



Data Summary Report

Coleman Oil Yakima Bulk Plant

Site Name:	Coleman Oil Yakima Bulk Fuel
Site Address:	1 East I Street, Yakima
Ecology Site Cleanup ID:	13200
Facility/Site ID:	4233
Agreed Order:	DE 15639
ERTS ID Nos.:	663825, 670092

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PBS Project No. 41392.000

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TABLE OF CONTENTS

1.0 INTRODUCTION	1
1.1 Site Description and Topography.....	1
1.2 Adjacent Properties.....	1
2.0 REGIONAL GEOLOGY AND HYDROGEOLOGY.....	1
3.0 BACKGROUND.....	2
3.1 Site Ownership and Operation	2
3.2 Site Background	3
3.3 Preliminary Site Characterization Report, PBS-June 2015	3
4.0 2016 RELEASE IDENTIFICATION AND NOTIFICATION	4
5.0 SITE CHARACTERIZATION AND INTERIM ACTIONS	4
5.1 Soil Excavation	5
5.2 Heating Oil UST Removal	5
5.3 Additional Soil Excavation	5
5.4 Drilling Investigation and Monitoring Well Installation	6
5.5 Additional Drilling Investigation and Monitoring Well Installation	6
5.6 Groundwater Monitoring.....	7
5.7 Diesel Product (NAPL) Removal.....	9
5.8 Multiphase Extraction.....	10
5.9 Vapor Intrusion Evaluation.....	10
5.10 Aquifer Testing.....	11
5.11 NAPL Product Sampling.....	11
6.0 INVESTIGATION-DERIVED WASTES.....	11
7.0 APPLICABLE REGULATIONS AND CLEANUP STANDARDS	11
7.1 Soil and Groundwater Cleanup Standards.....	11
7.2 Vapor Intrusion and Indoor Air Cleanup Standards.....	12
8.0 FINDINGS	12
8.1 Soil	12
8.2 Groundwater.....	14
8.3 Vapor	16
8.4 Preliminary Conceptual Contaminant Migration Pathways	16
9.0 LIMITATIONS.....	18

SUPPORTING DATA**FIGURES**

- Figure 1 - Vicinity Map
- Figure 2 - Site Plan
- Figure 3 - Site Plan: Characterization Sample Locations
- Figure 4 - Site Plan: Soil Excavation and UST Removal
- Figure 5 - Groundwater Flow Direction Maps
- Figure 6 - Site Cross Section

TABLES

- Table 1 – Soil Analytical Results (2015)
- Table 2 – Soil Analytical Results (PCS Excavation, UST removal, MW install)
- Table 3 – Groundwater Analytical Results
- Table 4 – Groundwater Elevation Data
- Table 5 – Multiphase Extraction Summary
- Table 6 – Vapor Analytical Results
- Table 7 – NAPL Product Characteristics

APPENDICES

- Appendix A - Petroleum Contaminated Soil Disposal Documentation
- Appendix B - Soil Boring and Well Construction Logs
- Appendix C - Groundwater Sampling Forms
- Appendix D - Diesel Product Thickness and Removal Summary
- Appendix E - Air Sampling Data Sheets
- Appendix F - Survey Report
- Appendix G - Water Level and Product Thickness Hydrographs
- Appendix H - Aquifer Testing Reports
- Appendix I - Laboratory Reports / Chain-of-Custody Forms

ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
BTEX	Benzene, toluene, ethylbenzene, xylenes
COC	Contaminant/Chemical of Concern
CSID	Cleanup Site Identification number
CSM	Conceptual Site Model
CUL	clean-up levels
Ecology	Washington State Department of Ecology
FS	Feasibility Study
FOC	Fraction of Organic Carbon
FSID	Facility Site identification number
LNAPL	Light Non-Aqueous Phase Liquid
MTCA	Model Toxics Control Act
PAHs	Polycyclic Aromatic Hydrocarbons
PCS	Petroleum Contaminated Soil
PID	Photoionization detector
QAPP	Quality Assurance Project Plan
RCW	Revised Code of Washington
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
TEE	Terrestrial Ecological Evaluation
TPH	total petroleum hydrocarbon
VCP	Voluntary Cleanup Program
VOCs	Volatile Organic Compounds
WAC	Washington State Administrative Code

1.0 INTRODUCTION

Coleman Oil entered an Agreed Order (No. DE 15639) with other potentially liable parties (PLPs) and the State of Washington Department of Ecology (Ecology). The effective date of the Agreed Order is March 29, 2018. The PLPs are currently:

- Coleman Oil Company, LLC (Coleman Oil)
- BNSF Railway Company (BNSF)
- Carol Jean Wondrack
- Wondrack Distributing, Inc.
- Chevron Environmental Management Company (Chevron)

This Order requires the PLPs to complete a Data Summary Report, Remedial Investigation (RI), Feasibility Study (FS), and to prepare Draft Cleanup Action Plan (DCAP) for the site identified by Ecology as the Coleman Oil Yakima Bulk Plant located at 1 East I Street in Yakima, Washington (the Site). Refer to Figure 1 Vicinity Map.

PBS Engineering and Environmental Inc. (PBS) has completed the Data Summary Report for the Coleman Oil facility. The property is currently developed as a petroleum storage and active fueling facility. This report summarizes the work performed at the site and presents the results of the investigations.

1.1 Site Description and Topography

The site is located in the northeast quarter of Section 13, Township 13 North, Range 18 East of the Willamette Base and Meridian (W.M.) (Figure 1). The site is located in an industrial and commercial area of Yakima. The site is generally flat (Refer to Figure 2 for site layout).

1.2 Adjacent Properties

The eastern portion of the subject property is Yakima County Parcel Number 18131314070 and the western portion of the subject property is a part of Parcel Number 18131399997, which is the Burlington Northern Santa Fe Railroad (BNSF) easement. The property to the east of the site (Parcel 18131314441) is occupied by a Jack in the Box restaurant. The property to the northeast of the site (Parcel 18131314440) is occupied by Tammy's Mexican restaurant. The parcels to the north of the site (Parcels 18131314057 and 18131314901) are occupied by Carrier Transports Inc., which is a dealer of semi-truck trailers. The parcel to the west and northwest (Parcel 18131399997) is the easement for the BNSF railroad tracks.

2.0 REGIONAL GEOLOGY AND HYDROGEOLOGY

The site is located in the Yakima Valley, which lies within the central portion of the Columbia River Plateau physiographic province. This province is comprised of a series of flood basalts covering much of central and eastern Washington. The basalt flows of the Columbia River Basalt Group (CRBG) are late Miocene Epoch and early Pliocene Epoch (between 17 and 6 million years ago) in age, forming an extensive volcanic plateau. The Yakima Valley lies between anticlinal ridges that generally trend east-west as part of the Yakima Fold Belt; which consists of basaltic lava flows that have faulted and folded from the late Tertiary to the present. Glacial outwash and river-deposited silt, sand and gravel deposits overlie the Columbia River Basalt.

The closest surface water to the site is the Yakima River, located approximately two miles to the northeast. The calculated groundwater flow direction is to the south-southeast, which is the approximate direction the Yakima River flows through this area of the valley.

The property is located within the flood plain of the Yakima River and is underlain in most areas by Quaternary-age alluvium and unconsolidated terrace deposits. The alluvium is composed of unconsolidated silt, sand, gravel, and cobble. It ranges in thickness from 0 to 120 feet with an average thickness of 20 feet (USGS, 2009). The underlying terrace deposits consist of coarse-grained gravel with discontinuous layers of silt, clay, sand, or cemented gravel. The terrace gravels generally occur at the surface away from the river, and beneath the alluvium adjacent to the river. The thickness of this unit ranges from 0 to 350 feet with an average thickness of 90 feet (USGS, 2009). These unconsolidated Quaternary deposits are overlain in some areas by artificial fill material up to 20 feet deep, and are underlain by consolidated, Tertiary-age, continental sediments, primarily of the Upper Ellensburg Formation. <https://fortress.wa.gov/ecy/publications/documents/1703008.pdf>

The Yakima River basin aquifer system underlies about 6,200 square miles in south-central Washington. The aquifer system consists of basin-fill deposits occurring in six structural-sedimentary basins, the Columbia River Basalt Group (CRBG), and generally older bedrock. The basin-fill deposits were divided into 19 hydrogeologic units, the CRBG was divided into three units separated by two interbed units, and the bedrock was divided into four units (the Paleozoic, the Mesozoic, the Tertiary, and the Quaternary bedrock units). The thickness of the basin-fill units and the depth to the top of each unit and interbed of the CRBG were mapped. Only the surficial extent of the bedrock units was mapped due to insufficient data. Average mapped thickness of the different units ranged from 10 to 600 feet.

Lateral hydraulic conductivity (Kh) of the units varies widely indicating the heterogeneity of the aquifer system. Average or effective Kh values of the water-producing zones of the basin-fill units are on the order of 1 to 800 ft/d and are about 1 to 10 ft/d for the CRBG units as a whole. Effective or average Kh values for the different rock types of the Paleozoic, Mesozoic, and Tertiary units appear to be about 0.0001 to 3 ft/d. The more permeable Quaternary bedrock unit may have Kh values that range from 1 to 7,000 ft/d. Vertical hydraulic conductivity (Kv) of the units is largely unknown. Kv values have been estimated to range from about 0.009 to 2 ft/d for the basin-fill units and Kv values for the clay-to-shale parts of the units may be as small as 10⁻¹⁰ to 10⁻⁷ ft/d. Reported Kv values for the CRBG units ranged from 4×10⁻⁷ to 4 ft/d.

Source: https://wa.water.usgs.gov/projects/yakimagw/summary_of_results.htm

3.0 BACKGROUND

3.1 Site Ownership and Operation

The eastern portion of the parcel (tax parcel #18131314070) was acquired by Standard Oil Company in 1908. It was owned by Standard Oil Company and thereafter its successor in interest, Chevron U.S.A., until 1986 when it was acquired by Joseph E. Wondrack and Carol J. Wondrack. The eastern portion of the site has been owned by Carol Jean Wondrack since February 2010. The western portion of the site (part of tax parcel #18131399997) is owned by BNSF Railroad as successor in interest to the Northern Pacific Railway Company, which acquired its interest in the parcel from the United States of America, pursuant to Section 2 of the Northern Pacific Land Grant Act of 1864. Wondrack Distributing, Inc. operated the bulk fuel distributing facility located at the Site from 1976 to August 1, 2015. Since August 1, 2015, the bulk fuel distributing facility has been operated by Coleman Oil Company.

3.2 Site Background

A 1920 aerial photo showed eight aboveground storage tanks (ASTs) on concrete piers along the north property boundary. This photo showed an oil storage area in the southeast corner of the property and several buildings including an office and warehouse. The tanks are shown in the location of the current tank farm. A railroad siding is shown on the west side of the site. A historical map dated 1952 shows the tanks on concrete piers have been removed and replaced by vertically standing ASTs.

3.3 Preliminary Site Characterization Report, PBS-June 2015

PBS conducted a subsurface soils investigation for Wondrack Distributing to assess potential contamination from several ASTs in June 2015. The investigation was conducted by collecting soil samples using a combination of hand tools and the use of a truck-mounted drill rig. The maximum depth of exploration was approximately 8-feet below ground surface. Groundwater was not encountered or sampled during this investigation.

A total of 42 soil samples were collected from the following locations:

- The tank farm area
- In the vicinity of an above ground waste oil tank
- In the vicinity of the loading rack and subsurface fuel lines south of the tank farm
- The oil shed
- Piping at the former railroad area
- The east side of the warehouse
- The former oil storage area
- Additionally, one sample was collected of sludge within the stormwater sump.

The soil samples were laboratory tested for hydrocarbon identification (HCID). Select samples with a detection of hydrocarbons were additionally tested to quantify gasoline by NWTPH-Gx, diesel or heavy oil concentrations by NWTPH-Dx. Select samples were tested for benzene, toluene, ethylbenzene, and xylenes (BTEX), and select metals and PAHs.

The following conclusions were presented:

- Diesel- and/or motor oil-range compounds are present in soil at the tank farm, the out-of-use tank and drum storage area, and the loading rack at concentrations that exceed the MTCA Method A cleanup levels. Gasoline range hydrocarbons were not detected above the MTCA screening criteria.
 - The soil contamination is primarily, but not exclusively, associated with dark-stained soil at the surface. However, sampling by hand tools was limited to the upper 3 feet from the surface, and deeper sampling within the tank farm compound was not possible due to drill rig access limitations.
 - The concentrations of cadmium and lead in soil near the waste oil tank were found to exceed the MTCA Method A cleanup level. PAH concentrations that exceed MTCA Method A cleanup levels were also detected in the samples from the waste oil tank.
-

The preliminary site characterization was detailed in a report titled *Preliminary Site Characterization Report, Coleman Oil, Yakima, WA, PBS, August 16, 2016*. The report was submitted to Coleman Oil. A summary of the soil analytical results from the 2015 soils investigation are presented in Table 1. Sample locations are shown on Figure 3: Characterization Sample Locations.

4.0 2016 RELEASE IDENTIFICATION AND NOTIFICATION

On March 21, 2016, on-site personnel noted what appeared to be fuel product seeping to the surface through a crack in the asphalt (<1-gallon). This observation was made when diesel fuel was being pumped through a subsurface line beneath that location. The following actions were undertaken at the time by on-site personnel:

- Ceased pumping fuel through the line.
- Mopped up fuel product on the surface using absorptive pads from the spill kit.
- Removed asphalt and overburden soil from on top of the line (pipe run is approximately 1-foot below grade).
- Observed and plugged the hole in the line.
- Excavated impacted soil in the vicinity and approximately two to three feet below the breached fuel line.
- Stockpiled impacted soil (approximately seven cubic yards) on plastic sheeting and covered with plastic sheeting.
- The fuel pipe ran from the above storage tank area to the fuel dispenser island.

Visual observation of fuel product, in context with impacted soil and the breached fuel line, constitutes a confirmed release. As such, a Site Assessment was not required per *Guidance for Site Checks and Site Assessments for Underground Storage Tanks* (Ecology 1991). Coleman Oil personnel reported the release to Ecology within 24 hours per Washington Administrative Code (WAC) 173-340-300. The Department of Ecology (Ecology) assigned Environmental Report Tracking System (ERTS) number 663825 to the release.

Additionally, in December 2016 a release of gasoline product to the subsurface from a below grade shallow pipe was confirmed through pressure testing by Coleman Oil personnel. The fuel pipe ran from the bulk AST to the fuel dispenser canopy. Subsequently, a gasoline product was observed in the closest groundwater monitoring well (MW2) on December 12, 2016. Product was not detected in MW2 on November 2, 2017, indicating the release occurred sometime in November or early December 2016. This release was reported to Ecology on December 14, 2016. This release was assigned Ecology ERTS #670092.

In response to the reported releases, the Department of Ecology issued an Early Notice of Release of Hazardous Substances and Preliminary Determination of Liability for Release to Coleman Oil on March 30, 2017.

5.0 SITE CHARACTERIZATION AND INTERIM ACTIONS

PBS completed interim cleanup actions and site characterization investigation at the Coleman Oil facility between March 2016 and June 2017. The following sections describe these activities. Results from these activities are presented in Section 8.

5.1 Soil Excavation

Coleman Oil contracted with PBS and Able Clean-up Technologies, Inc. (ACT) to provide Interim Remedial Action at the release site. On March 21, 2016 ACT filed a public utility notification request. PBS and ACT mobilized to the site on March 23, 2016. Prior to beginning excavation work a private utility locate company conducted clearance for subsurface obstructions. A site-specific health and safety plan (HASP) was prepared and reviewed with all field personnel prior to beginning work. This Interim Action is summarized as follows:

- The excavation expanded to a pit that was approximately 8' x 8' x 5' deep.
- Approximately eight additional cubic yards (15 cubic yards total) were removed from the excavation and stockpiled on-site.
- Soil sampling for waste characterization for off-site disposal approval was conducted.
- Field screening (odor, visual observation, and/or photoionization detector [PID]) indicated the extent of impacted soil was not delineated vertically or laterally.
- Soil samples were collected from the base of the excavation and the north and west sidewalls.
- An underground storage tank (UST) was encountered within the excavation area along the south sidewall (Refer Section 5.2 Heat Oil Tank Removal).

Preliminary analytical results from samples collected from the sidewalls and base of the excavation indicated soil impacted by diesel fuel was not delineated in any direction and remained at concentrations ranging from 11,000 to 34,000 milligrams per kilogram (mg/kg).

Soil analytical results are presented in Table 2. Figure 4 presents the approximate location of the excavations and sample locations.

5.2 Heating Oil UST Removal

During soil excavation and heating oil UST of approximately 1,000-gallon capacity was discovered. Prior to UST decommissioning by removal, Able Clean-up Technologies, Inc. (ACT) of Spokane, Washington (ACT) pumped approximately 80 gallons of what appeared to be heat oil and sludge from the tank. On March 27, 2016 ACT removed the UST from the ground and temporarily stored it on-site in the contaminated soil containment area. The heating oil UST had not been in use for several years prior to the removal action.

Soil analytical results are presented in Table 2. Figure 4 presents the approximate location of the UST and sample locations.

5.3 Additional Soil Excavation

On March 30th, 2016 PBS oversaw the additional PCS excavation by ACT. The excavation was roughly square in shape and approximately 20 - 25 feet in length along the sidewalls and approximately 20 feet deep (Refer to Figure 4 – Site Plan: Soil Excavation and UST Removal and Figure 6: Cross-Section).

Representative soil analytical results were sent to an Environmental Health Specialist at the Yakima Health District (YHD). YHD approved the disposal of petroleum contaminated soil (PCS) to the Anderson Rock and Demolition Pits facility (Anderson) in Yakima, Washington.

A total of 212.15 tons of PCS was disposed of at Anderson. The YHD PCS disposal approval letter and the PCS disposal documentation are presented in Appendix A.

5.4 Drilling Investigation and Monitoring Well Installation

A subsurface investigation and well installation to help determine the degree and extent of the fuel release was conducted on April 27-28, 2016.

Prior to beginning the drilling investigations, PBS filed a public utility notification request. On April 7, 2016, PBS supervised a private utility locates company, Geophysical Survey of Kennewick, WA, while they conducted borehole clearance for subsurface obstructions. PBS was on-site April 27 and 28, 2016 to conduct the drilling investigation, with Holt Services of Puyallup, Washington providing the drilling services. The borings were advanced with a hollow-stem auger drilling method.

This drilling and sampling program was comprised of the advancement of three monitoring wells (MW1 to MW3) and one recovery well (RW1). The monitoring wells were advanced to a maximum of 25 feet, with 2-inch casing diameter and 10-foot screen. RW1 was advanced to 30 feet, with a 4-inch casing diameter and 15-foot screen (Refer to Figure 4: Site Plan for well locations).

During the advancement of boreholes, soil was screened for volatiles using a hand-held PID. Cursory PID readings were taken along the flights of soil as they were brought to the surface. PID readings were also taken from select soil intervals by partially filling a sealable plastic bag and taking headspace readings within the bag. Volatiles were not detected in soil until the depth approaching the water table was reached. PID readings as high as 1,200 parts per million (ppm) were detected at groundwater depth.

In all borings, soils were logged continuously, noting grain size, density, color, odor, and moisture. Boring logs describing the subsurface lithology and PID readings are presented in Appendix B.

5.5 Additional Drilling Investigation and Monitoring Well Installation

A supplementary subsurface investigation and well installation to further determine the degree and extent of groundwater contamination was conducted on November 8-9, 2016.

Prior to beginning the drilling investigations PBS filed a public utility notification request. On November 7, 2016, Geophysical Survey of Kennewick, WA conducted borehole clearance for subsurface obstructions. PBS was on-site November 8-9, 2016 to conduct the drilling investigation. Holt Services of Puyallup, Washington provided the drilling services.

This drilling and sampling program was comprised of the advancement of three new monitoring wells (MW4, MW5, and MW6). The monitoring wells were advanced to a maximum of 25 feet, with 2-inch casing diameter and 10-foot screen (Refer to Figure 4: Site Plan for well locations).

During the advancement of boreholes, soil was screened for volatiles using a hand-held PID. Cursory PID readings were taken along the runs of soil as they were brought to the surface. PID readings were also taken from select soil intervals by partially filling a sealable plastic bag and taking headspace readings within the bag. Volatiles were not detected at significant concentrations in soil until the depth approaching the water table was reached. PID readings as high as 300 parts per million (ppm) were detected at groundwater depth.

In all borings, soils were logged continuously, noting grain size, density, color, odor, and moisture.

One soil sample was collected at each well location in the unsaturated zone. Samples were collected in laboratory-supplied containers, placed on ice in a cooler and transported to Friedman and Bruya Laboratory in Seattle, Washington, within the specified holding times and under chain-of-custody documentation. Analyses were conducted under a 5-day turnaround time and included the following:

- Gasoline range Total Petroleum Hydrocarbons (TPH) by method NWTPH-Gx
- Diesel range TPHs by method NWTPH-Dx
- Benzene, toluene, ethylbenzene and xylenes (BTEX) by EPA method 8021

Boring logs describing the subsurface lithology, sample depths, and PID readings are presented in Appendix B.

5.6 Groundwater Monitoring

On May 10, 2016, December 13, 2016, and June 9, 2017 PBS was on-site to gauge and sample the groundwater wells. Well locations are presented on Figure 4 – Site Plan. Detailed groundwater sampling information, including depth to water and depth to product, is presented in Appendix C - Groundwater Sampling Forms.

Monitoring well information is summarized as follows:

Monitoring Well Construction Summary

Monitoring Well Identification	Screened Interval (feet bgs)	Well Depth (feet bgs)
MW1	14.9 – 24.9	24.9
MW2	15.3 – 25.3	25.3
MW3	14 – 24	24
RW1	15 – 30	30
MW4	15 – 25	25
MW5	15 – 25	25
MW6	15 – 25	25

May 10, 2016 Groundwater Monitoring Event

The May 2016 Groundwater Monitoring Event (GME) included the gauging and sampling (unless NAPL present) at monitoring wells MW1, MW2, MW3 and RW1.

Prior to sampling the wells were gauged using an interface probe. Static water levels ranged from 19.13 feet below top of casing (fbTOC) in MW1 to 19.18 fbTOC in MW2. Light, non-aqueous phase liquid (NAPL or product), in the form of diesel product, was identified in RW1 (4.2 feet thickness) and in MW3 (4.7 feet thickness). RW1 and MW3 were not sampled due to the presence of NAPL product.

Groundwater purging and sampling was conducted at MW1 and MW2 using a peristaltic pump, employing low flow sampling methodology with pumping rates not exceeding 0.20 liters/minute and creating minimal drawdown in the well. Groundwater field parameters (conductivity, pH, temperature, dissolved oxygen and oxidation-reduction potential) were recorded during purging using a YSI Model 556MSP water-quality analyzer equipped with a flow-through cell.

Once groundwater parameters stabilized, which indicates groundwater is representative of the aquifer formation and is not well column water, a sample was collected. PBS personnel wore new disposable nitrile gloves when collecting samples.

All samples were collected in laboratory-supplied containers, placed on ice in a cooler and transported to Friedman and Bruya Laboratory in Seattle, Washington, within the specified holding times and under chain-of-custody documentation. Analyses were conducted under a 5-day turnaround time and included the following:

- Gasoline range Total Petroleum Hydrocarbons (TPH) by method NWTPH-Gx
- Diesel range TPHs by method NWTPH-Dx
- Benzene, toluene, ethylbenzene and xylenes (BTEX) by EPA method 8021
- Polycyclic Aromatic Hydrocarbons (PAHs) by EPA Method 8270D SIM

December 13, 2016 Groundwater Monitoring Event

The December 2016 GME included the gauging and sampling (unless was present) at monitoring wells MW1 through MW6 and RW1.

Prior to sampling the wells were gauged using an interface probe. Static water levels ranged from 17.40 fbTOC in MW6 to 23.73 fbTOC in MW3. NAPL identified by the project laboratory as diesel product, was identified in MW5 (0.30-feet thickness). NAPL determined to be mixed diesel and gasoline product was identified in MW2 (8-feet thickness) and MW3 (0.14-feet thickness). RW1 and MW1 were not sampled, but NAPL was observed at thicknesses of 0.25-feet and 1.14-feet, respectively.

Groundwater purging and sampling was conducted at MW4 and MW6 using a peristaltic pump, employing low flow sampling methodology with pumping rates not exceeding 0.20 liters/minute and creating minimal drawdown in the well. Groundwater field parameters could not be collected during this sampling event due to an equipment malfunction of the YSI. PBS personnel wore new disposable nitrile gloves when collecting each sample.

All samples were collected in laboratory-supplied containers, placed on ice in a cooler and transported to Friedman and Bruya Laboratory in Seattle, Washington, within specified holding times and under chain-of-custody documentation. Analyses were conducted under a 5-day turnaround time and included the following:

- Gasoline range Total Petroleum Hydrocarbons (TPH) by method NWTPH-Gx
- Diesel range TPHs by method NWTPH-Dx
- Benzene, toluene, ethylbenzene and xylenes (BTEX) by EPA method 8021
- Polycyclic Aromatic Hydrocarbons (PAHs) by EPA Method 8270D SIM

June 9, 2017 Groundwater Monitoring Event

The June 2017 GME included the gauging and sampling (unless NAPL was present) at monitoring wells MW1 through MW6 and RW1.

Prior to sampling the wells were gauged using an interface probe. Static water levels ranged from 16.61 fbTOC in MW6 to 20.81 fbTOC in MW3. NAPL was identified in RW1 (1.48-foot thickness), MW1 (0.16-foot thickness), MW3 (2.87-foot thickness), and MW5 (0.66-foot thickness). NAPL in MW5 was identified as a diesel product and LNAPL in MW3 was identified as mixed diesel and gasoline product.

Groundwater purging and sampling was conducted at MW4, and MW6 using a peristaltic pump, employing low flow sampling methodology with pumping rates not exceeding 0.36 liters/minute and creating minimal drawdown in the well. Once groundwater parameters stabilized, which indicates groundwater is representative of the aquifer formation and is not well column water, a sample was collected. PBS personnel wore new disposable nitrile gloves when collecting samples. A "grab" groundwater sample was collected from MW2 using a disposable bailer. Detailed groundwater sampling information is presented in Appendix C - Groundwater Sampling Forms.

All samples were collected in laboratory-supplied containers, placed on ice in a cooler and transported Friedman and Bruya Laboratory in Seattle, Washington, within specified holding times and under chain-of-custody documentation. Analyses were conducted under a 5-day turnaround time and included the following:

- Gasoline range Total Petroleum Hydrocarbons (TPH) by method NWTPH-Gx
- Diesel range TPHs by method NWTPH-Dx
- Benzene, toluene, ethylbenzene and xylenes (BTEX) by EPA method 8021
- Polycyclic Aromatic Hydrocarbons (PAHs) by EPA Method 8270D SIM
- Lead by EPA Method 200.8
- Select Volatile Organic Compounds (VOCs) by EPA Method 8260C

Groundwater analytical results from each event are presented in Table 3. Groundwater elevation data is presented in Table 4.

5.7 Diesel Product (NAPL) Removal

With guidance from PBS, on-site Coleman Oil staff conducted diesel product removal events using a peristaltic pump. An interface probe was used during extraction to monitor the NAPL thickness and pumping was ceased once NAPL thickness was no longer measurable. The pumped NAPL was contained into a 300-gallon tote that was labeled and stored onsite, pending disposal by Coleman Oil.

Eight NAPL removal events were conducted between May 10, 2016 and August 5, 2016. In total, approximately four gallons were removed from MW3 and 48.5 gallons were removed from RW1.

A summary of diesel product thickness and removal is presented in Appendix D.

5.8 Multiphase Extraction

Multiphase extraction (MPE or vacuum extraction) is a process of rapidly removing NAPL, contaminated groundwater and vapor from the subsurface. PBS oversaw National Response Corporation (NRC) of Pasco, WA, who utilized a vacuum rig with catchment vessel to remove contaminated media from the subsurface through select wells on-site. Contaminated media was removed from the wells using transparent, reinforced down-well tubing and vacuum.

From May 10, 2016 to May 27, 2017, eleven (11) MPE events were undertaken at the property. A total of approximately 3,616-gallons of NAPL product and contaminated groundwater has been removed from the subsurface and disposed of off-site.

Based on visual observations at the tubing and vacuum truck, and conversations with NRC, PBS roughly estimates that 10% (or 350 gallons) of the removed liquid material was NAPL product. It is unknown what volume of the contaminant load was removed as vapor.

Measured product thickness and MPE volumes are presented in Table 5.

5.9 Vapor Intrusion Evaluation

PBS completed a Vapor Intrusion (VI) investigation at the subject property. Because VOCs have been identified in groundwater samples collected in close proximity to the building at concentrations exceeding the screening levels, the investigation consisted of indoor air sampling to determine if contamination is unacceptably impacting the building's indoor air.

Three six-liter Summa canisters were ordered from Friedman and Bruya, along with flow controllers set at a flow rate of 16 milliliters (mL) /minute (6-hour sample time). The canisters were batch-certified for air-phase hydrocarbons and volatile organic compounds.

On December 13, 2016, PBS collected one indoor air sample in the office (VS1), one in the crawlspace (VS2) and one outdoor air sample (VS3) to allow for the comparison of indoor air quality to ambient air quality.

Collected samples were submitted to Friedman and Bruya Laboratory in Seattle, Washington, within specified holding times and under chain of custody documentation. Analyses were conducted under normal turnaround time and included the following:

- Air-Phase Petroleum Hydrocarbons by Method MA-APH
- BTEXN and 1,2,4-Trimethylbenzene by EPA Method TO-15

The air analytical results are presented in Table 6. Air Sampling Datasheets are presented in Appendix E.

5.10 Aquifer Testing

The purpose of conducting aquifer testing is to better understand properties of the aquifer and the groundwater flow system at the site. Practical applications of knowledge gained through aquifer testing include estimating groundwater flow velocity, evaluating potential contaminant migration, and evaluating feasible remedial approaches and design.

On June 9, 2017, an assessment of hydraulic conductivity was undertaken within monitoring wells MW6 and MW4, which are screened in the unconfined aquifer at the site. For the purpose of determining hydraulic conductivity, one rising head slug test was undertaken at each well. This method evaluates the hydraulic conductivity of the subsurface materials in the immediate vicinity of the screened interval of the well. An initial displacement was achieved through the removal of water from the well with a disposable bailer. The change in water level was recorded via a pressure transducer and data logger (In Situ Level Troll 700) until the water level within the well returned to or approached equilibrium.

5.11 NAPL Product Sampling

On June 9, 2017 product samples were collect from MW3 and MW5, using a disposable bailer and laboratory supplied glass containers. The samples were sent to Pace Energy Forensics Laboratory of Pittsburg, PA (Pace). Samples were analyzed for Qualitative Fingerprinting by GC/MS Full Scan (ASTM D5739).

6.0 INVESTIGATION-DERIVED WASTES

Gloves, tubing and other disposable field supplies were disposed of as solid waste. Purged groundwater and decontamination water were placed in 55-gallon drums, which are sealed, labeled and stored on-site. Soil cuttings and excavated soil were temporarily stored on-site in drums or stockpiles, before being disposed of at Anderson Rock and Demolition Pits facility (Anderson) in Yakima, Washington. Soil was disposed of as petroleum contaminated soil with written approval from the Yakima County Health District.

7.0 APPLICABLE REGULATIONS AND CLEANUP STANDARDS

Contaminated site assessment and cleanup is conducted in accordance with the substantive requirements of the Model Toxics Control Act (MTCA), Chapter 70.105D of the Revised Code of Washington (RCW) and its implementing regulations, Chapter 173-340 of the Washington Administrative Code (WAC). Site assessment and cleanup (if applicable) has been and will continue to be performed under MTCA. This section summarizes the cleanup standards established for this site.

7.1 Soil and Groundwater Cleanup Standards

In accordance with MTCA, development of preliminary cleanup levels includes identifying potential exposure pathways for human and ecological impacts based on the planned land use. MTCA provides for three methods (Method A, B or C) for establishing cleanup standards. Method A (unrestricted land use) is typically used as the default standard levels. Method B and C are used when developing site-specific cleanup levels.

Considering the current land use and unknown potential future land use, MTCA Method A Cleanup Levels are adopted as screening levels at this time. Method A Cleanup Levels for soil and groundwater are presented in Tables 1 and 2, along with the contaminant concentrations. MTCA Method A Industrial Cleanup Levels are also presented for soil.

7.2 Vapor Intrusion and Indoor Air Cleanup Standards

Vapor Intrusion

In the state of Washington vapor intrusion (VI) is evaluated in general accordance Ecology’s *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* (Ecology VI Guidance). Ecology’s *The Updated Process for Initially Assessing the Potential for Petroleum Vapor Intrusion Implementation Memorandum No. 14* (March 2016) provides guidance on how to initially assess whether VI is a potential concern at sites with petroleum contamination. This memo supplements Chapter 2, “Preliminary VI Assessments,” in Ecology’s VI Guidance. Ecology’s Screening and Cleanup Levels were updated in 2015.

The VI Evaluation is a tiered approach, in which data is evaluated and the decision is made to either “off-ramp” and rule out the VI pathway as a concern or proceed forward with the evaluation. The VI Evaluation is summarized as follows:

Tier II Assessment: The purpose of the Tier II Assessment is to determine the actual impact vapor intrusion has on indoor air and to evaluate what measures, if any, are required to protect indoor receptors from vapor intrusion. The Tier II Assessment includes the sampling of indoor air. Ecology’s 2015 Indoor Air Cleanup Levels are the adopted cleanup criteria as it relates to vapor intrusion.

Indoor Air Quality

As the site is an industrial bulk fuel distribution facility with a worker health and safety program, the National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limits (RELs) and the Occupational Safety and Health Administration (OSHA) 8-hour time weighted average (TWA) Permissible Exposure Limits (PELs) for general industry are the adopted cleanup criteria for indoor air quality at the property.

8.0 FINDINGS

8.1 Soil

Field Observations

A typical subsurface profile encountered in excavations and soil borings on-site is presented below:

Typical Subsurface Profile

Classification	Description	Approximate Depth Range (feet bgs)
Fill	Loose, dark brown sandy gravel; medium sand; subangular fine gravel: damp	0 to 2
Silt	Medium dense, brown sandy silt with gravel; medium sand; subrounded coarse gravel; damp	2 to 8
Sand	Dense, brown and gray sand with gravel and cobbles; medium sand; subrounded coarse gravel	8 to 30

Classification	Description	Approximate Depth Range (feet bgs)
	Groundwater	19

Graphic boring logs are provided in Appendix B.

Analytical Results

2015 Subsurface Investigation

The following conclusions were presented in the 2015 Site Characterization Report:

- Diesel- and/or motor oil-range compounds are present in soil at the tank farm, the out-of-use tank and drum storage area, and the loading rack at concentrations that exceed the MTCA Method A cleanup levels. Gasoline range hydrocarbons were not detected above the MTCA screening criteria.
- The soil contamination is primarily, but not exclusively, associated with dark-stained soil at the surface. However, sampling by hand tools was limited to the upper 3 feet from the surface, and deeper sampling within the tank farm compound was not possible due to drill rig access limitations.
- The concentrations of cadmium and lead in soil near the waste oil tank were found to exceed the MTCA Method A cleanup level. PAH concentrations that exceed MTCA Method A cleanup levels were also detected in the samples from the waste oil tank.

A summary of the soil analytical results from the 2015 soils investigation are presented in Table 1.

Soil Excavation Area

Contaminant concentrations in samples collected from the north, east and south sidewalls of the excavation were either not detected or were below MTCA Method A Cleanup Levels.

Contaminant concentrations in samples collected from the west sidewall and the base of the excavation exceed the adopted Cleanup Levels for the following compounds:

- Gasoline range Total Petroleum Hydrocarbons (TPH)
- Diesel range TPHs
- Benzene, ethylbenzene and xylenes
- Naphthalene

It should be noted that an additional two feet of soil at the base of the excavation were removed after sampling was conducted. As the excavation extended below the water table, additional soil sampling was not conducted.

Soil analytical results are presented in Table 2. Figure 4 presents the approximate location of the excavations and sample locations.

UST Decommissioning

Based on the findings of the UST assessment, the soil contamination identified in the vicinity of the UST are related to the nearby diesel fuel release and do not indicate a release from the heating oil UST, based on the following:

- The presence of diesel range and low levels of gasoline range petroleum hydrocarbons and volatiles indicate a fresh release. This petroleum signature is consistent with that identified during the diesel release investigation and is not consistent with a release of weathered heating oil.
- The heating oil tank was inspected after removal and was found to be in fair condition. No perforations were observed.

The heating oil UST decommissioning was detailed in a report titled UST Removal Report: Heat Oil Tank, Coleman Oil Yakima Facility, dated May 11, 2016. The report was submitted to Coleman Oil. Soil analytical results are presented in Table 2. Figure 4 presents the approximate location of the UST and sample locations.

Well Installation

During the installation of monitoring wells MW5 and MW6, one soil sample was collected from the unsaturated zone at each location. Soil samples were analyzed for the following compounds:

- Gasoline range Total Petroleum Hydrocarbons (TPH)
- Diesel range TPHs
- Benzene, toluene, ethylbenzene and xylenes

The concentration of gasoline range TPHs exceeded the Cleanup Level in sample MW5a. The remaining analyte concentrations were below the Cleanup Level and/or the laboratory method detection limit. Soil Analytical Results are presented in Table 2.

8.2 Groundwater

Depth to product (DTP) and depth to water (DTW) measurements were taken in gauging events, during groundwater sampling events and before MPE events. At each well, ground level and top of casing (TOC) elevations were measured by a licensed surveyor, so groundwater and product elevations are known. A NAPL density of 0.8 was used to calculate the potentiometric groundwater surface. DTP, DTW and groundwater elevation data is presented in Table 4. The survey report is included as Appendix F. Water level and product thickness hydrographs are presented in Appendix G.

Analytical Results

Groundwater

Contaminant concentrations in groundwater samples collected from each of the sampled wells have exceedances of the adopted Cleanup Levels. The following compounds have been identified above the Cleanup Level:

- Gasoline range Total Petroleum Hydrocarbons (TPH)
 - Diesel range TPHs
 - Oil range TPHs
-

- Benzene, toluene and xylenes
- Naphthalene

Groundwater analytical results are presented in Table 3. Groundwater elevation data is presented in Table 4. A copy of the laboratory reports and chain of custody documentation is included in Appendix I.

NAPL

Pace analyzed product samples from MW3 and MW5 and made the following conclusion, "The petroleum signatures show that MW3 and MW5 share a similar weathered #2 diesel fuel signature. MW3 exhibits an intermingling of a significant gasoline component with the #2 diesel fuel. MW5 contains the #2 diesel fuel component intermingled with a proportionately lower amount of a refined residual range petroleum."

Below is a graph and comment from the Pace letter report:

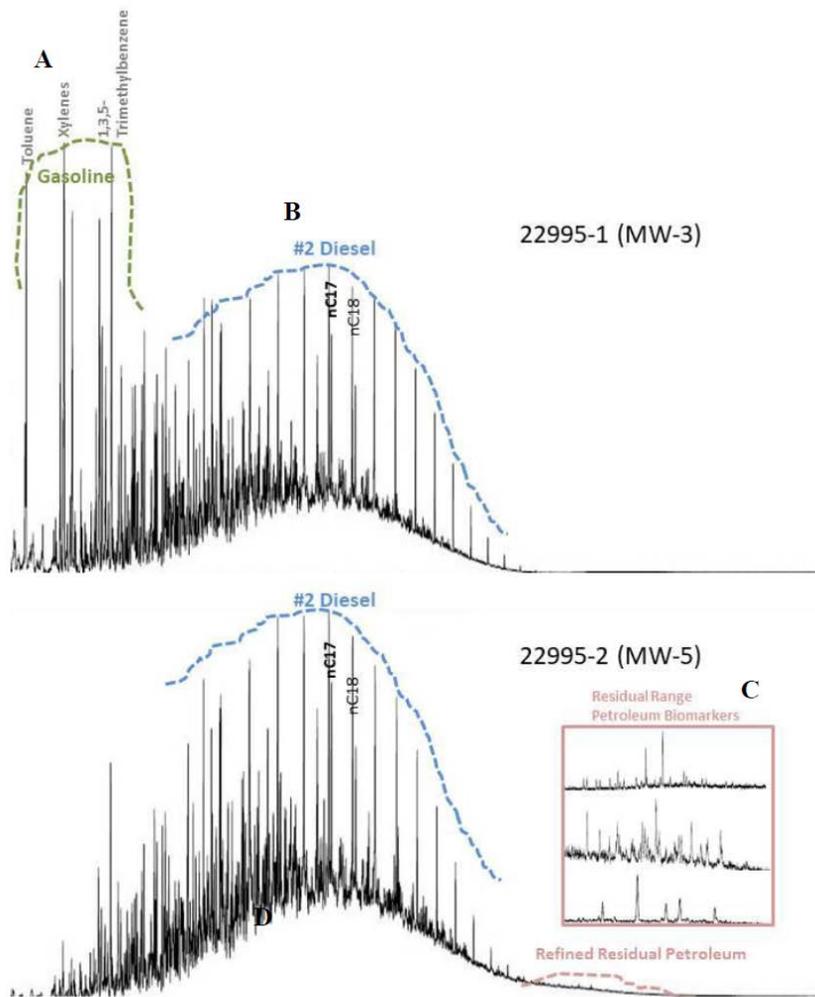


Figure 1. Diagnostic petroleum attributes of the sample – TIC & biomarkers. (A) Gasoline signature (B) diesel signature (C) Refined residual range petroleum signature

Select fuel components are presented in Table 7 to illustrate Pace findings.

The complete Pace letter and analytical report are included in Attachment I.

Hydraulic Conductivity

The rising head test data was processed using hydrogeological modeling software (AQTESOLV v4.5). The calculations were performed using the Bouwer-Rice solution. The Bouwer-Rice solution was developed for open boreholes or screened wells that partially or fully penetrate an unconfined aquifer and was therefore deemed the most appropriate solution to be used for the site.

The recovery was curved at the most valuable part of recovery, so the line matching was placed tangent to the curve at approximately 80% recovery.

The two calculated hydraulic conductivities (K values) were 1.79 feet per day (ft/day) at MW4 and 1.183 ft/day for MW6.

The calculated hydraulic conductivities are indicative of silty sands (Fetter, 1994), which is generally consistent with the subsurface lithology observed during well installations. The mean of the two K values is 1.487 feet/day and is the adopted K value for the site. The aquifer testing analysis reports are presented in Appendix H.

8.3 Vapor

Vapor Intrusion

Concentrations of benzene, naphthalene and 1,2,4-trimethylbenzene exceed the VI Cleanup Level in each sample. Concentrations of air-phase hydrocarbons (APH) in the aliphatic carbon C9 – C12 range exceed the VI Cleanup Level in the indoor and crawlspace samples.

The results indicate that soil vapor as air phase aliphatic hydrocarbons has migrated up through the soil and into the crawlspace and may be having a relatively low impact on indoor air as well.

Indoor Air Quality

Contaminant concentrations did not exceed the OSHA PELs or NIOSH RELs in any sample. These are the adopted cleanup criteria for the site as it is currently operated, as it is an industrial bulk fuel facility with a worker health and safety program.

The air analytical results are presented in Table 6.

8.4 Preliminary Conceptual Contaminant Migration Pathways

A preliminary conceptual site model (CSM) includes the identification of contaminants of concern and occurrence, impacted media and exposure pathways. The CSM will continue to be developed and will be more formally presented in the Remedial Investigation report.

Contaminants of Concern and Occurrence

The primary COCs are petroleum hydrocarbon contaminants (gasoline, diesel, oil and PAHs) and metals, which are associated with the former and current site use as a fuel storage and distribution facility. Historical releases are likely related to the storage and handling of fuel, such as releases from:

- Storage vessels
- Piping
- Dispensers
- Surface spills

Known releases include the March 2016 diesel fuel release and the November/December 2016 gasoline fuel release. Both releases are from subsurface pipes and the volume of each release is unknown.

The sources of these releases have been identified and discontinued. Bulk fuel is currently stored in new ASTs (2017) and underground storage and piping is not utilized.

Impacted Media

Fuel releases are confirmed to have impacted soil and groundwater on site. NAPL has been confirmed to be present. Depth to water and depth to product measurements were taken in each well in April 2018. NAPL was identified in each of the seven wells and ranged in thickness from 0.05-feet in MW6 and 1.4-feet in RW1.

Impact to soil vapor is suspected based on the VI Evaluation.

There is no surface water or sediment in the vicinity of the releases and are not being evaluated as impacted media.

Human Health Receptors

The following complete exposure pathway is identified:

- The potential from dermal contact with impacted soil by site workers engaged in excavation activities.

The following exposure pathway is considered to be potentially complete:

- Vapor intrusion to indoor air. This pathway should be evaluated further should site use change. This pathway should be evaluated further should the site be occupied by workers who are not included in a company health and safety and medical monitoring plan.

Ecological Receptors

Impacts to subsurface soil and groundwater, resulting from on-site petroleum hydrocarbon releases, are not currently considered to be a concern to ecological receptors, based on the following:

- The site is located in an industrial and commercial urban setting.
 - The site surface is comprised of structures and other hard scape materials (asphalt, concrete). The far western portion of the site adjoins the railroad, which has a coarse gravel surface (approximately 1-foot thickness). There is no exposed soil.
 - The migration pathway of contaminated groundwater to surface water and/or sediment is not considered to be complete.
-

9.0 LIMITATIONS

PBS has prepared this report for use by the Coleman Oil Company. It will be submitted to the Department of Ecology as a requirement of the Agreed Order.

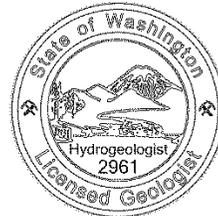
This study was limited to the tests, locations, and depths as indicated to determine the absence or presence of certain contaminants. The site as a whole may have other contamination that was not characterized by this study. The findings and conclusions of this report are not scientific certainties but, rather, are probabilities based on professional judgment concerning the significance of the data gathered during the course of this investigation. PBS is not able to represent that the site or adjoining land contain no hazardous substances or other latent conditions beyond that detected or observed by PBS.

Sincerely,
PBS Engineering and Environmental Inc.

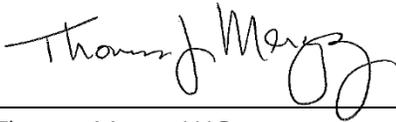


Ken Nogeire, LHG
Senior Geologist/Hydrogeologist

July 19, 2019
Date

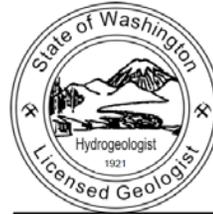


KENNETH NOGEIRE



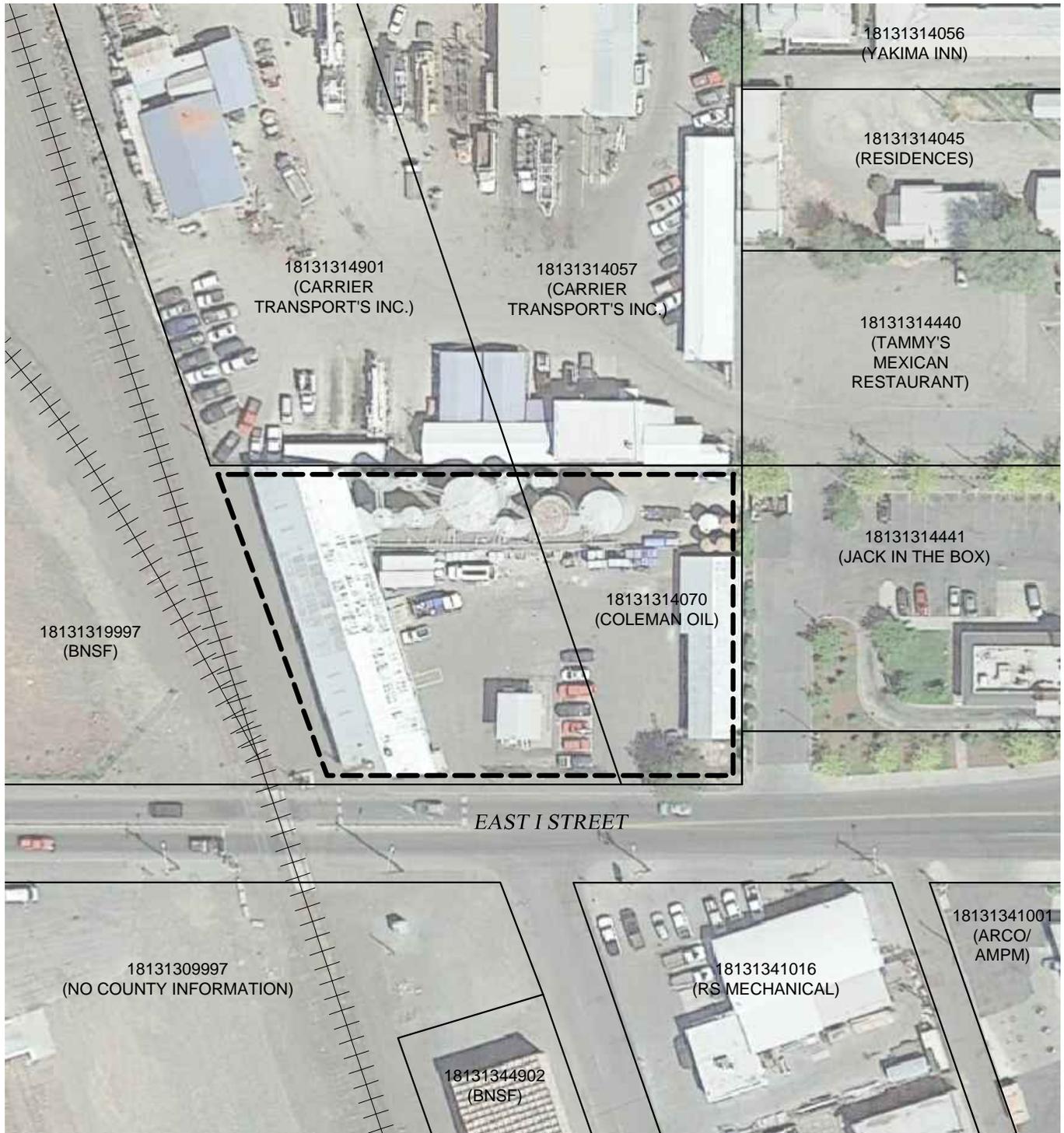
Thomas Mergy, LHG
Senior Geologist/Hydrogeologist

July 19, 2018
Date



Thomas J Mergy

FIGURES



SOURCE: © 2016 GOOGLE EARTH PRO

LEGEND

- APPROXIMATE PARCEL BOUNDARIES
- - - - - SUBJECT PROPERTY



Scale 1" = 80'



PREPARED FOR: COLEMAN OIL



SITE PLAN
1 EAST I STREET
YAKIMA, WASHINGTON

JUL 2018
41392.000
FIGURE
2



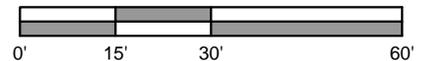
SOURCE: © 2017 GOOGLE EARTH PRO

LEGEND

- ⊕ MW-1 EXISTING WELL NUMBER AND LOCATION (RW-1, MW-1 - MW-6)
- S1 NEAR SURFACE SOIL SAMPLE NUMBER AND APPROXIMATE LOCATION (APRIL 2015)
- ⊙ S11 SOIL BORING NUMBER AND APPROXIMATE LOCATION (APRIL 2015)
- △ VS1 VAPOR SAMPLE NUMBER AND LOCATION
- ← APPROXIMATE GROUNDWATER FLOW DIRECTION
- FORMER SUBSURFACE FUEL LINES



Scale 1" = 30'



PREPARED FOR: COLEMAN OIL



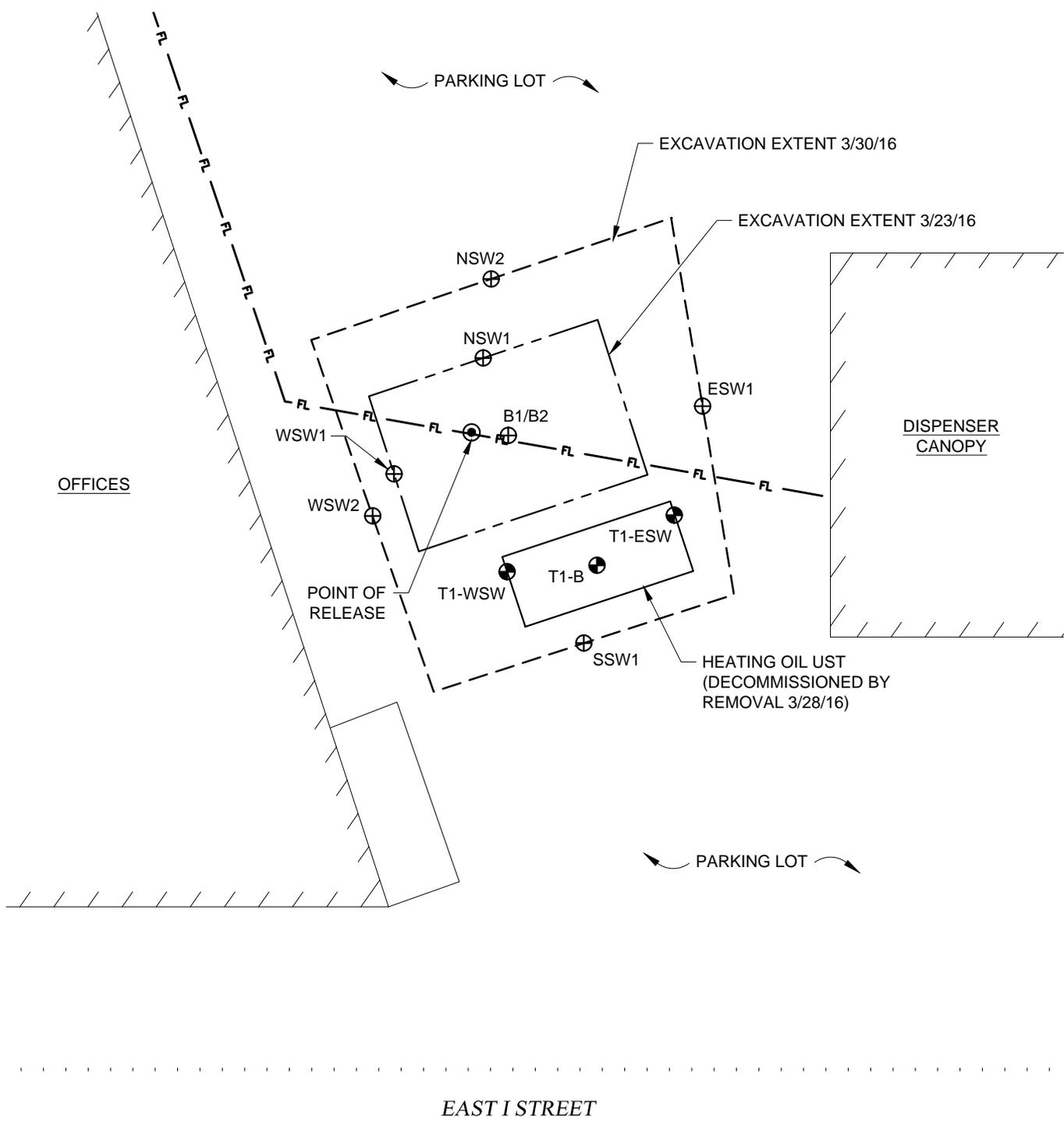
**SITE PLAN: CHARACTERIZATION
SAMPLE LOCATIONS**
1 EAST I STREET
YAKIMA, WASHINGTON

JUL 2018
41392.000

FIGURE

3

Filename: L:\Projects\41000\41392 Coleman Oil\CAD\Data Summary Report Figs\41392.000_FIG_3.dwg Layout Tab: FIG-4_JULY User: Rebecca Snellings CAD Plot Date/Time: 7/19/2018 12:14:51 PM



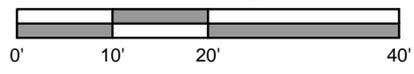
LEGEND

- ⊕ B1 SOIL SAMPLE LOCATION AND NUMBER
- T1-B TANK SAMPLE LOCATION AND NUMBER
- FL — SUBSURFACE FUEL LINE

SOURCE: © 2016 GOOGLE EARTH PRO



Scale 1" = 20'



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SITE PLAN: SOIL EXCAVATION AND UST REMOVAL
 1 EAST I STREET
 YAKIMA, WASHINGTON

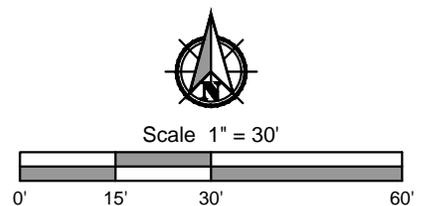
JUL 2018
 41392.000
 FIGURE
4



SOURCE: © 2017 GOOGLE EARTH PRO

LEGEND

- ⊕ MW-1 MONITORING WELL NUMBER AND LOCATION
- ⊕ RW-1 MONITORING WELL NUMBER AND LOCATION
- (1071.81) GROUNDWATER ELEVATION (FEET AMSL)(DEC 2016)
- — GROUNDWATER CONTOUR (DEC 2016) DASHED WHERE INFERRED
- ➔ APPROXIMATE GROUNDWATER FLOW DIRECTION
- * ANOMALOUS ELEVATION AT MW2: NOT USED IN CONTOURING



PREPARED FOR: COLEMAN OIL



NAPL CORRECTED POTENTIOMETRIC SURFACE MAP
DECEMBER 2016
 1 EAST I STREET
 YAKIMA, WASHINGTON

JUL 2018
 41392.000
 FIGURE
5A



SOURCE: © 2017 GOOGLE EARTH PRO

LEGEND

-  MW-1 MONITORING WELL NUMBER AND LOCATION
 RW-1 MONITORING WELL NUMBER AND LOCATION
 (1068.64) GROUNDWATER ELEVATION (FEET AMSL)(MAR 2017)
-  GROUNDWATER CONTOUR (MAR 2017) DASHED WHERE INFERRED
-  APPROXIMATE GROUNDWATER FLOW DIRECTION



Scale 1" = 30'



PREPARED FOR: COLEMAN OIL



NAPL CORRECTED POTENTIOMETRIC SURFACE MAP
MARCH 2017
 1 EAST I STREET
 YAKIMA, WASHINGTON

JUL 2018
 41392.000

FIGURE

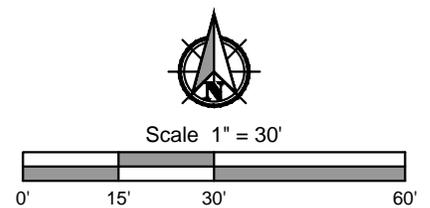
5B



SOURCE: © 2017 GOOGLE EARTH PRO

LEGEND

- ⊕ MW-1 MONITORING WELL NUMBER AND LOCATION
- ⊕ RW-1 MONITORING WELL NUMBER AND LOCATION
- (1068.64) GROUNDWATER ELEVATION (FEET AMSL)(JUN 2017)
- GROUNDWATER CONTOUR (JUN 2017) DASHED WHERE INFERRED
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- * ANOMALOUS ELEVATION AT MW2: NOT USED IN CONTOURING

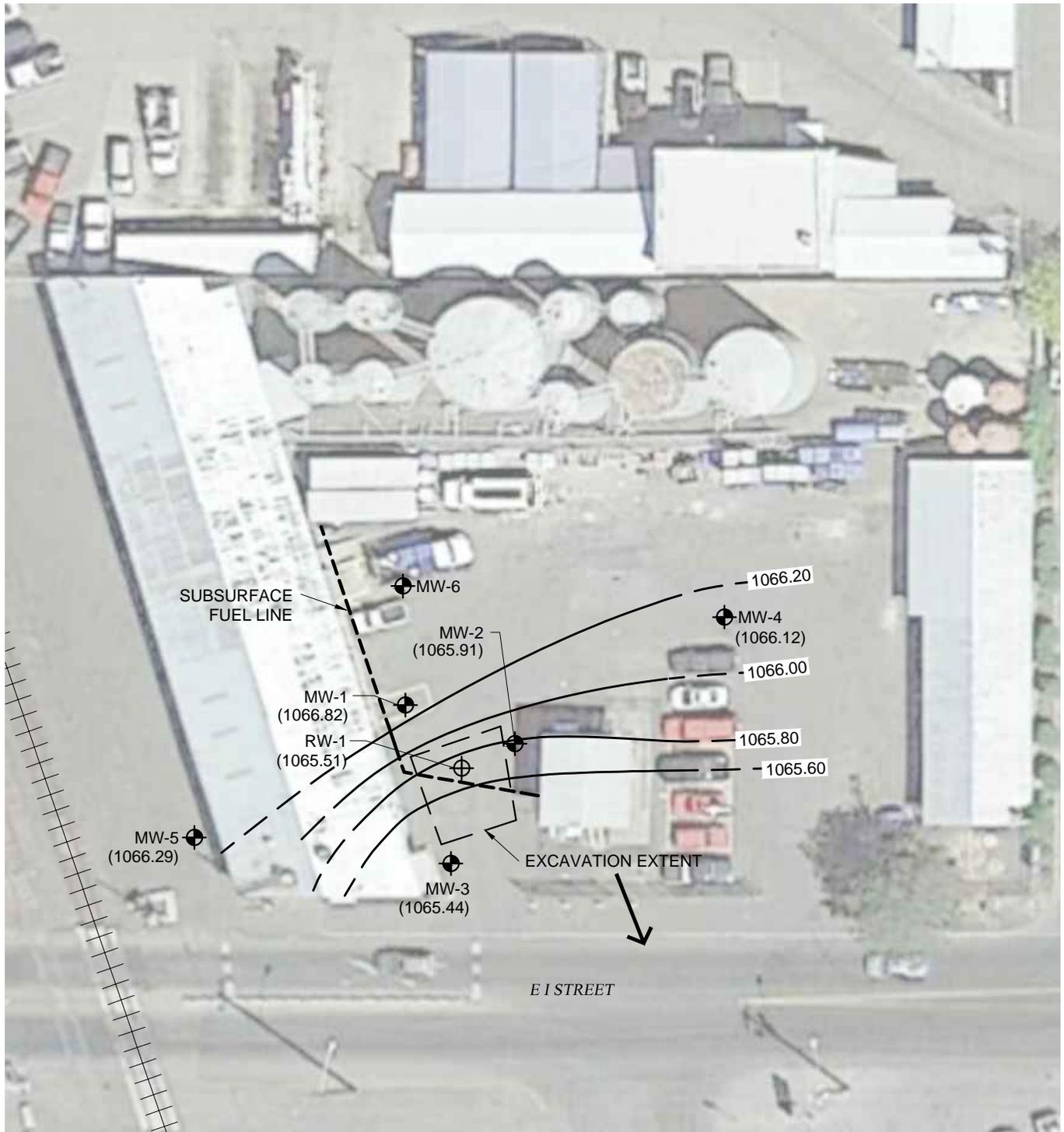


PREPARED FOR: COLEMAN OIL



NAPL CORRECTED POTENTIOMETRIC SURFACE MAP
JUNE 2017
 1 EAST I STREET
 YAKIMA, WASHINGTON

JUL 2018
 41392.000
FIGURE
5C



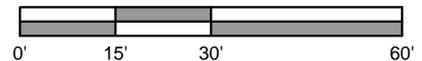
SOURCE: © 2017 GOOGLE EARTH PRO

LEGEND

- MW-1 MONITORING WELL NUMBER AND LOCATION
- RW-1 MONITORING WELL NUMBER AND LOCATION
- (1068.64) GROUNDWATER ELEVATION (FEEL AMSL)(APRIL 2018)
- GROUNDWATER CONTOUR (APRIL 2018) DASHED WHERE INFERRED
- APPROXIMATE GROUNDWATER FLOW DIRECTION



Scale 1" = 30'



PREPARED FOR: COLEMAN OIL



NAPL CORRECTED POTENTIOMETRIC SURFACE MAP

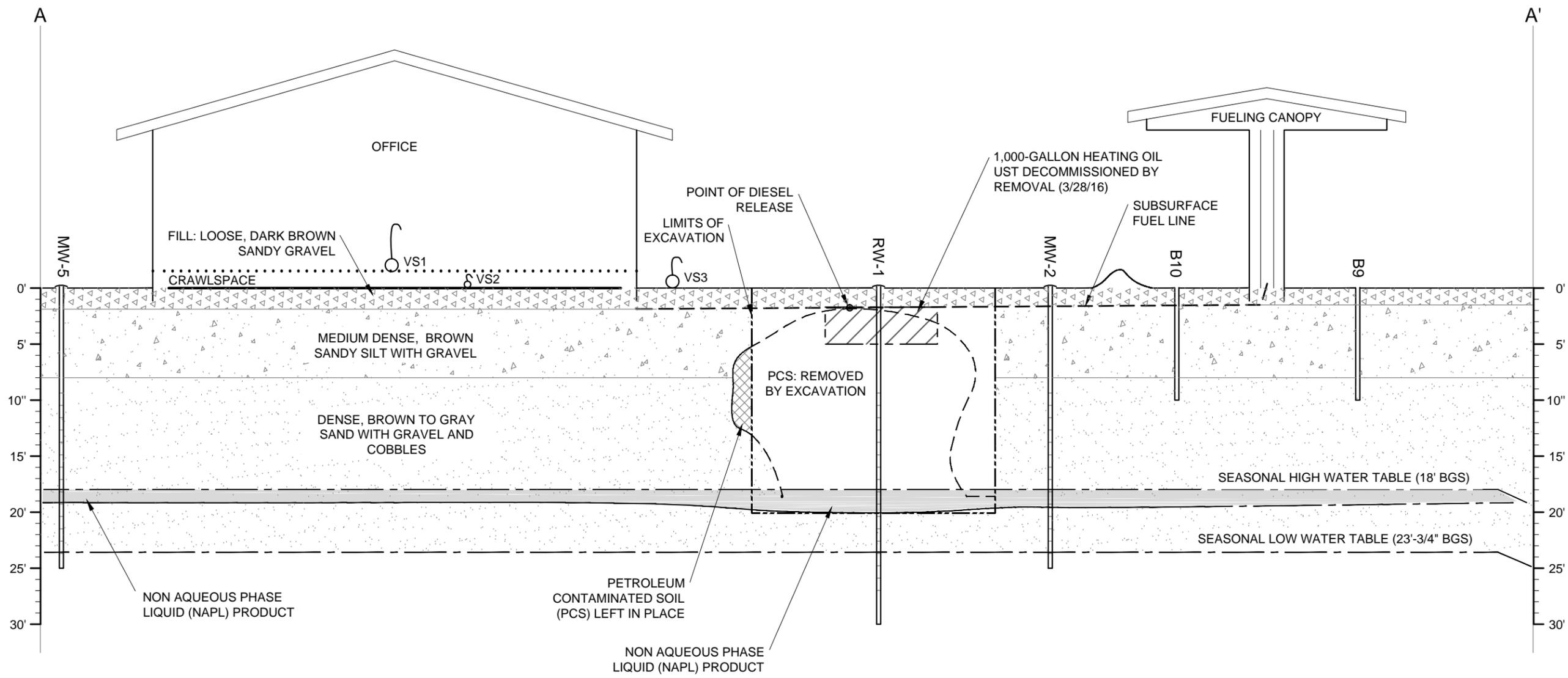
APRIL 2018
1 EAST I STREET
YAKIMA, WASHINGTON

JUL 2018
41392.000

FIGURE

5D

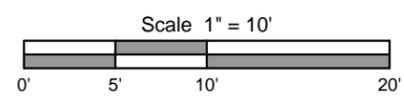
Filename: L:\Projects\41000\41392 Coleman Oil\CAD\Data Summary Report Figs\41392.000_FIG_6-Cross Section.dwg
 Layout Tab: FIG 7 User: Rebecca Snellings CAD Plot Date/Time: 7/19/2018 2:23:12 PM



CROSS-SECTION A - A'

LEGEND

VS3 VAPOR SAMPLE LOCATION AND NUMBER



PREPARED FOR: COLEMAN OIL

Full Size Sheet Format Is 11x17; If Printed Size Is Not 11x17, Then This Sheet Format Has Been Modified & Indicated Drawing Scale Is Not Accurate.



COLEMAN OIL
CROSS-SECTION A - A'
 1 EAST I STREET, YAKIMA, WASHINGTON

PROJECT	41392.000
DATE	MAY 2018
SHEET ID	6

TABLES

TABLE 1: SOIL ANALYTICAL RESULTS (2015)

Site: Coleman Oil: 1 East I St, Yakima, WA
 Project No: 41392.000

Location / Depth	Description	Result mg/Kg															PAHs		
		HCID			NWTPH-Dx		Metals					BTEX				VOCs	B(a)P	Naph	Carcinogenic PAHs**
		Gx	Dx	Oil	Dx	Oil	Asenic	Cadmium	Chromium	Lead	Mercury	Benzene	Toluene	Ethyl Benzene	Xylenes	Various			
Soil Sampling: completed April 3, 2015																			
S1 / 0.5'	Native	ND	ND	2,600 e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S2 / 0.75'	Native	ND	ND	590 e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S3 / 0.4'	Native	ND	ND	D	2,100 x	11,000	-	-	-	-	-	-	-	-	-	-	-	-	-
S4 / 0.8'	Native	ND	ND	D	270 x	1,100	-	-	-	-	-	-	-	-	-	-	-	-	-
S5 / 0.5'	Native	ND	ND	600 e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S6 / 1.0'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S7 / 0.5'	Native	ND	390 xe	470 e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S8 / 1.0'	Native	ND	D x	D	550 x	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-
S9 / 0.25'	Native	ND	ND	6,700 e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soil Sampling: completed April 8, 2015																			
S10 / 4.5'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S11	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S12	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S13 / 2'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S14 / 5.0'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S15 / 3.5'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S16 / 6.5'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S17 / 2.5'	Native	ND	ND	ND	-	-	2.62	-	-	4.56	-	<0.03	<0.05	<0.05	<0.05	ND	-	-	-
S18 / 5.0'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S19 / 1.5'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S20 / 4.5'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S21 / 9.5'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S22 / 4.5'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S23 / 2.0'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S24 / 5.5'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S25 / 10.0'	Native	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soil Sampling: completed April 14, 2015																			
S26 / 1.0'	Native	ND	D	D	15,000	980	-	-	-	-	-	-	-	-	-	-	-	-	-
S27 / 2.0'	Native	ND	160 e	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S28 / 0.5'	Native	ND	10,000 e	1,500 e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S29 / 1.0'	Native	ND	7,300 e	7,400e	-	-	8	2.35	6	332	<1	-	-	-	-	-	-	-	-
S30 / 2.0'	Native	ND	D	D	3,200	5,000	-	-	-	-	-	-	-	-	-	-	0.1	0.12	0.11
S31 / 1.5'	Native	ND	3,300 e	2,100 e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S32 / 0.5'	Native	ND	2,400 e	1,200 e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S33 / 0.5'	Native	ND	2,100 e	510 e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S34 / 0.5'	Native	ND	320 e	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S35 / 0.5'	Native	ND	90 e	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S36 / 0.5'	Native	ND	D	D	52,000	5,300	-	-	-	-	-	-	-	-	-	-	-	-	-
S37 / 2.75'	Native	ND	D	ND	530	<250	-	-	-	-	-	-	-	-	-	-	-	-	-
S38 / 0.5'	Native	ND	ND	310 e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S39 / 3.0'	Native	-	-	-	15,000	31,000	-	-	-	-	-	-	-	-	-	-	-	-	-
S40 / 0.5'	Native	D	ND	ND	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.06	-	-	-	-
S41 / 0.5'	Native	D	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S42 / 0.5'	Native	ND	290 e	ND	660	310	-	-	-	-	-	-	-	-	-	-	-	-	-
S43 / 1.0'	Native	ND	99 e	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S44	Native	ND	1,300 e	330 e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Adopted Criteria	MTCA Method A Cleanup Levels For Soil	100	2,000	2,000	2,000	2,000	20	2	19	250	2	0.03	7	6	9	Various	0.1	5	0.1
	Method A for Industrial	28/105	39,000	39,000	39,000	39,000	2.9	3,500	19	1,000	2.1	0.03	7.3	6.1	9.1	Various	0.01	4.5	0.01

BOLD indicates above MTCA Method A Cleanup Levels for Soil
 TPH - total petroleum hydrocarbons
 Gx - gasoline range hydrocarbons
 Dx - diesel range hydrocarbons
 mg/kg - miligrams per kilogram
 <0.03 - less than the laboratory method reporting limit
 x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation
 VOCs - volatile organic compounds
 PAHs - polycyclic aromatic hydrocarbons
 Naph - naphthalenes (naphthalene+ 1-methyl naphthalene + 2-methyl naphthalene)
 B(a)P - benzo(a)pyrene
 ND - material not detected above laboratory method reporting limit
 D - detected above the method reporting limit
 e - the concentration reported is a laboratory estimate

TABLE 2: SOIL ANALYTICAL RESULTS (PCS Excavation UST Decommissioning and MW Installation)

Site: Coleman Oil: 1 East I St, Yakima, WA
 Project No: 41392.000

		Result mg/Kg										
Location - Depth	Description	TPHs			BTEX				PAHs			Metals
		Gx	Dx	Oil	Benzene	Toluene	Ethyl Benzene	Xylenes	B(a)P	Naph	Carcinogenic PAHs**	Lead
Soil Sampling: Excavation confirmation sampling completed March 23, 2016												
NSW1 - 4	Native	-	11,000	270x	-	-	-	-	-	-	-	-
WSW1 - 4	Native	-	26,000	570x	-	-	-	-	-	-	-	-
B1 - 5.5	Native	5,100	34,000	770x	0.79	14	20	110	<0.5*	8.1	<0.05**	-
Soil Sampling: Heating oil tank decommissioning on March 28, 2016												
T1-WSW - 5	Native	-	9500	<250	-	-	-	-	-	-	-	-
T1-ESW - 5	Native	-	920	<250	-	-	-	-	-	-	-	-
T1-B - 7	Native	340	190	<250	<0.02	<0.063	0.18	2.3	-	-	-	-
Soil Sampling: Excavation confirmation sampling completed March 30, 2016												
NSW2 - 15	Native	<2	<50	<250	<0.02	<0.02	<0.02	<0.06	-	-	-	-
ESW1 - 15	Native	3	<50	<250	<0.02	<0.02	<0.02	<0.06	-	-	-	-
SSW1 - 15	Native	5.5	<50	<250	<0.02	0.039	0.024	0.14	-	-	-	-
WSW2 - 11	Native	3,400	9,900***	330x	<0.02	3.1	7.5	62	-	-	-	-
B2 - 18	Native	1,600	25,000***	570x	0.65	5.1	7.3	44	<0.5*	7.2	<0.05**	4.94
Soil Sampling: During the installation of monitoring wells MW5-MW7 on November 8-9, 2016												
MW4-6	Native	<2	<50	<250	<0.02	<0.02	<0.02	<0.06	-	-	-	-
MW5a - 20	Native	140	1,100	<250	<0.02	<0.02	0.27	1.1	-	-	-	-
MW6	Native	<2	<50	<250	<0.02	<0.02	<0.02	<0.06	-	-	-	-
Adopted Criteria	MTCA Method A Cleanup Levels For Soil	100/30	2,000	2,000	0.03	7	6	9	0.1	5	0.1	250
	Method A for Industrial	28/105	39,000	39,000	0.03	7.3	6.1	9.1	0.01	4.5	0.01	1,000

BOLD indicates above MTCA Method A Cleanup Levels for Soil

TPH - total petroleum hydrocarbons

Gx - gasoline range hydrocarbons

Dx - diesel range hydrocarbons

mg/kg - milligrams per kilogram

<50 - less than the laboratory method reporting limit

PAHs - polycyclic aromatic hydrocarbons

Naph - naphthalenes (naphthalene+ 1-methyl naphthalene + 2-methyl naphthalene)

B(a)P - benzo(a)pyrene

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

* - Detection limit exceeded the adopted criteria due to elevated diesel concentration

**Value for carcinogenic PAHs by toxicity equivalency methodology in WAC 173-340-708(8) and table 708.2

*** VPH/EPH analysis was also conducted for this sample, and may be used at a later date to determine appropriate Cleanup Criteria. VPH/EPH results can be found in the attached laboratory reports

TABLE 3: GROUNDWATER ANALYTICAL RESULTS

Site: Coleman Oil: 1 East I St, Yakima, WA
 Project No: 41392.000

Location/ Depth	Description	Result ug/L														
		TPHs			VOCs							PAHs			Metals	
		Gx	Dx	Oil	Benzene	Toluene	Ethyl Benzene	Xylenes	MTBE	EDC	EDB	Hexane	B(a)P	Naph	Carcinogenic PAHs**	Lead
RW1	May 9, 2016	Not sampled due to the presence of LNAPL: 4.26 feet thickness														
	December 13, 2016	Not sampled due to the presence of LNAPL: 0.25 feet thickness														
	June 9, 2017	Not sampled due to the presence of LNAPL: 1.48 feet thickness														
MW1	May 9, 2016	4,300	12,000	1,100	49	78	89	440	-	-	-	-	<1.2*	56	<1.2*	<1.2*
	December 13, 2016	Not sampled due to the presence of LNAPL: 1.14 feet thickness														
	June 9, 2017	Not sampled due to the presence of LNAPL: 0.16 feet thickness														
MW2	May 9, 2016	420	1,300	250	<1	<1	1.1	<3	-	-	-	-	-	-	-	-
	December 13, 2016	Not sampled due to the presence of LNAPL														
	June 9, 2017	83,000	-	-	2,900	9,900	1,000	5,900	<1	<1	<1	140	-	-	-	-
MW3	May 9, 2016	Not sampled due to the presence of LNAPL: 4.7 feet thickness														
	December 13, 2016	Not sampled due to the presence of LNAPL: 4.91 feet thickness														
	June 9, 2017	Not sampled due to the presence of LNAPL: 2.87 feet thickness														
MW4	December 13, 2016	12,000	3,200	460	500	<100	130	<300	-	-	-	-	<0.06	160	<0.06	<0.06
	June 9, 2017	7,600	4,300	870	240	12	120	<30	<1	<1	<1	12	<0.06	160	<0.06	<1
MW5	December 13, 2016	Not sampled due to the presence of LNAPL: 0.57 feet thickness														
	June 9, 2017	Not sampled due to the presence of LNAPL: 0.66 feet thickness														
MW6	December 13, 2016	13,000	3,100	<250	110	<100	130	<300	-	-	-	-	<0.06	310	<0.06	<0.06
	June 9, 2017	7,600	3,700	<400	140	100	110	69	<1	<1	<1*	49	<0.06	250	<0.06	<1
Adopted Criteria	MTCA Method A Cleanup Levels For Groundwater	800/1000	500	500	5	1,000	700	1,000	20	5	0.01	-	0.1	160	0.1	15

BOLD indicates above MTCA Method A Cleanup Levels for Groundwater

ug/L - micrograms per litre

<50 - less than the laboratory method reporting limit

* - Detection limit exceeded the adopted criteria

**Value for carcinogenic PAHs by toxicity equivalency methodology in WAC 173-340-708(8) and table 708.2

LNAPL - light, non-aqueous phase liquid

Industrial Cleanup Levels for Groundwater not available

TPH - total petroleum hydrocarbons

Gx - gasoline range hydrocarbons

Dx - diesel range hydrocarbons

PAHs - polycyclic aromatic hydrocarbons

Naph - naphthalenes (naphthalene+ 1-methyl naphthalene + 2-methyl naphthalene)

B(a)P - benzo(a)pyrene

MTBE - methyl tert-butyl ether

EDC - 1,2 dichloroethane

EDB - ethylene dibromide

TABLE 4: Groundwater Elevation Data

Site: Coleman Oil: 1 East I St, Yakima, WA

Project No: 41392.000

Well ID	Well Screen Interval (feet)	Date	TOC elev (feet)	Depth to Product (feet)	Depth to Water (feet)	Product Thickness (feet)	Potent. Elev* (feet)
MW-1	9.9-25.9	5/10/2016	1089.54	0.00	19.13	0.00	1070.41
		10/5/2016	1089.54	16.75	22.02	5.27	1071.74
		10/20/2016	1089.54	17.15	19.94	2.79	1071.83
		11/2/2016	1089.54	17.56	18.75	1.19	1071.74
		12/13/2016	1089.54	18.99	20.13	1.14	1070.32
		1/20/2017	1089.54	19.42	24.32	4.90	1069.14
		2/2/2017	1089.54	20.42	21.51	1.09	1068.90
		3/21/2017	1089.54	18.83	22.39	3.56	1070.00
		4/4/2017	1089.54	19.35	19.59	0.24	1070.14
		4/20/2017	1089.54	18.7	19.07	0.37	1070.77
		5/8/2017	1089.54	17.9	18.29	0.39	1071.56
		5/25/2017	1089.54	17.75	17.96	0.21	1071.75
		6/9/2017	1089.54	17.68	17.84	0.16	1071.83
		4/12/2018	1089.54	22.60	23.20	0.60	1066.82
MW-2	10.3-25.3	5/10/2016	1089.44	--	19.82	--	1069.62
		10/5/2016	1089.44	--	16.54	--	1072.90
		10/20/2016	1089.44	--	16.51	--	1072.93
		11/2/2016	1089.44	--	16.54	--	1072.90
		12/13/2016	1089.44	17.11	25.50	8.39	1070.65
		1/20/2017	1089.44	21.05	21.21	0.16	1068.36
		2/2/2017	1089.44	--	21.50	--	1067.94
		4/4/2017	1089.44	--	20.24	--	1069.20
		4/20/2017	1089.44	--	19.26	--	1070.19
		3/21/2017	1089.44	--	20.50	--	1068.94
		5/8/2017	1089.44	--	18.90	--	1070.54
		5/25/2017	1089.44	--	18.00	--	1071.44
		6/9/2017	1089.44	17.85	17.87	0.02	1071.59
		4/12/2018	1089.44	23.48	23.71	0.23	1065.91
MW-3	14-24	5/10/2016	1089.15	18.80	23.50	4.70	1069.41
		10/5/2016	1089.15	17.15	22.74	5.59	1070.88
		10/20/2016	1089.15	17.11	22.46	5.35	1070.97
		11/2/2016	1089.15	18.06	20.86	2.80	1070.53
		12/13/2016	1089.15	18.82	23.73	4.91	1069.35
		1/20/2017	1089.15	20.41	24.12	3.71	1068.00
		2/2/2017	1089.15	20.90	24.01	3.11	1067.63
		3/21/2017	1089.15	19.70	23.74	4.04	1068.64
		4/4/2017	1089.15	19.68	23.18	3.50	1068.77
		4/20/2017	1089.15	19.05	22.93	3.88	1069.32
		5/8/2017	1089.15	18.32	22.60	4.28	1069.97
		5/25/2017	1089.15	17.89	22.25	4.36	1070.39
		6/9/2017	1089.15	17.94	20.81	2.87	1070.64
		4/12/2018	1089.15	23.56	24.30	0.74	1065.44
MW-4	15-25	12/13/2016	1088.85	--	18.09	--	1070.76
		2/2/2017	1088.85	20.00	20.31	0.31	1068.79
		3/21/2017	1088.85	19.28	19.31	0.03	1069.57
		4/4/2017	1088.85	19.14	19.20	0.06	1069.70
		4/20/2017	1088.85	18.55	18.62	0.07	1070.29
		5/8/2017	1088.85	--	17.62	--	1071.23
		5/25/2017	1088.85	--	17.22	--	1071.63

TABLE 4: Groundwater Elevation Data

Site: Coleman Oil: 1 East I St, Yakima, WA
Project No: 41392.000

Well ID	Well Screen Interval (feet)	Date	TOC elev (feet)	Depth to Product (feet)	Depth to Water (feet)	Product Thickness (feet)	Potent. Elev* (feet)
		6/9/2017	1088.85	--	17.19	--	1071.66
		4/12/2018	1088.85	22.43	22.73	0.30	1066.12
MW-5	15-25	12/13/2016	1090.01	19.73	20.30	0.57	1070.17
		3/21/2017	1090.01	20.31	21.05	0.74	1069.56
		4/4/2017	1090.01	20.36	21.22	0.86	1069.48
		4/20/2017	1090.01	20.02	20.20	0.18	1069.95
		5/8/2017	1090.01	19.33	19.80	0.47	1070.59
		5/25/2017	1090.01	18.85	19.60	0.75	1071.01
		6/9/2017	1090.01	18.88	19.54	0.66	1071.00
		4/12/2018	1090.01	23.62	24.13	0.51	1066.29
MW-6	15-25	12/13/2016	1089.21	--	17.40	--	1071.81
		3/21/2017	1089.21	--	18.25	--	1070.97
		4/4/2017	1089.21	--	18.00	--	1071.21
		4/20/2017	1089.21	--	17.39	--	1071.82
		5/8/2017	1089.21	--	16.82	--	1072.39
		5/25/2017	1089.21	--	16.59	--	1072.62
		6/9/2017	1089.21	--	16.61	--	1072.60
		4/12/2018	NA*	21.50	21.55	0.05	NA*
RW-1	15.05-30.05	5/10/2016	1089.54	19.38	23.64	4.26	1069.31
		10/5/2016	1089.54	17.48	23.69	6.21	1070.82
		10/20/2016	1089.54	17.83	20.99	3.16	1071.08
		11/2/2016	1089.54	18.06	20.86	2.80	1070.92
		12/13/2016	1089.54	19.58	19.83	0.25	1069.91
		1/20/2017	1089.54	20.75	23.83	3.08	1068.17
		2/2/2017	1089.54	21.26	23.75	2.49	1067.78
		3/21/2017	1089.54	20.09	23.90	3.81	1068.69
		4/4/2017	1089.54	20.16	22.78	2.62	1068.86
		4/20/2017	1089.54	19.82	21.09	1.27	1069.47
		5/8/2017	1089.54	19.10	20.55	1.45	1070.15
		5/25/2017	1089.54	18.70	19.41	0.71	1070.70
		6/9/2017	1089.54	18.55	20.03	1.48	1070.69
		4/12/2018	1089.54	23.75	25.15	1.40	1065.51

* $POT_ELEV = TOC_ELEV - [DTW - (PTH * PD)]$ where:
 POT_ELEV = potentiometric surface elevation
 TOC_ELEV = top of casing elevation
 DTW = depth to water
 PTH = product thickness
 PD = product density 0.8
 * = groundwater elevation not known due to broken well casing

TABLE 5: Multiphase Extraction Summary

Site: Coleman Oil - 1 East I Street, Yakima, WA
Project No: 41392

MPE Event Date	Product Thickness ¹ (feet)				Removal Volume ² (gallons)				
	RW1	MW3	MW1	MW2	RW1	MW3	MW1	MW2	Totals
10.5.16	6.2	5.6	5.27	0	184	158	52	0	394
10.20.16	3.16	5.36	2.79	0	186	178	94	0	458
11.2.16	2.8	5.17	1.19	0	280	266	154	0	700
12.29.16	-	-	-	-	93	101	78	186	458
1.20.17	3.08	4.9	3.71	0.16	15	15	15	15	60
2.2.17	2.49	3.11	1.1	0	51	51	51	0	153
3.21.17	3.81	4.04	3.56	0	64	60	60	0	184
4.4.17*	2.62	3.5	0.24	0	20	30	30	0	140
4.20.17**	1.27	3.88	0.37	0	64	105	63	0	274
5.8.17	1.45	4.28	0.39	0	230	221	74	0	525
5.25.17	0.71	4.36	0.21	0	224	74	224	0	522
Totals:					1411	1259	895	201	3868

1 - measured prior to vacuum extraction

2 - combination of LNAPL product and contaminated groundwater

* - also pumped 30 gallons of water and product from each MW4 and MW5

** - also pumped 42 gallons of water and product from MW4

TABLE 6: VAPOR INTRUSION AIR ANALYTICAL RESULTS

Site: Coleman Oil - 1 East I Street, Yakima, WA
 Project No: 41392

Results (µg/m3)										
Sample Location	APH			Volatile and Semi-Volatile Compounds						
	Aliphatic Hydrocarbons (EC5-8)	Aliphatic Hydrocarbons (EC9-12)	Aromatic Hydrocarbons (EC9-10)	Benzene	Toluene	Ethylbenzene	Xylene-o	Xylene-m,p	Naphthalene	1,2,4-trimethylbenzene
September 21, 2016 Indoor Air Sampling Event										
VS1: Indoor	170	160	<75	1.7	8	2.1	3	9	0.91	6.9
VS2: Crawlspace	340	7,700	<75	2.2	19	11.0	11	38	0.28	<3.7
VS3: Outdoor	130	<110	<75	1.6	9.1	2.6	4.1	11	0.31	4.0
Vapor Intrusion Cleanup Levels ¹	2,700	140	180	0.321	2,290	457	45.7	45.7	0.0735	3.2
OSHA PEL ²	NA	NA	NA	3,190	750,000	435,000	435,000	435,000 (m- or p-)	50,000	NA
NIOSH REL ³	NA	NA	NA	319	375,000	435,000	435,000	435,000 (m- or p-)	50,000	125,000

APH- air-phase petroleum hydrocarbons

<0.32 - not detected above the laboratory method reporting limit

NA- not applicable

(-) - not analyzed

See lab report for full analyte list and method reporting limits

Bold indicates exceedance of the vapor intrusion Cleanup Level

¹ Washington State Department of Ecology's *Guidance for Evaluating Soil Vapor Intrusion in Washington State*: Table B-1 Method B Indoor Air Cleanup Levels (Adopted value for toxicity as a carcinogen, when available). Updated April 6, 2015.

² Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs)

³ National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL), based on a ten hour time weighted average exposure

TABLE 7: NAPL Product Characteristics

Site: Coleman Oil: 1 East I St, Yakima, WA
Project No: 41392.000

Sample	Description	Gasoline Indicator	Diesel Indicators	
		C1 to C4 alkylcyclohexanes relative to C5+ (percentage of total abundance)	C8 to C9 alkylcyclohexanes (percentage of total abundance)	C12 to C20 normal alkane hydrocarbons (percentage of total abundance)
Product Sampling: June 9, 2018				
MW3	Near diesel and gasoline release point	31%	26%	65%
MW5	West of the release between the office building and the railroad	17%	27%	74%

Refer to Pace laboratory report in Appendix I for more detail on fuel indicators

APPENDIX A

Petroleum Contaminated Soil Disposal Documentation



Yakima Health District
1210 Ahtanum Ridge Drive
Union Gap, Washington 98903
Phone (509) 575-4040

March 25, 2016

Mr. Kipp Silver
C/O Able Clean-Up Technologies, Inc.
4117 East Nebraska Avenue
Spokane, WA 99217

RE: Coleman Oil Co., 1 East "I" Street, Yakima, WA : Petroleum Contaminated Soil

Mr. Kipp Silver,

This office has reviewed the data on the above mentioned project. The data submitted indicates that the contaminant which requires remediation is diesel. Based on the data submitted it has been determined that the soil may be processed at the Anderson PCS Facility provided that all handling is in accordance with the procedure that has been approved by this office and Washington State Department of Ecology. This letter is to notify you that currently the soil will be considered to be stored on the property and no treatment can begin until the total fee is paid. Waste material may be stored for up to 90 days. Anderson PCS Facility will notify me of the total number of tons delivered for treatment and I will bill you for the remainder of the fee at that time.

FEE ACCOUNT:	Able Clean-Up Technologies, Inc.
PROJECT NAME:	Coleman Oil Co. 1 East "I" Street Yakima, WA
PRE-TREATMENT AUTHORIZATION:	(Based on time spent prior to soil delivery to the site at \$141/hour)
TONNAGE FEE AT \$0.60 PER TON:	To be determined after delivery
BALANCE OWED:	To be billed after delivery

If you have any questions regarding this letter please contact me at (509) 249-6562.

Sincerely,

Ted Silvestri, RS
Environmental Health Specialist

cc: Anderson PCS Facility

PENDLETON EXCAVATING, INC.

3702 Kern Rd
Yakima, WA 98902

Invoice

Date	Invoice #
3/31/2016	19791

Bill To
Able Clean-Up Technologies Inc 4117 E Nebraska Ave Spokane, WA 99217-6644

P.O. No.	Terms	Project

Quantity	Description	Rate	Amount
	16 loads 212.15 tons		
			Total

Copy

Coleman Oil PCS
ANDERSON
 ROCK & DEMOLITION PITS
 YAKIMA, WASH.
 Approved
 Petroleum Contaminated Soils Site - Topsoil - Shale - Crushed Rock

43711
No 78499
 41 Rocky Top Road
 Yakima, WA 98908
 Bus. (509) 965-3621 • Fax (509) 965-8656
 www.andersonrock.com

DELIVERIES # 16153

We make deliveries under the care-time of customer's risk only and accept no responsibility whatsoever for damages resulting from such deliveries.

Name: Apde Clean Up Technologies

Address: _____

Phone: Chris (509) 999-3000

P.O. #: PCS

Job: Coleman Oil Co. 1 E I Street

Hauled by: Anderson

Received by: _____

Date: 3/2/10 **Sold by:** _____

A. Cured concrete
 B. Asphaltic materials (does not include roofing)
 C. Brick and masonry
 D. Ceramic materials
 E. Glass
 F. Stainless Steel
 G. Aluminum
 H. Lime
 I. Dirt Rock
 J. Bldg. Demolition

WEIGHT TICKET #	TIME	TRUCK NO.	QUANTITY	PRODUCT
132610	9:25	9	16.95	PCS
132612	9:35	6	14.81	PCS
132616	10:20	9	15.11	PCS
132618	10:29	6	16.90	PCS
132619	11:15	9	15.99	PCS
132623	11:42	6	14.25	PCS
132625	2:30	9	12.33	PCS
132627	12:54	6	15.97	PCS
132630	1:27	9	16.60	PCS
132632	1:52	6	15.77	PCS
132637	2:21	9	16.20	PCS
132642	2:53	9	16.63	PCS
			187.51	
		TOTAL		

DATE BILLED

CUSTOMER AGREES TO PAY (a) A LATE CHARGE OF 1.5% PER MONTH IF ACCOUNT IS NOT PAID WITHIN 10 DAYS OF INVOICE, AND (b) ATTORNEY'S FEE INCURRED IN COLLECTION.

OUT OF COUNTY?
 YES NO
OUT OF CITY?
 YES NO

(in case of)

ANDERSON

ROCK & DEMOLITION PITS
YAKIMA, WASH.

LOAD TICKET

NO: 78526

41 Rocky Top Road
Yakima, WA 98908

Bus. (509) 965-3621 • Fax (509) 965-8656
www.andersonrock.com

Petroleum Contaminated Soils Site - Topsoil - Shale - Crushed Rock

<p>DELIVERIES We make deliveries inside the curb line at customer's risk only and accept no responsibility whatsoever for damages resulting from such deliveries.</p>		<p>Name <u>Able Clean Up Technologies</u></p>	
<p>Received by _____</p>		<p>Address _____</p>	
<p>Date <u>3/25/16</u> Sold by _____</p>		<p>Phone Home <u>Chris</u></p>	
<p>A. Cured concrete B. Asphaltic materials (does not include roofing) C. Brick and masonry D. Ceramic materials</p>		<p>Office <u>509-999-3600</u></p>	
<p>E. Glass F. Stainless Steel G. Aluminum H. Lime I. Dirt Rock J. Bldg. Demolition</p>		<p>P.O. # <u>PCS</u></p>	
		<p>Job # <u>Coleman Oil LEIS.</u></p>	
		<p>Hauled by <u>Anderson</u></p>	

WEIGHT TICKET #	TIME	TRUCK NO.	QUANTITY	PRODUCT
132645	3:22	9	15.35	PCS
132653	4:09	6	15.01	PCS
			<u>30.36</u>	
<p><u>Coleman Oil</u> Category <u>DISP.</u> Last 4 of Job # <u>16153</u> Card Approved <u>[Signature]</u> Check # _____ Price _____</p>				
TOTAL				

DATE BILLED
Tax

CUSTOMER AGREES TO PAY (a) A LATE CHARGE OF 1.5% PER MONTH IF ACCOUNT IS NOT PAID WITHIN 10 DAYS OF INVOICE, AND (b) ATTORNEY'S FEE INCURRED IN COLLECTION.

OUT OF COUNTY?
 YES NO
OUT OF CITY?
 YES NO

5 180m

ANDERSON

ROCK & DEMOLITION PITS
YAKIMA, WASH.

LOAD TICKET

NO 78543

41 Rocky Top Road
Yakima, WA 98908

Bus. (509) 965-3621 • Fax (509) 965-8656
www.andersonrock.com

Petroleum Contaminated Soils Site - Topsoil - Shale - Crushed Rock

DELIVERIES

We make deliveries inside the curb line at customer's risk only and accept no responsibility whatsoever for damages resulting from such deliveries.

Name ABLE CleanUp Tech

Address _____

Received by _____

Phone Home Chris

Date 3/30/10 Sold by _____

Office (509) 999-3000

- A. Cured concrete
- B. Asphaltic materials (does not include roofing)
- C. Brick and masonry
- D. Ceramic materials
- E. Glass
- F. Stainless Steel
- G. Aluminum
- H. Lime
- I. Dirt Rock
- J. Bldg. Demolition

P.O. # _____
Job # Coleman Oil & IS#

Hauled by Anderson

WEIGHT TICKET #	TIME	TRUCK NO.	QUANTITY	PRODUCT	UNIT PRICE	AMOUNT
132677	1:59	9	15.47	5/8"m		
132678	2:20	6	15.74	5/8"m		
132684	2:50	9	16.33	5/8"m		
132685	3:09	6	15.42	5/8"m		
132687	3:45	9	15.19	5/8"m		
132688	4:00	6	15.39	5/8"m		
					TOTAL	
					93.54 TAX	
					TOTAL	
					Category <u>Disposal</u>	
					16153	
					APPROVED <u>[Signature]</u>	
TOTAL					Check # _____	Paid _____

8.290 DATE BILLED

Tax

CUSTOMER AGREES TO PAY (a) A LATE CHARGE OF 1.5% PER MONTH IF ACCOUNT IS NOT PAID WITHIN 10 DAYS OF INVOICE, AND (b) ATTORNEY'S FEE INCURRED IN COLLECTION.

OUT OF COUNTY? YES NO
 OUT OF CITY? YES NO

APPENDIX B

Soil Boring and Well Construction Logs



400 Bradley Boulevard
Suite 300
Richland, WA 99352
Phone: 509.942.1600
Fax: 866.727.0140

WONDRACK DISTRIBUTING
1 E. I STREET
YAKIMA, WASHINGTON

BORING B-1

PBS PROJECT NUMBER:
64116.000

BORING B-1 LOCATION:
3.5' W of three valves along west side and
near center of oil shed

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/WELL INSTALLATION
0.0		ASPHALT						
0.0 - 2.0		Loose black silty GRAVEL (GP-GM); fine to coarse, subrounded gravel		0				
2.0 - 5.0		FILL Brown SILT (ML); homogeneous; damp		0			90	
5.0 - 6.0		becoming moist			S10			No blackish staining or odors
6.0 - 20.0		Boring complete at 5 feet bgs Groundwater not encountered at time of exploration						

BORING LOG-ENV CORE_64116_B1-B14_081115_RG.GPJ_DATATMPL_GDT_PRINT DATE: 6/15/15:RPG

BORING METHOD: Direct Push
DRILLED BY: ESN Northwest
BORING BIT DIAMETER: 2¼-inch OD

LOGGED BY: D. Ertel
COMPLETED: 4/08/15



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Suite 300
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Phone: 509.942.1600
Fax: 866.727.0140

WONDRACK DISTRIBUTING
1 E. I STREET
YAKIMA, WASHINGTON

BORING B-2

PBS PROJECT NUMBER:
64116.000

BORING B-2 LOCATION:
12' S of concrete containment berm around
tank farm, 2.5' W of concrete corner

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/WELL INSTALLATION
0.0		ASPHALT						
0.0 - 2.0		Loose black to brown silty GRAVEL (GP-GM); fine to coarse gravel; damp FILL Brown SILT (ML); homogeneous; damp		2				Fuel odor due to truck unloading near shed
2.0 - 5.5		becomes moist; trace fine gravel					60	
5.5 - 6.0		Loose gray to brown GRAVEL (GP) with silt and sand; fine sand; fine to coarse gravel, subrounded gravel		0.5	S11			No black staining; fuel odor due to truck unloading
10.0		Boring complete at 10 feet bgs Groundwater not encountered at time of exploration						

BORING LOG-ENV CORE 64116_B1-B14_081115_RG.GPJ_DATATMPL_GDT_PRINT DATE: 6/15/15:RPG

BORING METHOD: Direct Push
DRILLED BY: ESN Northwest
BORING BIT DIAMETER: 2 1/4-inch OD

LOGGED BY: D. Ertel
COMPLETED: 4/08/15



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 Phone: 509.942.1600
 Fax: 866.727.0140

WONDRACK DISTRIBUTING
 1 E. I STREET
 YAKIMA, WASHINGTON

BORING B-3

PBS PROJECT NUMBER:
 64116.000

BORING B-3 LOCATION:
 48.5' S of concrete containment berm around
 tank farm, 11.5' W of concrete corner

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/ TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		ASPHALT						
0.5		Black silty sandy GRAVEL (GM)		0				No fuel staining or odor
1.5		FILL Brown SILT (ML); homogeneous; damp		0	S13		85	
5.0		Boring complete at 5 feet bgs Groundwater not encountered at time of exploration						

BORING LOG-ENV CORE 64116_B1-B14_081115_RG.GPJ DATATMPL_GDT_PRINT DATE: 6/15/15:RPG

BORING METHOD: Direct Push
 DRILLED BY: ESN Northwest
 BORING BIT DIAMETER: 2 1/4-inch OD

LOGGED BY: D. Ertel
 COMPLETED: 4/08/15



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Fax: 866.727.0140

WONDRACK DISTRIBUTING
1 E. I STREET
YAKIMA, WASHINGTON

BORING B-4

PBS PROJECT NUMBER:
64116.000

BORING B-4 LOCATION:
3' N of N edge of asphalt containment berm at
loading rack

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/ TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		ASPHALT						
0.0 - 2.0		Loose black to dark brown sandy GRAVEL (GP)		0				
2.0 - 5.0		FILL Brown SILT (ML) with gravel		0	S14			
5.0 - 6.0		becomes wet Gray to brown sandy GRAVEL (GP); fine sand; subrounded gravel						
6.0 - 20.0		Boring complete at 5 feet bgs Groundwater not encountered at time of exploration						

BORING LOG-ENV CORE_64116_B1-B14_081115_RG.GPJ_DATATMPL.GDT_PRINT DATE: 6/15/15:RPG

BORING METHOD: Direct Push
DRILLED BY: ESN Northwest
BORING BIT DIAMETER: 2 1/4-inch OD

LOGGED BY: D. Ertel
COMPLETED: 4/08/15



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WONDRACK DISTRIBUTING
1 E. I STREET
YAKIMA, WASHINGTON

BORING B-5

PBS PROJECT NUMBER:
64116.000

BORING B-5 LOCATION:
4' SW of raised inlet valves at NW end of oil shed

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/WELL INSTALLATION
0.0		ASPHALT						
0.0 - 1.5		Loose brown to black silty GRAVEL (GM)		0				
1.5 - 5.0		FILL Brown SILT (ML); homogeneous; moist		0	S15		50	
5.0 - 6.0		becomes wet		0				
6.0 - 10.0		Loose GRAVEL (GP) with sand; fine to coarse sand; moist		0	S16		60	
10.0 - 20.0		Boring complete at 10 feet bgs Groundwater not encountered at time of exploration						

BORING LOG-ENV CORE_64116_B1-B14_081115_RG.GPJ_DATATMPL_GDT_PRINT DATE: 6/15/15:RPG

BORING METHOD: Direct Push
DRILLED BY: ESN Northwest
BORING BIT DIAMETER: 2 1/4-inch OD

LOGGED BY: D. Ertel
COMPLETED: 4/08/15



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WONDRACK DISTRIBUTING
 1 E. I STREET
 YAKIMA, WASHINGTON

BORING B-6

PBS PROJECT NUMBER:
 64116.000

BORING B-6 LOCATION:
 3.5' E of loading dock, 7.5' N of steps to office

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/ TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		ASPHALT						
0.0 - 1.8		Loose dark brown silty sandy GRAVEL (GM); fine to coarse gravel; damp		0				
1.8 - 4.5		FILL Brown SILT (ML); homogeneous; damp		0	S17		60	
4.5 - 5.0		Loose SAND (SP) with gravel; fine sand; damp		0				
5.0 - 20.0		Boring complete at 5 feet bgs Groundwater not encountered at time of exploration						

BORING LOG-ENV CORE 64116_B1-B14_081115_RG.GPJ DATATMPL.GDT _PRINT DATE: 6/15/15:RPG

BORING METHOD: Direct Push
 DRILLED BY: ESN Northwest
 BORING BIT DIAMETER: 2 1/4-inch OD

LOGGED BY: D. Ertel
 COMPLETED: 4/08/15



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Phone: 509.942.1600
Fax: 866.727.0140

WONDRACK DISTRIBUTING
1 E. I STREET
YAKIMA, WASHINGTON

BORING B-7

PBS PROJECT NUMBER:
64116.000

BORING B-7 LOCATION:
6.5' S of concrete containment berm around
tank farm

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/WELL INSTALLATION
0.0		ASPHALT						
0.0 - 1.8		Loose dark brown silty sandy GRAVEL (GM); dry		0				
1.8 - 4.5		FILL Brown SILT (ML); homogeneous		0			70	
4.5 - 10.0		becomes wet Loose gray to brown GRAVEL (GP)		0	S18		20	
10.0 - 20.0		Boring complete at 10 feet bgs Groundwater not encountered at time of exploration						

BORING LOG-ENV CORE_64116_B1-B14_081115_RG.GPJ_DATATMPL.GDT_PRINT DATE: 6/15/15:RPG

BORING METHOD: Direct Push
DRILLED BY: ESN Northwest
BORING BIT DIAMETER: 2 1/4-inch OD

LOGGED BY: D. Ertel
COMPLETED: 4/08/15



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 Fax: 866.727.0140

WONDRACK DISTRIBUTING
 1 E. I STREET
 YAKIMA, WASHINGTON

BORING B-8

PBS PROJECT NUMBER:
 64116.000

BORING B-8 LOCATION:
 In concrete slab 5' N of asphalt on E side of
 loading rack

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/WELL INSTALLATION
0.0		CONCRETE						
0.0 - 5.5		Brown SILT (ML); homogeneous; damp		0	S19		60	No odors or blackish staining
5.5 - 10.0		Light gray to gray sandy GRAVEL (GP); basalt; fine sand		0			60	
10.0 - 20.0		Boring complete at 10 feet bgs Groundwater not encountered at time of exploration						

BORING LOG-ENV CORE_64116_B1-B14_081115_RG.GPJ_DATATMPL_GDT_PRINT DATE: 6/15/15:RPG

BORING METHOD: Direct Push
 DRILLED BY: ESN Northwest
 BORING BIT DIAMETER: 2¼-inch OD

LOGGED BY: D. Ertel
 COMPLETED: 4/08/15



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WONDRACK DISTRIBUTING
1 E. I STREET
YAKIMA, WASHINGTON

BORING B-9

PBS PROJECT NUMBER:
64116.000

BORING B-9 LOCATION:
6.5' S, 1.5' E of concrete curb on E side of
loading rack

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/WELL INSTALLATION
0.0		CONCRETE						
0.0 - 1.5		Brown silty GRAVEL (GM)		0				
1.5 - 5.0		FILL Brown sandy SILT (ML) with gravel; homogeneous						
5.0 - 5.5		becomes wet			S20			
5.5 - 8.5		Light gray to brown gravelly SAND (SP); dry		0				
8.5 - 9.5		Loose brown SAND (SP) with gravel; medium sand; fine gravel; moist		0	S21			
10.0 - 20.0		Boring complete at 10 feet bgs Groundwater not encountered at time of exploration						

BORING LOG-ENV CORE_64116_B1-B14_081115_RG.GPJ_DATA\IPL_GDT_PRINT DATE: 6/15/15:RPG

BORING METHOD: Direct Push
DRILLED BY: ESN Northwest
BORING BIT DIAMETER: 2 1/4-inch OD

LOGGED BY: D. Ertel
COMPLETED: 4/08/15



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 Phone: 509.942.1600
 Fax: 866.727.0140

WONDRACK DISTRIBUTING
 1 E. I STREET
 YAKIMA, WASHINGTON

BORING B-10

PBS PROJECT NUMBER:
 64116.000

BORING B-10 LOCATION:
 5' S, 1.5' W of concrete curb on W side of
 loading rack

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		CONCRETE						
0.0 - 1.5		Brown SILT (ML) with gravel; blocky; damp		0				
1.5 - 5.0		FILL Brown SILT (ML); homogeneous		0			60	
5.0 - 5.5		becomes slight plasticity; wet			S22			
5.5 - 6.0		increase in gravel Loose gray to brown sandy GRAVEL (GP); moist		0				
6.0 - 10.0							25	
10.0		Boring complete at 10 feet bgs Groundwater not encountered at time of exploration						

BORING LOG-ENV CORE 64116_B1-B14_081115_RG.GPJ DATATMPL.GDT PRINT DATE: 6/15/15:RPG

BORING METHOD: Direct Push
 DRILLED BY: ESN Northwest
 BORING BIT DIAMETER: 2 1/4-inch OD

LOGGED BY: D. Ertel
 COMPLETED: 4/08/15



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Phone: 509.942.1600
Fax: 866.727.0140

WONDRACK DISTRIBUTING
1 E. I STREET
YAKIMA, WASHINGTON

BORING B-11

PBS PROJECT NUMBER:
64116.000

BORING B-11 LOCATION:
5' N, 1' W of concrete curb on W side of
loading rack

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/WELL INSTALLATION
0.0		CONCRETE						
0.0 - 1.5		Loose black silty sandy GRAVEL (GM)						
1.5 - 5.5		FILL Brown SILT (ML); homogeneous; slight plasticity		0	S23		40	
5.5 - 6.0		becomes wet						
6.0 - 10.0		Brown to gray sandy GRAVEL (GP); fine sand; fine to coarse gravel, subrounded gravel		0			40	
10.0 - 20.0		Boring complete at 10 feet bgs Groundwater not encountered at time of exploration						

BORING LOG-ENV CORE_64116_B1-B14_081115_RG.GPJ_DATATMPL_GDT_PRINT DATE: 6/15/15:RPG

BORING METHOD: Direct Push
DRILLED BY: ESN Northwest
BORING BIT DIAMETER: 2 1/4-inch OD

LOGGED BY: D. Ertel
COMPLETED: 4/08/15



400 Bradley Boulevard
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Phone: 509.942.1600
Fax: 866.727.0140

WONDRACK DISTRIBUTING
1 E. I STREET
YAKIMA, WASHINGTON

BORING B-12

PBS PROJECT NUMBER:
64116.000

BORING B-12 LOCATION:
9.5' S, of oil shed, 22' W of east fence

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/WELL INSTALLATION
0.0		ASPHALT						
0.0 - 1.5		Loose black sandy silty GRAVEL (GP-GM)		0				
1.5 - 5.5		FILL Brown SILT (ML); homogeneous		0			60	
5.5 - 19.0		Loose brown to gray sandy GRAVEL (GP); fine sand; damp		0	S24		50	
19.0 - 20.0		Boring complete at 19 feet bgs Groundwater not encountered at time of exploration		0			48	Drilled to 19 feet bgs using direct push in an attempt to sample groundwater. Encountered refusal at 19 feet bgs; groundwater was not encountered and no sample was collected.

BORING LOG-ENVY CORE 64116_B1-B14_081115_RG.GPJ_DATA\TPL_GDT_PRINT DATE: 6/15/15:RPG

BORING METHOD: Direct Push
DRILLED BY: ESN Northwest
BORING BIT DIAMETER: 2 1/4-inch OD

LOGGED BY: D. Ertel
COMPLETED: 4/08/15



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WONDRACK DISTRIBUTING
1 E. I STREET
YAKIMA, WASHINGTON

BORING B-13

PBS PROJECT NUMBER:
64116.000

BORING B-13 LOCATION:
3' S of suspected underground storage tank

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/ TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		ASPHALT						
0.0 - 2.0		Loose dark brown to black silty sandy GRAVEL (GP-GM); dry		0				
2.0 - 5.5		FILL Brown SILT (ML); homogeneous; damp		0			76	
5.5 - 10.0		Loose brown sandy GRAVEL (GP); fine to coarse gravel; dry		0	S25		25	
10.0 - 20.0		Boring complete at 10 feet bgs Groundwater not encountered at time of exploration						

BORING LOG-ENV CORE_64116_B1-B14_081115_RG.GPJ_DATA\IMPL_GDT_PRINT DATE: 6/15/15:RPG

BORING METHOD: Direct Push
DRILLED BY: ESN Northwest
BORING BIT DIAMETER: 2 1/4-inch OD

LOGGED BY: D. Ertel
COMPLETED: 4/08/15



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Phone: 509.942.1600
Fax: 866.727.0140

WONDRACK DISTRIBUTING
1 E. I STREET
YAKIMA, WASHINGTON

BORING B-14

PBS PROJECT NUMBER:
64116.000

BORING B-14 LOCATION:
NW corner of tank farm

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/WELL INSTALLATION
0.0		GRAVEL (GP) with silt			S36	█		Black staining; oil odor
		FILL Brown SILT (ML) with trace gravel; homogeneous; damp						
2.0		GRAVEL (GP)			S37	█		
2.75		Boring complete at 2.75 feet bgs Groundwater not encountered at time of exploration						
4.0								
6.0								
8.0								
10.0								
12.0								
14.0								
16.0								
18.0								
20.0								

BORING LOG-ENV CORE_64116_B1-B14_081115_RG.GPJ_DATATMPL_GDT_PRINT DATE: 6/15/15:RPG

BORING METHOD: Post Hole
DRILLED BY: PBS Employee
BORING BIT DIAMETER: 6-inch

LOGGED BY: D. Ertel
COMPLETED: 4/14/15



COLEMAN OIL - YAKIMA
1 EAST I STREET
YAKIMA, WASHINGTON

BORING MW1

PBS PROJECT NUMBER:
41392.000

BORING MW1 LOCATION:
(See Site Plan)

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/ TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		ASPHALT						
0.0 - 1.0		Brown elastic SILT (MH) with sand and gravel; medium plasticity; fine sand; fine, subrounded gravel; moist						5-inch x 12-inch flush-mount monument with 1 foot of concrete backfill 2-inch PVC blank
1.0 - 10.0		Medium dense gray poorly graded SAND (SP-SM) with silt, gravel, and cobbles to 4"; low plasticity; medium sand; coarse, subrounded gravel; moist		0.0			90	Bentonite
10.0 - 18.0		- grades to dense - grades to wet					95	Sand
18.0 - 25.0			4/27/2016 	1000			95	2-inch 0.010-slot screen
25.0		Final depth 25.0 feet bgs; Groundwater encountered at approximately 18 feet		25			95	

BORING LOG-ENV CORE - 41392.000 MW1-68RW1 JHD.GPJ DATATMPL.GDT PRINT DATE: 7/16/18RPG

BORING METHOD: Sonic Drilling
DRILLED BY: Holt Services
BORING BIT DIAMETER: 8-inch

LOGGED BY: M. Bagley
COMPLETED: 4/27/16



COLEMAN OIL - YAKIMA
1 EAST I STREET
YAKIMA, WASHINGTON

BORING MW2

PBS PROJECT NUMBER:
41392.000

BORING MW2 LOCATION:
(See Site Plan)

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/ TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		ASPHALT						
0.0 - 1.0		Brown silty SAND (SM) with gravel; medium plasticity; fine sand; fine, subrounded gravel; moist						5-inch x 12-inch flush-mount monument with 1 foot of concrete backfill 2-inch PVC blank
1.0 - 10.0		Medium dense gray poorly graded SAND (SP-SM) with silt, gravel, and cobbles to 4"; low plasticity; medium sand; coarse, subrounded gravel; moist		0.0			70	Bentonite
10.0 - 18.0		- grades to dense - grades to wet		0.0			99	Sand
18.0 - 25.0				0.0			95	2-inch 0.010-slot screen
25.0		Final depth 25.0 feet bgs; Groundwater encountered at approximately 18 feet		76				

BORING LOG-ENV CORE - 41392.000 MW1-68RW1 JHD.GPJ DATATMPL.GDT PRINT DATE: 7/16/18RPG

BORING METHOD: Sonic Drilling
DRILLED BY: Holt Services
BORING BIT DIAMETER: 8-inch

LOGGED BY: M. Bagley
COMPLETED: 4/27/16



COLEMAN OIL - YAKIMA
1 EAST I STREET
YAKIMA, WASHINGTON

BORING MW3

PBS PROJECT NUMBER:
41392.000

BORING MW3 LOCATION:
(See Site Plan)

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/ TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		ASPHALT Brown silty SAND (SM) with gravel; medium plasticity; fine sand; fine, subrounded gravel; moist						5-inch x 12-inch flush-mount monument with 1 foot of concrete backfill
5.0		Loose gray poorly graded SAND (SP-SM) with silt, gravel, and cobbles; low plasticity; medium sand; coarse, subrounded gravel; moist					80	2-inch PVC blank
10.0		- grades to dense, gray/black, with cobbles to 5"						Bentonite
15.0				1200				
20.0			4/27/2016 	464				
25.0				418			95	2-inch 0.010-slot screen
25.0		Final depth 25.0 feet bgs; Groundwater encountered at approximately 18 feet						
30.0								

BORING LOG-ENV CORE - 41392.000 MW1-68RW1 - JHD.GPJ DATA\TMPL_GDT_ PRINT DATE: 7/16/18RPG

BORING METHOD: Sonic Drilling
DRILLED BY: Holt Services
BORING BIT DIAMETER: 8-inch

LOGGED BY: M. Bagley
COMPLETED: 4/27/16



COLEMAN OIL - YAKIMA
1 EAST I STREET
YAKIMA, WASHINGTON

BORING MW4

PBS PROJECT NUMBER:
41392.000

BORING MW4 LOCATION:
(See Site Plan)

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/ TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Brown SILT (ML) with sand, gravel, and cobbles; low plasticity; fine sand; coarse, subrounded gravel; moist						5-inch x 12-inch flush-mount monument with 1 foot of concrete backfill
5.0		Medium dense gray poorly graded GRAVEL (GP) with sand and cobbles; medium sand; coarse, subrounded gravel; moist		0.0	MW-4		90	2-inch PVC blank
10.0				15				Bentonite
15.0		- grades to dense		0.0			90	
20.0		Gray silty SAND (SM) with gravel and cobbles; non-plastic; medium sand; coarse, subrounded gravel; moist to wet		3.0			50	Sand
25.0		Final depth 25.0 feet bgs; Groundwater encountered at approximately 18 feet		220			100	2-inch 0.010-slot screen
30.0				300+				

BORING LOG-ENV CORE - 41392.000 MW1-6&RW1 - JHD.GPJ - DATA\TMPL_GDT - PRINT DATE: 7/16/18RPG

BORING METHOD: Sonic Drilling
DRILLED BY: Holt Services
BORING BIT DIAMETER: 8-inch

LOGGED BY: M. Bagley
COMPLETED: 11/08/17



COLEMAN OIL - YAKIMA
1 EAST I STREET
YAKIMA, WASHINGTON

BORING MW5

PBS PROJECT NUMBER:
41392.000

BORING MW5 LOCATION:
(See Site Plan)

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/WELL INSTALLATION
0.0		Brown silty SAND (SM) with gravel and cobbles; low plasticity; fine sand; coarse, subrounded gravel; moist						5-inch x 12-inch flush-mount monument with 1 foot of concrete backfill
5.0		Medium dense gray poorly graded GRAVEL (GP) with sand and cobbles; coarse sand; coarse, subrounded gravel; moist					70	2-inch PVC blank
10.0				0.0				Bentonite
15.0		- grades to dense					70	Sand
20.0		Gray silty SAND (SM) with gravel and cobbles; non-plastic; medium sand; coarse, subrounded gravel; moist to wet	11/8/2016	15	MW-5a			2-inch 0.010-slot screen
25.0		- becomes gray/black; wet		250+			90	
25.0		Final depth 25.0 feet bgs; Groundwater encountered at approximately 18 feet						

BORING LOG-ENV CORE - 41392.000 MW1-6&RW1 - JHD.GPJ DATA\TMPL.GDT PRINT DATE: 7/16/18RPG

BORING METHOD: Sonic Drilling
DRILLED BY: Holt Services
BORING BIT DIAMETER: 8-inch

LOGGED BY: M. Bagley
COMPLETED: 11/08/17



COLEMAN OIL - YAKIMA
1 EAST I STREET
YAKIMA, WASHINGTON

BORING MW6

PBS PROJECT NUMBER:
41392.000

BORING MW6 LOCATION:
(See Site Plan)

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/ TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Brown SILT (ML) with sand, gravel, and organics; low plasticity; fine sand; fine, subrounded gravel; moist						5-inch x 12-inch flush-mount monument with 1 foot of concrete backfill
5.0		Medium dense poorly graded gray SAND (SP) with gravel and cobbles; fine sand; coarse, subrounded gravel; moist		0.3			100	2-inch PVC blank
10.0		- grades to dense		73	MW-6		100	Bentonite
15.0			11/8/2016 	300+			90	Sand
20.0		Black-gray silty SAND (SM) with gravel and cobbles; low plasticity; coarse sand; coarse, subrounded gravel; wet					90	2-inch 0.010-slot screen
25.0		Final depth 25.0 ft bgs; Groundwater encountered at approximately 17 ft		300+				

BORING LOG-ENV CORE - 41392.000 MW1-6&RW1 - JHD.GPJ DATA\TMPL_GDT_ PRINT DATE: 7/16/18RPG

BORING METHOD: Sonic Drilling
DRILLED BY: Holt Services
BORING BIT DIAMETER: 8-inch

LOGGED BY: M. Bagley
COMPLETED: 11/08/17



COLEMAN OIL - YAKIMA
1 EAST I STREET
YAKIMA, WASHINGTON

BORING RW1

PBS PROJECT NUMBER:
41392.000

BORING RW1 LOCATION:
(See Site Plan)

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/WELL INSTALLATION
0.0		ASPHALT						
0.0 - 10.0		Loose dark gray poorly graded GRAVEL (GP) with sand; medium sand; fine, subangular gravel; moist						5-inch x 12-inch flush-mount monument with 1 foot of concrete backfill 4-inch PVC blank
10.0 - 18.0		Medium dense dark gray-brown poorly graded SAND (SP-SM) with silt, gravel, and cobbles to 4"; low plasticity; medium sand; coarse, subrounded gravel; moist		0.0			80	Bentonite
18.0 - 20.0		- grades to dense						
20.0 - 22.0		- grades to wet						
22.0			4/27/2016 	820				
22.0 - 28.0								Sand 4-inch 0.010-slot screen
28.0 - 30.0							95	
30.0		Final depth 30.0 feet bgs; Groundwater encountered at approximately 18 feet		0.0				

BORING LOG-ENVY CORE-41392.000 MW1-68RW1 JHD.GPJ DATATMPL.GDT PRINT DATE: 7/16/18RPG

BORING METHOD: Sonic Drilling
DRILLED BY: Holt Services
BORING BIT DIAMETER: 8-inch

LOGGED BY: M. Bagley
COMPLETED: 4/27/16

APPENDIX C

Groundwater Sampling Forms

	PBS Engineering and Environmental GROUNDWATER SAMPLING FORM (YSI 556)	Project No: 41392.000 Project Name/ Location: Coleman Oil 1 E I Street, Yakima, WA Date: June 9, 2017	
	Initial DTW (feet bgs)	17.19	Monitoring Well ID
Screen Interval (feet bgs)	15.00-25.00	Sample ID (if not well ID)	-
Well depth (feet bgs)	25.00	QC Sample type: _____ <input type="checkbox"/> Not collected ID__DUP_6.9.17__	
Depth of pump/tubing inlet (feet bgs)	20.00		
Sampling method (describe pump or sampler)	Low Flow Peristaltic	Field Personnel	PB & KN
Purge Rate (L/min)	0.28	Weather Conditions	Sunny, 72°

WELL PURGING INFORMATION									
<input type="checkbox"/> Time elapsed <input checked="" type="checkbox"/> actual	DTW (feet)	Temp. (C)	Specific conductivity <input type="checkbox"/> mS/cm <input checked="" type="checkbox"/> μS/cm	Dissolved oxygen (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Observations	Volume purged <input checked="" type="checkbox"/> ltr <input type="checkbox"/> gal
1200	17.25	16.03	708	1.05	6.30	18.0	-	-	0.75
1205	17.29	15.98	710	1.75	5.93	30.8	-	-	2.00
1210	17.32	16.01	711	1.00	5.98	23.2	-	-	3.00
1215	17.33	16.02	711	0.70	6.05	23.5	-	-	5.00
1220	17.35	16.15	713	0.75	6.10	23.4	-	-	6.00
1225	17.36	16.16	712	0.70	6.16	22.7	-	-	7.00
Total Volume Purged									7

FIELD OBSERVATIONS / NOTES (such as well head condition, groundwater color, sediment load, recovery, sheen, odor, equipment)

Sample time: 1225

Signature of Field Personnel: PB & KN

APPENDIX D

Diesel Product Thickness and Removal Summary

Diesel Product Thickness and Removal Summary

Coleman Oil Yakima

Address: 1 E. I Street, Yakima, WA

Ecology ERTS No: 663825

PBS Project No.: 41392

	RW1 product thickness (feet)	RW1 product removed (liters)		MW3 product thickness (feet)	MW3 product removed (liters)
5/10/2016	4.26	0	5/10/2016	4.7	0
5/31/2016	4.94	35.4	5/31/2016	4.87	12
6/8/2016	4.25	32	6/8/2016		
6/10/2016		12	6/30/2016	4.25	3.6
6/30/2016	4.75	53			
7/12/2016	3.2	19.05			
7/21/2016	2.5	15.45			
8/5/2016	2.58	16.5			
total		183.4			15.6

APPENDIX E

Air Sampling Datasheets

Field Form – Summa Canister Sampling
Indoor and Outdoor Air Sampling

PBS Project No.: 41392.000 _____ Sample ID: _____ VS-1 _____

Site Name: Coleman Oil _____ Date: 12/13/16 _____

Canister ID: 18572 _____ Gauge ID: _____ N/A _____

Flow Controller ID: 07850 _____

Canister Pressure

Initial: _____ -30 _____ mm Hg

Final: _____ -14 _____ in Hg
circle one

Sampling Time

Begin: _____ 919 _____

End: _____ 1419 _____

Comments/Observations: The indoor air sample was located in the back office on top of a desk _____

PBS Project No.: 41391.000 _____ Sample ID: _____ VS-2 _____

Site Name: Coleman Oil _____ Date: 12/13/2016 _____

Canister ID: 18580 _____ Gauge ID: _____ N/A _____

Flow Controller ID: 07851 _____

Canister Pressure

Initial: _____ -29 _____ mm Hg

Final: _____ -13 _____ in Hg
circle one

Sampling Time

Begin: _____ 928 _____

End: _____ 1422 _____

Comments/Observations: This sample was collected from the crawl space beneath the building. _____

PBS Project No.: 41391.000_____

Sample ID: VS-3_____

Site Name: Coleman Oil_____

Date: 12/13/2016_____

Canister ID: 20545_____

Gauge ID: N/A_____

Flow Controller ID: 07848_____

Canister Pressure

Sampling Time

Initial: -29_____ mm Hg

Begin: 925_____

Final: -14_____ in Hg
circle one

End: 1423_____

Comments/Observations: This sample was collected outside of the east side of the building near the entrance. _____

APPENDIX F

Survey Report

YAKIMA PLANT FUEL RELEASE - WELL LOCATION SURVEY REPORT
 COLEMAN OIL COMPANY
 JOB #4365

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	467104.96	1636980.19	1088.59	CONTROL POINT 1, SET REBAR & HDJ RED CAP
2	467054.80	1636869.03	1089.82	CONTROL POINT 2, SET REBAR & HDJ RED CAP
1000	467174.09	1636965.91	1089.65	MW3 NORTH EDGE OF EXTERNAL CASING
1001	467173.89	1636965.90	1089.15	MW3 NORTH EDGE OF 2IN PVC WELL PIPE
1002	467194.51	1636962.68	1090.05	MW1 NORTH EDGE OF EXTERNAL CASING
1003	467194.30	1636962.63	1089.54	MW1 NORTH EDGE OF 4IN PVC WELL PIPE
1004	467211.57	1636953.36	1090.21	MW1 NORTH EDGE OF EXTERNAL CASING
1005	467211.29	1636953.38	1089.54	MW1 NORTH EDGE OF 2IN PVC WELL PIPE
1006	467209.98	1636986.28	1089.73	MW2 NORTH EDGE OF EXTERNAL CASING
1007	467209.69	1636986.34	1089.44	MW2 NORTH EDGE OF 2IN PVC WELL PIPE
1009	467246.11	1636952.13	1089.50	MW6 NORTH EDGE OF EXTERNAL CASING
1010	467245.86	1636952.17	1089.21	MW6 NORTH EDGE OF 2IN PVC WELL PIPE
1011	467235.90	1637036.33	1089.20	MW4 NORTH EDGE OF EXTERNAL CASING
1012	467235.59	1637036.33	1088.85	MW4 NORTH EDGE OF 2IN PVC WELL PIPE
1013	467176.87	1636900.68	1090.25	MW5 NORTH EDGE OF EXTERNAL CASING
1014	467176.60	1636900.74	1090.01	MW5 NORTH EDGE OF 2IN PVC WELL PIPE

POINT	LATITUDE (NORTH)	LONGITUDE (WEST)	ELEVATION	DESCRIPTION
1	46°36'51.3018"	120°30'49.2301"	1088.59	CONTROL POINT 1, SET REBAR & HDJ RED CAP
2	46°36'50.8065"	120°30'50.8224"	1089.82	CONTROL POINT 2, SET REBAR & HDJ RED CAP
1001	46°36'51.9823"	120°30'49.4350"	1089.15	MW3 NORTH EDGE OF 2IN PVC WELL PIPE
1003	46°36'52.1837"	120°30'49.4819"	1089.54	MW1 NORTH EDGE OF 4IN PVC WELL PIPE
1005	46°36'52.3515"	120°30'49.6144"	1089.54	MW1 NORTH EDGE OF 2IN PVC WELL PIPE
1007	46°36'52.3357"	120°30'49.1423"	1089.44	MW2 NORTH EDGE OF 2IN PVC WELL PIPE
1010	46°36'52.6927"	120°30'49.6319"	1089.21	MW6 NORTH EDGE OF 2IN PVC WELL PIPE
1012	46°36'52.5915"	120°30'48.4261"	1088.85	MW4 NORTH EDGE OF 2IN PVC WELL PIPE
1014	46°36'52.0089"	120°30'50.3685"	1090.01	MW5 NORTH EDGE OF 2IN PVC WELL PIPE

DATUM NOTES:

HORIZONTAL DATUM IS NAD83-2011 (EPOCH 2010.00) PER THE WASHINGTON STATE REFERENCE NETWORK (WSRN)

VERTICAL DATUM IS NAVD88 PER THE WASHINGTON STATE REFERENCE NETWORK (WSRN).

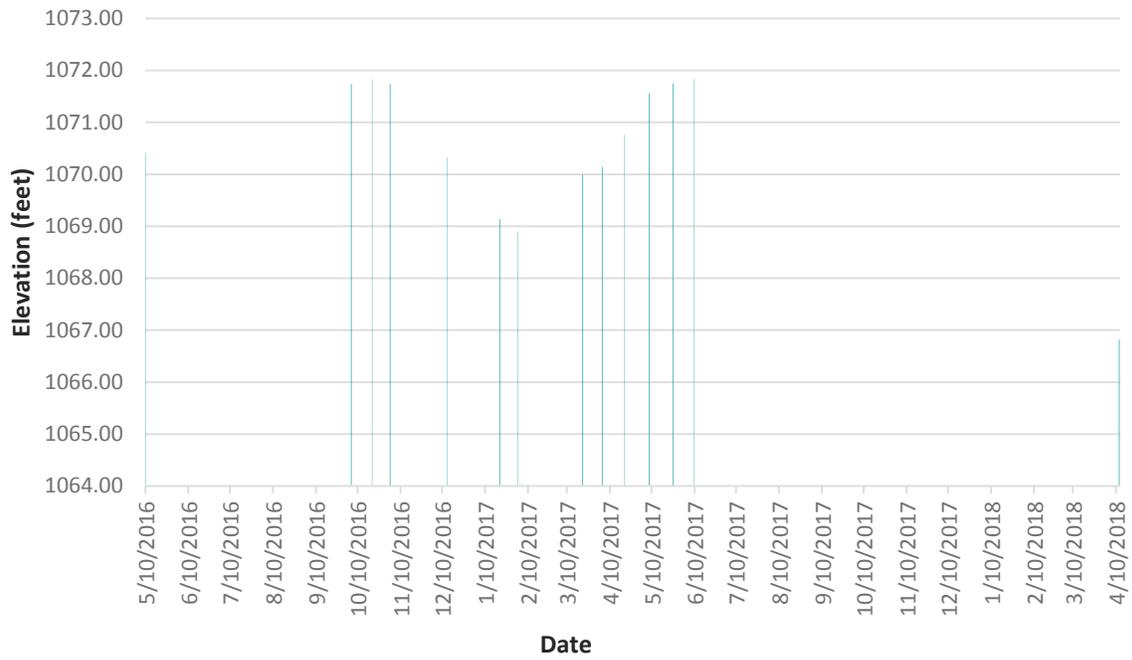
COORDINATES LISTED ARE WASHINGTON STATE PLANE SOUTH ZONE GRID



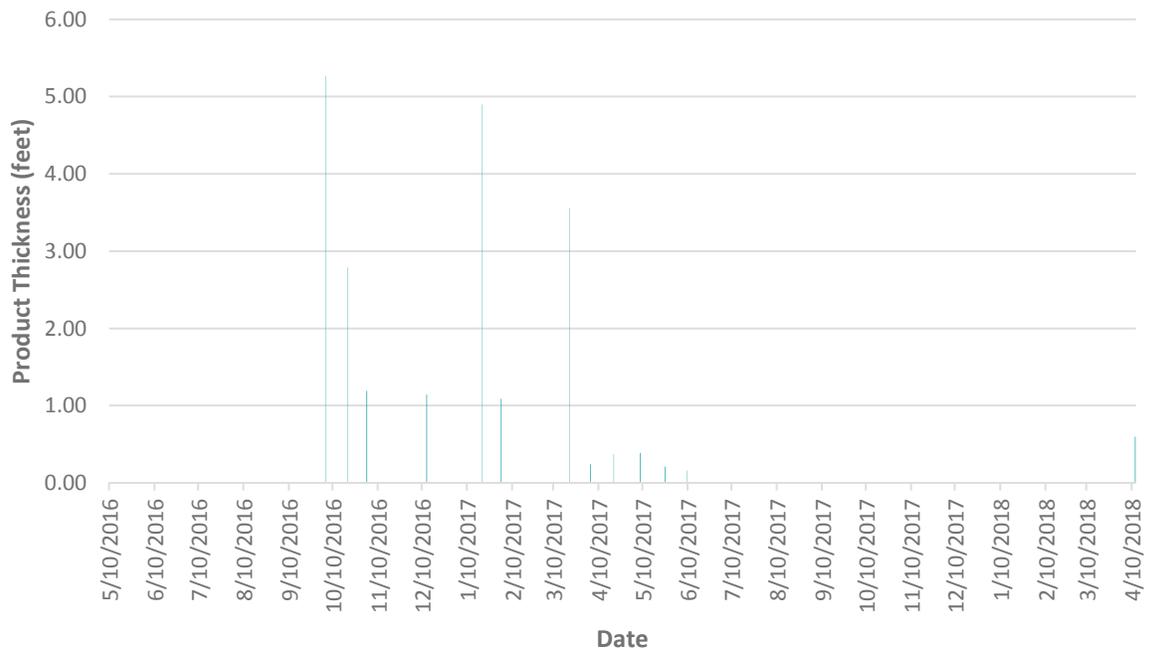
APPENDIX G

Water Level and Product Thickness Hydrographs

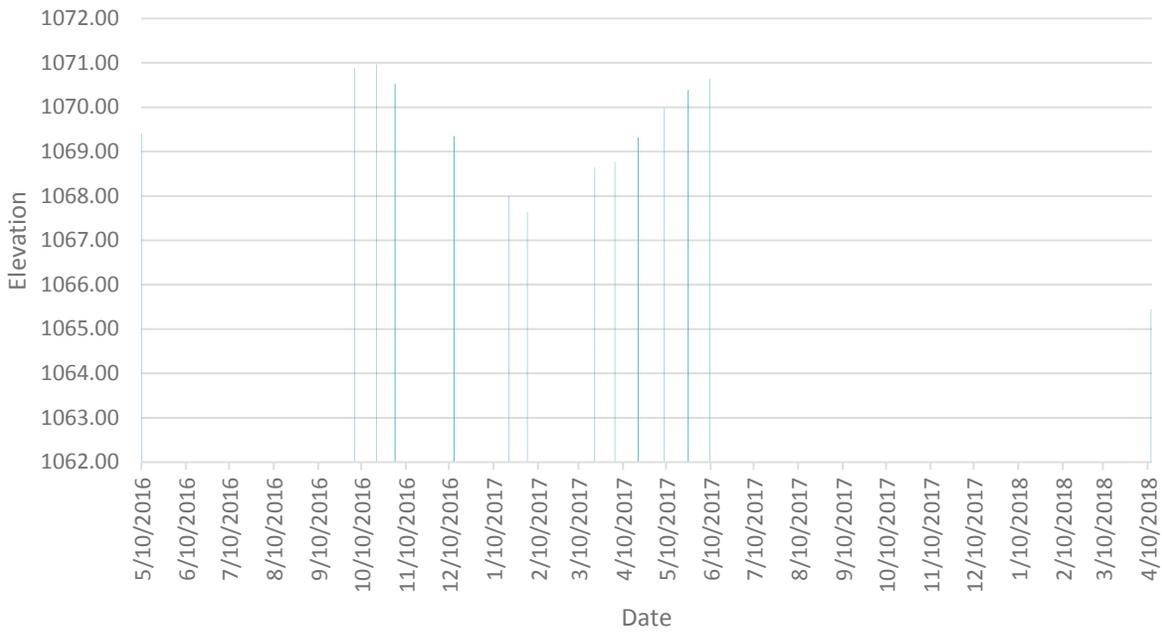
MW1 Potentiometric Groundwater Surface Hydrograph



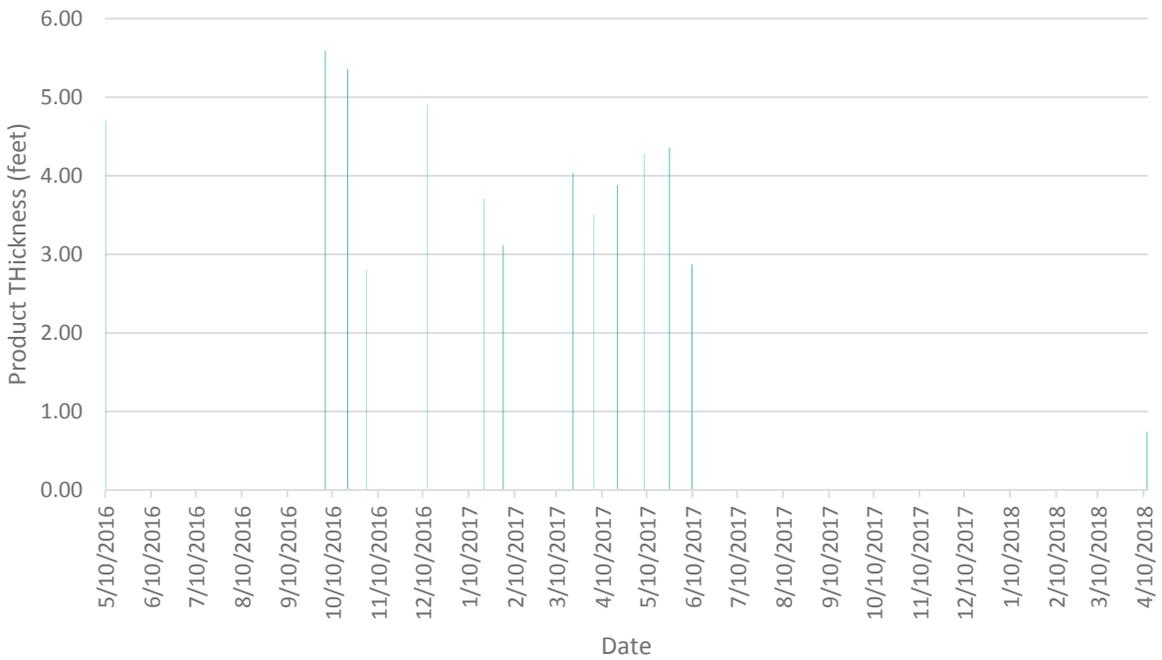
MW1 NAPL Product Thickness

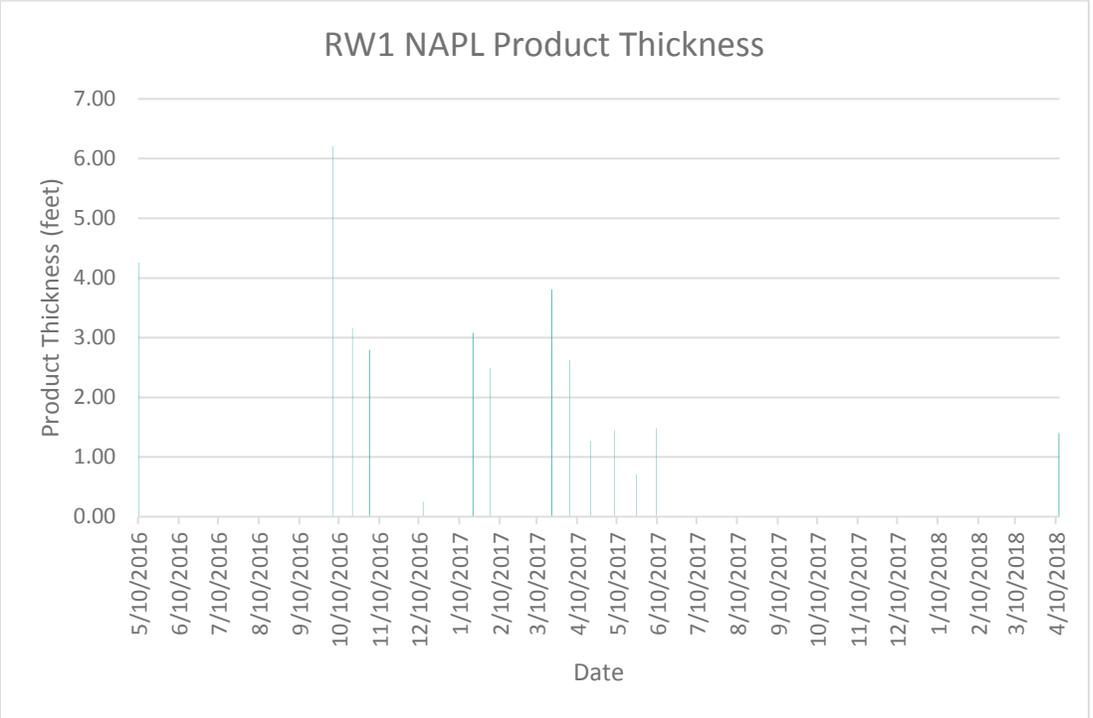
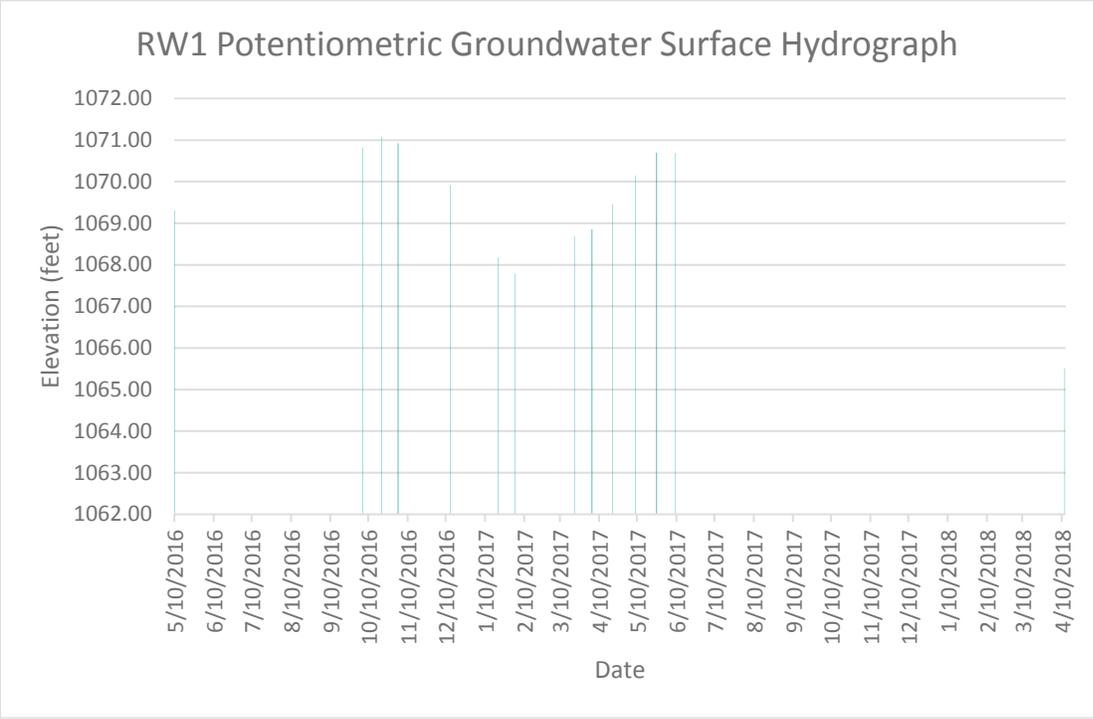


MW3 Potentiometric Groundwater Surface Hydrograph



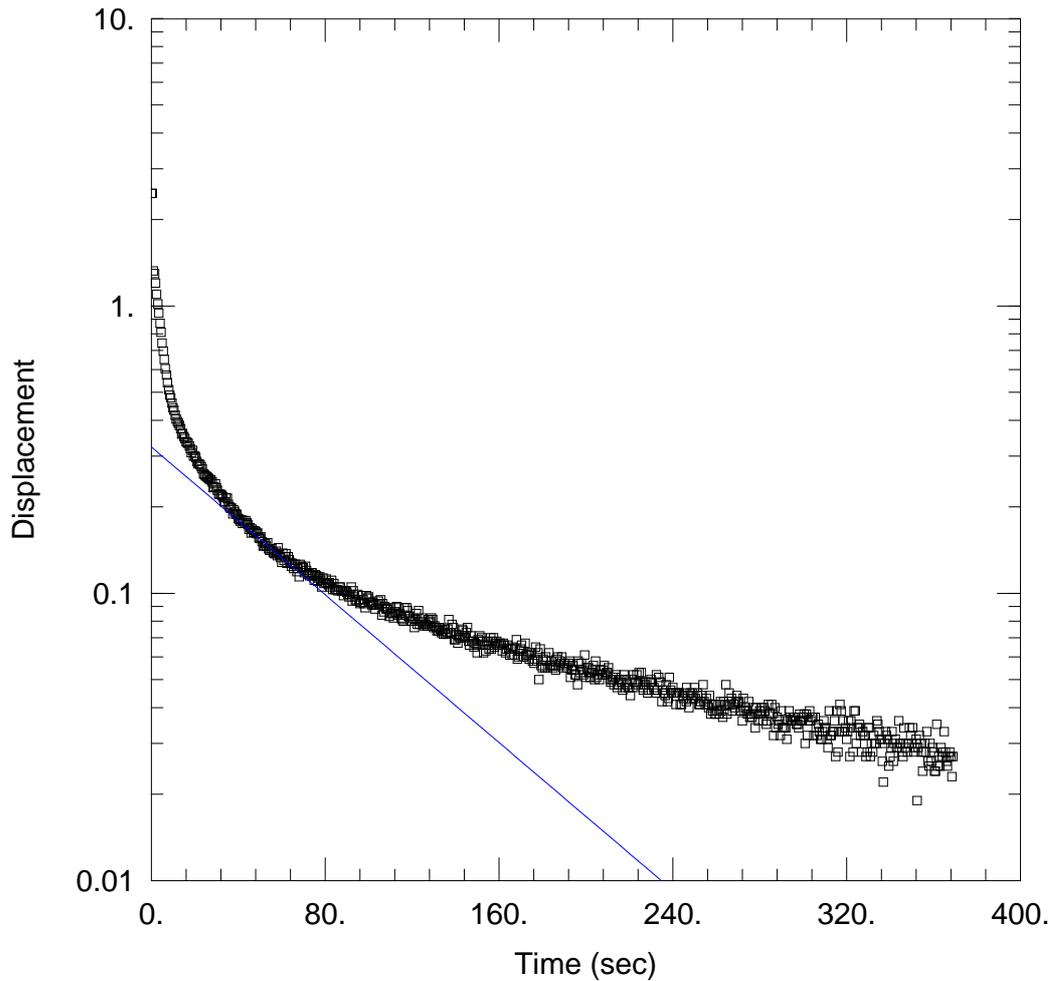
MW3 NAPL Product Thickness





APPENDIX H

Aquifer Testing Reports



RISING HEAD AQUIFER TEST

Data Set: E:\Coleman Yakima\MW4 41392.aqt

Date: 09/06/17

Time: 06:21:46

PROJECT INFORMATION

Company: PBS Engineering

Client: Coleman Oil

Project: 41392

Location: Yakima, WA

Test Well: MW4

Test Date: 6.9.17

AQUIFER DATA

Saturated Thickness: 10. ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (MW4)

Initial Displacement: 2.465 ft

Total Well Penetration Depth: 7.81 ft

Casing Radius: 0.084 ft

Static Water Column Height: 7.81 ft

Screen Length: 7.81 ft

Well Radius: 0.084 ft

Gravel Pack Porosity: 0.25

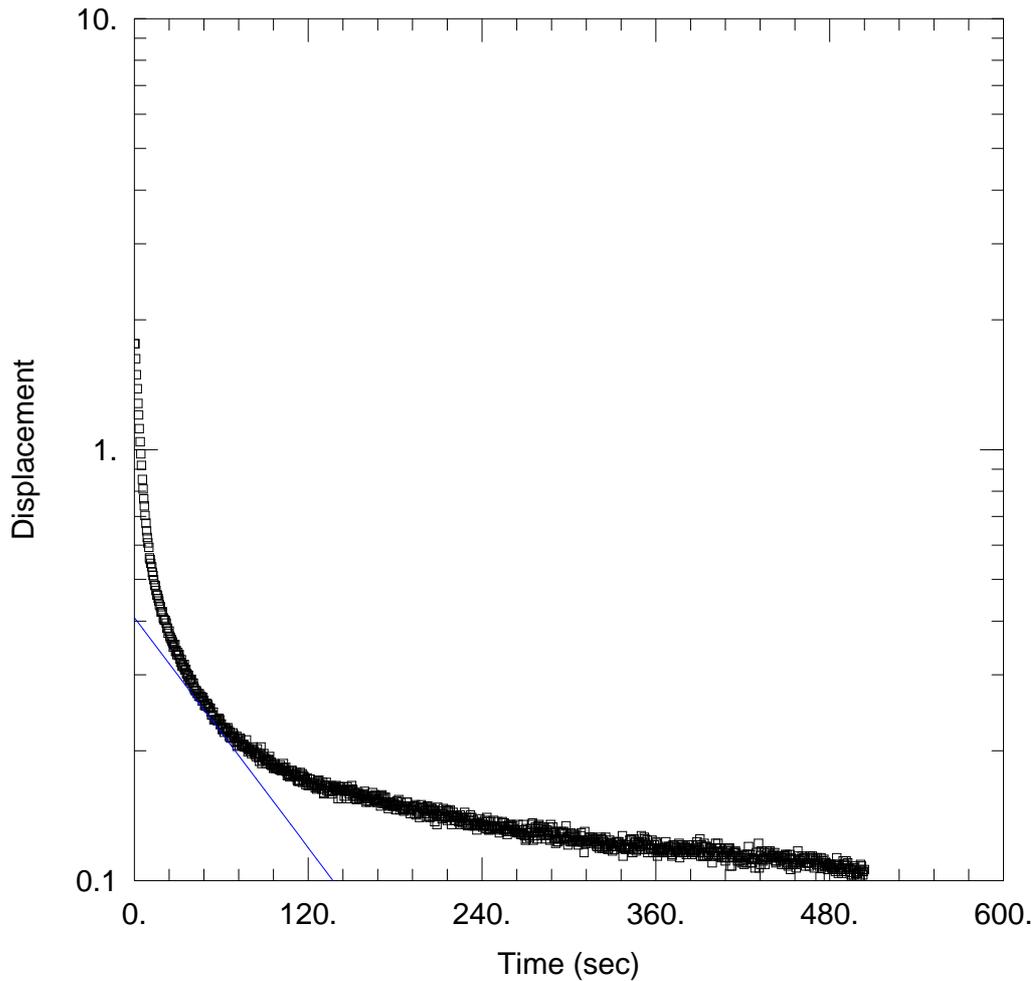
SOLUTION

Aquifer Model: Unconfined

$K = 1.79$ ft/day

Solution Method: Bouwer-Rice

$y_0 = 0.3228$ ft



RISING HEAD AQUIFER TEST

Data Set: E:\Coleman Yakima\MW6 41392.aqt

Date: 09/06/17

Time: 06:26:33

PROJECT INFORMATION

Company: PBS Engineering

Client: Coleman Oil

Project: 41392

Location: Yakima, WA

Test Well: MW4

Test Date: 6.9.17

AQUIFER DATA

Saturated Thickness: 10. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW6)

Initial Displacement: 1.76 ft

Static Water Column Height: 8.39 ft

Total Well Penetration Depth: 8.39 ft

Screen Length: 8.39 ft

Casing Radius: 0.084 ft

Well Radius: 0.084 ft

Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 1.183 ft/day

y0 = 0.4071 ft

APPENDIX I

Laboratory Reports
Chain-of-Custody Documentation

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

May 19, 2015

Dana Ertel, Project Manager
PBS Engineering and Environmental, Inc.
400 Bradley Blvd, Suite 300
Richland, WA 99352

Dear Mr. Ertel:

Included is the amended report from the testing of material submitted on April 8, 2015 from the 64116, F&BI 504134 project. Per your request, the estimated concentrations of the HCID analysis were included in the report for the samples that were not quantified by NWTPH-Dx analysis.

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
PBR0416R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
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fbi@isomedia.com
www.friedmanandbruya.com

April 16, 2015

Dana Ertel, Project Manager
PBS Engineering and Environmental, Inc.
400 Bradley Blvd, Suite 300
Richland, WA 99352

Dear Mr. Ertel:

Included are the results from the testing of material submitted on April 8, 2015 from the 64116, F&BI 504134 project. There are 5 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
PBR0416R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on April 8, 2015 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental 64116, F&BI 504134 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>PBS Engineering and Environmental</u>
504134 -01	S1
504134 -02	S2
504134 -03	S3
504134 -04	S4
504134 -05	S5
504134 -06	S6
504134 -07	S7
504134 -08	S8

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/16/15
 Date Received: 04/08/15
 Project: 64116, F&BI 504134
 Date Extracted: 04/08/15
 Date Analyzed: 04/08/15

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
 FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID
 Results Reported as Not Detected (ND) or Detected (D)**

**THE DATA PROVIDED BELOW WAS PERFORMED PER THE GUIDELINES ESTABLISHED BY THE
 WASHINGTON DEPARTMENT OF ECOLOGY AND WERE NOT DESIGNED TO PROVIDE INFORMATION
 WITH REGARDS TO THE ACTUAL IDENTIFICATION OF ANY MATERIAL PRESENT**

<u>Sample ID</u> Laboratory ID	<u>Gasoline</u>	<u>Diesel</u>	<u>Heavy Oil</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 53-144)
S1 504134-01	ND	ND	2,600 e	72
S2 504134-02	ND	ND	590 e	99
S3 504134-03	ND	ND	D	62
S4 504134-04	ND	ND	D	74
S5 504134-05	ND	ND	600 e	99
S6 504134-06	ND	ND	ND	88
S7 504134-07	ND	390 x e	470 e	99
S8 504134-08	ND	D x	D	82
Method Blank 05-727 MB	ND	ND	ND	102

ND - Material not detected at or above 20 mg/kg gas, 50 mg/kg diesel and 250 mg/kg heavy oil.

e - The concentration reported is an estimate.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/16/15
Date Received: 04/08/15
Project: 64116, F&BI 504134
Date Extracted: 04/13/15
Date Analyzed: 04/13/15

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**

Results Reported on a Dry Weight Basis
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 53-144)
S3 504134-03	2,100 x	11,000	91
S4 504134-04	270 x	1,100	89
S8 504134-08	550 x	1,100	97
Method Blank 05-744 MB	<50	<250	124

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/16/15

Date Received: 04/08/15

Project: 64116, F&BI 504134

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

Laboratory Code: 504208-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	105	115	64-133	9

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	118	58-147

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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.

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 the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

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

j - The analyte concentration is reported below the lowest calibration standard. 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 laboratory control sample(s) percent recovery and/or RPD were 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 analyte 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 with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

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.

SO4134

SAMPLE CHAIN OF CUSTODY

NE 04/08/15 03/15/15

Send Report To Dana Ertel

Company PRS Environmental

Address 400 Bradley Blvd Suite 300

City, State, ZIP Richland, WA 99352

Phone # (509) 727-0873 Fax #

SAMPLERS (signature) Dana H. Ertel

PROJECT NAME/NO. 64116

PO#

REMARKS

All return cores of bags/packaging.

Page # 1 of 1/15/15

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 Sampled	Time Sampled	Sample Type	# of containers	ANALYSES REQUESTED						Notes	
						TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS		HClO
S1	01	4/15/15		Soil	3								Q - per DE 04/14/15 E
S2	02												
S3	03												
S4	04												
S5	05												
S6	06												
S7	07												
S8	08												

Samples received at 5 °C

SIGNATURE

Relinquished by: Dana H. Ertel

PRINT NAME

Dana Ertel

COMPANY

PRS

DATE

4/15/15

TIME

1030

Friedman & Bryva, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029

Ph. (206) 285-8282

Fax (206) 283-5044

FORMS\COC\COC.DOC

SIGNATURE

Relinquished by: Dana H. Ertel

PRINT NAME

Dana Ertel

COMPANY

PRS

DATE

4/15/15

TIME

1030

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FORMS\COC\COC.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

May 19, 2015

Dana Ertel, Project Manager
PBS Engineering and Environmental, Inc.
400 Bradley Blvd, Suite 300
Richland, WA 99352

Dear Mr. Ertel:

Included is the amended report from the testing of material submitted on April 13, 2015 from the Yakima 64116, F&BI 504216 project. Per your request, the estimated HCID concentrations were included in the report.

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
PBR0417R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
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Eric Young, B.S.

3012 16th Avenue West
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www.friedmanandbruya.com

April 17, 2015

Dana Ertel, Project Manager
PBS Engineering and Environmental, Inc.
400 Bradley Blvd, Suite 300
Richland, WA 99352

Dear Mr. Ertel:

Included are the results from the testing of material submitted on April 13, 2015 from the Yakima 64116, F&BI 504216 project. There are 11 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
PBR0417R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on April 13, 2015 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Yakima 64116, F&BI 504216 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>PBS Engineering and Environmental</u>
504216 -01	S9
504216 -02	S10
504216 -03	S11
504216 -04	S13
504216 -05	S14
504216 -06	S15
504216 -07	S16
504216 -08	S17
504216 -09	S18
504216 -10	S19
504216 -11	S20
504216 -12	S21
504216 -13	S22
504216 -14	S23
504216 -15	S24
504216 -16	S25

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/17/15
 Date Received: 04/13/15
 Project: Yakima 64116, F&BI 504216
 Date Extracted: 04/14/15
 Date Analyzed: 04/14/15

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
 FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID
 Results Reported as Not Detected (ND) or Detected (D)**

**THE DATA PROVIDED BELOW WAS PERFORMED PER THE GUIDELINES ESTABLISHED BY THE
 WASHINGTON DEPARTMENT OF ECOLOGY AND WERE NOT DESIGNED TO PROVIDE INFORMATION
 WITH REGARDS TO THE ACTUAL IDENTIFICATION OF ANY MATERIAL PRESENT**

<u>Sample ID</u> Laboratory ID	<u>Gasoline</u>	<u>Diesel</u>	<u>Heavy Oil</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 56-165)
S9 504216-01 1/10	ND	ND	6,700 e	98
S10 504216-02	ND	ND	ND	101
S11 504216-03	ND	ND	ND	96
S13 504216-04	ND	ND	ND	96
S14 504216-05	ND	ND	ND	97
S15 504216-06	ND	ND	ND	96
S16 504216-07	ND	ND	ND	98
S17 504216-08	ND	ND	ND	99
S18 504216-09	ND	ND	ND	96
S19 504216-10	ND	ND	ND	94
S20 504216-11	ND	ND	ND	96

ND - Material not detected at or above 20 mg/kg gas, 50 mg/kg diesel and 250 mg/kg heavy oil.

e - The concentration reported is an estimate.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/17/15
Date Received: 04/13/15
Project: Yakima 64116, F&BI 504216
Date Extracted: 04/14/15
Date Analyzed: 04/14/15

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID
Results Reported as Not Detected (ND) or Detected (D)**

**THE DATA PROVIDED BELOW WAS PERFORMED PER THE GUIDELINES ESTABLISHED BY THE
WASHINGTON DEPARTMENT OF ECOLOGY AND WERE NOT DESIGNED TO PROVIDE INFORMATION
WITH REGARDS TO THE ACTUAL IDENTIFICATION OF ANY MATERIAL PRESENT**

<u>Sample ID</u> Laboratory ID	<u>Gasoline</u>	<u>Diesel</u>	<u>Heavy Oil</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 56-165)
S21 504216-12	ND	ND	ND	91
S22 504216-13	ND	ND	ND	95
S23 504216-14	ND	ND	ND	95
S24 504216-15	ND	ND	ND	92
S25 504216-16	ND	ND	ND	95
Method Blank 05-765 MB	ND	ND	ND	105

ND - Material not detected at or above 20 mg/kg gas, 50 mg/kg diesel and 250 mg/kg heavy oil.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	S17	Client:	PBS Engineering and Environmental
Date Received:	04/13/15	Project:	Yakima 64116, F&BI 504216
Date Extracted:	04/14/15	Lab ID:	504216-08
Date Analyzed:	04/15/15	Data File:	504216-08.028
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Indium	80	60	125
Holmium	94	60	125

Analyte:	Concentration mg/kg (ppm)
Arsenic	2.62
Lead	4.56

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	NA	Project:	Yakima 64116, F&BI 504216
Date Extracted:	04/14/15	Lab ID:	I5-222 mb
Date Analyzed:	04/15/15	Data File:	I5-222 mb.010
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Indium	94	60	125
Holmium	102	60	125

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Lead	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	S17	Client:	PBS Engineering and Environmental
Date Received:	04/13/15	Project:	Yakima 64116, F&BI 504216
Date Extracted:	04/13/15	Lab ID:	504216-08
Date Analyzed:	04/13/15	Data File:	041320.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	89	113
Toluene-d8	101	64	137
4-Bromofluorobenzene	101	81	119

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Methylene chloride	<0.5	o-Xylene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Styrene	<0.05
trans-1,2-Dichloroethene	<0.05	Isopropylbenzene	<0.05
1,1-Dichloroethane	<0.05	Bromoform	<0.05
2,2-Dichloropropane	<0.05	n-Propylbenzene	<0.05
cis-1,2-Dichloroethene	<0.05	Bromobenzene	<0.05
Chloroform	<0.05	1,3,5-Trimethylbenzene	<0.05
2-Butanone (MEK)	<0.5	1,1,2,2-Tetrachloroethane	<0.05
1,2-Dichloroethane (EDC)	<0.05	1,2,3-Trichloropropane	<0.05
1,1,1-Trichloroethane	<0.05	2-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	4-Chlorotoluene	<0.05
Carbon tetrachloride	<0.05	tert-Butylbenzene	<0.05
Benzene	<0.03	1,2,4-Trimethylbenzene	<0.05
Trichloroethene	<0.02	sec-Butylbenzene	<0.05
1,2-Dichloropropane	<0.05	p-Isopropyltoluene	<0.05
Bromodichloromethane	<0.05	1,3-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,4-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dichlorobenzene	<0.05
cis-1,3-Dichloropropene	<0.05	1,2-Dibromo-3-chloropropane	<0.5
Toluene	<0.05	1,2,4-Trichlorobenzene	<0.25
trans-1,3-Dichloropropene	<0.05	Hexachlorobutadiene	<0.25
1,1,2-Trichloroethane	<0.05	Naphthalene	<0.05
2-Hexanone	<0.5	1,2,3-Trichlorobenzene	<0.25

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Yakima 64116, F&BI 504216
Date Extracted:	04/13/15	Lab ID:	05-0718 mb
Date Analyzed:	04/13/15	Data File:	041308.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	89	113
Toluene-d8	100	64	137
4-Bromofluorobenzene	100	81	119

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Methylene chloride	<0.5	o-Xylene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Styrene	<0.05
trans-1,2-Dichloroethene	<0.05	Isopropylbenzene	<0.05
1,1-Dichloroethane	<0.05	Bromoform	<0.05
2,2-Dichloropropane	<0.05	n-Propylbenzene	<0.05
cis-1,2-Dichloroethene	<0.05	Bromobenzene	<0.05
Chloroform	<0.05	1,3,5-Trimethylbenzene	<0.05
2-Butanone (MEK)	<0.5	1,1,2,2-Tetrachloroethane	<0.05
1,2-Dichloroethane (EDC)	<0.05	1,2,3-Trichloropropane	<0.05
1,1,1-Trichloroethane	<0.05	2-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	4-Chlorotoluene	<0.05
Carbon tetrachloride	<0.05	tert-Butylbenzene	<0.05
Benzene	<0.03	1,2,4-Trimethylbenzene	<0.05
Trichloroethene	<0.02	sec-Butylbenzene	<0.05
1,2-Dichloropropane	<0.05	p-Isopropyltoluene	<0.05
Bromodichloromethane	<0.05	1,3-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,4-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dichlorobenzene	<0.05
cis-1,3-Dichloropropene	<0.05	1,2-Dibromo-3-chloropropane	<0.5
Toluene	<0.05	1,2,4-Trichlorobenzene	<0.25
trans-1,3-Dichloropropene	<0.05	Hexachlorobutadiene	<0.25
1,1,2-Trichloroethane	<0.05	Naphthalene	<0.05
2-Hexanone	<0.5	1,2,3-Trichlorobenzene	<0.25

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/17/15

Date Received: 04/13/15

Project: Yakima 64116, F&BI 504216

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 504171-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	1.92	75	80	67-121	6
Lead	mg/kg (ppm)	50	7.41	81	87	59-148	7

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	97	83-113
Lead	mg/kg (ppm)	50	102	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/17/15

Date Received: 04/13/15

Project: Yakima 64116, F&BI 504216

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 504208-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	mg/kg (ppm)	2.5	<0.5	38	37	10-56	3
Chloromethane	mg/kg (ppm)	2.5	<0.5	60	60	10-90	0
Vinyl chloride	mg/kg (ppm)	2.5	<0.05	64	63	10-91	2
Bromomethane	mg/kg (ppm)	2.5	<0.5	65	65	10-110	0
Chloroethane	mg/kg (ppm)	2.5	<0.5	74	72	10-101	3
Trichlorofluoromethane	mg/kg (ppm)	2.5	<0.5	71	72	10-95	1
Acetone	mg/kg (ppm)	12.5	<0.5	92	91	11-141	1
1,1-Dichloroethene	mg/kg (ppm)	2.5	<0.05	78	79	11-103	1
Methylene chloride	mg/kg (ppm)	2.5	<0.5	92	92	14-128	0
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	92	92	17-134	0
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	85	85	13-112	0
1,1-Dichloroethane	mg/kg (ppm)	2.5	<0.05	87	87	23-115	0
2,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	88	86	18-117	2
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	91	91	25-120	0
Chloroform	mg/kg (ppm)	2.5	<0.05	88	89	29-117	1
2-Butanone (MEK)	mg/kg (ppm)	12.5	<0.5	99	101	20-133	2
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	84	86	22-124	2
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	<0.05	90	90	27-112	0
1,1-Dichloropropene	mg/kg (ppm)	2.5	<0.05	89	90	26-107	1
Carbon tetrachloride	mg/kg (ppm)	2.5	<0.05	89	88	22-115	1
Benzene	mg/kg (ppm)	2.5	<0.03	86	85	26-114	1
Trichloroethene	mg/kg (ppm)	2.5	<0.02	90	88	30-112	2
1,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	91	92	31-119	1
Bromodichloromethane	mg/kg (ppm)	2.5	<0.05	93	92	31-131	1
Dibromomethane	mg/kg (ppm)	2.5	<0.05	91	91	27-124	0
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	<0.5	102	101	16-147	1
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	98	97	28-137	1
Toluene	mg/kg (ppm)	2.5	<0.05	88	90	34-112	2
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	92	93	30-136	1
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	<0.05	88	89	32-126	1
2-Hexanone	mg/kg (ppm)	12.5	<0.5	89	90	17-147	1
1,3-Dichloropropane	mg/kg (ppm)	2.5	<0.05	93	94	29-125	1
Tetrachloroethene	mg/kg (ppm)	2.5	<0.025	88	89	25-114	1
Dibromochloromethane	mg/kg (ppm)	2.5	<0.05	88	89	32-143	1
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	91	92	32-126	1
Chlorobenzene	mg/kg (ppm)	2.5	<0.05	89	90	37-113	1
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	91	92	34-115	1
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	91	93	35-126	2
m,p-Xylene	mg/kg (ppm)	5	<0.1	93	93	25-125	0
o-Xylene	mg/kg (ppm)	2.5	<0.05	94	96	27-126	2
Styrene	mg/kg (ppm)	2.5	<0.05	95	96	39-121	1
Isopropylbenzene	mg/kg (ppm)	2.5	<0.05	97	98	34-123	1
Bromoform	mg/kg (ppm)	2.5	<0.05	85	87	18-155	2
n-Propylbenzene	mg/kg (ppm)	2.5	<0.05	94	96	31-120	2
Bromobenzene	mg/kg (ppm)	2.5	<0.05	89	89	40-115	0
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	96	96	24-130	0
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	95	94	27-148	1
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	<0.05	87	89	33-123	2
2-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	93	93	39-110	0
4-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	93	92	39-111	1
tert-Butylbenzene	mg/kg (ppm)	2.5	<0.05	102	103	36-116	1
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	96	97	35-116	1
sec-Butylbenzene	mg/kg (ppm)	2.5	<0.05	96	98	33-118	2
p-Isopropyltoluene	mg/kg (ppm)	2.5	<0.05	96	97	32-119	1
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	87	90	38-111	3
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	86	87	39-109	1
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	89	89	40-111	0
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	<0.5	92	96	37-122	4
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	93	95	31-121	2
Hexachlorobutadiene	mg/kg (ppm)	2.5	<0.25	90	91	24-128	1
Naphthalene	mg/kg (ppm)	2.5	<0.05	96	98	24-139	2
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	91	93	35-117	2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/17/15

Date Received: 04/13/15

Project: Yakima 64116, F&BI 504216

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Dichlorodifluoromethane	mg/kg (ppm)	2.5	52	10-76
Chloromethane	mg/kg (ppm)	2.5	67	34-98
Vinyl chloride	mg/kg (ppm)	2.5	72	42-107
Bromomethane	mg/kg (ppm)	2.5	70	46-113
Chloroethane	mg/kg (ppm)	2.5	78	47-115
Trichlorofluoromethane	mg/kg (ppm)	2.5	80	53-112
Acetone	mg/kg (ppm)	12.5	94	39-147
1,1-Dichloroethene	mg/kg (ppm)	2.5	84	65-110
Methylene chloride	mg/kg (ppm)	2.5	92	50-127
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	92	72-122
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	88	71-113
1,1-Dichloroethane	mg/kg (ppm)	2.5	89	74-109
2,2-Dichloropropane	mg/kg (ppm)	2.5	88	64-151
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	91	73-110
Chloroform	mg/kg (ppm)	2.5	90	76-110
2-Butanone (MEK)	mg/kg (ppm)	12.5	110	60-121
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	91	73-111
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	93	72-116
1,1-Dichloropropene	mg/kg (ppm)	2.5	93	72-112
Carbon tetrachloride	mg/kg (ppm)	2.5	92	67-123
Benzene	mg/kg (ppm)	2.5	90	72-106
Trichloroethene	mg/kg (ppm)	2.5	93	72-107
1,2-Dichloropropane	mg/kg (ppm)	2.5	97	74-115
Bromodichloromethane	mg/kg (ppm)	2.5	96	75-126
Dibromomethane	mg/kg (ppm)	2.5	95	76-116
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	112	80-128
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	107	71-138
Toluene	mg/kg (ppm)	2.5	93	74-111
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	101	77-135
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	93	77-116
2-Hexanone	mg/kg (ppm)	12.5	107	70-129
1,3-Dichloropropane	mg/kg (ppm)	2.5	101	75-115
Tetrachloroethene	mg/kg (ppm)	2.5	89	73-111
Dibromochloromethane	mg/kg (ppm)	2.5	94	64-152
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	99	77-117
Chlorobenzene	mg/kg (ppm)	2.5	93	76-109
Ethylbenzene	mg/kg (ppm)	2.5	95	75-112
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	88	76-125
m,p-Xylene	mg/kg (ppm)	5	97	77-115
o-Xylene	mg/kg (ppm)	2.5	94	76-115
Styrene	mg/kg (ppm)	2.5	101	76-119
Isopropylbenzene	mg/kg (ppm)	2.5	97	76-120
Bromoform	mg/kg (ppm)	2.5	92	50-174
n-Propylbenzene	mg/kg (ppm)	2.5	99	77-115
Bromobenzene	mg/kg (ppm)	2.5	96	76-112
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	97	77-121
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	99	74-121
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	97	74-116
2-Chlorotoluene	mg/kg (ppm)	2.5	95	75-113
4-Chlorotoluene	mg/kg (ppm)	2.5	96	77-115
tert-Butylbenzene	mg/kg (ppm)	2.5	103	77-123
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	99	77-119
sec-Butylbenzene	mg/kg (ppm)	2.5	97	78-120
p-Isopropyltoluene	mg/kg (ppm)	2.5	98	77-120
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	91	76-112
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	89	74-109
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	89	75-114
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	92	68-122
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	89	75-122
Hexachlorobutadiene	mg/kg (ppm)	2.5	84	74-130
Naphthalene	mg/kg (ppm)	2.5	92	73-122
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	86	75-117

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.

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 the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

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

j - The analyte concentration is reported below the lowest calibration standard. 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 laboratory control sample(s) percent recovery and/or RPD were 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 analyte 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 with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

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.

504216

SAMPLE CHAIN OF CUSTODY

ME 04-13-15

03 / 132

Send Report To Dana Eitel

Company PRS Environmental

Address 400 Bradley Blvd Suite 300

City, State, ZIP Richland, WA 99352

Phone # (509) 727-0873 Fax #

SAMPLERS (signature) Dana Eitel

PROJECT NAME/NO. Yakima 64116

REMARKS

Page # 1 of 2

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 Sampled	Time Sampled	Sample Type	# of containers	ANALYSES REQUESTED						Notes			
						TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS		HCID	Pb	Arsenic
S09	0144	4/8/15		Soil	3										
S10	027	↓		↓	3										
S11	031	↓		↓	3										
No Sample 12					—										
S13	044	4/8/15		↓	3										No Sample Analyzed
S14	051	↓		↓	3										
S15	06	↓		↓	3										
S16	07	↓		↓	3										
S17	08	↓		↓	3				✓						
S18	09	↓		↓	3										

Friedman & Bryna, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029

Ph. (206) 285-8282

Fax (206) 283-5044

FORMS\COCC\DOC

SIGNATURE		PRINT NAME		COMPANY		DATE	TIME
Relinquished by: <u>Dana Eitel</u>		<u>Dana Eitel</u>		<u>PRS</u>		<u>4/10/15</u>	
Received by: <u>Melissa Davis</u>		<u>Melissa Davis</u>		<u>F&B</u>		<u>4/13/15</u>	<u>1125</u>
Relinquished by:							
Received by:							

Samples received at 6 °C

504216

SAMPLE CHAIN OF CUSTODY NE 04-13-15

03/152

Send Report To Dana Ertel
 Company PRS Environmental
 Address 400 Bradley Blvd Suite 300
 City, State, ZIP Riskland, WA 99352
 Phone # (509) 727-0873 Fax # _____

SAMPLERS (signature)	
PROJECT NAME/NO. <u>64116</u>	PO#
REMARKS	

Page # 2 of 2

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 Sampled	Time Sampled	Sample Type	# of containers	ANALYSES REQUESTED						Notes		
						TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS		H CID	
S19	10A-D	4/8/15		Soil	4									
S20	11A-C				3									
S21	12T				3									
S22	13				3									
S23	14				3									
S24	15				3									
S25	16				3									

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

SIGNATURE		PRINT NAME		COMPANY		DATE	TIME
Relinquished by:							
Received by:	<u>[Signature]</u>	<u>Nhan Phan</u>		<u>FCBT</u>		<u>4/23/15</u>	<u>1125</u>
Relinquished by:							
Received by:							

Samples received at 6 °C

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

May 19, 2015

Dana Ertel, Project Manager
PBS Engineering and Environmental, Inc.
400 Bradley Blvd, Suite 300
Richland, WA 99352

Dear Mr. Ertel:

Included is the amended report from the testing of material submitted on April 17, 2015 from the 64116 Yakima, F&BI 504328 project. Per your request, the estimated concentrations of the HCID analysis were included in the report for the samples that were not quantified by NWTPH-Dx analysis.

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
PBR0507R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

May 7, 2015

Dana Ertel, Project Manager
PBS Engineering and Environmental, Inc.
400 Bradley Blvd, Suite 300
Richland, WA 99352

Dear Mr. Ertel:

Included are the results from the testing of material submitted on April 17, 2015 from the 64116 Yakima, F&BI 504328 project. There are 17 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
PBR0507R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on April 17, 2015 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental 64116 Yakima, F&BI 504328 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>PBS Engineering and Environmental</u>
504328 -01	S26
504328 -02	S27
504328 -03	S28
504328 -04	S29
504328 -05	S30
504328 -06	S31
504328 -07	S32
504328 -08	S33
504328 -09	S34
504328 -10	S35
504328 -11	S36
504328 -12	S37
504328 -13	S38
504328 -14	S39
504328 -15	S40
504328 -16	S41
504328 -17	S42
504328 -18	S43
504328 -19	S44

The 8082A aroclor 1016 matrix spike failed below the acceptance criteria. The laboratory control sample passed the acceptance criteria, therefore the results are likely due to matrix effect.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/07/15
 Date Received: 04/17/15
 Project: 64116 Yakima, F&BI 504328
 Date Extracted: 04/20/15
 Date Analyzed: 04/20/15

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
 FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID
 Results Reported as Not Detected (ND) or Detected (D)**

**THE DATA PROVIDED BELOW WAS PERFORMED PER THE GUIDELINES ESTABLISHED BY THE
 WASHINGTON DEPARTMENT OF ECOLOGY AND WERE NOT DESIGNED TO PROVIDE INFORMATION
 WITH REGARDS TO THE ACTUAL IDENTIFICATION OF ANY MATERIAL PRESENT**

<u>Sample ID</u> Laboratory ID	<u>Gasoline</u>	<u>Diesel</u>	<u>Heavy Oil</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 53-144)
S26 504328-01	ND	D	D	ip
S27 504328-02	ND	160 e	ND	89
S28 504328-03	ND	10,000 e	1,500 e	ip
S29 504328-04	ND	7,300 e	7,400 e	78
S30 504328-05	ND	D	D	82
S31 504328-06	ND	3,300 e	2,100 e	87
S32 504328-07	ND	2,400 e	1,200 e	95
S33 504328-08	ND	2,100 e	510 e	87
S34 504328-09	ND	320 e	ND	99
S35 504328-10	ND	90 e	ND	88

ND - Material not detected at or above 20 mg/kg gas, 50 mg/kg diesel and 250 mg/kg heavy oil.

e - The reported concentration is an estimate.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/07/15
 Date Received: 04/17/15
 Project: 64116 Yakima, F&BI 504328
 Date Extracted: 04/20/15
 Date Analyzed: 04/20/15

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
 FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID
 Results Reported as Not Detected (ND) or Detected (D)**

**THE DATA PROVIDED BELOW WAS PERFORMED PER THE GUIDELINES ESTABLISHED BY THE
 WASHINGTON DEPARTMENT OF ECOLOGY AND WERE NOT DESIGNED TO PROVIDE INFORMATION
 WITH REGARDS TO THE ACTUAL IDENTIFICATION OF ANY MATERIAL PRESENT**

<u>Sample ID</u> Laboratory ID	<u>Gasoline</u>	<u>Diesel</u>	<u>Heavy Oil</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 53-144)
S36 504328-11	ND	D	D	ip
S37 504328-12	ND	D	ND	103
S38 504328-13	ND	ND	310 e	89
S40 504328-15	D	ND	ND	94
S41 504328-16	D	ND	ND	97
S42 504328-17	ND	290 e	ND	90
S43 504328-18	ND	99 e	ND	91
S44 504328-19	ND	1,300 e	330 e	91
Method Blank 05-808 MB	ND	ND	ND	89

ND - Material not detected at or above 20 mg/kg gas, 50 mg/kg diesel and 250 mg/kg heavy oil.

e - The reported concentration is an estimate.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/07/15
Date Received: 04/17/15
Project: 64116 Yakima, F&BI 504328
Date Extracted: 04/27/15
Date Analyzed: 04/27/15

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

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<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)
S40 504328-15	<0.02	<0.02	<0.02	<0.06	<2	89
Method Blank 05-0821 MB	<0.02	<0.02	<0.02	<0.06	<2	79

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/07/15
Date Received: 04/17/15
Project: 64116 Yakima, F&BI 504328
Date Extracted: 04/27/15
Date Analyzed: 04/27/15

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**

Results Reported on a Dry Weight Basis
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 56-165)
S26 504328-01	15,000	980	69
S30 504328-05 1/10	3,200	5,000	100
S36 504328-11 1/10	52,000	5,300	ip
S37 504328-12	530	<250	96
S39 504328-14 1/10	15,000	31,000	79
S42 504328-17	660	310	91
Method Blank 05-851 MB	<50	<250	106

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	S29	Client:	PBS Engineering and Environmental
Date Received:	04/17/15	Project:	64116 Yakima, F&BI 504328
Date Extracted:	04/27/15	Lab ID:	504328-04
Date Analyzed:	04/27/15	Data File:	504328-04.065
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Germanium	95	60	125
Indium	84	60	125
Holmium	96	60	125

Analyte:	Concentration mg/kg (ppm)
Arsenic	8.00
Cadmium	2.35
Chromium	5.91
Lead	332
Mercury	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	NA	Project:	64116 Yakima, F&BI 504328
Date Extracted:	04/27/15	Lab ID:	I5-252 mb
Date Analyzed:	04/27/15	Data File:	I5-252 mb.045
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Germanium	72	60	125
Indium	78	60	125
Holmium	92	60	125

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Cadmium	<1
Chromium	<1
Lead	<1
Mercury	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	S30	Client:	PBS Engineering and Environmental
Date Received:	04/17/15	Project:	64116 Yakima, F&BI 504328
Date Extracted:	04/27/15	Lab ID:	504328-05 1/50
Date Analyzed:	05/01/15	Data File:	050110.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	88 d	31	163
Benzo(a)anthracene-d12	103 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	0.12
Acenaphthylene	<0.1
Acenaphthene	<0.1
Fluorene	<0.1
Phenanthrene	0.14
Anthracene	0.16
Fluoranthene	0.11
Pyrene	0.23
Benz(a)anthracene	<0.1
Chrysene	<0.1
Benzo(a)pyrene	0.10
Benzo(b)fluoranthene	0.11
Benzo(k)fluoranthene	<0.1
Indeno(1,2,3-cd)pyrene	<0.1
Dibenz(a,h)anthracene	<0.1
Benzo(g,h,i)perylene	0.34

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	64116 Yakima, F&BI 504328
Date Extracted:	04/27/15	Lab ID:	05-853 mb 1/5
Date Analyzed:	04/28/15	Data File:	042805.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	83	31	163
Benzo(a)anthracene-d12	82	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	S30	Client:	PBS Engineering and Environmental
Date Received:	04/17/15	Project:	64116 Yakima, F&BI 504328
Date Extracted:	05/04/15	Lab ID:	504328-05 1/50
Date Analyzed:	05/04/15	Data File:	09.D\ECD1A.CH
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	40 d	29	154

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.2
Aroclor 1232	<0.2
Aroclor 1016	<0.2
Aroclor 1242	<0.2
Aroclor 1248	<0.2
Aroclor 1254	<0.2
Aroclor 1260	<0.2
Aroclor 1262	0.37
Aroclor 1268	<0.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	64116 Yakima, F&BI 504328
Date Extracted:	05/04/15	Lab ID:	05-895 mb 1/5
Date Analyzed:	05/04/15	Data File:	07.D\ECD1A.CH
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	80	29	154

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/07/15

Date Received: 04/17/15

Project: 64116 Yakima, F&BI 504328

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

Laboratory Code: 504462-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<2	<2	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	
			Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	81	69-120
Toluene	mg/kg (ppm)	0.5	92	70-117
Ethylbenzene	mg/kg (ppm)	0.5	92	65-123
Xylenes	mg/kg (ppm)	1.5	91	66-120
Gasoline	mg/kg (ppm)	20	100	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/07/15

Date Received: 04/17/15

Project: 64116 Yakima, F&BI 504328

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

Laboratory Code: 504328-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	14,000	123 b	138 b	63-146	11 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	110	79-144

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/07/15

Date Received: 04/17/15

Project: 64116 Yakima, F&BI 504328

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 504442-41 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	10.3	83 b	102 b	67-121	21 b
Cadmium	mg/kg (ppm)	10	<1	97	102	88-121	5
Chromium	mg/kg (ppm)	50	5.43	79	83	57-128	5
Lead	mg/kg (ppm)	50	68.8	114	122	59-148	7
Mercury	mg/kg (ppm)	10	<1	88	95	50-150	8

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	84	83-113
Cadmium	mg/kg (ppm)	10	100	85-114
Chromium	mg/kg (ppm)	50	88	78-121
Lead	mg/kg (ppm)	50	105	80-120
Mercury	mg/kg (ppm)	10	96	70-130

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/07/15

Date Received: 04/17/15

Project: 64116 Yakima, F&BI 504328

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PNA'S BY EPA METHOD 8270D SIM**

Laboratory Code: 504416-03 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	<0.01	88	44-129
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	86	52-121
Acenaphthene	mg/kg (ppm)	0.17	<0.01	88	51-123
Fluorene	mg/kg (ppm)	0.17	<0.01	90	37-137
Phenanthrene	mg/kg (ppm)	0.17	<0.01	84	34-141
Anthracene	mg/kg (ppm)	0.17	<0.01	85	32-124
Fluoranthene	mg/kg (ppm)	0.17	<0.01	86	16-160
Pyrene	mg/kg (ppm)	0.17	<0.01	79	10-180
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	87	23-144
Chrysene	mg/kg (ppm)	0.17	<0.01	89	32-149
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	94	23-176
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	96	42-139
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	89	21-163
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	99	23-170
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	100	31-146
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	98	37-133

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	89	90	58-121	1
Acenaphthylene	mg/kg (ppm)	0.17	85	86	54-121	1
Acenaphthene	mg/kg (ppm)	0.17	87	87	54-123	0
Fluorene	mg/kg (ppm)	0.17	91	91	56-127	0
Phenanthrene	mg/kg (ppm)	0.17	89	91	55-122	2
Anthracene	mg/kg (ppm)	0.17	83	85	50-120	2
Fluoranthene	mg/kg (ppm)	0.17	87	88	54-129	1
Pyrene	mg/kg (ppm)	0.17	77	83	53-127	7
Benz(a)anthracene	mg/kg (ppm)	0.17	82	84	51-115	2
Chrysene	mg/kg (ppm)	0.17	88	92	55-129	4
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	97	98	56-123	1
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	101	105	54-131	4
Benzo(a)pyrene	mg/kg (ppm)	0.17	90	90	51-118	0
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	98	93	49-148	5
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	101	95	50-141	6
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	98	95	52-131	3

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/07/15

Date Received: 04/17/15

Project: 64116 Yakima, F&BI 504328

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES FOR
POLYCHLORINATED BIPHENYLS AS
AROCLOR 1016/1260 BY EPA METHOD 8082A**

Laboratory Code: 504328-05 1/50 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Control Limits
Aroclor 1016	mg/kg (ppm)	0.8	<0.2	29 vo	50-150
Aroclor 1260	mg/kg (ppm)	0.8	<0.2	74	50-150

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Aroclor 1016	mg/kg (ppm)	0.8	82	81	55-130	1
Aroclor 1260	mg/kg (ppm)	0.8	99	89	58-133	11

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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.
- 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 the analyte were outside of acceptance criteria. The value reported is an estimate.
- c - The presence of the analyte may be due to carryover from previous sample injections.
- cf - The sample was centrifuged prior to analysis.
- d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.
- dv - Insufficient sample volume was available to achieve normal reporting limits.
- f - The sample was laboratory filtered prior to analysis.
- fb - The analyte was detected in the method blank.
- 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. Variability is attributed to sample inhomogeneity.
- hs - Headspace was present in the container used for analysis.
- ht - The analysis was performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.
- j - The analyte concentration is reported below the lowest calibration standard. 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 laboratory control sample(s) percent recovery and/or RPD were 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 analyte 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 with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.
- ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.
- 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.

504328

SAMPLE CHAIN OF CUSTODY ME 04/17/15

153/2

Send Report To Dave Erle
 Company PBS Environmental
 Address 400 Bradley Blvd Suite 300
 City, State, ZIP Richland, WA 99352
 Phone # (509) 727-0873 Fax # _____

SAMPLERS (signature) <u>Dave Erle</u>	PROJECT NAME/NO. <u>64116</u>	PO#
REMARKS	<u>Yakima</u>	

Page # 1 of 2
 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 Sampled	Time Sampled	Sample Type	# of containers	ANALYSES REQUESTED										Notes
						TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS	HClD	MTCA5	PCBS	PAHs	
S26	01A	4/14/15		Soil	3	X										X-PO D2
S27	02				3											4/24/15
S28	03				3											Mt.
S29	04				3							X				
S30	05	AD			4	X							X			
S31	06	AK			3								X			
S32	07				3											
S33	08				3											
S34	09				3											
S35	10				3											

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

SIGNATURE		PRINT NAME		COMPANY	DATE	TIME
Relinquished by: <u>Dave Erle</u>		Dave Erle		PBS	4/15/15	
Received by: <u>M. Phan</u>		M. Phan		FBT	4/16/15	1415
Relinquished by:						
Received by:						

samples received at 6:00 o'clock

504325

SAMPLE CHAIN OF CUSTODY

ME 09/13/15

VS3/2015

Send Report To Dana Ertel

Company PRS Environmental

Address 400 Bradley Blvd Suite 300

City, State, ZIP Richland, WA 99352

Phone # (509) 727-0873 Fax # _____

SAMPLERS (signature)

PROJECT NAME/NO.

64116 Yalima

PO#

REMARKS

Page # 2 of 2

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 Sampled	Time Sampled	Sample Type	# of containers	ANALYSES REQUESTED						Notes		
						TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS		HClD	
S36	DA 24/11/15			Soil	3	X								
S37	12			↓		X								Analyte per DC 11/15
S38	13			↓		X								Porter Analyte
S39	14			Soil/Knowledge	4	X								Soil/Knowledge
S40	15			Soil			X	X						Soil
S41	16			↓										
S42	17			↓		X								
S43	18			↓										
S44	19			↓										

Friedman & Braga, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029

Ph. (206) 285-8282

Fax (206) 283-5044

FORMSIC00C00C.DOC

SIGNATURE

Relinquished by:

Received by: [Signature]

Relinquished by: [Signature]

Received by:

PRINT NAME

Shawn Phelan

COMPANY

F&B I

DATE

9/13/15

TIME

1418

Samples received at 6 °C

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

March 31, 2016

Ken Nogeire, Project Manager
PBS Engineering and Environmental, Inc.
2517 Eastlake Ave E, Suite 100
Seattle, WA 98102

Dear Mr. Nogeire:

Included are the results from the testing of material submitted on March 23, 2016 from the Coleman Yakima, 64116 PO, F&BI 603413 project. There are 9 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
PBS0331R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on March 23, 2016 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Coleman Yakima, 64116 PO, F&BI 603413 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>PBS Engineering and Environmental</u>
603413 -01	NSW1-4
603413 -02	WSW1-4
603413 -03	B1-5.5

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/31/16

Date Received: 03/23/16

Project: Coleman Yakima, 64116 PO, F&BI 603413

Date Extracted: 03/24/16

Date Analyzed: 03/24/16

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

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<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)
B1-5.5 603413-03 1/10	0.79	14	20	110	5,100	ip
Method Blank 06-556 MB	<0.02	<0.02	<0.02	<0.06	<2	89

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/31/16

Date Received: 03/23/16

Project: Coleman Yakima, 64116 PO, F&BI 603413

Date Extracted: 03/24/16

Date Analyzed: 03/24/16

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**

Results Reported on a Dry Weight Basis

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 53-144)
NSW1-4 603413-01	11,000	270 x	91
WSW1-4 603413-02	26,000	570 x	72
B1-5.5 603413-03	34,000	770 x	103
Method Blank 06-567 MB	<50	<250	99

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B1-5.5	Client:	PBS Engineering and Environmental
Date Received:	03/23/16	Project:	Coleman Yakima, 64116 PO, F&BI 603413
Date Extracted:	03/24/16	Lab ID:	603413-03 1/250
Date Analyzed:	03/24/16	Data File:	032418.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	3 d	31	163
Benzo(a)anthracene-d12	163 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	8.1
Acenaphthylene	<0.5
Acenaphthene	1.4
Fluorene	3.4
Phenanthrene	5.0
Anthracene	<0.5
Fluoranthene	<0.5
Pyrene	2.4
Benz(a)anthracene	<0.5
Chrysene	<0.5
Benzo(a)pyrene	<0.5
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Coleman Yakima, 64116 PO, F&BI 603413
Date Extracted:	03/24/16	Lab ID:	06-569 mb 1/5
Date Analyzed:	03/28/16	Data File:	032803.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	92	31	163
Benzo(a)anthracene-d12	102	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/31/16

Date Received: 03/23/16

Project: Coleman Yakima, 64116 PO, F&BI 603413

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
AND XYLENES
USING EPA METHOD 8021B**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	mg/kg (ppm)	0.5	94	91	69-120	3
Toluene	mg/kg (ppm)	0.5	100	96	70-117	4
Ethylbenzene	mg/kg (ppm)	0.5	101	98	65-123	3
Xylenes	mg/kg (ppm)	1.5	99	99	66-120	0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/31/16

Date Received: 03/23/16

Project: Coleman Yakima, 64116 PO, F&BI 603413

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

Laboratory Code: 603420-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	95	97	63-146	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	104	79-144

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/31/16

Date Received: 03/23/16

Project: Coleman Yakima, 64116 PO, F&BI 603413

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	93	91	58-121	2
Acenaphthylene	mg/kg (ppm)	0.17	96	93	54-121	3
Acenaphthene	mg/kg (ppm)	0.17	93	92	54-123	1
Fluorene	mg/kg (ppm)	0.17	94	91	56-127	3
Phenanthrene	mg/kg (ppm)	0.17	94	92	55-122	2
Anthracene	mg/kg (ppm)	0.17	90	86	50-120	5
Fluoranthene	mg/kg (ppm)	0.17	93	87	54-129	7
Pyrene	mg/kg (ppm)	0.17	92	97	53-127	5
Benz(a)anthracene	mg/kg (ppm)	0.17	95	94	51-115	1
Chrysene	mg/kg (ppm)	0.17	92	95	55-129	3
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	99	96	56-123	3
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	100	99	54-131	1
Benzo(a)pyrene	mg/kg (ppm)	0.17	93	89	51-118	4
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	91	87	49-148	4
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	86	83	50-141	4
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	86	84	52-131	2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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.

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 the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

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

j - The analyte concentration is reported below the lowest calibration standard. 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 laboratory control sample(s) percent recovery and/or RPD were 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 analyte 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 with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

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.

603413

SAMPLE CHAIN OF CUSTODY

HE 03/23/16

522/051

Report To Ken Noyce

Company PBS Engineering

Address Seattle, WA

City, State, ZIP _____

Phone 504512-463 Email KenNoyce@pbsenv.com

SAMPLERS (signature) K. Noyce

PROJECT NAME Coburn Yukon

REMARKS _____

INVOICE TO _____

Page # _____ of _____

PO # _____

64116

INVOICE TO _____

TURNAROUND TIME
 Standard Turnaround
 RUSH 24 hrs
Rush charges authorized by: Ken Noyce

SAMPLE DISPOSAL
 Dispose after 30 days
 Archive Samples
 Other _____

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes						
						TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM							
NSWJ-4	01	3.23.16	1140	So.1	1	X	X	X											
WSWJ-4	02	3.23.16	1200	So.1	1	X	X	X										24 for diesel	
B1-S.S	03-A-F	3.23.16	1240	So.1	6	X	X	X											48 for 6x BTEX PAHs

Friedman & Bruya, Inc.

3012 16th Avenue West

Seattle, WA 98119-2029

Ph. (206) 285-8282

SIGNATURE K. Noyce

PRINT NAME Ken Noyce

COMPANY PBS

DATE 3/23/16 TIME 1640

Received by: K. Noyce

Received by: Ericella

Received by: _____

Received by: _____

DATE 3/23/16 TIME 1640

DATE 3/23/16 TIME 1640

DATE _____ TIME _____

DATE _____ TIME _____

Samples received at 4 °C

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

April 4, 2016

Ken Nogeire, Project Manager
PBS Engineering and Environmental, Inc.
2517 Eastlake Ave E, Suite 100
Seattle, WA 98102

Dear Mr. Nogeire:

Included are the results from the testing of material submitted on March 30, 2016 from the 41392, F&BI 603529 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
PBS0404R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on March 30, 2016 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental 41392, F&BI 603529 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>PBS Engineering and Environmental</u>
603529 -01	T1-WSW
603529 -02	T1-ESW
603529 -03	T1-B

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/04/16
Date Received: 03/30/16
Project: 41392, F&BI 603529
Date Extracted: 03/30/16
Date Analyzed: 03/30/16

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

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<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)
T1-B 603529-03	<0.02	0.063	0.18	2.3	340	85
Method Blank 06-608 MB	<0.02	<0.02	<0.02	<0.06	<2	86

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/04/16
Date Received: 03/30/16
Project: 41392, F&BI 603529
Date Extracted: 03/30/16
Date Analyzed: 03/30/16

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**

Results Reported on a Dry Weight Basis
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 48-168)
T1-WSW 603529-01	9,500	<250	79
T1-ESW 603529-02	920	<250	84
T1-B 603529-03	190	<250	83
Method Blank 06-604 MB2	<50	<250	83

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/04/16

Date Received: 03/30/16

Project: 41392, F&BI 603529

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

Laboratory Code: 603520-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<2	<2	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	
			Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	90	69-120
Toluene	mg/kg (ppm)	0.5	95	70-117
Ethylbenzene	mg/kg (ppm)	0.5	96	65-123
Xylenes	mg/kg (ppm)	1.5	94	66-120
Gasoline	mg/kg (ppm)	20	95	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/04/16

Date Received: 03/30/16

Project: 41392, F&BI 603529

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

Laboratory Code: 603504-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	116	124	73-135	7

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	118	74-139

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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.

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 the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

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

j - The analyte concentration is reported below the lowest calibration standard. 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 laboratory control sample(s) percent recovery and/or RPD were 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 analyte 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 with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

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.

603529

SAMPLE CHAIN OF CUSTODY

ME 03/30/16 CT

Send Report To Ken Nogerre

Company PBS Engineering

Address Seattle, WA

City, State, ZIP _____

Phone # 509.512.8163 Fax # _____

Email Address Ken.nogerre@pbsenv.com

SAMPLERS (signature) Ken Nogerre

PROJECT NAME/NO. 411392

411392

PO # 411392

PROJECT ADDRESS

Yakima, WA

• ELECTRONIC DATA REQUESTED

Page # 1 of 1

TURNAROUND TIME

Standard Turnaround

• RUSH _____
Rush charges authorized by: _____

SAMPLE DISPOSAL

Dispose after 30 days

• Return samples
• Will call with instructions

Samples Received at _____ °C

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
TL-WSW	01	3.28.16	930	So.1	1	X						
F1-ESW	02	3.28.16	935	So.1	1	X						
T1-B	03A-D	3.28.16	940	So.1	4	X	X	X				

Samples received at 5 °C

Friedman & Bruya, Inc.

3012 16th Avenue West

Seattle, WA 98119-2029

Ph. (206) 285-8282

Fax (206) 283-5044

FORMS\COC\COC.DOC

SIGNATURE

PRINT NAME

COMPANY

DATE

TIME

Relinquished by: [Signature]

K. Nogerre

PBS

3.29.16

1645

Received by: [Signature]

John Wils

Fed Ex SOC

3/30/16

11:59am

Relinquished by: [Signature]

Ellen Roberts Rodford

F&B

3/30/16 11:45

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

April 22, 2016

Ken Nogeire, Project Manager
PBS Engineering and Environmental, Inc.
2517 Eastlake Ave E, Suite 100
Seattle, WA 98102

Dear Mr. Nogeire:

Included are the results from the testing of material submitted on April 1, 2016 from the 41392, F&BI 604013 project. There are 14 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
PBS0422R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on April 1, 2016 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental 41392, F&BI 604013 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>PBS Engineering and Environmental</u>
604013 -01	NSW2-17
604013 -02	ESW1-17
604013 -03	SSW1-17
604013 -04	WSW2-11
604013 -05	B2-18
604013 -06	Trip Blank

Samples WSW2-11 and B2-18 was sent to Fremont Analytical for EPH and VPH analyses. Review of the enclosed report indicates that all quality assurance were acceptable.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/22/16
 Date Received: 04/01/16
 Project: 41392, F&BI 604013
 Date Extracted: 04/01/16
 Date Analyzed: 04/01/16 and 04/05/16

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

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<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)
NSW2-17 604013-01	<0.02	<0.02	<0.02	<0.06	<2	81
ESW1-17 604013-02	<0.02	<0.02	<0.02	<0.06	3.1	84
SSW1-17 604013-03	<0.02	0.039	0.024	0.14	5.5	76
WSW2-11 604013-04	<0.02	3.1	7.5	62	3,400	ip
B2-18 604013-05	0.65	5.1	7.3	44	1,600	ip
Method Blank 06-612 MB	<0.02	<0.02	<0.02	<0.06	<2	86

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/22/16
Date Received: 04/01/16
Project: 41392, F&BI 604013
Date Extracted: 04/01/16
Date Analyzed: 04/01/16

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES
USING METHOD 8021B**

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>Surrogate (% Recovery)</u> Limit (52-124)
Trip Blank 604013-06	<1	<1	<1	<3	84
Method Blank 06-613 MB	<1	<1	<1	<3	83

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/22/16
Date Received: 04/01/16
Project: 41392, F&BI 604013
Date Extracted: 04/04/16
Date Analyzed: 04/04/16

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**

Results Reported on a Dry Weight Basis
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> (% Recovery) (Limit 48-168)
NSW2-17 604013-01	<50	<250	93
ESW1-17 604013-02	<50	<250	105
SSW1-17 604013-03	<50	<250	91
WSW2-11 604013-04	9,900	330 x	93
B2-18 604013-05	25,000	570 x	73
Method Blank 06-660 MB	<50	<250	105

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	B2-18	Client:	PBS Engineering and Environmental
Date Received:	04/01/16	Project:	41392, F&BI 604013
Date Extracted:	04/01/16	Lab ID:	604013-05
Date Analyzed:	04/01/16	Data File:	604013-05.065
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Analyte:	Concentration mg/kg (ppm)
----------	------------------------------

Lead	4.94
------	------

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	NA	Project:	41392, F&BI 604013
Date Extracted:	04/01/16	Lab ID:	I6-186 mb
Date Analyzed:	04/01/16	Data File:	I6-186 mb.019
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Analyte:	Concentration mg/kg (ppm)
----------	------------------------------

Lead	<1
------	----

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B2-18	Client:	PBS Engineering and Environmental
Date Received:	04/01/16	Project:	41392, F&BI 604013
Date Extracted:	04/04/16	Lab ID:	604013-05 1/250
Date Analyzed:	04/04/16	Data File:	040415.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	45	31	163
Benzo(a)anthracene-d12	160	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	7.2
Acenaphthylene	<0.5
Acenaphthene	0.86
Fluorene	2.1
Phenanthrene	2.5
Anthracene	<0.5
Fluoranthene	<0.5
Pyrene	1.6
Benz(a)anthracene	<0.5
Chrysene	<0.5
Benzo(a)pyrene	<0.5
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	41392, F&BI 604013
Date Extracted:	04/04/16	Lab ID:	06-657 mb 1/5
Date Analyzed:	04/04/16	Data File:	040404.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	89	31	163
Benzo(a)anthracene-d12	90	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/22/16

Date Received: 04/01/16

Project: 41392, F&BI 604013

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

Laboratory Code: 603575-02 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<2	<2	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	
			Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	81	69-120
Toluene	mg/kg (ppm)	0.5	91	70-117
Ethylbenzene	mg/kg (ppm)	0.5	93	65-123
Xylenes	mg/kg (ppm)	1.5	94	66-120
Gasoline	mg/kg (ppm)	20	95	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/22/16

Date Received: 04/01/16

Project: 41392, F&BI 604013

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,
AND XYLENES
USING EPA METHOD 8021B**

Laboratory Code: 604014-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (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

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	100	65-118
Toluene	ug/L (ppb)	50	92	72-122
Ethylbenzene	ug/L (ppb)	50	92	73-126
Xylenes	ug/L (ppb)	150	89	74-118

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/22/16

Date Received: 04/01/16

Project: 41392, F&BI 604013

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

Laboratory Code: 604013-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	128	120	73-135	6

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	122	74-139

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/22/16

Date Received: 04/01/16

Project: 41392, F&BI 604013

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 603575-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Lead	mg/kg (ppm)	50	30.1	96	111	70-130	14

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	mg/kg (ppm)	50	106	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/22/16

Date Received: 04/01/16

Project: 41392, F&BI 604013

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: 604023-02 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	<0.01	87	87	44-129	0
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	85	86	52-121	1
Acenaphthene	mg/kg (ppm)	0.17	<0.01	86	87	51-123	1
Fluorene	mg/kg (ppm)	0.17	<0.01	82	83	37-137	1
Phenanthrene	mg/kg (ppm)	0.17	<0.01	87	87	34-141	0
Anthracene	mg/kg (ppm)	0.17	<0.01	81	85	32-124	5
Fluoranthene	mg/kg (ppm)	0.17	<0.01	82	80	16-160	2
Pyrene	mg/kg (ppm)	0.17	<0.01	90	91	10-180	1
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	87	87	23-144	0
Chrysene	mg/kg (ppm)	0.17	<0.01	90	90	32-149	0
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	89	89	23-176	0
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	89	89	42-139	0
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	83	88	21-163	6
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	95	90	23-170	5
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	91	89	31-146	2
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	93	89	37-133	4

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	90	58-121
Acenaphthylene	mg/kg (ppm)	0.17	90	54-121
Acenaphthene	mg/kg (ppm)	0.17	89	54-123
Fluorene	mg/kg (ppm)	0.17	90	56-127
Phenanthrene	mg/kg (ppm)	0.17	91	55-122
Anthracene	mg/kg (ppm)	0.17	85	50-120
Fluoranthene	mg/kg (ppm)	0.17	91	54-129
Pyrene	mg/kg (ppm)	0.17	84	53-127
Benz(a)anthracene	mg/kg (ppm)	0.17	88	51-115
Chrysene	mg/kg (ppm)	0.17	91	55-129
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	96	56-123
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	91	54-131
Benzo(a)pyrene	mg/kg (ppm)	0.17	85	51-118
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	91	49-148
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	90	50-141
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	90	52-131

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.

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 the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

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

j - The analyte concentration is reported below the lowest calibration standard. 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 laboratory control sample(s) percent recovery and/or RPD were 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 analyte 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 with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

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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Friedman & Bruya

Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 604013

Lab ID: 1604015

April 21, 2016

Attention Michael Erdahl:

Fremont Analytical, Inc. received 2 sample(s) on 4/1/2016 for the analyses presented in the following report.

Extractable Petroleum Hydrocarbons by NWEPH

Sample Moisture (Percent Moisture)

Volatile Petroleum Hydrocarbons by NWVPH

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in black ink, appearing to read "Mike Ridgeway".

Mike Ridgeway
President

DoD/ELAP Certification #L2371, ISO/ICC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)



Date: 04/21/2016

CLIENT: Friedman & Bruya
Project: 604013
Lab Order: 1604015

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1604015-001	WSW2-11	03/30/2016 12:00 AM	04/01/2016 3:54 PM
1604015-002	B1-18	03/30/2016 12:00 AM	04/01/2016 3:54 PM

CLIENT: Friedman & Bruya

Project: 604013

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Analytical Report

WO#: 1604015

Date Reported: 4/21/2016

Client: Friedman & Bruya

Collection Date: 3/30/2016

Project: 604013

Lab ID: 1604015-001

Matrix: Soil

Client Sample ID: WSW2-11

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Extractable Petroleum Hydrocarbons by NWEPH						
				Batch ID: 13403	Analyst: CM	
Aliphatic Hydrocarbon (C8-C10)	52.4	4.86	*	mg/Kg-dry	1	4/20/2016 12:26:00 AM
Aliphatic Hydrocarbon (C10-C12)	271	4.86	*	mg/Kg-dry	1	4/20/2016 12:26:00 AM
Aliphatic Hydrocarbon (C12-C16)	715	4.86	*	mg/Kg-dry	1	4/20/2016 12:26:00 AM
Aliphatic Hydrocarbon (C16-C21)	711	4.86	Q	mg/Kg-dry	1	4/20/2016 12:26:00 AM
Aliphatic Hydrocarbon (C21-C34)	176	4.86	*	mg/Kg-dry	1	4/20/2016 12:26:00 AM
Aromatic Hydrocarbon (C8-C10)	31.2	4.86	*	mg/Kg-dry	1	4/20/2016 9:30:00 AM
Aromatic Hydrocarbon (C10-C12)	160	4.86	*	mg/Kg-dry	1	4/20/2016 9:30:00 AM
Aromatic Hydrocarbon (C12-C16)	531	4.86	*	mg/Kg-dry	1	4/20/2016 9:30:00 AM
Aromatic Hydrocarbon (C16-C21)	820	4.86		mg/Kg-dry	1	4/20/2016 9:30:00 AM
Aromatic Hydrocarbon (C21-C34)	659	4.86		mg/Kg-dry	1	4/20/2016 9:30:00 AM
Surr: 1-Chlorooctadecane	64.3	60-140		%Rec	1	4/20/2016 12:26:00 AM
Surr: o-Terphenyl	104	60-140		%Rec	1	4/20/2016 9:30:00 AM

NOTES:

Q - Indicates an analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF); high bias.

* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH						
				Batch ID: 13409	Analyst: BC	
Aliphatic Hydrocarbon (C5-C6)	ND	2.23		mg/Kg-dry	1	4/7/2016 12:32:08 PM
Aliphatic Hydrocarbon (C6-C8)	16.6	2.23		mg/Kg-dry	1	4/7/2016 12:32:08 PM
Aliphatic Hydrocarbon (C8-C10)	122	44.7	D	mg/Kg-dry	20	4/7/2016 4:13:09 AM
Aliphatic Hydrocarbon (C10-C12)	509	44.7	D	mg/Kg-dry	20	4/7/2016 4:13:09 AM
Aromatic Hydrocarbon (C8-C10)	173	44.7	D	mg/Kg-dry	20	4/7/2016 4:13:09 AM
Aromatic Hydrocarbon (C10-C12)	2,960	44.7	DE	mg/Kg-dry	20	4/7/2016 4:13:09 AM
Aromatic Hydrocarbon (C12-C13)	4,630	44.7	DE	mg/Kg-dry	20	4/7/2016 4:13:09 AM
Benzene	ND	0.558		mg/Kg-dry	1	4/7/2016 12:32:08 PM
Toluene	1.82	0.558		mg/Kg-dry	1	4/7/2016 12:32:08 PM
Ethylbenzene	4.23	0.558	Q	mg/Kg-dry	1	4/7/2016 12:32:08 PM
m,p-Xylene	18.1	0.558		mg/Kg-dry	1	4/7/2016 12:32:08 PM
o-Xylene	11.1	0.558		mg/Kg-dry	1	4/7/2016 12:32:08 PM
Naphthalene	274	11.2	D	mg/Kg-dry	20	4/7/2016 4:13:09 AM
Methyl tert-butyl ether (MTBE)	ND	0.558	*	mg/Kg-dry	1	4/7/2016 12:32:08 PM
Surr: 1,4-Difluorobenzene	113	65-140		%Rec	1	4/7/2016 12:32:08 PM
Surr: Bromofluorobenzene	71.7	65-140	D	%Rec	20	4/7/2016 4:13:09 AM

NOTES:

Q - Indicates an analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF); high bias.

* - Flagged value is not within established control limits.



Analytical Report

WO#: 1604015
Date Reported: 4/21/2016

Client: Friedman & Bruya

Collection Date: 3/30/2016

Project: 604013

Lab ID: 1604015-001

Matrix: Soil

Client Sample ID: WSW2-11

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Sample Moisture (Percent Moisture)

Batch ID: R28628 Analyst: CG

Percent Moisture	7.71	0.500		wt%	1	4/6/2016 1:16:13 PM
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Analytical Report

WO#: 1604015

Date Reported: 4/21/2016

Client: Friedman & Bruya

Collection Date: 3/30/2016

Project: 604013

Lab ID: 1604015-002

Matrix: Soil

Client Sample ID: B1-18

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 13403

Analyst: CM

Aliphatic Hydrocarbon (C8-C10)	196	5.30	*	mg/Kg-dry	1	4/20/2016 2:58:00 AM
Aliphatic Hydrocarbon (C10-C12)	761	5.30	*	mg/Kg-dry	1	4/20/2016 2:58:00 AM
Aliphatic Hydrocarbon (C12-C16)	1,870	53.0	D	mg/Kg-dry	10	4/20/2016 6:35:00 PM
Aliphatic Hydrocarbon (C16-C21)	630	53.0	DQ	mg/Kg-dry	10	4/20/2016 6:35:00 PM
Aliphatic Hydrocarbon (C21-C34)	338	5.30	*	mg/Kg-dry	1	4/20/2016 2:58:00 AM
Aromatic Hydrocarbon (C8-C10)	100	5.30	*	mg/Kg-dry	1	4/20/2016 11:56:00 AM
Aromatic Hydrocarbon (C10-C12)	323	5.30	*	mg/Kg-dry	1	4/20/2016 11:56:00 AM
Aromatic Hydrocarbon (C12-C16)	989	5.30	*	mg/Kg-dry	1	4/20/2016 11:56:00 AM
Aromatic Hydrocarbon (C16-C21)	830	53.0	D	mg/Kg-dry	10	4/20/2016 7:29:00 PM
Aromatic Hydrocarbon (C21-C34)	1,100	53.0	D	mg/Kg-dry	10	4/20/2016 7:29:00 PM
Surr: 1-Chlorooctadecane	110	60-140		%Rec	1	4/20/2016 2:58:00 AM
Surr: o-Terphenyl	130	60-140		%Rec	1	4/20/2016 11:56:00 AM

NOTES:

Q - Indicates an analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF); high bias.

* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 13409

Analyst: BC

Aliphatic Hydrocarbon (C5-C6)	ND	1.86		mg/Kg-dry	1	4/7/2016 1:43:06 PM
Aliphatic Hydrocarbon (C6-C8)	27.5	1.86		mg/Kg-dry	1	4/7/2016 1:43:06 PM
Aliphatic Hydrocarbon (C8-C10)	ND	93.0	D	mg/Kg-dry	50	4/7/2016 4:48:40 AM
Aliphatic Hydrocarbon (C10-C12)	389	93.0	D	mg/Kg-dry	50	4/7/2016 4:48:40 AM
Aromatic Hydrocarbon (C8-C10)	159	93.0	D	mg/Kg-dry	50	4/7/2016 4:48:40 AM
Aromatic Hydrocarbon (C10-C12)	4,170	93.0	DE	mg/Kg-dry	50	4/7/2016 4:48:40 AM
Aromatic Hydrocarbon (C12-C13)	6,850	93.0	DE	mg/Kg-dry	50	4/7/2016 4:48:40 AM
Benzene	0.519	0.465		mg/Kg-dry	1	4/7/2016 1:43:06 PM
Toluene	7.80	0.465		mg/Kg-dry	1	4/7/2016 1:43:06 PM
Ethylbenzene	9.59	0.465	Q	mg/Kg-dry	1	4/7/2016 1:43:06 PM
m,p-Xylene	28.7	0.465		mg/Kg-dry	1	4/7/2016 1:43:06 PM
o-Xylene	14.7	0.465		mg/Kg-dry	1	4/7/2016 1:43:06 PM
Naphthalene	364	23.2	D	mg/Kg-dry	50	4/7/2016 4:48:40 AM
Methyl tert-butyl ether (MTBE)	ND	0.465	*	mg/Kg-dry	1	4/7/2016 1:43:06 PM
Surr: 1,4-Difluorobenzene	113	65-140		%Rec	1	4/7/2016 1:43:06 PM
Surr: Bromofluorobenzene	73.8	65-140	D	%Rec	50	4/7/2016 4:48:40 AM

NOTES:

Q - Indicates an analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF); high bias.

* - Flagged value is not within established control limits.



Analytical Report

WO#: 1604015
Date Reported: 4/21/2016

Client: Friedman & Bruya
Project: 604013
Lab ID: 1604015-002
Client Sample ID: B1-18

Collection Date: 3/30/2016
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Sample Moisture (Percent Moisture)</u>				Batch ID: R28628		Analyst: CG
Percent Moisture	12.9	0.500		wt%	1	4/6/2016 1:16:13 PM

Work Order: 1604015
 CLIENT: Friedman & Bruya
 Project: 604013

QC SUMMARY REPORT
Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: MB-13403	SampType: MBLK	Units: mg/Kg	Prep Date: 4/6/2016	RunNo: 28874							
Client ID: MBLKS	Batch ID: 13403		Analysis Date: 4/19/2016	SeqNo: 542942							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	ND	5.00									
Aliphatic Hydrocarbon (C10-C12)	ND	5.00									
Aliphatic Hydrocarbon (C12-C16)	ND	5.00									
Aliphatic Hydrocarbon (C16-C21)	ND	5.00									
Aliphatic Hydrocarbon (C21-C34)	ND	5.00									
Surr: 1-Chlorooctadecane	13.4		20.00		66.8	60	140				

Sample ID: LCS-13403	SampType: LCS	Units: mg/Kg	Prep Date: 4/6/2016	RunNo: 28874							
Client ID: LCSS	Batch ID: 13403		Analysis Date: 4/19/2016	SeqNo: 542941							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	155	5.00	100.0	0	155	70	130				S
Aliphatic Hydrocarbon (C10-C12)	123	5.00	50.00	0	245	70	130				S
Aliphatic Hydrocarbon (C12-C16)	136	5.00	50.00	0	272	70	130				S
Aliphatic Hydrocarbon (C16-C21)	41.7	5.00	50.00	0	83.3	70	130				Q
Aliphatic Hydrocarbon (C21-C34)	121	5.00	50.00	0	241	70	130				S
Surr: 1-Chlorooctadecane	12.4		20.00		62.1	60	140				

NOTES:

S - Outlying spike recovery observed (high bias). Detections will be qualified with a *.

Q - Indicates an analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF); high bias.

Sample ID: MB-13403	SampType: MBLK	Units: mg/Kg	Prep Date: 4/6/2016	RunNo: 28874							
Client ID: MBLKS	Batch ID: 13403		Analysis Date: 4/19/2016	SeqNo: 542976							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	ND	5.00									
Aromatic Hydrocarbon (C10-C12)	ND	5.00									
Aromatic Hydrocarbon (C12-C16)	ND	5.00									
Aromatic Hydrocarbon (C16-C21)	ND	5.00									
Aromatic Hydrocarbon (C21-C34)	ND	5.00									
Surr: o-Terphenyl	21.5		20.00		108	60	140				

Work Order: 1604015
 CLIENT: Friedman & Bruya
 Project: 604013

QC SUMMARY REPORT
Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: MB-13403	SampType: MBLK	Units: mg/Kg	Prep Date: 4/6/2016	RunNo: 28874							
Client ID: MBLKS	Batch ID: 13403	Analysis Date: 4/19/2016	SeqNo: 542976								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: LCS-13403	SampType: LCS	Units: mg/Kg	Prep Date: 4/6/2016	RunNo: 28874							
Client ID: LCSS	Batch ID: 13403	Analysis Date: 4/19/2016	SeqNo: 542975								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Aromatic Hydrocarbon (C8-C10)	143	5.00	50.00	0	285	70	130				S
Aromatic Hydrocarbon (C10-C12)	166	5.00	50.00	0	332	70	130				S
Aromatic Hydrocarbon (C12-C16)	173	5.00	50.00	0	347	70	130				S
Aromatic Hydrocarbon (C16-C21)	62.6	5.00	50.00	0	125	70	130				
Aromatic Hydrocarbon (C21-C34)	48.8	5.00	50.00	0	97.7	70	130				
Surr: o-Terphenyl	19.3		20.00		96.3	60	140				

NOTES:

S - Outlying spike recovery observed (high bias). Detections will be qualified with a *.

Sample ID: 1604015-001AMS	SampType: MS	Units: mg/Kg-dry	Prep Date: 4/6/2016	RunNo: 28874							
Client ID: WSW2-11	Batch ID: 13403	Analysis Date: 4/20/2016	SeqNo: 543026								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Aliphatic Hydrocarbon (C8-C10)	192	5.33	106.5	52.43	131	70	130				S
Aliphatic Hydrocarbon (C10-C12)	378	5.33	106.5	270.9	100	70	130				
Aliphatic Hydrocarbon (C12-C16)	821	5.33	106.5	714.7	99.3	70	130				
Aliphatic Hydrocarbon (C16-C21)	664	5.33	106.5	711.0	-43.9	70	130				SQ
Aliphatic Hydrocarbon (C21-C34)	288	5.33	106.5	176.4	105	70	130				
Surr: 1-Chlorooctadecane	12.9		21.31		60.6	60	140				

NOTES:

S - Outlying spike recoveries were associated with this sample.

Q - Indicates an analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF); high bias.

Work Order: 1604015
 CLIENT: Friedman & Bruya
 Project: 604013

QC SUMMARY REPORT
Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: 1604015-001AMSD	SampType: MSD	Units: mg/Kg-dry				Prep Date: 4/6/2016	RunNo: 28874				
Client ID: WSW2-11	Batch ID: 13403					Analysis Date: 4/20/2016	SeqNo: 543027				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	212	4.74	94.80	52.43	168	70	130	191.5	10.2	30	S
Aliphatic Hydrocarbon (C10-C12)	427	4.74	94.80	270.9	164	70	130	377.7	12.2	30	S
Aliphatic Hydrocarbon (C12-C16)	756	4.74	94.80	714.7	43.6	70	130	820.5	8.18	30	S
Aliphatic Hydrocarbon (C16-C21)	731	4.74	94.80	711.0	21.4	70	130	664.2	9.62	30	SQ
Aliphatic Hydrocarbon (C21-C34)	326	4.74	94.80	176.4	158	70	130	287.9	12.4	30	S
Surr: 1-Chlorooctadecane	13.5		18.96		71.3	60	140		0		

NOTES:

S - Outlying spike recoveries were associated with this sample.

Q - Indicates an analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF); high bias.

Sample ID: 1604015-002ADUP	SampType: DUP	Units: mg/Kg-dry				Prep Date: 4/6/2016	RunNo: 28874				
Client ID: B1-18	Batch ID: 13403					Analysis Date: 4/20/2016	SeqNo: 543023				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	404	5.23						196.4	69.2	30	R*
Aliphatic Hydrocarbon (C10-C12)	693	5.23						760.7	9.32	30	*
Aliphatic Hydrocarbon (C12-C16)	1,630	5.23						1,506	7.85	30	E*
Aliphatic Hydrocarbon (C16-C21)	1,500	5.23						1,211	21.1	30	EQ
Aliphatic Hydrocarbon (C21-C34)	334	5.23						338.4	1.31	30	*
Surr: 1-Chlorooctadecane	19.3		4.184		460	60	140		0		S

NOTES:

R - High RPD observed.

Q - Indicates an analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF); high bias.

* - Flagged value is not within established control limits.

Sample ID: 1604015-001AMS	SampType: MS	Units: mg/Kg-dry				Prep Date: 4/6/2016	RunNo: 28874				
Client ID: WSW2-11	Batch ID: 13403					Analysis Date: 4/20/2016	SeqNo: 543038				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	188	5.33	106.5	0	177	70	130				S
Aromatic Hydrocarbon (C10-C12)	342	5.33	106.5	0	321	70	130				S
Aromatic Hydrocarbon (C12-C16)	679	5.33	106.5	0	637	70	130				S

Work Order: 1604015
 CLIENT: Friedman & Bruya
 Project: 604013

QC SUMMARY REPORT
Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: 1604015-001AMS	SampType: MS	Units: mg/Kg-dry	Prep Date: 4/6/2016	RunNo: 28874							
Client ID: WSW2-11	Batch ID: 13403		Analysis Date: 4/20/2016	SeqNo: 543038							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Aromatic Hydrocarbon (C16-C21)	986	5.33	106.5	0	925	70	130				S
Aromatic Hydrocarbon (C21-C34)	416	5.33	106.5	0	390	70	130				S
Surr: o-Terphenyl	23.6		21.31		111	60	140				

NOTES:

S - Outlying spike recoveries were associated with this sample.

Sample ID: 1604015-001AMSD	SampType: MSD	Units: mg/Kg-dry	Prep Date: 4/6/2016	RunNo: 28874							
Client ID: WSW2-11	Batch ID: 13403		Analysis Date: 4/20/2016	SeqNo: 543034							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Aromatic Hydrocarbon (C8-C10)	217	4.74	94.80	0	229	70	130	0	200	30	S
Aromatic Hydrocarbon (C10-C12)	413	4.74	94.80	0	435	70	130	0	200	30	S
Aromatic Hydrocarbon (C12-C16)	815	4.74	94.80	0	860	70	130	0	200	30	S
Aromatic Hydrocarbon (C16-C21)	1,420	4.74	94.80	0	1,490	70	130	0	200	30	S
Aromatic Hydrocarbon (C21-C34)	831	4.74	94.80	0	877	70	130	0	200	30	S
Surr: o-Terphenyl	26.1		18.96		138	60	140		0		

NOTES:

S - Outlying spike recoveries were associated with this sample.

Sample ID: 1604015-002ADUP	SampType: DUP	Units: mg/Kg-dry	Prep Date: 4/6/2016	RunNo: 28874							
Client ID: B1-18	Batch ID: 13403		Analysis Date: 4/20/2016	SeqNo: 543031							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Aromatic Hydrocarbon (C8-C10)	84.1	5.23						0	200	30	*
Aromatic Hydrocarbon (C10-C12)	278	5.23						0	200	30	*
Aromatic Hydrocarbon (C12-C16)	853	5.23						0	200	30	*
Aromatic Hydrocarbon (C16-C21)	1,730	5.23						0	200	30	E
Aromatic Hydrocarbon (C21-C34)	1,120	5.23						0	200	30	E
Surr: o-Terphenyl	27.3		20.92		131	60	140		0		

NOTES:

* - Flagged value is not within established control limits.



Work Order: 1604015
 CLIENT: Friedman & Bruya
 Project: 604013

QC SUMMARY REPORT
Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: LCS-13409	SampType: LCS	Units: mg/Kg	Prep Date: 4/6/2016	RunNo: 28673							
Client ID: LCSS	Batch ID: 13409		Analysis Date: 4/7/2016	SeqNo: 539441							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Aliphatic Hydrocarbon (C5-C6)	21.2	2.00	30.00	0	70.7	70	130				
Aliphatic Hydrocarbon (C6-C8)	8.35	2.00	10.00	0	83.5	70	130				
Aliphatic Hydrocarbon (C8-C10)	9.26	2.00	10.00	0	92.6	70	130				
Aliphatic Hydrocarbon (C10-C12)	8.58	2.00	10.00	0	85.8	70	130				
Aromatic Hydrocarbon (C8-C10)	37.2	2.00	40.00	0	93.0	70	130				
Aromatic Hydrocarbon (C10-C12)	9.07	2.00	10.00	0	90.7	70	130				
Aromatic Hydrocarbon (C12-C13)	7.36	2.00	10.00	0	73.6	70	130				
Benzene	8.17	0.500	10.00	0	81.7	70	130				
Toluene	8.13	0.500	10.00	0	81.3	70	130				
Ethylbenzene	8.51	0.500	10.00	0	85.1	70	130				
m,p-Xylene	17.4	0.500	20.00	0	86.8	70	130				
o-Xylene	8.84	0.500	10.00	0	88.4	70	130				
Naphthalene	7.43	0.500	10.00	0	74.3	70	130				
Methyl tert-butyl ether (MTBE)	ND	0.500	10.00	0	0	70	130				SQ
Surr: 1,4-Difluorobenzene	2.57		2.500		103	65	140				
Surr: Bromofluorobenzene	2.57		2.500		103	65	140				

NOTES:

S - Outlying spike recovery observed (low bias). Samples will be qualified with a *.

Q - Indicates an analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF); high bias.

Sample ID: MB-13409	SampType: MBLK	Units: mg/Kg	Prep Date: 4/6/2016	RunNo: 28673							
Client ID: MBLKS	Batch ID: 13409		Analysis Date: 4/7/2016	SeqNo: 539319							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Aliphatic Hydrocarbon (C5-C6)	ND	2.00		0	0						
Aliphatic Hydrocarbon (C6-C8)	ND	2.00		0	0						
Aliphatic Hydrocarbon (C8-C10)	ND	2.00		0	0						
Aliphatic Hydrocarbon (C10-C12)	ND	2.00		0	0						
Aromatic Hydrocarbon (C8-C10)	ND	2.00		0	0						
Aromatic Hydrocarbon (C10-C12)	ND	2.00		0	0						
Aromatic Hydrocarbon (C12-C13)	ND	2.00		0	0						



Work Order: 1604015
 CLIENT: Friedman & Bruya
 Project: 604013

QC SUMMARY REPORT
Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: MB-13409	SampType: MBLK	Units: mg/Kg	Prep Date: 4/6/2016	RunNo: 28673							
Client ID: MBLKS	Batch ID: 13409		Analysis Date: 4/7/2016	SeqNo: 539319							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Benzene	ND	0.500		0	0						
Toluene	ND	0.500		0	0						
Ethylbenzene	ND	0.500		0	0						
m,p-Xylene	ND	0.500		0	0						
o-Xylene	ND	0.500		0	0						
Naphthalene	ND	0.500		0	0						
Methyl tert-butyl ether (MTBE)	ND	0.500		0	0						*
Surr: 1,4-Difluorobenzene	2.55		2.500		102	65	140				
Surr: Bromofluorobenzene	1.91		2.500		76.4	65	140				

NOTES:

* - Flagged value is not within established control limits.

Sample ID: 1604014-001BDUP	SampType: DUP	Units: mg/Kg-dry	Prep Date: 4/6/2016	RunNo: 28673							
Client ID: BATCH	Batch ID: 13409		Analysis Date: 4/7/2016	SeqNo: 539305							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Aliphatic Hydrocarbon (C5-C6)	ND	1.65		0	0			0		25	
Aliphatic Hydrocarbon (C6-C8)	6.01	1.65		0	0			4.209	35.2	25	R
Aliphatic Hydrocarbon (C8-C10)	7.10	1.65		0	0			3.721	62.4	25	R
Aliphatic Hydrocarbon (C10-C12)	20.6	1.65		0	0			19.61	5.04	25	
Aromatic Hydrocarbon (C8-C10)	11.8	1.65		0	0			8.624	30.8	25	R
Aromatic Hydrocarbon (C10-C12)	89.9	1.65		0	0			80.54	11.0	25	E
Aromatic Hydrocarbon (C12-C13)	64.5	1.65		0	0			62.40	3.25	25	
Benzene	ND	0.413		0	0			0		25	
Toluene	ND	0.413		0	0			0		25	
Ethylbenzene	ND	0.413		0	0			0		25	
m,p-Xylene	ND	0.413		0	0			0		25	
o-Xylene	ND	0.413		0	0			0		25	
Naphthalene	6.81	0.413		0	0			6.449	5.40	25	
Methyl tert-butyl ether (MTBE)	ND	0.413		0	0			0		25	*
Surr: 1,4-Difluorobenzene	2.10		2.064		102	65	140		0		

Work Order: 1604015
 CLIENT: Friedman & Bruya
 Project: 604013

QC SUMMARY REPORT
Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: 1604014-001BDUP	SampType: DUP	Units: mg/Kg-dry	Prep Date: 4/6/2016	RunNo: 28673							
Client ID: BATCH	Batch ID: 13409		Analysis Date: 4/7/2016	SeqNo: 539305							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Surr: Bromofluorobenzene	2.06		2.064		99.7	65	140		0	0	
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NOTES:
 R - High RPD observed. The method is in control as indicated by the Laboratory Control Sample (LCS).
 * - Flagged value is not within established control limits.

Sample ID: 1604015-002BMS	SampType: MS	Units: mg/Kg-dry	Prep Date: 4/6/2016	RunNo: 28673							
Client ID: B1-18	Batch ID: 13409		Analysis Date: 4/7/2016	SeqNo: 539310							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Aliphatic Hydrocarbon (C5-C6)	22.2	1.86	27.90	1.398	74.7	70	130				
Aliphatic Hydrocarbon (C6-C8)	41.4	1.86	9.299	27.47	149	70	130				S
Aliphatic Hydrocarbon (C8-C10)	81.4	1.86	9.299	66.78	157	70	130				SE
Aliphatic Hydrocarbon (C10-C12)	414	1.86	9.299	329.4	913	70	130				SE
Aromatic Hydrocarbon (C8-C10)	313	1.86	37.20	245.5	180	70	130				SE
Aromatic Hydrocarbon (C10-C12)	613	1.86	9.299	589.6	253	70	130				SQE
Aromatic Hydrocarbon (C12-C13)	554	1.86	9.299	813.4	-2,790	70	130				SQE
Benzene	12.8	0.465	9.299	0.5190	132	70	130				S
Toluene	17.9	0.465	9.299	7.797	108	70	130				
Ethylbenzene	17.9	0.465	9.299	9.588	89.3	70	130				Q
m,p-Xylene	44.2	0.465	18.60	28.70	83.6	70	130				
o-Xylene	22.8	0.465	9.299	14.67	87.5	70	130				
Naphthalene	152	0.465	9.299	100.5	551	70	130				S
Methyl tert-butyl ether (MTBE)	ND	0.465	9.299	0	0	70	130				S*
Surr: 1,4-Difluorobenzene	3.10		2.325		133	65	140				
Surr: Bromofluorobenzene	4.47		2.325		192	65	140				S

NOTES:
 S - Outlying surrogate recovery attributed to TPH interference. The method is in control as indicated by the Method Blank (MB) & Laboratory Control Sample (LCS).
 Q - Indicates an analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF); high bias.
 * - Flagged value is not within established control limits.

Work Order: 1604015
 CLIENT: Friedman & Bruya
 Project: 604013

QC SUMMARY REPORT
Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: 1604015-002BMSD	SampType: MSD	Units: mg/Kg-dry	Prep Date: 4/6/2016	RunNo: 28673
Client ID: B1-18	Batch ID: 13409		Analysis Date: 4/7/2016	SeqNo: 539311

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	23.5	1.86	27.90	1.398	79.4	70	130	22.24	5.70	30	
Aliphatic Hydrocarbon (C6-C8)	41.6	1.86	9.299	27.47	152	70	130	41.37	0.498	30	S
Aliphatic Hydrocarbon (C8-C10)	79.6	1.86	9.299	66.78	138	70	130	81.39	2.27	30	SE
Aliphatic Hydrocarbon (C10-C12)	458	1.86	9.299	329.4	1,390	70	130	414.3	10.1	30	SE
Aromatic Hydrocarbon (C8-C10)	330	1.86	37.20	245.5	227	70	130	312.6	5.44	30	SE
Aromatic Hydrocarbon (C10-C12)	593	1.86	9.299	589.6	40.2	70	130	613.1	3.29	30	SQE
Aromatic Hydrocarbon (C12-C13)	688	1.86	9.299	813.4	-1,350	70	130	554.2	21.5	30	SQE
Benzene	13.1	0.465	9.299	0.5190	135	70	130	12.80	2.14	30	S
Toluene	19.1	0.465	9.299	7.797	122	70	130	17.85	6.73	30	
Ethylbenzene	20.2	0.465	9.299	9.588	114	70	130	17.89	12.1	30	Q
m,p-Xylene	49.2	0.465	18.60	28.70	110	70	130	44.24	10.7	30	
o-Xylene	25.2	0.465	9.299	14.67	113	70	130	22.80	9.90	30	
Naphthalene	167	0.465	9.299	100.5	720	70	130	151.7	9.85	30	SE
Methyl tert-butyl ether (MTBE)	ND	0.465	9.299	0	0	70	130	0		30	S*
Surr: 1,4-Difluorobenzene	3.52		2.325		151	65	140		0		S
Surr: Bromofluorobenzene	4.89		2.325		210	65	140		0	0	S

NOTES:

S - Outlying surrogate recovery attributed to TPH interference. The method is in control as indicated by the Method Blank (MB) & Laboratory Control Sample (LCS).
 Q - Indicates an analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF); high bias.
 * - Flagged value is not within established control limits.



Date: 4/21/2016

Work Order: 1604015
CLIENT: Friedman & Bruya
Project: 604013

QC SUMMARY REPORT
Sample Moisture (Percent Moisture)

Sample ID: 1604002-001ADUP	SampType: DUP	Units: wt%	Prep Date: 4/6/2016	RunNo: 28628							
Client ID: BATCH	Batch ID: R28628		Analysis Date: 4/6/2016	SeqNo: 538346							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	19.5	0.500						16.74	15.4	20	

Client Name: FB	Work Order Number: 1604015
Logged by: Erica Silva	Date Received: 4/1/2016 3:54:00 PM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes No NA
- No cooler present**
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
7. Were all items received at a temperature of >0°C to 10.0°C * Yes No NA
- Please refer to Item Information**
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	10.1
Sample	10.3

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

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May 19, 2016

Ken Nogeire, Project Manager
PBS Engineering and Environmental, Inc.
2517 Eastlake Ave E, Suite 100
Seattle, WA 98102

Dear Mr. Nogeire:

Included are the results from the testing of material submitted on May 11, 2016 from the 41392, F&BI 605193 project. There are 12 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: Megan Nogeire
PBS0519R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on May 11, 2016 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental 41392, F&BI 605193 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>PBS Engineering and Environmental</u>
605193 -01	MW1
605193 -02	MW2
605193 -03	Trip blank

The 8270D laboratory control sample and laboratory control sample duplicate failed the relative percent difference for several compounds. The analytes were not detected therefore the data were acceptable.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/19/16
Date Received: 05/11/16
Project: 41392, F&BI 605193
Date Extracted: 05/12/16
Date Analyzed: 05/12/16 and 05/13/16

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 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)
MW1 605193-01	49	78	89	440	4,300	118
MW2 605193-02	<1	<1	1.1	<3	420	101
Method Blank 06-943 MB	<1	<1	<1	<3	<100	96

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/19/16
Date Received: 05/11/16
Project: 41392, F&BI 605193
Date Extracted: 05/12/16
Date Analyzed: 05/12/16

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES
USING METHOD 8021B**

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>Surrogate (% Recovery)</u> Limit (52-124)
Trip blank 605193-03	<1	<1	<1	<3	98
Method Blank 06-943 MB	<1	<1	<1	<3	96

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/19/16
Date Received: 05/11/16
Project: 41392, F&BI 605193
Date Extracted: 05/12/16
Date Analyzed: 05/12/16

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**
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 41-152)
MW1 605193-01	12,000	1,100 x	72
MW2 605193-02	1,300	250 x	112
Method Blank 06-959 MB	<50	<250	97

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	MW1	Client:	PBS Engineering and Environmental
Date Received:	05/11/16	Project:	41392, F&BI 605193
Date Extracted:	05/12/16	Lab ID:	605193-01 1/2
Date Analyzed:	05/12/16	Data File:	051222.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	87	31	160
Benzo(a)anthracene-d12	67	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	38 ve
Acenaphthylene	<0.06
Acenaphthene	0.16
Fluorene	0.19
Phenanthrene	0.18
Anthracene	<0.06
Fluoranthene	<0.06
Pyrene	<0.06
Benz(a)anthracene	<0.06
Chrysene	<0.06
Benzo(a)pyrene	<0.06
Benzo(b)fluoranthene	<0.06
Benzo(k)fluoranthene	<0.06
Indeno(1,2,3-cd)pyrene	<0.06
Dibenz(a,h)anthracene	<0.06
Benzo(g,h,i)perylene	<0.06

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	MW1	Client:	PBS Engineering and Environmental
Date Received:	05/11/16	Project:	41392, F&BI 605193
Date Extracted:	05/12/16	Lab ID:	605193-01 1/40
Date Analyzed:	05/13/16	Data File:	051304.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	111 d	31	160
Benzo(a)anthracene-d12	76 d	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	56
Acenaphthylene	<1.2
Acenaphthene	<1.2
Fluorene	<1.2
Phenanthrene	<1.2
Anthracene	<1.2
Fluoranthene	<1.2
Pyrene	<1.2
Benz(a)anthracene	<1.2
Chrysene	<1.2
Benzo(a)pyrene	<1.2
Benzo(b)fluoranthene	<1.2
Benzo(k)fluoranthene	<1.2
Indeno(1,2,3-cd)pyrene	<1.2
Dibenz(a,h)anthracene	<1.2
Benzo(g,h,i)perylene	<1.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	MW2	Client:	PBS Engineering and Environmental
Date Received:	05/11/16	Project:	41392, F&BI 605193
Date Extracted:	05/12/16	Lab ID:	605193-02 1/2
Date Analyzed:	05/12/16	Data File:	051223.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	105	31	160
Benzo(a)anthracene-d12	94	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	3.9
Acenaphthylene	<0.06
Acenaphthene	0.23
Fluorene	0.25
Phenanthrene	0.42
Anthracene	<0.06
Fluoranthene	<0.06
Pyrene	0.11
Benz(a)anthracene	<0.06
Chrysene	<0.06
Benzo(a)pyrene	<0.06
Benzo(b)fluoranthene	<0.06
Benzo(k)fluoranthene	<0.06
Indeno(1,2,3-cd)pyrene	<0.06
Dibenz(a,h)anthracene	<0.06
Benzo(g,h,i)perylene	<0.06

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	41392, F&BI 605193
Date Extracted:	05/12/16	Lab ID:	06-934 mb
Date Analyzed:	05/12/16	Data File:	051217.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	90	31	160
Benzo(a)anthracene-d12	92	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.03
Acenaphthylene	<0.03
Acenaphthene	<0.03
Fluorene	<0.03
Phenanthrene	<0.03
Anthracene	<0.03
Fluoranthene	<0.03
Pyrene	<0.03
Benz(a)anthracene	<0.03
Chrysene	<0.03
Benzo(a)pyrene	<0.03
Benzo(b)fluoranthene	<0.03
Benzo(k)fluoranthene	<0.03
Indeno(1,2,3-cd)pyrene	<0.03
Dibenz(a,h)anthracene	<0.03
Benzo(g,h,i)perylene	<0.03

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/19/16

Date Received: 05/11/16

Project: 41392, F&BI 605193

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

Laboratory Code: 605188-05 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (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	95	65-118
Toluene	ug/L (ppb)	50	97	72-122
Ethylbenzene	ug/L (ppb)	50	97	73-126
Xylenes	ug/L (ppb)	150	96	74-118
Gasoline	ug/L (ppb)	1,000	93	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/19/16

Date Received: 05/11/16

Project: 41392, F&BI 605193

**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

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	97	96	63-142	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/19/16

Date Received: 05/11/16

Project: 41392, F&BI 605193

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	ug/L (ppb)	1	98	89	67-116	10
Acenaphthylene	ug/L (ppb)	1	98	89	65-119	10
Acenaphthene	ug/L (ppb)	1	100	91	66-118	9
Fluorene	ug/L (ppb)	1	96	88	64-125	9
Phenanthrene	ug/L (ppb)	1	101	93	67-120	8
Anthracene	ug/L (ppb)	1	98	90	65-122	9
Fluoranthene	ug/L (ppb)	1	89	83	65-127	7
Pyrene	ug/L (ppb)	1	109	95	62-130	14
Benz(a)anthracene	ug/L (ppb)	1	112	98	60-118	13
Chrysene	ug/L (ppb)	1	109	96	66-125	13
Benzo(b)fluoranthene	ug/L (ppb)	1	107	91	55-135	16
Benzo(k)fluoranthene	ug/L (ppb)	1	100	93	62-125	7
Benzo(a)pyrene	ug/L (ppb)	1	102	89	58-127	14
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	1	102	77	36-142	28 vo
Dibenz(a,h)anthracene	ug/L (ppb)	1	94	69	37-133	31 vo
Benzo(g,h,i)perylene	ug/L (ppb)	1	96	74	34-135	26 vo

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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.

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 the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

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

j - The analyte concentration is reported below the lowest calibration standard. 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 laboratory control sample(s) percent recovery and/or RPD were 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 analyte 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 with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

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.

605193

SAMPLE CHAIN OF CUSTODY

ME 05-11-16

DOV/v1

Send Report To K. Nogueira

Company PBS

Address 2517 Eastlake Ave. E

City, State, ZIP Seattle, WA

Phone # 509.572.8163 Fax #

SAMPLERS (signature)

Megan Nogueira

PROJECT NAME/NO.

41392

PO #

41392

REMARKS

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

ANALYSES REQUESTED

Sample ID	Sample Location	Sample Depth	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	NWTPH-Dx	NWTPH-Ox	BTEX by 8021B	VOC's by 8260	SVOC's by 8270	RCRA-8 Metals	Notes
MW1			01A-F	10/4/16	5:00 AM	water	5	X	X	X				
MW2			02 +	11/3/16	5:00 AM	water	5	X	X	X				
trip blank			03A-B			water	2			X				

Friedman & Bruya, Inc
3012 16th Avenue West

Seattle, WA 98119

Ph (206) 285-8282

Fax (206) 283-5044

FORMS\COC\SESGEMSR1.DOC (Revision 1)

SIGNATURE

Received by: Ken Nogueira

Relinquished by: [Signature]

PRINT NAME

Ken Nogueira

D. Barnes

COMPANY

PBS

Federal SDC

DATE

5/11/16

2:34

TIME

1:00

3:00

Samples received at 5 °C

Received by: [Signature]

Relinquished by: [Signature]

Received by: [Signature]

Relinquished by: [Signature]

Received by: [Signature]

Relinquished by: [Signature]

Samples received at 5 °C

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

November 21, 2016

Ken Nogeire, Project Manager
PBS Engineering and Environmental, Inc.
2517 Eastlake Ave E, Suite 100
Seattle, WA 98102

Dear Mr Nogeire:

Included are the results from the testing of material submitted on November 9, 2016 from the Coleman Oil PO 41392.000, F&BI 611160 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: Mike Bagley
PBS1121R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on November 9, 2016 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Coleman Oil PO 41392.000, F&BI 611160 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>PBS Engineering and Environmental</u>
611160 -01	MW-5
611160 -02	MW-5a
611160 -03	MW-4
611160 -04	MW-6

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/21/16

Date Received: 11/09/16

Project: Coleman Oil PO 41392.000, F&BI 611160

Date Extracted: 11/15/16

Date Analyzed: 11/15/16 and 11/16/16

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

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<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-5a 611160-02	<0.02	<0.02	0.27	1.1	140	92
MW-4 611160-03	<0.02	<0.02	<0.02	<0.06	<2	80
MW-6 611160-04	<0.02	<0.02	<0.02	<0.06	<2	79
Method Blank	<0.02	<0.02	<0.02	<0.06	<2	82

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/21/16
Date Received: 11/09/16
Project: Coleman Oil PO 41392.000, F&BI 611160
Date Extracted: 11/09/16
Date Analyzed: 11/10/16

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**

Results Reported on a Dry Weight Basis
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 56-165)
MW-5 611160-01	<50	<250	115
MW-5a 611160-02	1,100	<250	103
MW-4 611160-03	<50	<250	99
MW-6 611160-04	<50	<250	100
Method Blank 06-2339 MB	<50	<250	108

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/21/16

Date Received: 11/09/16

Project: Coleman Oil PO 41392.000, F&BI 611160

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

Laboratory Code: 611184-06 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<2	<2	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	
			Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	91	69-120
Toluene	mg/kg (ppm)	0.5	90	70-117
Ethylbenzene	mg/kg (ppm)	0.5	89	65-123
Xylenes	mg/kg (ppm)	1.5	88	66-120
Gasoline	mg/kg (ppm)	20	80	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/21/16

Date Received: 11/09/16

Project: Coleman Oil PO 41392.000, F&BI 611160

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

Laboratory Code: 611159-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	92	94	64-133	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	92	58-147

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.

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 the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

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

j - The analyte concentration is reported below the lowest calibration standard. 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 laboratory control sample(s) percent recovery and/or RPD were 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 analyte 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 with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

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.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 22, 2016

Ken Nogeire, Project Manager
PBS Engineering and Environmental, Inc.
2517 Eastlake Ave E, Suite 100
Seattle, WA 98102

Dear Mr Nogeire:

Included are the results from the testing of material submitted on December 14, 2016 from the Coleman Oil PO 41392, F&BI 612214 project. There are 13 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
PBS1222R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 14, 2016 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Coleman Oil PO 41392, F&BI 612214 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>PBS Engineering and Environmental</u>
612214 -01	MW3
612214 -02	MW2
612214 -03	MW5
612214 -04	MW4
612214 -05	MW6
612214 -06	Trip Blank

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/22/16
Date Received: 12/14/16
Project: Coleman Oil PO 41392, F&BI 612214
Date Extracted: 12/15/16
Date Analyzed: 12/15/16

**RESULTS FROM THE ANALYSIS OF SOIL/PRODUCT SAMPLES
FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID**
Results Reported as Not Detected (ND) or Detected (D)

**THE DATA PROVIDED BELOW WAS PERFORMED PER THE GUIDELINES ESTABLISHED BY THE
WASHINGTON DEPARTMENT OF ECOLOGY AND WERE NOT DESIGNED TO PROVIDE INFORMATION
WITH REGARDS TO THE ACTUAL IDENTIFICATION OF ANY MATERIAL PRESENT**

<u>Sample ID</u> Laboratory ID	<u>Gasoline</u>	<u>Diesel</u>	<u>Heavy Oil</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 56-165)
MW3 612214-01 1/1000	D	D	ND	156
MW2 612214-02 1/1000	D	D	ND	116
MW5 612214-03 1/1000	ND	D	ND	ip
Method Blank 06-2575 MB2	ND	ND	ND	103

ND - Material not detected at or above 20,000 mg/kg gas, 50,000 mg/kg diesel and 250,000 mg/kg heavy oil.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/22/16
Date Received: 12/14/16
Project: Coleman Oil PO 41392, F&BI 612214
Date Extracted: 12/15/16
Date Analyzed: 12/15/16

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 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)
MW4 612214-04 1/100	500	<100	130	<300	12,000	87
MW6 612214-05 1/100	110	<100	130	<300	13,000	88
Method Blank 06-2560 MB	<1	<1	<1	<3	<100	90

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/22/16
Date Received: 12/14/16
Project: Coleman Oil PO 41392, F&BI 612214
Date Extracted: 12/15/16
Date Analyzed: 12/15/16

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**
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 41-152)
MW4 612214-04	3,200 x	460 x	108
MW6 612214-05	3,100 x	<250	99
Method Blank 06-2576 MB2	<50	<250	96

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID: MW4	Client: PBS Engineering and Environmental
Date Received: 12/14/16	Project: Coleman Oil PO 41392, F&BI 612214
Date Extracted: 12/19/16	Lab ID: 612214-04 1/2
Date Analyzed: 12/19/16	Data File: 121911.D
Matrix: Water	Instrument: GCMS6
Units: ug/L (ppb)	Operator: ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	86	31	160
Benzo(a)anthracene-d12	91	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	150 ve
Acenaphthylene	<0.06
Acenaphthene	1.1
Fluorene	3.4
Phenanthrene	2.2
Anthracene	0.086
Fluoranthene	<0.06
Pyrene	<0.06
Benz(a)anthracene	<0.06
Chrysene	<0.06
Benzo(a)pyrene	<0.06
Benzo(b)fluoranthene	<0.06
Benzo(k)fluoranthene	<0.06
Indeno(1,2,3-cd)pyrene	<0.06
Dibenz(a,h)anthracene	<0.06
Benzo(g,h,i)perylene	<0.06

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID: MW4	Client: PBS Engineering and Environmental
Date Received: 12/14/16	Project: Coleman Oil PO 41392, F&BI 612214
Date Extracted: 12/19/16	Lab ID: 612214-04 1/200
Date Analyzed: 12/19/16	Data File: 121925.D
Matrix: Water	Instrument: GCMS6
Units: ug/L (ppb)	Operator: ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	268 d	31	160
Benzo(a)anthracene-d12	125 d	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	160
Acenaphthylene	<6
Acenaphthene	<6
Fluorene	<6
Phenanthrene	<6
Anthracene	<6
Fluoranthene	<6
Pyrene	<6
Benz(a)anthracene	<6
Chrysene	<6
Benzo(a)pyrene	<6
Benzo(b)fluoranthene	<6
Benzo(k)fluoranthene	<6
Indeno(1,2,3-cd)pyrene	<6
Dibenz(a,h)anthracene	<6
Benzo(g,h,i)perylene	<6

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	MW6	Client:	PBS Engineering and Environmental
Date Received:	12/14/16	Project:	Coleman Oil PO 41392, F&BI 612214
Date Extracted:	12/19/16	Lab ID:	612214-05 1/2
Date Analyzed:	12/19/16	Data File:	121912.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	95	31	160
Benzo(a)anthracene-d12	90	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	310 ve
Acenaphthylene	<0.06
Acenaphthene	0.24
Fluorene	0.25
Phenanthrene	<0.06
Anthracene	<0.06
Fluoranthene	<0.06
Pyrene	<0.06
Benz(a)anthracene	<0.06
Chrysene	<0.06
Benzo(a)pyrene	<0.06
Benzo(b)fluoranthene	<0.06
Benzo(k)fluoranthene	<0.06
Indeno(1,2,3-cd)pyrene	<0.06
Dibenz(a,h)anthracene	<0.06
Benzo(g,h,i)perylene	<0.06

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	MW6	Client:	PBS Engineering and Environmental
Date Received:	12/14/16	Project:	Coleman Oil PO 41392, F&BI 612214
Date Extracted:	12/19/16	Lab ID:	612214-05 1/200
Date Analyzed:	12/19/16	Data File:	121926.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	295 d	31	160
Benzo(a)anthracene-d12	124 d	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	310
Acenaphthylene	<6
Acenaphthene	<6
Fluorene	<6
Phenanthrene	<6
Anthracene	<6
Fluoranthene	<6
Pyrene	<6
Benz(a)anthracene	<6
Chrysene	<6
Benzo(a)pyrene	<6
Benzo(b)fluoranthene	<6
Benzo(k)fluoranthene	<6
Indeno(1,2,3-cd)pyrene	<6
Dibenz(a,h)anthracene	<6
Benzo(g,h,i)perylene	<6

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Coleman Oil PO 41392, F&BI 612214
Date Extracted:	12/19/16	Lab ID:	06-2598 mb
Date Analyzed:	12/19/16	Data File:	121905.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	95	31	160
Benzo(a)anthracene-d12	97	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.03
Acenaphthylene	<0.03
Acenaphthene	<0.03
Fluorene	<0.03
Phenanthrene	<0.03
Anthracene	<0.03
Fluoranthene	<0.03
Pyrene	<0.03
Benz(a)anthracene	<0.03
Chrysene	<0.03
Benzo(a)pyrene	<0.03
Benzo(b)fluoranthene	<0.03
Benzo(k)fluoranthene	<0.03
Indeno(1,2,3-cd)pyrene	<0.03
Dibenz(a,h)anthracene	<0.03
Benzo(g,h,i)perylene	<0.03

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/22/16

Date Received: 12/14/16

Project: Coleman Oil PO 41392, F&BI 612214

**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: 612173-03 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (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	65-118
Toluene	ug/L (ppb)	50	105	72-122
Ethylbenzene	ug/L (ppb)	50	108	73-126
Xylenes	ug/L (ppb)	150	104	74-118
Gasoline	ug/L (ppb)	1,000	108	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/22/16

Date Received: 12/14/16

Project: Coleman Oil PO 41392, F&BI 612214

**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

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	93	103	63-142	10

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/22/16

Date Received: 12/14/16

Project: Coleman Oil PO 41392, F&BI 612214

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	ug/L (ppb)	1	91	85	67-116	7
Acenaphthylene	ug/L (ppb)	1	91	86	65-119	6
Acenaphthene	ug/L (ppb)	1	89	85	66-118	5
Fluorene	ug/L (ppb)	1	92	88	64-125	4
Phenanthrene	ug/L (ppb)	1	90	88	67-120	2
Anthracene	ug/L (ppb)	1	93	89	65-122	4
Fluoranthene	ug/L (ppb)	1	92	88	65-127	4
Pyrene	ug/L (ppb)	1	84	83	62-130	1
Benz(a)anthracene	ug/L (ppb)	1	95	91	60-118	4
Chrysene	ug/L (ppb)	1	94	89	66-125	5
Benzo(b)fluoranthene	ug/L (ppb)	1	84	81	55-135	4
Benzo(k)fluoranthene	ug/L (ppb)	1	90	88	62-125	2
Benzo(a)pyrene	ug/L (ppb)	1	86	82	58-127	5
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	1	89	83	36-142	7
Dibenz(a,h)anthracene	ug/L (ppb)	1	81	78	37-133	4
Benzo(g,h,i)perylene	ug/L (ppb)	1	87	78	34-135	11

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.

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 the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

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

j - The analyte concentration is reported below the lowest calibration standard. 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 laboratory control sample(s) percent recovery and/or RPD were 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 analyte is likely due to laboratory contamination.

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

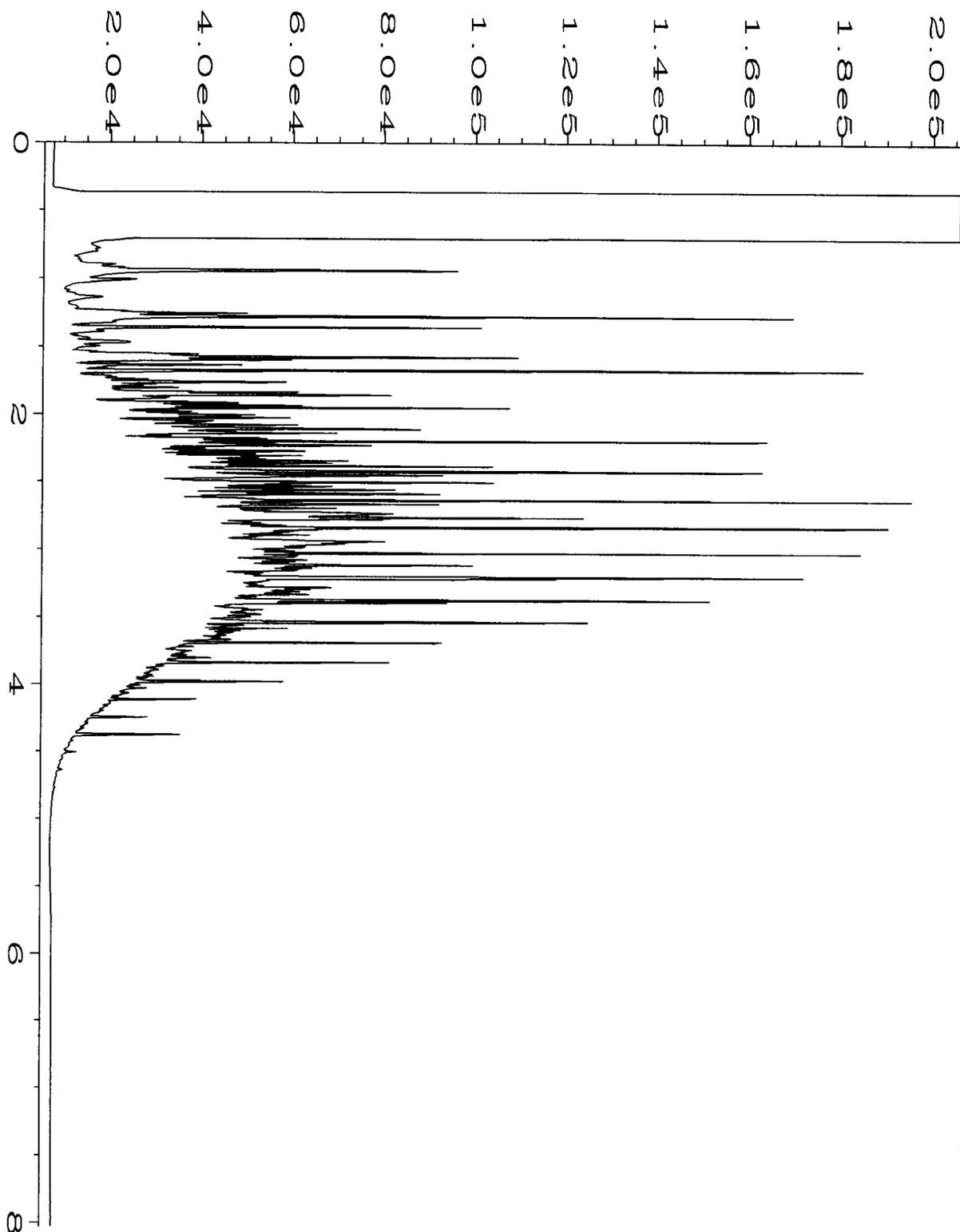
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

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

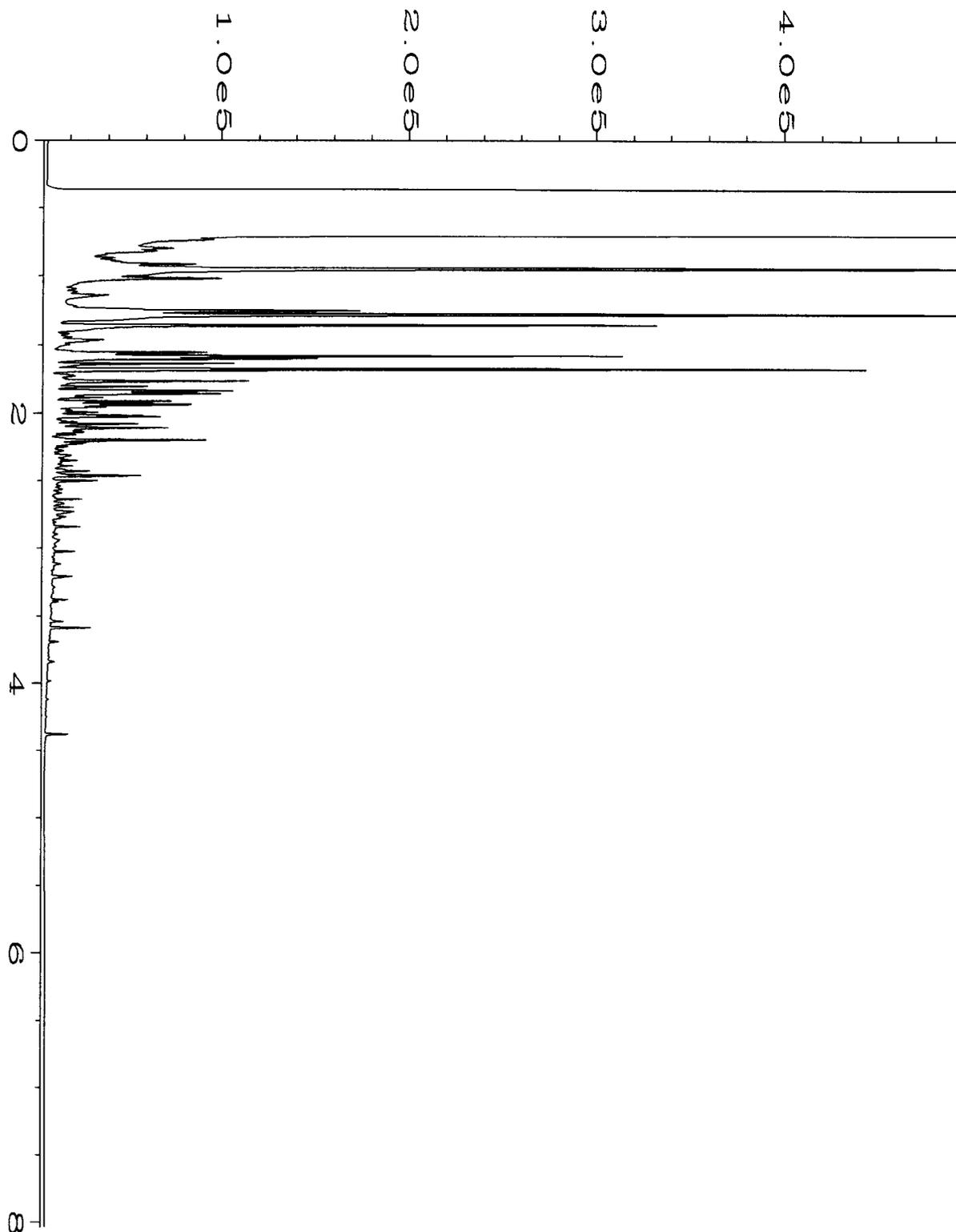
ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

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

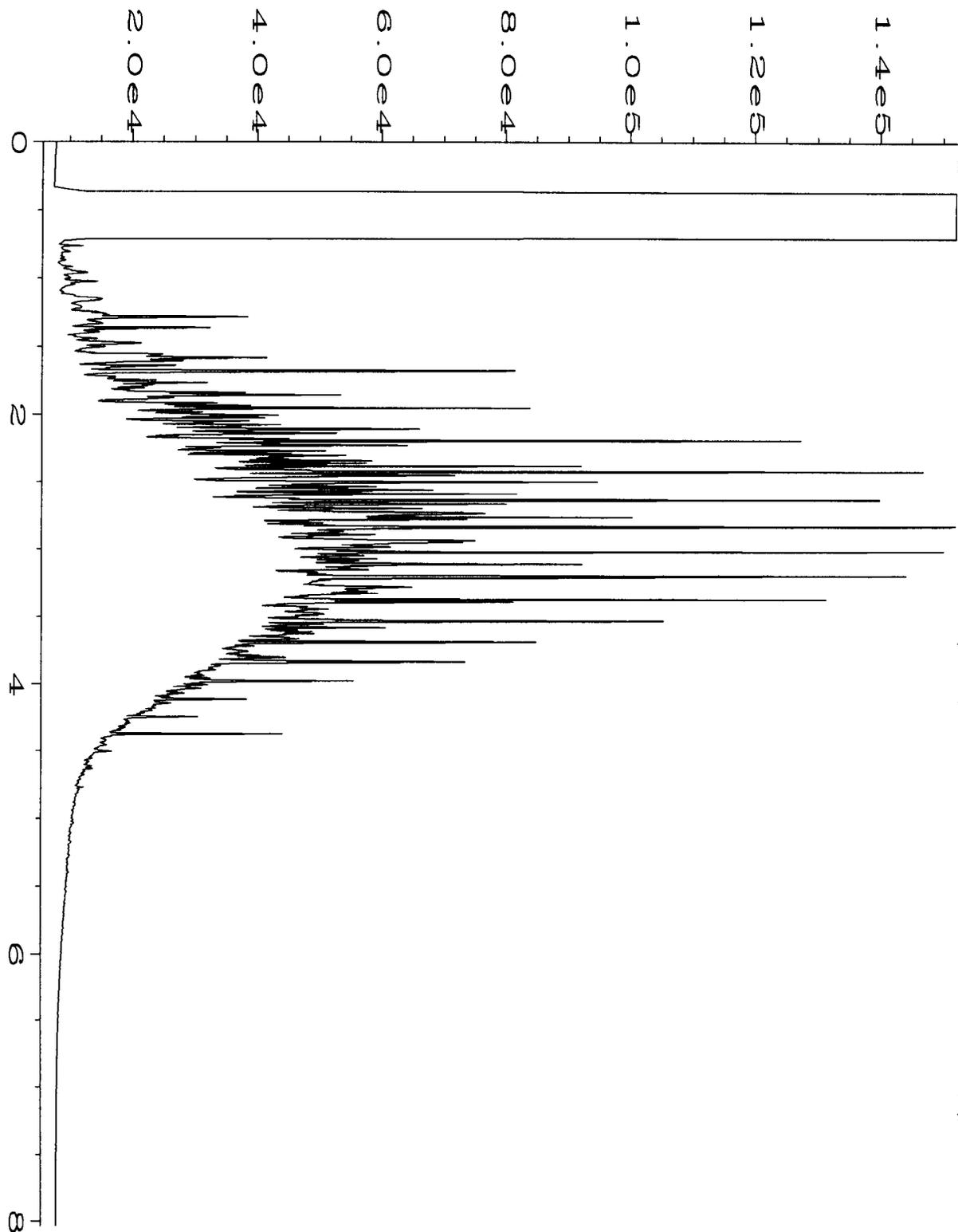
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



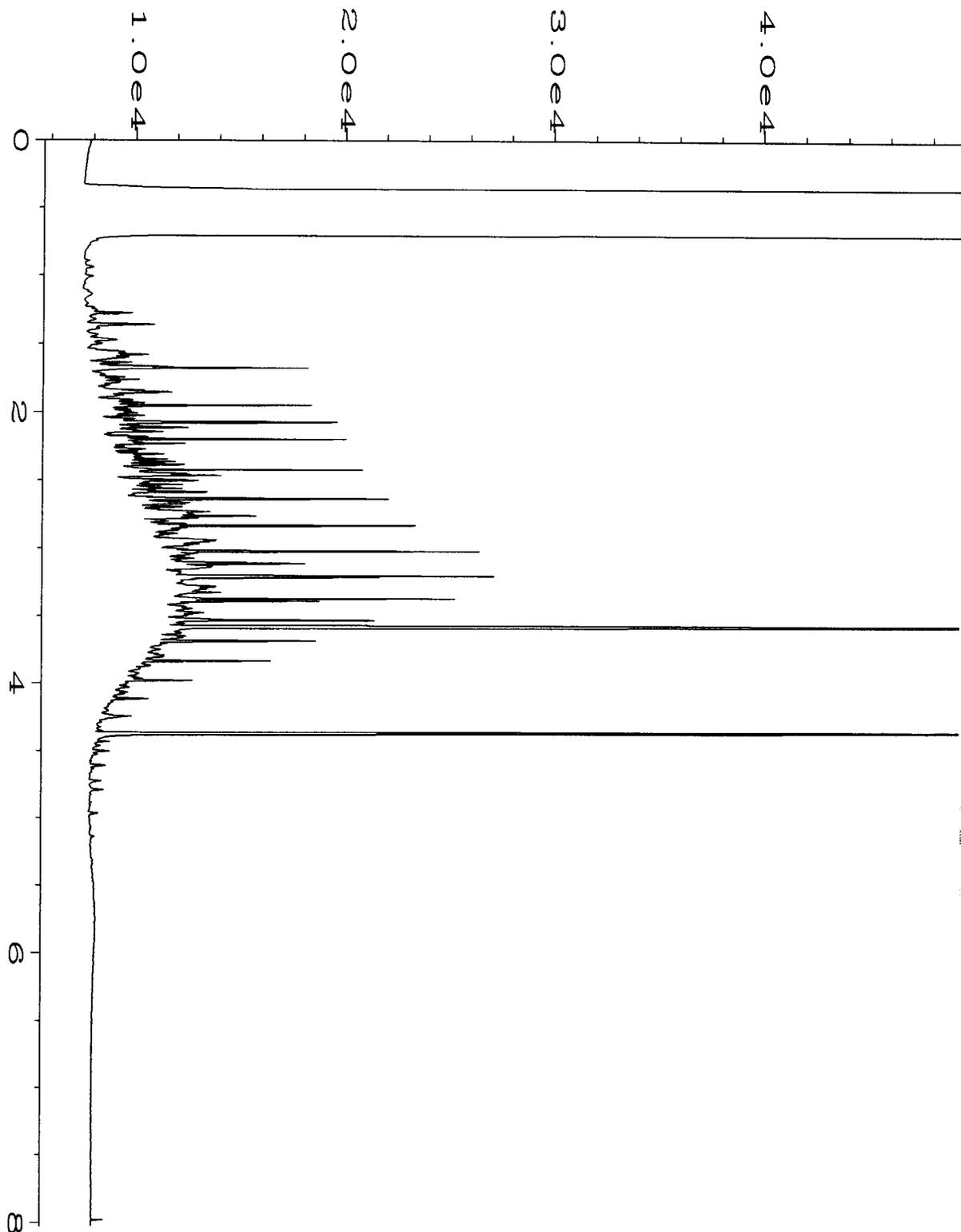
Data File Name	: C:\HPCHEM\1\DATA\12-15-16\048F1201.D	Page Number	: 1
Operator	: mwdl	Vial Number	: 48
Instrument	: GC1	Injection Number	: 1
Sample Name	: 612214-01 1/10	Sequence Line	: 12
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 15 Dec 16 09:50 PM	Analysis Method	: DX.MTH
Report Created on:	16 Dec 16 09:15 AM		



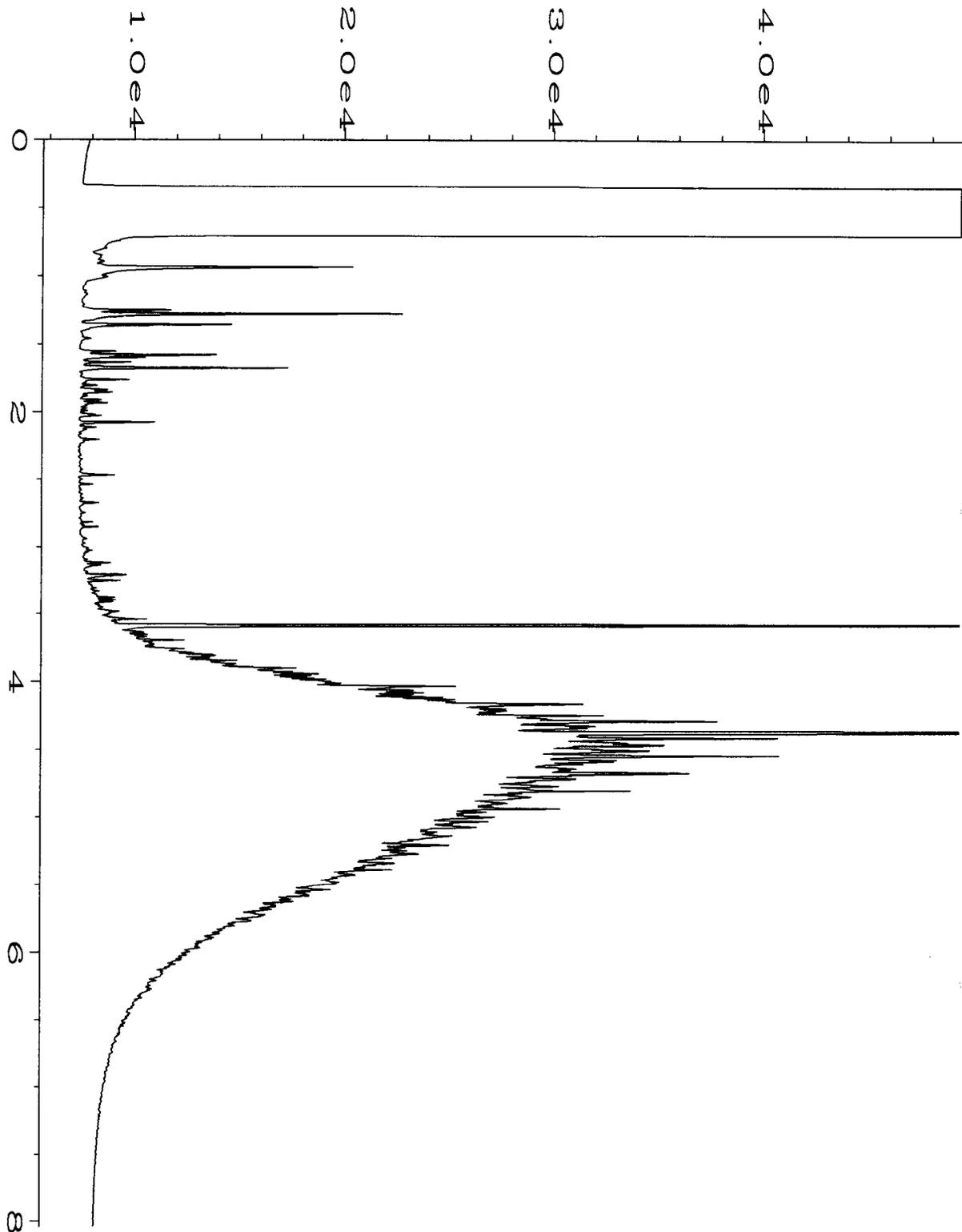
Data File Name	: C:\HPCHEM\1\DATA\12-15-16\049F1201.D	Page Number	: 1
Operator	: mwdl	Vial Number	: 49
Instrument	: GC1	Injection Number	: 1
Sample Name	: 612214-02 1/10	Sequence Line	: 12
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 15 Dec 16 10:02 PM	Analysis Method	: DX.MTH
Report Created on:	16 Dec 16 09:15 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-15-16\050F1201.D	Page Number	: 1
Operator	: mwdl	Vial Number	: 50
Instrument	: GC1	Injection Number	: 1
Sample Name	: 612214-03 1/10	Sequence Line	: 12
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 15 Dec 16 10:14 PM	Analysis Method	: DX.MTH
Report Created on:	16 Dec 16 09:15 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-15-16\097F1101.D	Page Number	: 1
Operator	: mwd1	Vial Number	: 97
Instrument	: GC1	Injection Number	: 1
Sample Name	: HCIDs Dx 47-110C	Sequence Line	: 11
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 15 Dec 16 09:27 PM	Analysis Method	: DX.MTH
Report Created on:	16 Dec 16 09:15 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-15-16\096F1101.D	Page Number	: 1
Operator	: mwdl	Vial Number	: 96
Instrument	: GC1	Injection Number	: 1
Sample Name	: HCIDs G/M 48-05A	Sequence Line	: 11
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 15 Dec 16 09:15 PM	Analysis Method	: DX.MTH
Report Created on:	16 Dec 16 09:15 AM		

612214

SAMPLE CHAIN OF CUSTODY

ME 12/14/16

W09/405

Report To K. Noeire

Company PBS

Address 2577 EASTOAK AVE ET100

City, State, ZIP Seattle, WA 98102

Phone 206.2339635 Email _____

SAMPLERS (Signature) [Signature]

PROJECT NAME Coleman 04

PO # 41392

REMARKS

INVOICE TO

Page # _____ of _____

TURNAROUND TIME

Standard Turnaround
 RUSH
Rush charges authorized by: _____

SAMPLE DISPOSAL
 Dispose after 30 days
 Archive Samples
 Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes				
						TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM		Product ID			
MW3	01	12/13/16	940	Product	1												
MW2	02		1215	Product	1												
MW5	03		1315	Product	1												
MW4	04 A-E		1240	GM	5	X	X	X	X			X					
MW6	05 V		1103	GM	5	X	X	X	X			X					
Trips Blank	06 A-B		-	water	2												

Samples received at 3 °C

* Added at lab (TP) 12/14/16

SIGNATURE

PRINT NAME

COMPANY

DATE

TIME

Relinquished by: K. Noeire

MEGAN NOEIRE

PBS

12/14/16 1320

Received by: [Signature]

Nyan Pran

FEBI

12/14/16 1415

Ph. (206) 285-8282

Seattle, WA 98119-2029

3012 16th Avenue West

Friedman & Bruya, Inc.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 20, 2016

Ken Nogeire, Project Manager
PBS Engineering and Environmental, Inc.
2517 Eastlake Ave E, Suite 100
Seattle, WA 98102

Dear Mr Nogeire:

Included are the results from the testing of material submitted on December 14, 2016 from the Coleman Oil PO 41392.000, F&BI 612215 project. There are 12 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
PBS1220R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 14, 2016 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Coleman Oil PO 41392.000, F&BI 612215 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>PBS Engineering and Environmental</u>
612215 -01	VS-1
612215 -02	VS-2
612215 -03	VS-3

The MA-APH concentration in sample VS-2 exceeded the calibration range of the instrument. The data were flagged accordingly.

Naphthalene was reported below the standard reporting limit. The data were flagged accordingly.

Naphthalene was detected in the TO-15 method blank. Samples with naphthalene below ten times that of the method blank were flagged.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	VS-1	Client:	PBS Engineering and Environmental
Date Received:	12/14/16	Project:	Coleman Oil PO 41392.000, F&BI 612215
Date Collected:	12/13/16	Lab ID:	612215-01 1/1.5
Date Analyzed:	12/16/16	Data File:	121522.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

	%	Lower	Upper
Surrogates:	Recovery:	Limit:	Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration
	ug/m3
APH EC5-8 aliphatics	170
APH EC9-12 aliphatics	160
APH EC9-10 aromatics	<75

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	VS-2	Client:	PBS Engineering and Environmental
Date Received:	12/14/16	Project:	Coleman Oil PO 41392.000, F&BI 612215
Date Collected:	12/13/16	Lab ID:	612215-02 1/1.5
Date Analyzed:	12/16/16	Data File:	121523.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

	%	Lower	Upper
Surrogates:	Recovery:	Limit:	Limit:
4-Bromofluorobenzene	97	70	130

Compounds:	Concentration
	ug/m3
APH EC5-8 aliphatics	340
APH EC9-12 aliphatics	7,700 ve
APH EC9-10 aromatics	<75

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	VS-3	Client:	PBS Engineering and Environmental
Date Received:	12/14/16	Project:	Coleman Oil PO 41392.000, F&BI 612215
Date Collected:	12/13/16	Lab ID:	612215-03 1/1.5
Date Analyzed:	12/16/16	Data File:	121524.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

	%	Lower	Upper
Surrogates:	Recovery:	Limit:	Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration
	ug/m3
APH EC5-8 aliphatics	130
APH EC9-12 aliphatics	<110
APH EC9-10 aromatics	<75

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Coleman Oil PO 41392.000, F&BI 612215
Date Collected:	12/15/16	Lab ID:	06-2582 mb/20550
Date Analyzed:	12/15/16	Data File:	121509.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

	%	Lower	Upper
Surrogates:	Recovery:	Limit:	Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration
	ug/m3
APH EC5-8 aliphatics	<46
APH EC9-12 aliphatics	<70
APH EC9-10 aromatics	<50

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	VS-1	Client:	PBS Engineering and Environmental
Date Received:	12/14/16	Project:	Coleman Oil PO 41392.000, F&BI 612215
Date Collected:	12/13/16	Lab ID:	612215-01 1/1.5
Date Analyzed:	12/16/16	Data File:	121522.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration	
	ug/m3	ppbv
Benzene	1.7	0.52
Toluene	7.7	2.1
Ethylbenzene	2.1	0.49
m,p-Xylene	8.6	2.0
o-Xylene	3.4	0.79
1,2,4-Trimethylbenzene	6.9	1.4
Naphthalene	0.91	0.17

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	VS-2	Client:	PBS Engineering and Environmental
Date Received:	12/14/16	Project:	Coleman Oil PO 41392.000, F&BI 612215
Date Collected:	12/13/16	Lab ID:	612215-02 1/1.5
Date Analyzed:	12/16/16	Data File:	121523.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

	%	Lower	Upper
Surrogates:	Recovery:	Limit:	Limit:
4-Bromofluorobenzene	97	70	130

Compounds:	Concentration	
	ug/m3	ppbv
Benzene	2.2	0.70
Toluene	19	5.0
Ethylbenzene	11	2.4
m,p-Xylene	38	8.7
o-Xylene	11	2.5
1,2,4-Trimethylbenzene	<3.7	<0.75
Naphthalene	0.28 j fb	0.054 j fb

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	VS-3	Client:	PBS Engineering and Environmental
Date Received:	12/14/16	Project:	Coleman Oil PO 41392.000, F&BI 612215
Date Collected:	12/13/16	Lab ID:	612215-03 1/1.5
Date Analyzed:	12/16/16	Data File:	121524.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration	
	ug/m3	ppbv
Benzene	1.6	0.49
Toluene	9.1	2.4
Ethylbenzene	2.6	0.60
m,p-Xylene	11	2.6
o-Xylene	4.1	0.95
1,2,4-Trimethylbenzene	4.0	0.82
Naphthalene	0.31 j fb	0.060 j fb

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Coleman Oil PO 41392.000, F&BI 612215
Date Collected:	12/15/16	Lab ID:	06-2582 mb/20550
Date Analyzed:	12/15/16	Data File:	121509.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration	
	ug/m3	ppbv
Benzene	<0.29	<0.1
Toluene	<2.9	<1
Ethylbenzene	<0.77	<0.1
m,p-Xylene	<0.36	<0.1
o-Xylene	<7	<2
1,2,4-Trimethylbenzene	<0.49	<0.1
Naphthalene	0.089 j	0.017 j

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/20/16

Date Received: 12/14/16

Project: Coleman Oil PO 41392.000, F&BI 612215

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES
FOR VOLATILES BY METHOD APH**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	230	105	70-130
APH EC9-12 aliphatics	ug/m3	350	109	70-130
APH EC9-10 aromatics	ug/m3	251	118	70-130

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/20/16

Date Received: 12/14/16

Project: Coleman Oil PO 41392.000, F&BI 612215

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES
FOR VOLATILES BY METHOD TO-15**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ppbv	10	111	70-130
Toluene	ppbv	10	108	70-130
Ethylbenzene	ppbv	10	108	70-130
m,p-Xylene	ppbv	20	105	70-130
o-Xylene	ppbv	10	104	70-130
1,2,4-Trimethylbenzene	ppbv	10	100	70-130
Naphthalene	ppbv	10	80	70-130

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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.

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 the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

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

j - The analyte concentration is reported below the lowest calibration standard. 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 laboratory control sample(s) percent recovery and/or RPD were 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 analyte 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 with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

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.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
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June 21, 2017

Ken Nogeire, Project Manager
PBS Engineering and Environmental, Inc.
2517 Eastlake Ave E, Suite 100
Seattle, WA 98102

Dear Mr Nogeire:

Included are the results from the testing of material submitted on June 13, 2017 from the Coleman Yakima PO 41392, F&BI 706207 project. There are 22 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
PBS0621R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on June 13, 2017 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Coleman Yakima PO 41392, F&BI 706207 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>PBS Engineering and Environmental</u>
706207 -01	MW2
706207 -02	MW4
706207 -03	MW6
706207 -04	DUP_6.9.17

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 06/21/17
 Date Received: 06/13/17
 Project: Coleman Yakima PO 41392, F&BI 706207
 Date Extracted: 06/16/17
 Date Analyzed: 06/16/17 and 06/19/17

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
 FOR BENZENE, TOLUENE, ETHYLBENZENE,
 XYLENES AND TPH AS GASOLINE
 USING METHODS 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)
MW2 706207-01 1/100	2,900	9,900	1,000	5,900	83,000	84
MW4 706207-02 1/10	240	12	120	<30	3,300	87
MW6 706207-03 1/10	140	100	110	69	7,600	92
Method Blank 07-1259 MB	<1	<1	<1	<3	<100	83

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 06/21/17

Date Received: 06/13/17

Project: Coleman Yakima PO 41392, F&BI 706207

Date Extracted: 06/16/17

Date Analyzed: 06/19/17

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES
USING METHOD 8021B**

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>Surrogate (% Recovery)</u> Limit (52-124)
DUP_6.9.17 706207-04 1/10	240	12	120	<30	86
Method Blank 07-1259 MB	<1	<1	<1	<3	83

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 06/21/17

Date Received: 06/13/17

Project: Coleman Yakima PO 41392, F&BI 706207

Date Extracted: 06/13/17

Date Analyzed: 06/13/17

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**

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 41-152)
MW4 706207-02	4,300 x	870 x	97
MW6 706207-03 1/1.6	3,700 x	<400	97
Method Blank 07-1250 MB	<50	<250	88

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020A

Client ID:	MW4	Client:	PBS Engineering and Environmental
Date Received:	06/13/17	Project:	Coleman Yakima PO 41392
Date Extracted:	06/14/17	Lab ID:	706207-02
Date Analyzed:	06/14/17	Data File:	706207-02.030
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Lead	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020A

Client ID: MW6
Date Received: 06/13/17
Date Extracted: 06/14/17
Date Analyzed: 06/14/17
Matrix: Water
Units: ug/L (ppb)

Client: PBS Engineering and Environmental
Project: Coleman Yakima PO 41392
Lab ID: 706207-03
Data File: 706207-03.031
Instrument: ICPMS2
Operator: SP

Analyte:	Concentration ug/L (ppb)
Lead	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020A

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	NA	Project:	Coleman Yakima PO 41392
Date Extracted:	06/14/17	Lab ID:	I7-324 mb2
Date Analyzed:	06/14/17	Data File:	I7-324 mb2.029
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Lead	<1
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	MW4	Client:	PBS Engineering and Environmental
Date Received:	06/13/17	Project:	Coleman Yakima PO 41392
Date Extracted:	06/13/17	Lab ID:	706207-02 1/2
Date Analyzed:	06/14/17	Data File:	061412.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	83	31	160
Benzo(a)anthracene-d12	86	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	160 ve
Acenaphthylene	<0.06
Acenaphthene	1.5
Fluorene	4.3
Phenanthrene	2.2
Anthracene	0.095
Fluoranthene	<0.06
Pyrene	<0.06
Benz(a)anthracene	<0.06
Chrysene	<0.06
Benzo(a)pyrene	<0.06
Benzo(b)fluoranthene	<0.06
Benzo(k)fluoranthene	<0.06
Indeno(1,2,3-cd)pyrene	<0.06
Dibenz(a,h)anthracene	<0.06
Benzo(g,h,i)perylene	<0.06

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	MW4	Client:	PBS Engineering and Environmental
Date Received:	06/13/17	Project:	Coleman Yakima PO 41392
Date Extracted:	06/13/17	Lab ID:	706207-02 1/200
Date Analyzed:	06/15/17	Data File:	061521.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	146 d	31	160
Benzo(a)anthracene-d12	94 d	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	150
Acenaphthylene	<6
Acenaphthene	<6
Fluorene	<6
Phenanthrene	<6
Anthracene	<6
Fluoranthene	<6
Pyrene	<6
Benz(a)anthracene	<6
Chrysene	<6
Benzo(a)pyrene	<6
Benzo(b)fluoranthene	<6
Benzo(k)fluoranthene	<6
Indeno(1,2,3-cd)pyrene	<6
Dibenz(a,h)anthracene	<6
Benzo(g,h,i)perylene	<6

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	MW6	Client:	PBS Engineering and Environmental
Date Received:	06/13/17	Project:	Coleman Yakima PO 41392
Date Extracted:	06/13/17	Lab ID:	706207-03 1/2
Date Analyzed:	06/14/17	Data File:	061413.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	91	31	160
Benzo(a)anthracene-d12	98	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	250 ve
Acenaphthylene	<0.06
Acenaphthene	0.30
Fluorene	0.29
Phenanthrene	<0.06
Anthracene	<0.06
Fluoranthene	<0.06
Pyrene	<0.06
Benz(a)anthracene	<0.06
Chrysene	<0.06
Benzo(a)pyrene	<0.06
Benzo(b)fluoranthene	<0.06
Benzo(k)fluoranthene	<0.06
Indeno(1,2,3-cd)pyrene	<0.06
Dibenz(a,h)anthracene	<0.06
Benzo(g,h,i)perylene	<0.06

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	MW6	Client:	PBS Engineering and Environmental
Date Received:	06/13/17	Project:	Coleman Yakima PO 41392
Date Extracted:	06/13/17	Lab ID:	706207-03 1/200
Date Analyzed:	06/15/17	Data File:	061522.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	157 d	31	160
Benzo(a)anthracene-d12	83 d	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	340
Acenaphthylene	<6
Acenaphthene	<6
Fluorene	<6
Phenanthrene	<6
Anthracene	<6
Fluoranthene	<6
Pyrene	<6
Benz(a)anthracene	<6
Chrysene	<6
Benzo(a)pyrene	<6
Benzo(b)fluoranthene	<6
Benzo(k)fluoranthene	<6
Indeno(1,2,3-cd)pyrene	<6
Dibenz(a,h)anthracene	<6
Benzo(g,h,i)perylene	<6

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Coleman Yakima PO 41392
Date Extracted:	06/13/17	Lab ID:	07-1249 mb2
Date Analyzed:	06/14/17	Data File:	061406.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	93	31	160
Benzo(a)anthracene-d12	99	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.03
Acenaphthylene	<0.03
Acenaphthene	<0.03
Fluorene	<0.03
Phenanthrene	<0.03
Anthracene	<0.03
Fluoranthene	<0.03
Pyrene	<0.03
Benz(a)anthracene	<0.03
Chrysene	<0.03
Benzo(a)pyrene	<0.03
Benzo(b)fluoranthene	<0.03
Benzo(k)fluoranthene	<0.03
Indeno(1,2,3-cd)pyrene	<0.03
Dibenz(a,h)anthracene	<0.03
Benzo(g,h,i)perylene	<0.03

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW2	Client:	PBS Engineering and Environmental
Date Received:	06/13/17	Project:	Coleman Yakima PO 41392
Date Extracted:	06/13/17	Lab ID:	706207-01
Date Analyzed:	06/13/17	Data File:	061309.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	57	121
Toluene-d8	106	63	127
4-Bromofluorobenzene	94	60	133

Compounds:	Concentration ug/L (ppb)
Hexane	140
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
1,2-Dibromoethane (EDB)	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW4	Client:	PBS Engineering and Environmental
Date Received:	06/13/17	Project:	Coleman Yakima PO 41392
Date Extracted:	06/13/17	Lab ID:	706207-02
Date Analyzed:	06/13/17	Data File:	061314A.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	99	60	133

Compounds:	Concentration ug/L (ppb)
Hexane	12
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
1,2-Dibromoethane (EDB)	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW6	Client:	PBS Engineering and Environmental
Date Received:	06/13/17	Project:	Coleman Yakima PO 41392
Date Extracted:	06/13/17	Lab ID:	706207-03
Date Analyzed:	06/13/17	Data File:	061312.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	104	63	127
4-Bromofluorobenzene	94	60	133

Compounds:	Concentration ug/L (ppb)
Hexane	49
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
1,2-Dibromoethane (EDB)	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Coleman Yakima PO 41392
Date Extracted:	06/13/17	Lab ID:	07-1227 mb
Date Analyzed:	06/13/17	Data File:	061307.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	106	63	127
4-Bromofluorobenzene	98	60	133

Compounds:	Concentration ug/L (ppb)
Hexane	<1
Methyl t-butyl ether (MTBE)	<1
1,2-Dichloroethane (EDC)	<1
1,2-Dibromoethane (EDB)	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 06/21/17

Date Received: 06/13/17

Project: Coleman Yakima PO 41392, F&BI 706207

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

Laboratory Code: 706226-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (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	105	65-118
Toluene	ug/L (ppb)	50	103	72-122
Ethylbenzene	ug/L (ppb)	50	106	73-126
Xylenes	ug/L (ppb)	150	103	74-118
Gasoline	ug/L (ppb)	1,000	96	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 06/21/17

Date Received: 06/13/17

Project: Coleman Yakima PO 41392, F&BI 706207

**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

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	111	103	63-142	7

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 06/21/17

Date Received: 06/13/17

Project: Coleman Yakima PO 41392, F&BI 706207

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020A**

Laboratory Code: 706161-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Lead	ug/L (ppb)	10	<5	98	96	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	ug/L (ppb)	10	98	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 06/21/17

Date Received: 06/13/17

Project: Coleman Yakima PO 41392, F&BI 706207

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: Laboratory Control Sample 1/0.25

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	ug/L (ppb)	0.25	89	90	67-116	1
Acenaphthylene	ug/L (ppb)	0.25	92	95	65-119	3
Acenaphthene	ug/L (ppb)	0.25	92	94	66-118	2
Fluorene	ug/L (ppb)	0.25	92	96	64-125	4
Phenanthrene	ug/L (ppb)	0.25	91	98	67-120	7
Anthracene	ug/L (ppb)	0.25	94	96	65-122	2
Fluoranthene	ug/L (ppb)	0.25	94	100	65-127	6
Pyrene	ug/L (ppb)	0.25	92	101	62-130	9
Benz(a)anthracene	ug/L (ppb)	0.25	97	109	60-118	12
Chrysene	ug/L (ppb)	0.25	94	105	66-125	11
Benzo(b)fluoranthene	ug/L (ppb)	0.25	96	107	55-135	11
Benzo(k)fluoranthene	ug/L (ppb)	0.25	94	112	62-125	17
Benzo(a)pyrene	ug/L (ppb)	0.25	93	107	58-127	14
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	0.25	101	117	36-142	15
Dibenz(a,h)anthracene	ug/L (ppb)	0.25	97	106	37-133	9
Benzo(g,h,i)perylene	ug/L (ppb)	0.25	101	115	34-135	13

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 06/21/17

Date Received: 06/13/17

Project: Coleman Yakima PO 41392, F&BI 706207

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Hexane	ug/L (ppb)	50	105	103	57-137	2
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	107	100	64-147	7
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	111	107	73-132	4
1,2-Dibromoethane (EDB)	ug/L (ppb)	50	106	102	82-125	4

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.

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 the analyte were outside of acceptance criteria. The value reported is an estimate.

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

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

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

j - The analyte concentration is reported below the lowest calibration standard. 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 laboratory control sample(s) percent recovery and/or RPD were 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 analyte 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 with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

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.

706207

SAMPLE CHAIN OF CUSTODY

NE 06/13/17 1103/413

Report To Ken Nagire

Company PBS

Address Seattle

City, State, ZIP _____

Phone 206.572.8163 Email ken.nagire@pbsusa.com

SAMPLERS (signature) <u>Ken Nagire</u>	PROJECT NAME <u>Coleman Yukon</u>	PO # <u>41392</u>
REMARKS	INVOICE TO <u>Ken</u>	

Page # _____ of _____

TURNAROUND TIME
 Standard Turnaround
 RUSH
 Rush charges authorized by: _____

SAMPLE DISPOSAL
 Dispose after 30 days
 Archive Samples
 Other _____

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes		
						TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	lead	Extended: MTBE EDC, EDC	Hexad			
MW2	01A-C	6.9.17	1215	liquid	3				X	X								
MW4	02A-G	6.9.17	1230	↓	7		X	X	X		X	X						
MW6	03A-G	6.9.17	1135	↓	7		X	X	X		X	X						
DWP-6.9.17	04A-B	6.9.17	—	↓	—				X									

Relinquished by: <u>Ken Nagire</u>	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Received by: <u>Ken Nagire</u>		Ken Nagire	PBS	6/12/17	1600
Relinquished by: <u>Ken Nagire</u>		Ken Nagire	PBS	6/13/17	1030
Received by: _____					

Samples received at 3 °C

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



Coleman Kakima

Report Prepared for:

**PBS Engineering
Seattle, WA 88102**

Report Prepared By:

**Mark Jonathan Cejas
PACE Energy Analytical Services, LLC**

**220 William Pitt Way
Pittsburgh, PA 15238**

20 July 2017

Table of Contents

- 1) INTRODUCTION**
- 2) ANALYTICAL METHODOLOGY**
 - a) C8-C40+ Semi Volatile Range Fingerprinting by GC/MS full scan (ASTM D5739)**
- 3) PRODUCT CHARACTERIZATION**

Introduction

PACE is pleased to provide this report that focuses on the chemical fingerprinting results conducted on behalf of PBS Engineering. The interpretive report was carried out on one water sample. The objective of this interpretive report was to characterize the petroleum type(s) in the sample.

Client ID	Lab ID	Date Collected	Date Received	C8-C36+ SVOC Fingerprinting by GC/MS
MW-3	22995-1	6/9/2017	6/13/2017	X
MW-5	22995-2	6/9/2017	6/13/2017	X

Supporting general site information was provided by AMRC for this interpretive report that included a detailed site map. The samples were submitted to PACE Energy Forensics Laboratory (Pittsburgh, PA) and analyzed with the following analytical method:

- 1) C8-C40 qualitative fingerprinting by GC/MS – full scan mode

Analytical Methodology

C8-C40+ Semi Volatile Range Fingerprinting by GC/MS full scan (ASTM D5739)

The samples were extracted and the extracts concentrated to ensure complete extraction of the sample. Extracts were injected into a GC equipped with a 60 meter DB-1 column to separate the hydrocarbons, which are detected with a mass spectrometer (MS) in full scan mode, interfaced to the GC. Hydrocarbons in the range of C₁₀ to C₄₀ are identified. By scanning the ion fragments shown in the following table, chromatograms of a number of hydrocarbons are generated. Aromatic hydrocarbons are identified by scanning over a large number of ion fragments, and the results are normalized in a bar diagram. This analysis also allows for tentative IDs of unknown compounds w/ NIST mass spectra library.

Ion (m/z)	Compound Class
TIC	All Compounds
85	n-Alkanes
113	Iso-Alkanes and Isoprenoids
83	Alkylcyclohexanes
134	C4-Benzenes
123	Bicyclanes
191	Terpanes
217	Steranes
253	Monoaromatic Steranes
231	Triaromatic Steranes
Bar Diagram	Aromatic Hydrocarbons

Sample Characterization

The 2 product samples were analyzed by the C8-C40+ semi volatile fingerprinting method by GC/MS. Multiple visualizations of diagnostic attributes of the petroleum in the sample are provided in Figures 1 & 2. The diagnostic attributes of MW-3 dictate that the sample was composed of gasoline, and weathered #2 diesel fuel. The diagnostic attributes of MW-5 show that the sample consisted of weathered #2 diesel fuel, and refined residual range petroleum.

MW-3 (22995-1)-The gasoline component in the sample is evident by the enrichment of volatile range C2 mono-aromatics toluene, xylenes, and 1,3,5-trimethylbenzene (figure 1 A), the enrichment of alkyl benzenes (figure 2 A) relative to alkyl naphthalenes, and the enrichment of C1-C4 alkylcyclohexanes relative to C5+ (83 m/z ion trace in main data package). #2 diesel fuel is evident in the middle distillate range distribution of n-paraffins (~C8-~C25 w/ ~C17 maximum) (figures 1 and 2), the presence of middle distillate range alkylcyclohexanes with a C8-C9 maximum (83 m/z ion trace in main data package), and the enrichment of bicyclic-sesquiterpanes (123 m/z ion trace in main data package)¹.

MW-5 (22995-2)- #2 diesel fuel is evident in the middle distillate range distribution of n-paraffins (~C8-~C25 w/ ~C17 maximum) (figures 1 and 2), the presence of middle distillate range alkylcyclohexanes with a C8-C9 maximum (83 m/z ion trace in main data package), and the enrichment of bicyclic-sesquiterpanes (123 m/z ion trace in main data package). The residual range petroleum component is apparent in the residual range (~C25-~C36) unresolved complex mixture (figure 1), enrichment of residual range petroleum biomarkers (figure 1 & 191, 217, 231, 253 ion traces in the main data package), and the enrichment of 3-4 ring PAHs (figure 2)². The refined character of the residual range petroleum is noticeable in the presence of 2-methyl anthracene (formed during refinery processes), and the overall distribution of C1 alkylated phenanthrenes/anthracenes (figure 2). The two isomers on the right side of the C1 alkylated phenanthrenes/anthracenes distribution are less thermodynamically stable and thus become depleted during refinery processes³

¹ Kaplan, Isaac R., et al. "Forensic environmental geochemistry: differentiation of fuel-types, their sources and release time." *Organic Geochemistry* 27.5 (1997): 289-317.

² Wang, Zhendi, Merv Fingas, and David S. Page. "Oil spill identification." *Journal of Chromatography A* 843.1 (1999): 369-411.

³ Radke, Matthias, et al. "Aromatic components of coal: relation of distribution pattern to rank." *Geochimica et Cosmochimica Acta* 46.10 (1982): 1831-1848.

Conclusion

The petroleum signatures show that MW3 and MW5 share a similar weathered #2 diesel fuel signature. MW-3 exhibits an intermingling of a significant gasoline component with the #2 diesel fuel. MW-5 contains the #2 diesel fuel component intermingled with a proportionately lower amount of a refined residual range petroleum.

Please call the lab at 412-826-4481, or you may email any questions or concerns to mark.cejas@pacelabs.com regarding any analytical data reports or interpretations.

Respectfully submitted,

Mark Jonathan Cejas, MSc

Senior Consulting Scientist

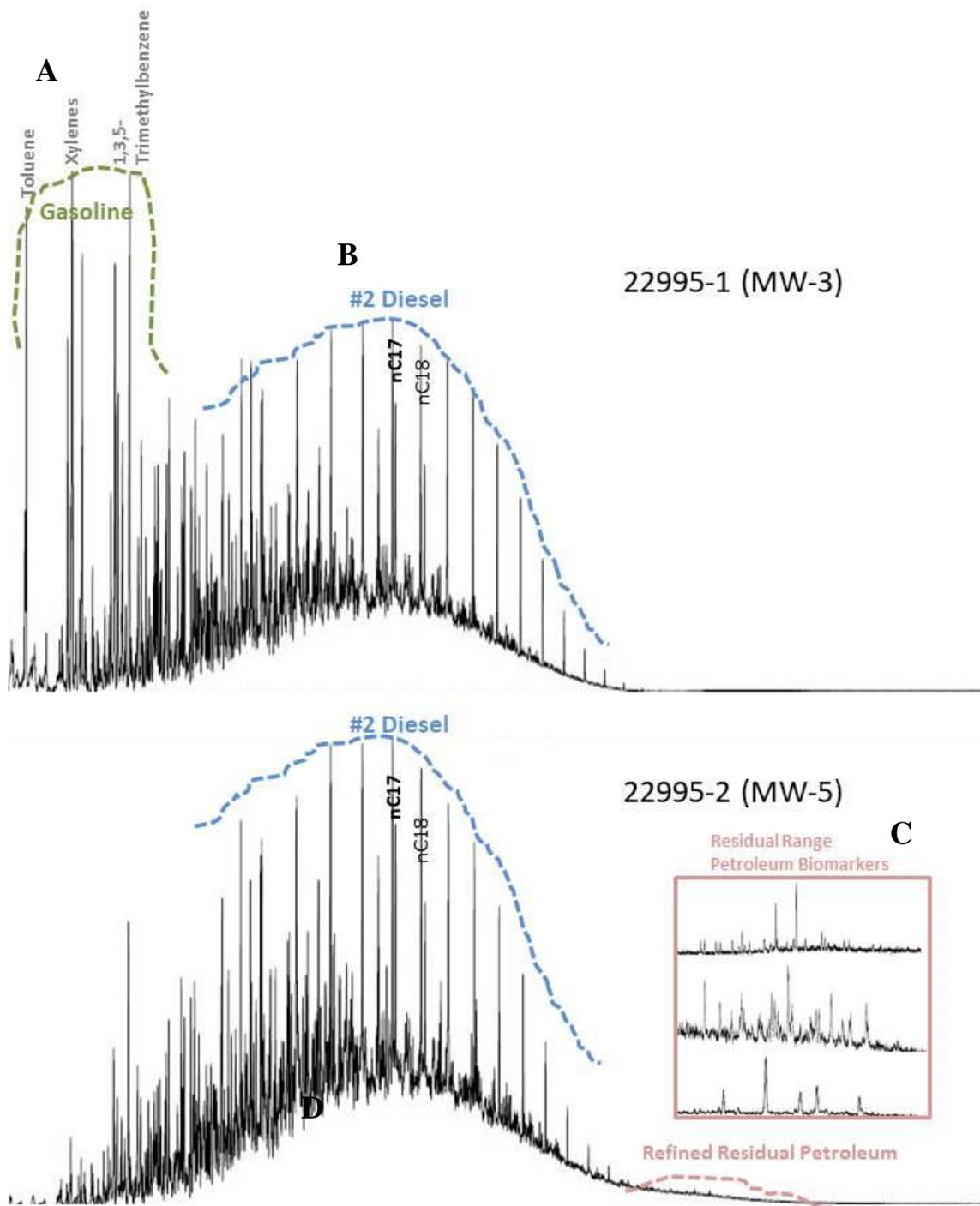


Figure 1. Diagnostic petroleum attributes of the sample – TIC & biomarkers. (A) Gasoline signature (B) diesel signature (C) Refined residual range petroleum signature

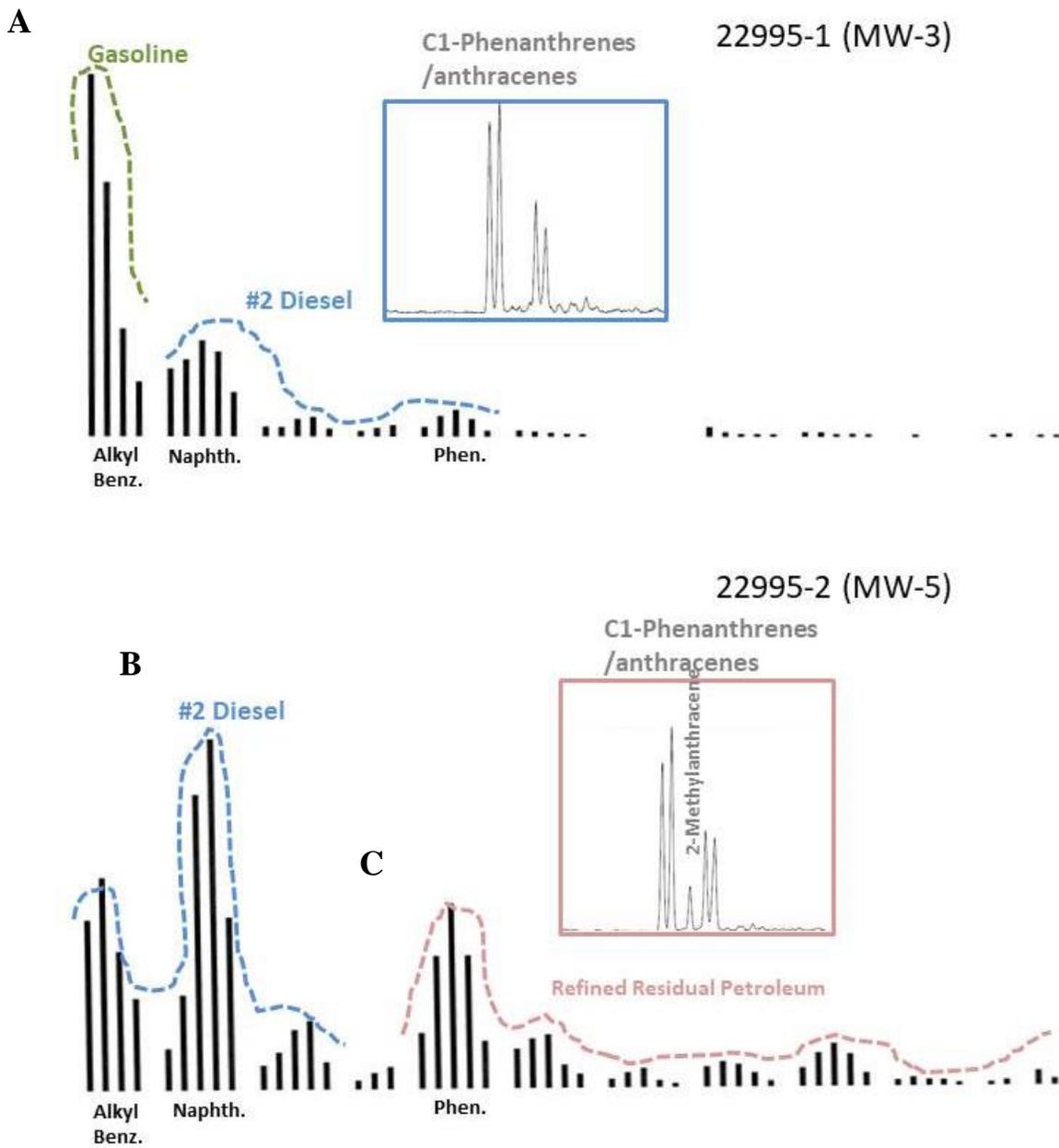


Figure 2. Diagnostic petroleum attributes of the sample - PAHs. (A) Gasoline signature (B) diesel signature (C) Refined residual range petroleum signature

June 26, 2017



Ken Nogeire
PBS Engineering
2517 Eastlake Ave
Suite 100
Seattle, WA 88102

RE: Coleman Kakima
Project Number: 41392

Pace Analytical received 4 samples on June 13, 2017 for analysis labeled MW3, and MW5. Per client request, the following analyses were performed:

1. C8-C40 Qualitative Molecular Characterization by GC/MS – full scan mode

The samples labeled as MW1 and MW2 have been placed on hold.

The sample was performed in house under laboratory number **22995**.

Please call the lab at 412-826-5245, or you may email any questions or concerns to ruth.welsh@pacelabs.com regarding any analytical data reports.

Respectfully submitted,

Ruth Welsh

Ruth Welsh
Project Manager



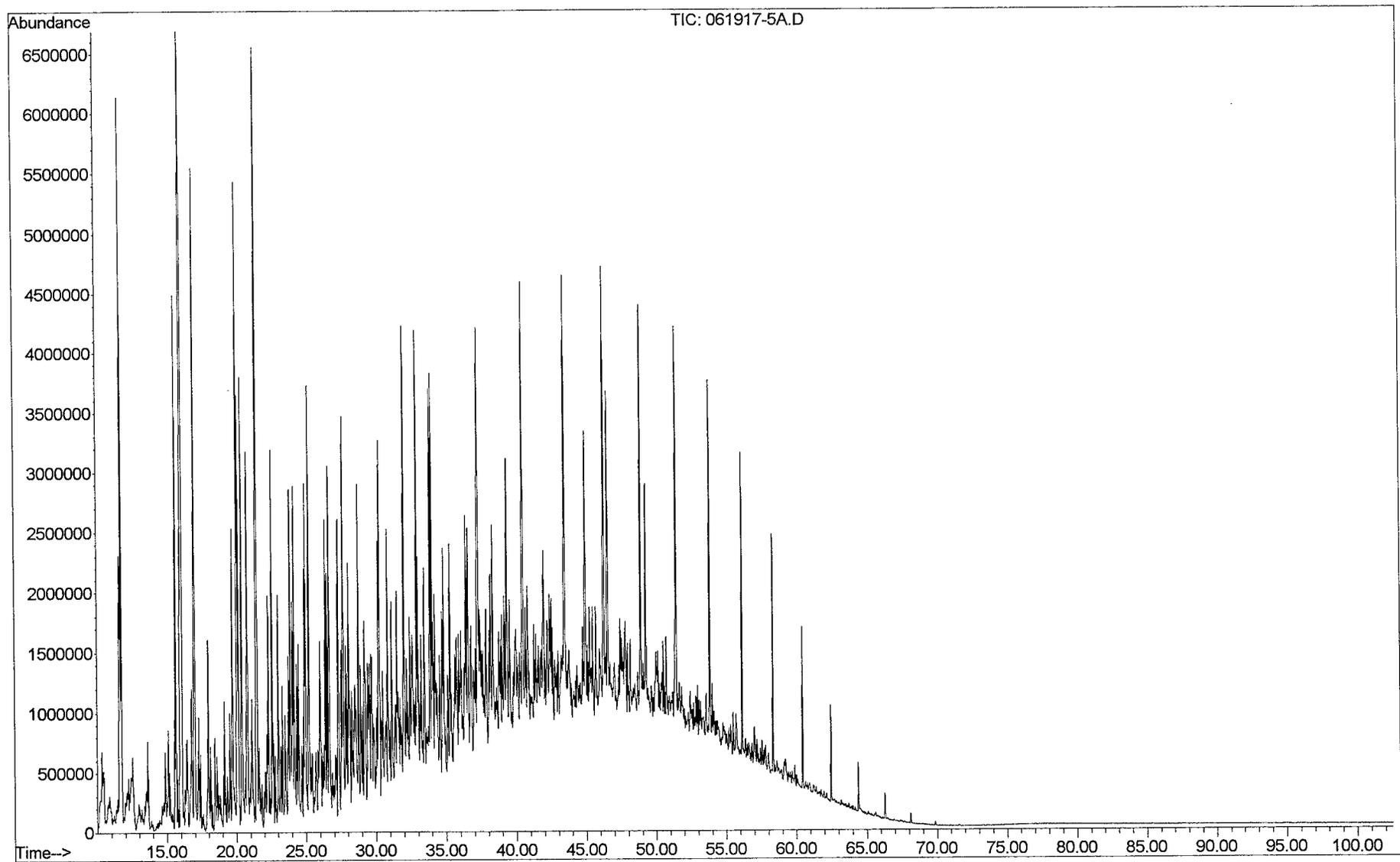
**C8-C40 - Qualitative Hydrocarbons Characterization
by GC/MS - full scan mode**

ION (m/z)	Mass Chromatograms	COMPOUND CLASS
TIC		All Compounds
85		n-Alkanes (Paraffins)
113		Iso-Alkanes (Isoparaffins) & Isoprenoids
83		Alkylcyclohexanes
134		C ₄ -benzenes (monoaromatics)
123		Bicyclanes
191		Terpanes
217		Steranes
Bar Diagram		Monoaromatic and Polyaromatic Hydrocarbon Distribution

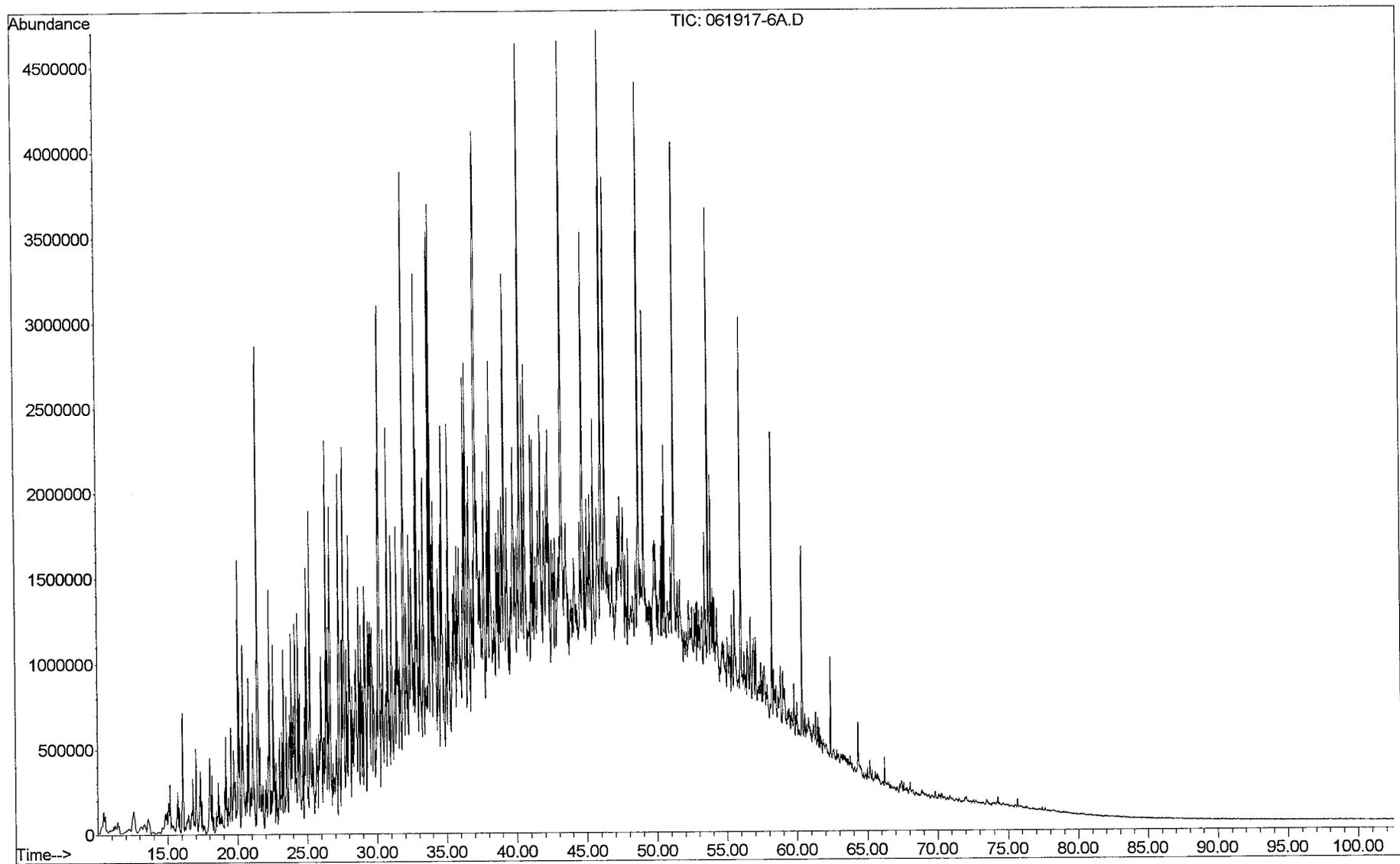
note: Chromatograms and data follow this cover page.

**Submitted by,
Pace Analytical Energy Services**

Sample Name: 22995-1 [MW-3] 1/5DILUTION
Misc Info :

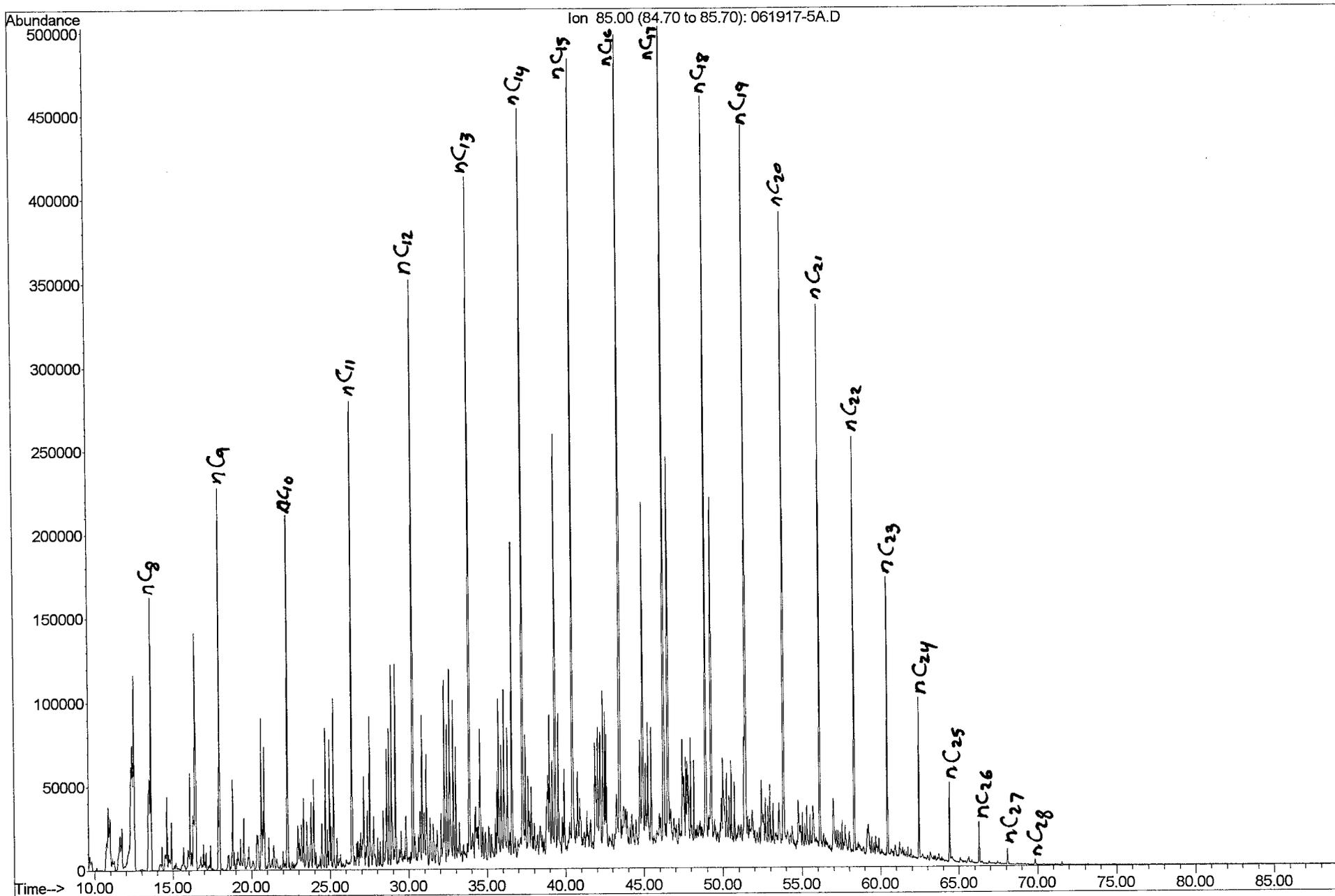


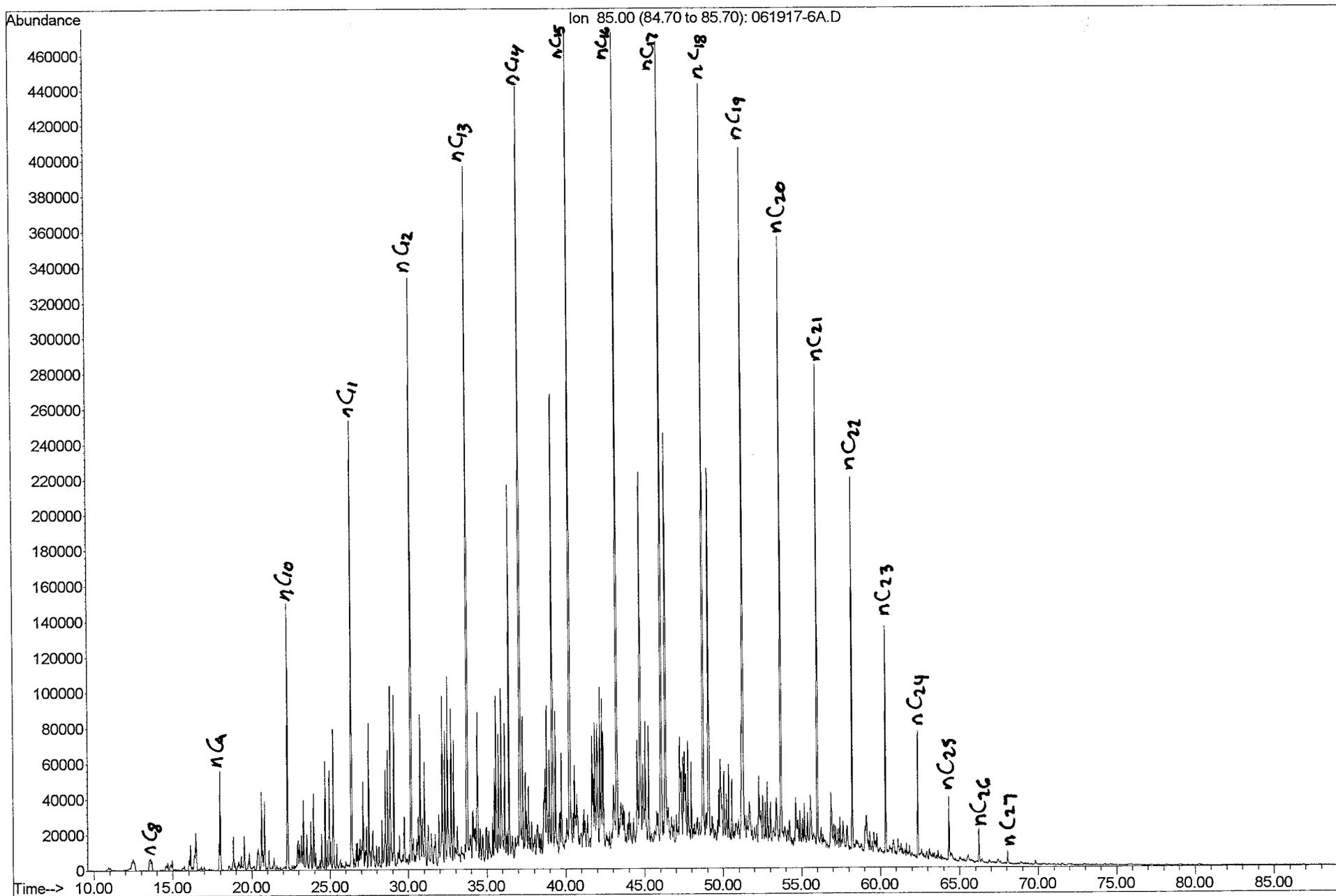
Sample Name: 22995-2 [MW-5] 1/5 DILUTION
Misc Info :

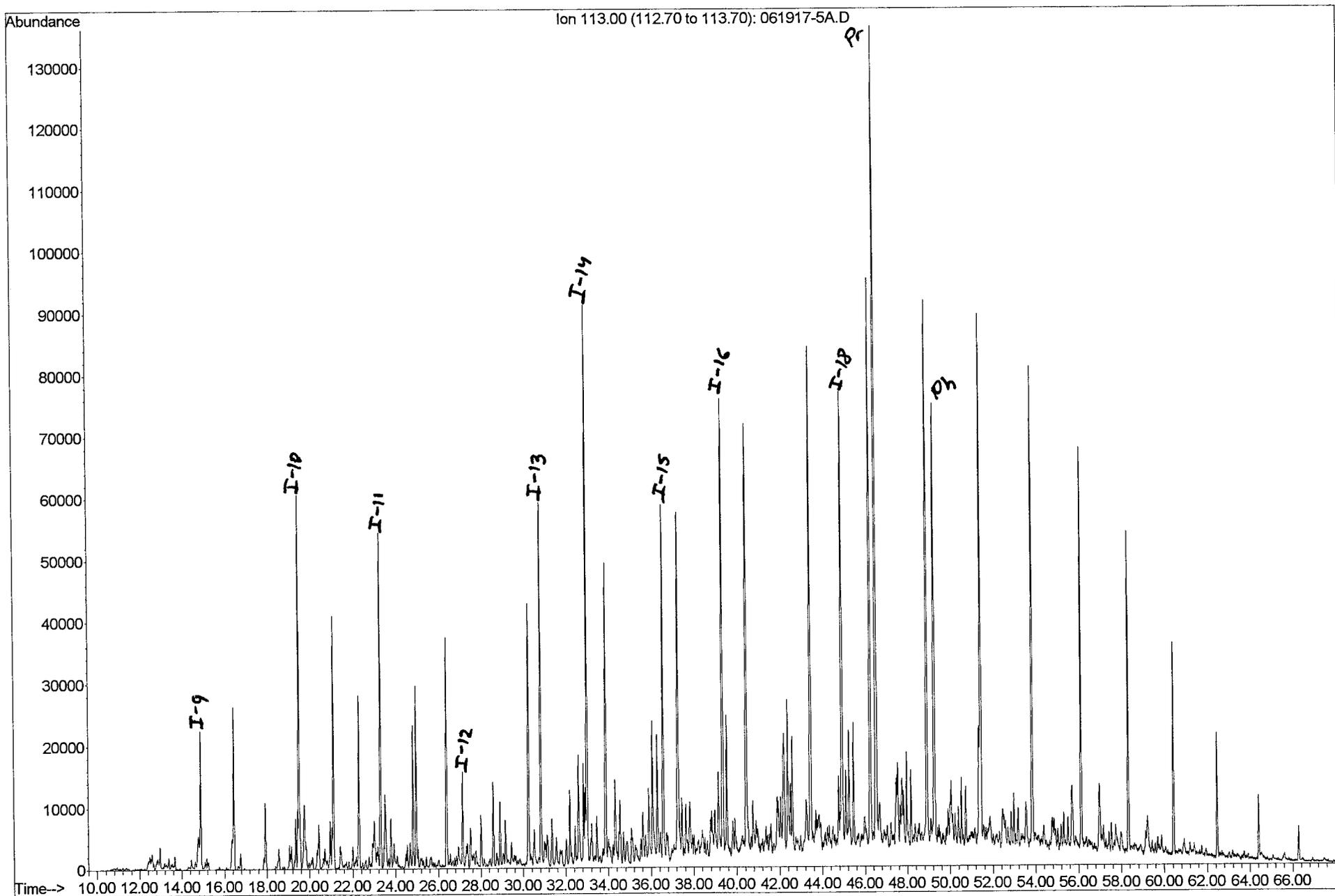


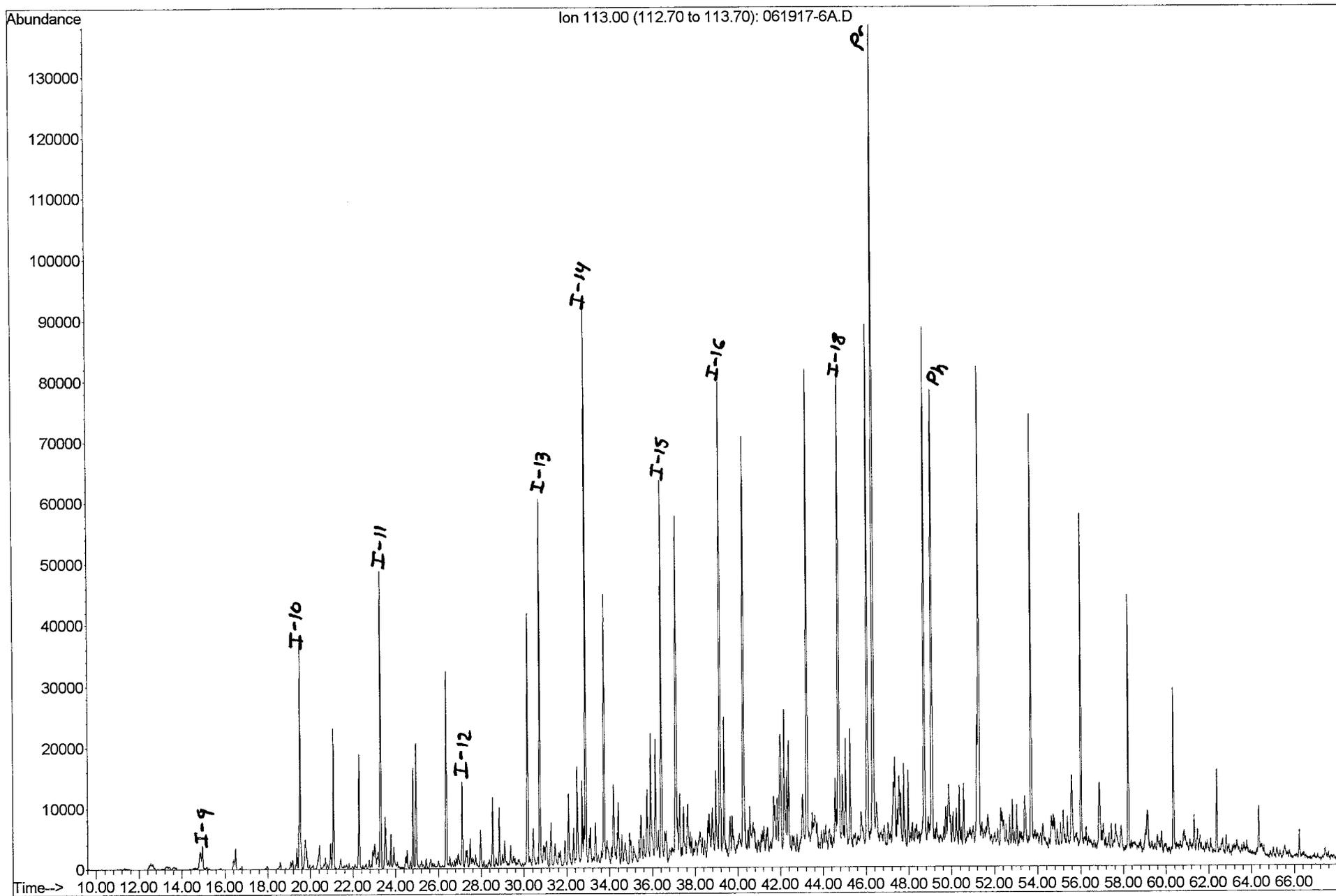
Key to Chromatogram Symbol Identification
For m/z 85 and m/z 113 Paraffins and Isoparaffins

Symbol	Detail
i-10	Iso-alkane with 10 carbon atoms
i-15	Farnesane (isoprenoid with 15 carbon atoms)
i-16	Isoprenoid with 16 carbon atoms
Pr	Pristane (isoprenoid with 19 carbon atoms)
Ph	Phytane (isoprenoid with 20 carbon atoms)
nC ₈	n-C ₈ normal Alkane
nC ₁₅	n-C ₁₅ normal Alkane
i-8	2,5-(2,4)-Dimethylhexane
i-8'	2,3,4-Trimethylpentane
i-8 ⁿ	2-3-Dimethylhexane
CH-n	Alkylcyclohexane (where n indicates the number of carbon atoms in the side chain)



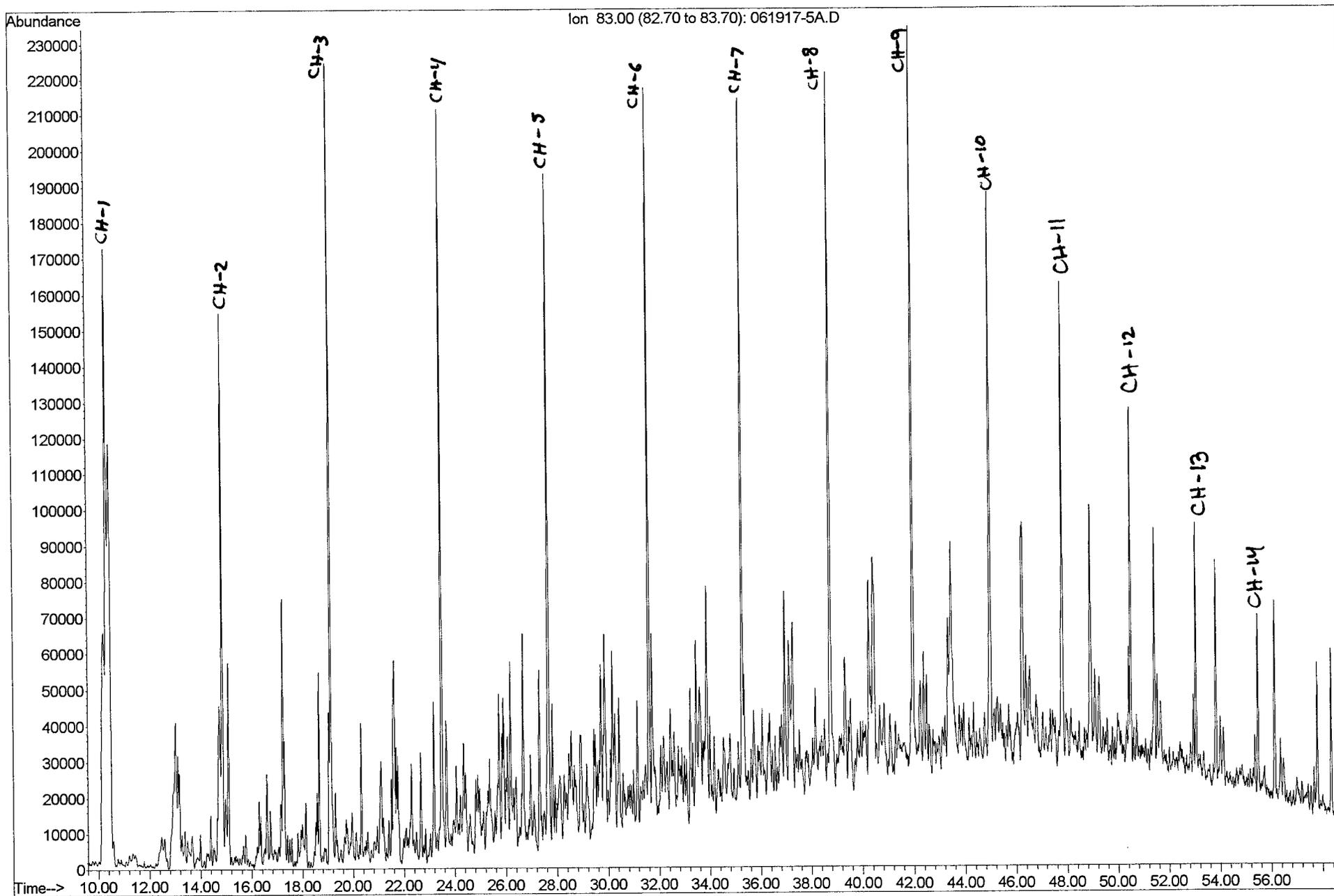


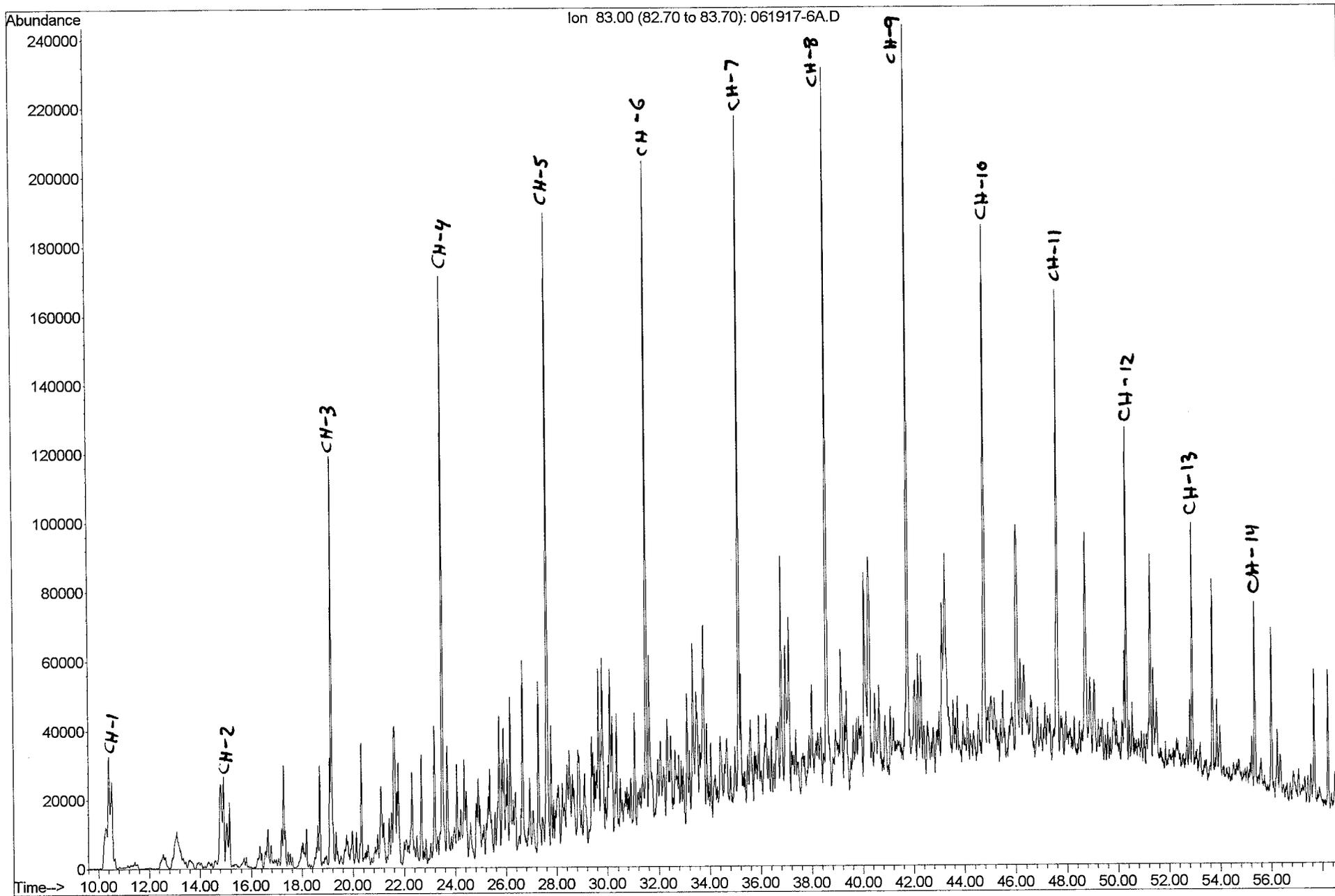




Key for Alkylcyclohexanes at m/z 83

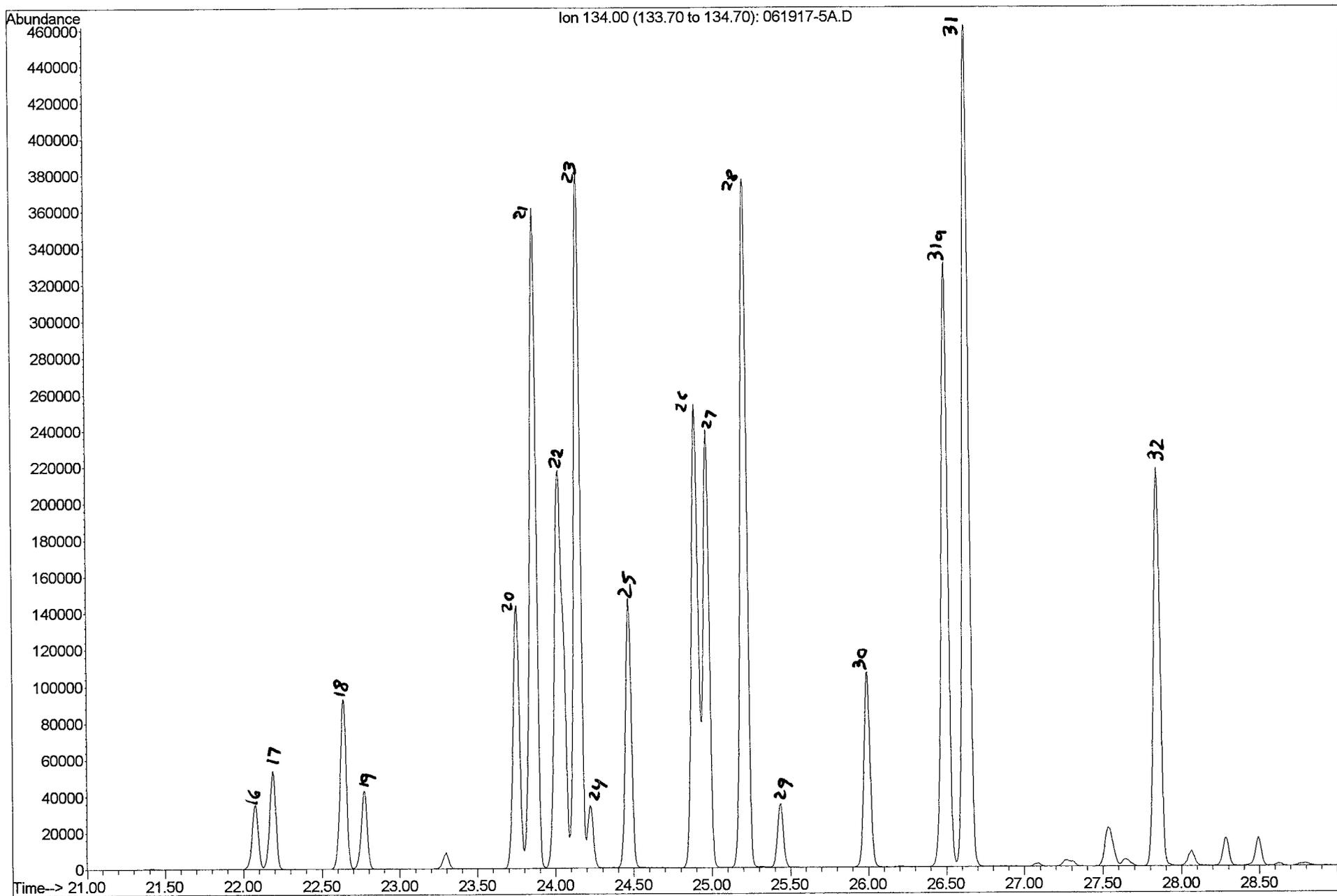
Symbol	Detail
CH-1	Methylcyclohexane
CH-2	Ethylcyclohexane
CH-3	Propylcyclohexane
CH-4	Butylcyclohexane
CH-5	Pentylcyclohexane
CH-6	Hexylcyclohexane
CH-7	Heptylcyclohexane
CH-8	Octylcyclohexane
CH-9	Nonylcyclohexane
CH-10	Decylcyclohexane
CH-11	Undecylcyclohexane
CH-12	Dodecylcyclohexane
CH-13	Tridecylcyclohexane
CH-14	Tetradecylcyclohexane

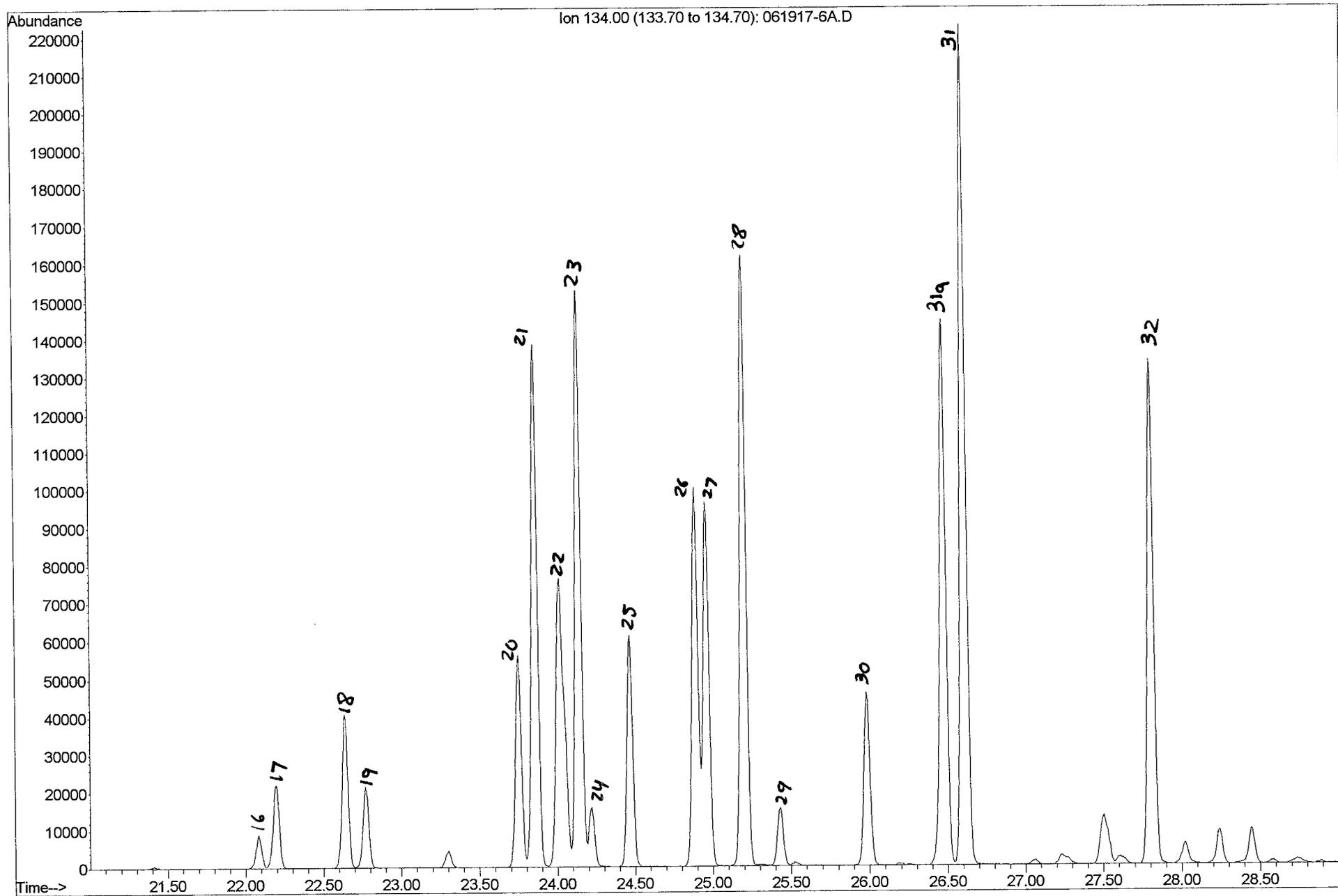




Key for C₄-Alkylbenzenes (m/z 134)

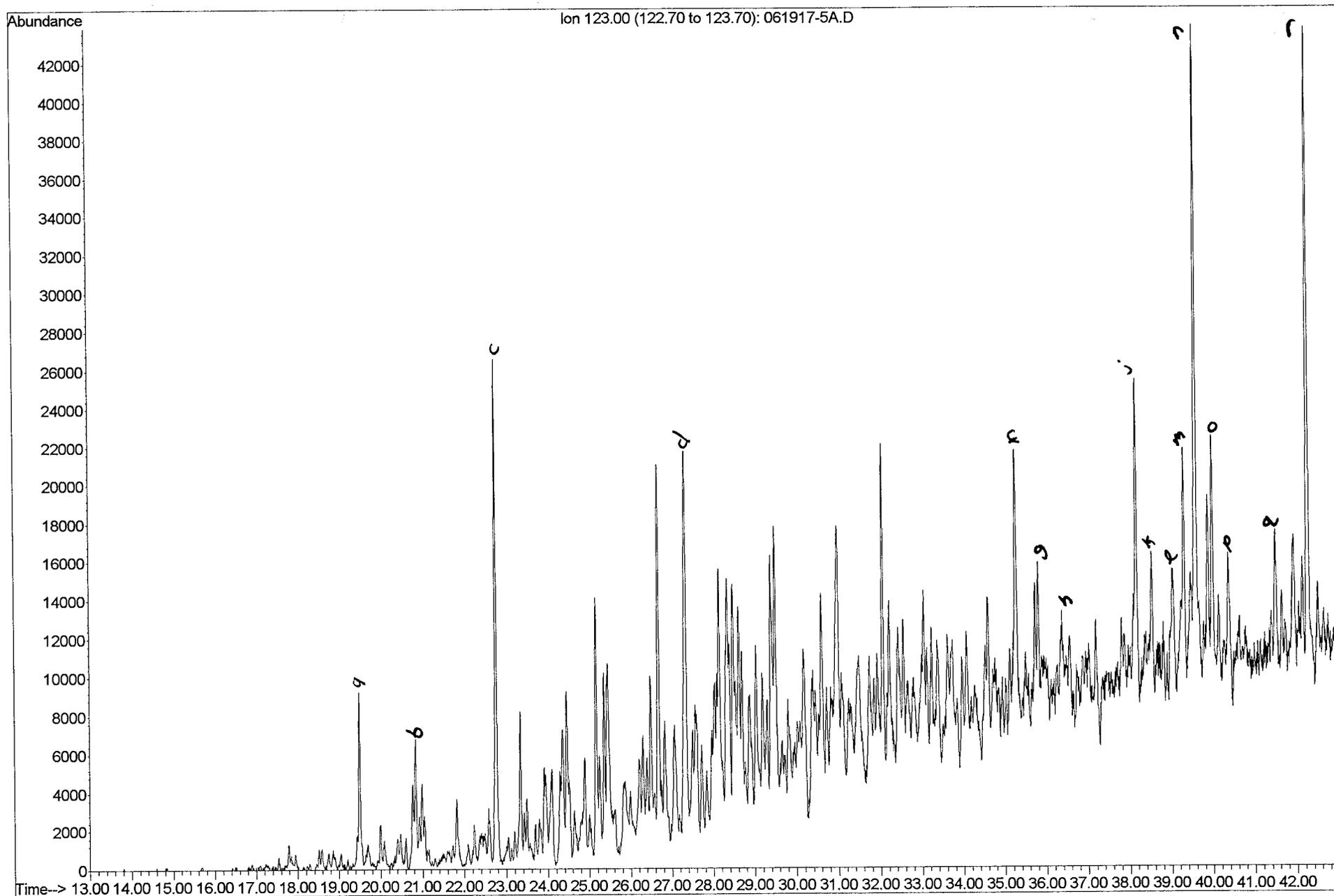
Symbol	Detail
16	Sec-Butylbenzene
17	1-Methyl-3-Isopropylbenzene
18	1-Methyl-4-Isopropylbenzene
19	1-Methyl-2-Isopropylbenzene
20	1,3-Diethylbenzene
21	1-Methyl-3-Propylbenzene
22	Butylbenzene
23	1,3-Diethyl-5-Ethylbenzene
24	1,2-Diethylbenzene
25	1-Methyl-2-Propylbenzene
26	1,4-Dimethyl-2-Ethylbenzene
27	1,3-Dimethyl-4-Ethylbenzene
28	1,2-Dimethyl-4-Ethylbenzene
29	1,3-Dimethyl-2-Ethylbenzene
30	1,2-Dimethyl-3-Ethylbenzene
31a	1,2,4,5-Tetramethylbenzene
31	1,2,3,5-Tetramethylbenzene
32	1,2,3,4-Tetramethylbenzene

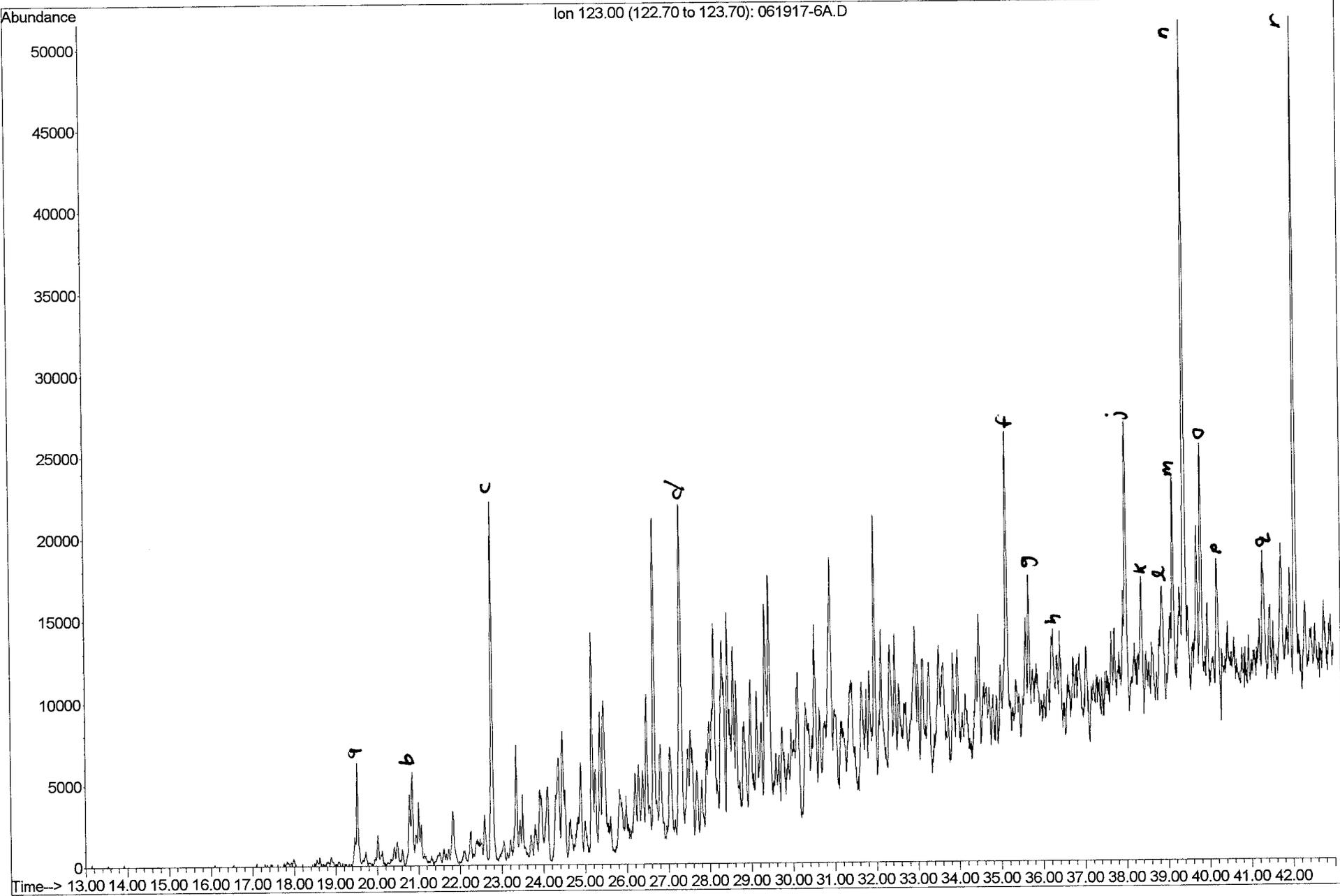




Key for Identification of the Bicyclanes (m/z 123)

Peak No.	Identity	Formula	M.W.
a	2,2,3-Trimethylbicycloheptane	C ₁₀ H ₁₈	138
b	C ₁₀ bicycloalkane	C ₁₀ H ₁₈	138
c	3,3,7-Trimethylbicycloheptane	C ₁₀ H ₁₈	138
d	C ₁₁ Decalin	C ₁₁ H ₂₀	152
f	Nordrimane	C ₁₄ H ₂₆	194
g	Nordrimane	C ₁₄ H ₂₆	194
h	Rearranged drimane	C ₁₅ H ₂₈	208
j	Rearranged drimane	C ₁₅ H ₂₈	208
k	Isomer of Eudesmane	C ₁₅ H ₂₈	208
l	4β (H) Eudesmane	C ₁₅ H ₂₈	208
m	C ₁₅ Bicyclic Sesquiterpane	C ₁₅ H ₂₈	208
n	8β (H) Drimane	C ₁₅ H ₂₈	208
o	C ₁₅ Bicyclic Sesquiterpane	C ₁₅ H ₂₈	208
p	C ₁₆ Bicyclic Sesquiterpane	C ₁₆ H ₃₀	222
q	C ₁₆ Bicyclic Sesquiterpane	C ₁₆ H ₃₀	222
r	8β (H) Homodrimane	C ₁₆ H ₃₀	222





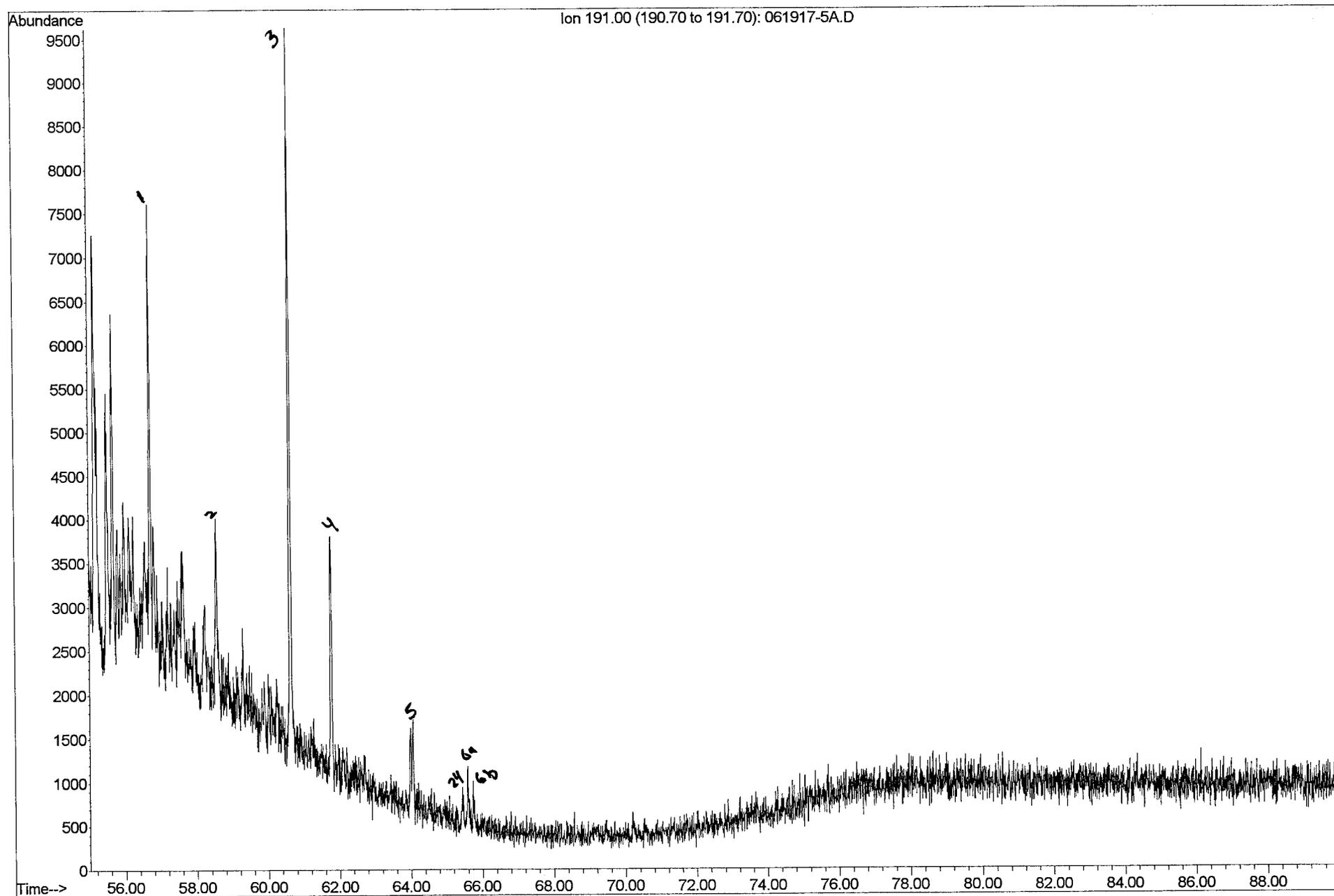
**Key for Tricyclic, Tetracyclic, and Pentacyclic Terpanes
Identification (m/z 191 Mass chromatograms)**

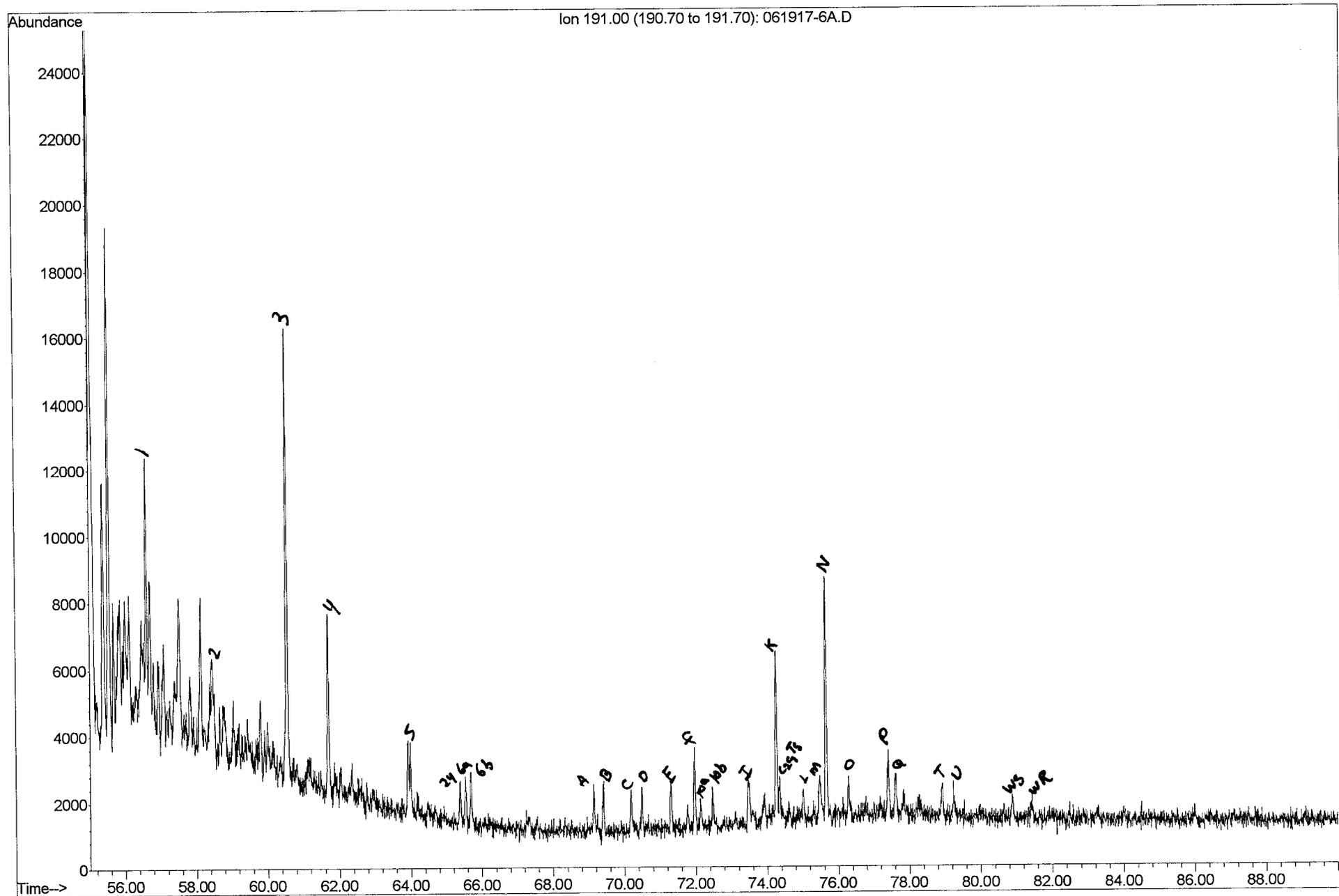
Code	Identity	Carbon #
0	C ₂₀ -Tricyclic Terpane	20
1	C ₂₁ -Tricyclic Terpane	21
2	C ₂₂ -Tricyclic Terpane	22
3	C ₂₃ -Tricyclic Terpane	23
4	C ₂₄ -Tricyclic Terpane	24
5	C ₂₅ -Tricyclic Terpane	25
Z4	C ₂₄ -Tetracyclic Terpane	24
6a	C ₂₆ -Tricyclic Terpane	26
6b	C ₂₆ -Tricyclic Terpane	26
7	C ₂₇ -Tricyclic Terpane	27
A	C ₂₈ -Tricyclic Terpane #1	28
B	C ₂₈ -Tricyclic Terpane #2	28
C	C ₂₉ -Tricyclic Terpane #1	29
D	C ₂₉ -Tricyclic Terpane #2	29
E	18 α -22,29,30-Trisnorneohopane (Ts)	27
F	17 α -22,29,30-Trisnorhopane (Tm)	27
G	17 β -22,29,30-Trisnorhopane	27
H	17 α -23,28-Bisnorlupane	28
10a	C ₃₀ -Tricyclic Terpane #1	30
10b	C ₃₀ -Tricyclic Terpane #2	30
I	17 α -28,30 Bisnorhopane	28
11a	C ₃₁ -Tricyclic Terpane #1	31
J	17 α -25-Norhopane	29
11b	C ₃₁ -Tricyclic Terpane #2	31
K	17 α ,21 β -30-Norhopane	29
C ₂₉ Ts	18 α -30-Norneohopane	29
C ₃₀ *	17 α -Diahopane	30
L	17 β -21 α -30-Normoretane	29
Ma	18 α -Oleanane	30
Mb	18 β -Oleanane	30
N	17 α -21 β -Hopane	30
O	17 β -21 α -Moretane	30
13a	C ₃₃ -Tricyclic Terpane #1	33
13b	C ₃₃ -Tricyclic Terpane #2	33



**Key for Tricyclic, Tetracyclic, and Pentacyclic Terpanes
Identification (m/z 191 Mass chromatograms) – Cont.**

Code	Identity	Carbon #
P	22S-17 α ,21 β -30-Homohopane	31
Q	22R-17 α ,21 β -30-Homohopane	31
R	Gammacerane	30
14a	C ₃₄ -Tricyclic Terpene #1	34
S	17 β ,21 α -Homomoretane	31
14b	C ₃₄ -Tricyclic Terpene #2	34
T	22S-17 α ,21 β -30-Bishomohopane	32
U	22R-17 α ,21 β -30-Bishomohopane	32
15a	C ₃₅ -Tricyclic Terpene #1	35
15b	C ₃₄ -Tricyclic Terpene #2	35
V	17 β ,21 α -C ₃₂ -Bishomomoretane	32
WS	22S-17 α ,21 β -30-Bishomohopane	33
WR	22R-17 α ,21 β -30,31,32-Trishomohopane	33
16a	C ₃₆ -Tricyclic Terpene #1	36
16b	C ₃₆ -Tricyclic Terpene #2	36
XS	22S-17 α ,21 β -30,31,32,33-Tetrahomohopane	34
XR	22R-17 α ,21 β -30,31,32,33-Tetrahomohopane	34
YS	22S-17 α ,21 β -30,31,32,33,34-Pentahomohopane	35
YR	22R-17 α ,21 β -30,31,32,33,34-Pentahomohopane	35

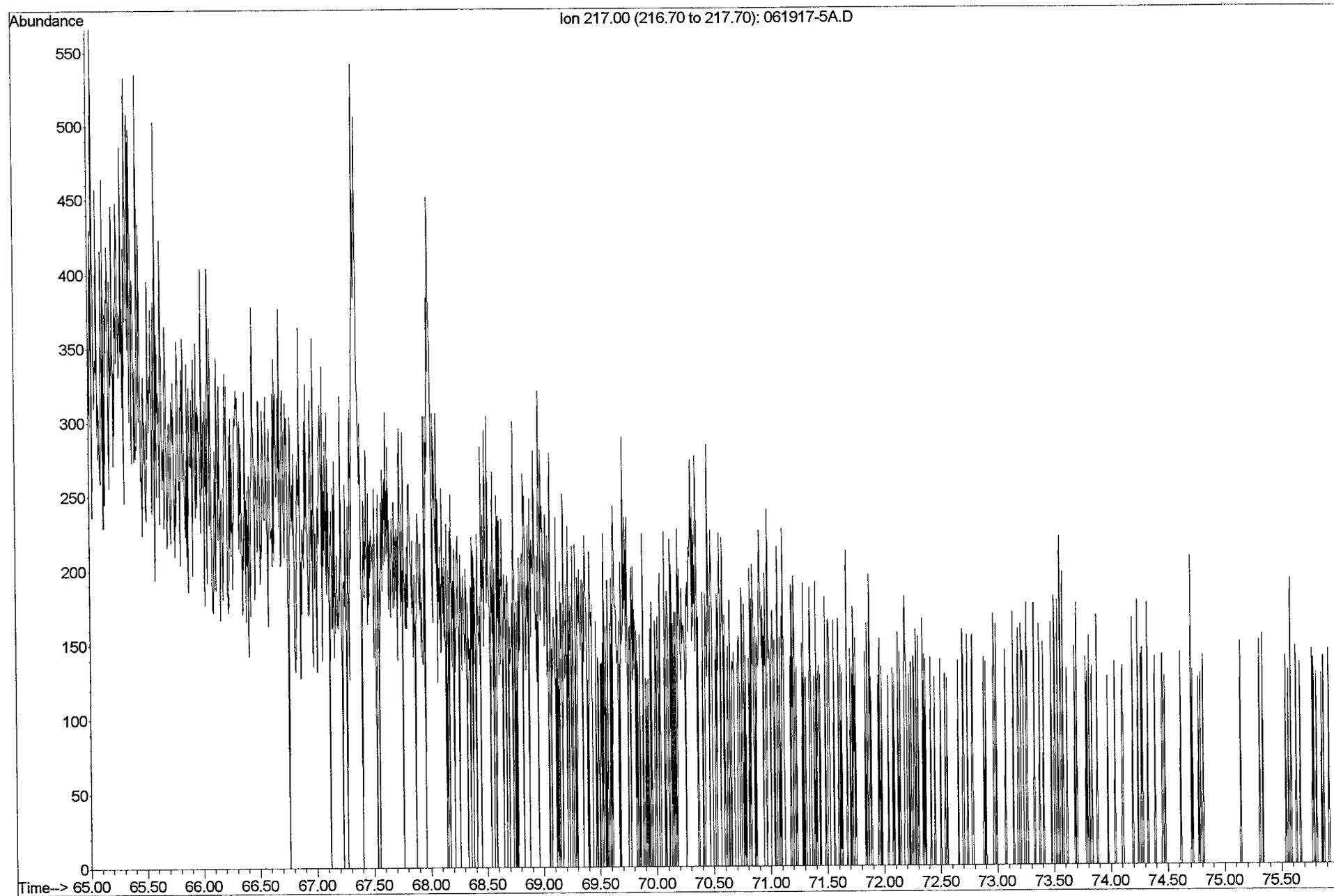


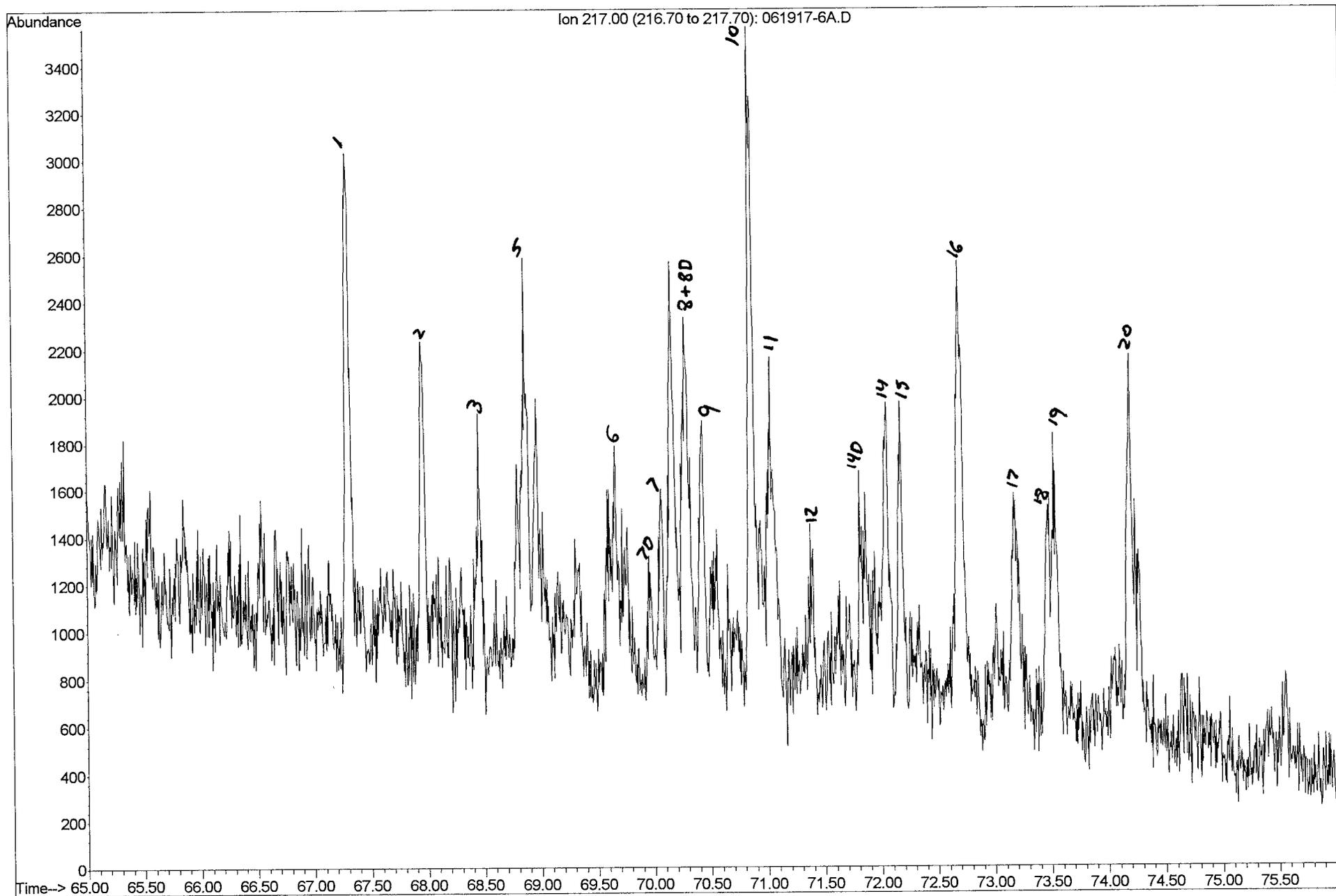




Key for Steranes Identification (m/z 217 Mass Chromatogram)

Code	Identity	Carbon #
1	13 β , 17 α -Diacholestane (20S)	27
2	13 β , 17 α -Diacholestane (20R)	27
3	13 α , 17 β -Diacholestane (20S)	27
4	13 α , 17 β -Diacholestane (20R)	27
5	24-methyl-13 β ,17 α -Diacholestane (20S)	28
6	24-methyl-13 β ,17 α -Diacholestane (20S)	28
7D	24-methyl-13 α ,17 β -Diacholestane (20S)	28
7	14 α ,17 α -Cholestane (20S)	27
8D	24-ethyl-13 β , 17 α -Diacholestane (20S)	29
8	14 β ,17 β -Cholestane (20R)	27
9	14 β ,17 β -Cholestane (20S)	27
9D	24-methyl-13 α ,17 β -Diacholestane (20R)	28
10	14 α ,17 α -Cholestane (20R)	27
11	24-ethyl-13 β , 17 α -Diacholestane (20R)	29
12	24-ethyl-13 α , 17 β -Diacholestane (20S)	29
13	24-ethyl-13 α , 17 α -Diacholestane (20S)	28
14D	24-ethyl-13 α , 17 β -Diacholestane (20R)	29
14	24-methyl-14 β , 17 β -Cholestane (20R)	28
15	24-methyl-14 β , 17 β -Cholestane (20S)	28
16	24-methyl-14 α , 17 α -Cholestane (20R)	28
17	24-ethyl-14 α -Cholestane (20S)	29
18	24-ethyl-14 β , 17 β -Cholestane (20R)	29
19	24-ethyl-14 β , 17 β -Cholestane (20S)	29
20	24-ethyl-14 α , 17 α -Cholestane (20R)	29
21A	24-n-Propylcholestane (20S)	30
21B	4-methyl-24-ethylcholestane (20S)	30
22A	4 α -methyl-24-ethyl-14 β ,17 β -cholestane (20S)	30
22B	24-n-Propyl-14 β ,17 β -cholestane (20S)	30
23A	4 α -methyl-24-ethyl-14 β ,17 β -cholestane (20R)	30
23B	24-n-propyl-14 β ,17 β -cholestane (20R)	30
24A	4 α -methyl-24-ethylcholestane (20R)	30
24B	24-n-propylcholestane (20R)	30

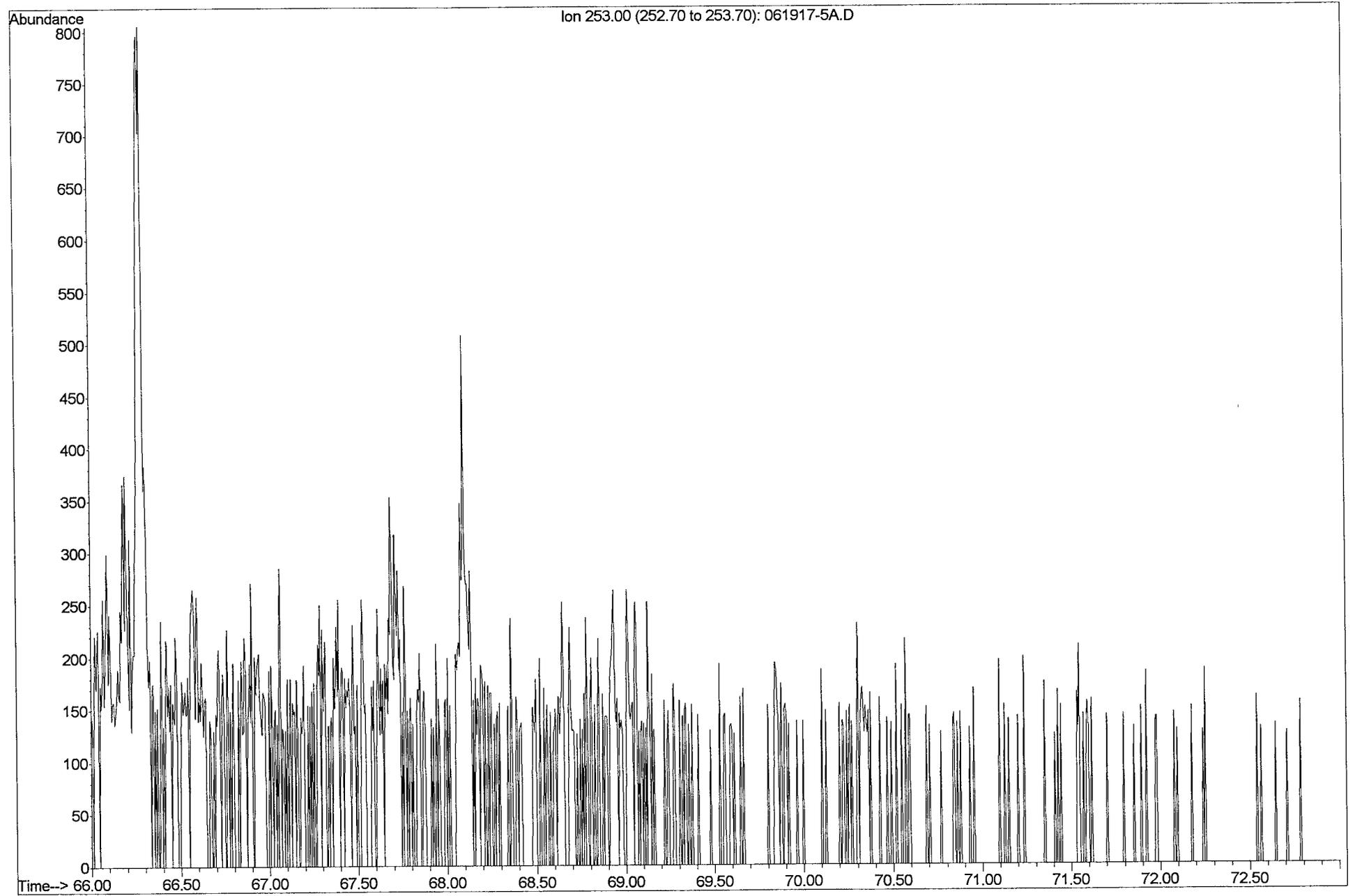


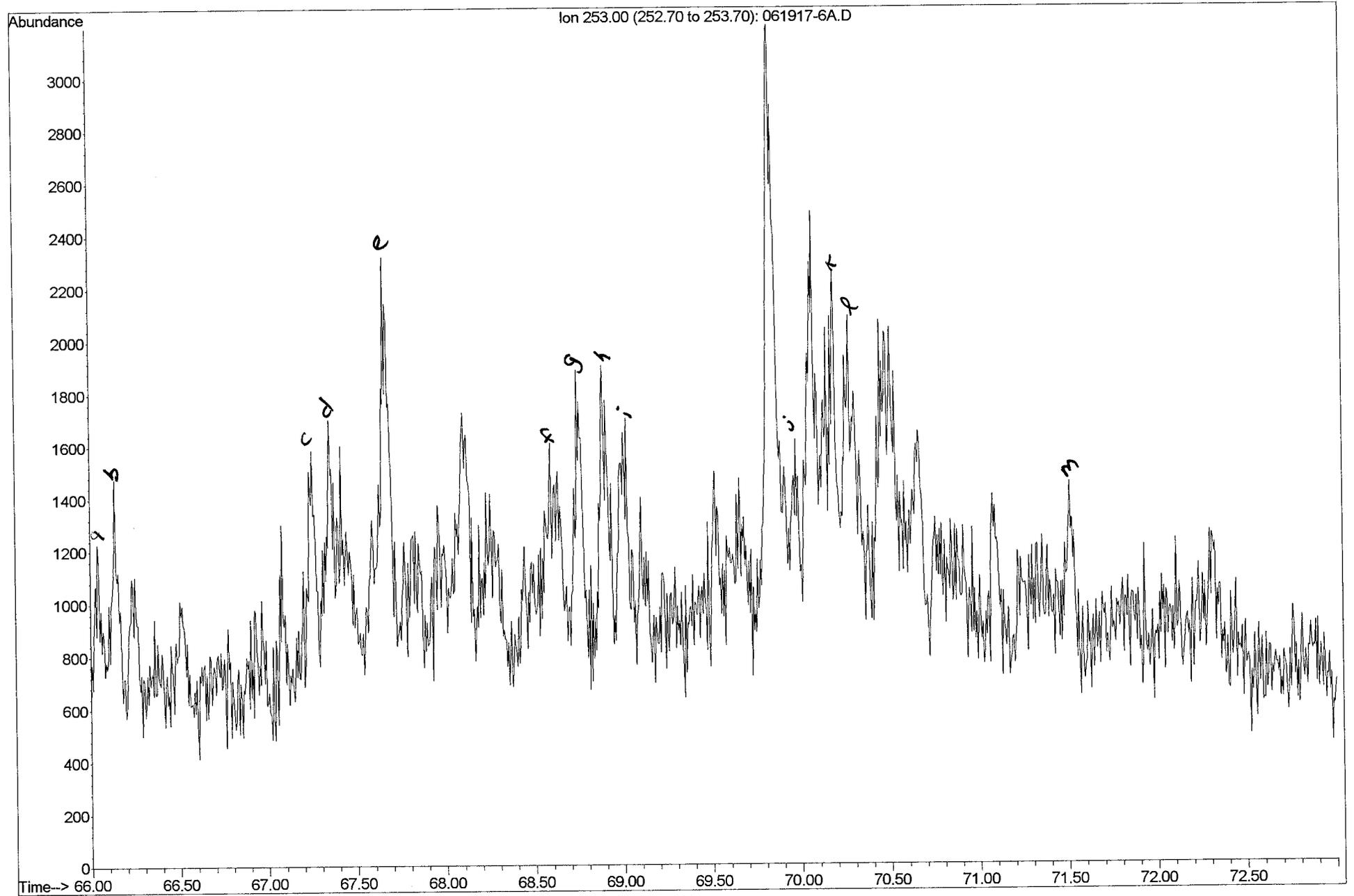




Key for Monoaromatic Steranes Identification (m/z 253 Mass Chromatogram)

Code	Identity	Elemental Composition
a	20S, 5 β C ₂₇ -Monoaromatic Sterane	C ₂₇ H ₄₂
b	20S, dia C ₂₇ -Monoaromatic Sterane	C ₂₇ H ₄₂
c	20R, 5 β C ₂₇ -Monoaromatic Sterane + 20R C ₂₇ dia MAS	C ₂₇ H ₄₂
d	20S, 5 α C ₂₇ -Monoaromatic Sterane	C ₂₇ H ₄₂
e	20R, 5 β C ₂₈ -Monoaromatic Sterane + 20S C ₂₈ dia MAS	C ₂₈ H ₄₄
f	20R, 5 α C ₂₇ -Monoaromatic Sterane	C ₂₇ H ₄₂
g	20S, 5 α C ₂₈ -Monoaromatic Sterane	C ₂₈ H ₄₄
h	20R, 5 β C ₂₈ -Monoaromatic Sterane + 20R C ₂₈ dia MAS	C ₂₈ H ₄₄
i	20S, 5 β C ₂₉ -Monoaromatic Sterane + 20S C ₂₉ dia MAS	C ₂₉ H ₄₆
j	20S, 5 α C ₂₉ -Monoaromatic Sterane	C ₂₉ H ₄₆
k	20R, 5 α C ₂₈ -Monoaromatic Sterane	C ₂₈ H ₄₄
l	20R, 5 β C ₂₉ -Monoaromatic Sterane + 20R C ₂₉ dia MAS	C ₂₉ H ₄₆
m	20R, 5 α C ₂₉ -Monoaromatic Sterane	C ₂₉ H ₄₆

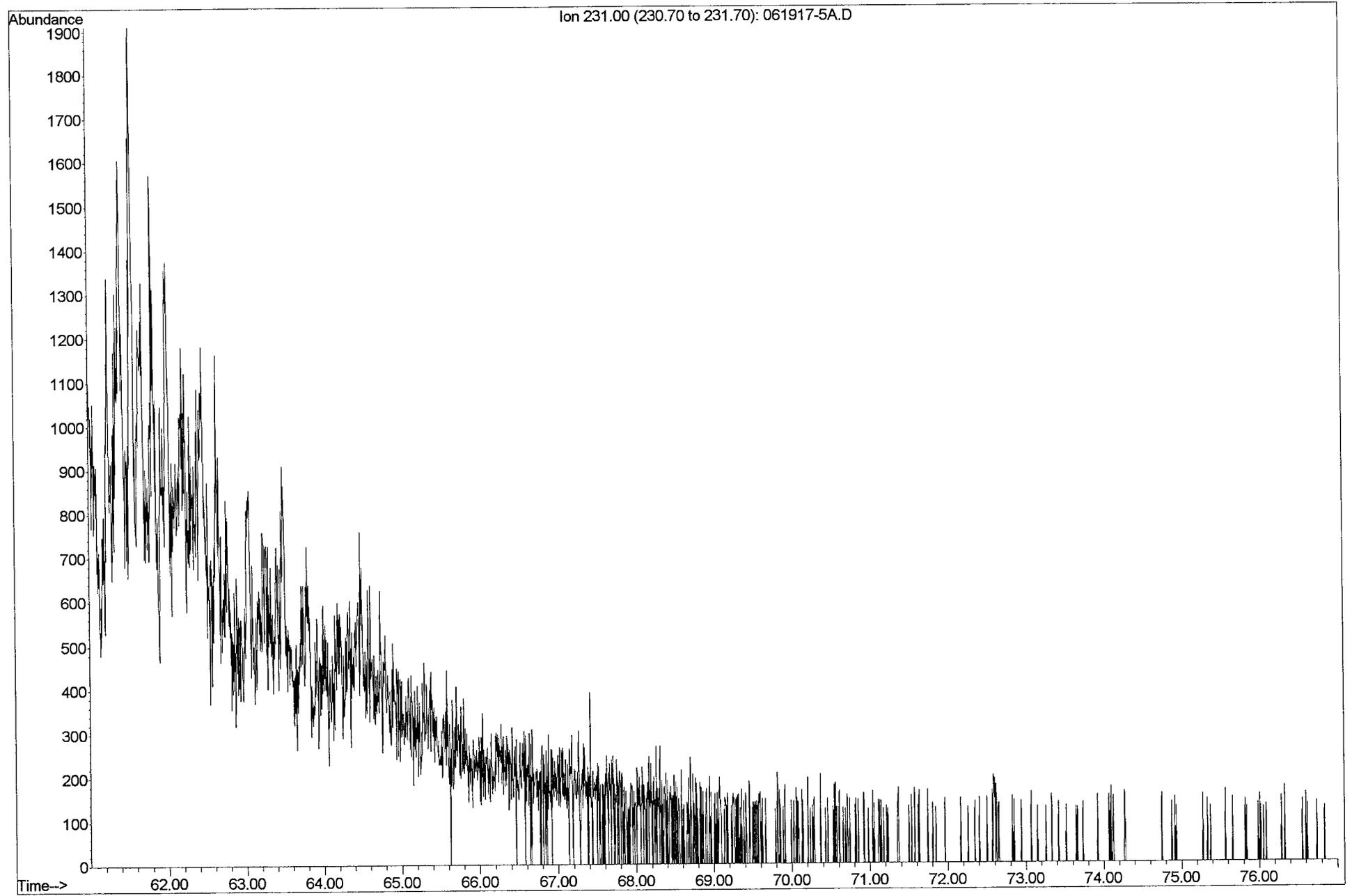


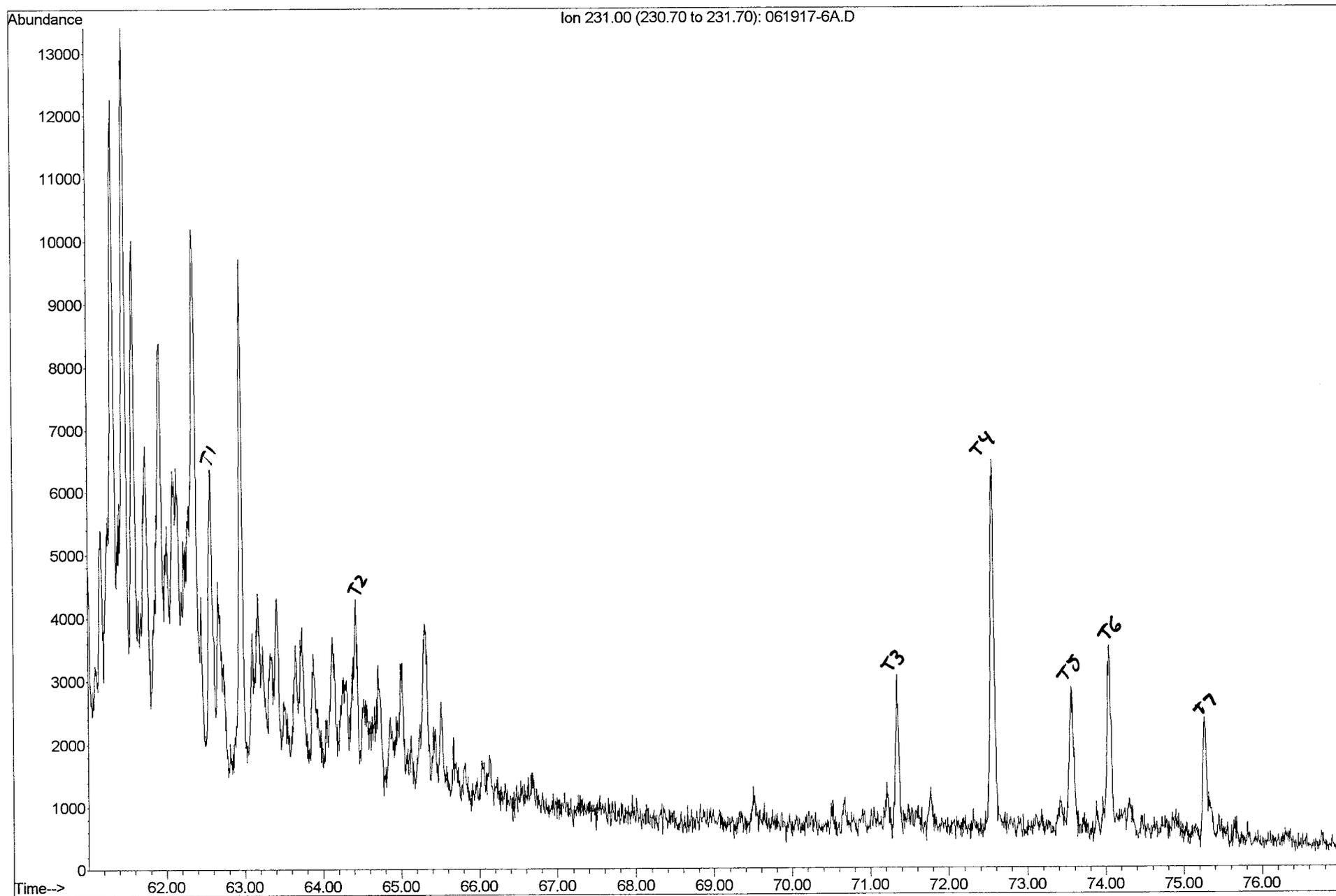




Key for Triaromatic Steranes Identification (m/z 231 Mass Chromatogram)

Code	Identity	Elemental Composition
T1	C ₂₀ Triaromatic Sterane	C ₂₀ H ₂₀
T2	C ₂₁ Triaromatic Sterane	C ₂₁ H ₂₂
T3	20S C ₂₆ Triaromatic Sterane	C ₂₆ H ₃₂
T4	20R C ₂₆ + 20S C ₂₇ Triaromatic Steranes	C ₂₆ H ₃₂ + C ₂₇ H ₃₄
T5	20S C ₂₈ Triaromatic Sterane	C ₂₈ H ₃₆
T6	20R C ₂₇ Triaromatic Sterane	C ₂₇ H ₃₄
T7	20R C ₂₈ Triaromatic Sterane	C ₂₈ H ₃₆





Key for Identifying Aromatic Hydrocarbons

No	m/z	Abbreviation	Compound
1	120	AB	C ₃ -alkylbenzenes
2	134		C ₄ -alkylbenzenes
3	148		C ₅ -alkylbenzenes
4	162		C ₆ -alkylbenzenes
5	128	NAPH	C ₀ -naphthalene
6	142		C ₁ -naphthalenes
7	156		C ₂ -naphthalenes
8	170		C ₃ -naphthalenes
9	184		C ₄ -naphthalenes
10	166	FL	C ₀ -fluorene
11	180		C ₁ -fluorenes
12	194		C ₂ -fluorenes
13	208		C ₃ -fluorenes
14	222		C ₄ -fluorenes
15	154	BP	C ₀ -biphenyl
16	168		C ₁ -biphenyls + dibenzofuran
17	182		C ₂ -biphenyls + C1 Dibenzofuran
18	178	PHEN	C ₀ -phenanthrene
19	192		C ₁ -phenanthrenes
20	206		C ₂ -phenanthrenes
21	220		C ₃ -phenanthrenes
22	234		C ₄ -phenanthrenes
23	202	PY	C ₀ -pyrene/fluoranthene
24	216		C ₁ -pyrenes/fluoranthenes
25	230		C ₂ -pyrenes/fluoranthenes
26	244		C ₃ -pyrenes/fluoranthenes
27	258		C ₄ -pyrenes/fluoranthenes
28	228	CHR	C ₀ -chrysene
29	242		C ₁ -chrysenes
30	256		C ₂ -chrysenes
31	270		C ₃ -chrysenes
32	284		C ₄ -chrysenes
33	148	BT	C ₁ -benzothiophenes
34	162		C ₂ -benzothiophenes
35	176		C ₃ -benzothiophenes
36	190		C ₄ -benzothiophenes
37	204		C ₅ -benzothiophenes

Key for Identifying Aromatic Hydrocarbons – Cont.

No	m/z	Abbreviation	Compound
38	184	DBT	C ₀ -dibenzothiophene
39	198		C ₁ -dibenzothiophenes
40	212		C ₂ -dibenzothiophenes
41	226		C ₃ -dibenzothiophenes
42	240		C ₄ -dibenzothiophenes
43	234	NBT	C ₀ -naphthobenzthiophene
44	248		C ₁ -naphthobenzthiophenes
45	262		C ₂ -naphthobenzthiophenes
46	276		C ₃ -naphthobenzthiophenes
47	290		C ₄ -naphthobenzthiophenes
48	253	MAS	Monoaromatic steranes
49	267		Monoaromatic steranes
50	239		Monoaromatic steranes
51	231	TAS	Triaromatic steranes
52	245		Triaromatic steranes

Aromatic Hydrocarbon Distribution

22995-2 [MW-5] 1/5 DILUTION

