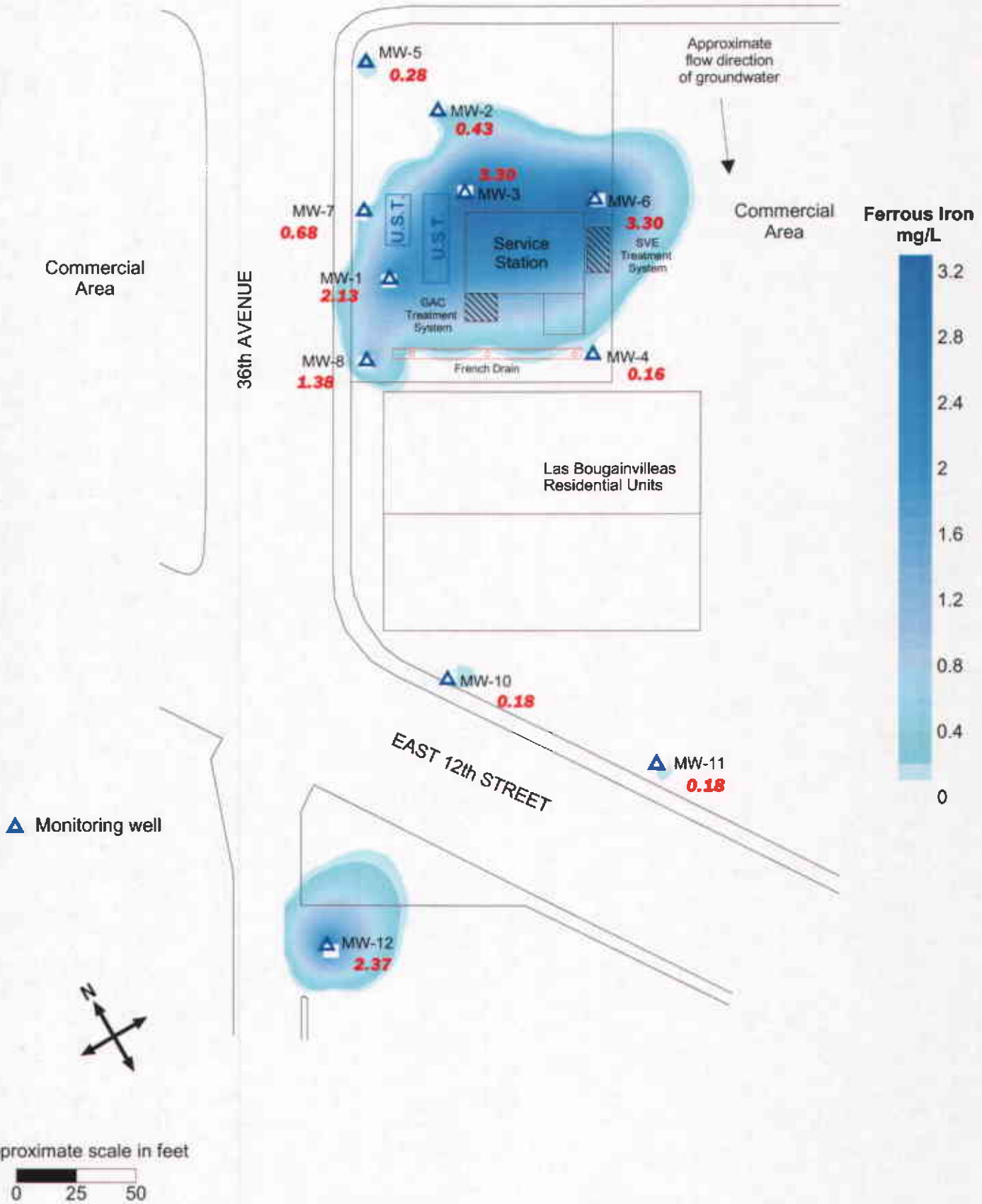


Figure 5: Contour map of Ferrous Iron concentrations in groundwater. July 30, 2002.



INTERNATIONAL BLVD

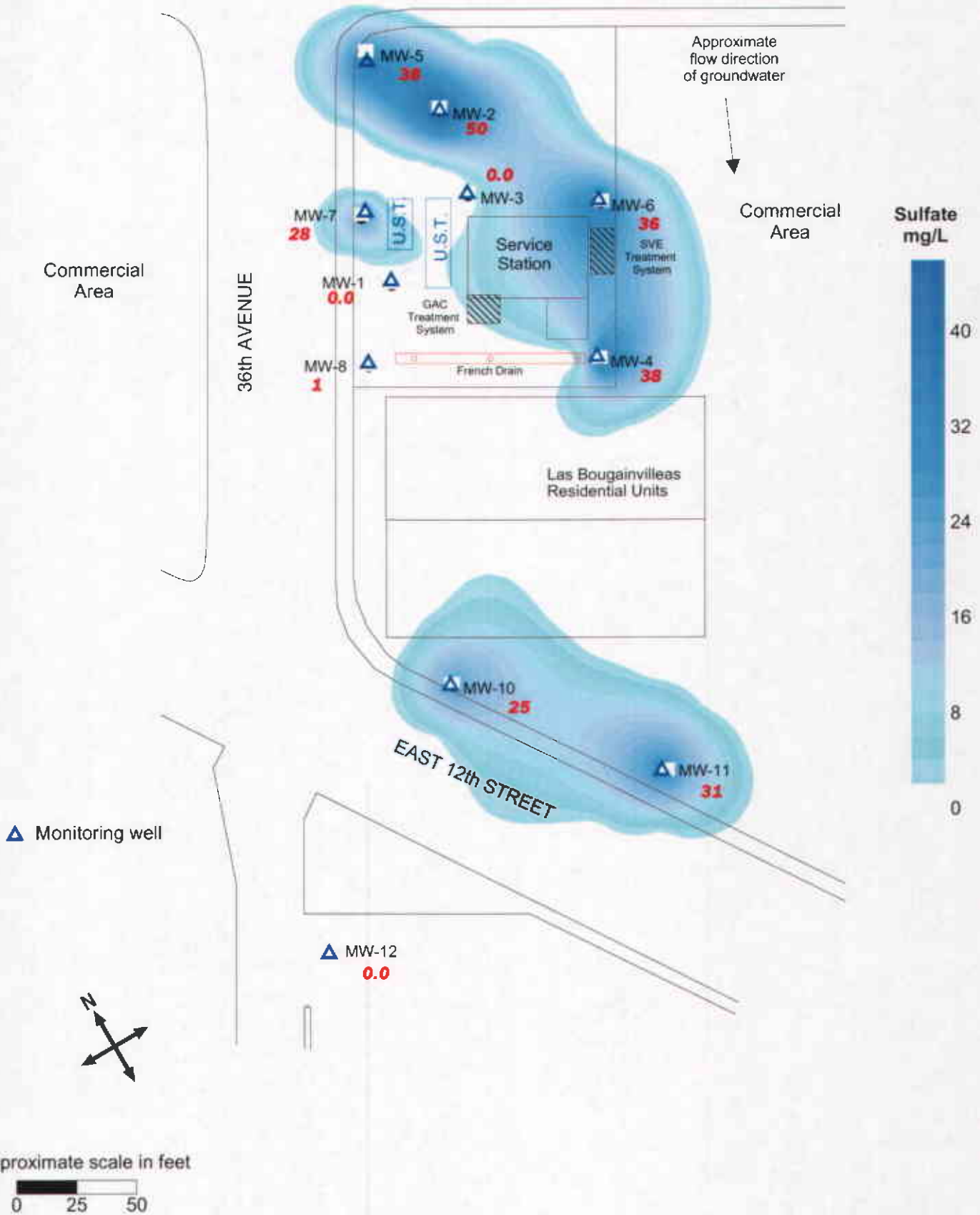


Figure 6: Contour map of Sulfate concentrations in groundwater.  
July 30, 2002.

INTERNATIONAL BLVD

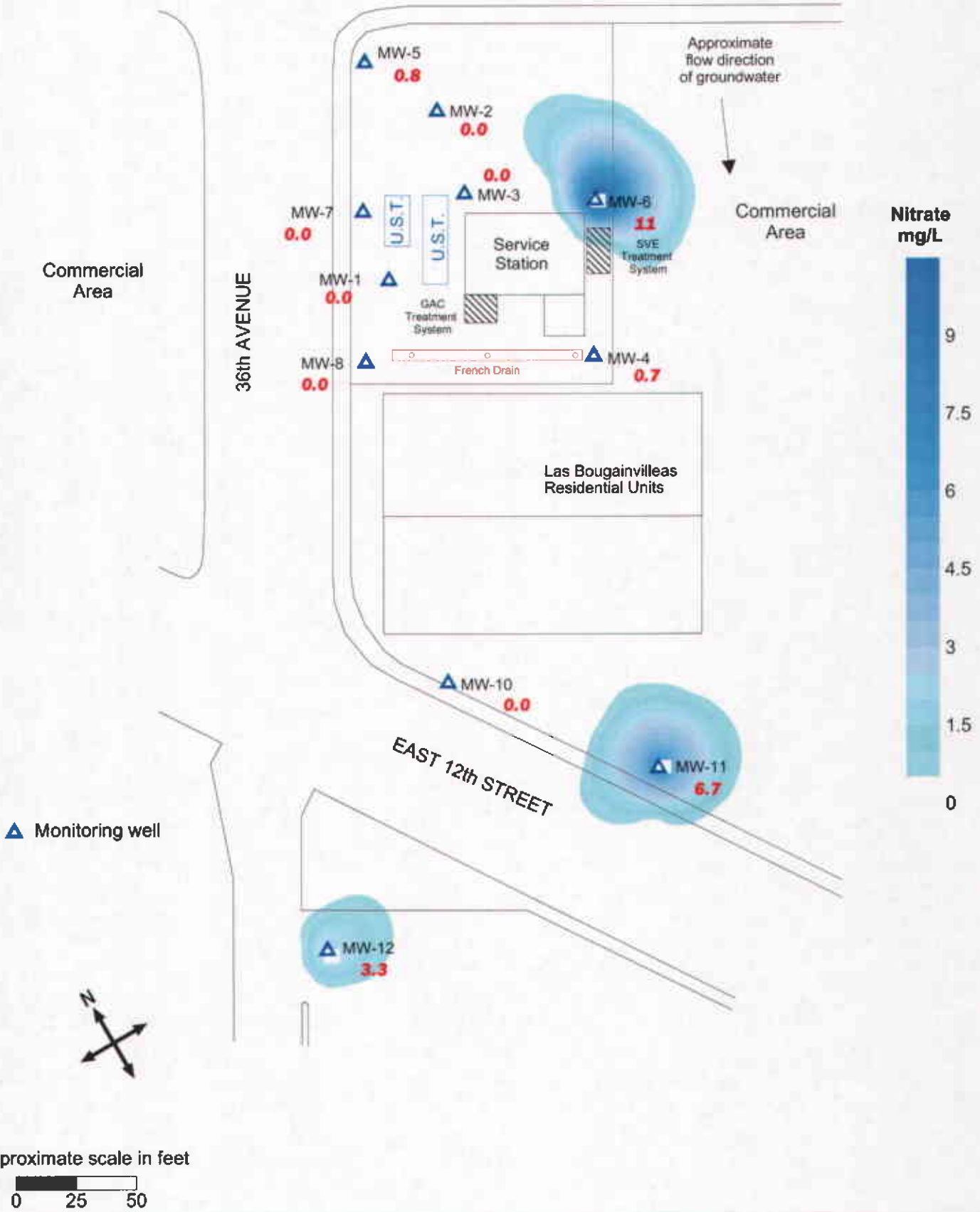


Figure 7: Contour map of Nitrate concentrations in groundwater.  
July 30, 2002.

INTERNATIONAL BLVD

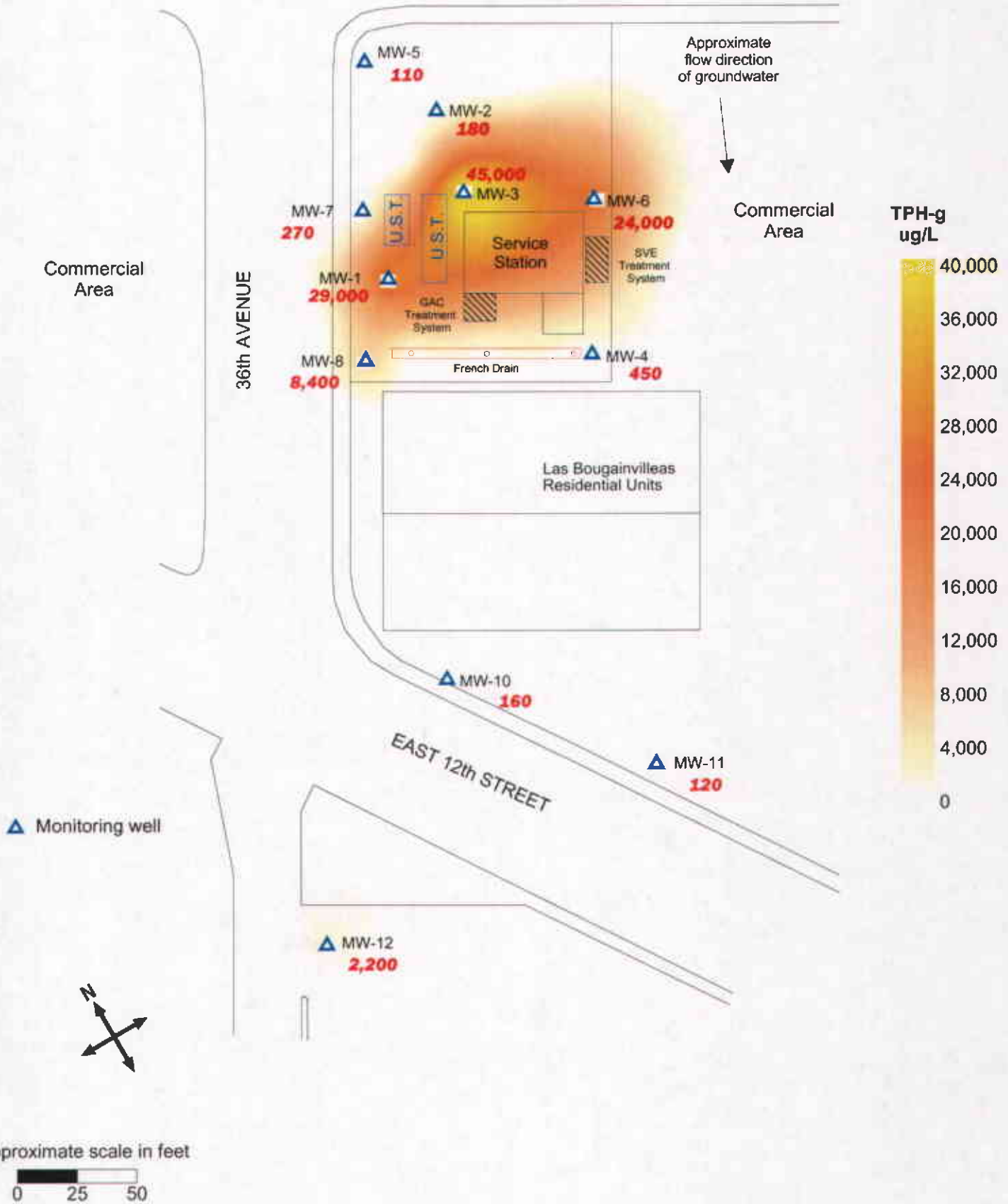


Figure 8: Contour map of TPH-g concentrations in groundwater.  
July 30, 2002.

INTERNATIONAL BLVD

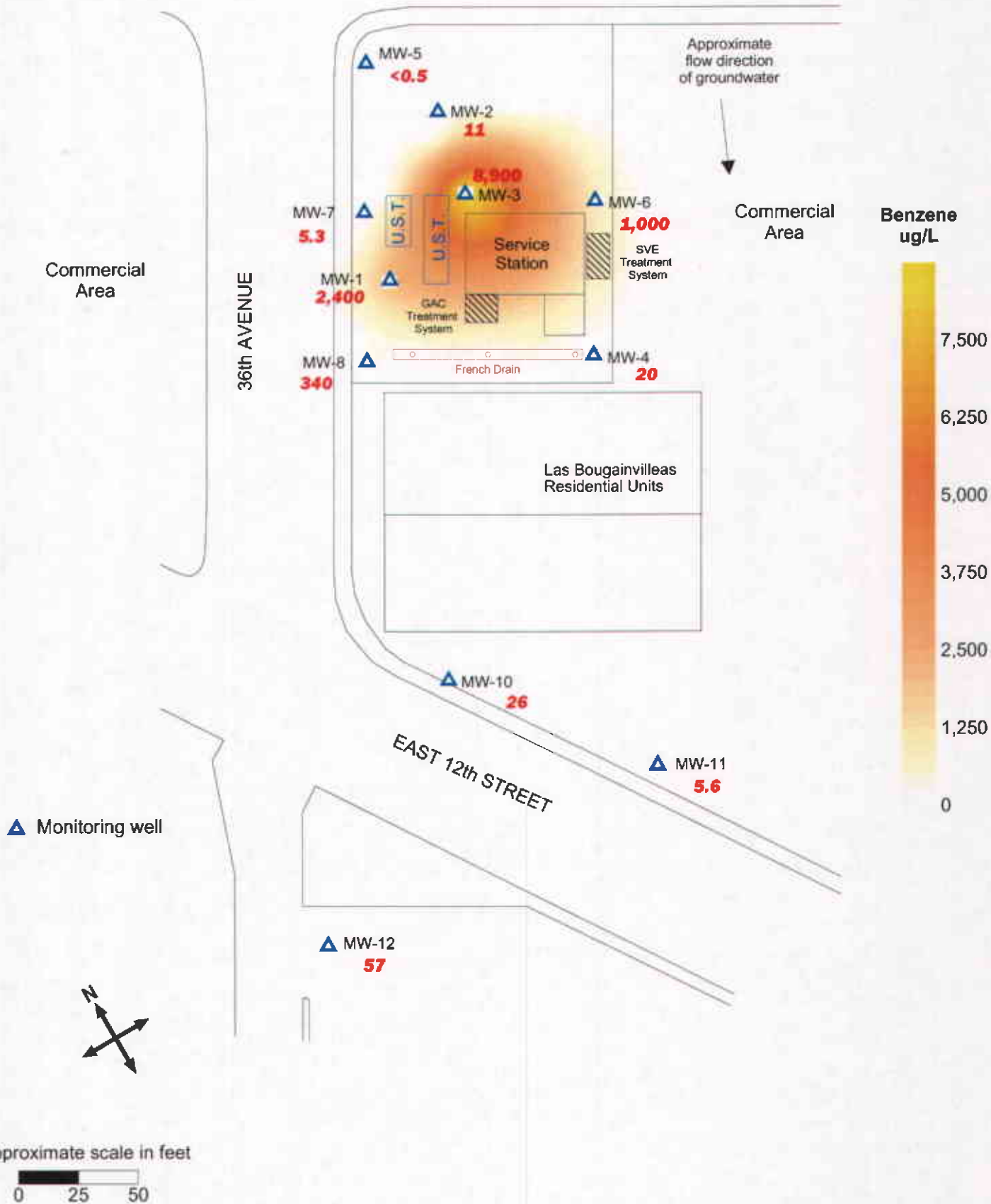


Figure 9: Contour map of Benzene concentrations in groundwater.  
July 30, 2002.

INTERNATIONAL BLVD

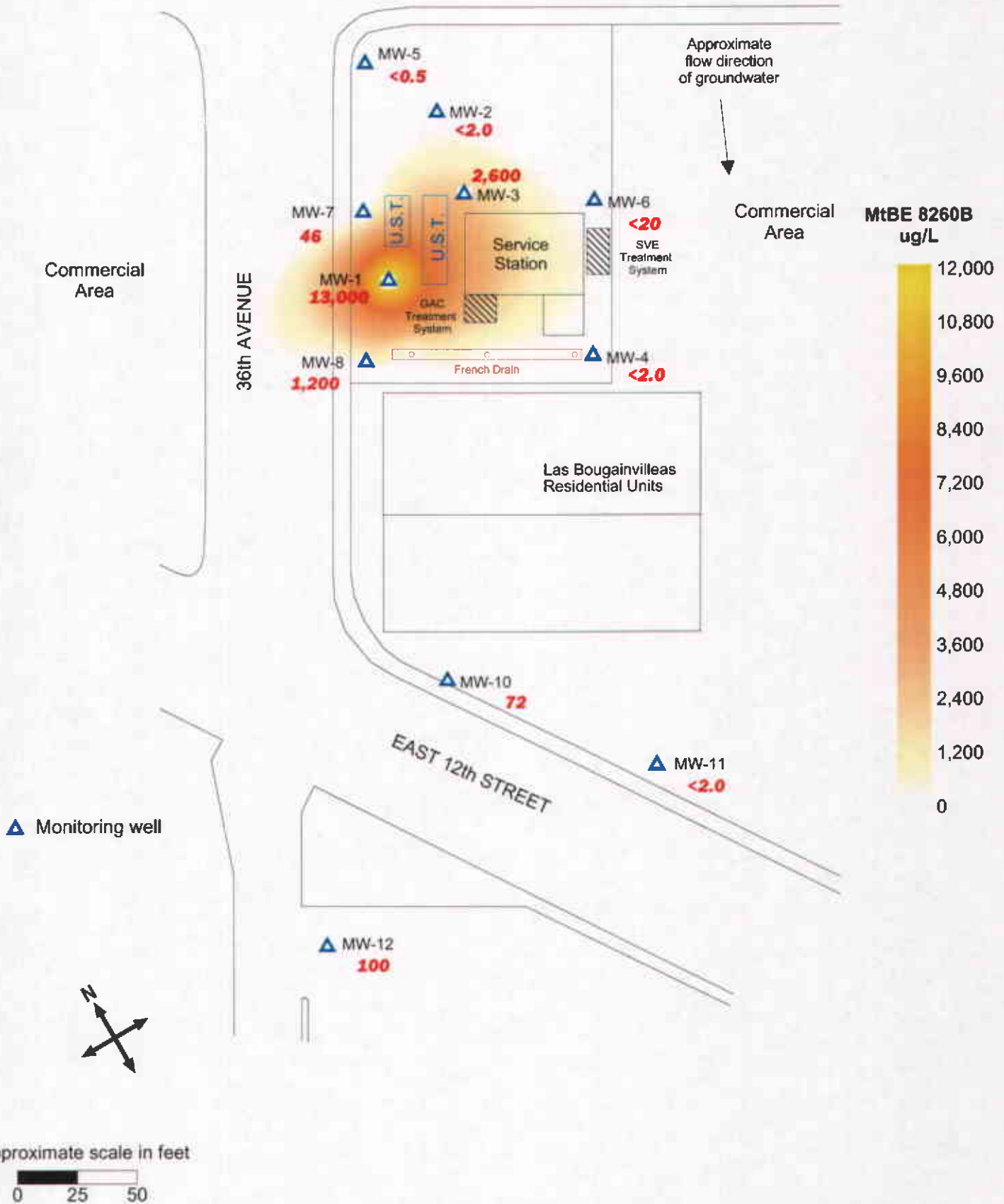


Figure 10: Contour map of MtBE concentrations in groundwater (8260B).  
July 30, 2002.

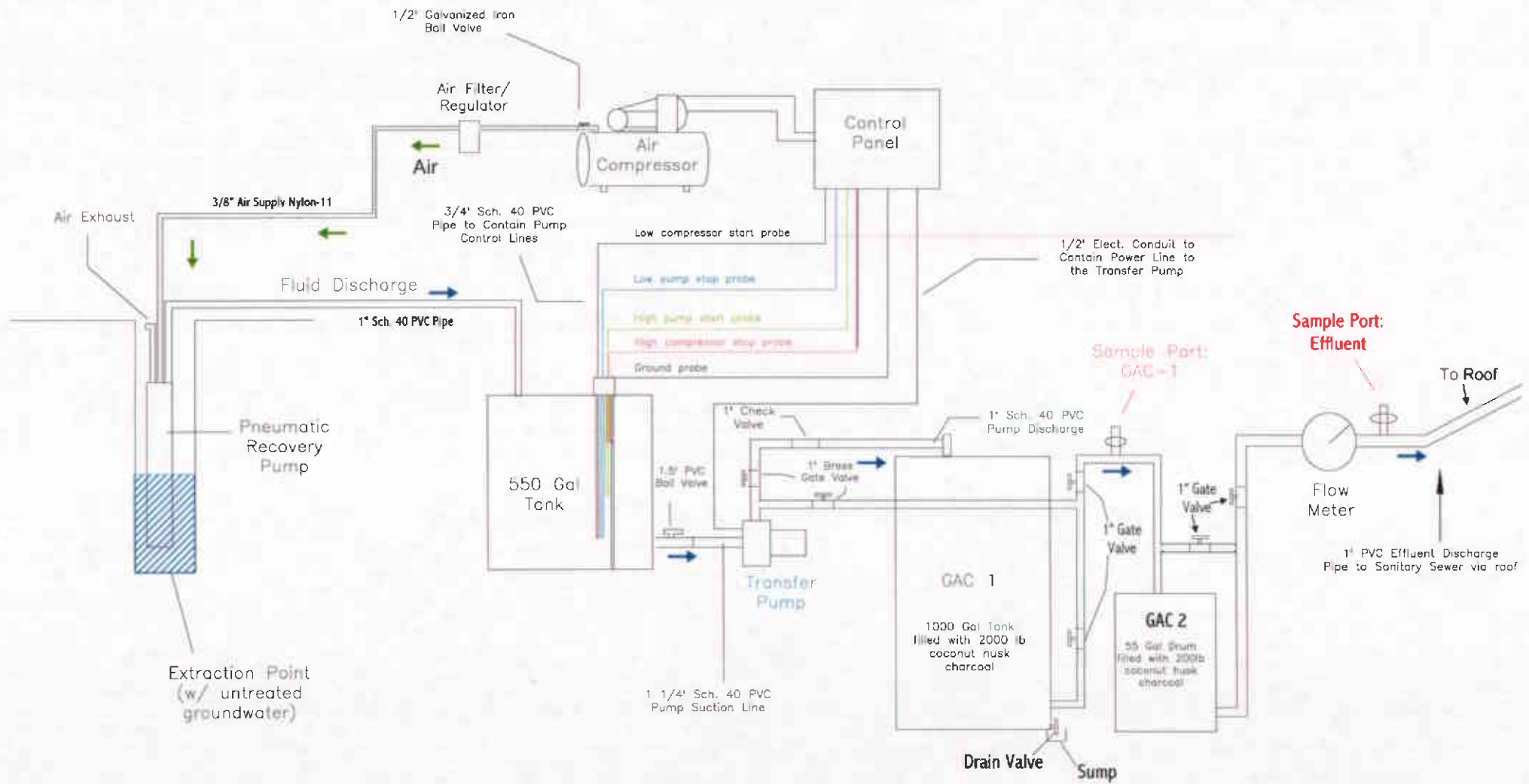
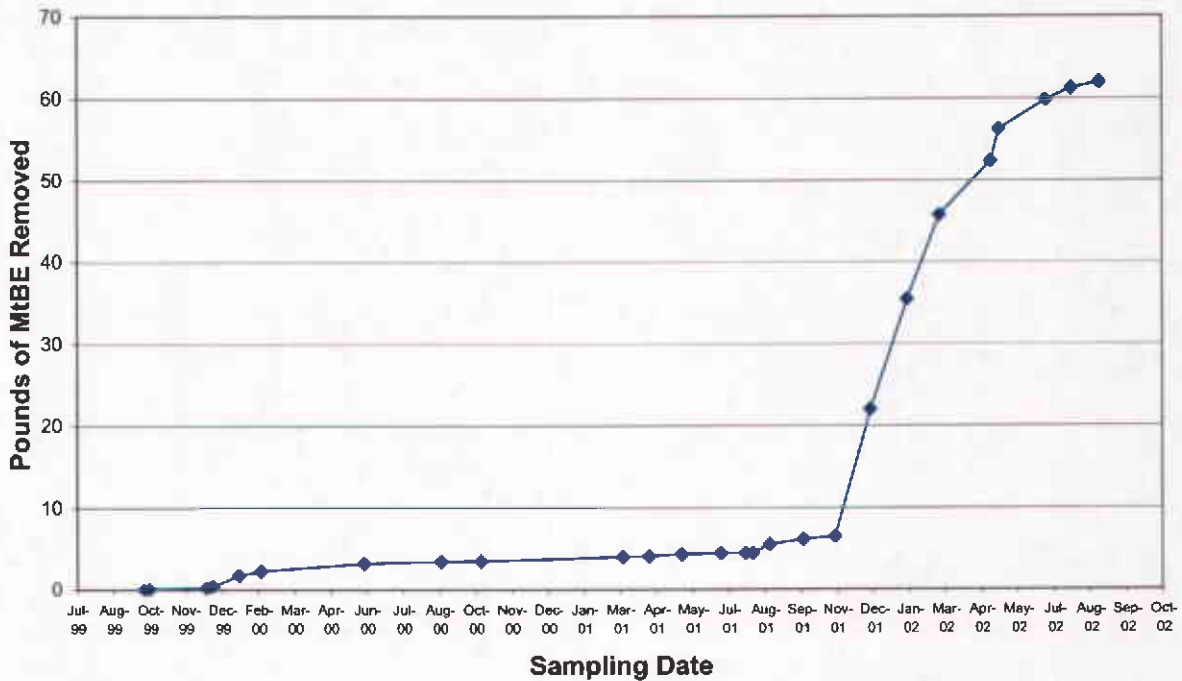
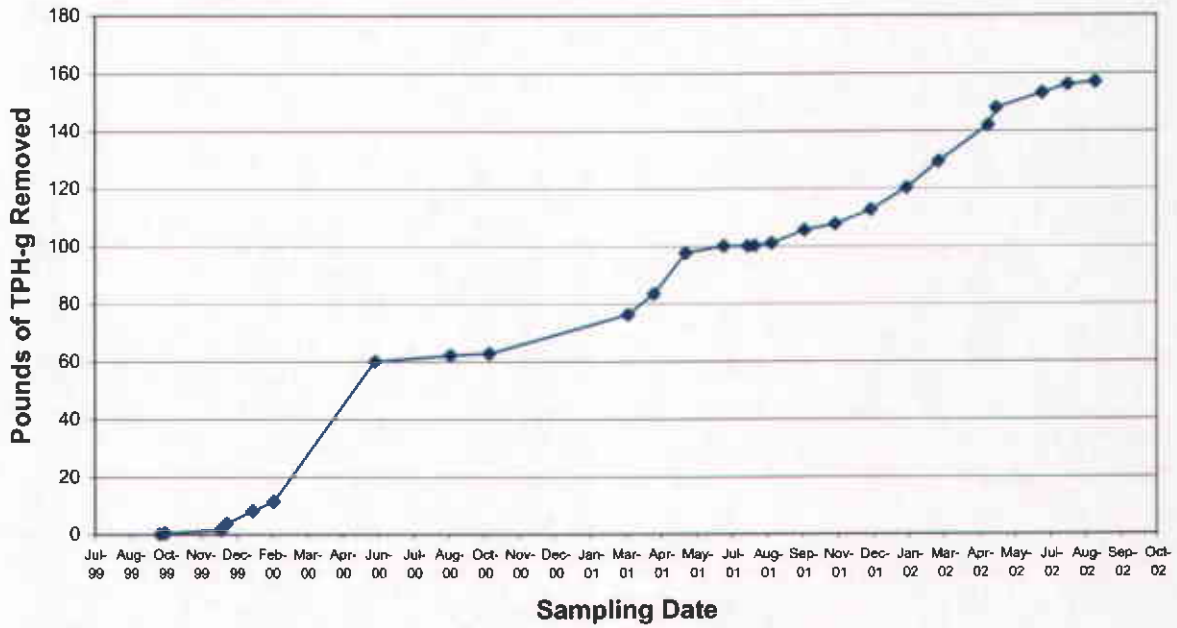


Figure 11: Schematic Diagram of the Groundwater Remediation System.

**Figure 12**  
**Cumulative Weight of TPH-g and MtBE Extracted from Groundwater**  
**Since Installation of the Treatment System**  
**3609 International Boulevard, Oakland, California**



# APPENDIX A

Table of elevations & coordinates on monitoring wells  
measured by Kier Wright Civil Engineers Surveyors, Inc.,  
and  
field measurements of physical, chemical, and  
biodegradation parameters of groundwater samples



**TABLE OF ELEVATIONS & COORDINATES  
 ON MONITORING WELLS**  
 SOMA ENVIRONMENTAL  
 Oakland-E. 14 the St. "International Blvd"

WELL NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
FD-C	2109299.85	6064039.85	39.35 40.25	Notch on north side of PVC Punch north rim of box
FD-E	2109281.13	6064067.87	40.06 40.55	Notch on north side of PVC Punch north rim of box
FD-W	2109314.99	6064017.59	39.16 39.95	Notch on north side of PVC Punch north rim of box
MW-1	2109338.74	6064025.97	40.11 40.76	Notch on north side of PVC Punch north rim of box
MW-2	2109383.20	6064073.06	40.71 41.61	Notch on north side of PVC Punch north rim of box
MW-3	2109351.11	6064064.63	40.91 41.68	Notch on north side of PVC Punch north rim of box
MW-4	2109278.18	6064076.40	40.01 40.67	Notch on north side of PVC Punch north rim of box
MW-5	2109410.84	6064058.46	41.16 41.60	Notch on south side of PVC Punch south rim of box
MW-6	2109320.46	6064105.06	40.92 41.52	Notch on north side of PVC Punch north rim of box
MW-7	2109368.19	6064025.54	39.94 40.54	Notch on north side of PVC Punch north rim of box
MW-8	2109321.68	6064000.46	39.38 39.72	Notch on north side of PVC Punch north rim of box

**TABLE OF ELEVATIONS & COORDINATES  
ON MONITORING WELLS**

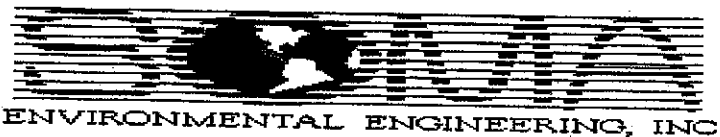
SOMA ENVIRONMENTAL  
Oakland-E. 14 the St. "International Blvd"

WELL NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
MW-10	2109193.97	6063957.39	36.71 37.70	Notch on north side of PVC Punch north rim of box
MW-11	2109125.26	6064007.52	XXXX	NO ELEVATION , BOAT ON TOP
MW-12	2109121.85	6063865.00	36.84 36.87	Notch on north side of PVC

Bench mark: NGS Bench mark No.M 554. To reach the station from the intersection of Interstate Highway 880 and Hegenberger Rd in South Oakland go northeast on Hegenberger Rd for 0.5 MI to a side road right Baldwin St. Turn right and go south on Baldwin St for 0.35 MI to a T-intersection, 85th Ave. for 0.1 MI to a side road right, Railroad Ave. Turn right and go south on Railroad Ave. for 0.1 MI to the station on the left, east, side of the road in a large concrete headwall for a culvert.

Elevation = 14.20 NAVD88 Datum

Coordinate values are based on the California Coordinate System, Zone III NAD 83 Datum.



Well No.: MW-1 Project No.: 2331  
 Casing Diameter: 2 inches Address: 3609 International Blvd.  
 Depth of Well: 30.5 feet Oakland, CA  
 Top of Casing Elevation: 97.99 feet  
 Depth to Groundwater: 12.80 feet Date: July 30, 2002  
 Groundwater Elevation: 85.19 feet Sampler: Roger Pappler  
 Water Column Height: 17.7 feet  $\times 0.17 = 3.0g/wcv$  Tony Perini  
 Purged Volume: 8.5 gallons  $9.0g = 3wcv$

Purging Method: Bailer  Pump

Sampling Method: Bailer  Pump

Color: Yes  No  Describe: cloudy

Sheen: Yes  No  Describe: Slight

Odor: Yes  No  Describe: Petroleum Hydrocarbon

Field Measurements:

Time	Vol (gallons)	pH	Temp (°C)	E.C. (µS/cm)	D.O. (mg/L)	Turbidity (NTU)	ORP (mV)	Fe <sup>+2</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	NO <sub>3</sub> <sup>-1</sup> (mg/L)
5:07 PM	0.5	7.21	22.23	0.890	8.07	179	19			
5:09 PM	2.5	6.96	20.98	0.909	2.01	101	-72			
5:12 PM	5.5	6.95	20.61	0.927	8.32	33	-89			
5:14 PM	8.5	6.93	19.93	0.984	8.86	24.8	-102			
5:30p Sampled → 3 Vol										

(notes: after taking pump from MW-1, and with water stabilized D.O. was 2.37 mg/L)

\* LLD flushed "LIMIT"



ENVIRONMENTAL ENGINEERING, INC

Well No.: MW-2 Project No.: 2331  
 Casing Diameter: 4 inches Address: 3609 International Blvd.  
 Depth of Well: 31.5 feet Oakland, CA  
 Top of Casing Elevation: 98.58 feet  
 Depth to Groundwater: 12.70 feet Date: July 30, 2002  
 Groundwater Elevation: 85.88 feet Sampler: Roger Pappler  
 Water Column Height: 12.8 feet  $\times 0.166 = 2.11$  gal/mov Tony Perini  
 Purged Volume: 21 gallons  $37.3$  gal  $\approx 3$  mov

Purging Method: Bailer  Pump

Sampling Method: Bailer  Pump

Color: Yes  No  Describe: \_\_\_\_\_

Sheen: Yes  No  Describe: \_\_\_\_\_

Odor: Yes  No  Describe: \_\_\_\_\_

Field Measurements:

Time	Vol (gallons)	pH	Temp (°C)	E.C. (µS/cm)	D.O. (mg/L)	Turbidity (NTU)	ORP (mV)	Fe <sup>+2</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	NO <sub>3</sub> <sup>-1</sup> (mg/L)
3:23 PM	16	7.36	20.17	0.881	0.23	101	78			
3:26 PM	56	6.95	20.11	0.880	0.21	44.2	73			
3:30 PM	11	6.92	20.25	0.889	0.74	39.6	80			
3:36 PM	18	6.89	20.23	0.883	0.39	79.1	104			
3:38 PM	21	6.88	20.19	0.881	0.37	111	57			
4 <sup>00</sup> P sampled → 3 VOAs								0.43	50	0



ENVIRONMENTAL ENGINEERING, INC

Well No.: MW-3 Project No.: 2331  
 Casing Diameter: 4 inches Address: 3609 International Blvd.  
 Depth of Well: 32 feet Oakland, CA  
 Top of Casing Elevation: 97.78 feet  
 Depth to Groundwater: 13.25 feet Date: July 30, 2002  
 Groundwater Elevation: 84.53 feet Sampler: Roger Pappler  
 Water Column Height: 18.75 feet  $\times 0.66 = 12.4$  Tony Perini  
 Purged Volume: 25 gallons  $27g = 3 WCV$

Purging Method: Bailer  Pump

Sampling Method: Bailer  Pump

Color: Yes  No  Describe: light black

Sheen: Yes  No  Describe: \_\_\_\_\_

Odor: Yes  No  Describe: slight petro

Field Measurements:

Time	Vol (gallons)	pH	Temp (°C)	E.C. (µS/cm)	D.O. (mg/L)	Turbidity (NTU)	ORP (mV)	Fe <sup>+2</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	NO <sub>3</sub> <sup>-1</sup> (mg/L)
1:41 PM	1.0	6.92	20.01	1.22	0.23	114	-123			
1:44 PM	4.0	6.79	19.96	1.22	0.17	30.9	-137			
1:48 PM	9.0	6.72	20.05	1.23	0.18	44.0	-141			
1:53 PM	15	6.69	19.98	1.28	0.18	111	-139			
1:58 PM	22	6.68	19.96	1.27	0.27	51.7	-129			
2 PM	25	6.68	19.97	1.25	0.31	40.1	-125			
2 <sup>75</sup> PM Sampled → 3 WCV								3.30	0*	0.0

\* LCD Rashed "LIMIT"



ENVIRONMENTAL ENGINEERING, INC

Well No.: MW-4 Project No.: 2331  
 Casing Diameter: 2 inches Address: 3609 International Blvd.  
 Depth of Well: 26.5 feet Oakland, CA  
 Top of Casing Elevation: 97.85 feet  
 Depth to Groundwater: 12.02 feet Date: July 30, 2002  
 Groundwater Elevation: 85.23 feet Sampler: Roger Pappler  
 Water Column Height: 13.88 feet x 0.17 = 2.36 gal / well Tony Perini  
 Purged Volume: 7.5 gallons 7.5 gal = 3 well

Purging Method: Bailer  Pump   
 Sampling Method: Bailer  Pump   
 Color: Yes  No  Describe: light black  
 Sheen: Yes  No  Describe: \_\_\_\_\_  
 Odor: Yes  No  Describe: slight petro

Field Measurements:

Time	Vol (gallons)	pH	Temp (°C)	E.C. (µS/cm)	D.O. (mg/L)	Turbidity (NTU)	ORP (mV)	Fe <sup>+2</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	NO <sub>3</sub> <sup>-1</sup> (mg/L)
6:06 PM	0.5	6.60	18.88	0.812	7.81	99	58			
6:08 PM	2.5	6.69	18.93	0.832	8.12	18.3	41			
6:10 PM	5	6.86	18.99	0.828	7.32	72.6	-6			
6:13 PM	7.5	6.79	18.85	0.834	8.52	6.3	-34			
6:30 PM sampled → 3 vol								0.16	38	0.7

notes: after pulling pump from mw-4, and stabilizing the water in the well D.O. was 4.47



ENVIRONMENTAL ENGINEERING, INC

Well No.: MW-5 Project No.: 2331  
 Casing Diameter: 2 inches Address: 3609 International Blvd.  
 Depth of Well: 26.5 feet Oakland, CA  
 Top of Casing Elevation: 99.04 feet  
 Depth to Groundwater: 12.94 feet Date: July 30, 2002  
 Groundwater Elevation: 86.10 feet Sampler: Roger Pappler  
 Water Column Height: 13.54 feet  $\times 0.17 = 2.30$  gal  $\checkmark$  Tony Perini  
 Purged Volume: 8.5 gallons  $6.9$  gal  $= 3$  vol  $\checkmark$

Purging Method: Bailer  Pump   
 Sampling Method: Bailer  Pump   
 Color: Yes  No  Describe: \_\_\_\_\_  
 Sheen: Yes  No  Describe: \_\_\_\_\_  
 Odor: Yes  No  Describe: \_\_\_\_\_

Field Measurements:

Time	Vol (gallons)	pH	Temp (°C)	E.C. (µS/cm)	D.O. (mg/L)	Turbidity (NTU)	ORP (mV)	Fe <sup>+2</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	NO <sub>3</sub> <sup>-1</sup> (mg/L)
12:35 PM	1.0	8.87	20.64	0.92	6.69	254	210			
12:38 PM	3.0	7.04	20.61	0.92	6.69	49.8	30			
12:40 PM	6.0	6.98	20.36	0.94	0.80	18.2	-28			
12:43 PM	8.5	6.93	20.30	0.92	0.37	22.5	-43			
10950P sampled → 3 vol								0.28	38	0.8

notes: D.O. meter stuck initially at 6.69, reset meter



ENVIRONMENTAL ENGINEERING, INC

Well No.: MW-6 Project No.: 2331  
 Casing Diameter: 2 inches Address: 3609 International Blvd.  
 Depth of Well: 25 feet Oakland, CA  
 Top of Casing Elevation: 98.77 feet  
 Depth to Groundwater: 13.28 feet Date: July 30, 2002  
 Groundwater Elevation: 85.49 feet Sampler: Roger Pappler  
 Water Column Height: 11.72 feet  $\times 0.17 = 1.99$  gal/wal Tony Perini  
 Purged Volume: 7.0 gallons  $\times 0.17 = 1.19$  gal/wal

Purging Method: Bailer  Pump   
 Sampling Method: Bailer  Pump

Color: Yes  No  Describe: light black  
 Sheen: Yes  No  Describe: \_\_\_\_\_  
 Odor: Yes  No  Describe: slight petro

Field Measurements:

Time	Vol (gallons)	pH	Temp (°C)	E.C. (µS/cm)	D.O. (mg/L)	Turbidity (NTU)	ORP (mV)	Fe <sup>+2</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	NO <sub>3</sub> <sup>-1</sup> (mg/L)
1:06 PM	1.5	7.0	19.37	1.110	2.21	820	-106			
1:09 PM	3.0	6.81	19.31	0.970	2.01	313	-106			
1:11 PM	5.0	6.91	19.47	0.908	0.86	205	-56			
1:13 PM	7.0	6.83	19.46	0.926	1.39	127	-58			
3:20 PM sampled → 3 VOL								33°	26	11.0





Well No.: MW-7 Project No.: 2331  
 Casing Diameter: 2 inches Address: 3609 International Blvd.  
 Depth of Well: 26.1 feet Oakland, CA  
 Top of Casing Elevation: 97.83 feet  
 Depth to Groundwater: 13.15 feet Date: July 30, 2002  
 Groundwater Elevation: 85.68 feet Sampler: Roger Pappler  
 Water Column Height: 13.95 feet Tony Perini  
 Purged Volume: 11 gallons

Purging Method: Bailer  Pump

Sampling Method: Bailer  Pump

Color: Yes  No  Describe: cloudy

Sheen: Yes  No  Describe: \_\_\_\_\_

Odor: Yes  No  Describe: \_\_\_\_\_

Field Measurements:

Time	Vol (gallons)	pH	Temp (°C)	E.C. (µS/cm)	D.O. (mg/L)	Turbidity (NTU)	ORP (mV)	Fe <sup>+2</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	NO <sub>3</sub> <sup>-1</sup> (mg/L)
4:29 PM	1.0	7.69	20.76	0.577	0.47	161	-62			
4:31 PM	2.5	7.23	20.80	0.626	5.98	77.9	-57			
4:34 PM	5.5	7.16	20.95	0.771	0.47	76.8	-65			
4:36 PM	7.0	7.10	20.57	0.773	1.00	31.5	-79			
4:39 PM	11	7.12	20.62	0.757	1.15	16.6	-64			
2 <sup>nd</sup> P sample → 3 <sup>rd</sup> cap								0.68	28	0.8



ENVIRONMENTAL ENGINEERING, INC

Well No.: MW-8 Project No.: 2331  
 Casing Diameter: 2 inches Address: 3609 International Blvd.  
 Depth of Well: 27 feet Oakland, CA  
 Top of Casing Elevation: 97.25 feet  
 Depth to Groundwater: 11.79 feet Date: July 30, 2002  
 Groundwater Elevation: 85.46 feet Sampler: Roger Pappler  
 Water Column Height: 15.21 feet x 0.17 = 2.6 gal/well Tony Perini  
 Purged Volume: 2.0 gallons 7.75 gal = 3 well

Purging Method: Bailer  Pump   
 Sampling Method: Bailer  Pump   
 Color: Yes  No  Describe: slight black  
 Sheen: Yes  No  Describe: slight  
 Odor: Yes  No  Describe: petro odor

Field Measurements:

Time	Vol (gallons)	pH	Temp (°C)	E.C. (µS/cm)	D.O. (mg/L)	Turbidity (NTU)	ORP (mV)	Fe <sup>2+</sup> (mg/L)	SO <sub>4</sub> <sup>2-</sup> (mg/L)	NO <sub>3</sub> <sup>-1</sup> (mg/L)
5:39 PM	0.5	9.03	19.56	0.932	0.18	157	-124			
5:40 PM	2.0									
10 <sup>15</sup> sampled → 3 VORD								1.38	1	0.0

AR/ED





ENVIRONMENTAL ENGINEERING, INC

Well No.: MW-11 Project No.: 2331  
 Casing Diameter: 2 inches Address: 3609 International Blvd.  
 Depth of Well: 25.50 feet Oakland, CA  
 Top of Casing Elevation: 95.94 feet  
 Depth to Groundwater: 12.39 feet Date: July 30, 2002  
 Groundwater Elevation: 83.55 feet Sampler: Roger Pappler  
 Water Column Height: 13.11 feet Tony Perini  
 Purged Volume: 7.0 gallons

Purging Method: Bailer  Pump   
 Sampling Method: Bailer  Pump   
 Color: Yes  No  Describe: cloudy  
 Sheen: Yes  No  Describe: \_\_\_\_\_  
 Odor: Yes  No  Describe: \_\_\_\_\_

Field Measurements:

Time	Vol (gallons)	pH	Temp (°C)	E.C. (µS/cm)	D.O. (mg/L)	Turbidity (NTU)	ORP (mV)	Fe <sup>+2</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	NO <sub>3</sub> <sup>-1</sup> (mg/L)
11:33 AM	1.0	9.43	19.34	0.917	1.08	150	59			
11:35 AM	2.5	7.07	19.51	0.946	1.18	69.2	65			
11:37 AM	4.0	6.88	19.19	0.922	0.64	20.2	14			
11:41 AM	7.0	6.78	18.92	0.945	0.21	6.8	-22			
12:15 PM sampled	3.0							18	31	6.7



ENVIRONMENTAL ENGINEERING, INC

Well No.: MW-12 Project No.: 2331  
 Casing Diameter: 4 inches Address: 3609 International Blvd.  
 Depth of Well: 31 feet Oakland, CA  
 Top of Casing Elevation: 94.84 feet  
 Depth to Groundwater: 10.93 feet Date: July 30, 2002  
 Groundwater Elevation: 83.91 feet Sampler: Roger Pappler  
 Water Column Height: 20.0<sup>ft</sup> feet  $\times 0.466 = 13.2$  gal / vol Tony Perini  
 Purged Volume: 28 gallons  $- 40$  gal  $= 8$  vol

Purging Method: Bailer  Pump   
 Sampling Method: Bailer  Pump   
 Color: Yes  No  Describe: cloudy  
 Sheen: Yes  No  Describe: \_\_\_\_\_  
 Odor: Yes  No  Describe: slight petro odor

Field Measurements:

Time	Vol (gallons)	pH	Temp (°C)	E.C. (µS/cm)	D.O. (mg/L)	Turbidity (NTU)	ORP (mV)	Fe <sup>+2</sup> (mg/L)	SO <sub>4</sub> <sup>-2</sup> (mg/L)	NO <sub>3</sub> <sup>-1</sup> (mg/L)
10:11 AM	5	6.32	19.28	0.95	0.56	82.5	-56			
10:17 AM	9	6.44	19.35	0.94	0.43	6.3	-61			
10:22 AM	16	6.42	19.46	0.94	0.38	3.7	-60			
10:30 AM	28	6.43	19.36	0.94	0.29	1.7	-60			
10:45	sampled									
								2.37	0	3.3

# **Appendix B**

Chain of Custody Form and Laboratory Report of Third  
Quarter 2002 Monitoring Event



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

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


A N A L Y T I C A L   R E P O R T

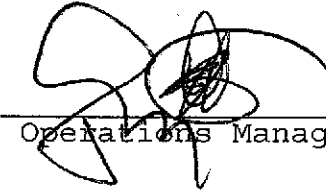
Prepared for:

SOMA Environmental Engineering Inc.  
2680 Bishop Dr.  
Suite 203  
San Ramon, CA 94583

Date: 15-AUG-02  
Lab Job Number: 159959  
Project ID: 2331  
Location: 3609 Int'l Blvd., Oakland

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

This package may be reproduced only in its entirety.

NELAP # 01107CA

Page 1 of 39







## Curtis &amp; Tompkins Laboratories Analytical Report

Lab #: 159959	Location: 3609 Int'l Blvd., Oakland
Client: SOMA Environmental Engineering Inc.	Prep: EPA 5030B
Project#: 2331	
Matrix: Water	Sampled: 07/30/02
Units: ug/L	Received: 07/31/02

Field ID: MW-1	Lab ID: 159959-001
Type: SAMPLE	

Analyte	Result	RL	Diln Fac	Batch#	Analyzed	Analysis
Gasoline C7-C12	29,000	250	5.000	74241	08/04/02	8015B(M)
MTBE	15,000	100	50.00	74275	08/06/02	EPA 8021B
Benzene	2,400	25	50.00	74275	08/06/02	EPA 8021B
Toluene	2,500	25	50.00	74275	08/06/02	EPA 8021B
Ethylbenzene	920	25	50.00	74275	08/06/02	EPA 8021B
m,p-Xylenes	3,200	25	50.00	74275	08/06/02	EPA 8021B
o-Xylene	1,200	25	50.00	74275	08/06/02	EPA 8021B

Surrogate	%REC	Limits	Diln Fac	Batch#	Analyzed	Analysis
Trifluorotoluene (FID)	128	68-145	5.000	74241	08/04/02	8015B(M)
Bromofluorobenzene (FID)	115	66-143	5.000	74241	08/04/02	8015B(M)
Trifluorotoluene (PID)	98	53-143	50.00	74275	08/06/02	EPA 8021B
Bromofluorobenzene (PID)	105	52-142	50.00	74275	08/06/02	EPA 8021B

Field ID: MW-2	Diln Fac: 1.000
Type: SAMPLE	Batch#: 74232
Lab ID: 159959-002	Analyzed: 08/03/02

Analyte	Result	RL	Analysis
Gasoline C7-C12	180	50	8015B(M)
MTBE	ND	2.0	EPA 8021B
Benzene	11	0.50	EPA 8021B
Toluene	6.3	0.50	EPA 8021B
Ethylbenzene	9.4	0.50	EPA 8021B
m,p-Xylenes	20	0.50	EPA 8021B
o-Xylene	7.0	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	97	68-145	8015B(M)
Bromofluorobenzene (FID)	113	66-143	8015B(M)
Trifluorotoluene (PID)	98	53-143	EPA 8021B
Bromofluorobenzene (PID)	108	52-142	EPA 8021B

C= Presence confirmed, but confirmation concentration differed by more than a factor of two  
 ND= Not Detected  
 RL= Reporting Limit

# GC07 TVH 'A' Data File RTX 502

Sample Name : 159959-001,74241

Sample #: b1

Page 1 of 1

FileName : G:\GC07\DATA\215A049.raw

Date : 8/5/02 08:00 AM

Method : TVHBTXE

Time of Injection: 8/4/02 08:29 PM

Start Time : 0.00 min

End Time : 26.00 min

Low Point : -37.11 mV

High Point : 1068.25 mV

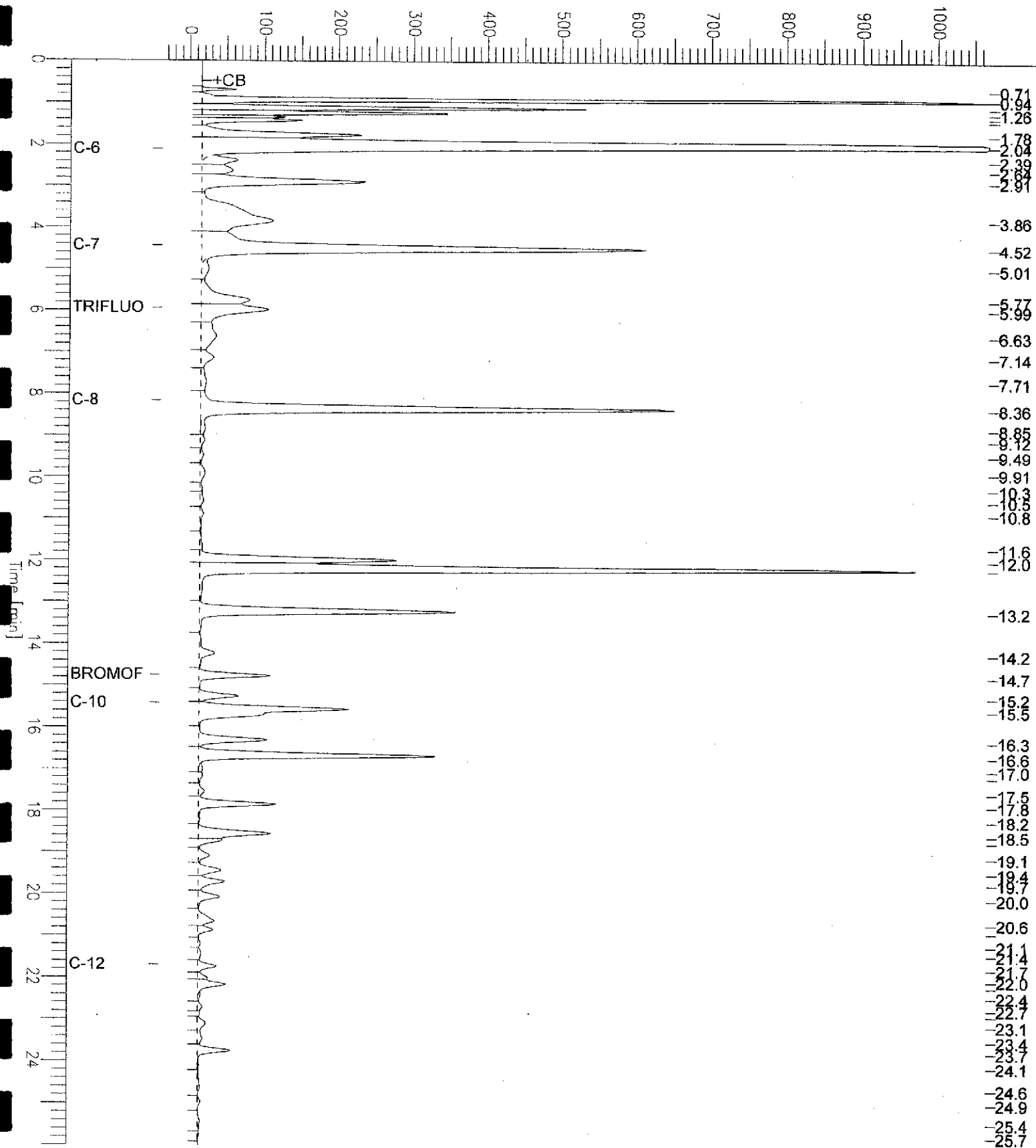
Scale Factor: 1.0

Plot Offset: -37 mV

Plot Scale: 1105.4 mV

MW-1

Response [mV]



# GC07 TVH 'A' Data File RTX 502

Sample Name : 159959-002,74232

Sample #: a1

Page 1 of 1

FileName : G:\GC07\DATA\214A021.raw

Date : 8/3/02 05:19 AM

Method : TVHBTXE

Time of Injection: 8/3/02 04:53 AM

Start Time : 0.00 min

End Time : 26.00 min

Low Point : 10.32 mV

High Point : 114.31 mV

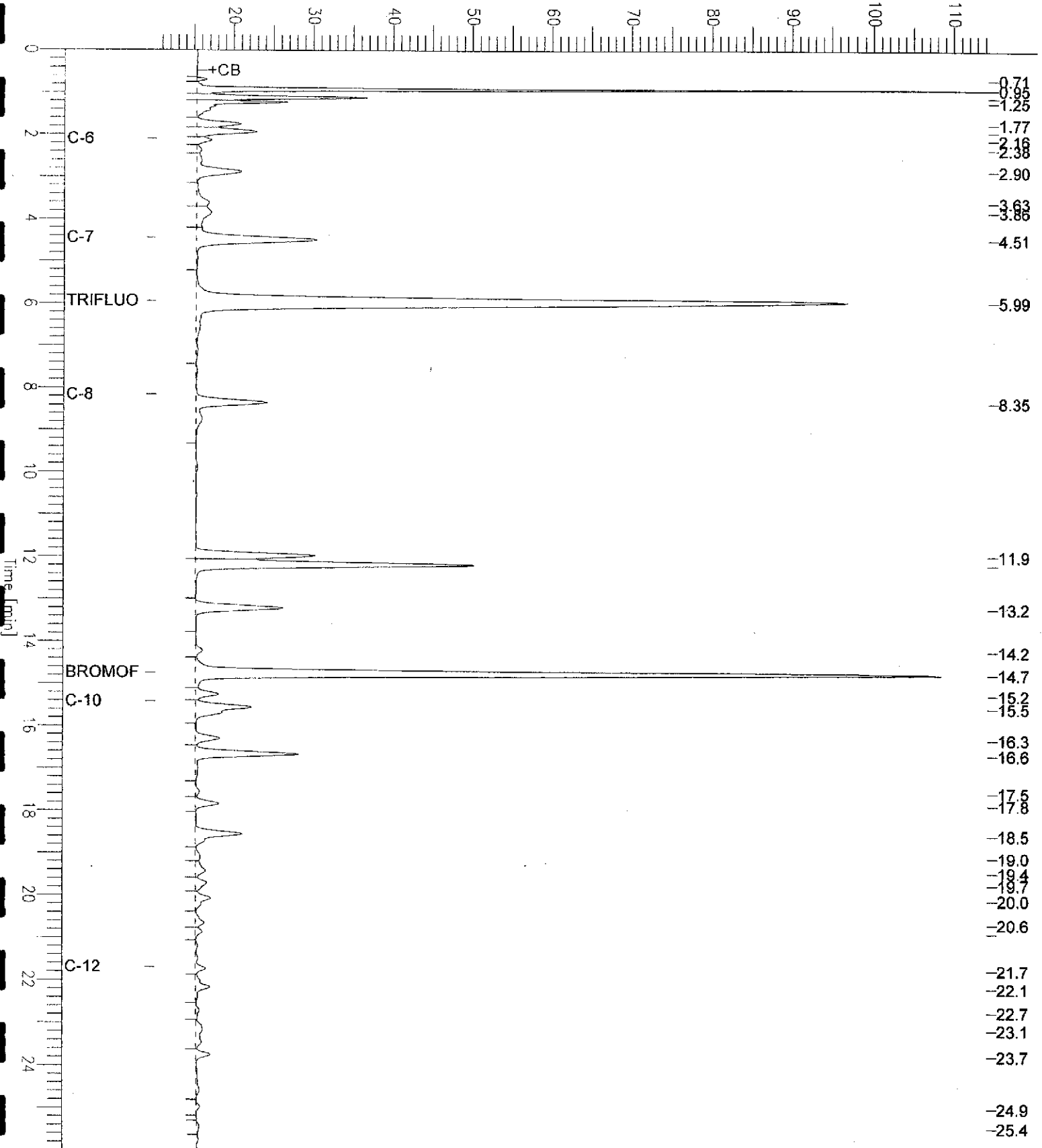
Scale Factor: 1.0

Plot Offset: 10 mV

Plot Scale: 104.0 mV

MW-2

Response [mV]





## Curtis &amp; Tompkins Laboratories Analytical Report

Lab #: 159959	Location: 3609 Int'l Blvd., Oakland
Client: SOMA Environmental Engineering Inc.	Prep: EPA 5030B
Project#: 2331	
Matrix: Water	Sampled: 07/30/02
Units: ug/L	Received: 07/31/02

Field ID: MW-3	Diln Fac: 50.00
Type: SAMPLE	Batch#: 74241
Lab ID: 159959-003	Analyzed: 08/04/02

Analyte	Result	RL	Analysis
Gasoline C7-C12	45,000	2,500	8015B(M)
MTBE	3,200	100	EPA 8021B
Benzene	8,900	25	EPA 8021B
Toluene	1,700	25	EPA 8021B
Ethylbenzene	1,600	25	EPA 8021B
m,p-Xylenes	4,000	25	EPA 8021B
o-Xylene	1,600	25	EPA 8021B

Surrogate	%REC	Limite	Analysis
Trifluorotoluene (FID)	104	68-145	8015B(M)
Bromofluorobenzene (FID)	109	66-143	8015B(M)
Trifluorotoluene (PID)	102	53-143	EPA 8021B
Bromofluorobenzene (PID)	104	52-142	EPA 8021B

Field ID: MW-4	Diln Fac: 1.000
Type: SAMPLE	Batch#: 74232
Lab ID: 159959-004	Analyzed: 08/03/02

Analyte	Result	RL	Analysis
Gasoline C7-C12	450	50	8015B(M)
MTBE	ND	2.0	EPA 8021B
Benzene	20	0.50	EPA 8021B
Toluene	24	0.50	EPA 8021B
Ethylbenzene	19	0.50	EPA 8021B
m,p-Xylenes	53	0.50	EPA 8021B
o-Xylene	21	0.50	EPA 8021B

Surrogate	%REC	Limite	Analysis
Trifluorotoluene (FID)	106	68-145	8015B(M)
Bromofluorobenzene (FID)	114	66-143	8015B(M)
Trifluorotoluene (PID)	105	53-143	EPA 8021B
Bromofluorobenzene (PID)	108	52-142	EPA 8021B

C= Presence confirmed, but confirmation concentration differed by more than a factor of two  
 ND= Not Detected  
 RL= Reporting Limit

# GC07 TVH 'A' Data File RTX 502

Sample Name : 159959-003,74241

Sample #: b1

Page 1 of 1

FileName : G:\GC07\DATA\215A047.raw

Date : 8/4/02 11:55 PM

Method : TVHBTXE

Time of Injection: 8/4/02 07:20 PM

Start Time : 0.00 min

End Time : 26.00 min

Low Point : 4.39 mV

High Point : 235.61 mV

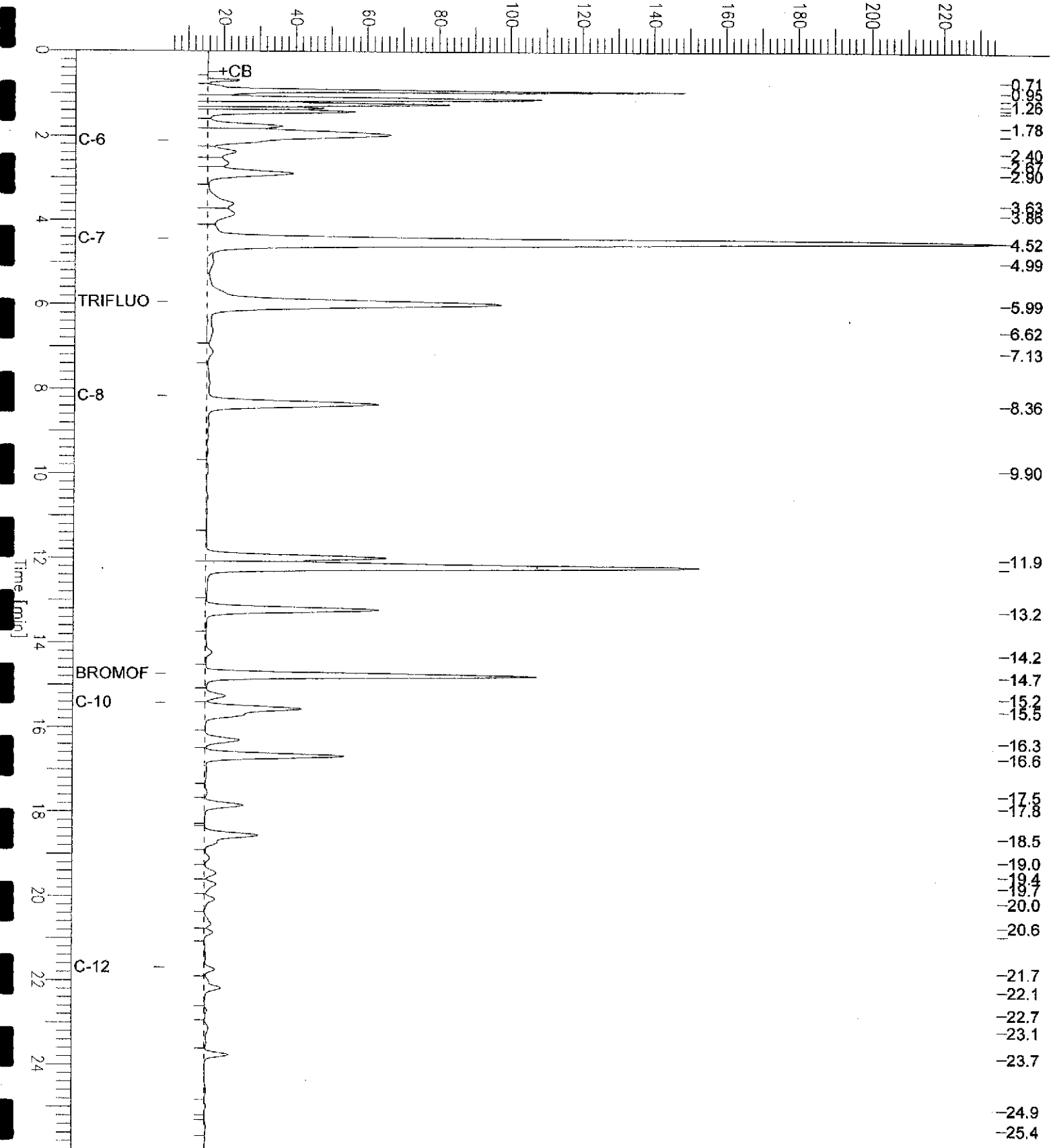
Scale Factor: 1.0

Plot Offset: 4 mV

Plot Scale: 231.2 mV

MW-3

Response [mV]



# GC07 TVH 'A' Data File RTX 502

Sample Name : 159959-004,74232

Sample #: a1

Page 1 of 1

FileName : G:\GC07\DATA\214A022.raw

Date : 8/3/02 05:53 AM

Method : TVHBTXE

Time of Injection: 8/3/02 05:27 AM

Start Time : 0.00 min

End Time : 26.00 min

Low Point : 10.49 mV

High Point : 113.98 mV

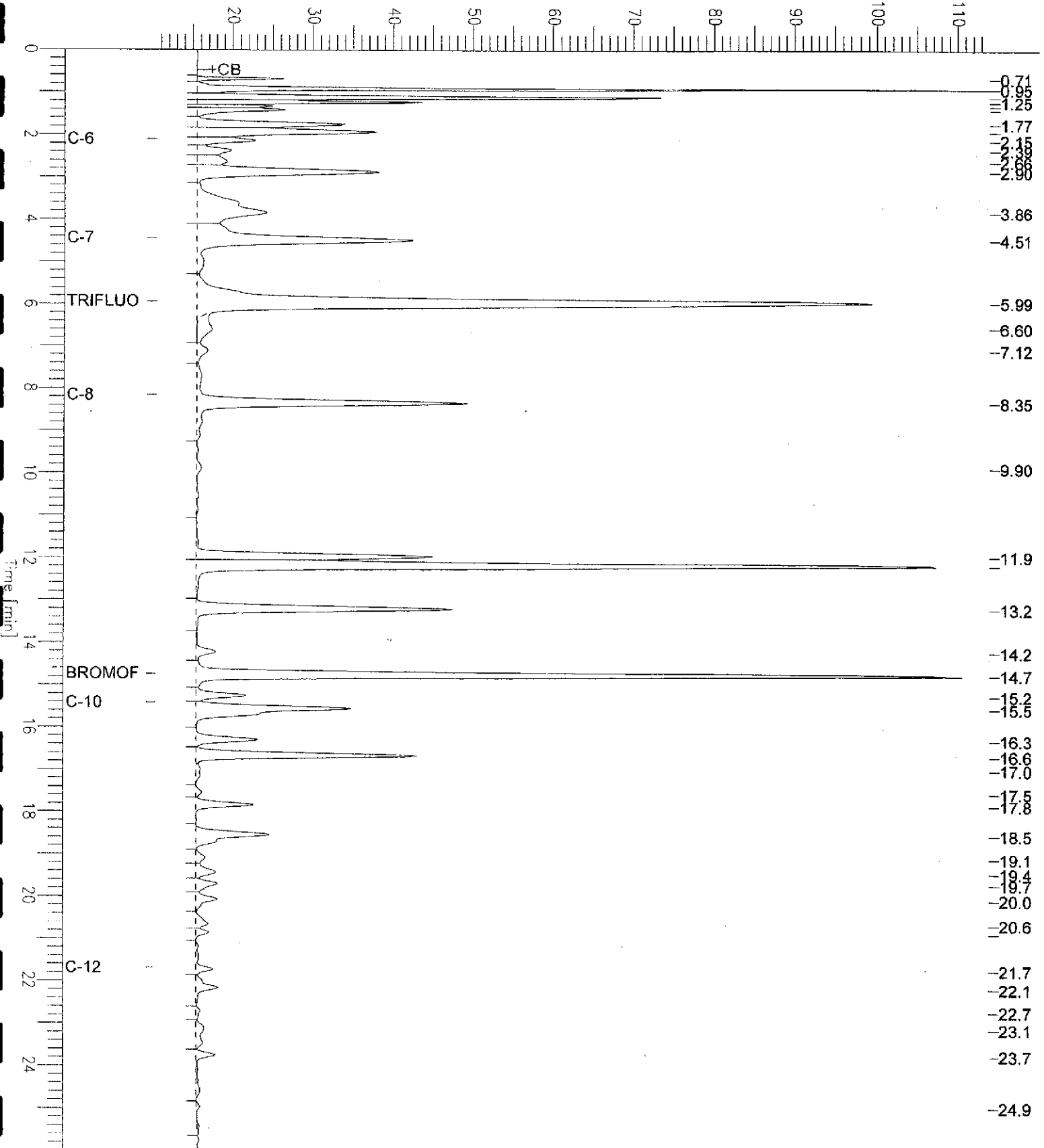
Scale Factor: 1.0

Plot Offset: 10 mV

Plot Scale: 103.5 mV

*HW-4*

Response [mV]



**Curtis & Tompkins Laboratories Analytical Report**

Lab #: 159959	Location: 3609 Int'l Blvd., Oakland
Client: SOMA Environmental Engineering Inc.	Prep: EPA 5030B
Project#: 2331	
Matrix: Water	Sampled: 07/30/02
Units: ug/L	Received: 07/31/02

Field ID: MW-5	Diln Fac: 1.000
Type: SAMPLE	Batch#: 74232
Lab ID: 159959-005	Analyzed: 08/03/02

Analyte	Result	RL	Analysis
Gasoline C7-C12	110	50	8015B (M)
MTBE	4.1	2.0	EPA 8021B
Benzene	ND	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	0.77	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)	111	68-145	8015B (M)
Bromofluorobenzene (FID)	114	66-143	8015B (M)
Trifluorotoluene (PID)	100	53-143	EPA 8021B
Bromofluorobenzene (PID)	107	52-142	EPA 8021B

Field ID: MW-6	Lab ID: 159959-006
Type: SAMPLE	

Analyte	Result	RL	Diln Fac	Batch#	Analyzed	Analysis
Gasoline C7-C12	24,000	250	5.000	74241	08/04/02	8015B (M)
MTBE	ND	20	10.00	74275	08/06/02	EPA 8021B
Benzene	1,000	5.0	10.00	74275	08/06/02	EPA 8021B
Toluene	410	5.0	10.00	74275	08/06/02	EPA 8021B
Ethylbenzene	1,400	5.0	10.00	74275	08/06/02	EPA 8021B
m,p-Xylenes	2,800	5.0	10.00	74275	08/06/02	EPA 8021B
o-Xylene	970	5.0	10.00	74275	08/06/02	EPA 8021B

Surrogate	%REC	Limits	Diln Fac	Batch#	Analyzed	Analysis
Trifluorotoluene (FID)	126	68-145	5.000	74241	08/04/02	8015B (M)
Bromofluorobenzene (FID)	113	66-143	5.000	74241	08/04/02	8015B (M)
Trifluorotoluene (PID)	111	53-143	10.00	74275	08/06/02	EPA 8021B
Bromofluorobenzene (PID)	107	52-142	10.00	74275	08/06/02	EPA 8021B

C= Presence confirmed, but confirmation concentration differed by more than a factor of two  
 ND= Not Detected  
 RL= Reporting Limit  
 Page 3 of 7

# GC07 TVH 'A' Data File RTX 502

Sample Name : 159959-005,74232

Sample #: a1

Page 1 of 1

FileName : G:\GC07\DATA\214A023.raw

Date : 8/3/02 06:28 AM

Method : TVHBTXE

Time of Injection: 8/3/02 06:01 AM

Start Time : 0.00 min

End Time : 26.00 min

Low Point : 10.17 mV

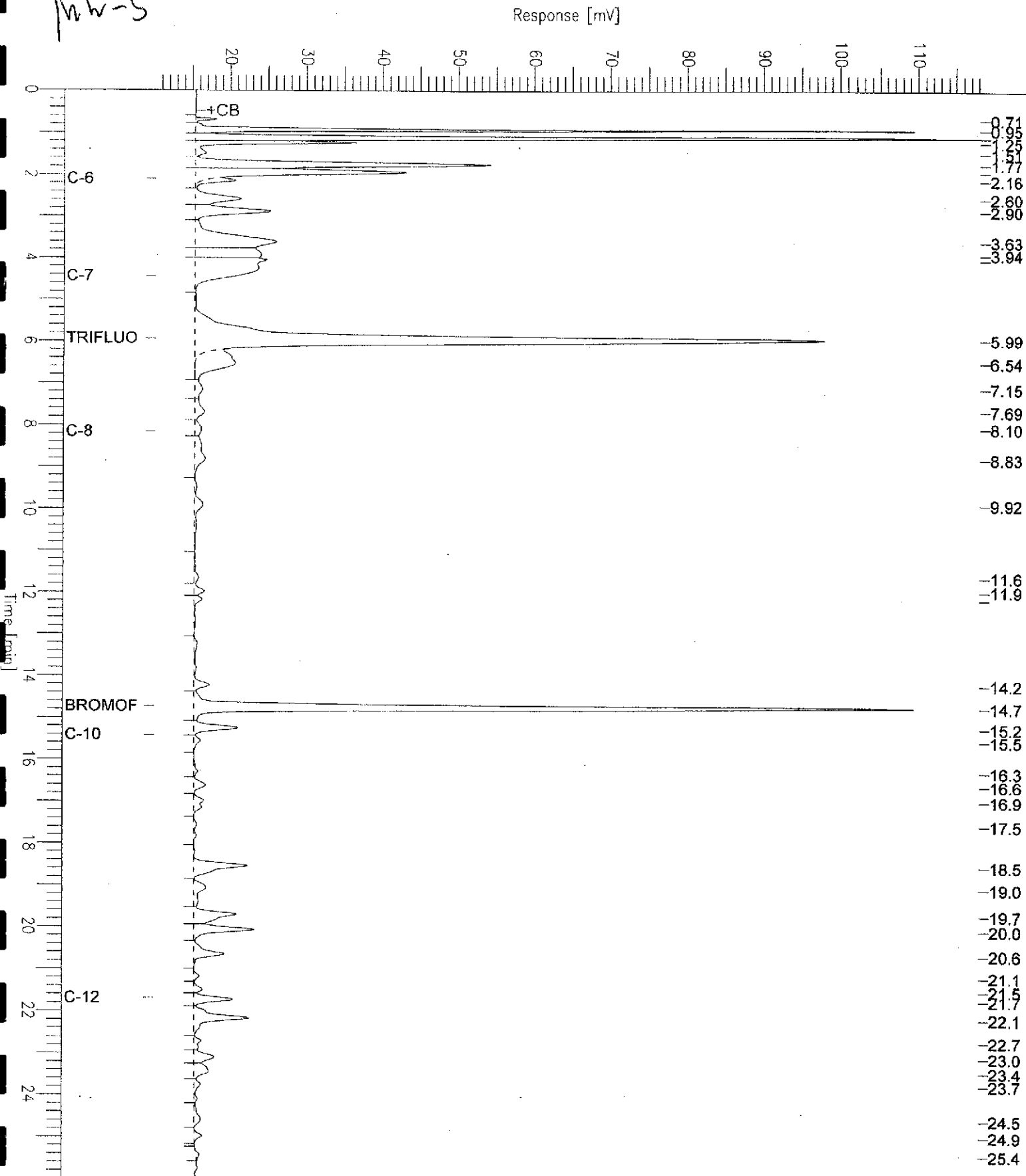
High Point : 118.08 mV

Scale Factor: 1.0

Plot Offset: 10 mV

Plot Scale: 107.9 mV

*mw-5*



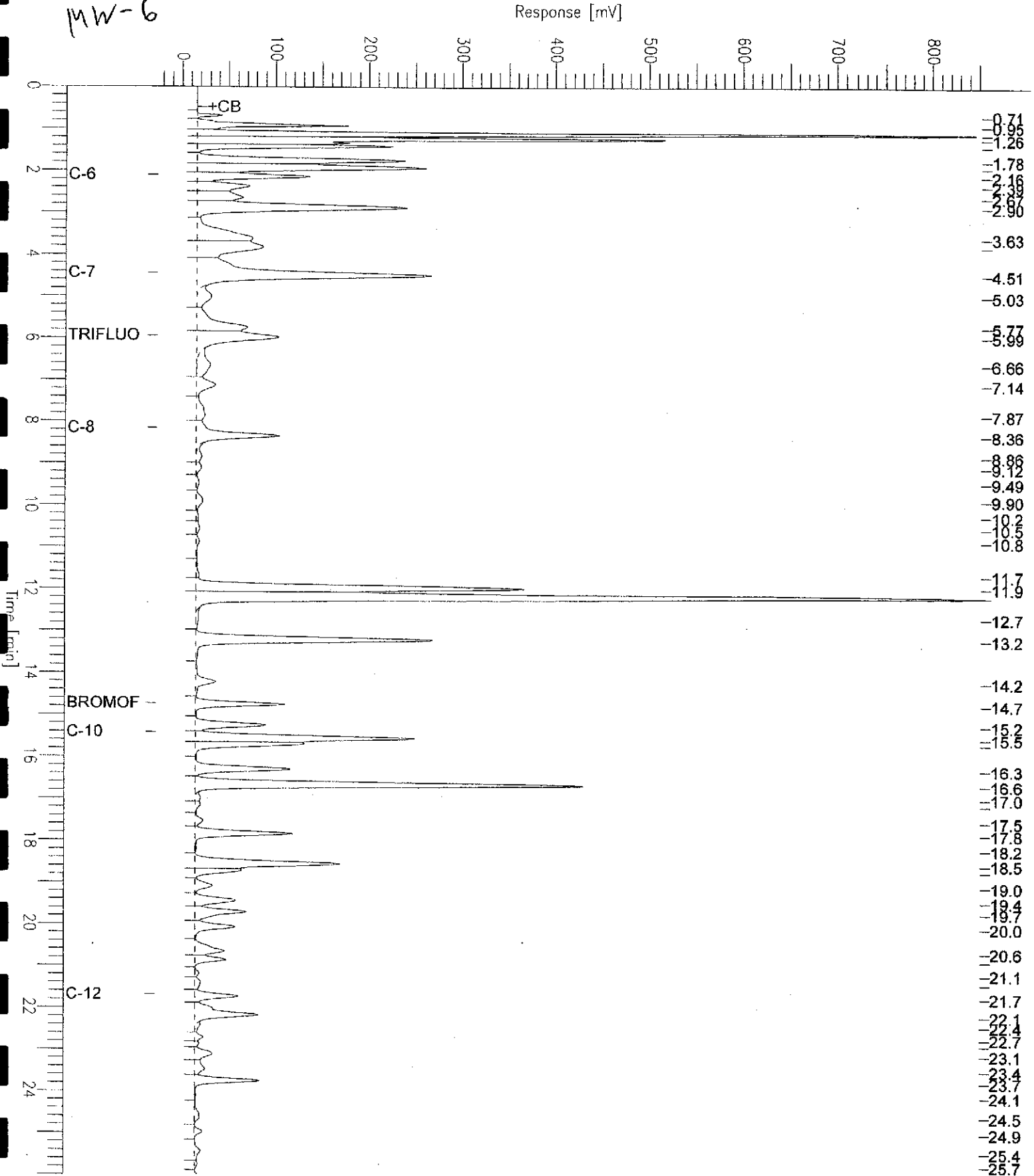


# GC07 TVH 'A' Data File RTX 502

Sample Name : 159959-006,74241  
 FileName : G:\GC07\DATA\215A050.raw  
 Method : TVHBTXE  
 Start Time : 0.00 min  
 Scale Factor : 1.0

Sample #: b1  
 Date : 8/5/02 08:01 AM  
 Time of Injection: 8/4/02 09:03 PM  
 Low Point : -26.21 mV  
 High Point : 852.25 mV  
 Plot Scale: 878.5 mV

MW-6





## Curtis &amp; Tompkins Laboratories Analytical Report

Lab #: 159959	Location: 3609 Int'l Blvd., Oakland
Client: SOMA Environmental Engineering Inc.	Prep: EPA 5030B
Project#: 2331	
Matrix: Water	Sampled: 07/30/02
Units: ug/L	Received: 07/31/02

Field ID: MW-7	Diln Fac: 1.000
Type: SAMPLE	Batch#: 74232
Lab ID: 159959-007	Analyzed: 08/03/02

Analyte	Result	RL	Analysis
Gasoline C7-C12	270	50	8015B(M)
MTBE	35	2.0	EPA 8021B
Benzene	5.3	0.50	EPA 8021B
Toluene	1.3 C	0.50	EPA 8021B
Ethylbenzene	2.3	0.50	EPA 8021B
m,p-Xylenes	5.8	0.50	EPA 8021B
o-Xylene	2.3	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	123	68-145	8015B(M)
Bromofluorobenzene (FID)	116	66-143	8015B(M)
Trifluorotoluene (PID)	106	53-143	EPA 8021B
Bromofluorobenzene (PID)	105	52-142	EPA 8021B

Field ID: MW-8	Diln Fac: 10.00
Type: SAMPLE	Batch#: 74232
Lab ID: 159959-008	Analyzed: 08/03/02

Analyte	Result	RL	Analysis
Gasoline C7-C12	8,400	500	8015B(M)
MTBE	1,400	20	EPA 8021B
Benzene	340	5.0	EPA 8021B
Toluene	78	5.0	EPA 8021B
Ethylbenzene	530	5.0	EPA 8021B
m,p-Xylenes	460	5.0	EPA 8021B
o-Xylene	57	5.0	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	138	68-145	8015B(M)
Bromofluorobenzene (FID)	111	66-143	8015B(M)
Trifluorotoluene (PID)	122	53-143	EPA 8021B
Bromofluorobenzene (PID)	105	52-142	EPA 8021B

C= Presence confirmed, but confirmation concentration differed by more than a factor of two  
 ND= Not Detected  
 RL= Reporting Limit

# GC07 TVH 'A' Data File RTX 502

Sample Name : 159959-007,74232

Sample #: a1

Page 1 of 1

FileName : G:\GC07\DATA\214A031.raw

Date : 8/3/02 11:00 AM

Method : TVHBTXE

Time of Injection: 8/3/02 10:34 AM

Start Time : 0.00 min

End Time : 26.00 min

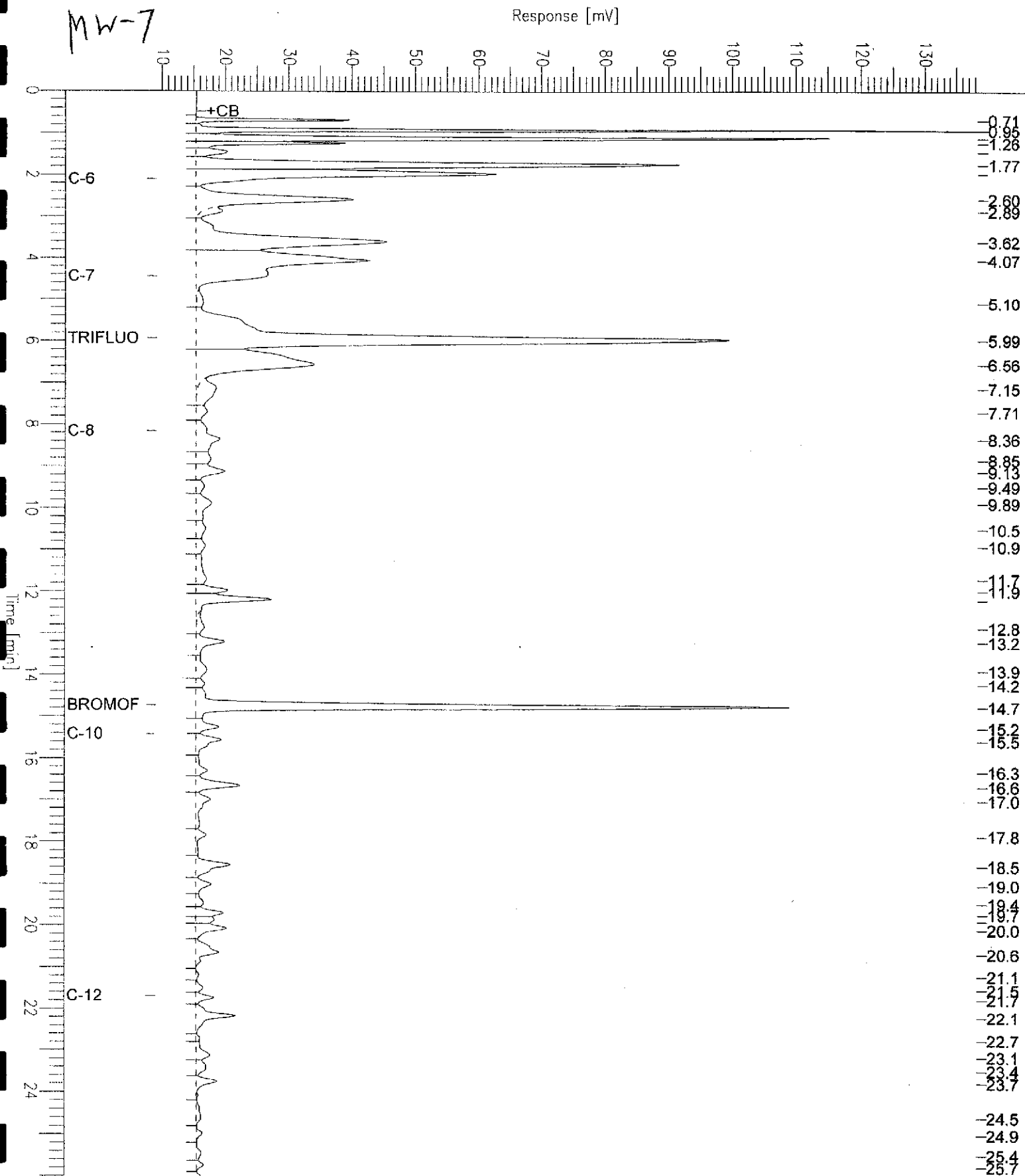
Low Point : 9.17 mV

High Point : 138.36 mV

Scale Factor: 1.0

Plot Offset: 9 mV

Plot Scale: 129.2 mV



# GC07 TVH 'A' Data File RTX 502

Sample Name : 159959-008,74232

Sample #: a1

Page 1 of 1

FileName : G:\GC07\DATA\214A035.raw

Date : 8/3/02 01:16 PM

Method : TVHBTXE

Time of Injection: 8/3/02 12:50 PM

Start Time : 0.00 min

End Time : 26.00 min

Low Point : 5.66 mV

High Point : 202.80 mV

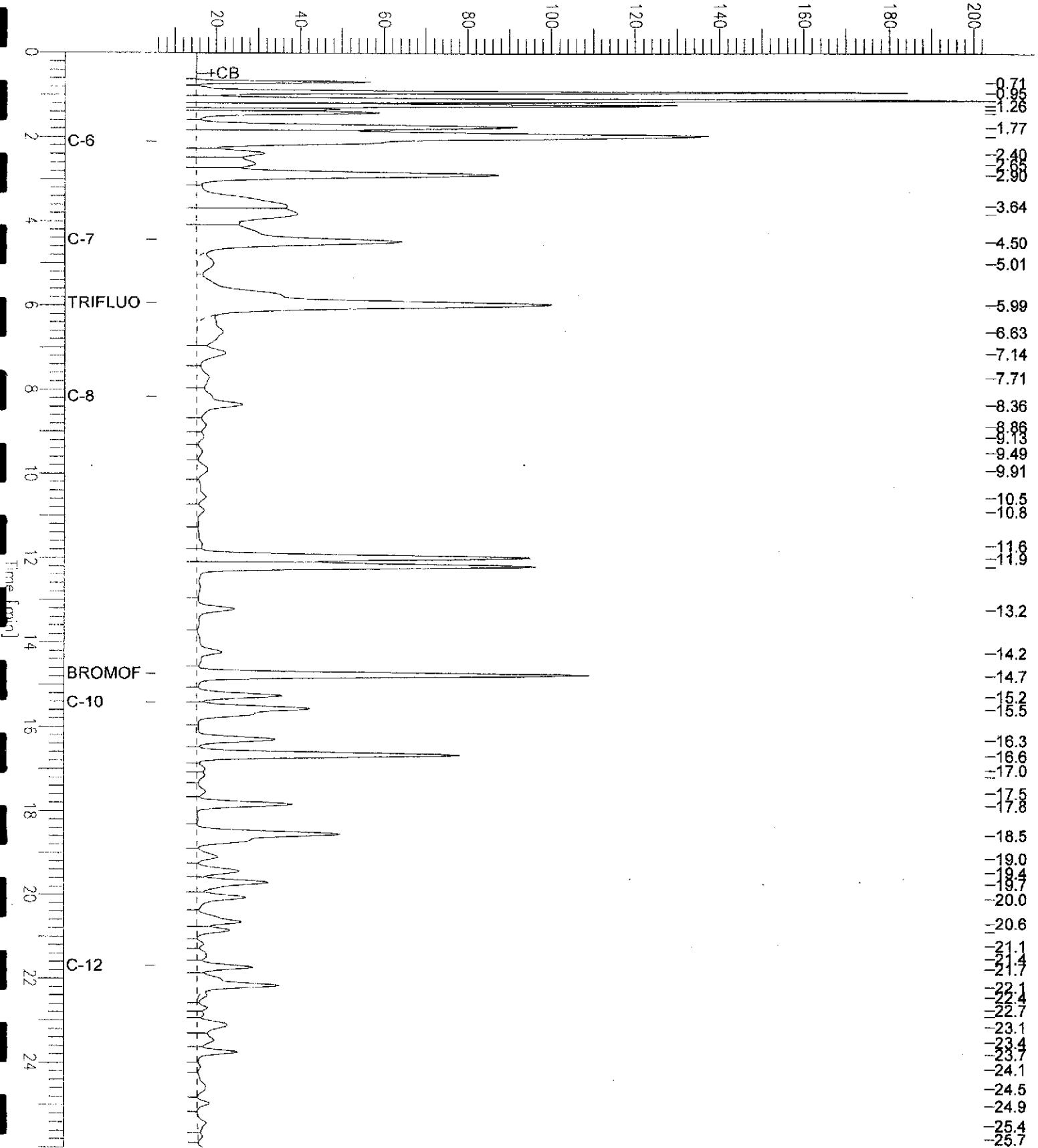
Scale Factor: 1.0

Plot Offset: 6 mV

Plot Scale: 197.1 mV

MW-8

Response [mV]





## Curtis &amp; Tompkins Laboratories Analytical Report

Lab #: 159959	Location: 3609 Int'l Blvd., Oakland
Client: SOMA Environmental Engineering Inc.	Prep: EPA 5030B
Project#: 2331	
Matrix: Water	Sampled: 07/30/02
Units: ug/L	Received: 07/31/02

Field ID: MW-10	Diln Fac: 1.000
Type: SAMPLE	Batch#: 74232
Lab ID: 159959-009	Analyzed: 08/03/02

Analyte	Result	RL	Analysis
Gasoline C7-C12	160	50	8015B (M)
MTBE	63	2.0	EPA 8021B
Benzene	26	0.50	EPA 8021B
Toluene	0.55	0.50	EPA 8021B
Ethylbenzene	8.1	0.50	EPA 8021B
m,p-Xylenes	1.0	0.50	EPA 8021B
o-Xylene	ND	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	108	68-145	8015B (M)
Bromofluorobenzene (FID)	115	66-143	8015B (M)
Trifluorotoluene (PID)	101	53-143	EPA 8021B
Bromofluorobenzene (PID)	108	52-142	EPA 8021B

Field ID: MW-11	Diln Fac: 1.000
Type: SAMPLE	Batch#: 74232
Lab ID: 159959-010	Analyzed: 08/03/02

Analyte	Result	RL	Analysis
Gasoline C7-C12	120	50	8015B (M)
MTBE	ND	2.0	EPA 8021B
Benzene	5.6	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	0.61	0.50	EPA 8021B
m,p-Xylenes	0.53	0.50	EPA 8021B
o-Xylene	ND	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	120	68-145	8015B (M)
Bromofluorobenzene (FID)	117	66-143	8015B (M)
Trifluorotoluene (PID)	106	53-143	EPA 8021B
Bromofluorobenzene (PID)	110	52-142	EPA 8021B

C= Presence confirmed, but confirmation concentration differed by more than a factor of two  
 ND= Not Detected  
 RL= Reporting Limit

# GC07 TVH 'A' Data File RTX 502

Sample Name : 159959-009,74232

Sample #: a1

Page 1 of 1

FileName : G:\GC07\DATA\214A032.raw

Date : 8/3/02 11:34 AM

Method : TVHBTXE

Time of Injection: 8/3/02 11:08 AM

Start Time : 0.00 min

End Time : 26.00 min

Low Point : 9.56 mV

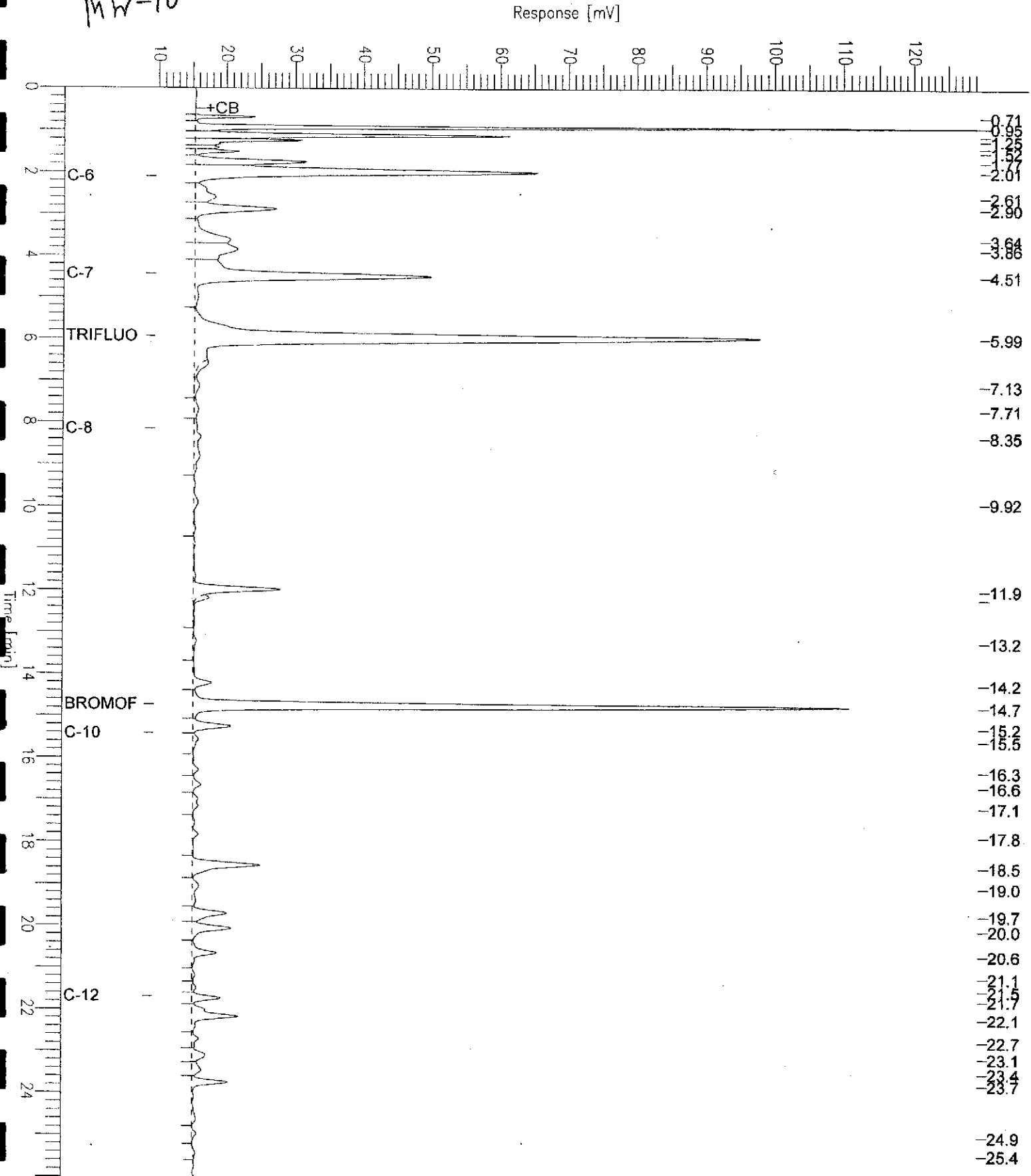
High Point : 129.60 mV

Scale Factor: 1.0

Plot Offset: 10 mV

Plot Scale: 120.0 mV

MW-10



# GC07 TVH 'A' Data File RTX 502

Sample Name : 159959-010,74232

Sample #: a1

Page 1 of 1

FileName : G:\GC07\DATA\214A033.raw

Date : 8/3/02 12:08 PM

Method : TVHBTXE

Time of Injection: 8/3/02 11:42 AM

Start Time : 0.00 min

End Time : 26.00 min

Low Point : -8.97 mV

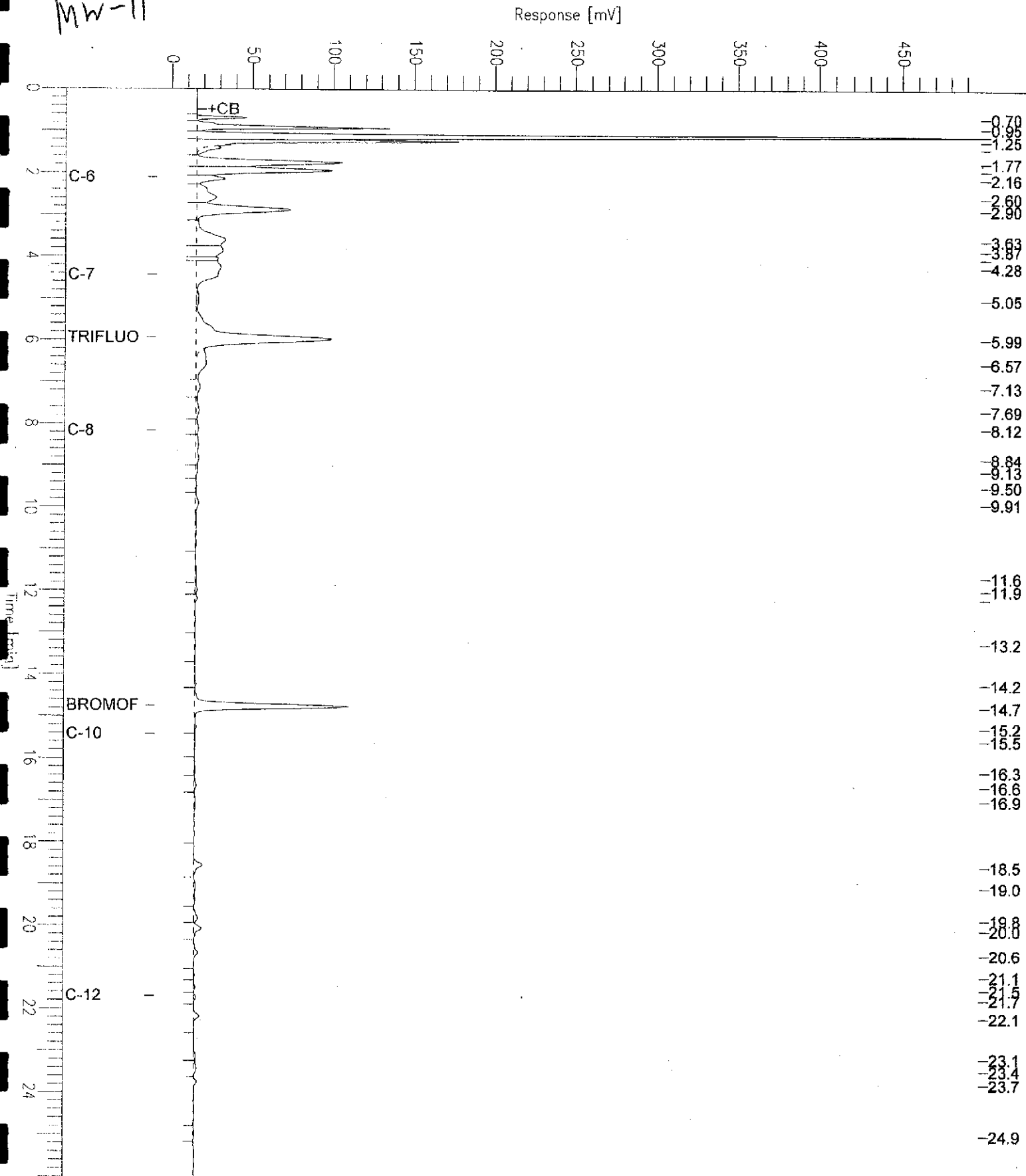
High Point : 497.94 mV

Scale Factor: 1.0

Plot Offset: -9 mV

Plot Scale: 506.9 mV

MW-11



## Curtis &amp; Tompkins Laboratories Analytical Report

Lab #: 159959	Location: 3609 Int'l Blvd., Oakland
Client: SOMA Environmental Engineering Inc.	Prep: EPA 5030B
Project#: 2331	
Matrix: Water	Sampled: 07/30/02
Units: ug/L	Received: 07/31/02

Field ID: MW-12	Diln Fac: 1.000
Type: SAMPLE	Batch#: 74232
Lab ID: 159959-011	Analyzed: 08/03/02

Analyte	Result	RL	Analysis
Gasoline C7-C12	2,200	50	8015B(M)
MTBE	110	2.0	EPA 8021B
Benzene	57	0.50	EPA 8021B
Toluene	ND	0.50	EPA 8021B
Ethylbenzene	11	0.50	EPA 8021B
m,p-Xylenes	2.6	0.50	EPA 8021B
o-Xylene	ND	0.50	EPA 8021B

Surrogate	%REC	Limits	Analysis
Trifluorotoluene (FID)	141	68-145	8015B(M)
Bromofluorobenzene (FID)	123	66-143	8015B(M)
Trifluorotoluene (PID)	124	53-143	EPA 8021B
Bromofluorobenzene (PID)	110	52-142	EPA 8021B

Type: BLANK	Batch#: 74232
Lab ID: QC185929	Analyzed: 08/02/02
Diln Fac: 1.000	

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)	92	68-145	8015B(M)
Bromofluorobenzene (FID)	104	66-143	8015B(M)
Trifluorotoluene (PID)	91	53-143	EPA 8021B
Bromofluorobenzene (PID)	95	52-142	EPA 8021B



# GC07 TVH 'A' Data File RTX 502

Sample Name : 159959-011,74232

Sample #: a1

Page 1 of 1

FileName : G:\GC07\DATA\214A034.raw

Date : 8/3/02 12:42 PM

Method : TVHBTXE

Time of Injection: 8/3/02 12:16 PM

Start Time : 0.00 min

End Time : 26.00 min

Low Point : -21.77 mV

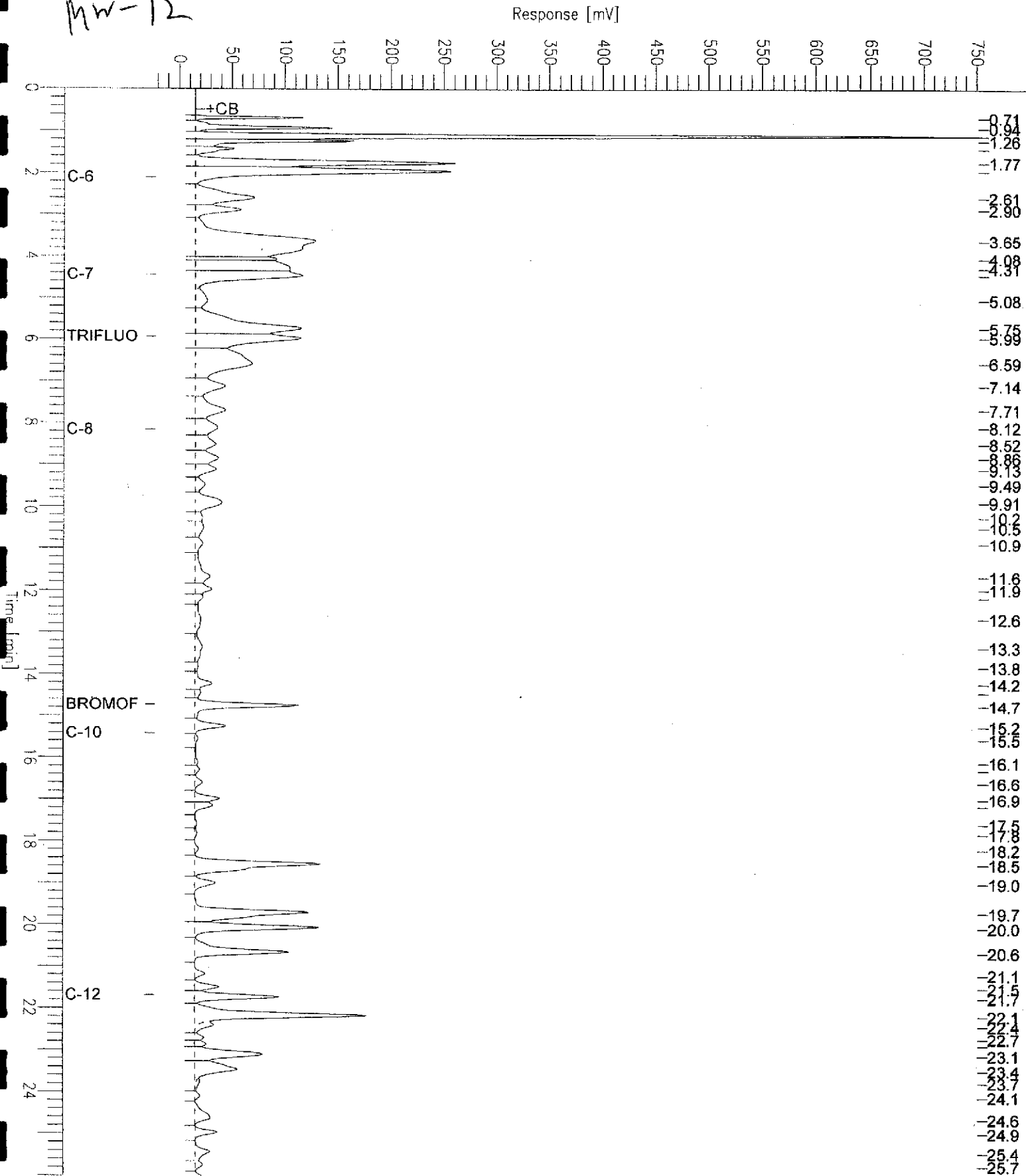
High Point : 751.63 mV

Scale Factor: 1.0

Plot Offset: -22 mV

Plot Scale: 773.4 mV

*MW-12*

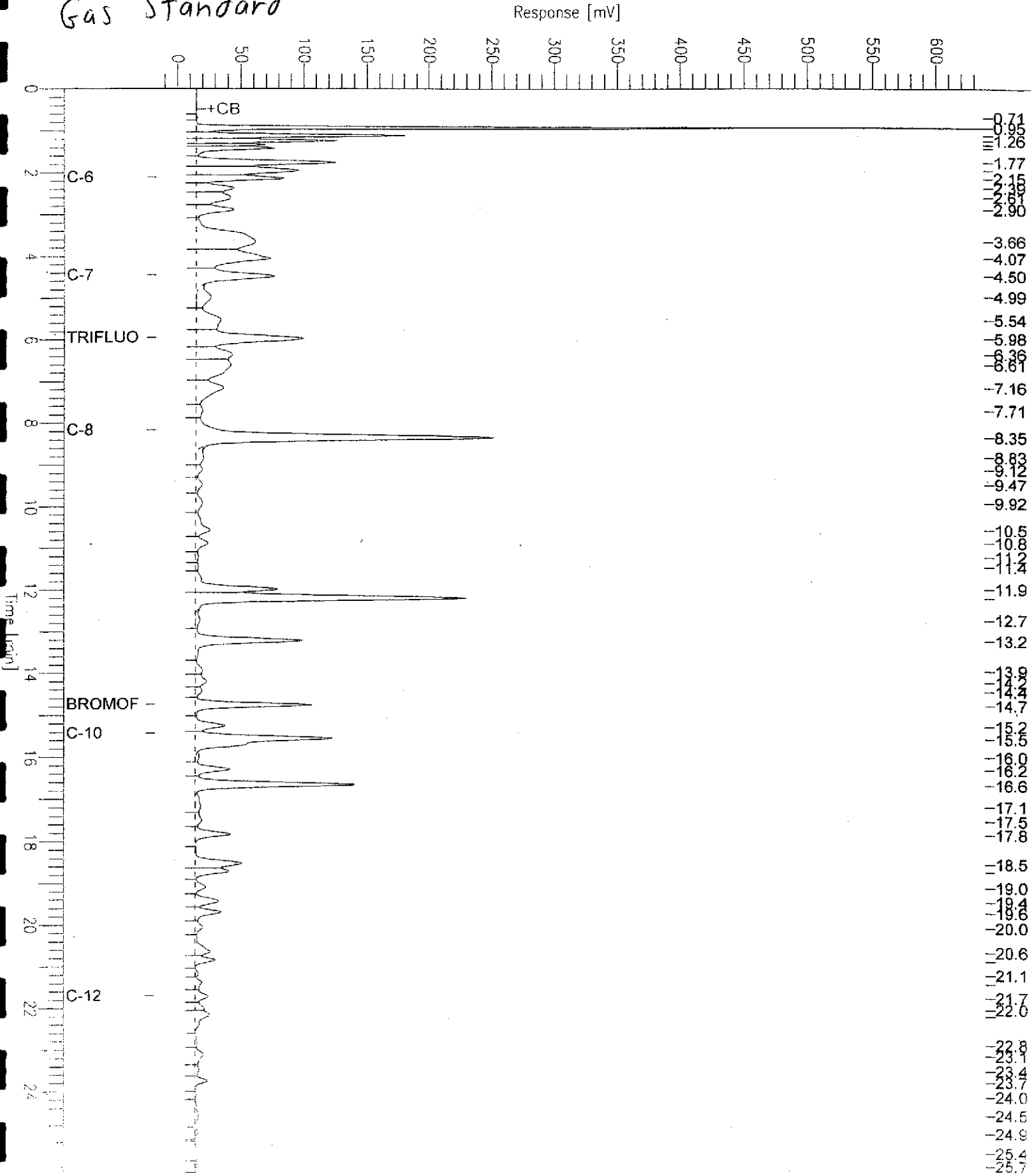


# GC07 TVH 'A' Data File RTX 502

Sample Name : ccv/lcs,qc185930,74232,02ws1119,5/5000  
 FileName : G:\GC07\DATA\214A002.raw  
 Method : TVHBTXE  
 Start Time : 0.00 min      End Time : 26.00 min  
 Scale Factor : 1.0      Plot Offset: -16 mV

Sample #:      Page 1 of 1  
 Date : 8/2/02 05:58 PM  
 Time of Injection: 8/2/02 05:32 PM  
 Low Point : -16.33 mV      High Point : 636.98 mV  
 Plot Scale: 653.3 mV

Gas Standard



**Curtis & Tompkins Laboratories Analytical Report**

Lab #: 159959	Location: 3609 Int'l Blvd., Oakland
Client: SOMA Environmental Engineering Inc.	Prep: EPA 5030B
Project#: 2331	
Matrix: Water	Sampled: 07/30/02
Units: ug/L	Received: 07/31/02

Type: BLANK	Batch#: 74241
Lab ID: QC185968	Analyzed: 08/04/02
Diln Fac: 1.000	

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)	92	68-145	8015B(M)
Bromofluorobenzene (FID)	108	66-143	8015B(M)
Trifluorotoluene (PID)	93	53-143	EPA 8021B
Bromofluorobenzene (PID)	99	52-142	EPA 8021B

Type: BLANK	Batch#: 74275
Lab ID: QC186106	Analyzed: 08/06/02
Diln Fac: 1.000	Analysis: EPA 8021B

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)	89	53-143
Bromofluorobenzene (PID)	97	52-142

C= Presence confirmed, but confirmation concentration differed by more than a factor of two

D= Not Detected

L= Reporting Limit



**Total Volatile Hydrocarbons**

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	8015B (M)
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC185930	Batch#:	74232
Matrix:	Water	Analyzed:	08/02/02
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	2,000	2,160	108	79-120

Surrogate	%REC	Limits
Trifluorotoluene (FID)	110	68-145
Bromofluorobenzene (FID)	112	66-143

### Total Volatile Hydrocarbons

Lab #: 159959	Location: 3609 Int'l Blvd., Oakland
Client: SOMA Environmental Engineering Inc.	Prep: EPA 5030B
Project#: 2331	Analysis: 8015B (M)
Type: LCS	Diln Fac: 1.000
Lab ID: QC185969	Batch#: 74241
Matrix: Water	Analyzed: 08/04/02
Units: ug/L	

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	2,000	1,899	95	79-120

Surrogate	%REC	Limits
Trifluorotoluene (FID)	104	68-145
Bromofluorobenzene (FID)	108	66-143



**Benzene, Toluene, Ethylbenzene, Xylenes**

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8021B
Type:	BS	Diln Fac:	1.000
Lab ID:	QC185931	Batch#:	74232
Matrix:	Water	Analyzed:	08/02/02
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
MTBE	20.00	17.53	88	59-135
Benzene	20.00	20.93	105	65-122
Toluene	20.00	21.08	105	67-121
Ethylbenzene	20.00	21.55	108	70-121
m,p-Xylenes	40.00	37.83	95	72-125
o-Xylene	20.00	21.37	107	73-122

Surrogate	%REC	Limits
Trifluorotoluene (PID)	95	53-143
Bromofluorobenzene (PID)	100	52-142

**Benzene, Toluene, Ethylbenzene, Xylenes**

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8021B
Type:	BSD	Diln Fac:	1.000
Lab ID:	QC185953	Batch#:	74232
Matrix:	Water	Analyzed:	08/02/02
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
MTBE	20.00	18.37	92	59-135	5	20
Benzene	20.00	21.75	109	65-122	4	20
Toluene	20.00	22.10	110	67-121	5	20
Ethylbenzene	20.00	21.53	108	70-121	0	20
m,p-Xylenes	40.00	39.78	99	72-125	5	20
o-Xylene	20.00	22.23	111	73-122	4	20

Surrogate	%REC	Limits
Trifluorotoluene (PID)	98	53-143
Bromofluorobenzene (PID)	102	52-142

### Benzene, Toluene, Ethylbenzene, Xylenes

Lab #: 159959	Location: 3609 Int'l Blvd., Oakland
Client: SOMA Environmental Engineering Inc.	Prep: EPA 5030B
Project#: 2331	Analysis: EPA 8021B
Type: LCS	Diln Fac: 1.000
Lab ID: QC185970	Batch#: 74241
Matrix: Water	Analyzed: 08/04/02
Units: ug/L	

Analyte	Spiked	Result	%REC	Limits
MTBE	20.00	17.64	88	59-135
Benzene	20.00	21.39	107	65-122
Toluene	20.00	21.35	107	67-121
Ethylbenzene	20.00	20.89	104	70-121
m,p-Xylenes	40.00	37.42	94	72-125
o-Xylene	20.00	21.51	108	73-122

Surrogate	%REC	Limits
Trifluorotoluene (PID)	96	53-143
Bromofluorobenzene (PID)	101	52-142





## Benzene, Toluene, Ethylbenzene, Xylenes

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8021B
Matrix:	Water	Batch#:	74275
Units:	ug/L	Analyzed:	08/06/02
Diln Fac:	1.000		

Type: BS Lab ID: QC186108

Analyte	Spiked	Result	%REC	Limits
MTBE	20.00	20.00	100	59-135
Benzene	20.00	21.44	107	65-122
Toluene	20.00	21.45	107	67-121
Ethylbenzene	20.00	21.33	107	70-121
m,p-Xylenes	40.00	40.63	102	72-125
o-Xylene	20.00	22.14	111	73-122

Surrogate	%REC	Limits
Trifluorotoluene (PID)	94	53-143
Bromofluorobenzene (PID)	104	52-142

Type: BSD Lab ID: QC186109

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
MTBE	20.00	17.84	89	59-135	11	20
Benzene	20.00	19.66	98	65-122	9	20
Toluene	20.00	19.41	97	67-121	10	20
Ethylbenzene	20.00	19.51	98	70-121	9	20
m,p-Xylenes	40.00	36.85	92	72-125	10	20
o-Xylene	20.00	20.16	101	73-122	9	20

Surrogate	%REC	Limits
Trifluorotoluene (PID)	88	53-143
Bromofluorobenzene (PID)	97	52-142

RPD= Relative Percent Difference



### Total Volatile Hydrocarbons

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	8015B (M)
Field ID:	ZZZZZZZZZZ	Batch#:	74232
MSS Lab ID:	159901-004	Sampled:	07/25/02
Matrix:	Water	Received:	07/26/02
Units:	ug/L	Analyzed:	08/02/02
Diln Fac:	1.000		

Type: MS Lab ID: QC185951

Analyte	MSS Result	Spiked	Result	%REC	Limits
Gasoline C7-C12	265.7	2,000	2,474	110	67-120

Surrogate	%REC	Limits
Trifluorotoluene (FID)	121	68-145
Bromofluorobenzene (FID)	113	66-143

Type: MSD Lab ID: QC185952

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	2,000	2,478	111	67-120	0	20

Surrogate	%REC	Limits
Trifluorotoluene (FID)	122	68-145
Bromofluorobenzene (FID)	114	66-143

RPD= Relative Percent Difference

**Benzene, Toluene, Ethylbenzene, Xylenes**

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8021B
Field ID:	ZZZZZZZZZZ	Batch#:	74241
MSS Lab ID:	159956-002	Sampled:	07/30/02
Matrix:	Water	Received:	07/30/02
Units:	ug/L	Analyzed:	08/04/02
Diln Fac:	1.000		

Type: MS                      Lab ID: QC185971

Analyte	MSS Result	Spiked	Result	%REC	Limits
MTBE	<0.2800	20.00	17.43	87	56-146
Benzene	<0.2400	20.00	20.60	103	52-149
Toluene	<0.2300	20.00	20.48	102	69-130
Ethylbenzene	<0.2400	20.00	20.58	103	70-131
m,p-Xylenes	<0.4400	40.00	35.87	90	68-137
o-Xylene	<0.2600	20.00	21.02	105	73-133

Surrogate	%REC	Limits
Trifluorotoluene (PID)	97	53-143
Bromofluorobenzene (PID)	103	52-142

Type: MSD                      Lab ID: QC185972

Analyte	Spiked	Result	%REC	Limits	RPD	Lin
MTBE	20.00	17.33	87	56-146	1	30
Benzene	20.00	20.21	101	52-149	2	30
Toluene	20.00	20.23	101	69-130	1	30
Ethylbenzene	20.00	20.44	102	70-131	1	30
m,p-Xylenes	40.00	35.29	88	68-137	2	30
o-Xylene	20.00	20.76	104	73-133	1	30

Surrogate	%REC	Limits
Trifluorotoluene (PID)	95	53-143
Bromofluorobenzene (PID)	104	52-142

## Purgeable Aromatics by GC/MS

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8260B
Field ID:	MW-1	Batch#:	74341
Lab ID:	159959-001	Sampled:	07/30/02
Matrix:	Water	Received:	07/31/02
Units:	ug/L	Analyzed:	08/08/02
Diln Fac:	100.0		

Analyte	Result	RL
MTBE	13,000	50

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	100	77-130
Toluene-d8	99	80-120
Bromofluorobenzene	90	80-120

## Purgeable Aromatics by GC/MS

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8260B
Field ID:	MW-3	Batch#:	74341
Lab ID:	159959-003	Sampled:	07/30/02
Matrix:	Water	Received:	07/31/02
Units:	ug/L	Analyzed:	08/08/02
Diln Fac:	25.00		

Analyte	Result	RL
MTBE	2,600	13

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	94	77-130
Toluene-d8	100	80-120
Bromofluorobenzene	88	80-120



Purgeable Aromatics by GC/MS

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8260B
Field ID:	MW-5	Batch#:	74341
Lab ID:	159959-005	Sampled:	07/30/02
Matrix:	Water	Received:	07/31/02
Units:	ug/L	Analyzed:	08/08/02
Diln Fac:	1.000		

Analyte	Result	RL
MTBE	ND	0.5

Surrogate	REC	Limits
1,2-Dichloroethane-d4	104	77-130
Toluene-d8	105	80-120
Bromofluorobenzene	118	80-120

**Purgeable Aromatics by GC/MS**

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8260B
Field ID:	MW-7	Batch#:	74341
Lab ID:	159959-007	Sampled:	07/30/02
Matrix:	Water	Received:	07/31/02
Units:	ug/L	Analyzed:	08/09/02
Diln Fac:	1.000		

Analyte	Result	RL
MTBE	46	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	97	77-130
Toluene-d8	102	80-120
Bromofluorobenzene	92	80-120



Purgeable Aromatics by GC/MS

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8260B
Field ID:	MW-8	Batch#:	74341
Lab ID:	159959-008	Sampled:	07/30/02
Matrix:	Water	Received:	07/31/02
Units:	ug/L	Analyzed:	08/08/02
Diln Fac:	10.00		

Analyte	Result	RL
MTBE	1,200	5.0

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	93	77-130
Toluene-d8	100	80-120
Bromofluorobenzene	87	80-120





Purgeable Aromatics by GC/MS

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8260B
Field ID:	MW-10	Batch#:	74341
Lab ID:	159959-009	Sampled:	07/30/02
Matrix:	Water	Received:	07/31/02
Units:	ug/L	Analyzed:	08/08/02
Diln Fac:	1.000		

Analyte	Result	RL
MTBE	72	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	101	77-130
Toluene-d8	99	80-120
Bromofluorobenzene	90	80-120



Purgeable Aromatics by GC/MS

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8260B
Field ID:	MW-12	Batch#:	74341
Lab ID:	159959-011	Sampled:	07/30/02
Matrix:	Water	Received:	07/31/02
Units:	ug/L	Analyzed:	08/09/02
Diln Fac:	1.000		

Analyte	Result	RL
MTBE	100	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	92	77-130
Toluene-d8	102	80-120
Bromofluorobenzene	88	80-120



Purgeable Aromatics by GC/MS

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC186332	Batch#:	74341
Matrix:	Water	Analyzed:	08/08/02
Units:	ug/L		

Analyte	Result	RL
MTBE	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	104	77-130
Toluene-d8	102	80-120
Bromofluorobenzene	118	80-120

**Purgeable Aromatics by GC/MS**

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC186333	Batch#:	74341
Matrix:	Water	Analyzed:	08/08/02
Units:	ug/L		

Analyte	Result	RL
MTBE	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	106	77-130
Toluene-d8	105	80-120
Bromofluorobenzene	87	80-120

Purgeable Aromatics by GC/MS

Lab #:	159959	Location:	3609 Int'l Blvd., Oakland
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2331	Analysis:	EPA 8260B
Matrix:	Water	Batch#:	74341
Units:	ug/L	Analyzed:	08/08/02
Diln Fac:	1.000		

Type: BS Lab ID: QC186330

Analyte	Spiked	Result	%REC	Limits
MTBE	50.00	55.94	112	54-131

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	104	77-130
Toluene-d8	102	80-120
Bromofluorobenzene	98	80-120

Type: BSD Lab ID: QC186331

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
MTBE	50.00	49.96	100	54-131	11	20

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	99	77-130
Toluene-d8	104	80-120
Bromofluorobenzene	98	80-120

# Appendix C

Laboratory Reports and Chain of Custody Forms for  
Treatment System



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

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

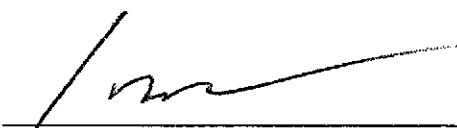
A N A L Y T I C A L   R E P O R T

Prepared for:

SOMA Environmental Engineering Inc.  
2680 Bishop Dr.  
Suite 203  
San Ramon, CA 94583

Date: 30-AUG-02  
Lab Job Number: 160367  
Project ID: 2333  
Location: 3609 International Blvd.

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

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### Total Volatile Hydrocarbons

Lab #: 160367	Location: 3609 International Blvd.
Client: SOMA Environmental Engineering Inc.	Prep: EPA 5030B
Project#: 2333	Analysis: 8015B (M)
Matrix: Water	Sampled: 08/23/02
Units: ug/L	Received: 08/23/02

Field ID: INFLUENT	Diln Fac: 10.00
Type: SAMPLE	Batch#: 74791
Lab ID: 160367-001	Analyzed: 08/27/02

Analyte	Result	RL
Gasoline C7-C12	12,000	500

Surrogate	%REC	Limits
Trifluorotoluene (FID)	90	68-145
Bromofluorobenzene (FID)	78	66-143

Field ID: GAC-1	Diln Fac: 1.000
Type: SAMPLE	Batch#: 74733
Lab ID: 160367-002	Analyzed: 08/26/02

Analyte	Result	RL
Gasoline C7-C12	ND	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	99	68-145
Bromofluorobenzene (FID)	106	66-143

Field ID: PSP#1	Diln Fac: 1.000
Type: SAMPLE	Batch#: 74733
Lab ID: 160367-003	Analyzed: 08/26/02

Analyte	Result	RL
Gasoline C7-C12	ND	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	99	68-145
Bromofluorobenzene (FID)	108	66-143

# Chromatogram

Sample Name : 160367-001,74791,TVH ONLY

Sample #: C1

Page 1 of 1

FileName : G:\GC05\DATA\239G007.raw

Date : 8/27/02 07:06 PM

Method : TVHBTXE

Time of Injection: 8/27/02 06:41 PM

Start Time : 0.00 min

End Time : 25.00 min

Low Point : -30.67 mV

High Point : 972.56 mV

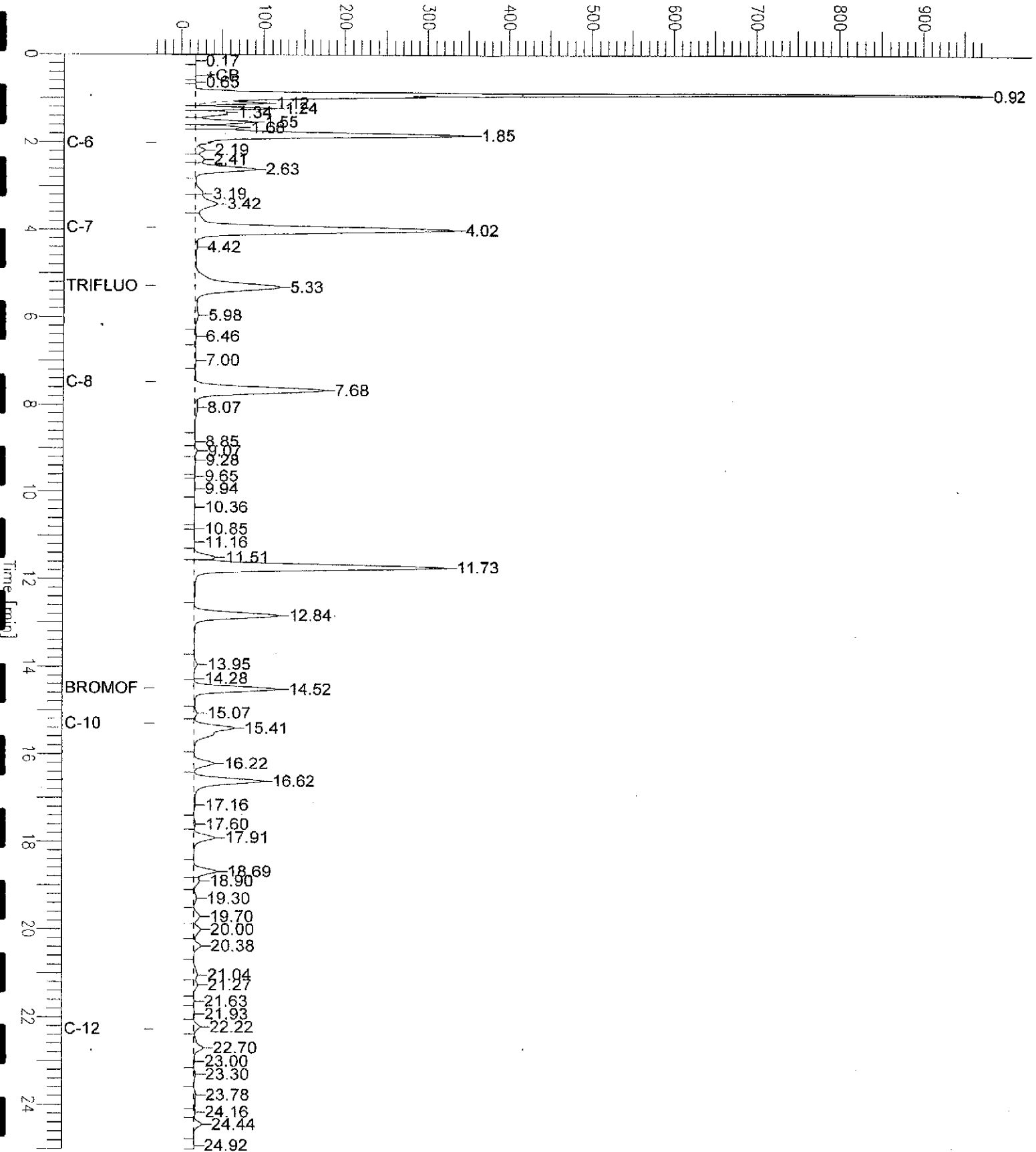
Scale Factor: 1.0

Plot Offset: -31 mV

Plot Scale: 1003.2 mV

Influent

Response [mV]



# Chromatogram

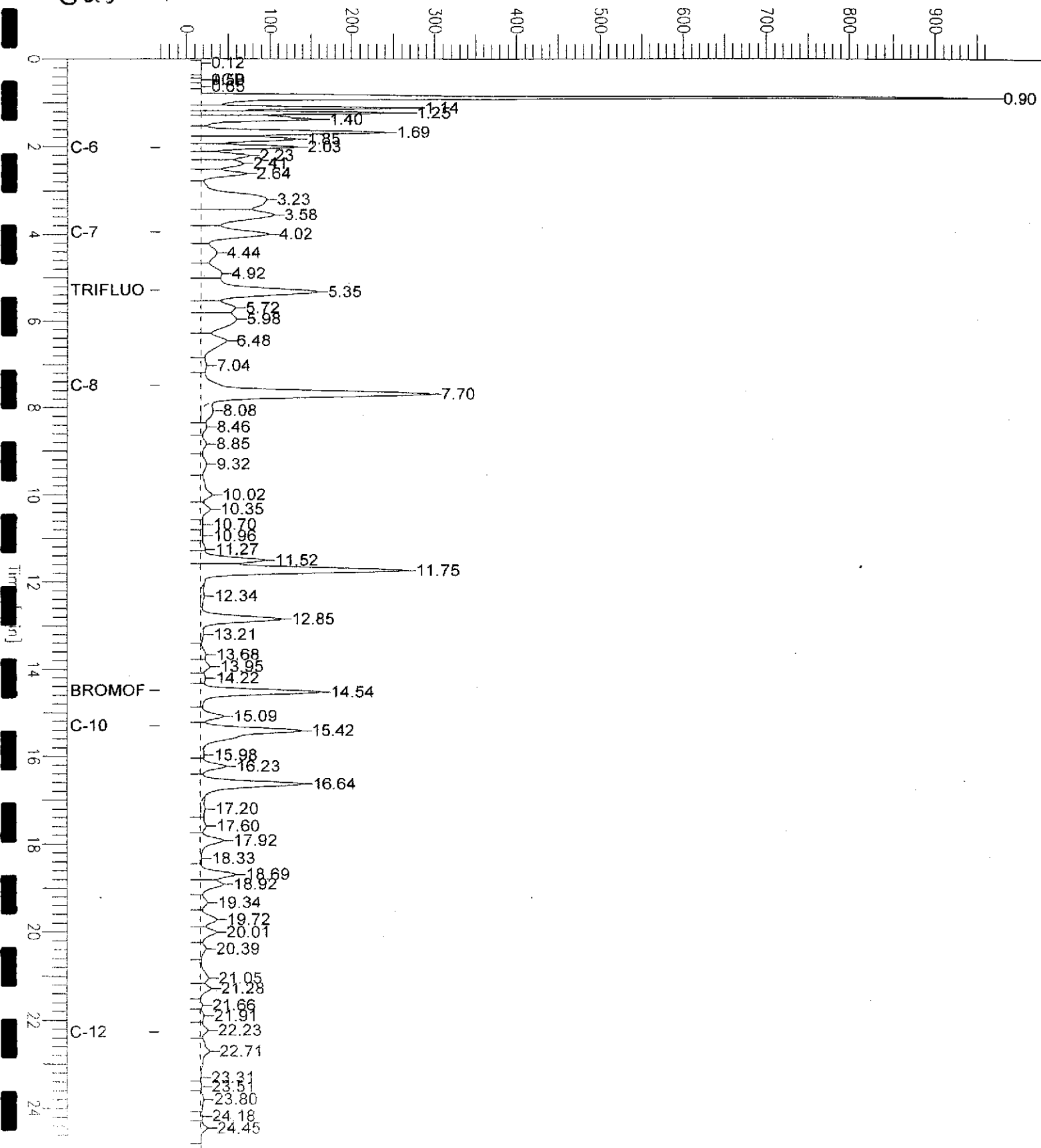
Sample Name : CCV/BS, QC188011, 74791, 02WS1323, 5/5000  
Sample Name : G:\GC05\DATA\239G002.raw  
Method : TVHBTXE  
Start Time : 0.00 min End Time : 25.00 min  
Scale Factor : 1.0 Plot Offset : -31 mV

Sample # :  
Date : 8/27/02 04:03 PM  
Time of Injection: 8/27/02 03:24 PM  
Low Point : -30.62 mV High Point : 969.18 mV  
Plot Scale: 999.8 mV

Page 1 of 1

Gas Standard

Response [mV]





Total Volatile Hydrocarbons

Lab #:	160367	Location:	3609 International Blvd.
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	8015B(M)
Matrix:	Water	Sampled:	08/23/02
Units:	ug/L	Received:	08/23/02

Type:	BLANK	Batch#:	74733
Lab ID:	QC187805	Analyzed:	08/26/02
Diln Fac:	1.000		

Analyte	Result	RL
Gasoline C7-C12	ND	50
Surrogate	%REC	Limits
Trifluorotoluene (FID)	100	68-145
Bromofluorobenzene (FID)	101	66-143

Type:	BLANK	Batch#:	74791
Lab ID:	QC188010	Analyzed:	08/27/02
Diln Fac:	1.000		

Analyte	Result	RL
Gasoline C7-C12	ND	50
Surrogate	%REC	Limits
Trifluorotoluene (FID)	104	68-145
Bromofluorobenzene (FID)	109	66-143

### Total Volatile Hydrocarbons

Lab #: 160367	Location: 3609 International Blvd.
Client: SOMA Environmental Engineering Inc.	Prep: EPA 5030B
Project#: 2333	Analysis: 8015B(M)
Type: LCS	Diln Fac: 1.000
Lab ID: QC187806	Batch#: 74733
Matrix: Water	Analyzed: 08/26/02
Units: ug/L	

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	2,000	2,106	105	79-120

Surrogate	%REC	Limits
Trifluorotoluene (FID)	113	68-145
Bromofluorobenzene (FID)	104	66-143



Total Volatile Hydrocarbons

Lab #:	160367	Location:	3609 International Blvd.
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	8015B (M)
Field ID:	GAC-1	Batch#:	74733
MSS Lab ID:	160367-002	Sampled:	08/23/02
Matrix:	Water	Received:	08/23/02
Units:	ug/L	Analyzed:	08/27/02
Diln Fac:	1.000		

Type: MS Lab ID: QC187875

Analyte	MSS Result	Spiked	Result	%REC	Limits
Gasoline C7-C12	<33.00	2,000	1,968	98	67-120
Surrogate	%REC	Limits			
Trifluorotoluene (FID)	112	68-145			
Bromofluorobenzene (FID)	106	66-143			

Type: MSD Lab ID: QC187876

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	2,000	1,995	100	67-120	1	20
Surrogate	%REC	Limits				
Trifluorotoluene (FID)	111	68-145				
Bromofluorobenzene (FID)	105	66-143				

## Purgeable Aromatics by GC/MS

Lab #:	160367	Location:	3609 International Blvd.
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Field ID:	INFLUENT	Batch#:	74746
Lab ID:	160367-001	Sampled:	08/23/02
Matrix:	Water	Received:	08/23/02
Units:	ug/L	Analyzed:	08/26/02
Diln Fac:	71.43		

Analyte	Result	RL
MTBE	9,200	36
Benzene	1,300	36
Toluene	690	36
Chlorobenzene	ND	36
Ethylbenzene	82	36
m,p-Xylenes	1,400	36
o-Xylene	390	36
1,3-Dichlorobenzene	ND	36
1,4-Dichlorobenzene	ND	36
1,2-Dichlorobenzene	ND	36

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	102	77-130
Toluene-d8	97	80-120
Bromofluorobenzene	80	80-120



**Purgeable Aromatics by GC/MS**

Lab #:	160367	Location:	3609 International Blvd.
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Field ID:	GAC-1	Batch#:	74746
Lab ID:	160367-002	Sampled:	08/23/02
Matrix:	Water	Received:	08/23/02
Units:	ug/L	Analyzed:	08/27/02
Diln Fac:	1.000		

Analyte	Result	RL
MTBE	ND	0.5
Benzene	ND	0.5
Toluene	ND	0.5
Chlorobenzene	ND	0.5
Ethylbenzene	ND	0.5
m,p-Xylenes	ND	0.5
o-Xylene	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	103	77-130
Toluene-d8	98	80-120
Bromofluorobenzene	80	80-120



## Purgeable Aromatics by GC/MS

Lab #:	160367	Location:	3609 International Blvd.
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Field ID:	PSP#1	Batch#:	74746
Lab ID:	160367-003	Sampled:	08/23/02
Matrix:	Water	Received:	08/23/02
Units:	ug/L	Analyzed:	08/27/02
Diln Fac:	1.000		

Analyte	Result	RL
MTBE	1.0	0.5
Benzene	ND	0.5
Toluene	ND	0.5
Chlorobenzene	ND	0.5
Ethylbenzene	ND	0.5
m,p-Xylenes	ND	0.5
o-Xylene	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	107	77-130
Toluene-d8	99	80-120
Bromofluorobenzene	80	80-120

ND= Not Detected

RL= Reporting Limit

**Purgeable Aromatics by GC/MS**

Lab #:	160367	Location:	3609 International Blvd.
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC187850	Batch#:	74746
Matrix:	Water	Analyzed:	08/26/02
Units:	ug/L		

Analyte	Result	RL
MTBE	ND	0.5
Benzene	ND	0.5
Toluene	ND	0.5
Chlorobenzene	ND	0.5
Ethylbenzene	ND	0.5
m,p-Xylenes	ND	0.5
o-Xylene	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	103	77-130
Toluene-d8	97	80-120
Bromofluorobenzene	82	80-120

ND= Not Detected

RL= Reporting Limit



## Purgeable Aromatics by GC/MS

Lab #:	160367	Location:	3609 International Blvd.
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Matrix:	Water	Batch#:	74746
Units:	ug/L	Analyzed:	08/26/02
Diln Fac:	1.000		

Type: BS Lab ID: QC187848

Analyte	Spiked	Result	%REC	Limits
Benzene	50.00	47.74	95	76-120
Toluene	50.00	46.41	93	79-120
Chlorobenzene	50.00	49.15	98	80-120

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	102	77-130
Toluene-d8	94	80-120
Bromofluorobenzene	101	80-120

Type: BSD Lab ID: QC187849

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Benzene	50.00	47.71	95	76-120	0	20
Toluene	50.00	45.73	91	79-120	1	20
Chlorobenzene	50.00	48.71	97	80-120	1	20

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	100	77-130
Toluene-d8	95	80-120
Bromofluorobenzene	99	80-120



A N A L Y T I C A L   R E P O R T

Prepared for:

SOMA Environmental Engineering Inc.  
2680 Bishop Dr.  
Suite 203  
San Ramon, CA 94583

Date: 30-JUL-02  
Lab Job Number: 159823  
Project ID: 2333  
Location: Tony's Auto Express-Oak

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

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# CHAIN OF CUSTODY FORM

**Curtis & Tompkins, Ltd.**

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

C&T  
 LOGIN # 159823

**Analyses**

Project No: 2337

Samplerz: Tommy Perini / Roger Papler

Project Name: Rizi / Oak 3604 Int'l

Report To: Tommy Perini / Roger Papler

Project P.O.: \_\_\_\_\_

Company: SOMA Env. Eng

Telephone: (925) 244-6600

Turnaround Time: Standard

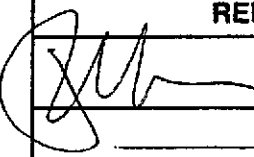
Fax: (925) 244-6600

Laboratory Number	Sample ID.	Sampling Date Time	Matrix			# of Containers	Preservative				Field Notes
			Soil	Water	Waste		HCL	H <sub>2</sub> SO	HNO <sub>3</sub>	ICE	
Factory Use	PSP-1	11/5P		X		3	X			X	Treatment system PSP-1
	KAL-1	120P		X		3	X			X	KAL-1
	Influent	125P		X		3	X			X	Influent
Preservation Correct? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A											
Received <input type="checkbox"/> On Ice <input checked="" type="checkbox"/> Cold <input type="checkbox"/> Ambient <input checked="" type="checkbox"/> Intact											

PH-9 8015  
 BTEP & MBE 8015  
 8140

Notes: \_\_\_\_\_

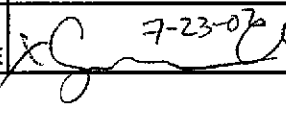
**RELINQUISHED BY:**

  
RW Papler     23 July 02 / 1435  
 DATE/TIME

\_\_\_\_\_  
DATE/TIME

\_\_\_\_\_  
DATE/TIME

**RECEIVED BY:**

  
 7-23-02     2:35  
 DATE/TIME

\_\_\_\_\_  
DATE/TIME

Signature

### Total Volatile Hydrocarbons

Lab #: 159823	Location: Tony's Auto Express-Oak
Client: SOMA Environmental Engineering Inc.	Prep: EPA 5030B
Project#: 2333	Analysis: 8015B(M)
Matrix: Water	Sampled: 07/23/02
Units: ug/L	Received: 07/23/02

Field ID: PSP-1	Diln Fac: 1.000
Type: SAMPLE	Batch#: 73985
Lab ID: 159823-001	Analyzed: 07/24/02

Analyte	Result	RL
Gasoline C7-C12	ND	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	98	68-145
Bromofluorobenzene (FID)	112	66-143

Field ID: GAC-1	Diln Fac: 1.000
Type: SAMPLE	Batch#: 73985
Lab ID: 159823-002	Analyzed: 07/25/02

Analyte	Result	RL
Gasoline C7-C12	ND	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	99	68-145
Bromofluorobenzene (FID)	111	66-143

Field ID: INFLUENT	Diln Fac: 25.00
Type: SAMPLE	Batch#: 74055
Lab ID: 159823-003	Analyzed: 07/26/02

Analyte	Result	RL
Gasoline C7-C12	15,000	1,300

Surrogate	%REC	Limits
Trifluorotoluene (FID)	106	68-145
Bromofluorobenzene (FID)	110	66-143

GC07 TVH 'A' Data File RTX 502

Sample Name : 159823-003,74055

Sample #: ALHS

Page 1 of 1

FileName : G:\GC07\DATA\207A011.raw

Date : 7/26/02 09:42 PM

Method : TVHBTXE

Time of Injection: 7/26/02 09:16 PM

Start Time : 0.00 min

End Time : 26.00 min

Low Point : 2.42 mV

High Point : 270.54 mV

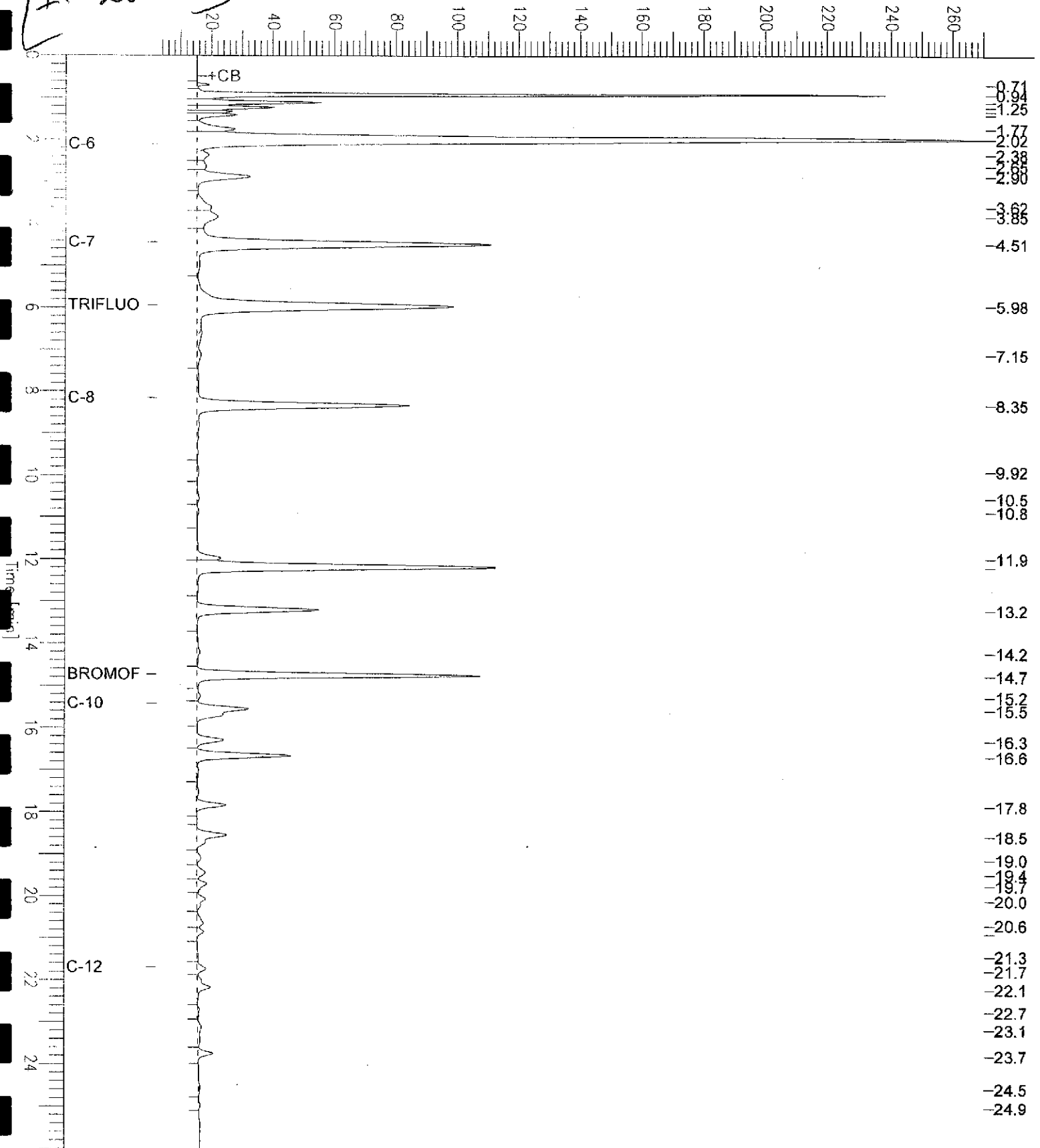
Scale Factor: 1.0

Plot Offset: 2 mV

Plot Scale: 268.1 mV

INFLUENT

Response [mV]



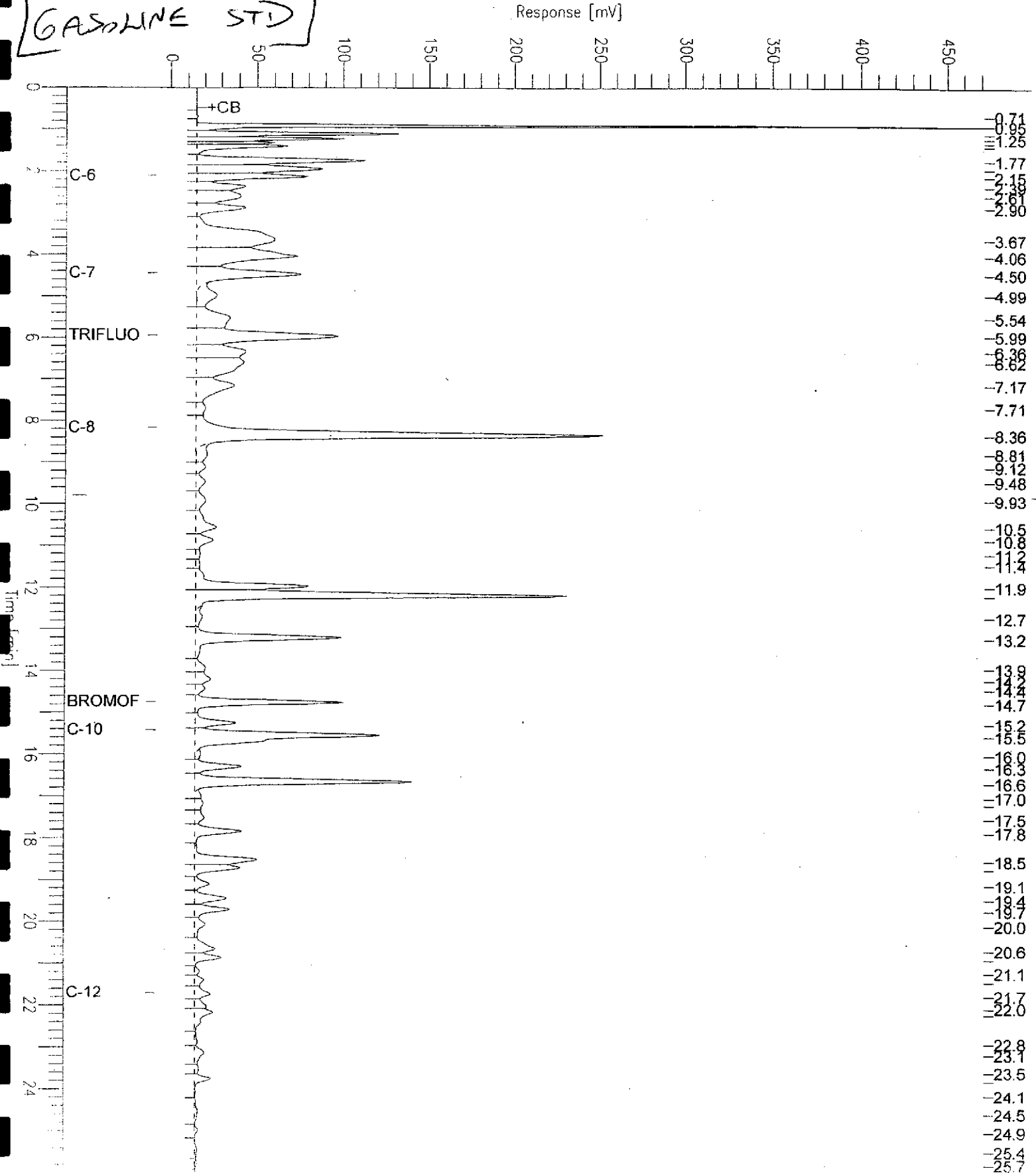


# GC07 TVH 'A' Data File RTX 502

Sample Name : ccv/lcs,qc185297,74055,02ws1033,5/5000  
 FileName : G:\GC07\DATA\207A003.raw  
 Method : TVHBTXE  
 Start Time : 0.00 min      End Time : 26.00 min  
 Scale Factor : 1.0      Plot Offset : -8 mV

Sample # :  
 Date : 7/26/02 05:10 PM  
 Time of Injection: 7/26/02 04:44 PM  
 Low Point : -7.95 mV      High Point : 471.22 mV  
 Plot Scale: 479.2 mV

GASOLINE STD





**Total Volatile Hydrocarbons**

Lab #:	159823	Location:	Tony's Auto Express-Oak
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	8015B(M)
Matrix:	Water	Sampled:	07/23/02
Units:	ug/L	Received:	07/23/02

Type:	BLANK	Batch#:	73985
Lab ID:	QC185018	Analyzed:	07/24/02
Diln Fac:	1.000		

Analyte	Result	RL
Gasoline C7-C12	ND	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	99	68-145
Bromofluorobenzene (FID)	109	66-143

Type:	BLANK	Batch#:	74055
Lab ID:	QC185296	Analyzed:	07/26/02
Diln Fac:	1.000		

Analyte	Result	RL
Gasoline C7-C12	ND	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	89	68-145
Bromofluorobenzene (FID)	101	66-143

### Total Volatile Hydrocarbons

Lab #:	159823	Location:	Tony's Auto Express-Oak
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	8015B(M)
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC185019	Batch#:	73985
Matrix:	Water	Analyzed:	07/25/02
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	3,000	3,278	109	79-120

Surrogate	%REC	Limits
Trifluorotoluene (FID)	123	68-145
Bromofluorobenzene (FID)	114	66-143

### Total Volatile Hydrocarbons

Lab #:	159823	Location:	Tony's Auto Express-Oak
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	8015B(M)
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC185297	Batch#:	74055
Matrix:	Water	Analyzed:	07/26/02
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	2,000	2,189	109	79-120

Surrogate	%REC	Limits
Trifluorotoluene (FID)	106	68-145
Bromofluorobenzene (FID)	106	66-143





Total Volatile Hydrocarbons

Lab #:	159823	Location:	Tony's Auto Express-Oak
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	8015B (M)
Field ID:	ZZZZZZZZZZ	Batch#:	74055
MSS Lab ID:	159878-002	Sampled:	07/24/02
Matrix:	Water	Received:	07/25/02
Units:	ug/L	Analyzed:	07/26/02
Diln Fac:	1.000		

Type: MS Lab ID: QC185298

Analyte	MSS Result	Spiked	Result	%REC	Limits
Gasoline C7-C12	104.7	2,000	2,275	109	67-120

Surrogate	%REC	Limits
Trifluorotoluene (FID)	107	68-145
Bromofluorobenzene (FID)	117	66-143

Type: MSD Lab ID: QC185299

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	2,000	2,241	107	67-120	1	20

Surrogate	%REC	Limits
Trifluorotoluene (FID)	108	68-145
Bromofluorobenzene (FID)	119	66-143



## Purgeable Organics by GC/MS

Lab #:	159823	Location:	Tony's Auto Express-Oak
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Field ID:	PSP-1	Batch#:	74006
Lab ID:	159823-001	Sampled:	07/23/02
Matrix:	Water	Received:	07/23/02
Units:	ug/L	Analyzed:	07/25/02
Diln Fac:	1.000		

Analyte	Result	RL
Freon 12	ND	10
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.0
Acetone	ND	20
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
Carbon Disulfide	ND	5.0
MTBE	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
Vinyl Acetate	ND	50
1,1-Dichloroethane	ND	5.0
2-Butanone	ND	10
cis-1,2-Dichloroethene	ND	5.0
2,2-Dichloropropane	ND	5.0
Chloroform	ND	5.0
Bromochloromethane	ND	10
1,1,1-Trichloroethane	ND	5.0
1,1-Dichloropropene	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Benzene	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
4-Methyl-2-Pentanone	ND	10
cis-1,3-Dichloropropene	ND	5.0
Toluene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
2-Hexanone	ND	10
1,3-Dichloropropane	ND	5.0
Tetrachloroethene	ND	5.0

D= Not Detected

L= Reporting Limit



## Purgeable Organics by GC/MS

Lab #:	159823	Location:	Tony's Auto Express-Oak
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Field ID:	PSP-1	Batch#:	74006
Lab ID:	159823-001	Sampled:	07/23/02
Matrix:	Water	Received:	07/23/02
Units:	ug/L	Analyzed:	07/25/02
Diln Fac:	1.000		

Analyte	Result	RL
Dibromochloromethane	ND	5.0
1,2-Dibromoethane	ND	5.0
Chlorobenzene	ND	5.0
1,1,1,2-Tetrachloroethane	ND	5.0
Ethylbenzene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0
Styrene	ND	5.0
Bromoform	ND	5.0
Isopropylbenzene	ND	5.0
1,1,2,2-Tetrachloroethane	ND	5.0
1,2,3-Trichloropropane	ND	5.0
Propylbenzene	ND	5.0
Bromobenzene	ND	5.0
1,3,5-Trimethylbenzene	ND	5.0
2-Chlorotoluene	ND	5.0
4-Chlorotoluene	ND	5.0
tert-Butylbenzene	ND	5.0
1,2,4-Trimethylbenzene	ND	5.0
sec-Butylbenzene	ND	5.0
para-Isopropyl Toluene	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
n-Butylbenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
1,2-Dibromo-3-Chloropropane	ND	5.0
1,2,4-Trichlorobenzene	ND	5.0
Hexachlorobutadiene	ND	5.0
Naphthalene	ND	5.0
1,2,3-Trichlorobenzene	ND	5.0

Surrogate	%REC	Limits
Dibromofluoromethane	100	80-121
1,2-Dichloroethane-d4	111	77-130
Toluene-d8	103	80-120
Bromofluorobenzene	106	80-120

D= Not Detected

L= Reporting Limit





## Purgeable Organics by GC/MS

Lab #:	159823	Location:	Tony's Auto Express-Oak
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Field ID:	GAC-1	Batch#:	74006
Lab ID:	159823-002	Sampled:	07/23/02
Matrix:	Water	Received:	07/23/02
Units:	ug/L	Analyzed:	07/25/02
Diln Fac:	1.000		

Analyte	Result	RL
Freon 12	ND	10
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.0
Acetone	ND	20
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
Carbon Disulfide	ND	5.0
MTBE	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
Vinyl Acetate	ND	50
1,1-Dichloroethane	ND	5.0
2-Butanone	ND	10
cis-1,2-Dichloroethene	ND	5.0
2,2-Dichloropropane	ND	5.0
Chloroform	ND	5.0
Bromochloromethane	ND	10
1,1,1-Trichloroethane	ND	5.0
1,1-Dichloropropene	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Benzene	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
4-Methyl-2-Pentanone	ND	10
cis-1,3-Dichloropropene	ND	5.0
Toluene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
2-Hexanone	ND	10
1,3-Dichloropropane	ND	5.0
Tetrachloroethene	ND	5.0

D= Not Detected

L= Reporting Limit



## Purgeable Organics by GC/MS

Lab #:	159823	Location:	Tony's Auto Express-Oak
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Field ID:	GAC-1	Batch#:	74006
Lab ID:	159823-002	Sampled:	07/23/02
Matrix:	Water	Received:	07/23/02
Units:	ug/L	Analyzed:	07/25/02
Diln Fac:	1.000		

Analyte	Result	RL
Dibromochloromethane	ND	5.0
1,2-Dibromoethane	ND	5.0
Chlorobenzene	ND	5.0
1,1,1,2-Tetrachloroethane	ND	5.0
Ethylbenzene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0
Styrene	ND	5.0
Bromoform	ND	5.0
Isopropylbenzene	ND	5.0
1,1,2,2-Tetrachloroethane	ND	5.0
1,2,3-Trichloropropane	ND	5.0
Propylbenzene	ND	5.0
Bromobenzene	ND	5.0
1,3,5-Trimethylbenzene	ND	5.0
2-Chlorotoluene	ND	5.0
4-Chlorotoluene	ND	5.0
tert-Butylbenzene	ND	5.0
1,2,4-Trimethylbenzene	ND	5.0
sec-Butylbenzene	ND	5.0
para-Isopropyl Toluene	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
n-Butylbenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
1,2-Dibromo-3-Chloropropane	ND	5.0
1,2,4-Trichlorobenzene	ND	5.0
Hexachlorobutadiene	ND	5.0
Naphthalene	ND	5.0
1,2,3-Trichlorobenzene	ND	5.0

Surrogate	%REC	Limits
Dibromofluoromethane	93	80-121
1,2-Dichloroethane-d4	109	77-130
Toluene-d8	102	80-120
Bromofluorobenzene	102	80-120

D= Not Detected

L= Reporting Limit

## Purgeable Organics by GC/MS

Lab #:	159823	Location:	Tony's Auto Express-Oak
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Field ID:	INFLUENT	Batch#:	74006
Lab ID:	159823-003	Sampled:	07/23/02
Matrix:	Water	Received:	07/23/02
Units:	ug/L	Analyzed:	07/25/02
Diln Fac:	40.00		

Analyte	Result	RL
Freon 12	ND	400
Chloromethane	ND	400
Vinyl Chloride	ND	400
Bromomethane	ND	400
Chloroethane	ND	400
Trichlorofluoromethane	ND	200
Acetone	ND	800
Freon 113	ND	200
1,1-Dichloroethene	ND	200
Methylene Chloride	ND	800
Carbon Disulfide	ND	200
MTBE	7,500	200
trans-1,2-Dichloroethene	ND	200
Vinyl Acetate	ND	2,000
1,1-Dichloroethane	ND	200
2-Butanone	ND	400
cis-1,2-Dichloroethene	ND	200
2,2-Dichloropropane	ND	200
Chloroform	ND	200
Bromochloromethane	ND	400
1,1,1-Trichloroethane	ND	200
1,1-Dichloropropene	ND	200
Carbon Tetrachloride	ND	200
1,2-Dichloroethane	ND	200
Benzene	1,400	200
Trichloroethene	ND	200
1,2-Dichloropropane	ND	200
Bromodichloromethane	ND	200
Dibromomethane	ND	200
4-Methyl-2-Pentanone	ND	400
cis-1,3-Dichloropropene	ND	200
Toluene	970	200
trans-1,3-Dichloropropene	ND	200
1,1,2-Trichloroethane	ND	200
2-Hexanone	ND	400
1,3-Dichloropropane	ND	200
Tetrachloroethene	ND	200

ND= Not Detected

L= Reporting Limit

## Purgeable Organics by GC/MS

Lab #:	159823	Location:	Tony's Auto Express-Oak
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Field ID:	INFLUENT	Batch#:	74006
Lab ID:	159823-003	Sampled:	07/23/02
Matrix:	Water	Received:	07/23/02
Units:	ug/L	Analyzed:	07/25/02
Diln Fac:	40.00		

Analyte	Result	RL
Dibromochloromethane	ND	200
1,2-Dibromoethane	ND	200
Chlorobenzene	ND	200
1,1,1,2-Tetrachloroethane	ND	200
Ethylbenzene	ND	200
m,p-Xylenes	1,200	200
o-Xylene	400	200
Styrene	ND	200
Bromoform	ND	200
Isopropylbenzene	ND	200
1,1,2,2-Tetrachloroethane	ND	200
1,2,3-Trichloropropane	ND	200
Propylbenzene	ND	200
Bromobenzene	ND	200
1,3,5-Trimethylbenzene	ND	200
2-Chlorotoluene	ND	200
4-Chlorotoluene	ND	200
tert-Butylbenzene	ND	200
1,2,4-Trimethylbenzene	270	200
sec-Butylbenzene	ND	200
para-Isopropyl Toluene	ND	200
1,3-Dichlorobenzene	ND	200
1,4-Dichlorobenzene	ND	200
n-Butylbenzene	ND	200
1,2-Dichlorobenzene	ND	200
1,2-Dibromo-3-Chloropropane	ND	200
1,2,4-Trichlorobenzene	ND	200
Hexachlorobutadiene	ND	200
Naphthalene	ND	200
1,2,3-Trichlorobenzene	ND	200

Surrogate	%REC	Limits
Dibromofluoromethane	92	80-121
1,2-Dichloroethane-d4	105	77-130
Toluene-d8	100	80-120
Bromofluorobenzene	99	80-120

D= Not Detected  
L= Reporting Limit

## Purgeable Organics by GC/MS

Lab #:	159823	Location:	Tony's Auto Express-Oak
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC185098	Batch#:	74006
Matrix:	Water	Analyzed:	07/25/02
Units:	ug/L		

Analyte	Result	RL
Freon 12	ND	10
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.0
Acetone	ND	20
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
Carbon Disulfide	ND	5.0
MTBE	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
Vinyl Acetate	ND	50
1,1-Dichloroethane	ND	5.0
2-Butanone	ND	10
cis-1,2-Dichloroethene	ND	5.0
2,2-Dichloropropane	ND	5.0
Chloroform	ND	5.0
Bromochloromethane	ND	10
1,1,1-Trichloroethane	ND	5.0
1,1-Dichloropropene	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Benzene	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
4-Methyl-2-Pentanone	ND	10
cis-1,3-Dichloropropene	ND	5.0
Toluene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
2-Hexanone	ND	10
1,3-Dichloropropane	ND	5.0
Tetrachloroethene	ND	5.0
Dibromochloromethane	ND	5.0

D= Not Detected

L= Reporting Limit

## Purgeable Organics by GC/MS

Lab #:	159823	Location:	Tony's Auto Express-Oak
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC185098	Batch#:	74006
Matrix:	Water	Analyzed:	07/25/02
Units:	ug/L		

Analyte	Result	RL
1,2-Dibromoethane	ND	5.0
Chlorobenzene	ND	5.0
1,1,1,2-Tetrachloroethane	ND	5.0
Ethylbenzene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0
Styrene	ND	5.0
Bromoform	ND	5.0
Isopropylbenzene	ND	5.0
1,1,2,2-Tetrachloroethane	ND	5.0
1,2,3-Trichloropropane	ND	5.0
Propylbenzene	ND	5.0
Bromobenzene	ND	5.0
1,3,5-Trimethylbenzene	ND	5.0
2-Chlorotoluene	ND	5.0
4-Chlorotoluene	ND	5.0
tert-Butylbenzene	ND	5.0
1,2,4-Trimethylbenzene	ND	5.0
sec-Butylbenzene	ND	5.0
para-Isopropyl Toluene	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
n-Butylbenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
1,2-Dibromo-3-Chloropropane	ND	5.0
1,2,4-Trichlorobenzene	ND	5.0
Hexachlorobutadiene	ND	5.0
Naphthalene	ND	5.0
1,2,3-Trichlorobenzene	ND	5.0

Surrogate	%REC	Limits
Dibromofluoromethane	91	80-121
1,2-Dichloroethane-d4	103	77-130
Toluene-d8	100	80-120
Bromofluorobenzene	101	80-120

ND= Not Detected  
 RL= Reporting Limit

**Purgeable Organics by GC/MS**

Lab #:	159823	Location:	Tony's Auto Express-Oak
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Matrix:	Water	Batch#:	74006
Units:	ug/L	Analyzed:	07/25/02
Diln Fac:	1.000		

Type: BS Lab ID: QC185096

Analyte	Spiked	Result	%REC	Limits
1,1-Dichloroethene	50.00	49.79	100	71-131
Benzene	50.00	51.23	102	76-120
Trichloroethene	50.00	49.65	99	78-120
Toluene	50.00	52.02	104	79-120
Chlorobenzene	50.00	52.46	105	80-120

Surrogate	%REC	Limits
Dibromofluoromethane	90	80-121
1,2-Dichloroethane-d4	101	77-130
Toluene-d8	103	80-120
Bromofluorobenzene	92	80-120

Type: BSD Lab ID: QC185097

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
1,1-Dichloroethene	50.00	49.11	98	71-131	1	20
Benzene	50.00	49.46	99	76-120	4	20
Trichloroethene	50.00	48.40	97	78-120	3	20
Toluene	50.00	50.16	100	79-120	4	20
Chlorobenzene	50.00	50.83	102	80-120	3	20

Surrogate	%REC	Limits
Dibromofluoromethane	92	80-121
1,2-Dichloroethane-d4	101	77-130
Toluene-d8	101	80-120
Bromofluorobenzene	94	80-120

RPD= Relative Percent Difference



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A N A L Y T I C A L   R E P O R T

Prepared for:

SOMA Environmental Engineering Inc.  
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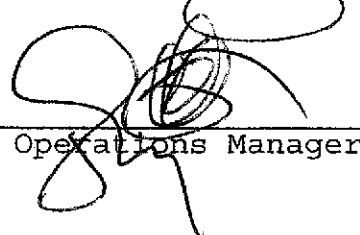
Date: 03-JUL-02  
Lab Job Number: 159338  
Project ID: 2333  
Location: Oakland - Tony's

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

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## Total Volatile Hydrocarbons

Lab #:	159338	Location:	Oakland - Tony's
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	8015B(M)
Matrix:	Water	Sampled:	06/24/02
Units:	ug/L	Received:	06/24/02

Field ID:	PSP#1	Diln Fac:	1.000
Type:	SAMPLE	Batch#:	73277
Lab ID:	159338-001	Analyzed:	06/26/02

Analyte	Result	RL
Gasoline C7-C12	ND	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	88	68-145
Bromofluorobenzene (FID)	77	66-143

Field ID:	GAC-1	Diln Fac:	1.000
Type:	SAMPLE	Batch#:	73277
Lab ID:	159338-002	Analyzed:	06/25/02

Analyte	Result	RL
Gasoline C7-C12	ND	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	89	68-145
Bromofluorobenzene (FID)	79	66-143

Field ID:	INFLUENT	Diln Fac:	5.000
Type:	SAMPLE	Batch#:	73306
Lab ID:	159338-003	Analyzed:	06/27/02

Analyte	Result	RL
Gasoline C7-C12	16,000	250

Surrogate	%REC	Limits
Trifluorotoluene (FID)	132	68-145
Bromofluorobenzene (FID)	79	66-143

ND= Not Detected  
 RL= Reporting Limit

# GC19 TVH 'X' Data File (FID)

Sample Name : 159338-003,73306

Sample #: c1

Page 1 of 1

FileName : G:\GC19\DATA\177X025.raw

Date : 6/27/02 06:47 AM

Method : TVHBTXE

Time of Injection: 6/27/02 06:20 AM

Start Time : 0.00 min

End Time : 26.80 min

Low Point : -31.24 mV

High Point : 1055.41 mV

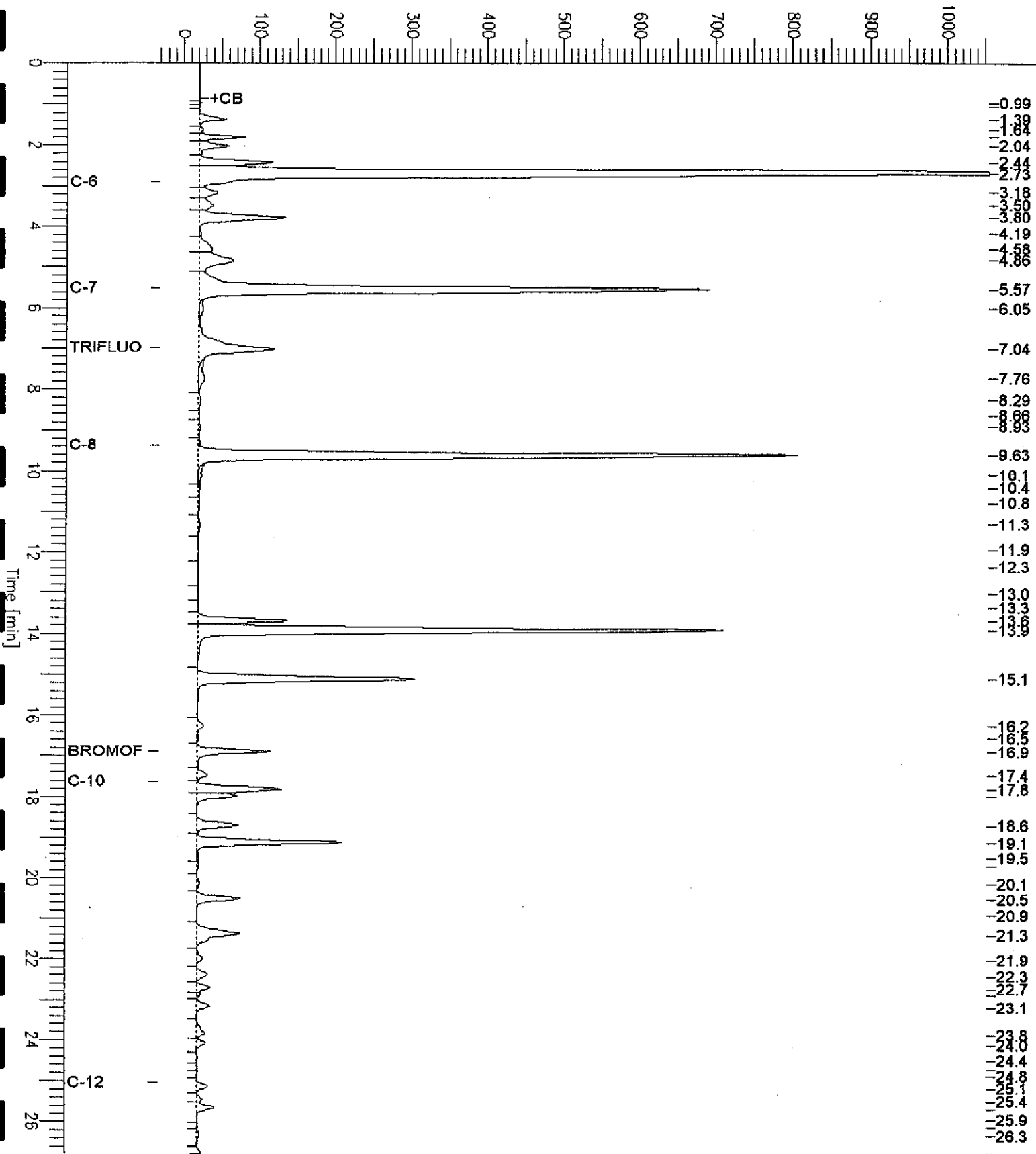
Scale Factor: 1.0

Plot Offset: -31 mV

Plot Scale: 1086.6 mV

INFLUENT

Response [mV]



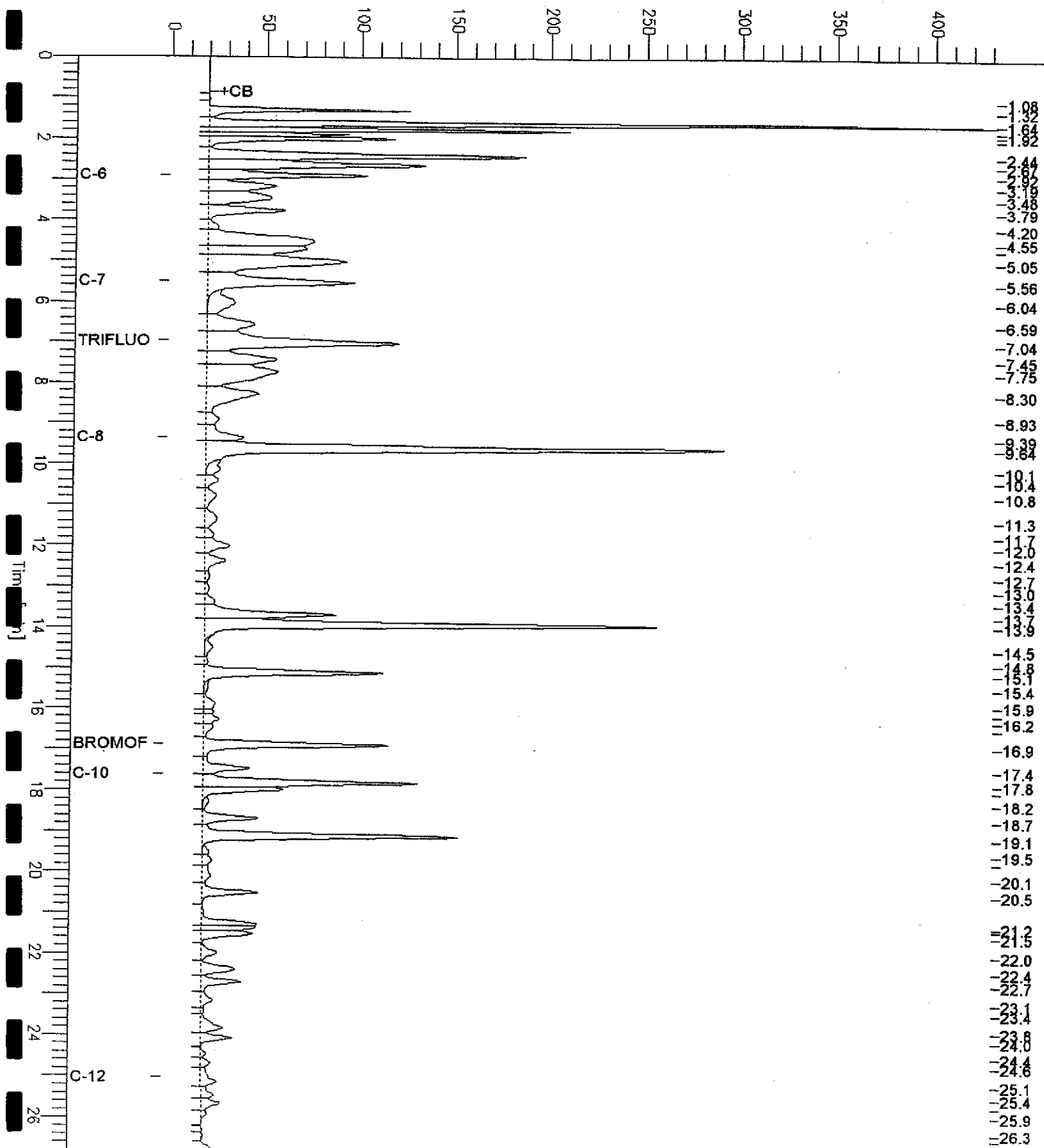
# GC19 TVH 'X' Data File (FID)

Sample Name : ccv/lcs,gc182332,73306,02ws0906,5/5000  
 FileName : G:\GC19\DATA\177X003.raw  
 Method : TVHBTXE  
 Start Time : 0.00 min  
 Scale Factor : 1.0

Sample # :  
 Date : 6/26/02 03:45 PM  
 Time of Injection: 6/26/02 03:18 PM  
 Low Point : -1.16 mV  
 High Point : 431.51 mV  
 Plot Scale: 432.7 mV

*Gasoline*

Response [mV]





Total Volatile Hydrocarbons

Lab #:	159338	Location:	Oakland - Tony's
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	8015B (M)
Matrix:	Water	Sampled:	06/24/02
Units:	ug/L	Received:	06/24/02

Type:	BLANK	Batch#:	73277
Lab ID:	QC182213	Analyzed:	06/25/02
Diln Fac:	1.000		

Analyte	Result	RL
Gasoline C7-C12	ND	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	88	68-145
Bromofluorobenzene (FID)	75	66-143

Type:	BLANK	Batch#:	73306
Lab ID:	QC182331	Analyzed:	06/26/02
Diln Fac:	1.000		

Analyte	Result	RL
Gasoline C7-C12	ND	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	90	68-145
Bromofluorobenzene (FID)	78	66-143

### Total Volatile Hydrocarbons

Lab #:	159338	Location:	Oakland - Tony's
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	8015B(M)
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC182214	Batch#:	73277
Matrix:	Water	Analyzed:	06/25/02
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	2,000	1,775	89	79-120

Surrogate	%REC	Limits
Trifluorotoluene (FID)	107	68-145
Bromofluorobenzene (FID)	75	66-143

### Total Volatile Hydrocarbons

Lab #: 159338	Location: Oakland - Tony's
Client: SOMA Environmental Engineering Inc.	Prep: EPA 5030B
Project#: 2333	Analysis: 8015B(M)
Type: LCS	Diln Fac: 1.000
Lab ID: QC182332	Batch#: 73306
Matrix: Water	Analyzed: 06/26/02
Units: ug/L	

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	2,000	1,715	86	79-120

Surrogate	%REC	Limits
Trifluorotoluene (FID)	114	68-145
Bromofluorobenzene (FID)	81	66-143

**Total Volatile Hydrocarbons**

Lab #:	159338	Location:	Oakland - Tony's
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	8015B(M)
Field ID:	ZZZZZZZZZZ	Batch#:	73277
MSS Lab ID:	159329-006	Sampled:	06/20/02
Matrix:	Water	Received:	06/21/02
Units:	ug/L	Analyzed:	06/26/02
Diln Fac:	1.000		

Type: MS Lab ID: QC182216

Analyte	MSS Result	Spiked	Result	%REC	Limits
Gasoline C7-C12	<20.00	2,000	1,652	83	67-120
Surrogate	%REC	Limits			
Trifluorotoluene (FID)	112	68-145			
Bromofluorobenzene (FID)	78	66-143			

Type: MSD Lab ID: QC182217

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	2,000	1,673	84	67-120	1	20
Surrogate	%REC	Limits				
Trifluorotoluene (FID)	111	68-145				
Bromofluorobenzene (FID)	78	66-143				

RPD= Relative Percent Difference





## Purgeable Aromatics by GC/MS

Lab #:	159338	Location:	Oakland - Tony's
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Field ID:	PSP#1	Batch#:	73335
Lab ID:	159338-001	Sampled:	06/24/02
Matrix:	Water	Received:	06/24/02
Units:	ug/L	Analyzed:	06/27/02
Diln Fac:	1.000		

Analyte	Result	RL
MTBE	1.7	0.5
Benzene	ND	0.5
Toluene	ND	0.5
Chlorobenzene	ND	0.5
Ethylbenzene	ND	0.5
m,p-Xylenes	ND	0.5
o-Xylene	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	107	77-130
Toluene-d8	102	80-120
Bromofluorobenzene	109	80-120

D= Not Detected

L= Reporting Limit

## Purgeable Aromatics by GC/MS

Lab #:	159338	Location:	Oakland - Tony's
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Field ID:	GAC-1	Batch#:	73335
Lab ID:	159338-002	Sampled:	06/24/02
Matrix:	Water	Received:	06/24/02
Units:	ug/L	Analyzed:	06/27/02
Diln Fac:	1.000		

Analyte	Result	RL
MTBE	ND	0.5
Benzene	ND	0.5
Toluene	ND	0.5
Chlorobenzene	ND	0.5
Ethylbenzene	ND	0.5
m,p-Xylenes	ND	0.5
o-Xylene	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	110	77-130
Toluene-d8	102	80-120
Bromofluorobenzene	107	80-120

ND= Not Detected

RL= Reporting Limit

**Purgeable Aromatics by GC/MS**

Lab #:	159338	Location:	Oakland - Tony's
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Field ID:	INFLUENT	Batch#:	73335
Lab ID:	159338-003	Sampled:	06/24/02
Matrix:	Water	Received:	06/24/02
Units:	ug/L	Analyzed:	06/27/02
Diln Fac:	83.33		

Analyte	Result	RL
MTBE	11,000	42
Benzene	1,600	42
Toluene	1,400	42
Chlorobenzene	ND	42
Ethylbenzene	ND	42
m,p-Xylenes	1,500	42
o-Xylene	690	42
1,3-Dichlorobenzene	ND	42
1,4-Dichlorobenzene	ND	42
1,2-Dichlorobenzene	ND	42

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	112	77-130
Toluene-d8	106	80-120
Bromofluorobenzene	102	80-120

ND= Not Detected

RL= Reporting Limit

## Purgeable Aromatics by GC/MS

Lab #:	159338	Location:	Oakland - Tony's
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC182446	Batch#:	73335
Matrix:	Water	Analyzed:	06/27/02
Units:	ug/L		

Analyte	Result	RL
MTBE	ND	0.5
Benzene	ND	0.5
Toluene	ND	0.5
Chlorobenzene	ND	0.5
Ethylbenzene	ND	0.5
m,p-Xylenes	ND	0.5
o-Xylene	ND	0.5
1,3-Dichlorobenzene	ND	0.5
1,4-Dichlorobenzene	ND	0.5
1,2-Dichlorobenzene	ND	0.5

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	106	77-130
Toluene-d8	99	80-120
Bromofluorobenzene	108	80-120

## Purgeable Aromatics by GC/MS

Lab #:	159338	Location:	Oakland - Tony's
Client:	SOMA Environmental Engineering Inc.	Prep:	EPA 5030B
Project#:	2333	Analysis:	EPA 8260B
Matrix:	Water	Batch#:	73335
Units:	ug/L	Analyzed:	06/27/02
Diln Fac:	1.000		

Type: BS Lab ID: QC182443

Analyte	Spiked	Result	%REC	Limits
Benzene	50.00	52.38	105	76-120
Toluene	50.00	49.83	100	79-120
Chlorobenzene	50.00	49.63	99	80-120

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	107	77-130
Toluene-d8	103	80-120
Bromofluorobenzene	103	80-120

Type: BSD Lab ID: QC182444

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Benzene	50.00	51.82	104	76-120	1	20
Toluene	50.00	49.08	98	79-120	2	20
Chlorobenzene	50.00	47.80	96	80-120	4	20

Surrogate	%REC	Limits
1,2-Dichloroethane-d4	107	77-130
Toluene-d8	105	80-120
Bromofluorobenzene	103	80-120