
SITE ASSESSMENT AND MONITORING REPORT T-115 SOUTHWEST TANK AREA



Property:

T-115 Southwest Tank Area
6730 West Marginal Way Southwest
Seattle, Washington

Prepared for:

Port of Seattle
2711 Alaskan Way
Seattle, Washington

Report Date:

June 12, 2012

Site Assessment and Monitoring Report

T-115 Southwest Tank Area

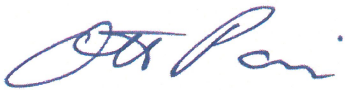
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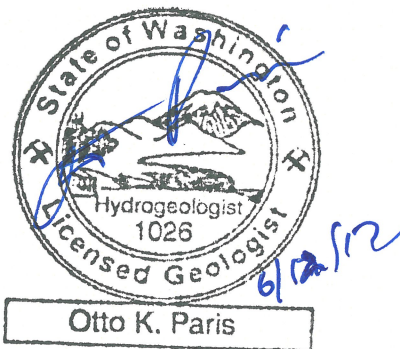
T-115 Southwest Tank Area
6730 West Marginal Way Southwest
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ACRONYMS AND ABBREVIATIONS

mg/L	milligrams per liter
BTEX	benzene, toluene, ethylbenzene, xylenes
Columbia	Columbia Environmental, Inc.
DRPH	diesel-range petroleum hydrocarbons
EPA	U.S. Environmental Protection Agency
GRPH	gasoline-range petroleum hydrocarbons
GeoScience	GeoScience Management, Inc.
MTCA	Washington State Model Toxics Control Act
NWTPH	Northwest Total Petroleum Hydrocarbons
ORPH	oil-range petroleum hydrocarbons
Port	Port of Seattle
Sea-Pac	Sea-Pac Transport Services LLC
Shultz	Shultz Distributing, Inc.
SoundEarth	SoundEarth Strategies, Inc.
T-115	Terminal 115
UST	underground storage tank

1.0 INTRODUCTION AND SCOPE

1.1 INTRODUCTION

This report summarizes the results of SoundEarth Strategies, Inc.'s (SoundEarth) groundwater monitoring and product recovery activities at the Port of Seattle's (Port) Terminal 115 (T-115) Southwest Tank Area site. The Southwest Tank Area is a Port term used to identify a general area associated with two former underground storage tanks (USTs) that is located in the southwest portion of T-115 near the intersection of West Marginal Way Southwest and Southwest Front Street, as shown on Figure 1. The site is presently situated within two individual lease parcels currently leased by Sea-Pac Transport Services, LLC (Sea-Pac) and Shultz Distributing, Inc. (Shultz). A generalized site plan of the Southwest Tank Area site is presented on Figure 2. The Southwest Tank Area site is not defined as including the currently operating fuel storage and dispensing facilities located on the Shultz lease parcel (Figure 2).

Subsurface petroleum contaminants were initially detected in November 1994 beneath the Southwest Tank Area site during a geotechnical study completed by AGRA Earth & Environmental, Inc. for siting and construction of the Shultz cardlock fueling facility (GeoScience Management, Inc. 1995a). Additional subsurface investigations, interim remedial actions, and groundwater monitoring were completed from 1995 through 2009. The Southwest Tank Area site was identified as a potential source of contaminants in the T-115 Environmental Conditions Report prepared by SoundEarth (2011) for the purpose of identifying upland source areas that might potentially recontaminate the Lower Duwamish Waterway. The groundwater monitoring and product recovery activities summarized in this report were completed for the purpose of evaluating current groundwater conditions and subsurface contamination beneath the site.

1.2 PURPOSE AND SCOPE

The purpose of the monitoring and product recovery activities completed during this phase of site monitoring was to evaluate current groundwater quality and free-phase product conditions with respect to previous groundwater monitoring findings beneath and adjacent to the site. Work efforts were completed by SoundEarth in general accordance with the *Work Plan for T-115 SW Tank Area Monitoring and Product Recovery*, dated September 23, 2011.

The specific scope of services completed by SoundEarth included the following:

- Measure groundwater levels in all of the site monitoring and recovery wells (15 wells total) on a monthly basis.
- Measure free product thicknesses at about 2-week to 4-week intervals in wells within which product had been detected during previous groundwater monitoring activities.
- Remove recoverable free product from the wells on a semimonthly to monthly basis.
- Obtain samples of free product obtained from three of the wells for laboratory analysis of petroleum product characteristics.
- Obtain three rounds of quarterly groundwater samples from 10 of the existing monitoring and recovery wells.

- Submit the groundwater samples for laboratory analysis of diesel-range and oil-range petroleum hydrocarbons (DRPH and ORPH, respectively). In addition, submit groundwater samples obtained from 4 of the wells for laboratory analysis of gasoline-range petroleum hydrocarbons (GRPH), and benzene, toluene, ethylbenzene and xylenes (BTEX).
- Replace the damaged surface monument for well RW-2.
- Compile and summarize data obtained during previous site assessment and interim remedial actions at the site.
- Evaluate the resulting groundwater monitoring and analytical data with respect to the nature and extent of groundwater contamination, potential sources of petroleum contaminants, and Washington State Model Toxics Control Act (MTCA) cleanup levels.
- Develop recommendations for additional assessment, monitoring, and remedial actions applicable for further characterization and/or cleanup of the site.

1.3 REPORT ORGANIZATION

A summary of historic operations associated with the Southwest Tank Area site is included in Section 2.0, Site Background. Also included in Section 2.0 of this report is a summary of prior site assessment and remediation activities pertinent to existing groundwater contamination at the site. Section 3.0 describes the groundwater monitoring and product recovery activities, and includes groundwater analytical data. A discussion of the nature and extent of groundwater contamination and identified data gaps is also included in Section 3.0. Conclusions and recommendations are presented in Section 4.0.

2.0 SITE BACKGROUND

2.1 CURRENT SITE CONDITIONS

The Southwest Tank Area site refers to an area of subsurface petroleum contamination encountered in the southwest portion of T-115 in 1994 and 1995 and presumed to be related to an abandoned UST associated with pre-1994 facilities and operations. This area of soil and groundwater contamination is located within two T-115 parcels currently leased by Shultz and Sea-Pac (Figure 2). A row of large concrete blocks (Ecology blocks) delineates the approximate boundary between the two lease parcels.

The Sea-Pac lease parcel is currently being used to store a wide range of surplus equipment and supplies, such as shipping containers, steel piping, various storage containers, and a water landing craft. The surface of the Sea-Pac parcel consists of some areas of concrete paving, the apparent foundations of removed buildings or structures, and some unpaved exposed soil or gravel portions.

A cardlock commercial fueling facility operated by Shultz occupies the eastern portion of the Shultz lease parcel. A Subway restaurant and a drive-through coffee stand are located in the western portion of the Shultz lease parcel (Figure 2). Concrete and asphalt pavement cover most of the Shultz lease parcel, with some smaller unpaved areas located along the northern side of the parcel.

2.2 HISTORIC OPERATIONS AT THE SITE

An aluminum smelter was constructed in 1952 over an area that encompassed the Southwest Tank Area site (SoundEarth 2011). The aluminum smelter operated from 1952 through 1985, and the facility included a 9,500-gallon UST. The building at the site was occupied by a crane services company in 1985.

An undated site plan notes that the smelter building was “...used as an aluminum warehouse, with an attached maintenance building and office” (SoundEarth 2011).

At the time of the initial subsurface investigation completed by GeoScience Management, Inc. (GeoScience) in 1995, the site consisted of an empty warehouse with an attached office and shed (GeoScience 1995a). Figure 3 shows the approximate locations of the facilities that existed in 1995. Drawings of the site facilities indicated the presence of an 8,000-gallon fuel oil UST located adjacent to the east side of the warehouse building (GeoScience 1995a). The noted 8,000-gallon UST appears to be referring to the 9,500-gallon UST removed from the site during subsequent interim remedial actions as summarized in the following Section 2.3 of this report.

2.3 PREVIOUS ASSESSMENT ACTIVITIES AND REMEDIAL ACTIONS

Several phases of subsurface site assessment activities and interim remedial actions were completed at and adjacent to the Southwest Tank Area site from March 1995 through April 1998. Site assessment activities and remedial actions included (1) evaluating the extent of subsurface petroleum contamination associated with the free product encountered during the geotechnical engineering study, (2) establishing baseline soil and groundwater conditions in the area of the Shultz fueling facility before construction of the facility, and (3) removal of two USTs.

The Port initiated a long-term groundwater and free product recovery program in 1999 that continued through 2009. The following paragraphs briefly summarize the results of the subsurface site investigations, interim remedial actions, and long-term monitoring completed from 1995 through 2009.

2.3.1 Site Assessment Activities (1995)

The initial discovery of petroleum contamination at the site occurred as part of a geotechnical engineering evaluation for the planned construction of a cardlock fueling facility in the eastern portion of the site. Approximately 2 feet of free product was detected in one of the monitoring wells (MW-12; GeoScience 1995a). The approximate location of abandoned well MW-12 is shown on Figure 3. GeoScience completed several phases of site assessment activities during 1995 to evaluate the source and extent of the free product observed in MW-12. A total of 12 soil hand borings and 7 hollow-stem auger borings were completed, and monitoring wells MW-13 through MW-18 were installed in 6 of the hollow-stem auger borings (GeoScience 1995a). The concentrations of DRPH in three soils samples obtained from three of the hand borings exceeded the former MTCA Method A cleanup level.

Free product was detected in well MW-18. The initial phase of site assessment activities included the analysis of one round of groundwater samples collected from wells MW-13 through MW-17 for DRPH. The DRPH concentrations detected in the groundwater samples obtained from MW-14, MW-15, and MW-16 exceeded the former MTCA Method A cleanup level.

In addition, product samples were collected from the 9,500-gallon UST, the UST fill pipe, and well MW-12 for characterization purposes (forensic analysis). Measurements of the UST contents indicated that the tank contained “several hundred gallons of water and a heating fuel-like product” (GeoScience 1995a). The analysis of product samples from the UST and MW-12 indicated diesel-range hydrocarbons, with the sample from MW-12 exhibiting more weathering of the product than the sample obtained from the UST (GeoScience 1995a). The product sample

obtained from the UST fill pipe also had a characteristic diesel fuel pattern, with the addition of a lighter range pattern possibly suggesting a weathered gasoline-range hydrocarbon. GeoScience concluded that although the samples obtained from the UST and MW-12 appeared to be related, excavation of the UST and associated fuel delivery lines would be needed to determine the connection between the UST and the product observed in MW-12 (GeoScience 1995a).

Recovery of free product from wells MW-12 and MW-18 began in June 1995 using a passive skimmer and hand bailing (GeoScience 1995b). Approximately 7.3 gallons of petroleum product was removed from these two wells from June 1, 1995 through December 1, 1995 (GeoScience 1995e). Well MW-12 was abandoned on July 31, 1995 (GeoScience 1995c).

Two more episodes of groundwater sampling and analysis were completed during August and December 1995 (GeoScience 1995c; 1995d). DRPH were detected in the samples obtained from wells MW-14 and MW-15 at concentrations that exceeded the former MTCA Method A cleanup level.

2.3.2 Underground Storage Tank Removals (1995 to 1996)

Columbia Environmental, Inc. (Columbia) completed a site assessment report documenting the removal of the 9,500-gallon fuel oil UST on August 21, 1995. The site assessment report described the UST as being “in poor condition, with corrosion and numerous holes in the tank shell” (Columbia 1995). Although a product line was observed in the UST excavation heading to the northwest and toward the warehouse building (Figure 3), the exact location(s) of the entire product line was not confirmed. The product line was potentially connected to a burner located inside the existing warehouse building, or further north to a previously existing portion of the building (Columbia 1995).

Additional over-excavation of contaminated soil was completed after the tank was removed. DRPH were detected at concentrations exceeding the former MTCA Method A cleanup level in two of the soil samples collected from the walls of the resulting excavation (Columbia 1995).

A previously unknown 600-gallon heating oil UST was encountered in the northern part of the site during construction of the card lock fueling facility (Figure 3). The UST fill pipe was encased in concrete and there was no indication as to the connections or use of this tank (GeoScience 1996). A sample of residual product obtained from the bottom of the UST indicated a “diesel fuel or similar product” (GeoScience 1996). The UST was removed on September 4, 1996, and was in poor condition with “numerous holes in the ends and bottom” (GeoScience 1996). Some limited excavation of petroleum hydrocarbon contaminated soil was completed following removal of the tank. DRPH was detected at concentrations that exceeded the former MTCA Method A cleanup level in soil samples obtained from the limits of the excavation.

2.3.3 Background Sampling for Card Lock Facility (1996)

Columbia completed several episodes of soil and groundwater sampling during construction of the cardlock fueling facility for the purpose of evaluating background conditions before operation of the fueling facility. Soil samples were collected from several hand borings and from excavations for the USTs, the dispenser islands, oil water separators, and a catch basin (Columbia 1996a; 1996b). Petroleum hydrocarbons were detected in three of the soil samples at concentrations less than the former MTCA Method A cleanup level.

Four monitoring wells (MW-19 through MW-22) were installed after construction, but before operation, of the cardlock fueling facility in December 1996 (Columbia 1997). Well MW-19 was installed as a replacement well for well MW-13 that was destroyed during site construction activities (GeoScience 1997). The locations of abandoned and existing monitoring wells are shown on Figure 3. DRPH were detected at a concentration that exceeded the former MTCA Method A cleanup level in the soil sample obtained from the MW-21 boring at a depth of about 6 feet. The DRPH detected in the groundwater sample obtained from well MW-21 (0.97 milligrams per liter [mg/L]) were the only contaminants detected in the groundwater samples obtained from wells MW-21, MW-22, and MW-23 (Columbia 1997).

2.3.4 Extraction Wells, Pilot Testing, and Monitoring (1997)

Five 4-inch-diameter extraction wells (RW-1 through RW-5) were installed in 1997 for the primary purpose of completing a vacuum extraction pilot-scale test (GeoScience 1998). The results from the high-vacuum extraction test indicated that the relatively low-permeability subsurface soils in the vicinity of the extraction wells resulted in low groundwater and product recovery rates. A total of about 8.5 gallons of free product and 7 gallons of emulsified product and water were recovered during two separate pilot tests (GeoScience 1998). Groundwater recovery rates averaged less than 0.1 gallons per minute, and the average product recovery rate was about 0.04 gallons per hour. Air samples obtained from the system indicated low to very low concentrations of detected volatile hydrocarbons.

Three episodes of hydrogen peroxide injections were also completed during this phase of site evaluation activities. Hydrogen peroxide was added to wells RW-1 through RW-5, MW-14, and MW-18. Laboratory analytical results from sampling wells MW-14 and RW-2 both before and after the addition of the hydrogen peroxide indicated no significant effect in reducing petroleum hydrocarbon concentrations (GeoScience 1998).

Monitoring well MW-23, located south of the former 9,500-gallon fuel oil UST, was also installed during this phase of work.

2.3.5 Long-Term Groundwater Monitoring and Product Recovery (1999 to 2009)

The Port initiated a long-term groundwater monitoring program at the site in 1999 that continued through December 2009. A review of unpublished Port data indicates that samples obtained from the wells were analyzed for DRPH using Northwest Total Petroleum Hydrocarbon (NWTPH) Method NWTPH-Dx extended with silica gel cleanup. Groundwater sampling episodes during 1999 and 2000 included collecting several samples from wells MW-14, MW-15, MW-17, MW-19, MW-21, RW-2, RW-3, and RW-4. Starting in August, 2001, the semiannual groundwater monitoring consisted of sampling wells MW-15, MW-16, MW-17, MW-19, and MW-21. DRPH was not detected in the samples obtained from MW-15, MW-16, MW-17, and MW-21 between August 2001 and December 2009. DRPH concentrations detected in the samples obtained from MW-19 ranged from below the reporting limit to 5.2 mg/L.

A free product monitoring and recovery program continued at the site through December 2008. Free product was detected in wells MW-14, MW-18, RW-1, and RW-5 at varying thicknesses from 1999 through 2008 based on a review of unpublished Port data. A trace amount of product was also detected in well RW-2 in June 2008.

Product recovery methods included the use of bailers, peristaltic pumps, and a passive hydrocarbon skimmer. Based on review of unpublished data, about 15 gallons of free product was removed from the wells from 1999 through 2008.

2.4 SUMMARY OF SITE CONDITIONS FROM PREVIOUS INVESTIGATIONS

A comprehensive evaluation of the nature and extent of contamination in the Southwest Tank Area had not been documented at the time SoundEarth began the current groundwater monitoring and product recovery tasks described in the following Section 3.0. Based on SoundEarth's review of available reports and unpublished data, known subsurface conditions and SoundEarth's preliminary evaluation of potential source(s) and extent of contamination are summarized below:

- Subsurface soils beneath the site consist of artificial fill, with native silty soils underlying the fill at some locations to the total depth explored. The fill is primarily the result of dredging and filling portions of the Duwamish River valley during construction of the T-115 area. The thickness of the fill in this part of T-115 appears to be about 10 feet or less (SoundEarth 2011). Based on available data, most of the fill soils encountered in the explorations consist of clayey silt, sandy silt, and silty sand. An upper layer of sand or sand and gravel fill was encountered at some locations extending from the ground surface to maximum depths of about 4 feet.
- Groundwater levels measured between 1999 and 2008 indicate groundwater depths typically range from about 4 to 10 feet below ground surface. Apparent seasonal fluctuations in groundwater levels measured in individual wells typically ranged from about 3 to 5 feet. Groundwater flow direction was typically to the southwest and south at the time of the semiannual monitoring events.
- The extent of free petroleum product, consisting of weathered DRPH, appeared to be limited to the north-central area of the site in the vicinity of MW-14, MW-18, and the recovery wells. The low-permeability fine-grained fill and native soils appear to have limited the lateral migration of the free product. Product recovery efforts appeared to be effective at reducing the apparent thickness and migration of the free product floating on the water table.
- Analytical data from the 1999 to 2009 groundwater monitoring program indicate that DRPH concentrations in shallow groundwater downgradient of the observed free product do not exceed MTCA Method A cleanup levels in the vicinity of wells MW-17 and MW-21. DRPH concentrations detected in more than half of samples obtained from well MW-19 have exceeded the MTCA Method A cleanup level. Depending on seasonal groundwater flow directions, well MW-19 is located crossgradient to downgradient of wells with observed free product.
- Some known areas of petroleum-contaminated soil remain at the site. Figure 4 shows the locations of soil samples with DRPH concentrations that exceed the current MTCA Method A cleanup level of 2,000 milligrams per kilogram. The soil samples and concentrations listed on Figure 4 likely represent areas of residual soil contamination at these general locations at the site. The lateral and vertical extent of residual petroleum-contaminated soil has not been defined. However, except for the five soil samples noted on Figure 4, DRPH concentrations detected in all of the other soil samples collected during site assessment activities, and from the limits of the UST excavations, did not exceed the current MTCA Method A cleanup level.
- Potential sources of petroleum-contaminated soil and groundwater include the two former USTs, and the associated piping for the larger UST. However, specific source(s) for the free

product observed north of the former 9,500-gallon fuel oil UST have not been determined. Possible sources of the free product include leaks associated with the former 600-gallon heating oil UST, leaks from undocumented delivery piping associated with the former 9,500-gallon UST, or undetermined spills or releases associated with former operations at the site.

3.0 GROUNDWATER MONITORING AND PRODUCT RECOVERY

3.1 OVERVIEW AND SCHEDULE

SoundEarth began a groundwater and free product monitoring program for the Southwest Tank Area site in March 2011. Initial activities included gaining access to and locating all of the monitoring and recovery wells, and two rounds of groundwater and product level measurements in March and May 2011. All monitoring and recovery wells designated for sampling were redeveloped in June 2011. Monitoring, sampling and product recovery activities completed between June 2011 and February 2012 included the following:

- Three quarterly episodes of groundwater sampling and analysis in June, September, and December 2011.
- Two episodes of water level and product thickness measurements in June 2011.
- Collection and analysis of free product samples obtained from wells MW-14, MW-18, and RW-1 in June 2011.
- Periodic free product recovery from wells MW-14, MW-18, and RW-1 from July 2011 to February 2012.
- Six episodes of monthly water-level measurements in all of the wells from September 2011 to February 2012.
- Monthly to semimonthly product measurements in wells MW-14, MW-18, RW-1, RW-2, and RW-5 from September 2011 to February 2012.

3.2 FIELD ACTIVITIES

3.2.1 Well Redevelopment

On June 16, 2011, monitoring wells MW-15 through MW-17, MW-19 through MW-21, MW-23, and recovery wells RW-2, RW-4, and RW-5 were redeveloped before groundwater sampling. The monitoring wells were developed with the use of a submersible pump. Monitoring well development consisted of surging the monitoring wells using a surge block and purging groundwater from the monitoring wells until a minimum of five submerged well volumes were removed.

3.2.2 Groundwater Sampling and Analysis

The three quarterly episodes of groundwater sampling and analysis were conducted on June 16 to 22, 2011; September 27 to 29, 2011; and December 15 to 16, 2011. Groundwater samples were collected from wells MW-15, MW-16, MW-17, MW19, MW-20, MW-21, MW-23, RW-2, RW-4, and RW-5. Groundwater samples were not collected from wells RW-2 and RW-5 during the September sampling event because of the presence of free product detected in these two wells.

Upon arrival at the site for each quarterly episode, SoundEarth personnel opened all of the monitoring and remediation wells to obtain water-level and product-level measurements before sample collection. Groundwater measurements were obtained at least 30 minutes after opening the wells to provide time for water levels to equilibrate with atmospheric conditions. Groundwater levels were measured relative to the top of each well casing to an accuracy of 0.01 feet using an electronic water-level meter.

In accordance with the U.S. Environmental Protection Agency (EPA) Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures (April 1996), purging and sampling of each well was performed using a peristaltic pump and dedicated polyethylene tubing at flow rates ranging from 35 to 173 milliliters per minute. The tubing intake was placed approximately 2 to 3.5 feet below the groundwater surface or mid-screen in each well. During purging, water quality was monitored using a Quanta, Horiba-U22 or YSI water quality meter equipped with a flow-through cell. The water quality parameters that were monitored and recorded included temperature, pH, specific conductance, dissolved oxygen, turbidity, and oxidation-reduction potential. Each well sampled was purged until, at a minimum, pH, specific conductance, and turbidity or dissolved oxygen stabilized.

Following purging, groundwater samples were collected from the pump outlet tubing located upstream of the flow-through cell and placed directly into clean, laboratory-prepared sample containers. Each container was labeled with a unique sample identification number, placed on ice in a cooler, and transported to Friedman & Bruya, Inc. of Seattle, Washington, under standard chain-of-custody protocols for laboratory analysis.

All of the groundwater samples were submitted for analysis of DRPH and ORPH by Method NWTPH-Dx (with silica gel cleanup). The samples obtained from wells MW-19, MW-20, MW-21, and MW-23 were also submitted for analysis of GRPH by Method NWTPH-Gx; and for BTEX by EPA Method 8021. Purge water generated during the monitoring events was placed into 55-gallon steel storage containers for offsite disposal.

3.2.3 Groundwater Monitoring and Product Recovery

Groundwater levels were measured once a month in all of the on-site monitoring and recovery wells from September 2011 through February 2012 to evaluate seasonal fluctuations in water levels, groundwater flow directions, and gradients. A water/product interface probe was used to measure water and product levels (if present) in those wells where free product had been observed during previous monitoring activities (MW-14, MW-18, and RW-1 through RW-5).

Recovery of product from the wells was completed by removing as much product as practicable from each of the wells using a bailer and/or peristaltic pump. For the purposes of evaluating potential product recovery rates, measurements of groundwater and product levels continued over a 1 to 2 hour period after completing product removal. Additional product monitoring and removal occurred at varying frequencies (2 to 14 days) during the first two months of monitoring activities to evaluate recovery rates with respect to frequency of product removal efforts. Product and product/water mixtures removed from the wells were placed into a 30-gallon steel storage container for off-site disposal.

A passive product skimmer containing about 0.3 quarts of petroleum product was encountered in well MW-18. The passive skimmer was removed from the well in July 2011, and product was removed from the skimmer and placed into the 30-gallon product storage container. The

passive skimmer is being temporarily stored near the storage container for eventual reuse at the site or disposal.

3.2.4 Well Monument Repair (RW-2)

The surface monument for recovery well RW-2 had been severely damaged sometime before beginning groundwater monitoring activities in May 2011. On October 12, 2011, Cascade Drilling, L.P. removed the damaged RW-2 well monument and installed a new flush-grade surface monument. Photographs documenting the damaged and repaired well monument are included as Appendix A.

3.3 RESULTS

3.3.1 Groundwater Elevations

Groundwater elevations measured between March 2011 and February 2012 are summarized in Table 1. Seasonal groundwater level fluctuations ranging from 2.45 to 7.18 feet were measured in individual wells during this monitoring period. The lowest groundwater elevations were observed during the September and October monitoring events. For most of the wells, the highest groundwater elevations were measured during the January 2012 monitoring event.

A groundwater elevation contour map based on the September 27, 2011 measurements is presented on Figure 5. The general northeast-to-southwest groundwater flow directions shown on Figure 5 were similar to the general flow directions observed during most of the other monthly monitoring events. However, during periods of high seasonal precipitations there appears to be a wider range of water-level fluctuations between individual wells that result in changes in groundwater flow directions over relatively short distances across the site. Figure 6 shows the groundwater elevation contour map based on the February 14, 2012, measurements. As shown on Figure 6, an apparent area of high groundwater elevations in the north-central part of the site and the low groundwater elevations in the southwest and southeast parts of the site result in a range of localized groundwater flow directions.

3.3.2 Product Thickness and Recovery

Product thicknesses measured in wells MW-14, MW-18, RW-1, RW-2, and RW-5 between June 2011 and February 2012 are presented in Table 2. The data listed in Table 2 includes measurements of product thickness completed during both monthly water-level monitoring events and product recovery efforts. Well MW-14 typically contained the greatest thickness of free product. Product was detected in wells RW-2 and RW-5 only once during this monitoring period (Table 2), and the thickness in these two wells were less than or equal to 0.01 feet. Figure 7 shows the approximate extent of free product based on both recent and historic data, and the range of product thicknesses measured in the wells from March 2011 to February 2012.

As shown in Table 2, product recovery efforts resulted in general decreasing thicknesses of product in the wells. A total of about one gallon of product and product/water mixtures was recovered from the wells between June 2011 and February 2012. Product and water levels measured in the wells following product removal efforts indicated low product recovery rates.

3.3.3 Analytical Results

Table 3 summarizes the laboratory analytical results from the three quarterly groundwater sampling events. Figure 8 lists the DRPH concentrations detected in the groundwater samples. The laboratory reports and chain-of-custody documentation are included as Appendix B.

The analytical results listed on Table 3 are summarized below:

- Samples obtained from wells RW-2, RW-4, and RW-5 were the only samples with DRPH concentrations exceeding the MTCA Method A cleanup level. As shown on Figure 8, these three wells are located near the limits of the historic and current free product plume. As indicated in Tables 2 and 3, a thin layer (<0.01 feet) of product was detected in wells RW-2 and RW-5 during the September 2011 sampling event.
- DRPH concentrations detected in samples obtained from wells MW-17, MW-19, MW-20, and MW-21 do not exceed the MTCA Method A cleanup level.
- GRPH and BTEX were not detected in the groundwater samples analyzed for these compounds, with the exception of the low benzene concentration (1.7 micrograms per liter) detected in the June 2011 sample obtained from well MW-21.
- ORPH was detected in the June 2011 groundwater sample collected from the well RW-2 at a concentration that exceeds the Method A cleanup level. However, the analytical laboratory noted that the chromatographic pattern for this sample does not correspond to the ORPH standard.

The free product samples obtained from wells MW-14, MW-18, and RW-1 were submitted for analysis of DRPH and ORPH by Method NWTPH-Dx for the purpose of characterizing the free product. The resulting chromatographic patterns indicated that the product consists of a weathered diesel fuel oil, and are consistent with the chromatographic patterns for the groundwater samples with detectable concentrations of DRPH.

3.4 DISCUSSION OF RESULTS

Based on data obtained to-date from the site, an area of free product consisting of weathered DRPH remains on the groundwater table in the north-central portion of the site. The decreasing trend of free product thicknesses measured in the wells was likely the result of the product recovery efforts. However, the low product recovery rates measured after removal of the product from individual wells corresponds to a relatively low hydraulic conductivity water table aquifer in this portion of the site.

Groundwater elevations and flow directions in the water table aquifer beneath the site vary in response to seasonal precipitation and apparent changes in localized groundwater recharge. Groundwater levels measured in the wells do not appear to be influenced by tidal fluctuations in the Lower Duwamish Waterway. Based on recent and historic groundwater level measurements, groundwater often flows in a general northeast to southwest direction in the vicinity of the free product plume, then in a more southerly flow direction in the southern part of the site (Figure 5). However, changes in localized groundwater flow directions appear to occur during periods of increased groundwater elevations (Figure 6). These groundwater flow patterns beneath the site are likely of limited areal extent, as shallow groundwater would eventually flow in a general east to northeast direction towards the Lower Duwamish Waterway located about 1,400 feet east of the site. Potential factors controlling the local groundwater elevations, flow directions and gradients include the following:

- The varying hydraulic characteristics of the dredge fill and underlying native alluvial sediments comprising the upper portion of the water table aquifer.
- The pattern of unpaved areas and paved areas in the site vicinity.
- Areas of high recharge resulting from leakage of stormwater conveyance systems.

- The presence of shallow underground utility corridors for stormwater and sewer piping resulting in preferred groundwater flow pathways, and/or functioning as areas of increased groundwater discharge.

The groundwater analytical data indicates that DRPH is the primary contaminant of concern at the site. GRPH was not detected and the ORPH detected in one of the RW-2 samples corresponds to the high concentrations of weathered DRPH detected in this sample. The spatial distribution of the wells, groundwater flow directions, and the DRPH concentrations indicate that the higher DRPH concentrations detected in the groundwater samples correspond to the presence of free product (weathered diesel fuel) in the north central portion of the site. Potential sources of the free product and associated soil and groundwater contamination in this part of the site include leaks from the former 600-gallon heating oil UST and from former product piping that might have been related to the former 9,500-gallon UST.

A potential source of the DRPH concentrations detected in some of the groundwater samples obtained from wells MW-17 and MW-21 include leaks and spills associated with the former 9,500-gallon UST as evidenced by the presence of soil contamination at the UST excavation limits (Figure 4). However, the DRPH concentrations detected in these samples do not exceed the MTCA Method A cleanup level.

BTEX was not detected in any of the samples analyzed for these fuel constituents, except for the low concentration of benzene detected in one of the samples obtained from well MW-21. The source of the benzene is not known, although it might be associated with the storage of gasoline at the cardlock fueling facility.

Based on the general groundwater flow direction, the extent of DRPH-contaminated groundwater downgradient from the free product plume appears to be relatively limited. However, several data gaps in defining the lateral extent of the DRPH-contaminated groundwater have been identified as follows:

- West and southwest of well RW-1.
- North and northwest of wells MW-19 and RW-5.

4.0 CONCLUSIONS AND RECOMMENDATIONS

DRPH is the primary chemical of concern beneath the site. Free product consisting of weathered diesel fuel is present on the water table aquifer in the north-central portion of the Southwest Tank Area site. Based on our review of historic site assessment and monitoring data, the lateral extent of the free product plume has remained relatively stable since the late 1990s. Periodic product recovery efforts have reduced the free product thicknesses measured in the wells.

DRPH concentrations detected in the groundwater samples obtained from wells RW-2, RW-4, and RW-5 exceed the MTCA Method A cleanup level. These three wells are located near or along the edges of the free product plume area. DRPH concentrations detected in samples obtained from other wells did not exceed the MTCA Method A cleanup level.

Natural degradation processes combined with the relatively low-permeability soils comprising most of the water table aquifer appear to have attenuated the lateral migration of DRPH-contaminated

groundwater. However, the continued presence of free product will continue to provide a source of ongoing groundwater contamination.

Several data gaps remain for evaluating the lateral extent of free product and DRPH-contaminated groundwater. These data gaps are located southwest of well RW-1, west of well RW-1, and northwest of wells MW-19 and RW-5. Additional groundwater monitoring wells should be installed in these areas as part of the ongoing assessment and monitoring of free product and water quality beneath the site. Direct-push borings could also be used to evaluate the extent of groundwater contamination in these areas before siting and installing additional monitoring wells.

An evaluation of practicable interim remedial actions should be completed. This objective of this remedial evaluation would be to assess practical alternative remedial actions, including product recovery, that achieve targeted cleanup goals and timeframes. Potential options for product recovery could include the following:

- Source removal consisting of excavation of DRPH-contaminated soil to maximum depths of about 10 feet and removal of free product within the area encompassed by the product plume. Given the low permeabilities of the saturated soils and the shallow depths of the product plume and associated soil-product smear zone, this approach would probably be the most effective for achieving cleanup goals over a shorter time frame.
- Continued periodic product recovery efforts using a combination of manual product removal, passive product skimmers, and/or product-specific absorbent socks. Given the low permeabilities of the saturated soils in this area of the site, this approach should be considered as a long-term interim remedial action. Additional recovery wells might be needed to increase the effectiveness of product recovery efforts using this approach for source removal. The wide range of seasonal groundwater elevations would likely require frequent monitoring and resetting of passive skimmers.

A long-term groundwater and product monitoring program should be implemented regardless of whether other interim remedial actions eventually occur. Groundwater and product monitoring is needed to confirm that the free product plume remains relatively stable and that natural attenuation processes continue to limit the transport of DRPH-contaminated groundwater downgradient of the product plume. At a minimum, the long-term monitoring program should include the continued monitoring of water levels, product levels, and analysis of groundwater samples for DRPH. Additional sampling and analysis might be warranted to evaluate the effectiveness of natural attenuation processes.

5.0 LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project

parameters indicated. SoundEarth is not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. SoundEarth does not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

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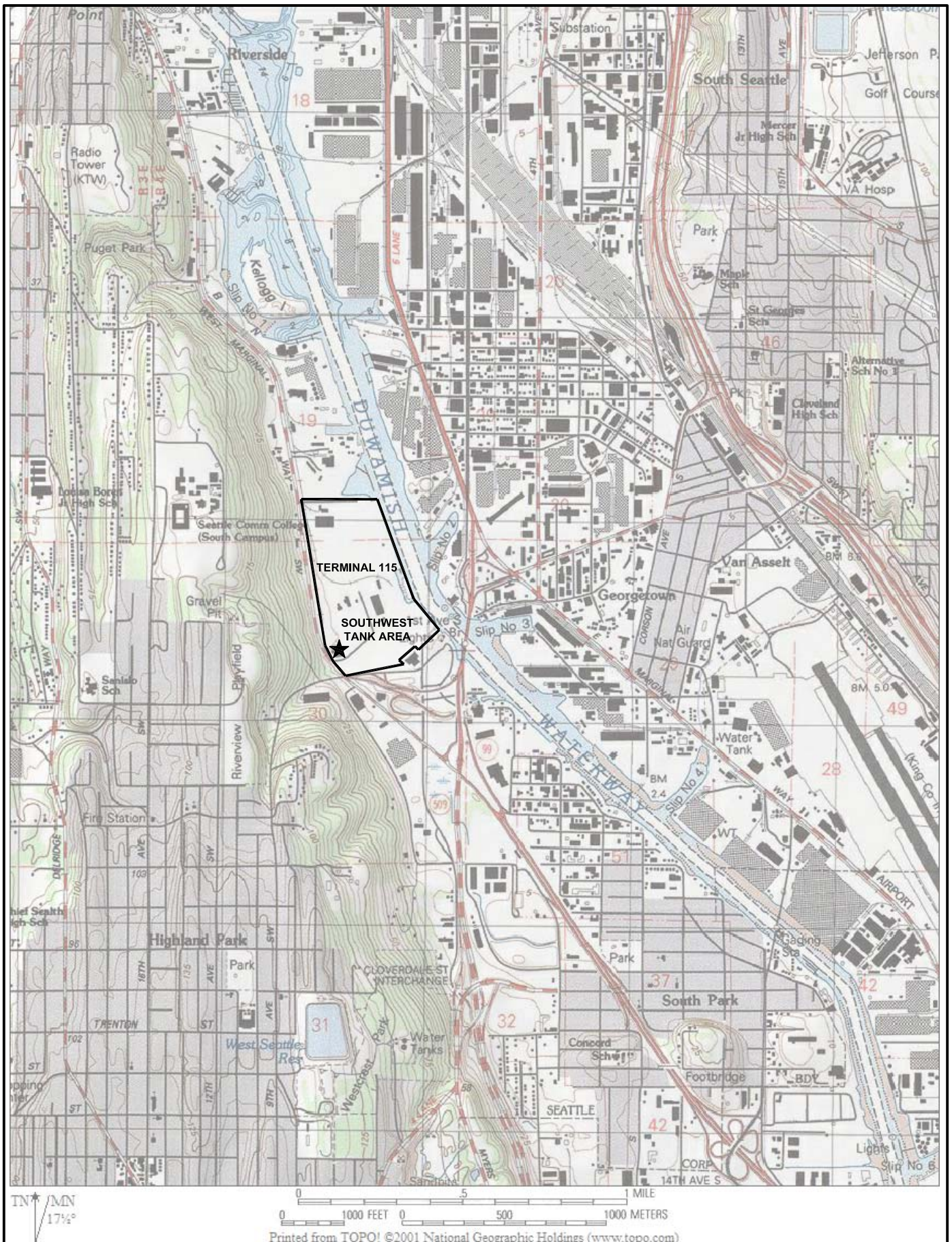
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FIGURES



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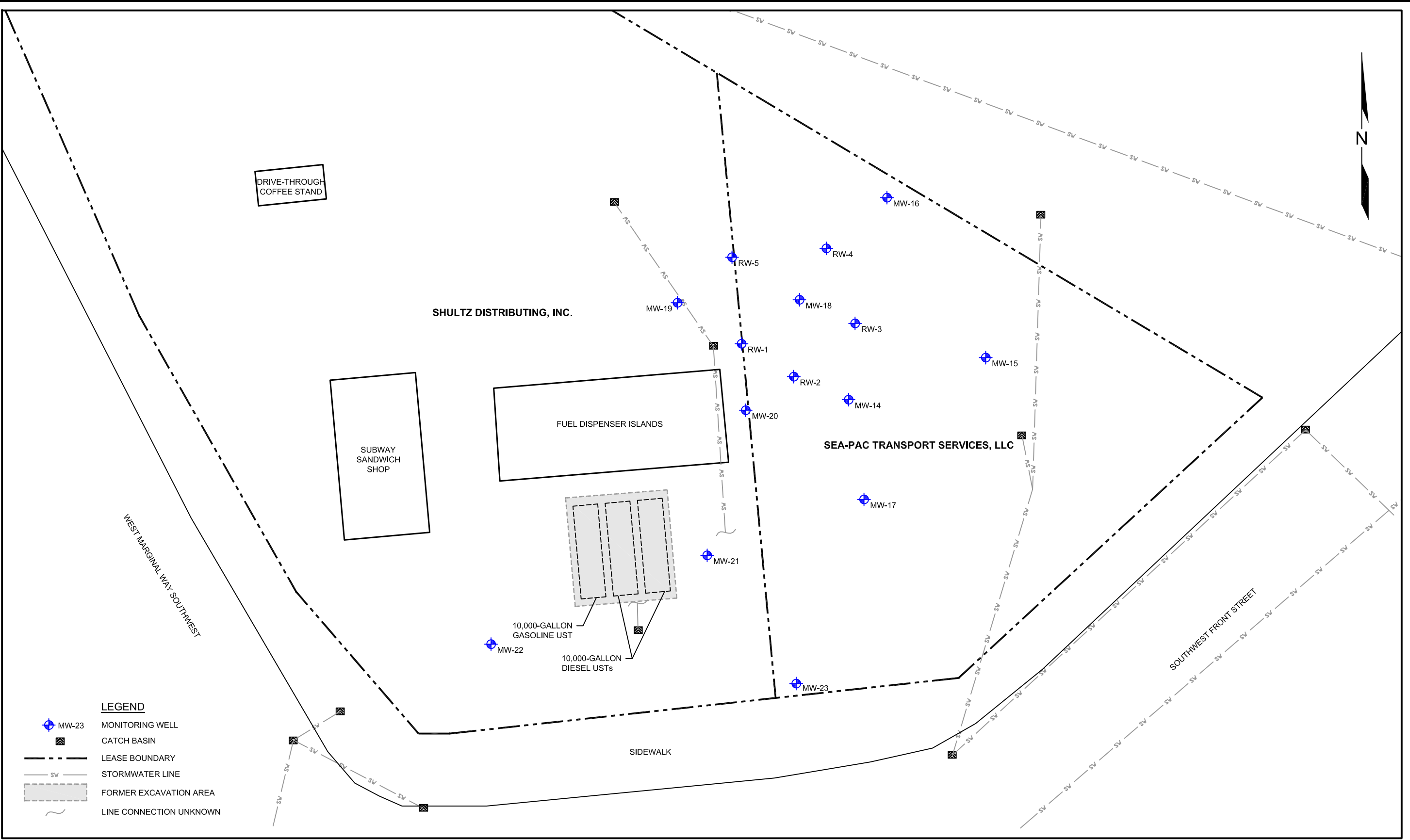
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 CHECKED BY:OKP
 CAD FILE:0675-002_FIG1

PROJECT NAME:T-115 SOUTHWEST TANK AREA
 PROJECT NUMBER:0675-002
 STREET ADDRESS:6730 WEST MARGINAL WAY SW
 CITY, STATE:SEATTLE, WASHINGTON

FIGURE 1
 SITE LOCATION MAP

4/12/2012

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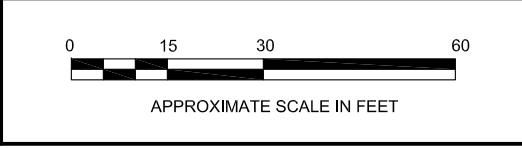
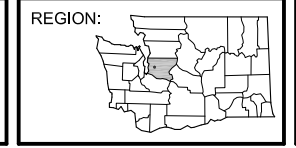
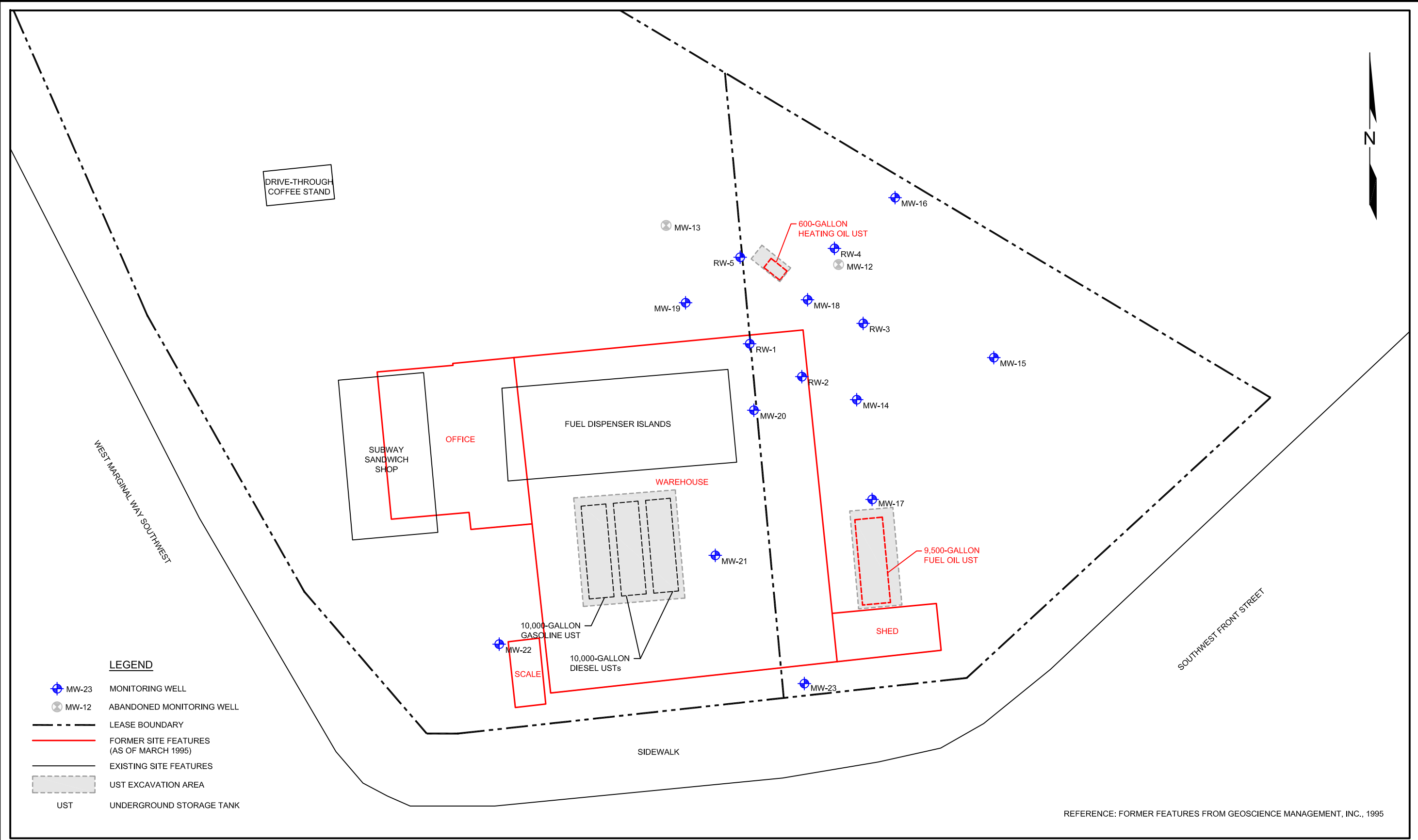


FIGURE 2
 SITE PLAN

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P:\0675 PORT OF SEATTLE\0675-002 T115\TECHNICAL\CAD\2012\0675-002_2012_HF.DWG 5/31/2012



REFERENCE: FORMER FEATURES FROM GEOSCIENCE MANAGEMENT, INC., 1995



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PROJECT NAME: T-115 SOUTHWEST TANK AREA
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 CITY, STATE: SEATTLE, WASHINGTON

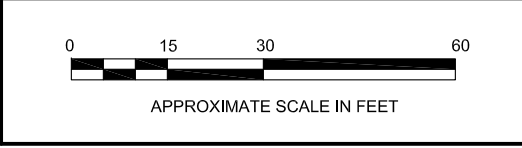
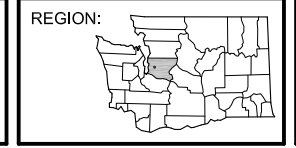
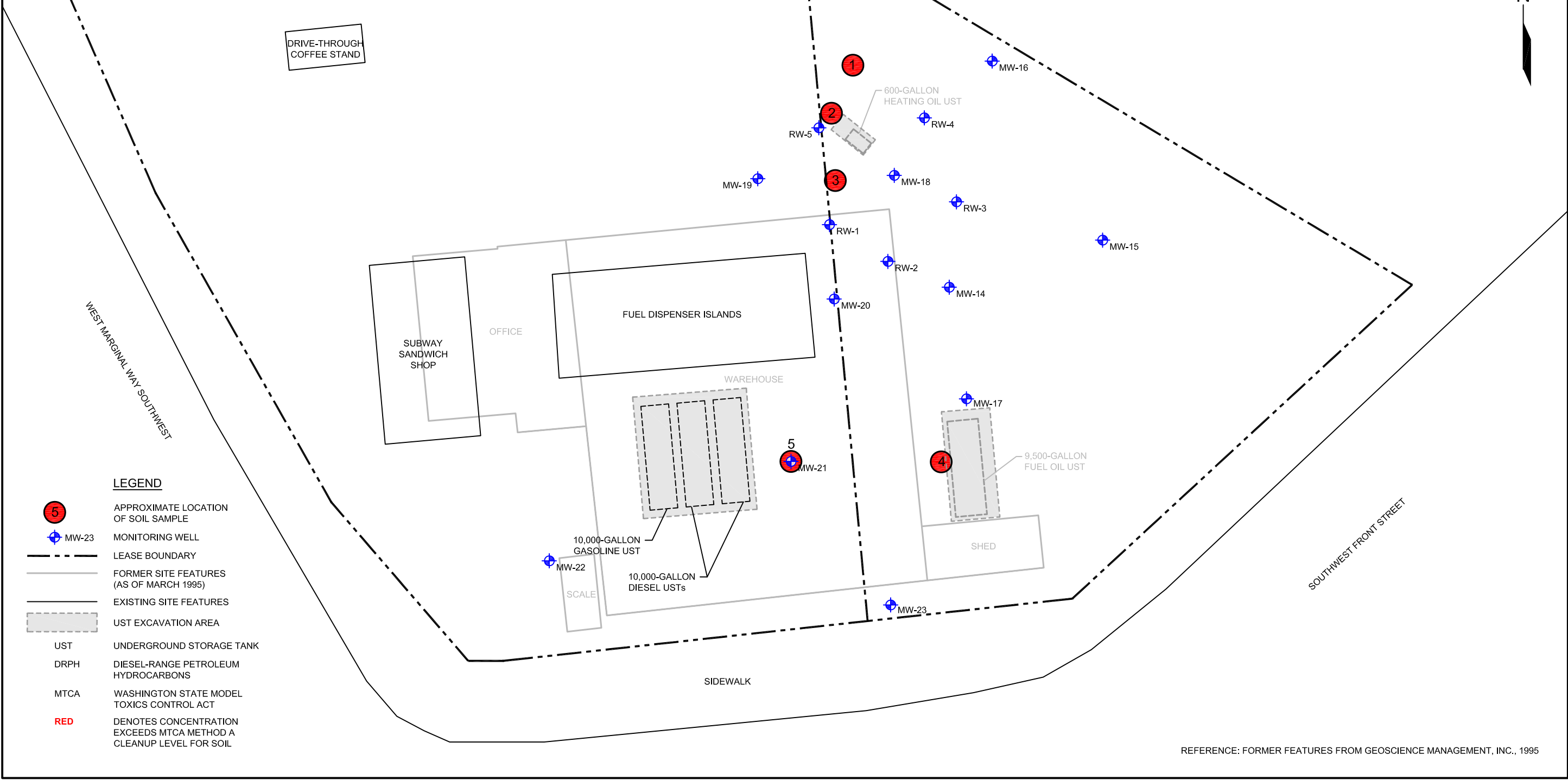


FIGURE 3
FORMER SITE FEATURES

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4/12/2012
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Location No.	Sample Type	Sample Name/Number	Sample Depth (feet below ground surface)	Date	DRPH (milligrams per kilogram)
1	Hand Auger Boring	HB-5 @ 4'	4.0	03/22/95	8,600
2	UST Excavation Sidewall	WWALL	8.0	09/04/96	5,810
3	Hand Auger Boring	HB-8 @ 4.5'	4.5	03/23/95	3,300
4	UST Excavation Sidewall	S11	9.0	08/25/95	2,100
5	Monitoring Well Boring	MW21-1	6.0	12/05/96	9,600
MTCA Method A Cleanup Level for Soil					2,000



DATE: 03/29/12
 DRAWN BY: NAC
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 CAD FILE: 0675-002_2012_DRPH

PROJECT NAME: T-115 SOUTHWEST TANK AREA
 PROJECT NUMBER: 0675-002
 STREET ADDRESS: 6730 WEST MARGINAL WAY SW
 CITY, STATE: SEATTLE, WASHINGTON

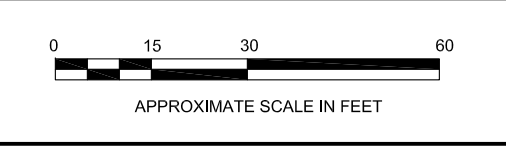
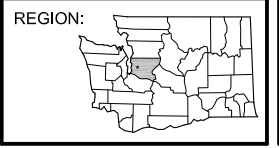
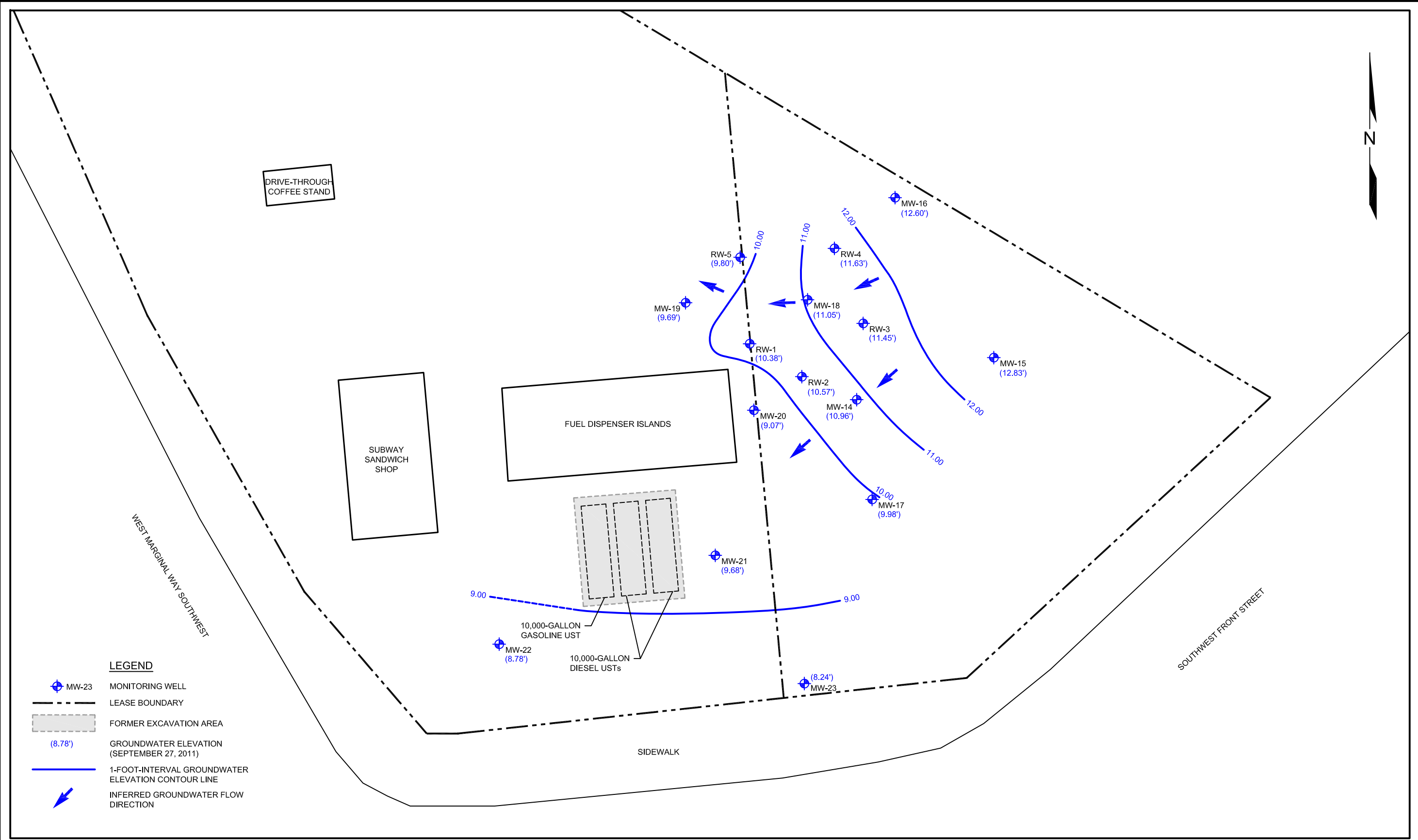


FIGURE 4
 SOIL DRPH CONCENTRATIONS EXCEEDING MTCA CLEANUP LEVEL

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PROJECT NAME: T-115 SOUTHWEST TANK AREA
 PROJECT NUMBER: 0675-002
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 CITY, STATE: SEATTLE, WASHINGTON

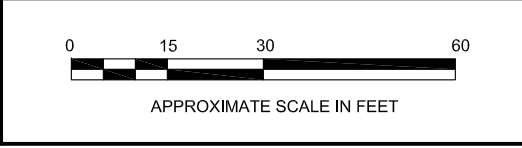
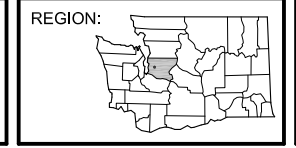
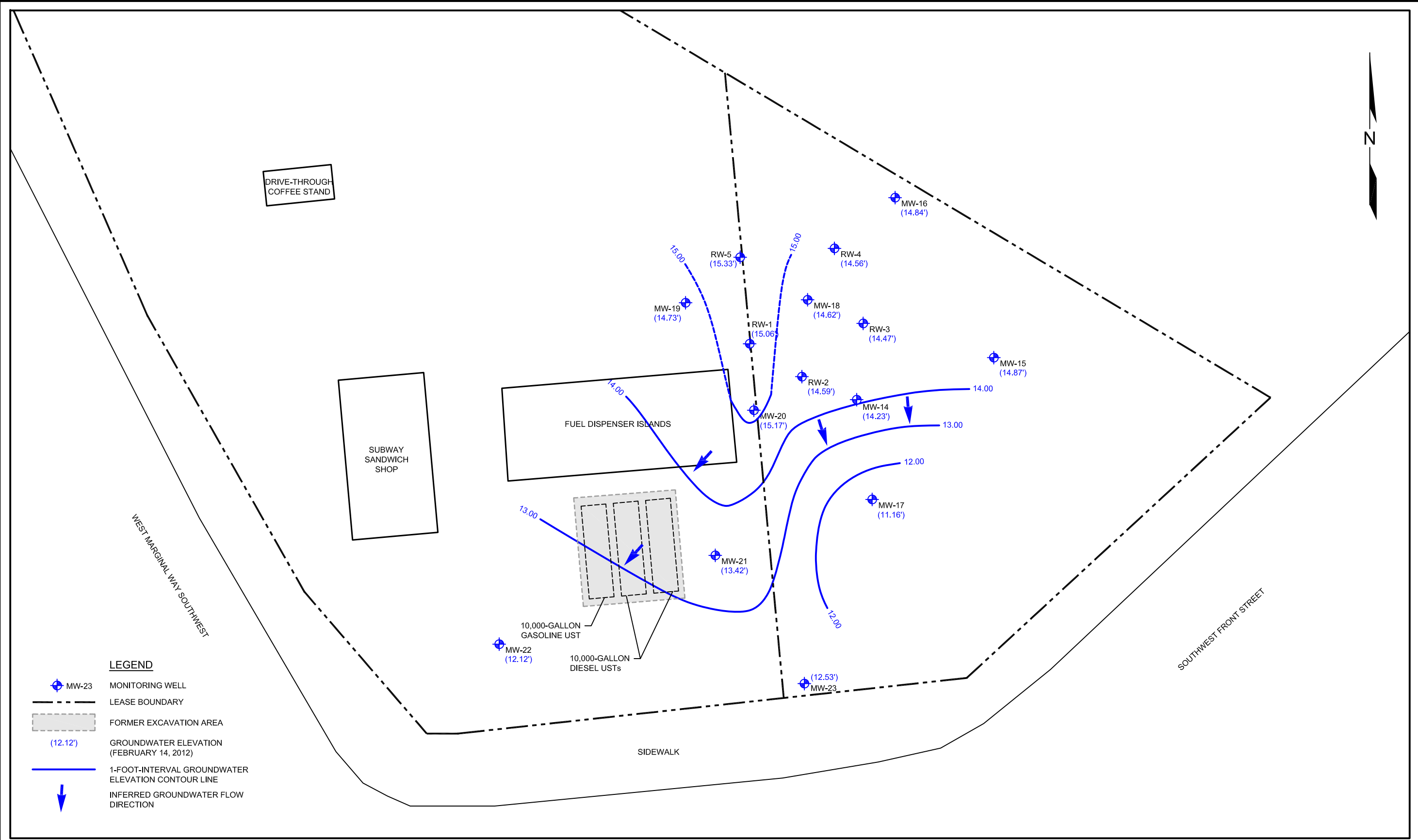


FIGURE 5
 GROUNDWATER CONTOUR MAP
 (SEPTEMBER 27, 2011)

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- LEGEND**
- MW-23 MONITORING WELL
 - LEASE BOUNDARY
 - FORMER EXCAVATION AREA
 - (12.12') GROUNDWATER ELEVATION (FEBRUARY 14, 2012)
 - 1-FOOT-INTERVAL GROUNDWATER ELEVATION CONTOUR LINE
 - INFERRED GROUNDWATER FLOW DIRECTION



DATE: 03/13/12
 DRAWN BY: NAC
 CHECKED BY: DRAFT
 CAD FILE: 0675-002_2012_CM2

PROJECT NAME: T-115 SOUTHWEST TANK AREA
 PROJECT NUMBER: 0675-002
 STREET ADDRESS: 6730 WEST MARGINAL WAY SW
 CITY, STATE: SEATTLE, WASHINGTON

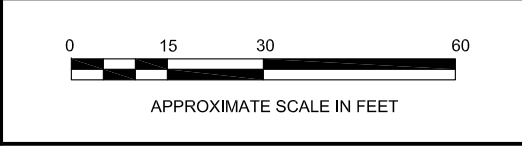
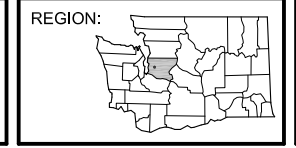
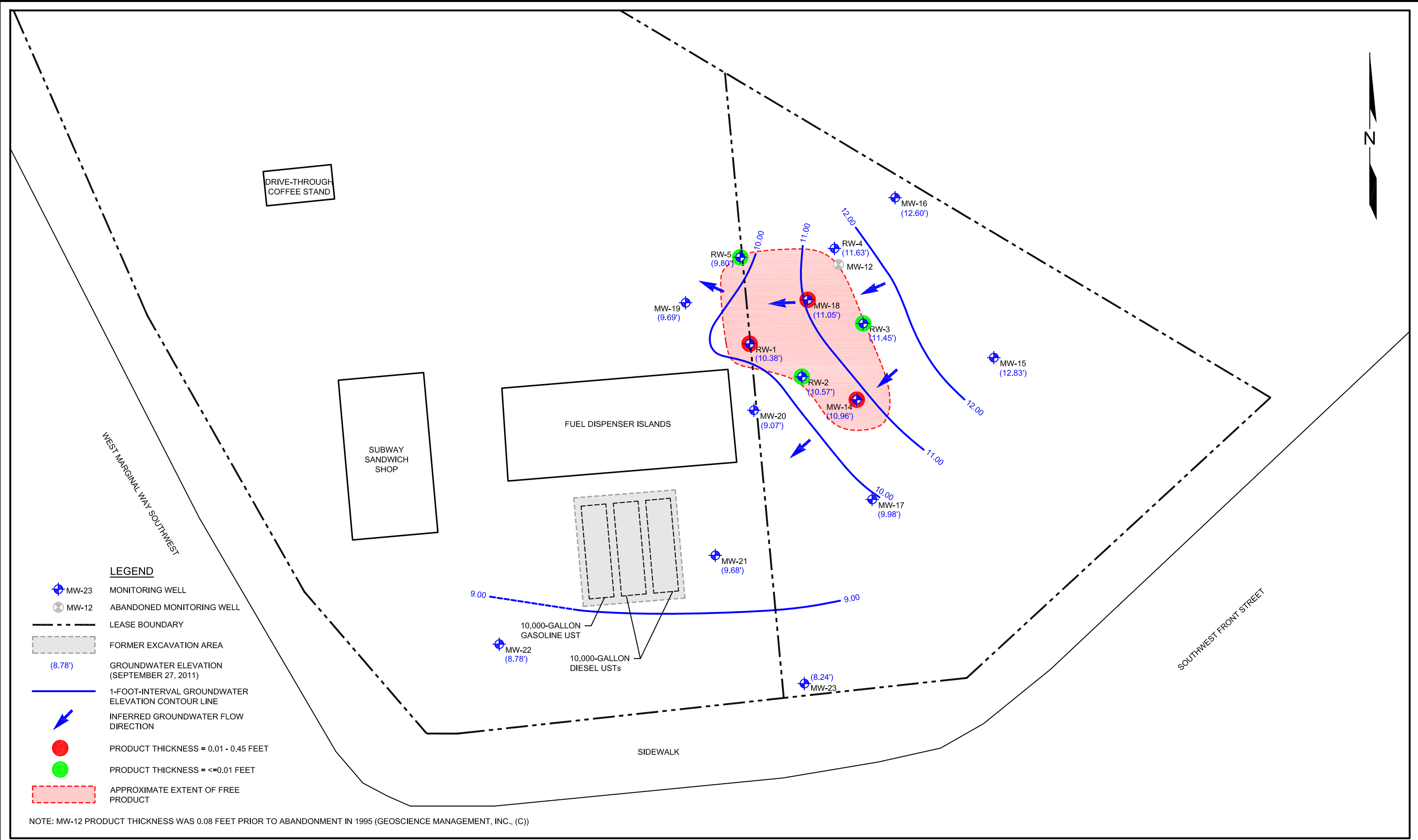


FIGURE 6
 GROUNDWATER CONTOUR MAP
 (FEBRUARY 14, 2012)

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5/31/2012
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DATE: 03/13/12
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 CAD FILE: 0675-002_2012_FP

PROJECT NAME: T-115 SOUTHWEST TANK AREA
 PROJECT NUMBER: 0675-002
 STREET ADDRESS: 6730 WEST MARGINAL WAY SW
 CITY, STATE: SEATTLE, WASHINGTON

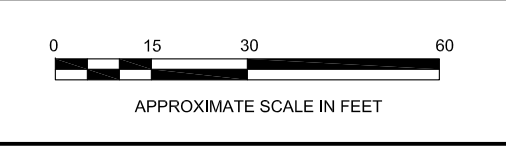
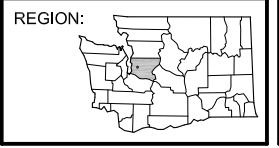


FIGURE 7
 FREE PRODUCT THICKNESS IN WELLS
 (MARCH 2011 - FEBRUARY 2012)

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5/31/2012
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Well ID	Sample Date	DRPH
MW-15	06/21/11	<50
	09/28/11	<50
	12/15/11	<50
MW-16	06/21/11	<50
	09/28/11	<50
	12/15/11	<50
MW-17	06/21/11	140
	09/27/11	74
	12/15/11	<50
MW-19	06/22/11	260
	09/28/11	250
	12/16/11	320
MW-20	06/22/11	62
	09/28/11	<50
	12/16/11	<50
MW-21	06/21/11	130
	09/28/11	<50
	12/16/11	<50
MW-23	06/21/11	<50
	09/28/11	<50
	12/15/11	<50
RW-2	06/21/11	120,000
	09/27/11	--
	12/15/11	3,700
RW-4	06/21/11	3,400
	09/28/11	5,700
	12/15/11	1,500
RW-5	06/22/11	13,000
	09/27/11	--
	12/15/11	740
MTCA Method A Cleanup Level		500

DRIVE-THROUGH COFFEE STAND

SUBWAY SANDWICH SHOP

FUEL DISPENSER ISLANDS








10,000-GALLON GASOLINE UST
10,000-GALLON DIESEL USTs

SIDEWALK

SOUTHWEST FRONT STREET



LEGEND

-  MW-23 MONITORING WELL
 -  LEASE BOUNDARY
 -  FORMER EXCAVATION AREA
 -  (8.78') GROUNDWATER ELEVATION (SEPTEMBER 27, 2011)
 -  1-FOOT-INTERVAL GROUNDWATER ELEVATION CONTOUR LINE
 -  INFERRED GROUNDWATER FLOW DIRECTION
 -  APPROXIMATE EXTENT OF FREE PRODUCT
 - DRPH DIESEL-RANGE PETROLEUM HYDROCARBONS
 - RED DENOTES CONCENTRATION EXCEEDS MTCA METHOD A CLEANUP LEVEL
 - MTCA WASHINGTON STATE MODEL TOXICS CONTROL ACT
 - < RESULT BELOW LABORATORY REPORTING LIMIT
 - NOT SAMPLED
- RESULTS SHOWN IN MICROGRAMS PER LITER



DATE: _____ 03/13/12
 DRAWN BY: _____ NAC
 CHECKED BY: _____ DRAFT
 CAD FILE: _____ 0675-002_2012_GD

PROJECT NAME: _____ T-115 SOUTHWEST TANK AREA
 PROJECT NUMBER: _____ 0675-002
 STREET ADDRESS: _____ 6730 WEST MARGINAL WAY SW
 CITY, STATE: _____ SEATTLE, WASHINGTON

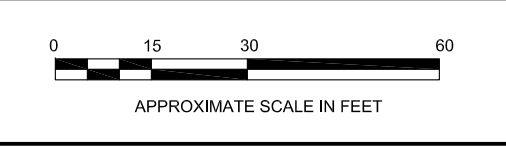
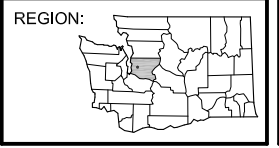


FIGURE 8
GROUNDWATER DRPH ANALYTICAL RESULTS

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TABLES



Table 1
Groundwater Elevations
T-115 Southwest Tank Area
6730 West Marginal Way Southwest
Seattle, Washington

Well No.	Groundwater Elevation (feet)									
	03/24/11	05/27/11	06/16/11	06/21/11	09/27/11	10/26/11	11/17/11	12/15/11	01/26/12	02/14/12
MW-14	14.84*	13.76*	12.88*	12.79*	10.96	12.10*	12.64*	12.80*	15.95*	14.23*
MW-15	15.23	14.47	13.77	13.73	12.83	12.80	13.14	13.49	15.51	14.87
MW-16	NM	14.51	13.89	13.78	12.60	12.84	12.99	13.60	15.37	14.84
MW-17	12.43	11.05	10.48	10.47	9.98	10.14	10.16	10.41	12.09	11.16
MW-18	15.13*	14.08*	13.35*	13.09*	11.05*	12.01*	12.58*	13.26	15.51	14.62
MW-19	15.19	14.93	12.78	12.60	9.69	10.39	11.06	12.39	15.53	14.73
MW-20	NM	13.02	11.36	11.14	9.07	10.26	13.79	11.23	15.06	15.17
MW-21	14.30	12.98	12.18	12.11	9.68	10.11	10.35	11.64	15.72	13.42
MW-22	14.02	12.32	11.31	11.17	8.78	8.63	9.02	9.49	12.45	12.12
MW-23	NM	11.67	10.69	10.52	8.24	8.01	8.58	9.96	13.18	12.53
RW-1	NM	13.87*	13.12*	12.69*	10.38*	11.65	12.81	12.81	16.52	15.06
RW-2	NM	13.77	12.73	12.52	10.57	11.73	12.64	12.78	15.80	14.59
RW-3	15.05	14.14	13.27	13.12	11.45	12.31	12.67	13.17	17.17	14.47
RW-4	15.25	14.41	13.60	13.39	11.63	12.45	12.71	13.31	NM	14.56
RW-5	NM	14.13	13.05	12.34	9.80	10.93	14.34	12.90	16.98	15.33

NOTES:

*Elevation corrected for free product thickness in well.

NM = not measured



Table 2
Free Product Thickness
T-115 Southwest Tank Area
6730 West Marginal Way Southwest
Seattle, Washington

Well No.	Free Product Thickness (feet)												
	03/24/11	05/27/11	06/16/11	06/21/11	07/06/11	09/27/11	10/12/11	10/26/11	11/08/11	11/17/11	12/15/11	01/26/12	02/14/12
MW-14	0.15	0.45	0.40	0.25	0.30	0	0.17	0.34	0.13	0.08	0.03	0.11	0.04
MW-18	0.01	0.01	0.11	0.14	0.19	0.03	0.02	0.06	0.05	0.04	0	0	0.01
RW-1	NM	0.19	0.21	0.19	0.13	0.03	0	0	0	0	0	0	0
RW-2	NM	0	0	0	NM	0.01	NM	0	0	0	0	0	0
RW-5	NM	0	0	0	NM	0.01	NM	0	0	0	0	0	0

NOTES:

NM= Not measured



Table 3
Groundwater Analytical Results
Southwest Tank Area
Port of Seattle Terminal 115
Seattle, Washington

Well ID	Sample Date	Depth to Groundwater ¹ (feet)	Groundwater Elevation ² (feet)	Analytical Results (µg/L)						
				GRPH ³	DRPH ⁴	ORPH ⁴	Benzene ⁵	Toluene ⁵	Ethylbenzene ⁵	Total Xylenes ⁵
MW-15 TOC: 19.53 feet	06/21/11	5.80	13.73	--	<50	<250	--	--	--	--
	09/28/11	6.70	12.83	--	<50	<250	--	--	--	--
	12/15/11	6.04	13.49	--	<50	<250	--	--	--	--
MW-16 TOC: 20.80 feet	06/21/11	7.02	13.78	--	<50	<250	--	--	--	--
	09/28/11	8.20	12.60	--	<50	<250	--	--	--	--
	12/15/11	7.20	13.60	--	<50	<250	--	--	--	--
MW-17 TOC: 19.81 feet	06/21/11	9.34	10.47	--	140	<250	--	--	--	--
	09/27/11	9.83	9.98	--	74	<250	--	--	--	--
	12/15/11	9.40	10.41	--	<50	<250	--	--	--	--
MW-19 TOC: 19.73 feet	06/22/11	7.13	12.60	<1	260	<250	<1	<1	<1	<3
	09/28/11	10.04	9.69	<100	250	<250	<1	<1	<1	<3
	12/16/11	7.34	12.39	<100	320	<250	<1	<1	<1	<3
MW-19 (Duplicate) TOC: 19.73 feet	06/22/11	7.13	12.60	<100	330	<250	<1	<1	<1	<3
	09/28/11	10.04	9.69	<100	190	<250	<1	<1	<1	<3
	12/16/11	7.34	12.39	<100	470	<250	<1	<1	<1	<3
MW-20 TOC: 19.46 feet	06/22/11	8.32	11.14	<100	62	<250	<1	<1	<1	<3
	09/28/11	10.39	9.07	<100	<50	<250	<1	<1	<1	<3
	12/16/11	8.23	11.23	<100	<50	<250	<1	<1	<1	<3
MW-21 TOC: 19.96 feet	06/21/11	7.85	12.11	<100	130	<250	1.7	<1	<1	<3
	09/28/11	10.28	9.68	<100	<50	<250	<1	<1	<1	<3
	12/16/11	8.32	11.64	<100	<50	<250	<1	<1	<1	<3
MW-23 TOC: 19.67 feet	06/21/11	9.15	10.52	--	<50	<250	<1	<1	<1	<3
	09/28/11	11.43	8.24	<100	<50	<250	<1	<1	<1	<3
	12/15/11	9.71	9.96	<100	<50	<250	<1	<1	<1	<3
RW-2 TOC: 19.83 feet	06/21/11	7.31	12.52	--	120,000	670 _x	--	--	--	--
	09/27/11	9.26	10.57	Not Sampled (Product Present)						
	12/15/11	7.05	12.78	--	3,700	<250	--	--	--	--
MTCA Method A Cleanup Level for Groundwater ⁶				1,000/800 ^a	500	500	5	1,000	700	1,000



Table 3
Groundwater Analytical Results
Southwest Tank Area
Port of Seattle Terminal 115
Seattle, Washington

Well ID	Sample Date	Depth to Groundwater ¹ (feet)	Groundwater Elevation ² (feet)	Analytical Results (µg/L)						
				GRPH ³	DRPH ⁴	ORPH ⁴	Benzene ⁵	Toluene ⁵	Ethylbenzene ⁵	Total Xylenes ⁵
RW-4 TOC: 19.43 feet	06/21/11	6.04	13.39	--	3,400	<250	--	--	--	--
	09/28/11	7.80	11.63	--	5,700	<250	--	--	--	--
	12/15/11	6.12	13.31	--	1,500	<250	--	--	--	--
RW-5 TOC: 19.63 feet	06/22/11	7.29	12.34	--	13,000	<250	--	--	--	--
	09/27/11	9.83	9.80	Not Sampled (Product Present)						
	12/15/11	6.73	12.90	--	740	<250	--	--	--	--
MTCA Method A Cleanup Level for Groundwater⁶				1,000/800^a	500	500	5	1,000	700	1,000

NOTES:

Red denotes concentrations exceeding MTCA Method A Cleanup Levels for Groundwater.

Samples analyzed by Friedman & Bruya, Inc. of Seattle, Washington.

TOC elevation data from previous Port of Seattle reports.

¹Measured from the top of well casing.

²Elevations referenced to mean Low Low Water datum.

³Analyzed by Method NWTPH-Gx.

⁴Analyzed by Method NWTPH-Dx, with silica gel cleanup.

⁵Analyzed by EPA Method 8021B.

⁶MTCA Method A Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007.

^a1,000 µg/L when benzene is not detected and 800 µg/L when benzene is detected.

< = not detected at a concentration exceeding the laboratory reporting limit

-- = not analyzed

µg/L = micrograms per liter

DRPH = diesel-range petroleum hydrocarbons

EPA = U.S. Environmental Protection Agency

GRPH = gasoline-range petroleum hydrocarbons

MTCA = Washington State Model Toxics Control Act

NWTPH = Northwest Total Petroleum Hydrocarbon

ORPH = oil-range petroleum hydrocarbons

TOC = top of casing elevation

x= The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

APPENDIX A
WELL RW-2 REPAIR PHOTOGRAPHS



Photograph 1. Condition of well RW-2 prior to repair.



Photograph 2. Condition of well RW-2 after repair.



Project No.: 0675-002-04
Date: April 12, 2012
Drawn By: AJL
Chk By: OKP
File ID: 0675-002-04_Site Assessment... docx

WELL RW-2 REPAIR PHOTOGRAPHS

T-115 Southwest Tank Area
6730 West Marginal Way SW
Seattle, Washington

APPENDIX B
LABORATORY ANALYTICAL REPORTS

Friedman & Bruya, Inc. #106269

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Charlene Morrow, M.S.
Yelena Aravkina, M.S.
Bradley T. Benson, B.S.
Kurt Johnson, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
TEL: (206) 285-8282
FAX: (206) 283-5044
e-mail: fbi@isomedia.com

July 7, 2011

Chris Carter, Project Manager
SoundEarth Strategies
2811 Fairview Ave. East, Suite 2000
Seattle, WA 98102

Dear Mr. Carter:

Included are the results from the testing of material submitted on June 17, 2011 from the T115SWTNK0611 T115BECRP, SD02 Agreement No. P-00316341 F&BI 106269 project. There are 4 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Otto Paris
SOU0707R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on June 17, 2011 by Friedman & Bruya, Inc. from the SoundEarth Strategies T115SWTNK0611 T115BECRP, F&BI 106269 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>SoundEarth Strategies</u>	<u>Matrix</u>
106269-01	RW-1-Product-20110617	Product
106269-02	MW-18-Product-20110617	Product
106269-03	MW-14-Product-20110617	Product

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 07/07/11

Date Received: 06/17/11

Project: T115SWTNK0611 T115BECRP, F&BI 106269

Date Extracted: 06/21/11

Date Analyzed: 06/21/11

**RESULTS FROM THE ANALYSIS OF PRODUCT SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL**

USING METHOD NWTPH-Dx

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 50-150)
RW-1-Product-20110617 106269-01 1/200	1,100,000	<50,000	116
MW-18-Product-20110617 106269-02 1/200	1,100,000	<50,000	118
MW-14-Product-20110617 106269-03 1/200	1,000,000	<50,000	149
Method Blank 01-1113 MB	<50	<250	122

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 07/07/11

Date Received: 06/17/11

Project: T115SWTNK0611 T115BECRP, F&BI 106269

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF PRODUCT
SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-Dx**

Laboratory Code: 106269-03 1/10 (Duplicate)

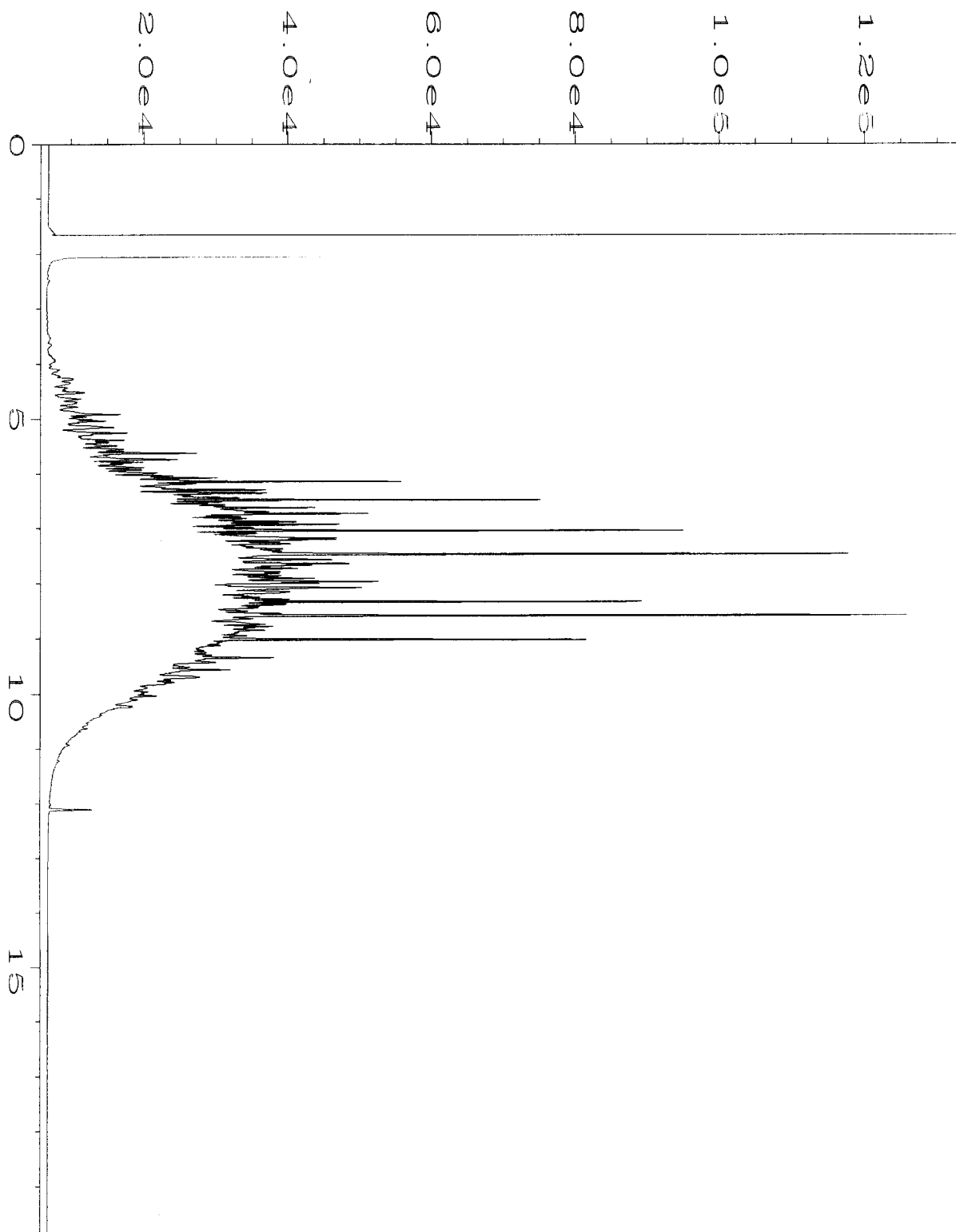
Analyte	Reporting Units	(Wet wt) Sample Result	(Wet wt) Duplicate Result	Relative Percent Difference	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	1,000,000	1,100,000	10	0-20

Laboratory Code: Laboratory Control Sample

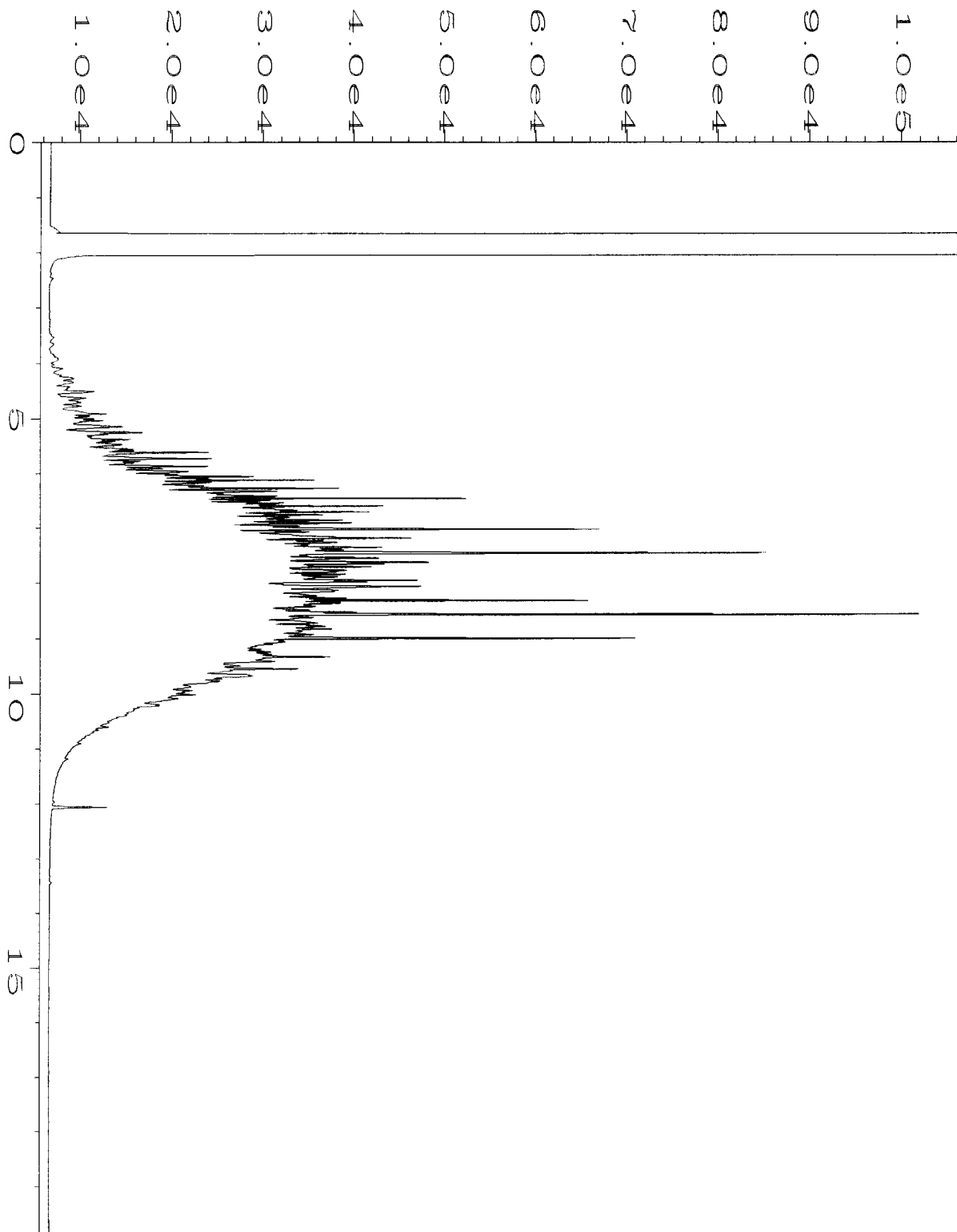
Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	141	137	79-144	3

Data Qualifiers & Definitions

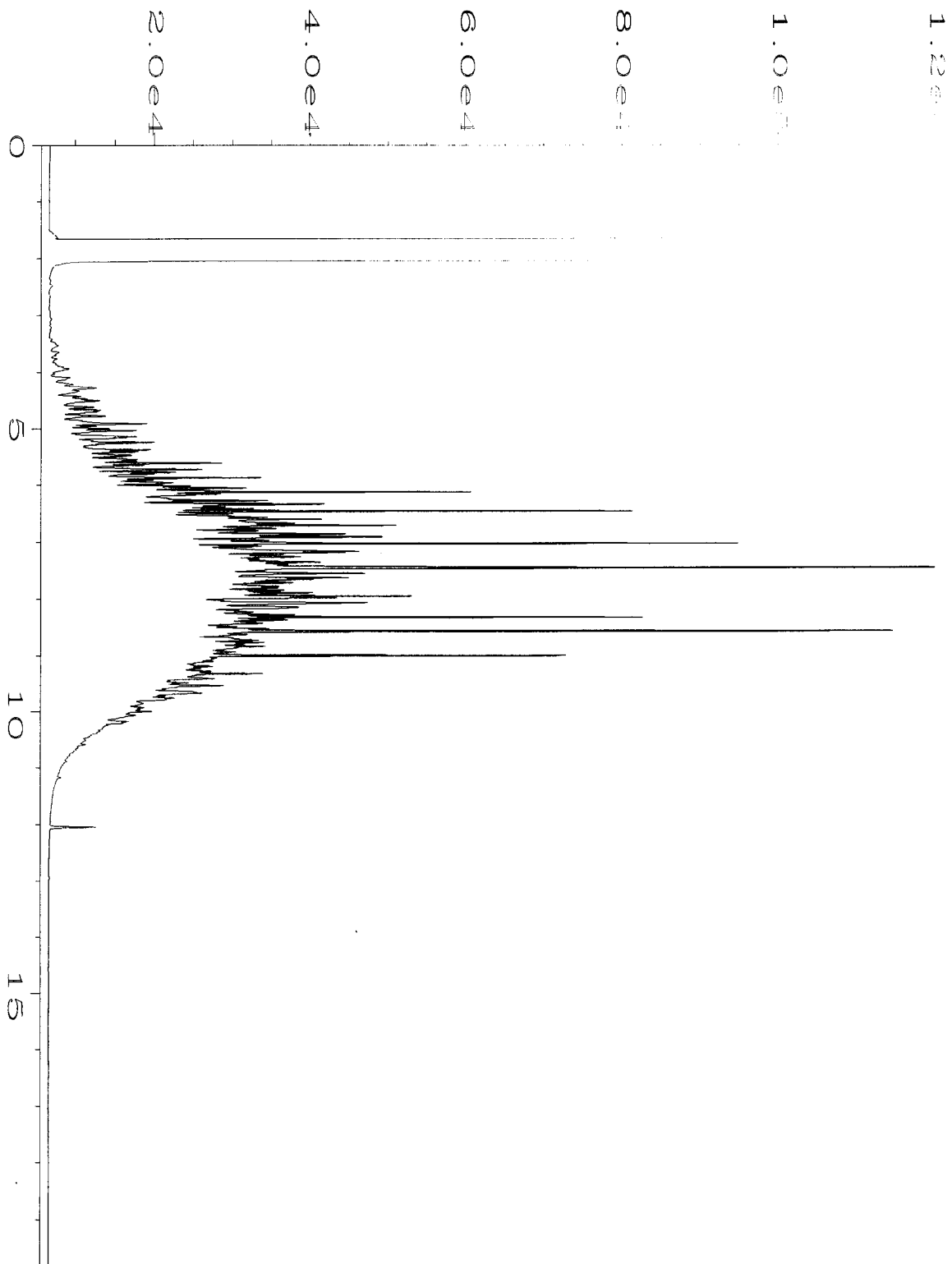
- a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.
- A1 – More than one compound of similar molecule structure was identified with equal probability.
- b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.
- ca - The calibration results for this range fell outside of acceptance criteria. The value reported is an estimate.
- c - The presence of the analyte indicated may be due to carryover from previous sample injections.
- d - The sample was diluted. Detection limits may be raised due to dilution.
- ds - The sample was diluted. Detection limits are raised due to dilution and surrogate recoveries may not be meaningful.
- dv - Insufficient sample was available to achieve normal reporting limits and limits are raised accordingly.
- fb - Analyte present in the blank and the sample.
- fc – The compound is a common laboratory and field contaminant.
- hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. The variability is attributed to sample inhomogeneity.
- ht - Analysis performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of normal control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.
- j – The result is below normal reporting limits. The value reported is an estimate.
- J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
- jl - The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.
- jr - The rpd result in laboratory control sample associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- lc - The presence of the compound indicated is likely due to laboratory contamination.
- L - The reported concentration was generated from a library search.
- nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.
- pc – The sample was received in a container not approved by the method. The value reported should be considered an estimate.
- pr – The sample was received with incorrect preservation. The value reported should be considered an estimate.
- ve - Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.
- vo - The value reported fell outside the control limits established for this analyte.
- x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



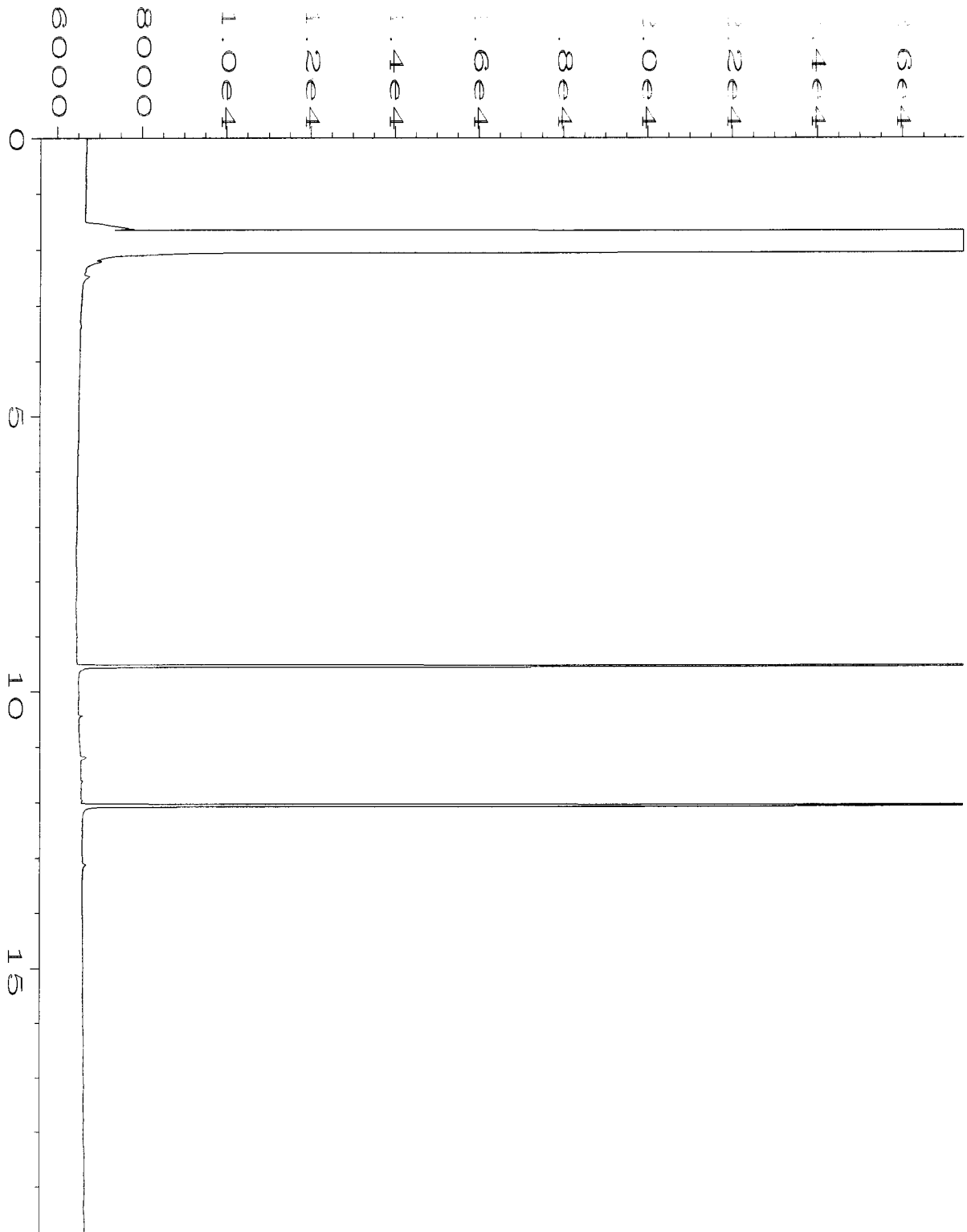
Data File Name	: C:\HPCHEM\1\DATA\06-21-11\006F0301.D	Page Number	: 1
Operator	: ML	Vial Number	: 6
Instrument	: GC1	Injection Number	: 1
Sample Name	: 106269-01 1/10	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Jun 11 10:22 AM	Analysis Method	: TPHD.MTH
Report Created on:	22 Jun 11 09:46 AM		



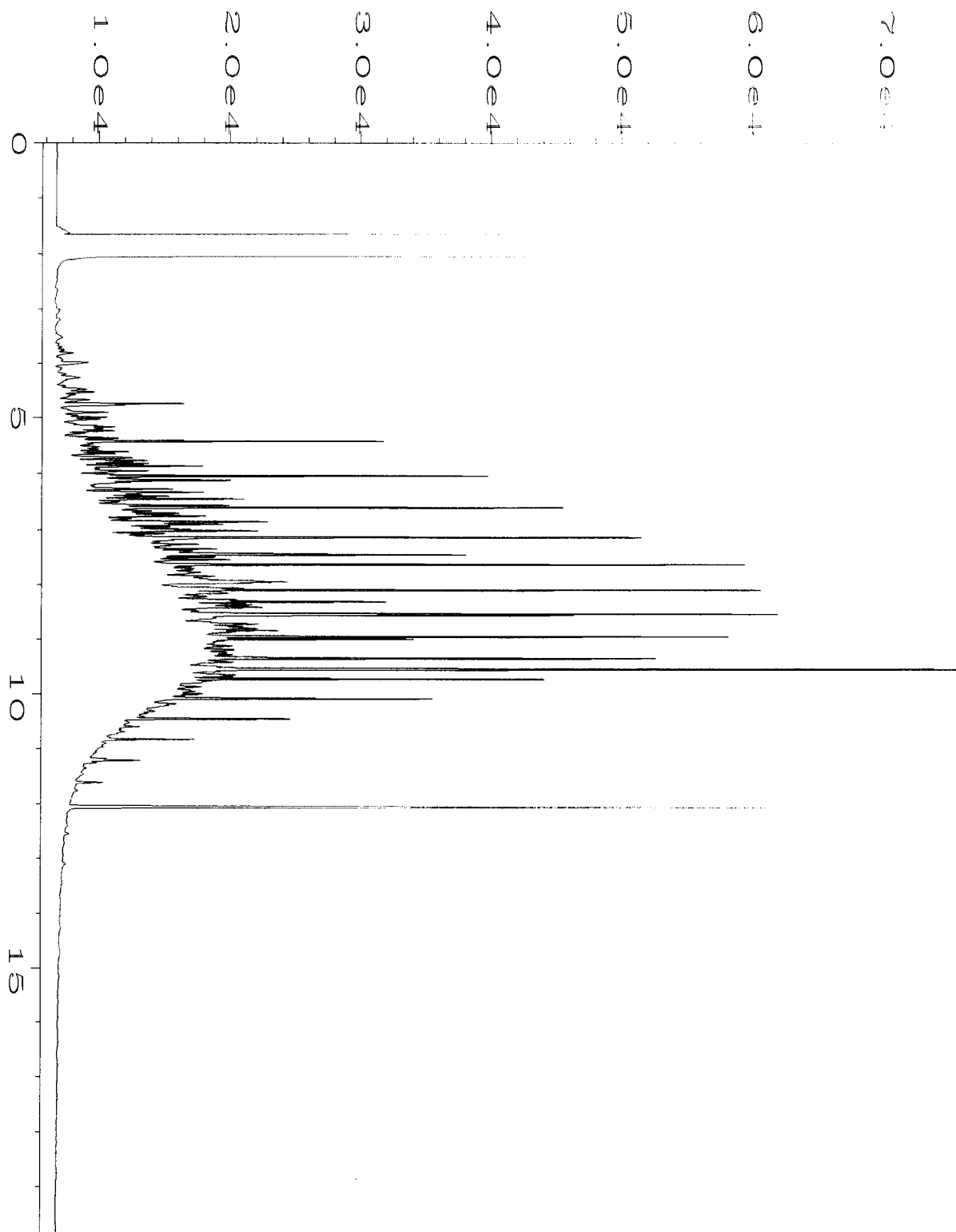
Data File Name	: C:\HPCHEM\1\DATA\06-21-11\007F0301.D	Page Number	: 1
Operator	: ML	Vial Number	: 7
Instrument	: GC1	Injection Number	: 1
Sample Name	: 106269-02 1/10	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Jun 11 10:43 AM	Analysis Method	: TPHD.MTH
Report Created on:	22 Jun 11 09:46 AM		



Data File Name	: C:\HPCHEM\1\DATA\06-21-11\008F0301.D	Page Number	: 1
Operator	: ML	Vial Number	: 8
Instrument	: GC1	Injection Number	: 1
Sample Name	: 106269-03 1/10	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Jun 11 11:09 AM	Analysis Method	: TPHD.MTH
Report Created on:	22 Jun 11 09:46 AM		



Data File Name	: C:\HPCHEM\1\DATA\06-21-11\010F0301.D	Page Number	: 1
Operator	: ML	Vial Number	: 10
Instrument	: GC1	Injection Number	: 1
Sample Name	: 01-1113 mb	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Jun 11 12:03 PM	Analysis Method	: TPHD.MTH
Report Created on:	22 Jun 11 09:46 AM		



Data File Name	: C:\HPCHEM\1\DATA\06-21-11\003F0201.D	Page Number	: 1
Operator	: ML	Vial Number	: 3
Instrument	: GC1	Injection Number	: 1
Sample Name	: 500 WADF 35-58C	Sequence Line	: 2
Run Time Bar Code:		Instrument Method	: THERM.MTH
Acquired on	: 21 Jun 11 09:01 AM	Analysis Method	: TPHD.MTH
Report Created on:	22 Jun 11 09:46 AM		

106269

SAMPLE CHAIN OF CUSTODY

ME 6/17/11 102

Send Report To Otto Paris, Chris Carter
 Company SoundEarth Strategies Inc
 Address 2811 Fairview Ave East Ste 2000
 City, State, ZIP Seattle WA 98102
 Phone # 206-306-1900 Fax # 206-306-1907

SAMPLERS (signature) [Signature]

PROJECT NAME/NO. T115/0675-002-02 PO # _____

REMARKS Please direct bill Port of Seattle

Page # 1 of 1

TURNAROUND TIME
 Standard (2 Weeks)
 RUSH
 Rush charges authorized by: _____

SAMPLE DISPOSAL
 Dispose after 30 days
 Return samples
 Will call with instructions

Sample ID	Lab ID	Date	Time	Sample Type	# of containers	ANALYSES REQUESTED							Notes	
						TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS			
RW-1-Product-2010067	01	6/17/11	1133	w/Product	1	X								
MW-18-Product-2010067	02	I	1320	I	1	X								
MW-14-Product-2010067	03	I	1458	I	1	X								

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282
 Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>[Signature]</u>	Andrea Liljegren	SoundEarth	6/17/11	11035
Received by: <u>[Signature]</u>	HONG NGUYEN	[Signature]	6/17/11	✓
Relinquished by:				
Received by:				

Samples received at 30 °C

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 106269 CLIENT SES INITIALS/ DV
DATE: 06-17-11

If custody seals are present on cooler, are they intact? NA YES NO

Cooler/Sample temperature 30 °C

Were samples received on ice/cold packs? YES NO

Number of days samples have been sitting prior to receipt at laboratory 0 days

Is there a Chain-of-Custody* (COC)? YES NO
*or other representative documents, letters, and/or shipping memos

Are the samples clearly identified? (explain "no" answer below) YES NO

Is the following information provided on the COC* ? (explain "no" answer below)

- | | | | | | |
|--------------|---|-----------------------------|--------------------|---|-----------------------------|
| Sample ID's | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | # of Containers | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| Date Sampled | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | Relinquished | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| Time Sampled | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | Requested analysis | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) YES NO

Were appropriate sample containers used? (explain "no" answer below) YES NO

If custody seals are present on samples, are they intact? NA YES NO

Are samples requiring no headspace, headspace free? NA YES NO

Explain "no" items from above (use the back if needed)

Are samples for PCB testing (if yes, put a red sticker on each sample) YES NO

Did samples originate out of the country? (if yes, put in APHIS refrigerator) YES NO

Was client notified of sample receipt? Over the Counter Picked up by F&BI
 YES NO (explain)

If Yes, name of person contacted _____ Left Message

Special Instructions from Client _____

Friedman & Bruya, Inc. #106315 amended

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Charlene Morrow, M.S.
Yelena Aravkina, M.S.
Bradley T. Benson, B.S.
Kurt Johnson, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
TEL: (206) 285-8282
FAX: (206) 283-5044
e-mail: fbi@isomedia.com

October 17, 2011

Chris Carter, Project Manager
SoundEarth Strategies
2811 Fairview Ave. East, Suite 2000
Seattle, WA 98102

Dear Mr. Carter:

Included is the amended report from the testing of material submitted on June 22, 2011 from the T115SWTNK0611 T115BECRP, SD02 Agreement No. P-00316341 F&BI 106315 project. The qualifier on the NWTPH-Dx analysis of sample RW-2-20110621 has been corrected.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Otto Paris, Andrea Liljegren
SOU0708R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Charlene Morrow, M.S.
Yelena Aravkina, M.S.
Bradley T. Benson, B.S.
Kurt Johnson, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
TEL: (206) 285-8282
FAX: (206) 283-5044
e-mail: fbi@isomedia.com

July 8, 2011

Chris Carter, Project Manager
SoundEarth Strategies
2811 Fairview Ave. East, Suite 2000
Seattle, WA 98102

Dear Mr. Carter:

Included are the results from the testing of material submitted on June 22, 2011 from the T115SWTNK0611 T115BECRP, SD02 Agreement No. P-00316341 F&BI 106315 project. There are 6 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Otto Paris
SOU0708R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on June 22, 2011 by Friedman & Bruya, Inc. from the SoundEarth Strategies T115SWTNK0611 T115BECRP, F&BI 106315 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>SoundEarth Strategies</u>	<u>Matrix</u>
106315-01	MW-15-20110621	Water
106315-02	MW-16-20110621	Water
106315-03	MW-17-20110621	Water
106315-04	MW-19-20110622	Water
106315-05	MW-20-20110622	Water
106315-06	MW-21-20110621	Water
106315-07	MW-23-20110621	Water
106315-08	RW-2-20110621	Water
106315-09	RW-4-20110621	Water
106315-10	RW-5-20110622	Water
106315-11	MW-99-20110622	Water

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 07/08/11

Date Received: 06/22/11

Project: T115SWTNK0611 T115BECRP, F&BI 106315

Date Extracted: 06/23/11

Date Analyzed: 06/23/11

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 52-124)
MW-19-20110622 106315-04	<1	<1	<1	<3	<100	102
MW-20-20110622 106315-05	<1	<1	<1	<3	<100	103
MW-21-20110621 106315-06	1.7	<1	<1	<3	<100	102
MW-23-20110621 106315-07	<1	<1	<1	<3	<100	102
MW-99-20110622 106315-11	<1	<1	<1	<3	<100	102
Method Blank 01-1131 MB	<1	<1	<1	<3	<100	120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 07/08/11

Date Received: 06/22/11

Project: T115SWTNK0611 T115BECRP, F&BI 106315

Date Extracted: 06/24/11

Date Analyzed: 07/06/11 and 07/08/11

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx
Sample Extracts Passed Through a
Silica Gel Column Prior to Analysis
Results Reported as ug/L (ppb)**

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 50-150)
MW-15-20110621 106315-01	<50	<250	70
MW-16-20110621 106315-02	<50	<250	85
MW-17-20110621 106315-03	140	<250	91
MW-19-20110622 106315-04	260	<250	109
MW-20-20110622 106315-05	62	<250	91
MW-21-20110621 106315-06	130	<250	88
MW-23-20110621 106315-07	<50	<250	79
RW-2-20110621 106315-08 1/10	120,000	670 x	111
RW-4-20110621 106315-09	3,400	<250	ip
RW-5-20110622 106315-10	13,000	<250	96
MW-99-20110622 106315-11	330	<250	93
Method Blank 01-1137 MB	<50	<250	109

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 07/08/11

Date Received: 06/22/11

Project: T115SWTNK0611 T115BECRP, F&BI 106315

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 106291-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	Relative Percent Difference (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	104	72-119
Toluene	ug/L (ppb)	50	101	71-113
Ethylbenzene	ug/L (ppb)	50	110	72-114
Xylenes	ug/L (ppb)	150	102	72-113
Gasoline	ug/L (ppb)	1,000	104	70-119

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 07/08/11

Date Received: 06/22/11

Project: T115SWTNK0611 T115BECRP, F&BI 106315

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-Dx**

Laboratory Code: Laboratory Control Sample Silica Gel

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	85	87	63-142	2

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

A1 - More than one compound of similar molecule structure was identified with equal probability.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for this range fell outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte indicated may be due to carryover from previous sample injections.

d - The sample was diluted. Detection limits may be raised due to dilution.

ds - The sample was diluted. Detection limits are raised due to dilution and surrogate recoveries may not be meaningful.

dv - Insufficient sample was available to achieve normal reporting limits and limits are raised accordingly.

fb - Analyte present in the blank and the sample.

fc - The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. The variability is attributed to sample inhomogeneity.

ht - Analysis performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of normal control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j - The result is below normal reporting limits. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.

jr - The rpd result in laboratory control sample associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the compound indicated is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received in a container not approved by the method. The value reported should be considered an estimate.

pr - The sample was received with incorrect preservation. The value reported should be considered an estimate.

ve - Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

106315

SAMPLE CHAIN OF CUSTODY

ME 06/22/11

DO4/V2

Send Report To Otto Paris, Chris Carter

Company SoundEarth Strategies, Inc.

Address 2811 Fairview Ave East, Ste 2000

City, State, ZIP Seattle WA 98162

Phone # 206-306-1900 Fax # 206-306-1907

SAMPLERS (signature) [Signature] and For Corey Leagne

PROJECT NAME/NO. T115 / 0675-002-02

REMARKS Please Direct Bill Port of Seattle

GEMS Y / N

Page # 1 of 1

TURNAROUND TIME

Standard (2 Weeks)

RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

Dispose after 30 days

Return samples

Will call with instructions

Sample ID	Sample Location	Sample Depth (feet)	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED						Notes	
								NWTPH-Dx	NWTPH-Gx	BTEX by 8021B	VOC's by 8260	SVOC's by 8270	RCRA-8 Metals		
MW-15-20110621	MW-15	8	01	6/21/11	1418	W	1	X							Dx 156 per OP MC 6/24/11
MW-16-20110621	MW-16	9	02		1245		1	X							
MW-17-20110621	MW-17	12	03		1548		1	X							
MW-19-20110622	MW-19	10	04 A-D	6/22/11	0939		4	X	X	X					
MW-20-20110622	MW-20	13	05		1040		4	X	X	X					
MW-21-20110621	MW-21	10	06	6/21/11	1618		4	X	X	X					
MW-23-20110621	MW-23	12	07		1650		4	X	X	X					
RW-2-20110621	RW-2	10	08		1522		1	X							
RW-4-20110621	RW-4	8.5	09		1335		1	X							
RW-5-20110622	RW-5	10	10 A-D	6/22/11	0950		4	X							DO NOT analyze for BTEX and BTEX 02
MW99-20110622	-	10	11 A-D		1000		4	X	X	X					

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282
 Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>[Signature]</u>	Andrea Liljegren	SoundEarth	6/22/11	1212
Received by: <u>[Signature]</u>	Nhan Phan	Fe B T	6/22/11	1212
Relinquished by:				
Received by:				

Friedman & Bruya, Inc. #109417

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Charlene Morrow, M.S.
Yelena Aravkina, M.S.
Bradley T. Benson, B.S.
Kurt Johnson, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
TEL: (206) 285-8282
FAX: (206) 283-5044
e-mail: fbi@isomedia.com

October 6, 2011

Otto Paris, Project Manager
SoundEarth Strategies
2811 Fairview Ave. East, Suite 2000
Seattle, WA 98102

Dear Mr. Paris:

Included are the results from the testing of material submitted on September 28, 2011 from the T115SWTNK0611 T115BECRP, SD02 Agreement No. P-00316341 F&BI 109417 project. There are 6 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Chris Carter, Andrea Liljegren
SOU1006R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on September 28, 2011 by Friedman & Bruya, Inc. from the SoundEarth Strategies T115SWTNK0611 T115BECRP, SD02 Agreement No. P-00316341, F&BI 109417 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>SoundEarth Strategies</u>	<u>Matrix</u>
109417-01	MW-15-20110928	Water
109417-02	MW-16-20110928	Water
109417-03	MW-17-20110928	Water
109417-04	MW-19-20110928	Water
109417-05	MW-20-20110928	Water
109417-06	MW-21-20110928	Water
109417-07	MW-23-20110928	Water
109417-08	RW-4-20110928	Water
109417-09	MW-99-20110928	Water

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/06/11

Date Received: 09/28/11

Project: T115SWTNK0611 T115BECRP, F&BI 109417

Date Extracted: 09/29/11

Date Analyzed: 09/29/11

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 52-124)
MW-19-20110928 109417-04	<1	<1	<1	<3	<100	115
MW-20-20110928 109417-05	<1	<1	<1	<3	<100	112
MW-21-20110928 109417-06	<1	<1	<1	<3	<100	112
MW-23-20110928 109417-07	<1	<1	<1	<3	<100	112
MW-99-20110928 109417-09	<1	<1	<1	<3	<100	112
Method Blank 01-1784 MB	<1	<1	<1	<3	<100	114

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/06/11

Date Received: 09/28/11

Project: T115SWTNK0611 T115BECRP, F&BI 109417

Date Extracted: 09/30/11

Date Analyzed: 10/03/11

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx
Sample Extracts Passed Through a
Silica Gel Column Prior to Analysis
Results Reported as ug/L (ppb)**

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 51-134)
MW-15-20110928 109417-01	<50	<250	81
MW-16-20110928 109417-02	<50	<250	75
MW-17-20110928 109417-03	74	<250	78
MW-19-20110928 109417-04	250	<250	81
MW-20-20110928 109417-05	<50	<250	90
MW-21-20110928 109417-06	<50	<250	104
MW-23-20110928 109417-07	<50	<250	94
RW-4-20110928 109417-08	5,700	<250	62
MW-99-20110928 109417-09	190	<250	82
Method Blank 01-1788 MB	<50	<250	85

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/06/11

Date Received: 09/28/11

Project: T115SWTNK0611 T115BECRP, F&BI 109417

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 109417-04 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	Relative Percent Difference (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	90	65-118
Toluene	ug/L (ppb)	50	93	72-122
Ethylbenzene	ug/L (ppb)	50	98	73-126
Xylenes	ug/L (ppb)	150	97	74-118
Gasoline	ug/L (ppb)	1,000	107	69-134

Date of Report: 10/06/11

Date Received: 09/28/11

Project: T115SWTNK0611 T115BECRP, F&BI 109417

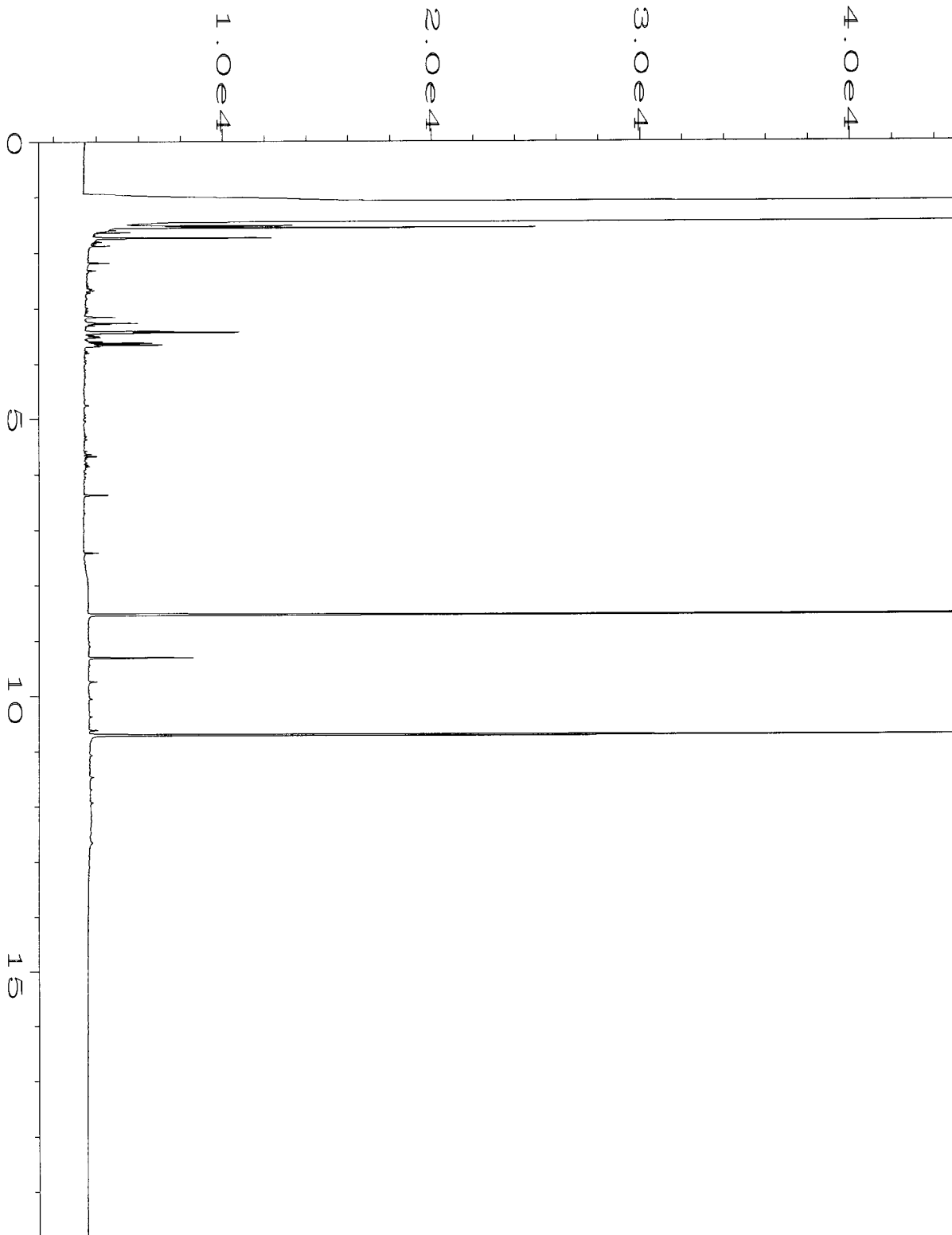
**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-Dx**

Laboratory Code: Laboratory Control Sample Silica Gel

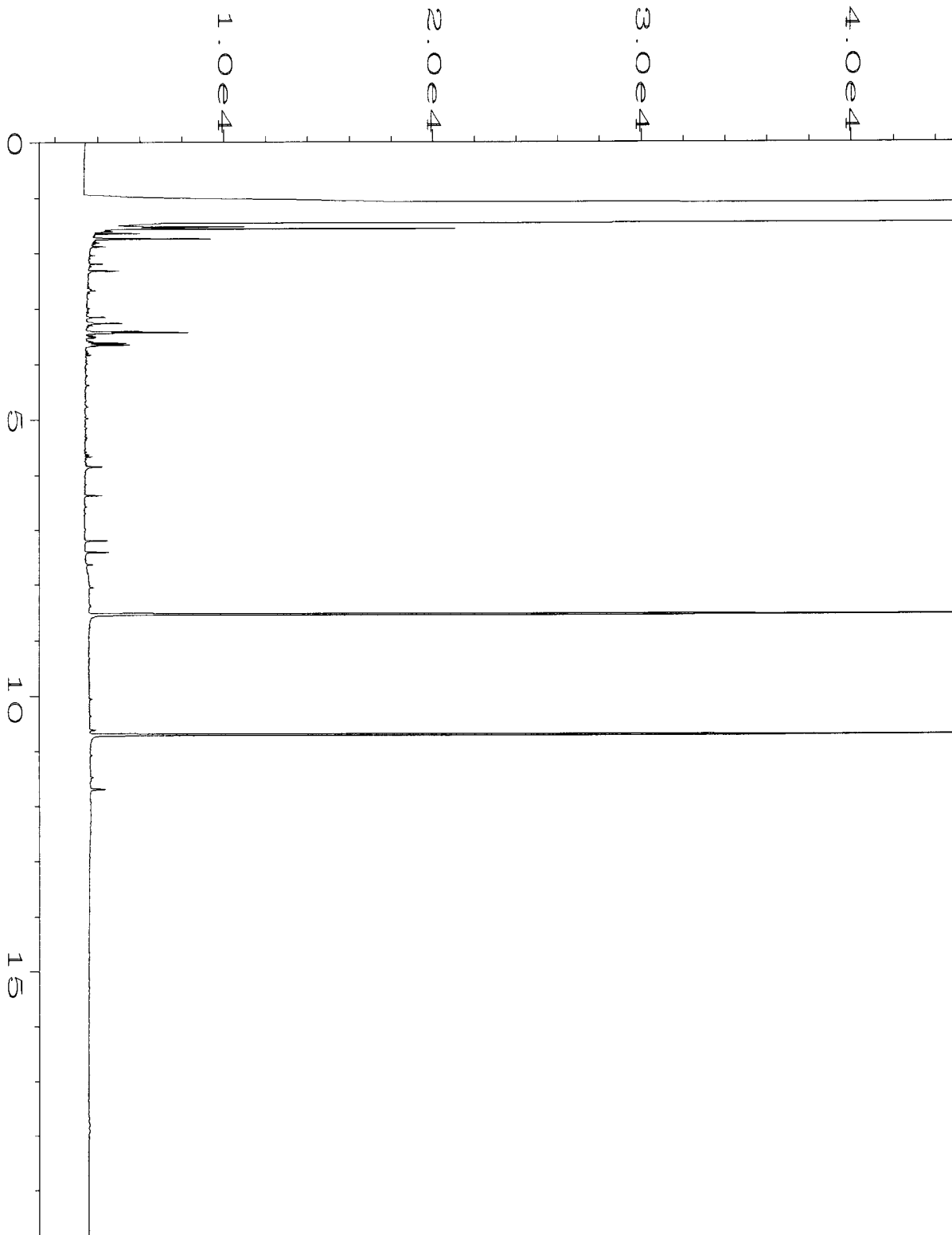
Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	82	100	58-134	20

Data Qualifiers & Definitions

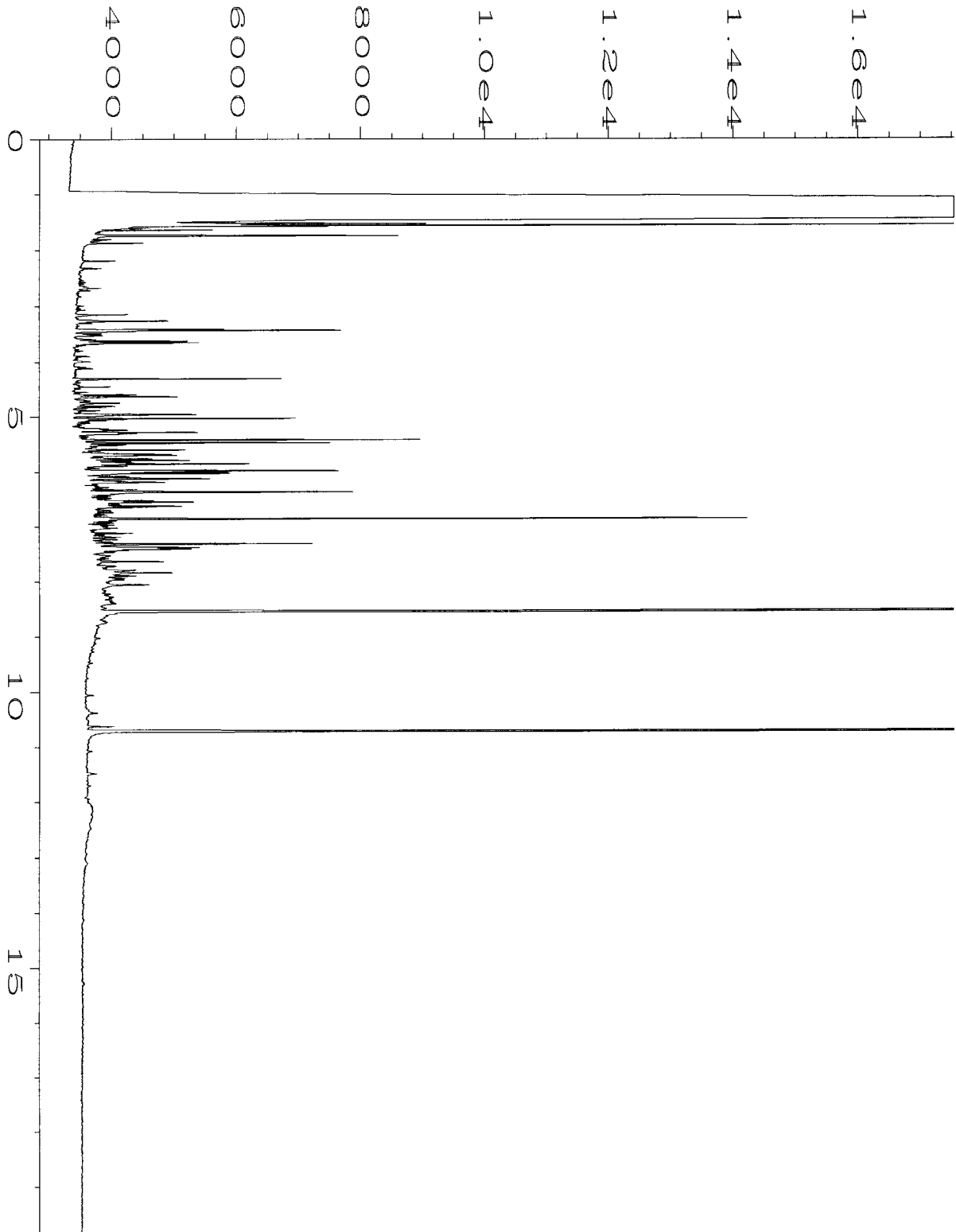
- a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.
- A1 - More than one compound of similar molecule structure was identified with equal probability.
- b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.
- ca - The calibration results for this range fell outside of acceptance criteria. The value reported is an estimate.
- c - The presence of the analyte indicated may be due to carryover from previous sample injections.
- d - The sample was diluted. Detection limits may be raised due to dilution.
- ds - The sample was diluted. Detection limits are raised due to dilution and surrogate recoveries may not be meaningful.
- dv - Insufficient sample was available to achieve normal reporting limits and limits are raised accordingly.
- fb - Analyte present in the blank and the sample.
- fc - The compound is a common laboratory and field contaminant.
- hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. The variability is attributed to sample inhomogeneity.
- ht - Analysis performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of normal control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.
- j - The result is below normal reporting limits. The value reported is an estimate.
- J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
- jl - The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.
- jr - The rpd result in laboratory control sample associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- lc - The presence of the compound indicated is likely due to laboratory contamination.
- L - The reported concentration was generated from a library search.
- nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.
- pc - The sample was received in a container not approved by the method. The value reported should be considered an estimate.
- pr - The sample was received with incorrect preservation. The value reported should be considered an estimate.
- ve - Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.
- vo - The value reported fell outside the control limits established for this analyte.
- x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



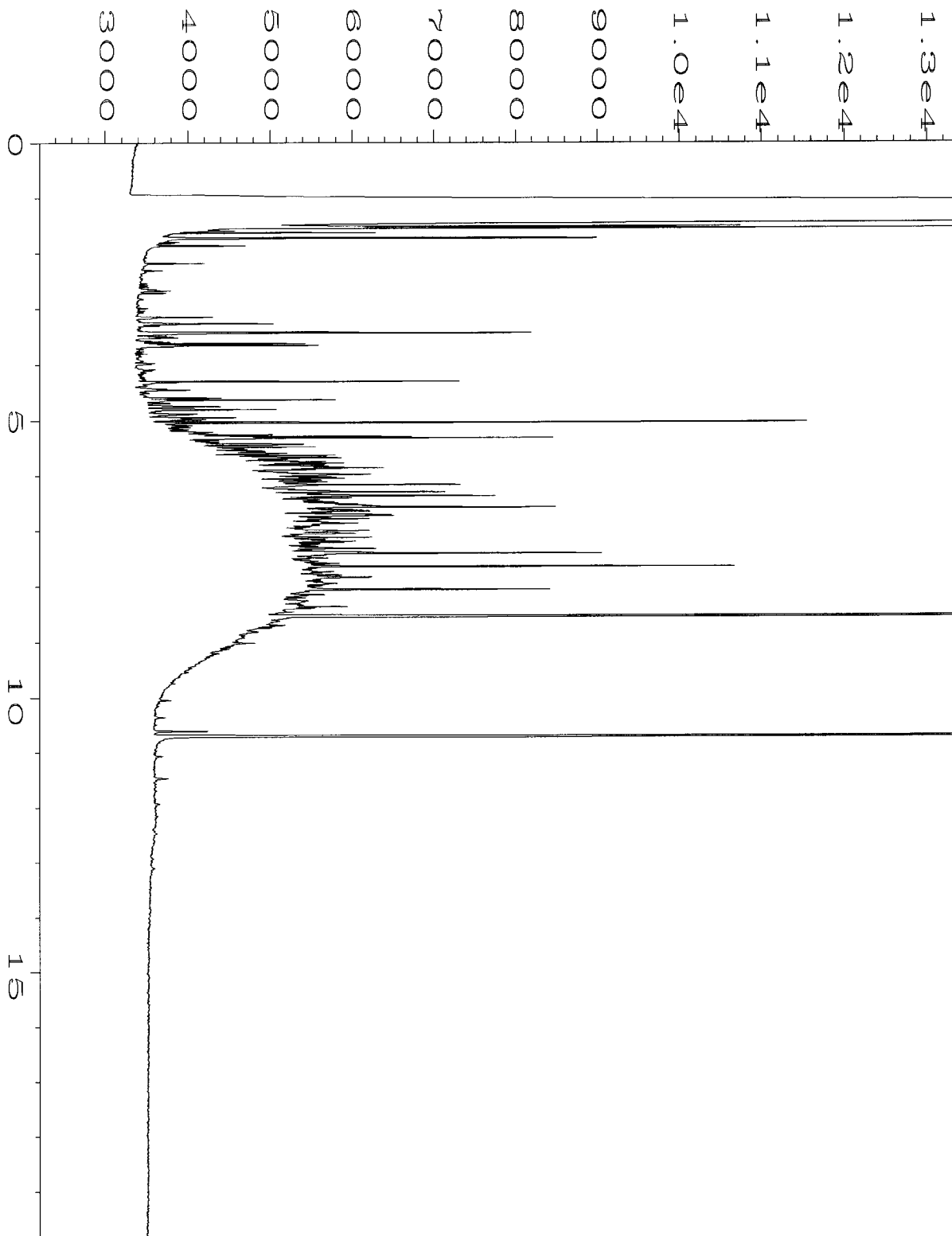
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Operator	: ML	Vial Number	: 9
Instrument	: GC #6	Injection Number	: 1
Sample Name	: 109417-01 sg	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 03 Oct 11 02:03 PM	Analysis Method	: TPHD.MTH
Report Created on:	04 Oct 11 09:36 AM		



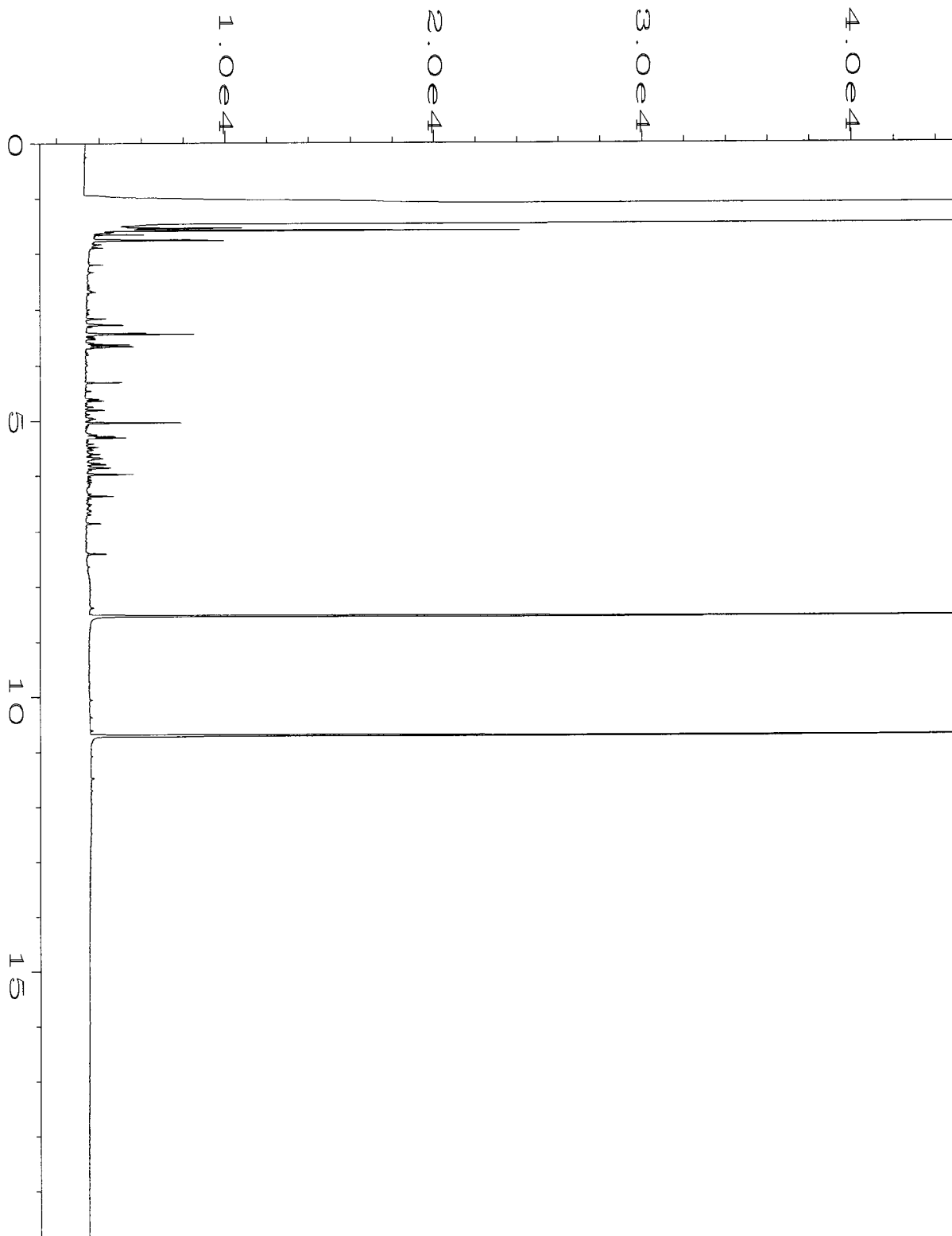
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Operator	: ML	Vial Number	: 10
Instrument	: GC #6	Injection Number	: 1
Sample Name	: 109417-02 sg	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 03 Oct 11 02:30 PM	Analysis Method	: TPHD.MTH
Report Created on:	04 Oct 11 09:36 AM		



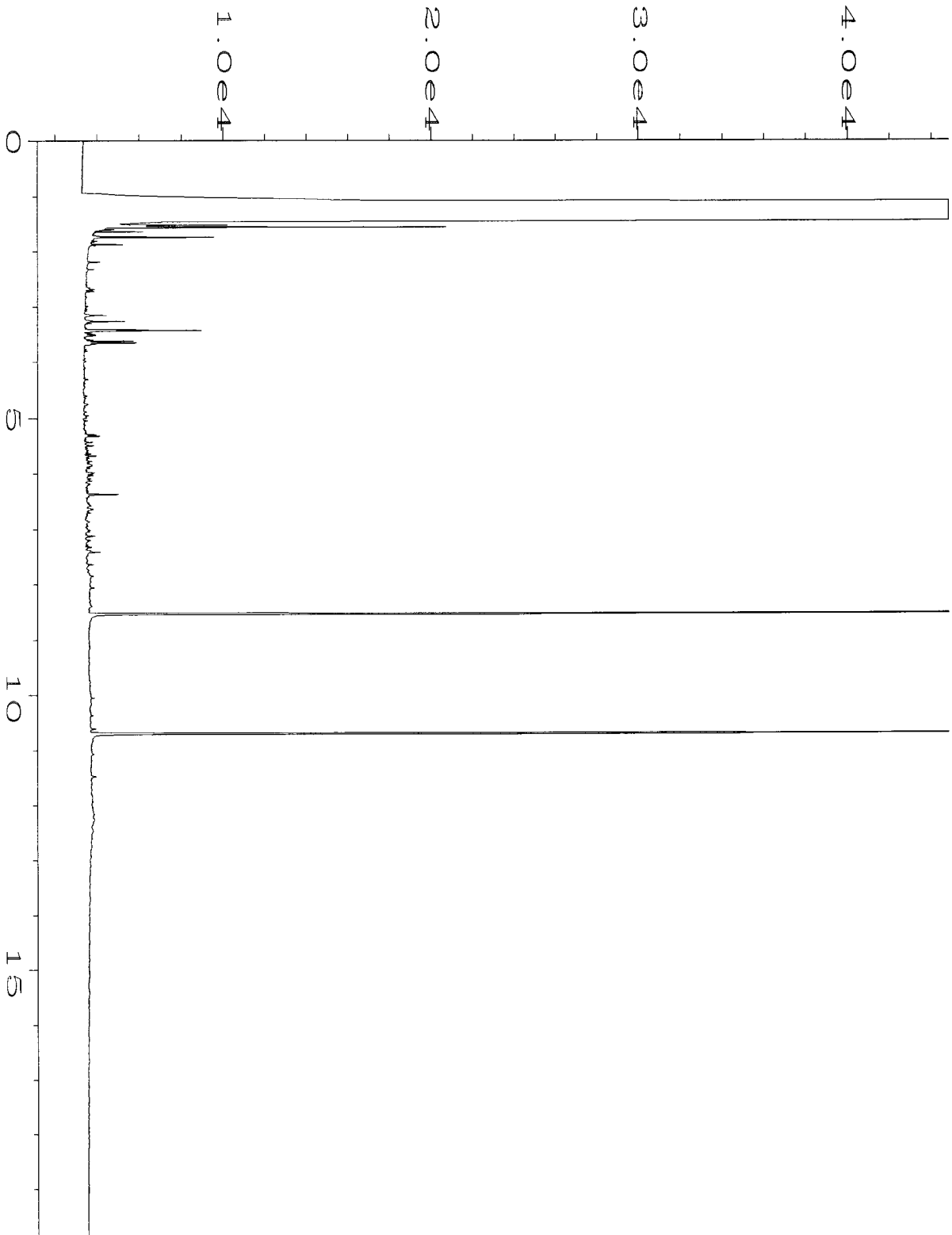
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Operator	: ML	Vial Number	: 11
Instrument	: GC #6	Injection Number	: 1
Sample Name	: 109417-03 sg	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 03 Oct 11 02:56 PM	Analysis Method	: TPHD.MTH
Report Created on:	04 Oct 11 09:37 AM		



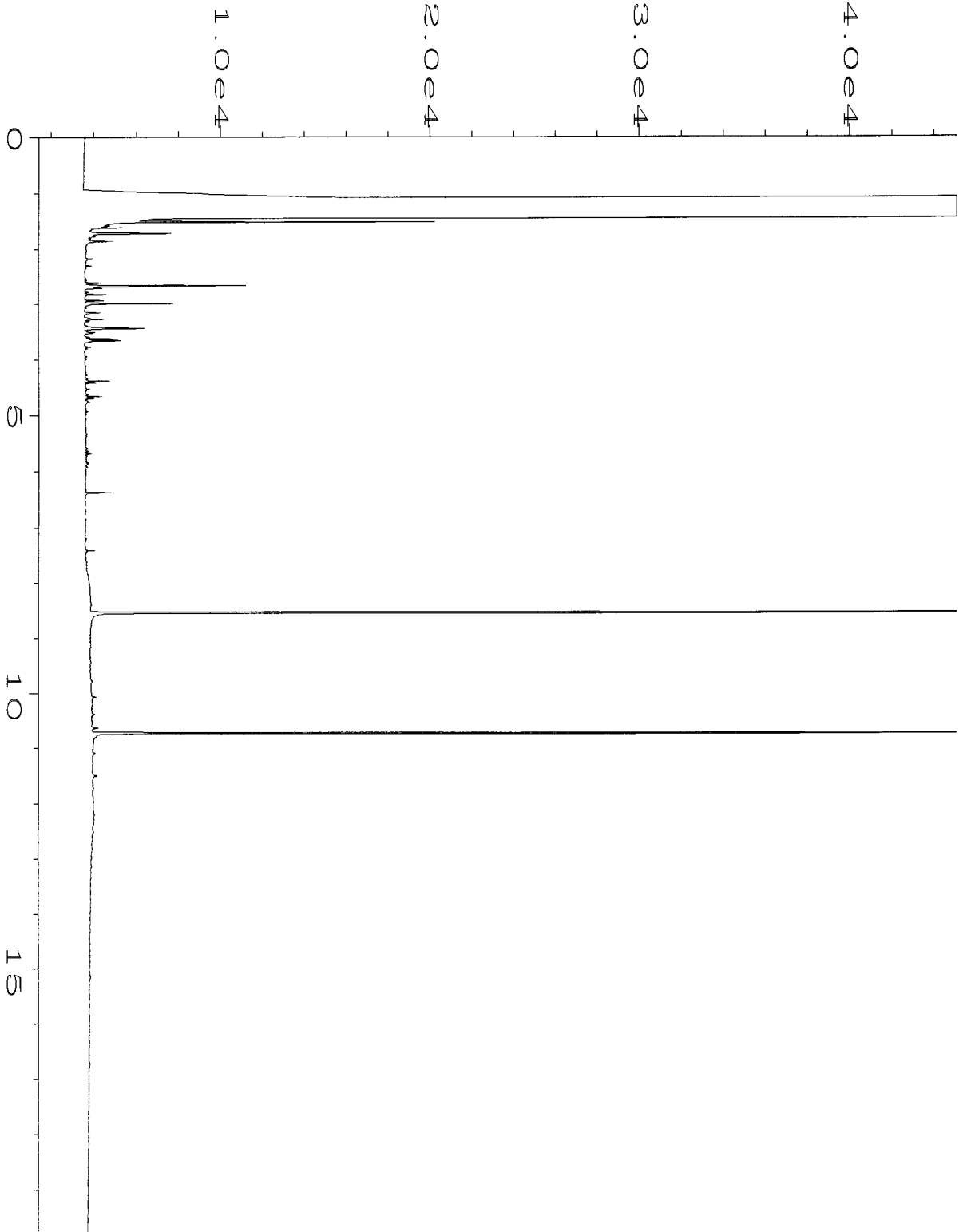
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Operator	: ML	Vial Number	: 12
Instrument	: GC #6	Injection Number	: 1
Sample Name	: 109417-04 sg	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 03 Oct 11 03:22 PM	Analysis Method	: TPHD.MTH
Report Created on:	04 Oct 11 09:37 AM		



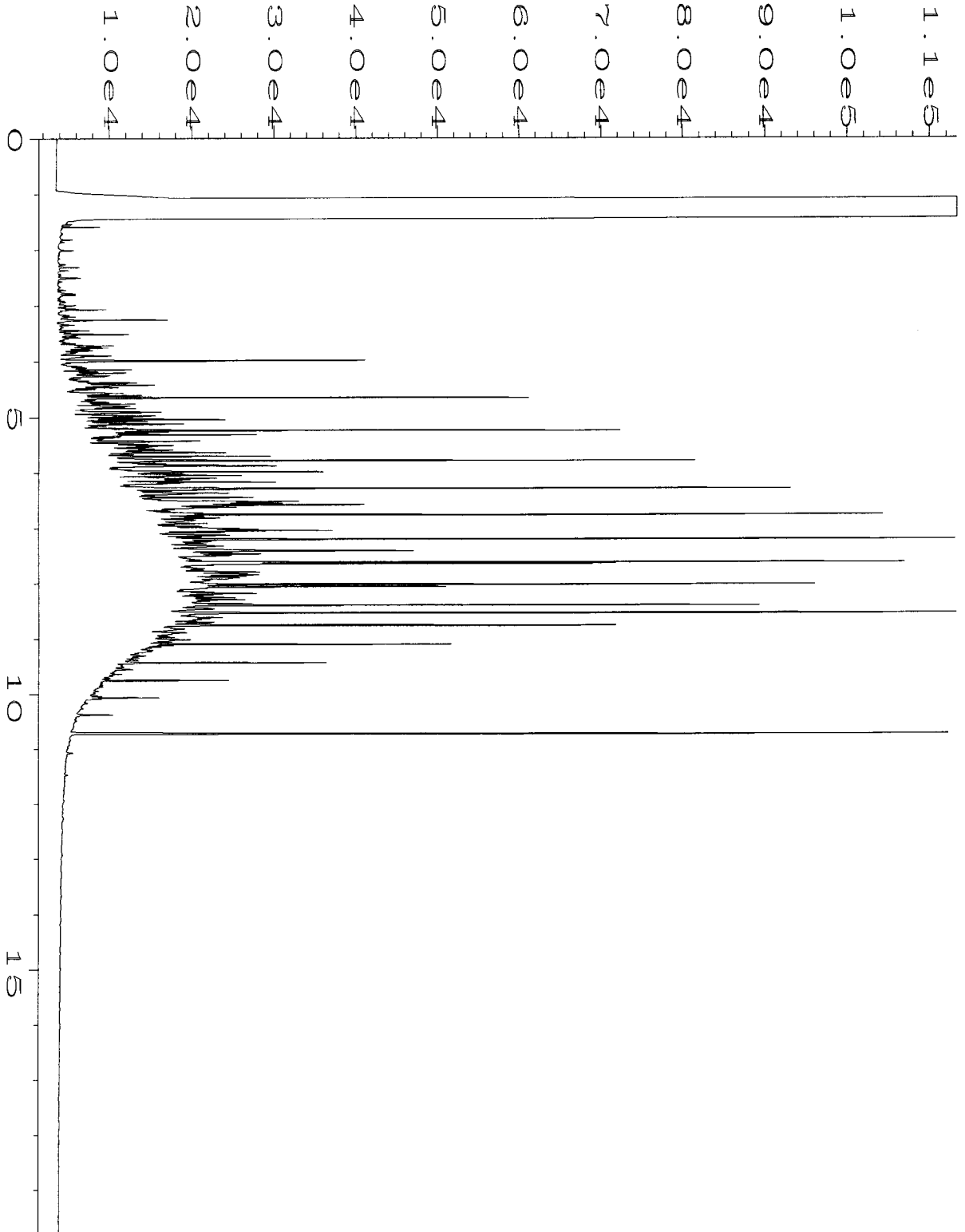
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Operator	: ML	Vial Number	: 13
Instrument	: GC #6	Injection Number	: 1
Sample Name	: 109417-05 sg	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 03 Oct 11 03:49 PM	Analysis Method	: TPHD.MTH
Report Created on:	04 Oct 11 09:37 AM		



Data File Name	: C:\HPCHEM\6\DATA\10-03-11\014F0601.D	Page Number	: 1
Operator	: ML	Vial Number	: 14
Instrument	: GC #6	Injection Number	: 1
Sample Name	: 109417-06 sg	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 03 Oct 11 05:34 PM	Analysis Method	: TPHD.MTH
Report Created on:	04 Oct 11 09:37 AM		



Data File Name	: C:\HPCHEM\6\DATA\10-03-11\006F0301.D	Page Number	: 1
Operator	: ML	Vial Number	: 6
Instrument	: GC #6	Injection Number	: 1
Sample Name	: 01-1788 mb sg	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 03 Oct 11 12:50 PM	Analysis Method	: TPHD.MTH
Report Created on:	04 Oct 11 09:36 AM		



Data File Name	: C:\HPCHEM\6\DATA\10-03-11\003F0201.D	Page Number	: 1
Operator	: ML	Vial Number	: 3
Instrument	: GC #6	Injection Number	: 1
Sample Name	: 500 WADF 35-58C	Sequence Line	: 2
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 03 Oct 11 09:21 AM	Analysis Method	: TPHD.MTH
Report Created on:	04 Oct 11 09:36 AM		

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 109417 CLIENT SES INITIALS/DATE: (NP) 9/28/11

If custody seals are present on cooler, are they intact? NA YES NO

Cooler/Sample temperature 2 °C

Were samples received on ice/cold packs? YES NO

Number of days samples have been sitting prior to receipt at laboratory 2 days

Is there a Chain-of-Custody* (COC)? YES NO
*or other representative documents, letters, and/or shipping memos

Are the samples clearly identified? (explain "no" answer below) YES NO

Is the following information provided on the COC* ? (explain "no" answer below)

Sample ID's	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	# of Containers	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Date Sampled	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Relinquished	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Time Sampled	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Requested analysis	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) YES NO

Were appropriate sample containers used? (explain "no" answer below) YES NO

If custody seals are present on samples, are they intact? NA YES NO

Are samples requiring no headspace, headspace free? NA YES NO

Explain "no" items from above (use the back if needed)

Received 5 containers of: MW-19-20110928 and 3 containers of MW 99-20110928

Are samples for PCB testing (if yes, put a red sticker on each sample) YES NO

Did samples originate out of the country? (if yes, put in APHIS refrigerator) YES NO

Was client notified of sample receipt? Over the Counter Picked up by F&BI
 YES NO (explain)

If Yes, name of person contacted _____ Left Message

Special Instructions from Client _____

109417

SAMPLE CHAIN OF CUSTODY

ME 09/28/11

V2/B05

Send Report To otto Paris

Company SoundEarth Strategies Inc

Address 2811 Fairview Ave E, St 2000

City, State, ZIP Seattle, WA 98102

Phone # 206-306-1900 Fax # 206-306-1907

SAMPLERS (signature) [Signature]

PROJECT NAME/NO. T115/0675-002-04 PO # _____

REMARKS Please direct bill Port of Seattle, per Service Directive N GEMS Y / _____

Page # 1 of 1

TURNAROUND TIME

Standard (2 Weeks)

RUSH

Rush charges authorized by: _____

SAMPLE DISPOSAL

Dispose after 30 days

Return samples

Will call with instructions

Sample ID	Sample Location	Sample Depth	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED								Notes	
								NWTPH-Dx & Gx	NWTPH-Gx	BTEX by 8021B	VOC's by 8260	SVOC's by 8270	RCRA-8 Metals				
MW-15-20110928		8	01	9/28/11	1641	W	1	X									
MW-16-20110928		10	02	9/28/11	1048	W	1	X									
MW-17-20110928		12	03	9/27/11	1647	W	1	X									
MW-19-20110928		13	04 ^A _E	9/28/11	1406	W	5	X	X	X							
MW-20-20110928		13	05 ^A _E	9/28/11	1425	W	5	X	X	X							
MW-21-20110928		12	06 ^A _E	9/28/11	1309	W	5	X	X	X							
MW-23-20110928		14	07 ^A _D	9/28/11	1255	W	4	X	X	X							
RW-4-20110928		9	08	9/28/11	1145	W	1	X									
MW99-20110928		13	09 ^A _{A-C}	9/28/11	1425	W	3	X	X	X							

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119
 Ph. (206) 285-8282
 Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>[Signature]</u>	Andrew Lygarens	SES	9/28/11	1750
Received by: <u>[Signature]</u>	HONG NGUYEN	EMJ	V	V
Relinquished by:				
Received by:				

Friedman & Bruya, Inc. #112263

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Bradley T. Benson, B.S.
Kurt Johnson, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
TEL: (206) 285-8282
e-mail: fbi@isomedia.com

December 28, 2011

Otto Paris, Project Manager
SoundEarth Strategies
2811 Fairview Ave. East, Suite 2000
Seattle, WA 98102

Dear Mr. Paris:

Included are the results from the testing of material submitted on December 16, 2011 from the SOU_0675-002_20111216, F&BI 112263 project. There are 7 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrea Liljegren
SOU1228R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 16, 2011 by Friedman & Bruya, Inc. from the SoundEarth Strategies SOU_0675-002_20111216, F&BI 112263 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>SoundEarth Strategies</u>	<u>Matrix</u>
112263 -01	MW-15-20111215	Water
112263 -02	MW-16-20111215	Water
112263 -03	MW-17-20111215	Water
112263 -04	MW-19-20111216	Water
112263 -05	MW-20-20111216	Water
112263 -06	MW-21-20111216	Water
112263 -07	MW-23-20111215	Water
112263 -08	RW-2-20111215	Water
112263 -09	RW-4-20111215	Water
112263 -10	RW-5-20111215	Water
112263 -11	MW-99-20111216	Water

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/28/11
 Date Received: 12/16/11
 Project: SOU_0675-002_20111216, F&BI 112263
 Date Extracted: 12/19/11 and 12/21/11
 Date Analyzed: 12/19/11 and 12/21/11

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
 FOR BENZENE, TOLUENE, ETHYLBENZENE,
 XYLENES AND TPH AS GASOLINE
 USING EPA METHOD 8021B AND NWTPH-Gx**
 Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-150)
MW-19-20111216 112263-04	<1	<1	<1	<3	<100	92
MW-20-20111216 112263-05	<1	<1	<1	<3	<100	90
MW-21-20111216 112263-06	<1	<1	<1	<3	<100	90
MW-23-20111215 112263-07	<1	<1	<1	<3	<100	91
MW-99-20111216 112263-11	<1	<1	<1	<3	<100	86
Method Blank 01-2237 MB	<1	<1	<1	<3	<100	90
Method Blank 01-2247 MB	<1	<1	<1	<3	<100	88

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/28/11
 Date Received: 12/16/11
 Project: SOU_0675-002_20111216, F&BI 112263
 Date Extracted: 12/20/11
 Date Analyzed: 12/21/11

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
 FOR TOTAL PETROLEUM HYDROCARBONS AS
 DIESEL AND MOTOR OIL
 USING METHOD NWTPH-Dx
 Sample Extracts Passed Through a
 Silica Gel Column Prior to Analysis
 Results Reported as ug/L (ppb)**

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 50-150)
MW-15-20111215 112263-01	<50	<250	68
MW-16-20111215 112263-02	<50	<250	79
MW-17-20111215 112263-03	<50	<250	70
MW-19-20111216 112263-04	320	<250	77
MW-20-20111216 112263-05	<50	<250	79
MW-21-20111216 112263-06	<50	<250	82
MW-23-20111215 112263-07	<50	<250	84
RW-2-20111215 112263-08	3,700	<250	88
RW-4-20111215 112263-09	1,500	<250	84
RW-5-20111215 112263-10	740	<250	80
MW-99-20111216 112263-11	470	<250	86

Method Blank
01-2240 MB

ENVIRONMENTAL CHEMISTS
<50 <250

65

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/28/11

Date Received: 12/16/11

Project: SOU_0675-002_20111216, F&BI 112263

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 112263-04 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	Relative Percent Difference (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	88	72-119
Toluene	ug/L (ppb)	50	89	71-113
Ethylbenzene	ug/L (ppb)	50	88	72-114
Xylenes	ug/L (ppb)	150	84	72-113
Gasoline	ug/L (ppb)	1,000	102	70-119

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/28/11

Date Received: 12/16/11

Project: SOU_0675-002_20111216, F&BI 112263

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 112295-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	Relative Percent Difference (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	89	72-119
Toluene	ug/L (ppb)	50	90	71-113
Ethylbenzene	ug/L (ppb)	50	89	72-114
Xylenes	ug/L (ppb)	150	85	72-113
Gasoline	ug/L (ppb)	1,000	99	70-119

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/28/11

Date Received: 12/16/11

Project: SOU_0675-002_20111216, F&BI 112263

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-Dx**

Laboratory Code: Laboratory Control Sample Silica Gel

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	75	85	63-142	12

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

A1 - More than one compound of similar molecule structure was identified with equal probability.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for this range fell outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte indicated may be due to carryover from previous sample injections.

d - The sample was diluted. Detection limits may be raised due to dilution.

ds - The sample was diluted. Detection limits are raised due to dilution and surrogate recoveries may not be meaningful.

dv - Insufficient sample was available to achieve normal reporting limits and limits are raised accordingly.

fb - Analyte present in the blank and the sample.

fc - The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. The variability is attributed to sample inhomogeneity.

ht - Analysis performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of normal control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j - The result is below normal reporting limits. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.

jr - The rpd result in laboratory control sample associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the compound indicated is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

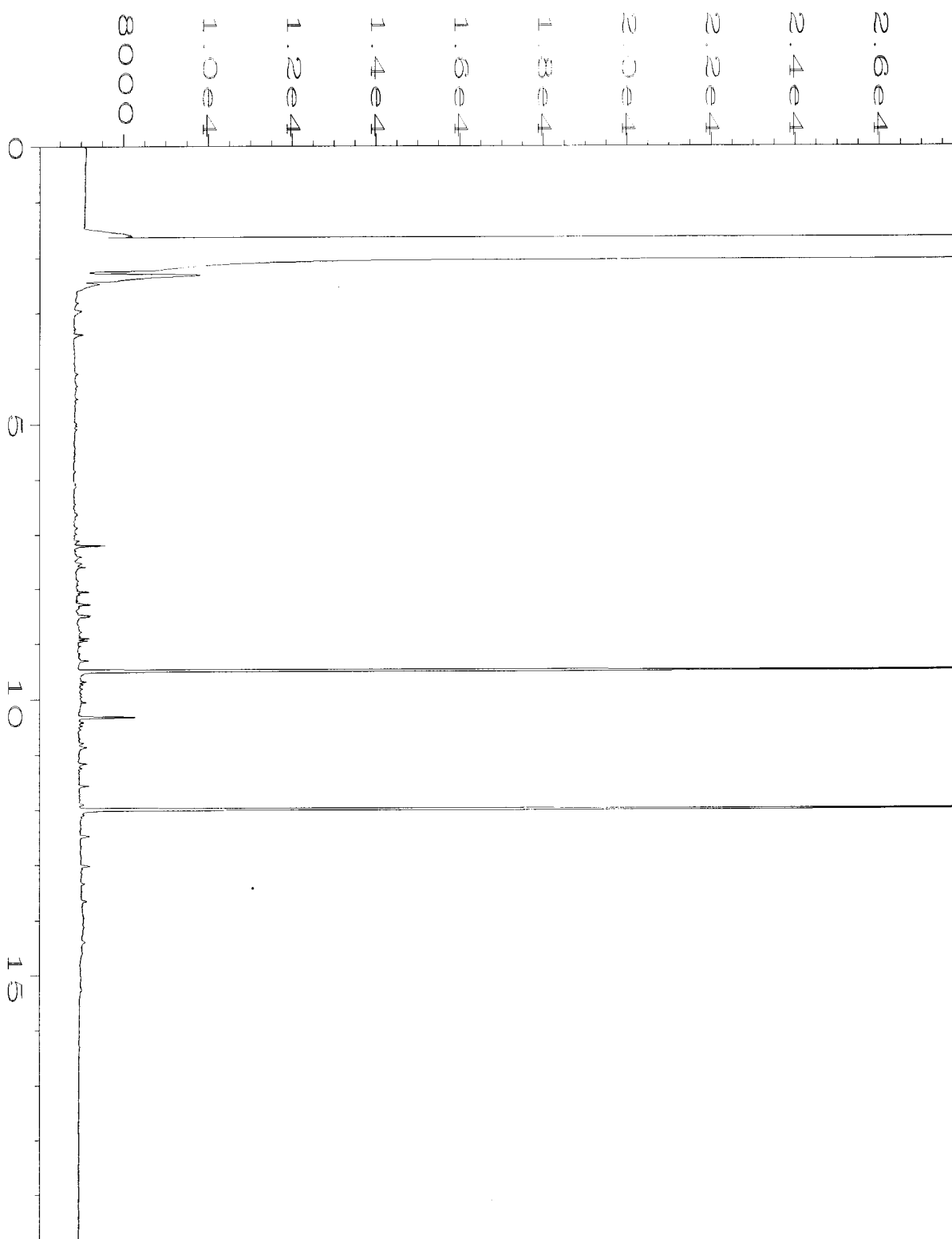
pc - The sample was received in a container not approved by the method. The value reported should be considered an estimate.

pr - The sample was received with incorrect preservation. The value reported should be considered an estimate.

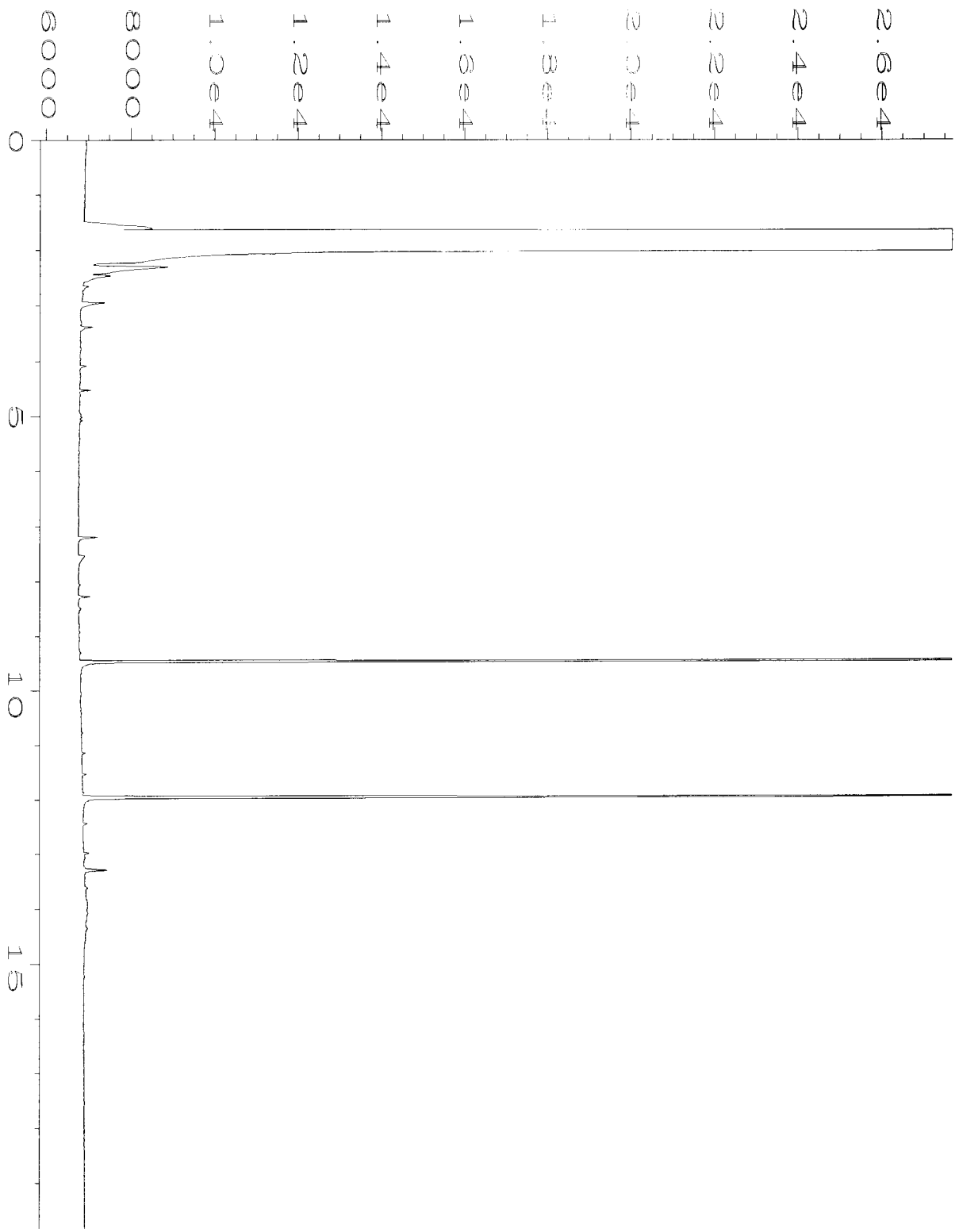
ve - Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

vo - The value reported fell outside the control limits established for this analyte.

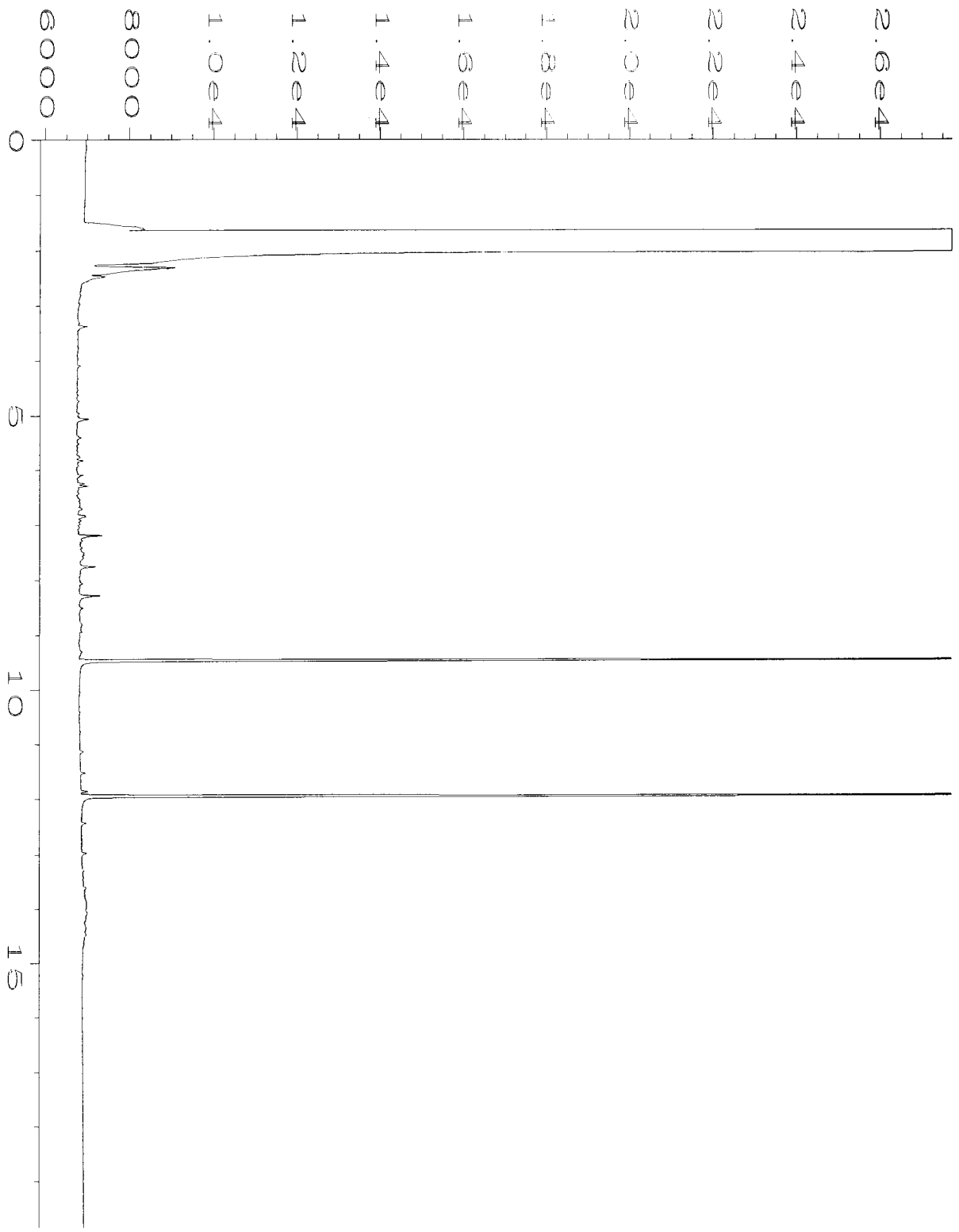
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



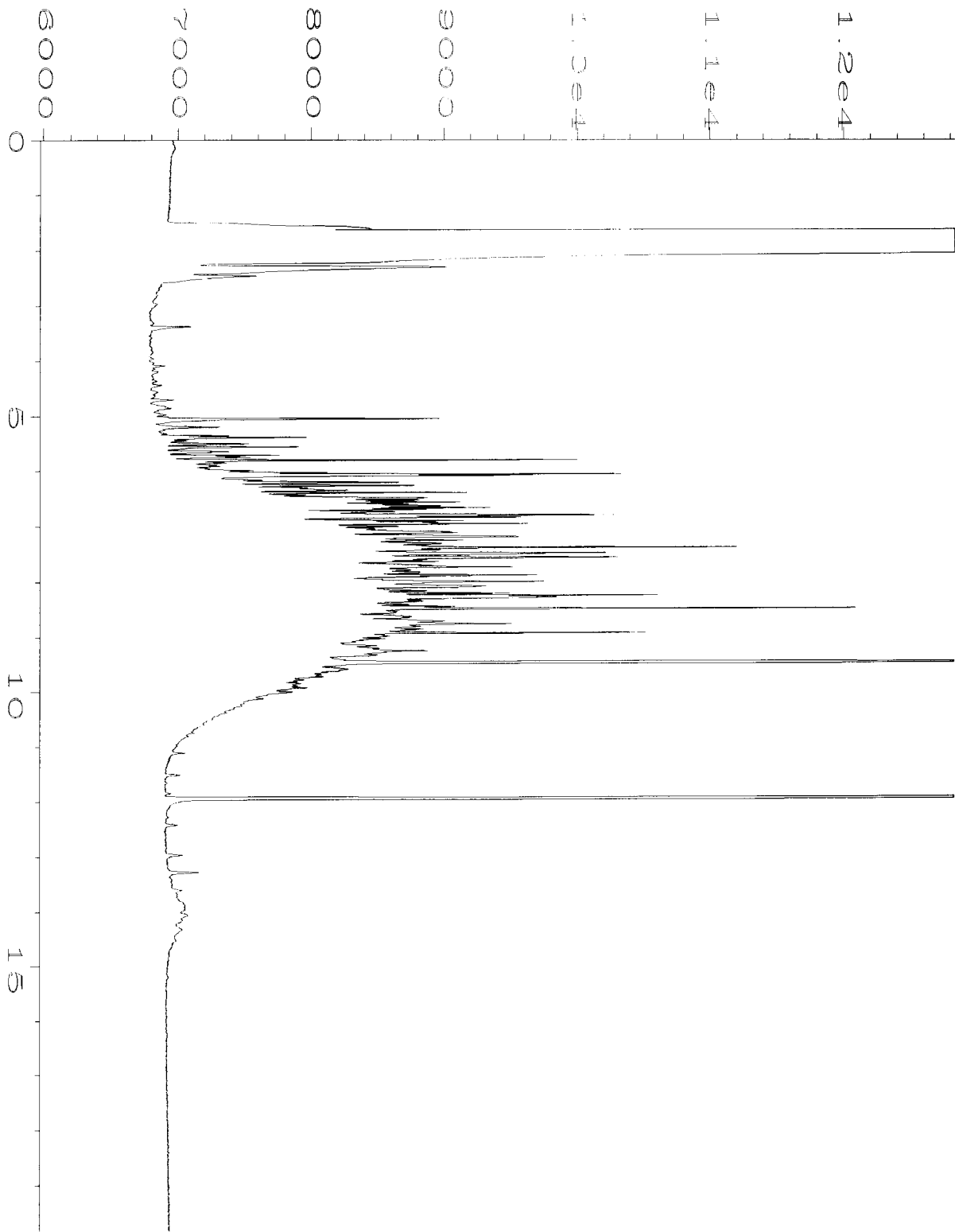
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Operator	: ML	Vial Number	: 17
Instrument	: GC1	Injection Number	: 1
Sample Name	: 112263-01 sg	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Dec 11 04:58 PM	Analysis Method	: TPHD.MTH
Report Created on:	22 Dec 11 11:04 AM		



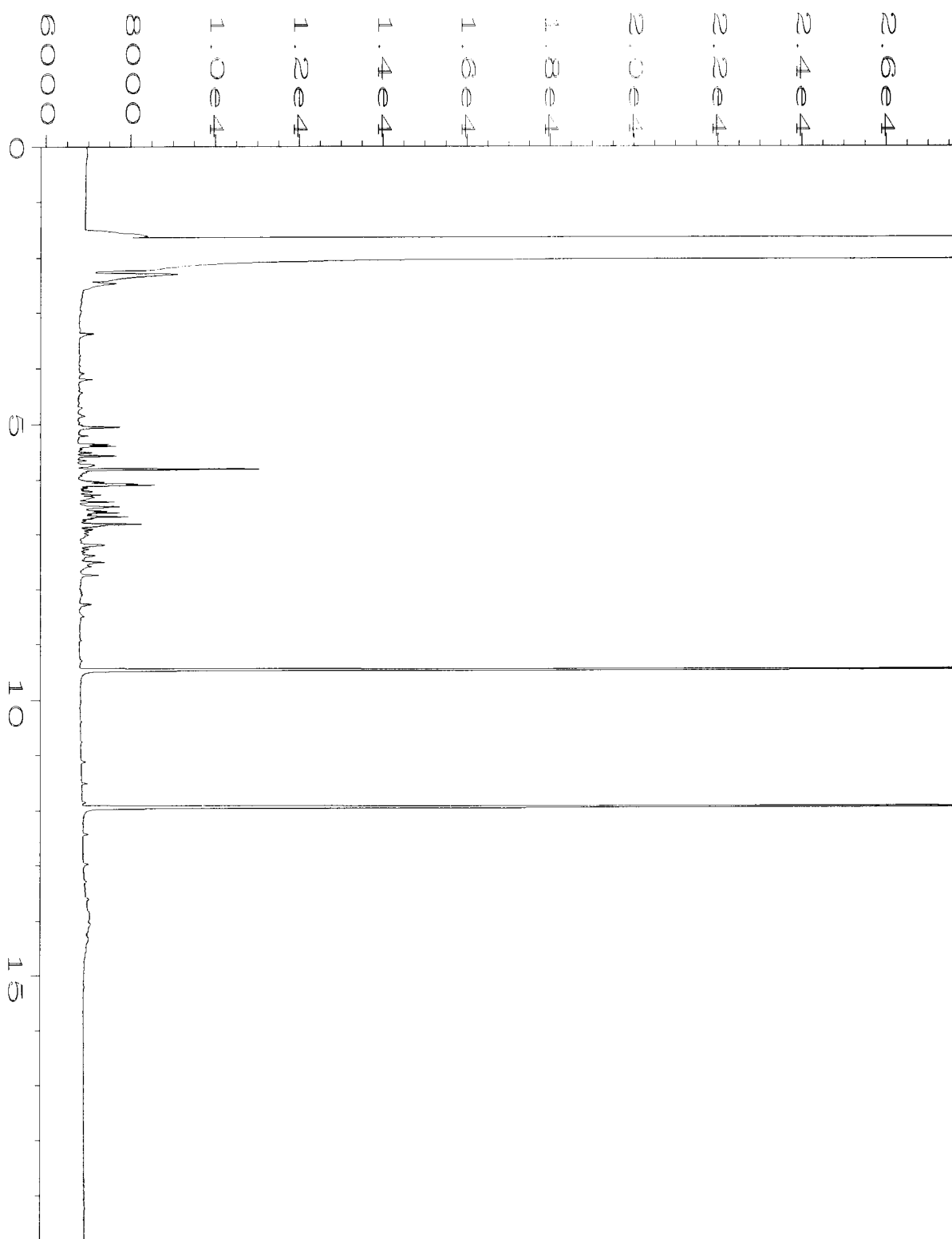
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 Operator : ML
 Instrument : GC1
 Sample Name : 112263-02 sg
 Run Time Bar Code:
 Acquired on : 21 Dec 11 05:19 PM
 Report Created on: 22 Dec 11 11:04 AM
 Page Number : 1
 Vial Number : 18
 Injection Number : 1
 Sequence Line : 5
 Instrument Method: TPHD.MTH
 Analysis Method : TPHD.MTH



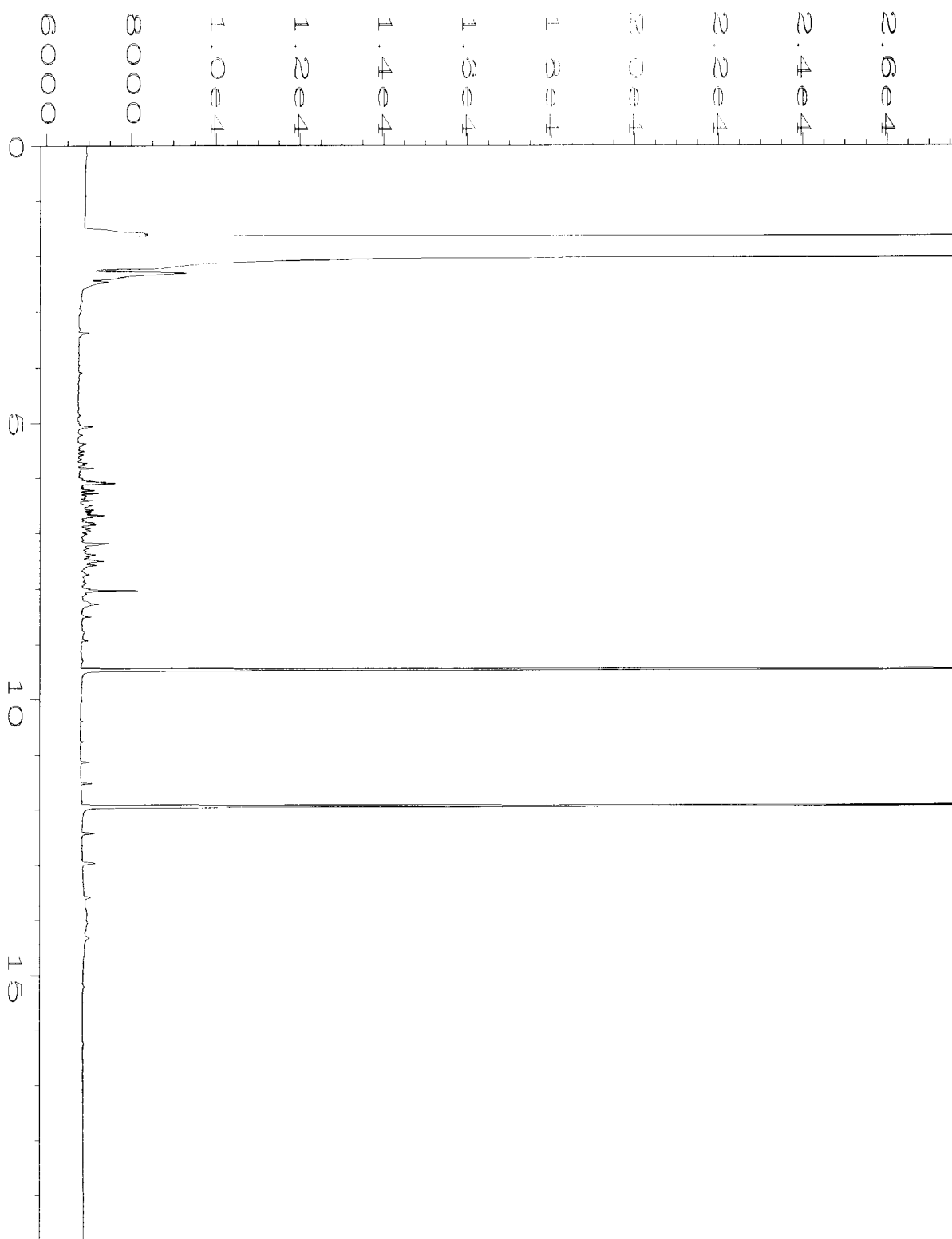
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Operator	: ML	Vial Number	: 19
Instrument	: GC1	Injection Number	: 1
Sample Name	: 112263-03 sg	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Dec 11 05:46 PM	Analysis Method	: TPHD.MTH
Report Created on:	22 Dec 11 11:04 AM		



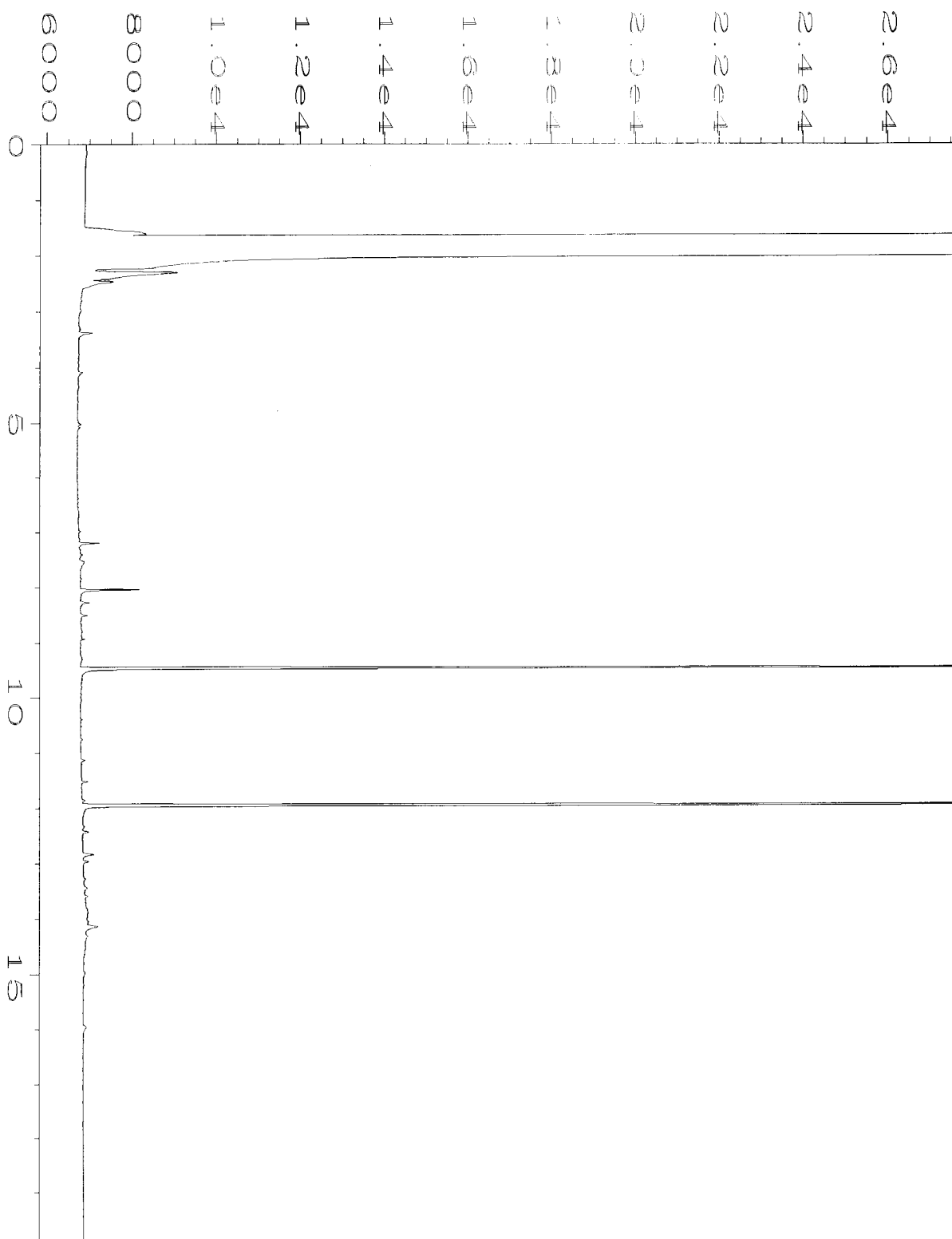
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Operator	: ML	Vial Number	: 20
Instrument	: GC1	Injection Number	: 1
Sample Name	: 112263-04 sg	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Dec 11 06:13 PM	Analysis Method	: TPHD.MTH
Report Created on:	22 Dec 11 11:05 AM		



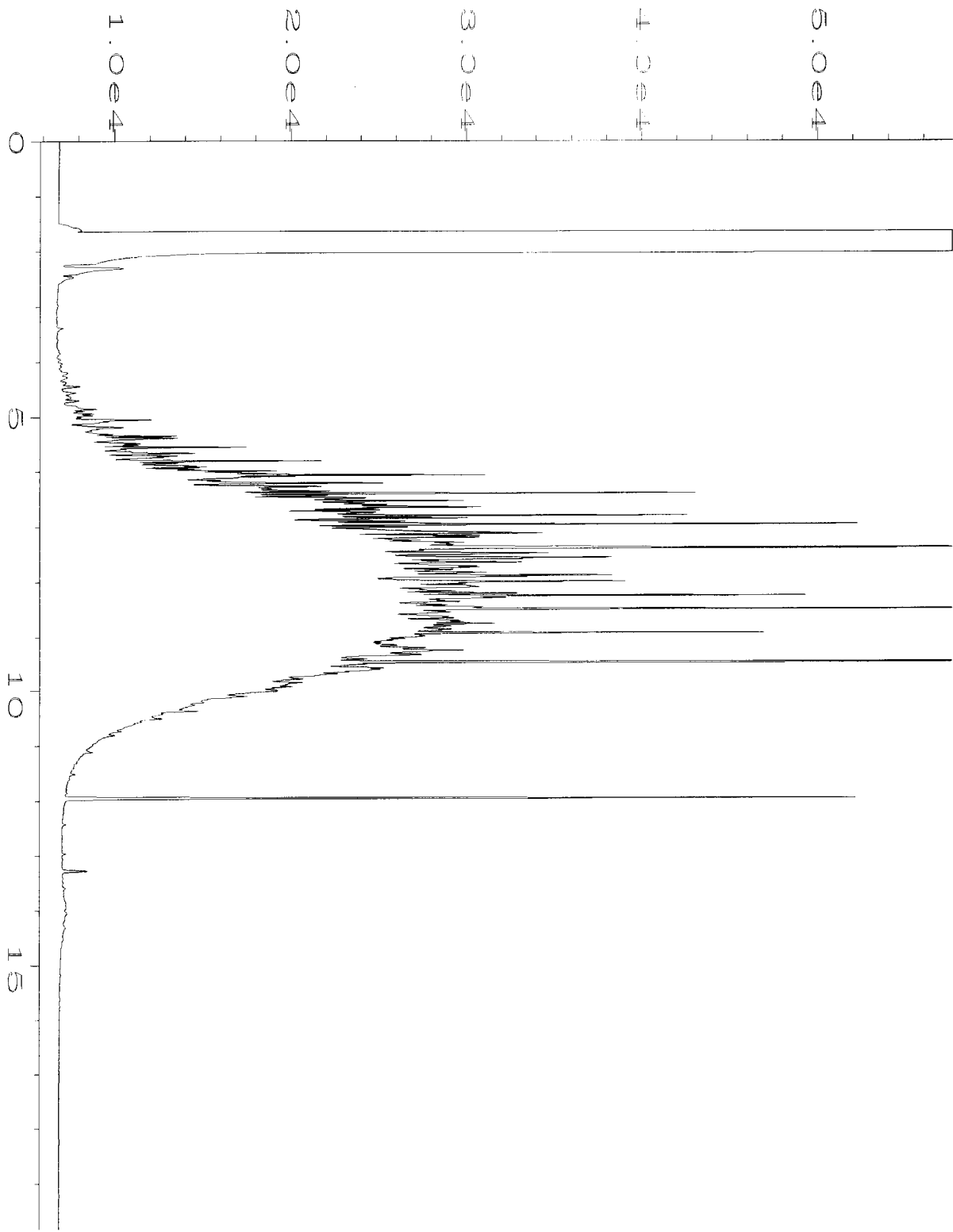
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Operator	: ML	Vial Number	: 21
Instrument	: GC1	Injection Number	: 1
Sample Name	: 112263-05 sg	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Dec 11 06:40 PM	Analysis Method	: TPHD.MTH
Report Created on:	22 Dec 11 11:05 AM		



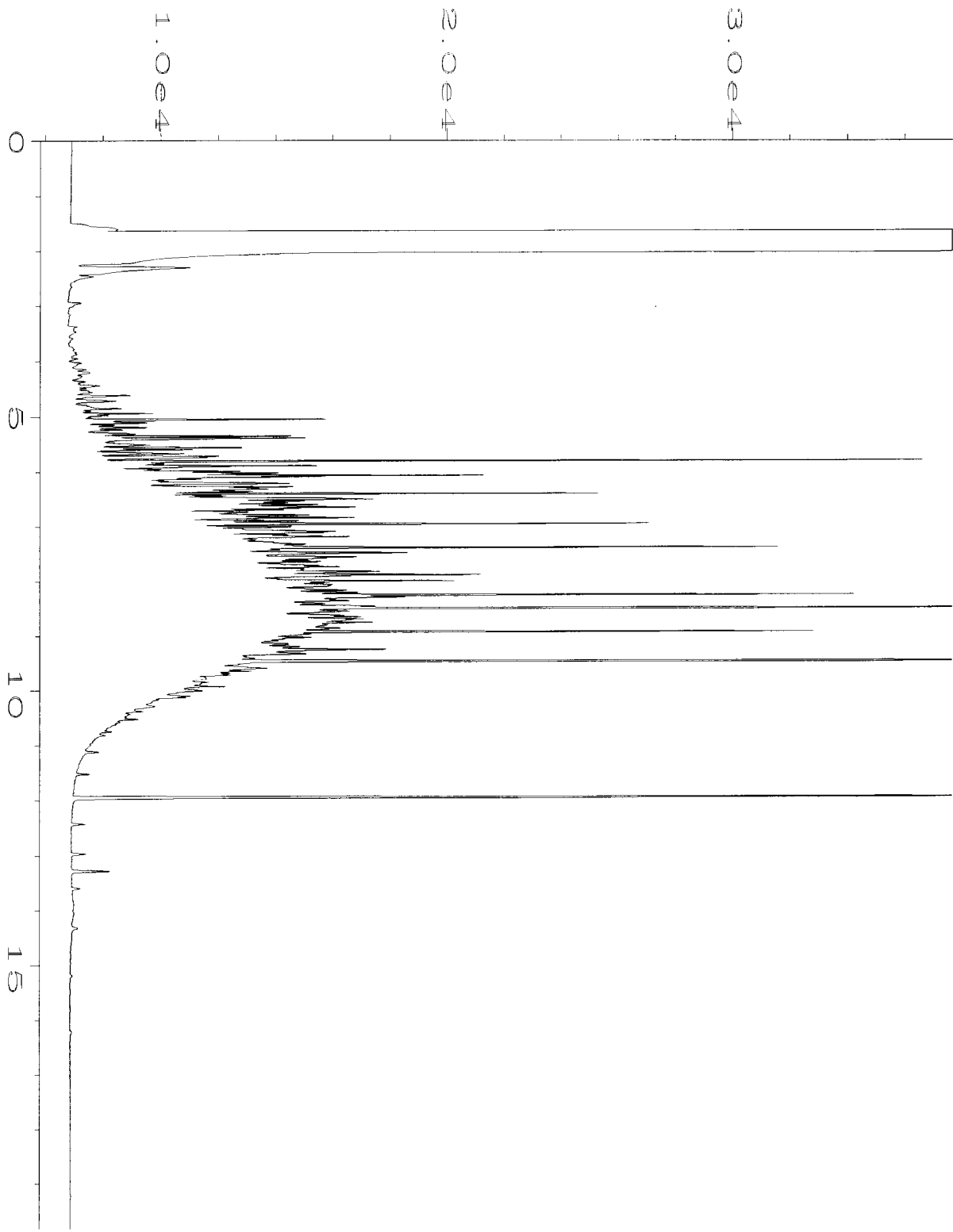
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Operator	: ML	Vial Number	: 22
Instrument	: GC1	Injection Number	: 1
Sample Name	: 112263-06 sg	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Dec 11 07:07 PM	Analysis Method	: TPHD.MTH
Report Created on:	22 Dec 11 11:05 AM		



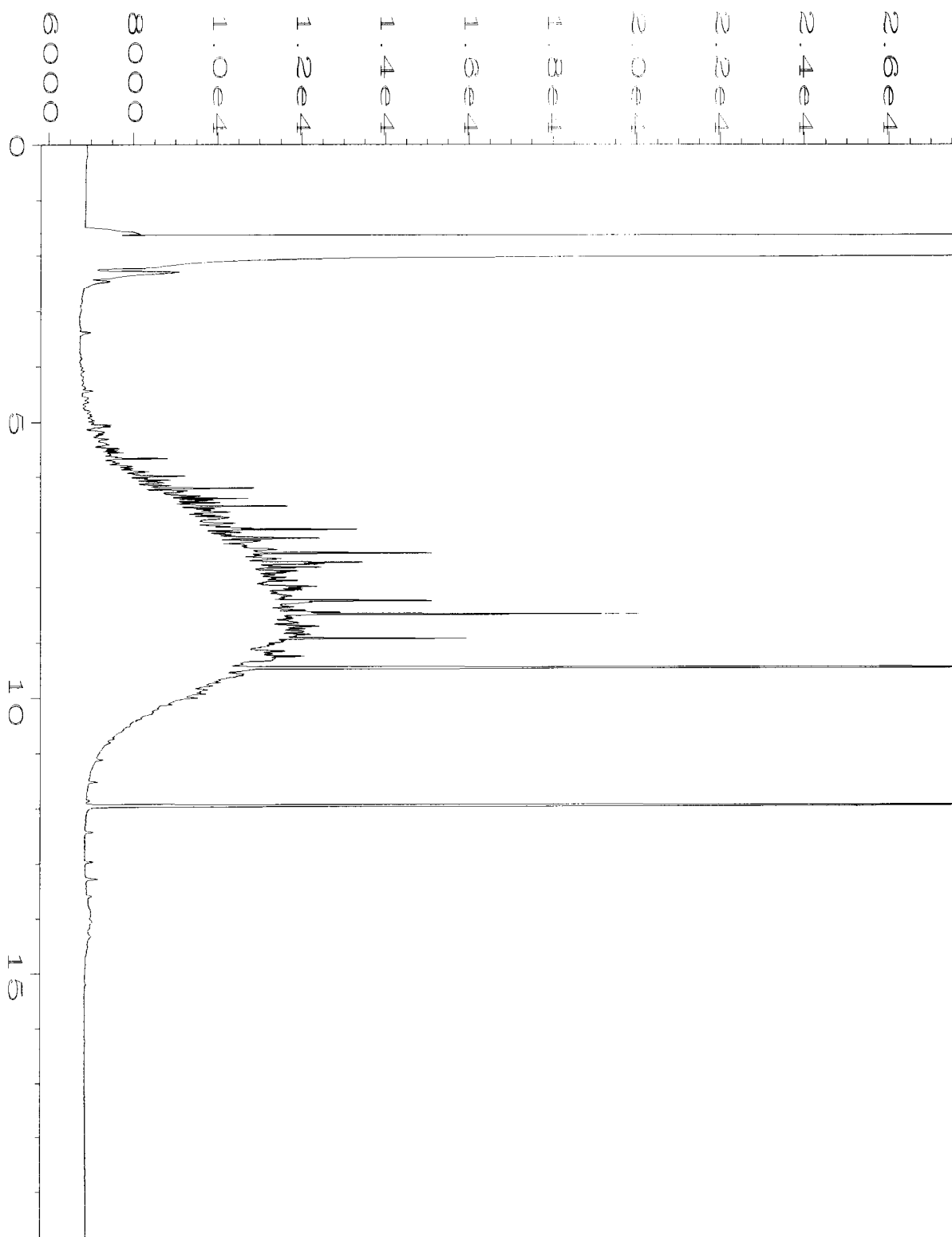
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Instrument	: GC1	Injection Number	: 1
Sample Name	: 112263-07 sg	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Dec 11 07:34 PM	Analysis Method	: TPHD.MTH
Report Created on:	22 Dec 11 11:05 AM		



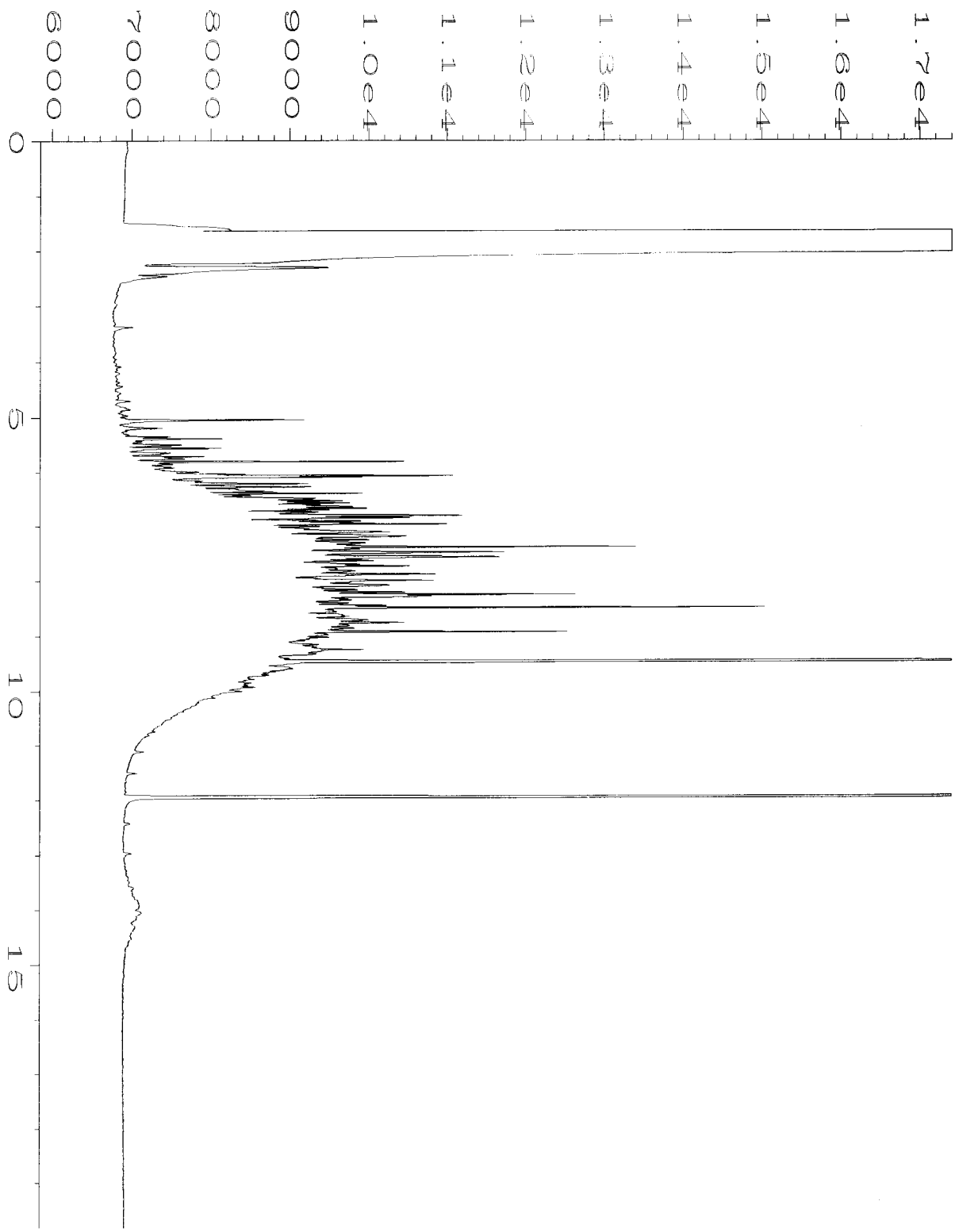
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Operator	: ML	Vial Number	: 24
Instrument	: GC1	Injection Number	: 1
Sample Name	: 112263-08 sg	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Dec 11 08:01 PM	Analysis Method	: TPHD.MTH
Report Created on:	22 Dec 11 11:05 AM		



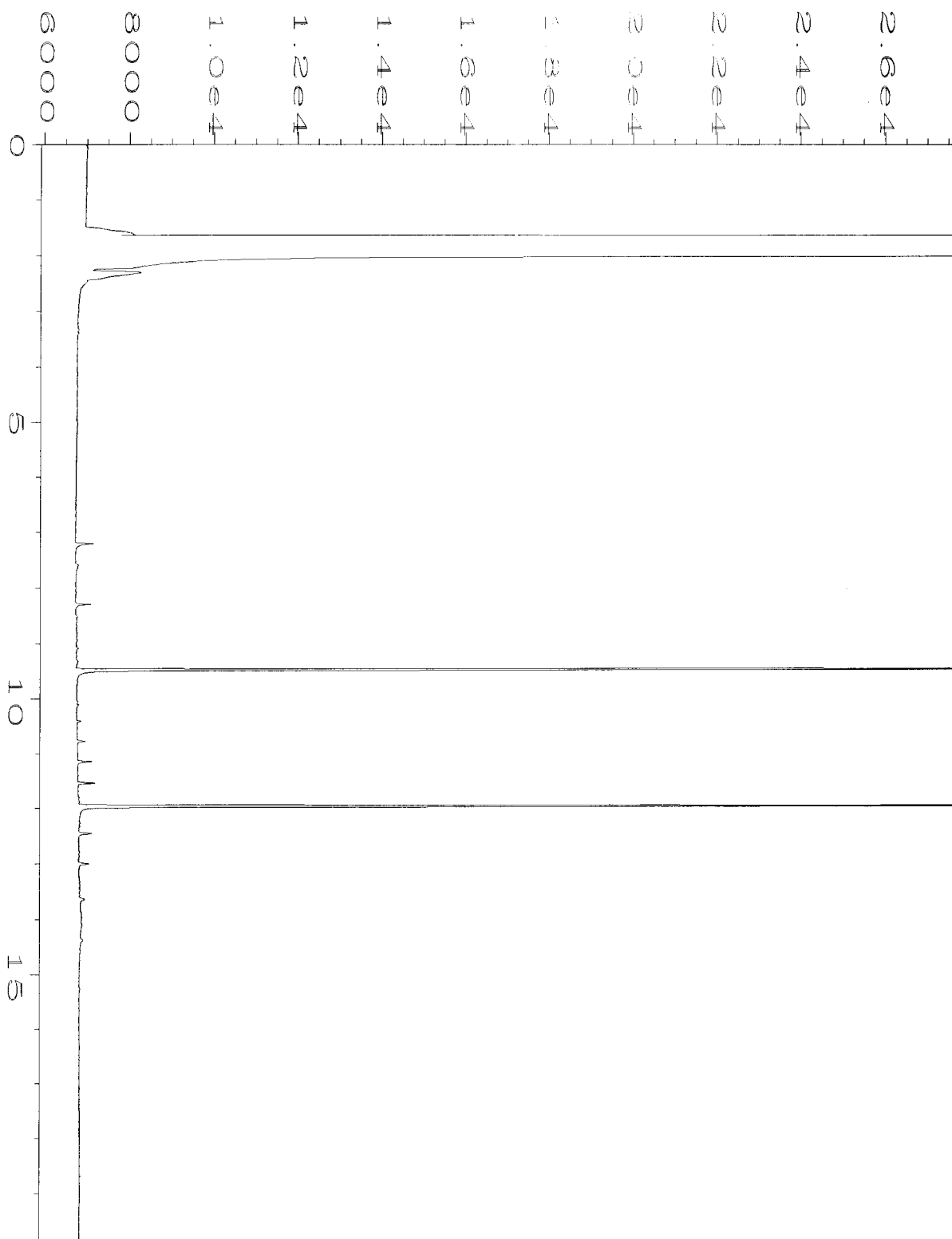
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Operator	: ML	Vial Number	: 25
Instrument	: GC1	Injection Number	: 1
Sample Name	: 112263-09 sg	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Dec 11 08:28 PM	Analysis Method	: TPHD.MTH
Report Created on:	22 Dec 11 11:05 AM		



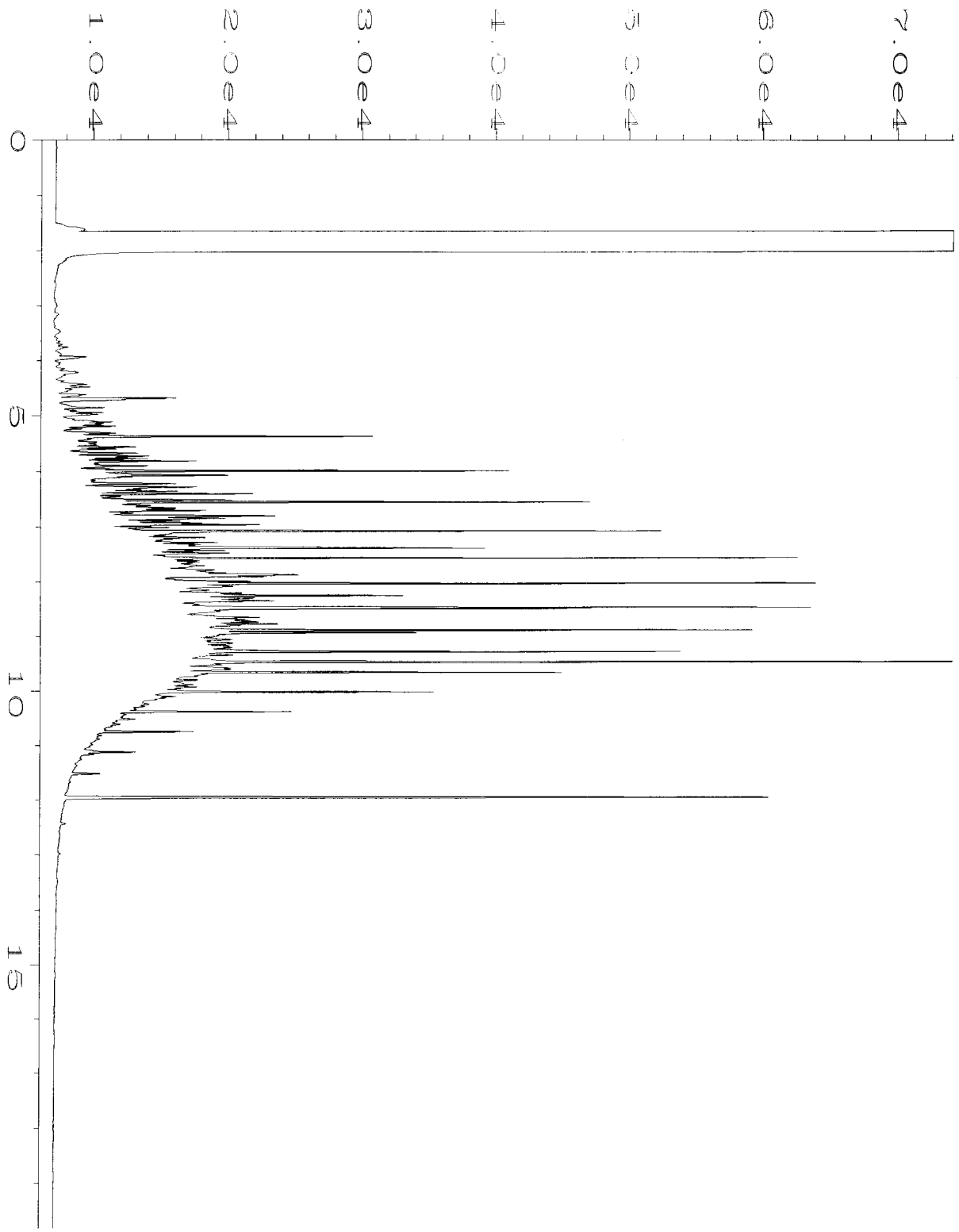
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Operator	: ML	Vial Number	: 26
Instrument	: GC1	Injection Number	: 1
Sample Name	: 112263-10 sg	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Dec 11 08:55 PM	Analysis Method	: TPHD.MTH
Report Created on:	22 Dec 11 11:05 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-21-11\027F0701.D	Page Number	: 1
Operator	: ML	Vial Number	: 27
Instrument	: GC1	Injection Number	: 1
Sample Name	: 112263-11 sg	Sequence Line	: 7
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Dec 11 10:15 PM	Analysis Method	: TPHD.MTH
Report Created on:	22 Dec 11 11:05 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-21-11\014F0301.D	Page Number	: 1
Operator	: ML	Vial Number	: 14
Instrument	: GC1	Injection Number	: 1
Sample Name	: 01-2240 mb sg	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Dec 11 02:07 PM	Analysis Method	: TPHD.MTH
Report Created on:	22 Dec 11 11:03 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-21-11\003F0201.D	Page Number	: 1
Operator	: ML	Vial Number	: 3
Instrument	: GC1	Injection Number	: 1
Sample Name	: 500 WADF 37-06B	Sequence Line	: 2
Run Time Bar Code:		Instrument Method:	TPHD.MTH
Acquired on	: 21 Dec 11 09:16 AM	Analysis Method	: TPHD.MTH
Report Created on:	22 Dec 11 11:02 AM		

112263

SAMPLE CHAIN OF CUSTODY

ME 12-16-11

Page # 104 of 112

Send Report To Otto Paris, Andrea Liljegren
 Company SoundEarth Strategies Inc.
 Address 2811 Fairview Ave East, Ste 2000
 City, State, ZIP Seattle, WA 98102
 Phone # 206-306-1900 Fax # 206-306-1907

SAMPLERS (signature) [Signature]
 PROJECT NAME/NO. T115/0675-002 PO #
 REMARKS [Signature] GEMS Y / N

TURNAROUND TIME
 Standard (2 Weeks)
 RUSH
 Rush charges authorized by:
 SAMPLE DISPOSAL
 Dispose after 30 days
 Return samples
 Will call with instructions

Sample ID	Sample Location	Sample Depth (feet)	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED								Notes					
								NWTPH-Dx w/ Silica gel	NWTPH-Gx	BTEX by 8021B	VOC's by 8260	SVOC's by 8270	RCRA-8 Metals								
MW-15-2011215	MW-15	10	01	12/15/11	1230	W	1	X													
MW-16-2011215	MW-16	10	02		1253		1	X													
MW-17-2011215	MW-17	10	03		1332		1	X													
MW-19-2011216	MW-19	11	04 A-D	12/16/11	1105		4	X	X	X											
MW-20-2011216	MW-20	13	05		1239		4	X	X	X											
MW-21-2011216	MW-21	11	06		1130		4	X	X	X											
MW-23-2011215	MW-23	13	07	12/15/11	1555		4	X	X	X											
RW-2-2011215	RW-2	10	08		1407		1	X													
RW-4-2011215	RW-4	10	09		1445		1	X													
RW-5-2011215	RW-5	-	10		1553		1	X													
MW99-2011216	-	11	11A-D	12/16/11	1185		4	X	X	X											

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119
 Ph. (206) 285-8282
 Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>[Signature]</u>	Andrea Liljegren	SES	12/16/11	
Received by: <u>[Signature]</u>	Nhan Pham	FBI	12/16/11	1510
Relinquished by:				
Received by:				